July 19, 2024



Texas Department of Transportation, Austin District

Water Pollution Abatement Plan Original

SH 29 from Wolf Ranch Parkway to IH-35 SBFR



### **Texas Commission on Environmental Quality**

# **Edwards Aquifer Application Cover Page**

#### **Our Review of Your Application**

The Edwards Aquifer Program staff conducts an administrative and technical review of all applications. The turnaround time for administrative review can be up to 30 days as outlined in 30 TAC 213.4(e). Generally administrative completeness is determined during the intake meeting or within a few days of receipt. The turnaround time for technical review of an administratively complete Edwards Aquifer application is 90 days as outlined in 30 TAC 213.4(e). Please know that the review and approval time is directly impacted by the quality and completeness of the initial application that is received. In order to conduct a timely review, it is imperative that the information provided in an Edwards Aquifer application include final plans, be accurate, complete, and in compliance with 30 TAC 213.

#### **Administrative Review**

- Edwards Aquifer applications must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.
  - To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: <a href="http://www.tceq.texas.gov/field/eapp">http://www.tceq.texas.gov/field/eapp</a>.
- 2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.
- 3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.
- 4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.
  - An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.
- 5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.
- 6. If the geologic assessment was completed before October 1, 2004 and the site contains "possibly sensitive" features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

#### **Technical Review**

- 1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.
- 2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

- clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.
- 3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or will be denied. Please note that because the technical review is underway, whether the application is withdrawn or denied **the application fee will be forfeited**.
- 4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

#### **Mid-Review Modifications**

It is important to have final site plans prior to beginning the permitting process with TCEQ to avoid delays.

Occasionally, circumstances arise where you may have significant design and/or site plan changes after your Edwards Aquifer application has been deemed administratively complete by TCEQ. This is considered a "Mid-Review Modification". Mid-Review Modifications may require redistribution of an application that includes the proposed modifications for public comment.

If you are proposing a Mid-Review Modification, two options are available:

- If the technical review has begun your application can be denied/withdrawn, your fees will be forfeited, and the plan will have to be resubmitted.
- TCEQ can continue the technical review of the application as it was submitted, and a modification application can be submitted at a later time.

If the application is denied/withdrawn, the resubmitted application will be subject to the administrative and technical review processes and will be treated as a new application. The application will be redistributed to the affected jurisdictions.

Please contact the regional office if you have questions. If your project is located in Williamson, Travis, or Hays County, contact TCEQ's Austin Regional Office at 512-339-2929. If your project is in Comal, Bexar, Medina, Uvalde, or Kinney County, contact TCEQ's San Antonio Regional Office at 210-490-3096

Please fill out all required fields below and submit with your application.

| <b>1. Regulated Entity Name:</b> SH 29 from Wolf Ranch Parkway to IH-35 SBFR |               |        |                    |        |                                   | 2. Regulated Entity No.: N/A |                            |                               |  |  |
|--|---------------|--------|--------------------|--------|-----------------------------------|------------------------------|----------------------------|-------------------------------|--|--|
| 3. Customer Name: Texas Department of Transportation                         |               |        |                    |        | <b>4. Customer No.:</b> 600803456 |                              |                            |                               |  |  |
| 5. Project Type:<br>(Please circle/check one)                                | New           | Modif  | ication            | 1      | Exter                             | nsion                        | Exception                  |                               |  |  |
| 6. Plan Type:<br>(Please circle/check one)                                   | WPAP          | SCS    | UST                | AST    | EXP                               | EXT                          | Technical<br>Clarification | Optional Enhanced<br>Measures |  |  |
| 7. Land Use:<br>(Please circle/check one)                                    | Residential ( | Non-r  | esiden             | tial   |                                   | 8. Sit                       | e (acres):                 | 12.99                         |  |  |
| 9. Application Fee:  | N/A           | 10. Po | ermai              | nent I | BMP(                              | s):                          | Stormtrooper®              |                               |  |  |
| 11. SCS (Linear Ft.):  | N/A           | 12. A  | 12. AST/UST (No. 7 |        |                                   |                              | N/A                        |                               |  |  |
| 13. County:  | Williamson    | 14. W  | aters              | hed:   |                                   |                              | South Fork San             | Gabriel River                 |  |  |

# **Application Distribution**

Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which cross into multiple jurisdictions, can require additional copies. Refer to the "Texas Groundwater Conservation Districts within the EAPP Boundaries" map found at:

http://www.tceq.texas.gov/assets/public/compliance/field\_ops/eapp/EAPP%20GWCD%20map.pdf

For more detailed boundaries, please contact the conservation district directly.

| Austin Region                           |  |   |  |  |  |  |  |  |
|---|--|---|--|--|--|--|--|--|
| County:                                 | Hays   | Travis  | Williamson   |  |  |  |  |  |
| Original (1 req.)                       | _  | _   | _1_  |  |  |  |  |  |
| Region (1 req.)                         | _  | _   | _1_  |  |  |  |  |  |
| County(ies)                             |  |   | _1_  |  |  |  |  |  |
| Groundwater Conservation<br>District(s) | Edwards Aquifer AuthorityBarton Springs/ Edwards AquiferHays TrinityPlum Creek | Barton Springs/<br>Edwards Aquifer  | NA   |  |  |  |  |  |
| City(ies) Jurisdiction                  | AustinBudaDripping SpringsKyleMountain CitySan MarcosWimberleyWoodcreek        | AustinBee CavePflugervilleRollingwoodRound RockSunset ValleyWest Lake Hills | AustinCedar ParkFlorence _1_GeorgetownJerrellLeanderLiberty HillPflugervilleRound Rock |  |  |  |  |  |

| San Antonio Region                         |  |   |        |                              |               |  |  |  |  |
|--|--|---|--------|------------------------------|---------------|--|--|--|--|
| County:                                    | Bexar  | Comal   | Kinney | Medina                       | Uvalde        |  |  |  |  |
| Original (1 req.)                          | _  | _   | _      | _                            | _             |  |  |  |  |
| Region (1 req.)                            | _  |   |        | _                            | _             |  |  |  |  |
| County(ies)                                |  | _   |        |                              |               |  |  |  |  |
| Groundwater<br>Conservation<br>District(s) | Edwards Aquifer<br>Authority<br>Trinity-Glen Rose  | Edwards Aquifer<br>Authority  | Kinney | EAA<br>Medina                | EAA<br>Uvalde |  |  |  |  |
| City(ies)<br>Jurisdiction                  | Castle HillsFair Oaks RanchHelotesHill Country VillageHollywood ParkSan Antonio (SAWS)Shavano Park | Bulverde<br>Fair Oaks Ranch<br>Garden Ridge<br>New Braunfels<br>Schertz | NA     | San<br>Antonio ETJ<br>(SAWS) | NA            |  |  |  |  |

| I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review. |           |  |  |  |  |  |  |  |
|---|-----------|--|--|--|--|--|--|--|
| Michael Curl  |           |  |  |  |  |  |  |  |
| Print Name of Customer/Authorized Agent   |           |  |  |  |  |  |  |  |
| Michael Curl  | 7/19/2024 |  |  |  |  |  |  |  |
| Signature of Customer/Authorized Agent  | Date      |  |  |  |  |  |  |  |
|   |           |  |  |  |  |  |  |  |

| **FOR TCEQ INTERNAL USE ONLY**                   |        |                                 |  |  |  |  |  |
|--|--------|---------------------------------|--|--|--|--|--|
| Date(s)Reviewed:                                 | Date A | Date Administratively Complete: |  |  |  |  |  |
| Received From:                                   | Corre  | ect Number of Copies:           |  |  |  |  |  |
| Received By:                                     | Distri | Distribution Date:              |  |  |  |  |  |
| EAPP File Number:                                | Comp   | olex:                           |  |  |  |  |  |
| Admin. Review(s) (No.):                          | No. A  | R Rounds:                       |  |  |  |  |  |
| Delinquent Fees (Y/N):                           | Revie  | w Time Spent:                   |  |  |  |  |  |
| Lat./Long. Verified:                             | SOSC   | Customer Verification:          |  |  |  |  |  |
| Agent Authorization<br>Complete/Notarized (Y/N): | Fee    | Payable to TCEQ (Y/N):          |  |  |  |  |  |
| Core Data Form Complete (Y/N):                   | Check  | x: Signed (Y/N):                |  |  |  |  |  |
| Core Data Form Incomplete Nos.:                  |        | Less than 90 days old (Y/N):    |  |  |  |  |  |



## **Edwards Aquifer Protection Program Roadway Application**

#### **Texas Commission on Environmental Quality**

This application is intended only for projects which a major roadway is designed for construction, such as State highways, County roads, and City thoroughfares.

Designed for Regulated Activities on the Contributing Zone to the Edwards Aquifer in relation to 30 TAC §213.24, Regulated Activities on the Edwards Aquifer Recharge Zone, in relation to 30 TAC §213.5(b), Effective June 1, 1999.

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer.

The application was prepared by:

Print Name of Customer/Agent: Michael Curl

Date: 7/19/2024

Signature of Customer/Agent:

# **Project Information**

1. Regulated Entity (Project) Name: SH 29 from Wolf Ranch Parkway to IH-35 SBFR

2. County: Williamson

3. Stream Basin(s): San Gabriel Sub Basin, Brazos River Basin

4. Groundwater Conservation District (if applicable): N/A

5. Customer (Applicant):

Contact Person: Kyle Russell

**Entity: Texas Department of Transportation** 

Mailing Address: <u>2727 S Austin Ave</u> City, State: <u>Georgetown,TX Zip: 78626</u>

Telephone: 512-930-5402

Email Address: kyle.russell@txdot.gov

| 6.  | Agent (Representative):  |  |  |  |  |  |  |  |
|-----|--|--|--|--|--|--|--|--|
|     | Contact Person: Michael Curl Entity: The Estes Group, LLC Mailing Address: 1205 BMC Drive City, State: Cedar Park, TX Zip: 78613 Telephone: 512-350-1613 Email Address: michael.curl@teg-tx.com  |  |  |  |  |  |  |  |
| 7.  | Landowner of R.O.W. (Right of Way) Person or entity responsible for maintenance of water quality Best Management Practices (BMPs), if not applicant.   |  |  |  |  |  |  |  |
|     | Contact Person: John Taylor Entity: Texas Department of Transportation Mailing Address: 2727 S Austin Ave City, State: Georgetown,TX Zip: 78626 Telephone: 512-930-4700 Email Address: john.taylor@txdot.gov   |  |  |  |  |  |  |  |
| 8.  | The TCEQ must be able to inspect the project site or the application will be returned. Sufficient survey marking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of any regulated activities and the geologic or manmade features noted in the Geologic Assessment. |  |  |  |  |  |  |  |
|     | Survey marking will be completed by this date: Sufficient staking will be provided on the project site once construction begins.   |  |  |  |  |  |  |  |
| 9.  | Attachment A - Road Map. A road map showing directions to and the location of the project site is attached. The map clearly shows the boundary of the project site.  |  |  |  |  |  |  |  |
| 10. | Attachment B - USGS Quadrangle. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') is attached. The map(s) clearly show:  |  |  |  |  |  |  |  |
|     | Project site boundaries  |  |  |  |  |  |  |  |
|     | ☐ USGS Quadrangle Name(s)  |  |  |  |  |  |  |  |
|     | All drainage paths from site to surface waters   |  |  |  |  |  |  |  |
| 11. | ☐ This project extends into (Check all that apply):  |  |  |  |  |  |  |  |
|     | Recharge Zone (RZ)   |  |  |  |  |  |  |  |
|     | Contributing Zone (CZ)  Transition Zone (CZ/TZ)  |  |  |  |  |  |  |  |
|     | Transition Zone (TZ) Zone not regulated by EAPP  |  |  |  |  |  |  |  |

| 12. X Attachment C - Project Description. A detailed is attached. The project description is consistent the minimum, the following details: |  |
|---|--|
| minimum, the following details:   |  |
| Complete site area [Acres]  |  |
| Offsite upgradient stormwater areas to be   | e captured   |
|   |  |
| Permanent BMP(s)  |  |
| Proposed site use   |  |
| Existing roadway (paved and/or unpaved)   |  |
| Structures to be demolished [Include dem  | io phase]  |
| Major interim phases  |  |
| 13. Existing project site conditions are noted below:   |  |
| ☐ Existing paved and/or unpaved   | Existing commercial site                               |
| roads   | Existing industrial site                               |
| □ Undeveloped (Cleared)   | Existing residential site                              |
| Undeveloped (Undisturbed/Not  | Other:   |
| cleared)  |  |
| 14. Attachment D - Factors Affecting Surface War factors that could affect surface water quality is a                                       |  |
| 15. Only inert materials as defined by 30 TAC §33   | 0.3 will be used as fill material.                     |
| 16. Type of pavement or road surface to be used:  |  |
| Concrete  |  |
| Asphaltic concrete pavement   |  |
| Permeable Friction Course (PFC)   |  |
| Other:  |  |
| <u> </u>  |  |
| 17. Right of Way (R.O.W.) and Pavement Area:  |  |
| R.O.W. for project: <u>12.99</u> (ac.)  |  |
| Length: <u>3,241.38</u> ft.   |  |
| Width: varies from <u>140</u> ft. to <u>180</u> ft. Impervious cover (IC): <u>23.60</u> (ac.)   |  |
| · · · · · · · · · · · · · · · · · · ·   | O.W. area <u>12.99</u> (ac.) x 100 = <u>58.7</u> % IC. |
|   | is.  |
| Number of travel lanes: proposed: <u>6</u> , exist  |  |
| Typical widths of lanes: 12 (ft.)   | •  |
| Are intersections also being improved? (Y   | /N) <u>Y</u>   |
| v v   | · • —  |

# Site Plan Requirements

## Items 18 - 28 must be included on the Site Plan.

| 18. | . $\square$ The Site Plan must have a minimum scale of 1" = 400'. Site Plan Scale: 1" = $\underline{100}$ '   |
|-----|---|
| 19. | <ul> <li>. 100-year floodplain boundaries:</li> <li>☐ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled. The 100-year floodplain boundaries are based on the following specific (including date of material) source(s):</li> <li>☐ No part of the project site is located within the 100-year floodplain.</li> </ul>  |
| 20. | . A layout of the development with existing and finished contours at appropriate, but not greater than ten-foot contour intervals is shown. Sensitive features, lots, wells, buildings, roads, culverts, etc. are shown on the site plan.   |
| 21. | A figure (map) indicating all paths of drainage from the site to surface waters.  Name all stream crossings:  Drainage patterns and approximate slopes.  There will be no discharge to surface waters.  |
| 22. | . 🔀 Distinguish between areas of soil disturbance and areas which will not be disturbed.  |
| 23. | <ul> <li>Show locations of major structural and nonstructural controls. These are the temporary and permanent best management practices. Include the following:</li> <li>Show design and location of any hazardous materials traps.</li> <li>Show design at outfalls of major control structures and conveyances.</li> <li>A description of the BMPs and measures that prevent pollutants from entering surface streams.</li> </ul> |
| 24. | . Show locations of staging areas or project specific locations (PSL). Are they:  Onsite, within project R.O.W.  Offsite.  Not yet determined. (Requires future authorization)  |
| 25. | . Show locations where soil stabilization practices are expected to occur.  |
| 26. | . Show surface waters (including wetlands).   |
| 27. | <ul> <li>Temporary aboveground storage tank facilities:</li></ul>   |
| 28. | . 🔀 Plan(s) also include:   |
|     | <ul> <li>Sidewalks</li> <li>Related turn lanes</li> <li>Demolition plans</li> <li>Other improved areas:</li> </ul> Shared-use paths <ul> <li>Off-site improvements and staging areas</li> <li>Utility relocations</li> </ul>  |

# Permanent Best Management Practices (BMPs)

Description of practices and measures that will be used after construction is completed.

| 29. Permanent BMPs and measures have been of and maintained to ensure that 80% of the incretotal suspended solids (TSS) from the site cause quantities have been calculated in accordance vexecutive director.                                 | mental increase in the annual mass loading of d by the regulated activity is removed. These  |
|--|--|
| measures for this site.  A technical guidance other than the TCE   | GM) was used to design permanent BMPs and Q TGM was used to design permanent BMPs e citation for the technical guidance that was   |
| 30. Attachment E - BMPs for Upgradient (Offsit   | te) Stormwater.  |
| and flows across the site is attached.  No surface water, groundwater or storm flows across the site, and an explanation Permanent BMPs or measures are not re-  | nwater originates upgradient from the site nwater originates upgradient from the site and is attached. equired to prevent pollution of surface water, ates upgradient from the site and flows across |
| 31. Attachment F - BMPs for On-site Stormwat   | er.  |
| surface water or groundwater that original pollution caused by contaminated storm  Permanent BMPs or measures are not re-  | equired to prevent pollution of surface water or lows off the site, including pollution caused by  |
| 32. Attachment G - Construction Plans. Construction proposed permanent BMPs and measures have supervision of a Texas Licensed Professional Eng Construction plans for the proposed permanent all proposed structural plans and specifications, | been prepared by or under the direct gineer, and are signed, sealed, and dated. t BMPs and measures are attached and include   |
| Major bridge cross-sections, and roadwa  | ay plan and profiles   |
| BMP plans and details  | Design calculations  |
| Erosion control  | TCEQ Construction Notes  |
| ⊠ SW3P   | EPIC, as necessary   |

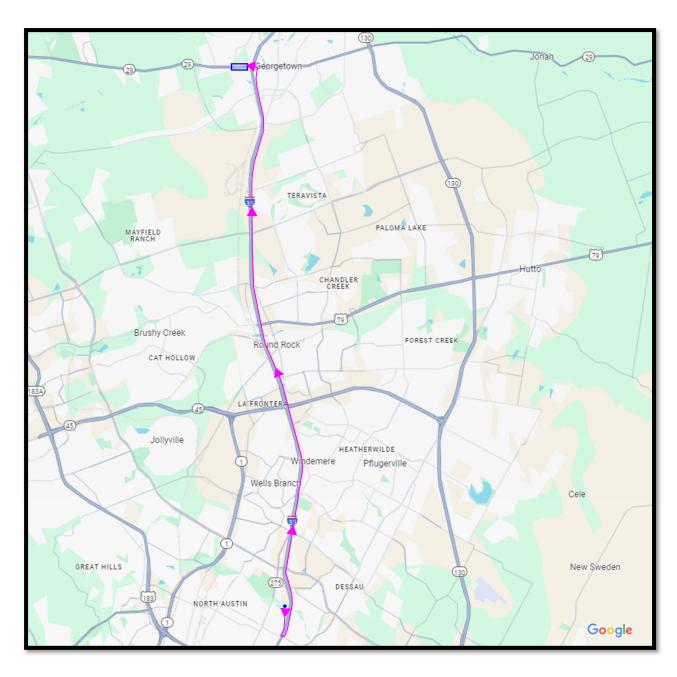
| 33. | Attachment H - Inspection, Maintenance, Repair and Retrofit Plan. A site and BMP specific plan for the inspection, maintenance, repair, and, if necessary, retrofit of the permanent BMPs and measures is attached. The plan fulfills all the following:  |
|-----|---|
|     | <ul> <li>☑ Prepared and certified by the engineer designing the permanent BMPs and measures.</li> <li>☑ Signed by the owner or responsible party.</li> <li>☑ Outlines specific procedures for documenting inspections, maintenance, repairs, and, if necessary, retrofit.</li> <li>☑ Contains a discussion of recordkeeping procedures.</li> </ul>  |
| 34. | Attachment I - Pilot-Scale Field Testing Plan. Pilot studies for BMPs that are not recognized by the Executive Director require prior approval from the TCEQ. A plan for pilot-scale field testing is attached.  N/A  |
| 35. | Attachment J - Measures for Minimizing Surface Stream Contamination. A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is attached. The measures address increased stream flashing, the creation of stronger flows, and in-stream effects caused by the regulated activity which increase erosion or may result in water quality degradation. |
|     | Include permanent spill measures used to contain hydrocarbons or hazardous substances by way of traps, or response contingencies.   |
| 36. | The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity.  |
|     | If the applicant intends to transfer responsibility, check the box below.  Yes  |
|     | A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days.   |

## Stormwater to be generated by the Proposed Project

Description of practices and measures that will be used during construction. 37. The site description, controls, maintenance, and inspection requirements for the Storm Water Pollution Prevention Plan (SWPPP or SW3P) developed under the Texas Pollutant Discharge Elimination System (TPDES) general permits for stormwater discharges have been submitted to fulfill paragraphs 30 TAC §213.24(1-5) & §213.5(b) of the technical report. The Temporary Stormwater Section (TCEQ-0602) is included with the application.  $\overline{\square}$  The SWPPP (SW3P) will serve as the Temporary Stormwater Section (TCEQ-0602). 38. Attachment K - Volume and Character of Stormwater. A detailed description of the volume (quantity) and character (quality) of the stormwater runoff expected to occur from the proposed project is attached. The estimates of stormwater runoff quality and quantity are based on area and type of impervious cover. Include the pre-construction runoff coefficient. Include the post-construction runoff coefficient. Administrative Information 39. X Submit one (1) original and one (1) copy of the application, plus one electronic copy as needed, for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ is required to distribute the additional copies to these jurisdictions. 40. The fee for the plan(s) is based on: The total R.O.W. (as in Item 17).

X TxDOT roadway project.



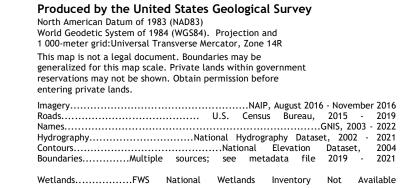


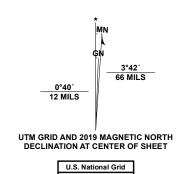
Attachment A - Road Map







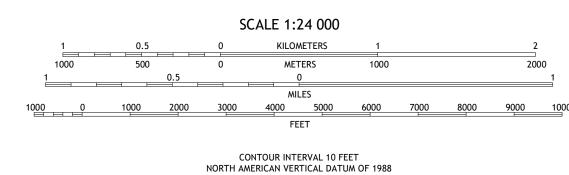




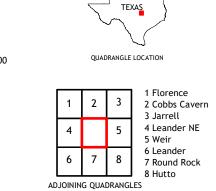
PV

PU

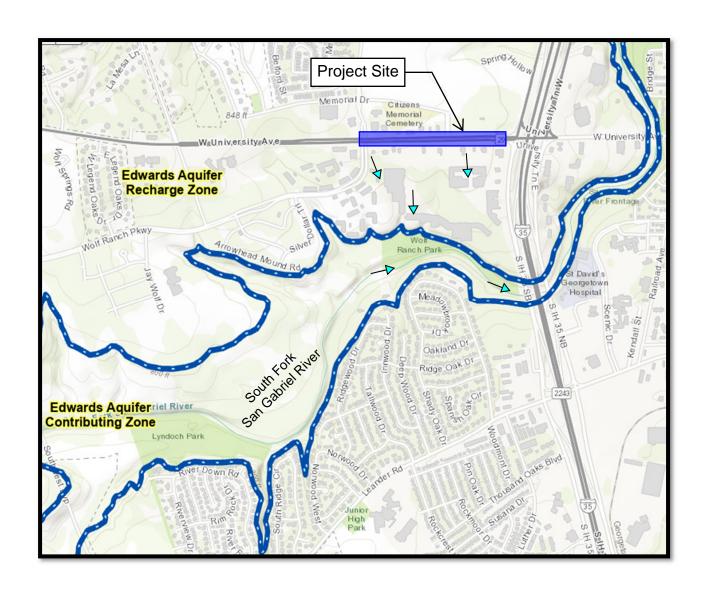
Grid Zone Designation



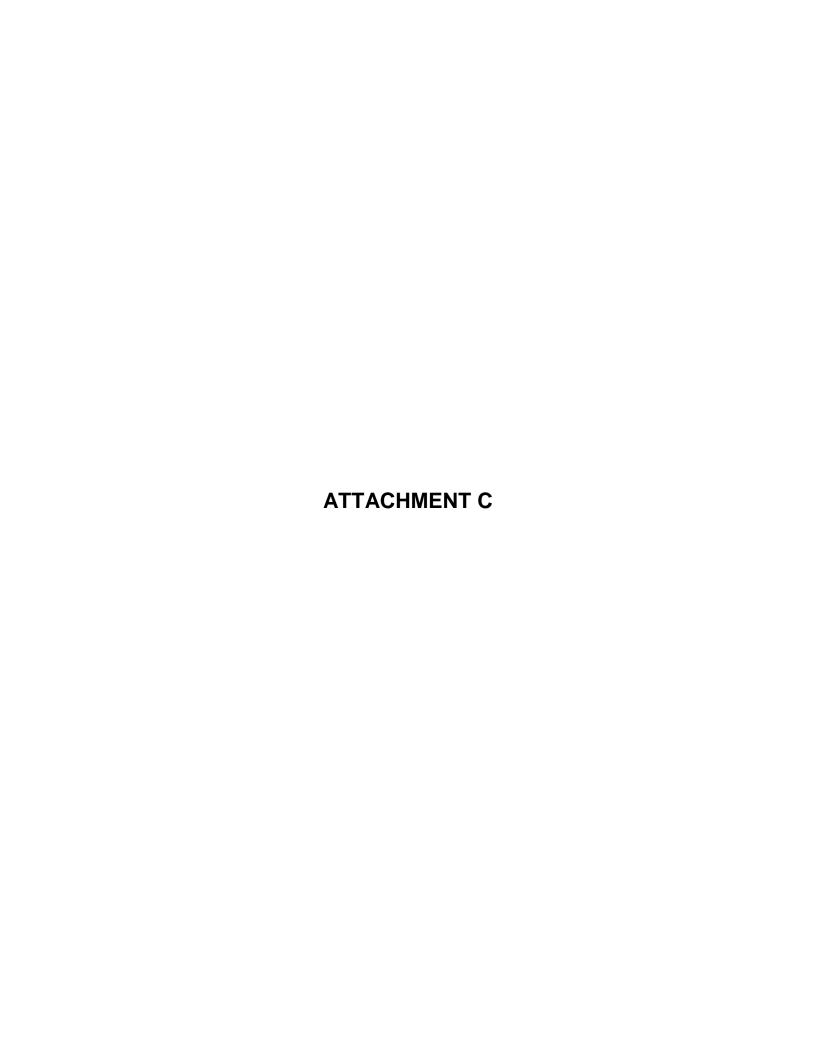
This map was produced to conform with the National Geospatial Program US Topo Product Standard.







Attachment B - Edwards Recharge Zone Map





#### **Project Description**

This approximately 0.61-mile roadway project lies within Williamson County and inside the city limits of Georgetown, Texas. The project area is 12.99 acres. The drainage area running to or through the project is 40.18 acres of which 22.30 acres is impervious area today. As a result of the widening on SH 29, there will be approximately 1.30 acres of additional impervious are due to the proposed improvements, bringing total impervious cover to 23.60 acres.

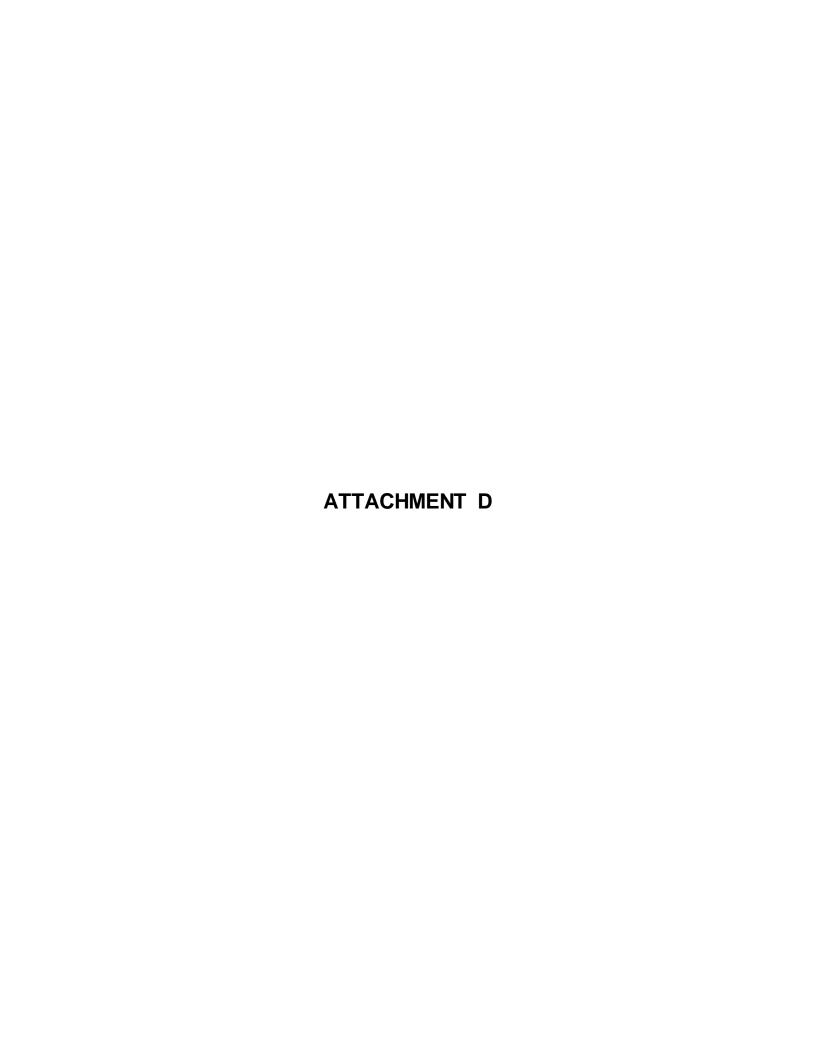
The project includes widening existing SH 29 to a 6-lane arterial with raised median, extended turn lanes, and intersection improvements. The proposed limits are from Wolf Ranch Parkway to IH-35 SBFR. The ROW acquisition for this project is from Wolf Ranch Town Center, an existing commercial development along the south side of SH 29. The ROW acquisiton process is ongoing.

Within the proposed project limits, existing SH 29 has a usual pavement width of approx. 84' and a maximum width of 108' at existing intersections. Please see the as-builts provided in Appendix B at the end of this application for information regarding the existing pavement that this project ties into. The proposed typical section is usually 4-12' thru lanes (2 in each direction), dual lefts at intersections/approaches, and a section that includes a 3<sup>rd</sup> WB thru lane. It also includes raised median, curb and gutter, shared-use-path, sidewalk, and traffic signals.

The proposed temporary WPAP will implement erosion control logs, inlet protection, soil retention blankets, temporary seeding and construction exits as temporary measures to treat runoff from the construction site. The proposed permanent BMPs are Stormtrooper® stormwater quality interceptors, which will treat runoff exiting the project area. These permanent best management practices (BMPs) are designed in accordance with TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) with errata and addendum sheets added in 2009 and 2017, respectively, to remove increased TSS load from the proposed improvements after ultimate development.

The existing SH 29 pavement within the proposed project limits does not currently have a WPAP. Therefore, existing pavement is classified as predevelopment impervious cover.

TCEQ requires that 80% of the increased TSS load generated by the increase in impervious area be removed. For this project, 1137 pounds of TSS load removal are required, and 5044 pounds are removed through the Stormtrooper® stormwater quality interceptor, resulting in 3907 pounds of overtreatment.





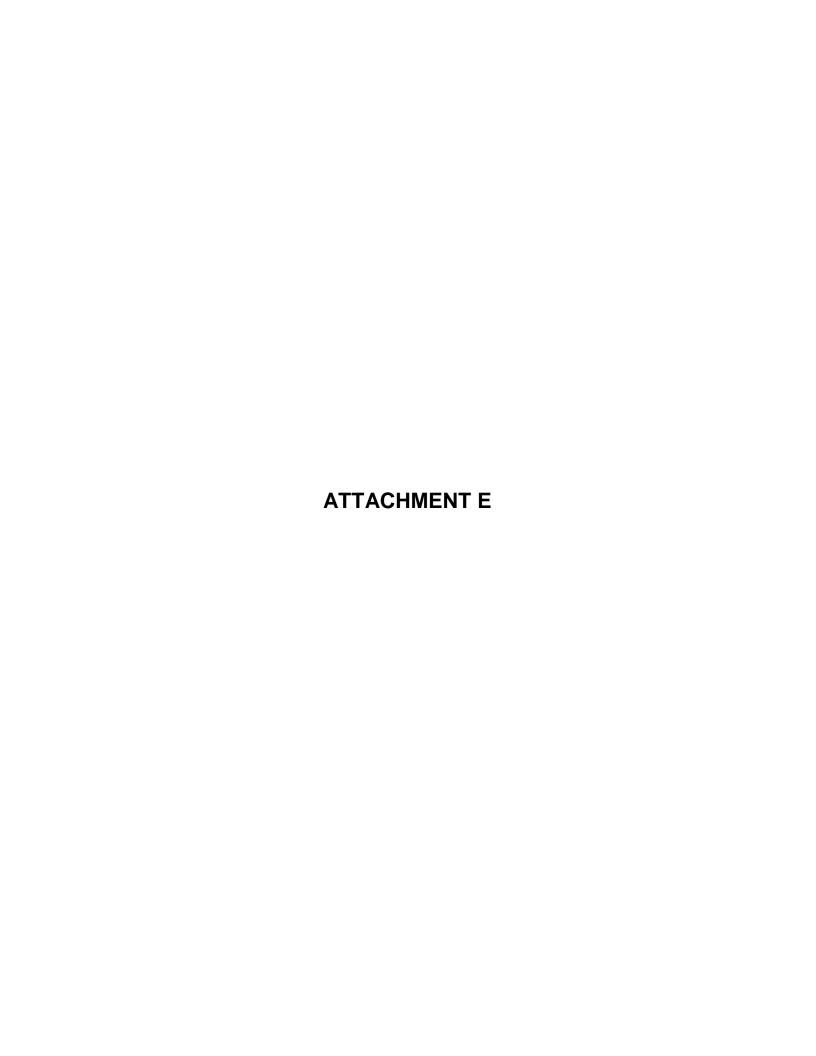
#### **Factors Affecting Surface Water Quality**

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site during construction include:

- Soil erosion due to the clearing of the site.
- Oil, grease, fuel and hydraulic fluid from construction equipment and vehicle drippings.
- Dirt and dust which may fall off construction vehicles.
- Hydrocarbons from asphalt paving operations.
- Miscellaneous trash and litter from construction workers and material wrappings.
- Concrete truck washout.

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site during construction include:

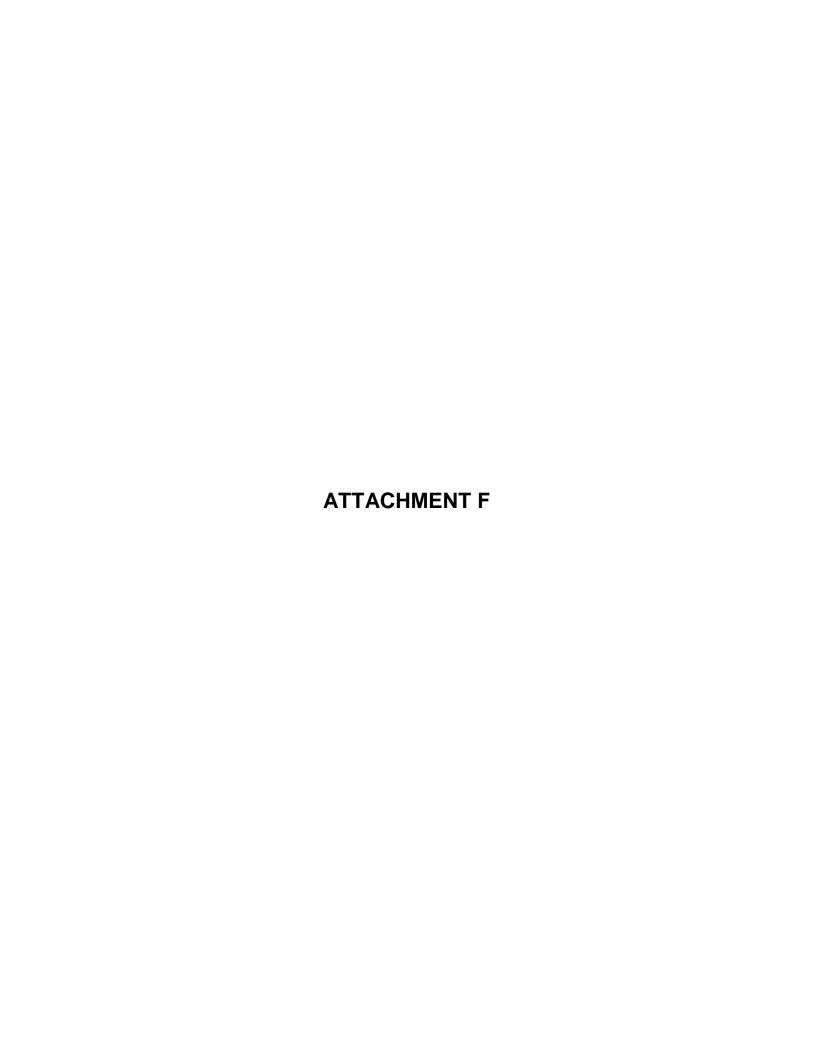
- Oil, grease, fuel and hydraulic fluid from construction equipment and vehicle drippings.
- Dirt and dust which may fall off construction vehicles.
- Concrete truck washout.





#### **BMPs for Upgradient Stormwater**

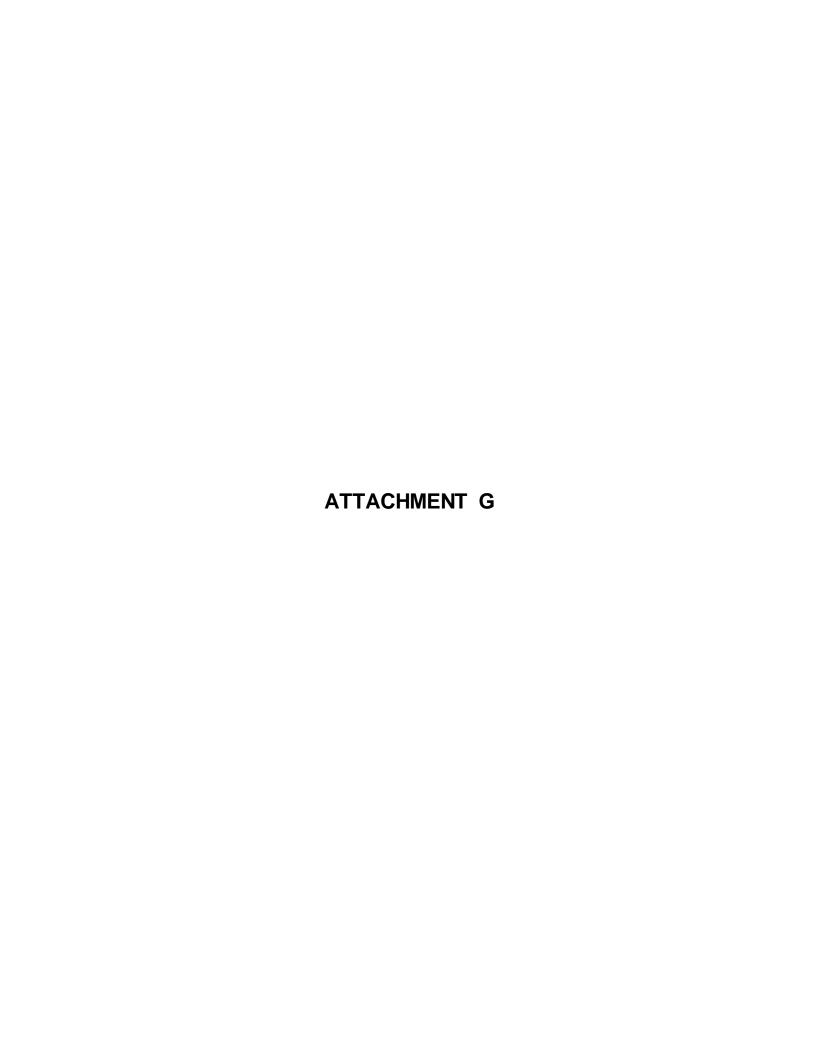
The majority of upgradient flows enter the site from the north flowing across previously developed land (parking lots, landscaping, existing roadways). Flows enter the project storm sewer system through newly constructed storm sewer inlets and existing inlets beyond TxDOT ROW. Drainage from the roadway will be treated using Stormtrooper® stormwater quality interceptors that have been designed according to TCEQ's Technical Guidance Manual RG-348 (2005), with errata and addendum sheets added in 2009 and 2017, respectively.





#### **BMPs for On-Site Stormwater**

Stormtrooper® stormwater quality interceptors will be installed to prevent pollution of surface water, groundwater, or stormwater that originates on-site. These treatment measures have been designed according to TCEQ's Technical Guidance Manual RG-348 (2005), with errata and addendum sheets added in 2009 and 2017, respectively.





### **Construction Plans**

Please see Appendix A for construction plans including TCEQ construction notes, proposed structural BMP plans/shop drawings, and permanent BMP specifications. Design calculations are also provided within this attachment.

# Texas Commission on Environmental Quality TSS Required Load Reduction Calculations

Project Name: SH 29

Project Location: Georgetown, TX
Date Prepared: 10/4/2024

Prepared For:

#### Lm = 27.2(AN x P)

where: Lm = Required TSS removal

An = Net increase in impervious area for site
P = Average annual precipitation, inches

Site Data:

County = Williamson

Stormwater Quality Structure = Wet Vault

Total site area = 40.18 acres

Pre-development impervious area = 22.30 acres

Post-development impervious area = 23.60 acres

Post-development impervious fraction = 0.59

P = 32 inches

Lm = 1137 lbs. Total Project Required Removal

**Storm**Trooper

8.908686

| Drainag<br>e Basin | Area | Total<br>Area | Impervious<br>Cover | Impervious<br>Area | Pre-Dev.<br>Impervious<br>Cover | A <sub>n</sub> for<br>Drainage<br>Area | Runoff<br>Coef.<br>(C) | Pervious<br>Area | Runoff<br>Coef.<br>(C) | Composite<br>Runoff<br>Coef. (C) | Effective<br>Area | Intensity (I) | Calculated<br>Flow (Q) | Required<br>Pollutant<br>Removal | StormTrooper<br>Model | Unit<br>Surface<br>Area | By-Pass<br>Flowrat<br>e | Intensity<br>Treated | Fraction<br>of Flow<br>Treated<br>(F) | F/0.9 Overflo<br>Rate (ft | w Removal<br>s) Effeciency | Actual<br>Effeciency | Load<br>Reduction<br>(L <sub>R</sub> ) |
|--------------------|------|---------------|---------------------|--------------------|---------------------------------|--|------------------------|------------------|------------------------|----------------------------------|-------------------|---------------|------------------------|----------------------------------|-----------------------|-------------------------|-------------------------|----------------------|---------------------------------------|---------------------------|----------------------------|----------------------|--|
|                    | [ID] | [ac]          | [%]                 | [ac]               | [ac]                            | [ac]                                   |                        | [ac]             |                        |                                  | [ac]              | [in/hr]       | [cfs]                  | L <sub>m</sub> in [lbs]          | #                     | (sf)                    | (cfs)                   | [in/hr]              | Figure 3-11]                          |                           | [Figure 3-10               | )]                   | (lbs)                                  |
| Α                  | 1    | 19.33         | 48.3%               | 9.34               | 8.39                            | 0.945                                  | 0.9                    | 9.99             | 0.03                   | 0.45                             | 1.15              | 1.1           | 9.57                   | 875                              | 110                   | 913                     | 8.91                    | 1.02                 | 0.90                                  | 1.00 9.76E-0              | 3 <b>49%</b>               | 49%                  | 5149                                   |

Total TSS Removed by BMP's Annually = 5149
Total Required Reduction (Lm) = 1137
Solids Removed By Other Means = 0
Sufficient Removal = Yes

| <u>STORMTROOPER</u> |      |         |             |  |  |  |  |  |  |  |
|---------------------|------|---------|-------------|--|--|--|--|--|--|--|
| Model               | S.A. | By-Pass | E.A. @ 80%  |  |  |  |  |  |  |  |
| 5                   | 100  | 420     | < 0.13      |  |  |  |  |  |  |  |
| 10                  | 149  | 600     | 0.14 - 0.20 |  |  |  |  |  |  |  |
| 20                  | 248  | 1000    | 0.21 - 0.33 |  |  |  |  |  |  |  |
| 25                  | 369  | 1440    | 0.34 - 0.50 |  |  |  |  |  |  |  |
| 40                  | 588  | 2250    | 0.51 - 0.79 |  |  |  |  |  |  |  |
| 70                  | 730  | 2720    | 0.80 - 0.98 |  |  |  |  |  |  |  |
| 110                 | 913  | 4000    | 0.99 - 1.23 |  |  |  |  |  |  |  |

E.A. = (Imp. x 0.9 + Perv. x 0.03) 100% Impervious Acres Treated/Single Unit 0.14 Acres 0.22 Acres 0.37 Acres 0.56 Acres 0.88 Acres 1.09 Acres 1.37 Acres

Α

#### STEP ONE: Required TSS Removal

**AREA** 

**EQUATION 3.3** 

 $L_m = 28.93(A_n \times P)$ (Georgetown Requires 85% TSS Removal)

L<sub>m</sub> = Required TSS Removal (pounds)

A<sub>n</sub> = Net Increase in Impervius Area (acres)

P = Average Annual Precipitation (inches

Drainage Basin = 19.33 Acres Pre-Dev. Imp. Area = 8.39 Acres Post-Dev. Imp. Area = 0.95 Pervious Area = 9.99 Acres P = 32Inches  $L_{\rm m} = 875$ Lbs

#### STEP TWO: Select an Appropriate BMP

Effective Area = 1.15  $EA = (Ai \times 0.9) + (Ap \times 0.03)$ StormTrooper SWAQ\_ 110

**DRAINAGE BASIN** 

Unit Surface Area = 913 Sq. Ft.

**EQUATION 3.4** 

Q = CiA, where:

C = 0.45Composite Run-Off Coefficient Stormwater Quality Intensity i = 1.10 A = 19.33Drainage Basin Acreage Q = 9.57Required Treatment Flow

**EQUATION 3.5** 

 $V_{OR} = Q/A$ , where:

Q = 9.57Required Treatment Flow A = 913Unit Surface Area V<sub>OR</sub> = 9.76E-03 Overflow Rate

BMP Effeciency = 49%

#### STEP THREE: Calculate Fraction of Annual Runoff to be Treated

Unit By-Pass Flowrate = 8.91 Treated Intensity = 1.02 in/hr

Annual Volume Treated = 90% Volume of Run-Off Entering Unit Treatment Reduction = 1.00 **BMP Effeciency Reduction Factor** 

Actual BMP Effeciency = 49%

#### STEP FOUR: Calculate TSS Load Removed by BMPs

 $\frac{\text{EQUATION 3.8}}{\text{L}_{\text{r}}} = (\text{BMP Efficiency}) \times \text{P} \times (\text{A}_{\text{r}} \times 34.6 + \text{A}_{\text{p}} \times 0.54)$ 

 $L_r$  = Load Removed by BMF

BMP Efficiency = TSS Removal Efficiency A<sub>i</sub> = Impervious Tributary Area to the BMP (ac

A<sub>D</sub> = Pervious Tributary Area to the BMP (ac

 $A_i = 9.34$ 

 $A_{D} = 9.99$ 

L<sub>r</sub> = 5149 lbs

**TOTAL SITE DETAILS** Project Name: SH 29 Project Location: Georgetown, TX Date Prepared: 10/4/2024 Prepared By: 0 Total Project Area to be Treated =40.18 Pre-Development Impervious Area =22.30 Post-Development Impervious Area =23.60 Composite Run-Off Coefficient = 0.59 Required TSS Removal L<sub>m</sub> = 1137

| STORMTROOPER |             |  |
|--------------|-------------|--|
| Model        | E.A. @ 80%  |  |
| 5            | < 0.13      |  |
| 10           | 0.14 - 0.20 |  |
| 20           | 0.21 - 0.33 |  |
| 25           | 0.34 - 0.50 |  |
| 40           | 0.51 - 0.79 |  |
| 70           | 0.80 - 0.98 |  |
| 110          | 0.99 - 1.23 |  |
|              |             |  |

В

#### STEP ONE: Required TSS Removal

**AREA** 

**EQUATION 3.3** 

 $L_m = 28.93(A_n \times P)$  (Georgetown Requires 85% TSS Removal)

2

L<sub>m</sub> = Required TSS Removal (pounds)

A<sub>n</sub> = Net Increase in Impervius Area (acres)

P = Average Annual Precipitation (inches

 Drainage Basin = 0.00
 Acres

 Pre-Dev. Imp. Area = 0.00
 Acres

 Post-Dev. Imp. Area = 0.00
 Acres

 Pervious Area = 0.00
 Acres

P = 32 Inches  $L_m = 0$  Lbs

STEP TWO: Select an Appropriate BMP

Effective Area = 0.00 EA = (Ai x 0.9) + (Ap x 0.03)

DRAINAGE BASIN

StormTrooper SWAQ\_ 0

Unit Surface Area = #N/A Sq. Ft.

**EQUATION 3.4** 

Q = CiA, where:

C = #DIV/0! Composite Run-Off Coefficient i = 1.10 Stormwater Quality Intensity A = 0.00 Drainage Basin Acreage Q = #DIV/0! Required Treatment Flow

**EQUATION 3.5** 

 $V_{OR} = Q/A$ , where:

 $\begin{array}{ll} {\sf Q = \#DIV/0!} & {\sf Required\ Treatment\ Flow} \\ {\sf A = \#N/A} & {\sf Unit\ Surface\ Area} \\ {\sf V_{\sf OR} = \#N/A} & {\sf Overflow\ Rate} \end{array}$ 

BMP Effeciency = 0%

STEP THREE: Calculate Fraction of Annual Runoff to be Treated

Unit By-Pass Flowrate = #N/A cfs Treated Intensity = #N/A in/hr

Annual Volume Treated = 90% Volume of Run-Off Entering Unit
Treatment Reduction = 1.00 BMP Effeciency Reduction Factor

Actual BMP Effeciency = 0%

STEP FOUR: Calculate TSS Load Removed by BMPs

**EQUATION 3.8** 

 $\overline{L_r}$  = (BMP Efficiency) x P x (A<sub>i</sub> x 34.6 + A<sub>p</sub> x 0.54)

 $L_r$  = Load Removed by BMF

BMP Efficiency = TSS Removal Efficiency A<sub>i</sub> = Impervious Tributary Area to the BMP (ac

 $A_p$  = Pervious Tributary Area to the BMP (ac

 $A_i = 0.00$  $A_p = 0.00$ 

L<sub>r</sub> = 0 lbs

TOTAL SITE DETAILS

Project Name: SH 29
Project Location: Georgetown, TX
Date Prepared: 10/4/2024

Prepared By: 0

Total Project Area to be Treated =40.18

Pre-Development Impervious Area =22.30

Post-Development Impervious Area =23.60

Composite Run-Off Coefficient = 0.59

Required TSS Removal L<sub>m</sub> = 1137

| STORMTROOPER |             |  |
|--------------|-------------|--|
| Model        | E.A. @ 80%  |  |
| 5            | < 0.13      |  |
| 10           | 0.14 - 0.20 |  |
| 20           | 0.21 - 0.33 |  |
| 25           | 0.34 - 0.50 |  |
| 40           | 0.51 - 0.79 |  |
| 70           | 0.80 - 0.98 |  |
| 110          | 0.99 - 1.23 |  |

С

#### STEP ONE: Required TSS Removal

**AREA** 

**EQUATION 3.3** 

 $L_m = 28.93(A_n \times P)$  (Georgetown Requires 85% TSS Removal)

3

L<sub>m</sub> = Required TSS Removal (pounds)

A<sub>n</sub> = Net Increase in Impervius Area (acres)

P = Average Annual Precipitation (inches

 $L_m = 0$ 

STEP TWO: Select an Appropriate BMP

Effective Area = 0.00 EA =  $(Ai \times 0.9) + (Ap \times 0.03)$ 

**DRAINAGE BASIN** 

StormTrooper SWAQ\_ 0

Unit Surface Area = #N/A Sq. Ft.

Lbs

**EQUATION 3.4** 

Q = CiA, where:

C = #DIV/0! Composite Run-Off Coefficient i = 1.10 Stormwater Quality Intensity A = 0.00 Drainage Basin Acreage Q = #DIV/0! Required Treatment Flow

**EQUATION 3.5** 

 $V_{OR} = Q/A$ , where:

Q = #DIV/0! Required Treatment Flow A = #N/A Unit Surface Area  $V_{OR} = \#N/A$  Overflow Rate

BMP Effeciency = 0%

STEP THREE: Calculate Fraction of Annual Runoff to be Treated

Unit By-Pass Flowrate = #N/A cfs

Treated Intensity = #N/A in/hr

Annual Volume Treated = 90% Volume of Run-Off Entering Unit
Treatment Reduction = 1.00 BMP Effeciency Reduction Factor

lbs

Actual BMP Effeciency = 0%

STEP FOUR: Calculate TSS Load Removed by BMPs

**EQUATION 3.8** 

 $\overline{L_r}$  = (BMP Efficiency) x P x (A<sub>1</sub> x 34.6 + A<sub>p</sub> x 0.54)

L<sub>r</sub> = Load Removed by BMF

BMP Efficiency = TSS Removal Efficiency

A<sub>i</sub> = Impervious Tributary Area to the BMP (ac

 $A_p$  = Pervious Tributary Area to the BMP (ac

 $A_i = 0.00$  $A_p = 0.00$ 

 $L_r = 0$ 

TOTAL SITE DETAILS
Project Name: SH 29

Project Location: Georgetown, TX
Date Prepared 10/4/2024

Prepared By: 0

Total Project Area to be Treated =40.18

Pre-Development Impervious Area =22.30

Post-Development Impervious Area =23.60

Composite Run-Off Coefficient = 0.59

Required TSS Removal L<sub>m</sub> = 1137

| STORMTROOPER |             |  |
|--------------|-------------|--|
| Model        | E.A. @ 80%  |  |
| 5            | < 0.13      |  |
| 10           | 0.14 - 0.20 |  |
| 20           | 0.21 - 0.33 |  |
| 25           | 0.34 - 0.50 |  |
| 40           | 0.51 - 0.79 |  |
| 70           | 0.80 - 0.98 |  |
| 110          | 0.99 - 1.23 |  |

D

#### STEP ONE: Required TSS Removal

**AREA** 

**EQUATION 3.3** 

 $L_m = 28.93(A_n \times P)$  (Georgetown Requires 85% TSS Removal)

L<sub>m</sub> = Required TSS Removal (pounds)

A<sub>n</sub> = Net Increase in Impervius Area (acres)

P = Average Annual Precipitation (inches

Drainage Basin = 0.00 Acres
Pre-Dev. Imp. Area = 0.00 Acres

Post-Dev. Imp. Area = 0.00

Pervious Area = 0.00 Acres
P = 32 Inches

 $L_m = 0$  Lbs

#### STEP TWO: Select an Appropriate BMP

Effective Area = 0.00 EA =  $(Ai \times 0.9) + (Ap \times 0.03)$ StormTrooper SWAQ\_ 0

**DRAINAGE BASIN** 

Unit Surface Area = #N/A Sq. Ft.

**EQUATION 3.4** 

Q = CiA, where:

C = #DIV/0! Composite Run-Off Coefficient i = 1.10 Stormwater Quality Intensity A = 0.00 Drainage Basin Acreage Q = #DIV/0! Required Treatment Flow

**EQUATION 3.5** 

 $V_{OR} = Q/A$ , where:

 $\begin{array}{ll} {\sf Q = \#DIV/0!} & {\sf Required\ Treatment\ Flow} \\ {\sf A = \#N/A} & {\sf Unit\ Surface\ Area} \\ {\sf V_{\sf OR} = \#N/A} & {\sf Overflow\ Rate} \\ \end{array}$ 

BMP Effeciency = 0%

#### STEP THREE: Calculate Fraction of Annual Runoff to be Treated

Unit By-Pass Flowrate = #N/A cfs Treated Intensity = #N/A in/h

Annual Volume Treated = 90% Volume of Run-Off Entering Unit
Treatment Reduction = 1.00 BMP Effeciency Reduction Factor

Actual BMP Effeciency = 0%

#### STEP FOUR: Calculate TSS Load Removed by BMPs

**EQUATION 3.8** 

 $\overline{L_r}$  = (BMP Efficiency) x P x (A<sub>r</sub> x 34.6 + A<sub>p</sub> x 0.54)

 $L_r$  = Load Removed by BMF

BMP Efficiency = TSS Removal Efficiency A<sub>i</sub> = Impervious Tributary Area to the BMP (ac

 $A_p$  = Pervious Tributary Area to the BMP (ac

 $A_i = 0.00$  $A_p = 0.00$ 

 $L_r = 0$  lbs

TOTAL SITE DETAILS
Project Name: SH 29

Project Location: Georgetown, TX Date Prepared: 10/4/2024 Prepared By: 0

Total Project Area to be Treated =40.18

Pre-Development Impervious Area =22.30

Post-Development Impervious Area =23.60

Composite Run-Off Coefficient = 0.59 Required TSS Removal L<sub>m</sub> = 1137

| STORMTROOPER |             |  |
|--------------|-------------|--|
| Model        | E.A. @ 80%  |  |
| 5            | < 0.13      |  |
| 10           | 0.14 - 0.20 |  |
| 20           | 0.21 - 0.33 |  |
| 25           | 0.34 - 0.50 |  |
| 40           | 0.51 - 0.79 |  |
| 70           | 0.80 - 0.98 |  |
| 110          | 0.99 - 1.23 |  |





### Inspection, Maintenance, Repair, and Retrofit Plan SH 29, Georgetown, TX, Williamson County

These maintenance guidelines were prepared at the request of the Texas Commission on Environmental Quality (TCEQ) with regard to their approval of an Edwards Aquifer Protection Plan for the above referenced project. These guidelines apply to the portions of the project limits that are subject to the Edwards Aquifer Rules.

#### **Stormtrooper® Stormwater Quality Interceptors Guidelines**

Description: Furnish maintenance services on Stormtroopers®.

Equipment: Furnish all equipment, tools, and machinery necessary for maintenance. Equipment must meet all federal, state, and local regulations and be approved before use. Storage of equipment, tools, or machinery within the roadway right-of-way is not permitted.

Work Methods: Provide the following maintenance services quarterly, unless otherwise shown on the plans. Perform work in accordance with all federal, state, and local regulations.

- A. <u>Site Inspection</u>: Observation and maintenance is best accomplished during non-flow conditions, 3-4 days after the most recent rain.
- B. Maintenance Method:
  - a) Remove interceptor covers or open hatchway to observe conditions. Remove hatchway safety net ("EnterNet"). Observe for trash and debris and remove if necessary. This is the most important maintenance requirement. If absorbent pillows are utilized, observe their condition. A uniform browning or gray color of the pillow means they should be replaced. Observe baffle debris screen and clean if necessary.
  - b) Coalescing plates are self-cleaning and seldom require maintenance unless damaged. Do not walk on or stand on plate packs. Call ParkUSA (888-611-PARK) for replacement parts.
  - c) Check the depth (level) of oil and sediment with a tank sampler device designed for this purpose.

Maintenance Table: Recommended maximum capacities of oil and sediment.

| Recommended Maximum Maintenance Levels |                    |                         |
|--|--------------------|-------------------------|
| Model Number                           | Oil Depth (inches) | Sediment Depth (inches) |
| SWAQ-05                                | 12"                | 12"                     |
| SWAQ-10                                | 12"                | 12"                     |
| SWAQ-20                                | 12"                | 12"                     |
| SWAQ-25                                | 12"                | 12"                     |
| SWAQ-40                                | 12"                | 12"                     |
| SWAQ-70                                | 12"                | 12"                     |
| SWAQ-110                               | 12"                | 12"                     |



Measurement: This item will be measured as follows:

- A. <u>Site Inspection</u>: Measured by each site inspection completed at each treatment system location.
- B. <u>Trash, Debris, Oil, and Sediment Removal</u>: Measured by each cycle of removal at each treatment system location.

Record Keeping: Maintenance supervisor to determine the best method of BMP maintenance record keeping. It is recommended to keep a log of all maintenance the BMPs undergo.

#### **Maintenance Contract**

The Transportation Operations Manager may be contact for questions or concerns pertaining to the maintenance of the facility. The current Transportation Operations Manager whose maintenance section is in charge of this project area may be reached through the following contact:

Douglas Havins
Texas Department of Transportation
2727 S Austin Ave
Georgetown, TX, 78626
Phone: 512-930-4700

I understand that I am responsible for maintenance of the Permanent Pollution Abatement Measures included in this project until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property or ownership is transferred.

| I, the owner, have read and understand the requirements of the attached Maintenance Plan and |           |  |
|--|-----------|--|
| Sahosiyules:   |           |  |
| Douglas Havins   | 9/16/2024 |  |
| TOBĂB773AC4A416.<br>Douglas Havins   | <br>Date  |  |
| (signature)  |           |  |





## Measures for Minimizing Surface Stream Contamination

Measures for minimizing surface stream contamination are as follows:

### Stormtrooper® stormwater quality

Runoff from this project will generally collect in the proposed storm sewer system and shall pass through a Stormtrooper® on its way offsite. The Stormtrooper® shall remove greater than 80% of the increased TSS load from this project. Once the runoff passes through the storm sewer system, it eventually outfalls into a wet pond on the south side of the Wolf Ranch Town Center development.

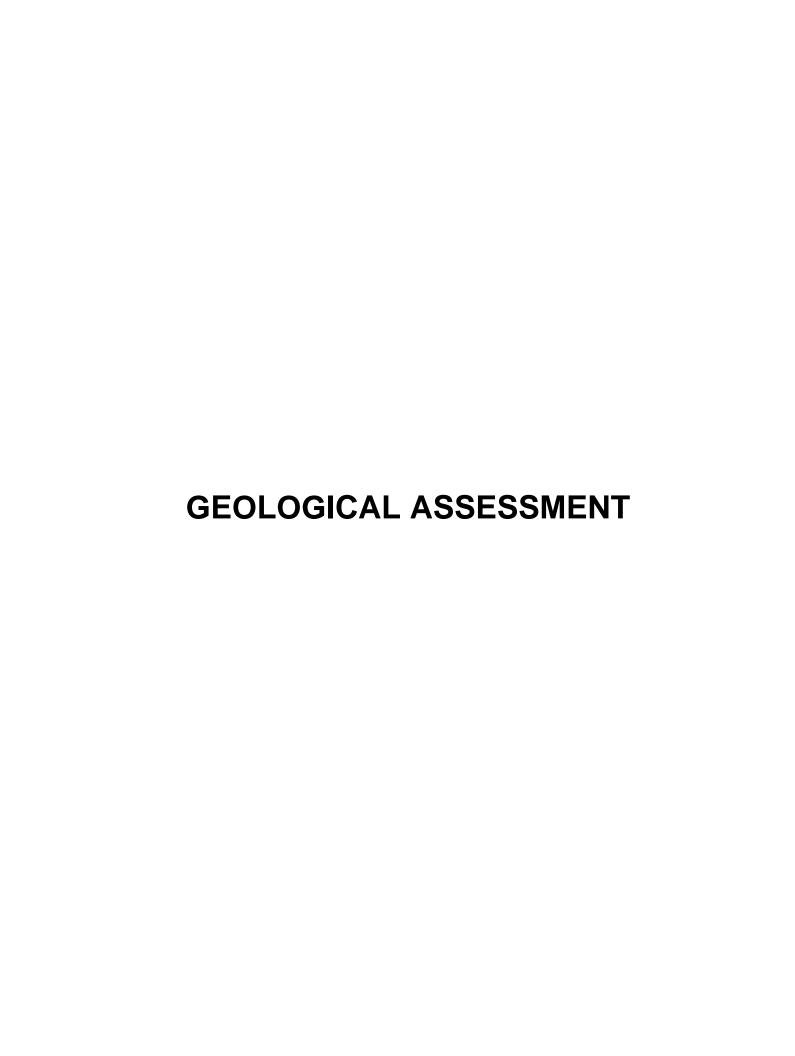




## **Volume and Character of Stormwater**

The runoff coefficient weighted value for the project area prior to development is 0.63, and after construction, it will increase to 0.65 (values are based on the Rational Method using runoff coefficients per TxDOT's Bridge Division Hydraulic Manual).

| Pi    | re-Construc | tion             | Po    | ost-Construc | tion             | Aggre         | egate         |
|-------|-------------|------------------|-------|--------------|------------------|---------------|---------------|
| Area  | Cexisting   | Q <sub>100</sub> | Area  | Cproposed    | Q <sub>100</sub> | C<br>increase | Q<br>increase |
| acres | -           | CFS              | acres | -            | CFS              | -             | CFS           |
| 12.99 | 0.63        | 49.51            | 12.99 | 0.65         | 51.08            | 0.02          | 1.57          |



# Geologic Assessment

**Texas Commission on Environmental Quality** 

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

# Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

| Print Name of Geologist: Kevin Denson, P.G.   | Telephone: <u>512 442-1122</u>                   |
|---|--|
| Date: November 29, 2023   | Fax:   |
| Representing: <u>Terracon Consultants, Inc.</u> (Nannumber)   | ne of Company and TBPG or TBPE registration      |
| Signature of Geologist:   |  |
| MEWIN Denson  |  |
| Regulated Entity Name: SH-29 Widening, wes  | t of IH-35, Georgetown, Williamson County, Texas |
| Project Information   | l-2-   |
| 1. Date(s) Geologic Assessment was perform  | ed: August 30, 2023                              |
| 2. Type of Project:   | State A South                                    |
|   | ☐ AST ☐ UST  MARK KEVIN DENSON                   |
| 3. Location of Project:   | B GEOLOGY  |
| <ul><li>Recharge Zone</li><li>Transition Zone</li><li>Contributing Zone within the Transition</li></ul> | n Zone   |

4. Attachment A - Geologic Assessment Table. Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached. 5. | Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups\* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map. Table 1 - Soil Units, Infiltration \* Soil Group Definitions (Abbreviated) **Characteristics and Thickness** A. Soils having a high infiltration rate when thoroughly wetted. Thickness(feet) Soil Name Group\* B. Soils having a moderate 0-1 EeB D infiltration rate when thoroughly wetted. D 2-3 GsB C. Soils having a slow infiltration rate when thoroughly wetted. D. Soils having a very slow infiltration rate when thoroughly wetted. 6. Attachment B – Stratigraphic Column. A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column. 7. Attachment C – Site Geology. A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached. 8. Attachment D – Site Geologic Map(s). The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1": 400' Applicant's Site Plan Scale: 1" = \_' Site Geologic Map Scale: 1" = 30' Site Soils Map Scale (if more than 1 soil type): 1'' = 500'9. Method of collecting positional data: Solobal Positioning System (GPS) technology. Other method(s). Please describe method of data collection: \_\_\_\_\_ 10. The project site and boundaries are clearly shown and labeled on the Site Geologic Map. 11. Surface geologic units are shown and labeled on the Site Geologic Map.

| 12. | . Geologic or manmade features were discovered on the project site during the field<br>investigation. They are shown and labeled on the Site Geologic Map and are describe<br>in the attached Geologic Assessment Table.   |
|-----|--|
|     | $\boxtimes$ Geologic or manmade features were not discovered on the project site during the fie investigation.   |
| 13. | . 🔀 The Recharge Zone boundary is shown and labeled, if appropriate.   |
| 14. | . All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section   |
|     | <ul> <li>☐ There are (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)</li> <li>☐ The wells are not in use and have been properly abandoned.</li> <li>☐ The wells are not in use and will be properly abandoned.</li> <li>☐ The wells are in use and comply with 16 TAC Chapter 76.</li> <li>☐ There are no wells or test holes of any kind known to exist on the project site.</li> </ul> |

# **Administrative Information**

15. Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

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| LOCATION   FEATURE CHARACTERISTICS   2  | GEO        | GEOLOGIC ASSESSMENT TABI | SSESSME         | ENT T           | ABLE   |               |        | PROJ       | ECT N   | IAME: SH      | 1-26 1 | Widenin    | g, SH-29           | West      | PROJECT NAME: SH-26 Widening, SH-29 West of IH-35, Georgetown, Texas | rgeto   | wn, T | exas  |                                  |       |            |
|---|------------|--------------------------|-----------------|-----------------|--------|---------------|--------|------------|---------|---------------|--------|------------|--------------------|-----------|--|---------|-------|-------|----------------------------------|-------|------------|
| 1   1   1   1   1   1   1   1   1   1   | LOCA       | NOIL                     |                 | FEATU           | IRE CH | <b>ARACTE</b> | RIST   | SOI        |         |               | 5      |            |                    |           |  | EVAL    | -UAI  | NO    | PHYS                             | SICAL | SETTING    |
| Lovanibre   Feature   Fe  | 4          | 18*                      | 10.             | 2A              | 28     | 3             |        | 4          |         | 5             | 5.A    | 9          | 7                  | 8A        | 88   | 6       | 5     |       | Ξ                                |       | 12         |
| None, exposed bedrock features   None   No  | FEATURE IC |                          | LONGITUDE       | FEATURE<br>TYPE | POINTS | FORMATION     | O<br>N | ENSIONS (F | EET)    |               | MOO    |            | APERTURE<br>(FEET) | INFILL    | RELATIVE<br>INFILTRATION<br>RATE                                     | TOTAL   |       | YIIV: | CATCHM<br>ENT<br>AREA<br>(ACRES) |       | ТОРОСВАРНУ |
| 7 2B POINTS RA INF savity 29 C 30  |            |                          |                 |                 |        |               | ×      | >          | 2       |               | 10     |            |                    |           |  |         | <40   | _     | 41.6                             | >1.6  |            |
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| T   2B POINTS   8A INF  |            |                          |                 |                 |        |               |        |            |         |               |        |            |                    |           |  |         |       |       |                                  |       |            |
| 28 POINTS 84 INI  avity 20 C  aniarged fracture(s) 20 C  bright and bedrock features 5 V  feature in bedrock 30 FS  role 20 X  x x  stered or aligned features 30 Ciff; intered | * DATUI    | M NAD27                  |                 |                 |        |               |        |            |         |               |        |            |                    |           |  |         |       |       |                                  |       |            |
| Cave         30         N           Solution cavity         20         C           Solution-enlarged fracture(s)         20         C           Fault         20         F           Other natural bedrock features         5         V           Manmade feature in bedrock         30         FS           Swallow hole         30         X           Sinkhole         20         Non-karst closed depression         5         T TO           Zone, clustered or aligned features         30         Ciff, 3  | 2A TYP     | E TYPE                   |                 |                 |        | 2B POINTS     | (0     | 8A IN      | FLIN    | ဖ             |        |            |                    |           |  |         |       |       |                                  |       |            |
| Solution cavity         20         C           Solution-enlarged fracture(s)         20         O           Fault         20         F           Other natural bedrock features         5         Y           Manimade feature in bedrock         30         FS           Swallow hole         30         X           Sinkhole         20         Non-karst closed depression         5           Zone, clustered or aligned features         30         Cliff, 3   | ပ          | Cave                     |                 |                 |        | 3             | 0      |            | None,   | exposed t     | oupec  | 충          |                    |           |  |         |       |       |                                  |       |            |
| Solution-enlarged fracture(s)         20         0           Fault         20         F           Other natural bedrock features         5         V           Manmade feature in bedrock         30         FS           Swallow hole         30         X           Sinkhole         20         Non-karst closed depression         5           Zone, clustered or aligned features         30         Ciff, 3  | SC         | Solution cav             | ılty .          |                 |        | ×             | 0      |            | Coars   | a - cobbles   | s, bre | akdown,    | , sand, gr         | avel      |  |         |       |       |                                  |       |            |
| Fault         20         Fault           Other natural bedrock features         5         V           Manmade feature in bedrock         30         FS           Swallow hole         X         X           Sinkhole         20         X           Non-karst closed depression         5         72 TO           Zone, clustered or aligned features         30         Cliff, 3   | Ν          | Salution-enk             | arged fracture  | (s)             |        | 20            | 0      | 0          | Loose   | or soft mu    | nd or  | soil, orga | anics, lea         | ves, sti  | cks, dark col  | ors     |       |       |                                  |       |            |
| Other natural bedrock features 5 Manmade feature in bedrock 30 Swallow hole 30 Sinkhole 20 Non-karst closed depression 5 Zone, clustered or aligned features 30   | ш          | Fault                    |                 |                 |        | 7             | 0      | ш,         | Fines,  | compacte      | ³d cla | y-rich se  | diment, s          | soil prof | ile, gray or re  | oloo pa | હ     |       |                                  |       |            |
| Manmade feature in bedrock 30 Swallow hole 30 Sinkhole 20 Non-karst closed depression 5 Zone, clustered or aligned features 30  | 0          | Other natura             | al bedrock feat | tures           |        |               | 2      | >          | Vegeta  | ation. Give   | deta ; | ils in nar | rative de          | scriptio  | _  |         |       |       |                                  |       |            |
| Swallow hole 30 Sinkhole 20 Non-karst closed depression 5 Zone, clustered or aligned features 30  | MB         | Manmade fe               | sature in bedro | ck              |        | ਲ             | 0      |            | Flows   | one, ceme     | ents,  | cave de    | posits             |           |  |         |       |       |                                  |       |            |
| Sinkhole Non-karst closed depression 5 Zone, clustered or aligned features 30   | SW         | Swallow hole             | Φ               |                 |        | స             | 0      |            | Other   | materials     |        |            |                    |           |  |         |       |       |                                  |       |            |
| Non-karst closed depression 5<br>Zone, clustered or aligned features 30   | SH         | Sinkhole                 |                 |                 |        | ×             | 0      |            |         |               |        |            |                    |           |  |         |       |       |                                  |       |            |
| Zone, clustered or aligned features 30  | 8          | Non-karst cl             | losed depressi  | ion             |        |               | 2      | 12 TC      | POGE    | APHY          |        |            |                    |           |  |         |       |       |                                  |       |            |
|   | Z          | Zone, cluste             | ered or aligned | features        |        | ਲ             | 0      | CIII       | Hilltop | , Hillside, I | Drain  | age, Flo   | odplain, §         | Streaml   | ped  |         |       |       |                                  |       |            |

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information passented have complies with that document and is a true representation of the conditions observed in the field.

My signature certifies that am qualified as a geologist as defined by 30 TAC 213

Sheet of

TNRCC-0585-Table (Rev. 5-1-02)

# ATTACHMENT B

Stratigraphic Column SH-29 Widening SH-29 West of IH-35 Georgetown, Texas

| HYDROGEOLOGIC<br>SUBDIVISION | FORMATION         | THICKNESS (feet) | ГІТНОГОСУ  |
|------------------------------|-------------------|------------------|--|
| Edwards Aquifer              | Edwards Formation | 09               | Mudstone to packstone, crystalline limestone, wackestone |



Source: Senger, Collins and Kreitler, 1990



# **ATTACHMENT C**

### SITE-SPECIFIC GEOLOGY

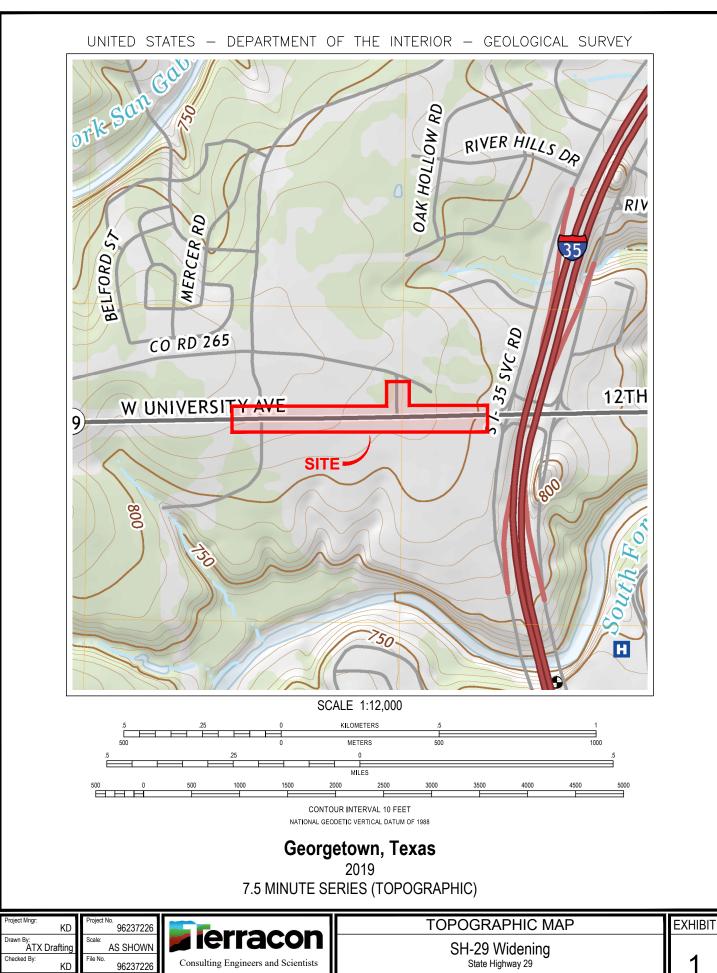
The Geologic Assessment (GA) of the SH-29 Widening site was conducted by Kevin Denson, P.G., of Terracon Consultants, Inc. on August 30, 2023. The site consists of an approximate 3,200 linear foot section of State Highway 29 in Georgetown, Williamson County, Texas. Specifically, the site extends from west of IH-35 to 0.161 miles west of Wolf Ranch Parkway. Exhibit 1 (attached) is a site location map depicting the site in relation to the surrounding area. The areas immediately surrounding the site are commercial properties. Site elevation ranges from about 832 feet above mean sea level (msl) to about 797 feet msl and slopes gently to the east.

The surficial geologic unit present at the site has been identified as the Edwards Limestone. Exhibit 2 (attached) is a geologic map of the site. The Edwards consists of massive to thin bedded limestones and dolostones. The formation is characterized by honeycomb textures, collapse breccias and cavern systems, which account for most of the significant porosity within the strata that compose most of the aquifer. The site is located entirely within the recharge zone of the Edwards Aquifer and the recharge zone boundary is located approximately 1,000 feet south of the site, corresponding to the location of the San Gabriel River. Attachment B is a stratigraphic column prepared for the site. Exposure of this unit onsite is obscured by the existing roadway and commercial development. No faulting was observed on the site and the nearest mapped fault is located approximately 2,000 feet east of the site. The fault, which trends toward the northeast, is associated with the Balcones Fault zone which represents the dominant structural trend in the vicinity of the site. The completed Geologic Assessment form is attached as Attachment A.

No sensitive geologic features were observed on the site. Due to the lack of sensitive recharge features and the presence of impermeable cover over much of the site, the potential for fluid movement to the Edwards aguifer beneath the site is considered low.

No streams or springs were observed on the site. A review of the site maps contained in the City of Georgetown Ordinance 2015-14 indicated there are no known springs occupied by the Georgetown Salamander on the site, and the nearest known occupied spring is located approximately two miles west-southwest of the site (Shadow Canyon).





| Project Mngr: KD          | Project No. 96237226  |   | TOPOGRAPHIC MAP                   | <b>EXHIBIT</b> |
|---------------------------|-----------------------|---|-----------------------------------|----------------|
| Drawn By:<br>ATX Drafting | Scale: AS SHOWN       | <b>ierracon</b>   | SH-29 Widening                    |                |
| Checked By: KD            | File No. 96237226     | Consulting Engineers and Scientists   | State Highway 29                  | I 1 I          |
| Approved By: KD           | Date:<br>Nov 22, 2023 | 5307 INDUSTRIAL OAKS BLVD #160         AUSTIN, TX 78735           PH. (512) 442-1122         FAX (512) 442-1181 | obergotom, rimanion obanty, rondo | -              |



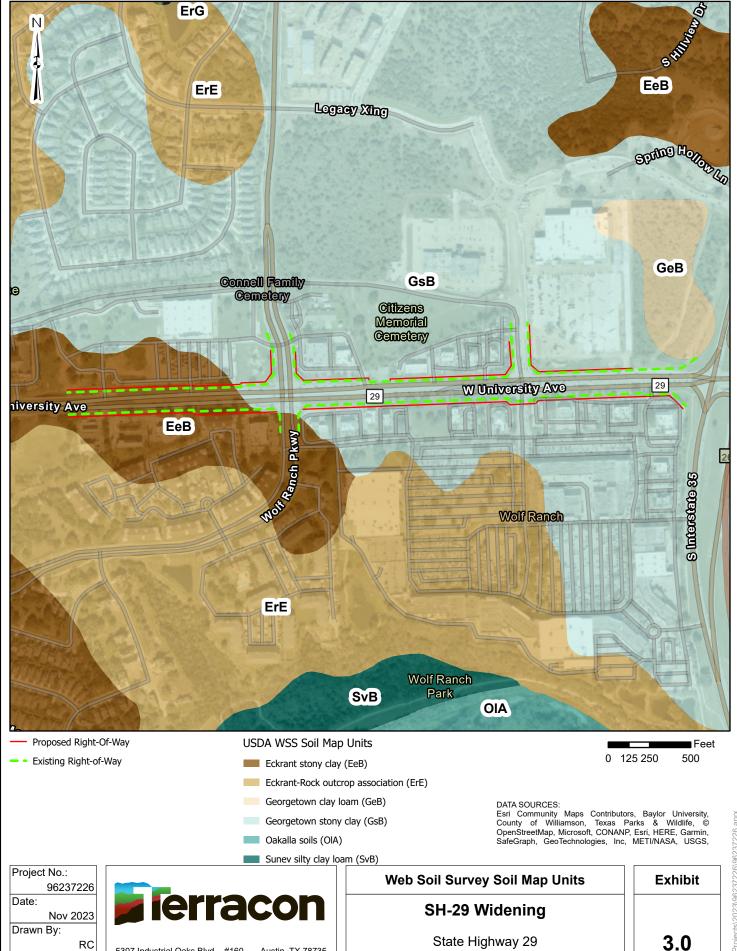
LEGEND

— — Existing Right-Of-Way

Proposed Right-Of-Way

Ked Edwards Formation

Drawn By:
ATX Drafting
Checked By:
KD
Approved By:
KD
Approved



5307 Industrial Oaks Blvd. - #160

PH. (512) 442-1122

Reviewed By:

KD

Austin, TX 78735

terracon.com

Georgetown, Williamson County, Texas



Project No.:

96237226 Date:

Nov 2023 Drawn By:

RC Reviewed By:

KD

**Terracon** 

5307 Industrial Oaks Blvd. - #160 Austin, TX 78735
PH. (512) 442-1122 terracon.com

### **Edwards Aquifer Zones**

# **SH-29 Widening**

State Highway 29 Georgetown, Williamson County, Texas **Exhibit** 

4.0

| TEMPORARY STORMWATER |
|----------------------|
|                      |
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# **Temporary Stormwater Section**

**Texas Commission on Environmental Quality** 

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.

Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.

# Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Temporary Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

| Project Information  |  |
|--|--|
| Regulated Entity Name: SH 29 from Wolf Ranch Parkway to IH-35 SBFR |  |
| Michael Cur  |  |
| Signature of Customer/Agent:                                       |  |
| Date: <u>5/24/2024</u>   |  |
| Print Name of Customer/Agent: Michael Curl, P.E.                   |  |
| executive director approval. The application was prepared by:      |  |

# Potential Sources of Contamination

Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.

| 1. | Fuels for construction equipment and hazardous substances which will be used during construction:  |
|----|--|
|    | ☐ The following fuels and/or hazardous substances will be stored on the site: N/A  |
|    | These fuels and/or hazardous substances will be stored in:   |
|    | Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year. |

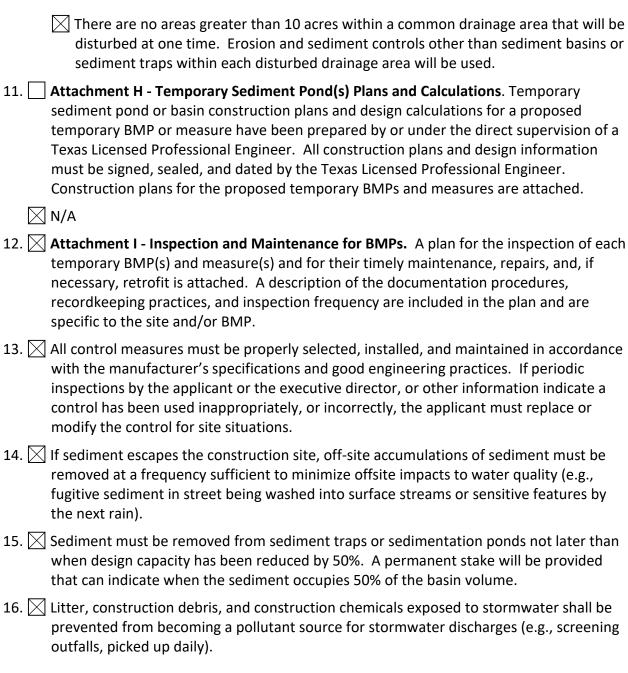
|    | <ul> <li>Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.</li> <li>Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.</li> </ul> |
|----|---|
|    | igotimes Fuels and hazardous substances will not be stored on the site.   |
| 2. | Attachment A - Spill Response Actions. A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.  |
| 3. | Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.   |
| 4. | Attachment B - Potential Sources of Contamination. A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.   |
| S  | equence of Construction   |
| 5. | Attachment C - Sequence of Major Activities. A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.   |
|    | <ul> <li>For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.</li> <li>For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.</li> </ul>  |
| 6. | Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: South Fork San Gabriel River  |

# Temporary Best Management Practices (TBMPs)

Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. All structural BMPs must be shown on the site plan.

7. Attachment D – Temporary Best Management Practices and Measures. TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information is attached:

|      | A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.   |
|------|---|
|      | A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.  |
|      | A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.   |
|      | A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.  |
| 8. 🔀 | The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.   |
|      | Attachment E - Request to Temporarily Seal a Feature. A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.  |
|      | There will be no temporary sealing of naturally-occurring sensitive features on the site.   |
| 9.   | Attachment F - Structural Practices. A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided. |
| 10.  | Attachment G - Drainage Area Map. A drainage area map supporting the following requirements is attached:  |
|      | For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.   |
|      | For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.   |
|      | For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not  |
|      | attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.  |
|      | There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.   |



# Soil Stabilization Practices

Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.

17. Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices. A schedule of the interim and permanent soil stabilization practices for the site is attached.

- 18. Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
- 19. Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

# **Administrative Information**

- 20. All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
- 21. If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.
- 22. Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.





### **Spill Response Actions**

In the event of an accidental spill:

- Contractor shall take action to contain spill. Contractor may use sand or other absorbent material stockpiled on site to absorb spill. Absorbent material should be spread over the spill area to absorb the spilled product.
- In the event of an uncontained discharge the contractor shall utilize onsite equipment to construct berms downgradient of the spill with sand or other absorbent material to contain and absorb the spilled product.
- Sand or material used to contain the spill should be collected and stored in such a way so as not to continue to affect additional ground. Once the spill has been contained, collected material should be placed on poly or plastic sheeting until removed from the site. In the event of potential rainfall, the material should be covered with poly or plastic sheeting.
- The contractor will be required to notify the owner, who will in turn contact TCEQ to notify them in the event of a spill. Additional notifications as required by the type and amount of spill will be conducted by the owner or owner's representative.
- The contractor will be required to report significant or hazardous spills in reportable quantities to:
  - o The National Response Center at (800) 424-8802
  - o The Edwards Aquifer Authority at (210) 222-2204
  - The TCEQ Regional Office (512) 339-2929 (if during business hours: 8 AM to 5 PM) or
  - o The State Emergency Response Center (800) 832-8224 (if after hours)
- Contaminated soils will be sampled for waste characterization. When the analysis results are known the contaminated soil will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.

Additional guidance can be obtained from TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) Section 1.4.16. Contractor shall review this section.

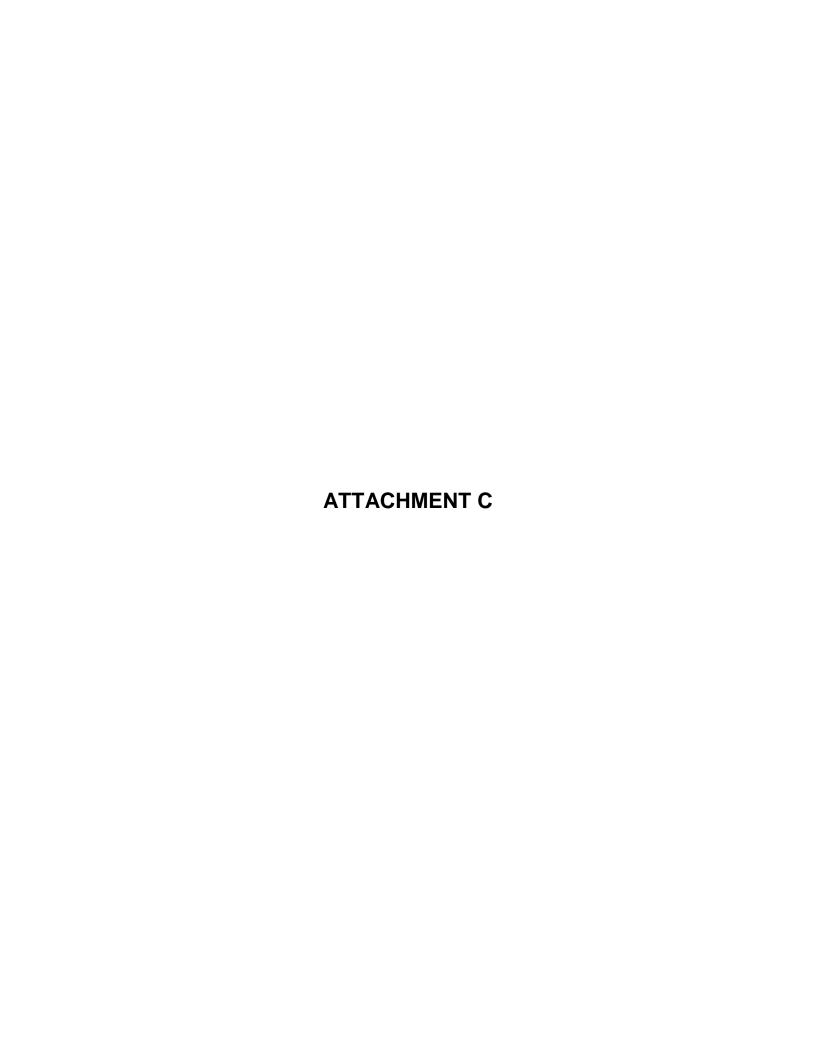




## **Potential Sources of Contamination**

### Potential sources of contamination include:

- Oil, grease, fuel and hydraulic fluid from construction equipment and vehicle drippings.
- Dirt and dust which may fall off construction vehicles.
- Hydrocarbons from asphalt paving operations.
- Miscellaneous trash and litter from construction workers and material wrappings.
- Concrete truck washout.





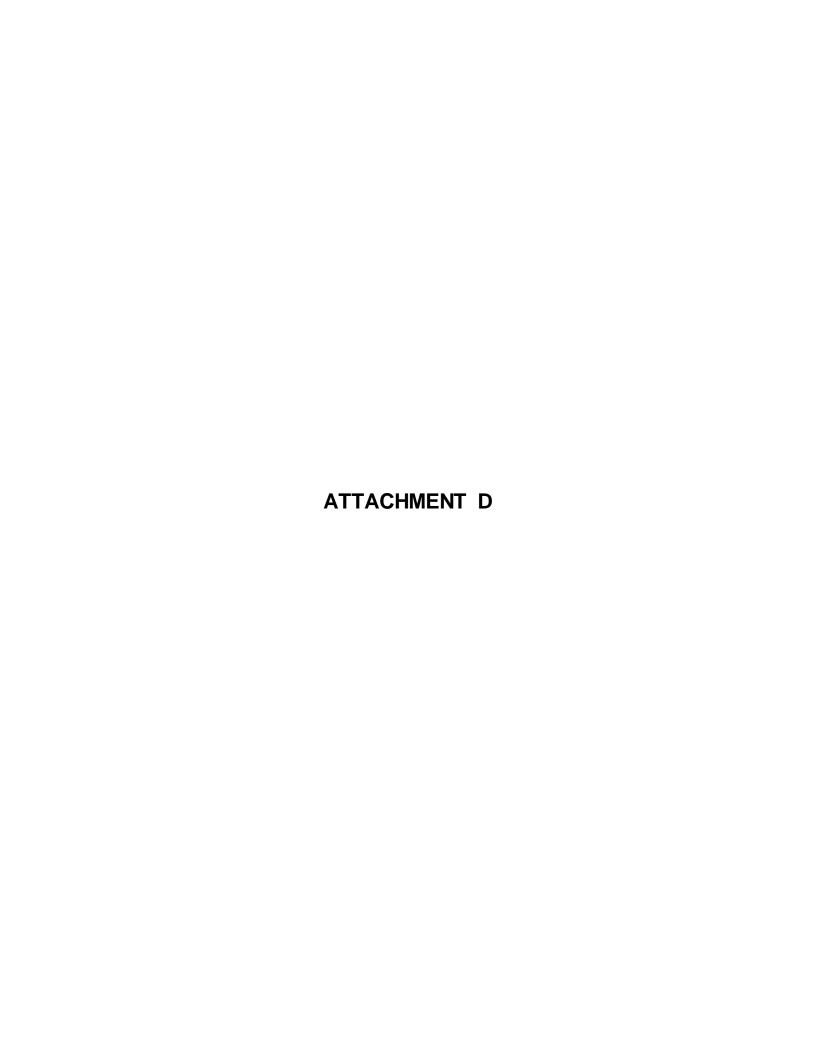
### **Sequence of Major Activities**

Site preparation for this project will generally include the following, in the order that they appear below:

- The entire project site will be affected by proposed roadway construction activities. It is anticipated that this may disturb approximately 12.99 acres.
- Of the 12.99 acres, clearing / removal of vegetation and trees from the location of the proposed roadway and drainage improvements will be necessary. It is anticipated that this may disturb approximately 1.30 acres.
- Of the 12.99 acres, excavation will occur to accommodate the installation of proposed drainage improvements. It is anticipated that this may disturb approximately 0.32 acres.

Construction activities specifically regarding disturbance of the project site would generally include the following, in the order that they appear below:

- Placement of temporary erosion control devices. It is anticipated that this may disturb a negligible amount of the site area.
- Excavation of roadway embankment, preparation of subgrade for roadway construction, placement of roadway base material, and placement of curbing, asphalt, and concrete material. It is anticipated that this may disturb approximately 2.65 acres.
- Site cleanup, top dressing, and revegetation (if applicable). It is anticipated that this may disturb the entire project area, which is approximately 12.99 acres.





### **Temporary Best Management Practices (TBMPs)**

Soil retention blankets, erosion control logs, and construction entrance/ exit(s) will be used during and/or after construction and will be installed prior to site preparation, as applicable. Prior to the initiation of construction activities, all previously installed control measures will be repaired or reestablished for their designed or intended purpose.

Engineered erosion control logs will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site. This will occur throughout the proposed construction area, where applicable.

Site preparation, which is the initiation of all activity on the project, will disturb the largest amount of soil. Therefore, before any work can begin, the contractor shall be responsible for the installation of all on-site control measures. The methodology for pollution prevention of on-site stormwater will include:

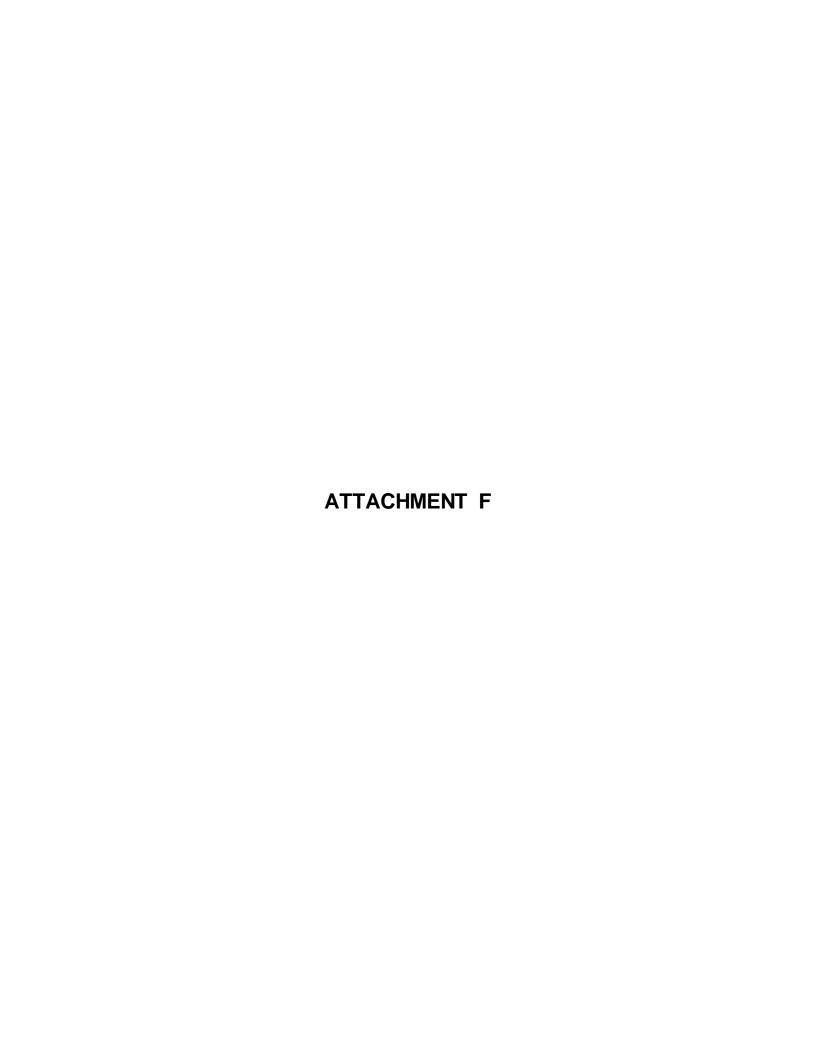
- Erection of erosion control logs along the downgradient boundary of construction activities for temporary erosion and sediment controls.
- Installation of stabilized construction entrance/ exit(s) to reduce the dispersion of sediment from the site.
- Installation of erosion control logs as inlet protection when there is planned construction within the drainage area that will runoff to the inlet.

Prior to the initiation of construction activities, all previously installed control measures will be repaired or reestablished for their designed or intended purpose. This work, which is the remainder of all activity on the project, may also disturb additional soil.

Temporary measures are intended to provide a method of slowing the flow of runoff from the construction site to allow sediment and suspended solids to settle out of the runoff. By containing the sediment and solids within the site, they will not enter surface streams and/or sensitive features.

No naturally occurring sensitive features were identified in the Geologic Assessment within the project limits.

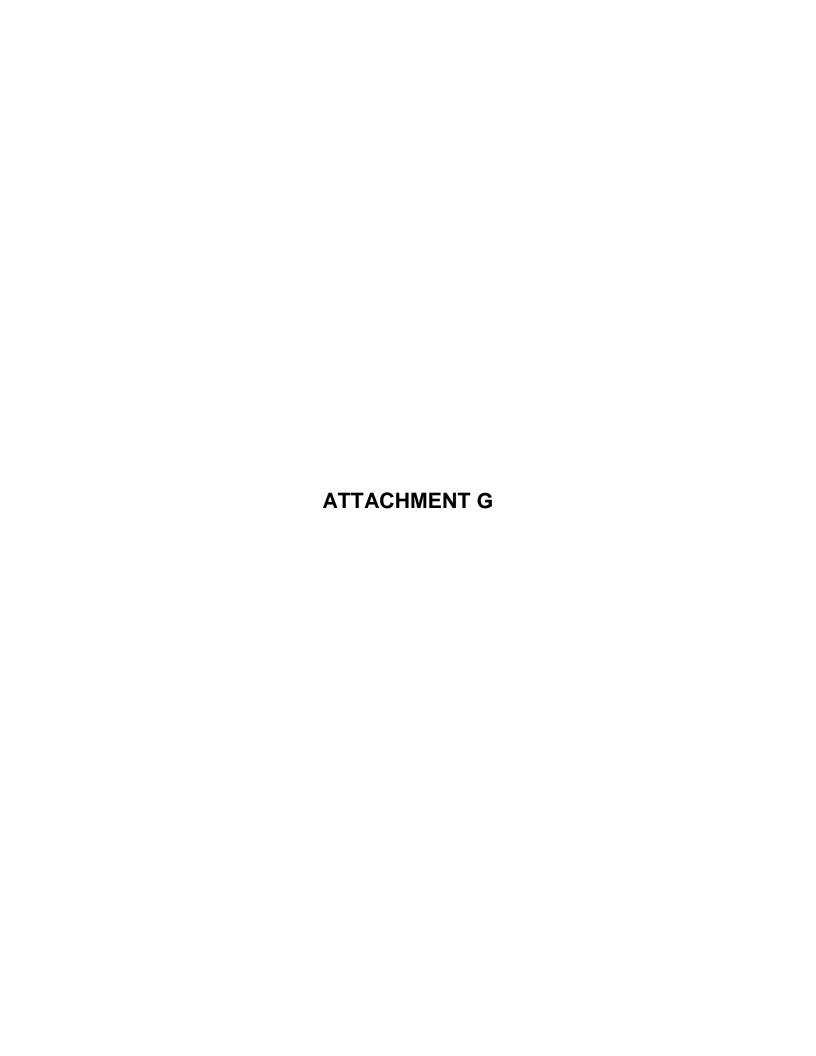
BMP measures utilized in this plan are intended to allow stormwater to continue downstream after passing through the BMPs. This will allow stormwater runoff to continue downgradient to streams and/or features that may exist downstream of this site.





# **Structural Practices**

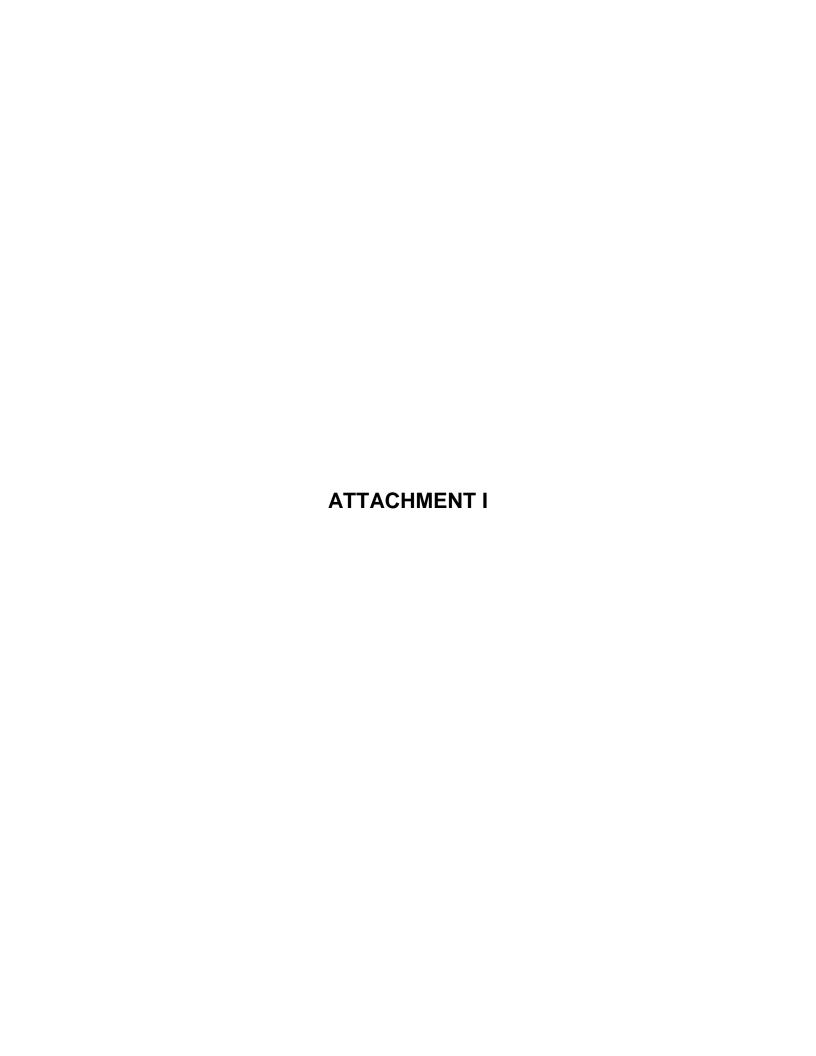
Structural practices to be used include erosion control logs. Refer to Attachment D for additional details.





# **Drainage Area Map**

Please see Appendix A for the project's drainage area map.





# **Inspection and Maintenance for BMP's**

Inspections and maintenance will be in accordance with TCEQ construction General Permit No. TXR150000.

| Road:                        |                   |             |                 | INSPECTIO                           | ON AND MAI                       | NTENAN              | CE REPOR             | Amount of last rainfall:<br>Date: |                         |                              |
|------------------------------|-------------------|-------------|-----------------|-------------------------------------|----------------------------------|---------------------|----------------------|-----------------------------------|-------------------------|------------------------------|
| Site or<br>Drainage<br>Area* | Approxima<br>From | te Stations | of              | **Date since<br>last<br>Disturbance | **Date of<br>next<br>Disturbance | Control<br>Measures | Current<br>Condition | Corre                             | ctive Action or Remarks | Work<br>Sequence<br>Priority |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 |                                     |                                  |                     |                      |                                   |                         |                              |
|                              |                   |             |                 | lde borrow sour<br>must be stabiliz |                                  |                     | s yard, stock        | piles, etc.                       |                         |                              |
|                              | Control Measures  |             |                 |                                     |                                  |                     |                      |                                   | Condition Codes         |                              |
|                              | 1. Temporary S    | Seeding     | 11. Diversion S | wale 21. Stone Outlet Structure     |                                  |                     |                      |                                   | U- Upgrade needed       |                              |

| Control Measures             |                                |  |  |  |  |  |  |
|------------------------------|--------------------------------|--|--|--|--|--|--|
| 1. Temporary Seeding         | 11. Diversion Swale            | 21. Stone Outlet Structure               |  |  |  |  |  |
| 2. Permanent Plant/Sod/Seed  | 12. Diversion Dike/Swale       | 22. Curbs and Gutters                    |  |  |  |  |  |
| 3. Mulch                     | 13. Pipe Slope Drain           | 23. Storm Sewers                         |  |  |  |  |  |
| 4. Soil Retention Blanket    | 14. Paved Flume                | 24. Velocity Control Devices             |  |  |  |  |  |
| 5. Buffer Zone               | 15. Rock Bed at Constr. Exit   | 25. Excess Dirt Removed from Rdwy Daily  |  |  |  |  |  |
| 6. Preserve Natural Resource | 16. Timber Mat at Constr. Exit | 26. Haul Roads dampened for dust Control |  |  |  |  |  |
| 7. Silt Fence                | 17. Channel Liner              | 27. Cleanup of Possible Contaminants     |  |  |  |  |  |
| 8. Hay Bales                 | 18. Sediment Trap              | 28                                       |  |  |  |  |  |
| 9. Rock Berm                 | 19. Sediment Basin             | 29                                       |  |  |  |  |  |
| 10. Diversion Dike           | 20. Storm Inlet Sediment Trap  | 30                                       |  |  |  |  |  |

| Condition Codes       |  |  |  |  |  |
|-----------------------|--|--|--|--|--|
| U- Upgrade needed     |  |  |  |  |  |
| R- Replacement needed |  |  |  |  |  |
| M- Maintenance needed |  |  |  |  |  |
| C- Cleaning needed    |  |  |  |  |  |
| I- Increase measures  |  |  |  |  |  |
| S- Stable (no action) |  |  |  |  |  |
| O1- Other:            |  |  |  |  |  |
| O2- Other:            |  |  |  |  |  |
| O3- Other:            |  |  |  |  |  |
| O4- Other:            |  |  |  |  |  |

| Construction Superintendent | Inspector |  |
|-----------------------------|-----------|--|





## **Schedule of Interim and Permanent Soil Stabilization Practices**

Interim stabilization would be performed pursuant to TCEQ Construction General Permit TXR150000. All areas not planned for impervious cover (i.e. asphalt, concrete) will be permanently stabilized with seeding and/or sodding prior to completion of this project.



## Agent Authorization Form

For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

| I               | Shane Rotter   |  |
|-----------------|--|--|
|                 | Print Name   |  |
|                 | TCEQ Liaison   |  |
|                 | Title - Owner/President/Other  |  |
| of              | Texas Department of Transportation Corporation/Partnership/Entity Name |  |
| have authorized | Michael Curl   |  |
|                 | Print Name of Agent/Engineer   |  |
| of              | The Estes Group, LLC   |  |
|                 | Print Name of Firm   |  |

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

## I also understand that:

- 1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
- 2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.
- 3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.
- 4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.
- 5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

Applicant's Signature

THE STATE OF \$
County of \$

BEFORE ME, the undersigned authority, on this day personally appeared known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this day of \_\_\_\_\_\_.

NOTARY PUBLIC

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: \_\_\_\_\_\_.





# **TCEQ Core Data Form**

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

## **SECTION I: General Information**

| 1. Reason for   | Submissi  | <b>on</b> (If other is checked | l please descrii | be in space provide  | ed.)        |              |   |             |                     |                 |
|---|---|--------------------------------|------------------|----------------------|-------------|--------------|---|-------------|---------------------|-----------------|
| New Pern  | nit, Registra   | ation or Authorization         | (Core Data Foi   | rm should be subm    | itted with  | the prog     | ram application.)                       |             |                     |                 |
| Renewal   | (Core Data  | Form should be submi           | tted with the r  | enewal form)         |             |              | Other                                   |             |                     |                 |
| 2. Customer   | Reference   | Number (if issued)             |                  | Follow this link to  |             | 3. Re        | gulated Entity Re                       | ference     | Number (if i        | ssued)          |
| CN 6008034  | CN 600803456 for CN or RN numbers in Central Registry** |                                |                  |                      | RN          | י            |   |             |                     |                 |
| SECTIO  | N II:   | Customer                       | Inforr           | <u>nation</u>        |             |              |   |             |                     |                 |
| 4. General Customer Information 5. Effective Date for Customer Information Updates (mm/dd/yyyy) |   |                                |                  |                      |             |              |   |             |                     |                 |
| New Custon  | mer   |                                | pdate to Custo   | omer Information     |             | Chai         | nge in Regulated En                     | tity Owne   | ership              |                 |
| Change in L   | egal Name   | (Verifiable with the Te        | xas Secretary o  | of State or Texas Co | omptrolle   | r of Publi   | Accounts)                               |             |                     |                 |
| The Custome   | r Name su   | ıbmitted here may              | be updated o     | automatically bo     | sed on v    | what is c    | urrent and active                       | with th     | e Texas Seci        | retary of State |
| (SOS) or Texa   | s Comptro   | oller of Public Accou          | ınts (CPA).      |                      |             |              |   |             |                     |                 |
| 6. Customer   | Legal Nam   | ne (If an individual, pri      | nt last name fi  | rst: eg: Doe, John)  |             |              | If new Customer,                        | enter pre   | evious Custom       | er below:       |
|   |   |                                |                  |                      |             |              |   |             |                     |                 |
| 7. TX SOS/CP  | A Filing N  | umber                          | 8. TX State      | Tax ID (11 digits)   |             |              | 9. Federal Tax ID                       |             | 10. DUNS Number (if |                 |
|   |   |                                |                  |                      |             |              | (9 digits)                              |             | applicable)         |                 |
|   |   |                                |                  |                      |             |              | (5 digits)                              |             |                     |                 |
|   |   |                                |                  |                      |             |              |   |             |                     |                 |
| 11. Type of C   | ustomer:  | ☐ Corpora                      | tion             |                      |             | Indivi       | Individual Partnership: General Limited |             |                     | eral 🗌 Limited  |
| Government: [   | City 🔲 (  | County 🔲 Federal 🔲             | Local State      | e 🗌 Other            |             | Sole P       | Sole Proprietorship                     |             |                     |                 |
| 12. Number o  | of Employ   | ees                            |                  |                      | <b>.</b>    |              | 13. Independe                           | ntly Ow     | ned and Ope         | erated?         |
| 0-20  | 21-100  | 101-250 251-                   | 500 🗌 501        | and higher           |             |              | ☐ Yes                                   | ☐ No        |                     |                 |
| 14. Customer  | r <b>Role</b> (Pro                                      | posed or Actual) – as i        | t relates to the | Regulated Entity     | listed on t | his form.    | Please check one o                      | f the follo | wing                |                 |
| Owner   |   | ☐ Operator                     |                  | wner & Operator      |             |              | □ out                                   |             |                     |                 |
| Occupation  | al Licensee   | Responsible Pa                 | rty 🔲            | VCP/BSA Applican     | it          |              | Other                                   |             |                     |                 |
| 15. Mailing   |   |                                |                  |                      |             |              |   |             |                     |                 |
| Address:  |   |                                |                  |                      |             |              |   |             |                     |                 |
| Address:  | City  |                                |                  | State                |             | ZIP          |   |             | ZIP + 4             |                 |
| 16. Country I   | <br>Mailing In  | <br>formation (if outside      | USA)             |                      | 17.         | <br>E-Mail A | ddress (if applicab                     | le)         |                     |                 |
|   |   |                                |                  |                      |             |              |   |             |                     |                 |
| 18. Telephon  | e Numher  | •                              |                  | 19. Extension o      | r Code      |              | 20 Fay N                                | lumher      | (if applicable)     |                 |
| TO' ICICNIINII  | c muniper   |                                |                  | TA' EVICIOION OF     | COUL        |              | ZU, Fax IV                              | ullibel     | iii ubbilcubiei     |                 |

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| SECTION III:   | <u>Regula</u>  | ated En                                  | <u>tity Intorn</u>               | <u>liation</u>                 |                                    |          |                                  |            |                |
|--|--|--|----------------------------------|--------------------------------|------------------------------------|----------|----------------------------------|------------|----------------|
| 21. General Regulated Entity Information (If 'New Regulated Entity" is selected, a new permit application is also required.)                               |  |  |                                  |                                |                                    |          |                                  |            |                |
| New Regulated Entity Update to Regulated Entity Name Update to Regulated Entity Information  |  |  |                                  |                                |                                    |          |                                  |            |                |
| The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC). |  |  |                                  |                                |                                    |          |                                  |            |                |
| 22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)   |  |  |                                  |                                |                                    |          |                                  |            |                |
| SH 29 from Wolf Ranch Parkv  | way to IH-35   | 5BFR                                     |                                  |                                |                                    |          |                                  |            |                |
| 23. Street Address of the Regulated Entity:  |  |  |                                  |                                |                                    |          |                                  |            |                |
| (No PO Boxes)  | City   |  | State                            |                                | ZIP                                |          |                                  | ZIP + 4    |                |
| 24. County   | Williamson   | 1  | 1                                | 1                              | l                                  |          | 1                                |            | 1              |
| L  |  | If no Stre                               | eet Address is provi             | ded, fields 2                  | 5-28 are re                        | quired.  |                                  |            |                |
| 25. Description to   | CI 20 C  | NAZ-IÉ Dougle Doul                       | 25 CDED                          |                                |                                    |          |                                  |            |                |
| Physical Location:   | 5H 29 Irom   | wolf Ranch Park                          | way to IH-35 SBFR                |                                |                                    |          |                                  |            |                |
| 26. Nearest City   |  |  |                                  |                                |                                    | State    |                                  | Nea        | rest ZIP Code  |
| Georgetown   |  |  |                                  |                                |                                    | TX       |                                  | 7862       | 16             |
| Latitude/Longitude are re used to supply coordinate  | -  | -  | -                                |                                | ata Standa                         | rds. (Ge | eocoding of th                   | e Physical | Address may be |
| 27. Latitude (N) In Decim  | dinates where none have been provided or to gain accuracy).  Decimal: 30.633056   28. Longitude (W) In Decimal: 97.697222  |  |                                  |                                |                                    |          | •                                |            |                |
|  | aı.  | 30.633056                                |                                  | 28. LC                         | ongitude (W                        | V) In De | cimai:                           | 37.03722   | 2              |
| Degrees  | Minutes  | 30.633056                                | Seconds                          | Degre                          |                                    | V) In De | Minutes                          | 37.03722   | Seconds        |
| Degrees 30   |  | 30.633056                                | Seconds 59                       |                                |                                    | V) In De |                                  | 37.03722   |                |
| _  | Minutes  |  | 59                               | Degre                          | es                                 |          | Minutes 41                       | ndary NAI  | Seconds 50     |
| 30   | Minutes 30.  | 37                                       | 59                               | Degre                          | es<br>97<br>y NAICS Co             |          | Minutes 41                       | ndary NAIG | Seconds 50     |
| 30 29. Primary SIC Code  | Minutes 30.  | 37<br>Secondary SIC                      | 59                               | Degre                          | es<br>97<br>y NAICS Co             |          | Minutes 41 32. Second            | ndary NAIG | Seconds 50     |
| 30 29. Primary SIC Code  | 30. (4 c   | 37 Secondary SIC                         | 59 <b>Code</b>                   | Degre 31. Primar (5 or 6 digit | es<br>97<br><b>y NAICS Co</b> oss) |          | Minutes 41 32. Second            | ndary NAIG | Seconds 50     |
| 30  29. Primary SIC Code (4 digits)  | 30. (4 c   | 37 Secondary SIC                         | 59 <b>Code</b>                   | Degre 31. Primar (5 or 6 digit | es<br>97<br><b>y NAICS Co</b> oss) |          | Minutes 41 32. Second            | ndary NAIG | Seconds 50     |
| 30  29. Primary SIC Code (4 digits)  33. What is the Primary B   | 30. (4 c   | 37 Secondary SIC ligits) this entity? (E | 59 <b>Code</b>                   | Degre 31. Primar (5 or 6 digit | es<br>97<br><b>y NAICS Co</b> oss) |          | Minutes 41 32. Second            | ndary NAIG | Seconds 50     |
| 30  29. Primary SIC Code (4 digits)  33. What is the Primary B Roadway construction  34. Mailing   | 30. (4 c   | 37 Secondary SIC igits) this entity? (E  | 59 <b>Code</b>                   | Degre 31. Primar (5 or 6 digit | es<br>97<br><b>y NAICS Co</b> oss) |          | Minutes 41 32. Second            | ndary NAIG | Seconds 50     |
| 30  29. Primary SIC Code (4 digits)  33. What is the Primary B   | 30. (4 c   | 37 Secondary SIC igits) this entity? (E  | 59 <b>Code</b>                   | Degre 31. Primar (5 or 6 digit | es<br>97<br><b>y NAICS Co</b> oss) |          | Minutes 41 32. Secon (5 or 6 dig | ndary NAIG | Seconds 50     |
| 30  29. Primary SIC Code (4 digits)  33. What is the Primary B Roadway construction  34. Mailing   | 30. (4 c  Business of telescope and telescop | 37 Secondary SIC ligits) this entity? (E | 59 Code On not repeat the SIC of | 31. Primar<br>(5 or 6 digit    | es 97  y NAICS Co ss)              | de       | Minutes 41 32. Secon (5 or 6 dig | ndary NAIG | Seconds 50     |

**39. TCEQ Programs and ID Numbers** Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

(512)930-5402

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| Dam Safety   | ,            | Districts                | L Edwards Aquifer    |            | ШΕ  | missions inventory Air | industrial Hazardous Waste |  |  |
|--|--------------|--------------------------|----------------------|------------|-----|------------------------|----------------------------|--|--|
|  |              |                          |                      |            |     |                        |                            |  |  |
| ☐ Municipal S  | Solid Waste  | New Source<br>Review Air | OSSF                 |            | ☐ P | etroleum Storage Tank  | PWS                        |  |  |
|  |              |                          |                      |            |     |                        |                            |  |  |
| Sludge   |              | Storm Water              | ☐ Title V Air        |            | П   | ires                   | Used Oil                   |  |  |
|  |              |                          |                      |            |     |                        |                            |  |  |
| ☐ Voluntary (  | Cleanup      | ☐ Wastewater             | ☐ Wastewater Agricul | ture       | □ v | Vater Rights           | Other:                     |  |  |
|  |              |                          |                      |            |     |                        |                            |  |  |
| SECTION IV: Preparer Information                                     |              |                          |                      |            |     |                        |                            |  |  |
| 40. Name:  | Michael Curl |                          |                      | 41. Title: |     | Project Engineer       |                            |  |  |
| 42. Telephone Number 43. Ext./Code 44. Fax Number 45. E-Mail Address |              |                          |                      |            |     |                        |                            |  |  |

| 40. Name:     | Michael Curl |               |                | 41. Title:         | Project Engineer |  |
|---------------|--------------|---------------|----------------|--------------------|------------------|--|
| 42. Telephone | Number       | 43. Ext./Code | 44. Fax Number | 45. E-Mail Address |                  |  |
| (512)350-1613 | 1            |               | ( ) -          | michael.curl       | @teg-tx.com      |  |

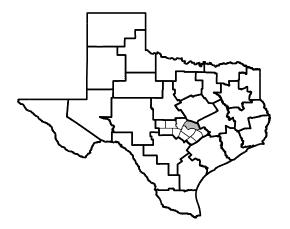
# **SECTION V: Authorized Signature**

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

| Company:         | The Estes Group, LLC Job Title: Project Eng |  |  | gineer |                          |
|------------------|---|--|--|--------|--------------------------|
| Name (In Print): | Michael Curl                                |  |  |        | ( 512 ) 350- <b>1613</b> |
| Signature:       | Michael Cur                                 |  |  | Date:  | 7/19/2024                |

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Registered Accessibility Specialist (RAS) Inspection Required

TDLR No.

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008).

# STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

# PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

STATE PROJECT NUMBER STP(CC337-1-53)HES CSJ 0337-01-053

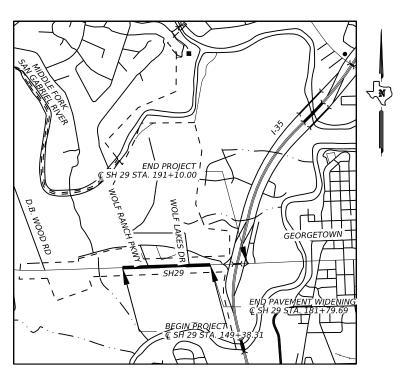
## SH 29 WILLIAMSON COUNTY

NET LENGTH OF PROJECT = 3,241.38 FT. = 0.614 MI.

FROM: 0.161 MI. W OF WOLF RANCH PARKWAY TO: 0.075 MI. W OF IH-35 SBFR

FOR THE CONSTRUCTION OF INTERSECTION IMPROVEMENTS WITH RIGHT AND/OR LEFT TURN LANES

CONSISTING OF GRADING, PAVING, SIGNING AND PAVEMENT MARKINGS, AND SIGNAL UPGRADES



 CONT
 SECT
 JOB
 HIGHWAY

 0337
 01
 053
 SH 29

 DIST
 COUNTY
 SHEET NO.

 AUS
 WILLIAMSON
 1

# DESIGN SPEED: MAIN LANE: 45 MPH

MAIN LANE: 45 M

A.D.T.: 2022: 31,195 VPD 2042: 43,673 VPD

## FINAL PLANS

| LETTING DATE:                       |
|-------------------------------------|
| DATE CONTRACTOR BEGAN WORK:         |
| DATE WORK WAS COMPLETED & ACCEPTED: |
| FINAL CONTRACT COST: \$             |
| CONTRACTOR                          |

PLANS PREPARED BY:





|   | RRECT:     |      |       |      |      |        |
|---|------------|------|-------|------|------|--------|
|   |            |      |       |      |      |        |
|   |            |      |       |      |      |        |
| Ш | CONSULTING | ENG. | (TBPE | FIRM | REG. | F-928) |

|                           |         | CONSOLITING ENG. (TETE      | 71K/7 KEG. 7 320) |
|---------------------------|---------|-----------------------------|-------------------|
| SUBMITTED<br>FOR LETTING: |         | RECOMMENDED<br>FOR LETTING: |                   |
|                           |         |                             |                   |
| CITY OF GEORG             | SETOWN  | DISTRICT DESIG              | N ENGINEER        |
| CITY OF GLONE             | JE TOWN | DISTRICT DESIG              | W ENGINEER        |
| SUBMITTED<br>FOR LETTING: |         | APPROVED<br>FOR LETTING:    |                   |
|                           |         |                             |                   |

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Texas Department of Transportation

NOT TO SCALE

EXCEPTIONS: NONE

EQUATIONS: NONE

RAILROAD CROSSINGS: NONE

AREA ENGINEER

DIRECTOR OF TRANSPORTATION
PLANNING & DEVELOPMENT

.2/2024 1:43:43 PM ://kh-nw bentlev.com:kh-nw-01/Docu

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                                                                                                                  ** SNS-95

** TS-FD-12

** WV & IZ-14

** TS-CF-21

** ED(1)-14

** ED(3)-14

** ED(6)-14

** ED(6)-14

** ED(9)-14

** ED(9)-14

** CPM(1)-23

** PM(1)-22

** PM(2)-22

** PM(3)-22

** SMD(GEN)-08

** SMD(SLIP-1)
                       TRAFFIC CONTROL STANDARDS
                  * BC(1)-21 THRU BC (12)-21

* LPCB-13

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* TCP(2-5)-18
                     * TCP(3-1)-13

    TCP(3-2)-13

                                                                                                                       SMD(SLIP-1)
SMD(SLIP-2)
                    * TCP(3-3)-14
                      TCP(3-4)-13
                                                                                                                       SMD(SLIP-3)
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                      WOLF RANCH PKWY TRAFFIC SIGNAL ELECTRIC DATA
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                        WOLF LAKES DR TRAFFIC SIGNAL ELEVATION VIEWS
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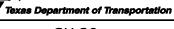
TRAFFIC CONTROL PLAN - NARRATIVE
TRAFFIC CONTROL PLAN - TYPICAL SECTIONS

TRAFFIC CONTROL PLAN - PHASE 1 TRAFFIC CONTROL PLAN - PHASE 2 TRAFFIC CONTROL PLAN - PHASE 4 TRAFFIC CONTROL PLAN - PHASE 5

TRAFFIC CONTROL PLAN - PHASE 6 TRAFFIC CONTROL PLAN - PHASE 7



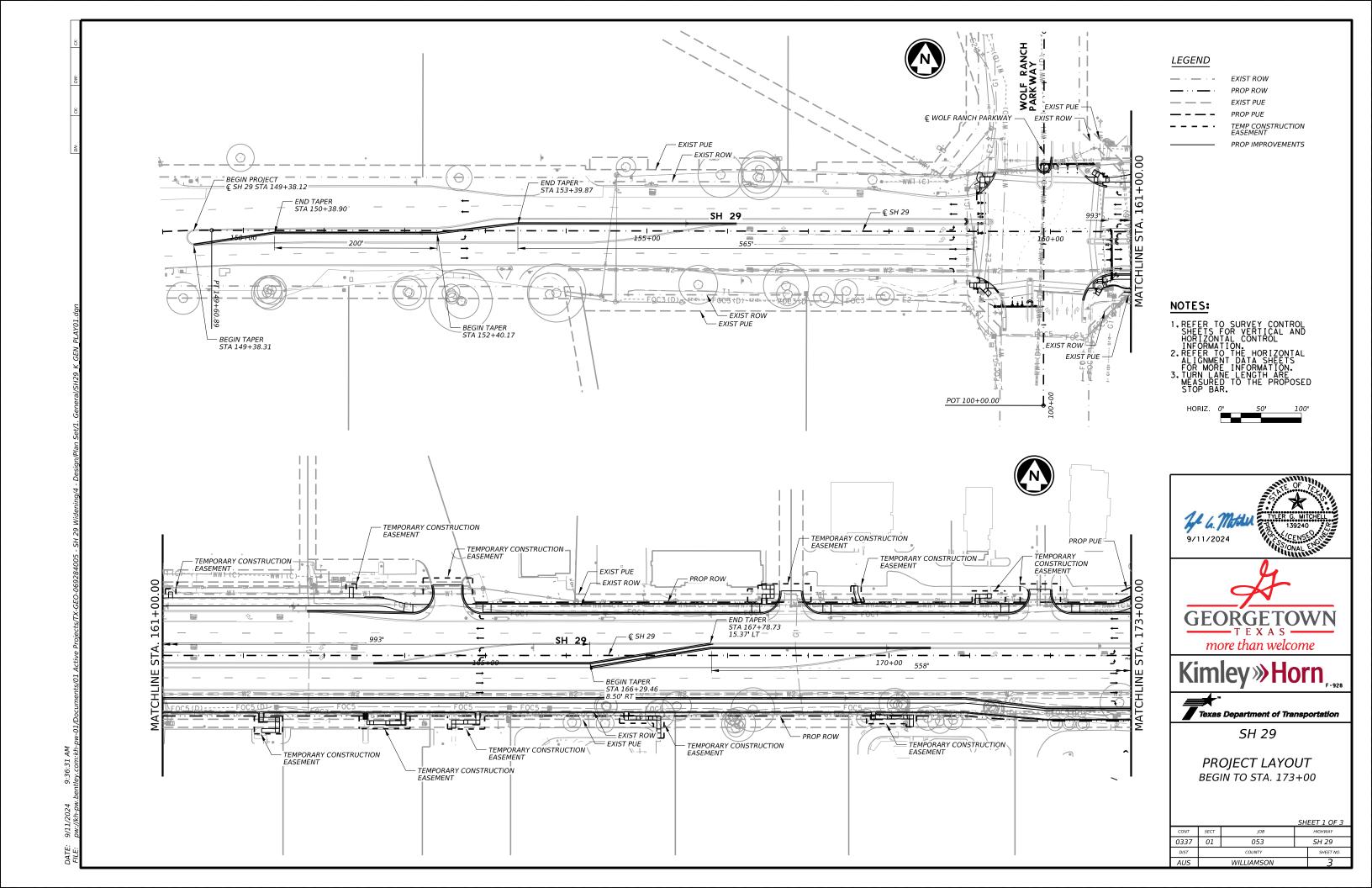




SH 29

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| 0337         | 01         | 053    | SH 29   |           |  |  |  |  |
| DIST         |            | COUNTY |         | SHEET NO. |  |  |  |  |
| AUS          | WILLIAMSON |        |         | 2         |  |  |  |  |



PROP PUE
PROP CONSTRUCTION
EASEMENT
PROP IMPROVEMENTS

## NOTES:

- REFER TO SURVEY CONTRO SHEETS FOR VERTICAL AN HORIZONTAL CONTROL
- REFER TO THE HORIZONTAL ALIGNMENT DATA SHEETS FOR MORE INFORMATION. TURN LANE LENGTH ARE







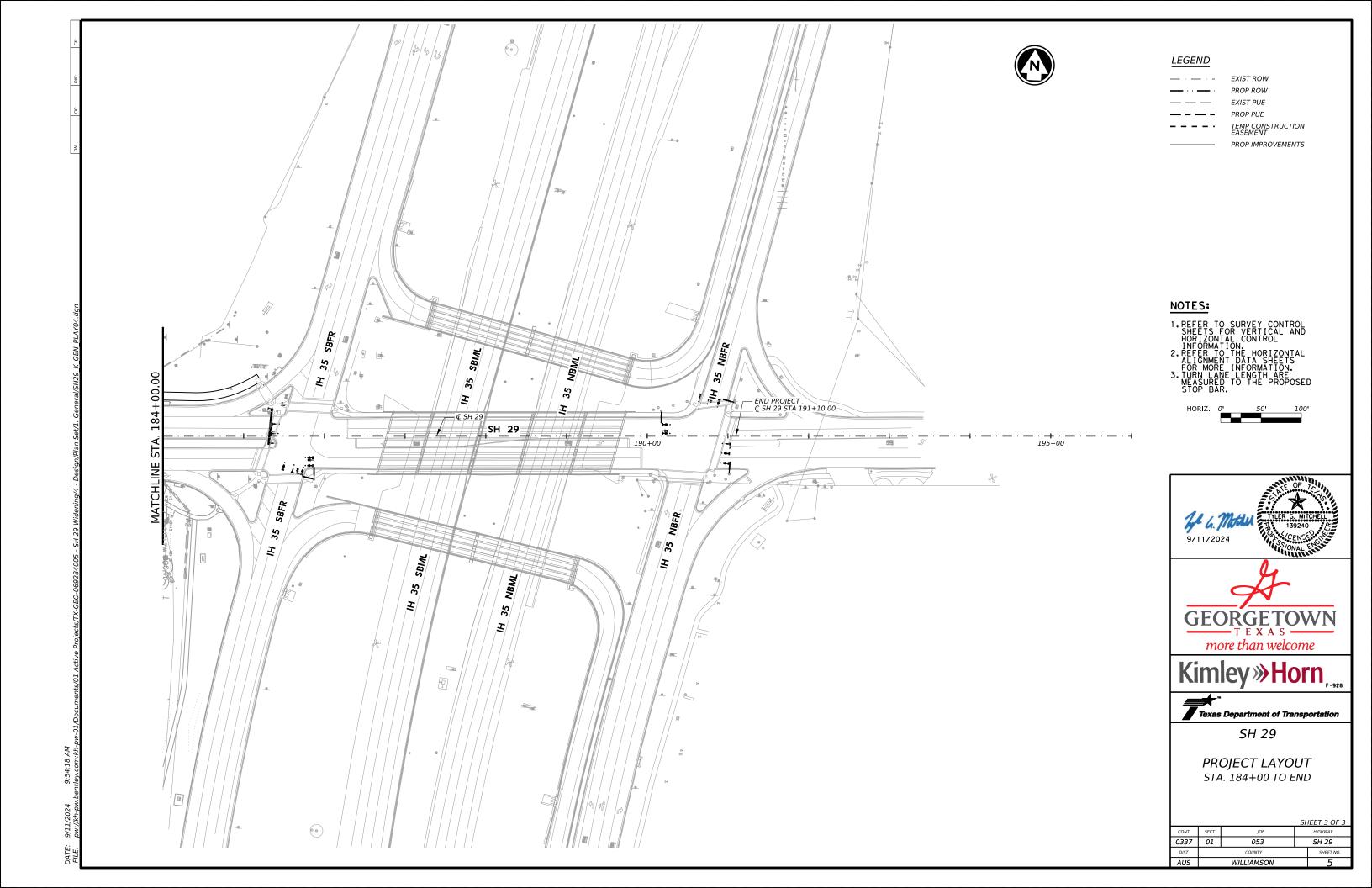




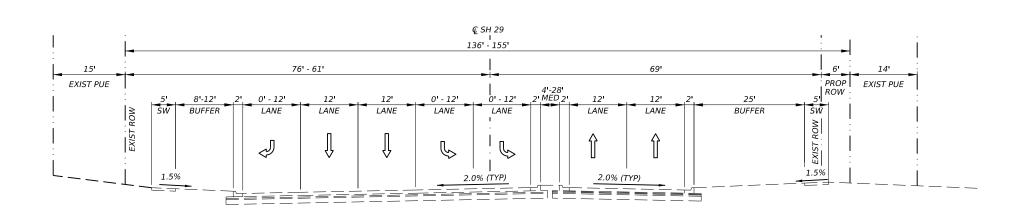
SH 29

PROJECT LAYOUT STA. 173+00 TO STA. 184+00

|      |      |            | <i></i> | FFT 2 0F 2 |
|------|------|------------|---------|------------|
|      |      |            | SH.     | EET 2 OF 3 |
| ONT  | SECT | JOB        |         | HIGHWAY    |
| 337  | 01   | 053        | SH 29   |            |
| DIST |      | COUNTY     |         | SHEET NO.  |
| NUS  |      | WILLIAMSON | 4       |            |



# EXISTING TYPICAL SECTION - SH 29 © SH 29 BEGIN TO STA. 165+60.00



EXISTING TYPICAL SECTION - SH 29 € SH 29 STA. 165+60.00 TO END PROJECT



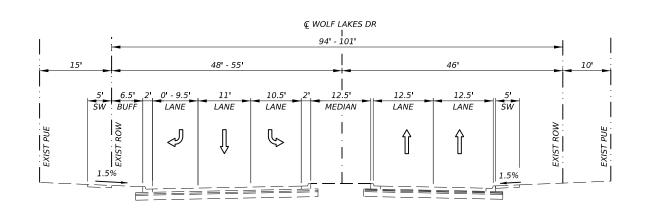
SH 29

EXISTING TYPICAL SECTIONS

|      |      |            | CLI   | EET 1 OF 2 |  |
|------|------|------------|-------|------------|--|
|      |      |            | эп    | EET 1 OF 2 |  |
| CONT | SECT | јов        |       | HIGHWAY    |  |
| 0337 | 01   | 053        | SH 29 |            |  |
| DIST |      | COUNTY     |       | SHEET NO.  |  |
| AUS  |      | WILLIAMSON |       | 6          |  |

€ WOLF LAKES DR

# EXISTING TYPICAL SECTION - WOLF LAKES DR € WOLF LAKES DR STA. 8+00.00 TO STA. 9+45.00



EXISTING TYPICAL SECTION - WOLF LAKES DR € WOLF LAKES DR STA. 10+56.00 TO STA. 13+00.00





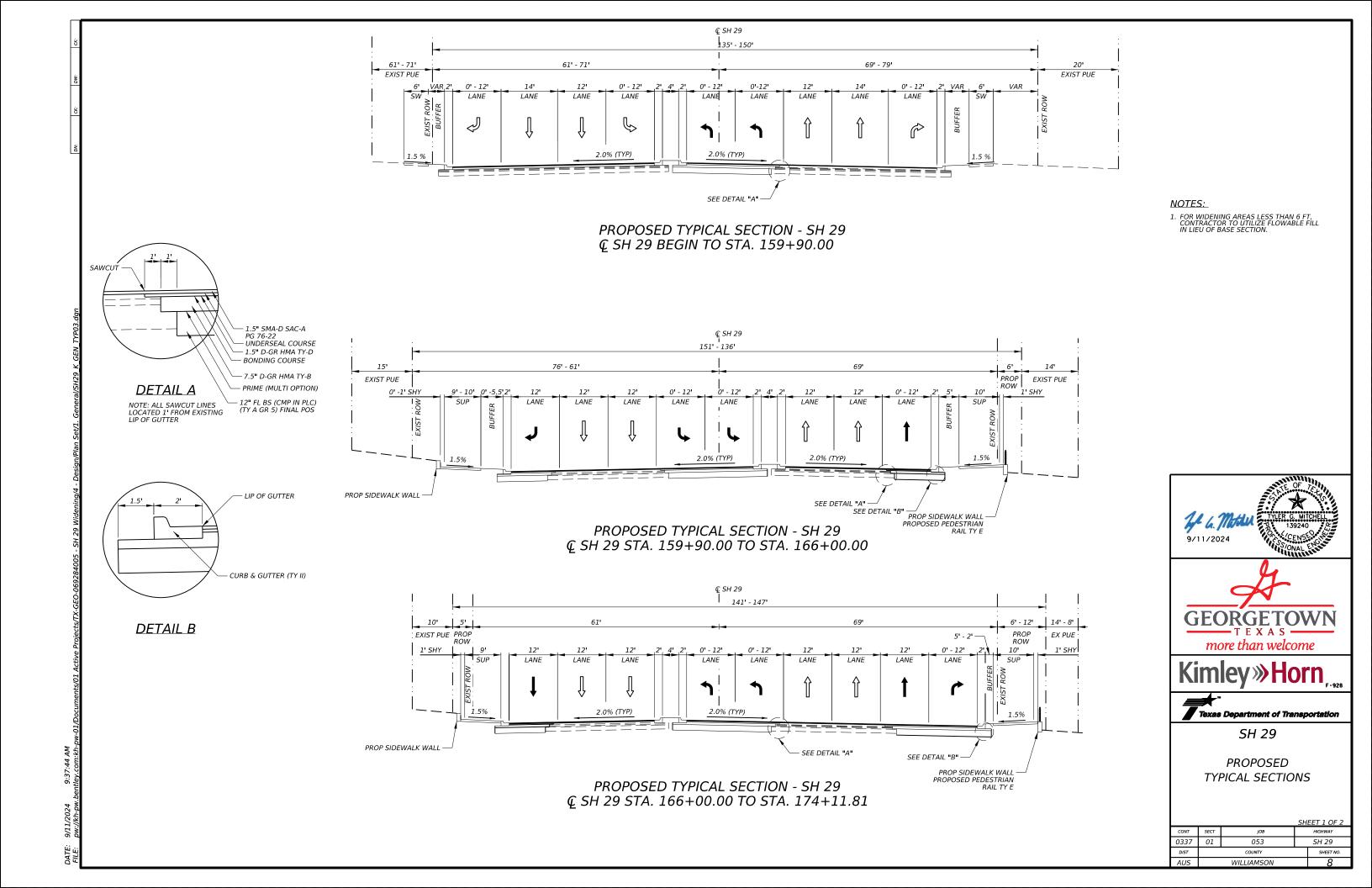


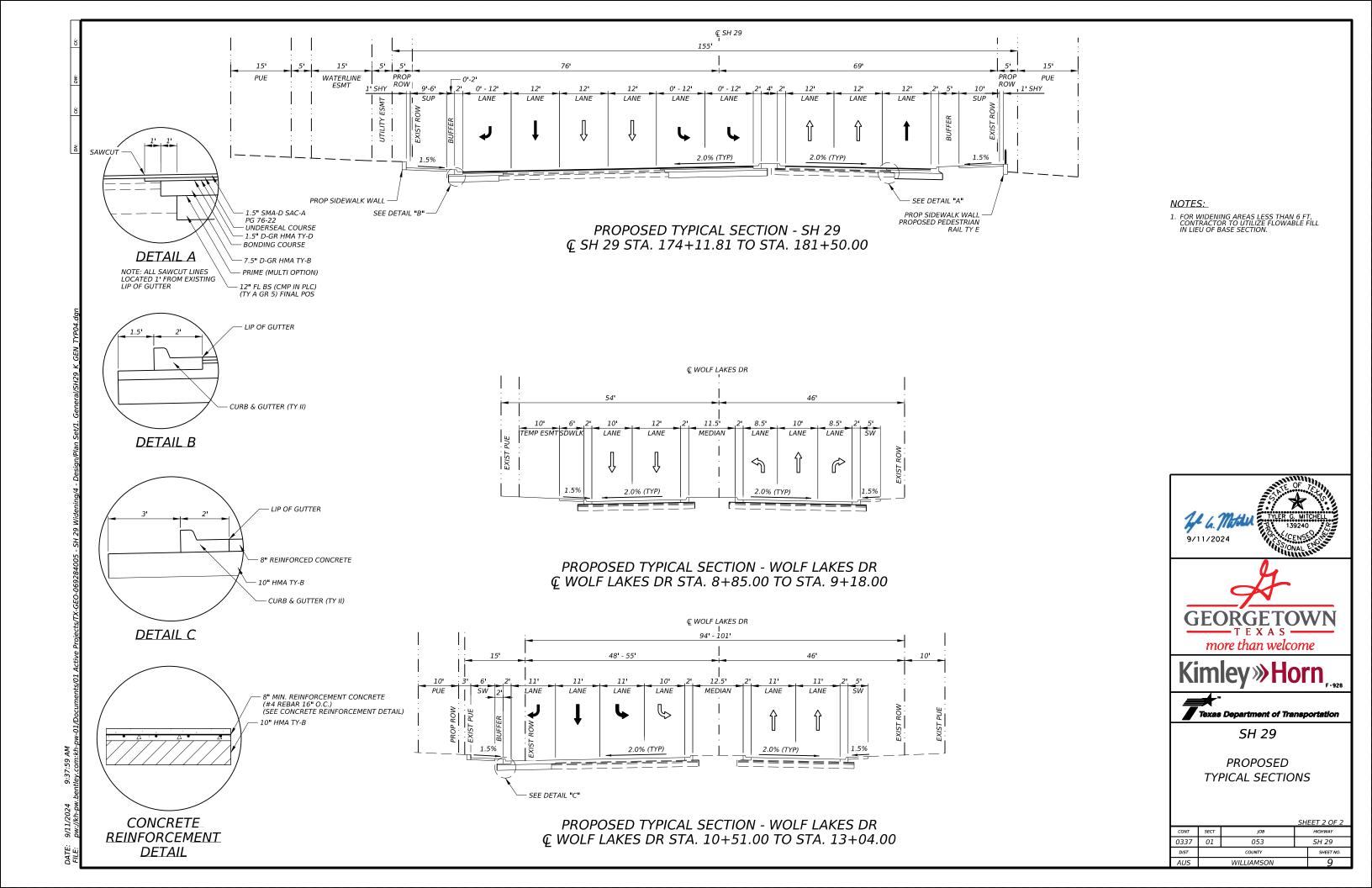


SH 29

**EXISTING** TYPICAL SECTIONS

|      |      |            | SH  | EET 2 OF 2 |
|------|------|------------|-----|------------|
| CONT | SECT | JOB        | J., | HIGHWAY    |
| 0337 | 01   | 053        |     | SH 29      |
| DIST |      | COUNTY     |     | SHEET NO.  |
| ALIC |      | MULLIAMCON |     | 7          |





SUMMARY OF MOBILIZATION ITEMS
LOCATION

PROJECT TOTALS

SUMMARY OF ROADWAY ITEMS

LOCATION

LS

7002

PREPARING ROW

STA

1.00

MOBILIZATI BARRICADES , SIGNS AND TRAFFIC HANDLING

МО

10.00

| SH 29 BEGIN TO STA. 153+00   |
|--|
| SH 29 STA. 153+00 TO STA. 159+00                                     |
| SH 29 STA. 159+00 TO STA. 165+00<br>SH 29 STA. 165+00 TO STA. 171+00 |
| SH 29 STA. 171+00 TO STA. 177+00                                     |
| SH 29 STA. 177+00 TO STA. 183+00                                     |
| SH 29 STA. 183+00 TO END   |
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| SH 29 STA, 153+00 TO STA, 159+00                                     |
| SH 29 STA. 159+00 TO STA. 165+00                                     |
| SH 29 STA. 165+00 TO STA. 171+00                                     |
| SH 29 STA. 171+00 TO STA. 177+00                                     |
| SH 29 STA, 177+00 TO STA, 183+00<br>SH 29 STA, 183+00 TO END         |
| PROJECT TOTALS   |
|  |
| SUMMARY OF EROSION CONTROL ITEMS                                     |
| LOCATION   |
|  |
|  |
|  |
|  |
|  |
|  |
| SH 29 BEGIN TO STA. 153+00   |
|  |

| 3 5 29 5 1A, 177+00 10 5 1A, 165+00 |                                 | 0/3              | 203                                 |   |             |  | 3H 29 31A.                      | 1//+00 10 1                                   | 55+00       | 910                                   |                                      | 210         |             |   |
|-------------------------------------|---------------------------------|------------------|-------------------------------------|---|-------------|--|---------------------------------|---|-------------|---------------------------------------|--------------------------------------|-------------|-------------|---|
| SH 29 STA. 183+00 TO END            |                                 |                  |                                     | 20  | 10          |  | PRO                             | JECT TOTALS                                   |             | 4382                                  | 469                                  | 2723        | 289         |   |
| PROJECT TOTALS                      | 12                              | 6573             | 1470                                | 20  | 10          |  |                                 |   |             |                                       |                                      |             |             |   |
|                                     |                                 |                  |                                     |   |             |  |                                 |   |             |                                       |                                      |             |             |   |
| SUMMARY OF EROSION CONTROL ITEMS    |                                 |                  |                                     |   |             |  |                                 |   |             |                                       |                                      |             |             | ] |
| LOCATION                            | 160<br>7002                     | 162<br>7002      | 164<br>7012                         | 164<br>7039                               | 168<br>7001 | 506<br>7002                                | 506<br>7011                     | 506<br>7020                                   | 506<br>7024 | 506<br>7039                           | 506<br>7041                          | 506<br>7044 | 506<br>7046 | 1 |
|                                     | 7002                            | 7002             | 7012                                | 7033                                      | 7001        | 7002                                       | 7011                            | 7020  | 7021        | 7033                                  | 7011                                 | 7011        | 7010        | 1 |
|                                     | FURN &<br>PLACE<br>TOPSOIL (4") | BLOCK<br>SODDING | DRILL SEED<br>(PERM_URBAN<br>_CLAY) | BROADCAST<br>SEED<br>(TEMP_WARM<br>_COOL) |             | ROCK FILTER<br>DAMS<br>(INSTALL)<br>(TY 2) | ROCK FILTER<br>DAMS<br>(REMOVE) | CONSTRUCT<br>ION EXITS<br>(INSTALL)<br>(TY 1) |             | TEMP SEDMT<br>CONT FENCE<br>(INSTALL) | TEMP SEDMT<br>CONT FENCE<br>(REMOVE) |             |             |   |
|                                     | SY                              | SY               | SY                                  | AC  | TGL         | LF   | LF                              | SY  | SY          | LF                                    | LF                                   | LF          | LF          | 1 |
| SH 29 BEGIN TO STA. 153+00          |                                 |                  |                                     |   |             |  |                                 |   |             |                                       |                                      | 164         | 164         | 1 |
| SH 29 STA. 153+00 TO 159+00         | 1135                            | 1135             | 568                                 | 568                                       | 20          |  |                                 |   |             |                                       |                                      | 1275        | 1275        | 1 |
| SH 29 STA. 159+00 TO 165+00         | 870                             | 870              | 435                                 | 435                                       | 15          |  |                                 | 78  | 78          |                                       |                                      | 1576        | 1576        | 1 |
| SH 29 STA. 165+00 TO 171+00         | 1186                            | 1186             | 593                                 | 593                                       | 20          |  |                                 |   |             |                                       |                                      | 1721        | 1721        | 1 |
| SH 29 STA. 171+00 TO 177+00         | 956                             | 956              | 478                                 | 478                                       | 17          |  |                                 |   |             |                                       |                                      | 1264        | 1264        | 1 |
| SH 29 STA. 177+00 TO END            | 219                             | 219              | 110                                 | 110                                       | 4           | 100  | 100                             | 78  | 78          | 100                                   | 100                                  | 295         | 295         | ] |
| PROJECT TOTALS                      | 4366                            | 4366             | 2184                                | 2184                                      | 76          | 100  | 100                             | 156   | 156         | 100                                   | 100                                  | 6295        | 6295        | J |
|                                     |                                 |                  |                                     |   |             |  |                                 |   |             |                                       |                                      |             |             |   |

| UMMARY OF ROADWAY ITEMS          |                      |                     |                   |   |  |
|----------------------------------|----------------------|---------------------|-------------------|---|--|
| LOCATION                         | 531                  | 3006                | 3007              | 7019  | 7019   |
|                                  | 7007                 | 7001                | 7001              | 7001  | 7002   |
|                                  | CURB RAMPS<br>(TY 3) | UNDERSEAL<br>COURSE | BONDING<br>COURSE | SUBSURFAC<br>E UTIL<br>LOCATE<br>(OUTSIDE<br>RDBED) | SUBSURFAC<br>E UTIL<br>LOCATE<br>(WITHIN<br>RDBED) |
|                                  | EA                   | GAL                 | GAL               | EA  | EA   |
| SH 29 BEGIN TO STA. 153+00       |                      | 87                  | 90                |   |  |
| SH 29 STA, 153+00 TO STA, 159+00 | 6                    | 1191                | 115               |   |  |
| SH 29 STA. 159+00 TO STA. 165+00 |                      | 1591                | 193               |   |  |
| SH 29 STA. 165+00 TO STA. 171+00 |                      | 1284                | 514               |   |  |
| SH 29 STA. 171+00 TO STA. 177+00 | 6                    | 1547                | 295               |   |  |
| SH 29 STA, 177+00 TO STA, 183+00 |                      | 873                 | 263               |   |  |
| SH 29 STA. 183+00 TO END         |                      |                     |                   | 20  | 10   |
| PROJECT TOTALS                   | 12                   | 6573                | 1470              | 20  | 10   |

| LOCATION                    | 104<br>7010               | 104<br>7011                      | 104<br>7013                                    | 104<br>7016             | 104<br>7017                      | 105<br>7016   | 496<br>7019             | 752<br>7005                       | 752<br>7006                           | 752<br>7007                           | 752<br>7008                           |
|-----------------------------|---------------------------|----------------------------------|--|-------------------------|----------------------------------|---|-------------------------|-----------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
|                             | REMOV<br>CONC<br>(PAVERS) | REMOV<br>CONC<br>(DRIVEWAYS<br>) | REMOV<br>CONC<br>(SIDEWALK,<br>RAMP OR<br>SUP) | REMOV<br>CONC<br>(CURB) | REMOV<br>CONC (CURB<br>& GUTTER) | RMV<br>(16"-20")<br>TRT/UNTRT<br>BASE & ASPH<br>PAV | REMOV STR<br>(RET WALL) | TREE<br>REMOVAL<br>(4" - 12" DIA) | TREE<br>REMOVAL<br>(12" - 18"<br>DIA) | TREE<br>REMOVAL<br>(18" - 24"<br>DIA) | TREE<br>REMOVAL<br>(24" - 30"<br>DIA) |
|                             | SY                        | SY                               | SY   | LF                      | LF                               | SY  | LF                      | EA                                | EA                                    | EA                                    | EA                                    |
| SH 29 BEGIN TO STA. 153+00  | 421                       |                                  |  |                         | 362                              | 34  |                         |                                   |                                       |                                       |                                       |
| SH 29 STA, 153+00 TO 159+00 | 872                       |                                  |  |                         | 326                              | 41  |                         |                                   |                                       |                                       |                                       |
| SH 29 STA. 159+00 TO 165+00 | 427                       | 205                              | 702  | 123                     | 1097                             | 263   |                         |                                   |                                       |                                       |                                       |
| SH 29 STA. 165+00 TO 171+00 | 1485                      | 133                              | 650  | 87                      | 1776                             | 140   |                         | 1                                 | 5                                     | 2                                     |                                       |
| SH 29 STA. 171+00 TO 177+00 | 267                       | 131                              | 855  | 79                      | 1547                             | 306   | 135                     | 2                                 | 2                                     | 1                                     |                                       |
| SH 29 STA, 177+00 TO 183+00 | 910                       |                                  | 516  |                         | 1133                             | 86  |                         | 1                                 |                                       |                                       | 1                                     |
| PROJECT TOTALS              | 4382                      | 469                              | 2723   | 289                     | 6241                             | 870   | 135                     | 4                                 | 7                                     | 3                                     | 1                                     |

| SUMMARY OF REMOVAL ITEMS    |                           |                                  |  |                         |                                  |   |                         |                                   |                                       |                                       |                                       |
|-----------------------------|---------------------------|----------------------------------|--|-------------------------|----------------------------------|---|-------------------------|-----------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| LOCATION                    | 104<br>7010               | 104<br>7011                      | 104<br>7013                                    | 104<br>7016             | 104<br>7017                      | 105<br>7016   | 496<br>7019             | 752<br>7005                       | 752<br>7006                           | 752<br>7007                           | 752<br>7008                           |
|                             | REMOV<br>CONC<br>(PAVERS) | REMOV<br>CONC<br>(DRIVEWAYS<br>) | REMOV<br>CONC<br>(SIDEWALK,<br>RAMP OR<br>SUP) | REMOV<br>CONC<br>(CURB) | REMOV<br>CONC (CURB<br>& GUTTER) | RMV<br>(16"-20")<br>TRT/UNTRT<br>BASE & ASPH<br>PAV | REMOV STR<br>(RET WALL) | TREE<br>REMOVAL<br>(4" - 12" DIA) | TREE<br>REMOVAL<br>(12" - 18"<br>DIA) | TREE<br>REMOVAL<br>(18" - 24"<br>DIA) | TREE<br>REMOVAL<br>(24" - 30"<br>DIA) |
|                             | SY                        | SY                               | SY   | LF                      | LF                               | SY  | LF                      | EA                                | EA                                    | EA                                    | EA                                    |
| SH 29 BEGIN TO STA. 153+00  | 421                       |                                  |  |                         | 362                              | 34  |                         |                                   |                                       |                                       |                                       |
| SH 29 STA, 153+00 TO 159+00 | 872                       |                                  |  |                         | 326                              | 41  |                         |                                   |                                       |                                       |                                       |
| SH 29 STA. 159+00 TO 165+00 | 427                       | 205                              | 702  | 123                     | 1097                             | 263   |                         |                                   |                                       |                                       |                                       |
| SH 29 STA. 165+00 TO 171+00 | 1485                      | 133                              | 650  | 87                      | 1776                             | 140   |                         | 1                                 | 5                                     | 2                                     |                                       |
| SH 29 STA. 171+00 TO 177+00 | 267                       | 131                              | 855  | 79                      | 1547                             | 306   | 135                     | 2                                 | 2                                     | 1                                     |                                       |
| SH 29 STA, 177+00 TO 183+00 | 910                       |                                  | 516  |                         | 1133                             | 86  |                         | 1                                 |                                       |                                       | 1                                     |
| PROJECT TOTALS              | 4382                      | 469                              | 2723   | 289                     | 6241                             | 870   | 135                     | 4                                 | 7                                     | 3                                     | 1                                     |

7062

(TY E)

LF

202 1778

LF

LF

CONC CURB & GUTTER (TY II)

CONC CURB (TY F2)

CONC CURB (TY C1)

CONC CURB (TY F3)

CONC CURB (TY F3)

LF

LF

SY

CONC SIDEWALKS

SY

CURB RAMPS CURB RAMPS (TY 1) (TY 2)

EA

EA

7002

CY

RIPRAP (CONC)(5 IN) (HANDRAIL)

7092

CONC PAV (JOINT REINF) (8")

SY

FLOWABLE BACKFILL

CY

STONE-MTRX -ASPH SMA-D SAC-A PG76-22 PAV(0" TO 2")

SY

TON

| ,        | SH 29   SUMMARY TABLES   SHEET 1 OF 2   CONT   SECT   JOB   HIGHWAY   O337   O1   O53   SH 29 |  |               |                      |  |  |  |  |  |  |  |  |  |  |  |
|----------|---|--|---------------|----------------------|--|--|--|--|--|--|--|--|--|--|--|
| AL<br>O" | G   |  | — T E X A S - |                      |  |  |  |  |  |  |  |  |  |  |  |
|          | Ki  | m  | ley»Ho        | )rn <sub>F-928</sub> |  |  |  |  |  |  |  |  |  |  |  |
|          | 7   | Texas Department of Transportation SH 29 |               |                      |  |  |  |  |  |  |  |  |  |  |  |
|          |   | Texas Department of Transportation SH 29 |               |                      |  |  |  |  |  |  |  |  |  |  |  |
|          |   | SU                                       | MMARY TABL    | ES                   |  |  |  |  |  |  |  |  |  |  |  |
|          |   |  | SHEET         | 1 OF 2               |  |  |  |  |  |  |  |  |  |  |  |
|          | CONT  | SECT JOB HIGH                            |               |                      |  |  |  |  |  |  |  |  |  |  |  |
|          | 0337  | 01                                       | 053           | SH 29                |  |  |  |  |  |  |  |  |  |  |  |
|          | DIST  |  | COUNTY        | SHEET NO.            |  |  |  |  |  |  |  |  |  |  |  |
|          | AUS   |  | WILLIAMSON    | 12                   |  |  |  |  |  |  |  |  |  |  |  |

| SUMMARY OF WORKZONE TRAFFIC CONT | ROL ITEMS                                  |                         |                              |  |  |                                       |                                       |   |   |                  |   |           |           |           |                            |
|----------------------------------|--|-------------------------|------------------------------|--|--|---------------------------------------|---------------------------------------|---|---|------------------|---|-----------|-----------|-----------|----------------------------|
| LOCATION                         | 503  | 505                     | 505                          | 512  | 512  | 512                                   | 512                                   | 512   | 512   | 662              | 662   | 662       | 662       | 662       | 677                        |
|                                  | 7002                                       | 7001                    | 7003                         | 7009   | 7010   | 7033                                  | 7034                                  | 7057  | 7058  | 7005             | 7008  | 7065      | 7068      | 7100      | 7002                       |
|                                  | PORTABLE<br>CHANGEABL<br>E MESSAGE<br>SIGN | TMA<br>(STATIONAR<br>Y) | TMA<br>(MOBILE<br>OPERATION) | PORT CTB<br>(FUR &<br>INST)(LOW<br>PROF)(TY 1) | PORT CTB<br>(FUR &<br>INST)(LOW<br>PROF)(TY 2) | PORT CTB<br>(MOVE)(LOW<br>PROF)(TY 1) | PORT CTB<br>(MOVE)(LOW<br>PROF)(TY 2) | PORT CTB<br>(REMOVE)(<br>LOW<br>PROF)(TY 1) | PORT CTB<br>(REMOVE)(<br>LOW<br>PROF)(TY 2) | MRK<br>NON-REMOV | WK ZN PAV<br>MRK<br>NON-REMOV<br>(W)6"(SLD) | MRK REMOV | MRK REMOV | MRK REMOV | ELIM EXT PM<br>& MRKS (6") |
|                                  | EA   | DAY                     | DAY                          | LF   | LF   | LF                                    | LF                                    | LF  | LF  | LF               | LF  | LF        | LF        | LF        | LF                         |
| TCP PHASE 1                      |  |                         |                              |  |  |                                       |                                       |   |   |                  |   | 997       |           | 3337      | 1276                       |
| TCP PHASE 2                      |  |                         |                              | 1200   | 200  |                                       |                                       |   | 120   | 541              | 1326  |           | 2376      |           | 246                        |
| TCP PHASE 3                      |  |                         |                              | 340  |  | 1200                                  | 80                                    | 1540  | 80  | 807              | 3467  |           | 1087      |           | 281                        |
| TCP PHASE 4                      |  |                         |                              |  |  |                                       |                                       |   |   | 437              |   |           | 627       |           | 211                        |
| TCP PHASE 5                      |  |                         |                              |  |  |                                       |                                       |   |   |                  |   |           | 442       |           |                            |
| TCP PHASE 6                      |  |                         |                              |  |  |                                       |                                       |   |   |                  |   |           |           |           |                            |
| TCP PHASE 7                      |  |                         |                              |  |  |                                       |                                       |   |   |                  |   |           |           |           |                            |
| PROJECT TOTALS                   | 4  | 334                     | 81                           | 1540   | 200  | 1200                                  | 80                                    | 1540  | 200   | 1785             | 4793  | 997       | 4532      | 3337      | 2014                       |

7003

FL BS (CMP

IN PLC)(TY A GR 5)(FNAL

POS)

CY

PRIME COAT (MULTI OPTION)

GAL

EMBANK (FNL)(OC)(T Y B)

CY

36 8456 1520 2791

EXCAV (ROADWAY)

CY

D-GR HMA TY-B PG64-22 (EXEMPT)

TON

D-GR HMA

TY-D PG 76-22

(EXEMPT)

TON

| SUMMARY OF SIGNING ITEMS    |  |  |  |
|-----------------------------|--|--|--|
| LOCATION                    | 644  | 644  | 644                                      |
|                             | 7001   | 7065                                       | 7068                                     |
|                             | IN SM RD SN<br>SUP&AM<br>TY10BWG(1)<br>SA(P) | RELOCATE<br>SM RD SN<br>SUP&AM TY<br>10BWG | RELOCATE<br>SM RD SN<br>SUP&AM TY<br>TWT |
|                             | EA   | EA   | EA                                       |
| SH 29 BEGIN TO STA. 153+00  |  |  |  |
| SH 29 STA. 153+00 TO 159+00 |  |  | 1  |
| SH 29 STA. 159+00 TO 165+00 |  |  | 5  |
| SH 29 STA. 165+00 TO 171+00 |  | 1  | 5  |
| SH 29 STA. 171+00 TO 177+00 | 1  | 1  | 1  |
| SH 29 STA. 177+00 TO 183+00 | 1  | 1  | 3  |
| SH 29 STA. 183+00 TO END    |  |  |  |
| PROJECT TOTALS              | 2  | 3  | 15                                       |

|                             | EA   | L EA                                       |  |
|-----------------------------|--|--|--|
| WOLF RANCH                  | 1  | 4  |  |
| WOLF LAKES                  | 1  |  |  |
| IH 35                       | 1  | 8  |  |
| PROJECT TOTALS              | 3  | 12   |  |
| SUMMARY OF SIGNING ITEMS    |  |  |  |
| LOCATION                    | 644<br>7001                                  | 644<br>7065                                | 644<br>7068                              |
|                             | IN SM RD SN<br>SUP&AM<br>TY10BWG(1)<br>SA(P) | RELOCATE<br>SM RD SN<br>SUP&AM TY<br>10BWG | RELOCATE<br>SM RD SN<br>SUP&AM TY<br>TWT |
|                             | EA   | EA   | EA                                       |
| SH 29 BEGIN TO STA. 153+00  |  |  |  |
| SH 29 STA. 153+00 TO 159+00 |  |  | 1  |

RETROFIT REFL BRDR SHEETING (3

SEC)

EΑ

6007 7001

BBU SYSTEM (EXTERNAL BATTERY CABINET)

WOLF RANCH

WOLF LAKES

PROJECT TOTALS

SUMMARY OF TRAFFIC SIGNAL ITEMS LOCATION

TRF SIG CBL (TY A)(12 AWG)(2 CONDR)

1535

2310

4000

7845

6013 7006

GROUND BOX (PREPARE)

| SUMMARY OF TRAFFIC SIGNAL ITEMS |             |   |             |   |                                 |   |                      |             |                                     |             |   |                                    |                                     |                                |                                  |                                      |                                  |                                      |                                  |                                      |                                     |  |  |                 |
|---------------------------------|-------------|---|-------------|---|---------------------------------|---|----------------------|-------------|-------------------------------------|-------------|---|------------------------------------|-------------------------------------|--------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|-------------------------------------|--|--|-----------------|
| LOCATION                        | 416<br>7044 | 416   | 618<br>7030 | 618<br>7031                               | 618<br>7036                     | 618<br>7037                               | 618<br>7090          | 620<br>7008 | 620<br>7010                         | 621<br>7005 | 624<br>7008                               | 680<br>7003                        | 680<br>7011                         | 680<br>7004                    | 682<br>7001                      | 682<br>7002                          | 682<br>7003                      | 682<br>7004                          | 682                              | 682<br>7006                          | 682<br>7018                         | 682<br>7042  | 682<br>7043  | 682<br>7044     |
|                                 | 7044        | 7046  | 7030        | 7031                                      | 7030                            | 7037                                      | 7090                 | 7008        | 7010                                | 7003        | 7006                                      | 7003                               | 7011                                | 7004                           | 7001                             | 7002                                 | 7003                             | 7004                                 | 7005                             | 7006                                 | 7018                                | 7042   | 7043   | 1044            |
|                                 | (TRF SIG    | T DRILL SHAFT<br>(TRF SIG<br>I) POLE) (48 IN) | (PVC) (SCH  | CONDT<br>(PVC) (SCH<br>40) (2")<br>(BORE) | CONDT<br>(PVC) (SCH<br>40) (3") | CONDT<br>(PVC) (SCH<br>40) (3")<br>(BORE) | CONDUIT<br>(PREPARE) | (NO.8)      | R ELEC CONDR<br>(NO.6)<br>INSULATED | (4 CONDR)   | GROUND<br>BOX TY D<br>(162922)W<br>/APRON | INSTALL<br>HWY TRF SIO<br>(SYSTEM) | INSTALL<br>HWY TRF SIG<br>(UPGRADE) | REMOVING<br>TRAFFIC<br>SIGNALS | VEH SIG SEC<br>(12")LED(G<br>RN) | VEH SIG SEC<br>(12")LED(G<br>RN ARW) | VEH SIG SEC<br>(12")LED(YE<br>L) | VEH SIG SEC<br>(12")LED(YE<br>L ARW) | VEH SIG SEC<br>(12")LED(RE<br>D) | VEH SIG SEG<br>(12")LED(R<br>ED ARW) | PED SIG SEC<br>(LED)(COU<br>NTDOWN) | BACKPLATE<br>W/REF<br>BRDR(3<br>SEC)(VENT)<br>ALUM | BACKPLATE<br>W/REF<br>BRDR(4<br>SEC)(VENT)<br>ALUM | W/REF<br>BRDR(5 |
|                                 | LF          | LF  | LF          | LF  | LF                              | LF  | LF                   | LF          | LF                                  | LF          | EA  | EA                                 | EA                                  | EA                             | EA                               | EA                                   | EA                               | EA                                   | EA                               | EA                                   | EA                                  | EA   | EA   | EA              |
| WOLF RANCH                      |             | 66  | 140         |   | 110                             |   | 520                  | 1170        |                                     | 615         |   |                                    | 1                                   |                                | 6                                | 9                                    | 6                                | 13                                   | 6                                | 11                                   |                                     | 11   | 4  |                 |
| WOLF LAKES                      |             | 88  | 235         | 160                                       | 320                             | 1335                                      |                      | 2195        | 585                                 | 650         | 5   | 1                                  |                                     | 1                              | 10                               | 11                                   | 10                               | 13                                   | 10                               | 9                                    | 8                                   | 15   | 2  | 2               |
| IH 35                           | 13          |   | 50          |   | 100                             |   | 1200                 | 100         |                                     | 1200        |   |                                    | 1                                   |                                | 4                                | 5                                    | 4                                | 5                                    | 4                                | 4                                    |                                     | 3  | 4  |                 |
| PROJECT TOTALS                  | 13          | 154   | 425         | 160                                       | 530                             | 1335                                      | 1720                 | 3465        | 585                                 | 2465        | 5   | 1                                  | 2                                   | 1                              | 20                               | 25                                   | 20                               | 31                                   | 20                               | 24                                   | 8                                   | 29   | 10   | 2               |
| SUMMARY OF TRAFFIC SIGNAL ITEMS |             |   |             |   |                                 |   |                      |             |                                     |             |   |                                    |                                     |                                |                                  |                                      | I                                |                                      |                                  |                                      |                                     |  |  |                 |
| LOCATION                        | 682<br>7045 | 684<br>7007                                   | 684<br>7031 | 684<br>7033                               | 686<br>7002                     | 686<br>7048                               | 686<br>7056          | 686<br>7064 | 686<br>7068                         | 686<br>7313 | 687<br>7001                               | 687<br>7005                        | 688<br>7001                         | 688<br>7003                    | 690<br>7027                      | 690<br>7030                          | 690<br>7086                      | 690<br>7091                          | 6001<br>7003                     | 6006<br>7001                         | 6006<br>7002                        | 6006<br>7005                                       | 6006<br>7007                                       | 6006<br>7014    |

PED POLE ASSEMBLY

EΑ

REMOVE PED PED DETECT PUSH BUTTON (APS)

EA

EA

PED PETECTOR CONTROLLE R UNIT

EΑ

REMOVAL OF SIGNAL RELATED

SIGNS

PERMOVAL OF REMOVE VID PEDESTRIAN IMAGE VEH DET SYS BUTTONS (VIVDS)

EΑ

20

REMOVE LED TRAF SIG LAMP UNIT

ILSN (8S)

4

4

VIVDS CAM ASSY FXD LNS

EΑ

VIVDS PROSR SYS

EΑ

VIVDS CNTRL SOFTWARE

EΑ

VIVDS CABLING

1000

1400

2500

**GEORGETOWN** more than welcome

Kimley»Horn

Texas Department of Transportation SH 29

SUMMARY TABLES

053

COUNTY

WILLIAMSON

SH 29

SHEET NO.

0337 01

4900

VIVDS CAM

ASSY (RELOCATE)

EΑ

| SUMMARY OF PAVEMENT MARKING ITEM | S  |  |   |  |   |   |              |                             |                             |                             |                                 |             |                           |                             |                           |  |                                      |                                      |                               |                               |                                  |
|----------------------------------|--|--|---|--|---|---|--------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------|-------------|---------------------------|-----------------------------|---------------------------|--|--------------------------------------|--------------------------------------|-------------------------------|-------------------------------|----------------------------------|
| LOCATION                         | 666<br>7018                                    | 666<br>7024                                    | 666<br>7036                                     | 666<br>7042                                    | 666<br>7066                                   | 666<br>7137   | 666<br>7172  | 666<br>7175                 | 666<br>7177                 | 666<br>7179                 | 666<br>7184                     | 666<br>7186 | 666<br>7194               | 666<br>7213                 | 666<br>7221               | 666<br>7408                                    | 666<br>7411                          | 666<br>7423                          | 672<br>7004                   | 672<br>7006                   | 678<br>7002                      |
|                                  | REFL PAV<br>MRK TY I<br>(W)8"(DOT)<br>(100MIL) | REFL PAV<br>MRK TY I<br>(W)8"(SLD)(<br>100MIL) | REFL PAV<br>MRK TY I<br>(W)24"(SLD)<br>(100MIL) | REFL PAV<br>MRK TY I<br>(W)(ARROW)<br>(100MIL) | REFL PAV<br>MRK TY I<br>(W)(WORD)(<br>100MIL) | RE PV MRK<br>TY<br>I(BLACK)6"<br>(SHADOW)(0<br>90MIL) | (W) 6" (BRK) | RE PM TY II<br>(W) 6" (SLD) | RE PM TY II<br>(W) 8" (DOT) | RE PM TY II<br>(W) 8" (SLD) | RE PM TY II<br>(W) 24"<br>(SLD) | 1 000       | RE PM TY II<br>(W) (WORD) | RE PM TY II<br>(Y) 6" (SLD) | RE PM TY II<br>(Y) (CURB) | REFL PAV<br>MRK TY I<br>(W)6*(BRK)(<br>100MIL) | REFL PAV<br>MRK TY I (W)<br>6" (SLD) | REFL PAV<br>MRK TY I (Y)<br>6" (SLD) | REFL PAV<br>MRKR TY<br>II-A-A | REFL PAV<br>MRKR TY<br>II-C-R | PAV SURF<br>PREP FOR<br>MRK (6") |
|                                  | LF   | LF   | LF  | EA   | EA  | LF  | LF           | LF                          | LF                          | LF                          | LF                              | EA          | EA                        | LF                          | LF                        | LF   | LF                                   | LF                                   | EA                            | EA                            | LF                               |
| SH 29 BEGIN TO STA. 153+00       | 35   | 259  |   | 1  | 1   |   | 125          |                             |                             | 259                         |                                 | 1           | 1                         |                             |                           | 125  |                                      |                                      |                               | 7                             | 125                              |
| SH 29 STA. 153+00 TO 159+00      | 17   | 1727   |   | 10   | 10  |   | 297          |                             | 17                          | 1727                        |                                 | 10          | 10                        |                             |                           | 297  |                                      |                                      |                               | 15                            | 297                              |
| SH 29 STA. 159+00 TO 165+00      | 122  | 1413   | 1057  | 11   | 6   |   | 348          | 164                         | 122                         | 1413                        | 1057                            | 11          | 6                         | 156                         |                           | 348  | 164                                  | 156                                  |                               | 18                            | 348                              |
| SH 29 STA. 165+00 TO 171+00      | 79   | 898  |   | 2  | 6   |   | 599          |                             | 79                          | 898                         |                                 | 2           | 6                         |                             |                           | 599  |                                      |                                      |                               | 30                            | 599                              |
| SH 29 STA. 171+00 TO 177+00      | 78   | 1603   | 927   | 17   | 10  | 20  | 597          |                             | 78                          | 1603                        | 927                             | 17          | 10                        | 105                         |                           | 597  |                                      | 105                                  |                               | 30                            | 617                              |
| SH 29 STA. 177+00 TO 183+00      | 63   | 994  |   | 2  | 5   |   | 532          |                             | 63                          | 994                         |                                 | 2           | 5                         | 150                         | 150                       | 532  |                                      | 150                                  | 8                             | 27                            | 532                              |
| SH 29 STA. 183+00 TO END         |  |  |   |  |   |   | 27           |                             |                             |                             |                                 |             |                           | 46                          | 46                        | 27   |                                      | 46                                   | 2                             | 2                             | 27                               |
| PROJECT TOTALS                   | 394  | 6894   | 1984  | 43   | 38  | 20  | 2525         | 164                         | 359                         | 6894                        | 1984                            | 43          | 38                        | 457                         | 196                       | 2525   | 164                                  | 457                                  | 10                            | 129                           | 2545                             |

INS TRF SIG PL AM(S)1 PL AM(S)1 ARM(60')LU ARM(65')LU M&ILSN SIG PL

EΑ

EΑ

INS TRF SIG PL AM(S)1 ARM(44')LU M&ILSN INS TRF SIG PL AM(S)1 ARM(50')LU M&ILSN

EΑ

EΑ

EΑ

TRF SIG CBL (TY A)(14 AWG)(7 CONDR)

LF

1185

2555

2000

5740

INS TRF SIG PL AM (S)ILSN ARM(9')

EA

TRF SIG CBL (TY A)(14 AWG)(5 CONDR)

815

2905

2000

5720

|            | 05 - SH 29 Widening/4 - Design/Plan Set/1. General/SH29_1 |
|------------|---|
|            | Active Projects/TX-GEO-069284005 - SH                     |
| 3:33:37 PM | :ley.com:kh-pw-01/Documents/01                            |
| /16/2024   | pw://kh-pw.bent   |
| DATE: 9,   | FILE:   |

| SUMMARY OF DRAINAGE ITEMS   |                      |                                    |                            |                            |                            |                            |                            |                                  |                                 |                                 |                                 |                                      |                                     |
|-----------------------------|----------------------|------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------------|-------------------------------------|
|                             | 401                  | 402                                | 464                        | 464                        | 464                        | 464                        | 464                        | 464                              | 465                             | 465                             | 465                             | 465                                  | 465                                 |
|                             | 7001                 | 7001                               | 7003                       | 7005                       | 7007                       | 7009                       | 7011                       | 7042                             | 7005                            | 7006                            | 7011                            | 7013                                 | 7014                                |
| LOCATION                    | FLOWABLE<br>BACKFILL | TRENCH<br>EXCAVATION<br>PROTECTION | RC PIPE (CL III)(18<br>IN) | RC PIPE (CL III)(24<br>IN) | RC PIPE (CL III)(30<br>IN) | RC PIPE (CL III)(36<br>IN) | RC PIPE (CL III)(48<br>IN) | RC PIPE (ARCH)(CL<br>III)(DES 3) | JCTBOX(COMPL)(P,<br>B)(3FTX3FT) | JCTBOX(COMPL)(PJ<br>B)(4FTX4FT) | JCTBOX(COMPL)(PJ<br>B)(6FTX6FT) | INLET<br>(COMPL)(PCO)(3F<br>T)(NONE) | INLET<br>(COMPL)(PCO)(3F<br>)(LEFT) |
|                             | CY                   | LF                                 | LF                         | LF                         | LF                         | LF                         | LF                         | LF                               | EA                              | EA                              | EA                              | EA                                   | EA                                  |
| SH 29 STA. 153+00 TO 159+00 |                      |                                    |                            |                            |                            |                            |                            |                                  |                                 |                                 |                                 |                                      |                                     |
| SH 29 STA. 159+00 TO 165+00 |                      | 14                                 |                            | 31                         |                            |                            |                            |                                  |                                 | 1                               |                                 |                                      |                                     |
| SH 29 STA. 165+00 TO 171+00 | 6                    | 633                                | 550                        | 183                        | 120                        | 263                        |                            |                                  | 1                               |                                 |                                 | 1                                    | 2                                   |
| SH 29 STA. 171+00 TO 177+00 | 6                    | 677                                | 413                        | 108                        |                            | 202                        | 82                         |                                  |                                 |                                 | 2                               |                                      |                                     |
| SH 29 STA. 177+00 TO END    |                      | 307                                | 396                        |                            |                            |                            | 274                        |                                  |                                 | 1                               |                                 |                                      |                                     |
| WLD BEGIN TO END            |                      |                                    | 17                         | 108                        |                            | 11                         | 49                         | 8                                |                                 |                                 | 2                               |                                      |                                     |
| PROJECT TOTALS              | 12                   | 1631                               | 1376                       | 430                        | 120                        | 476                        | 405                        | 8                                | 1                               | 2                               | 4                               | 1                                    | 2                                   |

| SUMMARY OF DRAINAGE ITEMS   |                                      |  |  |   |   |   |     |                       |                            |                      |                        |
|-----------------------------|--------------------------------------|--|--|---|---|---|-----|-----------------------|----------------------------|----------------------|------------------------|
|                             | 465                                  | 465  | 465  | 465   | 465   | 476   | 479 | 479                   | XXX                        | 496                  | 496                    |
| LOCATION                    | INLET<br>(COMPL)(PCO)(3F<br>T)(BOTH) | 7017<br>INLET<br>(COMPL)(PCO)(4F<br>T)(NONE) | 7018<br>INLET<br>(COMPL)(PCO)(4<br>)(LEFT) | 7026<br>INLET<br>FT (COMPL)(PCO)(6FT<br>)(LEFT) | 7031<br>INLET<br>(COMPL)(PCU)(3F<br>T)(RIGHT) | 7011<br>JACK BOR OR TUN<br>PIPE(24 IN)(RC)(CL<br>III) |     | ADJUSTING INLET (CAP) | 7xxx<br>SWAQ-110<br>BYPASS | REMOV STR<br>(INLET) | 7007  REMOV STR (PIPE) |
|                             | EA                                   | EA   | EA   | EA  | EA  | LF  | LF  | EA                    | EA                         | EA                   | LF                     |
| SH 29 STA. 153+00 TO 159+00 |                                      |  |  |   |   |   |     |                       |                            |                      |                        |
| SH 29 STA. 159+00 TO 165+00 |                                      |  |  |   | 1   |   | 1   | 1                     |                            |                      |                        |
| SH 29 STA. 165+00 TO 171+00 |                                      | 1  | 3  |   | 3   |   |     |                       |                            | 4                    | 552                    |
| SH 29 STA. 171+00 TO 177+00 | 1                                    |  | 2  | 2   | 3   | 99  |     |                       |                            | 3                    | 340                    |
| SH 29 STA. 177+00 TO END    |                                      |  |  | 3   | 3   |   |     |                       | 1                          | 1                    | 287                    |
| WLD BEGIN TO END            | 1                                    |  | 1  | 1   | 1   |   |     |                       | 1                          |                      |                        |
| PROJECT TOTALS              | 2                                    | 1  | 6  | 6   | 11  | 99  | 1   | 1                     | 2                          | 8                    | 1179                   |





Texas Department of Transportation

SH 29 DRAINAGE SUMMARY TABLES

| SHEET 1 OF 1 |            |        |           |         |  |  |
|--------------|------------|--------|-----------|---------|--|--|
| CONT         | SECT       | JOB    |           | HIGHWAY |  |  |
| 0337         | 01         | 053    | SH 29     |         |  |  |
| DIST         |            | COUNTY | SHEET NO. |         |  |  |
| AUS          | WILLIAMSON |        |           | 14      |  |  |

## BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER

THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION

DO NOT STORE ANY CONSTRUCTION MATERIAL OR FOLLIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD

THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER AND CITY OF IMPENDING/UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, SHOULDER, ETC. CLOSURES OR DETOURS.

CONTRACTOR TO FIELD VERIFY ALL UTILITIES HORIZONTALLY AND VERTICALLY PRIOR TO CONSTRUCTION.

ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES. PROPERTY OWNERS TO BE NOTIFIED AT LEAST 48 HOURS IN ADVANCE OF WORK ON THEIR DRIVEWAYS

TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR

AT NO TIME SHALL AN INTERSECTION OR DRIVEWAY BE COMPLETELY CLOSED DURING CONSTRUCTION. EACH INTERSECTION OR DRIVEWAY SHALL BE PHASE CONSTRUCTED TO MAINTAIN ACCESS FOR PROPERTY OWNERS.
COORDINATE WITH TXDOT IF SIGNAGE IS REQUIRED TO DESIGNATE AT DRIVEWAY LOCATIONS. IF REQUIRED BY TXDOT, CONTRACTOR TO PROVIDE ACCESS SIGNS AT ALL TIMES DURING CONSTRUCTION.

ALL CONSTRUCTION AND CONSTRUCTION RELATED ACTIVITIES SHALL BE PERFORMED MONDAY THRU FRIDAY FROM 7:00AM TO 6:00PM. NIGHT TIME WORK AND LANE CLOSURES WILL ONLY BE ALLOWED BETWEEN 8:00PM TO 5:00AM AS APPROVED BY THE CITY AND ENGINEER.

REMOVAL AND DISPOSAL OF EXISTING ABANDONED LITH ITIES (FITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM.

COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO BARRICADES, SIGNS AND TRAFFIC HANDLING ITEMS.

PRIOR TO EACH PHASE, CONTRACTOR TO ADJUST PROJECT BARRICADES, SIGNS AND STORM WATER POLLUTION PREVENTION MEASURES AS NECESSARY.

CONTRACTOR TO INFORM TXDOT AREA OFFICE 10 BUSINESS DAYS PRIOR TO ANY LANE CLOSURES ON SH 29 AS SHOWN

UTILIZE TXDOT STANDARD WZ (BTS-2)-3 FOR SIDEWALK AND DETOURS, SIDEWALKS SHALL NOT BE CLOSED FOR PERIODS OF MORE THAN 7 DAYS, UNLESS OTHERWISE APPROVED BY THE ENGINEER. CONTRACTOR TO PROVIDE SAFETY FENCE TO SEPARATE COSNTRUCTION AREAS FROM PEDESTRIAN. CONTRACTOR SHALL PHASE CONSTRUCT AND UTILIZE EXISTING RAMPS TO MAINTAIN PEDESTRIAN CROSSINGS.

### 2. SEQUENCE OF WORK

THIS PROJECT WILL BE CONSTRUCTED IN (8)PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, VERIFY ROW HAS BEEN ACQUIRED, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE BARNICADES AS SHOWN ON THE FLANS AIMOVICA SO SINECTED/AFROVED BY THE ENGINEER. LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.

PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE PHASES NOTED BELOW

PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES. A BRIEF DESCRIPTION OF THESE PHASES ARE

PHASE I - CONSTRUCT SH 29 MEDIAN ROAD IMPROVEMENTS FROM 0.20 MILES WEST OF WOLF RANCH PARKWAY TO 370

PHASE II - CONSTRUCT THE WB RIGHT-TURN/THRU LANE OF THE SH 29 ROAD IMPROVEMENTS FROM WOLF RANCH PARKWAY TO 370' WEST OF IH 35 SB FRONTAGE ROAD, INCLUDING DRIVEWAYS FOR THE NORTH SIDE AS SHOWN IN THE

PHASE III - CONSTRUCT THE EB RIGHT-TURN/THRU LANE OF THE SH 29 ROAD IMPROVEMENTS FROM WOLF RANCH PARKWAY TO WEST OF IH 35 SB FRONTAGE ROAD AS SHOWN IN PLANS.

PHASE IV - CONSTRUCT WOLF LAKES DR INTERSECTION RADIUS RETURN, INCLUDING PED RAMPS AND TRAFFIC SIGNAL WORK AS SHOWN IN THE PLANS. CONSTRUCT WOLF LAKES PED RAMPS AND TRAFFIC SIGNAL WORK, IH-35 SBFR AND NBFR

PHASE V - CONSTRUCT WOLF LAKES DR WIDENING AS SHOWN IN THE PLANS.

PHASE VI - CONSTRUCT THE SUP ALONG WB SH29 AND WOLF LAKES DR.

PHASE VII - CONSTRUCT THE SUP ALONG EB SH29 AND WOLF LAKES DR.

PHASE VIII - CONSTRUCT THE FINAL 1.5" OF SMA-D PAVEMENT SURFACE AND FINAL PAVEMENT MARKINGS FROM 0.20 MILES WEST OF WOLF RANCH PARKWAY TO 370' WEST OF IH 35 SB FRONTAGE ROAD

APPROVED TXDOT STANDARDS AND ATTACHED TCP TYPICAL SECTIONS SHOULD BE USED.

PORTABLE MESSAGE BOARDS TO PROVIDE A MINIMUM 7 DAY ADVANCE NOTICE OF TRAFFIC CHANGES.

#### PHASE I

THE INTENT OF PHASE I IS TO EXTEND SH 29 LEFT-TURN LANES BY RECONSTRUCTING THE MEDIAN. THE FULL PAVEMENT SECTION, UP TO BUT NOT INCLUDING THE FINAL 1.5" OF SMA-D, WILL BE CONSTRUCTED FOR SH 29. NIGHT TIME LANE CLOSURES MAY BE UTILIZED TO KEEP EXISTING DUAL LEFT TURN LANES OPEN DURING PEAK TRAFFIC HOURS, AS APPROVED BY THE CITY AND ENGINEER.

-MOBILIZATION -SET UP PROIECT BARRICADES AND SIGNS

PLACE STORM WATER POLLUTION PREVENTION MEASURES ALONG THE

CONSTRUCTION ZONE.

REMOVE EXIST PAVEMENT MARKINGS IN CONFLICT, INSTALL WORKZONE MARKINGS, AND SHIFT TRAFFIC AS SHOWN IN -CONSTRUCT LEFT-TURN LANE EXTENSIONS, PROPOSED CURB, AND MEDIAN RIPRAP AS SHOWN IN PLANS. -PHASE I MUST BE COMPLETED PRIOR TO STARTING PHASE II.

THE INTENT OF PHASE II IS TO CONSTRUCT SH 29 WB WIDENING ONLY. THE FULL PAVEMENT SECTION, UP TO BUT NOT INCLUDING THE FINAL 1.5" OF SMA-D, WILL BE CONSTRUCTED FOR SH 29.

REMOVE EXIST PAVEMENT MARKINGS IN CONFLICT WITH THIS PHASE & INSTALL WORKZONE

MARKINGS, AND SHIFT WB TRAFFIC AS SHOWN IN THE PLANS. -INSTALL LOW PROFILE BARRIER AS SHOWN IN THE PLANS.

CONSTRUCT STORM DRAIN INLETS AND PIPE AS SHOWN IN PLANS, CONTRACTOR SHALL BORE PROPOSED 24" RCP LATERAL UNDER SH 29 AS SHOWN IN THE PLANS. -CONSTRUCT TEMPORARY DITCH ON THE SOUTH SIDE OF SH 29. REMOVE INLETS, LEAVE OPENING IN EXISTING CURB

& GUTTER AS SHOWN IN PLANS, AND GRADE TO TEMPORARY DITCH TO INLET PCU US29 D-5. -CONSTRUCT PROPOSED CURB AND SH 29 WIDENING AS SHOWN IN THE PLANS.

-PHASE CONSTRUCT DRIVEWAYS TO MAINTAIN ACCESS AT ALL TIMES. -PHASE II MUST BE COMPLETED PRIOR TO STARTING PHASE III.

THE INTENT OF PHASE III IS TO CONSTRUCT SH 29 EB WIDENING. THE FULL PAVEMENT SECTION, UP TO BUT NOT INCLUDING THE FINAL 1.5" OF SMA-D, WILL BE CONSTRUCTED FOR SH 29

-REMOVE EXIST PAVEMENT MARKINGS IN CONFLICT WITH THIS PHASE & INSTALL WORKZONE MARKINGS, AND SHIFT WB TRAFFIC AS SHOWN IN THE PLANS.

-ADJUST STORM WATER POLLUTION PREVENTION MEASURES ALONG THE CONSTRUCTION ZONE. -INSTALL LOW PROFILE BARRIER AS SHOWN IN THE PLANS.

-CONSTRUCT STORM DRAIN INLETS AND PIPE AS SHOWN IN PLANS. -CONSTRUCT PROPOSED CURB, AND SH 29 WIDENING AS SHOWN IN THE PLANS.

-PHASE III MUST BE COMPLETED PRIOR TO STARTING PHASE IV.

#### PHASE IV

THE INTENT OF PHASE IV IS TO CONSTRUCT WOLF RANCH PARKWAY SIGNAL POLES AND PED RAMPS, WOLF LAKES DR SIGNAL POLES, IH-35 SBFR AND NBFR SIGNAL IMPROVEMENTS, PED RAMPS, AND RADIUS RETURN. THE FULL PAVEMENT SECTION, UP TO BUT NOT INCLUDING THE FINAL 1.5" OF SMA-D, WILL BE CONSTRUCTED FOR SH 29. THIS WORK WILL NOT BE COMPLETE UNTIL ROW HAS BEEN ACQUIRED.

-REMOVE EXIST PAVEMENT MARKINGS IN CONFLICT WITH THIS PHASE & INSTALL WORKZONE MARKINGS. AND SHIFT WB TRAFFIC AS SHOWN IN THE PLANS.

ADJUST STORM WATER POLLUTION PREVENTION MEASURES ALONG THE CONSTRUCTION ZONE.

-INSTALL CHANNELIZING DEVICES AS SHOWN IN THE PLANS.

-CONSTRUCT STORM DRAIN INLETS AND PIPE AS SHOWN IN PLANS. -CONSTRUCT PROPOSED WOLF RANCH PARKWAY SIGNAL POLES AND PED RAMPS

-CONSTRUCT PROPOSED WOLF LAKES DR SIGNAL POLES, PED RAMPS, AND RADIUS RETURN. -CONSTRUCT IH-35 SBFR AND NBFR SIGNAL IMPROVEMENTS PER WZ(BTS)(1-2)-13 STANDARDS.

-PHASE IV MUST BE COMPLETED PRIOR TO STARTING PHASE V

### PHASE V

THE INTENT OF PHASE V IS TO CONSTRUCT WOLF LAKES DR WIDENING AND SUP AS SHOWN IN THE PLANS. FOR THE WOLF LAKES DR RIGHT TURN LANE CONSTRUCT FULL CONCRETE SECTION. FOR THE SH 29 FULL PAVEMENT SECTION. BUILD UP TO BUT NOT INCLUDING THE FINAL 1.5" OF SMA-D. THIS WORK WILL NOT BE COMPLETE UNTIL ROW HAS BEEN

ADVANCE WARNING SIGNS EAST OF WOLF LAKES DR FROM PHASE I TO REMAIN FOR PHASE II. ADJUST STORM WATER POLLUTION PREVENTION MEASURES ALONG THE

CONSTRUCTION ZONE. ADJUST PHASE I LOW PROFILE BARRIER WITH BARRELS IN PHASE II AS SHOWN IN THE PLANS.

-PHASE I WORK ZONE PAVEMENT MARKINGS TO REMAIN FOR PHASE II -REMOVE EXIST PAVEMENT MARKINGS IN CONFLICT WITH THIS PHASE. INSTALL WORKZONE

MARKINGS, AND SHIFT SB TRAFFIC AS SHOWN IN THE PLANS.
-CONSTRUCT STORM DRAIN INLETS AND PIPE AS SHOWN IN PLANS.

-CONSTRUCT PROPOSED CURB, SUP, AND WOLF LAKES DR WIDENING AS SHOWN IN THE PLANS. -PHASE V MUST BE COMPLETED PRIOR TO STARTING PHASE VI.

## PHASE VI

THE INTENT OF PHASE VI IS TO CONSTRUCT THE WB SUP ALONG SH29. THIS WORK WILL NOT BE COMPLETE UNTIL ROW HAS BEEN ACQUIRED.

ADJUST STORM WATER POLLUTION PREVENTION MEASURES ALONG THE CONSTRUCTION ZONE -CÓNSTRUCT PROPOSED SUP AND RAMPS AS SHOWN IN THE PLANS

### PHASE VII

THE INTENT OF PHASE VII IS TO CONSTRUCT THE EB SUP ALONG SH29. THIS WORK WILL NOT BE COMPLETE UNTIL ROW HAS BEEN ACQUIRED.

ADJUST STORM WATER POLLUTION PREVENTION MEASURES ALONG THE CONSTRUCTION ZONE. -CONSTRUCT PROPOSED SUP AND RAMPS AS SHOWN IN THE PLANS

THE INTENT OF PHASE VIII IS TO CONSTRUCT THE FINAL RIDING SURFACE AND PAVEMENT MARKINGS FOR SH 29 USING MOBILE OPERATIONS.

-MILL OFF 1.5" OF EXISTING HMA. -CONSTRUCT FINAL 1.5" OF SMA-D THROUGHOUT THE LIMITS OF THE PROJECT UTILIZING MOBILE OPERATIONS. -PLACE FINAL TY II PAVEMENT MARKINGS AS SHOWN IN THE PLANS. -WAIT A MINIMUM OF 10 DAYS BEFORE PLACING FINAL TY I PAVEMENT MARKINGS AS SHOWN IN THE PLANS.

-INSTALL PERMANENT SIGNS AS SHOWN IN THE PLANS. -PLACE TOPSOIL AND PERMANENT SEEDING.

-AFTER THE ESTABLISHMENT OF VEGETATION, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AND RESEED ANY AREAS DISTURBED BY THEIR REMOVAL.

-PERFORM FINAL CLEANUP. -OPEN TO TRAFFIC UNRESTRICTED.

#### 3. SAFETY

THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC(1-12)-21. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS TO PROVIDE FOR THE SAFE PASSAGE OF TRAFFIC AT ALL TIMES.

THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/ APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL

THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING THE HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

#### 4. HAULING EQUIPMENT

THE USE OF RUBBER -TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT, THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED/APPROVED BY THE ENGINEER.

THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATION IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PERVIOUSLY RE-COMPACTED SUBGRADE OR COMPACTED BASE MATERIAL. EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

#### 5. FINAL CLEAN UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE. THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT, AND SIGHTLY CONDITION.

#### 6. PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO BARRICADES, SIGN AND TRAFFIC HANDLING. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

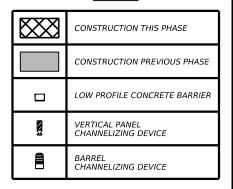


HIGHWAY 0337 01 053 SH 29 COUNTY SHEET NO WILLIAMSON

TRAFFIC CONTROL

PLAN

**NARRATIVE** 







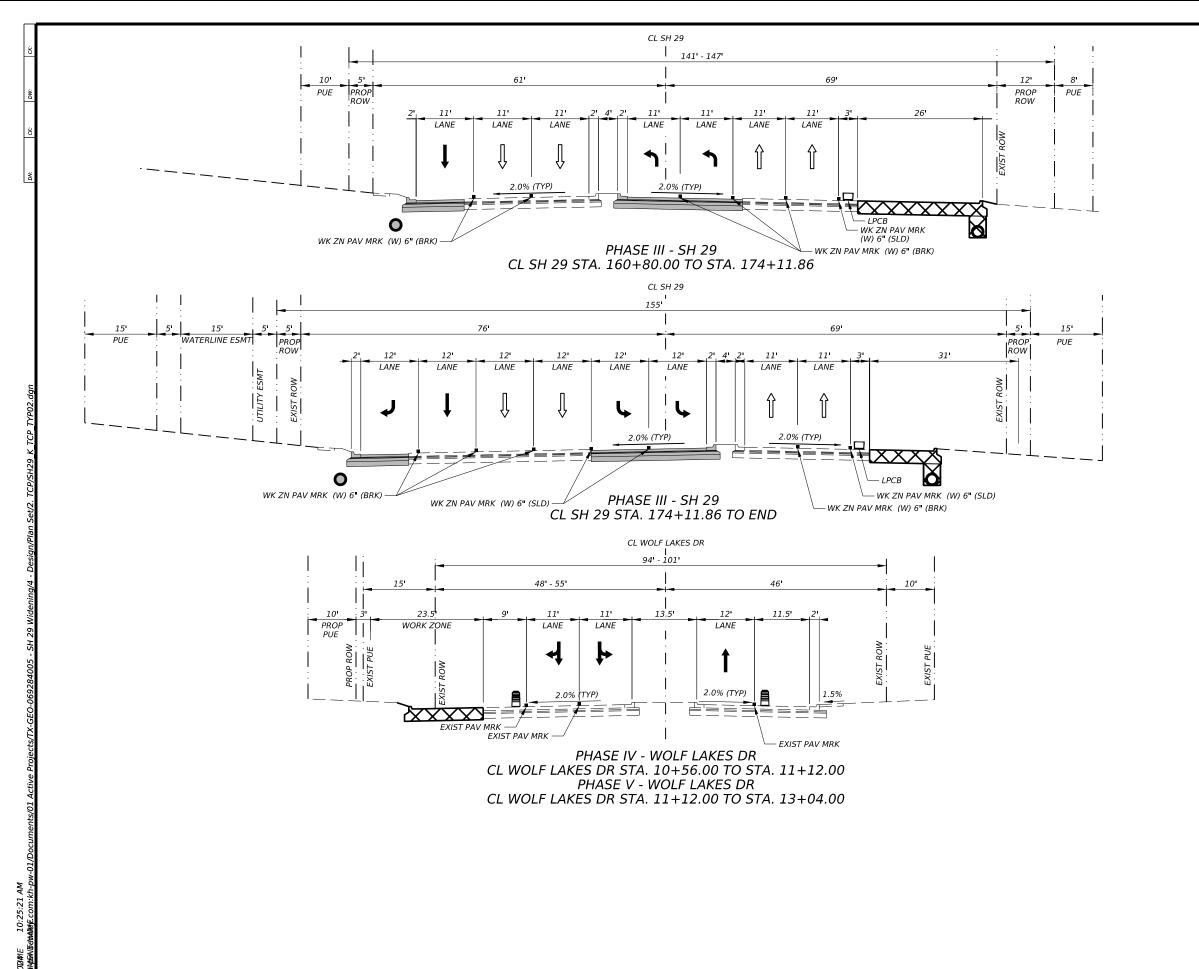


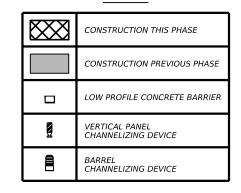


SH 29

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

|      | SHEET 1 OF 3 |           |  |           |  |  |  |
|------|--------------|-----------|--|-----------|--|--|--|
| CONT | SECT         | JOB       |  | HIGHWAY   |  |  |  |
| 0337 | 01           | 053 SH 29 |  |           |  |  |  |
| DIST |              | COUNTY    |  | SHEET NO. |  |  |  |
| AUS  | WILLIAMSON   |           |  | 16        |  |  |  |









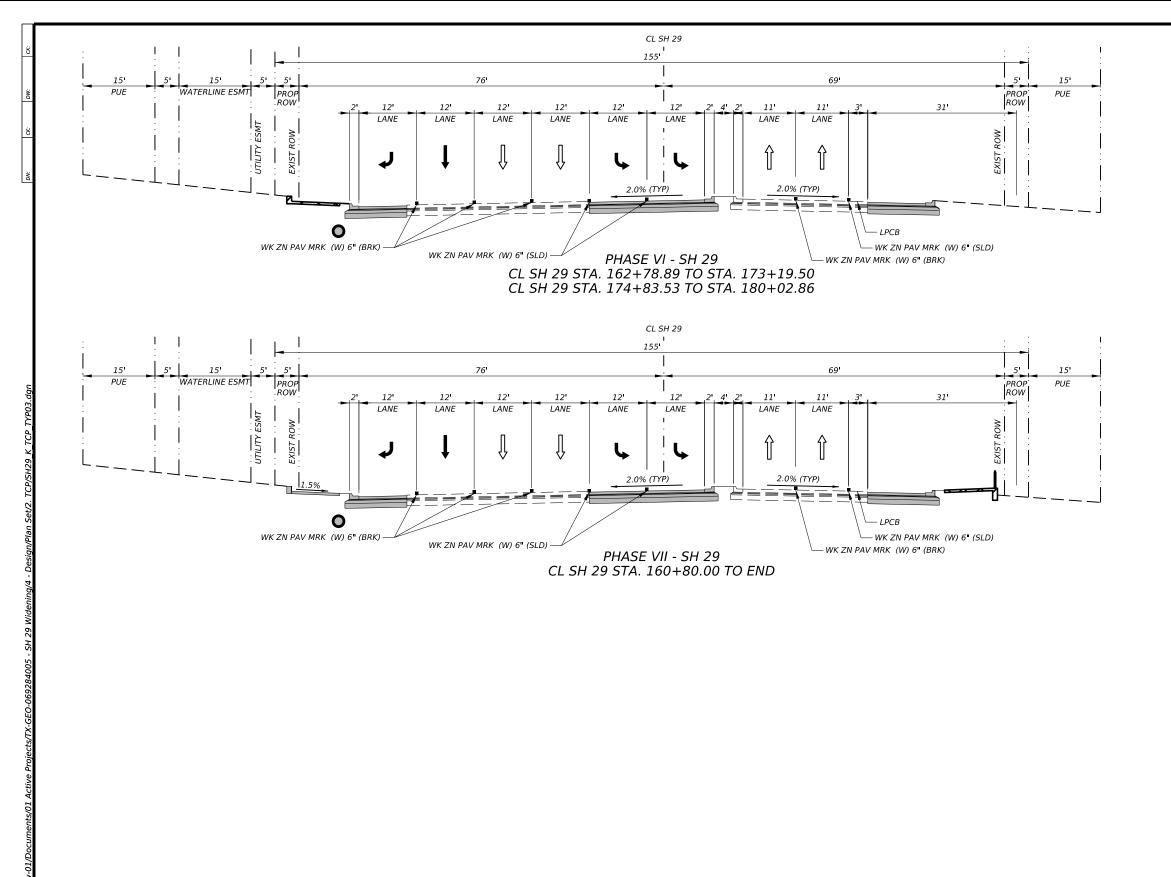


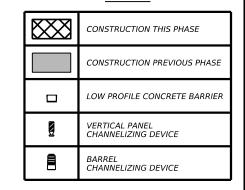


SH 29

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

|      | SHEET 2 OF 3 |            |           |  |  |  |  |
|------|--------------|------------|-----------|--|--|--|--|
| CONT | SECT         | JOB        | HIGHWAY   |  |  |  |  |
| 0337 | 01           | 053        | SH 29     |  |  |  |  |
| DIST |              | COUNTY     | SHEET NO. |  |  |  |  |
| AUS  |              | WILLIAMSON | 17        |  |  |  |  |









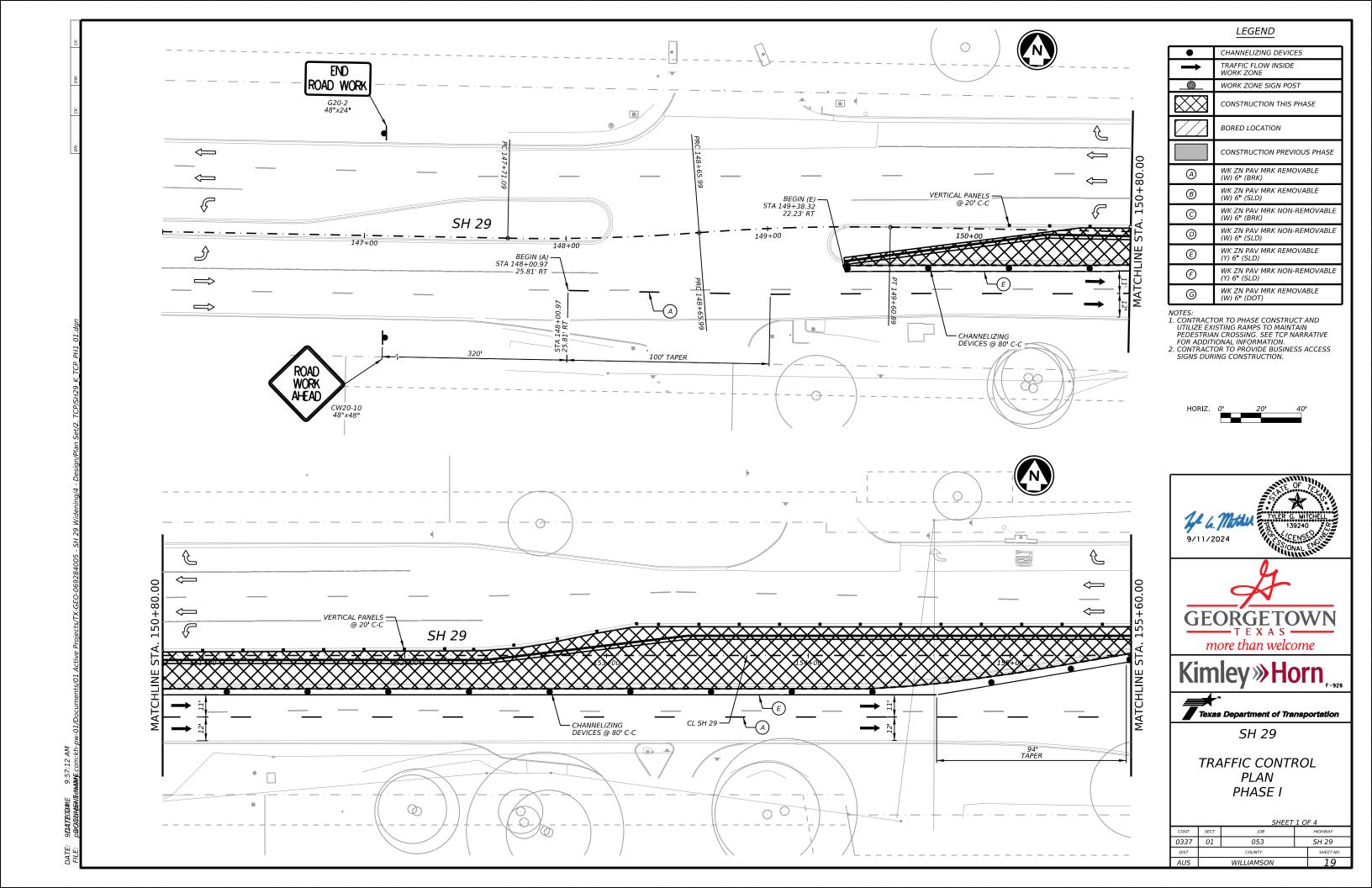


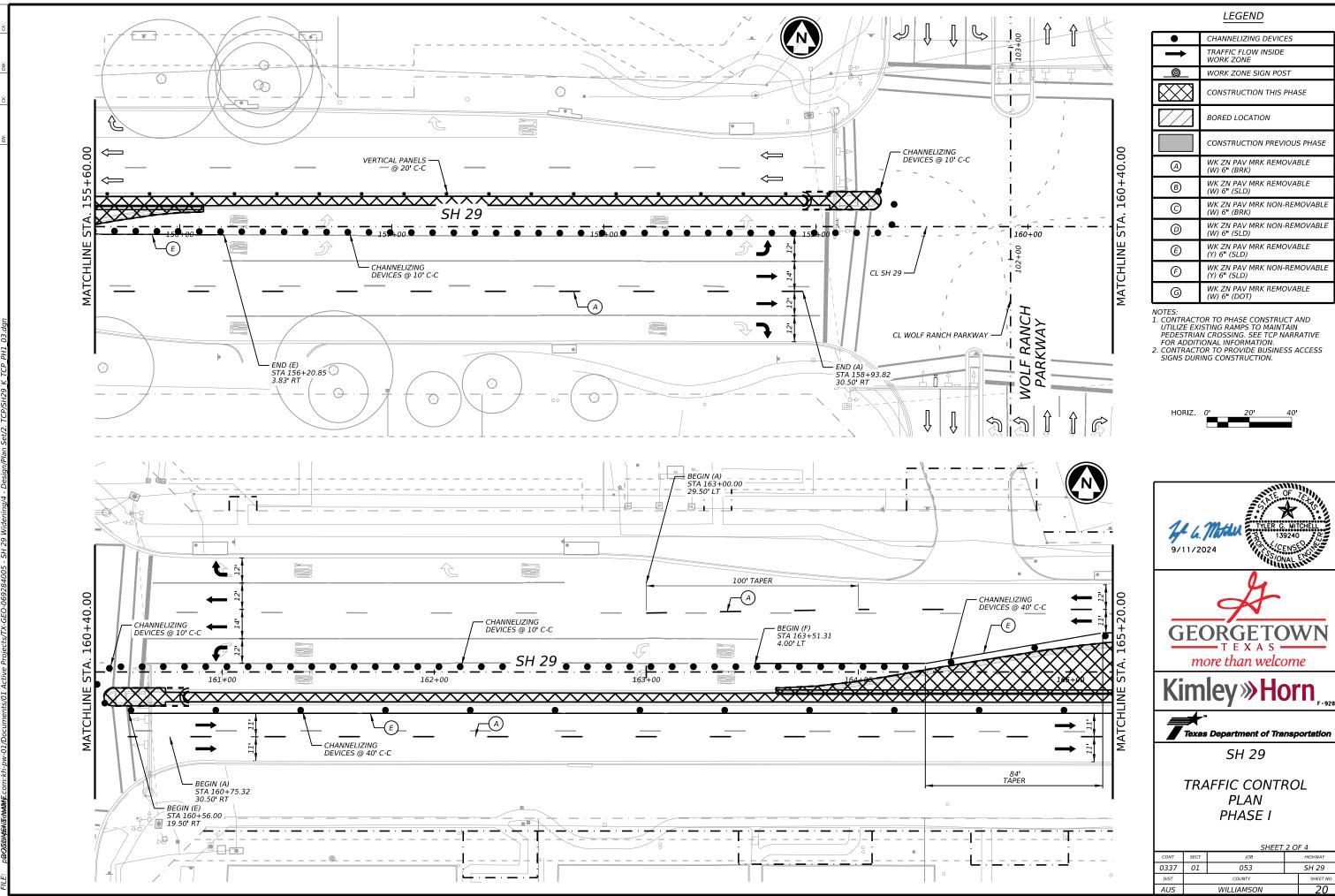


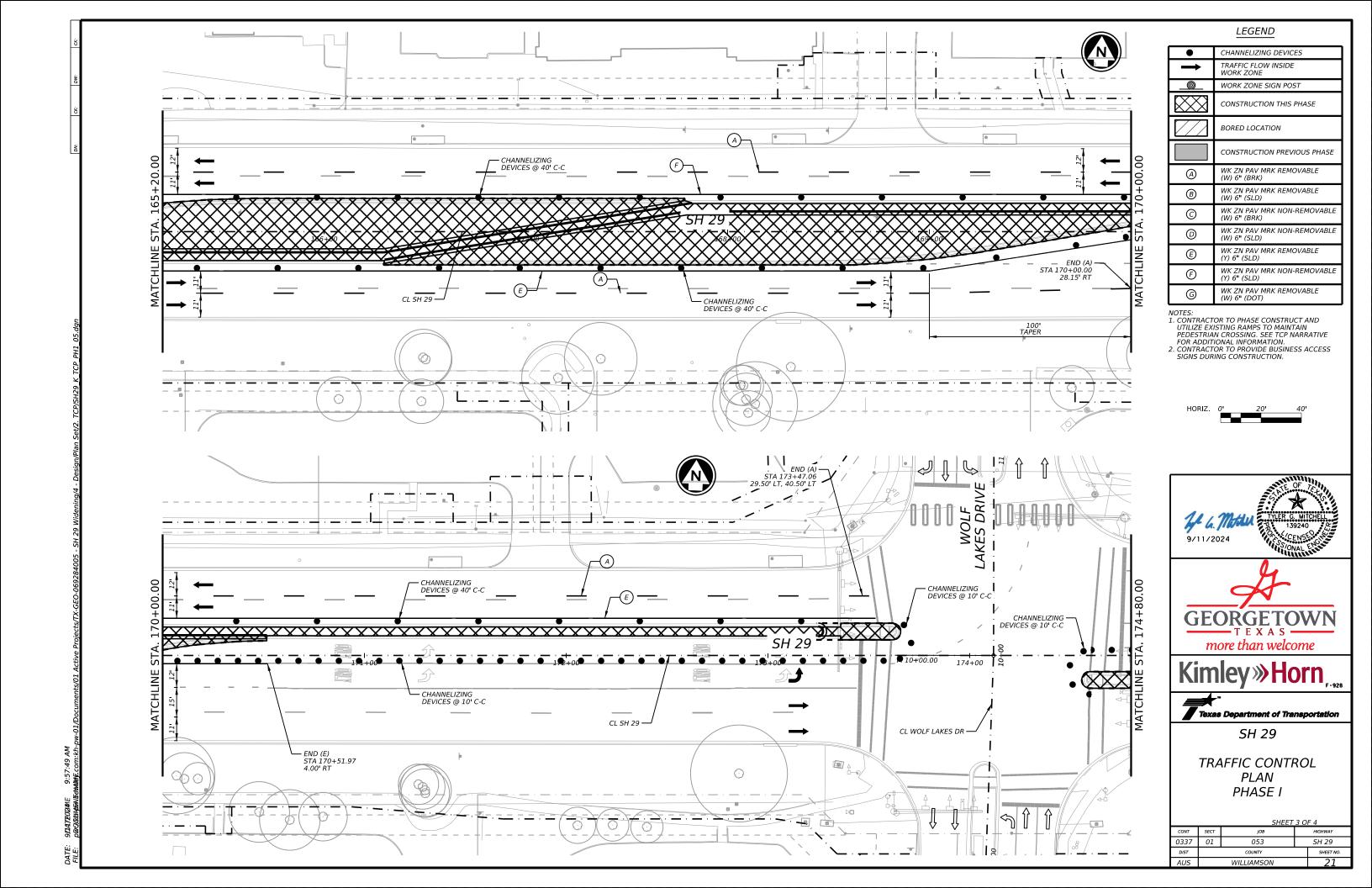
SH 29

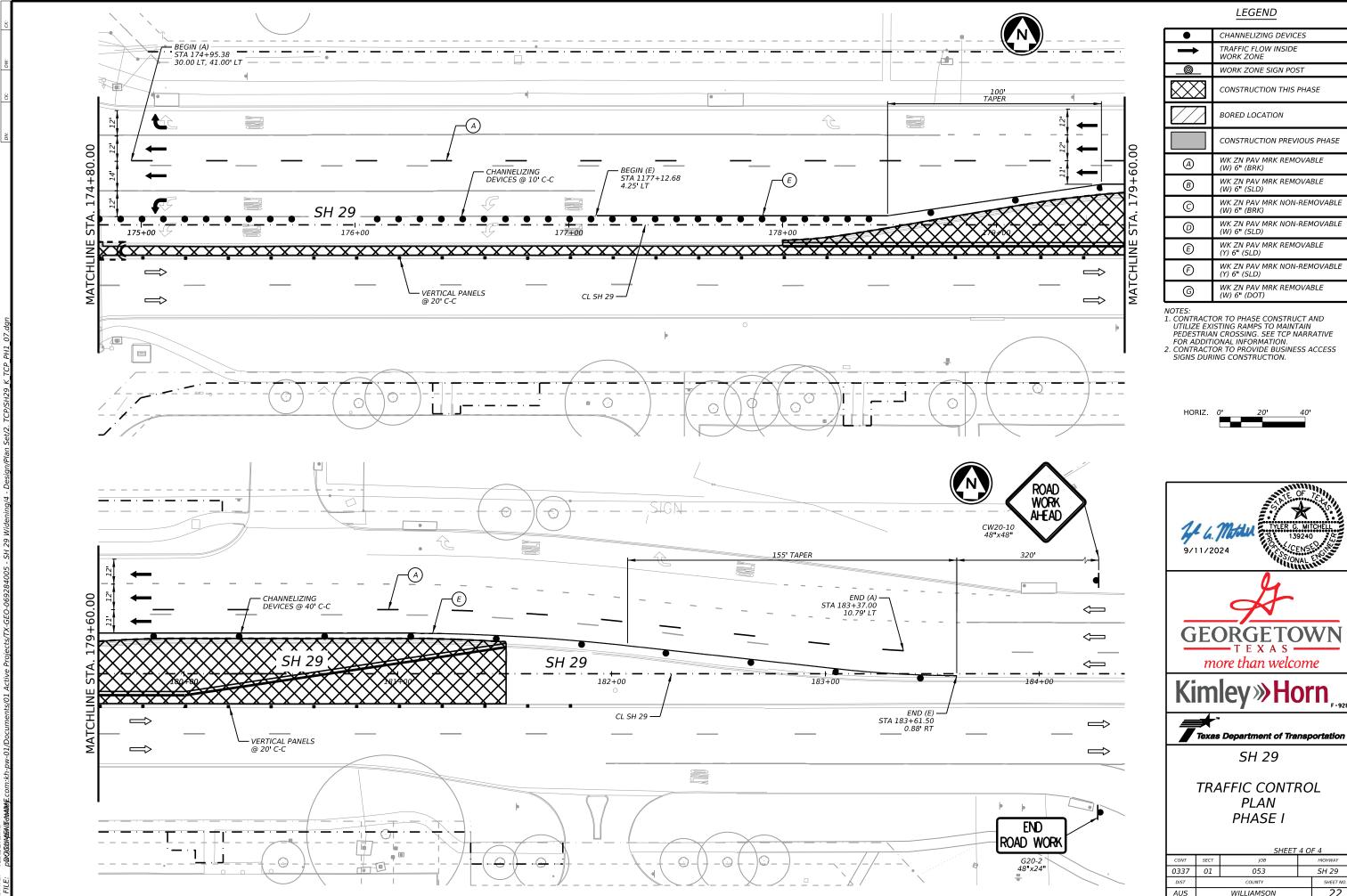
TRAFFIC CONTROL PLAN TYPICAL SECTIONS

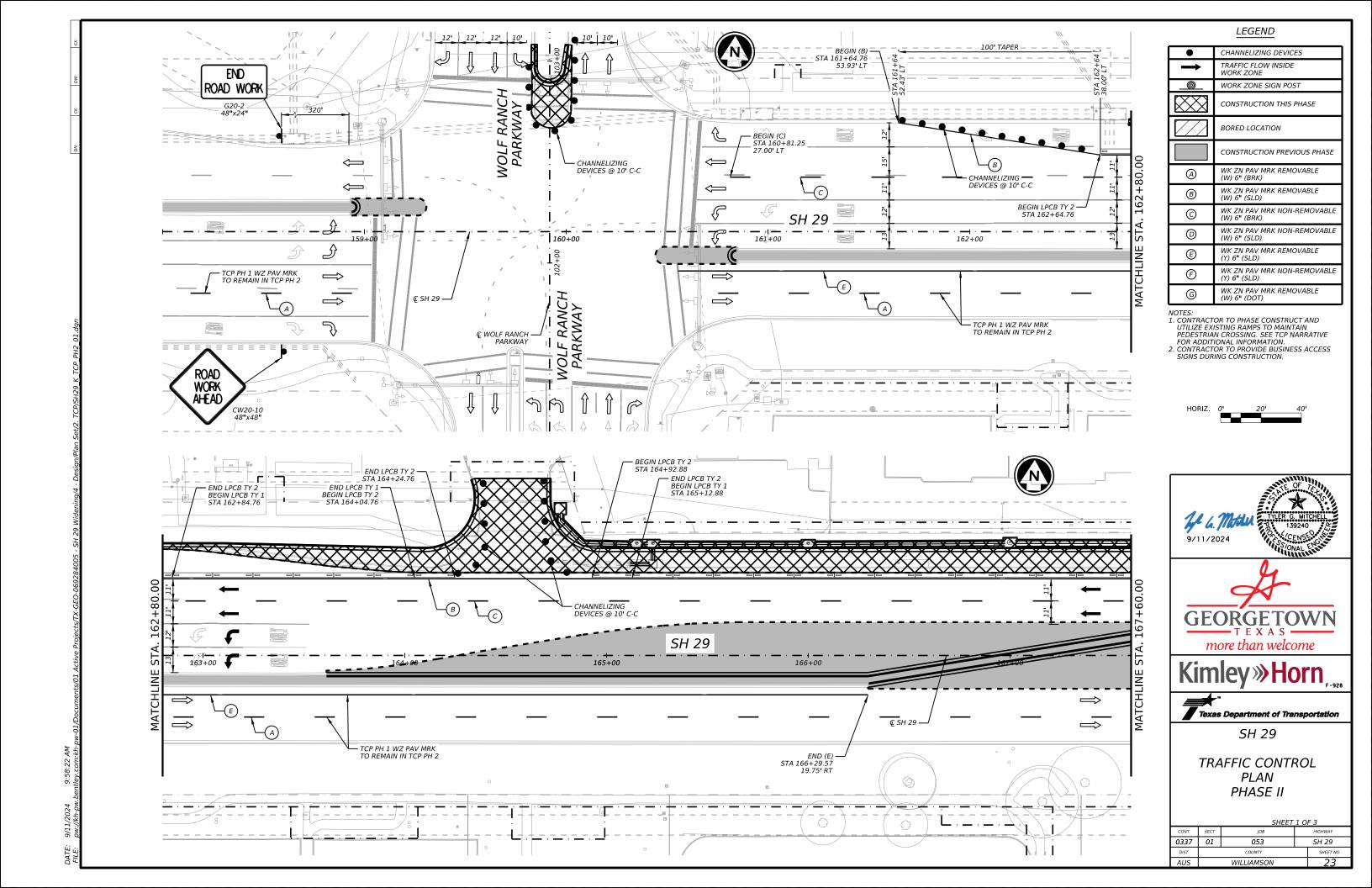
|      | SHEET 3 OF 3 |            |       |           |  |  |  |
|------|--------------|------------|-------|-----------|--|--|--|
| CONT | SECT         | JOB        |       | HIGHWAY   |  |  |  |
| 0337 | 01           | 053        | SH 29 |           |  |  |  |
| DIST |              | COUNTY     |       | SHEET NO. |  |  |  |
| AUS  |              | WILLIAMSON |       | 18        |  |  |  |

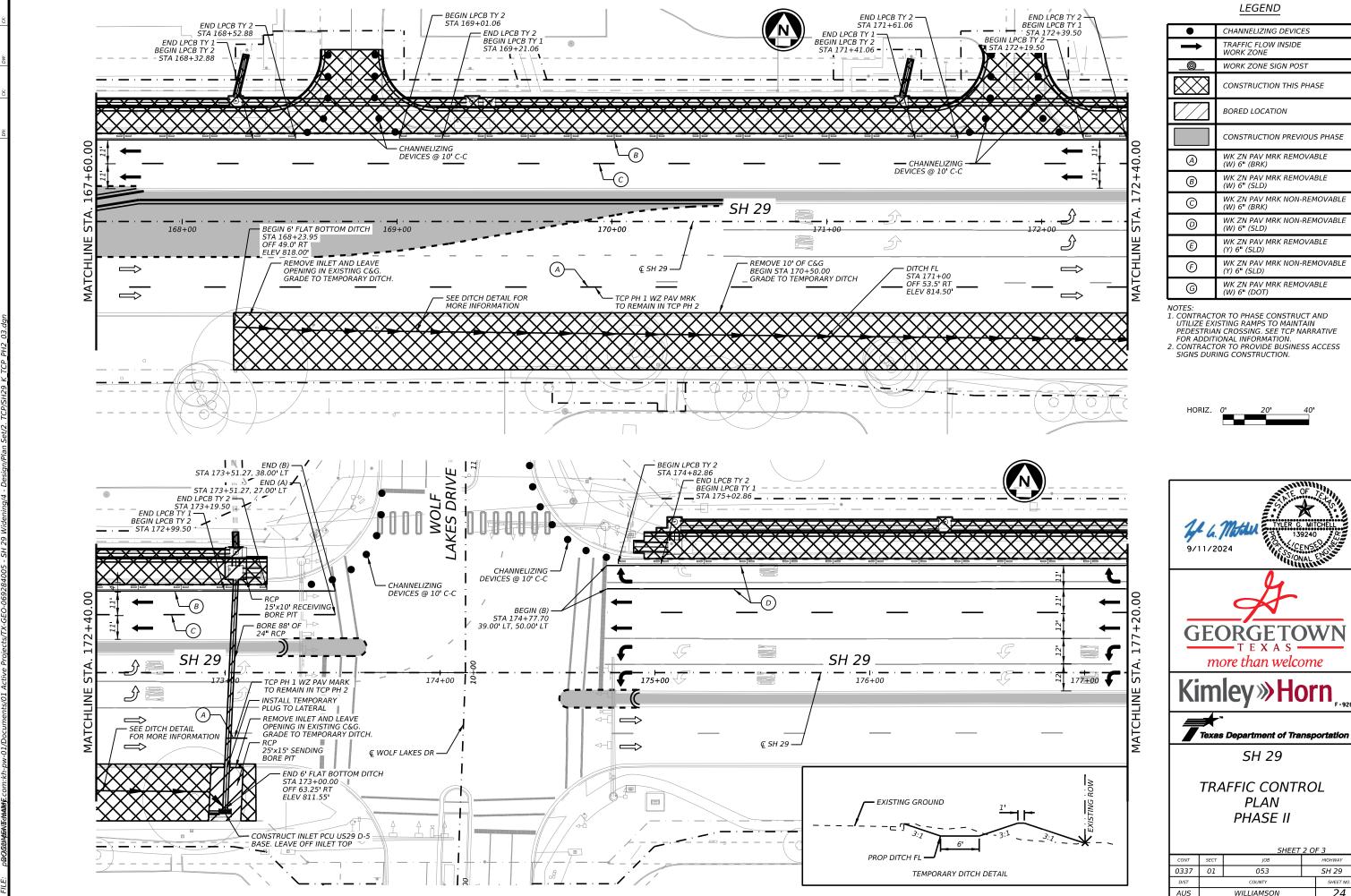


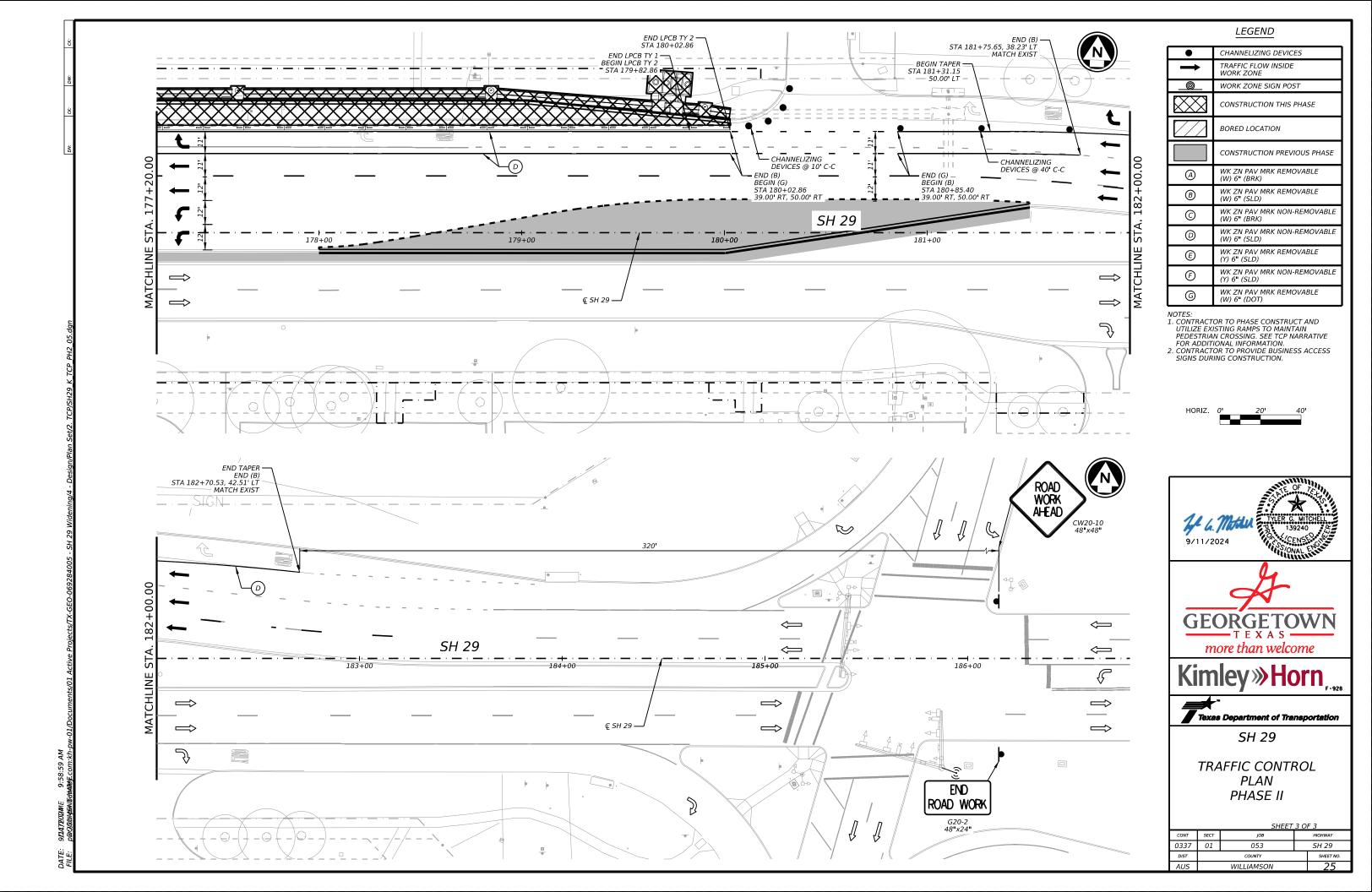


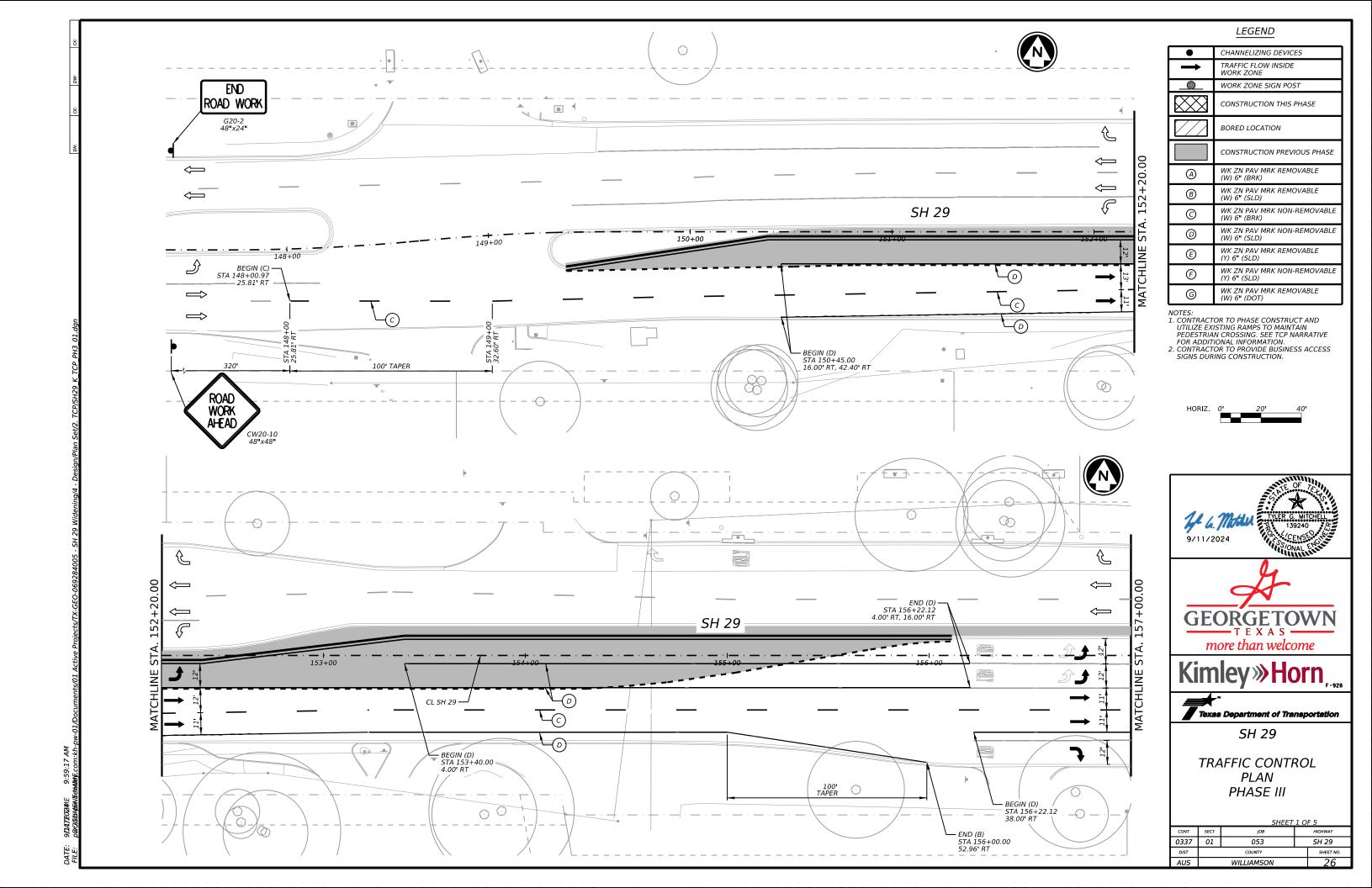


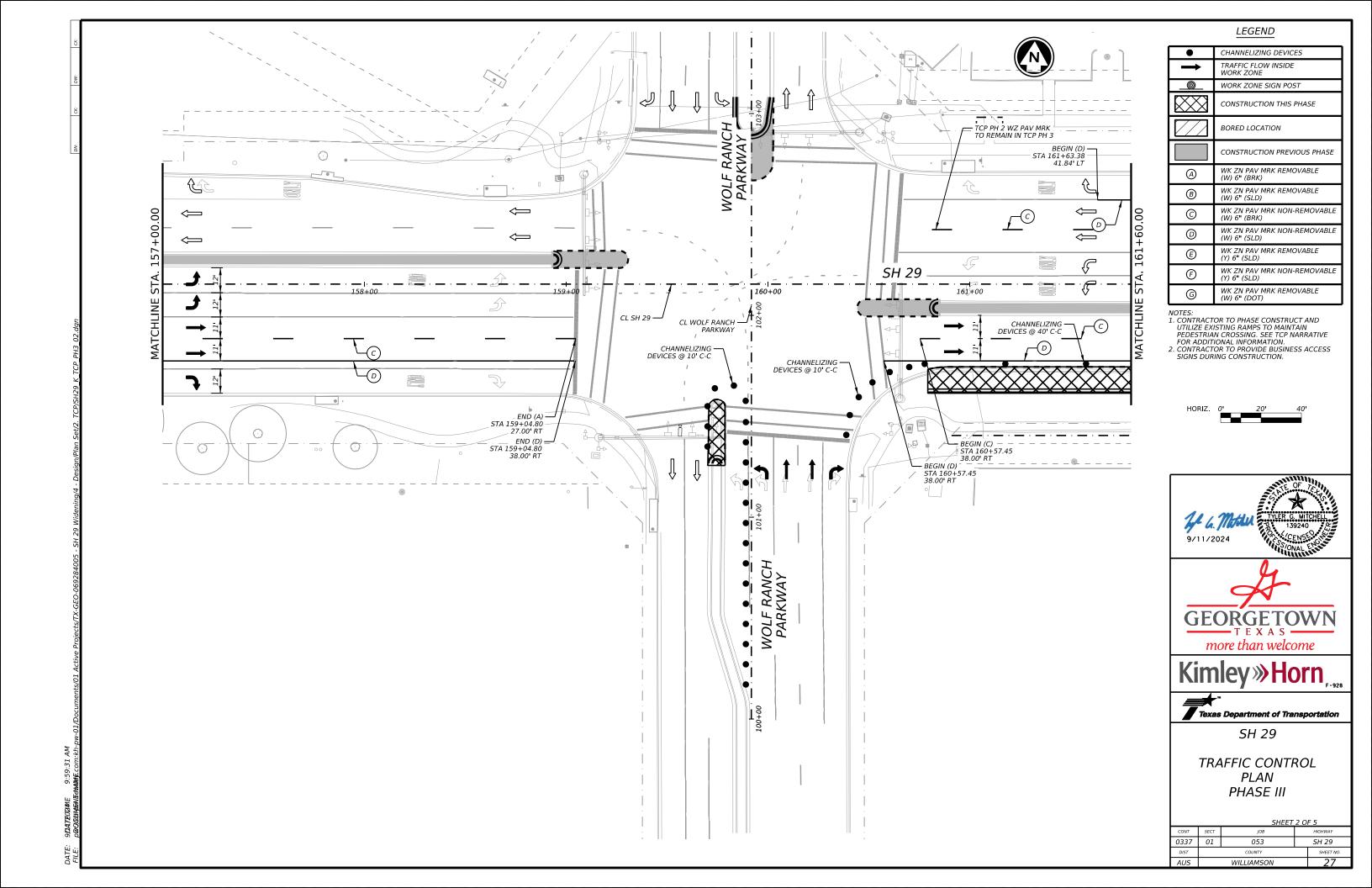


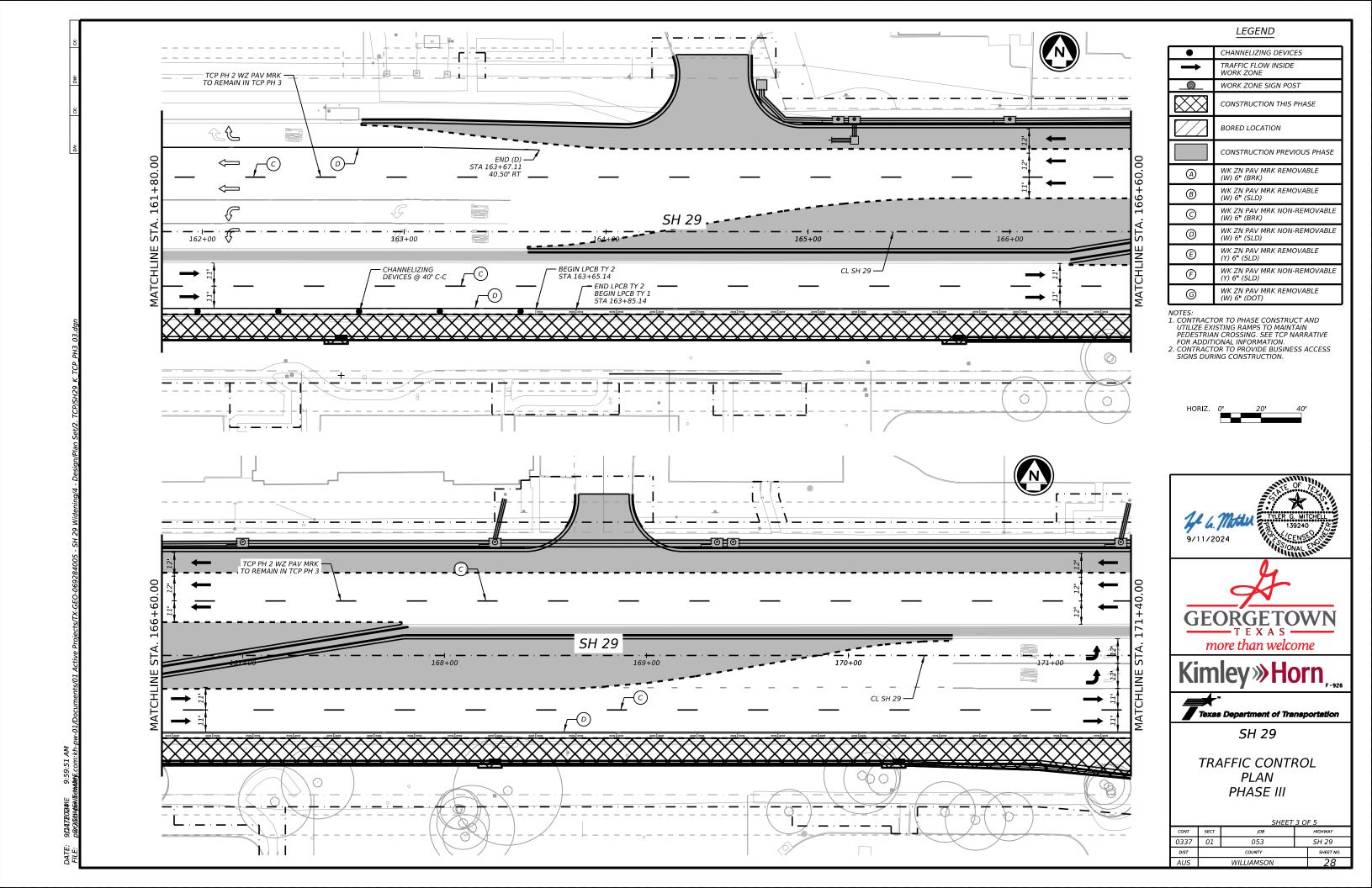


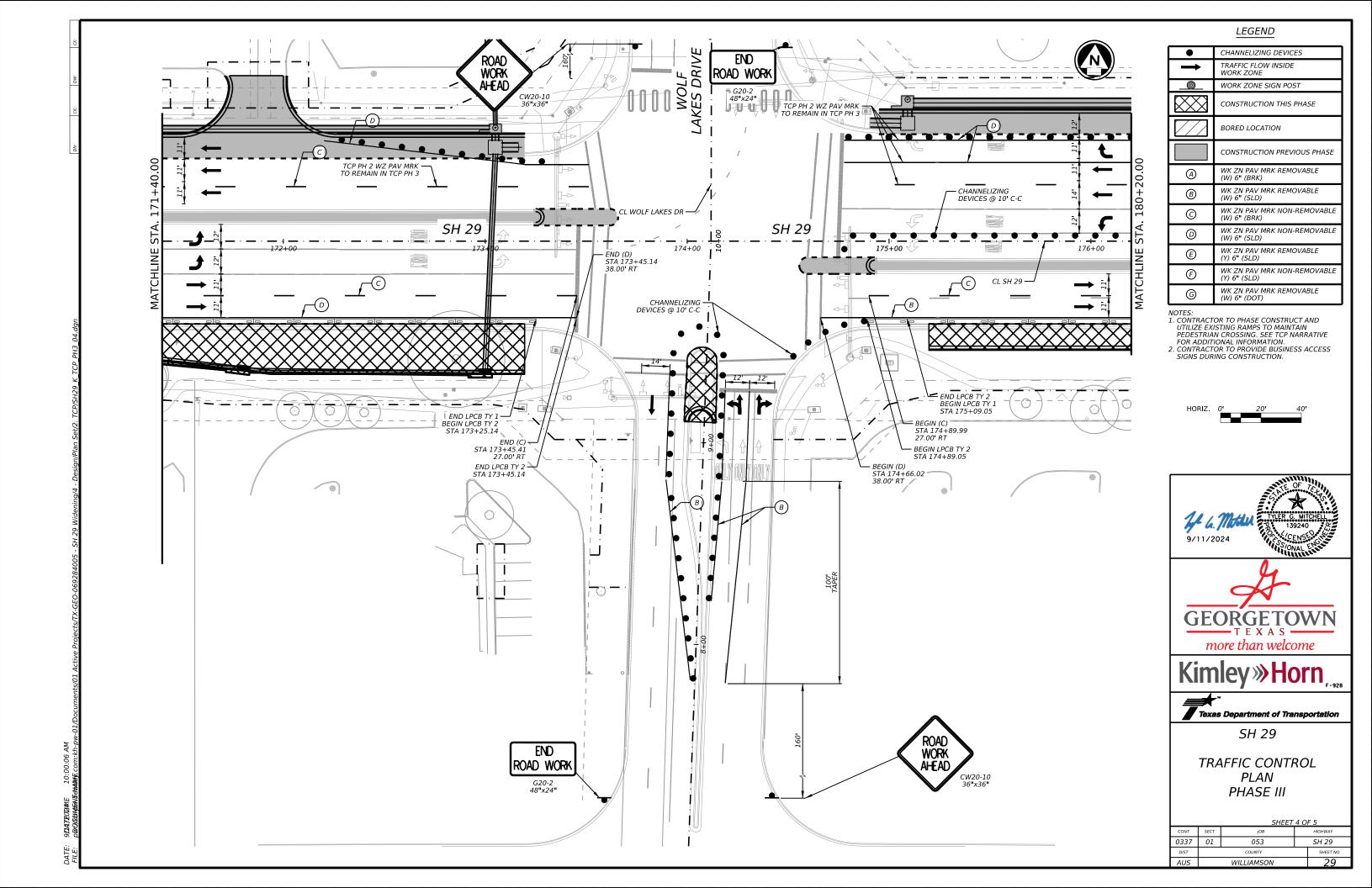


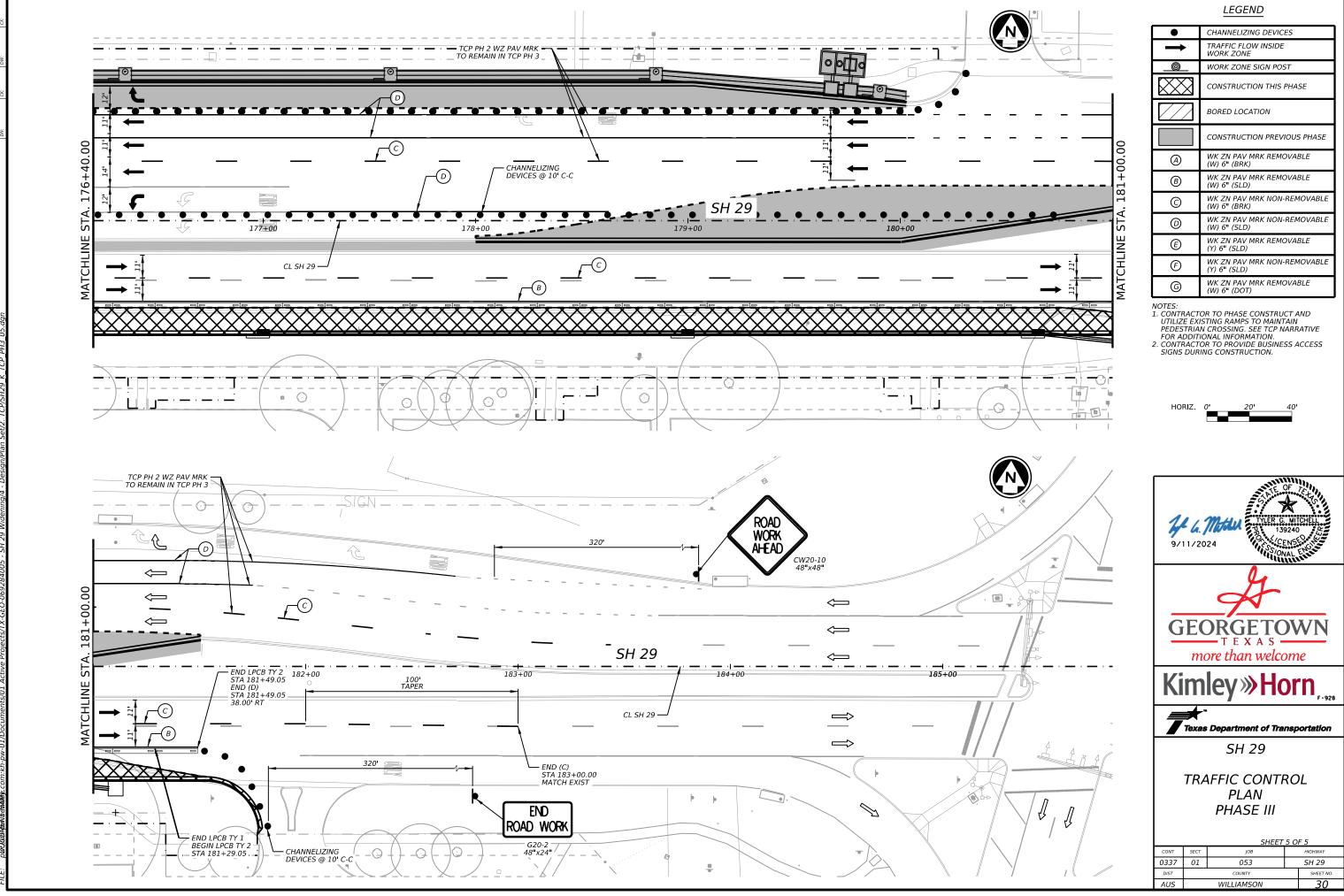












### LEGEND

| •        | CHANNELIZING DEVICES                        |
|----------|---|
| <b>†</b> | TRAFFIC FLOW INSIDE<br>WORK ZONE            |
| _@_      | WORK ZONE SIGN POST                         |
|          | CONSTRUCTION THIS PHASE                     |
|          | BORED LOCATION                              |
|          | CONSTRUCTION PREVIOUS PHASE                 |
| A        | WK ZN PAV MRK REMOVABLE<br>(W) 6" (BRK)     |
| $^{B}$   | WK ZN PAV MRK REMOVABLE<br>(W) 6" (SLD)     |
| 0        | WK ZN PAV MRK NON-REMOVABLE<br>(W) 6" (BRK) |
| <b>©</b> | WK ZN PAV MRK NON-REMOVABLE<br>(W) 6" (SLD) |
| Ē        | WK ZN PAV MRK REMOVABLE<br>(Y) 6" (SLD)     |
| Ē        | WK ZN PAV MRK NON-REMOVABLE<br>(Y) 6" (SLD) |
| ©        | WK ZN PAV MRK REMOVABLE<br>(W) 6" (DOT)     |

- NOTES:

  1. CONTRACTOR TO PHASE CONSTRUCT AND UTILIZE EXISTING RAMPS TO MAINTAIN PEDESTRIAN CROSSING. SEE TCP NARRATIVE FOR ADDITIONAL INFORMATION.

  2. CONTRACTOR TO PROVIDE BUSINESS ACCESS SIGNS DURING CONSTRUCTION.







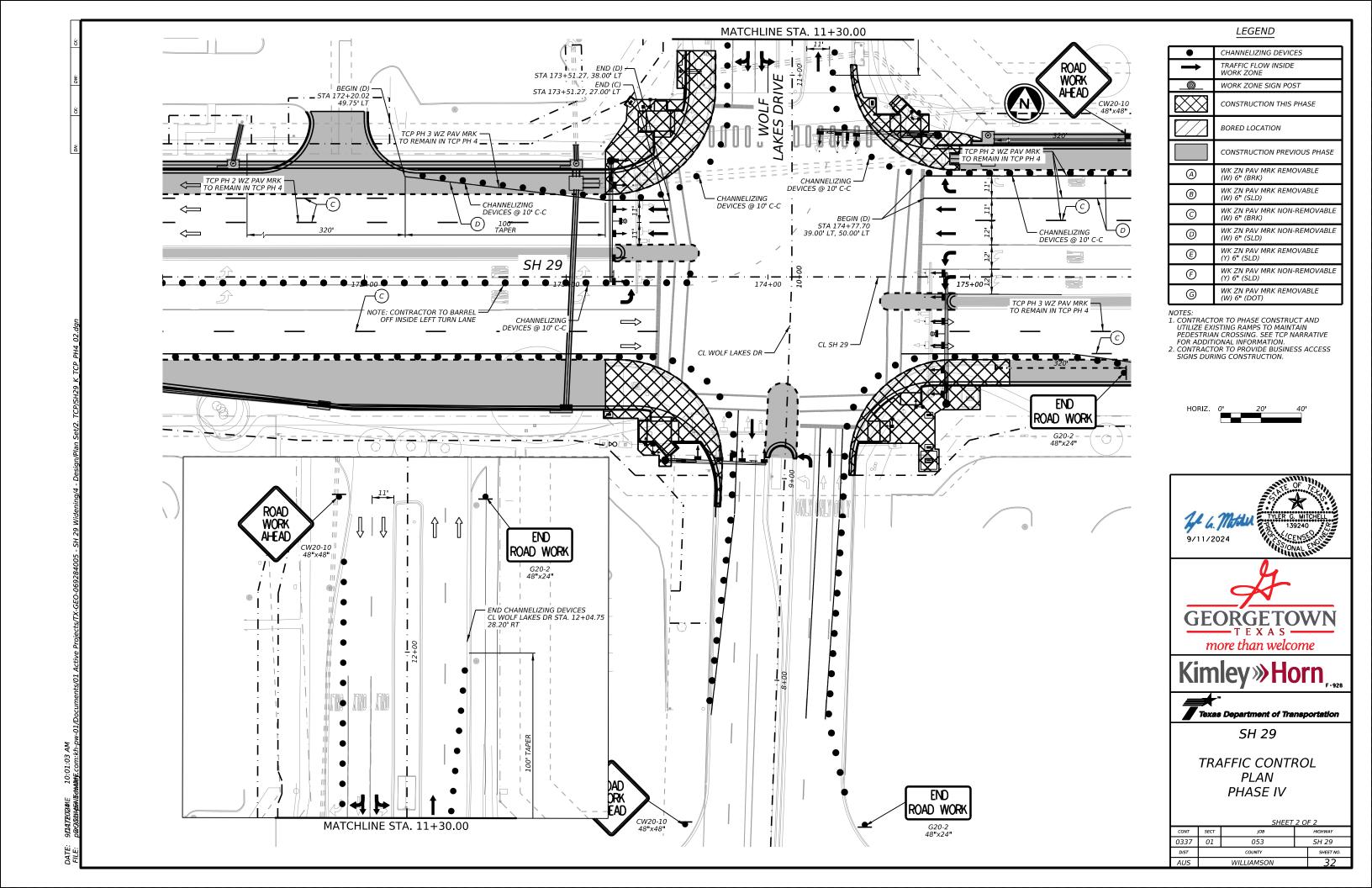


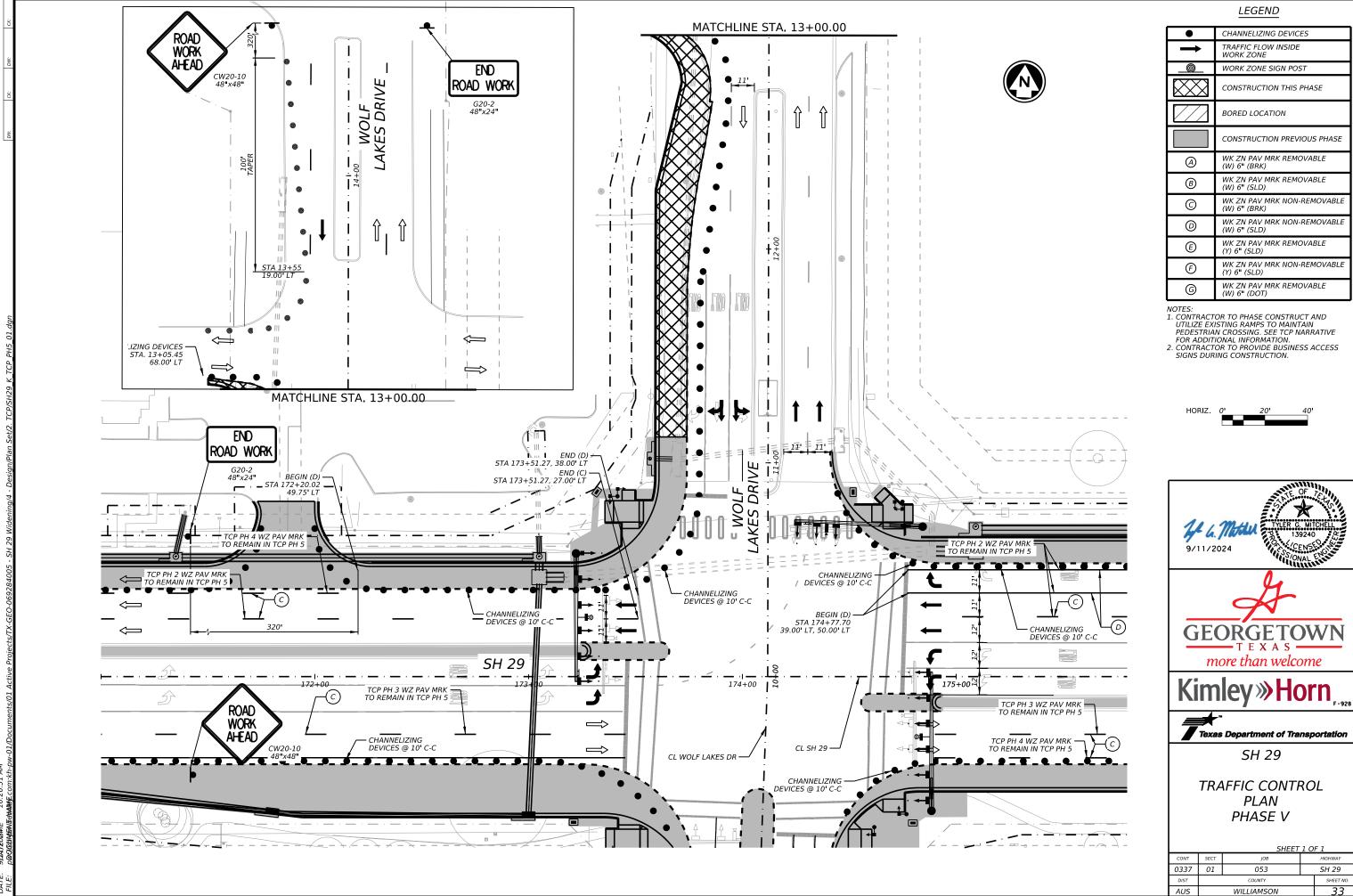


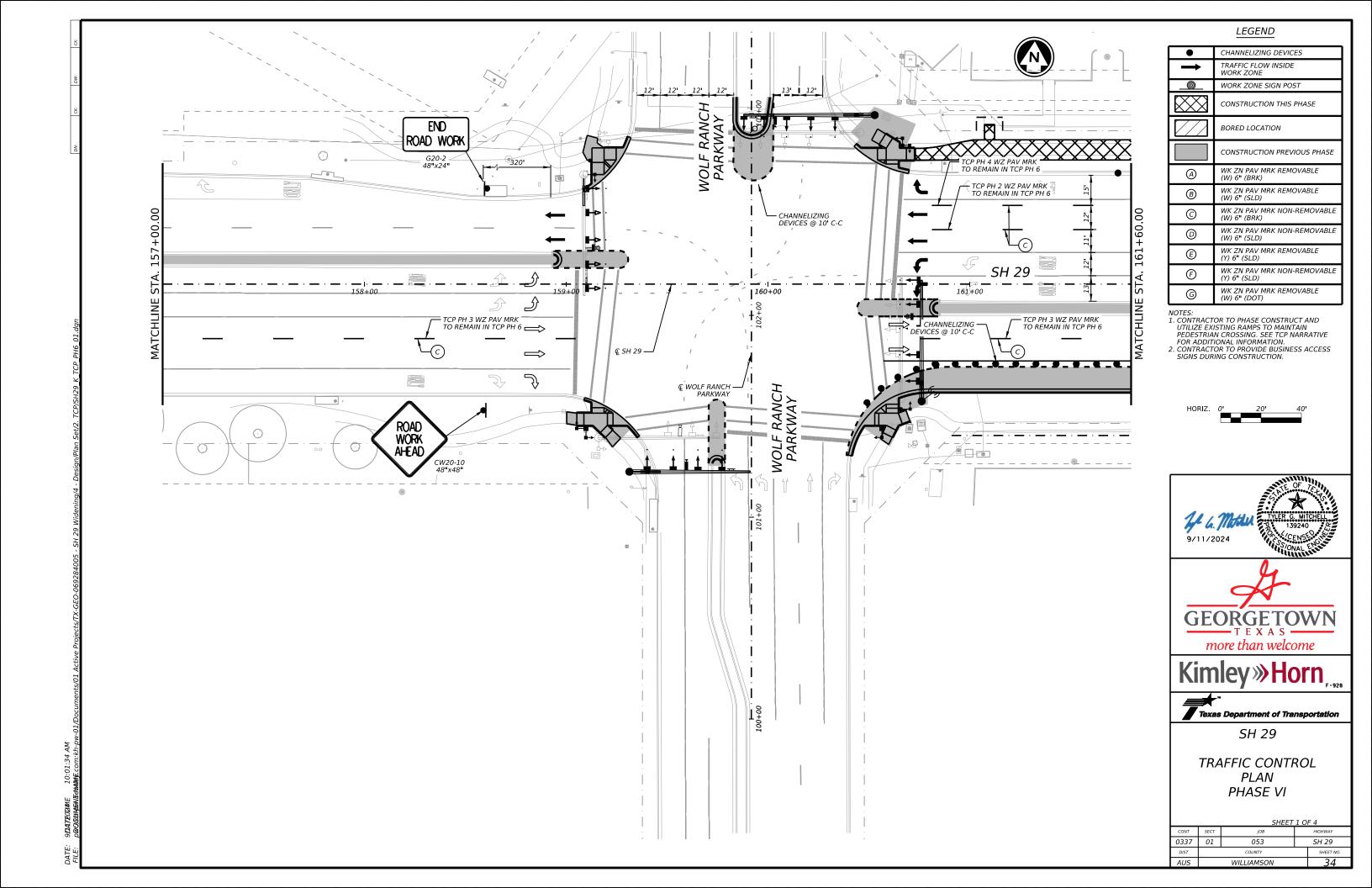
SH 29

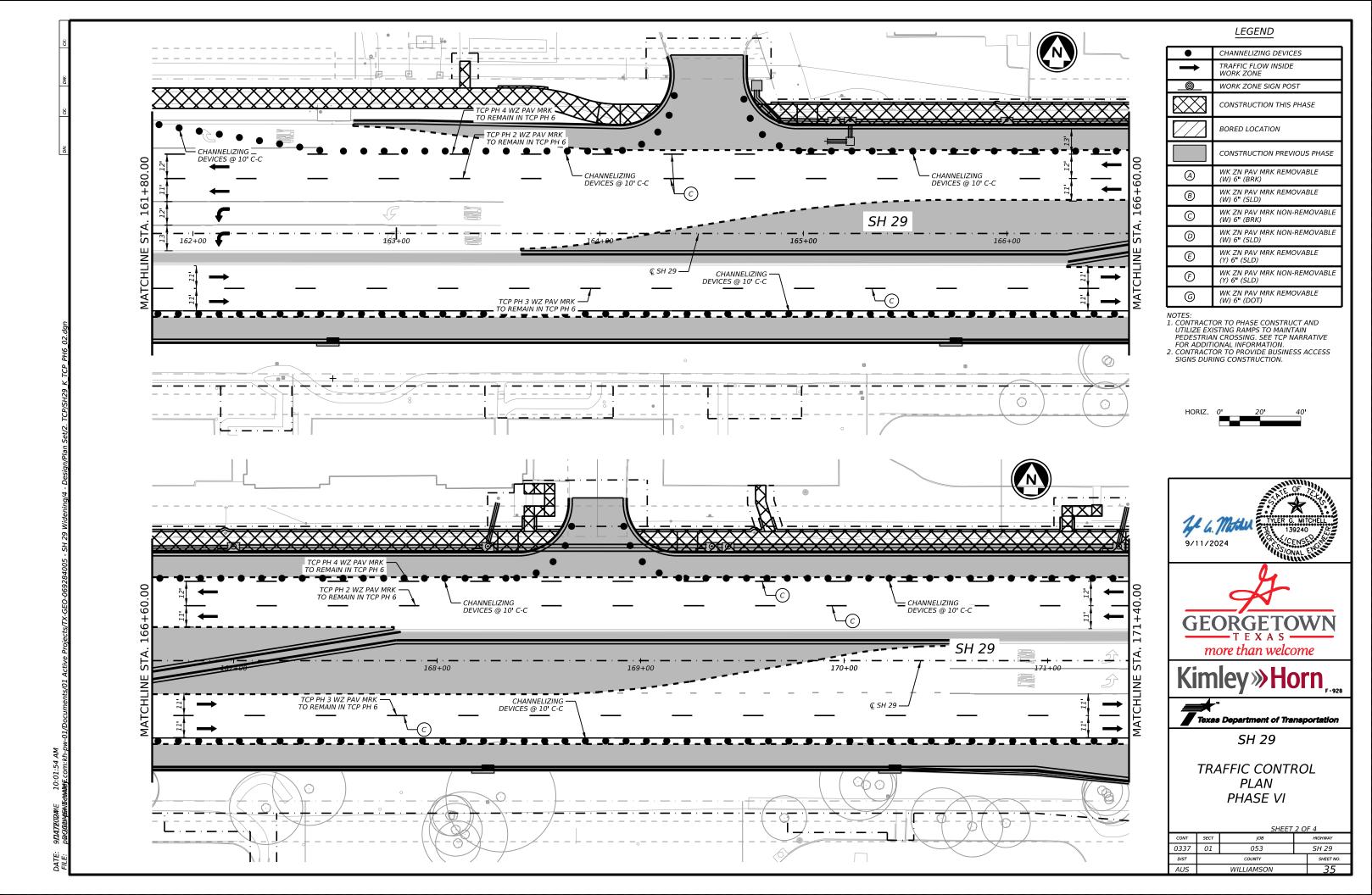
TRAFFIC CONTROL PLAN PHASE IV

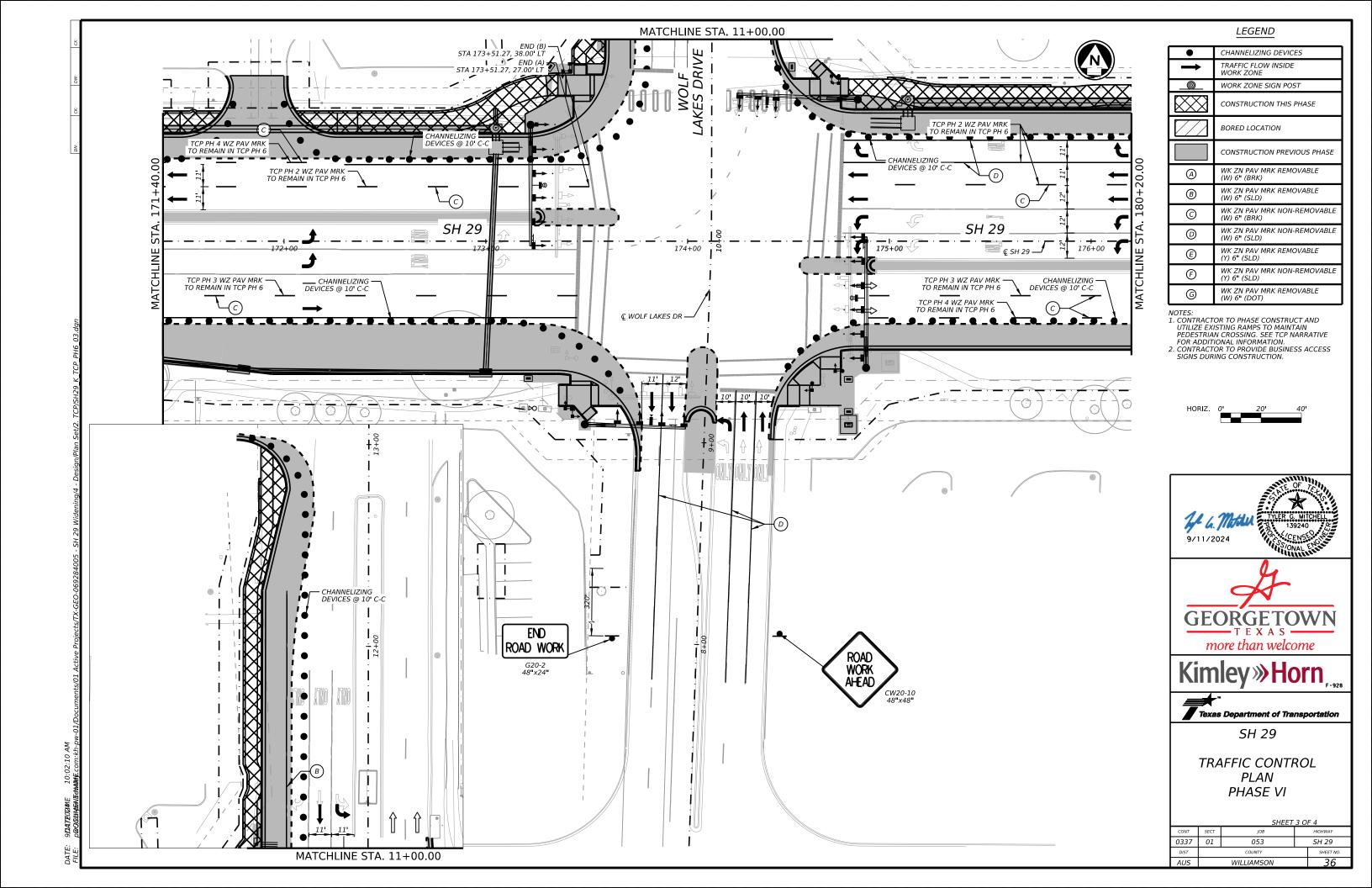
|      |      | SHEET      | 10 | F 2       |
|------|------|------------|----|-----------|
| CONT | SECT | JOB        |    | HIGHWAY   |
| 337  | 01   | 053        |    | SH 29     |
| DIST |      | COUNTY     |    | SHEET NO. |
| 4US  |      | WILLIAMSON |    | 31        |

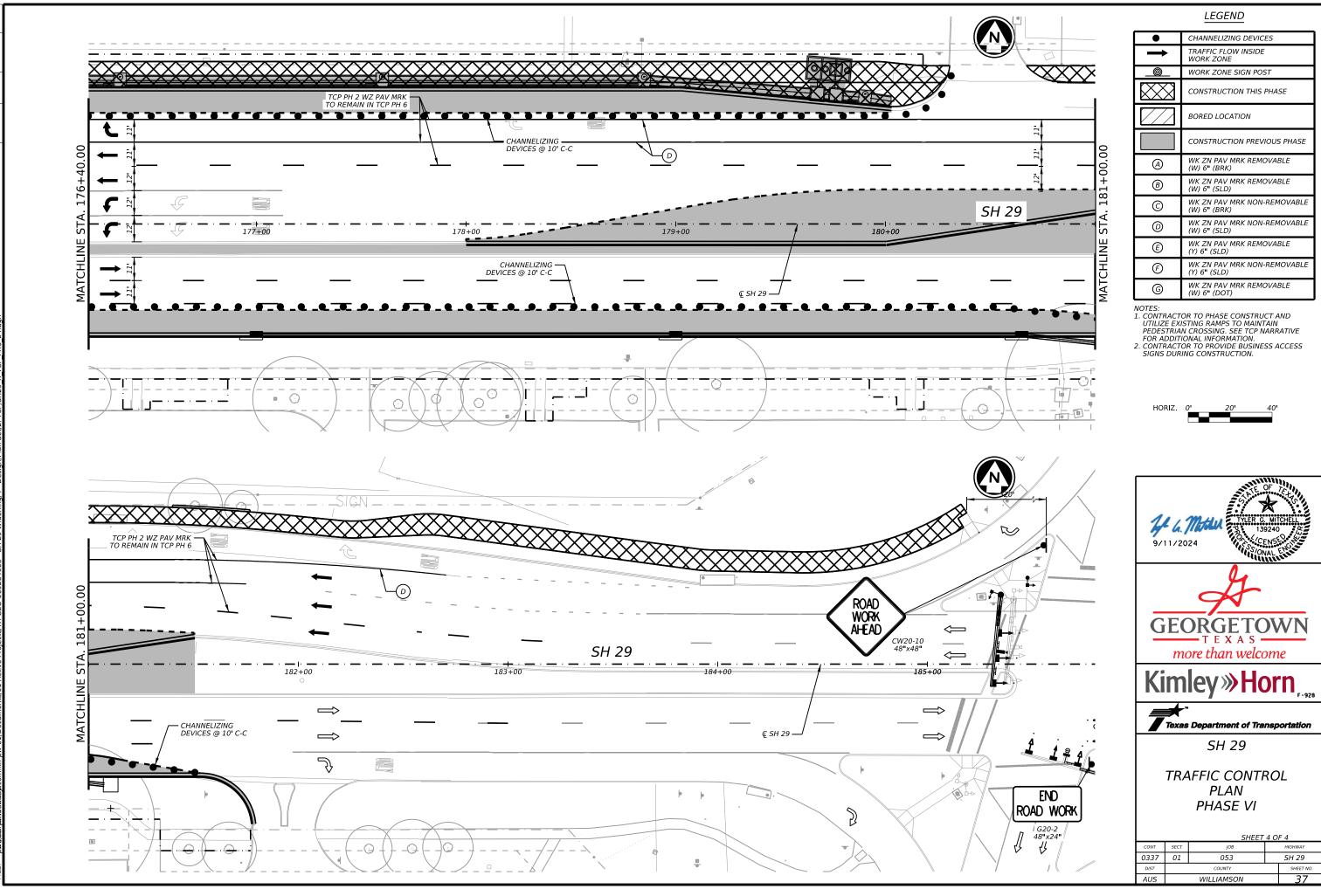


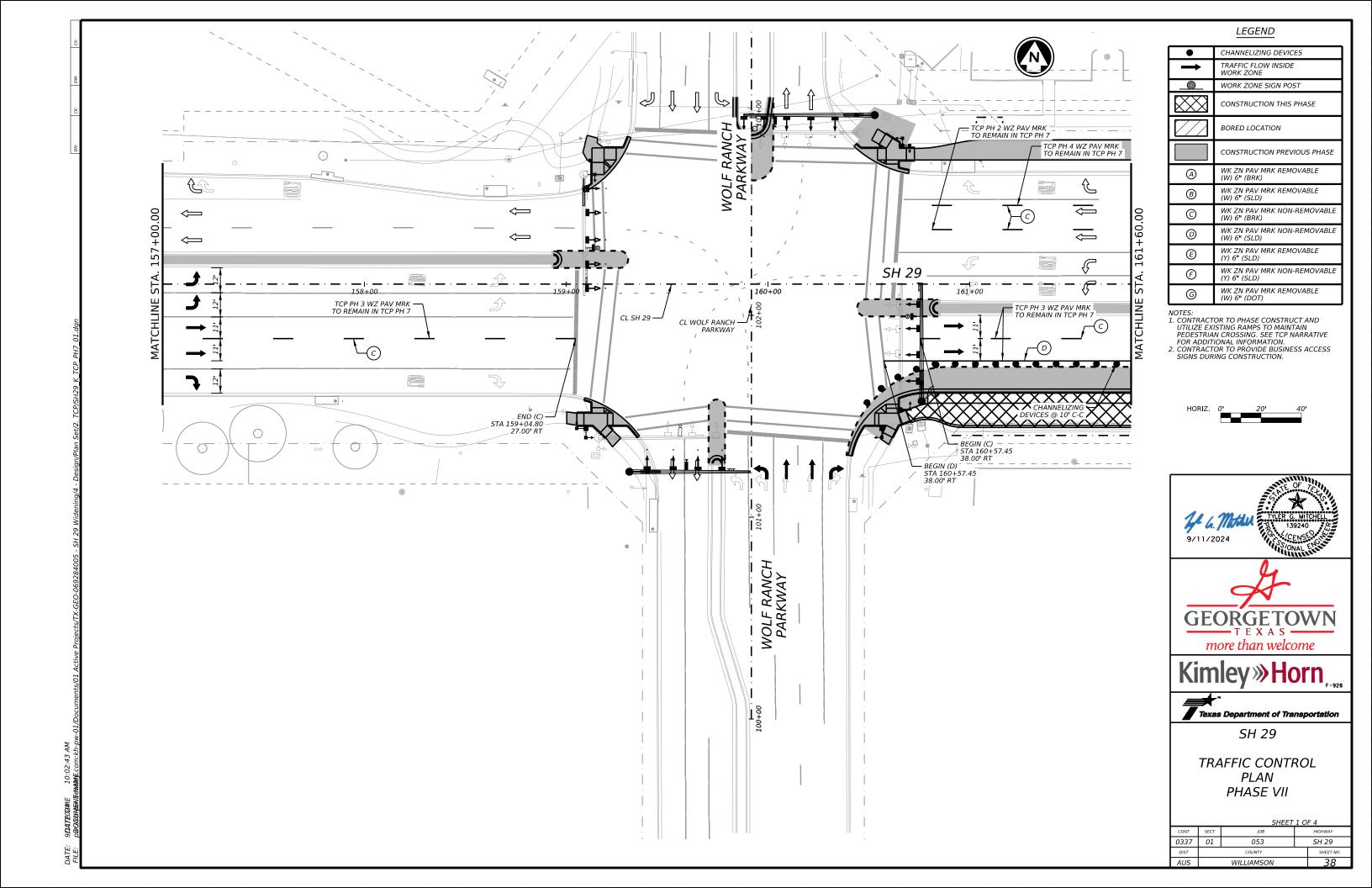


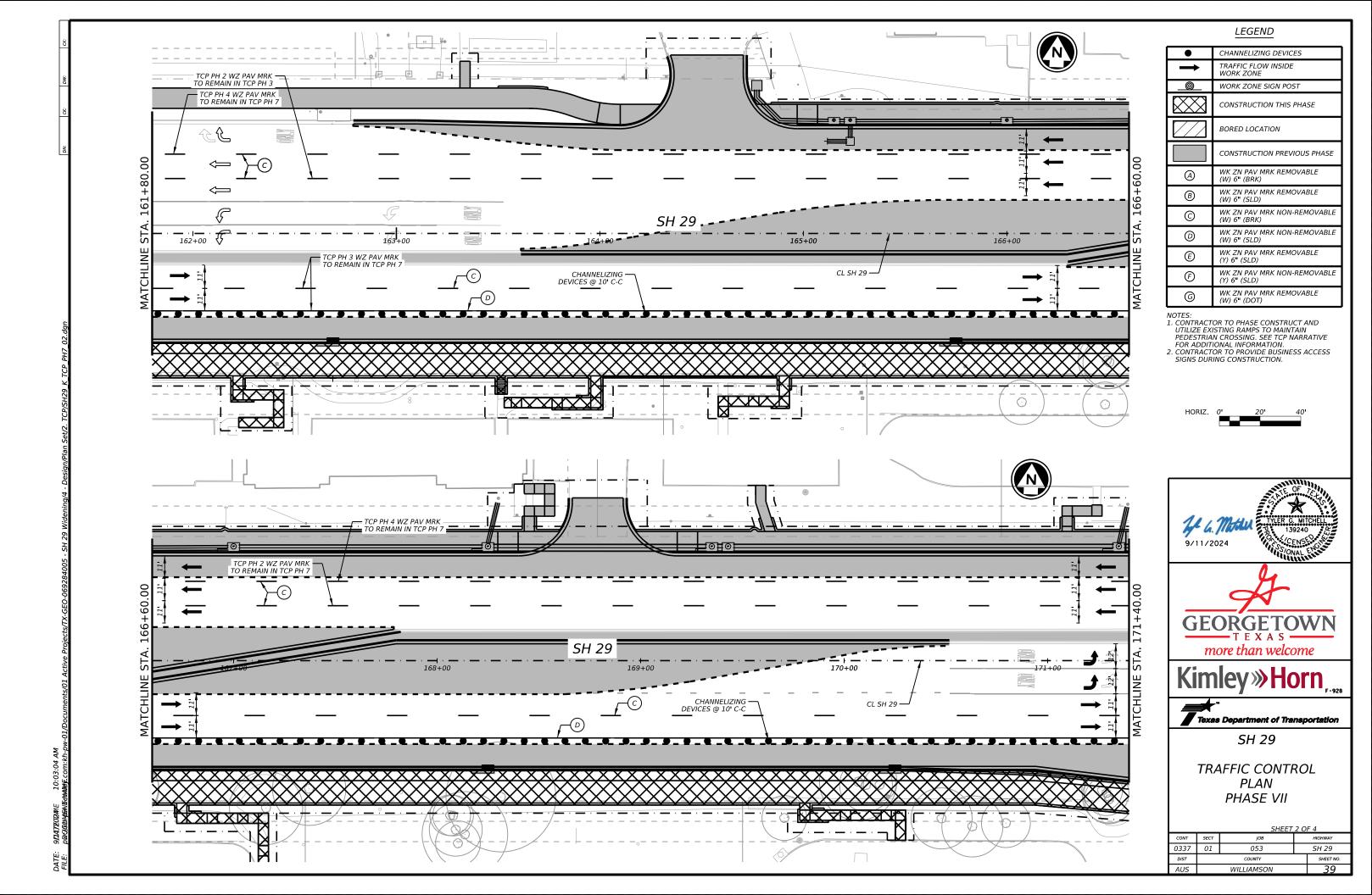


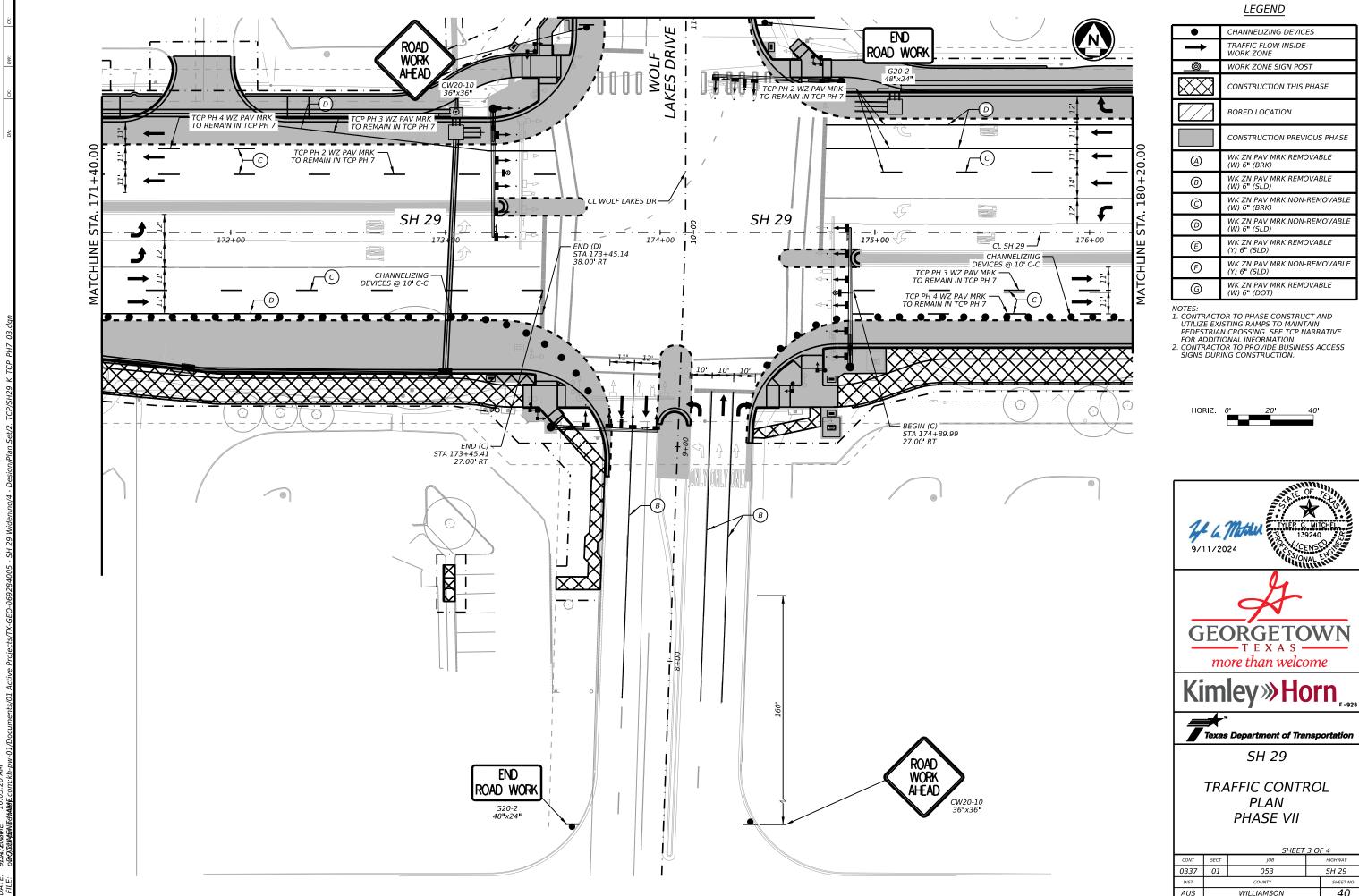


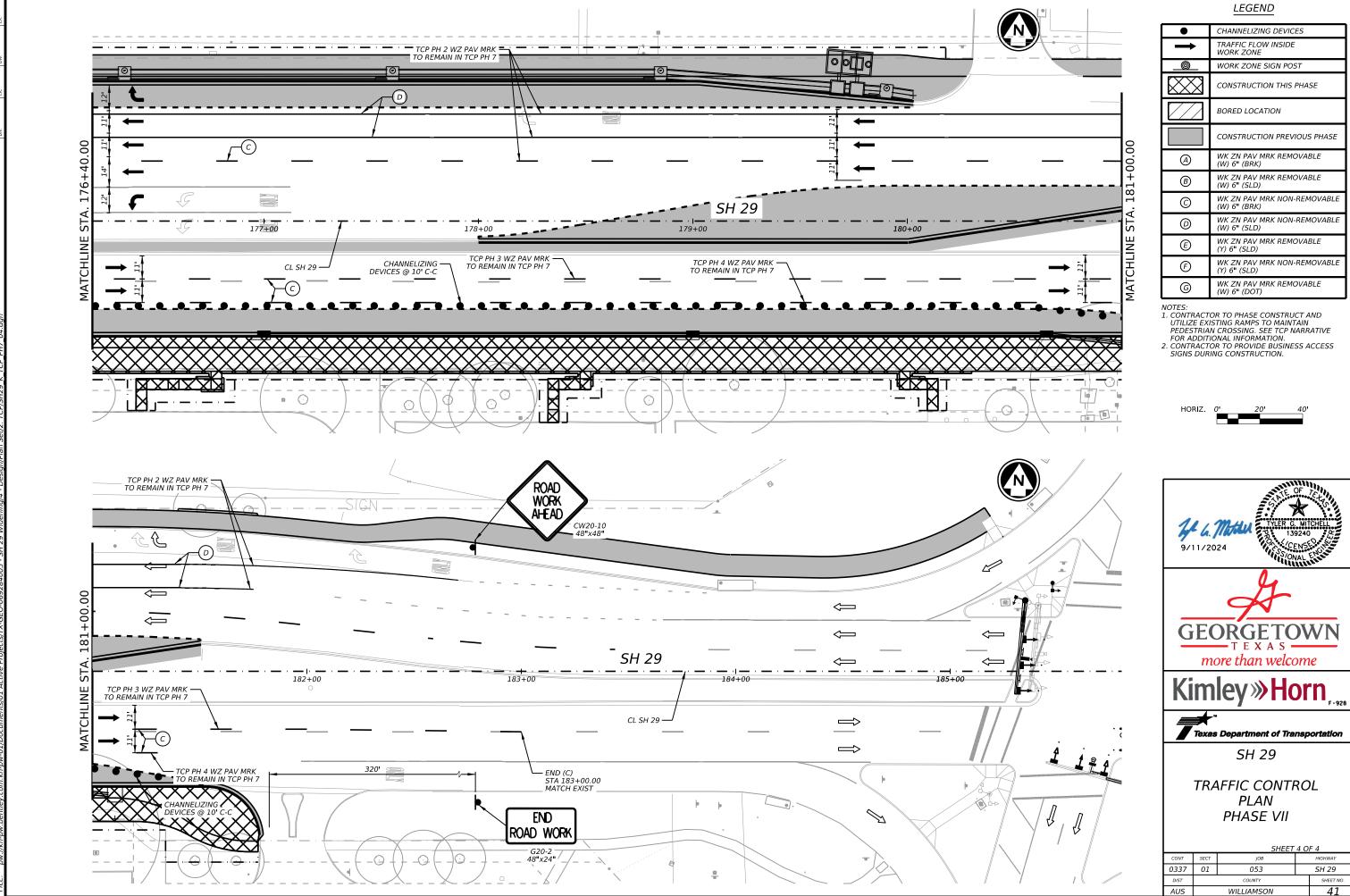












- 2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- 4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- 5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

of this standard is governed by the "Texas Engineering Practice Act". No warranty of any e by TxD01 for any purpose whotscever. TxD01 assumes no responsibility for the conversion of other formats of for inforrect results or dangaes resulting from its use. USH 29 Widening/4 - Design/Plan Set/CT/CTANDARDS/Dc-21.dg from its use.

- 6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- 7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- 9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- 10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
- 11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- 12. The Engineer has the final decision on the location of all traffic control devices.
- 13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

### WORKER SAFETY NOTES:

- 1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.
- 2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

### COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- 2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

### THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD) DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) MATERIAL PRODUCER LIST (MPL) ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)" STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD) TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12



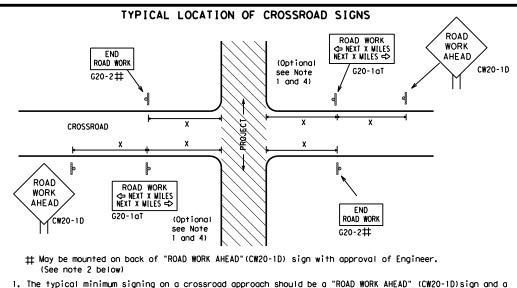
Traffic Safety Division Standard

### BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

|           |               | · • - | •    |           |     |           |           |
|-----------|---------------|-------|------|-----------|-----|-----------|-----------|
| FILE:     | bc-21.dgn     | DN: T | ×D0T | ck: TxDOT | DW: | TxDOT     | ck: TxDOT |
| C TxDOT   | November 2002 | CONT  | SECT | JOB       |     | HIG       | SHWAY     |
| 4-03 7-13 |               | 0337  | 01   | 053       |     | SH        | 29        |
| 9-07      |               |       |      | COUNTY    |     | SHEET NO. |           |
| 5-10      | 5-21          | AUS   | 1    | WILLIAM   | SOI | N         | 42        |

95



- (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
- The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
- Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
- The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
- Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
- When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

### BEGIN T-INTERSECTION WORK ZONE ★ ★ G20-9TP ★ ★ R20-5T FINES DOUBL X R20-50TP BINEM BORKERS ARE PRESENT ROAD WORK ⟨⇒ NEXT X WILES X X G20-2bT WORK ZONE G20-1bTI INTERSECTED 1000' - 1500' - Hwy 1 Block - City 1000'-1500' - Hwy 1 Block - City ROADWAY $\Rightarrow$ G20-1bTR ROAD WORK WORK ZONE G20-2bT \* \* Limit BEGIN \* \* G20-9TP ZONE TRAFFI G20-6T \* \* R20-5T FINES DOUBLE X X R20-5aTP WHEN WORKERS ROAD WORK G20-2

### CSJ LIMITS AT T-INTERSECTION

- 1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- 2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

### TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING 1,5,6

### SIZE

|   | Posted<br>Speed | Sign∆<br>Spacing<br>"X" |
|---|-----------------|-------------------------|
|   | MPH             | Feet<br>(Apprx.)        |
|   | 30              | 120                     |
|   | 35              | 160                     |
|   | 40              | 240                     |
| 1 | 45              | 320                     |
|   | 50              | 400                     |
|   | 55              | 500 <sup>2</sup>        |
|   | 60              | 600²                    |
| 1 | 65              | 700 <sup>2</sup>        |
|   | 70              | 800 <sup>2</sup>        |
|   | 75              | 900 <sup>2</sup>        |
|   | 80              | 1000 <sup>2</sup>       |
| J | *               | * 3                     |

SPACING

Sign onventional Expressway/ Number Freeway or Series CW20' CW21 CW22 48" x 48" 48" × 48' CW23 CW25 CW1, CW2, CW7. CW8. 48" x 48' 36" x 36' CW9, CW11 CW14 CW3, CW4, CW5, CW6, 48" x 48" 48" × 48' CW8-3, CW10, CW12

\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

 $\triangle$  Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

### GENERAL NOTES

- 1. Special or larger size signs may be used as necessary.
- 2. Distance between signs should be increased as required to have 1500 feet advance warning.
- 3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
- 5. Only diamond shaped warning sign sizes are indicated.
- 6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design

### SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS X X G20-9TP SPEED STAY ALERT ROAD LIMIT R4-1 DO NOT PASS appropriate: OBEY TRAFFIC **X X** R20-5T WORK WARNING \* \* G20-5T ROAD WORK AHEAD DOUBL F SIGNS € ★ R20-5aTP ME PRESENT CW20-1D ROAD STATE LAW TALK OR TEXT LATER CW13-1P R2-1++ ROAD ★ ★ G20-6T WORK WORK G20-10T \* \* R20-3T \* \* AHEAD AHEAD Type 3 Barricade or WPH CW13-1P CW20-1D channelizing devices $\Diamond$ $\Diamond$ $\Diamond$ $\Diamond$ $\Rightarrow$ $\Leftrightarrow$ ➾ $\Rightarrow$ Beginning of NO-PASSING SPEED END G20-2bT X X R2-1 LIMIT line should $\otimes \times \times$ coordinate ROAD WORK When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional with sign location "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still G20-2 X X NOTES within the project limits. See the applicable TCP sheets for exact location and spacing of signs and

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS

★ ★G20-9TP ZONE STAY ALERT BEGIN ROAD WORK NEXT X MILES OBEY SPEED TRAFFI ★ ★ G20-5T ROAD LIMIT ROAD ROAD ¥ ¥R20-5T FINES SIGNS WORK CLOSED R11-2 WORK DOUBLE STATE LAW ∕₂ MILE TALK OR TEXT LATER AHEAD X X R20-5aTP SHEN SHEEN ARE PRESENT **X** ★ G20-6T Type 3 R20-3T R2-1 G20-10 CW20-1D Barricade or CW13-1P CW20-1E channelizing devices -CSJ Limi Channelizing Devices  $\Rightarrow$ SPEED R2-1 END ROAD WORK LIMIT END | WORK ZONE G20-26T \* \* G20-2 \* \*

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer.

The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2b1 shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic

Contractor will install a regulatory speed limit sign at the end of the work zone.

|   | LEGEND                   |   |  |  |  |  |
|---|--------------------------|---|--|--|--|--|
|   | ⊢⊣ Туре 3 Barricade      |   |  |  |  |  |
| C | OOO Channelizing Devices |   |  |  |  |  |
|   | ₽                        | <b>■</b> Sign   |  |  |  |  |
|   | x                        | See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements. |  |  |  |  |

### SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

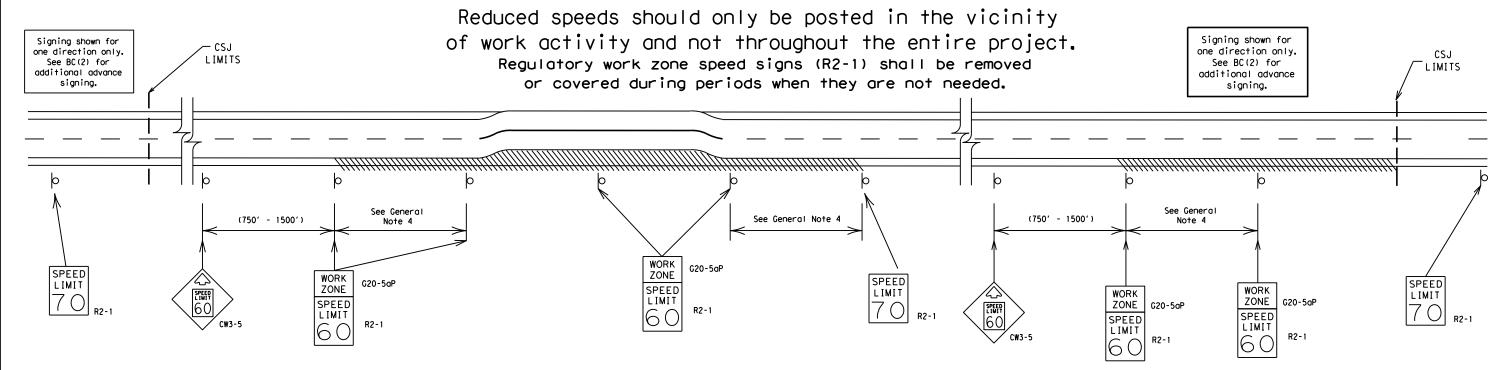
### BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

| E:    | bc-21.dgn     | DN: T | DOT    | ck: TxDOT | DW: | TxDOT     | ck: TxDOT |
|-------|---------------|-------|--------|-----------|-----|-----------|-----------|
| TxDOT | November 2002 | CONT  | SECT   | JOB       |     | HIC       | SHWAY     |
|       | REVISIONS     | 0337  | 01     | 053       |     | SH        | 29        |
| 9-07  | 8-14          | DIST  | COUNTY |           |     | SHEET NO. |           |
| 7-13  | 5-21          | AUS   | ١      | WILLIAM   | SON | N         | 43        |

### TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.



### GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width
- f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

### SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

### GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- 3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 4. Frequency of work zone speed limit signs should be:

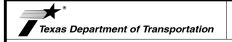
40 mph and greater 0.2 to 2 miles

35 mph and less 0.2 to 1 mile

- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- 7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- 8. Techniques that may help reduce traffic speeds include but are not limited to:
  A. Law enforcement.
  - B. Flagger stationed next to sign.
  - C. Portable changeable message sign (PCMS).
  - D. Low-power (drone) radar transmitter.
  - E. Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only.
   Work Zone Speed Limits should only be posted as approved for each project.
- 10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

SHEET 3 OF 12

Traffic Safety Division Standard



### BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

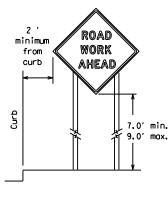
BC(3)-21

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\* \* XX 6.0' min.

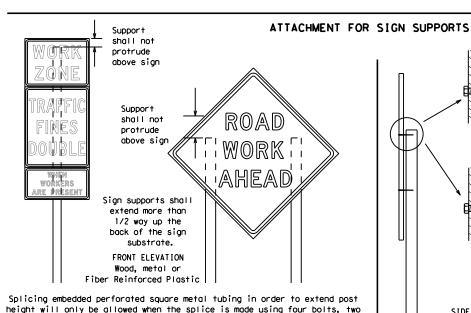
ROAD

WORK

AHEAD

\* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

\* \* When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.



SIDE ELEVATION

Wood

Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

### STOP/SLOW PADDLES

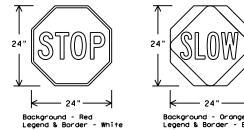
above and two below the spice point. Splice must be located entirely behind

the sign substrate, not near the base of the support. Splice insert lengths

should be at least 5 times nominal post size, centered on the splice and

of at least the same gauge material.

- 1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24". STOP/SLOW paddles shall be retroreflectorized when used at night.
- 3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



| SHEETING RE     | QUIREMENT | TS (WHEN USED AT NIGHT)                          |
|-----------------|-----------|--|
| USAGE           | COLOR     | SIGN FACE MATERIAL                               |
| BACKGROUND      | RED       | TYPE B OR C SHEETING                             |
| BACKGROUND      | ORANGE    | TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING |
| LEGEND & BORDER | WHITE     | TYPE B OR C SHEETING                             |
| LEGEND & BORDER | BLACK     | ACRYLIC NON-REFLECTIVE FILM                      |

### CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports. the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CW7TCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

### GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question reaardina installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

### <u>DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)</u>

- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
- a. Long-term stationary work that occupies a location more than 3 days.
- Intermediate-term stationary work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
- Short-term stationary daytime work that occupies a location for more than 1 hour in a single daylight period. Short, duration - work that occupies a location up to 1 hour.
- Mobile work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

### SIGN MOUNTING HEIGHT

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plagues mounted below other signs.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above
- the ground. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

### SIZE OF SIGNS

The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

### SIGN SUBSTRATES

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

### REFLECTIVE SHEETING

- 1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300
- for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background. 3. Orange sheeting, meeting the requirements of DMS-8300 Type  $B_{FL}$  or Type  $C_{FL}$ , shall be used for rigid signs with orange backgrounds.

### SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

### REMOVING OR COVERING

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting. Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

### SIGN SUPPORT WEIGHTS

- 1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used. The sandbags will be tied shut to keep the sand from spilling and to maintain a
- constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

### FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

SHEET 4 OF 12

Traffic Safety Division Standard



### BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

|          |               |       |      | _         |     |          |           |
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| 7-13     | 5-21          | AUS   | V    | WILLIAM   | 102 | <b>1</b> | 45        |

Welds to start on

back fill puddle.

weld starts here

opposite sides going in opposite directions. Minimum

weld, do not

¥ Maximum 12 sq. ft. of \* Maximum wood 21 sq. ft. of sign face sign face 2x6 4x4 block block 72" Length of skids may Top be increased for wood additional stability. post for sign Top 2x4 x 40" height 24" 2x4 brace for sign requirement height 3/8" bolts w/nuts requiremen or 3/8" x 3 1/2" (min.) lag screws Front 4x4 block 40" 4x4 block 36" Side Front SKID MOUNTED WOOD SIGN SUPPORTS \* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

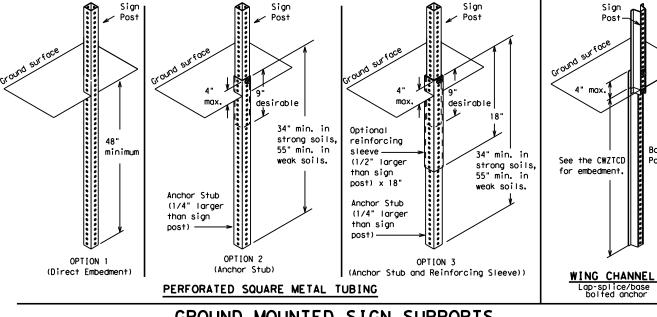
-2" x 2"

12 ga. upright

2"

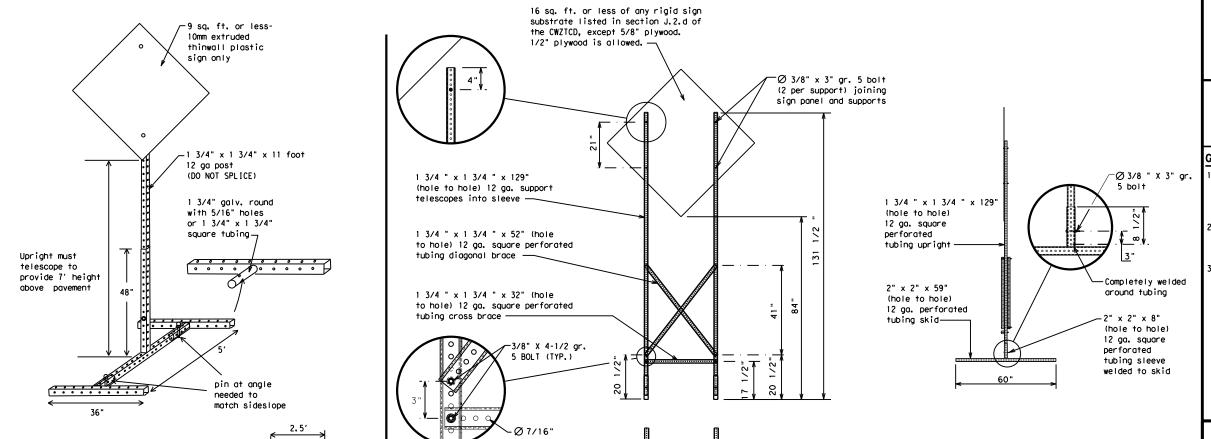
SINGLE LEG BASE

Side View



### GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



### **WEDGE ANCHORS**

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

### OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

### GENERAL NOTES

- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
  - ★ See BC(4) for definition of "Work Duration."
  - Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
  - ☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

### SHEET 5 OF 12



Traffic Safety Division Standard

### BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

### BC(5)-21

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| 7-13 5   | 5-21          | AUS    | V    | VILLIAM   | SOI | ١     | 46        |

| SKID MOUNTED | PERFORATED | SQUARE | STEEL | TUBING | SIGN | <b>SUPPORTS</b> |  |
|--------------|------------|--------|-------|--------|------|-----------------|--|
|              |            |        |       |        |      |                 |  |

\* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

32'

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### PORTABLE CHANGEABLE MESSAGE SIGNS

- 1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR." "AT." etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by
- 4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- 5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- 8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- 9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- 11. Do not use the word "Danger" in message.
- 12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- 13. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- 15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- 16. Each line of text should be centered on the message board rather than left or right justified.
- 17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

| WORD OR PHRASE              | ABBREVIATION      | WORD OR PHRASE | ABBREVIATION |
|-----------------------------|-------------------|----------------|--------------|
| Access Road                 | ACCS RD           | Major          | MAJ          |
| Alternate                   | ALT               | Miles          | MI           |
| Avenue                      | AVE               | Miles Per Hour | MPH          |
| Best Route                  | BEST RTE          | Minor          | MNR          |
| Boulevard                   | BLVD              | Monday         | MON          |
| Bridge                      | BRDG              | Normal         | NORM         |
| Cannot                      | CANT              | North          | N            |
| Center                      | CTR               | Northbound     | (route) N    |
| Construction<br>Ahead       | CONST AHD         | Parking        | PKING        |
| CROSSING                    | XING              | Road           | RD           |
|                             | DETOUR RTE        | Right Lane     | RT LN        |
| Detour Route Do Not         | DONT              | Saturday       | SAT          |
| East                        | F                 | Service Road   | SERV RD      |
| Eastbound                   | •                 | Shoulder       | SHLDR        |
|                             | (route) E<br>EMER | Slippery       | SL IP        |
| Emergency Vabials           |                   | South          | S            |
| Emergency Vehicle           | ENT               | Southbound     | (route) S    |
| Entrance, Enter             | EXP LN            | Speed          | SPD          |
| Express Lane                | EXP LN<br>EXPWY   | Street         | ST           |
| Expressway<br>XXXX Feet     | XXXX FT           | Sunday         | SUN          |
|                             | FOG AHD           | Telephone      | PHONE        |
| Fog Ahead                   | FRWY. FWY         | Temporary      | TEMP         |
| Freeway                     | FWY BLKD          | Thursday       | THURS        |
| Freeway Blocked             | FRI               | To Downtown    | TO DWNTN     |
| Friday<br>Hazardous Driving |                   | Traffic        | TRAF         |
| Hazardous Material          | HAZ UKIVING       | Travelers      | TRVLRS       |
|                             | HOV               | Tuesday        | TUES         |
| High-Occupancy<br>Vehicle   |                   | Time Minutes   | TIME MIN     |
|                             | HWY               | Upper Level    | UPR LEVEL    |
| Highway<br>Hour(s)          | HR. HRS           | Vehicles (s)   | VEH, VEHS    |
| Information                 | INFO              | Warning        | WARN         |
| It Is                       | ITS               | Wednesday      | WED          |
|                             | JCT               | Weight Limit   | WT LIMIT     |
| Junction<br>Left            | LFT               | West           | W            |
| Left Lane                   | LFT LN            | Westbound      | (route) W    |
|                             | LN CLOSED         | Wet Pavement   | WET PVMT     |
| Lane Closed<br>Lower Level  | LWR LEVEL         | Will Not       | WONT         |
| Maintenance                 | MAINT             |                |              |

designation # IH-number, US-number, SH-number, FM-number

### RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

### Phase 1: Condition Lists

| FREEWAY<br>CLOSED<br>X MILE | FRONTAGE<br>ROAD<br>CLOSED     | ROADWORK<br>XXX FT             | ROAD<br>REPAIRS<br>XXXX FT    |
|-----------------------------|--------------------------------|--------------------------------|-------------------------------|
| ROAD<br>CLOSED<br>AT SH XXX | SHOULDER<br>CLOSED<br>XXX FT   | FLAGGER<br>XXXX FT             | LANE<br>NARROWS<br>XXXX FT    |
| ROAD<br>CLSD AT<br>FM XXXX  | RIGHT LN<br>CLOSED<br>XXX FT   | RIGHT LN<br>NARROWS<br>XXXX FT | TWO-WAY<br>TRAFFIC<br>XX MILE |
| RIGHT X<br>LANES<br>CLOSED  | RIGHT X<br>LANES<br>OPEN       | MERGING<br>TRAFFIC<br>XXXX FT  | CONST<br>TRAFFIC<br>XXX FT    |
| CENTER<br>LANE<br>CLOSED    | DAYTIME<br>LANE<br>CLOSURES    | LOOSE<br>GRAVEL<br>XXXX FT     | UNEVEN<br>LANES<br>XXXX FT    |
| NIGHT<br>LANE<br>CLOSURES   | I-XX SOUTH<br>EXIT<br>CLOSED   | DETOUR<br>X MILE               | ROUGH<br>ROAD<br>XXXX FT      |
| VARIOUS<br>LANES<br>CLOSED  | EXIT XXX<br>CLOSED<br>X MILE   | ROADWORK<br>PAST<br>SH XXXX    | ROADWORK<br>NEXT<br>FRI-SUN   |
| EXIT<br>CLOSED              | RIGHT LN<br>TO BE<br>CLOSED    | BUMP<br>XXXX FT                | US XXX<br>EXIT<br>X MILES     |
| MALL<br>DRIVEWAY<br>CLOSED  | X LANES<br>CLOSED<br>TUE - FRI | TRAFFIC<br>SIGNAL<br>XXXX FT   | LANES<br>SHIFT                |

\* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phas

### Phase 2: Possible Component Lists

| Action to Take/E<br>Li     |                            | Location<br>List               | Warning<br>List             | * * Advance<br>Notice List  |
|----------------------------|----------------------------|--------------------------------|-----------------------------|-----------------------------|
| MERGE<br>RIGHT             | FORM<br>X LINES<br>RIGHT   | FM XXXX                        | SPEED<br>LIMIT<br>XX MPH    | TUE-FRI<br>XX AM-<br>X PM   |
| DETOUR<br>NEXT<br>X EXITS  | USE<br>XXXXX<br>RD EXIT    | BEFORE<br>RAILROAD<br>CROSSING | MAXIMUM<br>SPEED<br>XX MPH  | APR XX-<br>XX<br>X PM-X AM  |
| USE<br>EXIT XXX            | USE EXIT<br>I-XX<br>NORTH  | NEXT<br>X<br>MILES             | MINIMUM<br>SPEED<br>XX MPH  | BEGINS<br>MONDAY            |
| STAY ON<br>US XXX<br>SOUTH | USE<br>I-XX E<br>TO I-XX N | PAST<br>US XXX<br>EXIT         | ADVISORY<br>SPEED<br>XX MPH | BEGINS<br>MAY XX            |
| TRUCKS<br>USE<br>US XXX N  | WATCH<br>FOR<br>TRUCKS     | XXXXXXX<br>TO<br>XXXXXXX       | RIGHT<br>LANE<br>EXIT       | MAY X-X<br>XX PM -<br>XX AM |
| WATCH<br>FOR<br>TRUCKS     | EXPECT<br>DELAYS           | US XXX<br>TO<br>FM XXXX        | USE<br>CAUTION              | NEXT<br>FRI-SUN             |
| EXPECT<br>DELAYS           | PREPARE<br>TO<br>STOP      |                                | DRIVE<br>SAFELY             | XX AM<br>TO<br>XX PM        |
| REDUCE<br>SPEED<br>XXX FT  | END<br>SHOUL DER<br>USE    |                                | DRIVE<br>WITH<br>CARE       | NEXT<br>TUE<br>AUG XX       |
| USE<br>OTHER<br>ROUTES     | WATCH<br>FOR<br>WORKERS    |                                |                             | TONIGHT<br>XX PM-<br>XX AM  |
| STAY<br>IN<br>LANE *       |                            | * * Se                         | e Application Guidelin      | es Note 6.                  |

| Warning<br>List             | * * Advance<br>Notice List  |
|-----------------------------|-----------------------------|
| SPEED<br>LIMIT<br>XX MPH    | TUE-FRI<br>XX AM-<br>X PM   |
| MAXIMUM<br>SPEED<br>XX MPH  | APR XX-<br>XX<br>X PM-X AM  |
| MINIMUM<br>SPEED<br>XX MPH  | BEGINS<br>MONDAY            |
| ADVISORY<br>SPEED<br>XX MPH | BEGINS<br>MAY XX            |
| RIGHT<br>LANE<br>EXIT       | MAY X-X<br>XX PM -<br>XX AM |
| USE<br>CAUTION              | NEXT<br>FRI-SUN             |
| DRIVE<br>SAFELY             | XX AM<br>TO<br>XX PM        |
| DRIVE<br>WITH<br>CARE       | NEXT<br>TUE<br>AUG XX       |
|                             | TONICHT                     |

### APPLICATION GUIDELINES

- 1. Only 1 or 2 phases are to be used on a PCMS.
- 2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- 3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- 4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
- 6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

### WORDING ALTERNATIVES

location phase is used.

- 1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- 2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- 4. Highway names and numbers replaced as appropriate.
- 5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- 7. FI and MI. MILE and MILES interchanged as appropriate.
- 8. AT. BEFORE and PAST interchanged as needed. 9. Distances or AHEAD can be eliminated from the message if a

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC. THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

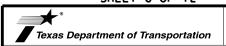
### FULL MATRIX PCMS SIGNS

BLVD

CLOSED

- 1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- 2. When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above
- When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
- 4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

### SHEET 6 OF 12



Traffic Safety Division Standard

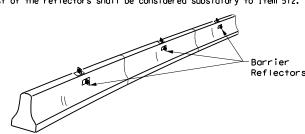
### BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

| FILE:   | bc-21.dgn     | DN: T> | OOT  | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
|---------|---------------|--------|------|-----------|-----|-------|-----------|
| C TxDOT | November 2002 | CONT   | SECT | ECT JOB   |     | HI    | GHWAY     |
|         | REVISIONS     | 0337   | 01   | 053       |     | SH    | 29        |
| 9-07    | 8-14          | DIST   | •    | COUNTY    |     |       | SHEET NO. |
| 7-13    | 5-21          | AUS    | ١    | VILLIAM   | 102 | 4     | 47        |

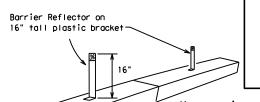
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of pregualified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- 2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



### CONCRETE TRAFFIC BARRIER (CTB)

- 3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- 4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- 5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- 6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- 7. Maximum spacing of Barrier Reflectors is forty (40) feet.
- 8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- 9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's
- 10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer
- 11. Single slope barriers shall be delineated as shown on the above detail.



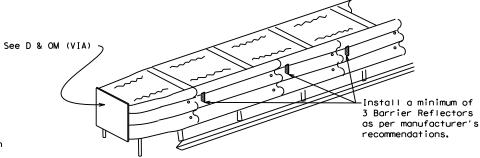
### IN WORK ZONES LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

LOW PROFILE CONCRETE

BARRIER (LPCB) USED

Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

### LOW PROFILE CONCRETE BARRIER (LPCB)



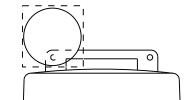
### DELINEATION OF END TREATMENTS

### END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH), Refer to the CWZTCD List for approved end treatments and manufacturers.

### BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

### Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

### WARNING LIGHTS

- 1. Warning lights shall meet the requirements of the TMUTCD.
- 2. Warning lights shall NOT be installed on barricades.
- 3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type  $B_{FL}$  or  $C_{FL}$  Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- 5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- 7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- 8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

### WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

- 1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- 2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- 3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- 4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- 5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- 6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

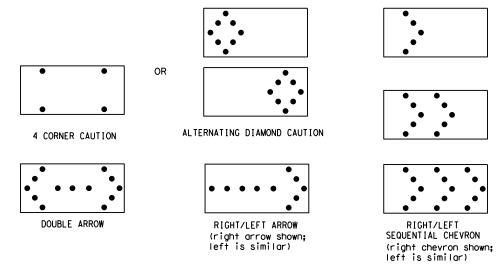
### WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

- 1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- 2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed
- 3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- 4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- 6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- 7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- 8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- 9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- 1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.

  2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions
- or work on shoulders unless the "CAUTION" display (see detail below) is used.
- The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- 4. The Flashing Arrow Board should be able to display the following symbols:



- 5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage.
   The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
   Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal
- intervals of 25 percent for each sequential phase of the flashing chevron.

  9. The sequential arrow display is NOT ALLOWED.

  10. The flashing arrow display is the TxDOT standard; however, the sequential chevron
- display may be used during daylight operations.
- 11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
  12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
  13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility,
- flash rate and dimming requirements on this sheet for the same size arrow.
- 14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

|      | REQUIREMENTS    |                                  |                                   |  |  |  |  |  |  |  |  |
|------|-----------------|----------------------------------|-----------------------------------|--|--|--|--|--|--|--|--|
| TYPE | MINIMUM<br>SIZE | MINIMUM NUMBER<br>OF PANEL LAMPS | MINIMUM<br>VISIBILITY<br>DISTANCE |  |  |  |  |  |  |  |  |
| В    | 30 × 60         | 13                               | 3/4 mile                          |  |  |  |  |  |  |  |  |
| С    | 48 × 96         | 15                               | 1 mile                            |  |  |  |  |  |  |  |  |

ATTENTION Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE
TRAFFIC BARRIER OR GUARDRAIL.

### FLASHING ARROW BOARDS

SHEET 7 OF 12

### TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- 3. Refer to the CWZTCD for a list of approved TMAs.
- 4. TMAs are required on freeways unless otherwise noted in the plans.
- 5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL. REFLECTORS. WARNING LIGHTS & ATTENUATOR

BC(7)-21

| 7-13    | 5-21          | AUS   | ١ ١   | WILLIAM   | 102 | v l   | 48        |
|---------|---------------|-------|---|-----------|-----|-------|-----------|
| 9-07    | 8-14          | DIST  |   | COUNTY    |     |       | SHEET NO. |
|         | REVISIONS     | 0337  | 01  | 053       |     | SH    | 29        |
| C TxD0T | November 2002 | CONT  | SECT  | JOB       |     | HIC   | GHWAY     |
| FILE:   | bc-21.dgn     | DN: T | <dot< th=""><th>ck: TxDOT</th><th>DW:</th><th>TxDOT</th><th>ck: TxDOT</th></dot<> | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
|         |               |       |   |           |     |       |           |



### GENERAL NOTES

- 1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- 3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- 4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- 5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- 6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

### GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

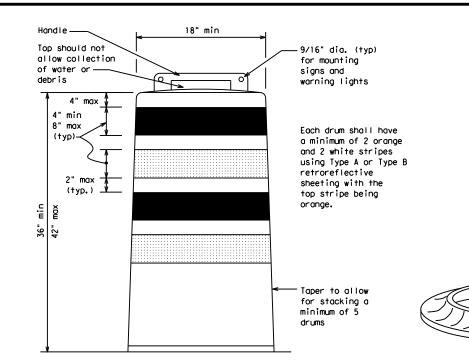
- 1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- 2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- 4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- 5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved
- 6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in
- 7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- 8. Plastic drums shall be constructed of ultra-violet stabilized, orange,
- high-density polyethylene (HDPE) or other approved material. 9. Drum body shall have a maximum unballasted weight of 11 lbs.
- 10.Drum and base shall be marked with manufacturer's name and model number.

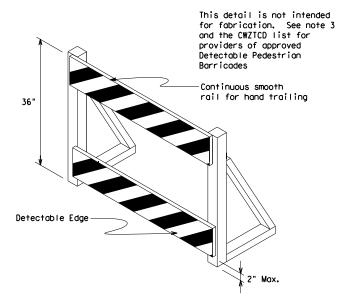
### RETROREFLECTIVE SHEETING

- 1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified
- 2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting

### BALLAST

- 1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- 2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- 5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- 6. Ballast shall not be placed on top of drums.
- 7. Adhesives may be used to secure base of drums to pavement.





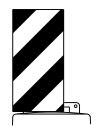
### DETECTABLE PEDESTRIAN BARRICADES

- 1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- 2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- 3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian
- 4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian
- 5. Warning lights shall not be attached to detectable pedestrian barricades.
- 6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign (Maximum Sign Dimension) Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer

See Ballast



12" x 24" Vertical Panel mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- 1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 2. Chevrons and other work zone signs with an orange background shall be manufactured with Type  $B_{\text{FL}}$  or Type  $C_{\text{FL}}$  Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- 5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each
- 6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2
- 7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum, A minimum of three (3) should be used at each location called for in the plans.
- 8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

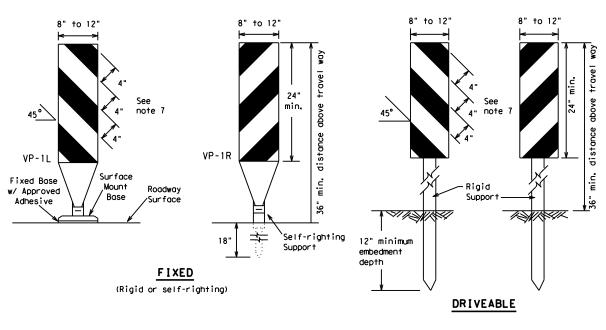


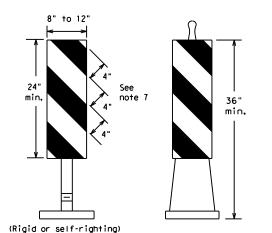
Traffic Safety

### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

|                       | _      |        |           |     |           |           |
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| TxDOT November 2002   | CONT   | SECT   | JOB       |     | HIGHWAY   |           |
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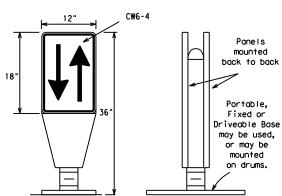




PORTABLE

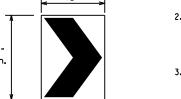
- 1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
- 3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- 4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- 5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List"
- 6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise,
- 7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

### VERTICAL PANELS (VPs)



- 1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- 2. The OTLD may be used in combination with 42"
- 3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- 4. The OTLD shall be orange with a black nonreflective legend. Sheeting for the OTLD shall be retroreflective Type  $B_{FL}$  or Type  $C_{FL}$  conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

### OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

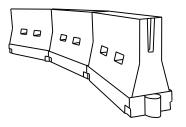
36"

- 1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- 3. Chevrons, when used, shall be erected on the out side of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- 4. To be effective, the chevron should be visible for at least 500 feet.
- 5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- 6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

### **CHEVRONS**

### **GENERAL NOTES**

- 1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- 2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- 3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- 4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- 5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- 7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



### LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- 2. LCDs may be used instead of a line of cones or drums.
- 3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- 4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- 5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

### WATER BALLASTED SYSTEMS USED AS BARRIERS

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- 2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- 3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

| Posted<br>Speed | Formula         | D             | esirab<br>er Len<br>* | le            | Suggested Maximum<br>Spacing of<br>Channelizing<br>Devices |                 |  |  |
|-----------------|-----------------|---------------|-----------------------|---------------|--|-----------------|--|--|
|                 |                 | 10'<br>Offset | 11'<br>Offset         | 12'<br>Offset | On a<br>Taper  | On a<br>Tangent |  |  |
| 30              | WS <sup>2</sup> | 150′          | 165′                  | 1801          | 30'  | 60′             |  |  |
| 35              | L = WS          | 2051          | 2251                  | 2451          | 35′  | 70′             |  |  |
| 40              | 60              | 265′          | 295′                  | 320′          | 40′  | 80′             |  |  |
| 45              |                 | 450′          | 495′                  | 540′          | 45′  | 90′             |  |  |
| 50              |                 | 5001          | 550′                  | 6001          | 50°  | 100′            |  |  |
| 55              | L=WS            | 550′          | 6051                  | 660′          | 55°  | 110′            |  |  |
| 60              | - ""            | 6001          | 660′                  | 7201          | 60 <i>°</i>  | 120′            |  |  |
| 65              |                 | 650′          | 715′                  | 780′          | 65′  | 130'            |  |  |
| 70              |                 | 700′          | 770′                  | 840′          | 70′  | 140′            |  |  |
| 75              |                 | 750′          | 8251                  | 900'          | 75′  | 150′            |  |  |
| 80              |                 | 800′          | 880′                  | 960′          | 80′  | 160′            |  |  |

XX Taper lengths have been rounded off. L=Length of Taper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

### SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



Traffic Safety Division Standard

### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

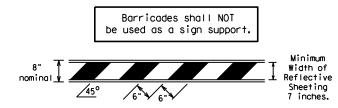
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| C) TxDOT  | November 2002 | CONT  | SECT  | JOB       |     | HIC       | SHWAY     |
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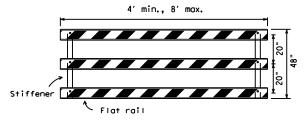
- 1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials
- used in the construction of Type 3 Barricades. 2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.

TYPE 3 BARRICADES

- 3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
- Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
- Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
- 6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
- Warning lights shall NOT be installed on barricades.
- Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The  $\,$ sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
- Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

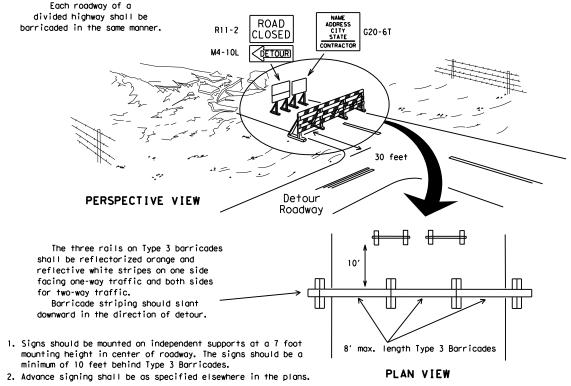


### TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

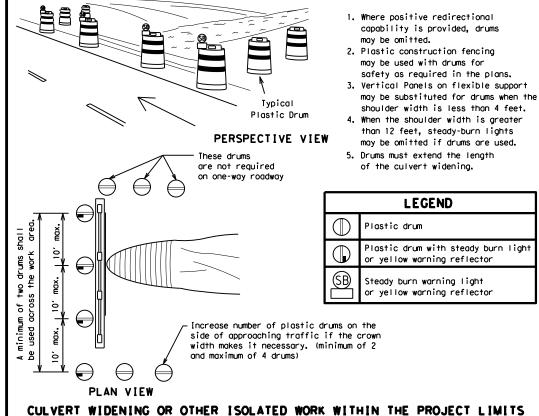
### TYPICAL PANEL DETAIL



TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

Two-Piece cones

Alternate



**CONES** 4" min. orange ₹2" min. 1 4" min. white 2" min. 4" min. orange [6" min. \_2" min. 2" min. \**1**4 min. 4" min. white 42" min. 28" min.

2" min.

One-Piece cones

2" to 6" 3" min.

Tubular Marker

FOR SKID OR POST TYPE BARRICADES

Alternate Drums, vertical panels or 42" cones Approx. Approx. at 50' maximum spacing 50' 50' Min. 2 drums or 1 Type 3 or 1 Type 3 barricade STOCKPILE On one-way roads Desirable downstream drums stockpile location Channelizing devices parallel to traffic or barricade may be is outside should be used when stockpile is omitted here clear zone. within 30' from travel lane.

TRAFFIC CONTROL FOR MATERIAL STOCKPILES

 $\Diamond$ 

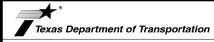
➾

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

- 1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
- 2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
- 3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
- 4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
- 5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
- 6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
- 7. Cones or tubular markers used on each project should be of the same size and shape.

**SHEET 10 OF 12** 



Traffic Safety Division Standard

### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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## 1:00:04 AM

### WORK ZONE PAVEMENT MARKINGS

### **GENERAL**

- The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- 6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

### PREFABRICATED PAVEMENT MARKINGS

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
- Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

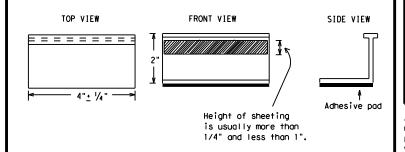
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- 3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- 4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per

### REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
- The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- 6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
- 7. Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- 10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

### Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
  - A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
  - B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- 3. Small design variances may be noted between tab manufacturers.
- 4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

| DEPARTMENTAL MATERIAL SPECIFICATIO                   | NS       |
|--|----------|
| PAVEMENT MARKERS (REFLECTORIZED)                     | DMS-4200 |
| TRAFFIC BUTTONS                                      | DMS-4300 |
| EPOXY AND ADHESIVES                                  | DMS-6100 |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS             | DMS-6130 |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS            | DMS-8240 |
| TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS | DMS-8241 |
| TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS   | DMS-8242 |

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12



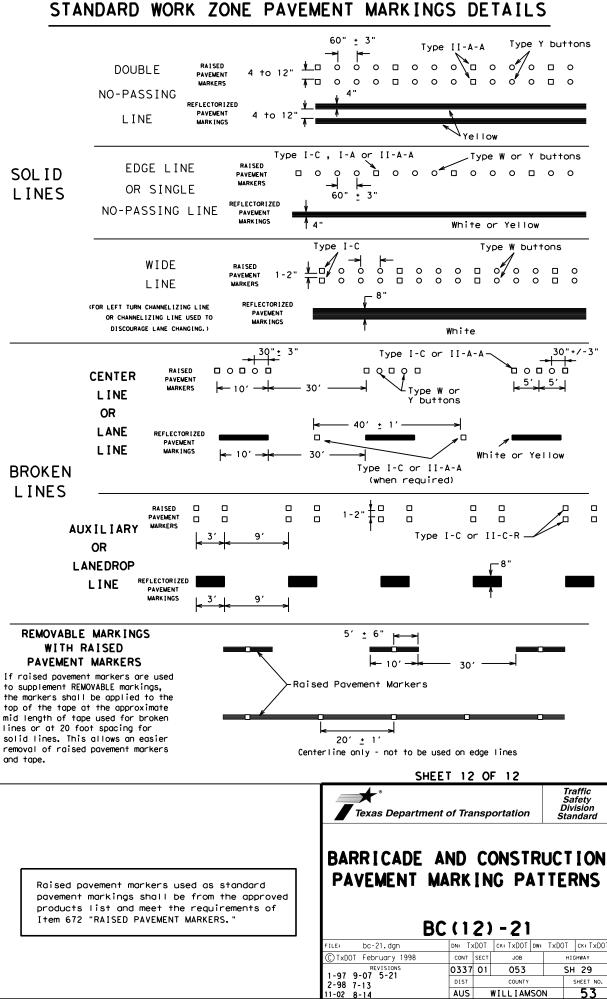
Traffic Safety Division Standard

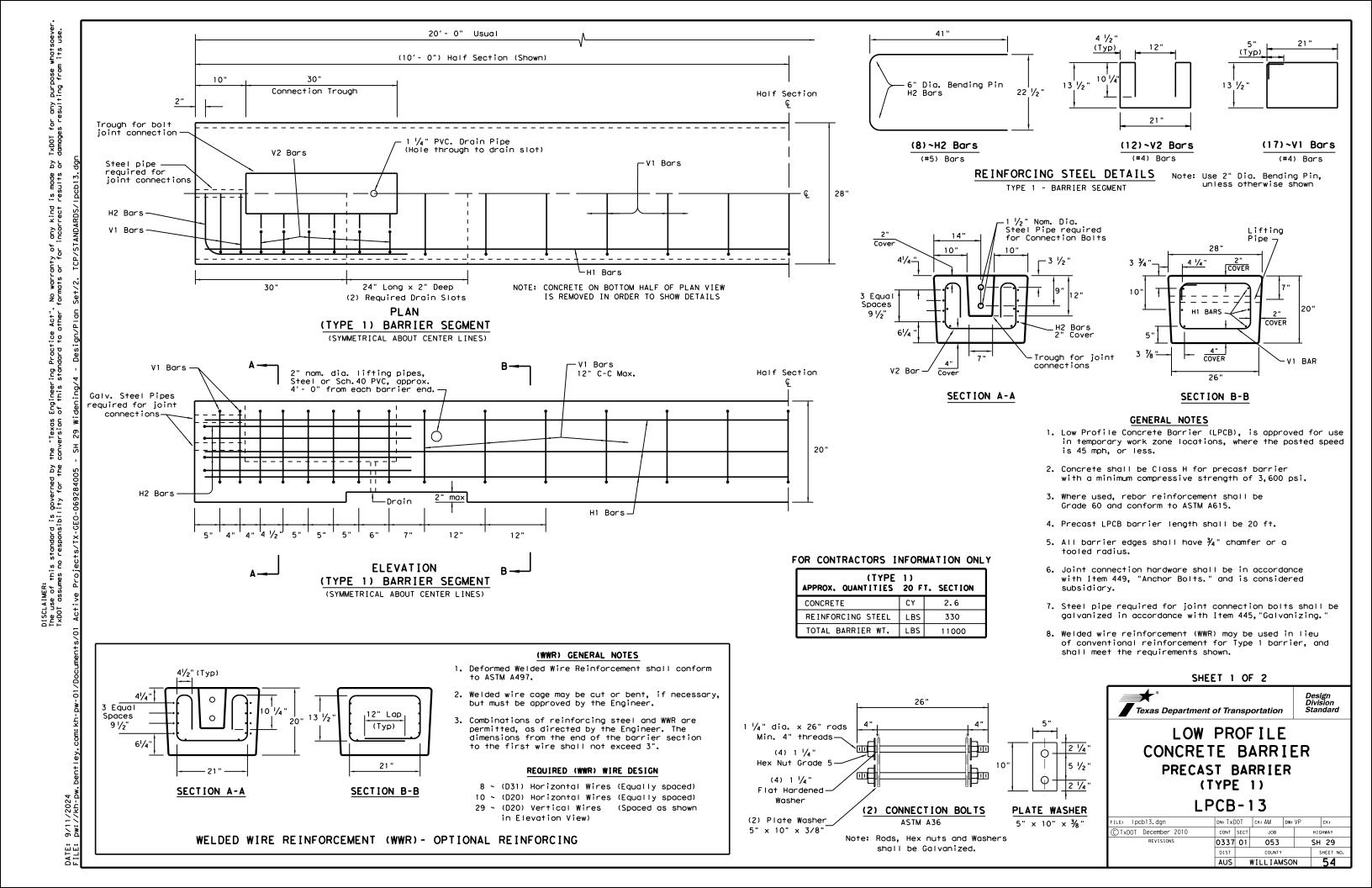
### BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

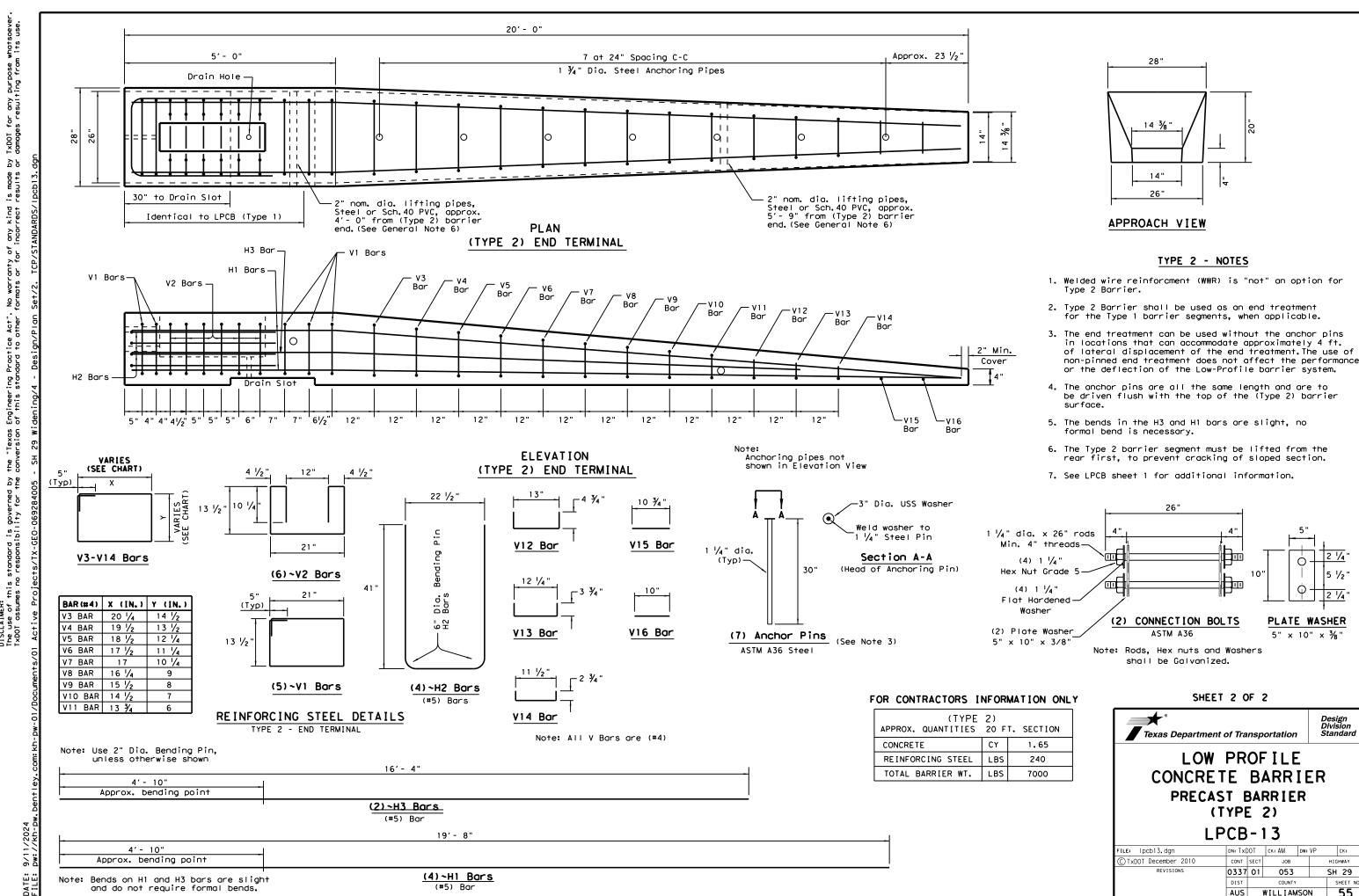
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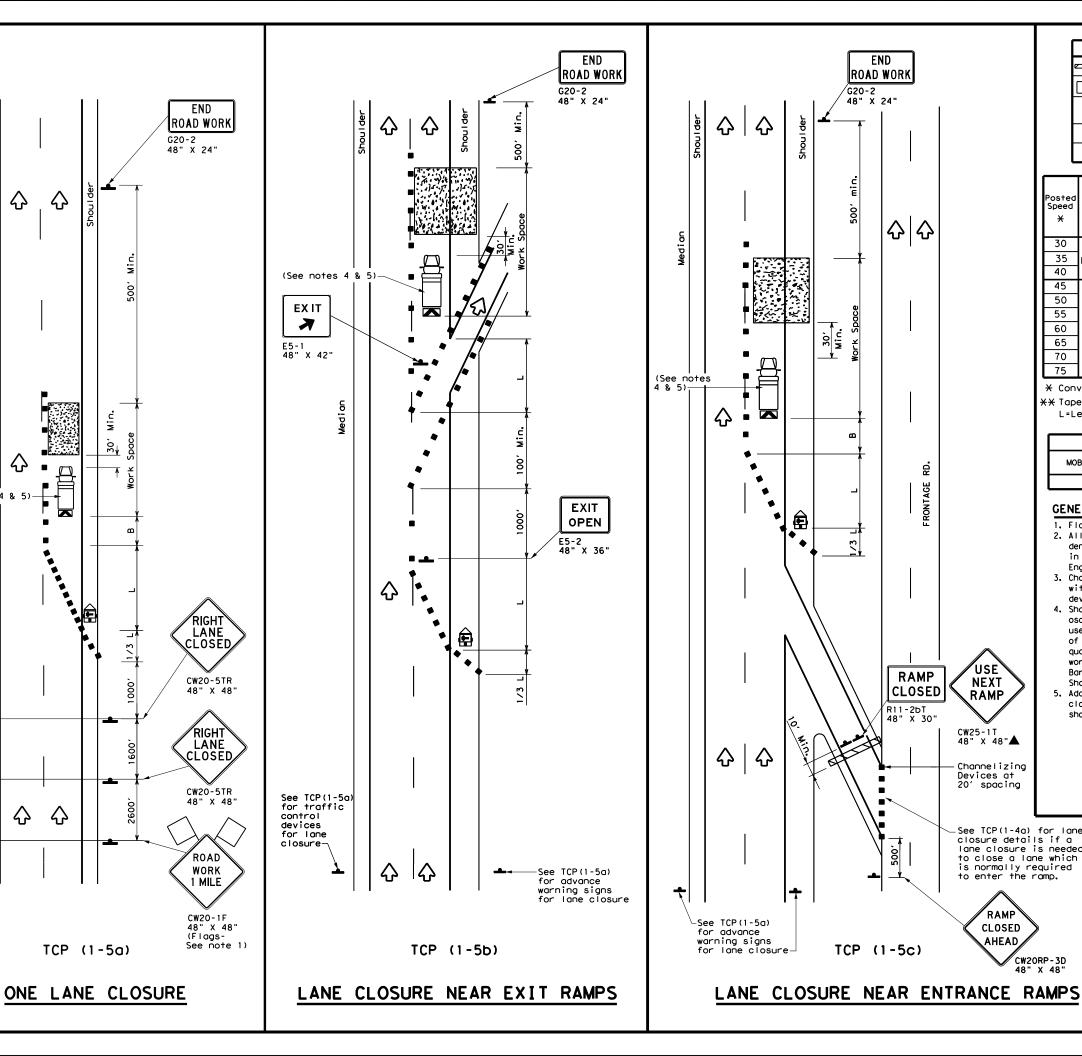
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HIGHWAY

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(See notes 4



|            | LEGEND                                  |   |  |  |  |  |  |  |  |  |
|------------|---|---|--|--|--|--|--|--|--|--|
| ~~~        | Type 3 Barricade                        |   | Channelizing Devices                       |  |  |  |  |  |  |  |
|            | Heavy Work Vehicle                      | K | Truck Mounted<br>Attenuator (TMA)          |  |  |  |  |  |  |  |
| <b>£</b>   | Trailer Mounted<br>Flashing Arrow Board |   | Portable Changeable<br>Message Sign (PCMS) |  |  |  |  |  |  |  |
| •          | Sign                                    | ♡ | Traffic Flow                               |  |  |  |  |  |  |  |
| $\Diamond$ | Flag                                    | 4 | Flagger                                    |  |  |  |  |  |  |  |
|            |   |   |  |  |  |  |  |  |  |  |

|                 |                    |               | Minimun       | •             | c                | d 14a*aaaa      |                                   |   |  |
|-----------------|--------------------|---------------|---------------|---------------|------------------|-----------------|-----------------------------------|---|--|
| Posted<br>Speed | Formula            | Desirable     |               |               | Spacir<br>Channe |                 | Minimum<br>Sign<br>Spacing<br>"X" | Suggested<br>Longitudinal<br>Buffer Space |  |
| *               |                    | 10'<br>Offset | 11'<br>Offset | 12'<br>Offset | On a<br>Taper    | On a<br>Tangent | Distance                          | "B"                                       |  |
| 30              | 2                  | 150′          | 165′          | 180′          | 30′              | 60′             | 120′                              | 90′                                       |  |
| 35              | L= WS <sup>2</sup> | 2051          | 225′          | 245′          | 35′              | 70′             | 160′                              | 120′                                      |  |
| 40              | 60                 | 265′          | 2951          | 320′          | 40′              | 80′             | 240′                              | 155′                                      |  |
| 45              |                    | 450′          | 4951          | 540′          | 45′              | 90′             | 320′                              | 195′                                      |  |
| 50              |                    | 500'          | 550′          | 600′          | 50′              | 100′            | 400′                              | 240'                                      |  |
| 55              | L=WS               | 550′          | 605′          | 660′          | 55′              | 110′            | 500′                              | 295′                                      |  |
| 60              | L - W 3            | 600'          | 660′          | 720′          | 60′              | 120′            | 600′                              | 350′                                      |  |
| 65              |                    | 650′          | 715′          | 780′          | 65′              | 130′            | 700′                              | 410′                                      |  |
| 70              |                    | 700′          | 770′          | 840′          | 70′              | 140′            | 800′                              | 475′                                      |  |
| 75              |                    | 750′          | 825′          | 900′          | 75′              | 150′            | 900′                              | 540′                                      |  |

- \* Conventional Roads Only
- \*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

| TYPICAL USAGE |   |   |  |  |  |  |  |  |  |  |
|---------------|---|---|--|--|--|--|--|--|--|--|
| MOBILE        | MOBILE SHORT SHORT TERM INTERMEDIATE LONG TERM DURATION STATIONARY TERM STATIONARY STATIONARY |   |  |  |  |  |  |  |  |  |
|               |   | ✓ |  |  |  |  |  |  |  |  |

### **GENERAL NOTES**

USE NEXT

RAMP

CW25-1T 48" X 48"▲

Channelizing Devices at 20' spacing

See TCP(1-4a) for lane closure details if a lane closure is needed

to close a lane which is normally required to enter the ramp.

CW20RP-3D 48" X 48"

RAMP

CLOSED

AHEAD

RAMP

CLOSED

R11-2bT 48" X 30"

END Road Work

**쇼 쇼** 

- 1. Flags attached to signs where shown, are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
- 4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

| LE: tcp1-5-18.dgn   | DN:  |      | CK:     | DW:  |     | CK:       |
|---------------------|------|------|---------|------|-----|-----------|
| TxDOT February 2012 | CONT | SECT | JOB     |      | HIG | HWAY      |
| REVISIONS           | 0337 | 01   | 053     |      | SH  | 29        |
| -16                 | DIST |      | COUNTY  |      |     | SHEET NO. |
|                     | AUS  | -    | WILLIAN | ISON |     | 56        |

WORK

AHEAD

for 50 MPH or less 3x for over 50 MPH

CW20-1D

48" x 48" (Flags-See note 1)

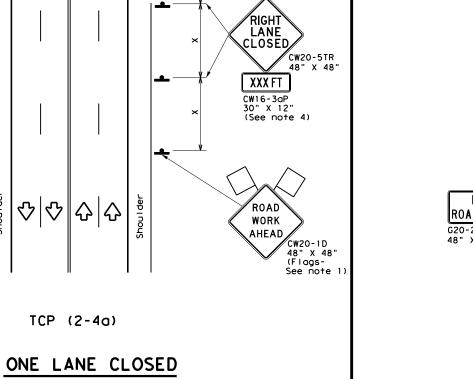
Shadow Vehicle with TMA and

high intensity rotating, flashing, oscillating or strobe lights. (See notes 5 & 6)

END

ROAD WORK

G20-2 48" X 24"



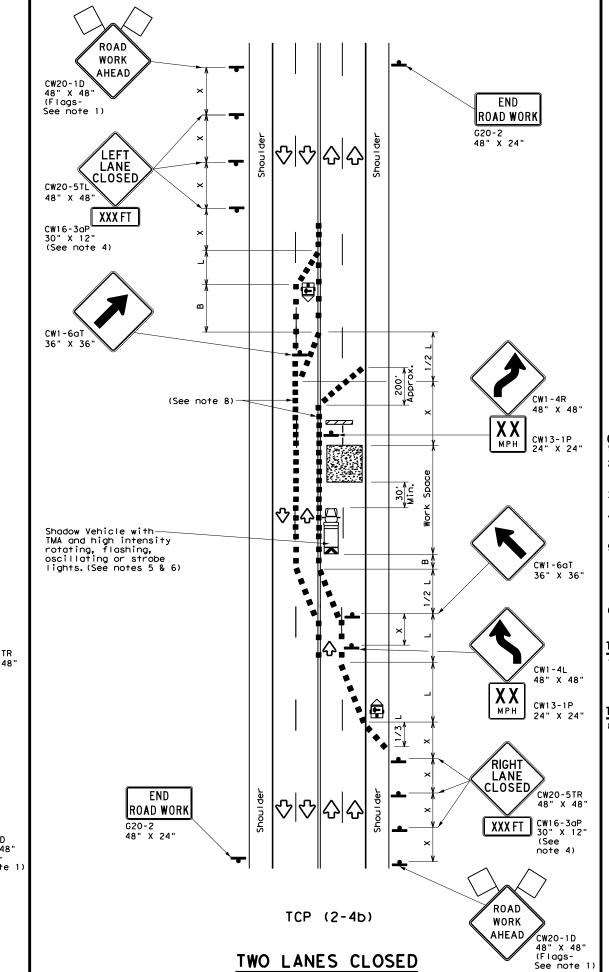
END

ROAD WORK

G20-2 48" X 24"

100' pprox.

MIN 30



|            | LEGEND                                  |   |  |  |  |  |  |  |  |  |
|------------|---|---|--|--|--|--|--|--|--|--|
|            | Type 3 Barricade                        |   | Channelizing Devices                       |  |  |  |  |  |  |  |
|            | Heavy Work Vehicle                      | K | Truck Mounted<br>Attenuator (TMA)          |  |  |  |  |  |  |  |
| <b>₽</b>   | Trailer Mounted<br>Flashing Arrow Board |   | Portable Changeable<br>Message Sign (PCMS) |  |  |  |  |  |  |  |
| 4          | Sign                                    | ∿ | Traffic Flow                               |  |  |  |  |  |  |  |
| $\Diamond$ | Flag                                    | Ŋ | Flagger                                    |  |  |  |  |  |  |  |

| _     | V \             |                                   |               |                  |  |                 |   |      |
|-------|-----------------|-----------------------------------|---------------|------------------|--|-----------------|---|------|
| Speed | Formula         | Desirable<br>Taper Lengths<br>X X |               | Spacir<br>Channe | Suggested Maximum<br>Spacing of<br>Channelizing<br>Devices |                 | Suggested<br>Longitudinal<br>Buffer Space |      |
| *     |                 | 10'<br>Offset                     | 11'<br>Offset | 12'<br>Offset    | On a<br>Taper  | On a<br>Tangent | "X"<br>Distance                           | "B"  |
| 30    | ws <sup>2</sup> | 150′                              | 165′          | 1801             | 30'  | 60′             | 1201                                      | 90′  |
| 35    | L = WS          | 2051                              | 225′          | 245′             | 35′  | 70′             | 160′                                      | 120′ |
| 40    | 80              | 265′                              | 295′          | 320′             | 40`  | 80'             | 240'                                      | 155′ |
| 45    |                 | 450′                              | 495′          | 540'             | 45′  | 90'             | 320'                                      | 195′ |
| 50    |                 | 5001                              | 550′          | 600′             | 50°  | 100′            | 400'                                      | 240′ |
| 55    | L=WS            | 550′                              | 6051          | 660′             | 55′  | 110'            | 500′                                      | 295′ |
| 60    | - ""            | 600'                              | 660′          | 720′             | 60`  | 120'            | 600'                                      | 350′ |
| 65    |                 | 650′                              | 715′          | 780′             | 65′  | 130′            | 700′                                      | 410′ |
| 70    |                 | 700′                              | 770′          | 8401             | 70′  | 140′            | 8001                                      | 475′ |
| 75    |                 | 750′                              | 825′          | 900′             | 75′  | 150′            | 900'                                      | 540′ |

- \* Conventional Roads Only
- \*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

| TYPICAL USAGE |                   |                          |                                 |                         |  |  |  |  |  |  |
|---------------|-------------------|--------------------------|---------------------------------|-------------------------|--|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |  |
|               |                   | 1                        | <b>√</b>                        |                         |  |  |  |  |  |  |

### GENERAL NOTES

- Flags attached to signs where shown, are REQUIRED.
   All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- 1. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
- 5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- . Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

### CP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

### CP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

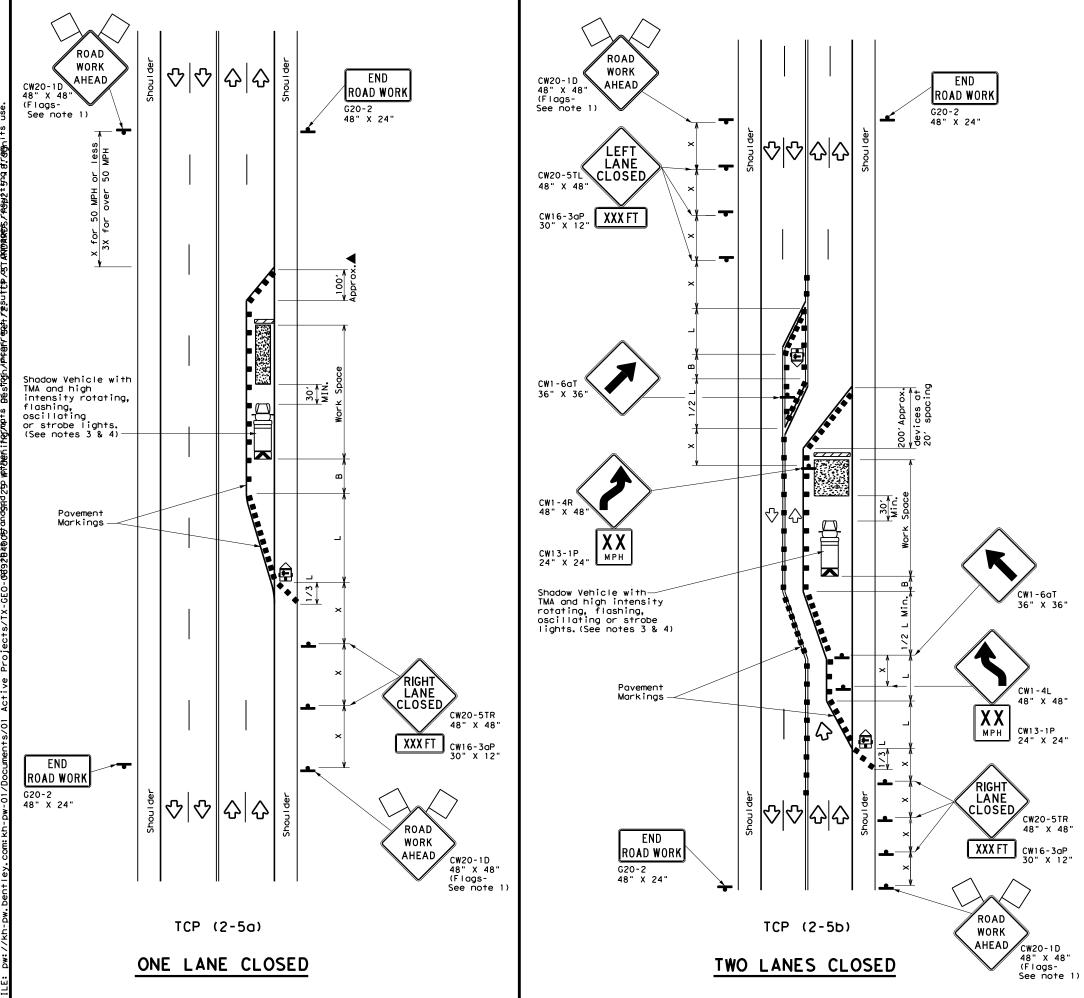


Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

| FILE: tcp2-4-18.dgn   | DN:  | DN: CK: DW: |         |      | CK:       |  |
|-----------------------|------|-------------|---------|------|-----------|--|
| © TxDOT December 1985 | CONT | SECT        | JOB     |      | HIGHWAY   |  |
| 8-95 3-03 REVISIONS   | 0337 | 01 053      |         |      | SH 29     |  |
| 1-97 2-12             | DIST | COUNTY      |         |      | SHEET NO. |  |
| 4-98 2-18             | AUS  | 1           | WILLIAN | ISON | 57        |  |



|            | LEGEND                                  |    |  |  |  |  |  |  |  |  |
|------------|---|----|--|--|--|--|--|--|--|--|
|            | Type 3 Barricade                        |    | Channelizing Devices                       |  |  |  |  |  |  |  |
|            | Heavy Work Vehicle                      |    | Truck Mounted<br>Attenuator (TMA)          |  |  |  |  |  |  |  |
| <b>£</b>   | Trailer Mounted<br>Flashing Arrow Board | (M | Portable Changeable<br>Message Sign (PCMS) |  |  |  |  |  |  |  |
| -          | Sign                                    | ♡  | Traffic Flow                               |  |  |  |  |  |  |  |
| $\Diamond$ | Flag                                    | ПО | Flagger                                    |  |  |  |  |  |  |  |

| <u>_</u>               | V( )                |               |                                    |               |                  |                 |                                   |   |  |  |
|------------------------|---------------------|---------------|------------------------------------|---------------|------------------|-----------------|-----------------------------------|---|--|--|
| Posted Formul<br>Speed |                     | D             | Minimur<br>esirab<br>er Lend<br>** | le            | Spacin<br>Channe |                 | Minimum<br>Sign<br>Spacing<br>"X" | Suggested<br>Longitudinal<br>Buffer Space |  |  |
| *                      |                     | 10'<br>Offset | 11'<br>Offset                      | 12'<br>Offset | On a<br>Taper    | On a<br>Tangent | Distance                          | "B"                                       |  |  |
| 30                     | 2                   | 150′          | 1651                               | 180'          | 30′              | 60,             | 120'                              | 90,                                       |  |  |
| 35                     | L = WS <sup>2</sup> | 2051          | 2251                               | 245′          | 35′              | 70′             | 160′                              | 120′                                      |  |  |
| 40                     | 80                  | 265′          | 295′                               | 3201          | 40`              | 80′             | 240'                              | 155′                                      |  |  |
| 45                     |                     | 450′          | 495′                               | 540′          | 45′              | 90′             | 3201                              | 195′                                      |  |  |
| 50                     |                     | 500′          | 550′                               | 600′          | 50′              | 100′            | 400′                              | 240′                                      |  |  |
| 55                     | L=WS                | 550′          | 6051                               | 660′          | 55′              | 110′            | 500′                              | 295′                                      |  |  |
| 60                     | L "3                | 600'          | 660′                               | 720′          | 60′              | 120′            | 600′                              | 350′                                      |  |  |
| 65                     |                     | 650′          | 715′                               | 780′          | 65′              | 130′            | 700′                              | 410′                                      |  |  |
| 70                     |                     | 7001          | 770′                               | 840'          | 70′              | 140′            | 800′                              | 475′                                      |  |  |
| 75                     |                     | 750′          | 8251                               | 900′          | 75′              | 150′            | 900'                              | 540′                                      |  |  |

- \* Conventional Roads Only
- \*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

| TYPICAL USAGE |                   |                          |                                 |                         |  |  |  |  |  |  |
|---------------|-------------------|--------------------------|---------------------------------|-------------------------|--|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |  |
| •             |                   |                          | 1                               | 1                       |  |  |  |  |  |  |

### GENERAL NOTES

- 1. Flags attached to signs where shown, are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA. 4. Additional Shadow Vehicles with TMAs may be positioned in each
- closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
- 5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

### TCP (2-5a)

If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

### TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.



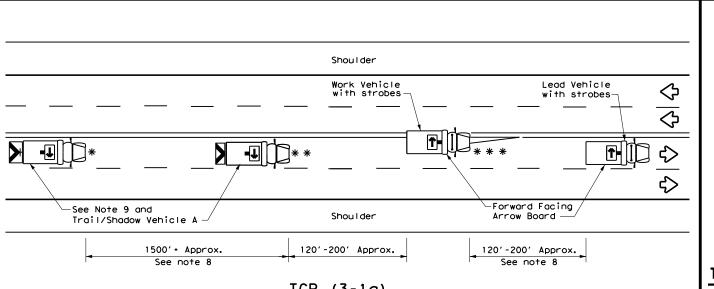
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP (2-5) -18

| FILE: tcp2-5-18.dgn   |      |      | CK:     | DW:  | W: CK: |           |
|-----------------------|------|------|---------|------|--------|-----------|
| © TxDOT December 1985 | CONT | SECT | JOB     |      | ніс    | SHWAY     |
| 8-95 2-12 REVISIONS   | 0337 | 01   | 053     |      | SH     | 29        |
| 1-97 3-03             | DIST |      | COUNTY  |      | 5      | SHEET NO. |
| 4-98 2-18             | AUS  | 1    | WILLIAN | ISON |        | 58        |

\* C | | | |



Shou I der

See note 9 and

1500' + Approx.

See note 8

WORK ON SHOULDER

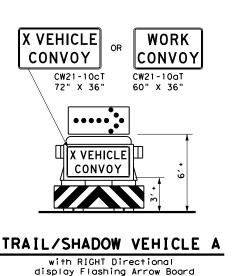
Trail/Shadow Vehicle B

₹>

120'-200'

### TCP (3-1a)UNDIVIDED MULTILANE ROADWAY

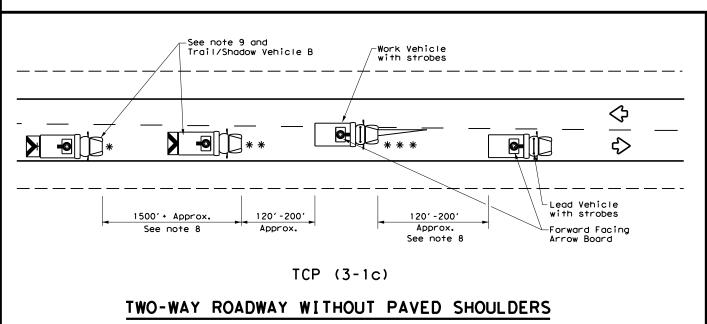
Lead Vehicle with strobes-

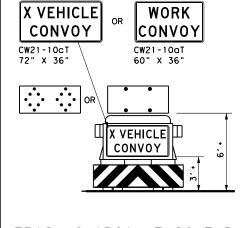


Work Vehicle with strobes 120' -200' 120' -200' 1500' + Approx. Approx. Approx. See note 8 See note 8 Shoulder See note 9 and Trail/Shadow Vehicle -Forward Facing Arrow Board WORK ON TRAVEL LANE

TCP (3-1b)

### TWO-WAY ROADWAY WITH PAVED SHOULDERS





TRAIL/SHADOW VEHICLE B

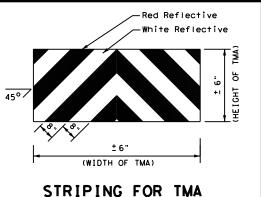
with Flashing Arrow Board in CAUTION display

|       | LEGEND                            |                       |  |  |  |  |  |  |  |
|-------|-----------------------------------|-----------------------|--|--|--|--|--|--|--|
| *     | Trail Vehicle                     | - ARROW BOARD DISPLAY |  |  |  |  |  |  |  |
| * *   | Shadow Vehicle                    |                       |  |  |  |  |  |  |  |
| * * * | Work Vehicle                      | RIGHT Directional     |  |  |  |  |  |  |  |
|       | Heavy Work Vehicle                | <b>F</b>              | LEFT Directional                                   |  |  |  |  |  |  |
|       | Truck Mounted<br>Attenuator (TMA) | Double Arrow          |  |  |  |  |  |  |  |
| ♦     | Traffic Flow                      | P                     | CAUTION (Alternating<br>Diamond or 4 Corner Flash) |  |  |  |  |  |  |

| TYPICAL USAGE |                   |                          |                                 |                         |  |  |  |  |  |
|---------------|-------------------|--------------------------|---------------------------------|-------------------------|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |
| 4             |                   |                          |                                 |                         |  |  |  |  |  |

### GENERAL NOTES

- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- 2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- 3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
- Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
- "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY" (CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- 10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



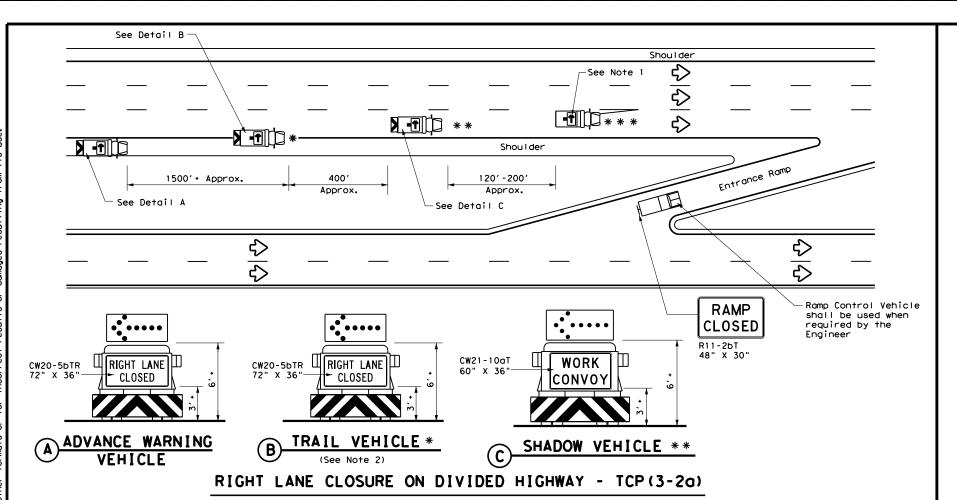


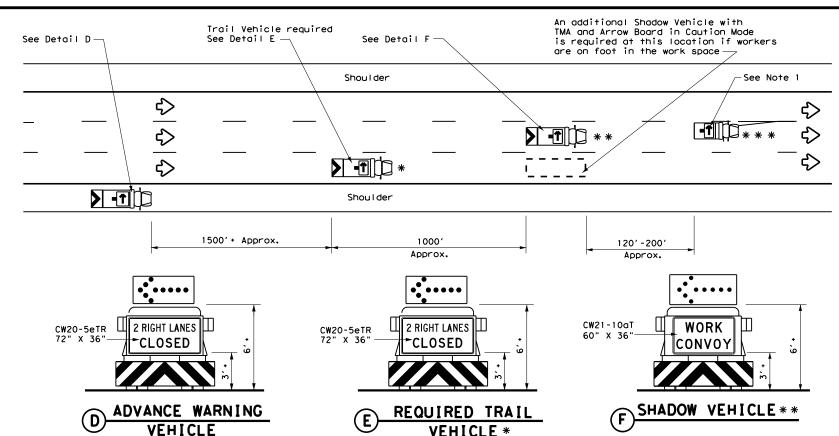
### Traffic Operations Division Standard TRAFFIC CONTROL PLAN

### MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

| FILE:                | tcp3-1.dgn             | DN: T | ×D0T | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
|----------------------|------------------------|-------|------|-----------|-----|-------|-----------|
| © TxDOT              | December 1985          | CONT  | SECT | JOB       |     | HI    | GHWAY     |
| 2-04 4-0             | REVISIONS<br>2-94 4-98 |       | 01   | 053       |     | SH 29 |           |
| 2-94 4-9<br>8-95 7-1 |                        | DIST  |      | COUNTY    |     |       | SHEET NO. |
| 1-97                 |                        | AUS   | 1    | WILLIAM   | 102 | 4     | 59        |





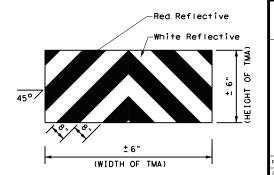
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

**LEGEND** Trail Vehicle ARROW BOARD DISPLAY Shadow Vehicle  $\Box$ RIGHT Directional Work Vehicle Heavy Work Vehicle LEFT Directional Truck Mounted Double Arrow Attenuator (TMA) CAUTION (Alternating Traffic Flow Diamond or 4 Corner Flash)

| TYPICAL USAGE |                   |  |                                 |                         |  |  |  |  |  |
|---------------|-------------------|--|---------------------------------|-------------------------|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION |  | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |
| 1             |                   |  |                                 |                         |  |  |  |  |  |

### GENERAL NOTES

- ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
- 2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
- 3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
- 6. Each vehicle shall have two-way radio communication capability.
- 7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
- 9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
- 10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- 11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- 12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
- 13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
- 14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

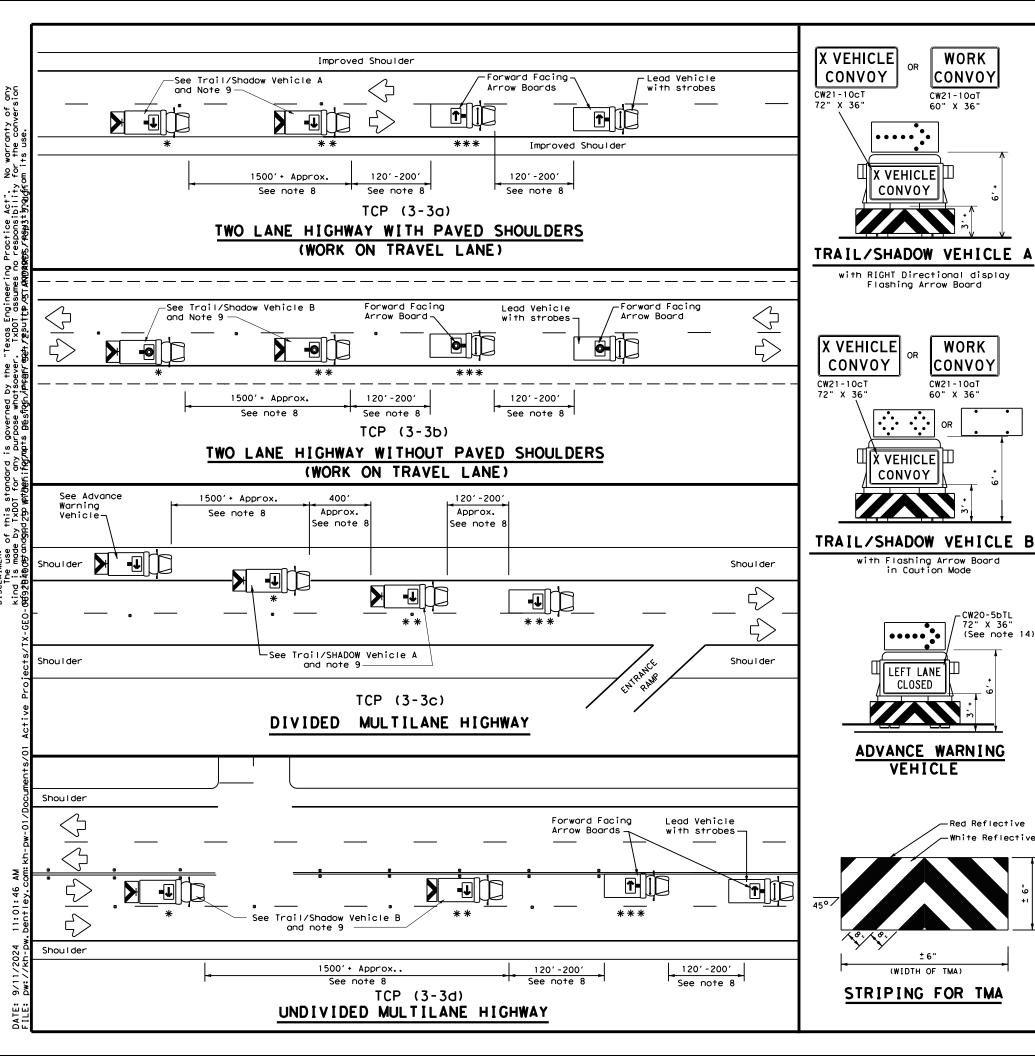


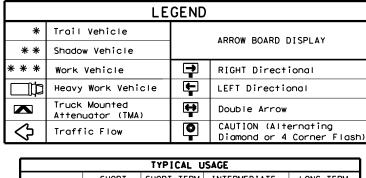
### TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP (3-2) -13

Traffic Operations

|                        | - '           | <b>y</b> . , | _   |           | •   | •     |           |
|------------------------|---------------|--------------|---|-----------|-----|-------|-----------|
| ILE:                   | tcp3-2.dgn    | DN: T:       | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>T×DOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW: | T×DOT | ck: TxDOT |
| C TxDOT                | December 1985 | CONT         | SECT  | JOB       |     | HIC   | SHWAY     |
| REVISIONS<br>2-94 4-98 |               | 0337         | 01  | 053       |     | SH    | 29        |
| 2-94 4-1<br>8-95 7-1   | ••            | DIST         |   | COUNTY    |     |       | SHEET NO. |
| 1-97                   |               | AUS          |   | WILLIAM   | SON | ı     | 60        |





| TYPICAL USAGE |                   |  |                                 |                         |  |  |  |  |  |
|---------------|-------------------|--|---------------------------------|-------------------------|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION |  | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |
| 1             |                   |  |                                 |                         |  |  |  |  |  |

### GENERAL NOTES

WORK

CONVOY

CW21-10aT

60" X 36"

X VEHICLE

CONVOY

Flashing Arrow Board

X VEHICLE|Ш

LEFT LANE

CLOSED

VEHICLE

(WIDTH OF TMA)

CONVOY

WORK

CONVOY

CW20-5bTL 72" X 36' (See note 14)

-Red Reflective

CW21-10aT

- 1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on
- prevailing roadway conditions, traffic volume, and sight distance restrictions. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the omber begoons or strobe lights.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION
- Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the
- Each vehicle shall have two-way radio communication capability.

  When work convoys must change lanes, the TRAIL VEHICLE should change lanes
- which work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK
- VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors. X VEHICLE CONVOY (CW21-10c1) or WORK CONVOY (CW21-10c1) or spacing between WORK vehicles and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10DT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- 10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- 11.A double arrow shall not be displayed on the arrow board on the Advance Warning
- 12. For divided highways with three or four lanes in each direction, use TCP(3-2). 13. Standard diamond shape versions of the CW20-5 series signs may be used as an
- option if the rectangular signs shown are not available.
- 14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- 15.On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.



Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP(3-3)-14

|                        | _     | •   |           |     |       |           |
|------------------------|-------|---|-----------|-----|-------|-----------|
| FILE: tcp3-3.dgn       | DN: T | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>TxDOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
| © TxDOT September 1987 | CONT  | SECT  | JOB       |     | HIC   | SHWAY     |
| REVISIONS<br>2-94 4-98 | 0337  | 01  | 053       |     | SH    | 29        |
| 8-95 7-13              | DIST  |   | COUNTY    |     |       | SHEET NO. |
| 1-97 7-14              | AUS   | ١   | VILLIAM   | 102 | ٧     | 61        |

Shadow Vehicle With Attenuator and Arrow Board CW20-1D 48" X 48 ROAD WORK (See note 2 and 5)-AHEAD -Shadow Vehicle With Attenuator and Arrow Board (See note 2 and 5) ➾ ₹> ➾ 30' Min. CW20-1D 48" X 48" 30' 30' WORK Work Space Min. Min. CW20-1D 48" X 4 Work Space ROAD WORK AHEAD TYPICAL TRAFFIC CONTROL FOR TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS ROAD Work Space WORK AHEAD -Shadow Vehicle With Attenuator CW20-1D 48" X 48" Min. and Arrow Board (See note 2 and 5) -Shadow Vehicle — With Attenuator and Arrow Board (See note 2 and 5) Ĵ Ç ₹ **17-** K ➪ ♦ 301 " X " ROAL Min. WORK Work Space AHEAD CW20-1D TYPICAL TRAFFIC CONTROL FOR TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS INSIDE LANE MARKINGS CW20-1D ROAD 48" X 48" WORK Work Space Shadow Vehicle With Attenuator 30' Min. and Arrow Board (See note 2 and 5)  $\Diamond$  $\Diamond$ **1** CW20-1D 48" X 48 ROAD ➾ WORK AHEAD ₹ Shadow Vehicle With Attenuator and Arrow Board (See note 2 and 5)— 301 Min WORK Work Space CW20-1D 48" X 48"

TYPICAL TRAFFIC CONTROL FOR

LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR

CENTER LANE MARKINGS

|       | LEGEND                            |                     |                      |  |  |  |  |  |  |
|-------|-----------------------------------|---------------------|----------------------|--|--|--|--|--|--|
| *     | Trail Vehicle                     |                     | ARROW BOARD DISPLAY  |  |  |  |  |  |  |
| * *   | Shadow Vehicle                    | ARROW BOARD DISPLAY |                      |  |  |  |  |  |  |
| * * * | Work Vehicle                      | <b>→</b>            | RIGHT Directional    |  |  |  |  |  |  |
|       | Heavy Work Vehicle                | <b>-</b>            | LEFT Directional     |  |  |  |  |  |  |
|       | Truck Mounted<br>Attenuator (TMA) | Double Arrow        |                      |  |  |  |  |  |  |
| Ç     | Traffic Flow                      |                     | Channelizing Devices |  |  |  |  |  |  |

| Speed | Formula         | * *           |               |               | Suggested Maximum<br>Spacing of<br>Channelizing<br>Devices |                 | Minimum<br>Sign<br>Spacing<br>"X" | Suggested<br>Longitudinal<br>Buffer Space |
|-------|-----------------|---------------|---------------|---------------|--|-----------------|-----------------------------------|---|
| *     |                 | 10'<br>Offset | 11'<br>Offset | 12'<br>Offset | On a<br>Taper  | On a<br>Tangent | Distance                          | "B"                                       |
| 30    | WS <sup>2</sup> | 150′          | 1651          | 1801          | 30'  | 60′             | 120'                              | 90′                                       |
| 35    | L = WS          | 2051          | 2251          | 245'          | 35′  | 70′             | 160′                              | 120'                                      |
| 40    | 60              | 265′          | 2951          | 3201          | 40'  | 80′             | 240′                              | 155′                                      |
| 45    |                 | 450′          | 4951          | 540′          | 45′  | 90′             | 320′                              | 1951                                      |
| 50    |                 | 500′          | 550′          | 6001          | 50′  | 100′            | 400′                              | 240'                                      |
| 55    | L=WS            | 550′          | 605′          | 660'          | 55′  | 110′            | 500′                              | 295′                                      |
| 60    | L-113           | 600′          | 660′          | 720′          | 60′  | 120'            | 600′                              | 350′                                      |
| 65    |                 | 650′          | 715′          | 780′          | 65′  | 130′            | 700′                              | 410′                                      |
| 70    |                 | 700′          | 770′          | 840′          | 701  | 140′            | 800′                              | 475′                                      |
| 75    |                 | 750′          | 825′          | 9001          | 75'  | 150′            | 900′                              | 540′                                      |

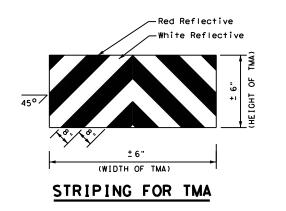
- X Conventional Roads Only
- \*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

| TYPICAL USAGE |                   |                          |                                 |                         |  |  |  |  |  |
|---------------|-------------------|--------------------------|---------------------------------|-------------------------|--|--|--|--|--|
| MOBILE        | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |  |  |
| 1             |                   |                          |                                 |                         |  |  |  |  |  |

### **GENERAL NOTES**

- 1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
- 2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
- All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
- 4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



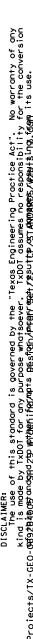


### TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP (3-4) -13

|           |            | AUS   | ١   | VILLIAM   | WILLIAMSON |         |           |  |
|-----------|------------|-------|---|-----------|------------|---------|-----------|--|
|           |            |       | DIST COUNTY   |           |            |         | SHEET NO. |  |
| REVISIONS |            | 0337  | 01  | 053       |            | SH 29   |           |  |
| TxDOT     | July, 2013 | CONT  | SECT  | JOB       |            | H]GHWAY |           |  |
| ILE:      | tcp3-4.dgn | DN: T | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>TxDOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW:        | TxDOT   | ck: TxDOT |  |

178



SIGNAL WORK AHEAD

CW20SG-1

SIGNAL WORK AHEAD

CW20SG-1

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14.

R4-7 24" × 30"

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NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

⇧

 $\bigcirc$ 

CW20SG-1

Typical

SIGNAL WORK AHEAD

CW20SG-1 48" x 48"

1/2L

1010

SIGNAL WORK AHEAD

CW20SG-1

-See Note 8

LANE CLOSE

CW20-5TR

SIGNAL WORK AHEAD

CW20SG-1 48" × 48

SIGNAL WORK AHEAD

CW20SG-1

OPERATIONS IN THE INTERSECTION

10' min.

1/2 L

 $\Diamond$ 

24" × 30"

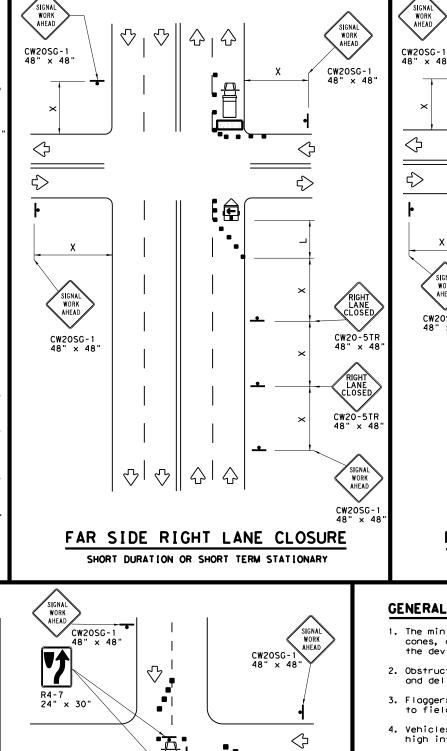
Х

Typical

WORK

CW20SG-1 48" x 48"

See Note



|            | LEGEND                                  |    |  |  |  |  |  |  |  |  |
|------------|---|----|--|--|--|--|--|--|--|--|
| ~~~        | Type 3 Barricade                        |    | Channelizing Devices                       |  |  |  |  |  |  |  |
|            | Heavy Work Vehicle                      | K  | Truck Mounted<br>Attenuator (TMA)          |  |  |  |  |  |  |  |
| <b>E</b>   | Trailer Mounted<br>Flashing Arrow Board | (M | Portable Changeable<br>Message Sign (PCMS) |  |  |  |  |  |  |  |
| -          | Sign                                    | ∜  | Traffic Flow                               |  |  |  |  |  |  |  |
| $\Diamond$ | Flag                                    | Ф  | Flagger                                    |  |  |  |  |  |  |  |

| Posted<br>Speed<br><del>X</del> |                    | * * *         |               |               | Spacir<br>Channe |                 | Minimum<br>Sign<br>Spacing<br>"X" | Suggested<br>Longitudinal<br>Buffer Space |
|---------------------------------|--------------------|---------------|---------------|---------------|------------------|-----------------|-----------------------------------|---|
| *                               |                    | 10'<br>Offset | 11'<br>Offset | 12'<br>Offset | On a<br>Taper    | On a<br>Tangent | Distance                          | "B"                                       |
| 30                              | 2                  | 150′          | 165′          | 180′          | 30'              | 60′             | 120′                              | 90'                                       |
| 35                              | L= WS <sup>2</sup> | 2051          | 225′          | 245'          | 35′              | 70′             | 160′                              | 120′                                      |
| 40                              | 80                 | 265′          | 295′          | 3201          | 40'              | 80′             | 240'                              | 155′                                      |
| 45                              |                    | 450′          | 495′          | 540′          | 45′              | 90′             | 3201                              | 195′                                      |
| 50                              |                    | 500′          | 550′          | 600,          | 50′              | 100′            | 4001                              | 240′                                      |
| 55                              | L=WS               | 550′          | 605′          | 660′          | 55′              | 110′            | 500′                              | 295′                                      |
| 60                              | - "3               | 600′          | 660′          | 720′          | 60′              | 120′            | 600′                              | 350′                                      |
| 65                              |                    | 650′          | 715′          | 780′          | 65′              | 130′            | 700′                              | 410′                                      |
| 70                              |                    | 700′          | 770′          | 840′          | 70′              | 140′            | 800′                              | 475′                                      |
| 75                              |                    | 750′          | 825′          | 900'          | 75′              | 150′            | 900′                              | 540′                                      |

\* Conventional Roads Only

WORK

CW20SG-1

LEFT LANE CLOSED

CW20-5TL

CW20-5TL 48" x 48

SIGNAL WORK AHEAD

CW20SG-1

\*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

### GENERAL NOTES

SIGNAL WORK AHEAD

CW20SG-1

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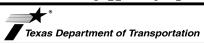
1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.

FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

- 2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- 3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- 4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- 5. High level warning devices (flag trees) may be used at corners of the vehicle.
- 6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
- 7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
- 8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
- Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

SHEET 1 OF 2



Traffic Operations Division Standard

### TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

|                  |           | _   |           |     | _         |           |  |
|------------------|-----------|---|-----------|-----|-----------|-----------|--|
| E: wzbts-13.dgn  | DN: T     | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>TxDOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW: | TxDOT     | ck: TxDOT |  |
| TxDOT April 1992 | CONT SECT |   | JOB       |     | HIGHWAY   |           |  |
| REVISIONS        | 0337      | 01  | 053       |     | SH 29     |           |  |
| 98 10-99 7-13    | DIST      | COUNTY  |           |     | SHEET NO. |           |  |
| 98 3-03          | AUS       | WILLIAMSO   |           |     | √ 63      |           |  |

GENERAL NOTES FOR WORK ZONE SIGNS

Wooden sign posts shall be painted white.

directed by the Engineer.

directed by the Engineer.

DURATION OF WORK

SIGN MOUNTING HEIGHT

REMOVING OR COVERING

Barricades shall NOT be used as sign supports.

Nails shall NOT be used to attach signs to any support.

Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

Signs shall be installed and maintained in a straight and plumb condition.

All signs shall be installed in accordance with the plans or as

Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as

The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).

The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.

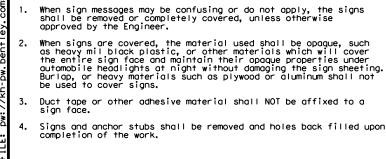
Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".

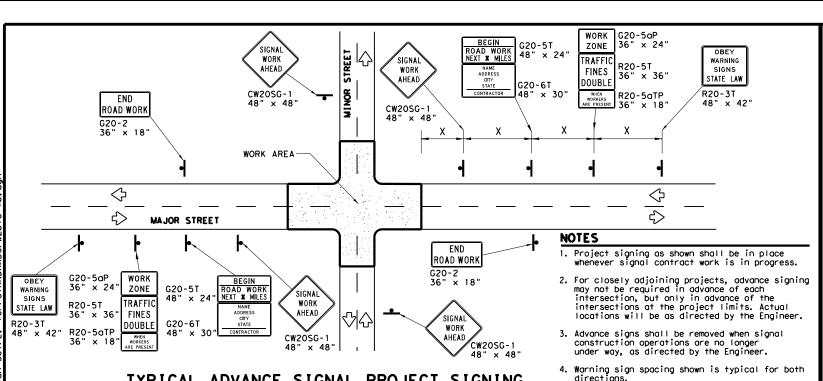
Work zone durations are defined in Part 6, Section 66.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.

Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.

Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.





### TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

### REFLECTIVE SHEETING

All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

warning sign spacing.

5. See the Table on sheet 1 of 2 for Typical

### SIGN SUPPORT WEIGHTS

- Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fastners. Sandbags shall be placed along the length of the skids to weigh down the
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

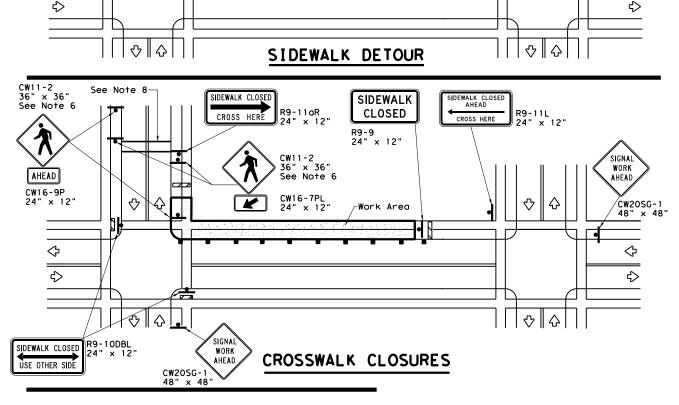
| γ | ports praced on stopes. |                      |  |  |  |  |  |  |
|---|-------------------------|----------------------|--|--|--|--|--|--|
| I | LEGEND                  |                      |  |  |  |  |  |  |
|   | 4                       | Sign                 |  |  |  |  |  |  |
|   |                         | Channelizing Devices |  |  |  |  |  |  |
|   |                         | Type 3 Barricade     |  |  |  |  |  |  |

| DEPARTMENTAL MATERIAL             | SPECIFICATIONS |
|-----------------------------------|----------------|
| SIGN FACE MATERIALS               | DMS-8300       |
| FLEXIBLE ROLL-UP REFLECTIVE SIGNS | DMS-8310       |

| COLOR  | USAGE            | SHEETING MATERIAL                                     |  |  |  |  |  |
|--------|------------------|---|--|--|--|--|--|
| ORANGE | BACKGROUND       | TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> SHEETING |  |  |  |  |  |
| WHITE  | BACKGROUND       | TYPE A SHEETING                                       |  |  |  |  |  |
| BLACK  | LEGEND & BORDERS | ACRYLIC NON-REFLECTIVE SHEETING                       |  |  |  |  |  |

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/txdot\_library/publications/construction.htm



Temporary Traffic Barrier

See Note 4 below

SIDEWALK DIVERSION

-Work Area

10' Min.

SIDEWALK

CLOSED

R9-9 24" x 12"

4′ Min.(See Note 7 below

CROSS HERE

R9-11aL 24" x 12"

♦∥♦

♦∥♦

SIDEWALK CLOSE

CROSS HERE

24" x 12'

♦∥♦

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### PEDESTRIAN CONTROL

Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.

"CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic

substrates, they may be mounted on top of a plastic drum at or near the location shown.

- For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
- Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
- Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3
- The width of existing sidewalk should be maintained if practical.
- Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.

When crosswalks or other pedestrian facilities are closed or relocated. temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian SHEET 2 OF 2

Texas Department of Transportation

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

**W**Z(BTS-2)-13

Operations Division Standard

CW20SG-1

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SIGNA

WORK

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SIGNAL WORK

AHEAD

♦

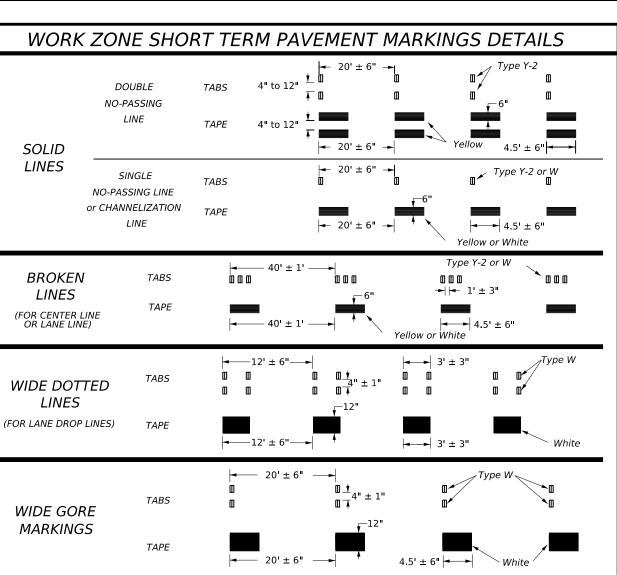
➾

CW20SG-1

48" x 48

| 2-98 10-99 7-13<br>4-98 3-03 | AUS   | COUNTY<br>WILLIAMSON  |           |     | SHEET NO. |           |  |
|------------------------------|-------|---|-----------|-----|-----------|-----------|--|
| REVISIONS                    | 0337  | 01  | 01 053    |     | SH 29     |           |  |
| C)TxDOT April 1992           | CONT  | SECT  | JOB       |     | HIO       | HIGHWAY   |  |
| ILE: wzbts-13.dgn            | DN: T | <dot< th=""><th>ck: TxDOT</th><th>DW:</th><th>TxDOT</th><th>ck: TxDOT</th></dot<> | ck: TxDOT | DW: | TxDOT     | ck: TxDOT |  |

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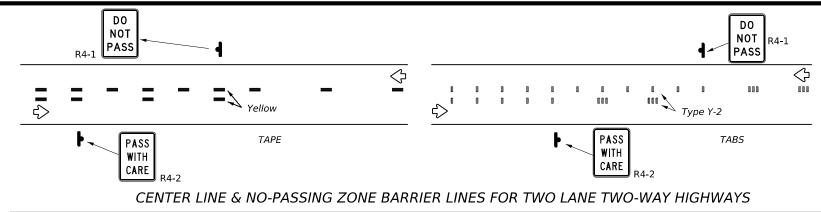
#### NOTES:

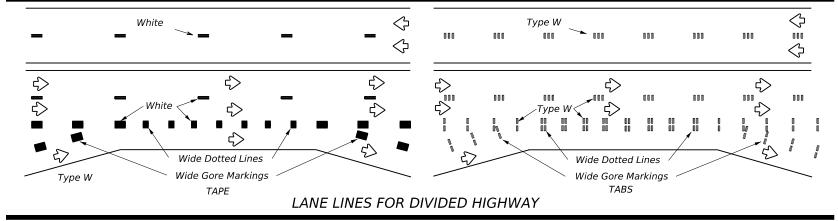
- 1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
- 2. Short term pavement markings shall NOT be used to simulate edge lines.
- 3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
- 4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
- 5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
- 6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent payement markings should then be placed.
- 7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
- 8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

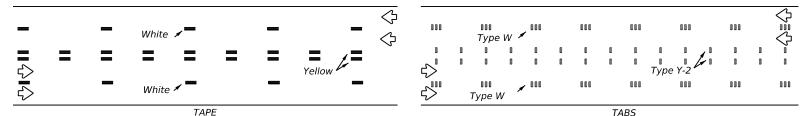
#### TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

- 1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
- 2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
- 3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
- No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

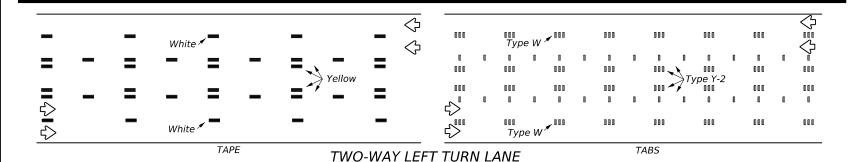
# WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS







### LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



Raised Removable Short Term Pavement Marker Marking (Tape)

If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

# Texas Department of Transportation

Traffic Safety Division Standard

#### PREFABRICATED PAVEMENT MARKINGS

- 1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
- Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

#### RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

#### DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors\_consultants/material\_specifications/default.htm

# WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

| FILE:        | WZS          | stpm-23.dgn   | DN:  |      | CK:      | DW: |     | CK:       |
|--------------|--------------|---------------|------|------|----------|-----|-----|-----------|
| © TxD        | ОТ           | February 2023 | CONT | SECT | JOB      |     | HIG | HWAY      |
|              |              | REVISIONS     | 0337 | 01   | 053      |     | SH  | 1 29      |
| 4-92<br>1-97 | 7-13<br>2-23 |               | DIST |      | COUNTY   |     |     | SHEET NO. |
| 3-03         |              |               | AUS  |      | WILLIAMS | SON |     | 65        |

| DEPARTMENTAL MATERIAL SPECIFICAT                      | IONS     |
|---|----------|
| PERMANENT PREFABRICATED PAVEMENT MARKINGS             | DMS-8240 |
| TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS | DMS-8241 |
| SIGN FACE MATERIALS                                   | DMS-8300 |

| COLOR  | USAGE            | SHEETING MATERIAL                                     |
|--------|------------------|---|
| ORANGE | BACKGROUND       | TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> SHEETING |
| BLACK  | LEGEND & BORDERS | ACRYLIC NON-REFLECTIVE SHEETING                       |

#### GENERAL NOTES

- 1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
- UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
- 3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are
- 4. Signs shall be spaced at the distances recommended as per BC standards.
- Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
- 6. Signs shall be fabricated and mounted on supports as shown on the BC  $\,$ standards and/or listed on the "Compliant Work Zone Traffic Control Devices"
- 7. Short term markings shall not be used to simulate edge lines.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

| ,                   | TABLE 1   |                   |  |  |  |
|---------------------|---|-------------------|--|--|--|
| Edge Condition      | Edge Height (D)   | * Warning Devices |  |  |  |
| 0                   | Less than or equal to: $1\frac{1}{4}$ " (maximum-planing) $1\frac{1}{2}$ " (typical-overlay)  | Sign: CW8-11      |  |  |  |
|                     | Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.                    |                   |  |  |  |
| ② >3 1 ↑ D          | Less than or equal to 3"  | Sign: CW8-11      |  |  |  |
| ③0" to 3/4"         |   |                   |  |  |  |
| 12" D               | Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3". |                   |  |  |  |
| Notched Wedge Joint |   |                   |  |  |  |

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

| MINIMUM               | WARNING   | SIGN  | SIZE  |
|-----------------------|-----------|-------|-------|
| Convention            | nal roads | 36" > | < 36" |
| Freeways/e<br>divided |           | 48" × | 48"   |

SIGNING FOR UNEVEN LANES

Texas Department of Transportation

WZ (UL) -13

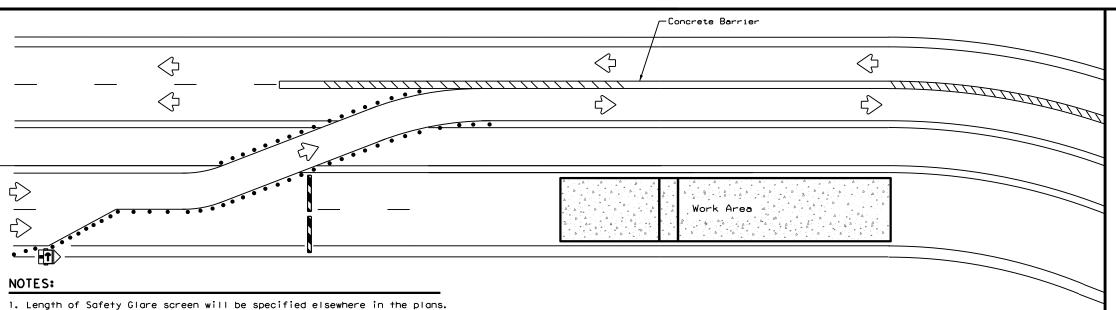
Traffic Operations Division Standard

|         | **-         |        |      | _         |     |       |           |
|---------|-------------|--------|------|-----------|-----|-------|-----------|
| FILE:   | wzul-13.dgn | DN: Tx | TOD: | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
| © TxD0T | April 1992  | CONT   | SECT | JOB       |     | ніс   | HWAY      |
|         | REVISIONS   | 0337   | 01   | 053       |     | SH    | 29        |
|         | 98 7-13     | DIST   |      | COUNTY    |     |       | SHEET NO. |
| 1-97 3- | 03          | AUS    | ١    | WILLIAM   | SOI | 1     | 66        |

NO CENTER LINE

TWO LANE CONVENTIONAL ROAD

DIVIDED ROADWAY



# LEGEND Type 3 Barricade Channelizing Devices Trailer Mounted Flashing Arrow Board Sign Safety glare screen

#### DEPARTMENTAL MATERIAL SPECIFICATIONS SIGN FACE MATERIALS DMS-8300 DELINEATORS AND OBJECT MARKERS DMS-8600 MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html

# BARRIER DELINEATION WITH MODULAR GLARE SCREENS

Refer to applicable BC and/or TCP sheets for approach requirements. Centerline  $\bigcirc$  $\Diamond$  $\Rightarrow$  $\Rightarrow$ 500' Max. See Notes 2 & 3 See Notes 2 & 3 Opposing Traffic Opposing Traffic Opposina Channelizing Channelizing Traffic Devices (See Devices (See Note 5) Lane Divider

VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete

traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.

to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades

4. Payment for these devices will be under statewide Special Specification

This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

are installed with reflective sheeting as described.

'Modular Glare Screens for Headlight Barrier.

Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached

#### NOTES:

**₹** 

 $\Diamond$ 

 $\Rightarrow$ 

 $\Rightarrow$ 

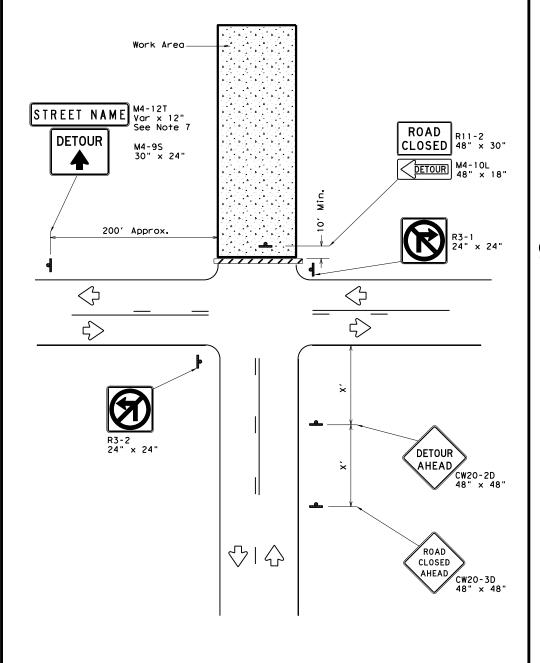
- When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the
- Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
  - Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
  - 4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
  - 5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.



# TRAFFIC CONTROL PLAN TYPICAL DETAILS

**W7(TD)-17** 

|                     | ₩2                | <b>,</b> , | <i>'</i>  |           |     |           |           |  |
|---------------------|-------------------|------------|---|-----------|-----|-----------|-----------|--|
| .E:                 | wztd-17.dgn       | DN: To     | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>TxDOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW: | TxDOT     | ck: TxDOT |  |
| TxDOT February 1998 |                   | CONT       | SECT  | JOB       |     | н         | GHWAY     |  |
| -98                 | REVISIONS<br>2-17 | 0337       | 01  | 053       |     | SI        | 1 29      |  |
| i-96 2-17           |                   | DIST       | COUNTY  |           |     | SHEET NO. |           |  |
| -13                 | AUS               | WILLIAMSON |   |           | 67  |           |           |  |



# ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

| LEGEND |                  |  |  |  |  |
|--------|------------------|--|--|--|--|
|        | Type 3 Barricade |  |  |  |  |
| 4      | Sign             |  |  |  |  |

| Posted<br>Speed<br>* | Minimum<br>Sign<br>Spacing<br>"X"<br>Distance |  |  |  |  |  |
|----------------------|---|--|--|--|--|--|
| 30                   | 120′  |  |  |  |  |  |
| 35                   | 160′  |  |  |  |  |  |
| 40                   | 240′  |  |  |  |  |  |
| 45                   | 320'  |  |  |  |  |  |
| 50                   | 400'  |  |  |  |  |  |
| 55                   | 500′  |  |  |  |  |  |
| 60                   | 600'  |  |  |  |  |  |
| 65                   | 700′  |  |  |  |  |  |
| 70                   | 800′  |  |  |  |  |  |
| 75                   | 900'  |  |  |  |  |  |

\* Conventional Roads Only

#### **GENERAL NOTES**

- This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
- Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
- Stockpiled materials shall not be placed on the traffic side of barricades.
- Barricades at the road closure should extend from pavement edge to pavement edge.
- 5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
- 6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
- 7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
- 8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-30) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
- Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.



Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ (RCD) -13

|           |              |        |      | -         | _   |       |           |
|-----------|--------------|--------|------|-----------|-----|-------|-----------|
| FILE:     | wzrod-13.dgn | DN: T: | ×DOT | ck: TxDOT | DW: | T×DOT | ck: TxDOT |
| © TxDOT   | August 1995  | CONT   | SECT | JOB       |     | ніс   | SHWAY     |
|           | REVISIONS    | 0337   | 01   | 053       |     | SH    | 29        |
| 1-97 4-98 |              | DIST   |      | COUNTY    |     |       | SHEET NO. |
| 2-98 3-03 |              | AUS    | 1    | WILLIAM   | 102 | ١ .   | 68        |

⊹Ⅰ分 Work Area Work CW21-1T Area 48" X 48" 48" X 48" (See Note 3) (See Note 3) -Project Limit Signs - Project • Limit Signs **안 I** 안 Give Us A **N** BRAKE (G20-7T) | 96" X 48" (See Note 6) ¥ 192" X 96" (Optional - See Note 7) DIVIDED HIGHWAY UNDIVIDED HIGHWAY

> \* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

|                                   | SUMMARY OF LARGE SIGNS |                           |                    |   |     |               |          |          |                  |  |
|-----------------------------------|------------------------|---------------------------|--------------------|---|-----|---------------|----------|----------|------------------|--|
| BACKGROUND SIGN COLOR DESIGNATION |                        | SIGN                      | SIGN<br>DIMENSIONS | REFLECTIVE SQ F                         |     | SN ET   SIEEL |          | _        | DRILLED<br>SHAFT |  |
| COLON                             | DESTONATION            |                           | DIMENSIONS         | 3.122.1110                              |     | Size          | (L       | F}<br>②  | 24" DIA.<br>(LF) |  |
| Orange                            | G20-7T                 | Working For You Give Us A | 96" X 48"          | Type B <sub>FL</sub> or C <sub>FL</sub> | 32  | •             | <b>A</b> | <b>A</b> | <b>A</b>         |  |
| Orange                            | G20-7T                 | Working For You Give Us A | 192" X 96"         | Type B <sub>FL</sub> or C <sub>FL</sub> | 128 | W8×18         | 16       | 17       | 12               |  |

▲ See Note 6 Below

| LEGEND |              |  |  |  |  |
|--------|--------------|--|--|--|--|
| •      | Sign         |  |  |  |  |
| ••     | Large Sign   |  |  |  |  |
| Ŷ      | Traffic Flow |  |  |  |  |

| DEPARTMENTAL MATERIAL SPEC | IFICATIONS |
|----------------------------|------------|
| PLYWOOD SIGN BLANKS        | DMS-7100   |
| ALUMINUM SIGN BLANKS       | DMS-7110   |
| SIGN FACE MATERIALS        | DMS-8300   |

| COLOR  | COLOR USAGE SHEETING MATERIAL |  |  |  |
|--------|-------------------------------|--|--|--|
| ORANGE | BACKGROUND                    | TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> |  |  |
| BLACK  | LEGEND & BORDERS              | NON-REFLECTIVE ACRYLIC FILM                  |  |  |

#### GENERAL NOTES

- 1. See BC and SMD sheets for additional sign support details.
- 2. Sign locations shall be approved by the Engineer.
- 3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
- 4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
- 5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
- 6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two  $4" \times 6"$  wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
- 7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:

Item 636 - Aluminum Signs

Item 647 - Large Roadside Sign Supports and Assemblies.

Item 416 - Drilled Shaft Foundations

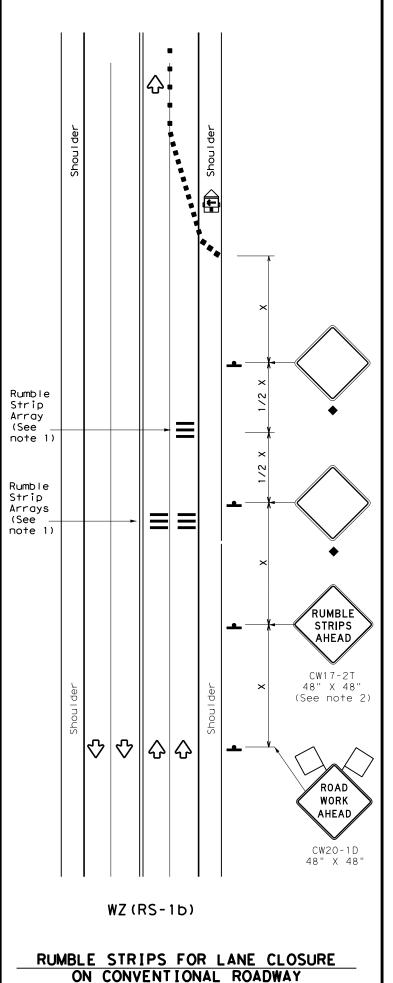
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.



**WORK ZONE** "GIVE US A BRAKE" SIGNS

WZ (BRK) - 13

| ııe: wzbr   | k-13.dgn | DN: T | <dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>T×DOT</td><td>ck: TxDOT</td></dot<> | ck: TxDOT | DW: | T×DOT | ck: TxDOT |
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| TxDOT Augi  | ust 1995 | CONT  | SECT  | JOB       |     | ніс   | HWAY      |
| REVI        | SIONS    | 0337  | 01  | 053       |     | SH    | 29        |
| -96 5-98 7- | -13      | DIST  |   | COUNTY    |     |       | SHEET NO. |
| -96 3-03    |          | AUS   | WILLIAMSON  |           |     | N     | 69        |



#### **GENERAL NOTES**

- Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
- 2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- 4. Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- 3. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- 10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

|            | LEGEND                                  |     |  |  |  |  |  |  |  |
|------------|---|-----|--|--|--|--|--|--|--|
|            | Type 3 Barricade                        | 0 0 | Channelizing Devices                       |  |  |  |  |  |  |
|            | Heavy Work Vehicle                      |     | Truck Mounted<br>Attenuator (TMA)          |  |  |  |  |  |  |
|            | Trailer Mounted<br>Flashing Arrow Panel | (M  | Portable Changeable<br>Message Sign (PCMS) |  |  |  |  |  |  |
| -          | Sign                                    | Ŷ   | Traffic Flow                               |  |  |  |  |  |  |
| $\Diamond$ | Flag                                    | ПO  | Flagger                                    |  |  |  |  |  |  |

| Posted<br>Speed | Formula      | D             | Minimur<br>esirab<br>er Len<br>** | le            | Spacin<br>Channe |                 | Minimum<br>Sign<br>Spacing<br>"x" | Suggested<br>Longitudinal<br>Buffer Space |
|-----------------|--------------|---------------|-----------------------------------|---------------|------------------|-----------------|-----------------------------------|---|
| *               |              | 10'<br>Offset | 11'<br>Offset                     | 12'<br>Offset | On a<br>Taper    | On a<br>Tangent | Distance                          | "В"                                       |
| 30              | _ <u>ws²</u> | 1501          | 1651                              | 180′          | 30′              | 60′             | 120′                              | 90′                                       |
| 35              | L = WS       | 2051          | 2251                              | 245'          | 35′              | 70′             | 160′                              | 120'                                      |
| 40              | 80           | 265′          | 295′                              | 3201          | 40′              | 80'             | 240'                              | 155′                                      |
| 45              |              | 4501          | 495′                              | 5401          | 45′              | 90′             | 3201                              | 195′                                      |
| 50              |              | 500'          | 550′                              | 6001          | 50′              | 100'            | 400′                              | 240'                                      |
| 55              | L=WS         | 550'          | 605′                              | 660′          | 55′              | 110′            | 500′                              | 295′                                      |
| 60              | L-#3         | 600'          | 660′                              | 720'          | 60′              | 120'            | 600′                              | 350′                                      |
| 65              |              | 650′          | 715′                              | 780′          | 65′              | 130′            | 700′                              | 410′                                      |
| 70              |              | 700′          | 770′                              | 840'          | 70′              | 140′            | 800′                              | 475′                                      |
| 75              |              | 750′          | 825′                              | 900'          | 75′              | 150′            | 900,                              | 540′                                      |

- \* Conventional Roads Only
- \*\* Taper lengths have been rounded off.
   L=Length of Taper(FT) W=Width of Offset(FT)
  S=Posted Speed(MPH)

| TYPICAL USAGE |                   |                          |                                 |                         |  |  |  |
|---------------|-------------------|--------------------------|---------------------------------|-------------------------|--|--|--|
| MOBILE        | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |  |  |  |
|               | ✓                 | <b>√</b>                 |                                 |                         |  |  |  |

- Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.
- For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

| TABLE 2                |   |  |  |  |  |
|------------------------|---|--|--|--|--|
| Speed                  | Approximate distance<br>between strips in<br>an array |  |  |  |  |
| ≤ 40 MPH               | 10′   |  |  |  |  |
| > 40 MPH &<br>≤ 55 MPH | 15′   |  |  |  |  |
| = 60 MPH               | 20′   |  |  |  |  |
| <u>&gt;</u> 65 MPH     | <del>*</del> 35′+                                     |  |  |  |  |

Texas Department of Transportation

TEMPORARY RUMBLE STRIPS

Traffic Safety Division Standard

WZ (RS) -22

| ILE:         | wzrs22.dgn    | DN: Tx | DOT        | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
|--------------|---------------|--------|------------|-----------|-----|-------|-----------|
| C TxDOT      | November 2012 | CONT   | SECT       | JOB       |     | HIG   | SHWAY     |
|              | REVISIONS     | 0337   | 01         | 053       |     | SH    | 29        |
| 2-14<br>4-16 | 1-22          | DIST   |            | COUNTY    |     | 9     | SHEET NO. |
| 4-10         |               | AUS    | WILLIAMSON |           | 70  |       |           |
|              |               | _      | _          |           |     |       |           |

11

1117



1) ALL COORDINATES SHOWN HEREON ARE BASED OFF THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NADB3 / NAVDB8, GEOID12A. ALL COORDINATES SHOWN HEREON ARE IN SURFACE COORDINATES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00011.

UNITS: U.S.SURVEY FEET

2) EXISTING CONTROL POINTS 246-2042 AND 246-2043 WERE RECOVREED AND FOUND TO BE OUT OF TOLERANCE. COORDINATE VALUES WERE RE-ESTABLISHED UTILIZING STATIC SURVEY PROCESSED TO CORS STATIONS TXBU, TXC2 AND SAM2. RE-ESTABLISHED COORDINATE VALUES FOR CONTROL POINTS 246-2042 AND 246-2043 WERE HELD AS A BASIS TO ESTABLISH COORDINATES FOR CONTROL POINTS 246-2042 AND 246-2043.

3) A CALIBRATION SHOULD BE PERFORMED WHEN USING ANY OF THE CONTROL SHOWN HEREON.

PNT NORTHING EASTING ELEV. DESCRIPTION

246-2042 10,203,630.89 3,126,986.98 797.09' TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD FOUND IN CONCRETE STAMPED "246-2042" 246-2043 10,209,215.74 3,130,755.70 737.94' TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD FOUND IN CONCRETE STAMPED "246-2043" 246-2071 10,203,360.50 3,124,649.52 818.88' TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2071" 246-2072" 10,203,791.80 3,123,527.51 836.97' TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2071"

HORIZONTAL & VERTICAL CONTROL - SURFACE COORDINATES

| PNT      | NORTHING      | EASTING      | ELEV.   | DESCRIPTION  |
|----------|---------------|--------------|---------|--|
| 246-2042 | 10,204,753.29 | 3,127,330.95 | 797.09' | TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD FOUND IN CONCRETE STAMPED "246-2042" |
| 246-2043 | 10,210,338.75 | 3,131,100.08 | 737.94' | TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD FOUND IN CONCRETE STAMPED "246-2043" |
| 246-2071 | 10,204,582.88 | 3,124,993.23 | 818.88' | TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2071"   |
| 246-2072 | 10.204.914.22 | 3.123.871.10 | 836.97' | TxDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2072"   |



Survey Date: July, 2023

400

0 200 400

1" = 800' (11" X 17") 1" = 400' (22" X 34") WILLIAMSON COUNTY, TEXAS

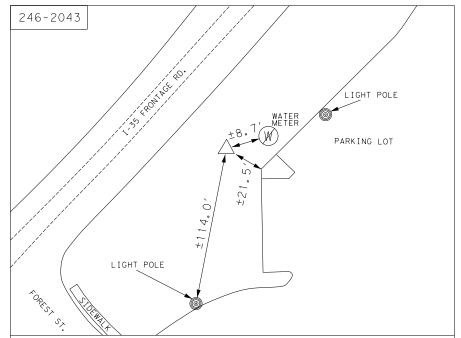


4801 Southwest Parkway Building Two, Suite 100 Austin, Texas 78735 (512) 447-0575 Fax: (512) 326-3029 Texas Firm Registration No. 10064300



S.H. 29 CONTROL LAYOUT

| FHWA<br>TEXAS | FEDERAL AI | NO.        |          |    |  |
|---------------|------------|------------|----------|----|--|
| DIVISION      |            |            |          | 71 |  |
| STATE         | DISTRICT   | COUNTY     |          |    |  |
| TEXAS         | AUS        | WILLIAMSON |          |    |  |
| CONTROL       | SECTION    | JOB        | HWAY NO. |    |  |
| 0337          | 01         | 053        | н. 29    |    |  |
|               |            |            |          |    |  |



POINT 246-2043 IS A 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD IN CONCRETE STAMPED "246-2043" FOUND IN THE SOUTHEAST RIGHT-OF-WAY OF THE NORTH I-35 FRONTAGE ROAD, ±114.0 FEET NORTHEAST OF A LIGHT POLE, ±21.5 FEET NORTHWEST OF THE BACK OF CURB, AND ±8.7 FEET SOUTHWEST OF A WATER METER.

SURFACE COORDINATES
N=10,210,338.75
E=3,131,100.08
ELEV: =737.94'
TXDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD IN CONCRETE STAMPED "246-2043" FOUND GRID COORDINATES N=10,209,215.74 E=3,130,755.70 ELEV.=737.94'

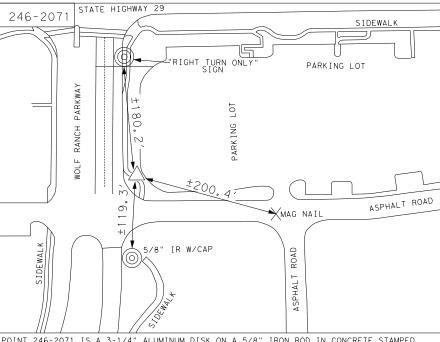
LIGHT POLE

POINT 246-2072 IS A 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD IN CONCRETE STAMPED "246-2072" SET IN THE NORTH RIGHT-OF-WAY OF STATE HIGHWAY 29, ±50.2 FEET NORTHEAST OF A LIGHT POLE, ±44.3 FEET NORTHEAST OF A PULL BOX AND ±40.9 FEET NORTHWEST OF A "RIGHT LANE MUST TURN RIGHT" SIGN.

SURFACE COORDINATES
N=10, 204, 914. 22
E=3, 123, 871. 10
E=3, 123, 871. 10
E=4, 123, 527. 51
ELEV. =836. 97'
TXDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2072"

246-2072

STATE HIGHWAY 29



POINT 246-2071 IS A 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD IN CONCRETE STAMPED
"246-2071" SET IN THE EAST RIGHT-OF-WAY OF WOLF RANCH PARKWAY, ±180.2 FEET SOUTHEAST
OF A "RIGHT TURN ONLY" SIGN, ±200.4 FEET NORTHWEST OF A MAG NAIL AND ±119.3 FEET NORTH OF AN IRON ROD.

SURFACE COORDINATES
N=10,204,582.88
N=10,203,460.50
E=3,124,993.23
E=3,124,993.23
E=3,124,649.52
ELEV.=818.88'
TXDOT 3-1/4" ALUMINUM DISK ON A 5/8" IRON ROD SET IN CONCRETE STAMPED "246-2071"



ASPHALT ROAD

SIDEWALK

±40.9

"RIGHT LANE MUST TURN RIGHT"

AEGISTER O SCOTT C. BRASHEAR 6660 POFESSION SANO SURVE





# HORIZONTAL & VERTICAL CONTROL SHEET

| FHWA<br>TEXAS |                | FEDERAL AI | SHEET<br>NO. |             |        |  |
|---------------|----------------|------------|--------------|-------------|--------|--|
| DIVISION      |                |            | 72           |             |        |  |
| STATE         | STATE DISTRICT |            | COUNTY       |             |        |  |
| TEXAS         |                | AUS        | WILLIAMSON   |             |        |  |
| CONTROL       | ONTROL SECTION |            | JOB          | HIGHWAY NO. |        |  |
| 0337          |                | 01         | 053 S.       |             | .н. 29 |  |
|               |                |            |              |             |        |  |

1) ALL COORDINATES SHOWN HEREON ARE BASED OFF THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NADB3 / NAVDB8, GEOID12A. ALL COORDINATES SHOWN HEREON ARE IN SURFACE COORDINATES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00011.
UNITS: U.S.SURVEY FEET

2) EXISTING CONTROL POINTS 246-2042 AND 246-2043 WERE RECOVREED AND FOUND TO BE OUT OF TOLERANCE. COORDINATE VALUES WERE RE-ESTABLISHED UTILIZING STATIC SURVEY PROCESSED TO CORS STATIONS TXBU, TXC2 AND SAM2. RE-ESTABLISHED COORDINATE VALUES FOR CONTROL POINTS 246-2042 AND 246-2043 WERE HELD AS A BASIS TO ESTABLISH COORDINATES FOR CONTROL POINTS 246-2042 AND 246-2043.

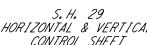
3) A CALIBRATION SHOULD BE PERFORMED WHEN USING ANY OF THE CONTROL SHOWN HEREON.



NOT TO SCALE

Survey Date: July, 2023





\* Alignment name: CL-SH29 \* Alignment description: \* Alignment style: Alignment\Baseline STATION NORTHING **EASTING** Element: Linear ement: Linear POT( ) 142+71.09 R1 10204775.22 PC( ) 147+71.09 R1 10204795.70 Tangential Direction: N87°39'07.02"E Tangential Length: 500.00 Element: Circular 94.86 1.13 1.13 Chord. Middle Ordinate: External: Tangent Direction: N87°39'07.01"E
Radial Direction: S02°20'52.99"E Chord Direction: N84°55'59.75"E Radial Direction: S07°47'07.52"E Tangent Direction: N82°12'52.48"E Element: Circular Degree of Curvature(Arc): 05°43'46.48" Length: 94.90 Length: Tangent: Chord: 47.49

\* Alignment name: CL-WRP \* Alignment description: \* Alignment style: Alignment\Baseline STATION NORTHING **EASTING** Element: Linear ement: Linear POT( ) 100+00.00 R1 10204639.40 POT( ) 104+63.18 R1 10205102.19 Tangential Direction: N02°20'34.50"W Tangential Length: 463.18 3124925.15 3124906.22

\* Alignment name: CL-WLD \* Alignment description:

\* Alignment style: Alignment\Baseline

STATION NORTHING **EASTING** Element: Linear ement: Linear POT( ) 7+00.00 R1 10204612.87 PI( ) 10+00.00 R1 10204912.87 Tangential Direction: N00°13'26.56"W Tangential Length: 300.00 3126336.32 3126335.15

Element: Linear Pl( ) 10+00.00 R1 10204912.87 POT( ) 14+64.43 R1 10205376.95 Tangential Direction: N02°13'39.47"W Tangential Length: 464.43

\* Alignment name: DRW 01 \* Alignment description:

\* Alignment style: Alignment\Driveway

STATION NORTHING **EASTING** Element: Linear ement: Linear POT( ) 10+00.00 R1 10204873.61 POT( ) 11+36.68 R1 10205010.17 Tangential Direction: N02°20'52.98"W Tangential Length: 136.68 3125377.61 3125372.01

\* Alignment name: DRW 02 \* Alignment description:

\* Alignment style: Alignment\Driveway

POT( ) 10+00.00 R1 10204891.04 POT( ) 11+36.68 R1 10205027.61 Tangential Direction: N02°20'52.98"W Tangential Length: 136.68 EASTING Element: Linear 3125802.72

\* Alignment name: DRW 03 \* Alignment description:

\* Alignment style: Alignment\Driveway

STATION NORTHING FASTING 3126110.96 3126105.36





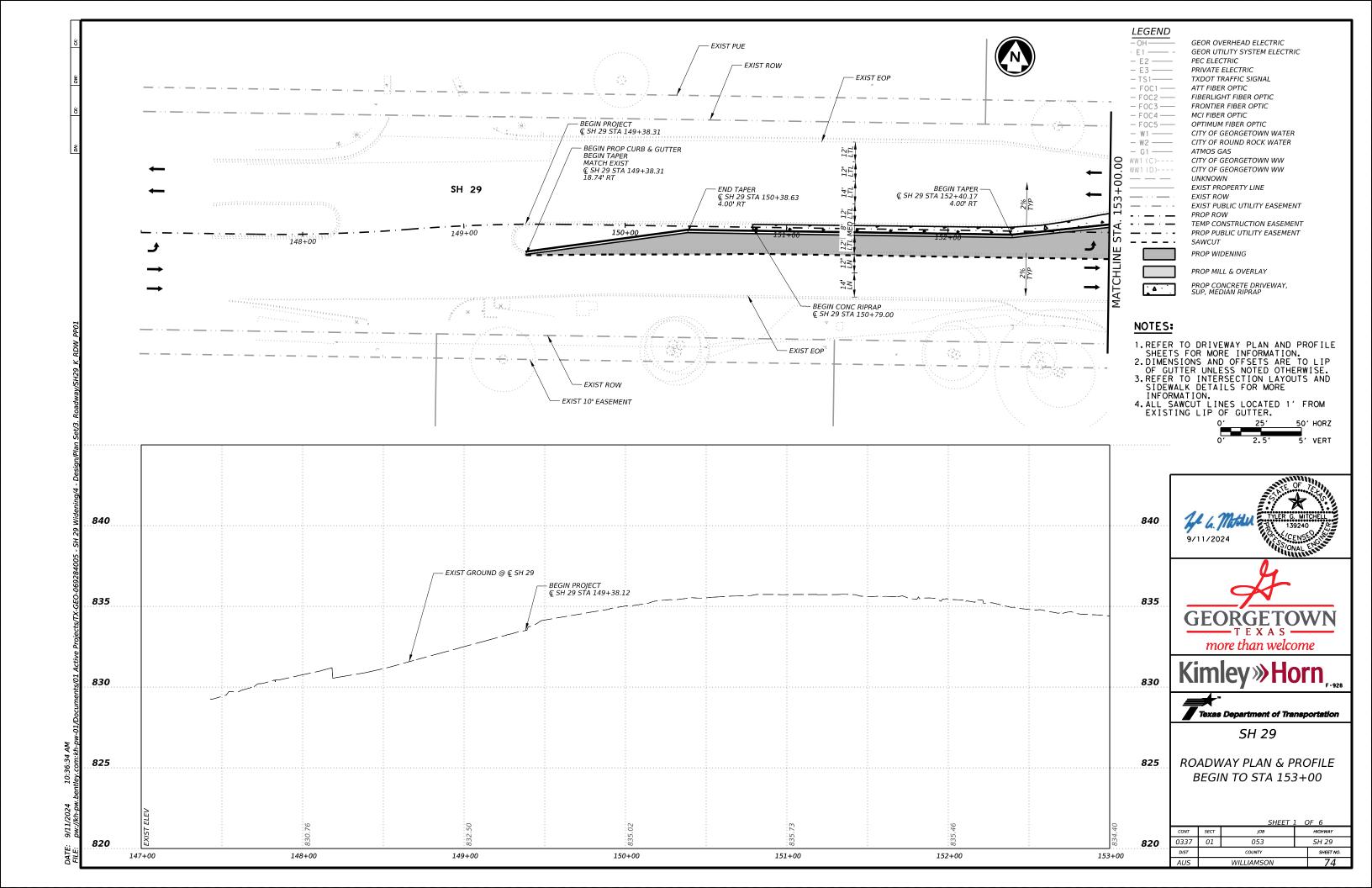


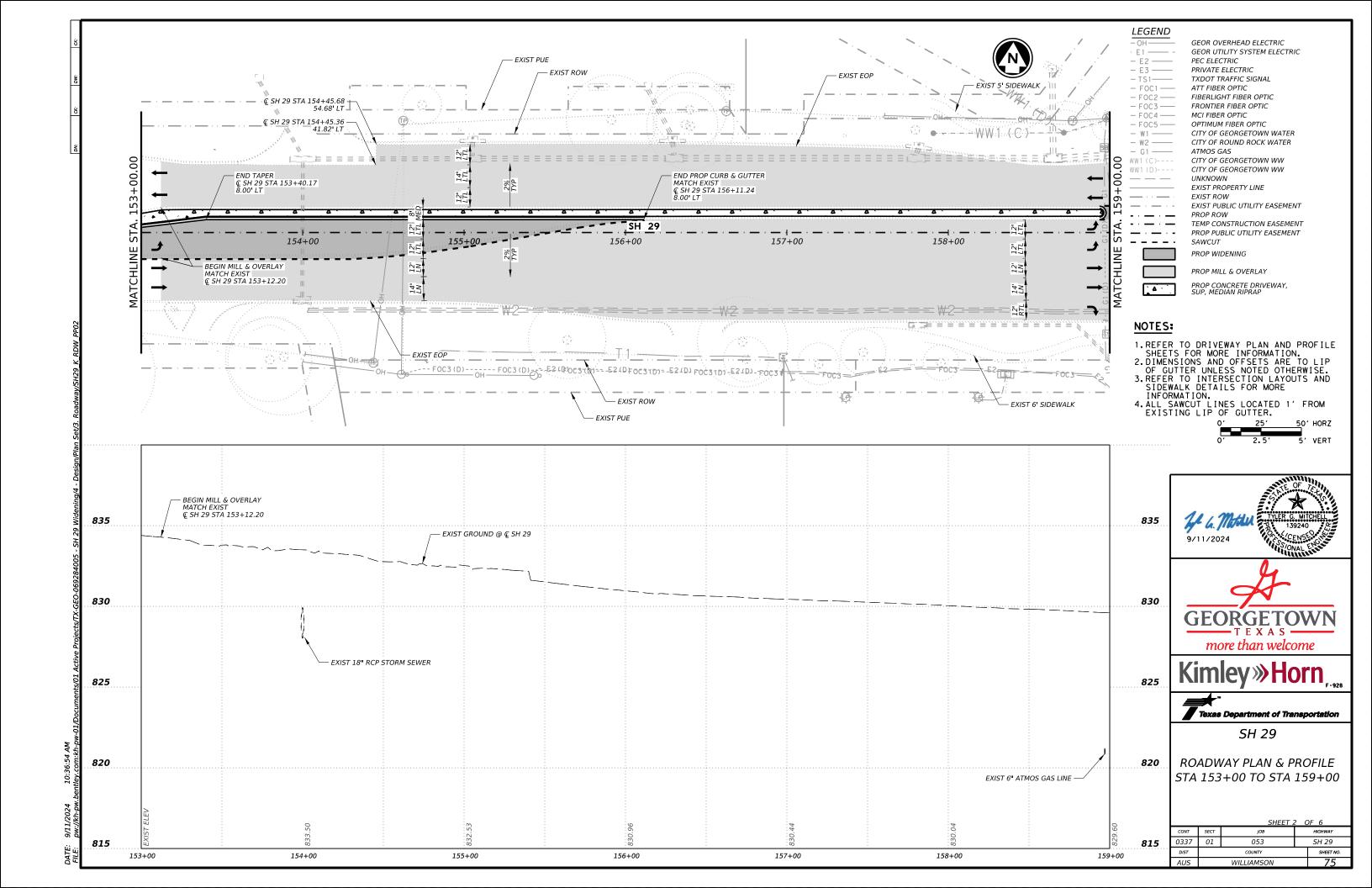


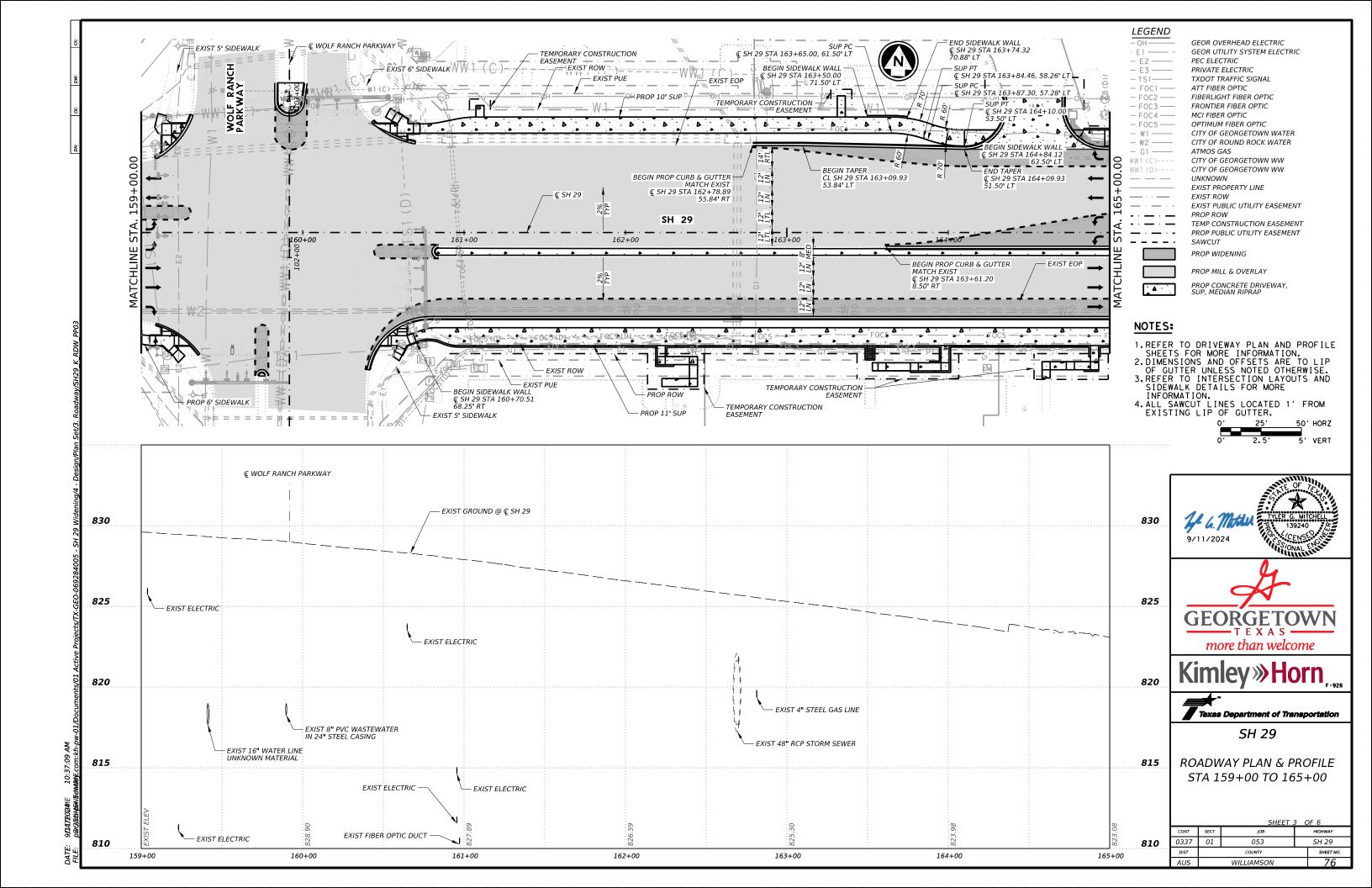
SH 29

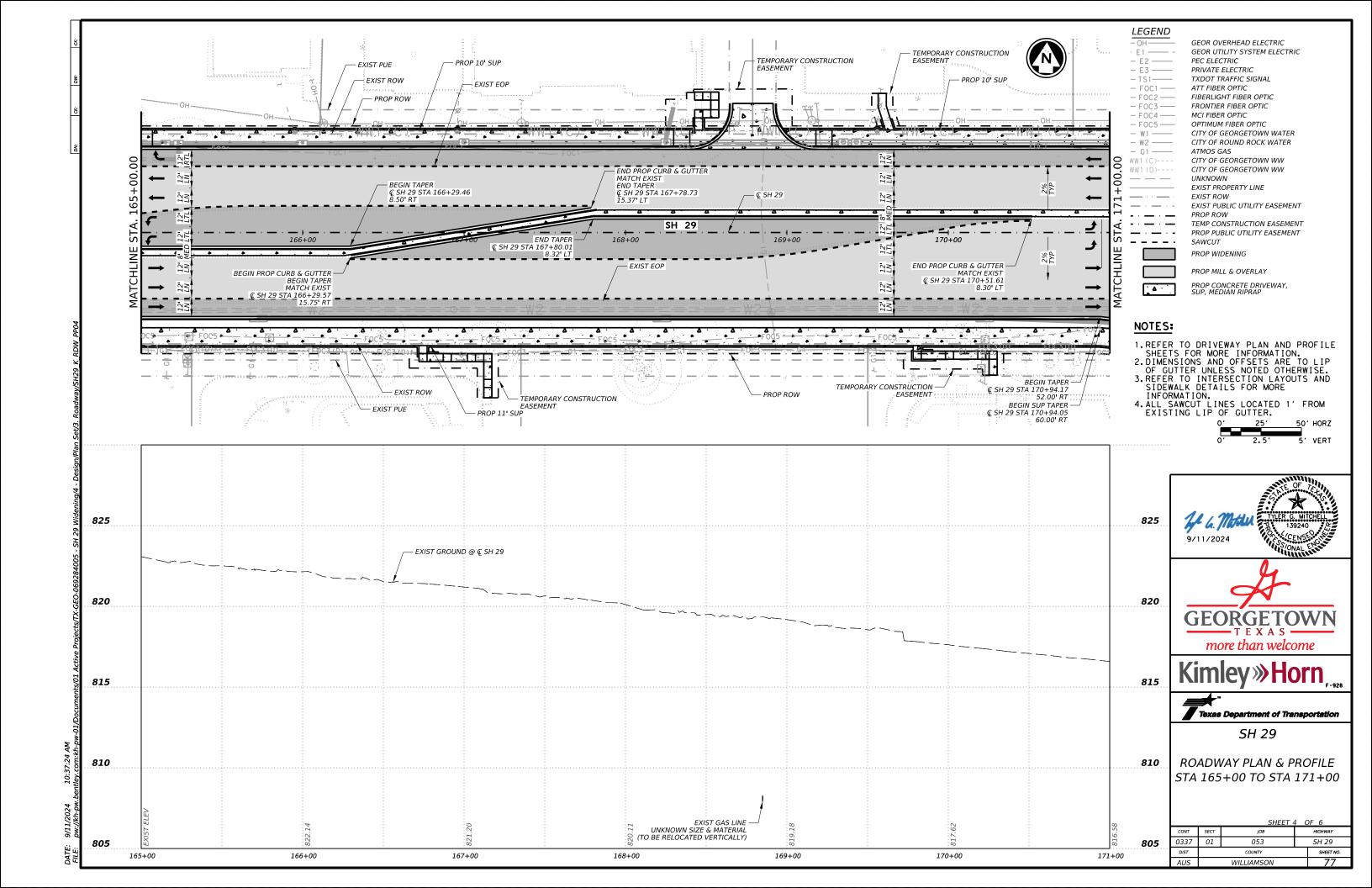
**HORIZONTAL** ALIGNMENT DATA

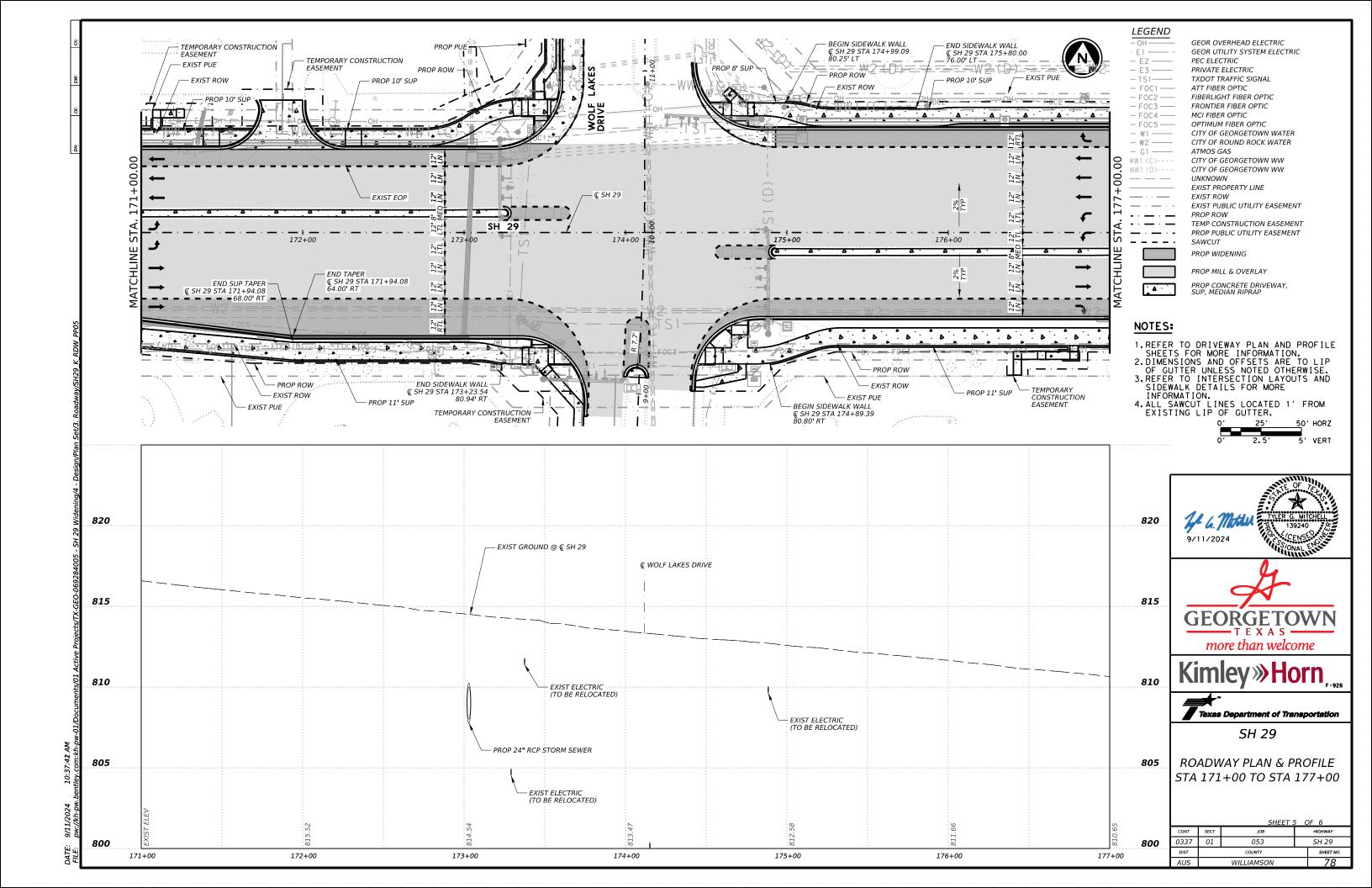
| SHEET 1 OF 1 |            |     |       |           |  |  |  |
|--------------|------------|-----|-------|-----------|--|--|--|
| CONT         | SECT       | JOВ |       | HIGHWAY   |  |  |  |
| 0337         | 01         | 053 | SH 29 |           |  |  |  |
| DIST         | COUNTY     |     |       | SHEET NO. |  |  |  |
| AUS          | WILLIAMSON |     |       | 73        |  |  |  |

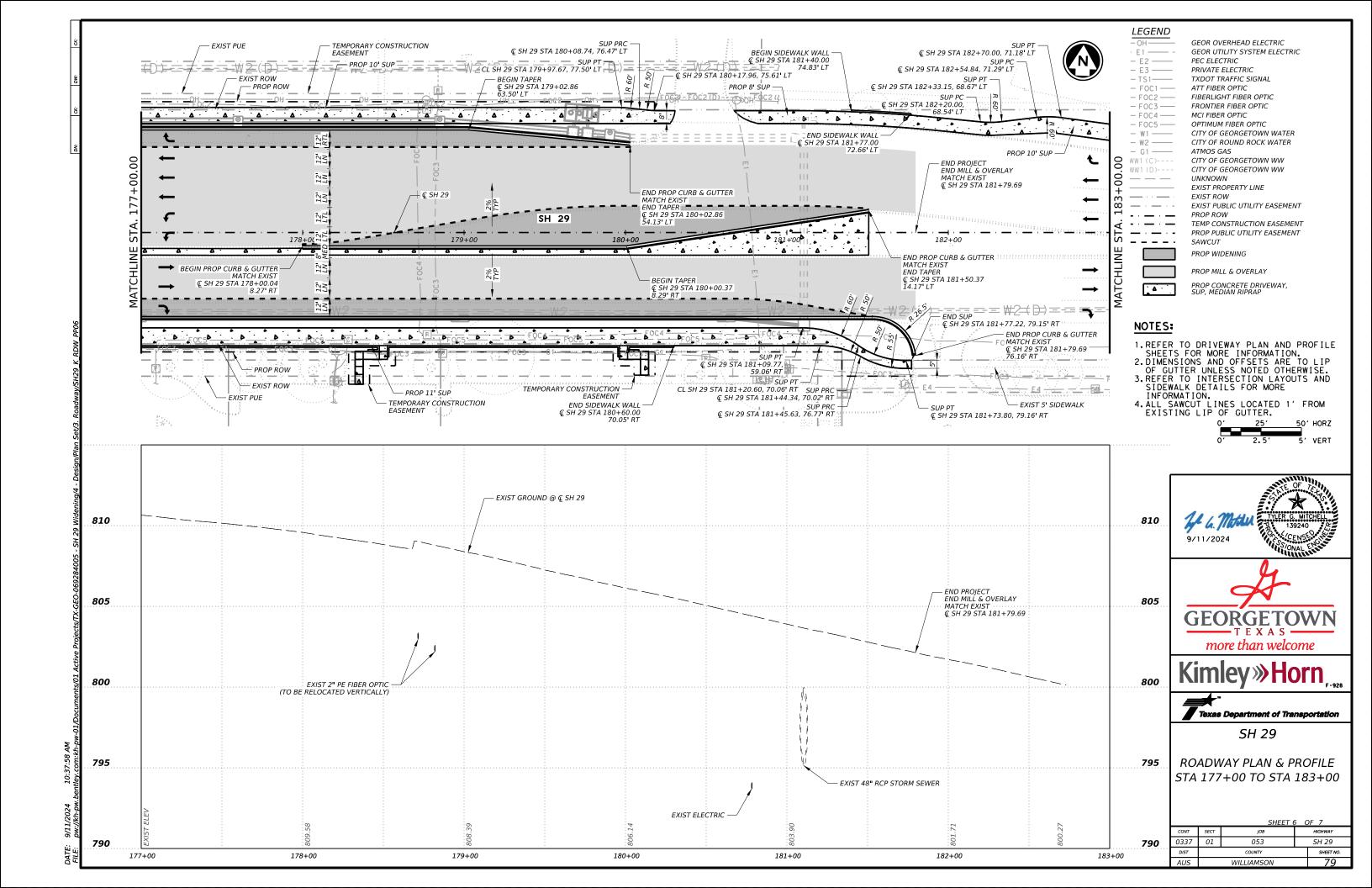


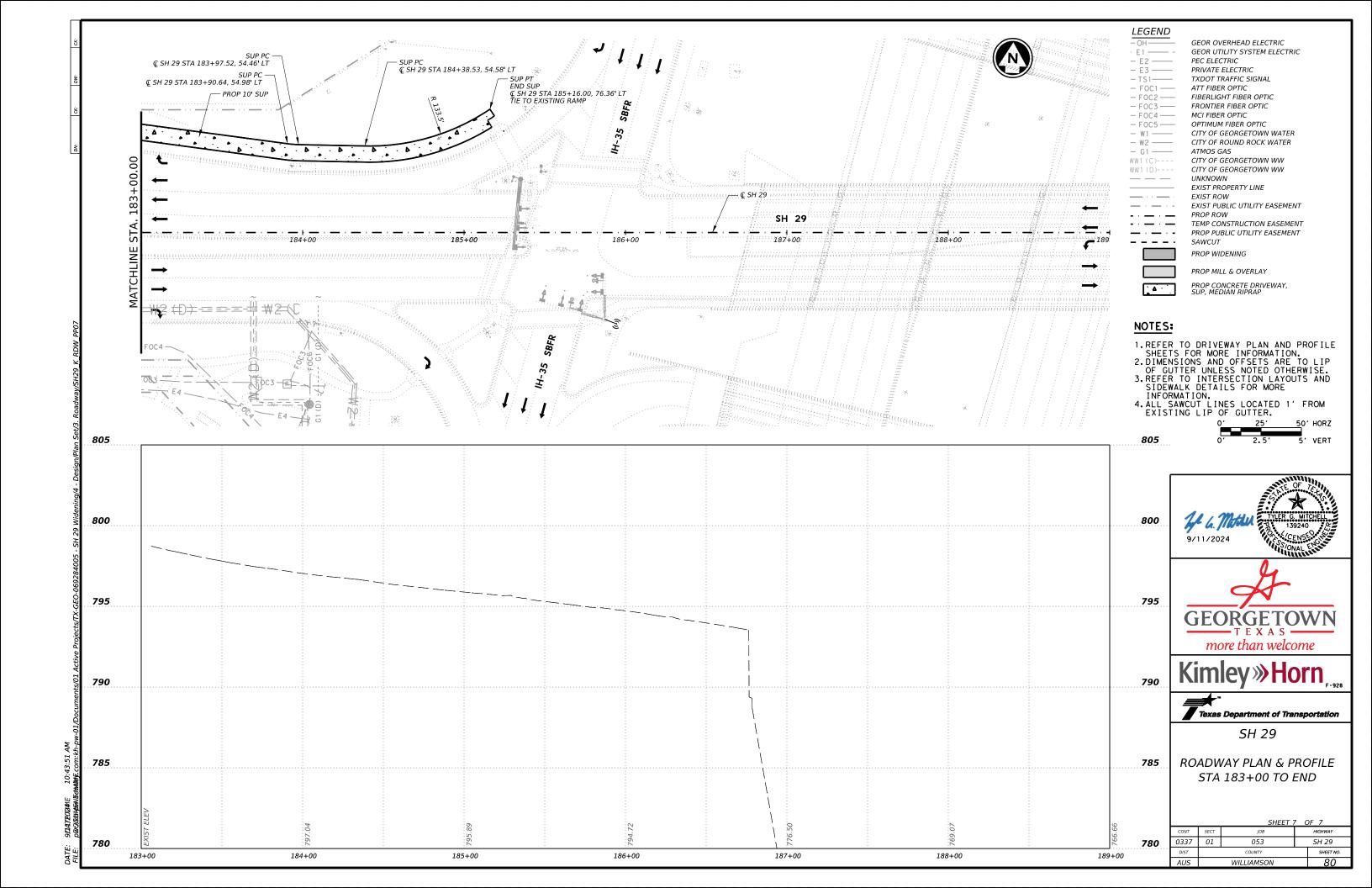


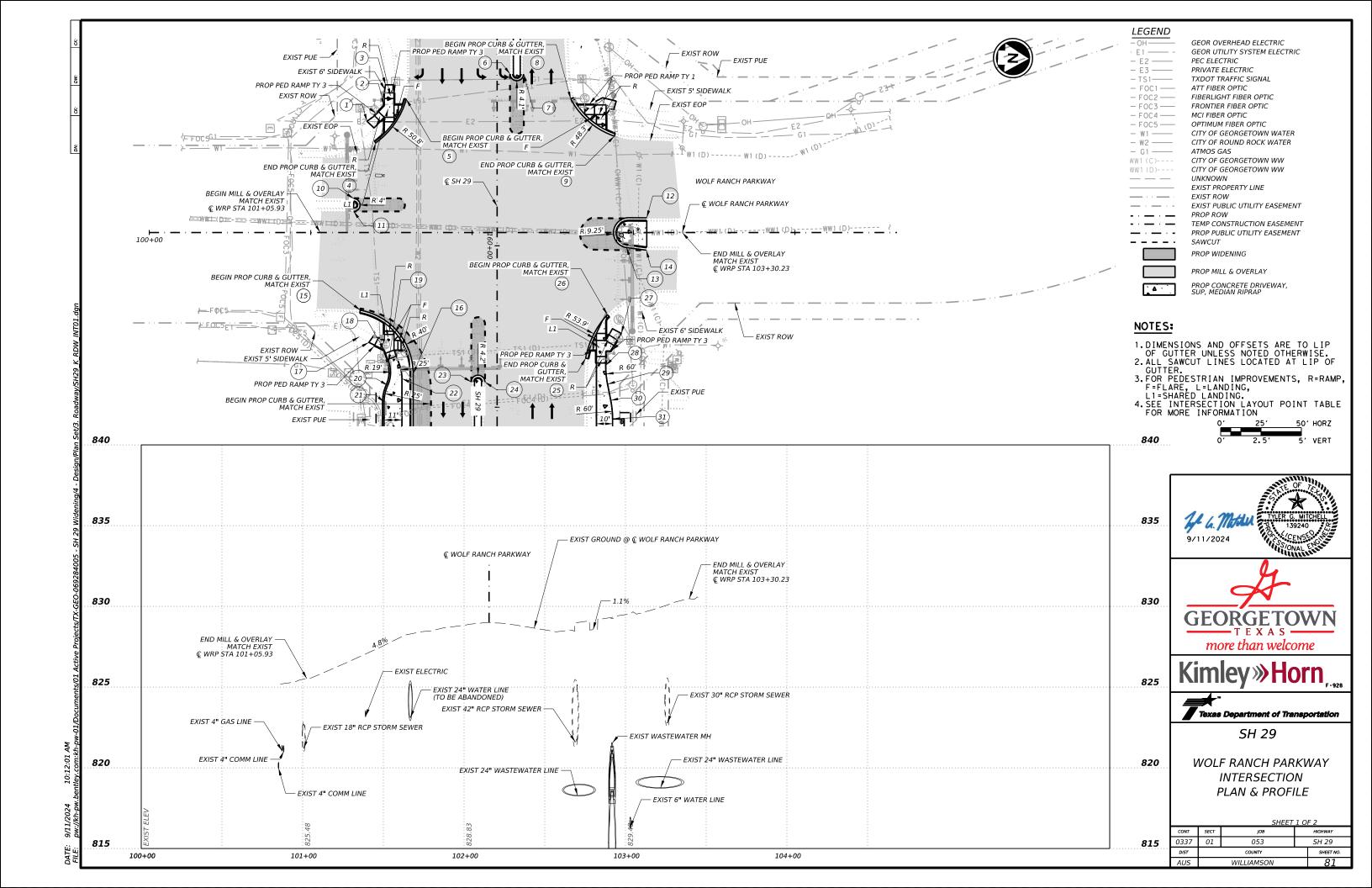


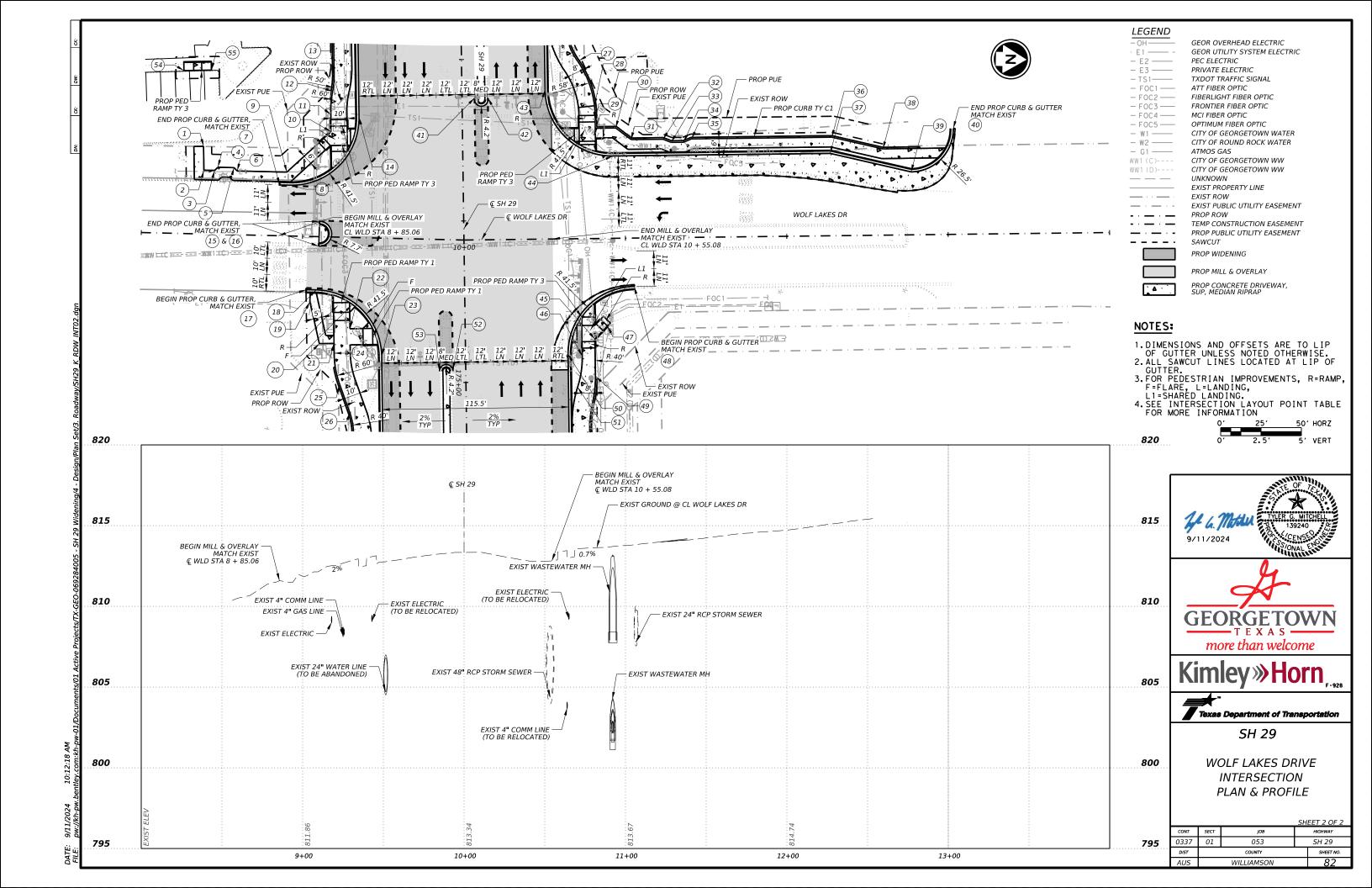












| WOLF RAN              |    |           |           |  |  |  |  |  |
|-----------------------|----|-----------|-----------|--|--|--|--|--|
| ALIGNMENT             | PT | STA       | OFFSET    |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 1  | 101+34.83 | 68.87' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 2  | 101+45.56 | 78.55' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 3  | 101+46.30 | 91.51'LT  |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 4  | 101+40.23 | 55.50' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 5  | 101+59.24 | 82.59' LT |  |  |  |  |  |
| CL SH 29              | 6  | 158+93.68 | 8.09' LT  |  |  |  |  |  |
| CL SH 29              | 7  | 158+93.66 | 16.50' LT |  |  |  |  |  |
| CL SH 29              | 8  | 159+09.10 | 45.62' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 9  | 102+88.11 | 59.70' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 10 | 101+26.64 | 21.25' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 11 | 101+26.59 | 13.08' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 12 | 103+08.20 | 9.11'LT   |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 13 | 102+95.62 | 9.28' RT  |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 14 | 103+07.89 | 10.92' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 15 | 101+30.70 | 48.10' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 16 | 101+63.49 | 87.44' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 17 | 101+36.07 | 68.04' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 18 | 101+45.58 | 72.82' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 19 | 101+48.29 | 80.10' RT |  |  |  |  |  |
| CL SH 29              | 20 | 160+86.45 | 67.73' RT |  |  |  |  |  |
| CL SH 29              | 21 | 160+96.87 | 70.00' RT |  |  |  |  |  |
| CL SH 29              | 22 | 160+82.30 | 59.00' RT |  |  |  |  |  |
| CL SH 29              | 23 | 160+84.38 | 16.04' RT |  |  |  |  |  |
| CL SH 29              | 24 | 160+84.39 | 7.60' RT  |  |  |  |  |  |
| CL SH 29              | 25 | 160+69.66 | 54.84' LT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 26 | 102+83.73 | 50.88' RT |  |  |  |  |  |
| CL WOLF RANCH PARKWAY | 27 | 102+92.41 | 62.53' RT |  |  |  |  |  |
| CL SH 29              | 28 | 160+74.15 | 67.28' RT |  |  |  |  |  |
| CL SH 29              | 29 | 160+85.72 | 68.40' LT |  |  |  |  |  |
| CL SH 29              | 30 | 160+95.76 | 70.37' LT |  |  |  |  |  |
| CL SH 29              | 31 | 161+07.33 | 71.50' LT |  |  |  |  |  |
|                       |    |           |           |  |  |  |  |  |

| ALIGNMENT        | PT | STA       | OFFSET     |
|------------------|----|-----------|------------|
| CL WOLF LAKES DR | 1  | 8+37.36   | 54.28' LT  |
| CL WOLF LAKES DR | 2  | 8+37.90   | 39.50' LT  |
| CL WOLF LAKES DR | 3  | 8+44.54   | 39.50' LT  |
| CL WOLF LAKES DR | 4  | 8+46.54   | 41.50' LT  |
| CL WOLF LAKES DR | 5  | 8+56.51   | 41.50' LT  |
| CL WOLF LAKES DR | 6  | 8+58.51   | 39.50' LT  |
| CL WOLF LAKES DR | 7  | 8+85.00   | 31.50' LT  |
| CL WOLF LAKES DR | 8  | 8+91.72   | 31.50 LT   |
| CL WOLF LAKES DR | 9  | 8+89.31   | 39.50'LT   |
| CL SH 29         | 10 | 173+43.56 | 81.43' RT  |
| CL SH 29         | 11 | 173+33.04 | 81.43' RT  |
| CL SH 29         | 12 | 173+33.64 | 80.10' RT  |
| CL SH 29         | 13 | 173+18.00 | 79.00' RT  |
| CL SH 29         | 14 | 173+34.85 | 64.00' RT  |
| CL WOLF LAKES DR | 15 | 9+10.23   | 9.50' LT   |
| CL WOLF LAKES DR | 16 | 9+10.23   | 5.89' RT   |
| CL WOLF LAKES DR | 17 | 9+03.00   | 33.00' RT  |
| CL WOLF LAKES DR | 18 | 9+03.00   | 33.00 RT   |
| CL WOLF LAKES DR | 19 | 9+05.50   | 40.39' RT  |
| CL WOLF LAKES DR |    |           |            |
| CL WOLF LAKES DR | 20 | 9+11.90   | 66.26' RT  |
|                  | 21 | 9+20.96   | 65.92' RT  |
| CL WOLF LAKES DR | 22 | 9+30.62   | 56.56' RT  |
| CL SH 29         | 23 | 174+82.89 | 52.00' RT  |
| CL SH 29         | 24 | 174+80.77 | 81.43' RT  |
| CL SH 29         | 25 | 175+00.20 | 78.19' RT  |
| CL SH 29         | 26 | 175+17.79 | 72.16' RT  |
| CL SH 29         | 27 | 173+01.63 | 72.86' LT  |
| CL SH 29         | 28 | 173+29.72 | 81.97' LT  |
| CL WOLF LAKES DR | 29 | 10+82.12  | 72.27' LT  |
| CL WOLF LAKES DR | 30 | 10+94.80  | 68.30' LT  |
| CL WOLF LAKES DR | 31 | 11+04.21  | 61.00' LT  |
| CL SH 29         | 32 | 11+24.00  | 61.00' LT  |
| CL SH 29         | 33 | 11+29.00  | 59.00' LT  |
| CL SH 29         | 34 | 11+36.69  | 59.00' LT  |
| CL SH 29         | 35 | 11+41.69  | 61.00 LT'  |
| CL WOLF LAKES DR | 36 | 12+28.62  | 61.00' LT  |
| CL WOLF LAKES DR | 37 | 12+27.43  | 51.00' LT  |
| CL WOLF LAKES DR | 38 | 12+60.17  | 53.43' LT  |
| CL WOLF LAKES DR | 39 | 12+77.46  | 39.00' LT  |
| CL WOLF LAKES DR | 40 | 13+03.96  | 65.55' LT  |
| CL SH 29         | 41 | 173+23.96 | 7.75' LT   |
| CL SH 29         | 42 | 173+23.96 | 16.00' LT  |
| CL SH 29         | 43 | 173+19.50 | 51.50' LT  |
| CL WOLF LAKES DR | 44 | 10+92.81  | 51.00' LT  |
| CL SH 29         | 45 | 174+74.26 | 80.27' LT  |
| CL SH 29         | 46 | 174+84.76 | 72.27' LT  |
| CL SH 29         | 47 | 174+66.26 | 88.21'LT   |
| CL WOLF LAKES DR | 48 | 11+05.15  | 30.00' RT  |
| CL SH 29         | 49 | 174+97.33 | 80.27' LT  |
| CL SH 29         | 50 | 174+83.53 | 63.50' LT  |
| CL SH 29         | 51 | 175+03.86 | 69.14' LT  |
| CL SH 29         | 52 | 174+92.04 | 8.00' RT   |
| CL SH 29         | 53 | 174+92.66 | 16.25' RT  |
| CL WOLF LAKES DR | 54 | 8+24.12   | 100.90' LT |
| CL WOLF LAKES DR | 55 | 8+41.11   | 101.53' LT |
|                  |    |           |            |

WOLF LAKES DR







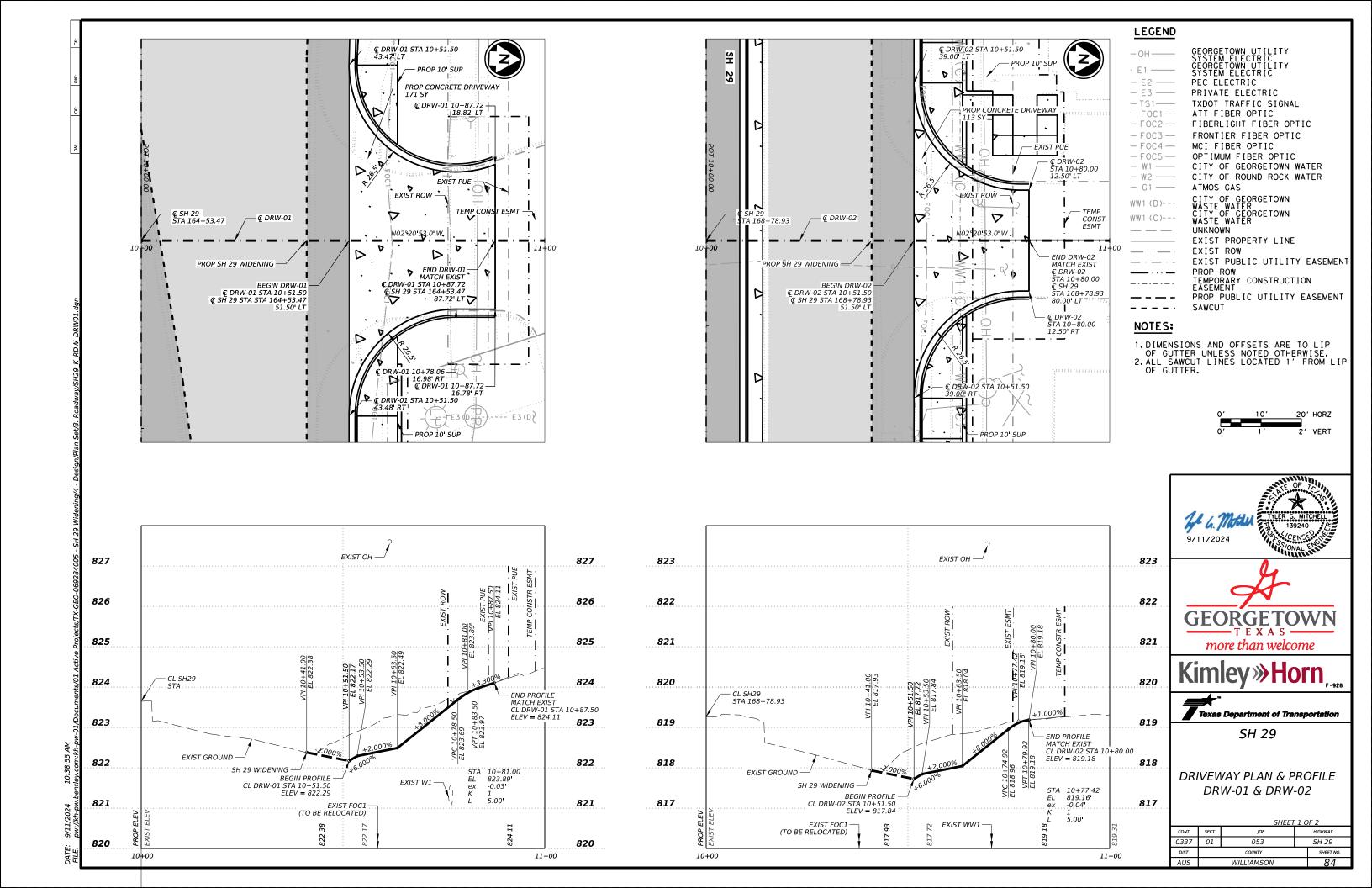


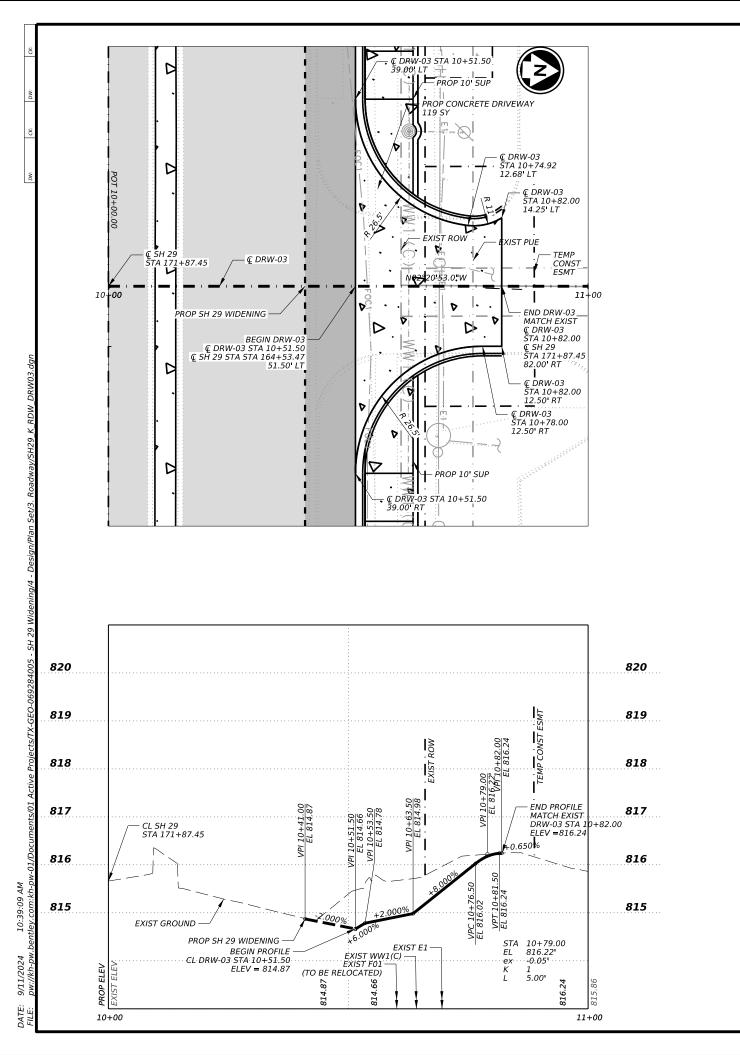
SH 29

INTERSECTION LAYOUT POINT TABLES

|     | SHEET 1 OF 1 |
|-----|--------------|
| JOB | HIGHWAY      |
| 053 | SH 29        |

|      |      |            | SH | EET 1 OF 1 |
|------|------|------------|----|------------|
| CONT | SECT | JOB        |    | HIGHWAY    |
| 0337 | 01   | 053        |    | SH 29      |
| DIST |      | COUNTY     |    | SHEET NO.  |
| AUS  |      | WILLIAMSON |    | 83         |



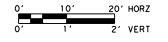


#### LEGEND

- OH -E1 — – E2 —— PEC ELECTRIC — ЕЗ —— PRIVATE ELECTRIC - TS1----TXDOT TRAFFIC SIGNAL - FOC1 -ATT FIBER OPTIC — FOC2 — FIBERLIGHT FIBER OPTIC — FOC3 — FRONTIER FIBER OPTIC - FOC4 -MCI FIBER OPTIC — FOC5 — OPTIMUM FIBER OPTIC CITY OF GEORGETOWN WATER — W1 —— - W2 ----CITY OF ROUND ROCK WATER - G1 ----ATMOS GAS CITY OF GEORGETOWN WASTE WATER CITY OF GEORGETOWN WASTE WATER WW1 (□)---WW1 (C)---UNKNOWN EXIST PROPERTY LINE EXIST ROW EXIST PUBLIC UTILITY EASEMENT PROP ROW TEMPORARY CONSTRUCTION EASEMENT PROP PUBLIC UTILITY EASEMENT SAWCUT

#### NOTES:

1. DIMENSIONS AND OFFSETS ARE TO LIP OF GUTTER UNLESS NOTED OTHERWISE. 2. ALL SAWCUT LINES LOCATED 1' FROM LIP OF GUTTER.







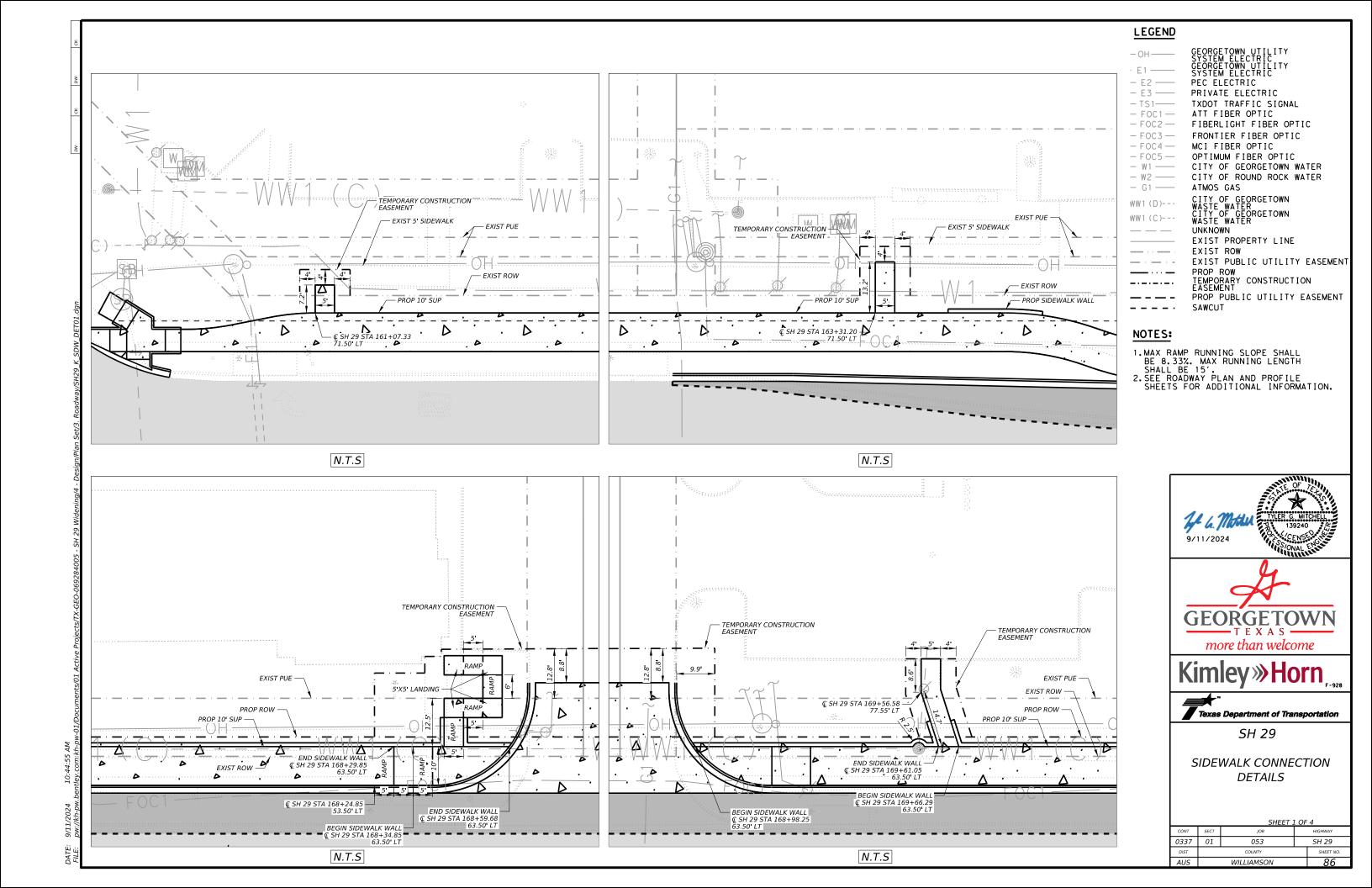


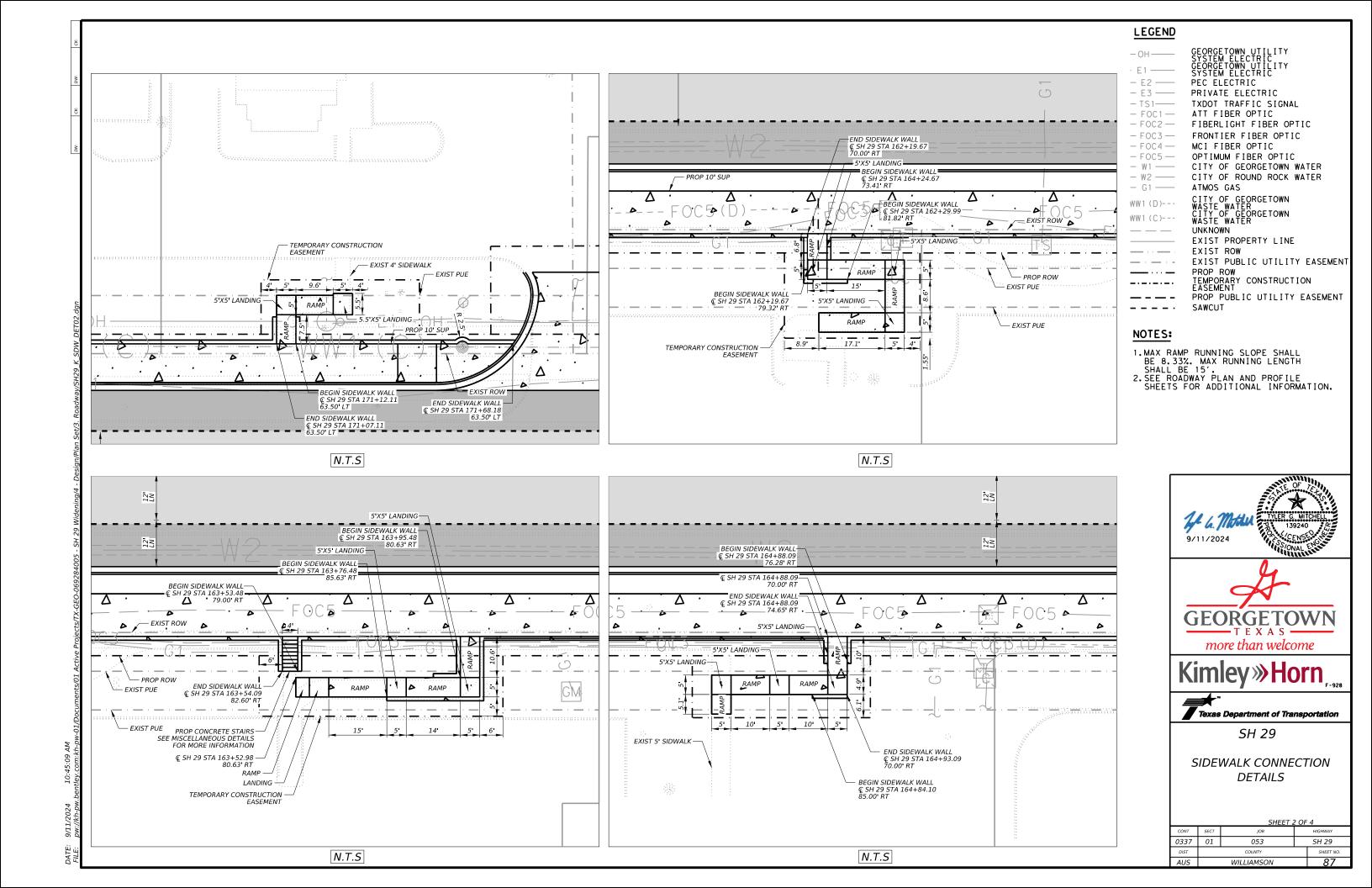


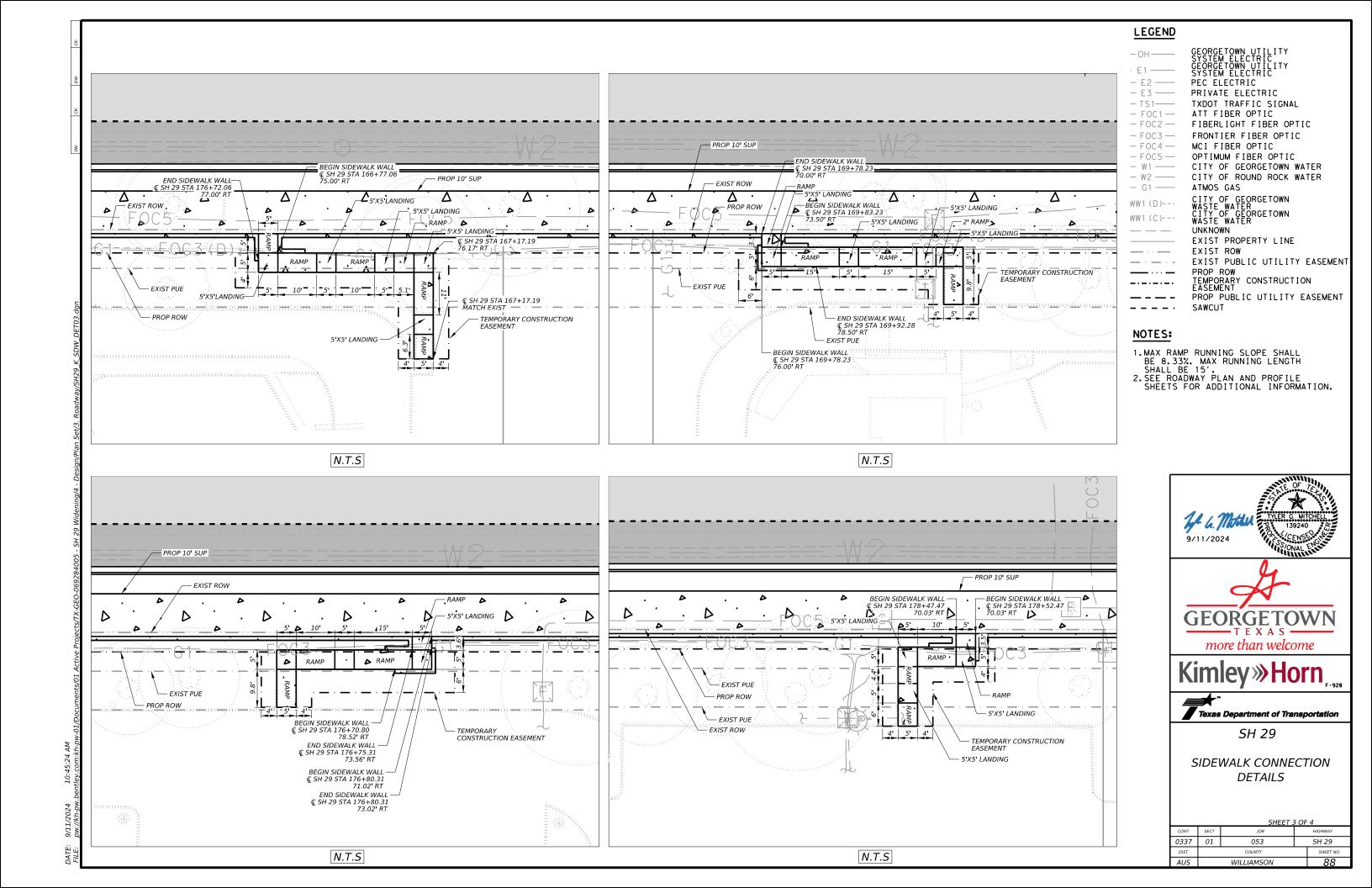
SH 29

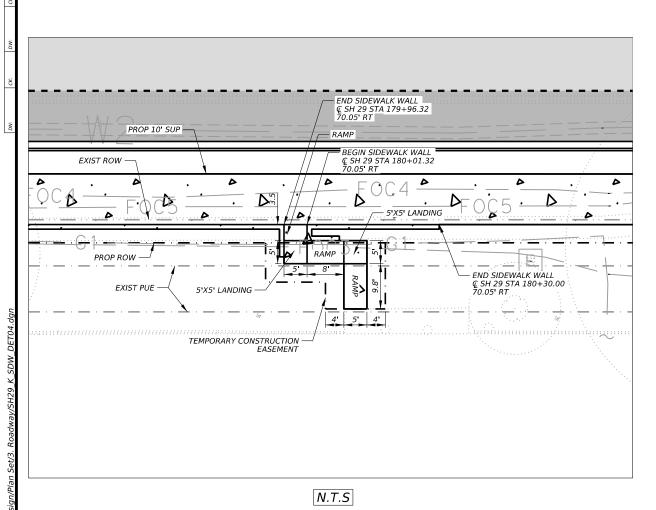
DRIVEWAY PLAN AND PROFILE DRWY-03

| SHEET 2 OF 2 |      |            |           |  |  |  |
|--------------|------|------------|-----------|--|--|--|
| CONT         | SECT | JOB        | HIGHWAY   |  |  |  |
| 0337         | 01   | 053        | SH 29     |  |  |  |
| DIST         |      | COUNTY     | SHEET NO. |  |  |  |
| AUS          |      | WILLIAMSON | 85        |  |  |  |









#### **LEGEND**

GEORGETOWN UTILITY SYSTEM ELECTRIC GEORGETOWN UTILITY SYSTEM ELECTRIC - OH -E1 — – E2 —— PEC ELECTRIC — Е3 —— PRIVATE ELECTRIC - TS1----TXDOT TRAFFIC SIGNAL ATT FIBER OPTIC — FOC1 — — FOC2 — FIBERLIGHT FIBER OPTIC — FOC3 — FRONTIER FIBER OPTIC — FOC4 — MCI FIBER OPTIC - FOC5 -OPTIMUM FIBER OPTIC — W1 —— CITY OF GEORGETOWN WATER - W2 ----CITY OF ROUND ROCK WATER ATMOS GAS - G1 ----CITY OF GEORGETOWN WASTE WATER CITY OF GEORGETOWN WASTE WATER WW1 (D)---WW1 (C)---UNKNOWN EXIST PROPERTY LINE EXIST ROW EXIST PUBLIC UTILITY EASEMENT PROP ROW TEMPORARY CONSTRUCTION EASEMENT PROP PUBLIC UTILITY EASEMENT SAWCUT

#### NOTES:

1. MAX RAMP RUNNING SLOPE SHALL BE 8.33%. MAX RUNNING LENGTH SHALL BE 15'. 2. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.





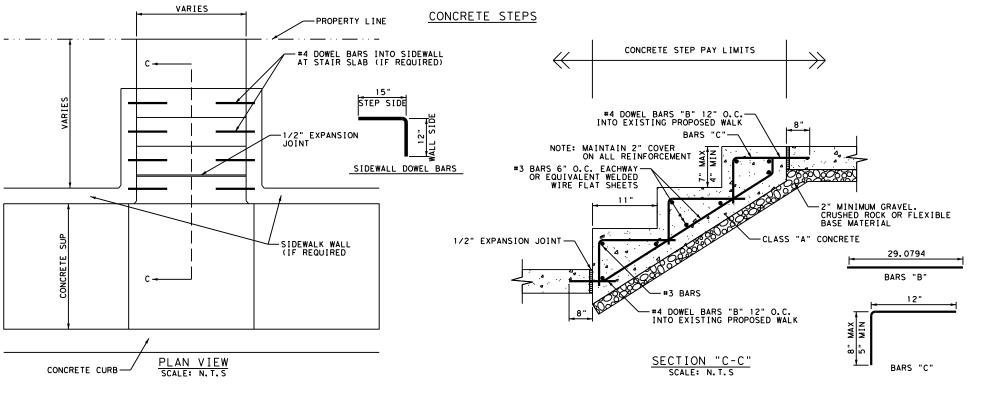




SH 29

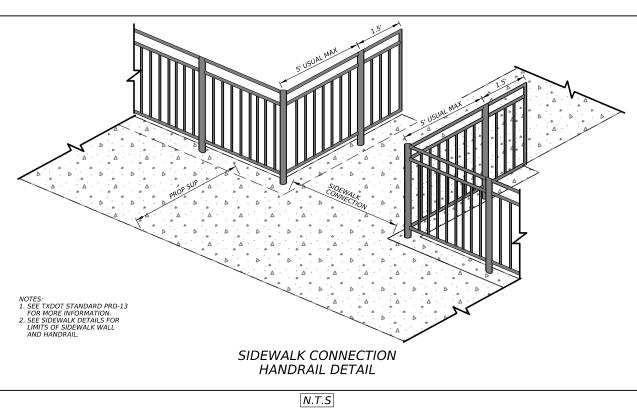
SIDEWALK CONNECTION **DETAILS** 

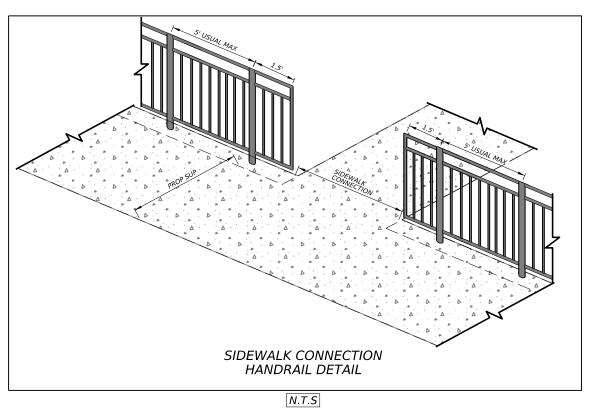
| SHEET 4 OF 4 |      |        |           |         |  |  |
|--------------|------|--------|-----------|---------|--|--|
| CONT         | SECT | JOB    |           | HIGHWAY |  |  |
| 0337         | 01   | 053    | SH 29     |         |  |  |
| DIST         |      | COUNTY | SHEET NO. |         |  |  |
| AUS          |      | 89     |           |         |  |  |



# NOTES:

1. SEE SIDEWALK CONNECTION DETAILS FOR SIDEWALK WALL AND STAIR LOCATIONS.











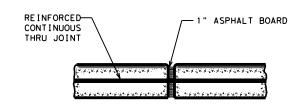


SH 29

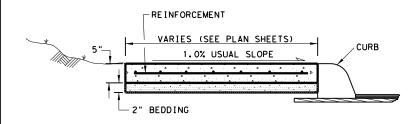
MISCELLANEOUS DETAILS

|      | SHEET 1 OF 1 |            |           |         |  |  |
|------|--------------|------------|-----------|---------|--|--|
| CONT | SECT         | SECT JOB   |           | HIGHWAY |  |  |
| 0337 | 01           | 053        | SH 29     |         |  |  |
| DIST |              | COUNTY     | SHEET NO. |         |  |  |
| AUS  |              | WILLIAMSON | 90        |         |  |  |

#### TRANSITION FOR CONCRETE CURB ENDS



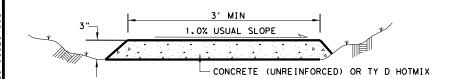
#### EXPANSION JOINT DETAIL



#### SIDEWALK & SHARED USE PATH (S.U.P.) TYP. SECT.

SIDEWALK OR S.U.P. EXPANSION JOINTS ARE TO BE AT A MAX. SPACING OF 40' AND COINCIDE WITH THE CURB EXPANSION JOINTS (WHEN ADJACENT TO CURB).

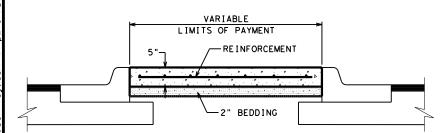
NOTE: TOOLED OR SAWED CONTRACTION JOINTS ARE NOT ALLOWED.



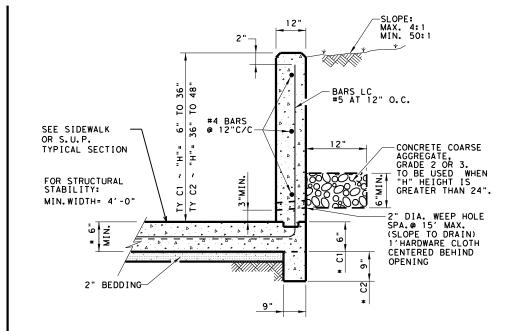
#### TEMPORARY SIDEWALK & SHARED USE PATH (S.U.P.)

CONC SIDEWALK (SPECIAL) (TYPE B)

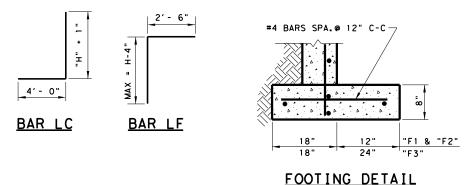
- 1. EXPANSION JOINTS, BEDDING, AND TOOL JOINTS ARE NOT REQUIRED.
  2. PROVIDE 5' X 5' PASSING AREA AT INTERVALS NOT TO EXCEED 200'.
  3. 4' TALL ORANGE CONSTRUCTION FENCE REQUIRED IF DROP OFF GREATER
- THAN 6" ADJACENT TO SIDEWALK.
- 4. ALL MATERIAL AND TESTING REQUIREMENTS ARE WAIVED.
- 5. INSTALLATION, MAINTENANCE, FENCE, AND REMOVAL ARE SUBSIDIARY TO
- 6. EXCAVATION AND EMBANKMENT TO PROVIDE ADA COMPLIANCE WILL BE PAID
- USING PERTINENT BID ITEMS.
  7. LOCATION AS DIRECTED BY ENGINEER.

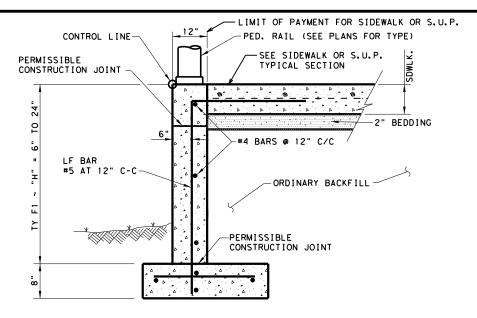


RIPRAP MEDIAN DETAIL

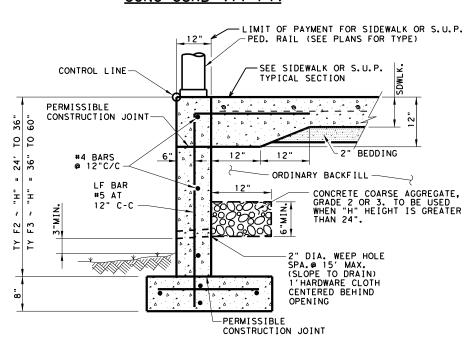


### CONC CURB (TY C1) & (TY C2)





### CONC CURB (TY F1)



# CONC CURB (TY F2) & (TY F3)

#### SIDEWALK, SHARED USE PATH, AND MEDIAN NOTES

Reinforcement will be in accordance with Item 432.3.1. Fiber reinforcement is not allowed. Class A and B Concrete are allowed to use Coarse Aggregate Grades 1-8.

Bedding may be sand, base, or RAP bedding. Furnish base meeting the requirement for any type or grade in accordance with Item 247. Base compressive strengths are waived. RAP must be 100% passing a 1 in, sieve. Bedding must be placed using ordinary compaction.

If roots are encountered verify with the Engineer prior to accommodating or removing 2 in. diameter or larger roots. Root removal must be in accordance with Item 752.4.2. Roots may remain in the bedding or base. For improvements within 6 in. of a root, the concrete thickness may be reduced by 1 in. and the bedding increased by 1 in. to minimize impacts to the roots. Adjust bedding and surface profile to provide a 1 in. bedding cushion around the roots. The surface profile may be adjusted to the extent allowed by ADA. This work is subsidiary.

CONCRETE CURB NOTES: All Concrete, including adjacent sidewalk or S.U.P., shall be Class "C" All Reinforcing Steel shall be Grade 60. Minimum 4' sidewalk width for CONC CURB (TYPES C1 & C2).

**‡**Until the sidewalk is complete, lateral support for the "F" curbs will be required.

ALL WORK SHOWN BEYOND TYPICAL SIDEWALK, S.U.P., AND PED RAIL IS SUBSIDIARY.

DESIGN SOIL PARAMETERS: Soil Unit Wt. = 120 pcf Phi = 30 Degrees Cohesion = 50 psf Min. PI = 15 Max. PI = 30

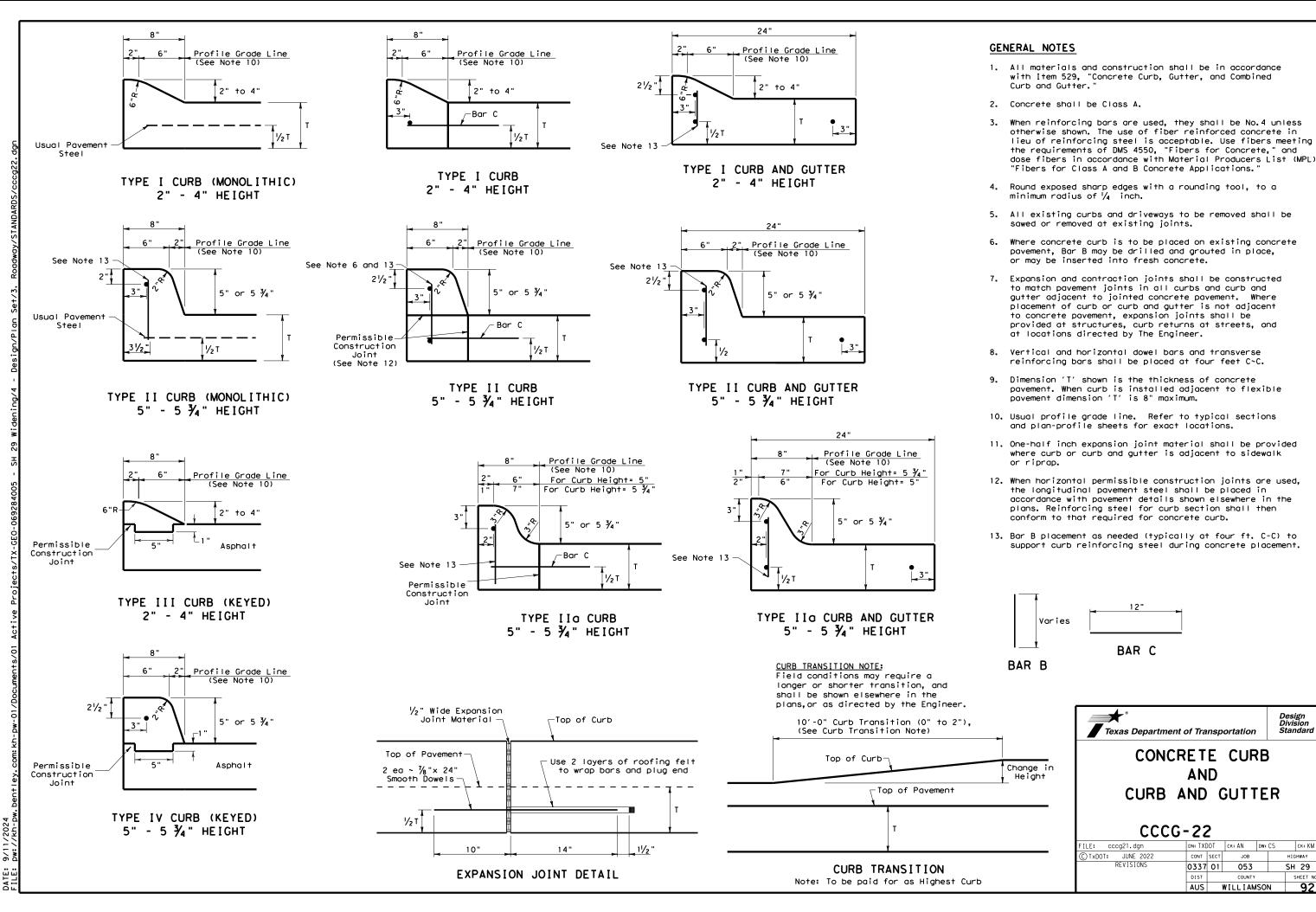
SURCHARGE: TYPE F CURB q = 2' Adjacent to sidewalk Max. slope behind TYPE C Curb = 4:1 Min. Factor of Safety against sliding is 1.5. Designed in accordance with current AASHTO Standards and Interim Specifications.

NOT TO SCALE Austin District Texas Department of Transportation Standard

> MISCELLANEOUS CURB, PATH, SIDEWALK, AND MEDIAN DETAILS

### MCPSWMD-23 (AUS)

| ©T×DOT 2017                  | CONT | SECT       | JOB    |  | HIGHWAY   |
|------------------------------|------|------------|--------|--|-----------|
| REVISIONS<br>04/19: APPROVED | 0337 | 01         | 053    |  | SH 29     |
| 02/23: ADDED TEMP S/W        | DIST |            | COUNTY |  | SHEET NO. |
|                              | AUS  | WILLIAMSON |        |  | 91        |



ск: КМ

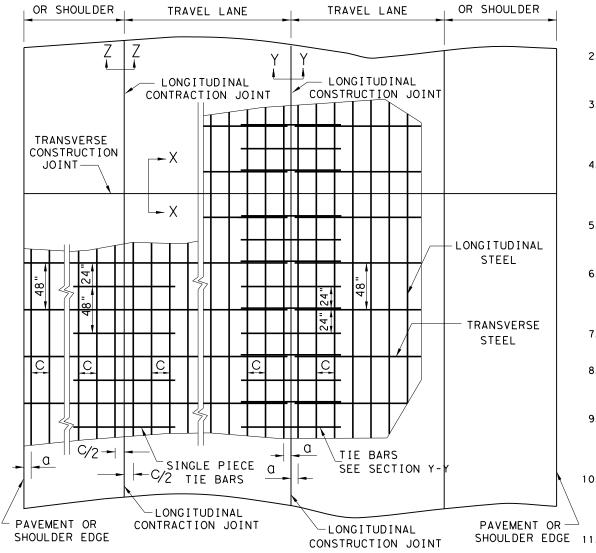
HIGHWAY

SH 29

|                                | TAE | BLE NO.1 LO                | NG I TUD I NA                           | L STEEL  |  |  |  |  |
|--------------------------------|-----|----------------------------|---|--|--|--|--|--|
| SLAB THICKNESS<br>AND BAR SIZE |     | LONGITUDINAL<br>STEEL BARS | FIRST<br>SPACING<br>AT EDGE<br>OR JOINT | LONG. STEEL<br>VERTICAL POSITION<br>FROM BOTTOM<br>OF PAVEMENT |  |  |  |  |
| T BAR (IN.) SIZE               |     | SPACING<br>C<br>(IN.)      | SPACING<br>a<br>(IN.)                   | T1<br>(IN.)  |  |  |  |  |
| 7.0                            | #5  | 6.5                        | 3 TO 4                                  | 3.5  |  |  |  |  |
| 7.5                            | #5  | 6.0                        | 3 TO 4                                  | 3.75   |  |  |  |  |
| 8.0                            | #6  | 9.0                        | 3 TO 4                                  | 4.0  |  |  |  |  |
| 8.5                            | #6  | 8.5                        | 3 TO 4                                  | 4.25   |  |  |  |  |
| 9.0                            | #6  | 8.0                        | 3 TO 4                                  | 4.5  |  |  |  |  |
| 9.5                            | #6  | 7.5                        | 3 TO 4                                  | 4.75   |  |  |  |  |
| 10.0                           | #6  | 7.0                        | 3 TO 4                                  | 5.0  |  |  |  |  |
| 10.5                           | #6  | 6.75                       | 3 TO 4                                  | 5.5  |  |  |  |  |
| 11.0                           | #6  | 6.5                        | 3 TO 4                                  | 6.0  |  |  |  |  |
| 11.5                           | #6  | 6.25                       | 3 TO 4                                  | 6.5  |  |  |  |  |
| 12.0                           | #6  | 6.0                        | 3 TO 4                                  | 7.0  |  |  |  |  |
| 12.5                           | #6  | 5.75                       | 3 TO 4                                  | 7.5  |  |  |  |  |
| 13.0 #6                        |     | 5.5                        | 3 TO 4                                  | 8.0  |  |  |  |  |

| TABLE                      | NO.         | 2 TRAN           | NSVERS      | E STEEL A  | ND TIE      | BARS             |  |
|----------------------------|-------------|------------------|-------------|--|-------------|------------------|--|
| SLAB<br>THICKNESS<br>(IN.) |             | NSVERSE<br>STEEL | AT LO       | E BARS<br>NGITUDINAL<br>CTION JOINT<br>TION Z-Z) |             |                  |  |
|                            | BAR<br>SIZE | SPACING<br>(IN.) | BAR<br>SIZE | SPACING (IN.)                                    | BAR<br>SIZE | SPACING<br>(IN.) |  |
| 7.0 - 7.5                  | #5 <b>°</b> | 48               | #5°         | 48   | #5 <b>°</b> | 24               |  |
| 8.0 - 13.0                 | #5°         | 48               | #6          | 48   | #6          | 24               |  |

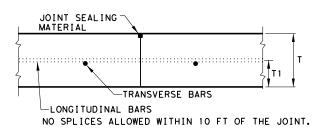
\*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE



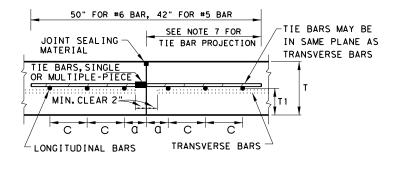
TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

#### GENERAL NOTES

- 1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
- 2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (COTE) OF NOT MORE THAN 5.5 X 10<sup>-6</sup> IN/IN/°F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
- 3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
- 4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1.
- ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
- 6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
- 7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
- 8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
- 9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
- 10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
- SHOULDER EDGE 11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

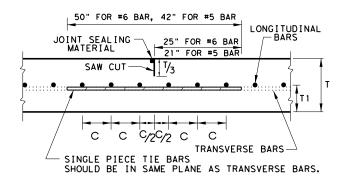


TRANSVERSE CONSTRUCTION JOINT SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT SECTION Y - Y

TRAVEL LANE



TRAVEL LANE

LONGITUDINAL CONTRACTION JOINT SECTION Z - Z

SHEET 1 OF 2

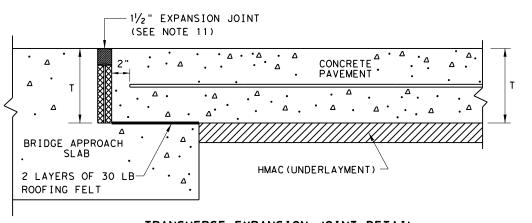


# CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

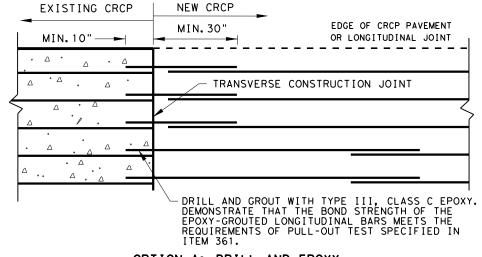
CRCP(1)-23

| E: crcp123.dgn   | DN: Tx[ | TOC    | ck: KM  | KM Dw: CES |           | CK:     |  |
|--|---------|--------|---------|------------|-----------|---------|--|
| TxDOT: APRIL 2023  | CONT    | SECT   | JOB     |            | HIO       | HIGHWAY |  |
| REVISIONS<br>. 2023:   | 0337    | 7 01   | 053     | 3          | SH 29     |         |  |
| SED LONG. STEEL VERTICAL LOCATION VED ADDITIONAL TIEBAR AT TRANSVERSE RUCTION JOINTS | DIST    | COUNTY |         |            | SHEET NO. |         |  |
| RUCTION JOINTS   | ALIS    | ١ ١    | WILLIAM | 1021       | u l       | 93      |  |

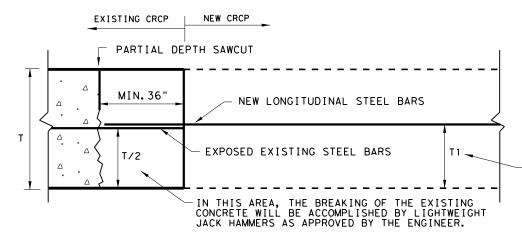


## TWO LAYERS OF 30 LB ROOFING FELT OR 1/2" ASPHALT BOARDS CONFORMING TO DMS-6310 MAY BE USED ON THE FREE SIDE OF JOINT. VARIES-CONCRETE PAVEMENT FREE LONGITUDINAL JOINT-(JOINT WITHOUT TIE BARS) LOCATION OF THE JOINT WILL BE SHOWN ELSEWHERE ON THE PLANS OR AS DIRECTED BY THE ENGINEER. TRANSVERSE EXPANSION JOINT DETAIL CENTERLINE FREE LONGITUDINAL JOINT DETAIL AT BRIDGE APPROACH

CAST-IN-PLACE CONCRETE TRAFFIC — BARRIER

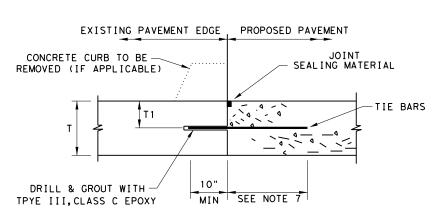


#### OPTION A: DRILL AND EPOXY PLAN VIEW ( NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL NEW CRCP TO EXISTING CRCP



BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.

TRANSITION STEEL BARS FROM T/2 TO T1 POSTITION WITHIN 60 FT. AS NEEDED.

2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

SEE CONCRETE BARRIER STANDARD

SHEETS FOR ANCHORAGE DETAILS.

ALL TIE BARS IN ANY CONTINUOUS PIECE OF CONCRETE TRAFFIC BARRIER SHALL BE ON THE SAME SIDE OF THE JOINT.

-1/2" MIN. ASPHALT BOARD CONFORMING TO DMS-6310.

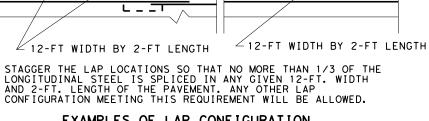


# CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1) - 23

| ILE: crcp123.dgn                                       | DN: TxDOT      |      | ck: KM     | DW: CES | CK:       |
|--|----------------|------|------------|---------|-----------|
| C)TxDOT: APRIL 2023                                    | CONT           | SECT | JOB        |         | HIGHWAY   |
| RIL 2023   | 0337           | 01   | 053        |         | SH 29     |
| DIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH<br>AB | DIST           |      | COUNTY SHE |         | SHEET NO. |
|  | AUS WILLIAMSON |      | SON        | 94      |           |



LONGITUDINAL

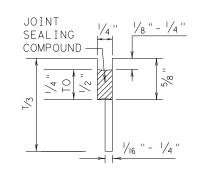
REINFORCING STEEL

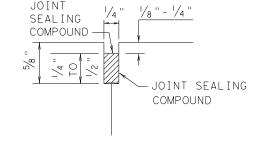
SPL I CES

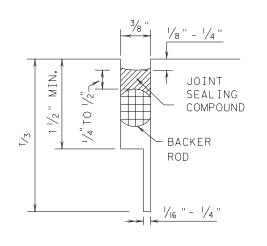
EDGE OF CRCP PAVEMENT OR LONGITUDINAL JOINT

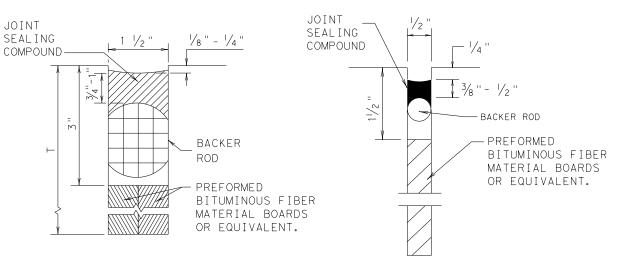
EXAMPLES OF LAP CONFIGURATION PLAN VIEW ( NOT TO SCALE)

## METHOD B: JOINT SEALING COMPOUND









LONGITUDINAL SAWED CONTRACTION JOINT

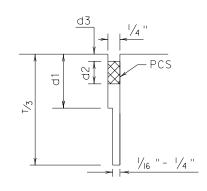
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT

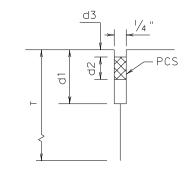
TRANSVERSE SAWED CONTRACTION JOINT

TRANSVERSE FORMED EXPANSION JOINT

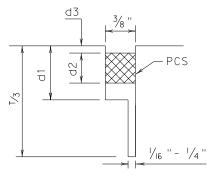
FORMED ISOLATION JOINT

# METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)





LONGITUDINAL SAWED LONGITUDINAL CONTRACTION JOINT CONSTRUCTION JOINT



PCS - - 1/4"

TRANSVERSE SAWED CONTRACTION JOINT

TRANSVERSE FORMED EXPANSION JOINT

BITUMINOUS FIBER MATERIAL BOARDS

EQUIVALENT

# 1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.

- 2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
- 3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.

GENERAL NOTES

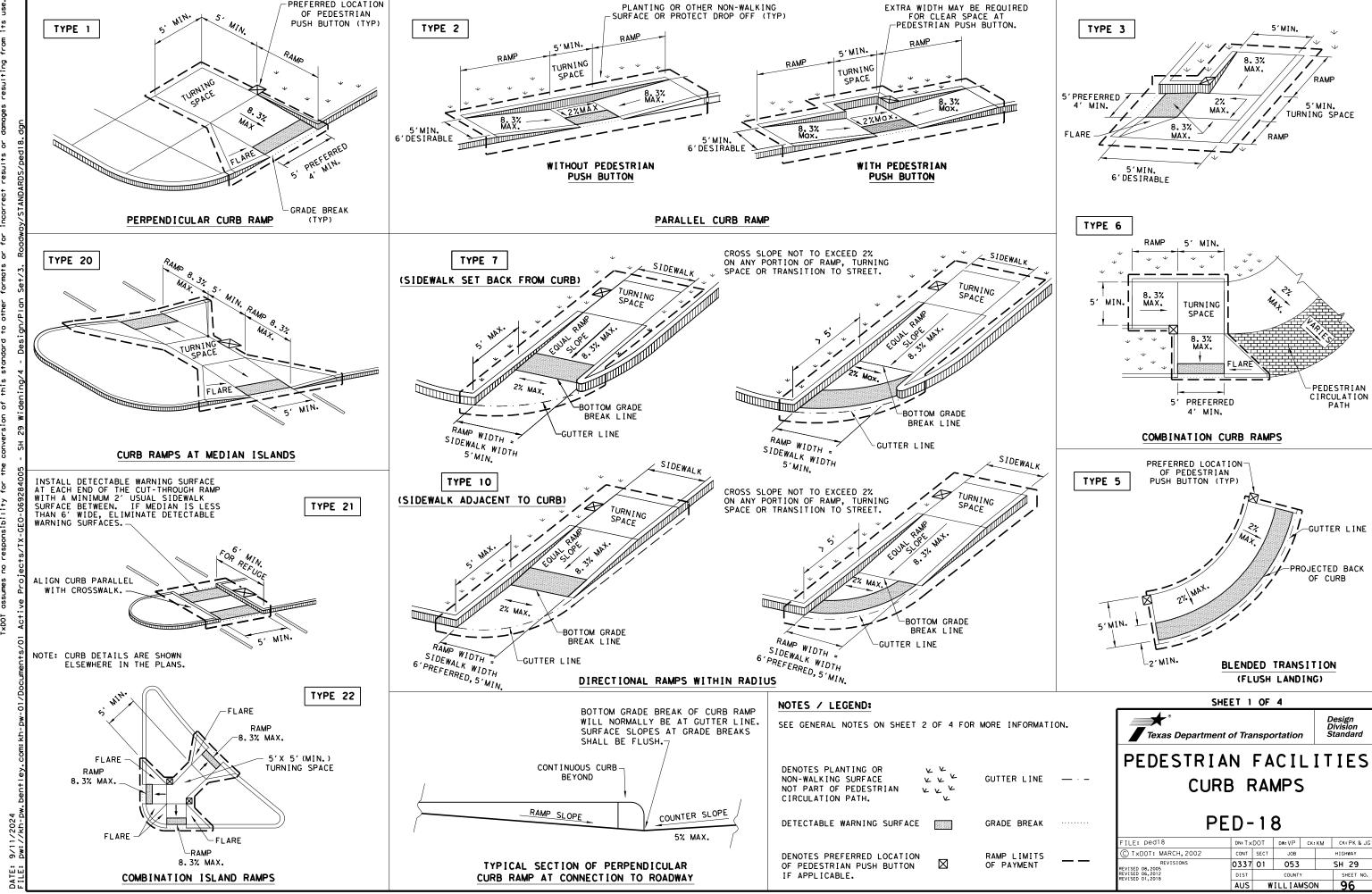
- 4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
- 5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
- 6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
- 7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
- 8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
- 9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.



JS-14

| LE: js14.dgn         | DN: Tx[ | TO   | DN: HC  | DW: | HC  | ck: AN    |  |
|----------------------|---------|------|---------|-----|-----|-----------|--|
| TxDOT: DECEMBER 2014 | CONT    | SECT | JOB     |     | HIC | HWAY      |  |
| REVISIONS            | 0337    | 01   | 053     |     | SH  | 29        |  |
|                      | DIST    |      | COUNTY  |     |     | SHEET NO. |  |
|                      | AUS     | ١    | WILLIAM | ISO | N   | 95        |  |

PREFERRED LOCATION



#### **GENERAL NOTES**

#### CURB RAMPS

- 1. Install a curb ramp or blended transition at each pedestrian street crossing.
- 2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
- 3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
- 4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing greas at intervals not to exceed 200' are required.
- 5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
- 6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
- 7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
- 8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
- To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
- 10. Small channelization islands, which do not provide a minimum 5' imes 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
- 11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
- 12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
- 13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531
- 14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
- 15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
- 16. Provide a smooth transition where the curb ramps connect to the street.
- 17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
- 18. Existing features that comply with applicabble standards may remain in place unless otherwise shown on the plans.

#### DETECTABLE WARNING MATERIAL

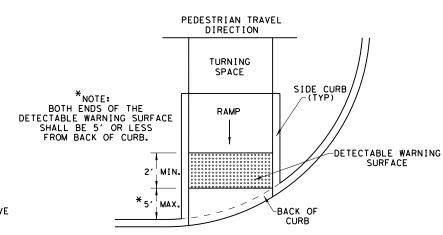
- 19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
- 20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
- 21. Detectable warning surfaces must be firm, stable and slip resistant.
- 22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
- 23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
- 24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

#### DETECTABLE WARNING PAVERS (IF USED)

- 25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
- 26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

#### SIDEWALKS

- 27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
- 28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
- 29. Street grades and cross slopes shall be as shown elsewhere in the plans.
- 30. Changes in level greater than 1/4 inch are not permitted.
- 31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
- 32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
- 33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
- 34. Sidewalk details are shown elsewhere in the plans.



DETECTABLE WARNING SURFACE DETAILS

PEDESTRIAN TRAVEL DIRECTION

TURNING

SPACE

PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING

SURFACE ON LANDING AT STREET EDGE.

PEDESTRIAN TRAVEL

DIRECTION

TURNING

SPACE

PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

RAMP

2' (Min.)

2' (MIN.

DETECTABLE WARNING

BACK OF

DETECTABLE WARNING

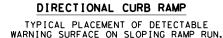
SURFACE

-SIDE FLARE

-BACK OF

CHRB

RAMP

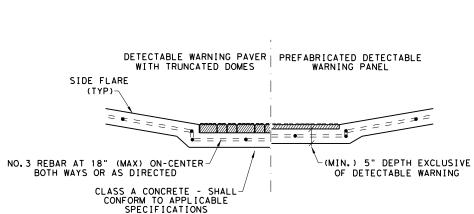




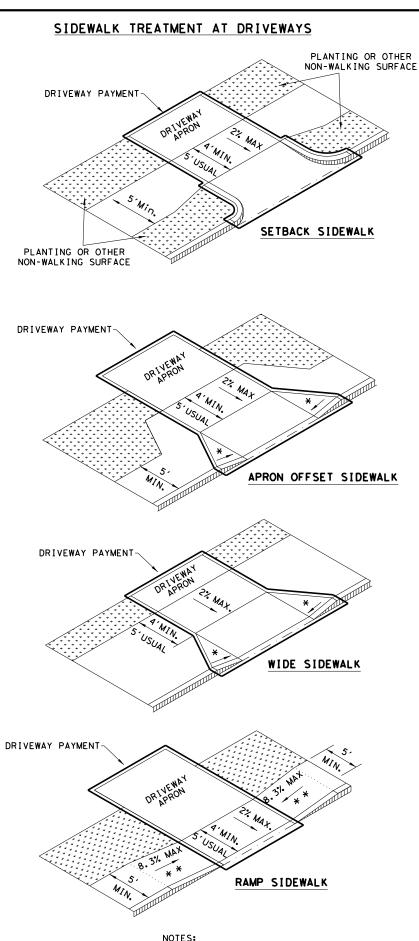


**PED-18** 

| ILE: ped18                       | DN: Tx | DOT  | DW: VP  | CK:        | KM | CK: PK & JG |  |
|----------------------------------|--------|------|---------|------------|----|-------------|--|
| TxDOT: MARCH, 2002               | CONT   | SECT | JOB     |            |    | HIGHWAY     |  |
| REVISIONS<br>VISED 08,2005       | 0337   | 01   | 053     | SH 29      |    |             |  |
| VISED 06, 2012<br>VISED 01, 2018 | DIST   |      | COUNTY  | Y          |    | SHEET NO.   |  |
|                                  | AUS    | ١    | WILLIAN | <b>USO</b> | N  | 97          |  |

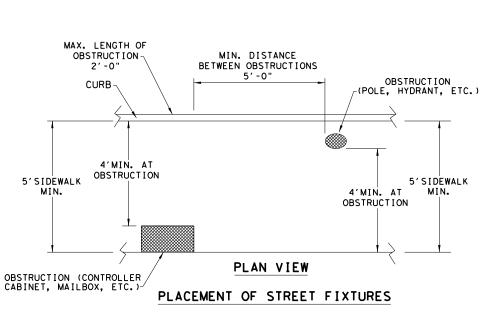


SECTION VIEW DETAIL CURB RAMP AT DETECTIBLE WARNINGS

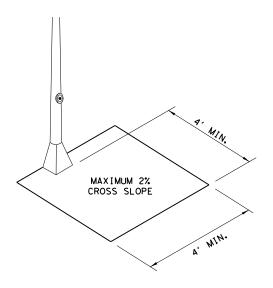


CAFEPROTECTED ZONE 4" MAX. POST PROJECTION 53" | PROTECTED ZONE 4" MAX. WALL PROJECTION 27" CANE DETECTABLE RANGE PROTECTED ZONE

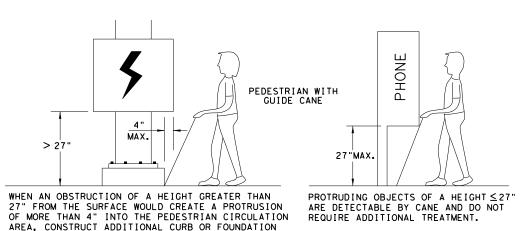
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



NOTE: ITEMS NOT INTENDED FOR PUBLIC USE.
MINIMUM 4' X 4' CLEAR GROUND SPACE
REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



DETECTION BARRIER FOR **VERTICAL CLEARANCE < 80"** 

AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.





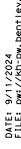
# PEDESTRIAN FACILITIES CURB RAMPS

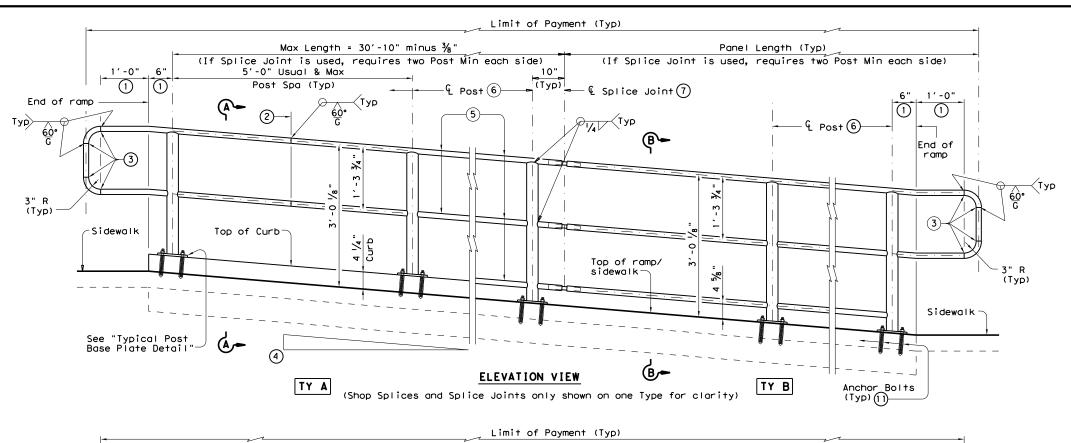
PED-18

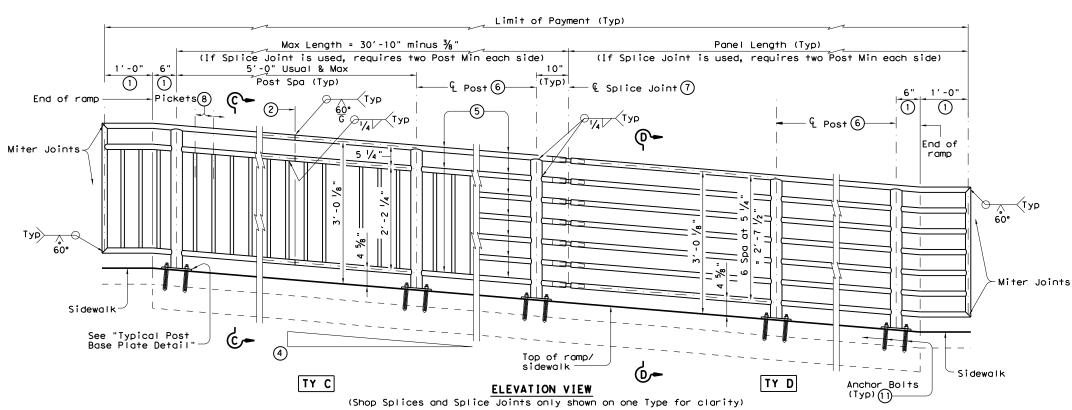
| FILE: ped18                        | DN: T × | :DOT | DW: VP  | CK: K | CK: PK & JG |
|------------------------------------|---------|------|---------|-------|-------------|
| © TxDOT: MARCH, 2002               | CONT    | SECT | JOB     |       | HIGHWAY     |
| REVISIONS<br>REVISED 08,2005       | 0337    | 01   | 053     |       | SH 29       |
| REVISED 06,2012<br>REVISED 01,2018 | DIST    |      | COUNT   | Y     | SHEET NO.   |
|                                    | AUS     | V    | VILLIAN | MSON  | 98          |

\* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

\* IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

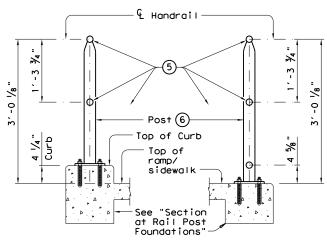






- (1) Parallel to ground.
- ② One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- 3 Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- 4 See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
- $\bigcirc$  1  $1/\!\!/_2$  " Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1  $1/\!\!/_2$  " Dia. pipe for galvanizing drainage and venting.
- (6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
- (7) See "Handrail Fabrication Details" for Splice Joints.
- (8) € %" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
- When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
- (0) Not to be used on bridges.
- (1) See "General Notes" for anchor bolt information.

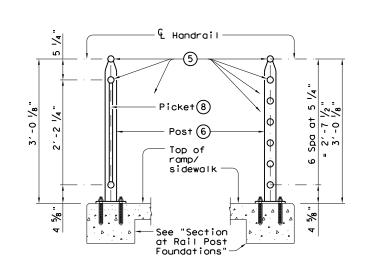
| RECOMMENDED USAGE 90                       |                           |  |  |  |  |  |
|--|---------------------------|--|--|--|--|--|
| Dropoff<br>Height/<br>Condition            | Recommended Rail Options  |  |  |  |  |  |
| <30"<br>dropoff                            | TY A, TY B, TY C, or TY D |  |  |  |  |  |
| ≥ 30"<br>dropoff,<br>or along<br>Bike Path | TY E or TY F              |  |  |  |  |  |



#### SECTION A-A

(Showing Handrail TY A)

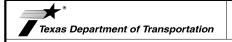
SECTION B-B
(Showing Handrail TY B)



# SECTION C-C (Showing Handrail TY C)

SECTION D-D (Showing Handrail TY D)

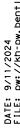
SHEET 1 OF 3

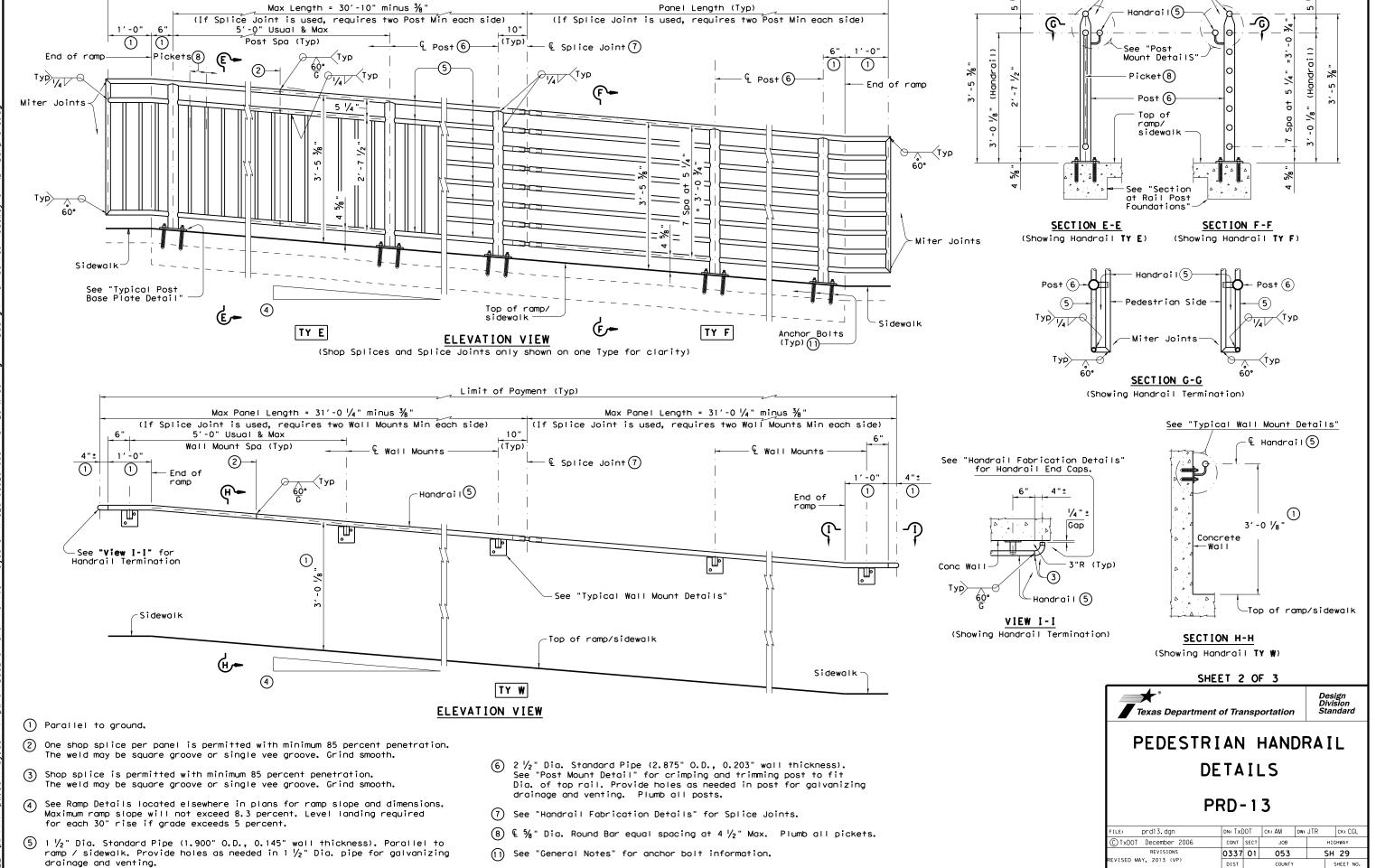


# PEDESTRIAN HANDRAIL DETAILS

PRD-13

| 1                      |         |            |        |     |           |         |  |
|------------------------|---------|------------|--------|-----|-----------|---------|--|
| FILE: prd13.dgn        | DN: Tx[ | TOC        | CK: AM | DW: | JTR       | ck: CGL |  |
| ℂTxDOT Decmeber 2006   | CONT    | SECT       | JOB    |     | ніс       | HWAY    |  |
| REVISIONS              | 0337    | 01         | 053    |     | SH        | SH 29   |  |
| REVISED MAY, 2013 (VP) | DIST    |            | COUNTY |     | SHEET NO. |         |  |
|                        | AUS     | WILLIAMSON |        |     | 99        |         |  |





AUS WILLIAMSON

100

Limit of Payment (Typ)

**ELEVATION** 

POST MOUNT DETAILS

## Continuous -Max -Landina Landing Ramp Ramp Post Spacing 5'-0" Max Post Spacing 5'-0" Max MULTI-LEVEL RAMP SINGLE-LEVEL RAMP

# PLAN SHOWING RAIL AT RAMP CONDITIONS

Post Spa

(Typ)

4 1/4"

5'-0" Max (Typ)

## GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated  $\sim$  #4 = 1'-5" Epoxy coated  $\sim$  #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be  $\frac{5}{8}$  " Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt.  $\frac{5}{8}$  " Dia. threaded rod embedment depth for wall mounts is 3  $\frac{1}{2}$  " and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be  $\frac{5}{8}$ " Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

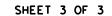
For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately  $\frac{1}{8}$ " by grinding.





# PEDESTRIAN HANDRAIL DETAILS

PRD-13

| FILE: prd13.dgn        | DN: Tx[ | TOC  | ck: AM  | DW:  | JTR | ck: CGL   |
|------------------------|---------|------|---------|------|-----|-----------|
| © TxDOT December 2006  | CONT    | SECT | JOB     |      | HIO | SHWAY     |
| REVISIONS              | 0337    | 01   | 053     |      | SH  | 29        |
| REVISED MAY, 2013 (VP) | DIST    |      | COUNTY  |      |     | SHEET NO. |
|                        | AUS     | 1    | WILLIAN | ISON | ı   | 101       |

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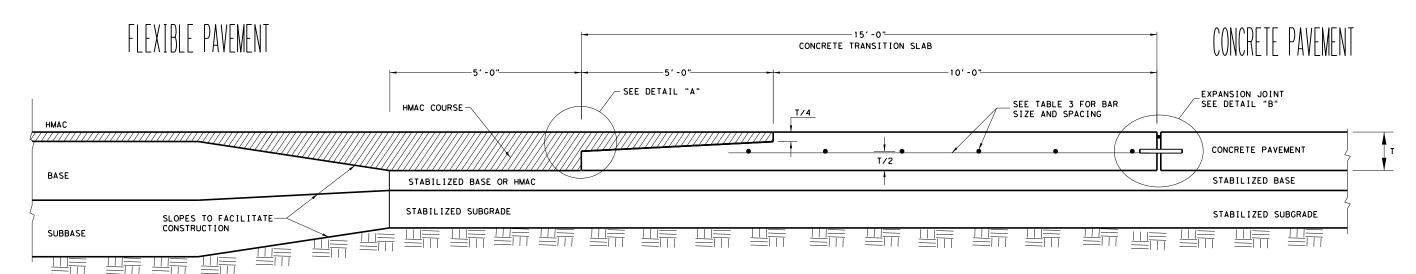
<sup>13</sup>/6"Dia. Max

Drain Hole

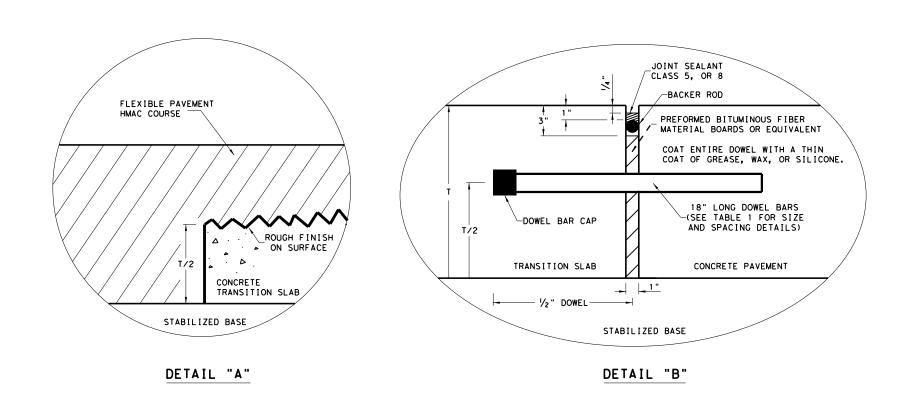
TYPICAL POST BASE PLATE DETAIL

½" Base Plate

(ASTM-A36)



# TYPICAL JUNCTION OF CONCRETE PAVEMENT WITH FLEXIBLE PAVEMENT (NOT TO SCALE)



# GENERAL NOTES

- 1. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT" AND "REINFORCING STEEL.
- 2. DETAILS FOR PAVEMENT WIDTH AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS.
- 3. MATCH THE LONGITUDINAL JOINTS OF THE CONCRETE TRANSITION SLAB WITH ADJOINING CONCRETE PAVEMENT. PROVIDE EQUIVALENT TIEBARS OR TRANSVERSE BARS AT THESE LONGITUDINAL JOINTS, SEE TABLE NO. 2.
- 4. REFER TO DMS-6310, "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
- 5. TRANSITION SLABS WILL BE PAID UNDER ITEM 360, "CONCRETE PAVEMENTS."

| TABLE NO.1 DOWELS (SMOOTH BARS) |                           |                  |  |  |  |
|---------------------------------|---------------------------|------------------|--|--|--|
| SLAB<br>THICKNESS<br>T<br>(IN.) | BAR DIA.<br>AND<br>LENGTH | SPACING<br>(IN.) |  |  |  |
| 7 TO 7.5                        | 1" X 18"                  | 12               |  |  |  |
| 8 TO 10                         | 1 ½" X 18"                | 12               |  |  |  |
| 10 TO 13                        | 1 ½" X 18"                | 12               |  |  |  |

| SLAB THICKNESS T (IN.)  7 TO 7.5  BAR SIZE SPACING (IN.)  24 | TABLE NO.2     | TIE BARS (D | EFORMED BARS) |
|--|----------------|-------------|---------------|
| 7 TO 7.5 #5 24   | THICKNESS<br>T | BAR SIZE    |               |
|  | 7 TO 7.5       | #5          | 24            |
| 8 TO 13 #6 24  | 8 TO 13        | #6          | 24            |

| TABLE NO.3 TRANSITION SLAB STEEL (DEFORMED BARS) |          |   |   |  |
|--|----------|---|---|--|
| SLAB<br>THICKNESS<br>T<br>(IN.)                  | BAR SIZE | SPACING<br>(IN.)<br>TRANSVERSE<br>DIRECTION | SPACING<br>(IN.)<br>LONGITUDINAL<br>DIRECTION |  |
| 7 TO 7.5   | #5       | 24  | 12  |  |
| 8 TO 13  | #6       | 24  | 12  |  |

ADJUST SPACING OF LONGITUDINAL BARS AS NEEDED TO ACCOMDATE DOWEL BAR SPACING.

|   | Texas Department of Transportation  Design Division Standard |
|---|--|
|   | CONCRETE PAVEMENT DETAILS                                    |
|   | TRANSITION SLAB  |
|   | T-7 to 13 INCHES   |
| 1 |  |

| 1RAN5-20 |         |      |           |     |    |  |
|----------|---------|------|-----------|-----|----|--|
| dgn      | DN: Tx[ | TOC  | DN: TxDOT | DW: | AN |  |
| 2020     | CONT    | SECT | JOB       |     |    |  |
|          | 0337    | 01   | 053       |     |    |  |

FILE: transitslab20. CTxDOT: NOVEMBER

HIGHWAY SH 29 AUS WILLIAMSON

Design Division Standard

ск: КМ

# CUTTING AND RESTORING PAVEMENT DETAIL

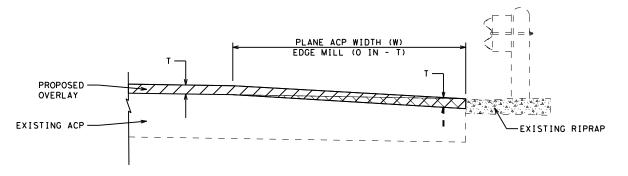
# **CUT AND RESTORE NOTES**

Y = DEPTH OF EXISTING ACP (IN)

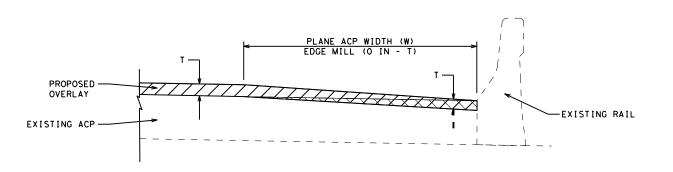
C = MIN 2 IN AND MAX 4 IN THICKNESS CUTTING AND RESTORING PAVEMENT PER ITEM 400
HMA MAY BE BLADE LAID
ALL ACP PER ITEM 3076
THE FOLLOWING WORK IS SUBSIDIARY:

-CEMENT STABILIZED BACKFILL

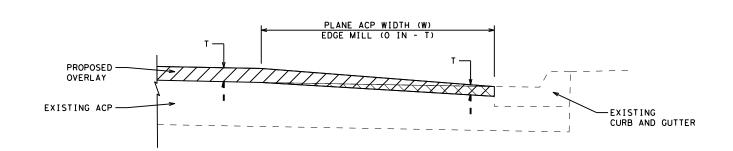
-SAWCUT EDGES
-TACK ALL ACP SURFACES IN CUT AND RESTORE



# MOWSTRIP OR RIPRAP EDGE MILL DETAIL



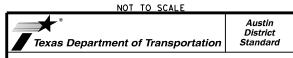
# RAIL EDGE MILL DETAIL



CURB EDGE MILL DETAIL

# **EDGE REPAIR NOTES**

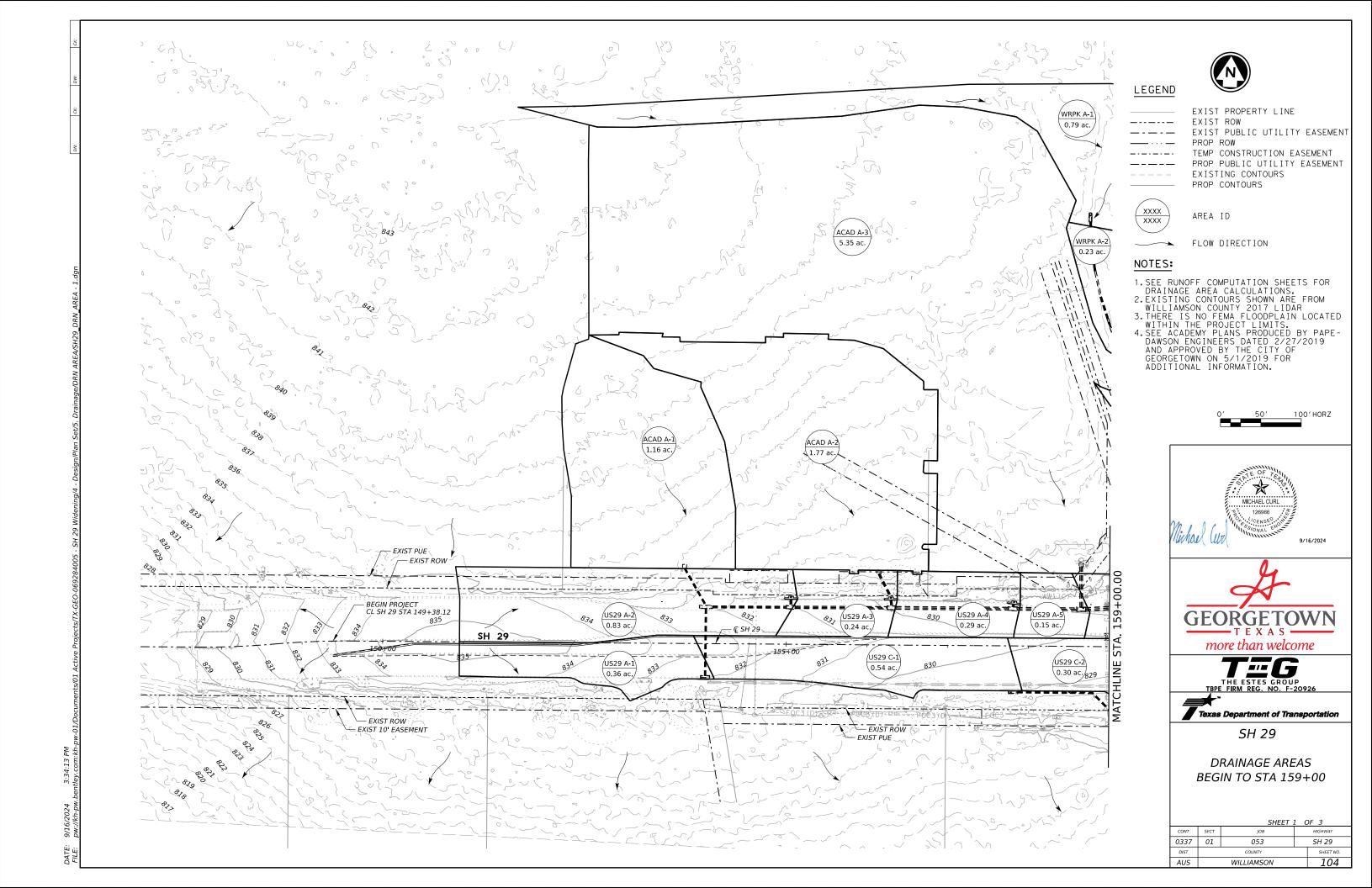
T = OVERLAY/INLAY THICKNESS (IN)
W = FULL LANE WIDTH OR MINIMUM 10 FT

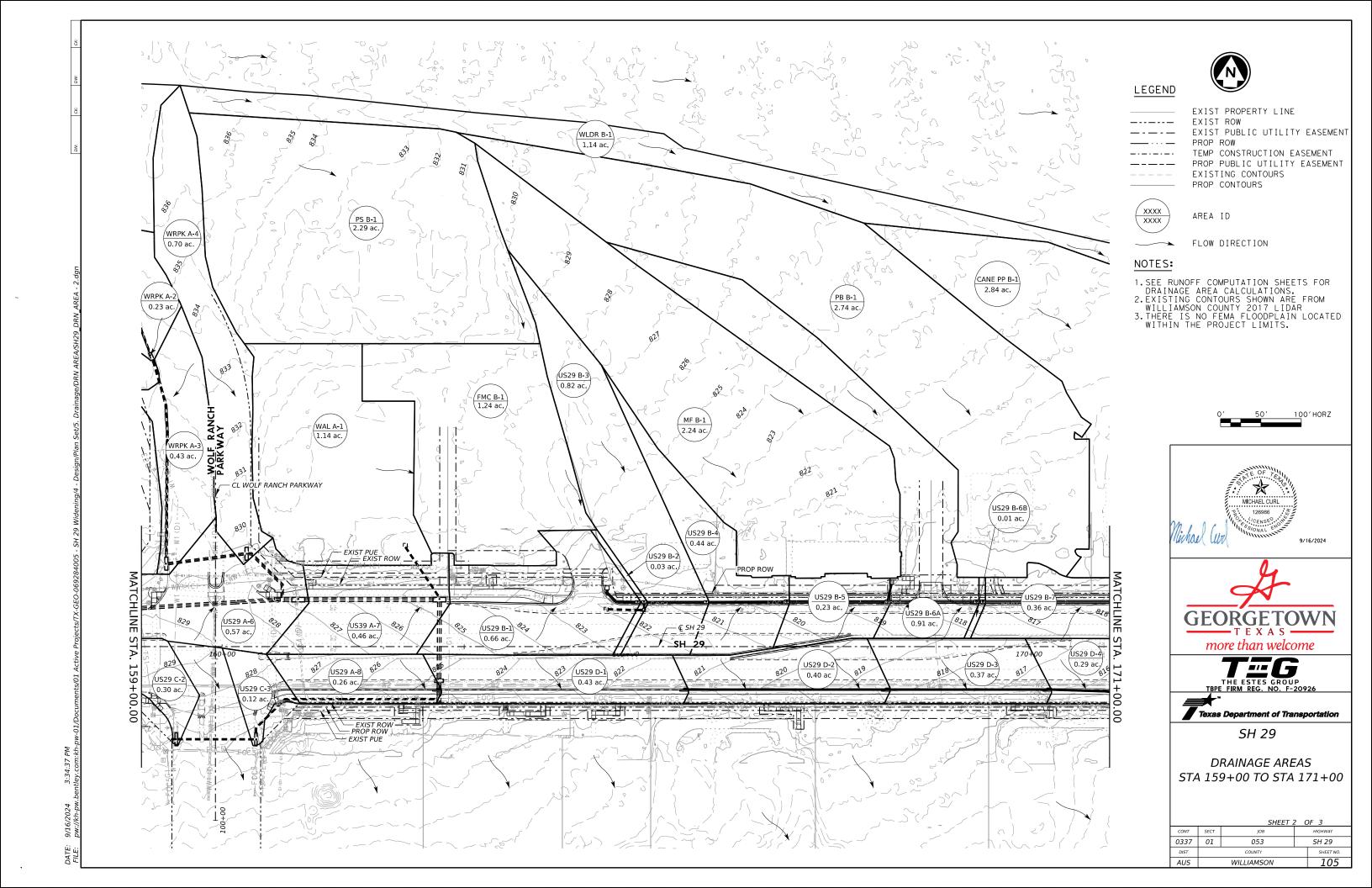


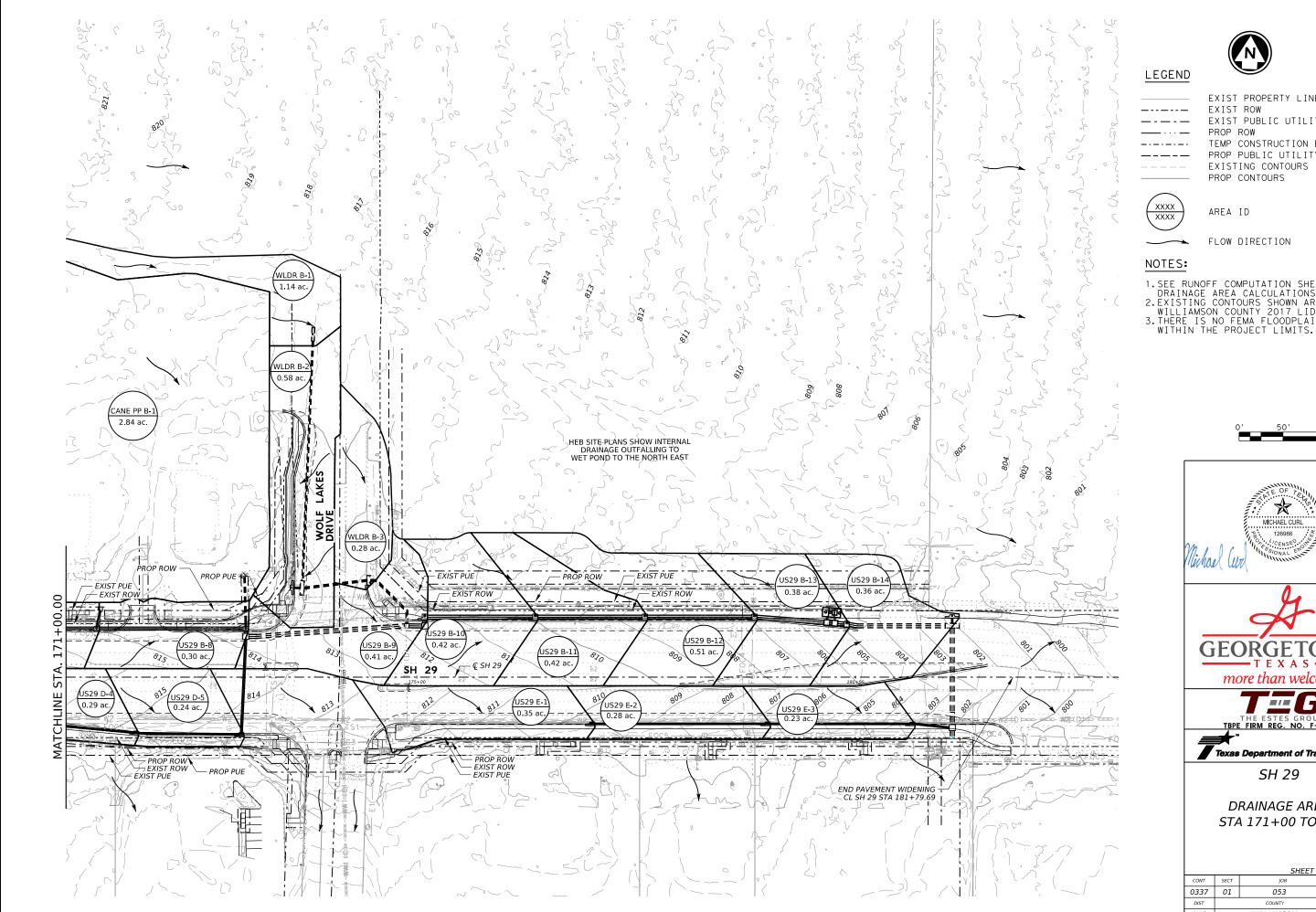
# FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(2)-22 (AUS)

| ©T×DOT 2017 | CONT | SECT          | JOB    | HIGHWAY   |
|-------------|------|---------------|--------|-----------|
|             | 0337 | 01            | 053    | SH 29     |
|             | DIST |               | COUNTY | SHEET NO. |
|             | AUS  | WILLIAMSON 1( |        | 103       |









# LEGEND

EXIST PROPERTY LINE

EXIST ROW

EXIST PUBLIC UTILITY EASEMENT

PROP ROW TEMP CONSTRUCTION EASEMENT

PROP PUBLIC UTILITY EASEMENT EXISTING CONTOURS PROP CONTOURS



AREA ID

FLOW DIRECTION

# NOTES:

- 1. SEE RUNOFF COMPUTATION SHEETS FOR DRAINAGE AREA CALCULATIONS.
  2. EXISTING CONTOURS SHOWN ARE FROM WILLIAMSON COUNTY 2017 LIDAR
  3. THERE IS NO FEMA FLOODPLAIN LOCATED











SH 29

DRAINAGE AREAS STA 171+00 TO END

|      |      | OF 3       |  |           |
|------|------|------------|--|-----------|
| CONT | SECT | JOB        |  | HIGHWAY   |
| 0337 | 01   | 053        |  | SH 29     |
| DIST |      | COUNTY     |  | SHEET NO. |
| AUS  |      | WILLIAMSON |  | 106       |

| KATI                 | DIVAL MILITUD 10 | TLAN FNOPUSED L | DRAINAGE AREAS & RU   | Non com orane               |                                 |
|----------------------|------------------|-----------------|-----------------------|-----------------------------|---------------------------------|
| AREA ID              | AREA<br>(acres)  | C-VALUE         | CONCENTRATION<br>USED | Intensity (10-yr)<br>(in/h) | DISCHARGE Q<br>(10-yr)<br>(cfs) |
| System A             |                  | 1               | '                     | '                           |                                 |
| US29 A-1             | 0.36             | 0.93            | 10                    | 7.254                       | 2.46                            |
| US29 A-2             | 0.83             | 0.66            | 10                    | 7.254                       | 4.02                            |
| US29 A-3             | 0.24             | 0.67            | 10                    | 7.254                       | 1.19                            |
| US29 A-4             | 0.29             | 0.65            | 10                    | 7.254                       | 1.37                            |
| US29 A-5             | 0.15             | 0.61            | 10                    | 7.254                       | 0.66                            |
| US29 A-6             | 0.57             | 0.78            | 10                    | 7.254                       | 3.23                            |
| US29 A-7             | 0.46             | 0.70            | 10                    | 7.254                       | 2.35                            |
| US29 A-8             | 0.26             | 0.81            | 10                    | 7.254                       | 1.57                            |
| ACAD A-1             | 1.16             | 0.70            | 10                    | 7.254                       | 5.92                            |
| ACAD A-2             | 1.77             | 0.70            | 10                    | 7.254                       | 9.08                            |
| ACAD A-3             | 5.35             | 0.70            | 10                    | 7.254                       | 27.38                           |
| WRPK A-1             | 0.79             | 0.49            | 10                    | 7.254                       | 2.81                            |
| WRPK A-2             | 0.23             | 0.72            | 10                    | 7.254                       | 1.23                            |
| WRPK A-3             | 0.43             | 0.86            | 10                    | 7.254                       | 2.71                            |
| WRPK A-4             | 0.70             | 0.81            | 10                    | 7.254                       | 4.13                            |
| WAL A-1              | 1.14             | 0.85            | 10                    | 7.254                       | 7.05                            |
| System B             |                  |                 |                       |                             |                                 |
| US29 B-1             | 0.66             | 0.77            | 10                    | 7.254                       | 3.69                            |
| US29 B-2             | 0.03             | 0.78            | 10                    | 7.254                       | 0.18                            |
| US29 B-3             | 0.82             | 0.43            | 10                    | 7.254                       | 2.56                            |
| US29 B-4             | 0.44             | 0.55            | 10                    | 7.254                       | 1.75                            |
| US29 B-5             | 0.23             | 0.70            | 10                    | 7.254                       | 1.19                            |
| US29 B-6A            | 0.91             | 0.49            | 10                    | 7.254                       | 3.27                            |
| US29 B-6B            | 0.01             | 0.37            | 10                    | 7.254                       | 0.04                            |
| US29 B-7             | 0.35             | 0.69            | 10                    | 7.254                       | 1.75                            |
| US29 B-8             | 0.30             | 0.76            | 10                    | 7.254                       | 1.67                            |
| US29 B-9             | 0.41             | 0.74            | 10                    | 7.254                       | 2.24                            |
| US29 B-10            | 0.42             | 0.61            | 10                    | 7.254                       | 1.89                            |
| US29 B-11            | 0.42             | 0.61            | 10                    | 7.254                       | 1.89                            |
| US29 B-12            | 0.51             | 0.54            | 10                    | 7.254                       | 2.01                            |
| US29 B-13            | 0.38             | 0.59            | 10                    | 7.254                       | 1.64                            |
| US29 B-14            | 0.36             | 0.69            | 10                    | 7.254                       | 1.83                            |
| FMC B-1              | 1.24             | 0.74            | 10                    | 7.254                       | 6.72                            |
| PS B-1               | 2.29             | 0.50            | 10                    | 7.254                       | 8.37                            |
| MF B-1               | 2.24             | 0.34            | 10                    | 7.254                       | 5.58                            |
| PB B-1               | 2.74             | 0.37            | 10                    | 7.254                       | 7.44                            |
| CANE PP B-1          | 2.84             | 0.56            | 10                    | 7.254                       | 11.71                           |
| WLDR B-1             | 1.14             | 0.34            | 10                    | 7.254                       | 2.83                            |
| WLDR B-2             | 0.58             | 0.70            | 10                    | 7.254                       | 2.94                            |
| WLDR B-3             | 0.28             | 0.60            | 10                    | 7.254                       | 1.24                            |
| System C             |                  |                 |                       |                             |                                 |
| US29 C-1             | 0.54             | 0.93            | 10                    | 7.254                       | 3.68                            |
| US29 C-2             | 0.30             | 0.92            | 10                    | 7.254                       | 2.03                            |
| US29 C-3             | 0.12             | 0.83            | 10                    | 7.254                       | 0.74                            |
| System D             |                  |                 |                       |                             |                                 |
| US29 D-1             | 0.43             | 0.85            | 10                    | 7.254                       | 2.68                            |
| US29 D-2             | 0.40             | 0.86            | 10                    | 7.254                       | 2.5                             |
| US29 D-3             | 0.37             | 0.87            | 10                    | 7.254                       | 2.36                            |
| US29 D-4             | 0.29             | 0.88            | 10                    | 7.254                       | 1.86                            |
| US29 D-5             | 0.24             | 0.91            | 10                    | 7.254                       | 1.62                            |
| System E             |                  |                 |                       |                             |                                 |
| ,                    | 2.25             |                 | 10                    | 7.254                       | 2.15                            |
| US29 E-1             | 0.35             | 0.84            | 10                    | 7.254                       | 2.15                            |
| US29 E-1<br>US29 E-2 | 0.35             | 0.84            | 10                    | 7.254<br>7.254              | 2.15<br>1.75                    |

| NATION.               | AL METHOD 100   | TEAR PROPUSED I | DRAINAGE AREAS &                 | RUNOFF COMPUTA               |                                  |
|-----------------------|-----------------|-----------------|----------------------------------|------------------------------|----------------------------------|
| AREA ID               | AREA<br>(acres) | C-VALUE         | TIME OF<br>CONCENTRATION<br>USED | Intensity (100-yr)<br>(in/h) | DISCHARGE Q<br>(100-yr)<br>(cfs) |
| System A              |                 |                 |                                  |                              |                                  |
| US29 A-1              | 0.36            | 0.93            | 10                               | 11.23                        | 3.8                              |
| US29 A-2              | 0.83            | 0.66            | 10                               | 11.23                        | 6.22                             |
| US29 A-3              | 0.24            | 0.67            | 10                               | 11.23                        | 1.84                             |
| US29 A-4              | 0.29            | 0.65            | 10                               | 11.23                        | 2.12                             |
| US29 A-5              | 0.15            | 0.61            | 10                               | 11.23                        | 1.02                             |
| US29 A-6              | 0.57            | 0.78            | 10                               | 11.23                        | 5                                |
| US29 A-7              | 0.46            | 0.70            | 10                               | 11.23                        | 3.64                             |
| US29 A-8              | 0.26            | 0.81            | 10                               | 11.23                        | 2.43                             |
| ACAD A-1              | 1.16            | 0.70            | 10                               | 11.23                        | 9.17                             |
| ACAD A-2              | 1.77            | 0.70            | 10                               | 11.23                        | 14.05                            |
| ACAD A-3              | 5.35            | 0.70            | 10                               | 11.23                        | 42.39                            |
| WRPK A-1              | 0.79            | 0.49            | 10                               | 11.23                        | 4.35                             |
| WRPK A-2              | 0.23            | 0.72            | 10                               | 11.23                        | 1.9                              |
| WRPK A-3              | 0.43            | 0.86            | 10                               | 11.23                        | 4.19                             |
| WRPK A-4              | 0.70            | 0.81            | 10                               | 11.23                        | 6.39                             |
| WAL A-1               | 1.14            | 0.85            | 10                               | 11.23                        | 10.92                            |
| System B              | 1.1 /           | 0.05            | 10                               | 11.23                        | 10.52                            |
| US29 B-1              | 0.66            | 0.77            | 10                               | 11.23                        | 5.72                             |
| US29 B-2              | 0.03            | 0.78            | 10                               | 11.23                        | 0.27                             |
| US29 B-3              | 0.82            | 0.43            | 10                               | 11.23                        | 3.96                             |
| US29 B-4              | 0.82            | 0.55            | 10                               | 11.23                        | 2.71                             |
| US29 B-4              | 0.44            | 0.70            | 10                               | 11.23                        | 1.85                             |
| US29 B-6A             | 0.23            | 0.49            | 10                               | 11.23                        |                                  |
|                       |                 | 0.49            | 10                               |                              | 5.06                             |
| US29 B-6B<br>US29 B-7 | 0.01            | 0.57            | 10                               | 11.23                        | 0.06                             |
|                       | 0.35<br>0.30    | 0.89            | 10                               | 11.23<br>11.23               | 2.71<br>2.58                     |
| US29 B-8<br>US29 B-9  | 0.30            |                 | 10                               | 11.23                        |                                  |
|                       | 0.41            | 0.74            |                                  |                              | 3.47                             |
| US29 B-10             |                 | 0.61            | 10                               | 11.23<br>11.23               | 2.93                             |
| US29 B-11             | 0.42            | 0.61            | 10                               |                              | 2.92                             |
| US29 B-12             | 0.51            | 0.54            | 10                               | 11.23                        | 3.11                             |
| US29 B-13             | 0.38            | 0.59            | 10                               | 11.23                        | 2.54                             |
| US29 B-14             | 0.36            | 0.69            | 10                               | 11.23                        | 2.84                             |
| FMC B-1               | 1.24            | 0.74            | 10                               | 11.23                        | 10.41                            |
| PS B-1                | 2.29            | 0.50            | 10                               | 11.23                        | 12.96                            |
| MF B-1                | 2.24            | 0.34            | 10                               | 11.23                        | 8.64                             |
| PB B-1                | 2.74            | 0.37            | 10                               | 11.23                        | 11.52                            |
| CANE PP B-1           | 2.84            | 0.56            | 10                               | 11.23                        | 18.12                            |
| WLDR B-1              | 1.14            | 0.34            | 10                               | 11.23                        | 4.38                             |
| WLDR B-2              | 0.58            | 0.70            | 10                               | 11.23                        | 4.54                             |
| WLDR B-3              | 0.28            | 0.60            | 10                               | 11.23                        | 1.92                             |
| System C              |                 |                 |                                  |                              |                                  |
| US29 C-1              | 0.54            | 0.93            | 10                               | 11.23                        | 5.7                              |
| US29 C-2              | 0.30            | 0.92            | 10                               | 11.23                        | 3.14                             |
| US29 C-3              | 0.12            | 0.83            | 10                               | 11.23                        | 1.14                             |
| System D              |                 |                 |                                  |                              |                                  |
| US29 D-1              | 0.43            | 0.85            | 10                               | 11.23                        | 4.14                             |
| US29 D-2              | 0.40            | 0.86            | 10                               | 11.23                        | 3.87                             |
| US29 D-3              | 0.37            | 0.87            | 10                               | 11.23                        | 3.66                             |
| US29 D-4              | 0.29            | 0.88            | 10                               | 11.23                        | 2.87                             |
| US29 D-5              | 0.24            | 0.91            | 10                               | 11.23                        | 2.51                             |
| System E              |                 |                 |                                  |                              |                                  |
| US29 E-1              | 0.35            | 0.84            | 10                               | 11.23                        | 3.33                             |
| US29 E-2              | 0.28            | 0.85            | 10                               | 11.23                        | 2.71                             |
| US29 E-3              | 0.23            | 0.85            | 10                               | 11.23                        | 2.25                             |

# NOTES:

- 1. PEAK FLOWS WERE CALCULATED USING THE RATIONAL METHOD.
  2. STORM FREQUENCY BASED ON THE INTERPOLATED NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES.





Texas Department of Transportation

SH 29

HYDROLOGIC DATA

|      |      | OF 1       |  |           |
|------|------|------------|--|-----------|
| CONT | SECT | JOB        |  | HIGHWAY   |
| 0337 | 01   | 053        |  | SH 29     |
| DIST |      | COUNTY     |  | SHEET NO. |
| AUS  |      | WILLIAMSON |  | 107       |

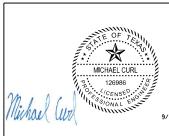
| :MQ |
|-----|
| CK: |
| DN: |
|     |

| DN:   | CI-4<br>CI-4                            |
|---|---|
| ctive Projects/TX-GEO-069284005 - SH 29 Widening/4 - Design/Plan Set/5. Drainage/DRN Calc/SH29 DRN-INLETS01.dgn | C1-3 C1-3 C1-3 C1-3 C1-3 C1-3 C1-3 C1-3 |

|   |                          |                          |                         |                                      |  | 10 - YEAR ON GRAD  | F AND SAG COI | NFIGURATION DATA  |                                   |   |   |  |  |                                |
|---|--------------------------|--------------------------|-------------------------|--------------------------------------|--|--|---------------|---|-----------------------------------|---|---|--|--|--------------------------------|
| Node ID                                 | Baseline Feature         | Baseline Station<br>(ft) | Baseline Offset<br>(ft) | Inlet Type                           | Inlet Profile<br>Type<br>(Inlet<br>Location) | Total Inlet Discharge (Total Rational Flow to Inlet) (cfs) |               | Inlet Bypass Flow<br>(Bypassed<br>Rational Flow)<br>(cfs) | Bypass to Node<br>(Bypass Target) | Inlet Allowable<br>Ponded Width<br>(Maximum Spread)<br>(ft) | Inlet Computed<br>Ponded Width<br>(Spread / Top<br>Width)<br>(ft) | Inlet Allowable<br>Ponded Depth<br>(Max. Gutter<br>Depth - Design)<br>(in) | Inlet Computed<br>Ponded Depth<br>(Depth Gutter)<br>(in) | Curb Opening<br>Length<br>(ft) |
| System A CI 50 (TY IIR) (10') EX        | BL CL-SH29               | 154+00                   | 41.93                   | CI (TY IR) (10)                      | On Grade                                     | 2.46   | 2.3           | 0.15  | CI-55 (TY II) (10') EX            | 13.5  | 9.31  | 6  | 2.2  | 9.2                            |
| CI-20 (TY II) (10') EX                  | BL CL-SH29               | 158+65                   | -43.28                  | CI (TY II) (10) 42IN                 | On Grade                                     | 0.66   | 0.66          | 0.13  | CI-40 (TY II) (15') EX            | 13.5  | 5.81  | 6  | 1.4  | 9.2                            |
| CI-40 (TY II) (15 ) EX                  | BL CL-SH29               | 160+94                   | -55.24                  | CI (TY II) (15) 48IN                 | On Grade                                     | 3.41   | 3.39          | 0.02  | CI-45 (TY II) (15 ) EX            | 13.5  | 9.95  | 6  | 2.4  | 14.2                           |
| CI-45 (TY II) (15 ) EX                  | BL CL-SH29               | 162+69                   | -55.23                  | CI (TY II) (15) 48IN                 | On Grade                                     | 2.37   | 2.37          | 0.02  | PCO US29 B-1                      | 13.5  | 8.74  | 6  | 2.1  | 14.2                           |
| PCU US29 A-8                            | BL CL-SH29               | 162+69                   | 53.5                    | PCU 3ft LT/RT                        | On Grade                                     | 1.57   | 1.44          | 0.13  | PCU US29 D-1                      | 13.5  | 7.71  | 6  | 1.9  | 9                              |
| D-4 EX                                  | BL CL-SH29               | 155+05                   | -55.63                  | PCO 3ft Both                         | On Grade                                     | 4.02   | 3.5           | 0.52  | D-2 EX                            | 13.5  | 9.86  | 6  | 2.4  | 14                             |
| D-2 EX                                  | BL CL-SH29               | 156+29                   | -55.63                  | PCO 3ft Both                         | On Grade                                     | 1.71   | 1.71          | 0.52  | D-3 EX                            | 13.5  | 8.15  | 6  | 2.0  | 14                             |
| D-3 EX                                  | BL CL-SH29               | 157+82                   | -51.66                  | PCO 3ft Both                         | On Grade                                     | 1.37   | 1.37          | 0   | CI-20 (TY II) (10') EX            | 13.5  | 9.41  | 6  | 2.3  | 14                             |
| CI-30 (TY II) (10') EX                  | N/A                      | N/A                      | N/A                     | CI (TY II) (10) 18IN                 | On Grade                                     | 2.81   | 2.42          | 0.39  | CI-30A (TY II) (15 ) EX           | 13.5  | 9.11  | 6  | 2.2  | 9.2                            |
| CI-30A (TY II) (15') EX                 | N/A                      | N/A                      | N/A                     | CI (TY II) (10) 24IN                 | On Grade                                     | 1.61   | 1.59          | 0.02  | CI-25 (TY II) (15') EX            | 13.5  | 7.39  | 6  | 1.8  | 9.2                            |
| CI-25 (TY II) (15') EX                  | BL CL-WRP                | 103+18                   | -58.67                  | CI (TY II) (15) 30IN                 | On Grade                                     | 2.73   | 2.73          | 0   | CI-40 (TY II) (15') EX            | 13.5  | 9   | 6  | 2.2  | 14.2                           |
| CI-35 (TY II) (15) EX                   | BL CL-WRP                | 103+31                   | 36.34                   | CI (TY II) (15) 30IN                 | On Grade                                     | 4.13   | 3.95          | 0.18  | CI-40 (TY II) (15') EX            | 13.5  | 10.52   | 6  | 2.5  | 14.2                           |
| System B                                |                          | '                        | '                       | · · · · · · · · · · · ·              |  |  |               |   |                                   |   |   |  |  | '                              |
| PCO US29 B-1                            | BL CL-SH29               | 165+15                   | -53                     | PCO 3ft LT/RT                        | On Grade                                     | 3.69   | 2.86          | 0.84  | PCO US29 B-2                      | 13.5  | 10.81   | 6  | 2.6  | 9.5                            |
| PCO US29 B-2                            | BL CL-SH29               | 165+23                   | -53                     | PCO 3ft None                         | On Grade                                     | 1.01   | 0.82          | 0.19  | PCO US29 B-3                      | 13.5  | 6.58  | 6  | 1.6  | 5                              |
| PCO US29 B-3                            | BL CL-SH29               | 166+00                   | -53                     | PCO_3ft_LT/RT                        | On Grade                                     | 2.75   | 2.54          | 0.21  | PCO US29 B-4                      | 13.5  | 10.82   | 6  | 2.6  | 9.5                            |
| PCO US29 B-4                            | BL CL-SH29               | 167+00                   | -53                     | PCO_4ft_LT/RT                        | On Grade                                     | 1.96   | 1.79          | 0.17  | PCO US29 B-5                      | 13.5  | 8   | 6  | 1.9  | 9.5                            |
| PCO US29 B-5                            | BL CL-SH29               | 168+25                   | -53                     | PCO_4ft_LT/RT                        | On Grade                                     | 1.36   | 1.36          | 0   | PCO US29 B-6A                     | 13.5  | 7.45  | 6  | 1.8  | 9.5                            |
| PCO US29 B-6A                           | BL CL-SH29               | 169+35                   | -53                     | PCO_4ft_LT/RT                        | On Grade                                     | 3.27   | 2.6           | 0.67  | PCO US29 B-6B                     | 13.5  | 10.11   | 6  | 2.4  | 9.5                            |
| PCO US29 B-6B                           | BL CL-SH29               | 169+43                   | -53                     | PCO_4ft_None                         | On Grade                                     | 0.71   | 0.71          | 0   | PCO US29 B-7                      | 13.5  | 10.9  | 6  | 2.6  | 5                              |
| PCO US29 B-7                            | BL CL-SH29               | 171+35                   | -53                     | PCO_4ft_LT/RT                        | On Grade                                     | 1.75   | 1.63          | 0.11  | PCO US29 B-8                      | 13.5  | 7.56  | 6  | 1.8  | 9.5                            |
| PCO US29 B-8                            | BL CL-SH29               | 173+05                   | -53                     | PCO_4ft_LT/RT                        | On Grade                                     | 1.78   | 1.55          | 0.23  | PCO US29 B-9                      | 13.5  | 6.83  | 6  | 1.6  | 9.5                            |
| PCO US29 B-9                            | BL CL-SH29               | 175+09                   | -65                     | PCO_6ft_LT/RT                        | On Grade                                     | 2.48   | 2.31          | 0.16  | PCO US29 B-10                     | 13.5  | 10.11   | 6  | 2.4  | 9.5                            |
| PCO US29 B-10                           | BL CL-SH29               | 176+35                   | -65                     | PCO_6ft_LT/RT                        | On Grade                                     | 2.05   | 2.03          | 0.02  | PCO US29 B-11                     | 13.5  | 9.91  | 6  | 2.4  | 9.5                            |
| PCO US29 B-11                           | BL CL-SH29               | 177+60                   | -65                     | PCO_6ft_LT/RT                        | On Grade                                     | 1.91   | 1.79          | 0.13  | PCO US29 B-12                     | 13.5  | 8.14  | 6  | 2.0  | 9.5                            |
| PCO US29 B-12                           | BL CL-SH29               | 178+85                   | -65                     | PCO_6ft_LT/RT                        | On Grade                                     | 2.13   | 1.86          | 0.28  | PCO US29 B-13                     | 13.5  | 7.96  | 6  | 1.9  | 9.5                            |
| PCO US29 B-13                           | BL CL-SH29               | 179+90                   | -56.84                  | PCO_6ft_LT/RT                        | On Grade                                     | 1.92   | 1.68          | 0.23  | PCO US29 B-14 EX                  | 13.5  | 7.37  | 6  | 1.8  | 9.5                            |
| PCO US29 B-14 EX                        | BL CL-SH29               | 181+10                   | -67.25                  | PCO_3ft_Both                         | On Grade                                     | 2.07   | 2.06          | 0   | <none></none>                     | 13.5  | 7.54  | 6  | 1.8  | 14                             |
| CI-110 (TY II) (15') EX                 | BL CL-WLD1               | 13+91                    | -29.07                  | CI (TY II) (15) 18IN                 | On Grade                                     | 2.83   | 2.83          | 0   | PCO WLDR B-2                      | 13.5  | 9.59<br>6.7   | 6  | 2.3  | 14.2                           |
| CI-115 (TY II) (15') EX<br>PCO WLDR B-2 | BL CL-WLD1<br>BL CL-WLD1 | 11+10<br>11+02           | 30.79<br>-52.5          | CI (TY II) (10)_36IN<br>PCO 3ft Both | On Grade                                     | 1.24<br>2.94   | 1.24<br>2.94  | 0   | PCO US29 B-9<br><none></none>     | 13.5<br>13.5  | 8.48  | 6  | 1.6<br>5.0   | 9.2                            |
| System C                                | BL CL-VVLDI              | 11+02                    | -32.3                   | PCO_3IL_BUILI                        | In Sag                                       | 2.94   | 2.94          | U   | <none></none>                     | 15.5  | 0.40  | 0  | 3.0  | 14                             |
| CI-55 (TY II) (10') EX                  | BL CL-SH29               | 157+81                   | 55.55                   | CI (TY II) (10) 18IN                 | On Grade                                     | 3.84   | 3.43          | 0.41  | CI-60 (TY II) (15') EX            | 13.5  | 12.57   | 6  | 3.0  | 9.2                            |
| CI-60 (TY II) (15 ) EX                  | BL CL-WRP                | 101+00.72                | -46.96                  | CI (TY II) (15) 18IN                 | On Grade                                     | 2.43   | 2.38          | 0.06  | <none></none>                     | 13.5  | 7.01  | 6  | 1.7  | 14.2                           |
| CI-65 (TY II) (15 ) EX                  | BL CL-WRP                | 101+00.72                | 48.37                   | CI (TY II) (15) 18IN                 | On Grade                                     | 0.74   | 0.74          | 0.00  | <none></none>                     | 13.5  | 4.4   | 6  | 1.1  | 14.2                           |
| System D                                | DL CL-WIN                | 101100.02                | 40.57                   | CI (11 II) (13)_10IIV                | Ondrade                                      | 0.74   | 0.74          | U   |                                   | 15.5  | 7.7   | U  | 1.1  | 14.2                           |
| PCU US29 D-1                            | BL CL-SH29               | 165+75                   | 53.5                    | PCU 3ft LT/RT                        | On Grade                                     | 2.81   | 2.49          | 0.31  | PCU US29 D-2                      | 13.5  | 11.18   | 6  | 2.7  | 9                              |
| PCU US29 D-2                            | BL CL-SH29               | 168+25                   | 53.5                    | PCU 3ft LT/RT                        | On Grade                                     | 2.81   | 2.35          | 0.46  | PCU US29 D-3                      | 13.5  | 9.83  | 6  | 2.4  | 9                              |
| PCU US29 D-3                            | BL CL-SH29               | 170+25                   | 53.5                    | PCU 3ft LT/RT                        | On Grade                                     | 2.82   | 2.38          | 0.45  | PCU US29 D-4                      | 13.5  | 9.98  | 6  | 2.4  | 9                              |
| PCU US29 D-4                            | BL CL-SH29               | 171+80                   | 63.81                   | PCU 3ft LT/RT                        | On Grade                                     | 2.3  | 1.96          | 0.34  | PCU US29 D-5                      | 13.5  | 8.7   | 6  | 2.1  | 9                              |
| PCU US29 D-5                            | BL CL-SH29               | 173+00                   | 65.5                    | PCU 3ft LT/RT                        | On Grade                                     | 1.97   | 1.83          | 0.14  | <none></none>                     | 13.5  | 9.65  | 6  | 2.3  | 9                              |
| System E                                |                          |                          |                         |                                      |  |  |               |   |                                   |   |   |  |  | 1                              |
| PCU US29 E-1                            | BL CL-SH29               | 177+00                   | 53.5                    | PCU 3ft LT/RT                        | On Grade                                     | 2.15   | 1.89          | 0.26  | PCU US29 E-2                      | 13.5  | 8.91  | 6  | 2.1  | 9                              |
| PCU US29 E-2                            | BL CL-SH29               | 179+00                   | 53.5                    | PCU_3ft_LT/RT                        | On Grade                                     | 2.01   | 1.71          | 0.3   | PCU US29 E-3                      | 13.5  | 7.74  | 6  | 1.9  | 9                              |
| PCU US29 E-3                            | BL CL-SH29               | 180+65                   | 53.5                    | PCU_3ft_LT/RT                        | On Grade                                     | 1.75   | 1.5           | 0.24  | <none></none>                     | 13.5  | 7   | 6  | 1.7  | 9                              |

# NOTES:

1. ANALYSIS WAS PERFORMED USING THE CURRENT VERSION OF OPENROADS DRAINAGE AND UTILITIES WHICH PERFORMS CALCULATIONS IN ACCORDANCE WITH FHWA HEC-22.
2. ALLOWABLE PONDED WIDTHS ARE IN ACCORDANCE WITH THE TXDOT MANUAL (2019) AND DO NOT EXCEED CURB HEIGHT.



9/16/2024







SH 29

HYDRAULIC DATA 10-YR INLETS

|      |      | SHEET :    | 1 ( | OF 1      |
|------|------|------------|-----|-----------|
| CONT | SECT | JOB        |     | HIGHWAY   |
| 0337 | 01   | 053        |     | SH 29     |
| DIST |      | COUNTY     |     | SHEET NO. |
| AUS  |      | WILLIAMSON |     | 108       |

| DW: |  |
|-----|--|
|     |  |
| CK: |  |
| DN: |  |
|     |  |

|                         |                  |                          |                         |                      | 100+   | A1:O48 - YEAR ON (   | GRADE AND SAC                                 | G CONFIGURATION I   | DATA                              |   |   |  |  |                                |
|-------------------------|------------------|--------------------------|-------------------------|----------------------|--|--|---|---|-----------------------------------|---|---|--|--|--------------------------------|
| Node ID                 | Baseline Feature | Baseline Station<br>(ft) | Baseline Offset<br>(ft) | Inlet Type           | Inlet Profile<br>Type<br>(Inlet<br>Location) | Total Inlet<br>Discharge (Total<br>Rational Flow to<br>Inlet)<br>(cfs) | Inlet Capacity<br>(Flow<br>Captured)<br>(cfs) | Inlet Bypass Flow<br>(Bypassed<br>Rational Flow)<br>(cfs) | Bypass to Node<br>(Bypass Target) | Inlet Allowable<br>Ponded Width<br>(Maximum Spread)<br>(ft) | Inlet Computed<br>Ponded Width<br>(Spread / Top<br>Width)<br>(ft) | Inlet Allowable<br>Ponded Depth<br>(Max. Gutter<br>Depth - Design)<br>(in) | Inlet Computed<br>Ponded Depth<br>(Depth Gutter)<br>(in) | Curb Opening<br>Length<br>(ft) |
| System A                |                  |                          |                         |                      |  |  |   |   |                                   |   |   |  |  |                                |
| CI 50 (TY IIR) (10') EX | BL CL-SH29       | 154+00                   | 41.93                   | CI (TY IR) (10)      | On Grade                                     | 3.8  | 3.11  | 0.69  | CI-55 (TY_II) (10') EX            | 13.5  | 10.96   | 6  | 2.6  | 9.2                            |
| CI-20 (TY_II) (10 ) EX  | BL CL-SH29       | 158+65                   | -43.28                  | CI (TY II) (10)_42IN | On Grade                                     | 1.02   | 1.02  | 0   | CI-40 (TY_II) (15 ) EX            | 13.5  | 6.84  | 6  | 1.6  | 9.2                            |
| CI-40 (TY_II) (15 ) EX  | BL CL-SH29       | 160+94                   | -55.24                  | CI (TY II) (15)_48IN | On Grade                                     | 6.34   | 5.43  | 0.92  | CI-45 (TY_II) (15') EX            | 13.5  | 12.57   | 6  | 3.0  | 14.2                           |
| CI-45 (TY_II) (15 ) EX  | BL CL-SH29       | 162+69                   | -55.23                  | CI (TY II) (15)_48IN | On Grade                                     | 4.55   | 4.31  | 0.25  | PCO US29 B-1                      | 13.5  | 11.16   | 6  | 2.7  | 14.2                           |
| PCU US29 A-8            | BL CL-SH29       | 162+69                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 2.43   | 2.07  | 0.36  | PCU US29 D-1                      | 13.5  | 9.09  | 6  | 2.2  | 9                              |
| D-4 EX                  | BL CL-SH29       | 155+05                   | -55.63                  | PCO_3ft_Both         | On Grade                                     | 6.22   | 4.63  | 1.59  | D-2 EX                            | 13.5  | 11.62   | 6  | 2.8  | 14                             |
| D-2 EX                  | BL CL-SH29       | 156+29                   | -55.63                  | PCO_3ft_Both         | On Grade                                     | 3.43   | 3.34  | 0.09  | D-3 EX                            | 13.5  | 10.59   | 6  | 2.5  | 14                             |
| D-3 EX                  | BL CL-SH29       | 157+82                   | -51.66                  | PCO_3ft_Both         | On Grade                                     | 2.21   | 2.21  | 0   | CI-20 (TY_II) (10') EX            | 13.5  | 11.25   | 6  | 2.7  | 14                             |
| CI-30 (TY II) (10') EX  | N/A              | N/A                      | N/A                     | CI (TY II) (10)_18IN | On Grade                                     | 4.35   | 3.19  | 1.16  | CI-30A (TY II) (15') EX           | 13.5  | 10.73   | 6  | 2.6  | 9.2                            |
| CI-30A (TY II) (15') EX | N/A              | N/A                      | N/A                     | CI (TY II) (10)_24IN | On Grade                                     | 3.06   | 2.56  | 0.5   | CI-25 (TY II) (15') EX            | 13.5  | 9.4   | 6  | 2.3  | 9.2                            |
| CI-25 (TY II) (15') EX  | BL CL-WRP        | 103+18                   | -58.67                  | CI (TY II) (15)_30IN | On Grade                                     | 4.69   | 4.35  | 0.34  | CI-40 (TY_II) (15') EX            | 13.5  | 11.03   | 6  | 2.6  | 14.2                           |
| CI-35 (TY II) (15) EX   | BL CL-WRP        | 103+31                   | 36.34                   | CI (TY II) (15)_30IN | On Grade                                     | 6.39   | 5.39  | 1   | CI-40 (TY_II) (15') EX            | 13.5  | 12.39   | 6  | 3.0  | 14.2                           |
| System B                |                  |                          |                         |                      |  |  |   |   |                                   |   |   |  |  |                                |
| PCO US29 B-1            | BL CL-SH29       | 165+15                   | -53                     | PCO_3ft_LT/RT        | On Grade                                     | 5.96   | 3.79  | 2.18  | PCO US29 B-2                      | 13.5  | 12.94   | 6  | 3.1  | 9.5                            |
| PCO US29 B-2            | BL CL-SH29       | 165+23                   | -53                     | PCO_3ft_None         | On Grade                                     | 2.45   | 1.37  | 1.08  | PCO US29 B-3                      | 13.5  | 9.16  | 6  | 2.2  | 5                              |
| PCO US29 B-3            | BL CL-SH29       | 166+00                   | -53                     | PCO_3ft_LT/RT        | On Grade                                     | 5.03   | 3.79  | 1.24  | PCO US29 B-4                      | 13.5  | 13.57   | 6  | 3.3  | 9.5                            |
| PCO US29 B-4            | BL CL-SH29       | 167+00                   | -53                     | PCO_4ft_LT/RT        | On Grade                                     | 3.95   | 2.82  | 1.14  | PCO US29 B-5                      | 13.5  | 10.4  | 6  | 2.5  | 9.5                            |
| PCO US29 B-5            | BL CL-SH29       | 168+25                   | -53                     | PCO_4ft_LT/RT        | On Grade                                     | 2.98   | 2.5   | 0.49  | PCO US29 B-6A                     | 13.5  | 9.99  | 6  | 2.4  | 9.5                            |
| PCO US29 B-6A           | BL CL-SH29       | 169+35                   | -53                     | PCO_4ft_LT/RT        | On Grade                                     | 5.55   | 3.56  | 1.99  | PCO US29 B-6B                     | 13.5  | 12.33   | 6  | 3.0  | 9.5                            |
| PCO US29 B-6B           | BL CL-SH29       | 169+43                   | -53                     | PCO_4ft_None         | On Grade                                     | 2.05   | 2.01  | 0.04  | PCO US29 B-7                      | 13.5  | 16.24   | 6  | 3.9  | 5                              |
| PCO US29 B-7            | BL CL-SH29       | 171+35                   | -53                     | PCO_4ft_LT/RT        | On Grade                                     | 2.75   | 2.23  | 0.52  | PCO US29 B-8                      | 13.5  | 8.96  | 6  | 2.1  | 9.5                            |
| PCO US29 B-8            | BL CL-SH29       | 173+05                   | -53                     | PCO_4ft_LT/RT        | On Grade                                     | 3.1  | 2.19  | 0.91  | PCO US29 B-9                      | 13.5  | 8.4   | 6  | 2.0  | 9.5                            |
| PCO US29 B-9            | BL CL-SH29       | 175+09                   | -65                     | PCO_6ft_LT/RT        | On Grade                                     | 4.46   | 3.43  | 1.02  | PCO US29 B-10                     | 13.5  | 12.6  | 6  | 3.0  | 9.5                            |
| PCO US29 B-10           | BL CL-SH29       | 176+35                   | -65                     | PCO_6ft_LT/RT        | On Grade                                     | 3.95   | 3.31  | 0.64  | PCO US29 B-11                     | 13.5  | 12.66   | 6  | 3.0  | 9.5                            |
| PCO US29 B-11           | BL CL-SH29       | 177+60                   | -65                     | PCO_6ft_LT/RT        | On Grade                                     | 3.57   | 2.71  | 0.85  | PCO US29 B-12                     | 13.5  | 10.29   | 6  | 2.5  | 9.5                            |
| PCO US29 B-12           | BL CL-SH29       | 178+85                   | -65                     | PCO_6ft_LT/RT        | On Grade                                     | 3.96   | 2.73  | 1.23  | PCO US29 B-13                     | 13.5  | 10.04   | 6  | 2.4  | 9.5                            |
| PCO US29 B-13           | BL CL-SH29       | 179+90                   | -56.84                  | PCO_6ft_LT/RT        | On Grade                                     | 3.77   | 2.57  | 1.2   | PCO US29 B-14 EX                  | 13.5  | 9.5   | 6  | 2.3  | 9.5                            |
| PCO US29 B-14 EX        | BL CL-SH29       | 181+10                   | -67.25                  | PCO_3ft_Both         | On Grade                                     | 4.04   | 3.46  | 0.58  | <none></none>                     | 13.5  | 9.69  | 6  | 2.3  | 14                             |
| CI-110 (TY II) (15') EX | BL CL-WLD1       | 13+91                    | -29.07                  | CI (TY II) (15)_18IN | On Grade                                     | 4.38   | 4.23  | 0.15  | PCO WLDR B-2                      | 13.5  | 11.3  | 6  | 2.7  | 14.2                           |
| CI-115 (TY II) (15') EX | BL CL-WLD1       | 11+10                    | 30.79                   | CI (TY II) (10)_36IN | On Grade                                     | 1.92   | 1.84  | 0.08  | PCO US29 B-9                      | 13.5  | 7.9   | 6  | 1.9  | 9.2                            |
| PCO WLDR B-2            | BL CL-WLD1       | 11+02                    | -52.5                   | PCO_3ft_Both         | In Sag                                       | 4.69   | 4.69  | 0   | <none></none>                     | 13.5  | 11.6  | 6  | 5.8  | 14                             |
| System C                |                  | 1                        |                         |                      |  |  |   |   |                                   |   |   |  | 1  |                                |
| CI-55 (TY_II) (10 ) EX  | BL CL-SH29       | 157+81                   | 55.55                   | CI (TY II) (10)_18IN | On Grade                                     | 6.4  | 4.77  | 1.63  | CI-60 (TY_II) (15 ) EX            | 13.5  | 15.23   | 6  | 3.7  | 9.2                            |
| CI-60 (TY_II) (15 ) EX  | BL CL-WRP        | 101+00.72                | -46.96                  | CI (TY II) (15)_18IN | On Grade                                     | 4.77   | 3.83  | 0.94  | <none></none>                     | 13.5  | 9.02  | 6  | 2.2  | 14.2                           |
| CI-65 (TY_II) (15 ) EX  | BL CL-WRP        | 101+00.62                | 48.37                   | CI (TY II) (15)_18IN | On Grade                                     | 1.14   | 1.14  | 0   | <none></none>                     | 13.5  | 5.18  | 6  | 1.2  | 14.2                           |
| System D                | T                | T                        |                         |                      |  |  |   |   |                                   | T   |   | -  |  |                                |
| PCU US29 D-1            | BL CL-SH29       | 165+75                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 4.5  | 3.68  | 0.82  | PCU US29 D-2                      | 13.5  | 13.34   | 6  | 3.2  | 9                              |
| PCU US29 D-2            | BL CL-SH29       | 168+25                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 4.69   | 3.5   | 1.19  | PCU US29 D-3                      | 13.5  | 11.9  | 6  | 2.9  | 9                              |
| PCU US29 D-3            | BL CL-SH29       | 170+25                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 4.84   | 3.62  | 1.22  | PCU US29 D-4                      | 13.5  | 12.22   | 6  | 2.9  | 9                              |
| PCU US29 D-4            | BL CL-SH29       | 171+80                   | 63.81                   | PCU_3ft_LT/RT        | On Grade                                     | 4.09   | 3.07  | 1.02  | PCU US29 D-5                      | 13.5  | 10.8  | 6  | 2.6  | 9                              |
| PCU US29 D-5            | BL CL-SH29       | 173+00                   | 65.5                    | PCU_3ft_LT/RT        | On Grade                                     | 3.54   | 3   | 0.53  | <none></none>                     | 13.5  | 12.03   | 6  | 2.9  | 9                              |
| System E                |                  |                          |                         |                      |  |  |   |   |                                   |   |   |  |  |                                |
| PCU US29 E-1            | BL CL-SH29       | 177+00                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 3.33   | 2.69  | 0.63  | PCU US29 E-2                      | 13.5  | 10.5  | 6  | 2.5  | 9                              |
| PCU US29 E-2            | BL CL-SH29       | 179+00                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 3.34   | 2.54  | 0.8   | PCU US29 E-3                      | 13.5  | 9.37  | 6  | 2.2  | 9                              |
| PCU US29 E-3            | BL CL-SH29       | 180+65                   | 53.5                    | PCU_3ft_LT/RT        | On Grade                                     | 3.05   | 2.32  | 0.73  | <none></none>                     | 13.5  | 8.63  | 6  | 2.1  | 9                              |

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2. ALLOWABLE PONDED WIDTHS ARE IN ACCORDANCE WITH THE TXDOT MANUAL (2019) AND DO NOT EXCEED CURB HEIGHT.









SH 29

HYDRAULIC DATA 100-YR INLETS

| ONT         SECT         JOB         HIGHWAY           337         01         053         SH 29           DIST         COUNTY         SHEET NO. |      |      | SHEET :    | 1 ( | OF 1      |
|---|------|------|------------|-----|-----------|
| DIST COUNTY SHEET NO.   | ONT  | SECT | JOB        |     | HIGHWAY   |
|   | 337  | 01   | 053        |     | SH 29     |
| 100   | DIST |      | COUNTY     |     | SHEET NO. |
| AUS   WILLIAMSON   109  | NUS  |      | WILLIAMSON |     | 109       |

|                             |  |  |                        |                  | 10 - Y                           | EAR CONVEYA                    | NCE CONFIG                   | URATION                    | DATA               |                                |                               |                                     |                         |                           |                         |                           |                              |
|-----------------------------|--|--|------------------------|------------------|----------------------------------|--------------------------------|------------------------------|----------------------------|--------------------|--------------------------------|-------------------------------|-------------------------------------|-------------------------|---------------------------|-------------------------|---------------------------|------------------------------|
| Pipe ID                     | Upstream Node<br>(Start)                         | Downstream Node<br>(Stop)                        | Conduit<br>Description | Diameter<br>(in) | Length<br>(Construction)<br>(ft) | Length<br>(Quantified)<br>(ft) | Discharge<br>(Flow)<br>(cfs) | Capacity<br>(Full<br>Flow) | Velocity<br>(ft/s) | Slope<br>(Construction)<br>(%) | Upstream<br>Invert<br>(Start) | Downstream<br>Invert (Stop)<br>(ft) | HGL<br>Upstream<br>(ft) | HGL<br>Downstream<br>(ft) | Normal<br>Depth<br>(in) | Critical<br>Depth<br>(in) | Slope<br>(Calculated)<br>(%) |
| System A                    | CL EQ (TV UD) (101) EV                           | CL 1 (TV II) (151) 5V                            | D.C.D.                 | 10               | 03.0                             | 0.4                            | 1 22 1                       | 11 22                      |                    | 1 10                           | 020.7                         | 027.7                               | 020.20                  | 020.45                    | F F2                    | C 00                      | 114                          |
| CI-50 EX<br>CI-1 EX         | CI 50 (TY IIR) (10') EX<br>CI-1 (TY II) (15') EX | CI-1 (TY_II) (15') EX<br>CI-5 (TY II) (10') EX   | RCP<br>RCP             | 18<br>24         | 83.9<br>92.0                     | 92<br>92                       | 2.3<br>8.14                  | 11.23<br>22.08             | 5<br>6.5           | 1.19<br>1.09                   | 828.7<br>827.2                | 827.7<br>826.2                      | 829.28<br>828.22        | 828.45<br>827.04          | 5.53<br>10.09           | 6.88<br>12.19             | 1.14<br>0.95                 |
| CI-5 EX                     | CI-5 (TY II) (10') EX                            | CI-10 (TY II) (10 ) EX                           | RCP                    | 30               | 114.5                            | 115                            | 11.5                         | 36.68                      | 6.61               | 0.87                           | 825.7                         | 824.7                               | 826.84                  | 825.86                    | 11.54                   | 13.64                     | 0.80                         |
| CI-10 EX                    | CI-10 (TY II) (10') EX                           | CI-15 (TY_II) (10 ) EX                           | RCP                    | 36               | 139.5                            | 140                            | 21.83                        | 38.51                      | 5.62               | 0.36                           | 824.2                         | 823.7                               | 825.82                  | 825.2                     | 19.41                   | 18.03                     | 0.33                         |
| CI-15 EX                    | CI-15 (TY_II) (10 ) EX                           | CI-20 (TY_II) (10 ) EX                           | RCP                    | 36               | 74.3                             | 74                             | 22.82                        | 56.09                      | 7.53               | 0.81                           | 823.6                         | 823                                 | 825.14                  | 824.8                     | 15.99                   | 18.46                     | 0.71                         |
| CI-20 EX                    | CI-20 (TY_II) (10') EX                           | JB A-1 EX  | RCP                    | 42               | 202.7                            | 203                            | 49.32                        | 85.04                      | 9.17               | 0.74                           | 822.5                         | 821                                 | 824.7                   | 822.91                    | 22.96                   | 26.33                     | 0.71                         |
| JB A-1 EX<br>CI-40 EX       | JB A-1 EX<br>CI-40 (TY II) (15') EX              | CI-40 (TY_II) (15') EX<br>CI-45 (TY II) (15') EX | RCP<br>RCP             | 48<br>48         | 10.1<br>159.5                    | 10<br>160                      | 58.74<br>61.83               | 96.83<br>92.12             | 8.07<br>7.86       | 0.90<br>0.45                   | 820.5<br>818.72               | 820.41<br>818                       | 822.81<br>821.21        | 822.67<br>821.02          | 26.98<br>28.78          | 27.7<br>28.45             | 0.45<br>0.41                 |
| CI-45 EX                    | CI-45 (TY II) (15 ) EX                           | CI-70 (TY IIR) (10') EX                          | RCP                    | 48               | 95.7                             | 96                             | 69.82                        | 90.74                      | 7.96               | 0.42                           | 817.9                         | 817.5                               | 820.53                  | 820.03                    | 31.58                   | 30.31                     | 0.40                         |
| CI-70A EX                   | CI-70 (TY_IIR) (10') EX                          | PCO US29 A-8                                     | RCP                    | 48               | 7.8                              | 8                              | 69.36                        | 112.74                     | 9.43               | 0.89                           | 810.91                        | 810.84                              | 814.9                   | 814.88                    | 27.22                   | 30.2                      | 0.62                         |
| CI-70B EX                   | PCO US29 A-8                                     | JB A-1A EX                                       | RCP                    | 48               | 8.3                              | 8                              | 70.63                        | 61.65                      | 5.62               | 0.26                           | 810.82                        | 810.8                               | 814.85                  | 814.82                    | (N/A)                   | 30.49                     | 0.18                         |
| JB A-1A EX                  | JB A-1A EX                                       | OUT-A  | RCP                    | 48               | 4.2                              | 4                              | 76.56                        | 99.51                      | 8.73               | 0.71                           | 810.8                         | 810.77                              | 814.79                  | 814.77                    | 31.58                   | 31.79                     | 0.48                         |
| ACAD A-1 EX<br>D-4 EX       | ACAD A-1 EX<br>D-4 EX                            | CI-1 (TY_II) (15 ) EX<br>CI-5 (TY II) (10 ) EX   | RCP<br>RCP             | 18<br>24         | 53.7<br>8.6                      | 54<br>9                        | 5.92<br>3.5                  | 10.43<br>28.9              | 6.09<br>6.22       | 1.04<br>2.25                   | 828.26<br>825.89              | 827.7<br>825.7                      | 829.2<br>827.05         | 828.51<br>827.06          | 9.71<br>5.64            | 11.28<br>7.86             | 0.99<br>1.63                 |
| ACAD A-2 EX                 | ACAD A-2   | D-2 EX   | RCP                    | 24               | 32.9                             | 33                             | 9.08                         | 45.5                       | 11.3               | 4.43                           | 826.16                        | 824.7                               | 827.24                  | 825.92                    | 7.27                    | 12.91                     | 4.05                         |
| D-2 EX                      | D-2 EX   | CI-10 (TY II) (10') EX                           | RCP                    | 24               | 8.2                              | 8                              | 10.76                        | 30.39                      | 8.84               | 2.58                           | 824.52                        | 824.31                              | 825.82                  | 825.93                    | 9.86                    | 14.11                     | 1.80                         |
| D-3 EX                      | D-3 EX   | CI-15 (TY_II) (10 ) EX                           | RCP                    | 24               | 4.3                              | 4                              | 1.37                         | 19.91                      | 3.63               | 1.39                           | 823.88                        | 823.82                              | 825.17                  | 825.17                    | 4.27                    | 4.86                      | 0.77                         |
| ACAD A-3 EX                 | ACAD A-3 EX                                      | CI-20 (TY_II) (10 ) EX                           | RCP                    | 36               | 50.9                             | 51                             | 27.38                        | 45.78                      | 6.76               | 0.51                           | 824.87                        | 824.61                              | 826.56                  | 826.28                    | 20.06                   | 20.3                      | 0.47                         |
| CI-30 EX                    | CI-30 (TY II) (10') EX                           | CI-30A (TY II) (15') EX                          | RCP                    | 18               | 167.9                            | 168                            | 2.42                         | 13.62                      | 5.82               | 1.79                           | 833                           | 830                                 | 833.59                  | 830.43                    | 5.14                    | 7.07                      | 1.68                         |
| CI-30A EX<br>CI-25 EX       | CI-30A (TY II) (15') EX                          | CI-25 (TY II) (15') EX<br>CI-35 (TY II) (15) EX  | RCP<br>RCP             | 18<br>18         | 245.8<br>96.8                    | 246<br>97                      | 3.95<br>6.48                 | 13.85<br>14.83             | 6.76<br>8.12       | 1.83<br>2.07                   | 829.5<br>824                  | 825<br>822                          | 830.26<br>824.99        | 825.55<br>823.32          | 6.58<br>8.32            | 9.12<br>11.82             | 1.74<br>1.99                 |
| CI-25 EX                    | CI-35 (TY II) (15) EX                            | JB A-1 EX  | RCP                    | 30               | 74.7                             | 75                             | 10.21                        | 31.07                      | 5.67               | 0.60                           | 821.95                        | 821.5                               | 823.28                  | 823.3                     | 11.84                   | 12.82                     | 0.57                         |
| WAL A-1                     | PJB WAL A-1                                      | CI-45 (TY_II) (15 ) EX                           | RCP                    | 18               | 75.6                             | 76                             | 7.05                         | 26.14                      | 12.56              | 6.50                           | 822.82                        | 817.9                               | 823.85                  | 820.88                    | 6.39                    | 12.34                     | 6.19                         |
| System B                    |  |  |                        |                  |                                  |                                |                              |                            |                    |                                |                               |                                     |                         |                           |                         |                           |                              |
| FMC B-1A EX                 | PJB FMC B-1 EX                                   | EX_CMP_T2  | RCP                    | 18               | 33.8                             | 34                             | 6.72                         | 13.7                       | 7.72               | 1.80                           | 818.8                         | 818.19                              | 819.81                  | 819.21                    | 8.9                     | 12.04                     | 1.70                         |
| FMC B-1B<br>FMC B-1C        | EX_CMP_T2<br>PIB FMC B-1                         | PJB FMC B-1<br>PCO US29 B-2                      | RCP<br>RCP             | 18<br>18         | 9.69<br>6.66                     | 10<br>7                        | 6.72<br>6.72                 | 27.35<br>18.51             | 12.81<br>9.65      | 7.84<br>4.51                   | 818.19<br>817.3               | 817.43<br>817                       | 819.2<br>818.59         | 818.79<br>818.6           | 6.08<br>7.5             | 12.04<br>12.04            | 6.78<br>3.11                 |
| US29 B-2                    | PCO US29 B-2                                     | PCO US29 B-3                                     | RCP                    | 24               | 72                               | 72                             | 18.77                        | 21.57                      | 7.73               | 0.97                           | 816.5                         | 815.8                               | 818.06                  | 817.45                    | 17.32                   | 18.72                     | 0.91                         |
| US29 B-3                    | PCO US29 B-3                                     | PCO US29 B-4                                     | RCP                    | 24               | 95                               | 95                             | 21.31                        | 21.46                      | 7.79               | 0.95                           | 815.7                         | 814.8                               | 817.35                  | 816.43                    | 19.52                   | 19.83                     | 0.90                         |
| US29 B-4                    | PCO US29 B-4                                     | PCO US29 B-5                                     | RCP                    | 30               | 120                              | 120                            | 23.1                         | 32.81                      | 7.24               | 0.67                           | 814.3                         | 813.5                               | 815.94                  | 815.05                    | 18.56                   | 19.63                     | 0.64                         |
| US29 B-5                    | PCO US29 B-5                                     | PCO US29 B-6A                                    | RCP                    | 36               | 105                              | 105                            | 30.05                        | 72.5                       | 9.78               | 1.24                           | 813                           | 811.7                               | 814.78                  | 813.51                    | 16.15                   | 21.31                     | 1.18                         |
| US29 B-6A                   | PCO US29 B-6A                                    | PCO US29 B-6B                                    | RCP                    | 36               | 3                                | 3                              | 32.65                        | 74.57                      | 10.2               | 3.33                           | 811.6                         | 811.5                               | 813.46                  | 813.15                    | 16.67                   | 22.26                     | 1.25                         |
| US29 B-6B<br>US29 B-7       | PCO US29 B-6B<br>PCO US29 B-7                    | PCO US29 B-7<br>PCO US29 B-8                     | RCP<br>RCP             | 36<br>36         | 187<br>165                       | 187<br>165                     | 33.35<br>42.43               | 60.88<br>64.7              | 8.81<br>9.76       | 0.86<br>0.97                   | 811.4<br>809.6                | 809.8<br>808                        | 813.28<br>811.72        | 811.79<br>809.77          | 19.01<br>21.26          | 22.5<br>25.47             | 0.83                         |
| US29 B-8                    | PCO US29 B-8                                     | PJB-US29 D                                       | RCP                    | 36               | 4.04                             | 4                              | 55.68                        | 70.16                      | 11.01              | 2.48                           | 806.6                         | 806.5                               | 809.02                  | 808.75                    | 24.22                   | 29.05                     | 1.11                         |
| US29 D-A                    | PJB-US29 D                                       | EX_CMP_T3  | RCP                    | 48               | 8.52                             | 9                              | 66.69                        | 103.57                     | 8.75               | 0.70                           | 805                           | 804.94                              | 807.47                  | 807.45                    | 28.02                   | 29.6                      | 0.52                         |
| US29 D-B                    | EX_CMP_T3  | JB B-2 EX  | RCP                    | 48               | 170.52                           | 171                            | 66.69                        | 110.44                     | 9.2                | 0.60                           | 804.94                        | 803.92                              | 807.41                  | 807.3                     | 26.9                    | 29.6                      | 0.59                         |
| JB B-2 EX                   | JB B-2 EX  | PJB B-2  | RCP                    | 48               | 15.54                            | 16                             | 73.69                        | 107.14                     | 9.19               | 0.74                           | 803.92                        | 803.81                              | 807.23                  | 807.21                    | 29.25                   | 31.17                     | 0.56                         |
| PJB B-2<br>US29 B-9         | PJB B-2<br>PCO US29 B-9                          | PCO US29 B-9<br>PCO US29 B-10                    | RCP<br>RCP             | 48<br>48         | 4.08<br>120.82                   | 4<br>121                       | 73.69<br>76                  | 101.14<br>99.19            | 8.78<br>8.7        | 1.22<br>0.50                   | 803.55<br>803.4               | 803.5<br>802.8                      | 806.73<br>806.04        | 806.72<br>805.45          | 30.4<br>31.49           | 31.17<br>31.67            | 0.50<br>0.48                 |
| US29 B-10                   | PCO US29 B-10                                    | PCO US29 B-11                                    | RCP                    | 48               | 120.82                           | 120                            | 78.04                        | 99.51                      | 8.77               | 0.50                           | 802.7                         | 802.1                               | 805.38                  | 804.77                    | 32.01                   | 32.11                     | 0.48                         |
| US29 B-11                   | PCO US29 B-11                                    | PCO US29 B-12                                    | RCP                    | 48               | 120                              | 120                            | 79.82                        | 90.84                      | 8.15               | 0.42                           | 801                           | 800.5                               | 803.9                   | 803.21                    | 34.9                    | 32.48                     | 0.40                         |
| US29 B-12A                  | PCO US29 B-12                                    | SWAQ110_BYPASS                                   | RCP                    | 48               | 77.26                            | 77                             | 81.68                        | 119.11                     | 10.21              | 0.78                           | 798.7                         | 798.1                               | 801.44                  | 800.97                    | 29.19                   | 32.86                     | 0.69                         |
| US29 B-12B                  | SWAQ110_BYPASS                                   | PCO US29 B-13                                    | RCP                    | 48               | 8.3                              | 8                              | 81.68                        | 106.17                     | 9.32               | 1.20                           | 798.1                         | 798                                 | 800.84                  | 800.66                    | 31.58                   | 32.86                     | 0.55                         |
| US29 B-13A<br>US29 B-13A EX | PCO US29 B-13<br>EX CMP T4                       | EX_CMP_T4<br>CI-130 (TY II) (15 ) EX             | RCP<br>RCP             | 48<br>48         | 10.06<br>100.01                  | 10<br>100                      | 83.36<br>83.36               | 137.82<br>114.43           | 11.49<br>9.93      | 1.15<br>0.68                   | 796.8<br>796.69               | 796.69<br>796                       | 799.57<br>799.45        | 799.54<br>799.53          | 26.93<br>30.4           | 33.2<br>33.2              | 0.92<br>0.63                 |
| US29 B-13A EX               | PCO US29 B-14 EX                                 | CI-130 (TY II) (15') EX                          | RCP                    | 18               | 6.65                             | 7                              | 2.06                         | 23.44                      | 8.17               | 7.98                           | 798.53                        | 798                                 | 799.43                  | 798.85                    | 3.61                    | 6.5                       | 4.98                         |
| CI-130 EX                   | CI-130 (TY II) (15') EX                          | MH B-5 EX  | RCP                    | 48               | 96.56                            | 97                             | 85.42                        | 110.67                     | 9.72               | 0.62                           | 795.9                         | 795.3                               | 798.7                   | 797.94                    | 31.64                   | 33.62                     | 0.59                         |
| MH B-5 EX-A                 | MH B-5 EX  | PJB-US29 E                                       | RCP                    | 48               | 10.05                            | 10                             | 85.42                        | 98.17                      | 6.8                | 0.70                           | 789.64                        | 789.57                              | 793.66                  | 793.6                     | 34.63                   | 33.62                     | 0.47                         |
| MH B-5 EX-B                 | PJB-US29 E                                       | OUT-B  | RCP                    | 48               | 8.34                             | 8                              | 90.53                        | 107.48                     | 9.59               | 0.76                           | 789.55                        | 789.48                              | 793.52                  | 793.48                    | 33.76                   | 34.62                     | 0.56                         |
| PS B-1                      | PJB PS B-1                                       | PCO US29 B-1                                     | RCP<br>RCP             | 24               | 44.07<br>3                       | 44                             | 8.37                         | 29.03                      | 7.99               | 1.82                           | 818                           | 817.2                               | 819.03                  | 818.35                    | 8.82                    | 12.37                     | 1.65                         |
| US29 B-1<br>MF B-1          | PCO US29 B-1<br>MF B-1 EX                        | PCO US29 B-2<br>PCO US29 B-5                     | RCP                    | 24<br>18         | 20.74                            | 3<br>21                        | 11.23<br>5.58                | 25.29<br>5.18              | 7.81<br>3.16       | 3.33<br>0.29                   | 817.1<br>814.36               | 817<br>814.3                        | 818.3<br>815.45         | 818.06<br>815.21          | 11.2<br>(N/A)           | 14.43<br>10.94            | 1.25<br>0.24                 |
| PB B-1                      | PB B-1 EX  | PCO US29 B-7                                     | RCP                    | 18               | 18.53                            | 19                             | 7.44                         | 19.07                      | 10.12              | 3.99                           | 811.84                        | 811.1                               | 812.9                   | 812.32                    | 7.81                    | 12.68                     | 3.30                         |
| CANE PP B-1 EX              | CANE PP B-1 EX                                   | EX_CMP_T   | RCP                    | 18               | 48.54                            | 49                             | 11.71                        | 11.1                       | 7.1                | 1.15                           | 810.85                        | 810.29                              | 812.17                  | 811.64                    | 15.86                   | 15.63                     | 1.12                         |
| CANE PP B-1                 | EX_CMP_T   | PCO US29 B-8                                     | RCP                    | 18               | 8                                | 8                              | 11.71                        | 25.56                      | 14.15              | 7.40                           | 810.29                        | 809.7                               | 811.6                   | 810.64                    | 8.55                    | 15.63                     | 5.92                         |
| CI-110 EX                   | CI-110 (TY II) (15') EX                          |  | RCP                    | 18               | 274.15                           | 274                            | 2.83                         | 10.69                      | 5.11               | 1.09                           | 812                           | 809                                 | 812.64                  | 809.53                    | 6.32                    | 7.66                      | 1.04                         |
| CI-105 EX<br>CI-115 EX      | CI-105 (TY II) (15') EX                          | CI-115 (TY II) (15') EX<br>JB B-2 EX             | RCP<br>RCP             | 24<br>24         | 72.62<br>70.5                    | 73<br>71                       | 5.76<br>7.01                 | 28.9<br>39.14              | 7.18<br>9.43       | 1.72<br>3.16                   | 808.5<br>807.15               | 807.25<br>804.92                    | 809.35<br>808.09        | 808.15<br>807.67          | 7.27<br>6.87            | 10.18<br>11.27            | 1.63<br>2.99                 |
| WLDR B-2                    | PCO WLDR B-2                                     | CI-105 (TY II) (15') EX                          |                        |                  | 8.22                             | 8                              | 2.94                         | 15.4                       | 4.03               | 0.97                           | 807.13                        | 804.92                              | 808.09                  | 807.67                    | 4.67                    | 5.34                      | 0.68                         |
| System C                    |  |  |                        |                  |                                  |                                |                              |                            |                    |                                |                               |                                     |                         |                           |                         |                           |                              |
| CI-55 EX                    | CI-55 (TY_II) (10 ) EX                           | CI-60 (TY_II) (15 ) EX                           | RCP                    | 18               | 179.2                            | 179                            | 3.43                         | 13.35                      | 6.33               | 1.67                           | 824.5                         | 821.5                               | 825.21                  | 822.52                    | 6.22                    | 8.48                      | 1.62                         |
| CI-60 EX                    | CI-60 (TY_II) (15 ) EX                           | CI-65 (TY_II) (15 ) EX                           | RCP                    | 18               | 96.32                            | 96                             | 5.71                         | 6.68                       | 4.25               | 0.42                           | 821.4                         | 821                                 | 822.47                  | 821.92                    | 12.8                    | 11.07                     | 0.40                         |
| CI-65 EX                    | CI-65 (TY_II) (15 ) EX                           | JB A-1A EX                                       | RCP                    | 18               | 245.78                           | 246                            | 6.35                         | 18.53                      | 9.5                | 3.23                           | 820                           | 812.05                              | 820.98                  | 815.2                     | 7.27                    | 11.69                     | 3.11                         |
| System D<br>US29 D-1        | PCU US29 D-1                                     | PCU US29 D-2                                     | RCP                    | 18               | 245                              | 245                            | 2.49                         | 10.44                      | 4.84               | 1.01                           | 815.57                        | 813.1                               | 816.17                  | 813.89                    | 5.99                    | 7.17                      | 0.99                         |
| US29 D-2                    | PCU US29 D-2                                     | PCU US29 D-3                                     | RCP                    | 18               | 195                              | 195                            | 4.84                         | 9.99                       | 5.61               | 0.93                           | 813.01                        | 811.2                               | 813.86                  | 812.19                    | 8.83                    | 10.15                     | 0.99                         |
| US29 D-3                    | PCU US29 D-3                                     | PCU US29 D-4                                     | RCP                    | 18               | 150.45                           | 150                            | 7.22                         | 10.61                      | 6.46               | 1.05                           | 811.09                        | 809.5                               | 812.13                  | 810.83                    | 10.89                   | 12.49                     | 1.02                         |
| US29 D-4                    | PCU US29 D-4                                     | PCU US29 D-5                                     | RCP                    | 18               | 114.99                           | 115                            | 9.18                         | 8.48                       | 5.2                | 0.68                           | 809.38                        | 808.6                               | 810.75                  | 809.77                    | (N/A)                   | 14.06                     | 0.65                         |
| US29 D-5                    | PCU US29 D-5                                     | PJB-US29 D                                       | RCP                    | 24               | 107.33                           | 107                            | 11.01                        | 14.22                      | 5                  | 0.41                           | 808.04                        | 807.6                               | 809.36                  | 808.79                    | 15.86                   | 14.28                     | 0.40                         |
| System E<br>US29 E-1        | PCU US29 E-1                                     | PCU US29 E-2                                     | RCP                    | 18               | 195                              | 195                            | 1.89                         | 12.63                      | 5.14               | 1.48                           | 804.4                         | 801.5                               | 804.91                  | 802.17                    | 4.71                    | 6.22                      | 1.45                         |
| US29 E-1<br>US29 E-2        | PCU US29 E-1<br>PCU US29 E-2                     | PCU US29 E-2<br>PCU US29 E-3                     | RCP                    | 18               | 160                              | 160                            | 3.6                          | 15.13                      | 7.02               | 2.14                           | 801.42                        | 798                                 | 804.91                  | 798.82                    | 5.98                    | 8.69                      | 2.07                         |
| US29 E-3                    | PCU US29 E-3                                     | PJB-US29 E                                       | RCP                    | 18               | 40.22                            | 40                             | 5.11                         | 9.77                       | 5.59               | 0.98                           | 797.9                         | 797.5                               | 798.77                  | 798.27                    | 9.24                    | 10.44                     | 0.87                         |
|                             |  |  |                        |                  |                                  |                                |                              |                            |                    |                                |                               |                                     |                         |                           |                         |                           |                              |

# NOTES:

1.ANALYSIS WAS PERFORMED USING THE CURRENT VERSION OF OPENROADS DRAINAGE AND UTILITIES WHICH PERFORMS CALCULATIONS IN ACCORDANCE WITH FHWA HEC-22









SH 29

HYDRAULIC DATA 10-YR STORM SEWER

|      |      | SHEET :    | 1 ( | OF 1      |
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| CONT | SECT | JOB        |     | HIGHWAY   |
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|                         |                                     |  |                     |                  | 100 -                  | YEAR CONVEYA | NCE CONFI       | GURATION       | Ι DΑΤΔ             |                       |                   |                 |                  |                    |                |                |                     |
|-------------------------|-------------------------------------|--|---------------------|------------------|------------------------|--------------|-----------------|----------------|--------------------|-----------------------|-------------------|-----------------|------------------|--------------------|----------------|----------------|---------------------|
|                         | I I martina a una Alia alia         | Dawn atma and Nada                               | Canadinit           | Dia t            | Length                 | Length       | Discharge       |                |                    | Slope                 | Upstream          | Downstream      | HGL              | HGL                | Normal         | Critical       | Slope               |
| Pipe ID                 | Upstream Node<br>(Start)            | Downstream Node<br>(Stop)                        | Conduit Description | Diameter<br>(in) | (Construction)<br>(ft) |              | (Flow)<br>(cfs) | (Full<br>Flow) | Velocity<br>(ft/s) | (Construction)<br>(%) | Invert<br>(Start) |                 |                  | Downstream<br>(ft) | Depth<br>(in)  | Depth<br>(in)  | (Calculated)<br>(%) |
| System A                |                                     |  | ·                   |                  | (11)                   | (11)         | (CIS)           | 11000)         |                    | (70)                  | (Start)           | (11)            | (10)             | (10)               | (111)          | (111)          | (%)                 |
| CI-50 EX                | CI 50 (TY IIR) (10') EX             | CI-1 (TY II) (15') EX                            | RCP                 | 18               | 83.9                   | 84           | 3.11            | 11.23          | 5.44               | 1.19                  | 828.7             | 827.7           | 829.37           | 828.8              | 6.47           | 8.05           | 1.14                |
| CI-1 EX                 | CI-1 (TY_II) (15 ) EX               | CI-5 (TY_II) (10 ) EX                            | RCP                 | 24               | 92.0                   | 92           | 12.18           | 22.08          | 7.2                | 1.09                  | 827.2             | 826.2           | 828.46           | 827.26             | 12.72          | 15.05          | 0.95                |
| CI-5 EX                 | CI-5 (TY II) (10') EX               | CI-10 (TY II) (10') EX                           | RCP                 | 30               | 114.5                  | 115          | 16.64           | 36.68          | 7.29               | 0.87                  | 825.7             | 824.7           | 827.08           | 826.4              | 14.17          | 16.55          | 0.80                |
| CI-10 EX                | CI-10 (TY II) (10') EX              | CI-15 (TY_II) (10') EX                           | RCP                 | 36               | 139.5                  | 140          | 33.47           | 38.51          | 6.14               | 0.36                  | 824.2             | 823.7           | 826.34           | 825.62             | 25.95          | 22.55          | 0.33                |
| CI-15 EX                | CI-15 (TY_II) (10 ) EX              | CI-20 (TY_II) (10') EX                           | RCP                 | 36               | 74.3                   | 74           | 35.2            | 56.09          | 8.38               | 0.81                  | 823.6             | 823             | 825.53           | 825.42             | 20.67          | 23.14          | 0.71                |
| CI-20 EX                | CI-20 (TY_II) (10') EX              | JB A-1 EX  | RCP<br>RCP          | 42<br>48         | 202.7<br>10.1          | 203<br>10    | 76.68<br>90.61  | 85.04          | 10<br>8.76         | 0.74<br>0.90          | 822.5<br>820.5    | 821<br>820.41   | 825.24<br>823.5  | 823.6<br>823.3     | 31.2<br>36.83  | 32.88<br>34.64 | 0.71                |
| JB A-1 EX<br>CI-40 EX   | JB A-1 EX<br>CI-40 (TY II) (15') EX | CI-40 (TY_II) (15') EX<br>CI-45 (TY II) (15') EX | RCP                 | 48               | 159.5                  | 160          | 95.66           | 96.83<br>92.12 | 7.61               | 0.45                  | 820.5             | 818             | 823.07           | 822.3              | 41.24          | 35.58          | 0.43                |
| CI-45 EX                |                                     | CI-70 (TY IIR) (10 ) EX                          | RCP                 | 48               | 95.7                   | 96           | 108.9           | 90.74          | 8.67               | 0.42                  | 817.9             | 817.5           | 821.54           | 820.66             | (N/A)          | 37.88          | 0.40                |
| CI-70A EX               | CI-70 (TY IIR) (10') EX             | PCO US29 A-8                                     | RCP                 | 48               | 7.8                    | 8            | 108.3           | 112.74         | 8.62               | 0.89                  | 810.91            | 810.84          | 815.1            | 815.03             | 37.75          | 37.77          | 0.62                |
| CI-70B EX               | PCO US29 A-8                        | JB A-1A EX                                       | RCP                 | 48               | 8.3                    | 8            | 110.17          | 61.65          | 8.77               | 0.26                  | 810.82            | 810.8           | 814.96           | 814.89             | (N/A)          | 38.08          | 0.18                |
| JB A-1A EX              | JB A-1A EX                          | OUT-A  | RCP                 | 48               | 4.2                    | 4            | 119.17          | 99.51          | 9.48               | 0.71                  | 810.8             | 810.77          | 814.81           | 814.77             | (N/A)          | 39.46          | 0.48                |
| ACAD A-1 EX             | ACAD A-1 EX                         | CI-1 (TY_II) (15 ) EX                            | RCP                 | 18               | 53.7                   | 54           | 9.17            | 10.43          | 6.66               | 1.04                  | 828.26            | 827.7           | 829.43           | 828.79             | 13.09          | 14.05          | 0.99                |
| D-4 EX                  | D-4 EX                              | CI-5 (TY_II) (10') EX                            | RCP                 | 24               | 8.6                    | 9            | 4.63            | 28.9           | 6.74               | 2.25                  | 825.89            | 825.7           | 827.39           | 827.4              | 6.49           | 9.07           | 1.63                |
| ACAD A-2 EX<br>D-2 EX   | ACAD A-2<br>D-2 EX                  | D-2 EX<br>CI-10 (TY II) (10') EX                 | RCP<br>RCP          | 24<br>24         | 32.9<br>8.2            | 33<br>8      | 14.05<br>17.37  | 45.5<br>30.39  | 12.76<br>5.53      | 4.43<br>2.58          | 826.16<br>824.52  | 824.7<br>824.31 | 827.51<br>826.57 | 826.74<br>826.5    | 9.16<br>13     | 16.21<br>18.03 | 4.05<br>1.80        |
| D-3 EX                  | D-3 EX                              | CI-15 (TY II) (10') EX                           | RCP                 | 24               | 4.3                    | 4            | 2.21            | 19.91          | 4.18               | 1.39                  | 823.88            | 823.82          | 825.57           | 825.57             | 5.4            | 6.2            | 0.77                |
| ACAD A-3 EX             | ACAD A-3 EX                         | CI-20 (TY_II) (10') EX                           | RCP                 | 36               | 50.9                   | 51           | 42.39           | 45.78          | 7.35               | 0.51                  | 824.87            | 824.61          | 827.13           | 826.73             | 27.37          | 25.46          | 0.47                |
| CI-30 EX                | CI-30 (TY II) (10') EX              | CI-30A (TY II) (15') EX                          | RCP                 | 18               | 167.9                  | 168          | 3.19            | 13.62          | 6.29               | 1.79                  | 833               | 830             | 833.68           | 830.5              | 5.92           | 8.16           | 1.68                |
| CI-30A EX               | CI-30A (TY II) (15') EX             | CI-25 (TY II) (15') EX                           | RCP                 | 18               | 245.8                  | 246          | 5.67            | 13.85          | 7.45               | 1.83                  | 829.5             | 825             | 830.42           | 825.67             | 8.02           | 11.03          | 1.74                |
| CI-25 EX                | CI-25 (TY II) (15') EX              | CI-35 (TY II) (15) EX                            | RCP                 | 18               | 96.8                   | 97           | 9.79            | 14.83          | 8.97               | 2.07                  | 824               | 822             | 825.21           | 824.38             | 10.67          | 14.49          | 1.99                |
| CI-35 EX                | CI-35 (TY II) (15) EX               | JB A-1 EX  | RCP                 | 30               | 74.7                   | 75           | 14.93           | 31.07          | 6.27               | 0.60                  | 821.95            | 821.5           | 824.34           | 824.25             | 14.65          | 15.63          | 0.57                |
| WAL A-1                 | PJB WAL A-1                         | CI-45 (TY_II) (15 ) EX                           | RCP                 | 18               | 75.6                   | 76           | 10.92           | 26.14          | 14.12              | 6.50                  | 822.82            | 817.9           | 824.08           | 822.09             | 8.11           | 15.19          | 6.19                |
| System B<br>FMC B-1A EX | PIB FMC B-1 EX                      | EX CMP T2  | RCP                 | 18               | 33.8                   | 34           | 10.41           | 13.7           | 5.89               | 1.80                  | 818.8             | 818.19          | 821.06           | 820.71             | 11.73          | 14.89          | 1.70                |
| FMC B-1B                | EX CMP T2                           | PJB FMC B-1                                      | RCP                 | 18               | 9.69                   | 10           | 10.41           | 27.35          | 5.89               | 7.84                  | 818.19            | 817.43          | 820.67           | 820.56             | 7.7            | 14.89          | 6.78                |
| FMC B-1C                | PJB FMC B-1                         | PCO US29 B-2                                     | RCP                 | 18               | 6.66                   | 7            | 10.41           | 18.51          | 5.89               | 4.51                  | 817.3             | 817             | 821.42           | 821.33             | 9.65           | 14.89          | 3.11                |
| US29 B-2                | PCO US29 B-2                        | PCO US29 B-3                                     | RCP                 | 24               | 72                     | 72           | 28.53           | 21.57          | 9.08               | 0.97                  | 816.5             | 815.8           | 821.68           | 820.45             | (N/A)          | 22.06          | 0.91                |
| US29 B-3                | PCO US29 B-3                        | PCO US29 B-4                                     | RCP                 | 24               | 95                     | 95           | 32.32           | 21.46          | 10.29              | 0.95                  | 815.7             | 814.8           | 820.15           | 818.11             | (N/A)          | 22.72          | 0.90                |
| US29 B-4                | PCO US29 B-4                        | PCO US29 B-5                                     | RCP                 | 30               | 120                    | 120          | 35.13           | 32.81          | 7.16               | 0.67                  | 814.3             | 813.5           | 818.01           | 817.09             | 27.35          | 24.16          | 0.64                |
| US29 B-5                | PCO US29 B-5                        | PCO US29 B-6A                                    | RCP                 | 36               | 105                    | 105          | 46.27           | 72.5           | 6.55               | 1.24                  | 813               | 811.7           | 817.02           | 816.49             | 20.9           | 26.59          | 1.18                |
| US29 B-6A<br>US29 B-6B  | PCO US29 B-6A<br>PCO US29 B-6B      | PCO US29 B-6B<br>PCO US29 B-7                    | RCP<br>RCP          | 36<br>36         | 3<br>187               | 3<br>187     | 49.83<br>51.84  | 74.57<br>60.88 | 7.05<br>7.33       | 3.33<br>0.86          | 811.6<br>811.4    | 811.5<br>809.8  | 816.41<br>816.27 | 816.36<br>815.11   | 21.53<br>25.53 | 27.58<br>28.1  | 0.83                |
| US29 B-0B               | PCO US29 B-7                        | PCO US29 B-7                                     | RCP                 | 36               | 165                    | 165          | 65.59           | 64.7           | 9.28               | 0.86                  | 809.6             | 808             | 815.03           | 813.38             | 29.97          | 31.13          | 0.83                |
| US29 B-8                | PCO US29 B-8                        | PJB-US29 D                                       | RCP                 | 36               | 4.04                   | 4            | 85.9            | 70.16          | 12.15              | 2.48                  | 806.6             | 806.5           | 811.65           | 811.5              | (N/A)          | 33.83          | 1.11                |
| US29 D-A                | PJB-US29 D                          | EX CMP T3  | RCP                 | 48               | 8.52                   | 9            | 102.78          | 103.57         | 8.18               | 0.70                  | 805               | 804.94          | 810.76           | 810.7              | 39.02          | 36.85          | 0.52                |
| US29 D-B                | EX_CMP_T3                           | JB B-2 EX  | RCP                 | 48               | 170.52                 | 171          | 102.78          | 110.44         | 8.18               | 0.60                  | 804.94            | 803.92          | 810.64           | 809.75             | 36.65          | 36.85          | 0.59                |
| JB B-2 EX               | JB B-2 EX                           | PJB B-2  | RCP                 | 48               | 15.54                  | 16           | 113.55          | 107.14         | 9.04               | 0.74                  | 803.92            | 803.81          | 809.76           | 809.64             | 42.67          | 38.61          | 0.56                |
| PJB B-2                 | PJB B-2                             | PCO US29 B-9                                     | RCP                 | 48               | 4.08                   | 4            | 113.55          | 101.14         | 9.04               | 1.22                  | 803.55            | 803.5           | 808.54           | 808.48             | (N/A)          | 38.61          | 0.50                |
| US29 B-9                | PCO US29 B-9                        | PCO US29 B-10                                    | RCP                 | 48               | 120.82                 | 121          | 116.98          | 99.19          | 9.31               | 0.50                  | 803.4             | 802.8           | 807.46           | 806.65             | (N/A)          | 39.14          | 0.48                |
| US29 B-10<br>US29 B-11  | PCO US29 B-10<br>PCO US29 B-11      | PCO US29 B-11<br>PCO US29 B-12                   | RCP<br>RCP          | 48<br>48         | 120<br>120             | 120<br>120   | 120.29<br>123   | 99.51<br>90.84 | 9.57<br>9.79       | 0.50<br>0.42          | 802.7<br>801      | 802.1<br>800.5  | 806.54<br>805.06 | 805.4<br>803.84    | (N/A)<br>(N/A) | 39.62<br>40.01 | 0.48                |
| US29 B-11A              | PCO US29 B-11                       | SWAQ110 BYPASS                                   | RCP                 | 48               | 77.26                  | 77           | 125.73          | 119.11         | 10.01              | 0.78                  | 798.7             | 798.1           | 803.45           | 802.78             | 42.34          | 40.01          | 0.69                |
| US29 B-12B              | SWAQ110 BYPASS                      | PCO US29 B-13                                    | RCP                 | 48               | 8.3                    | 8            | 125.73          | 106.17         | 10.01              | 1.20                  | 798.1             | 798             | 802.55           | 802.41             | (N/A)          | 40.38          | 0.55                |
| US29 B-13A              | PCO US29 B-13                       | EX CMP T4  | RCP                 | 48               | 10.06                  | 10           | 128.3           | 137.82         | 10.21              | 1.15                  | 796.8             | 796.69          | 802.18           | 802.08             | 36.66          | 40.72          | 0.92                |
| US29 B-13A EX           | EX_CMP_T4                           | CI-130 (TY II) (15') EX                          | RCP                 | 48               | 100.01                 | 100          | 128.3           | 114.43         | 10.21              | 0.68                  | 796.69            | 796             | 801.91           | 801.05             | (N/A)          | 40.72          | 0.63                |
| US29 B-14 EX            | PCO US29 B-14 EX                    | CI-130 (TY II) (15') EX                          | RCP                 | 18               | 6.65                   | 7            | 3.46            | 23.44          | 1.96               | 7.98                  | 798.53            | 798             | 800.04           | 800.03             | 4.68           | 8.52           | 4.98                |
| CI-130 EX               | CI-130 (TY II) (15') EX             | MH B-5 EX  | RCP                 | 48               | 96.56                  | 97           | 131.76          | 110.67         |                    | 0.62                  | 795.9             | 795.3           | 799.79           | 798.73             | (N/A)          | 41.16          | 0.59                |
| MH B-5 EX-A             | MH B-5 EX                           | PJB-US29 E                                       | RCP                 | 48               | 10.05                  | 10           | 131.76          | 98.17          | 10.49              | 0.70                  | 789.64            | 789.57          | 793.9            | 793.77             | (N/A)          | 41.16          | 0.47                |
| MH B-5 EX-B             | PJB-US29 E                          | OUT-B<br>PCO US29 B-1                            | RCP                 | 48               | 8.34                   | 8            | 139.31          | 107.48         |                    | 0.76                  | 789.55            | 789.48          | 793.59           | 793.48             | (N/A)          | 42.05          | 0.56                |
| PS B-1<br>US29 B-1      | PJB PS B-1<br>PCO US29 B-1          | PCO US29 B-1<br>PCO US29 B-2                     | RCP<br>RCP          | 24<br>24         | 44.07<br>3             | 3            | 12.96<br>16.75  | 29.03<br>25.29 | 4.13<br>5.33       | 1.82<br>3.33          | 818<br>817.1      | 817.2<br>817    | 821.57<br>821.37 | 821.41<br>821.33   | 11.24<br>14.27 | 15.55<br>17.71 | 1.65<br>1.25        |
| MF B-1                  | MF B-1 EX                           | PCO US29 B-5                                     | RCP                 | 18               | 20.74                  | 21           | 8.64            | 5.18           | 4.89               | 0.29                  | 814.36            | 814.3           | 817.78           | 817.61             | (N/A)          | 13.66          | 0.24                |
| PB B-1                  | PB B-1 EX                           | PCO US29 B-7                                     | RCP                 | 18               | 18.53                  | 19           | 11.52           | 19.07          | 6.52               | 3.99                  | 811.84            | 811.1           | 815.38           | 815.11             | 10.09          | 15.52          | 3.30                |
| CANE PP B-1 EX          | CANE PP B-1 EX                      | EX_CMP_T   | RCP                 | 18               | 48.54                  | 49           | 18.12           | 11.1           | 10.26              | 1.15                  | 810.85            | 810.29          | 813.85           | 812.36             | (N/A)          | 17.43          | 1.12                |
| CANE PP B-1             | EX_CMP_T                            | PCO US29 B-8                                     | RCP                 | 18               | 8                      | 8            | 18.12           | 25.56          | 10.26              | 7.40                  | 810.29            | 809.7           | 812.26           | 811.96             | 11.2           | 17.43          | 5.92                |
| CI-110 EX               |                                     | CI-105 (TY II) (15') EX                          | RCP                 | 18               | 274.15                 | 274          | 4.23            | 10.69          | 5.69               | 1.09                  | 812               | 809             | 812.79           | 810.18             | 7.87           | 9.46           | 1.04                |
| CI-105 EX               |                                     | CI-115 (TY II) (15') EX                          | RCP                 | 24               | 72.62                  | 73           | 8.92            | 28.9           | 8.1                | 1.72                  | 808.5             | 807.25          | 810.04           | 809.98             | 9.16           | 12.79          | 1.63                |
| CI-115 EX               | CI-115 (TY II) (15') EX             | JB B-2 EX  | RCP                 | 24               | 70.5                   | 71           | 10.77           | 39.14          | 3.43               | 3.16                  | 807.15            | 804.92          | 809.92           | 809.75             | 8.6            | 14.12          | 2.99                |
| WLDR B-2<br>System C    | PCO WLDR B-2                        | CI-105 (TY II) (15') EX                          | DC ALCH PIDE        | DES 3            | 8.22                   | 8            | 4.69            | 15.4           | 4.7                | 0.97                  | 808.7             | 808.62          | 810.12           | 810.11             | 6.05           | 6.92           | 0.68                |
| CI-55 EX                | CI-55 (TY II) (10') FX              | CI-60 (TY II) (15') EX                           | RCP                 | 18               | 179.2                  | 179          | 4.77            | 13.35          | 6.92               | 1.67                  | 824.5             | 821.5           | 825.34           | 823.01             | 7.44           | 10.07          | 1.62                |
| CI-60 EX                |                                     | CI-65 (TY II) (15 ) EX                           | RCP                 | 18               | 96.32                  | 96           | 8.48            | 6.68           | 4.8                | 0.42                  | 821.4             | 821             | 822.92           | 822.13             | (N/A)          | 13.54          | 0.40                |
| CI-65 EX                | CI-65 (TY_II) (15 ) EX              | JB A-1A EX                                       | RCP                 | 18               | 245.78                 | 246          | 9.51            | 18.53          | 10.55              | 3.23                  | 820               | 812.05          | 821.19           | 815.81             | 9.14           | 14.3           | 3.11                |
| System D                |                                     |  |                     |                  |                        |              |                 |                |                    |                       |                   |                 |                  |                    |                |                |                     |
| US29 D-1                | PCU US29 D-1                        | PCU US29 D-2                                     | RCP                 | 18               | 245                    | 245          | 3.68            | 10.44          | 2.08               | 1.01                  | 815.57            | 813.1           | 817.65           | 817.35             | 7.38           | 8.79           | 0.99                |
| US29 D-2                | PCU US29 D-2                        | PCU US29 D-3                                     | RCP                 | 18               | 195                    | 195          | 7.18            | 9.99           | 4.06               | 0.93                  | 813.01            | 811.2           | 817.28           | 816.34             | 11.29          | 12.46          | 0.91                |
| US29 D-3                | PCU US29 D-3                        | PCU US29 D-4                                     | RCP                 | 18               | 150.45                 | 150          | 10.81           | 10.61          | 6.12               | 1.05                  | 811.09            | 809.5           | 816.28           | 814.64             | 15.07          | 15.13          | 1.02                |
| US29 D-4                | PCU US29 D-4                        | PCU US29 D-5                                     | RCP                 | 18               | 114.99                 | 115          | 13.88           | 8.48           | 7.85               | 0.68                  | 809.38            | 808.6           | 814.76           | 812.67             | (N/A)          | 16.54          | 0.65                |
| US29 D-5<br>System E    | PCU US29 D-5                        | PJB-US29 D                                       | RCP                 | 24               | 107.33                 | 107          | 16.88           | 14.22          | 5.37               | 0.41                  | 808.04            | 807.6           | 812.12           | 811.5              | (N/A)          | 17.78          | 0.40                |
| US29 E-1                | PCU US29 E-1                        | PCU US29 E-2                                     | RCP                 | 18               | 195                    | 195          | 2.69            | 12.63          | 5.68               | 1.48                  | 804.4             | 801.5           | 805.02           | 802.34             | 5.64           | 7.47           | 1.45                |
| US29 E-2                | PCU US29 E-2                        | PCU US29 E-3                                     | RCP                 | 18               | 160                    | 160          | 5.23            | 15.13          | 7.78               | 2.14                  | 801.42            | 798             | 802.3            | 799.05             | 7.3            | 10.57          | 2.07                |
| US29 E-3                | PCU US29 E-3                        | PJB-US29 E                                       | RCP                 | 18               | 40.22                  | 40           | 7.55            | 9.77           | 6.1                | 0.98                  | 797.9             | 797.5           | 798.96           | 798.49             | 11.88          | 12.78          | 0.87                |
|                         |                                     |  |                     |                  |                        | <del>-</del> |                 |                | _                  |                       |                   |                 |                  |                    |                | _              |                     |

# NOTES:

1. ANALYSIS WAS PERFORMED USING THE CURRENT VERSION OF OPENROADS DRAINAGE AND UTILITIES WHICH PERFORMS CALCULATIONS IN ACCORDANCE WITH FHWA HEC-22





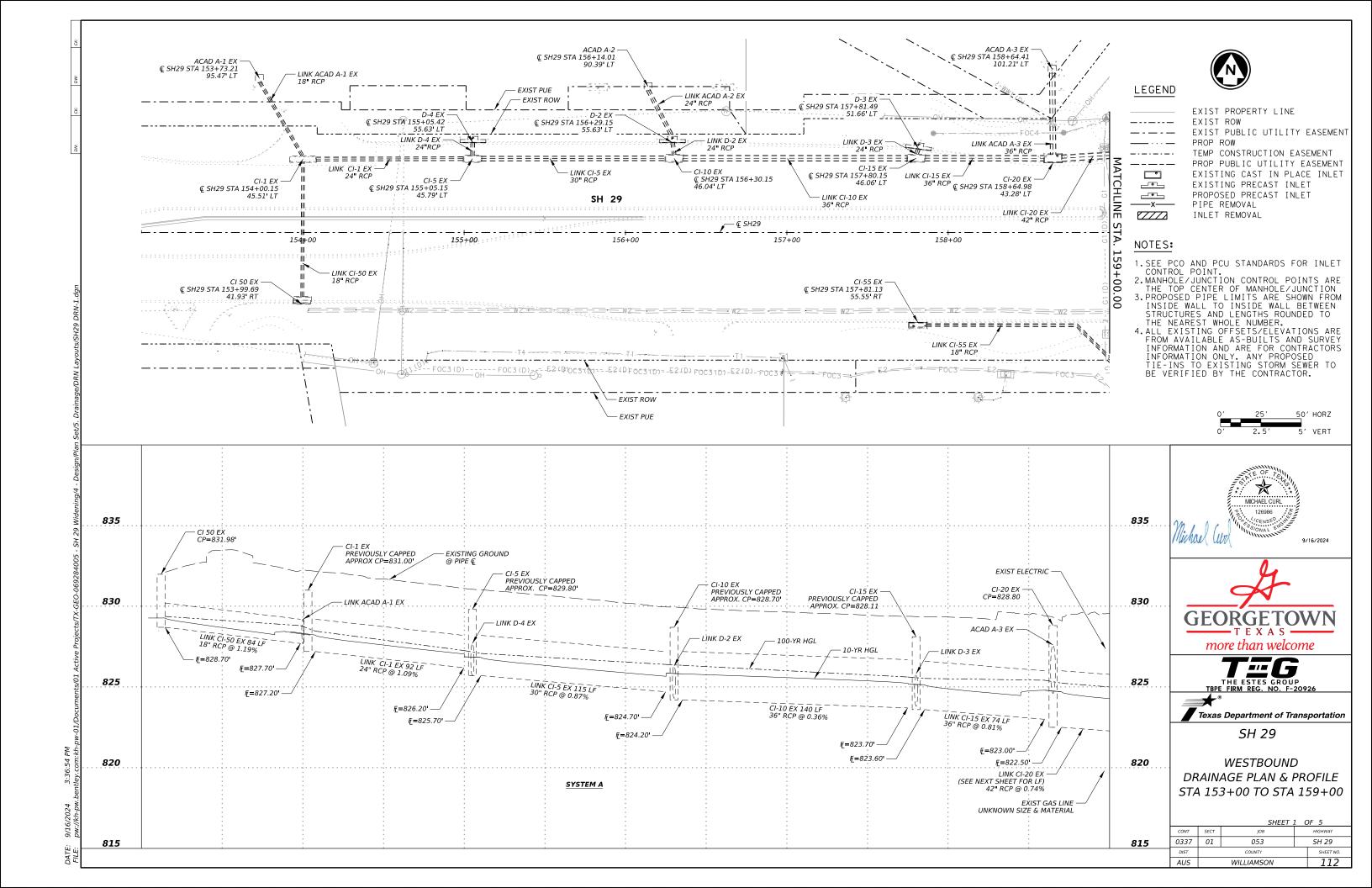


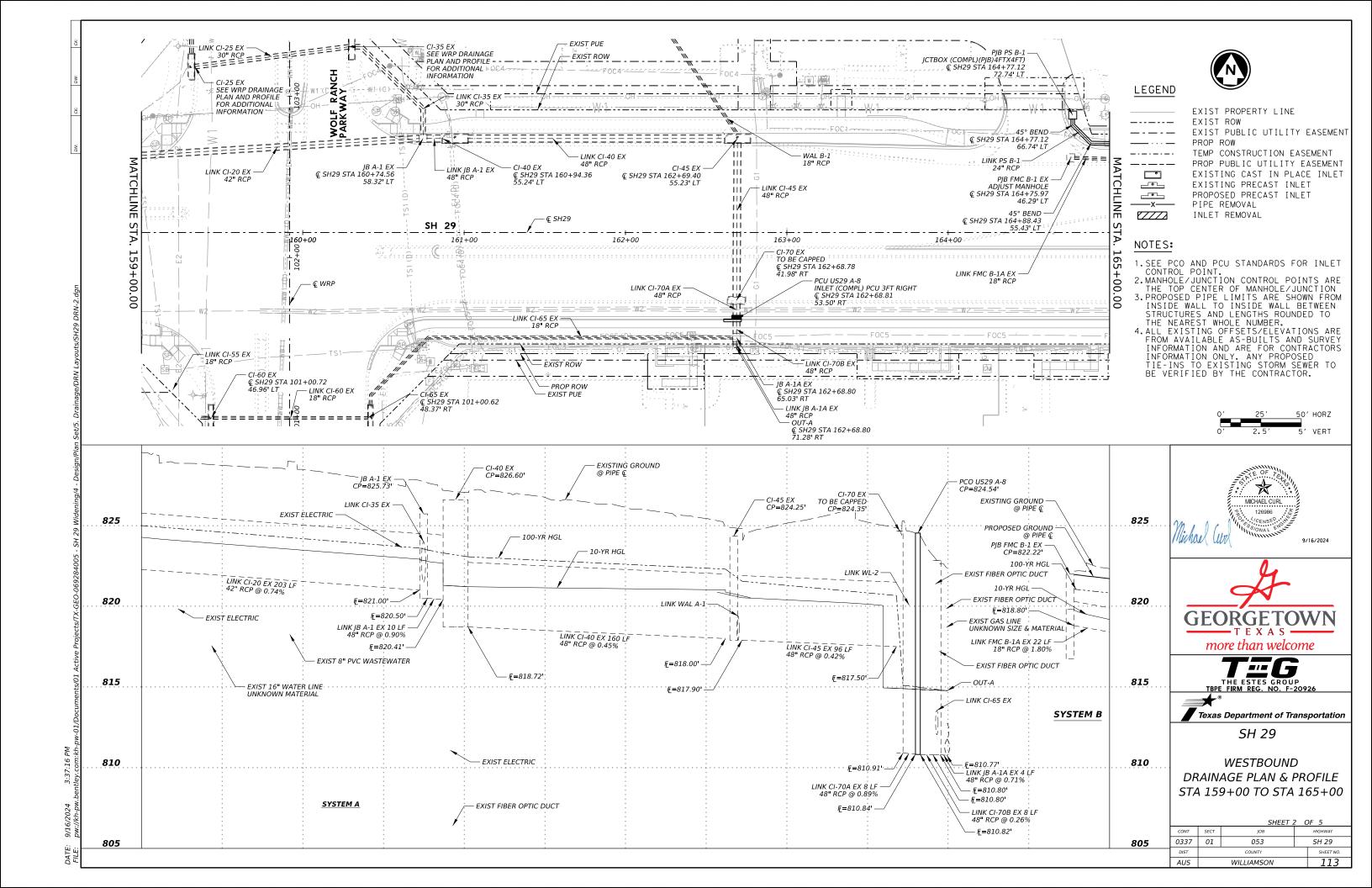


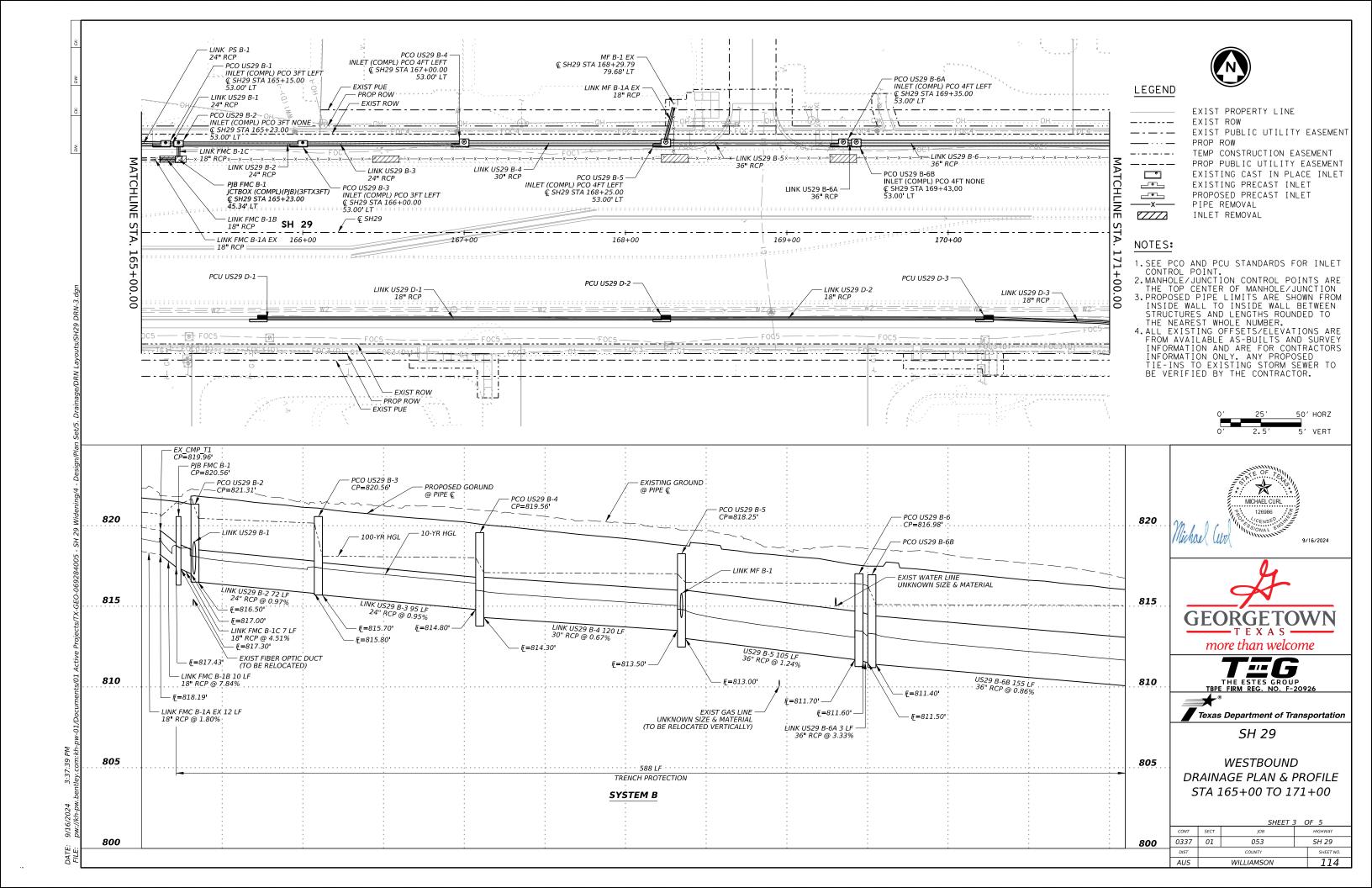
SH 29

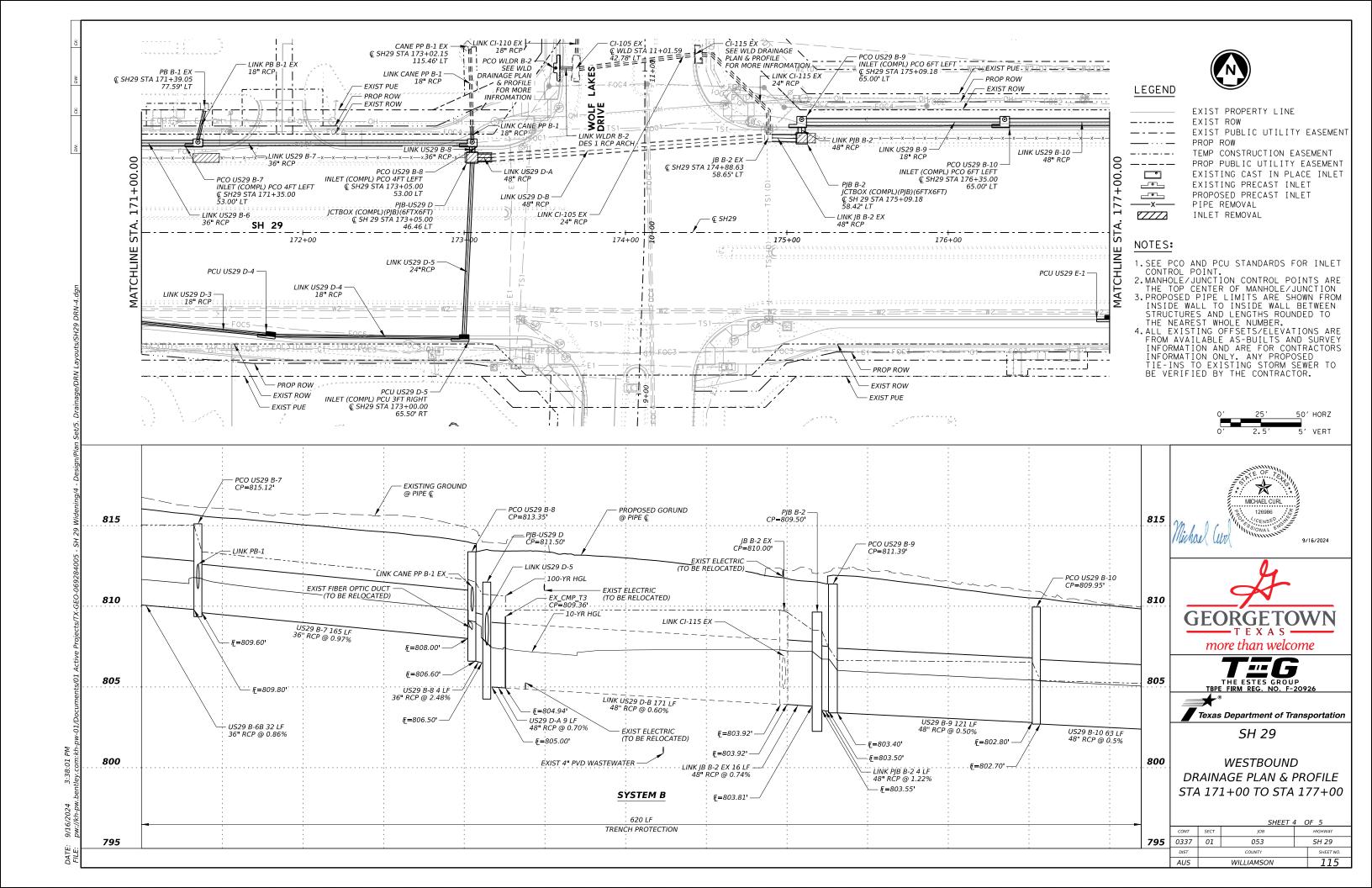
HYDRAULIC DATA 100-YR STORM SEWER

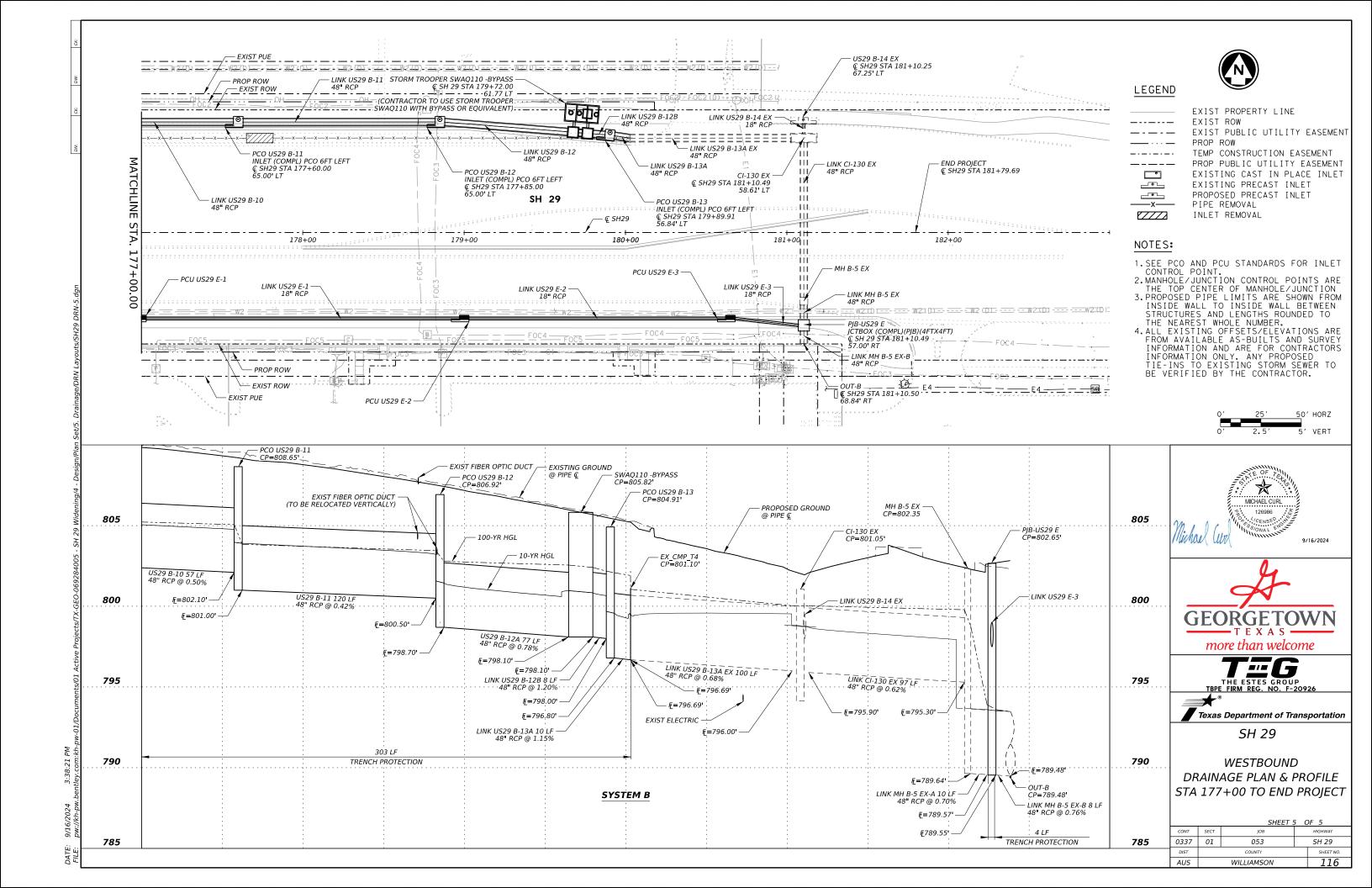
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|------|------|------------|-------|-----------|--|--|
| CONT | SECT | JOB        |       | HIGHWAY   |  |  |
| 0337 | 01   | 053        | SH 29 |           |  |  |
| DIST |      | COUNTY     |       | SHEET NO. |  |  |
| AUS  |      | WILLIAMSON | 111   |           |  |  |

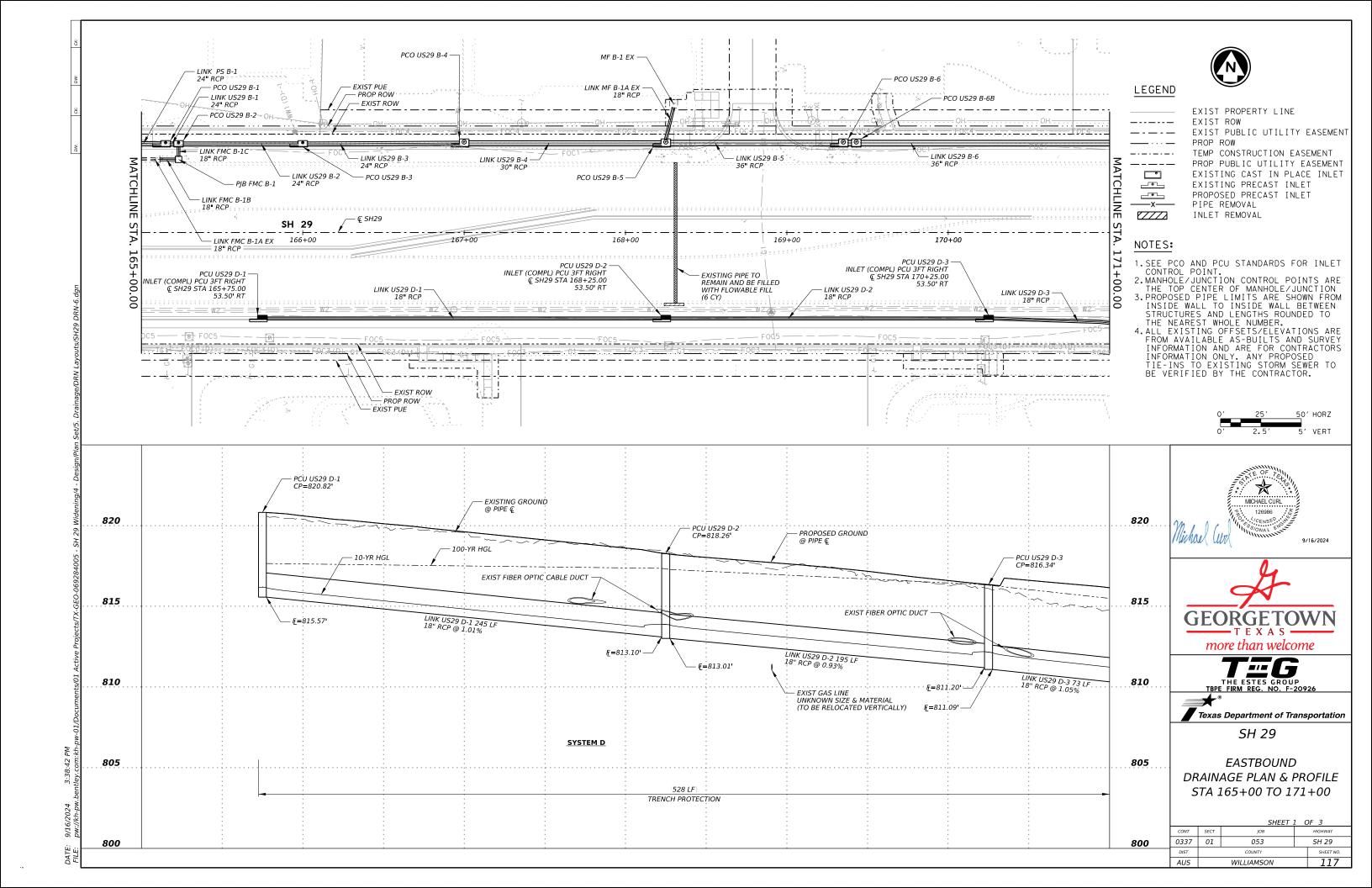


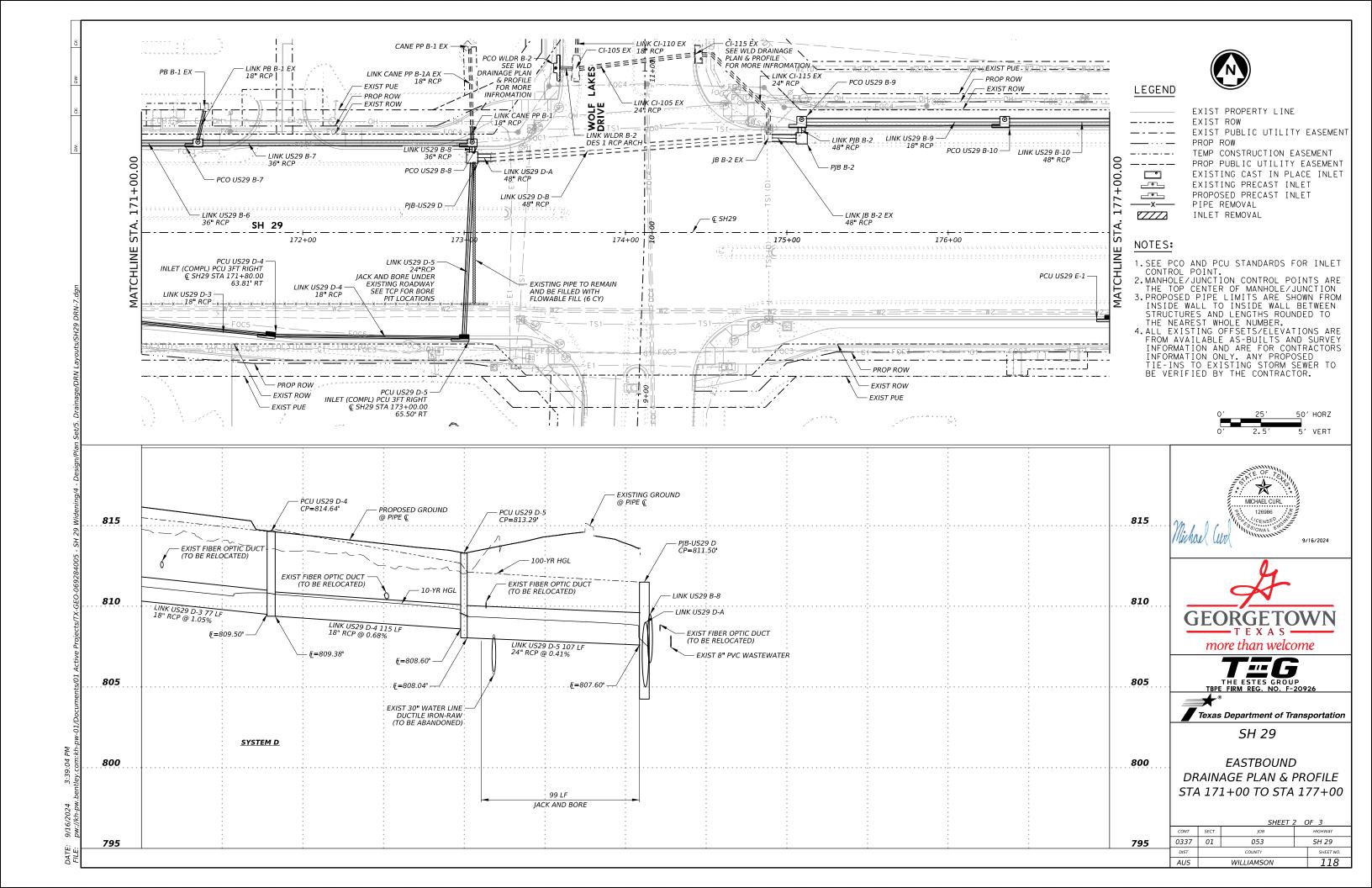


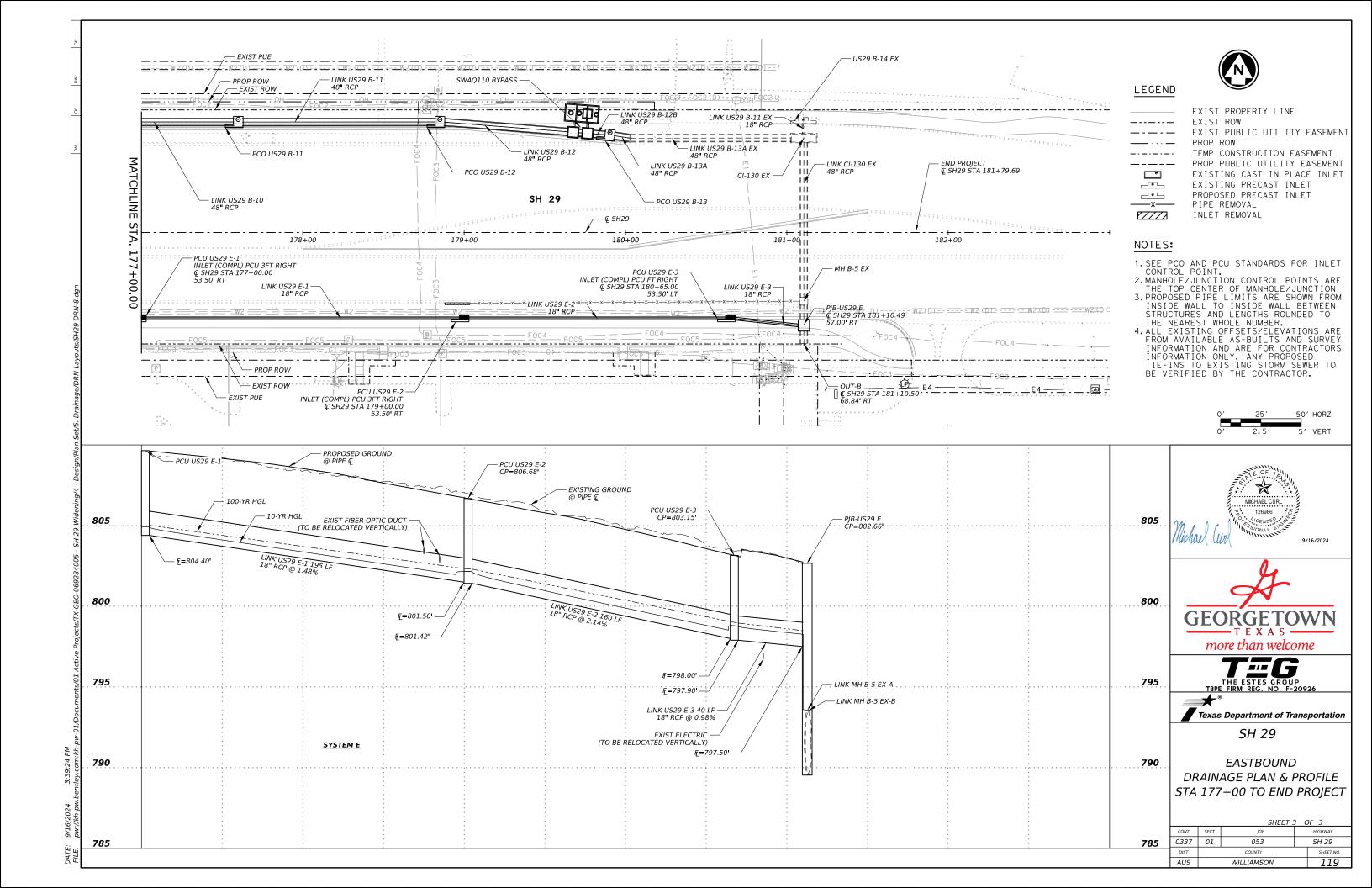


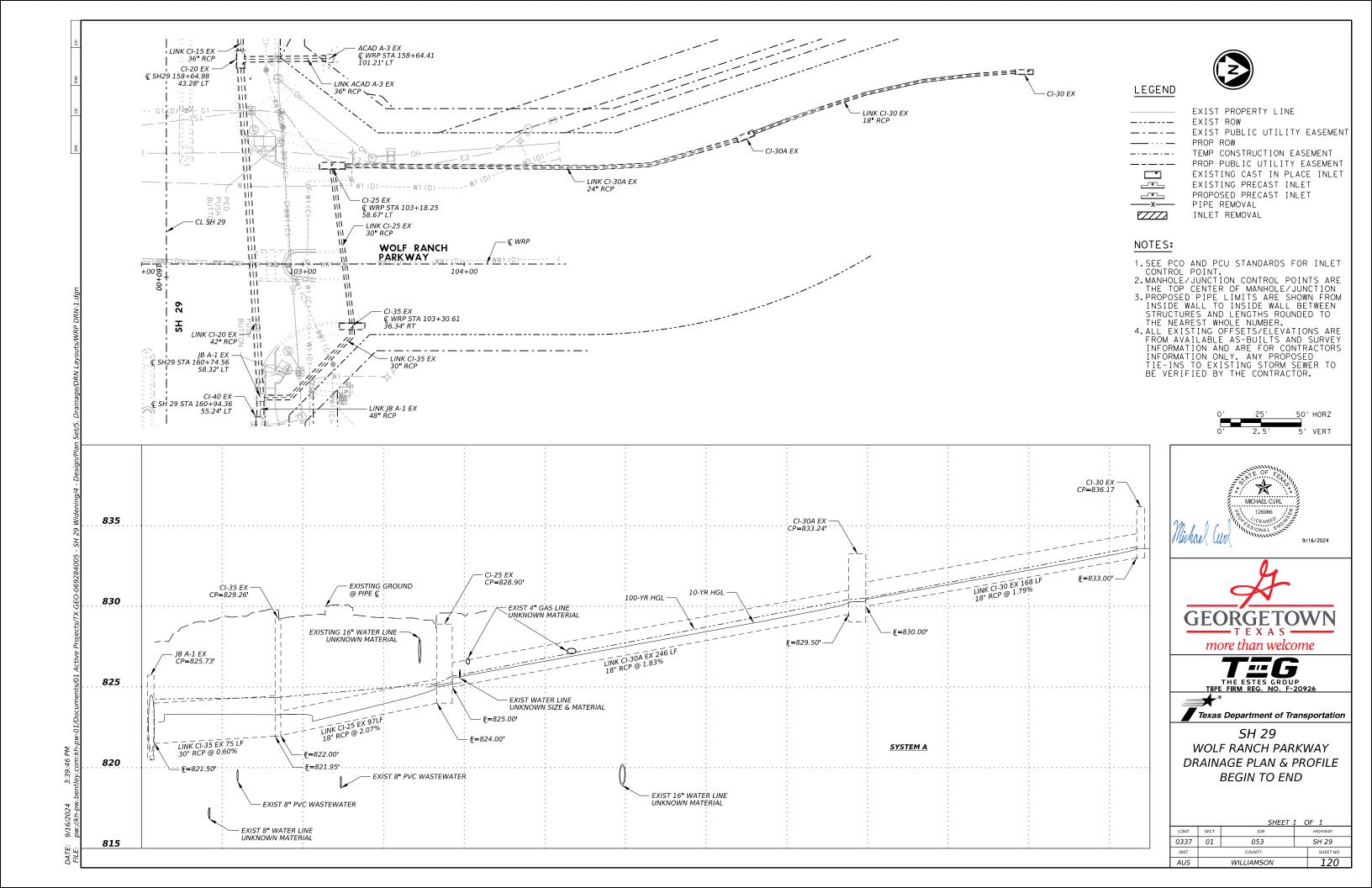


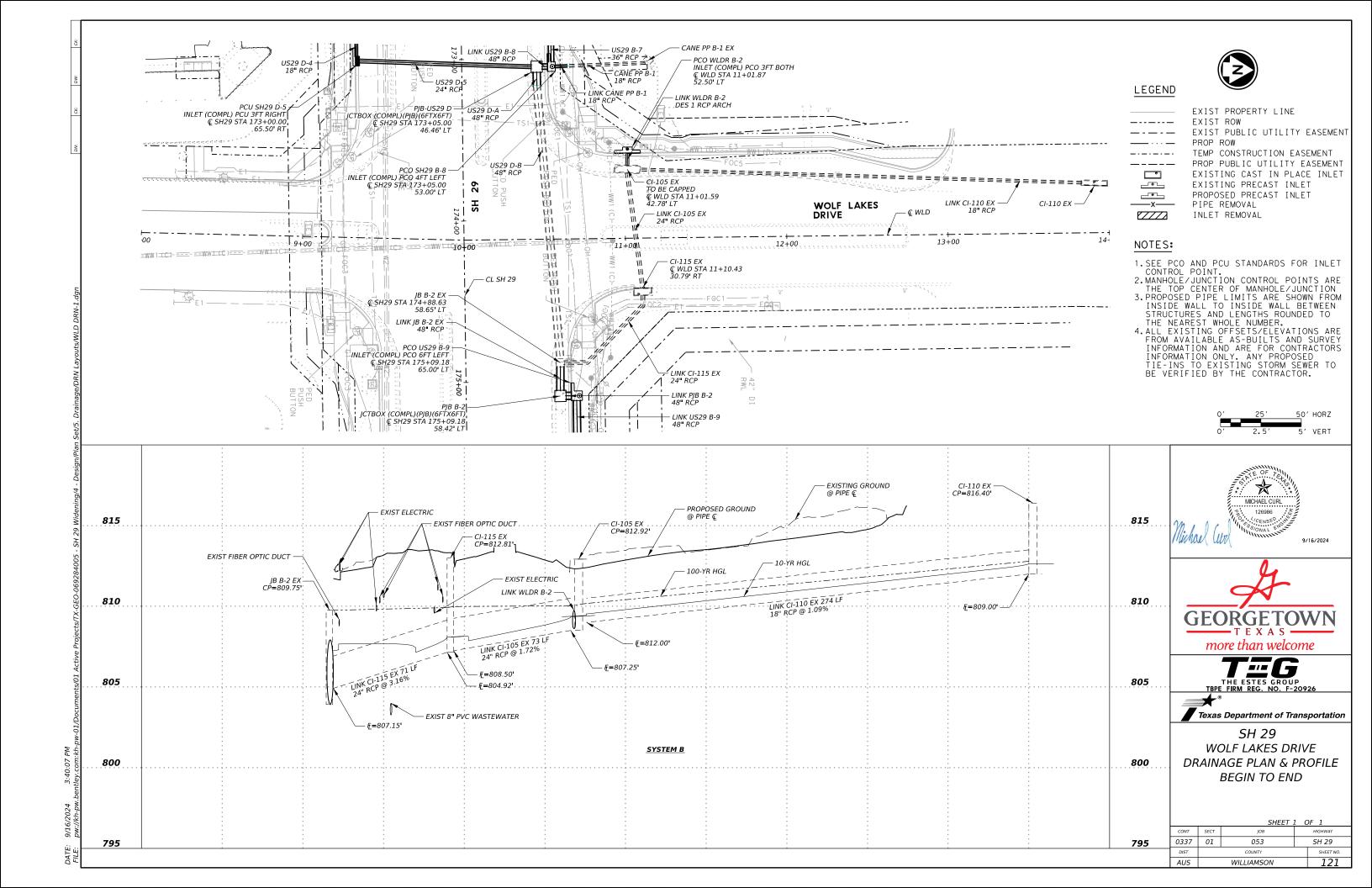


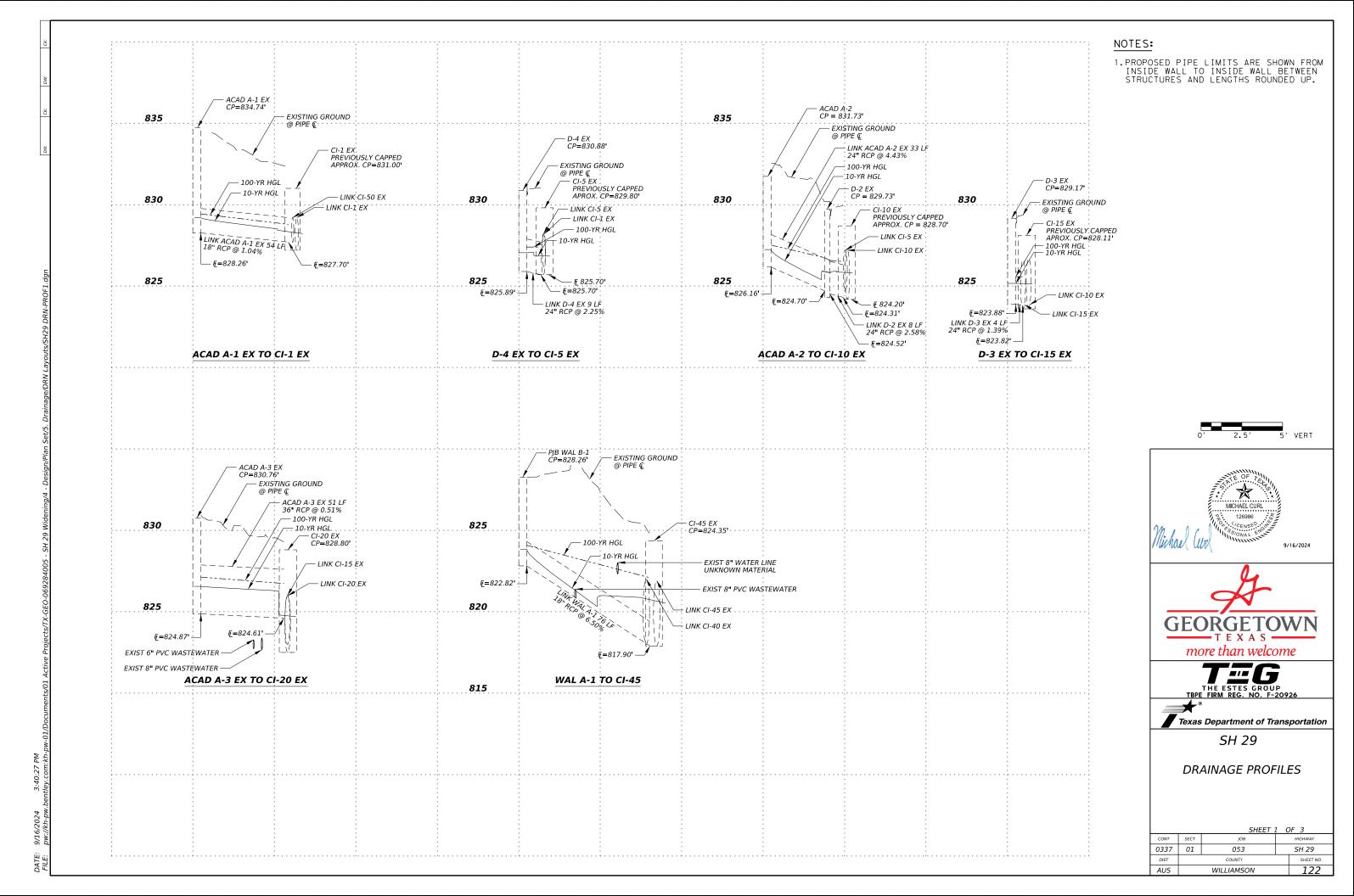


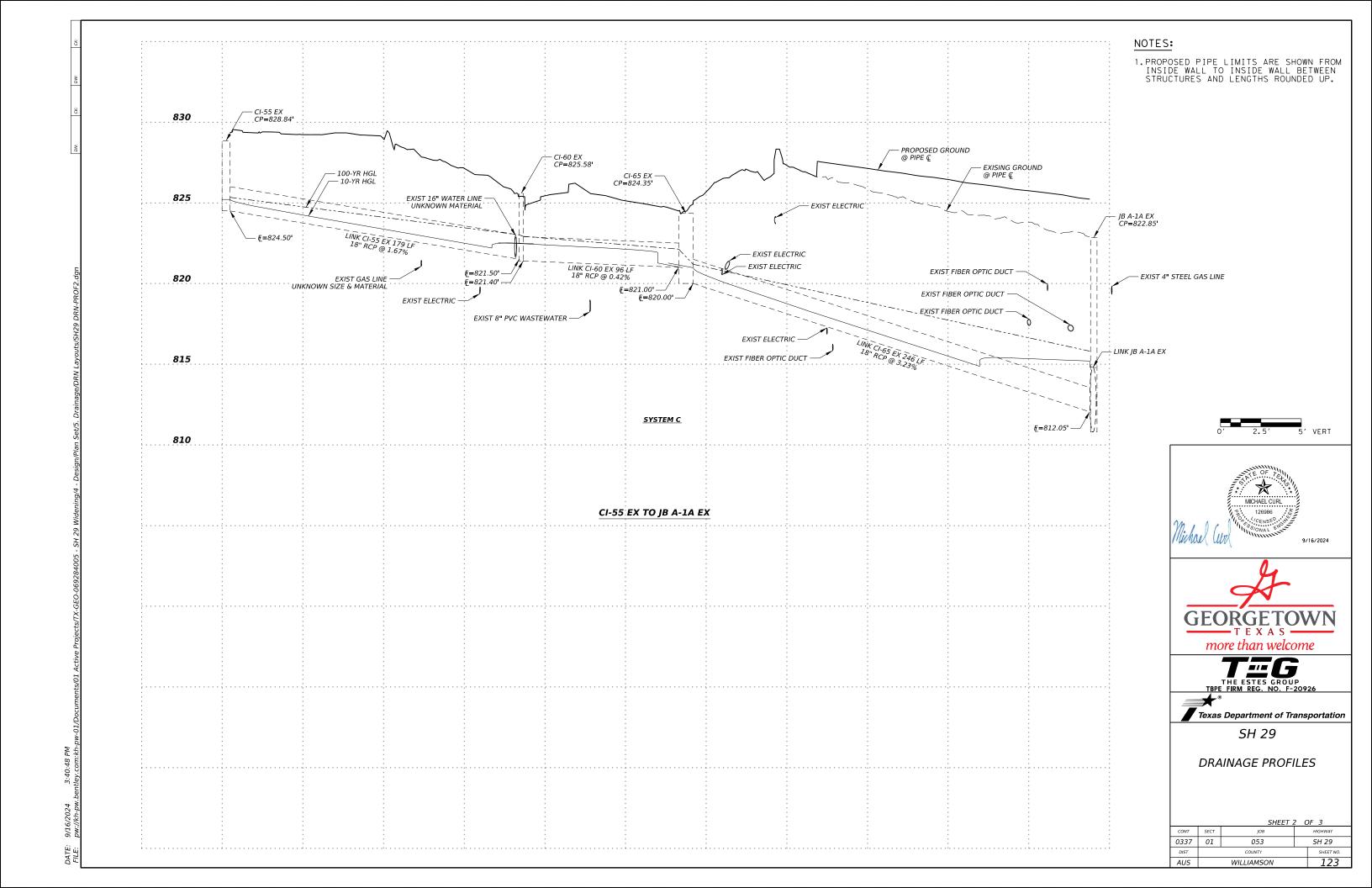


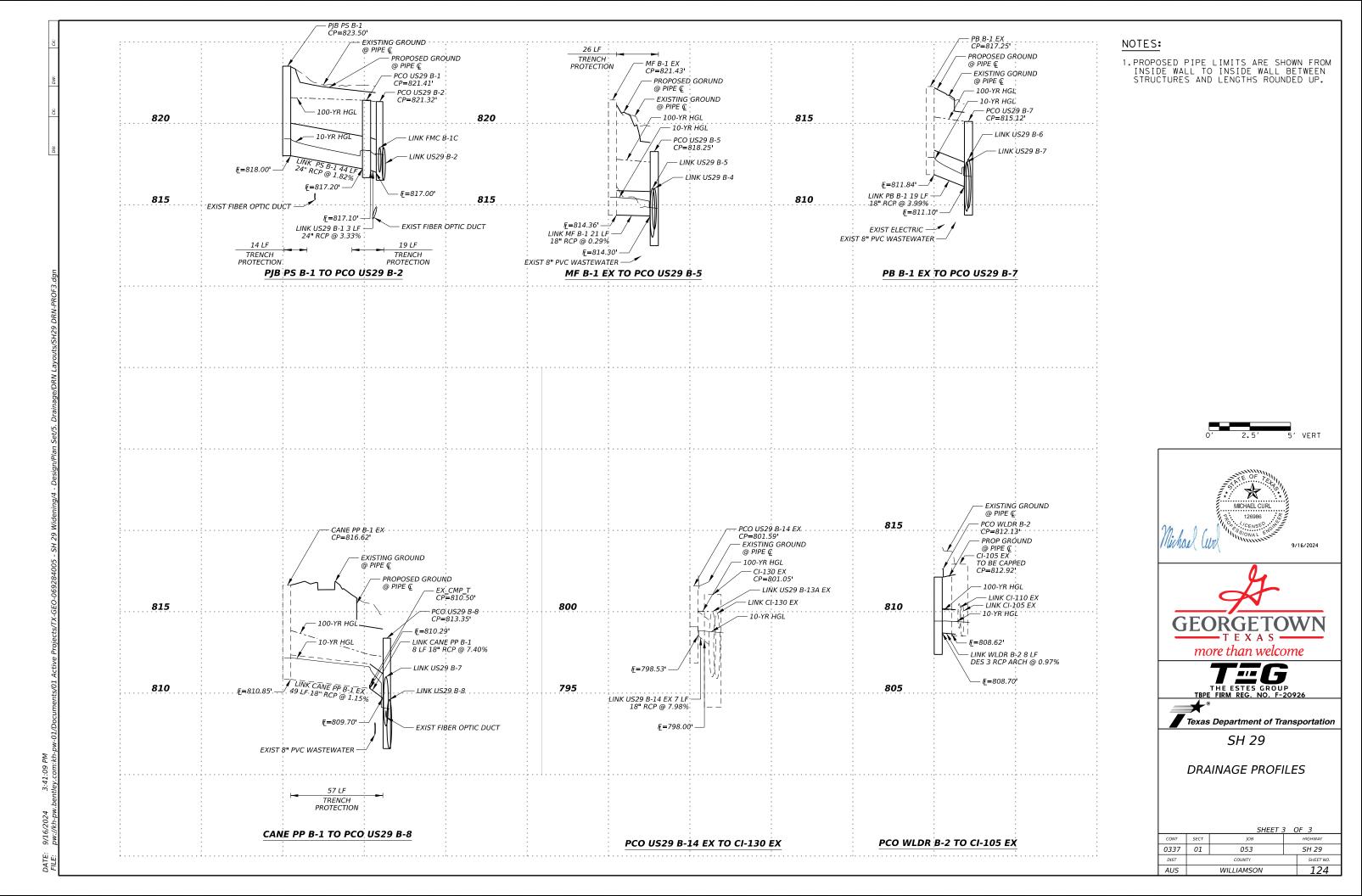




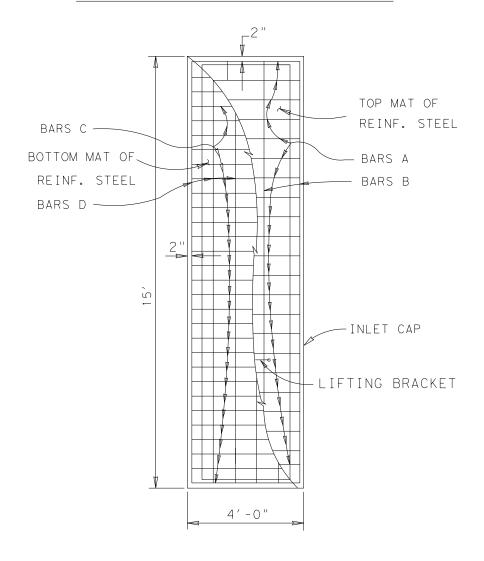






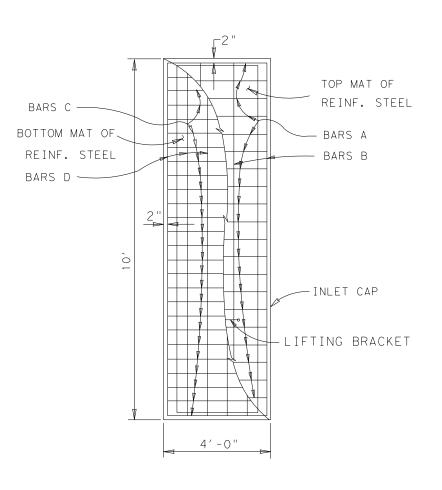


# CAP FOR A CURB INLET



| RI   | EINFO         | RCIN        | G STEE                      | L                               |  |  |
|------|---------------|-------------|-----------------------------|---------------------------------|--|--|
| BAR  | NO.           | SIZE        | SPAC.                       | LEN.                            |  |  |
| А    | 24            | 4           | 7"                          | 3′-8"                           |  |  |
| В 4  |               | 4           | 1′-2"                       | 14′-8"                          |  |  |
| C 19 |               | 6           | 9"                          | 3′-8"                           |  |  |
| D    | 9             | 4           | 6"                          | 14′-8"                          |  |  |
|      | BAR<br>A<br>B | A 24<br>B 4 | BAR NO. SIZE  A 24 4  B 4 4 | A 24 4 7" B 4 4 1'-2" C 19 6 9" |  |  |

# CAP FOR A CURB INLET



| RE  | REINFORCING STEEL |      |       |       |  |  |  |  |  |  |  |  |  |
|-----|-------------------|------|-------|-------|--|--|--|--|--|--|--|--|--|
| BAR | NO.               | SIZE | SPAC. | LEN.  |  |  |  |  |  |  |  |  |  |
| А   | 24                | 4    | 7 "   | 3′-8" |  |  |  |  |  |  |  |  |  |
| В   | 4                 | 4    | 1′-2" | 9′-8" |  |  |  |  |  |  |  |  |  |
| С   | 19                | 6    | 9"    | 3′-8" |  |  |  |  |  |  |  |  |  |
| D   | 9                 | 4    | 6"    | 9′-8" |  |  |  |  |  |  |  |  |  |



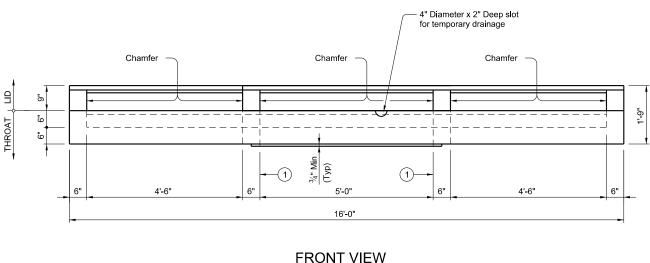


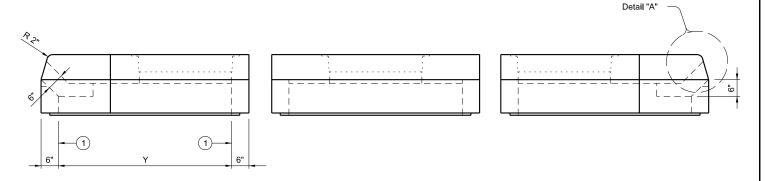


SH 29

DRAINAGE DETAILS

|      | SHEET 1 OF 1 |            |  |           |  |  |  |  |  |  |
|------|--------------|------------|--|-----------|--|--|--|--|--|--|
| CONT | SECT         | JOB        |  | HIGHWAY   |  |  |  |  |  |  |
| 0337 | 01           | 053        |  | SH 29     |  |  |  |  |  |  |
| DIST |              | COUNTY     |  | SHEET NO. |  |  |  |  |  |  |
| AUS  |              | WILLIAMSON |  | 125       |  |  |  |  |  |  |



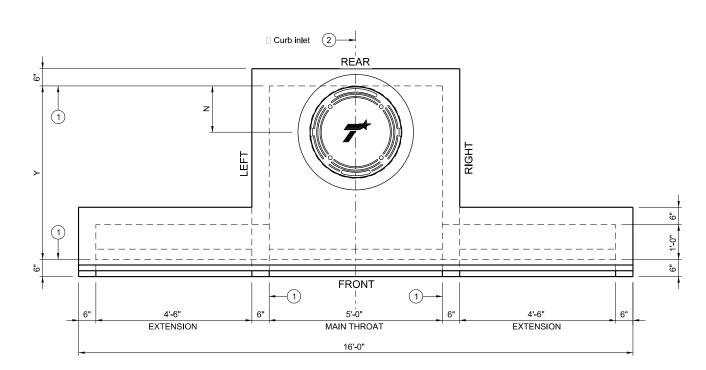


FRONT VIEW
(Showning left and right extensions)

RIGHT VIEW

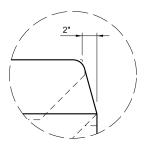
REAR VIEW
(Extensions not shown)

LEFT VIEW



1 Matches inside face of wall of precast base or riser below inlet.

(2) Reference point is located where the the main throat intersects the normal gutter line. See Curb and Gutter Transition Details for PCO Inlet (CGT-PCO) standard for more information.



DETAIL "A"

HS20 LOADING

SHEET 1 OF 2



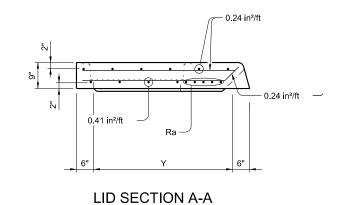
Bridge Division Standard

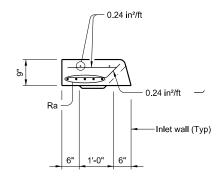
PRECAST CURB INLET OUTSIDE ROADWAY

PCO

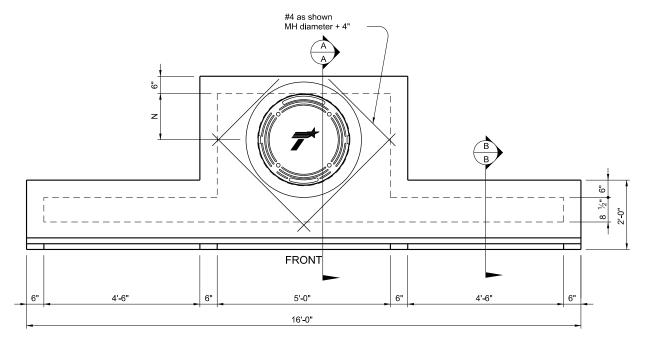
| : CD-PCO-23.dgn                 | DN: TxD | ОТ             | ck: TxDOT Dw: |           | TxDOT   | ск: TxDOT |  |  |  |  |  |  |
|---------------------------------|---------|----------------|---------------|-----------|---------|-----------|--|--|--|--|--|--|
| TxDOT February 2020             | CONT    | SECT           | JOB           |           | HIGHWAY |           |  |  |  |  |  |  |
| REVISIONS                       | 0337    | 01             | 053           |           |         | SH 29     |  |  |  |  |  |  |
| 06-2023, Added reference point. | DIST    |                |               | SHEET NO. |         |           |  |  |  |  |  |  |
|                                 | AUS     | WILLIAMSON 126 |               |           |         |           |  |  |  |  |  |  |

(Showning left and right extensions)





# LID SECTION B-B



# LID PLAN VIEW

(Showning left and right extensions)

# FABRICATION NOTES:

- 1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
- 2. Provide Grade 60 reinforcing steel or equivalent area of WWR.

  3. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in the plans.
- 4. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
- Lid may employ a butt joint with dowels at the Contractor's option.

  5. Provide lifting devices in conformance with Manufacturer's recommendations.

  6. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.
- <sup>3</sup>/<sub>4</sub>" as shown in Front View, sheet 1. 7. Chamfer vertical edges of inlet lid
- INSTALLATION NOTES:

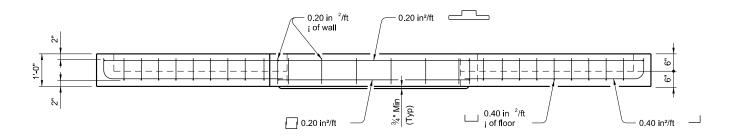
- Inlet throat and lid are not intended for direct traffic. Do not place in roadway.
   Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint
- depth, whichever is greater.

  3. Do not grout rubber gasket joints without Manufacturer's recommendation.

# GENERAL NOTES:

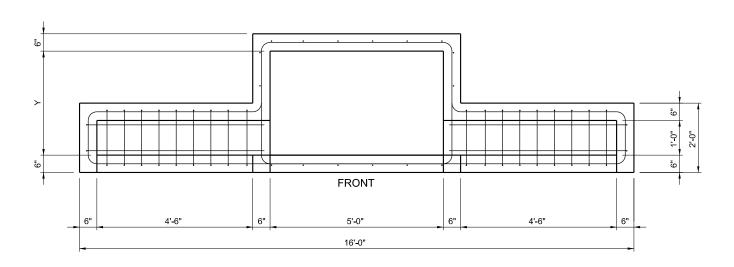
- Designed according to ASTM C913.
   Open area of main throat = 360 sq in. Open area of one extension throat = 324 sq in.
- 3. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, size, and extension placement. Extensions are subsidiary to inlet.

Cover dimensions are clear dimensions, unless noted otherwise.



# THROAT ELEVATION VIEW

(Showning left and right extensions)



# THROAT PLAN VIEW

(Showning left and right extensions)

| Size (Y) | N   | MH Dia* | Ra                |
|----------|-----|---------|-------------------|
| 3'       | 9"  | 18"     | (4) #5 Additional |
| 4'       | 16" | 32"     | (4) #5 Additional |
| 5'       | 16" | 32"     | (4) #5 Additional |
| 6'       | 16" | 32"     | (4) #5 Additional |

\*Nominal ring and cover size.



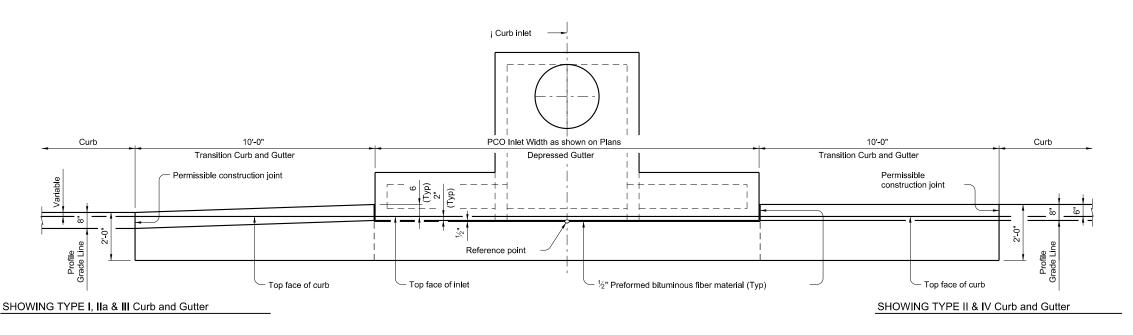


PRECAST CURB INLET

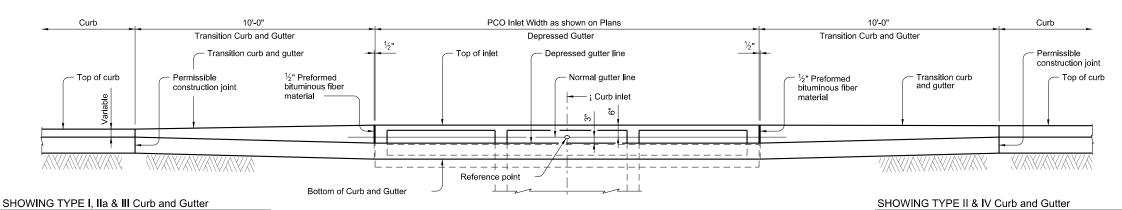
# **OUTSIDE ROADWAY**

PCO

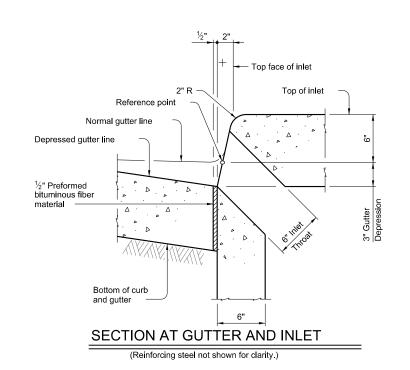
| E: CD-PCO-23.dgn                | DN: TxD | ОТ   | ск: TxDOT | DW:       | TxDOT | ск: ТхDОТ |  |  |
|---------------------------------|---------|------|-----------|-----------|-------|-----------|--|--|
| TxDOT February 2020             | CONT    | SECT | JOB       |           | н     | GHWAY     |  |  |
| REVISIONS                       | 0337    | 01   | 053       |           |       | SH 29     |  |  |
| 06-2023; Added reference point, | DIST    |      |           | SHEET NO. |       |           |  |  |
|                                 | AUS     |      | WILLIAMSO |           | 127   |           |  |  |



# **PLAN**



# **ELEVATION**



# CONSTRUCTION NOTES:

Align top face of curb with PCO Inlet as shown. MATERIAL NOTES:
Provide ½" preformed bituminous fiber material.

## **GENERAL NOTES:**

Reference point is located where the i of the main throat intersects the normal gutter line. See Precast Curb Inlet Outside Roadway (PCO) standard for details and notes not shown.

See Concrete Curb and Curb and Gutter (CCCG-22)

standard for details and notes not shown. Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter.'

Preformed bituminous fiber material is subsidiary to PCO Inlet.

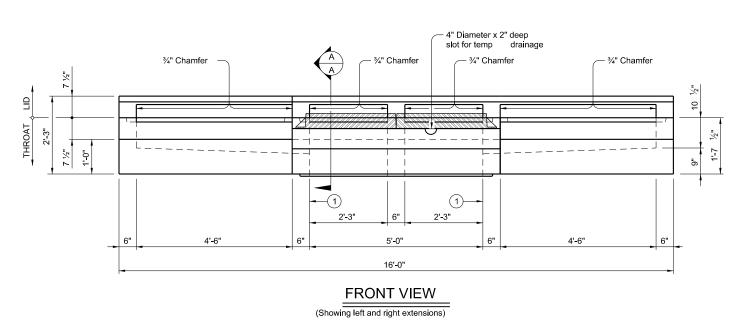


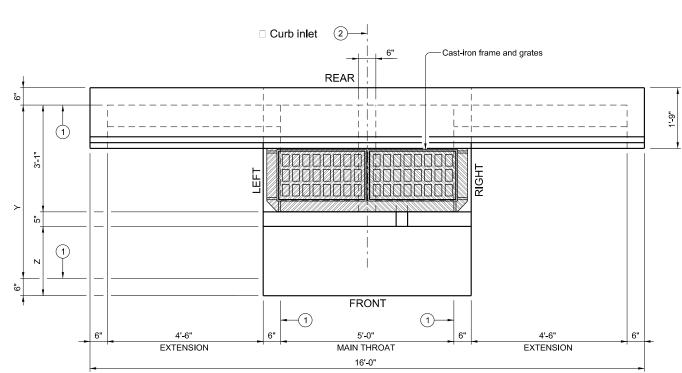
# **CURB AND GUTTER** TRANSITION DETAILS FOR PCO INLET

# CGT-PCO

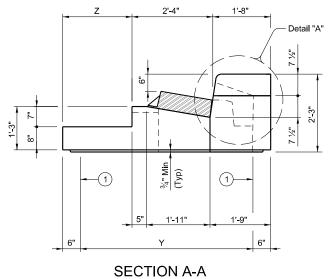
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|---------------------------------|---------|----------------|---------|-----------|-------|---------|--|--|--|--|--|
| TxDOT February 2020             | CONT    | SECT           | JOB     |           | Н     | HIGHWAY |  |  |  |  |  |
| REVISIONS                       | 0337    | 01             | 053     |           | SH 29 |         |  |  |  |  |  |
| 06-2023: Added reference point, | DIST    |                |         | SHEET NO. |       |         |  |  |  |  |  |
|                                 | AUS     | WILLIAMSON 128 |         |           |       |         |  |  |  |  |  |

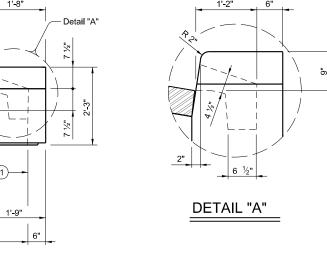






**PLAN VIEW** (Showing left and right extensions)





| TABLE OF<br>VARIABLE<br>DIMENSIONS<br>Size (Y) Z |    |  |
|--|----|--|
| Size (Y)   | Z  |  |
| 3'   | 0' |  |
| 4'   | 1' |  |

- 1 Matches inside face of wall of precast base or riser below inlet.
- Reference point is located where the ¡ of the main throat intersects the normal gutter line. See Curb and Gutter Transition Details for PCO Inlet (CGT-PCO) standard for more information.

**HS20 LOADING** 

SHEET 1 OF 2

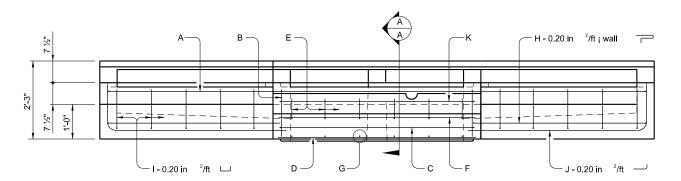
Bridge Division Standard



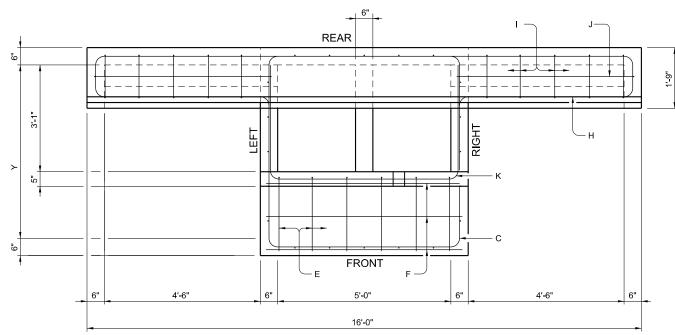
PRECAST CURB INLET **UNDER ROADWAY** 

PCH

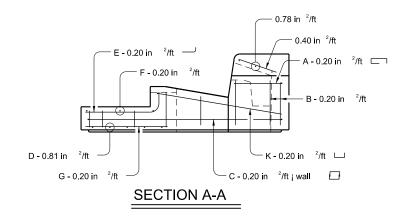
|                                |                             | _ (            | <i>-</i> U |     |       |           |  |  |
|--------------------------------|-----------------------------|----------------|------------|-----|-------|-----------|--|--|
| LE: CD-PCU-23.dgn              | DN: TxD                     | от             | ск: TxDOT  | DW: | TxDOT | ск: ТхDОТ |  |  |
| TxDOT February 2020            | CONT                        | SECT           | JOB        |     |       | HIGHWAY   |  |  |
| REVISIONS                      | REVISIONS 0337 01 053 SH 29 |                |            |     |       |           |  |  |
| 06-2023; Added reference point | DIST                        |                | COUNTY     |     |       | SHEET NO. |  |  |
|                                | AUS                         | WILLIAMSON 129 |            |     |       |           |  |  |



FRONT VIEW (Showing left and right extensions)



**PLAN VIEW** (Showing left and right extensions)



#### **FABRICATION NOTES:**

- Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
   Provide Grade 60 reinforcing steel or equivalent area of WWR.
- 3. Provide typical clear cover of 1  $\frac{1}{2}$ " to reinforcing steel from surface of concrete or lower outside shoulder.
- To relinform steer from states of the state of the state
- employ a butt joint with dowels at the Contractor's option.
- 6. Provide lifting devices in conformance with Manufacturer's recommendations.
- 7. Chamfer vertical edges on inlet lid 3/4" as shown in Front View, sheet 1.

## **INSTALLATION NOTES:**

- 1. Inlet throat is placed under roadway and intended for direct traffic. Inlet lid is not for direct traffic. Do not
- 2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
- 3. Do not grout rubber gasket joints without Manufacturer's recommendation.

#### **GENERAL NOTES:**

- Designed according to ASTM C913.
- Open area of main throat = 324 sq in.
   Payment for inlet is per Item 465, "Junction Boxes, Manholes and Inlets" by type, size and extension placement. Extensions are subsidiary to inlet.

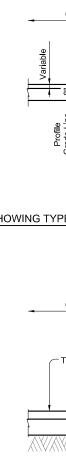




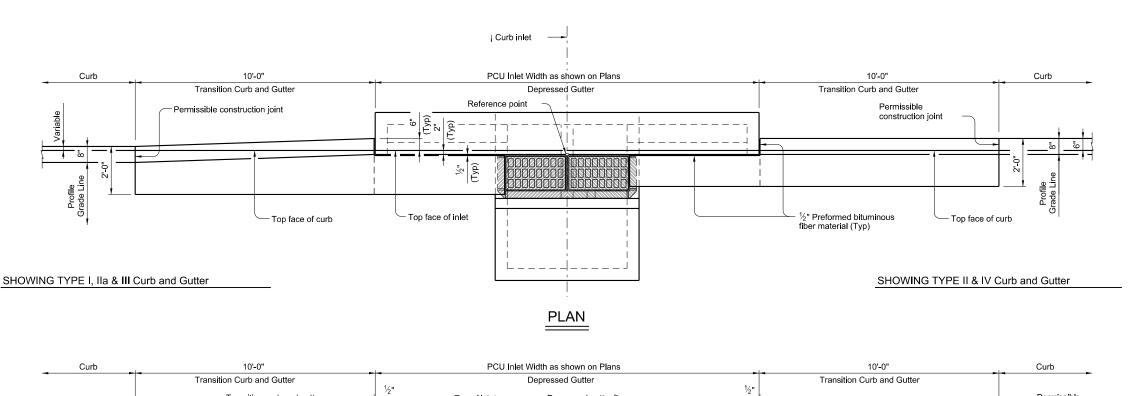
# PRECAST CURB INLET **UNDER ROADWAY**

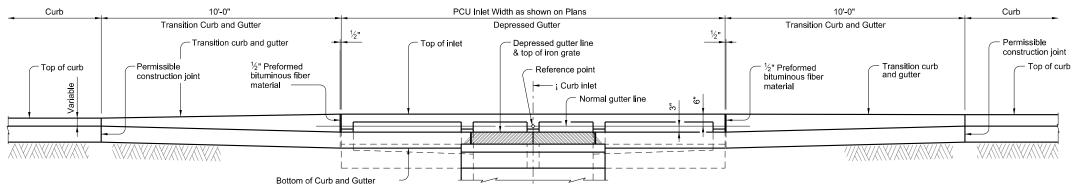
**PCU** 

| FILE: CD-PCU-23.dgn            | DN: TxD | ОТ             | ск: TxDOT | DW: | TxDOT   | ск: TxDOT |  |  |  |
|--------------------------------|---------|----------------|-----------|-----|---------|-----------|--|--|--|
| ©TxDOT February 2020           | CONT    | SECT           | JOB       |     | HIGHWAY |           |  |  |  |
| REVISIONS                      | 0337    | 01             | 053       |     | SH 29   |           |  |  |  |
| 06-2023; Added reference point | DIST    | COUNTY SHEET N |           |     |         |           |  |  |  |
|                                | AUS     |                | 130       |     |         |           |  |  |  |

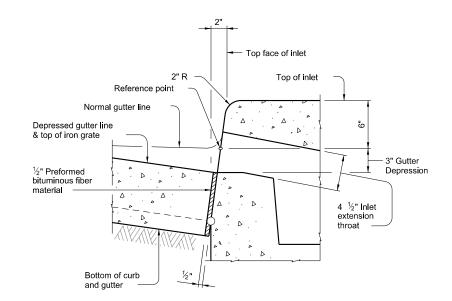


SHOWING TYPE I, Ila & III Curb and Gutter





# **ELEVATION**



# SECTION AT GUTTER AND INLET

(Reinforcing steel not shown for clarity.)

#### CONSTRUCTION NOTES: Align top face of curb with PCU Inlet as shown.

MATERIAL NOTES:
Provide ½" Preformed Bituminous Fiber Material.

SHOWING TYPE II & IV Curb and Gutter

## **GENERAL NOTES:**

Reference point is located where the i of the main throat intersects the normal gutter line. See Precast Curb Inlet Under Roadway standard

PCU for details and notes not shown.
See Concrete Curb and Curb and Gutter standard

CCCG-22 for details and notes not shown. Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter.

Preformed Bituminous Fiber Material is subsidiary to PCU Inlet.

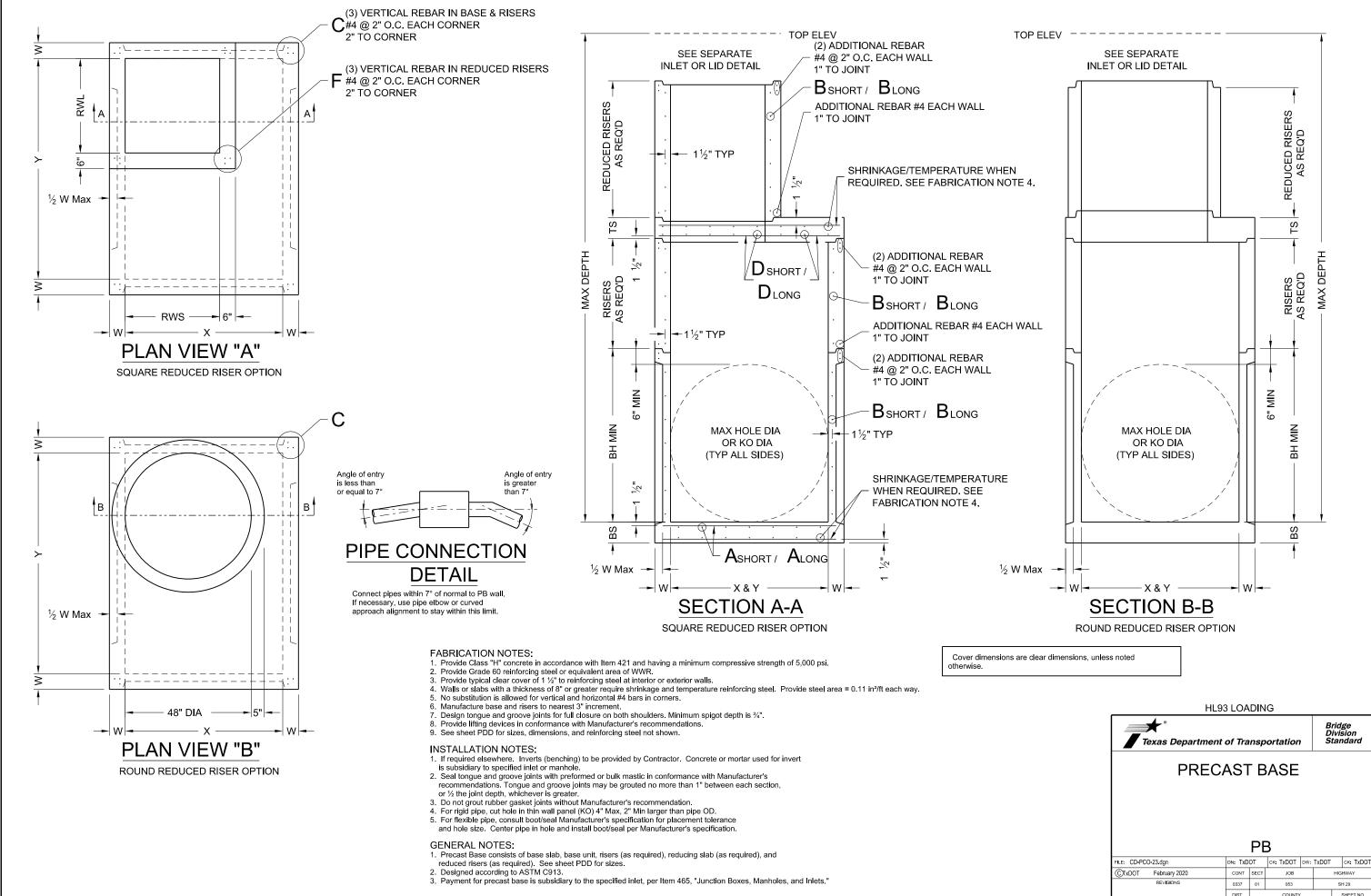


Bridge Division Standard

# **CURB AND GUTTER** TRANSITION DETAILS FOR PCU INLET

# CGT-PCU

|                                 |         | -              | •           | _         | _   |         |
|---------------------------------|---------|----------------|-------------|-----------|-----|---------|
| E: CD-CGT-PCU-23.dgn            | DN: TxD | ОТ             | CK: AES DW: |           | JTR | ck: AES |
| TxDOT February 2020             | CONT    | SECT           | JOB         |           | Н   | IGHWAY  |
| REVISIONS                       | 0337    | 01             |             | SH 29     |     |         |
| 06-2023, Added reference point, | DIST    |                |             | SHEET NO. |     |         |
|                                 | AUS     | WILLIAMSON 131 |             |           |     |         |



REDUCED RISERS AS REQ'D

Z

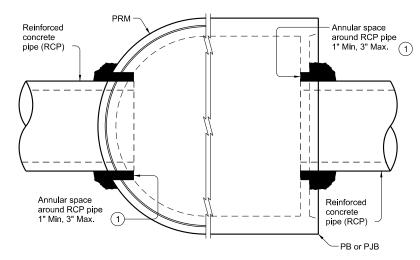
RISERS AS REQ'D

Z Z

053

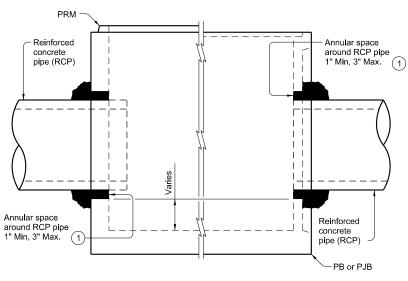
SH 29

MAX DEPTH



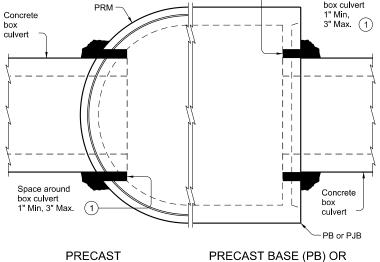
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

# TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

# TYPICAL HALF ELEVATION



PRECAST
ROUND MANHOLE (PRM)
WITH THROUGH-HOLE

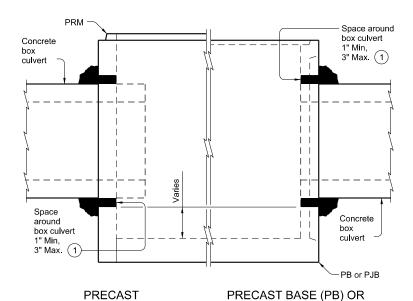
**ROUND MANHOLE (PRM)** 

WITH THROUGH-HOLE

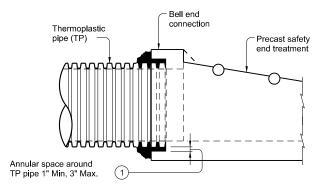
PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

Space around

# TYPICAL HALF PLAN



# TYPICAL HALF ELEVATION



 Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application."

PRECAST JUNCTION BOX (PJB)

WITH THIN-WALL KNOCK-OUT

# TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

Texas Department of Transportation

# PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

CONSTRUCTION NOTES:

MATERIAL NOTES:

Precast Base (PB)

Item 464 "Reinforced Concrete Pipe."

Specification Thermoplastic Pipe.

to other bid Items

Do not grout rubber gasket joints without Manufacturer's recommendations.
Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous

GENERAL NOTES: See applicable standards for notes and details not shown:

Precast Junction Box (PJB)
Precast Round Manhole (PRM)
Precast Safety End Treatments C/D Square (PSET-SC)

Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains."
Provide Reinforced Concrete Pipe (RCP) in accordance with

Provide Thermoplastic Pipe (TP) in accordance with Special

Payment for grouted connections is considered subsidiary

# **PBGC**

|                      | 1 000   |      |           |      |     |           |         |  |  |  |  |  |  |  |
|----------------------|---------|------|-----------|------|-----|-----------|---------|--|--|--|--|--|--|--|
| FILE: CD-PBGC-20.dgn | DN: TxD | ОТ   | ск: TAR   | DW:  | JTR |           | ск: TAR |  |  |  |  |  |  |  |
| CTxDOT February 2020 | CONT    | SECT | JOB       |      |     | HIGHWAY   |         |  |  |  |  |  |  |  |
| REVISIONS            | 0337    | 01   | 053       | 1 29 |     |           |         |  |  |  |  |  |  |  |
|                      | DIST    |      | COUNTY    |      |     | SHEET NO. |         |  |  |  |  |  |  |  |
|                      | AUS     |      | WILLIAMSC |      | 133 |           |         |  |  |  |  |  |  |  |

|         |      | MAX DEPTH = 15 ft. to top of BASE SLAB  MAX DEPTH = 25 ft. to top of BASE SLAB |                                  |           |                                   |                                  |           |                       |                                   |                                  |           |                                   |                                  |           |                                   | T                                |           |                       |                                   |                                  |           |                             |                               |                             |
|---------|------|--|----------------------------------|-----------|-----------------------------------|----------------------------------|-----------|-----------------------|-----------------------------------|----------------------------------|-----------|-----------------------------------|----------------------------------|-----------|-----------------------------------|----------------------------------|-----------|-----------------------|-----------------------------------|----------------------------------|-----------|-----------------------------|-------------------------------|-----------------------------|
|         |      |  | Base Slab                        |           |                                   | Base Unit or<br>Riser Walls      |           |                       | Below Grade<br>Reducing S         | Slab (w/PJB)<br>Slab (w/PB)      |           |                                   | Base Slab                        |           |                                   | Base Unit or<br>Riser Walls      |           |                       | Below Grade<br>Reducing S         | Slab (w/PJB)<br>Slab (w/PB)      |           | e 3)                        | e 2)                          | e 2)                        |
|         | Size | Short Span<br>Reinf Steel<br>Area  | Long Span<br>Reinf Steel<br>Area | Thickness | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area | Thickness | Reduced<br>Riser Size | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area | Thickness | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area | Thickness | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area | Thickness | Reduced<br>Riser Size | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area | Thickness | Min Height<br>(See Gen Note | Max HOLE DIA<br>(See Fab Note | Max KO DIA<br>(See Fab Note |
|         | XxY  | Ashort   | Along                            | BS        | Bshort                            | Blong                            | W         | RWSxRWL<br>or ID      | Dshort                            | Dlong                            | TS        | Ashort                            | Along                            | BS        | Bshort                            | Blong                            | W         | RWSxRWL<br>or ID      | Dshort                            | Dlong                            | TS        | BH MIN                      | HOLE DIA                      | KODIA                       |
|         | ft.  | in²/ft   | in²/ft                           | in.       | in²/ft                            | in²/ft                           | in.       | ft. **                | in <sup>2</sup> /ft               | in <sup>2</sup> /ft              | in.       | in²/ft                            | in <sup>2</sup> /ft              | in.       | in <sup>2</sup> /ft               | in <sup>2</sup> /ft              | in.       | ft. **                | in <sup>2</sup> /ft               | in <sup>2</sup> /ft              | in.       | ft.                         | in.                           | in.                         |
|         | 3x3  | 0.23   | 0.23                             | 6         | 0.19                              | 0.19                             | 6         | N/A                   | 0.37                              | 0.37                             | 9         | 0.29                              | 0.29                             | 6         | 0.24                              | 0.24                             | 6         | N/A                   | 0.37                              | 0.37                             | 9         | 3.5                         | 36                            | 36                          |
| (PJB)   | 4x4  | 0.29   | 0.29                             | 6         | 0.24                              | 0.24                             | 6         | N/A                   | 0.41                              | 0.41                             | 9         | 0.47                              | 0.47                             | 6         | 0.38                              | 0.38                             | 6         | N/A                   | 0.41                              | 0.41                             | 9         | 4.5                         | 48                            | 48                          |
| Box     | 3x5  | 0.29   | 0.18                             | 6         | 0.19                              | 0.35                             | 6         | N/A                   | 0.48                              | 0.48                             | 9         | 0.39                              | 0.18                             | 6         | 0.23                              | 0.59                             | 6         | N/A                   | 0.48                              | 0.48                             | 9         | 3.5                         | 36/60                         | 36/60                       |
|         | 4x5  | 0.36   | 0.18                             | 6         | 0.22                              | 0.34                             | 6         | N/A                   | 0.42                              | 0.42                             | 9         | 0.53                              | 0.26                             | 6         | 0.39                              | 0.59                             | 6         | N/A                   | 0.42                              | 0.42                             | 9         | 4.5                         | 48/60                         | 48/60                       |
| nctic   | 5x5  | 0.36   | 0.36                             | 6         | 0.34                              | 0.34                             | 6         | N/A                   | 0.43                              | 0.43                             | 9         | 0.62                              | 0.62                             | 6         | 0.59                              | 0.59                             | 6         | N/A                   | 0.43                              | 0.43                             | 9         | 5.5                         | 60                            | 60                          |
| n n     | 5x6  | 0.27   | 0.27                             | 9         | 0.34                              | 0.45                             | 6         | N/A                   | 0.48                              | 0.48                             | 9         | 0.47                              | 0.45                             | 9         | 0.38                              | 0.54                             | 8         | N/A                   | 0.48                              | 0.48                             | 9         | 5.5                         | 60/72                         | 60/72                       |
| ecas    | 6x6  | 0.27   | 0.27                             | 9         | 0.45                              | 0.45                             | 6         | N/A                   | 0.56                              | 0.56                             | 9         | 0.52                              | 0.52                             | 9         | 0.54                              | 0.54                             | 8         | N/A                   | 0.56                              | 0.56                             | 9         | 6.5                         | 72                            | 72                          |
| g.      | 8x8  | 0.46   | 0.46                             | 9         | 0.51                              | 0.51                             | 8         | N/A                   | 0.45                              | 0.45                             | 12        | 0.87                              | 0.87                             | 9         | 0.59                              | 0.59                             | 10        | N/A                   | 0.45                              | 0.45                             | 12        | 8.5                         | 96                            | 72                          |
|         | 3x3  | 0.23   | 0.23                             | 6         | 0.19                              | 0.19                             | 6         | N/A                   | N/A                               | N/A                              | N/A       | 0.29                              | 0.29                             | 6         | 0.24                              | 0.24                             | 6         | N/A                   | N/A                               | N/A                              | N/A       | 3.5                         | 36                            | 36                          |
|         | 4x4  | 0.29   | 0.29                             | 6         | 0.24                              | 0.24                             | 6         | N/A                   | N/A                               | N/A                              | N/A       | 0.47                              | 0.47                             | 6         | 0.38                              | 0.38                             | 6         | N/A                   | N/A                               | N/A                              | N/A       | 4.5                         | 48                            | 48                          |
|         | 3x5  | 0.29   | 0.18                             | 6         | 0.19                              | 0.35                             | 6         | 3x3                   | 0.30                              | 0.34                             | 9         | 0.39                              | 0.18                             | 6         | 0.23                              | 0.59                             | 6         | 3x3                   | 0.40                              | 0.40                             | 9         | 3.5                         | 36/60                         | 36/60                       |
|         | 4x5  | 0.36   | 0.18                             | 6         | 0.22                              | 0.34                             | 6         | 3x3                   | 0.30                              | 0.30                             | 9         | 0.53                              | 0.26                             | 6         | 0.39                              | 0.59                             | 6         | 3x3                   | 0.46                              | 0.37                             | 9         | 4.5                         | 48/60                         | 48/60                       |
|         | 4x5  | 0.36   | 0.18                             | 6         | 0.22                              | 0.34                             | 6         | 4x4                   | 0.30                              | 0.30                             | 9         | 0.53                              | 0.26                             | 6         | 0.39                              | 0.59                             | 6         | 4x4                   | 0.39                              | 0.39                             | 9         | 4.5                         | 48/60                         | 48/60                       |
|         | 4x5  | 0.36   | 0.18                             | 6         | 0.22                              | 0.34                             | 6         | 48"                   | 0.39                              | 0.39                             | 9         | 0.53                              | 0.26                             | 6         | 0.39                              | 0.59                             | 6         | 48"                   | 0.47                              | 0.47                             | 9         | 4.5                         | 48/60                         | 48/60                       |
|         | 4x5  | 0.36   | 0.18                             | 6         | 0.22                              | 0.34                             | 6         | 3x5                   | 0.33                              | 0.40                             | 9         | 0.53                              | 0.26                             | 6         | 0.39                              | 0.59                             | 6         | 3x5                   | 0.48                              | 0.48                             | 9         | 4.5                         | 48/60                         | 48/60                       |
|         | 5x5  | 0.36   | 0.36                             | 6         | 0.34                              | 0.34                             | 6         | 3x3                   | 0.34                              | 0.34                             | 9         | 0.62                              | 0.62                             | 6         | 0.59                              | 0.59                             | 6         | 3x3                   | 0.53                              | 0.53                             | 9         | 5.5                         | 60                            | 60                          |
|         | 5x5  | 0.36   | 0.36                             | 6         | 0.34                              | 0.34                             | 6         | 4x4                   | 0.36                              | 0.36                             | 9         | 0.62                              | 0.62                             | 6         | 0.59                              | 0.59                             | 6         | 4x4                   | 0.64                              | 0.64                             | 9         | 5.5                         | 60                            | 60                          |
| (PB)    | 5x5  | 0.38   | 0.38                             | 6         | 0.34                              | 0.34                             | 6         | 48"                   | 0.36                              | 0.36                             | 9         | 0.62                              | 0.62                             | 6         | 0.59                              | 0.59                             | 6         | 48"                   | 0.64                              | 0.64                             | 9         | 5.5                         | 60                            | 60                          |
| )<br>es | 5x5  | 0.36   | 0.36                             | 6         | 0.34                              | 0.34                             | 6         | 3x5                   | 0.34                              | 0.40                             | 9         | 0.62                              | 0.62                             | 6         | 0.59                              | 0.59                             | 6         | 3x5                   | 0.53                              | 0.53                             | 9         | 5.5                         | 60                            | 60                          |
| Ba      | 5x6  | 0.31   | 0.31                             | 9         | 0.34                              | 0.45                             | 6         | 3x3                   | 0.34                              | 0.34                             | 9         | 0.47                              | 0.45                             | 9         | 0.38                              | 0.54                             | 8         | 3x3                   | 0.61                              | 0.50                             | 9         | 5.5                         | 60/72                         | 60/72                       |
| cast    | 5x6  | 0.27   | 0.27                             | 9         | 0.34                              | 0.45                             | 6         | 4x4                   | 0.36                              | 0.45                             | 9         | 0.47                              | 0.45                             | 9         | 0.38                              | 0.54                             | 8         | 4x4                   | 0.74                              | 0.57                             | 9         | 5.5                         | 60/72                         | 60/72                       |
| Pre     | 5x6  | 0.29   | 0.29                             | 9         | 0.34                              | 0.45                             | 6         | 48"                   | 0.36                              | 0.45                             | 9         | 0.47                              | 0.45                             | 9         | 0.38                              | 0.54                             | 8         | 48"                   | 0.74                              | 0.57                             | 9         | 5.5                         | 60/72                         | 60/72                       |
|         | 5x6  | 0.29   | 0.29                             | 9         | 0.34                              | 0.45                             | 6         | 3x5                   | 0.45                              | 0.45                             | 9         | 0.47                              | 0.45                             | 9         | 0.38                              | 0.54                             | 8         | 3x5                   | 0.61                              | 0.61                             | 9         | 5.5                         | 60/72                         | 60/72                       |
|         | 6x6  | 0.29   | 0.29                             | 9         | 0.45                              | 0.45                             | 6         | 3x3                   | 0.41                              | 0.41                             | 9         | 0.52                              | 0.52                             | 9         | 0.54                              | 0.54                             | 8         | 3x3                   | 0.74                              | 0.74                             | 9         | 6.5                         | 72                            | 72                          |
|         | 6x6  | 0.27   | 0.27                             | 9         | 0.45                              | 0.45                             | 6         | 4x4                   | 0.45                              | 0.45                             | 9         | 0.52                              | 0.52                             | 9         | 0.54                              | 0.54                             | 8         | 4x4                   | 0.87                              | 0.87                             | 9         | 6.5                         | 72                            | 72                          |
|         | 6x6  | 0.29   | 0.29                             | 9         | 0.45                              | 0.45                             | 6         | 48"                   | 0.45                              | 0.45                             | 9         | 0.52                              | 0.52                             | 9         | 0.54                              | 0.54                             | 8         | 48"                   | 0.87                              | 0.87                             | 9         | 6.5                         | 72                            | 72                          |
|         | 6x6  | 0.29   | 0.29                             | 9         | 0.45                              | 0.45                             | 6         | 3x5                   | 0.45                              | 0.45                             | 9         | 0.52                              | 0.52                             | 9         | 0.54                              | 0.54                             | 8         | 3x5                   | 0.87                              | 0.87                             | 9         | 6.5                         | 72                            | 72                          |
|         | 8x8  | 0.52   | 0.52                             | 9         | 0.51                              | 0.51                             | 8         | 3x3                   | 0.61                              | 0.61                             | 12        | 0.91                              | 0.91                             | 9         | 0.70                              | 0.70                             | 10        | 3x3                   | 0.85                              | 0.85                             | 12        | 8.5                         | 96                            | 72                          |
|         | 8x8  | 0.52   | 0.52                             | 9         | 0.51                              | 0,51                             | 8         | 4x4                   | 0.70                              | 0.70                             | 12        | 0.87                              | 0.87                             | 9         | 0.70                              | 0.70                             | 10        | 4x4                   | 1.01                              | 1.01                             | 12        | 8.5                         | 96                            | 72                          |
|         | 8x8  | 0.52   | 0.52                             | 9         | 0.51                              | 0.51                             | 8         | 48"                   | 0.70                              | 0.70                             | 12        | 0.87                              | 0.87                             | 9         | 0.70                              | 0.70                             | 10        | 48"                   | 1.01                              | 1.01                             | 12        | 8.5                         | 96                            | 72                          |
|         | 8x8  | 0.52   | 0.52                             | 9         | 0.51                              | 0.51                             | 8         | 3x5                   | 0.70                              | 0.85                             | 12        | 0.87                              | 0.87                             | 9         | 0.70                              | 0.70                             | 10        | 3x5                   | 1.01                              | 1.01                             | 12        | 8.5                         | 96                            | 72                          |

\*\* Unless otherwise indicated.

- FABRICATION NOTES:

  1. Maximum spacing of reinforcement is 8".

  2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

## GENERAL NOTES:

- Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
   Precast Base consists of base slab, base unit, risers (as required), reducing slab (as
- Precast base consists of base stab, base unit, risers (as required), reducing stab (as required), and reduced risers (as required). See sheet PB for details.
   Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2"-6".

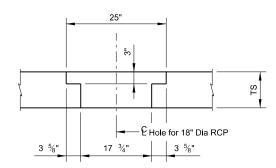
HL93 LOADING



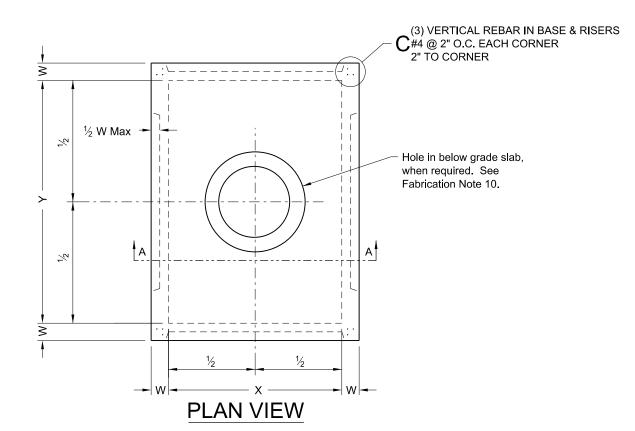
**DESIGN DATA FOR** PRECAST BASE AND **JUNCTION BOX** 

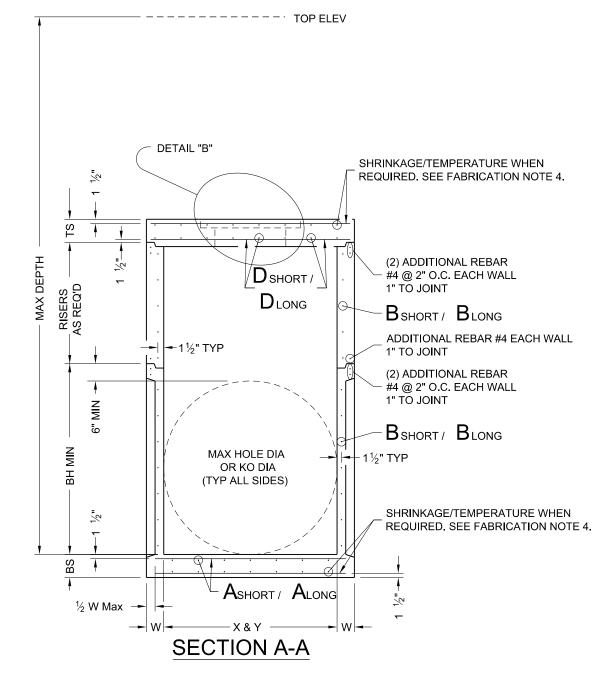
PDD

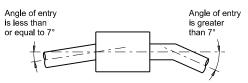
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# **DETAIL "B"**







# PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PJB wall. If necessary, use pipe elbow or curved approach alignment to stay within this limit.

# FABRICATION NOTES:

- Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
   Provide Grade 60 reinforcing steel or equivalent area of WWR.
   Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.

- 4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.

  5. No substitution is allowed for vertical and horizontal #4 bars in corners.
- 6. Manufacture base and risers to nearest 3" increment.
- 7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is  $\frac{3}{4}$ ".
- Provide lifting devices in conformance with Manufacturer's recommendations.
   See sheet PDD for sizes, dimensions, and reinforcing steel not shown.
- 10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

#### **INSTALLATION NOTES:**

- 1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary
- Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.

- Do not grout rubber gasket joints without Manufacturer's recommendation.
   For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
   For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

## **GENERAL NOTES:**

- 1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab.
- See sheet PDD for sizes.

  2. Designed according to ASTM C913.

  3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.

Cover dimensions are clear dimensions, unless noted otherwise

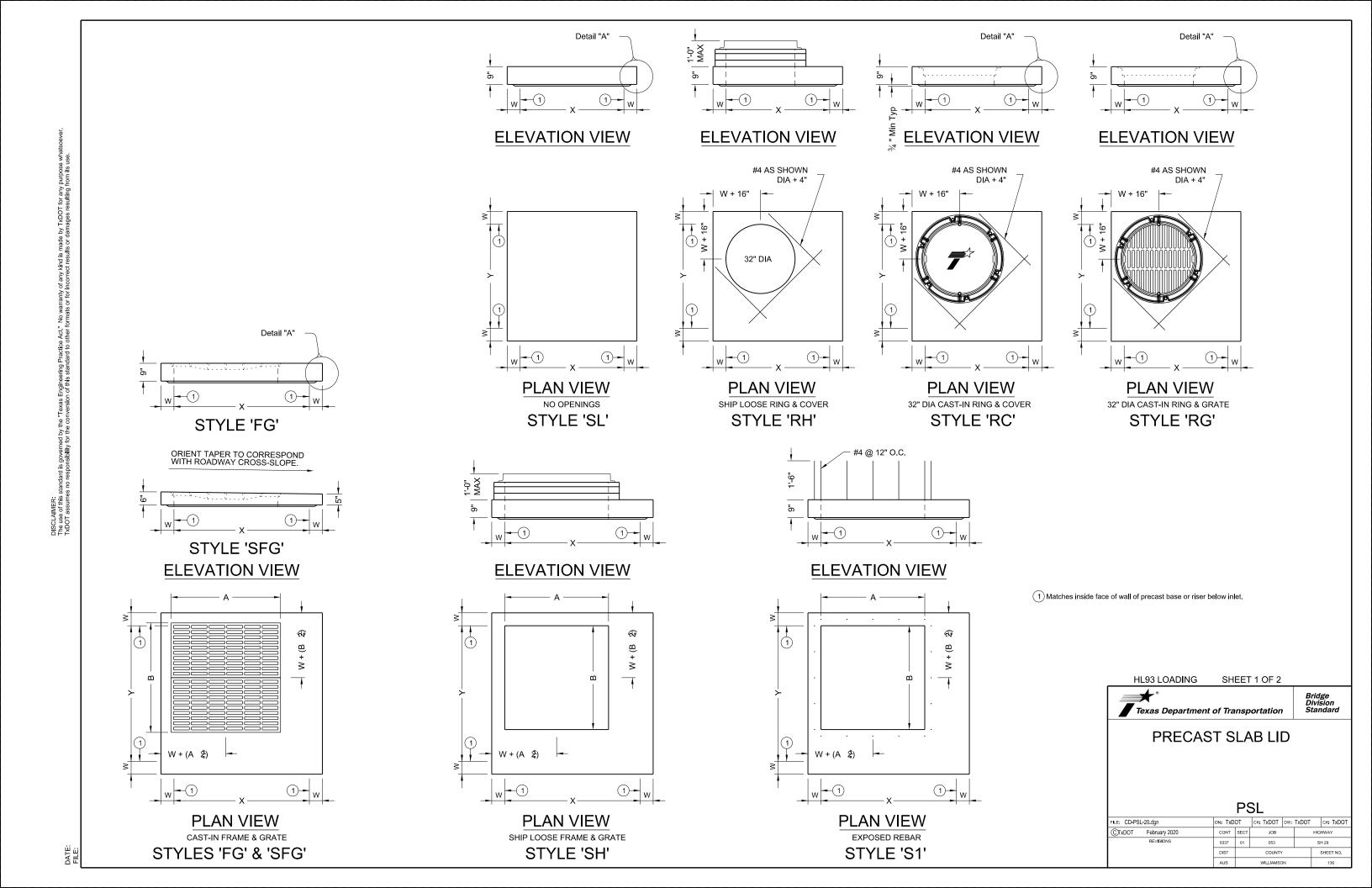
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PRECAST JUNCTION BOX

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| Style             | Size (X x Y) | w 2    | A x B (nominal)  | Short Span<br>Reinf Steel<br>Area | Long Span<br>Reinf Steel<br>Area |
|-------------------|--------------|--------|------------------|-----------------------------------|----------------------------------|
| SL                | 3'x3'        | 6"     | n/a              | 0.37 in□/ft                       | 0.37 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 3'x3'        | 6"     | 3'x3' or 32" Dia | 0.37 in□/ft                       | 0.37 in□/ft                      |
| SFG               | 3'x3'        | 6"     | 3'x3'            | 0.32 in □/ft                      | 0.32 in□/ft                      |
| SL                | 4'x4'        | 6"     | n/a              | 0.34 in □/ft                      | 0.34 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 4'x4'        | 6"     | 3'x3' or 32" Dia | 0.41 in□/ft                       | 0.41 in□/ft                      |
| SH,S1,FG          | 4'x4'        | 6"     | 4'x4'            | 0.41 in□/ft                       | 0.41 in□/ft                      |
| SFG               | 4'x4'        | 6"     | 4'x4'            | 0.32 in □/ft                      | 0.32 in□/ft                      |
| SL                | 3'x5'        | 6"     | n/a              | 0.39 in□/ft                       | 0.39 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 3'x5'        | 6"     | 3'x3' or 32" Dia | 0.48 in□/ft                       | 0.48 in□/ft                      |
| SH,S1,FG          | 3'x5'        | 6"     | 3'x5'            | 0.48 in□/ft                       | 0.48 in□/ft                      |
| SFG               | 3'x5'        | 6"     | 3'x5'            | 0.32 in □/ft                      | 0.32 in□/ft                      |
| SL                | 4'x5'        | 6"     | n/a              | 0.42 in □/ft                      | 0.42 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 4'x5'        | 6"     | 3'x3' or 32" Dia | 0.42 in □/ft                      | 0.42 in□/ft                      |
| SH,S1,FG          | 4'x5'        | 6"     | 4'x4'            | 0.63 in□/ft                       | 0.63 in□/ft                      |
| SH,S1,FG          | 4'x5'        | 6"     | 3'x5'            | 0.66 in □/ft                      | 0.66 in□/ft                      |
| SL                | 5'x5'        | 6"     | n/a              | 0.36 in □/ft                      | 0.36 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 5'x5'        | 6"     | 3'x3' or 32" Dia | 0.43 in □/ft                      | 0.43 in□/ft                      |
| SH,S1,FG          | 5'x5'        | 6"     | 4'x4'            | 0.63 in □/ft                      | 0.63 in□/ft                      |
| SH,S1,FG          | 5'x5'        | 6"     | 3'x5'            | 0.63 in □/ft                      | 0.63 in□/ft                      |
| SL                | 5'x6'        | 6"/8"  | n/a              | 0.48 in □/ft                      | 0.48 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 5'x6'        | 6"/8"  | 3'x3' or 32" Dia | 0.48 in □/ft                      | 0.48 in□/ft                      |
| SH,S1,FG          | 5'x6'        | 6"/8"  | 4'x4'            | 0.60 in □/ft                      | 0.60 in□/ft                      |
| SH,S1,FG          | 5'x6'        | 6"/8"  | 3'x5'            | 0.60 in □/ft                      | 0.60 in□/ft                      |
| SL                | 6'x6'        | 6"/8"  | n/a              | 0.43 in□/ft                       | 0.43 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 6'x6'        | 6"/8"  | 3'x3' or 32" Dia | 0.56 in□/ft                       | 0.56 in□/ft                      |
| SH,S1,FG          | 6'x6'        | 6"/8"  | 4'x4'            | 0.56 in□/ft                       | 0.56 in□/ft                      |
| SH,S1,FG          | 6'x6'        | 6"/8"  | 3'x5'            | 0.59 in□/ft                       | 0.59 in□/ft                      |
| SL                | 8'x8'        | 8"/10" | n/a              | 0.45 in□/ft                       | 0.45 in□/ft                      |
| RH,RC,RG,SH,S1,FG | 8'x8'        | 8"/10" | 3'x3' or 32" Dia | 0.45 in□/ft                       | 0.45 in□/ft                      |
| SH,S1,FG          | 8'x8'        | 8"/10" | 4'x4'            | 0.45 in□/ft                       | 0.45 in □/ft                     |
| SH,S1,FG          | 8'x8'        | 8"/10" | 3'x5'            | 0.45 in □/ft                      | 0.45 in□/ft                      |

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain. 6. 1'-6"

# **DETAIL "A"**

(Reinforcing not shown for clarity) When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

### FABRICATION NOTES:

- Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
- 2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.

  3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
- 4. Provide clear cover of 3/4" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.

  5. Slabs with a thickness of 8" or greater require shrinkage and temperature
- reinforcing. Provide steel area = 0.11 in²/ft each way.
- No substitution is allowed for diagonal #4 bars around openings.
   Design tongue and groove joints for full closure on both shoulders. Minimum
- spigot depth is 3/4".
- 8. Provide lifting devices in conformance with Manufacturer's recommendations.

### INSTALLATION NOTES:

- 1. Precast slab lids are intended for direct traffic and may be placed in roadway.
- Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever
- 3. Do not grout rubber gasket joints without Manufacturer's recommendation.
  4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
- 5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be
- exceeded.
  6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans

### GENERAL NOTES:

- Designed according to ASTM C913.
   Payment for lid is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Cover dimensions are clear dimensions, unless noted

HL93 LOADING SHEET 2 OF 2

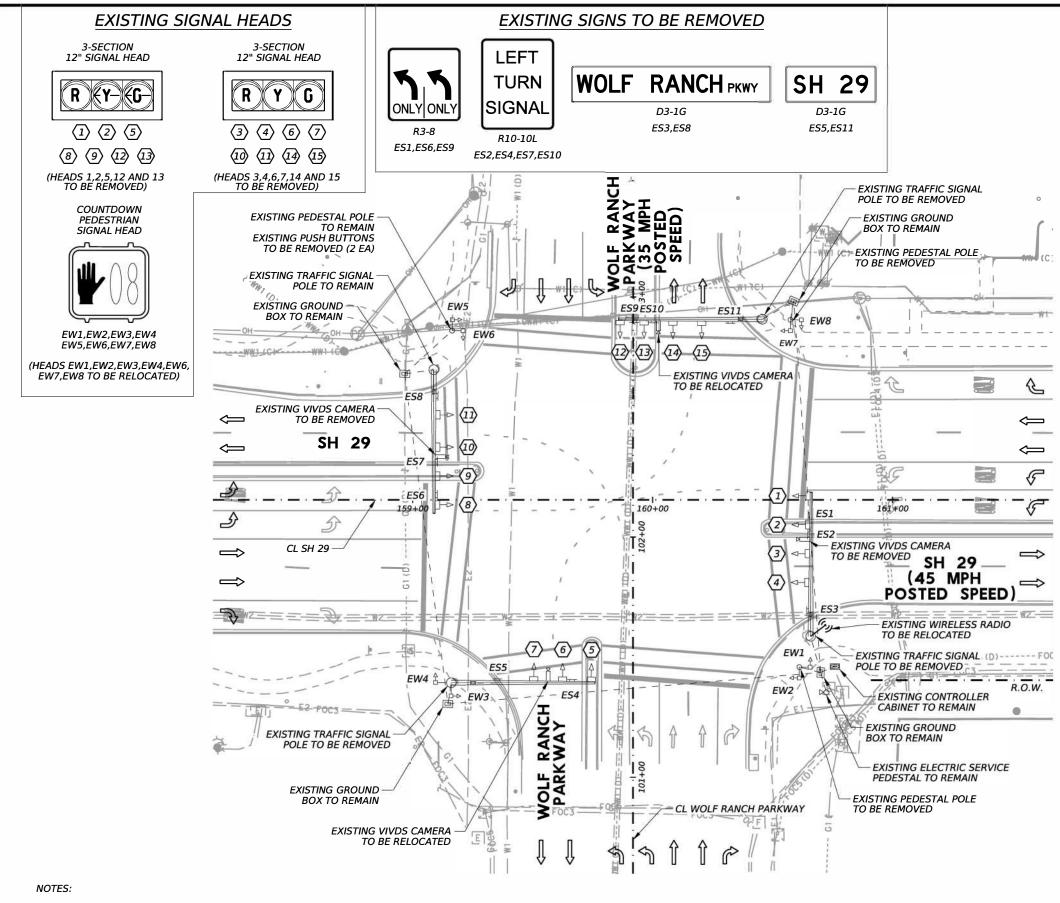


Bridge Division Standard

PRECAST SLAB LID

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| ©TxDOT February 2020 |  | CONT    | SECT         | JOB           |  | HIGHWAY |       | HWAY      |  |  |
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|                      |  | AUS     | S WILLIAMSON |               |  | 137     |       |           |  |  |



- 1. ALL EXISTING UNDERGROUND CONDUITS ARE TO BE REMOVED OR ABANDONED IN PLACE. ALL CABLES AND CONDUCTORS ARE TO BE REMOVED.
- 2. ALL TRAFFIC SIGNAL EQUIPMENT SPECIFIED FOR REMOVAL THAT IS DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL REMAIN THE PROPERTY OF THE CITY OF GEORGETOWN AND BE DELIVERED TO A LOCATION SPECIFIED BY THE CITY OF GEORGETOWN. ANY EQUIPMENT NOT DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL BECOME PROPERTY OF THE CONTRACTOR AND THE CONTRACTOR SHALL DISPOSE OF IN COMPLIANCE WITH ANY APPLICABLE FEDERAL, STATE, AND/OR LOCAL LAWS. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680 WITH NO ADDITIONAL PAY GIVEN.
- THE PRESENCE/ABSENCE AND LOCATION OF EXISTING TRAFFIC SIGNAL EQUIPMENT SHOWN IN THE PLANS IS BASED ON THE BEST RECORDS AVAILABLE TO THE ENGINEER. CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION SHOULD FIELD CONDITIONS DIFFER FROM WHAT IS DEPICTED IN THE PLANS.
- WHAT IS DEPICTED IN THE PLANS.

  I. THE CONTRACTOR SHALL VERIFY, PRIOR TO STARTING WORK RELATED TO THE TRAFFIC SIGNAL, THAT GROUND BOXES AND/OR CONDUIT RUNS SHOWN FOR REMOVAL CONTAIN CABLING ONLY FOR EXISTING TRAFFIC SIGNAL EQUIPMENT. SHOULD EXISTING GROUND BOXES AND/OR CONDUITS CONTAIN WIRING FOR ANY EQUIPMENT OTHER THAN THE EXISTING TRAFFIC SIGNAL, CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION.



TRAFFIC SIGNAL POLE

LUMINAIRE

HORIZONTAL SIGNAL HEAD

VERTICAL SIGNAL HEAD

SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

VIVDS CAMERA

GROUND BOX (TYPE D W/ APRON)

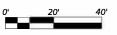
CONDUIT

ELECTRIC SERVICE PEDESTAL
 CONTROLLER CABINET

WIRELESS RADIO

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)







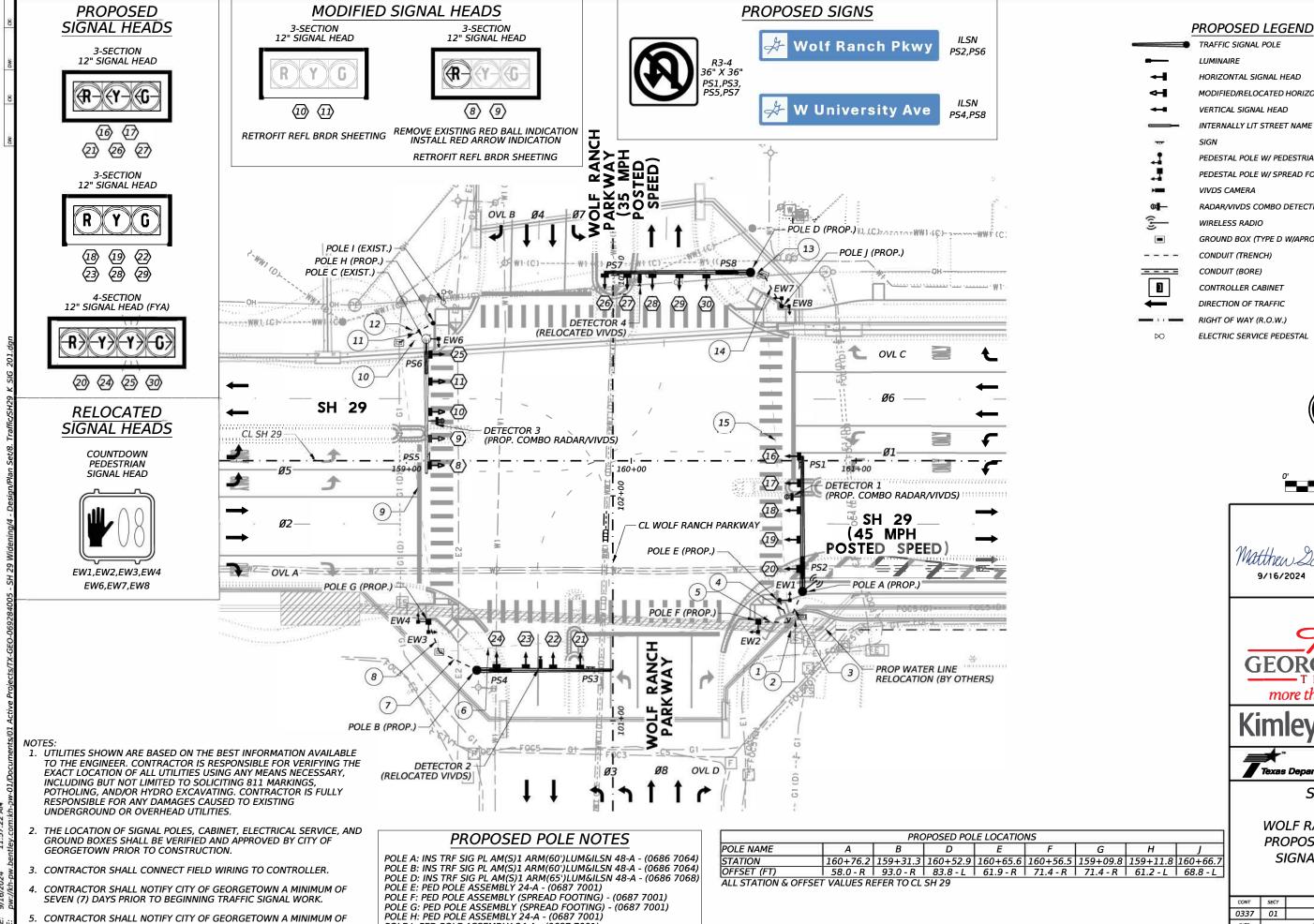




SH 29

WOLF RANCH PKWY EXISTING TRAFFIC SIGNAL LAYOUT

|      |      |            | Sŀ    | HEET 1 OF 1 |  |  |
|------|------|------------|-------|-------------|--|--|
| CONT | SECT | JOB        |       | HIGHWAY     |  |  |
| 0337 | 01   | 053        | SH 29 |             |  |  |
| DIST |      | COUNTY     |       | SHEET NO.   |  |  |
| AUS  |      | WILLIAMSON |       | 138         |  |  |



POLE J: PED POLE ASSEMBLY 24-A - (0687 7001)

CONTRACTOR SHALL NOTIFY CITY OF GEORGETOWN A MINIMUM OF

FOURTEEN (14) DAYS PRIOR TO ACTIVATION OF THE NEW TRAFFIC

LUMINAIRE HORIZONTAL SIGNAL HEAD MODIFIED/RELOCATED HORIZONTAL SIGNAL HEAD VERTICAL SIGNAL HEAD INTERNALLY LIT STREET NAME SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD PEDESTAL POLE W/ SPREAD FOOTING FOUNDATION

VIVDS CAMERA

RADAR/VIVDS COMBO DETECTION DEVICE

WIRELESS RADIO

GROUND BOX (TYPE D W/APRON)

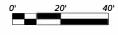
CONDUIT (TRENCH) CONDUIT (BORE)

CONTROLLER CABINET

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)

ELECTRIC SERVICE PEDESTAL







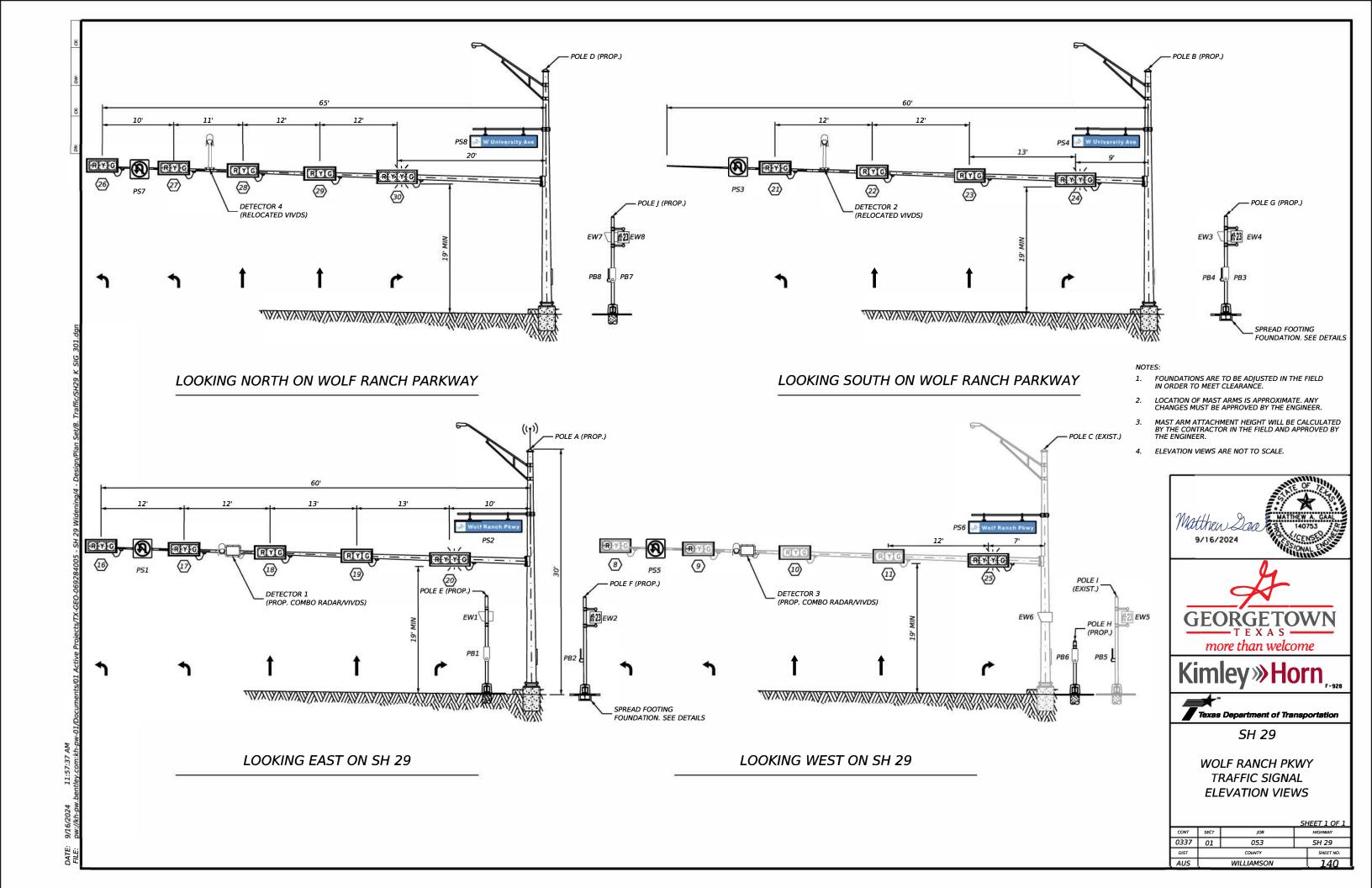




SH 29

**WOLF RANCH PKWY** PROPOSED TRAFFIC SIGNAL LAYOUT

|      |      |               | Sŀ | HEET 1 OF 1 | ı |
|------|------|---------------|----|-------------|---|
| CONT | SECT | JOB           |    | HIGHWAY     | ı |
| 0337 | 01   | 053           |    | SH 29       | l |
| DIST |      | COUNTY        |    | SHEET NO.   | l |
| A US |      | WILL IAM S ON |    | 139         | l |



| Des 22             |                                   |                                   |                             | Ø.                             | GF.                               | 30                          |                             |                                   |                                   | S.                           |
|--------------------|-----------------------------------|-----------------------------------|-----------------------------|--------------------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------------|-----------------------------------|------------------------------|
| CONDUCTOR<br>COLOR | CABLE 1<br>HEADS 16,17<br>PHASE 5 | CABLE 2<br>HEADS 18,19<br>PHASE 2 | CABLE 3<br>HEAD 20<br>OVL A | CABLE 4<br>HEADS 21<br>PHASE 7 | CABLE 5<br>HEADS 22,23<br>PHASE 4 | CABLE 6<br>HEAD 24<br>OVL B | CABLE 7<br>HEAD 25<br>OVL C | CABLE 8<br>HEADS 26,27<br>PHASE 3 | CABLE 9<br>HEADS 28,29<br>PHASE 8 | CABLE 10<br>HEAD 30<br>OVL D |
|                    | 7C                                | 5C                                | 7C                          | 7C                             | 5C                                | 7C                          | 7C                          | 7C                                | 5C                                | 7C                           |
| BLACK              | SPARE                             | Υ                                 | SPARE                       | SPARE                          | Y                                 | SPARE                       | SPARE                       | SPARE                             | Y                                 | SPARE                        |
| WHITE              | SIGNAL COMMON                     | SIGNAL COMMON                     | SIGNAL COMMON               | SIGNAL COMMON                  | SIGNAL COMMON                     | SIGNAL COMMON               | SIGNAL COMMON               | SIGNAL COMMON                     | SIGNAL COMMON                     | SIGNAL COMMO                 |
| RED                | R ARW                             | R                                 | R ARW                       | R ARW                          | R                                 | R ARW                       | R ARW                       | R ARW                             | R                                 | R ARW                        |
| GREEN              | SPARE                             | G                                 | SPARE                       | SPARE                          | G                                 | SPARE                       | SPARE                       | SPARE                             | G                                 | SPARE                        |
| ORANGE             | Y ARW                             | SPARE                             | Y ARW                       | Y ARW                          | SPARE                             | Y ARW                       | Y ARW                       | Y ARW                             | SPARE                             | Y ARW                        |
| BLUE               | G ARW                             |                                   | G ARW                       | G ARW                          |                                   | G ARW                       | G ARW                       | G ARW                             |                                   | G ARW                        |
| WHITE/BLACK        | SPARE                             |                                   | FY ARW                      | SPARE                          |                                   | FY ARW                      | FY ARW                      | SPARE                             |                                   | FY ARW                       |
|                    |                                   |                                   |                             | 00                             | 50                                | 0.00                        |                             |                                   |                                   | 73                           |

|             |                 |                 |                 | 13              | 20              | iT.             |                 |                 |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CONDUCTOR   | CABLE 11<br>EW1 | CABLE 12<br>PB1 | CABLE 13<br>EW2 | CABLE 14<br>PB2 | CABLE 15<br>EW3 | CABLE 16<br>PB3 | CABLE 17<br>FW4 | CABLE 18<br>PB4 |
| COLOR       | (PHASE 8 - PED) | (PHASE 8 - PED) | (PHASE 2 - PED) | (PHASE 4 - PED) | (PHASE 4 - PED) |
|             | 5C              | 2C              | 5C              | 2C              | 5C              | 2C              | 5C              | 2C              |
| BLACK       | SPARE           | PED CALL        | DW              | PED CALL        | DW              | PED CALL        | SPARE           | PED CALL        |
| WHITE       | PED COMMON      | APS COMMON      |
| RED         | DW              |                 | SPARE           |                 | SPARE           |                 | DW              |                 |
| GREEN       | W               |                 | SPARE           |                 | SPARE           |                 | W               |                 |
| ORANGE      | SPARE           |                 | W               |                 | W               |                 | SPARE           |                 |
| BLUE        |                 |                 |                 |                 |                 | _ <del></del>   |                 |                 |
| WHITE/BLACK |                 |                 |                 |                 |                 |                 |                 |                 |

| CONDUCTOR<br>COLOR | CABLE 19<br>EW5<br>(PHASE 6 - PED) | CABLE 20<br>PB5<br>(PHASE 6 - PED) | CABLE 21<br>EW6<br>(PHASE 4 - PED) | CABLE 22<br>PB6<br>(PHASE 4 - PED) | CABLE 23<br>EW7<br>(PHASE 6 - PED) | CABLE 24<br>PB7<br>(PHASE 6 - PED) | CABLE 25<br>EW8<br>(PHASE 8 - PED) | CABLE 26<br>PB8<br>(PHASE 8 - PED) |
|--------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
|                    | 5C                                 | 2C                                 | 5C                                 | 2C                                 | 5C                                 | 2C                                 | 5C                                 | 2C                                 |
| BLACK              | DW                                 | PED CALL                           | SPARE                              | PED CALL                           | DW                                 | PED CALL                           | SPARE                              | PED CALL                           |
| WHITE              | PED COMMON                         | APS COMMON                         |
| RED                | SPARE                              |                                    | DW                                 |                                    | SPARE                              | ]                                  | DW                                 |                                    |
| GREEN              | SPARE                              |                                    | W                                  |                                    | SPARE                              |                                    | W                                  |                                    |
| ORANGE             | W                                  |                                    | SPARE                              |                                    | W                                  |                                    | SPARE                              |                                    |
| BLUE               |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |
| WHITE/BLACK        |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |

# **POLE WIRING**

| INSIDE | TYPE                       | ELEC CONDR   | TRAY CABLE | SIG     | NAL CABLE 7 | ΥA      | RADIO    | VIVDS** |
|--------|----------------------------|--------------|------------|---------|-------------|---------|----------|---------|
| POLES  | TIPE                       | #8 INS (LUM) | 4C # 14    | 2C # 12 | 5C # 14     | 7C # 14 | ETHERNET | VIVDS   |
| Α      | SIGNAL POLE (30' TALL)     | 60           | 25         |         | 20          | 40      | 30       | 20      |
| В      | SIGNAL POLE (30' TALL)     | 60           | 25         |         | 20          | 40      |          | 20      |
| С      | SIGNAL POLE (30' TALL)     |              | 25         |         | 10          | 20      |          | 20      |
| D      | SIGNAL POLE (30' TALL)     | 60           | 25         |         | 20          | 40      |          | 20      |
| E      | PEDESTRIAN POLE (10' TALL) |              |            | 5       | 10          |         |          |         |
| F      | PEDESTRIAN POLE (10' TALL) |              |            | 5       | 10          |         |          |         |
| G      | PUSH BUTTON POLE (5' TALL) |              |            | 10      | 20          |         |          |         |
| Н      | PUSH BUTTON POLE (5' TALL) |              |            | 5       |             |         |          |         |
| 1      | PEDESTRIAN POLE (10' TALL) |              |            |         |             |         |          |         |
| J      | PEDESTRIAN POLE (10' TALL) |              |            | 10      | 20          |         |          |         |
|        | TOTAL QTY (LF)             | 180          | 100        | 35      | 130         | 140     | 30       | 80      |

# **GROUND WIRING**

|          |              |                            |                            |                          |        |                                | WIRE S                      | SIZE AND TY                | PΕ                        |                           |                           |                          |                  |                |        |          |
|----------|--------------|----------------------------|----------------------------|--------------------------|--------|--------------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|------------------|----------------|--------|----------|
|          |              | CONDU                      | ITEM 618<br>JIT SIZE AND   | TYPE                     |        | ITEM<br>ELECT<br>CONDU         | RICAL                       | ITEM 621<br>TRAY<br>CABLE  | SIC                       |                           | 1 684<br>PLE ( TYPE       | A)                       | ITEM 6306        | ETHERNET       | LENGTH |          |
| RUN #    | ACTION       | 2" PVC<br>SCH 40<br>TRENCH | 3" PVC<br>SCH 40<br>TRENCH | 3" PVC<br>SCH 40<br>BORE | ACTION | NO. 8<br>INSULATED<br>(GROUND) | NO. 8<br>INSULATED<br>(LUM) | 4 CNDR<br>NO. 14<br>(ILSN) | 2 CNDR<br>NO. 12<br>(APS) | 5 CNDR<br>NO. 14<br>(PED) | 5 CNDR<br>NO. 14<br>(VEH) | 7 CNDR<br>NO.14<br>(VEH) | VIVDS<br>CABLE** | CABLE<br>RADIO | OF RUN | RUN #    |
| 1        | Ε            | 2                          |                            |                          | I      |                                | 6                           | 4                          |                           |                           |                           |                          |                  |                | 10     | 1        |
| 2        | Ε            | 1                          | 3                          |                          | I      |                                |                             |                            | 8                         |                           | 3                         | 7                        | 4                | 1              | 10     | 2        |
| 3        | ı            | 1                          | 2                          |                          | I      | 3                              | 2                           | 1                          |                           |                           | 1                         | 2                        | 1                | 1              | 20     | 3        |
| 4        | I            | 1                          |                            |                          | I      | 1                              |                             |                            | 1                         | 1                         |                           |                          |                  |                | 15     | 4        |
| 5        | ı            | 1                          |                            |                          | I      | 1                              |                             |                            | 1                         | 1                         |                           |                          |                  |                | 15     | 5        |
| 6        | Ε            |                            |                            | 3                        | I      |                                | 2                           | 2                          | 4                         |                           | 1                         | 3                        | 2                |                | 160    | 6        |
| 7        | ı            | 1                          | 2                          |                          | I      | 3                              | 2                           | 1                          |                           |                           | 1                         | 2                        | 1                |                | 20     | 7        |
| 8        | ı            | 1                          |                            |                          | I      | 1                              |                             |                            | 2                         | 2                         |                           |                          |                  |                | 15     | 8        |
| 9        | Ε            |                            |                            | 3                        | I      |                                |                             | 1                          | 2                         |                           |                           | 1                        | 1                |                | 140    | 9        |
| 10       | Ε            | 1                          | 2                          |                          | I      |                                |                             | 1                          |                           | 1                         |                           | 1                        | 1                |                | 15     | 10       |
| 11       | ı            | 1                          |                            |                          | I      | 1                              |                             |                            | 1                         |                           |                           |                          |                  |                | 20     | 11       |
| 12       | Ε            | 1                          |                            |                          | I      |                                |                             |                            | 1                         |                           |                           |                          |                  |                | 30     | 12       |
| 13       | ı            | 1                          | 2                          |                          | I      | 3                              | 2                           | 11                         |                           |                           | 1                         | 2                        | 1                |                | 15     | 13       |
| 14       | ı            | 1                          |                            |                          | I      | 1                              |                             |                            | 2                         | 2                         |                           |                          |                  |                | 20     | 14       |
| 15       | Ε            |                            |                            | 3                        | ı      |                                | 2                           | 1                          | 2                         |                           | 1                         | 2                        | 1                |                | 155    | 15       |
| SUBTO    |              | 140                        | 110                        | 0                        |        | 250                            | 740                         | 515                        | 1460                      | 115                       | 400                       | 785                      | 725              | 30             | SUBTOT | TAL (LF) |
| ACTION C | CODES: I - I | INSTALL; E - E             | EXISTING                   |                          |        |                                |                             |                            |                           |                           |                           |                          |                  |                |        |          |

CONDUIT AND CABLE CHART

# ARM\_WIRING

|                                | SIGNAL C | ABLE TY A |         |
|--------------------------------|----------|-----------|---------|
| INSIDE ARMS                    | 5C # 14  | 7C # 14   | VIVDS** |
| POLE A - 60' ARM               |          |           |         |
| HEADS 16 & 17                  |          | 60        |         |
| HEADS 18 & 19                  | 40       |           |         |
| HEAD 20                        |          | 10        |         |
| DETECTOR 1 (COMBO RADAR/VIVDS) |          |           | 45      |
| POLE B - 60' ARM               |          |           |         |
| HEAD 21                        |          | 50        |         |
| HEADS 22 & 23                  | 35       |           |         |
| HEAD 24                        |          | 10        |         |
| DETECTOR 2 (VIVDS)             |          |           | 40      |
| POLE C - 60' ARM               |          |           |         |
| HEAD 25                        |          | 10        |         |
| DETECTOR 3 (COMBO RADAR/VIVDS) |          |           | 40      |
| POLE D - 65' ARM               |          |           |         |
| HEADS 26 & 27                  |          | 65        |         |
| HEADS 28 & 29                  | 45       |           |         |
| HEAD 30                        |          | 20        |         |
| DETECTOR 4 (VIVDS)             |          |           | 50      |
| TOTAL QTY (LF)                 | 120      | 225       | 175     |

# PUSH BUTTON DETAILS

| APS MESSAGE INFORMATION |                              |   |   |  |  |  |  |
|-------------------------|------------------------------|---|---|--|--|--|--|
|                         |                              | EXTENDED PRESS MESSAGE                                  | WALK PRESS MESSAGE                          |  |  |  |  |
| APS UNIT NO.            | ACKNOWLEDGEMENT DEFAULT WAIT | "WAIT TO CROSS (STREET NAME)<br>AT (CROSS STREET NAME)" | WALK SIGN IS ON TO CROSS<br>("STREET NAME") |  |  |  |  |
| PB1                     | YES                          | UNIVERSITY AT WOLF RANCH                                | UNIVERSITY                                  |  |  |  |  |
| PB2                     | YES                          | WOLF RANCH AT UNIVERSITY                                | WOLF RANCH                                  |  |  |  |  |
| PB3                     | YES                          | WOLF RANCH AT UNIVERSITY                                | WOLF RANCH                                  |  |  |  |  |
| PB4                     | YES                          | UNIVERSITY AT WOLF RANCH                                | UNIVERSITY                                  |  |  |  |  |
| PB5                     | YES                          | WOLF RANCH AT UNIVERSITY                                | WOLF RANCH                                  |  |  |  |  |
| PB6                     | YES                          | UNIVERSITY AT WOLF RANCH                                | UNIVERSITY                                  |  |  |  |  |
| PB7                     | YES                          | WOLF RANCH AT UNIVERSITY                                | WOLF RANCH                                  |  |  |  |  |
| PB8                     | YES                          | UNIVERSITY AT WOLF RANCH                                | UNIVERSITY                                  |  |  |  |  |

| PEDESTRIAN SIGN DETAIL |     |         |          |  |  |  |
|------------------------|-----|---------|----------|--|--|--|
| PO                     | LE  | SIGN    | SIZE     |  |  |  |
| Ε                      | PB1 | R10-3eL | 9" x 15" |  |  |  |
| F                      | PB2 | R10-3eR | 9" x 15" |  |  |  |
| G                      | PB3 | R10-3eL | 9" x 15" |  |  |  |
| G                      | PB4 | R10-3eR | 9" x 15" |  |  |  |
| Н                      | PB6 | R10-3eL | 9" x 15" |  |  |  |
| 1                      | PB5 | R10-3eR | 9" x 15" |  |  |  |
| ,                      | PB7 | R10-3eL | 9" x 15" |  |  |  |
| J                      | PB8 | R10-3eR | 9" x 15" |  |  |  |

# CABINET\_WIRING

|   | INCIDE.           | SIG     | NAL CABLE        | TY A             | RADIO    |         |
|---|-------------------|---------|------------------|------------------|----------|---------|
|   | INSIDE<br>CABINET | 2C # 12 | 5C # 14<br>(VEH) | 7C # 14<br>(VEH) | ETHERNET | VIVDS** |
| 1 | TOTAL QTY         | 40      | 15               | 35               | 5        | 20      |







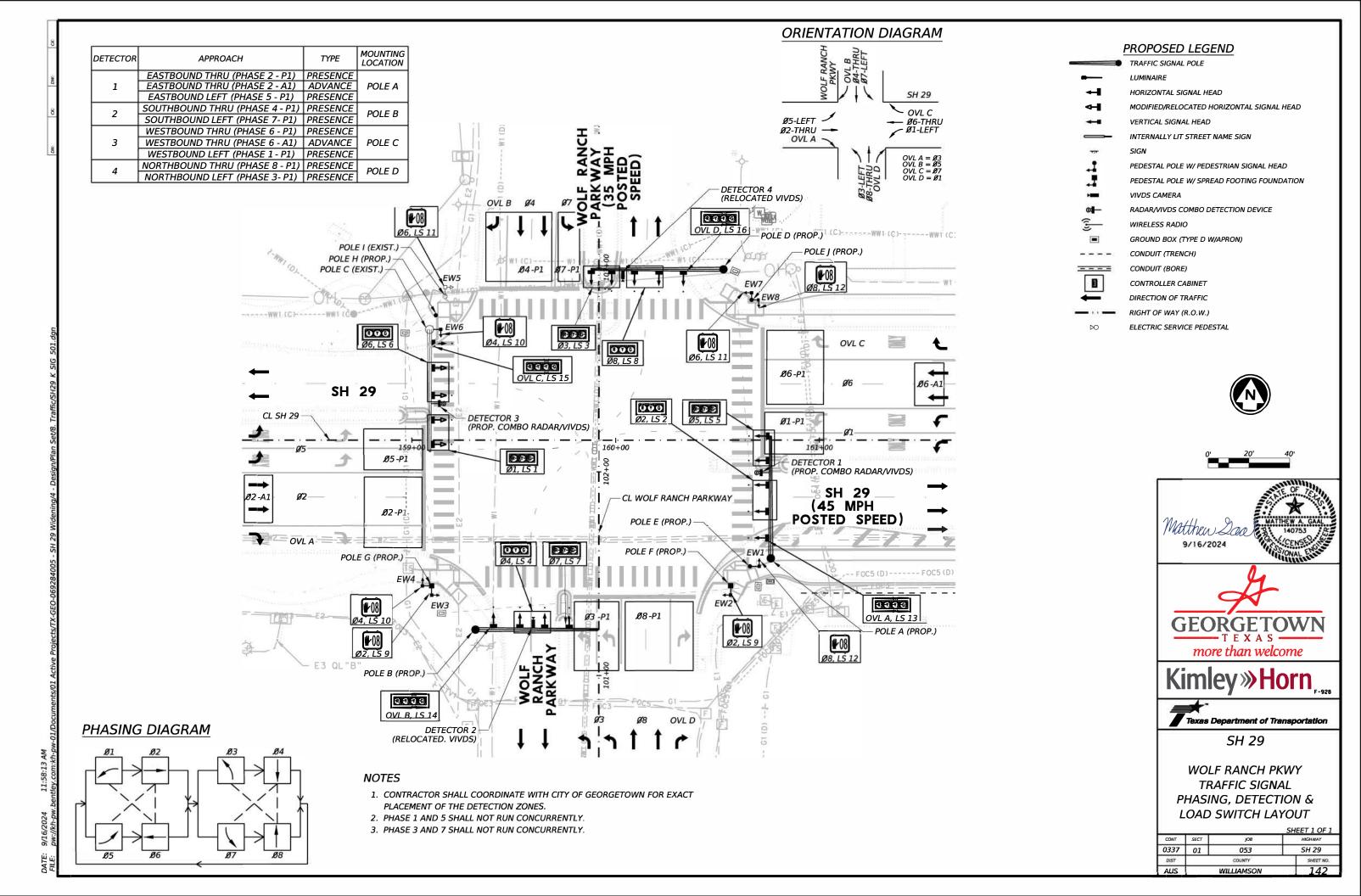


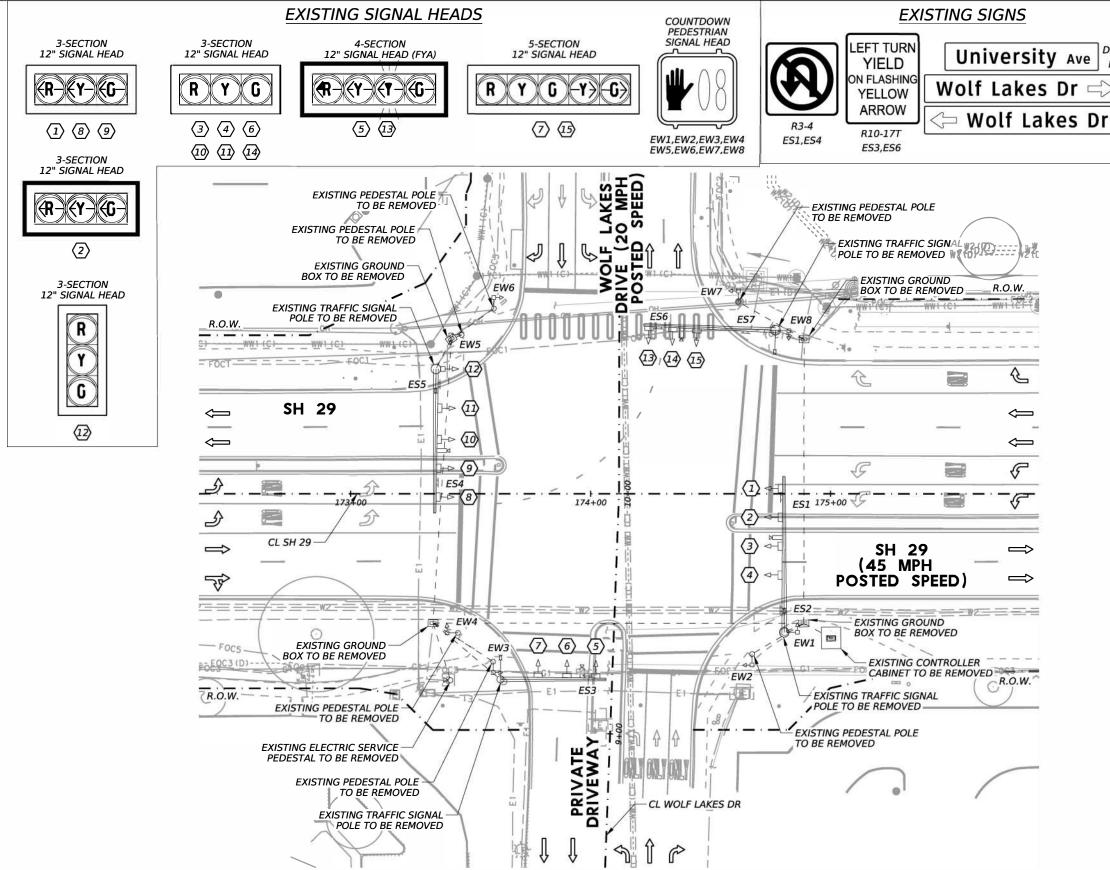
SH 29

WOLF RANCH PKWY TRAFFIC SIGNAL ELECTRICAL DATA

|      |      |            | Sŀ | <u> HEET 1 OF 1</u> |
|------|------|------------|----|---------------------|
| CONT | SECT | JOB        |    | HIGHWAY             |
| 0337 | 01   | 053        |    | SH 29               |
| DIST |      | COUNTY     |    | SHEET NO.           |
| AUS  |      | WILLIAMSON | -  | 141                 |

\*\*FURNISH AND INSTALL DETECTION CABLE PER MANUFATURER RECOMMENDATIONS.





### NOTES:

- ALL EXISTING UNDERGROUND CONDUITS ARE TO BE REMOVED OR ABANDONED IN PLACE. ALL CABLES AND CONDUCTORS ARE TO BE REMOVED.
- ALL TRAFFIC SIGNAL EQUIPMENT SPECIFIED FOR REMOVAL THAT IS DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL REMAIN THE PROPERTY OF THE CITY OF GEORGETOWN AND BE DELIVERED TO A LOCATION SPECIFIED BY THE CITY OF GEORGETOWN. ANY EQUIPMENT NOT DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL BECOME PROPERTY OF THE CONTRACTOR AND THE CONTRACTOR SHALL DISPOSE OF IN COMPLIANCE WITH ANY APPLICABLE FEDERAL, STATE, AND/OR LOCAL LAWS. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680 WITH NO ADDITIONAL PAY GIVEN.
- THE PRESENCE/ABSENCE AND LOCATION OF EXISTING TRAFFIC SIGNAL EQUIPMENT SHOWN IN THE PLANS IS BASED ON THE BEST RECORDS AVAILABLE TO THE ENGINEER. CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION SHOULD FIELD CONDITIONS DIFFER FROM WHAT IS DEPICTED IN THE PLANS.
- THE CONTRACTOR SHALL VERIFY, PRIOR TO STARTING WORK RELATED TO THE TRAFFIC SIGNAL, THAT GROUND BOXES AND/OR CONDUIT RUNS SHOWN FOR REMOVAL CONTAIN CABLING ONLY FOR EXISTING TRAFFIC SIGNAL EQUIPMENT. SHOULD EXISTING GROUND BOXES AND/OR CONDUITS CONTAIN WIRING FOR ANY EQUIPMENT OTHER THAN THE EXISTING TRAFFIC SIGNAL, CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION.



TRAFFIC SIGNAL POLE

**LUMINAIRE** 

HORIZONTAL SIGNAL HEAD

VERTICAL SIGNAL HEAD

 $\triangleleft \Box$ 

44

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. []

D3-1G

D3-1G

ES5

D3-1G

ES2

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

**VIVDS CAMERA** 

WIRELESS RADIO

GROUND BOX (TYPE D W/ APRON)

CONDUIT

ELECTRIC SERVICE PEDESTAL

CONTROLLER CABINET

**DIRECTION OF TRAFFIC** 

RIGHT OF WAY (R.O.W.)



Matthew Lac 9/16/2024

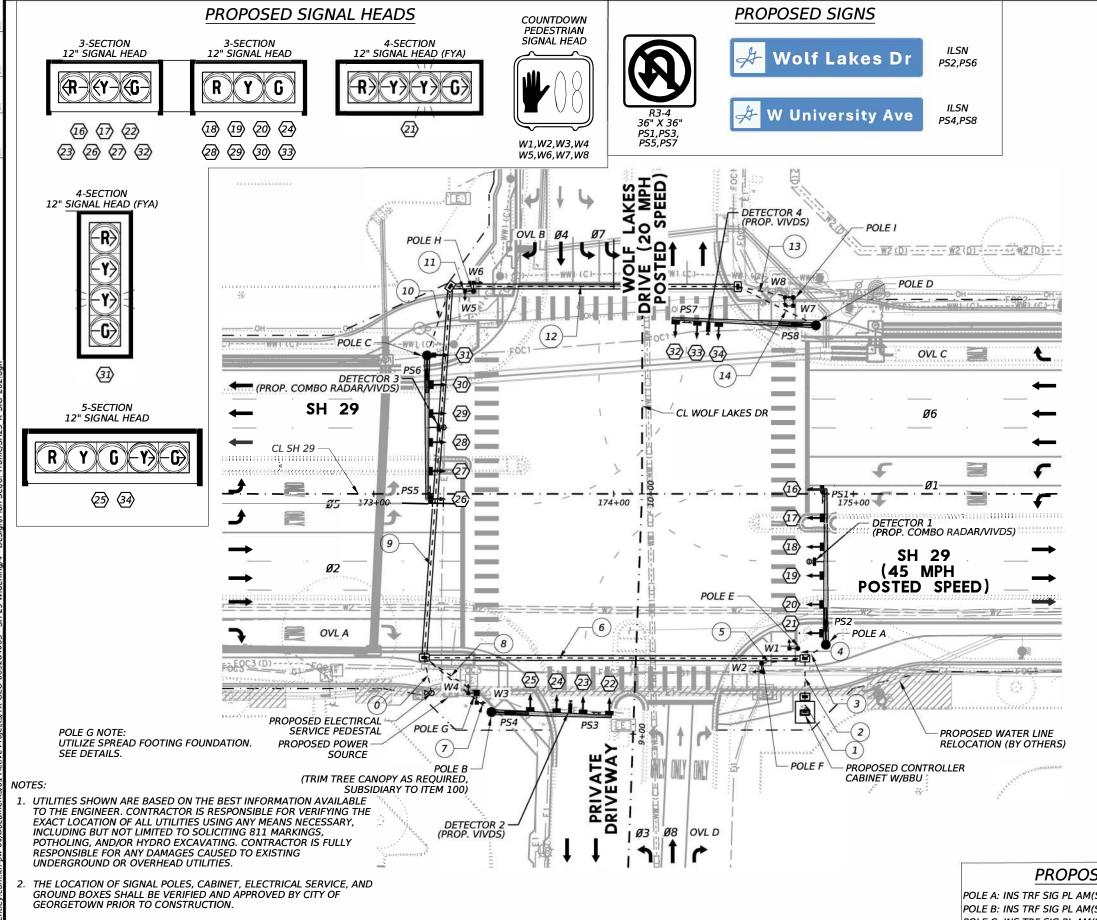




SH 29

**WOLF LAKES DR EXISTING TRAFFIC** SIGNAL LAYOUT

|      |      |     | SH        | HEET 1 OF 1 |
|------|------|-----|-----------|-------------|
| CONT | SECT | JOB |           | HIGHWAY     |
| 0337 | 01   | 053 |           | SH 29       |
| DIST |      |     | SHEET NO. |             |
| ALIC |      |     | 1/12      |             |



PROPOSED POLE LOCATIONS

# PROPOSED LEGEND

TRAFFIC SIGNAL POLE

HORIZONTAL SIGNAL HEAD

MODIFIED/RELOCATED HORIZONTAL SIGNAL HEAD

VERTICAL SIGNAL HEAD

INTERNALLY LIT STREET NAME SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD PEDESTAL POLE W/ SPREAD FOOTING FOUNDATION

VIVDS CAMERA

RADAR/VIVDS COMBO DETECTION DEVICE

WIRELESS RADIO

GROUND BOX (TYPE D W/APRON)

CONDUIT (TRENCH)

1

CONDUIT (BORE)

\_\_\_\_

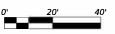
CONTROLLER CABINET

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)

ELECTRIC SERVICE PEDESTAL













SH 29

**WOLF LAKES DR** PROPOSED TRAFFIC SIGNAL LAYOUT

|      |      |        | Sŀ  | HEET 1 OF 1 |
|------|------|--------|-----|-------------|
| CONT | SECT | JOB    |     | HIGHWAY     |
| 0337 | 01   | 053    |     | SH 29       |
| DIST |      | COUNTY |     | SHEET NO.   |
| AUS  |      |        | 144 |             |

# PROPOSED POLE NOTES

POLE A: INS TRF SIG PL AM(S)1 ARM(65')LUM&ILSN 48-A - (0686 7068) POLE B: INS TRF SIG PL AM(S)1 ARM(50')LUM&ILSN 48-A - (0686 7056) POLE C: INS TRF SIG PL AM(S)1 ARM(60')LUM&ILSN 48-A - (0686 7064) POLE D: INS TRF SIG PL AM(S)1 ARM(60')LUM&ILSN 48-A - (0686 7064) POLE E: PED POLE ASSEMBLY 24-A - (0687 7001) POLE F: PED POLE ASSEMBLY 24-A - (0687 7001)

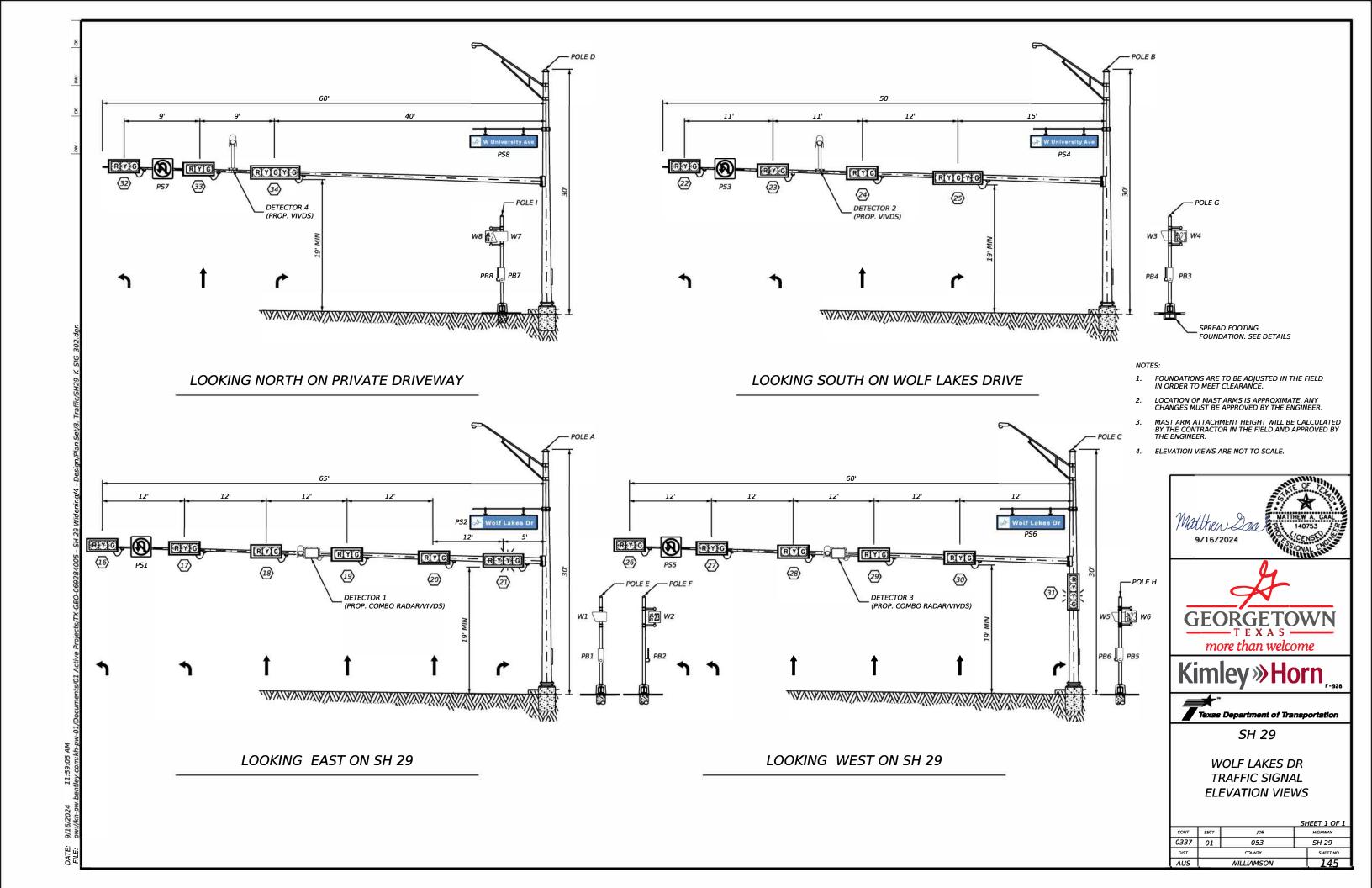
POLE G: PED POLE ASSEMBLY (SPREAD FOOTING) - (0687 7001)

POLE H: PED POLE ASSEMBLY 24-A - (0687 7001) POLE I: PED POLE ASSEMBLY 24-A - (0687 7001)

- 3. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER.
- CONTRACTOR SHALL NOTIFY CITY OF GEORGETOWN A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING TRAFFIC SIGNAL WORK.
- CONTRACTOR SHALL NOTIFY CITY OF GEORGETOWN A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO ACTIVATION OF THE NEW TRAFFIC

| STATION | 174+88.4 | 173+49.1 | 173+22.2 | 174+84.3 | 174+76.8 | 174+61.7 | 173+42.9 | 173+41.6 | 174+74.9 |
| OFFSET (FT) | 62.8 - R | 90.8 - R | 57.6 - L | 70.1 - L | 64.4 - R | 70.4 - R | 83.0 - R | 84.4 - L | 81.7 - L |
| ALL STATION & OFFSET VALUESREFER TO CL SH 29

SIGNAL.



| CONDUCTOR<br>COLOR | CABLE 1<br>HEADS 16,17<br>PHASE 5 | CABLE 2<br>HEADS 18,19,20<br>PHASE 2 | CABLE 3<br>HEAD 21<br>OVL A | CABLE 4<br>HEADS 22,23<br>PHASE 7 | CABLE 5<br>HEAD 24,25<br>PHASE 4 + OVL B | CABLE 6<br>HEADS 26,27<br>PHASE 1 | CABLE 7<br>HEADS 28,29,30<br>PHASE 6 | CABLE 8<br>HEAD 31<br>OVL C | CABLE 9<br>HEAD 32<br>PHASE 3 |
|--------------------|-----------------------------------|--------------------------------------|-----------------------------|-----------------------------------|--|-----------------------------------|--------------------------------------|-----------------------------|-------------------------------|
|                    | 7C                                | 5C                                   | 7C                          | 7C                                | 7C                                       | 7C                                | 5C                                   | 7C                          | 7C                            |
| BLACK              | SPARE                             | Y                                    | SPARE                       | SPARE                             | Υ  | SPARE                             | Υ                                    | SPARE                       | SPARE                         |
| WHITE              | SIGNAL COMMON                     | SIGNAL COMMON                        | SIGNAL COMMON               | SIGNAL COMMON                     | SIGNAL COMMON                            | SIGNAL COMMON                     | SIGNAL COMMON                        | SIGNAL COMMON               | SIGNAL COMMON                 |
| RED                | R ARW                             | R                                    | R ARW                       | R ARW                             | R  | R ARW                             | R                                    | R ARW                       | R ARW                         |
| GREEN              | SPARE                             | G                                    | SPARE                       | SPARE                             | G  | SPARE                             | G                                    | SPARE                       | SPARE                         |
| ORANGE             | Y ARW                             | SPARE                                | Y ARW                       | Y ARW                             | Y ARW                                    | Y ARW                             | SPARE                                | Y ARW                       | Y ARW                         |
| BLUE               | G ARW                             | -                                    | G ARW                       | G ARW                             | G ARW                                    | G ARW                             | -                                    | G ARW                       | G ARW                         |
| WHITE/BLACK        | SPARE                             | -                                    | FY ARW                      | SPARE                             | SPARE                                    | SPARE                             | -                                    | FY ARW                      | SPARE                         |
| -                  |                                   |                                      |                             |                                   |  | ,                                 |                                      |                             |                               |

| CONDUCTOR<br>COLOR | CABLE 10<br>HEAD 33,34<br>PHASE 8 + OVL D | CABLE 11<br>W1<br>(PHASE 8 - PED) | CABLE 12<br>PB1<br>(PHASE 8 - PED) | CABLE 13<br>W2<br>(PHASE 2 - PED) | CABLE 14<br>PB2<br>(PHASE 2 - PED) | CABLE 15<br>W3<br>(PHASE 2 - PED) | CABLE 16<br>PB3<br>(PHASE 2 - PED) | CABLE 17<br>W4<br>(PHASE 4 - PED) | CABLE 18<br>PB4<br>(PHASE 4 - PED) |
|--------------------|---|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|
|                    | 7C  | 5C                                | 2C                                 | 5C                                | 2C                                 | 5C                                | 2C                                 | 5C                                | 2C                                 |
| BLACK              | Υ   | SPARE                             | PED CALL                           | DW                                | PED CALL                           | DW                                | PED CALL                           | SPARE                             | PED CALL                           |
| WHITE              | SIGNAL COMMON                             | PED COMMON                        | APS COMMON                         | PED COMMON                        | APS COMMON                         | PED COMMON                        | APS COMMON                         | PED COMMON                        | APS COMMON                         |
| RED                | R   | DW                                |                                    | SPARE                             |                                    | SPARE                             |                                    | DW                                |                                    |
| GREEN              | G   | W                                 |                                    | SPARE                             |                                    | SPARE                             |                                    | W                                 |                                    |
| ORANGE             | Y ARW                                     | SPARE                             |                                    | W                                 |                                    | W                                 |                                    | SPARE                             |                                    |
| BLUE               | G ARW                                     |                                   |                                    |                                   |                                    |                                   |                                    |                                   |                                    |
| WHITE/BLACK        | SPARE                                     |                                   |                                    |                                   |                                    |                                   |                                    |                                   |                                    |

| CONDUCTOR<br>COLOR | CABLE 19<br>W5<br>(PHASE 4 - PED) | CABLE 20<br>PB5<br>(PHASE 4 - PED) | CABLE 21<br>W6<br>(PHASE 6 - PED) | CABLE 22<br>PB6<br>(PHASE 6 - PED) | CABLE 23<br>W7<br>(PHASE 6 - PED) | CABLE 24<br>PB7<br>(PHASE 6 - PED) | CABLE 25<br>W8<br>(PHASE 8 - PED) | CABLE 26<br>PB8<br>(PHASE 8 - PED) |
|--------------------|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|
|                    | 5C                                | 2C                                 | 5C                                | 2C                                 | 5C                                | 2C                                 | 5C                                | 2C                                 |
| BLACK              | SPARE                             | PED CALL                           | DW                                | PED CALL                           | DW                                | PED CALL                           | SPARE                             | PED CALL                           |
| WHITE              | PED COMMON                        | APS COMMON                         |
| RED                | DW                                |                                    | SPARE                             |                                    | SPARE                             |                                    | DW                                |                                    |
| GREEN              | W                                 |                                    | SPARE                             |                                    | SPARE                             |                                    | W                                 |                                    |
| ORANGE             | SPARE                             |                                    | W                                 |                                    | W                                 |                                    | SPARE                             |                                    |
| BLUE               |                                   |                                    |                                   |                                    |                                   |                                    |                                   |                                    |
| WHITE/BLACK        |                                   |                                    |                                   |                                    |                                   |                                    |                                   |                                    |

# ELECTRICAL\_SERVICE

| SERVICE<br>CONDUIT<br>SIZE* | SERVICE<br>CONDUCTORS<br>NO./SIZE | SAFETY<br>SWITCH<br>AMPS    | MAIN<br>CKT. BKR.<br>POLE/AMPS          | LIGHTING<br>CONTACTOR<br>AMPS                      | PANELBD/<br>LOADCENTER<br>AMP RATING                              | BRANCH<br>CIRCUIT<br>ID   | BRANCH<br>CKT. BKR.<br>POLE/AMPS  | BRANCH<br>CIRCUIT<br>AMPS  | KVA<br>LOAD  |
|-----------------------------|-----------------------------------|-----------------------------|---|--|---|---|---|--|--|
|                             |                                   |                             |   |  |   | SIGNAL  | 1P/50   | 40   |  |
| 2"                          | 3/#6                              | N/A                         | 2P/60                                   | N/A  | 100   | ILLUMINATION  | 2P/15   | 3.6  | 6.5  |
|                             |                                   |                             |   |  |   | ILSN  | 2P/15   | 3.6  |  |
|                             | CONDUIT<br>SIZE*                  | CONDUIT CONDUCTORS NO./SIZE | CONDUIT CONDUCTORS SWITCH NO./SIZE AMPS | CONDUIT CONDUCTORS SWITCH CKT. BKR. AMPS POLE/AMPS | CONDUIT CONDUCTORS SWITCH CKT. BKR. CONTACTOR AMPS POLE/AMPS AMPS | CONDUIT CONDUCTORS SWITCH CKT. BKR. CONTACTOR LOADCENTER AMPS POLE/AMPS AMPS AMP RATING | CONDUIT CONDUCTORS NO./SIZE SWITCH AMPS POLE/AMPS CONTACTOR AMP RATING ID  2" 3/#6 N/A 2P/60 N/A 100 ILLUMINATION | CONDUIT CONDUCTORS NO./SIZE SWITCH AMPS POLE/AMPS CONTACTOR AMPS LOADCENTER AMP RATING LOADCENTER AMP LOADCENTER AMP RATING LOADCENTER AMP LOADCE | CONDUIT CONDUCTORS NO./SIZE SWITCH AMPS POLE/AMPS CONTACTOR AMPS AMP RATING CIRCUIT CKT. BKR. POLE/AMPS AMPS AMPS AMP RATING CIRCUIT CKT. BKR. POLE/AMPS AMPS AMPS AMP RATING CIRCUIT CKT. BKR. POLE/AMPS AMPS AMPS AMPS AMPS AMPS AMPS AMPS |

\*VERIFY SERVICE CONDUIT SIZE WITH UTILITY. SIZE MAY VARY DUE TO UTILITY COMPANY REQUIREMENTS.

# PUSH BUTTON DETAILS

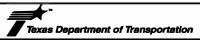
|              | APS MESSAGE INFORMATION      |   |  |  |  |  |  |  |
|--------------|------------------------------|---|--|--|--|--|--|--|
|              |                              | EXTENDED PRESS MESSAGE                                  | WALK PRESS MESSAGE                         |  |  |  |  |  |
| APS UNIT NO. | ACKNOWLEDGEMENT DEFAULT WAIT | "WAIT TO CROSS (STREET NAME)<br>AT (CROSS STREET NAME)" | WALK SIGN IS ON TO CROSS<br>(STREET NAME)" |  |  |  |  |  |
| PB1          | YES                          | UNIVERSITY AT WOLF LAKES                                | UNIVERSITY                                 |  |  |  |  |  |
| PB2          | YES                          | WOLF LAKES AT UNIVERSITY                                | WOLF LAKES                                 |  |  |  |  |  |
| PB3          | YES                          | WOLF LAKES AT UNIVERSITY                                | WOLF LAKES                                 |  |  |  |  |  |
| PB4          | YES                          | UNIVERSITY AT WOLF LAKES                                | UNIVERSITY                                 |  |  |  |  |  |
| PB5          | YES                          | UNIVERSITY AT WOLF LAKES                                | UNIVERSITY                                 |  |  |  |  |  |
| PB6          | YES                          | WOLF LAKES AT UNIVERSITY                                | WOLF LAKES                                 |  |  |  |  |  |
| PB7          | YES                          | WOLF LAKES AT UNIVERSITY                                | WOLF LAKES                                 |  |  |  |  |  |
| PB8          | YES                          | UNIVERSITY AT WOLF LAKES                                | UNIVERSITY                                 |  |  |  |  |  |

|   | PEDESTRIAN SIGN DETAIL |         |          |  |  |  |  |
|---|------------------------|---------|----------|--|--|--|--|
| ı | POLE                   | SIGN    | SIZE     |  |  |  |  |
| Ε | PB1                    | R10-3eL | 9" x 15" |  |  |  |  |
| F | PB2                    | R10-3eL | 9" x 15" |  |  |  |  |
| G | PB3                    | R10-3eL | 9" x 15" |  |  |  |  |
| G | PB4                    | R10-3eR | 9" x 15" |  |  |  |  |
| н | PB5                    | R10-3eL | 9" x 15" |  |  |  |  |
| п | PB6                    | R10-3eR | 9" x 15" |  |  |  |  |
| , | PB7                    | R10-3eL | 9" x 15" |  |  |  |  |
| ' | PB8                    | R10-3eR | 9" x 15" |  |  |  |  |









SH 29

WOLF LAKES DR TRAFFIC SIGNAL ELECTRICAL DATA

|      |      |            | SH | HEET 1 OF 2 |
|------|------|------------|----|-------------|
| CONT | SECT | JOВ        |    | HIGHWAY     |
| 0337 | 01   | 053        |    | SH 29       |
| DIST |      | COUNTY     |    | SHEET NO.   |
| AUS  |      | WILLIAMSON | -  | 146         |

# GROUND WIRING

|       |                          |                            |                          |                            |                          |        |     |     | IT AND CABL                    |                             |                            |                           |                           |                           |                           |                  |                  |          |
|-------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|--------|-----|-----|--------------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|----------|
|       |                          |                            |                          |                            |                          | -      |     |     | RE SIZE AND                    | TYPE                        |                            |                           |                           |                           |                           |                  | -                |          |
|       |                          | (                          | ITEM (<br>CONDUIT SIZ    |                            |                          |        | E   |     | i 620<br>CONDUCTOR             | 5                           | ITEM 621<br>TRAY CABLE     | 5                         | ITEM<br>IGNAL CAB         | 1 684<br>LE ( TYPE /      | 4)                        | ITEM 6306        |                  |          |
| RUN # | ACTION                   | 2" PVC<br>SCH 40<br>TRENCH | 2" PVC<br>SCH 40<br>BORE | 3" PVC<br>SCH 40<br>TRENCH | 3" PVC<br>SCH 40<br>BORE | ACTION |     |     | NO. 8<br>INSULATED<br>(GROUND) | NO. 8<br>INSULATED<br>(LUM) | 4 CNDR<br>NO. 14<br>(ILSN) | 2 CNDR<br>NO. 12<br>(APS) | 5 CNDR<br>NO. 14<br>(PED) | 5 CNDR<br>NO. 14<br>(VEH) | 7 CNDR<br>NO. 14<br>(VEH) | VIVDS<br>CABLE** | LENGTH<br>OF RUN | RUN #    |
| 0     | 1                        | 2                          |                          |                            |                          | ) I    | 1   | 2   | 1                              | 8                           | 4                          |                           |                           |                           |                           |                  | 10               | 0        |
| 1     | I                        | 1                          |                          | 3                          |                          | 1      | 1   | 2   | 3                              |                             |                            | 8                         | 8                         | 2                         | 8                         | 4                | 10               | 1        |
| 2     | 1                        | 1                          |                          | 3                          |                          | 1      | 1   | 2   | 3                              |                             |                            | 8                         | 8                         | 2                         | 8                         | 4                | 20               | 2        |
| 3     | 1                        | 1                          |                          | 2                          |                          | 1      |     |     | 3                              | 2                           | 1                          |                           |                           | 1                         | 2                         | 1                | 15               | 3        |
| 4     | ı                        | 1                          |                          |                            |                          | 1      |     |     | 1                              |                             |                            | 1                         | 1                         |                           |                           |                  | 10               | 4        |
| 5     | 1                        | 1                          |                          |                            |                          | 1      |     |     | 1                              |                             |                            | 1                         | 1                         |                           |                           |                  | 20               | 5        |
| 6     | 1                        |                            | 1                        |                            | 3                        | J. 1   | 1   | 2   |                                | 2                           | 1                          | 6                         | 6                         | 1                         | 6                         | 3                | 160              | 6        |
| 7     | ı                        | 1                          |                          | 2                          |                          | 1      |     |     | 3                              | 2                           | 1                          |                           |                           |                           | 2                         | 1                | 35               | 7        |
| 8     | ı                        | 1                          |                          |                            |                          | j 1    |     |     | 1                              |                             |                            | 2                         | 2                         |                           |                           |                  | 25               | 8        |
| 9     | 1                        |                            |                          |                            | 3                        | 1      |     |     |                                | 4                           | 2                          | 4                         | 4                         | 1                         | 4                         | 2                | 155              | 9        |
| 10    | 1                        | 1                          |                          | 2                          |                          | I      |     |     | 3                              | 2                           | 1                          |                           | e e                       | 1                         | 4                         | 1                | 30               | 10       |
| 11    | ı                        | 1                          |                          |                            |                          | 1      |     |     | 1                              |                             |                            | 2                         | 2                         |                           |                           |                  | 15               | 11       |
| 12    | ı                        |                            |                          |                            | 3                        | 1      |     |     |                                | 2                           | 1                          | 2                         | 2                         |                           | 2                         | 1                | 130              | 12       |
| 13    | ı                        | 1                          |                          |                            |                          | 1      |     |     | 1                              |                             |                            | 2                         | 2                         |                           |                           |                  | 20               | 13       |
| 14    | I                        | 1                          |                          | 2                          |                          | 1      |     |     | 3                              | 2                           | 1                          |                           | r                         |                           | 2                         | 1                | 35               | 14       |
|       | TAL (LF)                 | 235                        | 160                      | 320                        | 1335                     | -      | 190 | 380 | 525                            | 1430                        | 550                        | 2230                      | 2230                      | 420                       | 2040                      | 1155             | SUBTO            | ΓAL (LF) |
|       | TAL (LF)<br>CODE: I - IN |                            | 160                      | 320                        | 1335                     | -      | 190 | 380 | 525                            | 1430                        | 550                        | 2230                      | 2230                      | 420                       | 2040                      | 1155             | SUBTO            | FAL (LF) |

# POLE WIRING

| INSIDE | TYPE                       | ELEC CONDR   | TRAY CABLE | SIG     | NAL CABLE T | TY A    | VIVDS** |
|--------|----------------------------|--------------|------------|---------|-------------|---------|---------|
| POLES  | TIFE                       | #8 INS (LUM) | 4C # 14    | 2C # 12 | 5C # 14     | 7C # 14 | VIVDS   |
| Α      | SIGNAL POLE (30' TALL)     | 60           | 25         |         | 20          | 40      | 20      |
| В      | SIGNAL POLE (30' TALL)     | 60           | 25         |         |             | 40      | 20      |
| С      | SIGNAL POLE (30' TALL)     | 60           | 25         |         | 20          | 40      | 20      |
| D      | SIGNAL POLE (30' TALL)     | 60           | 25         |         |             | 40      | 20      |
| Ε      | PEDESTRIAN POLE (10' TALL) |              |            | 5       | 10          |         |         |
| F      | PEDESTRIAN POLE (10' TALL) |              |            | 5       | 10          |         |         |
| G      | PEDESTRIAN POLE (10' TALL) | Y            |            | 10      | 20          |         |         |
| Н      | PEDESTRIAN POLE (10' TALL) |              |            | 10      | 20          |         |         |
| 1      | PEDESTRIAN POLE (10' TALL) |              |            | 10      | 20          |         |         |
|        | TOTAL QTY (LF)             | 240          | 100        | 40      | 120         | 160     | 80      |

# CARINET\_WIRING

|                | ELEC               | CONDR             | 1       | SIGNAL C         | ABLE TY A        |         | )       |
|----------------|--------------------|-------------------|---------|------------------|------------------|---------|---------|
| INSIDE CABINET | #6 INS<br>(GROUND) | #6 INS<br>(POWER) | 2C # 12 | 5C # 14<br>(PED) | 5C # 14<br>(VEH) | 7C # 14 | VIVDS** |
| TOTAL QTY      | 5                  | 10                | 40      | 40               | 10               | 40      | . 20    |

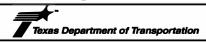
<sup>\*\*</sup>FURNISH AND INSTALL DETECTION CABLE PER MANUFACTURER RECOMMENDATIONS.

# ARM WIRING

| INCIDE ADMC                    | SIGNAL C | CABLE TY A | V/IV/DC** |
|--------------------------------|----------|------------|-----------|
| INSIDE ARMS                    | 5C # 14  | 7C # 14    | ─ VIVDS** |
| POLE A - 65' ARM               |          |            |           |
| HEADS 16 & 17                  |          | 65         |           |
| HEADS 18, 19 & 20              | 45       |            |           |
| HEAD 21                        |          | 5          |           |
| DETECTOR 1 (COMBO RADAR/VIVDS) |          |            | 35        |
| POLE B - 50' ARM               |          |            |           |
| HEADS 22 & 23                  |          | 50         |           |
| HEADS 24 & 25                  |          | 30         |           |
| DETECTOR 2 (VIVDS)             |          |            | 35        |
| POLE C - 60' ARM               |          |            |           |
| HEADS 26 & 27                  |          | 60         |           |
| HEADS 28, 29 & 30              | 40       |            |           |
| DETECTOR 3 (COMBO RADAR/VIVDS) |          |            | 35        |
| POLE D - 60' ARM               |          |            |           |
| HEAD 32                        |          | 60         |           |
| HEADS 33 & 34                  |          | 45         |           |
| DETECTOR 4 (VIVDS)             |          |            | 40        |
| TOTAL QTY (LF)                 | 85       | 315        | 145       |



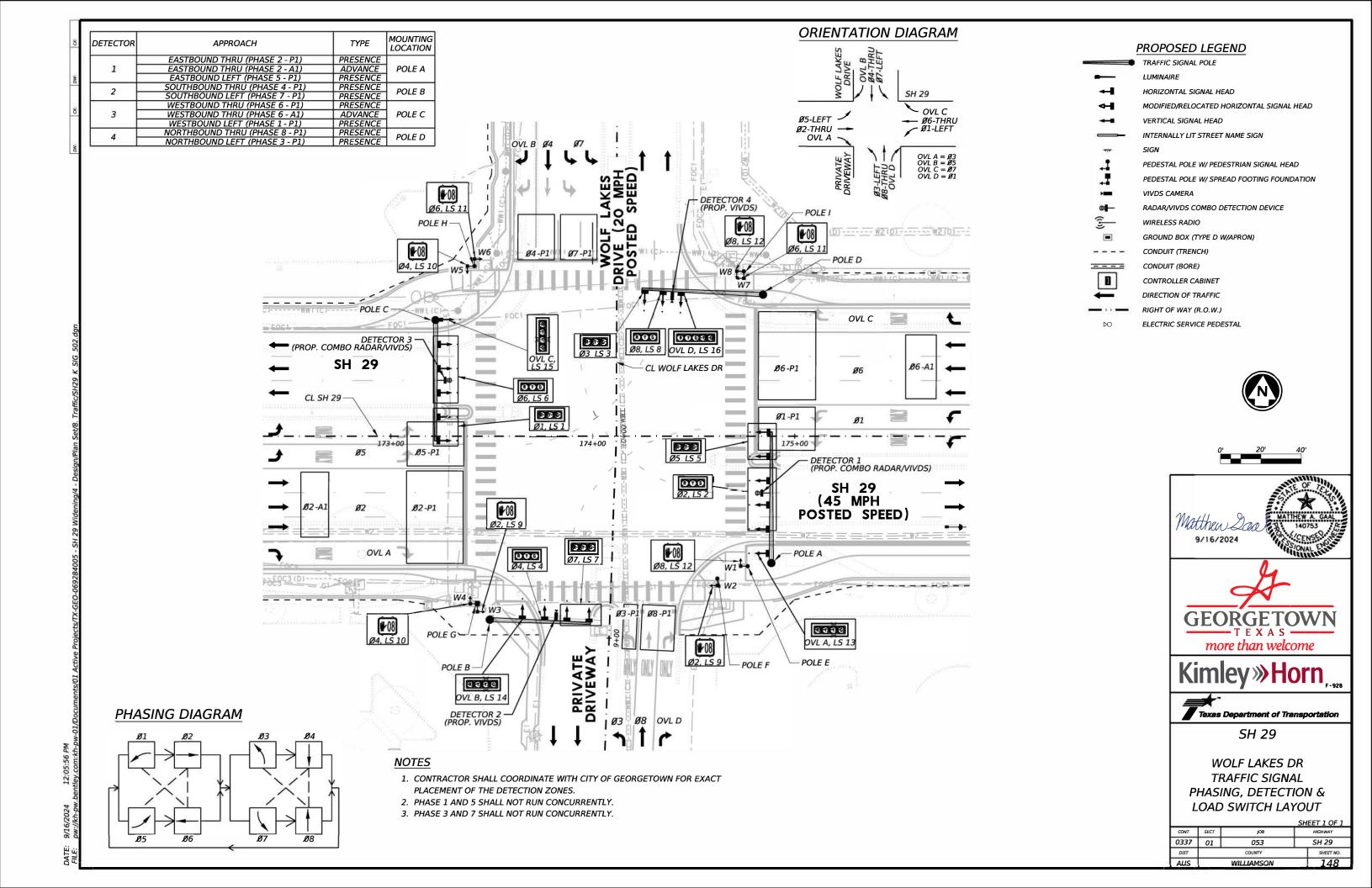


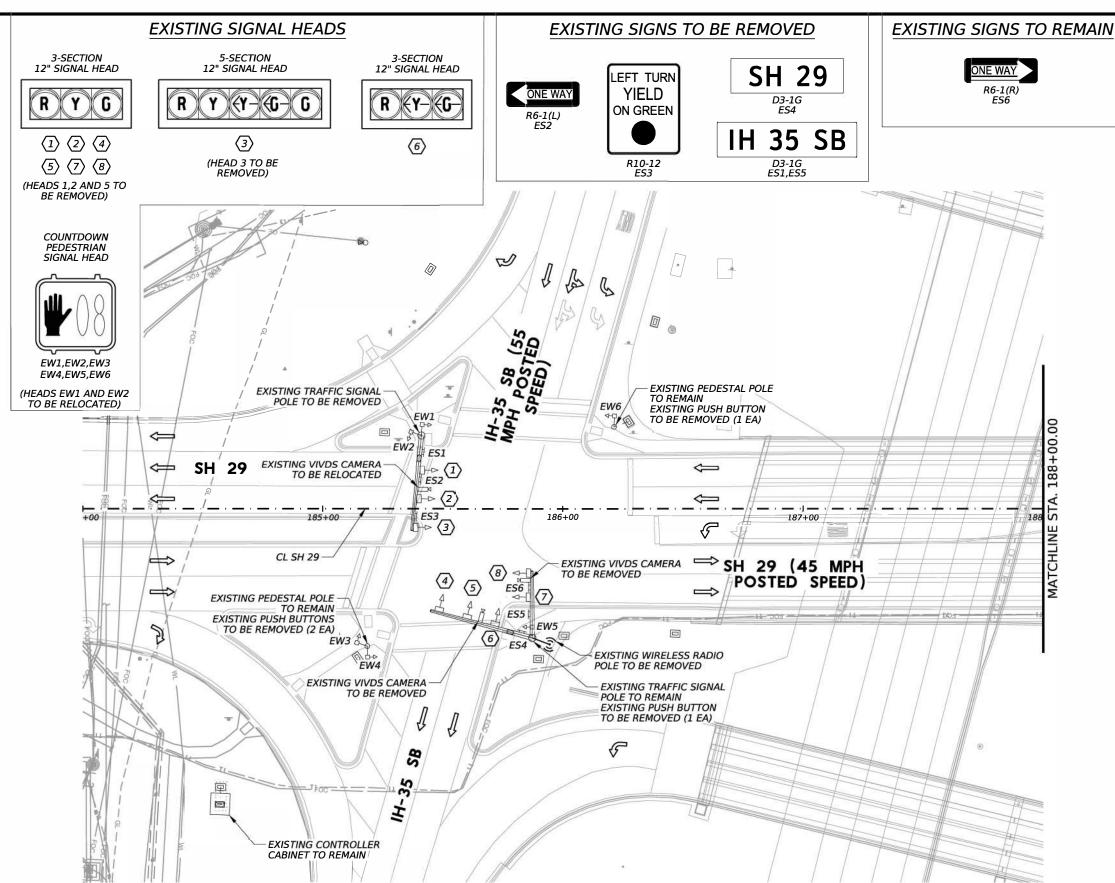


SH 29

WOLF LAKES DR TRAFFIC SIGNAL ELECTRICAL DATA

|      |      |            | SHEET 2 OF 2 |
|------|------|------------|--------------|
| CONT | SECT | JOB        | HIGHWAY      |
| 0337 | 01   | 053        | SH 29        |
| DIST |      | COUNTY     | SHEET NO.    |
| AUS  |      | WILLIAMSON | 147          |





NOTES:

1. ALL EXISTING UNDERGROUND CONDUITS ARE TO BE REMOVED OR ABANDONED IN PLACE. ALL CABLES AND CONDUCTORS ARE TO BE REMOVED.

ALL TRAFFIC SIGNAL EQUIPMENT SPECIFIED FOR REMOVAL THAT IS DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL REMAIN THE PROPERTY OF THE CITY OF GEORGETOWN AND BE DELIVERED TO A LOCATION SPECIFIED BY THE CITY OF GEORGETOWN. ANY EQUIPMENT NOT DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL BECOME PROPERTY OF THE CONTRACTOR AND THE CONTRACTOR SHALL DISPOSE OF IN COMPLIANCE WITH ANY APPLICABLE FEDERAL, STATE, AND/OR LOCAL LAWS. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680 WITH NO ADDITIONAL PAY GIVEN.

THE PRESENCE/ABSENCE AND LOCATION OF EXISTING TRAFFIC SIGNAL EQUIPMENT SHOWN IN THE PLANS IS BASED ON THE BEST RECORDS AVAILABLE TO THE ENGINEER. CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION SHOULD FIELD CONDITIONS DIFFER FROM WHAT IS DEPICTED IN THE PLANS.

THE CONTRACTOR SHALL VERIFY, PRIOR TO STARTING WORK RELATED TO THE TRAFFIC SIGNAL, THAT GROUND BOXES AND/OR CONDUIT RUNS SHOWN FOR REMOVAL CONTAIN CABLING ONLY FOR EXISTING TRAFFIC SIGNAL EQUIPMENT. SHOULD EXISTING GROUND BOXES AND/OR CONDUITS CONTAIN WIRING FOR ANY EQUIPMENT OTHER THAN THE EXISTING TRAFFIC SIGNAL, CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION.

### EXISTING LEGEND

TRAFFIC SIGNAL POLE

LUMINAIRE

HORIZONTAL SIGNAL HEAD VERTICAL SIGNAL HEAD

SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

VIVDS CAMERA
 VIVDS CAMERA

WIRELESS RADIO

GROUND BOX (TYPE D W/ APRON)

- - CONDUIT

 $\infty$ 

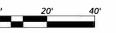
ELECTRIC SERVICE PEDESTAL

CONTROLLER CABINET

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)









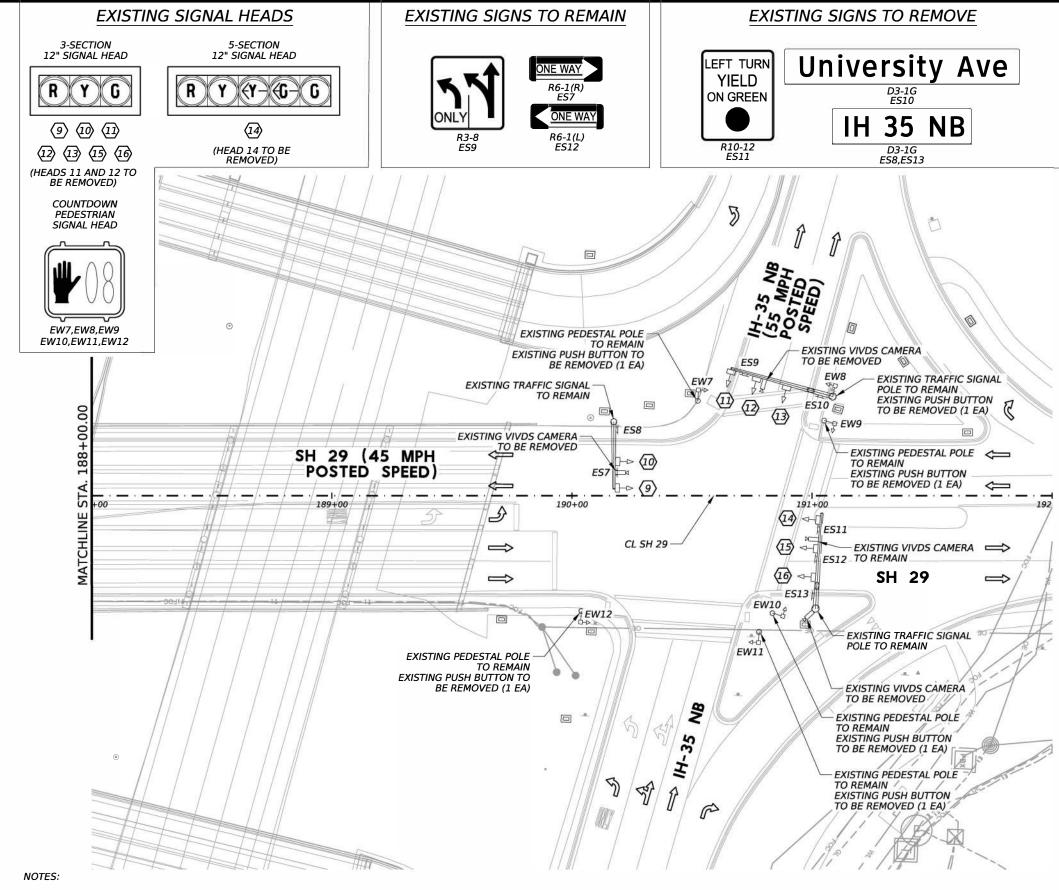




SH 29

I-35 EXISTING TRAFFIC SIGNAL LAYOUT

|      |      |            | SHEET 1 OF 2 |
|------|------|------------|--------------|
| CONT | SECT | JOB        | HIGHWAY      |
| 0337 | 01   | 053        | SH 29        |
| DIST |      | COUNTY     | SHEET NO.    |
| AUS  |      | WILLIAMSON | 149          |



ALL EXISTING UNDERGROUND CONDUITS ARE TO BE REMOVED OR ABANDONED IN PLACE. ALL CABLES
AND CONDUCTORS ARE TO BE REMOVED.

ALL TRAFFIC SIGNAL EQUIPMENT SPECIFIED FOR REMOVAL THAT IS DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL REMAIN THE PROPERTY OF THE CITY OF GEORGETOWN AND BE DELIVERED TO A LOCATION SPECIFIED BY THE CITY OF GEORGETOWN. ANY EQUIPMENT NOT DEEMED SALVAGEABLE BY THE CITY OF GEORGETOWN SHALL BECOME PROPERTY OF THE CONTRACTOR AND THE CONTRACTOR SHALL DISPOSE OF IN COMPLIANCE WITH ANY APPLICABLE FEDERAL, STATE, AND/OR LOCAL LAWS. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680 WITH NO ADDITIONAL PAY GIVEN.

3. THE PRESENCE/ABSENCE AND LOCATION OF EXISTING TRAFFIC SIGNAL EQUIPMENT SHOWN IN THE PLANS IS BASED ON THE BEST RECORDS AVAILABLE TO THE ENGINEER. CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION SHOULD FIELD CONDITIONS DIFFER FROM WHAT IS DEPICTED IN THE PLANS.

THE CONTRACTOR SHALL VERIFY, PRIOR TO STARTING WORK RELATED TO THE TRAFFIC SIGNAL, THAT GROUND BOXES AND/OR CONDUIT RUNS SHOWN FOR REMOVAL CONTAIN CABLING ONLY FOR EXISTING TRAFFIC SIGNAL EQUIPMENT. SHOULD EXISTING GROUND BOXES AND/OR CONDUITS CONTAIN WIRING FOR ANY EQUIPMENT OTHER THAN THE EXISTING TRAFFIC SIGNAL, CONTRACTOR SHALL STOP WORK IMMEDIATELY AND CONTACT THE ENGINEER FOR A RESOLUTION.

### EXISTING LEGEND

TRAFFIC SIGNAL POLE

LUMINAIRE

→ HORIZONTAL SIGNAL HEAD

VERTICAL SIGNAL HEAD

SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

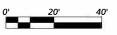
VIVDS CAMERA

GROUND BOX (TYPE D W/ APRON)

-- CONDUIT

WIRELESS RADIO

DIRECTION OF TRAFFIC RIGHT OF WAY (R.O.W.)







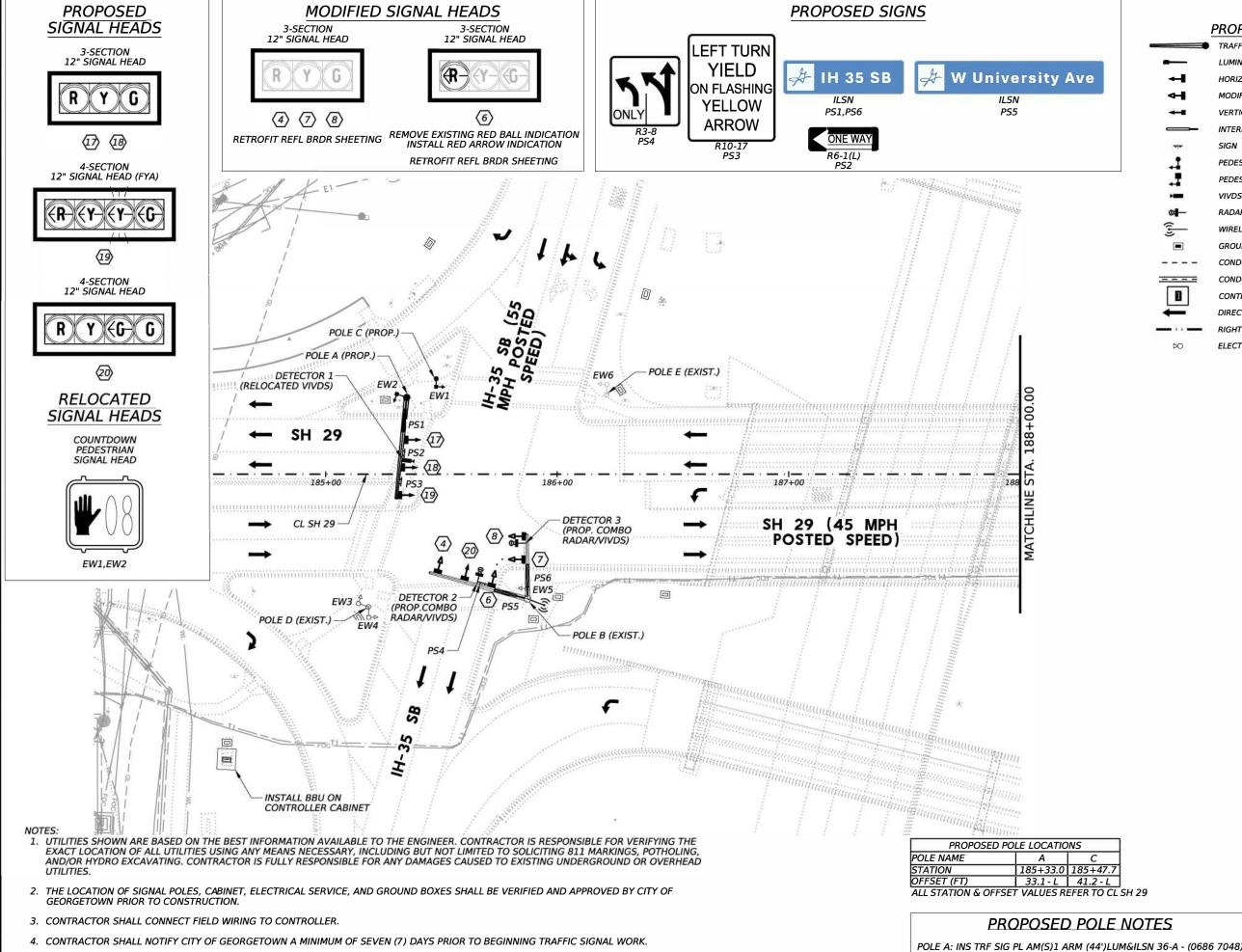
Kimley»Horn



SH 29

I-35 EXISTING TRAFFIC SIGNAL LAYOUT

|      |      |            | SHEET 2 OF 2 |
|------|------|------------|--------------|
| CONT | SECT | JOB        | HIGHWAY      |
| 0337 | 01   | 053        | SH 29        |
| DIST |      | COUNTY     | SHEET NO.    |
| AUS  | Ö    | WILLIAMSON | 150          |



5. CONTRACTOR SHALL NOTIFY CITY OF GEORGE TOWN A MINIMUM OF FOUR TEEN (14) DAYS PRIOR TO ACTIMATION OF THE NEW TRAFFIC SIGNAL.

PROPOSED LEGEND

HORIZONTAL SIGNAL HEAD

MODIFIED/RELOCATED HORIZONTAL SIGNAL HEAD

**VERTICAL SIGNAL HEAD** 

INTERNALLY LIT STREET NAME SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

PEDESTAL POLE W/ SPREAD FOOTING FOUNDATION

**VIVDS CAMERA** 

RADAR/VIVDS COMBO DETECTION DEVICE

WIRELESS RADIO

GROUND BOX (TYPE D W/APRON)

CONDUIT (TRENCH)

CONDUIT (BORE)

CONTROLLER CABINET

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)

ELECTRIC SERVICE PEDESTAL







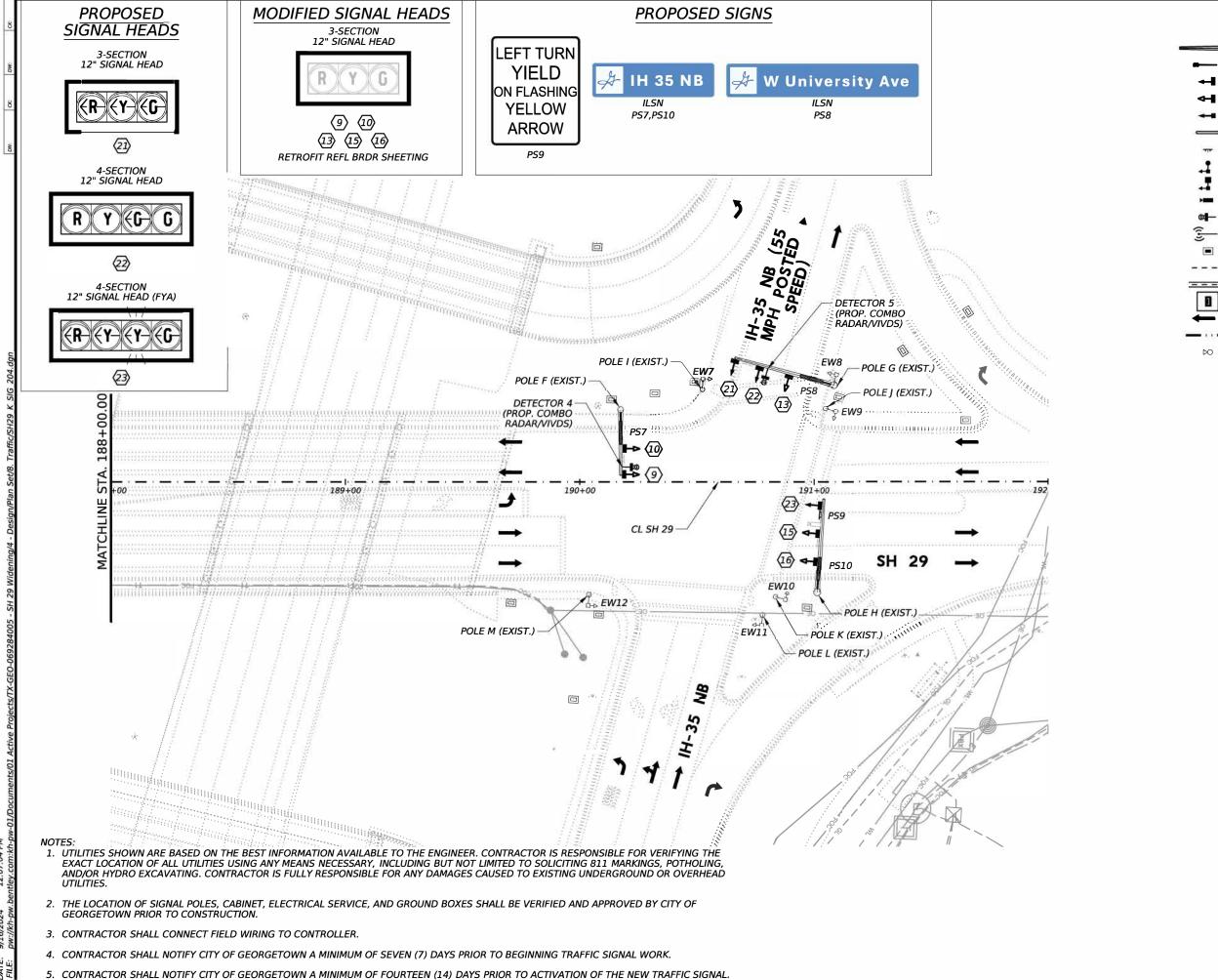


SH 29

*I-35* PROPOSED TRAFFIC SIGNAL LAYOUT

SHEET 1 OF 0337 01 SH 29 053 WILLIAMSON

POLE C: PED POLE ASSEMBLY 24-A - (0687 7001)



PROPOSED LEGEND

TRAFFIC SIGNAL POLE

LUMINAIRE

HORIZONTAL SIGNAL HEAD

MODIFIED/RELOCATED HORIZONTAL SIGNAL HEAD

VERTICAL SIGNAL HEAD

INTERNALLY LIT STREET NAME SIGN

SIGN

PEDESTAL POLE W/ PEDESTRIAN SIGNAL HEAD

PEDESTAL POLE W/ SPREAD FOOTING FOUNDATION

**VIVDS CAMERA** 

RADAR/VIVDS COMBO DETECTION DEVICE

WIRELESS RADIO

GROUND BOX (TYPE D W/APRON)

CONDUIT (TRENCH)

CONDUIT (BORE)

CONTROLLER CABINET

DIRECTION OF TRAFFIC

RIGHT OF WAY (R.O.W.)

ELECTRIC SERVICE PEDESTAL









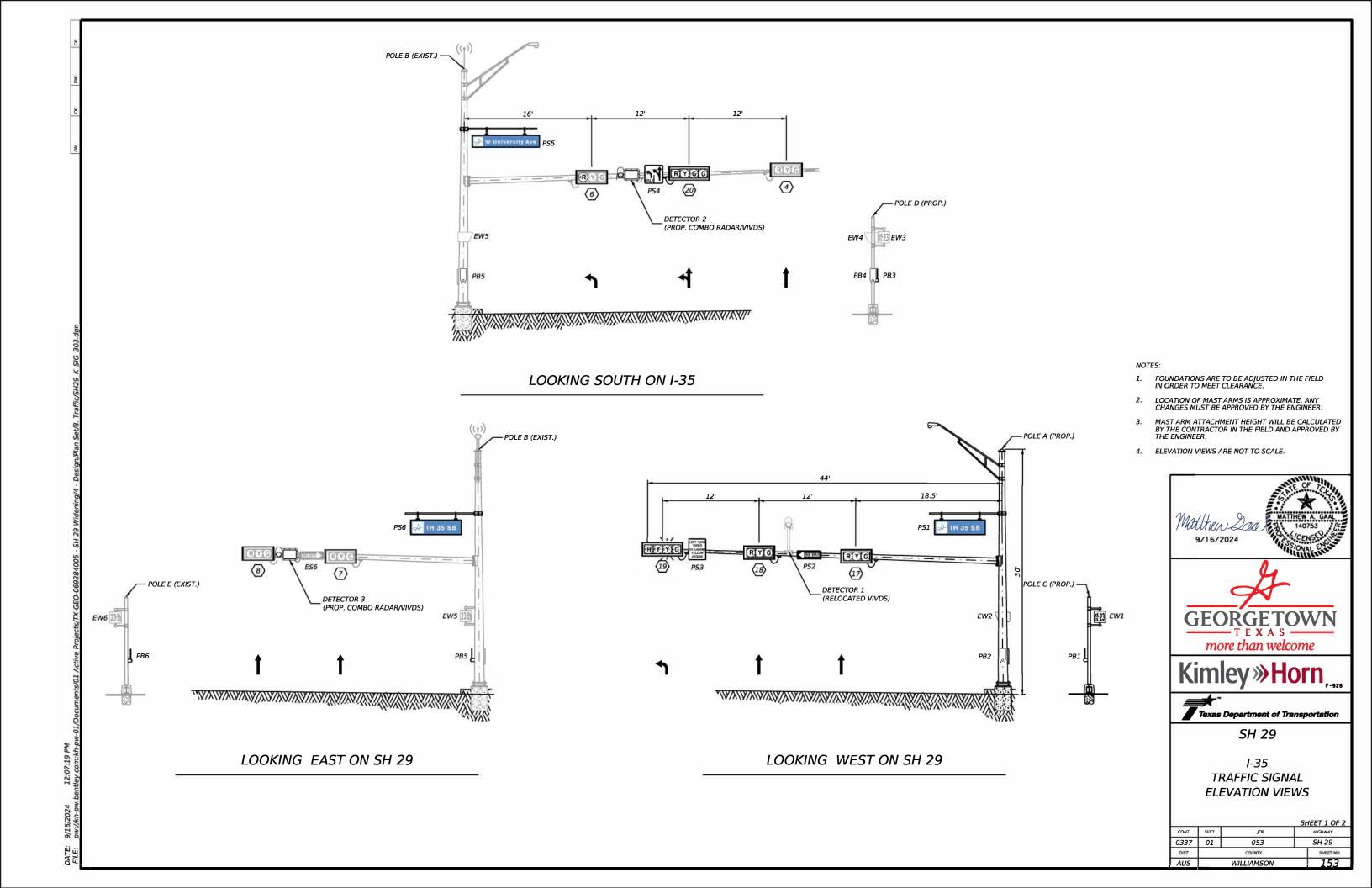


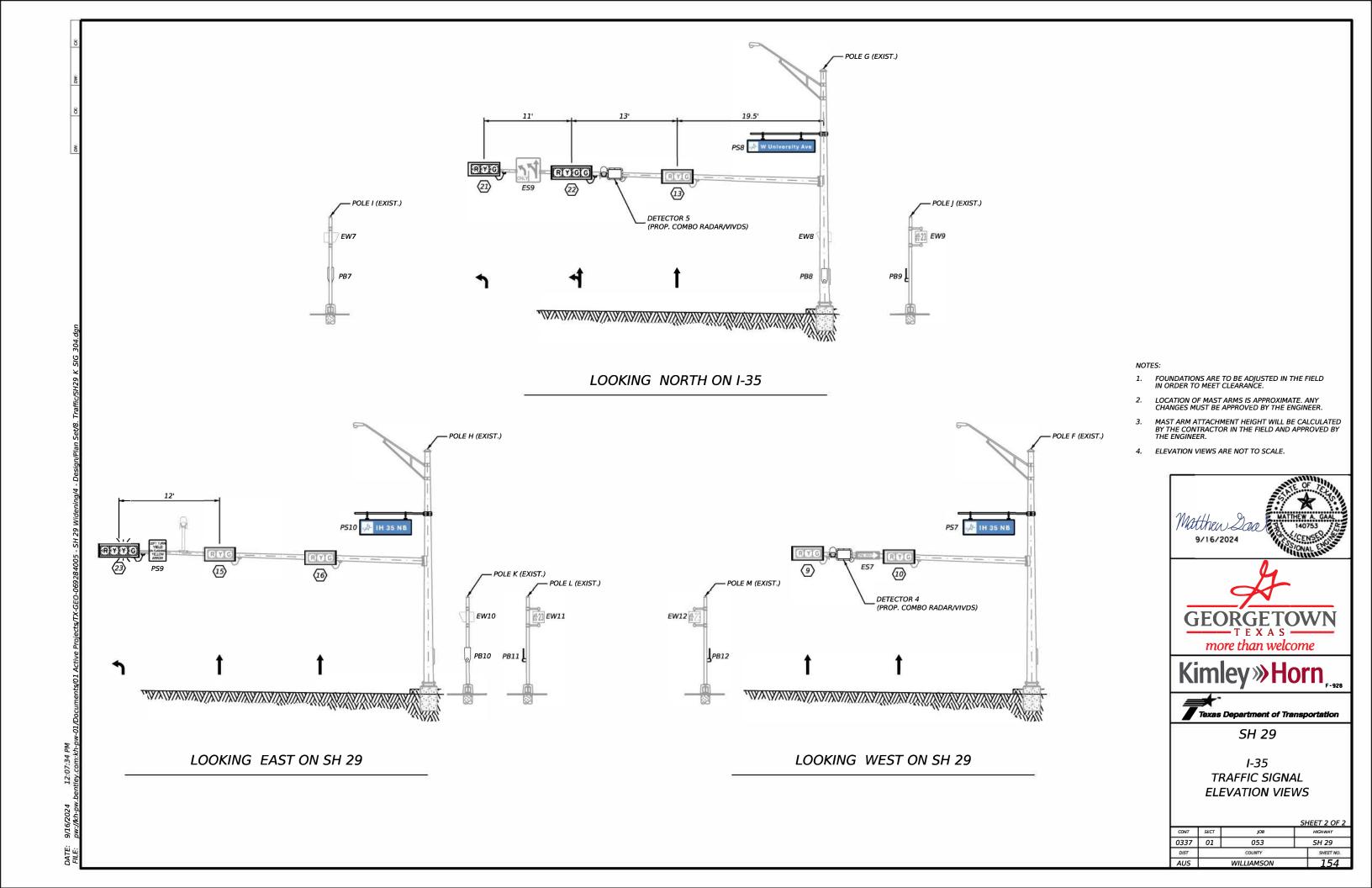


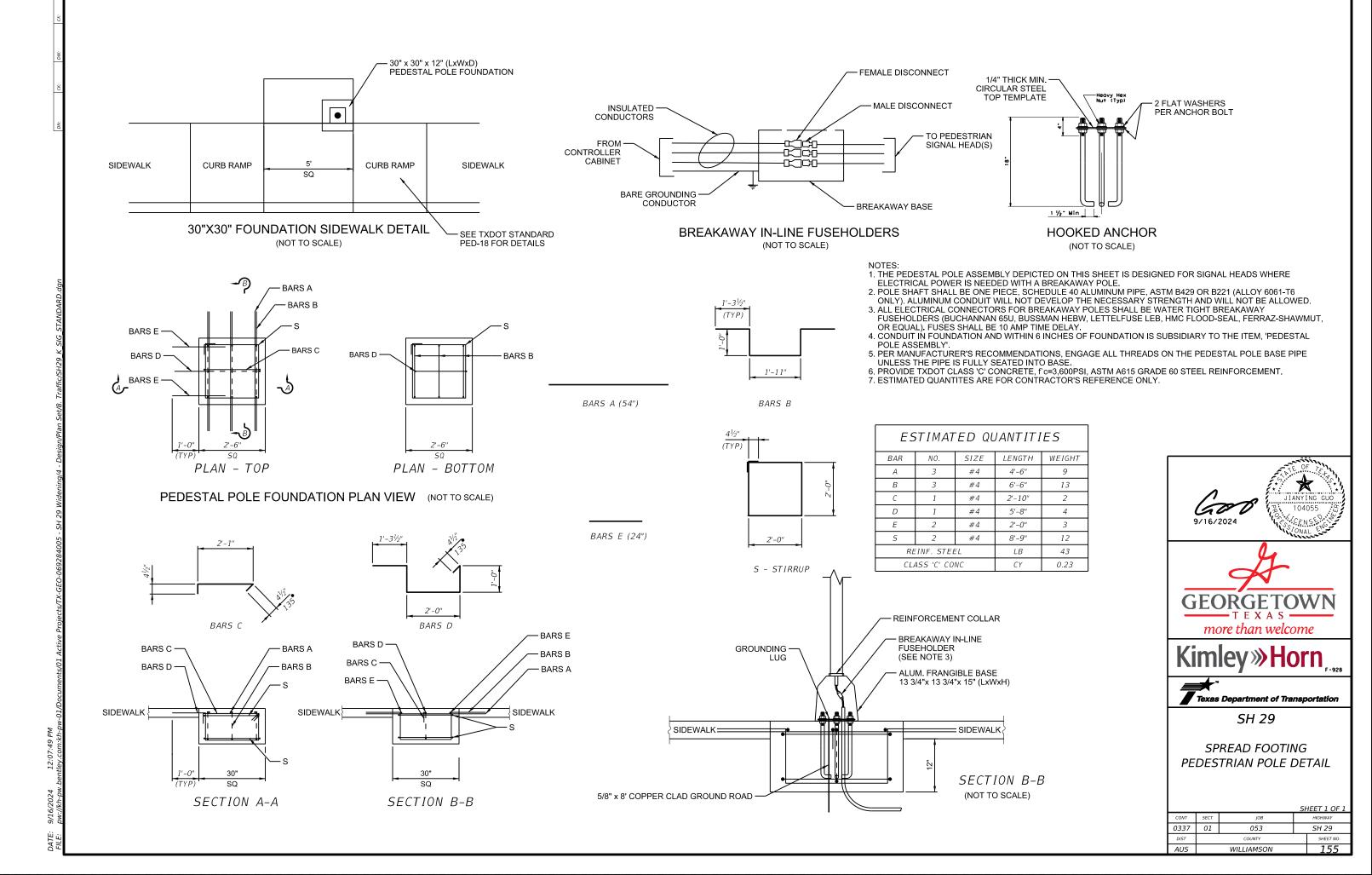
SH 29

I-35 PROPOSED TRAFFIC SIGNAL LAYOUT

|      |      |            | SHEET 2 OF 2 |
|------|------|------------|--------------|
| CONT | SECT | JOB        | HIGHWAY      |
| 0337 | 01   | 053        | SH 29        |
| DIST |      | COUNTY     | SHEET NO.    |
| AUS  |      | WILLIAMSON | 152          |







|               |      |               |                                  |            | <b>₽</b>               | 3            | SM RI   | ) SGN  | I ASSM TY XX      | (XXX (X) | $\overline{XX}$ ( $\overline{X} - \overline{XXXX}$ )   | BRIDGE                                     |
|---------------|------|---------------|----------------------------------|------------|------------------------|--------------|---|--------|-------------------|----------|--|--|
|               |      |               |                                  |            | 7 PE                   | TYPE         |   |        |                   |          |  | MOUNT<br>CLEARANC                          |
| PLAN<br>SHEET | SIGN | SIGN          |                                  |            | =                      | 3            | POST TYPE   | POSTS  | ANCHOR TYPE       |          | NTING DESIGNATION  | SIGNS                                      |
| NO.           | NO.  | NOMENCL ATURE | SIGN                             | DIMENSIONS | FLAT ALUMINUM (TYPE A) | EXAL ALUMINU | FRP = Fiberglass<br>TWT = Thin-Wall<br>10BWG = 10 BWG<br>S80 = Sch 80 | 1 or 2 | UB=Universal Bolt |          | D 1EXT or 2EXT = # of Ext  BM = Extruded Wind Beam  WC = 1.12 #/ft Wing  Channel  EXAL= Extruded Alum Sign  Panels | (See<br>Note 2<br>TY = TYF<br>TY N<br>TY S |
| 1             | 9    | R3-7L         | LEFT LANE MUST TURN LEFT         | 36 x 36    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 13   | R4-8          |                                  | 24 x 30    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 15   | R3-5L         | ONLY                             | 30 x 36    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 16   | R6-1R         | ONE WAY                          | 54 x 18    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 17   | R3-7R         | RIGHT LANE MUST TURN RIGHT       | 36 x 36    |                        |              | TWT   | 1      | SA                | P        |  |  |
| 2             | 18   | R1-1          | STOP                             | 36 x 36    |                        |              | TWT   | 1      | SA                | P        |  |  |
| 2             | 19   | R3-7L         | LEFT LANE MUST TURN LEFT         | 36 x 36    |                        |              | TWT   | 1      | SA                | P        |  |  |
| 2             | 20   | R2-1          | SPEED LIMIT 45                   | 30 x 36    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 21   | R2-1          | SPEED LIMIT 45                   | 30 x 36    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 22   | R6-1R         | ONE WAY                          | 54 x 18    |                        |              | TWT   | 1      | SA                | Р        |  |  |
| 2             | 23   | W2-1aTL       | HIGHWAY<br>INTERSECTION<br>AHEAD | 48 x 48    |                        |              | 10BWG   | 1      | SA                | P        |  |  |
| 2             | 24   | R3-7L         | LEFT LANE MUST                   | 36 x 36    |                        |              | TWT   | 1      | SA                | P        |  |  |

# ALUMINUM SIGN BLANKS THICKNESS Square Feet Minimum Thickness Less than 7.5 0.080" 7.5 to 15 0.100" Greater than 15 0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

# NOTE:

- 1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
- For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
- For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

# SUMMARY OF SMALL SIGNS

SOSS

| :        | sums16.dgn | DN: Tx | DOT  | ck: TxDOT | DW:  | TxDOT | ck: TxDOT |
|----------|------------|--------|------|-----------|------|-------|-----------|
| TxDOT    | May 1987   | CONT   | SECT | JOB       |      | HIC   | SHWAY     |
|          | REVISIONS  | 0337   | 01   | 053       |      | SH    | 29        |
| 16<br>16 |            | DIST   |      | COUNTY    |      |       | SHEET NO. |
|          |            | AUS    | ١    | WILLIAN   | ISOI | N     | 156       |

|              |             |                      |                 |            | PE A)               | PE G)        | SM R  | D SGN         | I ASSM TY XX                                     | XXXX (X)   | XX (X-XXXX)   | BR I DO  |
|--------------|-------------|----------------------|-----------------|------------|---------------------|--------------|---|---------------|--|--|---|--|
| PLAN         |             |                      |                 |            | 17                  | (TYI         | 5045 5::55  | Lacas         | I  | 110.11   |   | CLEARA   |
| SHEET<br>NO. | SIGN<br>NO. | SIGN<br>NOMENCLATURE | SIGN            | DIMENSIONS | FLAT ALUMINUM (TYPE | XAL ALUMINUM | POST TYPE  FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80 | POSTS  1 or 2 | UB=Universal Bolt                                | PREFABRICATED                                    | D 1EXT or 2EXT = # of Ext  BM = Extruded Wind Beam  WC = 1.12 #/ft Wing  Channel  EXAL = Extruded Alum Sign  Panels | TY = T   |
| 3            | 25          | M1-1(1 dgt)          |                 | 24 x 24    | ╫                   | <del> </del> | TWT   | 1 1           | SB   | P  | ruleis  | TY S   |
|              | 20          | Willitage            | JCT MITERSTATE  | ZTXZT      |                     |              | 1 7 7 1   |               | 05   | ,  |   |  |
|              |             |                      | 35              |            | +                   |              |   | <del> </del>  |  |  |   |  |
|              |             |                      | <u> </u>        |            |                     |              |   |               |  |  |   |  |
| 3            | 27          | R3-5R                |                 | 30 x 36    | $\perp$             |              | TWT   | 1             | SB   | Р  |   |  |
|              |             |                      | ONE WAY         |            | +                   |              |   | +             |  |  |   | <u> </u>   |
|              |             |                      |                 |            |                     |              |   |               |  |  |   |  |
| 3            | 28          | R3-7R                |                 | 36 x 36    | +                   |              | TWT   | 1             | SB   | P  | +   | <u> </u>   |
|              | 20          | 110-711              | RIGHT LANE      | 30 X 30    |                     |              | 1 7 7 1   |               | OD OD  | '  |   |  |
|              |             |                      | MUST            |            | $\perp$             |              |   | ₩             |  |  | <u> </u>  | 1  |
|              |             |                      | TURN RIGHT      |            |                     |              |   | +             |  |  |   |  |
| 3            | 29          | D2-2                 | (D -            | ??? x 30   |                     |              | 10BWG   | 1             | SB   |  |   |  |
|              |             |                      | Liberty Hiii 14 |            | +                   |              |   | +             |  |  |   |  |
|              |             |                      | Burnet 35       |            |                     |              |   |               |  |  |   |  |
| 4            | 30          | R3-7R                |                 | 36 x 36    | +                   |              | TWT   | 1             | SB   | P  | <del>                                     </del>  | <u> </u>   |
|              | - 00        | 110 711              | RIGHT LANE      | 00 X 00    |                     |              | 1 4 4 1   |               | <u> </u>   | <u>'</u>   |   |  |
|              |             |                      | MUST            |            | +                   |              |   | —             |  | <del>                                     </del> |   |  |
|              |             |                      | TURN RIGHT      |            | +                   |              |   | +             |  |  | +   |  |
| 4            | 31          | D1-2                 |                 | ??? x 30   |                     |              | 10BWG   | 1             | SB   |  |   |  |
|              |             |                      | ∯ Waco          |            |                     |              |   | +             |  | <del>                                     </del> |   |  |
|              |             |                      | Austin ⇒        |            |                     |              |   |               |  |  |   |  |
| 4            | 32          | R2-1                 |                 | 30 x 36    | +                   |              | TWT   | 1             | SB   | P  | <del>                                     </del>  | 1  |
| _            | 02          | 112 1                | SPEED<br>LIMIT  | 00 x 00    |                     |              | 1 4 4 1   | <u> </u>      | <u> </u>   | <u>'</u>   |   |  |
|              |             |                      | 40              |            | $\perp$             |              |   | —             |  | <del>                                     </del> |   |  |
|              |             |                      |                 |            | +                   |              |   | +             |  |  |   |  |
| 4            | 33          | R3-7L                | LEFT LANE       | 36 x 36    | +                   |              | TWT   | 1             | SB   | Р  |   |  |
|              |             |                      | MUST            |            | +                   |              |   | +             |  |  | +   |  |
|              |             |                      | TURN LEFT       |            |                     |              |   |               |  |  |   |  |
| 4            | 35          | R6-1R                |                 | 54 x 18    | +                   |              | TWT   | 1             | SB   | P  | <del>                                     </del>  | <del>                                     </del> |
| -            |             |                      | <u> </u>        |            |                     |              |   |               |  |  |   |  |
|              |             |                      | ONE WAY         |            | +                   |              |   | ┼             | <del> </del>                                     | <del>                                     </del> | +   | -  |
|              |             |                      |                 |            |                     |              |   |               |  |  |   |  |
|              |             |                      |                 |            | $\blacksquare$      |              |   |               |  |  |   |  |
|              |             |                      |                 |            | +                   |              |   | +             |  |  |   |  |
|              |             |                      |                 |            |                     |              |   | 1             |  |  |   |  |
|              |             |                      |                 |            | +                   |              |   | +             | <del>                                     </del> | <del>                                     </del> | +   | -  |
|              |             |                      |                 |            |                     |              |   | 1             |  |  | 1   |  |
|              |             |                      |                 |            | +                   |              |   | +             | <del>                                     </del> | <u> </u>   | +   | <u> </u>   |
|              |             |                      |                 |            |                     |              |   |               |  |  |   |  |
|              |             |                      |                 |            |                     |              |   | <u> </u>      |  |  |   |  |
|              |             |                      |                 |            | +                   |              |   | +             |  |  | +   |  |
|              |             |                      |                 |            |                     |              |   |               |  |  |   |  |

# ALUMINUM SIGN BLANKS THICKNESS Square Feet Minimum Thickness Less than 7.5 0.080" 7.5 to 15 0.100" Greater than 15 0.125"

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# NOTE:

- 1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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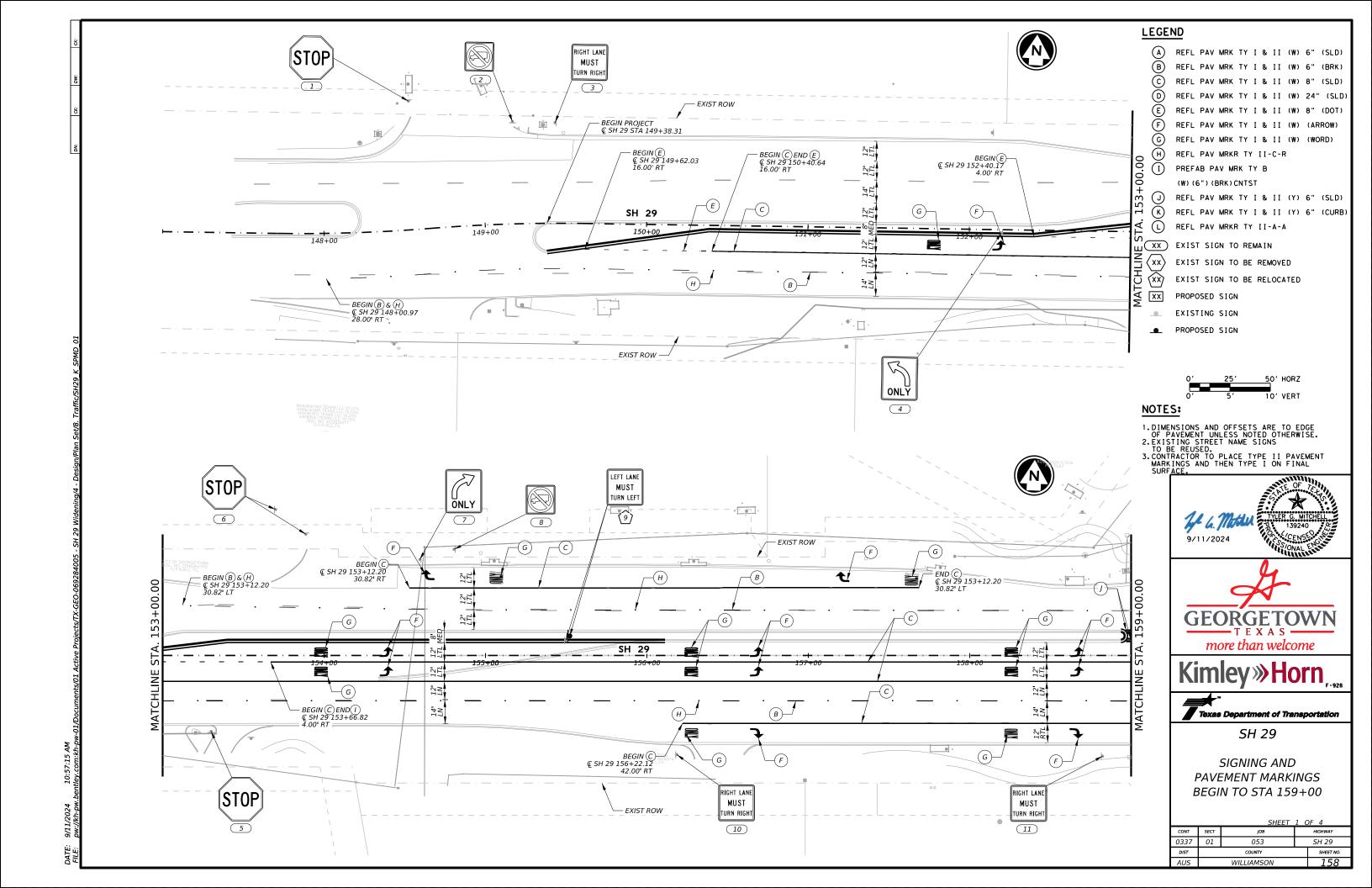
Texas Department of Transportation

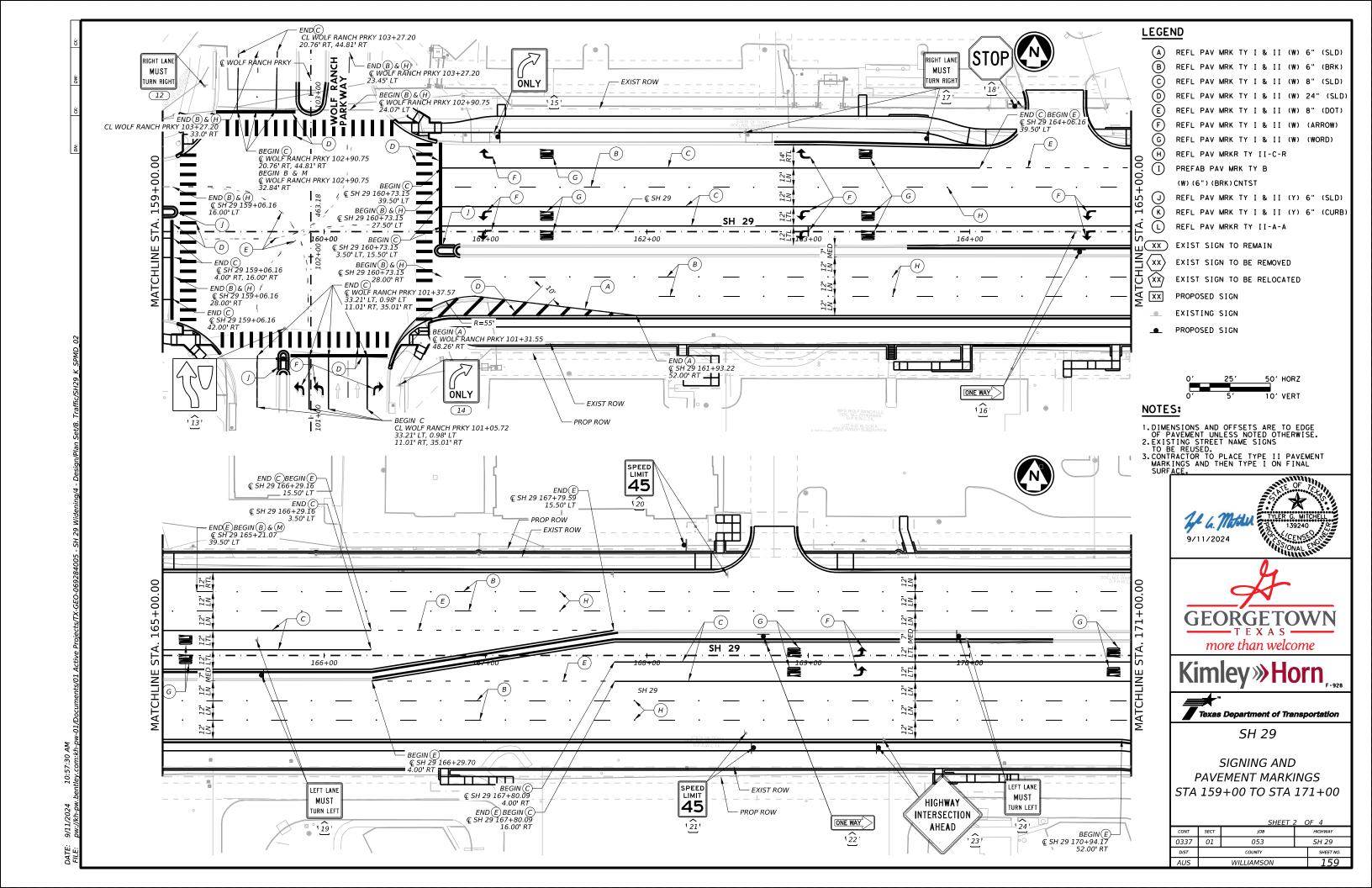
Traffic Operations Division Standard

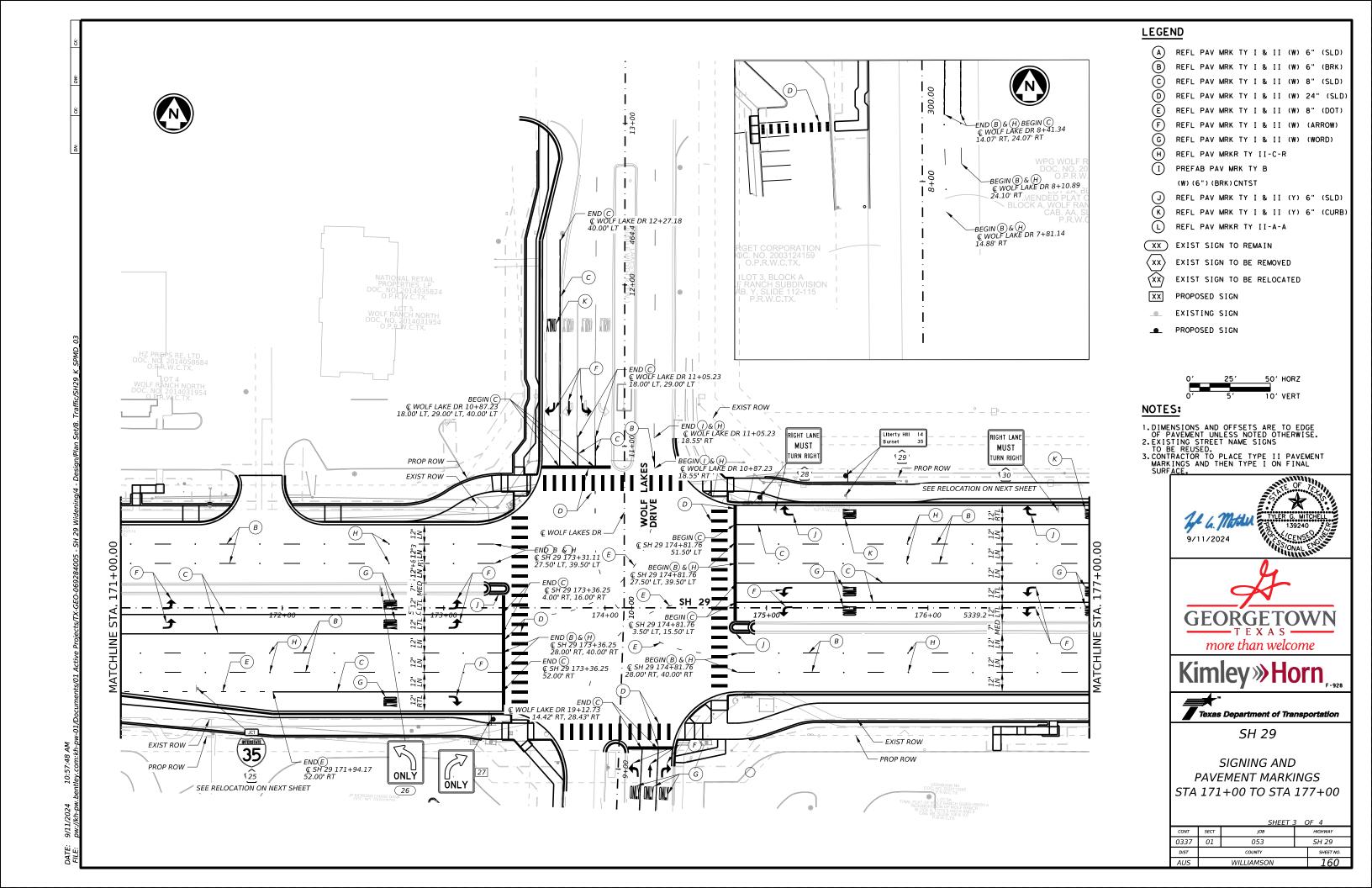
# SUMMARY OF SMALL SIGNS

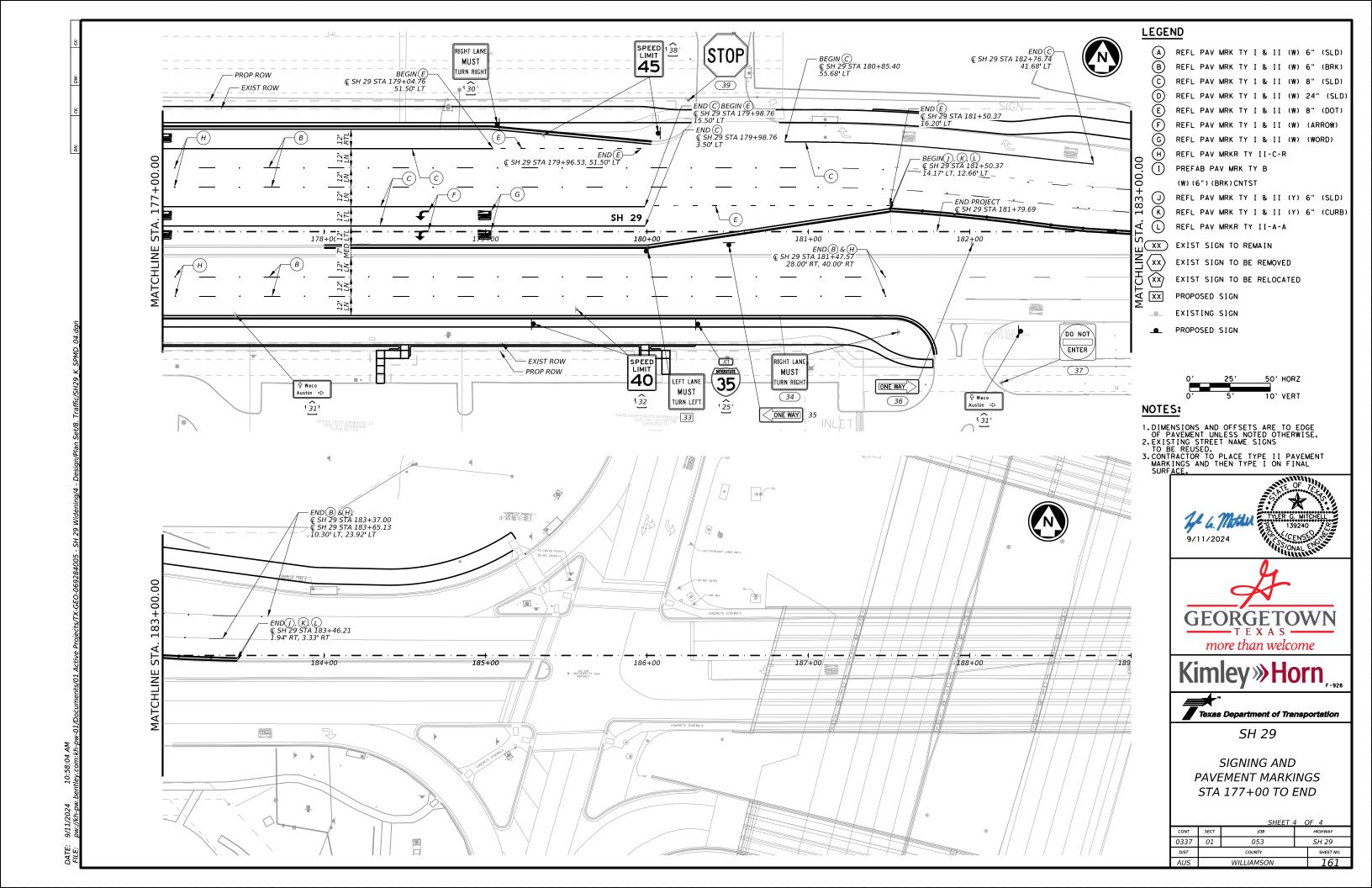
SOSS

| ILE:         | sums16.dgn | DN: Tx | DOT           | ck: TxDOT | DW:     | TxDOT     | ck: TxDOT |
|--------------|------------|--------|---------------|-----------|---------|-----------|-----------|
| C) T×DOT     | May 1987   | CONT   | CONT SECT JOB |           | HIGHWAY |           |           |
|              | REVISIONS  | 0337   | 01            | 053       |         | SI        | H 29      |
| 4-16<br>3-16 |            | DIST   | COUNTY        |           |         | SHEET NO. |           |
| , , ,        |            | AUS    | <u> </u>      | WILLIAM   | ISOI    | N         | 157       |









| Arm    |                | ROUND           | POLES           |      |       |                | POLYG | ONAL POL        | ES   |       |                    |
|--------|----------------|-----------------|-----------------|------|-------|----------------|-------|-----------------|------|-------|--------------------|
| Length | D <sub>B</sub> | D <sub>19</sub> | D <sub>24</sub> | D 30 | ① thk | D <sub>B</sub> | D19   | D <sub>24</sub> | D 30 | ① thk | Foundation<br>Type |
| ft.    | in.            | in.             | in.             | in.  | in.   | in.            | in.   | in.             | in.  | in.   | 1                  |
| 20     | 10.5           | 7.8             | 7. 1            | 6.3  | .179  | 11.5           | 8.5   | 7.7             | 6.8  | .179  | 30-A               |
| 24     | 11.0           | 8.3             | 7.6             | 6.8  | .179  | 12.0           | 9.0   | 8.2             | 7.3  | .179  | 30-A               |
| 28     | 11.5           | 8.8             | 8.1             | 7.3  | .179  | 12.5           | 9.5   | 8.7             | 7.8  | .179  | 30-A               |
| 32     | 12.5           | 9.8             | 9.1             | 8.3  | .179  | 12.0           | 9.0   | 8, 2            | 7.3  | . 239 | 30-A               |
| 36     | 12.0           | 9.3             | 8.6             | 7.8  | . 239 | 12.5           | 9.5   | 8.7             | 7.8  | .239  | 36-A               |
| 40     | 12.0           | 9.3             | 8.6             | 7.8  | . 239 | 13.5           | 10.5  | 9.7             | 8.8  | . 239 | 36-A               |
| 44     | 12.5           | 9.8             | 9.1             | 8.3  | . 239 | 14.0           | 11.0  | 10.2            | 9.3  | . 239 | 36-A               |
| 48     | 13.0           | 10.3            | 9.6             | 8.8  | . 239 | 15.0           | 12.0  | 11.2            | 10.3 | . 239 | 36-A               |

| Arm    |                | ROUND ARMS |                |       |        |      | POLYGONAL ARMS |                  |        |        |  |
|--------|----------------|------------|----------------|-------|--------|------|----------------|------------------|--------|--------|--|
| Length | L <sub>1</sub> | D,         | D <sub>2</sub> | ① thk | Rise   | L    | D,             | ② D <sub>2</sub> | 1) thk | Rise   |  |
| ft.    | ft.            | in.        | in.            | in.   | N136   | ft.  | in.            | in.              | in.    | Rise   |  |
| 20     | 19.1           | 6.5        | 3.8            | .179  | 1'-9"  | 19.1 | 7.0            | 3.5              | .179   | 1′-8"  |  |
| 24     | 23.1           | 7.5        | 4.3            | .179  | 1'-10" | 23.1 | 7.5            | 3.5              | .179   | 1'-9"  |  |
| 28     | 27.1           | 8.0        | 4.2            | .179  | 1'-11" | 27.1 | 8.0            | 3.5              | .179   | 1'-10" |  |
| 32     | 31.0           | 9.0        | 4.7            | .179  | 2'-1"  | 31.0 | 9.0            | 3.5              | .179   | 2′-0"  |  |
| 36     | 35.0           | 9.5        | 4.6            | .179  | 2'-4"  | 35.0 | 10.0           | 3.5              | .179   | 2'-1"  |  |
| 40     | 39.0           | 9.5        | 4.1            | .239  | 2′-8"  | 39.0 | 9.5            | 3.5              | . 239  | 2'-3"  |  |
| 44     | 43.0           | 10.0       | 4.1            | .239  | 2'-11" | 43.0 | 10.0           | 3.5              | .239   | 2′-6"  |  |
| 48     | 47.0           | 10.5       | 4.1            | . 239 | 3′-4"  | 47.0 | 11.0           | 3.5              | . 239  | 2′-9"  |  |

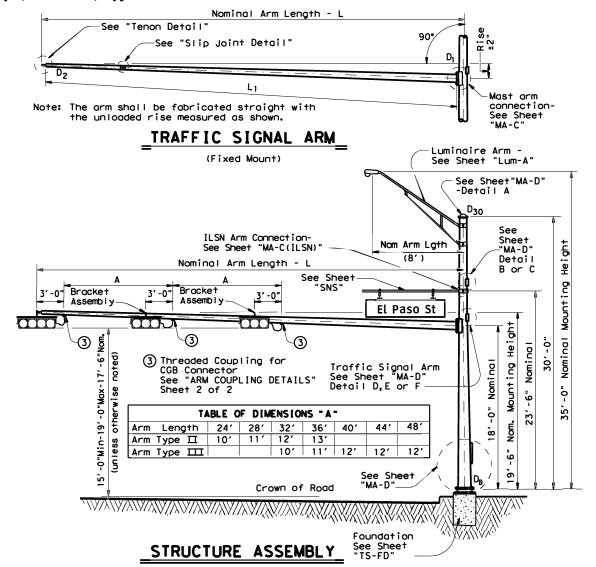
D<sub>2</sub> = Arm End O.D. L<sub>1</sub> = Shaft Length L = Nominal Arm Length

D<sub>B</sub> = Pole Base O.D.
D<sub>19</sub> = Pole Top O.D. with no Luminaire and no ILSN
D<sub>24</sub> = Pole Top O.D. with ILSN w/out Luminaire

 $D_{30}$  = Pole Top O.D. with Lumingire  $D_1$  = Arm Base O.D.

1) Thickness shown are minimums, thicker materials may be used.

 $\bigcirc$  D<sub>2</sub> may be increased by up to 1" for polygonal arms.



### SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

| Nominal       | 30' Poles Wi |  | 24' Poles W                      | ith ILSN |                | 19' Poles With No<br>Luminaire and No ILSN |  |  |
|---------------|--------------|--|----------------------------------|----------|----------------|--|--|--|
| Arm<br>Length | (or two if I | re plus: One<br>LSN attached)<br>ole, clamp-on | Above ho<br>plus one<br>hand hol | small    | See note above |  |  |  |
| f†            | Designation  | Quantity                                       | Designation                      | Quantity | Designation    | Quantity                                   |  |  |
| 20            | 20L-80       | _  | 205-80                           |          | 20-80          |  |  |  |
| 24            | 24L-80       |  | 245-80                           |          | 24-80          |  |  |  |
| 28            | 28L-80       |  | 285-80                           |          | 28-80          |  |  |  |
| 32            | 32L-80       |  | 325-80                           |          | 32-80          |  |  |  |
| 36            | 36L-80       |  | 365-80                           |          | 36-80          |  |  |  |
| 40            | 40L-80       |  | 40S-80                           |          | 40-80          |  |  |  |
| 44            | 44L-80       | 1  | 445-80                           |          | 44-80          |  |  |  |
| 48            | 48L-80       |  | 485-80                           |          | 48-80          |  |  |  |

Traffic Signal Arms (1 per Pole)

Type I Arm (1 Signal)

Ship each arm with the listed equipment attached Type II Arm (2 Signals) Type III Arm (3 Signals)

| Nominal<br>Arm<br>Length | 1 CGB cor   | nnector  | 1 Bracket A<br>and 2 CGB ( | Assembly<br>Connectors |             | 2 Bracket Assemblies<br>and 3 CGB Connectors |  |  |
|--------------------------|-------------|----------|----------------------------|------------------------|-------------|--|--|--|
| f†                       | Designation | Quantity | Designation                | Quantity               | Designation | Quantity                                     |  |  |
| 20                       | 201-80      |          |                            |                        |             |  |  |  |
| 24                       | 241-80      |          | 24∏-80                     |                        |             |  |  |  |
| 28                       | 281-80      |          | 28∏-80                     |                        |             |  |  |  |
| 32                       |             |          | 32∏-80                     |                        | 32111-80    |  |  |  |
| 36                       |             |          | 36∏-80                     |                        | 36Ⅲ-80      |  |  |  |
| 40                       |             |          |                            |                        | 40111-80    |  |  |  |
| 44                       |             |          |                            |                        | 44111-80    | 1  |  |  |
| 48                       |             |          |                            |                        | 48Ⅲ-80      |  |  |  |

Luminaire Arms (1 per 30' pole)

| Nominal Arm Length | Quantity |
|--------------------|----------|
| 8' Arm             | 1        |
|                    |          |

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

| Nominal Arm Length | Quantity |
|--------------------|----------|
| 7' Arm             |          |
| 9' Arm             | 6        |
|                    |          |

Anchor Bolt Assemblies (1 per pole)

| Anchor<br>Bolt<br>Diameter | Anchor<br>Bolt<br>Length |          |
|----------------------------|--------------------------|----------|
| 1 1/2"                     | 3'-4"                    | Quantity |
| 1 3/4"                     | 3′-10"                   | 1        |
|                            |                          |          |

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2



Texas Department of Transportation Traffic Operations Division TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)

SMA-80(1)-12

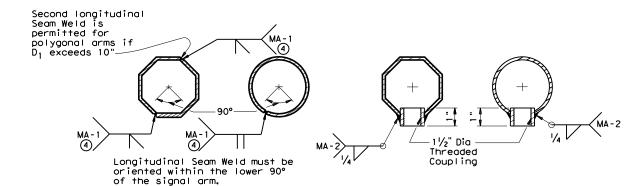
| C TxDOT August 1995 | DN: MS |      | CK: JSY  | DW: | MMF | CK: JSY   |
|---------------------|--------|------|----------|-----|-----|-----------|
| REVISIONS           | CONT   | SECT | JOB      |     | HI  | SHWAY     |
| -96<br>-99          | 0337   | 01   | 053      |     | SH  | 29        |
| -12                 | DIST   |      | COUNTY   |     |     | SHEET NO. |
|                     | AUS    | 1    | MTII TAM | SON |     | 162       |

# SLIP JOINT DETAIL

# TENON DETAIL

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1  $\frac{1}{2}$ " Dia Threaded Coupling.

# BRACKET ASSEMBLY



# ARM WELD DETAIL

4 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

# ARM COUPLING DETAILS

### VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

### **GENERAL NOTES:**

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

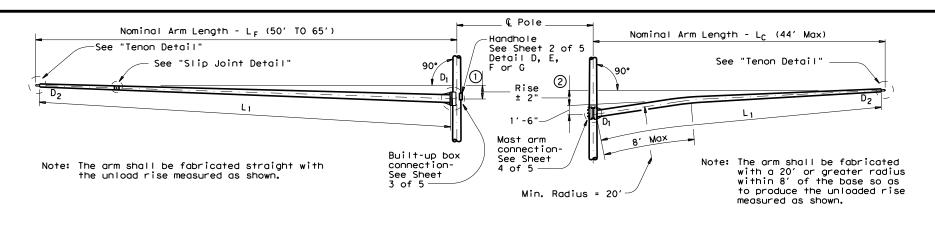
Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

SHEET 2 OF 2



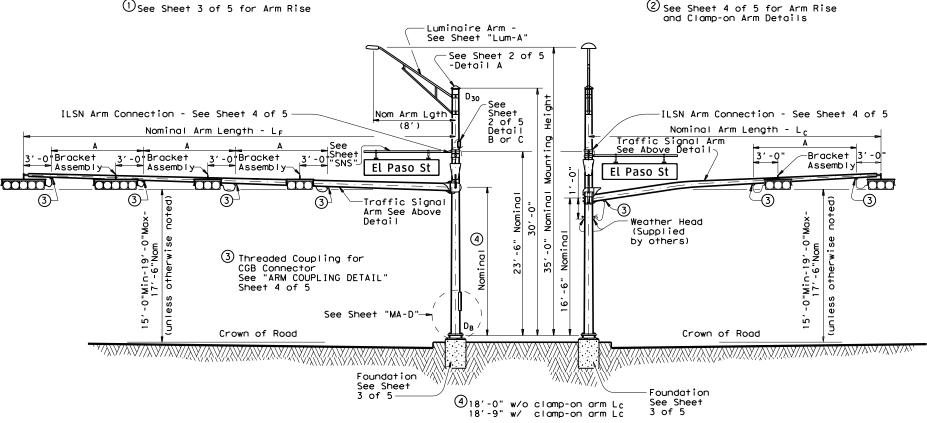
| © TxDOT August 1995 | DN: MS |      | CK: JSY   | DW: | MMF | CK: JSY   |
|---------------------|--------|------|-----------|-----|-----|-----------|
| REVISIONS<br>96     | CONT   | SECT | JOB       |     | HIO | SHWAY     |
| -12                 | 0337   | 01   | 053       |     | SH  | 29        |
|                     | DIST   |      | COUNTY    |     |     | SHEET NO. |
|                     | AUS    | ١    | WILL I AM | SOI | N   | 163       |



# FIXED MOUNT TRAFFIC SIGNAL ARM

# CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

2 See Sheet 4 of 5 for Arm Rise

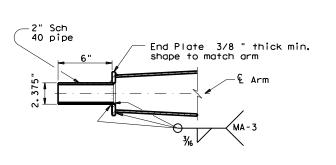


STRUCTURE ASSEMBLY

# ELEVATION

### (Showing fixed mount arm)

|             |     | TAE | BLE OF | DIME | NS I ON | S "A" |     |     |     |     |
|-------------|-----|-----|--------|------|---------|-------|-----|-----|-----|-----|
| Arm Length  | 24' | 28′ | 32'    | 36′  | 40'     | 44'   | 50′ | 55′ | 60′ | 65′ |
| Arm Type Ⅱ  | 10' | 11' | 12'    | 13'  |         |       |     |     |     |     |
| Arm Type Ⅲ  |     |     | 10'    | 11'  | 12'     | 12'   |     |     |     |     |
| Arm Type TV |     |     |        |      |         |       | 12' | 12' | 12' | 12' |



TENON DETAIL

### ELEVATION

(Showing clamp-on arm)

239" thickness is permissible for Tip Section -Min Lap 6'-0" (Min) ~17'-0" (Max) equals 1.5 times female \_20" ± 1" Note: A slip joint is Dia holes and permissible for arms Dia galv A307 bolt. 50' and greater in Tack weld nut to thread projection after making The slip joint shall be made in the joint. Repair damaged shop, but may be match galvanizing in accordance with Item 445, "Galvanizing". marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto.

Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

| Arm                           | Equivalent DL (5)       | WL EPA 56  |
|-------------------------------|-------------------------|------------|
| 8′ Luminaire Arm              | Luminaire 60 lbs        | 1.6 sq ft  |
| 9' ILSN Arm                   | Sign 85 lbs             | 11.5 sq ft |
| 50' to 65'<br>Fixed Mount Arm | Signal Loads<br>310 lbs | 52 sq ft   |
| Up to 44'<br>Clamp-on Arm     | Signal Loads<br>180 lbs | 32.4 sq ft |

- ${f ar 9}$  Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.
- igotimes Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

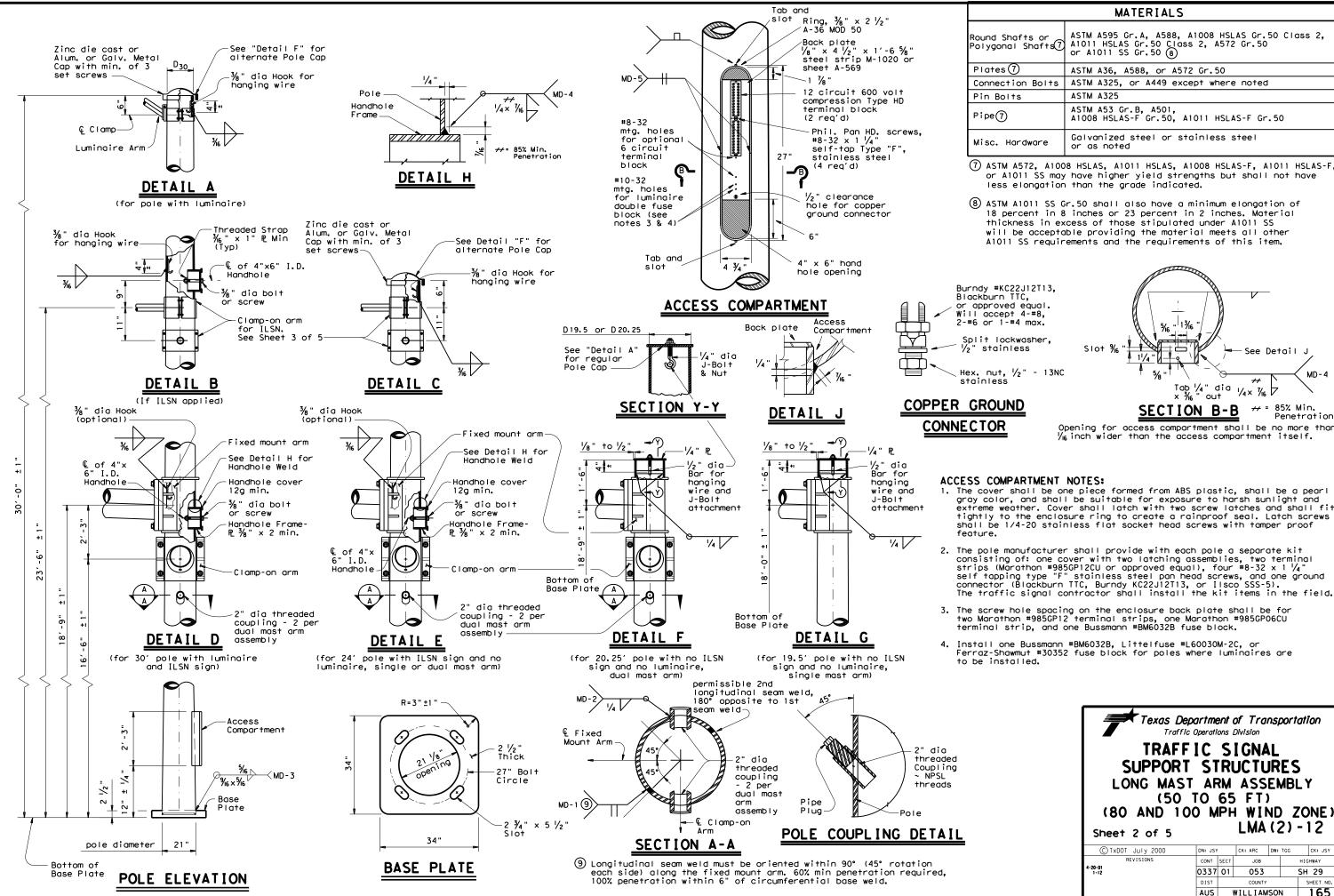
Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.



SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE) LMA(1)-12

| Sheet I of 5       |        |           |           |     |       |           |  |
|--------------------|--------|-----------|-----------|-----|-------|-----------|--|
| © TxDOT July 2000  | DN: TX | тоот      | CK: TXDOT | DW: | TXDOT | CK: TXDOT |  |
| REVISIONS<br>20-01 | CONT   | SECT      | JOB       |     | Н     | HIGHWAY   |  |
| 1-12               | 0337   | 01        | 053 SH 29 |     | 29    |           |  |
|                    | DIST   |           | COUNTY    |     |       | SHEET NO. |  |
|                    | AUS    | WILLIAMSO |           |     | N     | 164       |  |





See Detail J

→ = 85% Min.

LMA(2)-12

HIGHWAY

SH 29

CK: ARC DW: TGG

JOB

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WILLIAMSON

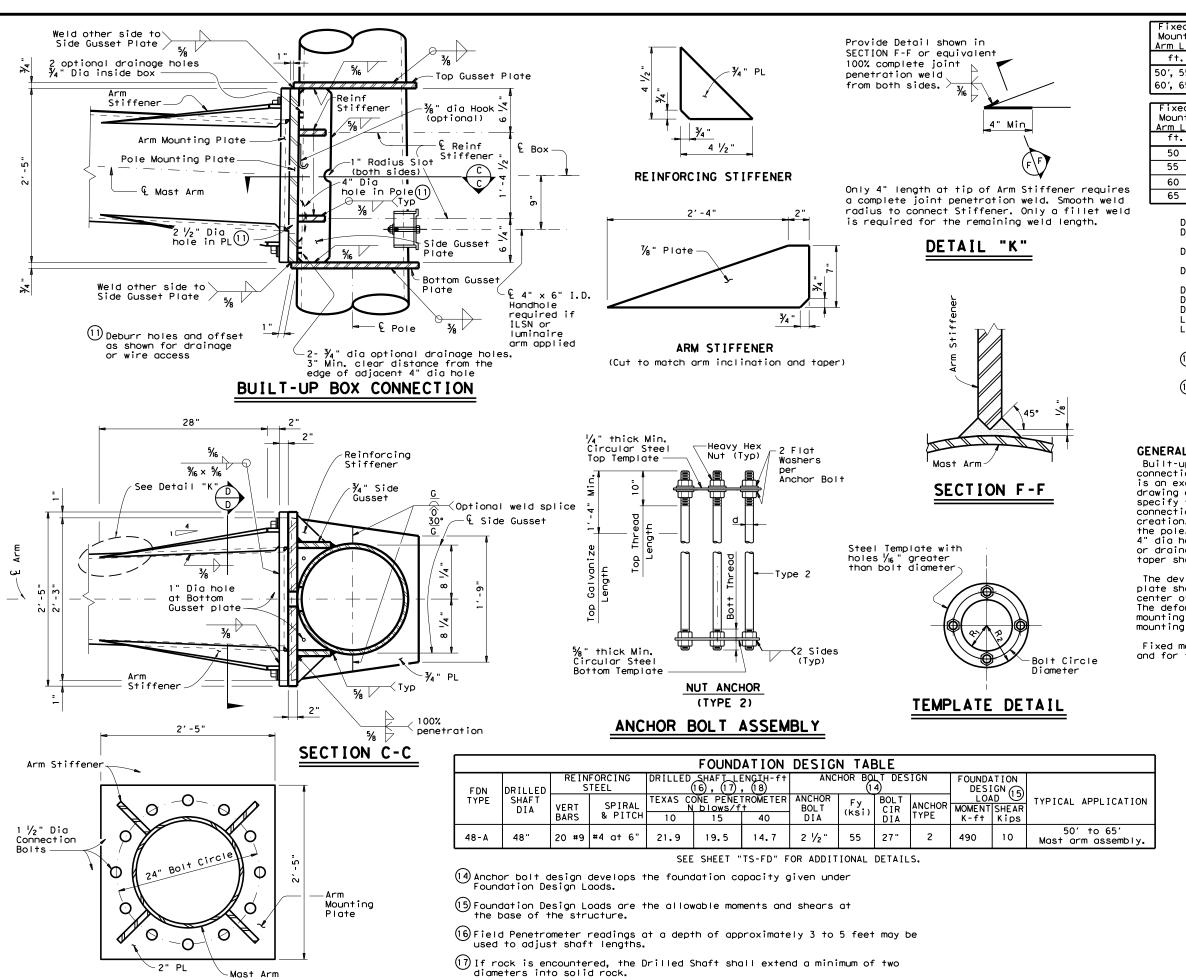
MD-4

Penetration

~ 2" PI

SECTION D-D

-Mast Arm



B Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

| Fixed                |                | ROUND POLES (13)                         |                 |      |        |                    |  |  |  |
|----------------------|----------------|--|-----------------|------|--------|--------------------|--|--|--|
| Mount<br>Arm L f     | D <sub>в</sub> | D <sub>19</sub> , 5 D <sub>20</sub> , 25 | D <sub>24</sub> | D 30 | 12)thk | Foundation<br>Type |  |  |  |
| ft.                  | in.            | in.                                      | in.             | in.  | in.    |                    |  |  |  |
| 50′, 55′<br>60′, 65′ | 21.0           | 18.2                                     | 17.6            | 16.8 | .3125  | 48-A               |  |  |  |

| Fixed<br>Mount | ROUND ARMS (13) |      |                |         |         |  |
|----------------|-----------------|------|----------------|---------|---------|--|
| Arm LF         | Lı              | Dı   | D <sub>2</sub> | (12)thk | D'as    |  |
| ft.            | ft.             | in.  | in.            | in.     | Rise    |  |
| 50             | 49              | 18.5 | 11.7           | .3125   | 3' - 3" |  |
| 55             | 54              | 18.5 | 11.0           | .3125   | 3' - 7" |  |
| 60             | 59              | 18.5 | 10.3           | .3125   | 3'-11"  |  |
| 65             | 64              | 18.5 | 9.6            | .3125   | 4' - 4" |  |

= Pole Base O.D.

D<sub>19.5</sub> = Pole Base 0.D. with no Luminaire and no ILSN (single mast arm)
D<sub>20.25</sub> = Pole Top 0.D. with no Luminaire and no ILSN (dual mast arm)

Pole Top O.D. with ILSN

w/out Luminaire
= Pole Top 0.D. with Luminaire

= Arm Base O.D. = Arm End O.D.

Shaft LengthFixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

### **GENERAL NOTES:**

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise connection, driff-to-prote socker connection, and driff rise creation. Specify the proper location of drain holes along the pole. 2  $\frac{1}{2}$ " dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed  $\frac{1}{2}$  in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

|                    | ANCHOR      | BOLT S        | & TEMP           | LATE S         | ΙΖΕ |     |
|--------------------|-------------|---------------|------------------|----------------|-----|-----|
| Bolt<br>Dia<br>in. | Length<br>‡ | Top<br>Thread | Bottom<br>Thread | Bolt<br>Circle | R2  | Rı  |
| 2 ½"               | 5′-2"       | 10"           | 6 ½"             | 27"            | 16" | 11" |

\*Min dimension given, longer bolts are acceptable.



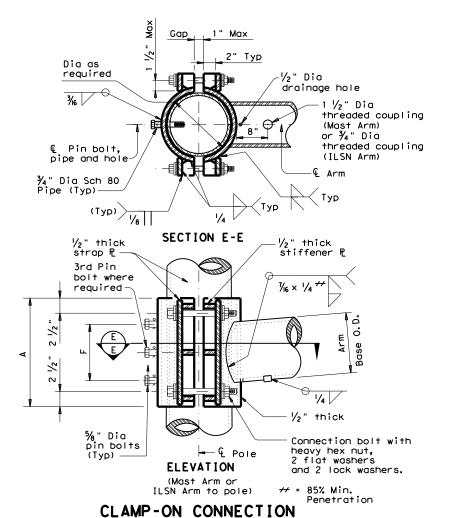
TRAFFIC SIGNAL SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5

LMA(3)-12

|                      | AUS     | WILLIAMSON |         |     |       | 100       |
|----------------------|---------|------------|---------|-----|-------|-----------|
|                      | DIST    |            | COUNTY  |     |       | SHEET NO. |
| 1-12                 | 0337    | 01         | 053     |     | SH 29 |           |
| REVISIONS<br>1-20-01 | CONT    | SECT       | JOB     |     | нго   | HWAY      |
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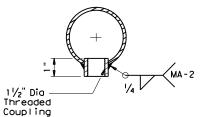


|          | 80 MPH WIND   |      |                |          |                |      |      |                |          |        |
|----------|---------------|------|----------------|----------|----------------|------|------|----------------|----------|--------|
| Clamp-on | On ROUND ARMS |      |                |          | POLYGONAL ARMS |      |      |                |          |        |
| Arm LC   | Lı            | Dι   | D <sub>2</sub> | thk (12) | Rise           | L,   | Dı   | D <sub>2</sub> | thk (12) | Rise   |
| ft.      | ft.           | in.  | in.            | in.      | Rise           | ft.  | in.  | in.            | in.      | Rise   |
| 20       | 19.1          | 6.5  | 3.8            | .179     | 1′-9"          | 19.1 | 7.0  | 3.5            | .179     | 1′-8"  |
| 24       | 23.1          | 7.5  | 4.3            | .179     | 1′-10"         | 23.1 | 7.5  | 3.5            | .179     | 1′-9"  |
| 28       | 27.1          | 8.0  | 4.2            | .179     | 1′-11"         | 27.1 | 8.0  | 3.5            | .179     | 1′-10" |
| 32       | 31.0          | 9.0  | 4.7            | .179     | 2′-1"          | 31.0 | 9.0  | 3.5            | .179     | 2'-0"  |
| 36       | 35.0          | 9.5  | 4.6            | .179     | 2′-4"          | 35.0 | 10.0 | 3.5            | .179     | 2'-1"  |
| 40       | 39.0          | 9.5  | 4.1            | .239     | 2′-8"          | 39.0 | 9.5  | 3.5            | .239     | 2'-3"  |
| 44       | 43.0          | 10.0 | 4.1            | .239     | 2'-11"         | 43.0 | 10.0 | 3.5            | .239     | 2'-6"  |
|          |               |      |                |          |                |      |      |                |          |        |

| 44       | 43.0                | 10.0           | 4, 1 | . 239    | 2'-11" | 43.0 | 10.0           | 3.5            | .239     | 2′-6"  |  |
|----------|---------------------|----------------|------|----------|--------|------|----------------|----------------|----------|--------|--|
|          | 100 MPH WIND        |                |      |          |        |      |                |                |          |        |  |
| Clamp-on | Clamp-on ROUND ARMS |                |      |          |        |      |                | POLYGON        | NAL ARMS |        |  |
| Arm LC   | L <sub>1</sub>      | D <sub>1</sub> | D 2  | thk (12) | Rise   | L    | D <sub>1</sub> | D <sub>2</sub> | thk (12) | Rise   |  |
| ft.      | ft.                 | in.            | in.  | in.      | 2 2    | ft.  | in.            | in.            | in.      | KISE   |  |
| 20       | 19.1                | 8.0            | 5.3  | .179     | 1′-8"  | 19.1 | 8.0            | 3.5            | .179     | 1′-7"  |  |
| 24       | 23.1                | 9.0            | 5.8  | .179     | 1′-9"  | 23.1 | 9.0            | 3.5            | .179     | 1′-8"  |  |
| 28       | 27.1                | 9.5            | 5.7  | .179     | 1'-10" | 27.1 | 10.0           | 3.5            | .179     | 1′-9"  |  |
| 32       | 31.0                | 9.5            | 5.2  | .239     | 1'-11" | 31.0 | 9.5            | 3.5            | .239     | 1′-10" |  |
| 36       | 35.0                | 10.0           | 5.1  | .239     | 2′-0"  | 35.0 | 10.0           | 3.5            | .239     | 1'-11" |  |
| 40       | 39.0                | 10.5           | 5.1  | .239     | 2'-3"  | 39.0 | 11.0           | 3.5            | .239     | 2'-1"  |  |
| 44       | 43.0                | 11.0           | 5, 1 | .239     | 2′-8"  | 43.0 | 11.5           | 4.0            | .239     | 2'-3"  |  |

(12) Thickness shown is minimum, thicker materials

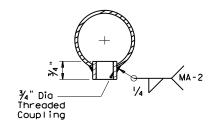
may be used.



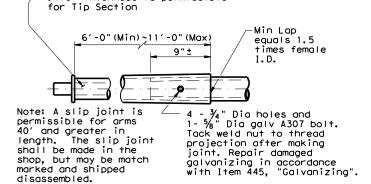
D1 = Arm Base O.D.

D2 = Arm End O.D. L1 = Shaft Length Lc = Clamp-on Arm Length

# ARM COUPLING DETAIL



# ILSN ARM COUPLING DETAIL

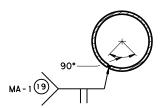


179" thickness is permissible

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2 " Dia Threaded Coupling.

# BRACKET ASSEMBLY



# ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm. 60% Min penetration 100% penetration within 6" of circumferential base welds.

| CE | NE | D٨ | 1 | NΛ | TE | C: |
|----|----|----|---|----|----|----|

ILSN Arm Size

Mast Arm Size

Base Dia Thick

Thick

in.

in.

.179

.179

.179

.179

.179

.239

. 239

. 239

.239

.239

.216

in.

10

in.

12

14

14

16

18

18

18

18

18

18

Sch 40

pipe Dia

6.5

8.0

9.0

9.5

9.5

10.0

10.5

11.0

11.5

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1  $\frac{1}{2}$  wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The sl shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1  $\frac{1}{2}$ " diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

CLAMP-ON ARM CONNECTION

in.

in.

6

8

8

10

12

12

12

12

12

12

Bolts

Dia

in.

3/4

4 Conn.

Dia

in.

1 1/4

1 1/4

1 1/4

1 1/4

1 1/4

1 1/4

⅓" Dia. Pin Bolts

No.

ea

2

⅓" Dia. Pin Bolts

No.

ea

2

2

2

2

3

3

3

3

3

3

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and  $\frac{7}{4}$ " diameter pipe shall have  $\frac{7}{16}$ " diameter holes for a  $\frac{7}{16}$ " diameter galvanized cotter pin. Back clamp plate shall be furnished with a  $\frac{3}{4}$ " diameter hole for each pin bolt. An  $\frac{1}{16}$  " diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



TRAFFIC SIGNAL SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5

LMA(4)-12

|         |          |      | AUS    | WILLIAMSO |         |     |     | 167       |
|---------|----------|------|--------|-----------|---------|-----|-----|-----------|
|         |          |      | DIST   |           | COUNTY  |     |     | SHEET NO. |
| 1-12    |          |      | 0337   | 01        | 053     |     | SH  | 1 29      |
| PO-01   | EVISIONS |      | CONT   | SECT      | JOB     |     | н   | GHWAY     |
| © TxD0T | November | 2000 | DN: JK |           | CK: GRB | DW: | FDN | CK: CAL   |

|      |     |               | Shippin           | g Parts List    |           |                          |                 |  |
|------|-----|---------------|-------------------|-----------------|-----------|--------------------------|-----------------|--|
|      |     |               | following attache | ed: enlarged ha |           | e cap, fixed arm con     | nection         |  |
|      |     |               | ny additional har |                 |           |                          |                 |  |
| Nomi | nal |               | ith Luminaire     | 24' Poles       |           | 19.50' (Single Wast Arm) |                 |  |
| Arm  |     |               | e plus: one (or   | See note al     | pove plus | 20.25' (Dua              |                 |  |
| Leng | th  | two if ILSN a | ttached) small    | one small l     | nond hole | Poles with no Lumino     | aire and no ILS |  |
|      |     | hand hole, cl | omp-on simplex    |                 |           | See note above           |                 |  |
|      |     |               |                   | Most Arm        |           |                          |                 |  |
| Lf f | t.  | Designation   | Quantity          | Designation     | Quantity  | Designation              | Quantity        |  |
| 50   |     | 50L           | 1                 | <b>50S</b>      |           | 50                       |                 |  |
| 55   |     | 55L           |                   | <b>55</b> S     |           | 55                       |                 |  |
| 60   |     | 60L           | 4                 | 60S             |           | 60                       |                 |  |
| 65   |     | 65L           | 2                 | <b>65</b> S     |           | 65                       |                 |  |
|      |     |               | Dual I            | Most Arm        |           |                          |                 |  |
| Lf   | Lc  |               |                   |                 |           |                          |                 |  |
| ft.  | ft. | Designation   | Quantity          | Designation     | Quantity  | Designation              | Quantity        |  |
| 50   | 20  | 5020L         |                   | <b>5020S</b>    |           | 5020                     |                 |  |
|      | 24  | 5024L         |                   | 50245           |           | 5024                     |                 |  |
|      | 28  | 5028L         |                   | 5028\$          |           | 5028                     |                 |  |
|      | 32  | 5032L         |                   | 5032S           |           | 5032                     |                 |  |
|      | 36  | 5036L         |                   | 5036S           |           | 5036                     |                 |  |
|      | 40  | 5040L         |                   | 5040S           |           | 5040                     |                 |  |
|      | 44  | 5044L         |                   | 50445           |           | 5044                     |                 |  |
| 55   | 20  | 5520L         |                   | <b>5520S</b>    |           | 5520                     |                 |  |
|      | 24  | 5524L         |                   | 55245           |           | 5524                     |                 |  |
|      | 28  | 5528L         |                   | 5528\$          |           | 5528                     |                 |  |
|      | 32  | 5532L         |                   | 5532\$          |           | 5532                     |                 |  |
|      | 36  | 5536L         |                   | 5536S           |           | 5536                     |                 |  |
|      | 40  | 5540L         |                   | 5540S           |           | 5540                     |                 |  |
|      | 44  | 5544L         |                   | 5544S           |           | 5544                     |                 |  |
| 60   | 20  | 6020L         |                   | 6020S           |           | 6020                     |                 |  |
|      | 24  | 6024L         |                   | 60245           |           | 6024                     |                 |  |
|      | 28  | 6028L         |                   | 60285           |           | 6028                     |                 |  |
|      | 32  | 6032L         |                   | 60325           |           | 6032                     |                 |  |
|      | 36  | 6036L         |                   | 60365           |           | 6036                     |                 |  |
|      | 40  | 6040L         |                   | 6040S           |           | 6040                     |                 |  |
|      | 44  | 6044L         |                   | 60445           |           | 6044                     |                 |  |
| 65   | 20  | 6520L         |                   | 6520S           |           | 6520                     |                 |  |
|      | 24  | 6524L         |                   | 6524S           |           | 6524                     |                 |  |
|      | 28  | 6528L         |                   | 6528\$          |           | 6528                     |                 |  |
|      | 32  | 6532L         |                   | 6532S           |           | 6532                     |                 |  |
|      | 36  | 6536L         |                   | 6536S           |           | 6536                     |                 |  |
|      | 40  | 6540L         |                   | 6540S           |           | 6540                     |                 |  |
|      | 44  | 6544L         |                   | 6544\$          |           | 6544                     |                 |  |

| 28         | 6528L           |              |        | 6528S           |  |
|------------|-----------------|--------------|--------|-----------------|--|
| 32         | 6532L           |              |        | 6532S           |  |
| 36         | 6536L           |              |        | 6536S           |  |
| 40         | 6540L           |              |        | 6540S           |  |
| 44         | 6544L           |              | 6544\$ |                 |  |
| Foundation | Summary Table * | #            |        |                 |  |
| I          | Location        | Avg. N       | No.    | Drill Shaft *** |  |
|            | ldent.          | Blow/ft.     | Each   | Length (feet)   |  |
|            |                 |              |        | 48-A            |  |
| WOLF F     | RANCH: POLE A   | 10           | 1      | 22              |  |
| WOLF F     | RANCH: POLE B   | 10           | 1      | 22              |  |
| WOLF I     | RANCH: POLE D   | 10           | 1      | 22              |  |
| WOLF I     | AKES: POLE A    | 10           | 1      | 22              |  |
| WOLF I     | .AKES: POLE B   | 10           | 1      | 22              |  |
| WOLF I     | .AKES: POLE C   | 10           | 1      | 22              |  |
| WOLF I     | AKES: POLE D    | 10           | 1      | 22              |  |
|            |                 |              |        |                 |  |
|            | Total Drill     | Shaft Length |        | 154             |  |

# Notes

- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Decimal lengths in Design Table are to allow interpolation for other penetrometer values.

  Round to nearest foot for entry into Summary Table.

|  |                   | Sh                      | ipping Parts List |  |  |  |  |  |  |
|--|-------------------|-------------------------|-------------------|--|--|--|--|--|--|
|  | Signal Arms (Fixe |                         |                   |  |  |  |  |  |  |
| Ship each arm with listed equipment attached |                   |                         |                   |  |  |  |  |  |  |
| Nominal                                      | Type IV Arm (     | Type IV Arm (4 Signals) |                   |  |  |  |  |  |  |
| Arm  | 3 Brocket A       |                         |                   |  |  |  |  |  |  |
| Length                                       | and 4 CGB C       |                         |                   |  |  |  |  |  |  |
| ft.  | Designation       | Quantity                |                   |  |  |  |  |  |  |
| 50   | 501V              | 1                       |                   |  |  |  |  |  |  |
| 55   | 551V              |                         |                   |  |  |  |  |  |  |
| 60   | 60 I V            | 4                       |                   |  |  |  |  |  |  |
| 65   | 65 I V            | 2                       |                   |  |  |  |  |  |  |
|  |                   |                         |                   |  |  |  |  |  |  |

| Lumingire Arms (1                         | per 30' pole) |
|---|---------------|
| Nominal Arm Length                        | Quantity      |
| 8' Arm                                    | 7             |
| ILSN Arm (Max. 2 per pol<br>clamps, bolts | and washers   |
| Nominal Arm Length                        | Quantity      |
| 7' Arm                                    |               |
| 9' Arm                                    | 8             |

|               | Type 1 Arm (    | 1 Signal) | Type II Arm (2              | ? Signals) | Type III Arm (3 Signals)   |          |  |
|---------------|-----------------|-----------|-----------------------------|------------|--|----------|--|
| Nominal       | 2 CGB connector | -         | 1 Brocket Assen             | •          | 2 Bracket Assembly and 4<br>CGB connectors, and 1 clamp<br>w/bolts and washers |          |  |
| Arm<br>Length | w/bolts and     | d washers | CGB connectors, w/bolts and | -          |  |          |  |
| ft.           | Designation     | Quantity  | Designation                 | Quantity   | Designation  | Quantity |  |
| 20            | 201-80          |           |                             | •          |  |          |  |
| 24            | 241-80          |           | 2411-80                     |            |  |          |  |
| 28            | 281-80          |           | 2811-80                     |            |  |          |  |
| 32            |                 |           | 3211-80                     |            | 32111-80   |          |  |
| 36            |                 |           | 3611-80                     |            | 36111-80   |          |  |
| 40            |                 |           |                             |            | 40111-80   |          |  |
| 44            |                 |           |                             |            | 44111-80   |          |  |

| Type I Arm (1 Signal) |  |          | Type II Arm (2                     | ? Signals) | Type III Arm (3 Signals)                                |          |  |
|-----------------------|--|----------|------------------------------------|------------|---|----------|--|
| Nominal<br>Arm        | 2 CGB connector and 1 clamp<br>w/bolts and washers |          | 1 Bracket Asser<br>CGB connectors, | •          | 2 Bracket Assembly and 4<br>CGB connectors, and 1 clamp |          |  |
| ft.                   | Designation  | Quantity | Designation                        | Quantity   | Designation   | Quantity |  |
| 20                    | 201-100  |          |                                    |            |   |          |  |
| 24                    | 241-100  |          | 2411-100                           |            |   |          |  |
| 28                    | 281-100  |          | 2811-100                           |            |   |          |  |
| 32                    |  |          | 3211-100                           |            | 32111-100   |          |  |
| 36                    |  |          | 3611-100                           |            | 36111-100   |          |  |
| 40                    |  |          |                                    |            | 40111-100   |          |  |
| 44                    |  |          |                                    |            | 44111-100   |          |  |

| Anchor Bo | olt Assemblies | (1 per pole) |
|-----------|----------------|--------------|
| Anchor    | Anchor         |              |
| Bolt      | Bolt           |              |
| Diameter  | Length         | Quantity     |
| 2 1/2 "   | 5' - 3"        | 7            |

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

### Abbreviations

Lf= Fixed Arm Length Lc= Clomp-on Arm

Clamp-on Arm Length (44' Max.)



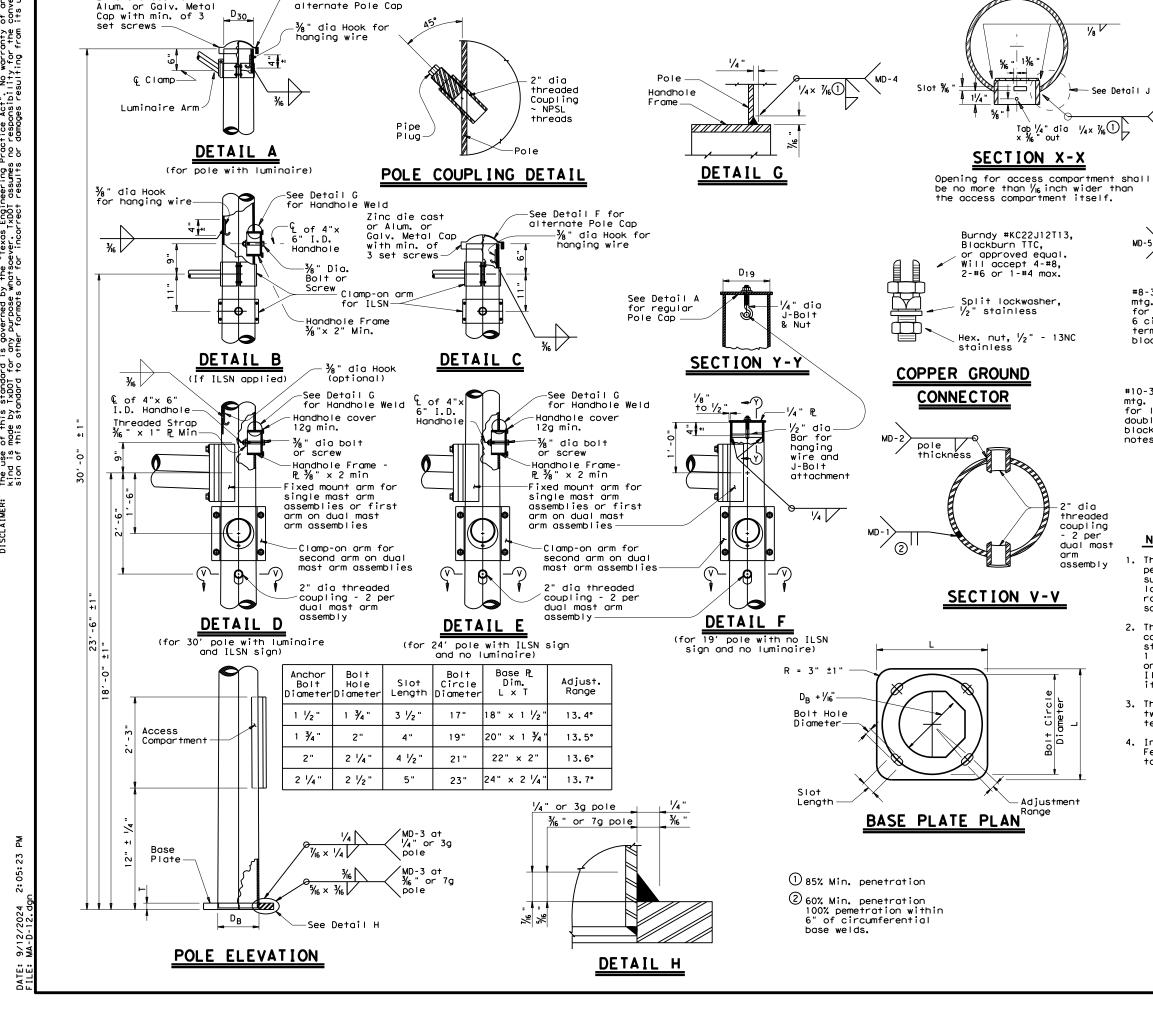


LONG MAST
ARM ASSEMBLY
PARTS LIST

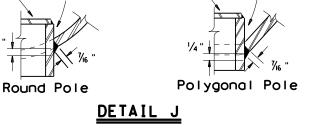
LMA(5)-12

AUS WILLIAMSON 168

Zinc die cast or



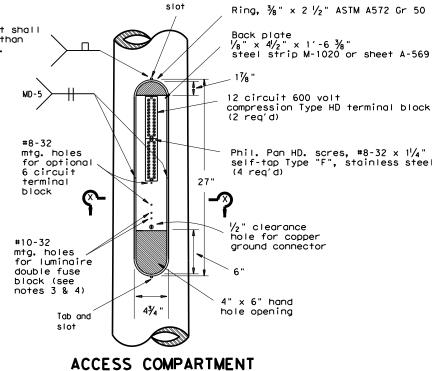
See Detail F for



Back plate

Access

Compartmen:



Access

Compartment

Tab and

Back plate

### NOTES:

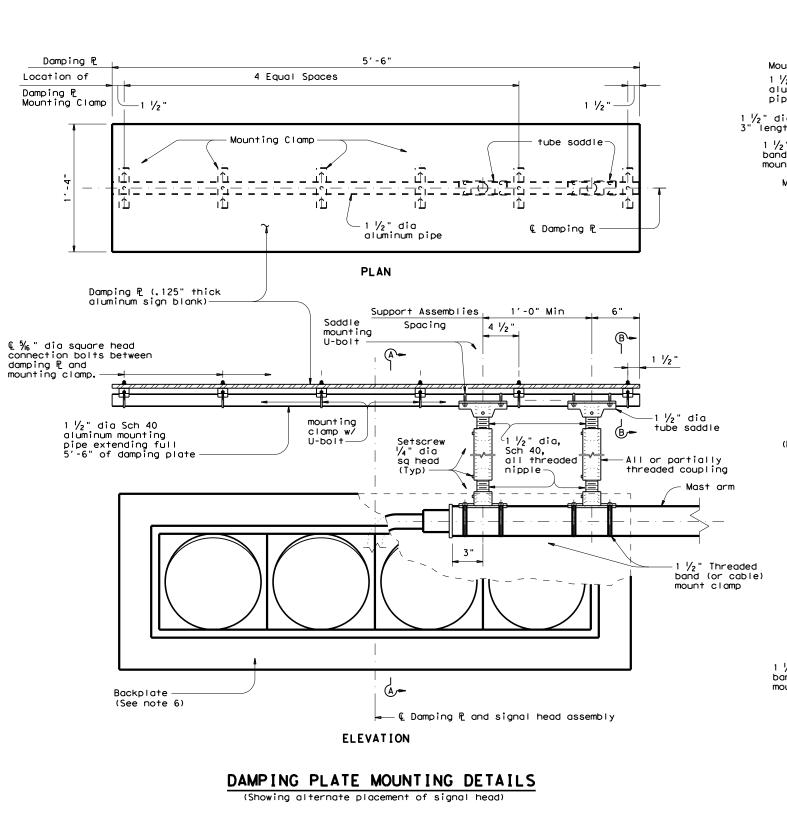
- The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
- 2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4 " self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TIC, Burndy KC22J1ZT13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
- 3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
- 4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

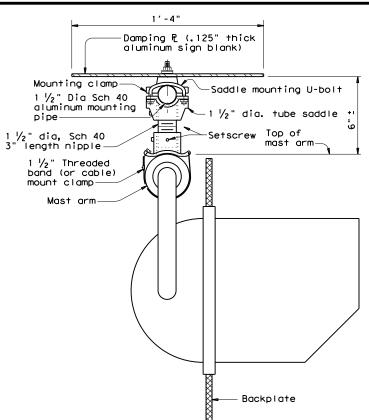


TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

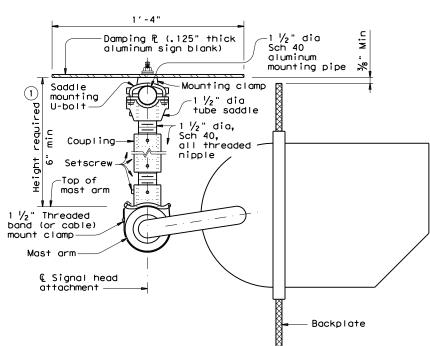
|      | ○ TxDOT August | 1995 | DN: MS |      | CK: JSY  | DW: FDN |     | CK: CAL   |
|------|----------------|------|--------|------|----------|---------|-----|-----------|
| 8-99 | REVISIONS      |      | CONT   | SECT | JOB      |         | ніс | YAWH      |
| 1-12 |                |      | 0337   | 01   | 053      |         | SH  | 29        |
|      |                |      | DIST   |      | COUNTY   |         | ,   | SHEET NO. |
|      |                |      | ALIC   | ١ ١  | NTII TAM | SON     |     | 160       |





### SECTION A-A

(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



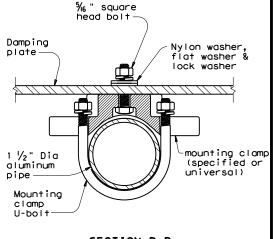
### SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

| Recommended supporting assemblies to achieve<br>required height for horizontal section heads |                           |                                      |     |  |  |  |  |  |
|--|---------------------------|--------------------------------------|-----|--|--|--|--|--|
| Height<br>required   | One nipple<br>each length | Two nipples One coupling each length |     |  |  |  |  |  |
| 6"-6 ¾"  | 3"                        | -                                    | -   |  |  |  |  |  |
| 7"-8 1/2"  | 4"                        | •                                    | -   |  |  |  |  |  |
| 9"-10 1/2"   | 6"                        |                                      |     |  |  |  |  |  |
| 11"-15 1/2"  | 5 1/2" - 4" 5"            |                                      |     |  |  |  |  |  |
| 16"-24"  | -                         | 6"                                   | 10" |  |  |  |  |  |

### **GENERAL NOTES:**

- 1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal most arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
- 2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
- 3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
- 4.Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
- 5. Contractor will verify applicable field dimensions before the installation.
- 6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type  $B_{FL}$  or  $C_{FL}$  retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.



SECTION B-B

(Showing damping plate attachment)

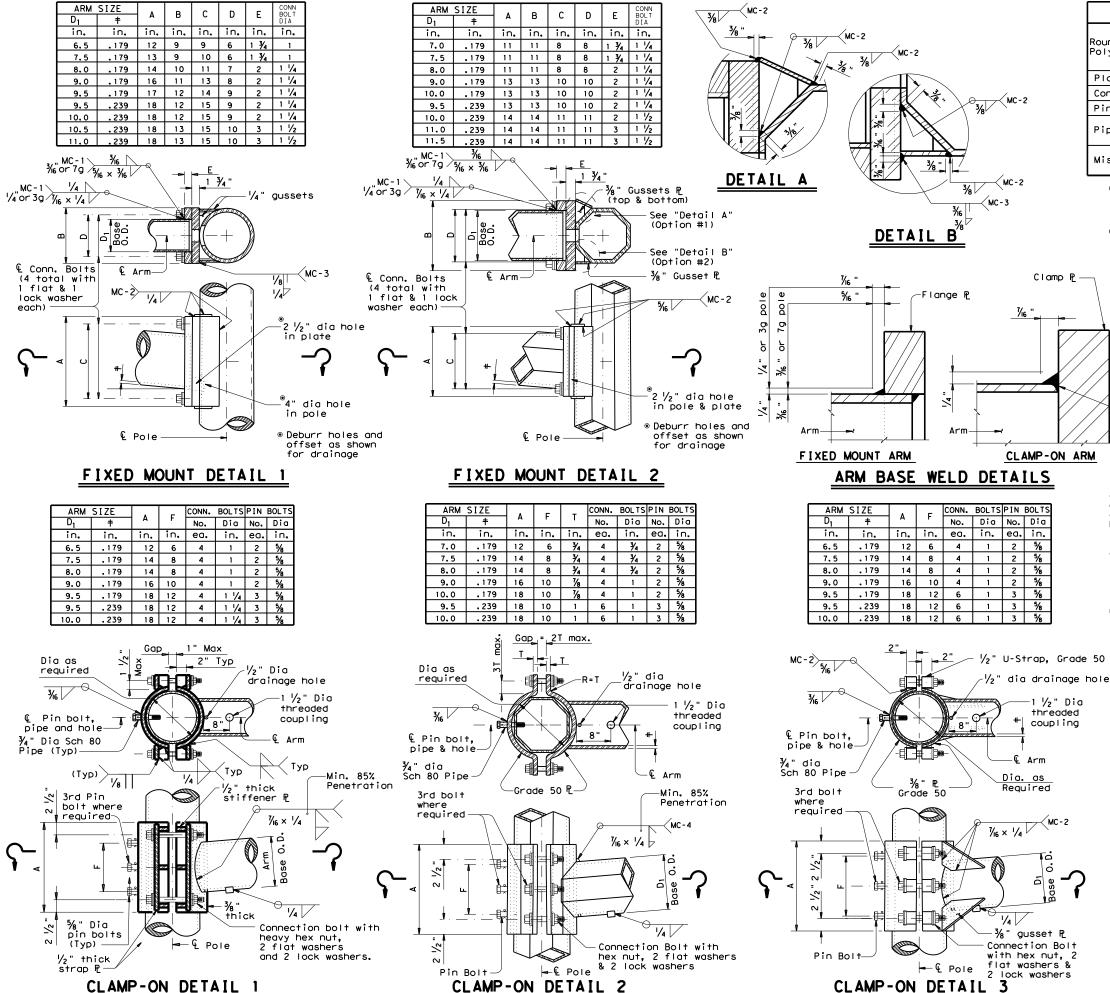


# MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

|                 | <br>_  | _    |           |      |         |           |
|-----------------|--------|------|-----------|------|---------|-----------|
| :ma-dpd-20.dgn  | DN: Tx | DOT  | ck: TxDOT | DW:  | TxDOT   | ck: TxDOT |
| TxDOT June 2020 | CONT   | SECT | JOB       |      | HIGHWAY |           |
| 0 REVISIONS     | 0337   | 01   | 053       |      | SH 29   |           |
| 0               | DIST   |      | COUNTY    |      |         | SHEET NO. |
|                 | AUS    | 1    | WILLIAN   | ISOI | N       | 170       |





Round Shafts or Polygonal Shafts①

ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②

Plates①

ASTM A36, A588, or A572 Gr.50

Connection Bolts

ASTM A325 or A449, except where noted

Pin Bolts

ASTM A325

Pipe①

ASTM A53 Gr.B, A501, A1011 HSLAS-F Gr.50

Misc. Hardware

Galvanized steel or stainless steel or as noted

- ① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- ② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

Min. 85% Penetration except "Clamp-on Detail 3"

### GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1  $\frac{1}{2}$ " wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

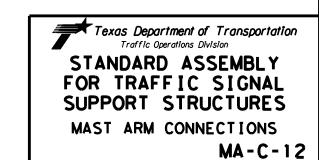
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

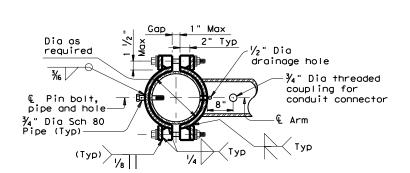
### NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and  $\frac{3}{4}$ " dia pipe shall have  $\frac{3}{6}$ " dia holes for a  $\frac{1}{6}$ " dia galvanized cotter pin. Back clamp plate shall be furnished with a  $\frac{3}{4}$ " dia hole for each pin bolt. An  $\frac{1}{6}$ " dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

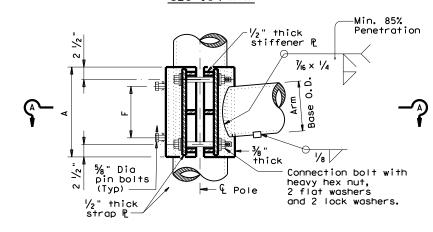


| © TxDOT August 1995 | DN: MS |      | CK: JSY | DW: M | MF  | CK: JSY   |
|---------------------|--------|------|---------|-------|-----|-----------|
| S-96 REVISIONS      | CONT   | SECT | JOB     |       | HIG | HWAY      |
| 5-09<br>1-12        | 0337   | 01   | 053     |       | SH  | 29        |
|                     | DIST   |      | COUNTY  |       | 9   | SHEET NO. |
|                     | AUS    | 1    | WILLIAM | SON   |     | 171       |

1264



### SECTION A-A



# ILSN CLAMP-ON DETAIL 1

### **GENERAL NOTES:**

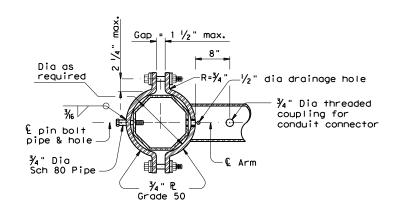
Clamp-on details shall be used for ILSN support arm assemblies. A 1  $\frac{1}{2}$ " inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

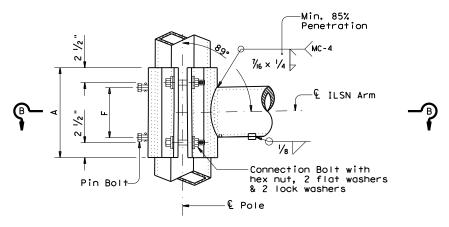
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

### NOTE:

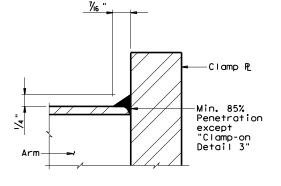
Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and  $\frac{7}{4}$ " dia pipe shall have  $\frac{7}{6}$ " dia holes for a  $\frac{7}{8}$ " dia galvanized cotter pin. Back clamp plate shall be furnished with a  $\frac{7}{4}$ " dia hole for each pin bolt. An  $\frac{1}{16}$  " dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



### SECTION B-B

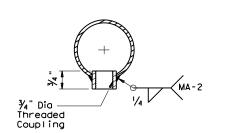


# ILSN CLAMP-ON DETAIL 2

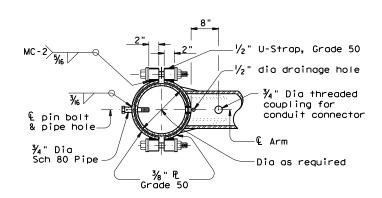


CLAMP-ON ARM

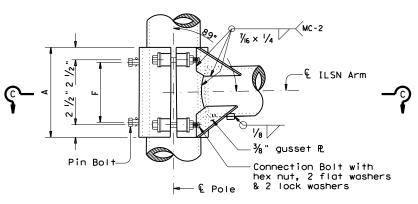
ARM BASE WELD DETAILS



ILSN ARM COUPLING DETAIL



SECTION C-C



ILSN CLAMP-ON DETAIL 3

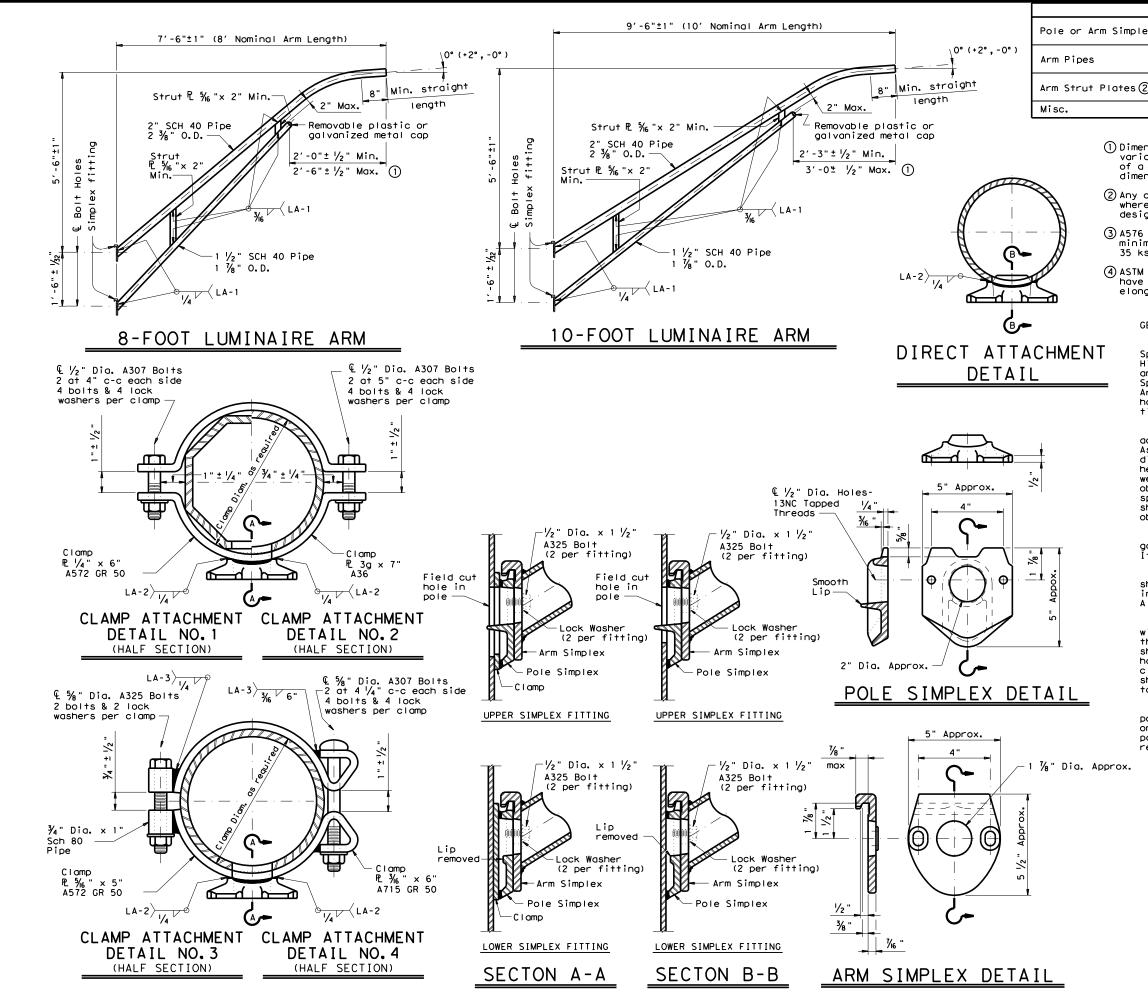


MAST-ARM CONNECTIONS

MA-C(ILSN)-12

| © TxDOT August 1995 | DN: MS |      | CK: JSY | DW: | MMF | CK: JSY  |  |
|---------------------|--------|------|---------|-----|-----|----------|--|
| REVISIONS<br>6      | CONT   | SECT | JOB     |     | ніс | HWAY     |  |
| 2                   | 0337   | 01   | 053     |     | SH  | SH 29    |  |
|                     | DIST   |      | COUNTY  |     | 9   | HEET NO. |  |
|                     | AUS    | ١    | WILLIAM | SOI | N   | 172      |  |





- (1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- ② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- (3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- (4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



ARM DETAILS

LUM-A-12

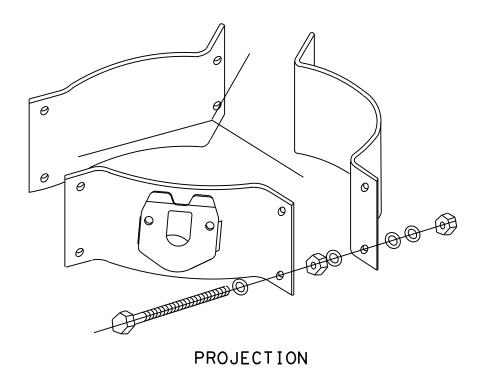
| CTxDOT August 1995 | DN: LEH |      | CK: JSY | DW: LT | Т     | CK: TEB   |  |
|--------------------|---------|------|---------|--------|-------|-----------|--|
| 96 REVISIONS       | CONT    | SECT | JOB     | JOB    |       | HIGHWAY   |  |
| -99<br>-12         | 0337    | 01   | 053     |        | SH 29 |           |  |
|                    | DIST    |      | COUNTY  |        | S     | SHEET NO. |  |
|                    | AUS     | ٧    | VILLIAM | SON    |       | 173       |  |

#### OTHER MATERIALS:

- Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
- 2. Welded tabs and backplates shall be ASTM A-36 steel or better.
- 3. Nylon insert locknuts shall conform to ASTM A563.

#### GENERAL NOTES:

- 1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabrication obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
- 2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
- 3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts,  $\frac{1}{2}$  in. X  $\frac{1}{2}$  in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
- 4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
- 5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
- 6. Approximately 2 in, diameter hole in upper mast arm clamp.



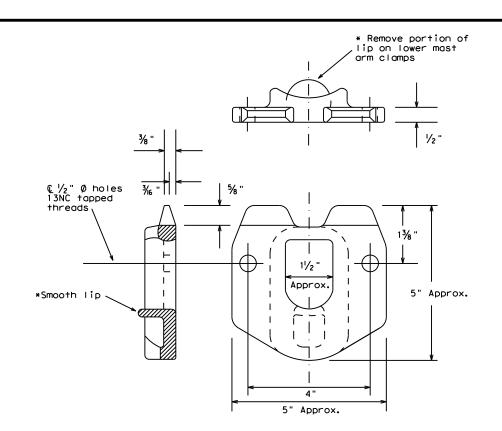
For 8.9 - 12 inch diameter Signal Poles (Two req'd for each mast arm)



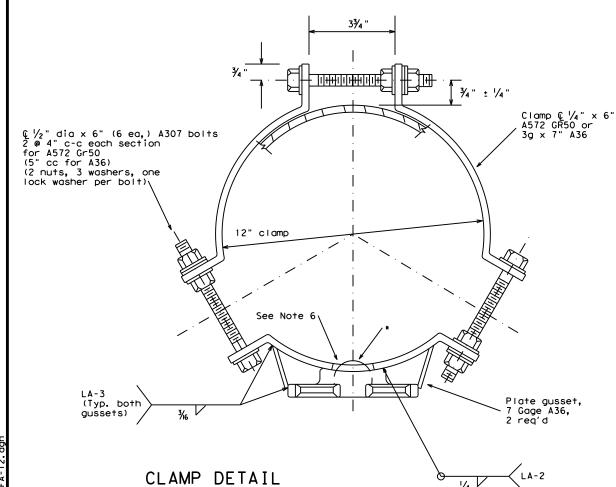
# CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

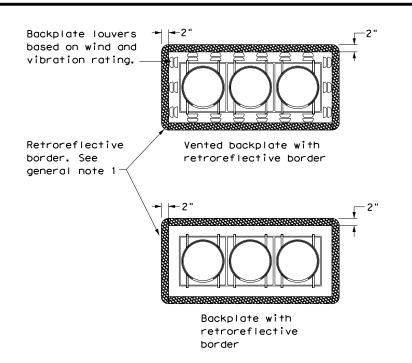
| ) T×DOT   | DN: KAE | 3      | CK: RES   | DW: FDN | CK: CAL   |
|-----------|---------|--------|-----------|---------|-----------|
| REVISIONS | CONT    | SECT   | JOB       |         | H I GHWAY |
|           | 0337    | 01     | 01 053 SH |         |           |
|           | DIST    | COUNTY |           |         | SHEET NO. |
|           | ALIC    | ١ ١    | WILL TAM  | ISON    | 17/       |



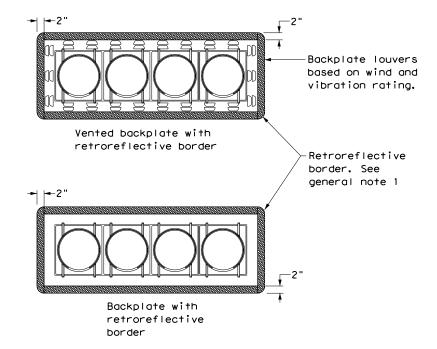
POLE SIMPLEX DETAILS







# THREE-SECTION HEAD HORIZONTAL OR VERTICAL



# FOUR-SECTION HEAD HORIZONTAL OR VERTICAL

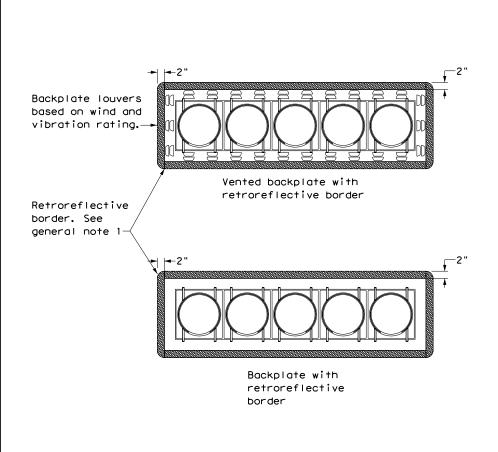
Vented backplate with

retroreflective border

Retroreflective

general note 1

border. See



FIVE-SECTION HEAD

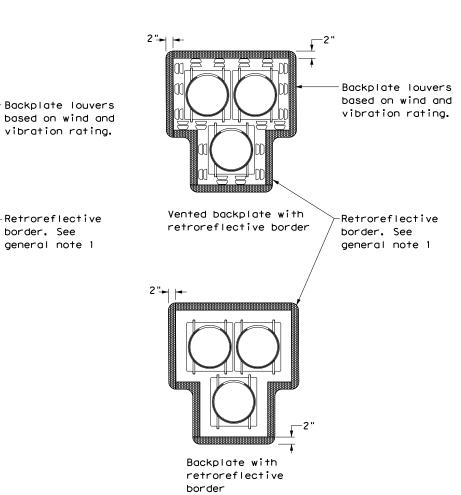
HORIZONTAL OR VERTICAL



border

Backplate with

retroreflective



PEDESTRIAN HYBRID

**BEACON** 

#### **GENERAL NOTES:**

- 1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type BFL or CFL retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
- 2. Signal head and backplate compatability must be verified by the contractor prior to installation.
- 3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
- 4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
- 5. This standard sheet applies to all signal heads with backplates, including but not limited to:
  - Pole mounted
  - Overhead mounted
  - Span wire mounted
  - Mast arm mounted
  - Vertical signal heads
  - Horizontal signal heads
  - Clustered signal heads
  - Pedestrian hybrid beacons



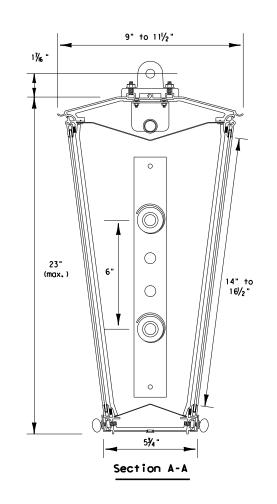
# TRAFFIC SIGNAL HEAD WITH BACKPLATE

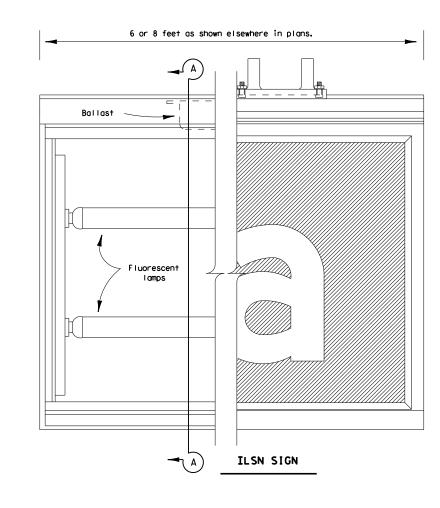
Traffic Safety Division Standard

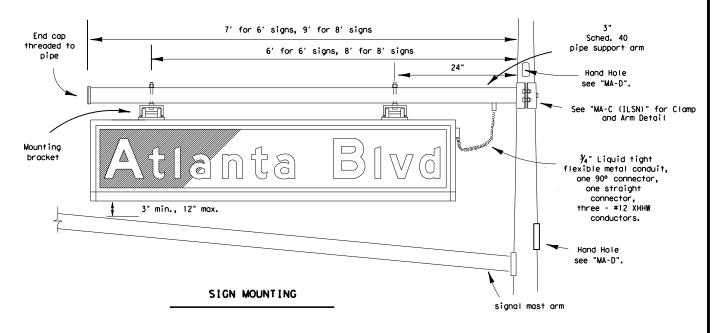
TS-BP-20

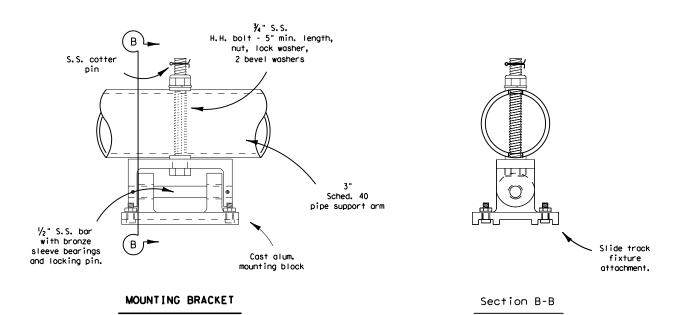
| E: ts-bp-20.dgn | DN: TxDOT     |                | ck: TxDOT | DW: | TxDOT | ck: TxDOT |
|-----------------|---------------|----------------|-----------|-----|-------|-----------|
| TxDOT June 2020 | CONT SECT JOB |                | HIGHWAY   |     |       |           |
| REVISIONS       | 0337          | 01 053         |           |     | SH 29 |           |
|                 | DIST          | COUNTY         |           |     |       | SHEET NO. |
|                 | AUS           | AUS WILLIAMSON |           |     |       | 175       |

## INTERNALLY LIGHTED STREET NAME SIGN DETAILS





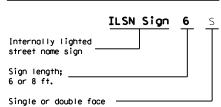




## ILSN SIGN NOTES:

- Eight foot ILSN sign shall not exceed 11.5 sq.ft. effective projected area (EPA) and shall not exceed a weight of 85 lbs. Six foot ILSN sign shall not exceed 8.7 sq.ft. EPA
- and shall not exceed a weight of 70 lbs.2. Sign message shall be as shown elsewhere in the plans.3. See Special Specification, "internally Lighted Street Name Signs" for additional details.

# EXPLANATION OF DESCRIPTION





# STREET NAME SIGN DETAILS (ILLUMINATED)

SNS-95

| TxDOT August 1995 | DN: TX | тоот | CK: TXDOT | DW: | TXDOT     | CK: TXDOT |
|-------------------|--------|------|-----------|-----|-----------|-----------|
| REVISIONS         | CONT   | SECT | JOB       |     | HIO       | CHWAY     |
|                   | 0337   | 01   | 053       |     | SH        | 29        |
|                   | DIST   |      | COUNTY    |     | SHEET NO. |           |
|                   | AUS    | ١    | VILLIAM   | SOI | N         | 176       |

|      |                         |        |                 | _                |                      |          |                  |        |             |        |                |                 |  |
|------|-------------------------|--------|-----------------|------------------|----------------------|----------|------------------|--------|-------------|--------|----------------|-----------------|--|
|      | FOUNDATION DESIGN TABLE |        |                 |                  |                      |          |                  |        |             |        |                |                 |  |
| FDN  | DRILLED                 |        | FORCING<br>TEEL | EMBEDDE<br>LENGT | D DRILLE<br>H-f+(1). | D SH AFT | ANCI             | HOR BO | LT DES      | I GN   | FOUNDA<br>DESI | TION<br>GN<br>D |  |
| TYPE | SHAFT                   | VERT   | SPIRAL          | TEXAS CO         | ONE PENE             | TROMETER | ANCHOR<br>BOLT   | Fy     | BOLT<br>CIR | ANCHOR | LOA<br>MOMENT  |                 | TYPICAL APPLICATION  |
|      | DIA                     | BARS   | & PITCH         |                  | 15                   | 40       | DIA              | (ksi)  | DIA         | TYPE   |                | Kips            |  |
| 24-A | 24"                     | 4-#5   | #2 at 12'       | 5.7              | 5.3                  | 4.5      | <del>3</del> ⁄4" | 36     | 12 ¾"       | 1      | 10             |                 | Pedestal pole, pedestal mounted controller.  |
| 30-A | 30"                     | 8- #9  | #3 at 6"        | 11.3             | 10.3                 | 8.0      | 1 1/2"           | 55     | 17"         | 2      | 87             | 3               | Mast arm assembly. (see Selection Table)   |
| 36-A | 36"                     | 10-#9  | #3 at 6"        | 13.2             | 12.0                 | 9.4      | 1 ¾"             | 55     | 19"         | 2      | 131            | 5               | Mast arm assembly. (see Selection Table)<br>30' strain pole with or without luminaire.                 |
| 36-B | 36"                     | 12-#9  | #3 at 6"        | 15.2             | 13.6                 | 10.4     | 2"               | 55     | 21"         | 2      | 190            | l 7             | Mast arm assembly, (see Selection Table)<br>Strain pole taller than 30' & strain<br>pole with mast arm |
| 42-A | 42"                     | 14- #9 | #3 at 6"        | 17.4             | 15.6                 | 11.9     | 2 1/4"           | 55     | 23"         | 2      | 271            | 9               | Mast arm assembly. (see Selection Table)   |

|         | FOUNDATION SELE<br>ARM PLUS IL | SN SUPPORT | ASSEMBLIES | (ft)      |           |
|---------|--------------------------------|------------|------------|-----------|-----------|
|         |                                | FDN 30-A   | FDN 36-A   | FDN 36-B  | FDN 42-A  |
| -       | MAX SINGLE ARM LENGTH          | 32′        | 48′        |           |           |
| 20      |                                | 24' X 24'  |            |           |           |
|         |                                | 28' X 28'  |            |           |           |
|         | MAXIMUM DOUBLE ARM             | 32' X 28'  | 32' X 32'  |           |           |
|         | LENGTH COMBINATIONS            |            | 36' X 36'  |           |           |
|         |                                |            | 40' X 36'  |           |           |
|         |                                |            | 44' X 28'  | 44' X 36' |           |
| •       | MAX SINGLE ARM LENGTH          |            | 36'        | 44'       |           |
|         |                                |            | 24' X 24'  |           |           |
| SPEED   |                                |            | 28' X 28'  |           |           |
| . 22    | MAXIMUM DOUBLE ARM             | _          | 32' X 24'  | 32' X 32' |           |
| 100 MPH | LENGTH COMBINATIONS            |            |            | 36' X 36' |           |
|         | ļ                              |            |            | 40' x24'  | 40' X 36' |
| -       | ! !                            |            | !          |           | 44' × 36' |

Span Wires

Clomp Arm Length

Supporting

**ILSN** 

Sway Cable

1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with

2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.

2 Flat Washers

Type 2

\_NUT ANCHOR\_ (TYPE 2)

Thickness =

d/4 (inch) min.

4 Sides

per Anchor Bolt

another arm up to 28'

Heavy Hex

Nut (Typ)

¼" thk. min. Circular Steel

Top Template

Lengt read Min.

Galvanîze L = Top Thr plus 6"N

(Omit bottom template for FDN 24-A)

Type 1

R=d-

1 ½" Min .

Circular Steel Bottom Template

HOOKED ANCHOR

(TYPE 1)

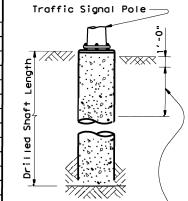
ANCHOR BOLT ASSEMBLY

80rient anchor bolts orthogonal

ensure that two bolts are in

tension under dead load.

with the fixed arm direction to



Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

uminaire Arm (optional)

Wire loads.

**ASSEMBLY** 

Fixed Arm Length

Luminaire

Arm (optional)

8'-0"

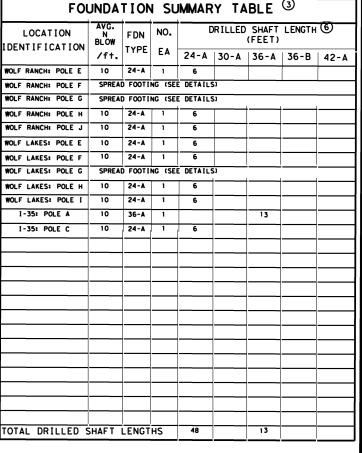
Anchor bolts to be

## NOTES:

- ① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- (2) Foundation Design Loads are the allowable moments and shears at the base of the structure.
- (3) Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- 4 Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- (5) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- (6) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

| ANCHOR BOLT & TEMPLATE SIZES |                  |               |                  |                |         |         |
|------------------------------|------------------|---------------|------------------|----------------|---------|---------|
| BOLT<br>DIA<br>IN.           | 7 BOLT<br>LENGTH | TOP<br>THREAD | BOTTOM<br>THREAD | BOLT<br>CIRCLE | R2      | Rı      |
| ¾"                           | 1'-6"            | 3"            | _                | 12 3/4"        | 7 1/8"  | 5 % "   |
| 1 1/2"                       | 3′-4"            | 6"            | 4"               | 17"            | 10"     | 7"      |
| 1 3/4"                       | 3'-10"           | 7"            | 4 1/2"           | 19"            | 11 1/4" | 7 3/4"  |
| 2"                           | 4'-3"            | 8"            | 5"               | 21"            | 12 1/2" | 8 1/2 " |
| 2 1/4"                       | 4'-9"            | 9"            | 5 1/2"           | 23"            | 13 3/4" | 9 1/4"  |

(7) Min dimensions given, longer bolts are acceptable.



#### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing Steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor boits and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

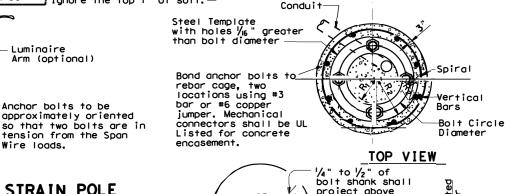
Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

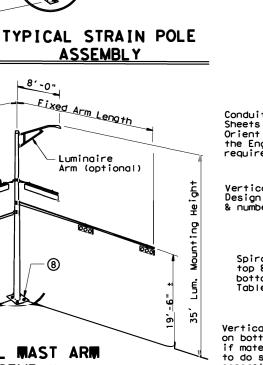


TRAFFIC SIGNAL POLE FOUNDATION

**TS-FD-12** 

|            | © TxD0T | August  | 1995 | DN: MS |      | CK: JSY | DW: | MAO/MMF | CK: JSY/TEB |
|------------|---------|---------|------|--------|------|---------|-----|---------|-------------|
| -96<br>-99 | RE      | VISIONS |      | CONT   | SECT | JOB     |     | HIC     | GHWAY       |
| -99<br>-12 |         |         |      | 0337   | 01   | 053     |     | SH      | 29          |
|            |         |         |      | DIST   |      | COUNTY  |     |         | SHEET NO.   |
|            |         |         |      | AUS    |      | WILLIAN | 1SO | N       | 177         |





to do so when concrete is placed.

project above concrete Circular Steel Template (Temporary) Conduit (See Layout Sheets for diameter. Orient as directed by the Engineer, 1 or 2 required) -Anchor Bo I t -Circular Vertical Bars (See Design Table for size & number). Steel Template Spiral, 3 flat turns top & 1 flat turn bottom. (See Design Table for size & pitch) Drilled Shaft Dia

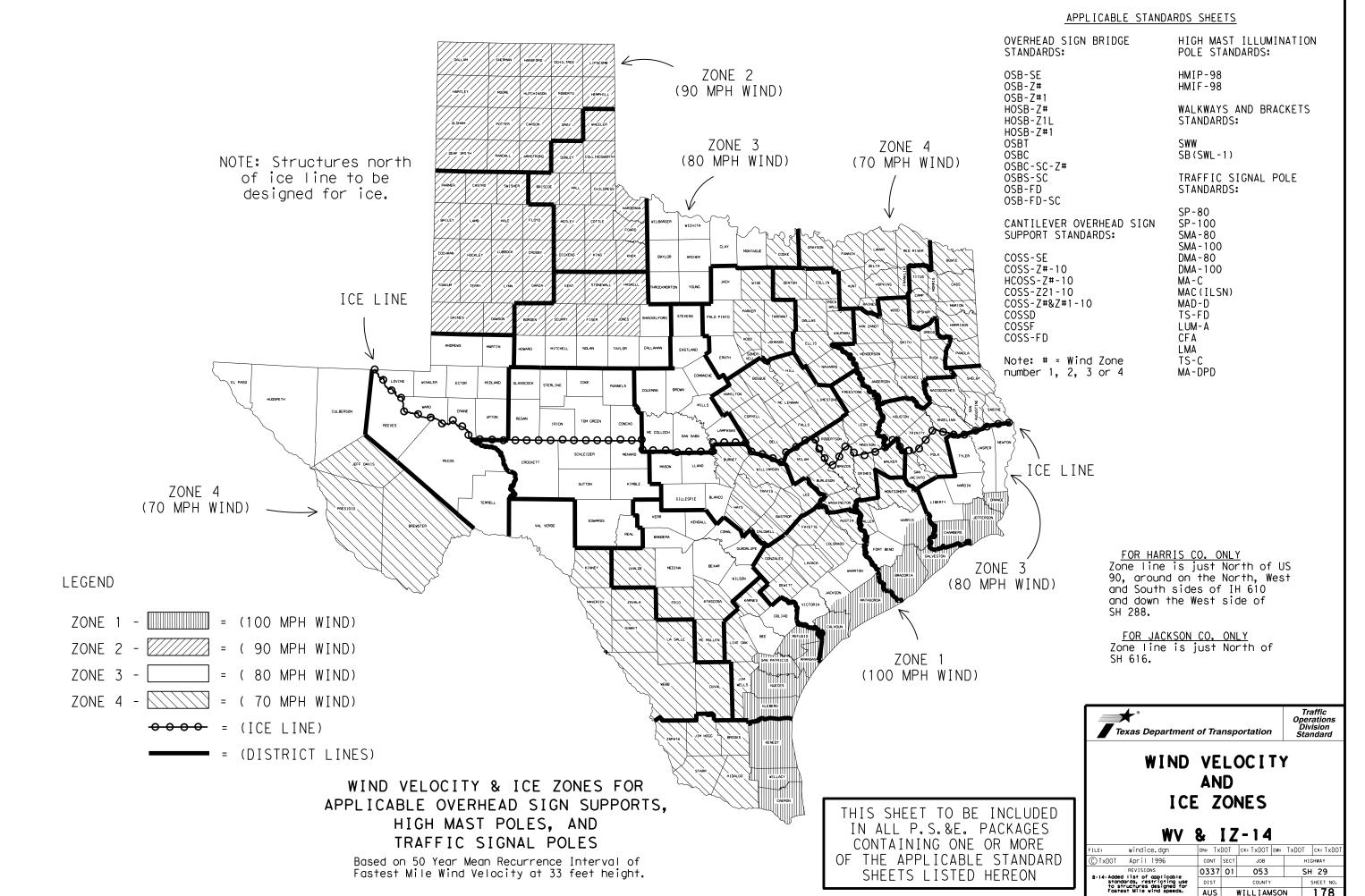
Vertical bars may rest on bottom of drilled hole if material is firm enough

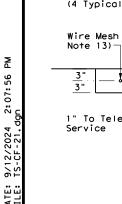
TYPICAL MAST ARM **ASSEMBLY** 

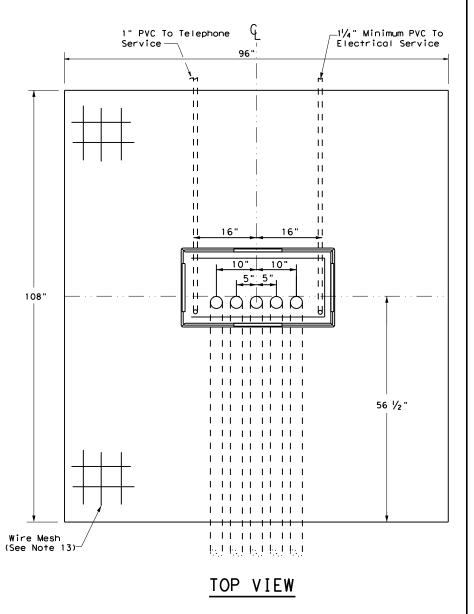
ELEVATION FOUNDATION DETAILS

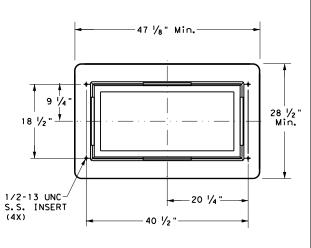
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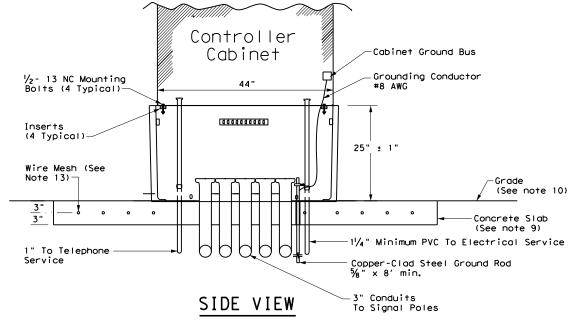








CABINET BASE



#### TRAFFIC SIGNAL CONTROLLER BASE:

- Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
- The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
- 3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard
- 4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-Ib and a minimum straight pull out strength of 750 lbs.
- Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
- The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
- The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
- 8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's

#### CONCRETE SLAB:

- Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to
- Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
- Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
- 12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
- 13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
- 14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

#### CONDUITS:

- Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future Terminate the conduits with a bushing between 2 and 4-inches above the slab.
- Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
- 17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
- Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable

#### CONTROLLER CABINET:

- 19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
- 20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

#### PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.



Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD TS-CF-21

| ILE: ts-cf-21.dgn   | DN:  |        | CK:     | DW:  | CK:       |
|---------------------|------|--------|---------|------|-----------|
| DTxDOT October 2000 | CONT | SECT   | JOB     |      | HIGHWAY   |
| REVISIONS<br>2-04   | 0337 | 01     | 053     |      | SH 29     |
| 2-21                | DIST | COUNTY |         |      | SHEET NO. |
|                     | AUS  | ١      | WILLIAN | ISON | 179       |

#### GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- 2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
- 3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is  $\frac{1}{2}$  in. or less in diameter.
- 4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- 5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- 6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

#### CONDUIT

#### A. MATERIALS

- 1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies. Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
- 2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

| AWG | 3 CONDUCTORS   | 5 CONDUCTORS   | 7 CONDUCTORS   |
|-----|----------------|----------------|----------------|
| #1  | 10" x 10" x 4" | 12" x 12" x 4" | 16" x 16" x 4" |
| #2  | 8" × 8" × 4"   | 10" x 10" x 4" | 12" x 12" x 4" |
| #4  | 8" × 8" × 4"   | 10" x 10" x 4" | 10" x 10" x 4" |
| #6  | 8" × 8" × 4"   | 8" × 8" × 4"   | 10" x 10" x 4" |
| #8  | 8" × 8" × 4"   | 8" × 8" × 4"   | 8" × 8" × 4"   |

- 4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- 6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- 7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

- 8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- 9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- 10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.
- B. CONSTRUCTION METHODS
- 1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- 2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
- 3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- 4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- 5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
- 6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- 8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- 9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- 10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- 11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- 13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- 14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing," Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.



# ELECTRICAL DETAILS CONDUITS & NOTES

Operation: Division Standard

ED(1)-14

| E:    | ed1-14.dgn   | DN:  |      | CK:     | DW: | CK:       |  |  |
|-------|--------------|------|------|---------|-----|-----------|--|--|
| TxDOT | October 2014 | CONT | SECT | JOB     |     | HIGHWAY   |  |  |
|       | REVISIONS    | 0337 | 01   | 053     |     | SH 29     |  |  |
|       |              | DIST |      | COUNTY  |     | SHEET NO. |  |  |
|       |              | AUS  |      | WILLIAN | 180 |           |  |  |

#### **ELECTRICAL CONDUCTORS**

- A. MATERIAL INFORMATION
- 1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
- 2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
- 3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
- 4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.
- B. CONSTRUCTION METHODS
- 1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
- Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
- 3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
- Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
- 5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
- 6. Support conductors in illumination poles with a J-hook at the top of the pole.
- 7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
- 8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
- Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
- 10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
- 11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

#### C. TEMPORARY WIRING

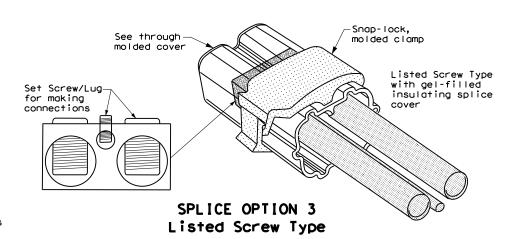
- Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
- 2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
- Use listed wire nuts with factory applied sealant for temporary wiring where approved.
- 4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
- Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

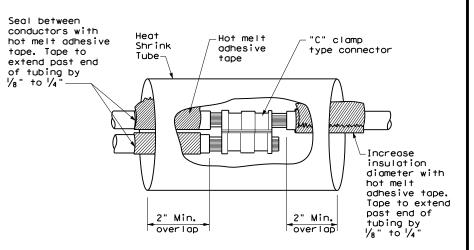
#### GROUND RODS & GROUNDING ELECTRODES

- A. MATERIAL INFORMATION
- 1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

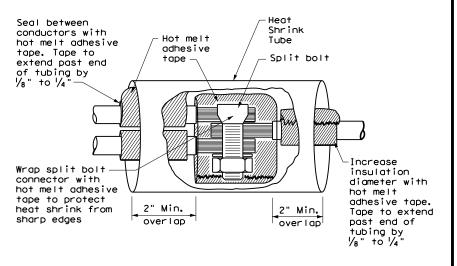
#### B. CONSTRUCTION METHODS

- 1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
- 2. Do not place ground rods in the same drilled hole as a timber pole.
- Install ground rods so the imprinted part number is at the upper end of the rod.
- 4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
- Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
- 6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
- 7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.

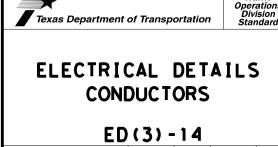


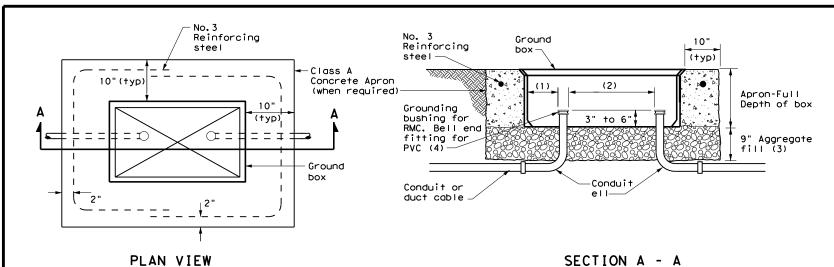


### SPLICE OPTION 1 Compression Type



SPLICE OPTION 2
Split Bolt Type



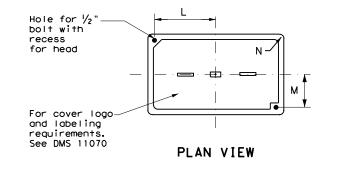


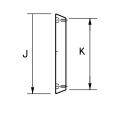
#### APRON FOR GROUND BOX

- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

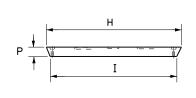
| GROUND BOX DIMENSIONS |  |  |  |  |  |  |
|-----------------------|--|--|--|--|--|--|
| TYPE                  | OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth) |  |  |  |  |  |
| А                     | 12 X 23 X 11   |  |  |  |  |  |
| В                     | 12 X 23 X 22   |  |  |  |  |  |
| С                     | 16 X 29 X 11   |  |  |  |  |  |
| D                     | 16 X 29 X 22   |  |  |  |  |  |
| E                     | 12 X 23 X 17   |  |  |  |  |  |

|          | GROL   | JND BO | ох со  | VER D  | IMENS  | IONS  |       |   |
|----------|--------|--------|--------|--------|--------|-------|-------|---|
| TYPE     |        |        | DIMEN  | ISIONS | (INCH  | ES)   |       |   |
| ITPE     | Н      | I      | J      | К      | L      | М     | N     | Р |
| A, B & E | 23 1/4 | 23     | 13 3/4 | 13 ½   | 9 %    | 5 1/8 | 1 3/8 | 2 |
| C & D    | 30 ½   | 30 1/4 | 17 ½   | 17 1/4 | 13 1/4 | 6 ¾   | 1 3/8 | 2 |





**END** 



SIDE

GROUND BOX COVER

# GROUND BOXES A. MATERIALS

- Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
- 2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
- 3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
- 4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.
- B. CONSTRUCTION METHODS
- Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
- Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth
  of concrete for the apron extends from finished grade to the top of the aggregate bed
  under the box. Ground box aprons, including concrete and reinforcing steel, are
  subsidiary to ground boxes when called for by descriptive code.
- 3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
- 4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
- 5. Temporarily seal all conduits in the ground box until conductors are installed.
- 6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
- 7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
- 8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
- 9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
- 10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
- 11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.



Traffic Operations Division Standard

# ELECTRICAL DETAILS GROUND BOXES

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|          |              | DIST   | r county |           |     | SHEET NO. |           |
|          |              | AUS    | ١        | WILLIAN   | ISO | N         | 182       |

#### **ELECTRICAL SERVICES NOTES**

- 1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
- 2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services, "DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- 4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
- 5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
- 6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
- 7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- 8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
- 9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
- 10. Provide rigid metal conduit (RMC) for all conduits on service, except for the \( \frac{1}{2} \) in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
- 11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
- 12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
- 13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- 14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8  $\frac{1}{2}$  in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
- 15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

#### SERVICE ASSEMBLY ENCLOSURE

- 1. Provide threaded hub for all conduit entries into the top of enclosure.
- 2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- 3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
- 4.Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

#### MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

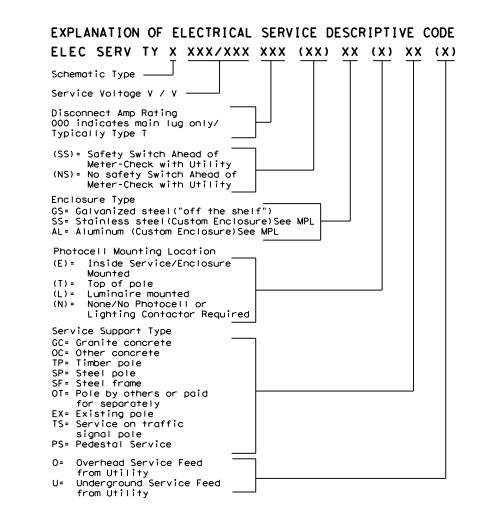
- 1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
- 2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

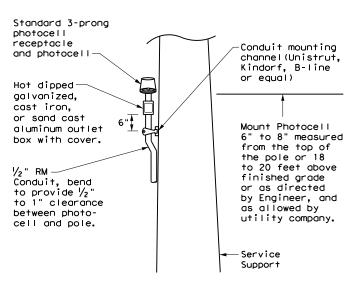
#### PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

|                        |                         |  | * ELE                        | CTRICAL                           | SERV                     | ICE DATA                       | 4                              |                                      |                         |                                  |                           |             |
|------------------------|-------------------------|--|------------------------------|-----------------------------------|--------------------------|--------------------------------|--------------------------------|--------------------------------------|-------------------------|----------------------------------|---------------------------|-------------|
| Elec.<br>Service<br>ID | Plan<br>Sheet<br>Number | Electrical Service Description         | Service<br>Conduit<br>**Size | Service<br>Conductors<br>No./Size | Safety<br>Switch<br>Amps | Main<br>Ckt. Bkr.<br>Pole/Amps | Two-Pole<br>Contractor<br>Amps | Panelbd/<br>Loadcenter<br>Amp Rating | Branch<br>Circuit<br>ID | Branch<br>Ckt. Bkr.<br>Pole/Amps | Branch<br>Circuit<br>Amps | KVA<br>Load |
| SB 183                 | 289                     | ELC SRV TY A 240/480 100(SS)AL(E)SF(U) | 2"                           | 3/#2                              | 100                      | 2P/100                         | 100                            | N/A                                  | Lighting NB             | 2P/40                            | 26                        | 28.1        |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      | Lighting SB             | 2P/40                            | 25                        |             |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      | Underpass               | 1P/20                            | 15                        |             |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      |                         |                                  |                           |             |
| NB Access              | 30                      | ELC SRV TY D 120/240 060(NS)SS(E)TS(O) | 1 1/4"                       | 3/#6                              | N/A                      | 2P/60                          |                                | 100                                  | Sig. Controller         | 1P/30                            | 23                        | 5.3         |
|                        |                         |  |                              |                                   |                          |                                | 30                             |                                      | Luminaires              | 2P/20                            | 9                         |             |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      | CCTV                    | 1P/20                            | 3                         |             |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      |                         |                                  |                           |             |
| 2nd & Main             | 58                      | ELC SRV TY T 120/240 000(NS)GS(N)SP(O) | 1 1/4"                       | 3/#6                              | N/A                      | N/A                            | N/A                            | 70                                   | Flashing Beacon 1       | 1P/20                            | 4                         | 1.0         |
|                        |                         |  |                              |                                   |                          |                                |                                |                                      | Flashing Beacon 2       | 1P/20                            | 4                         |             |

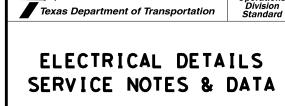
- \* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.
- \*\* Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.





#### TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

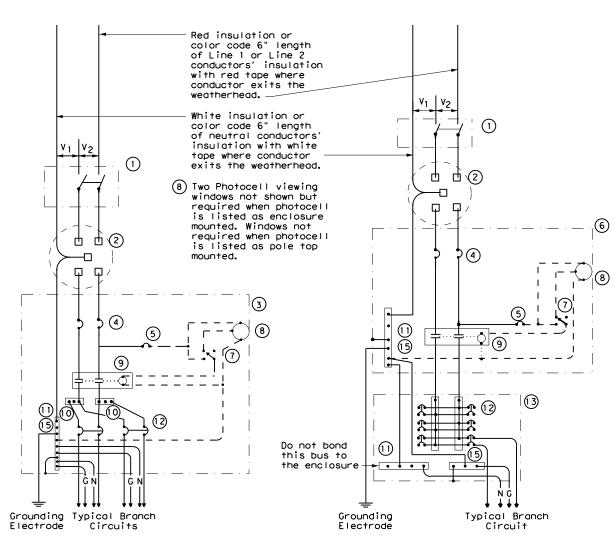


Operation

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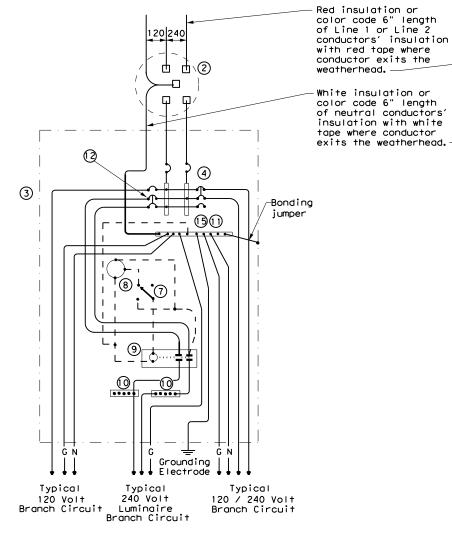
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|         |              | DIST   |                     | COUNTY    |     |       | SHEET NO. |
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SCHEMATIC TYPE A THREE WIRE

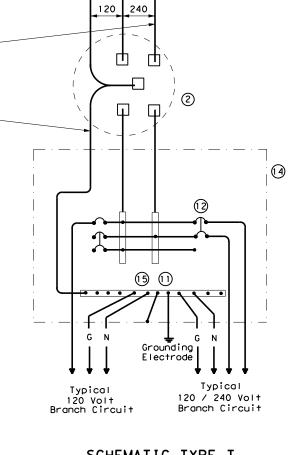
SCHEMATIC TYPE C THREE WIRE



SCHEMATIC TYPE D - CUSTOM 120/240 VOLTS - THREE WIRE

|       | WIRING LEGEND                                 |
|-------|---|
|       | Power Wiring                                  |
|       | Control Wiring                                |
| — н — | Neutral Conductor                             |
| — G—  | Equipment grounding conductor-always required |

|    | SCHEMATIC LEGEND  |
|----|---|
| 1  | Safety Switch (when required)                               |
| 2  | Meter (when required-verify with electric utility provider) |
| 3  | Service Assembly Enclosure                                  |
| 4  | Main Disconnect Breaker (See Electrical<br>Service Data)    |
| 5  | Circuit Breaker, 15 Amp (Control Circuit)                   |
| 6  | Auxiliary Enclosure   |
| 7  | Control Station ("H-O-A" Switch)                            |
| 8  | Photo Electric Control (enclosure-<br>mounted shown)        |
| 9  | Lighting Contactor  |
| 10 | Power Distribution Terminal Blocks                          |
| 11 | Neutral Bus   |
| 12 | Branch Circuit Breaker<br>(See Electrical Service Data)     |
| 13 | Separate Circuit Breaker Panelboard                         |
| 14 | Load Center   |
| 15 | Ground Bus  |



#### SCHEMATIC TYPE T

## 120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.



Traffic Operations Division Standard

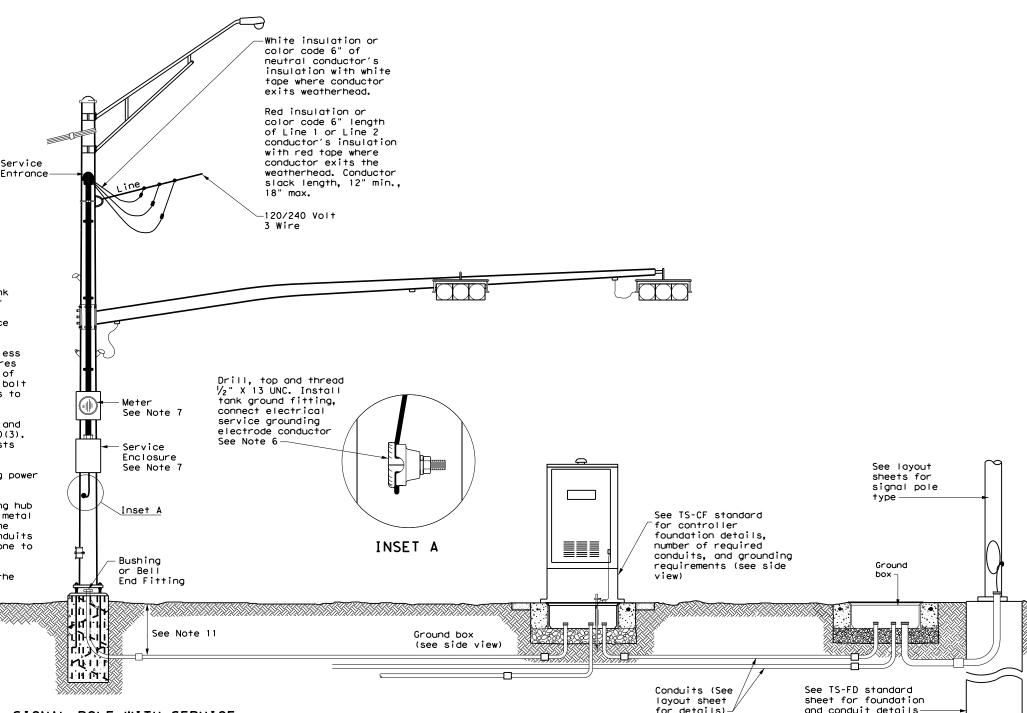
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

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| TxDOT | October 2014 | CONT   | SECT | JOB       |     | HIC   | HWAY      |
|       | REVISIONS    | 0337   | 01   | 053       |     | SH    | 29        |
|       |              | DIST   |      | COUNTY    |     |       | SHEET NO. |
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#### TRAFFIC SIGNAL NOTES

- 1. Do not pass luminaire conductors through the signal controller cabinet.
- Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
- 3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
- 4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
- Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use Listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
- 6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
- 7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of  $\frac{3}{4}$  in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
- 8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
- Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
- 10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
- For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



#### SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



Traffic Operations Division Standard

ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL
SYSTEM DETAILS

ED(8) - 14

SIGNAL CONTROLLER

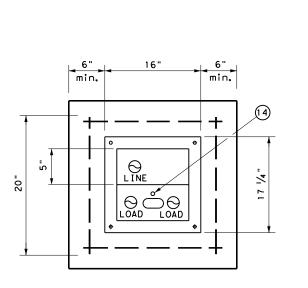
See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

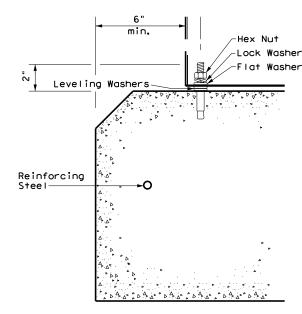
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#### PEDESTAL SERVICE NOTES

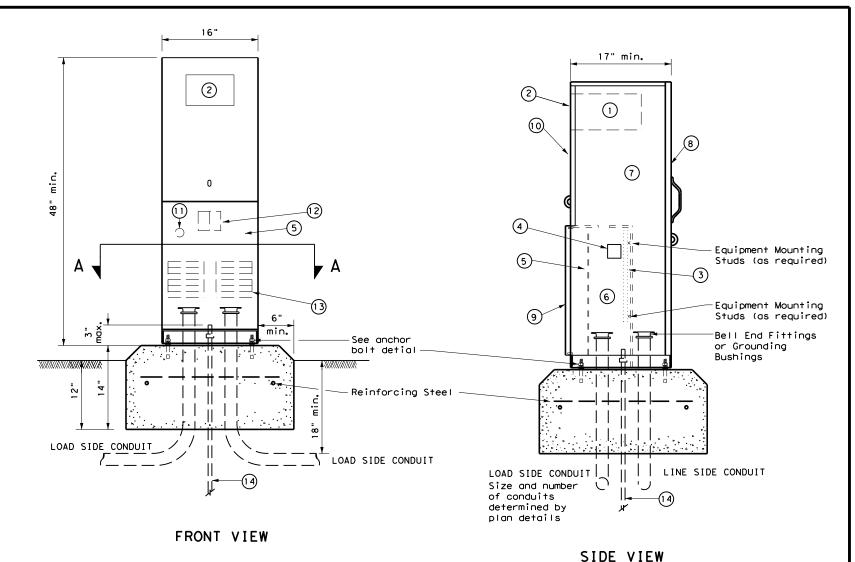
- 1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.
- 2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
- 3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.
- 4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
- 5. Install  $\frac{1}{2}$  in, X 2  $\frac{1}{16}$  in, minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a  $\frac{1}{2}$  in, galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.
- 6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than  $\frac{1}{16}$  in, gap at any corner. Do not exceed a maximum dip or rise in the foundation of  $\frac{1}{16}$  in, per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within  $\frac{1}{16}$  in. Repair rocking or movement of the service enclosure at no additional cost to the department.
- 7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
- 8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in, below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.





SECTION A-A

ANCHOR BOLT DETAIL



TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.

|    | LEGEND   |  |  |  |  |  |  |  |  |
|----|--|--|--|--|--|--|--|--|--|
| 1  | Meter Socket, (when required)                  |  |  |  |  |  |  |  |  |
| 2  | Meter Socket Window, (when required)           |  |  |  |  |  |  |  |  |
| 3  | Equipment Mounting Panel                       |  |  |  |  |  |  |  |  |
| 4  | Photo Electric Control Window, (When required) |  |  |  |  |  |  |  |  |
| 5  | Hinged Deadfront Trim                          |  |  |  |  |  |  |  |  |
| 6  | Load Side Conduit Trim                         |  |  |  |  |  |  |  |  |
| 7  | Line Side Conduit Area                         |  |  |  |  |  |  |  |  |
| 8  | Utility Access Door, with handle               |  |  |  |  |  |  |  |  |
| 9  | Pedestal Door                                  |  |  |  |  |  |  |  |  |
| 10 | Hinged Meter Access                            |  |  |  |  |  |  |  |  |
| 11 | Control Station (H-O-A Switch)                 |  |  |  |  |  |  |  |  |
| 12 | Main Disconnect                                |  |  |  |  |  |  |  |  |
| 13 | Branch Circuit Breakers                        |  |  |  |  |  |  |  |  |
| 14 | Copper Clad Ground Rod - 5/8" X 10'            |  |  |  |  |  |  |  |  |



Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS

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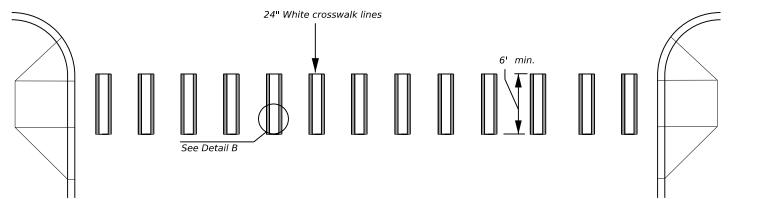
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|       | REVISIONS    | 0337   | 01   | 053        |     | SH 29   |           |
| TxDOT | October 2014 | CONT   | SECT | JOB        |     | HIGHWAY |           |
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# GENERAL NOTES

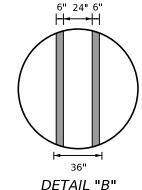
- 1. Contrast and Shadow markings may only be used on concrete pavements.
- 2. Contrast and Shadow markings shall not be used on edge lines.
- 3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
- 4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
- 5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
- 6. See PM(2) for raised reflective pavement markings installation details.

| MATERIAL SPECIFICATIONS                   |          |
|---|----------|
| PAVEMENT MARKERS (REFLECTORIZED)          | DMS-4200 |
| EPOXY AND ADHESIVES                       | DMS-6100 |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS  | DMS-6130 |
| TRAFFIC PAINT                             | DMS-8200 |
| HOT APPLIED THERMOPLASTIC                 | DMS-8220 |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |
|   |          |

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



CONTRAST CROSSWALK DESIGN



(See PM(4) for crosswalk line placement details)

Texas Department of Transportation

CONTRAST AND SHADOW PAVEMENT MARKINGS

Traffic Safety Division Standard

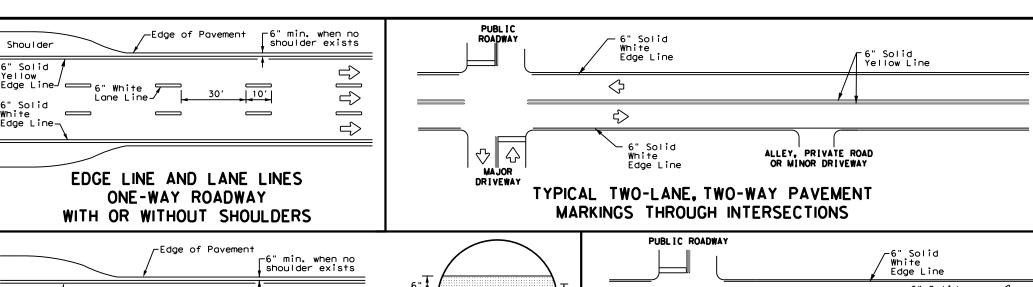
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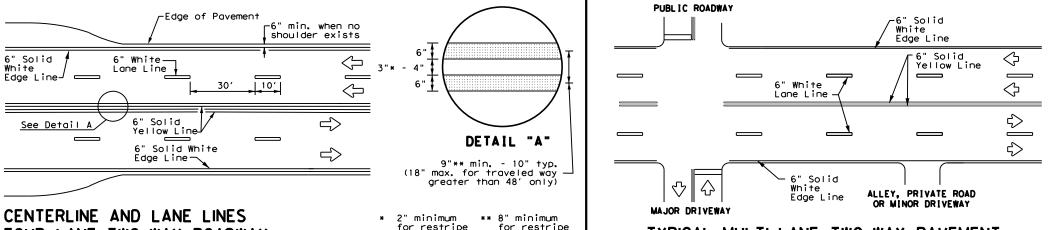
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| CTXDOT       | February 2023 | CONT | SECT | JOB      |     | HIGHWA | Υ      |
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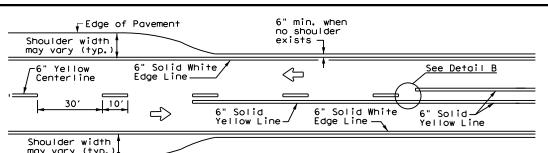
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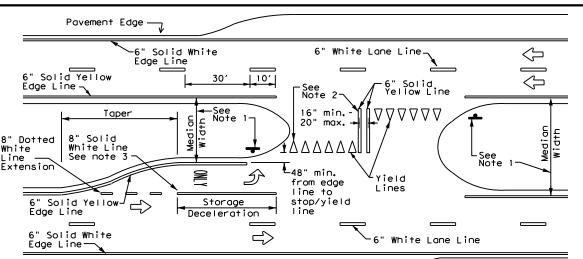
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the Engineer.

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# TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



FOUR LANE DIVIDED ROADWAY CROSSOVERS

# 18" min. - 20" max. (16" minimum for restripe projects when approved by the Engineer.)

TYPICAL MULTI-LANE. TWO-WAY PAVEMENT

MARKINGS THROUGH INTERSECTIONS

**DETAIL "B"**2" minimum for restripe projects when approved by the Engineer.

#### NOTES

 Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.

Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

3"to 12"+| |+

For posted speed on road

being marked equal to or greater than 45 MPH.

YIELD LINES

For posted speed on road

being marked equal to or less than 40 MPH.

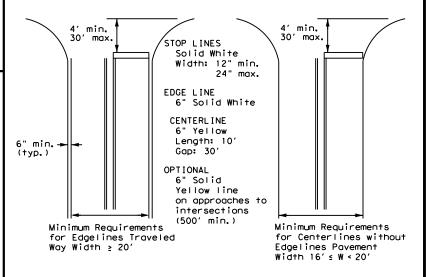
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- 3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

#### GENERAL NOTES

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- 2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

| MATERIAL SPECIFICATIONS                   |          |
|---|----------|
| PAVEMENT MARKERS (REFLECTORIZED)          | DMS-4200 |
| EPOXY AND ADHESIVES                       | DMS-6100 |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS  | DMS-6130 |
| TRAFFIC PAINT                             | DMS-8200 |
| HOT APPLIED THERMOPLASTIC                 | DMS-8220 |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

# GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways



Texas Department of Transportation

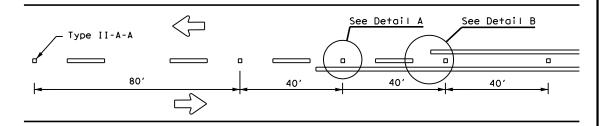
Traffic Safety Division Standard

PM(1)-22

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| E: pm1-22,dgn              | DN:  |      | CK:     | DW:  | CK:       |
| TxDOT December 2022        | CONT | SECT | JOB     |      | HIGHWAY   |
| REVISIONS<br>-78 8-00 6-20 | 0337 | 01   | 053     |      | SH 29     |
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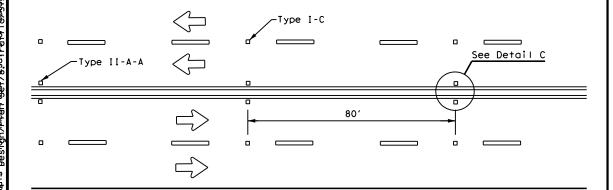
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# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

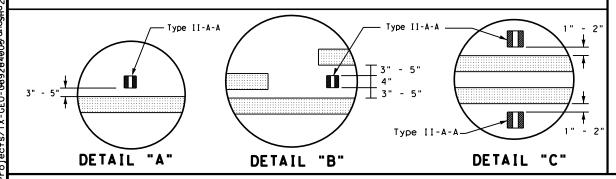


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## CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



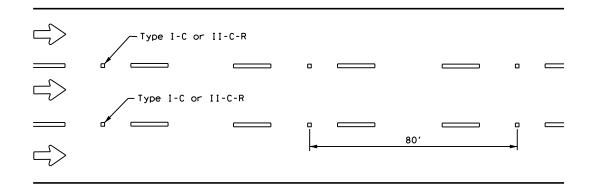
# CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



OR 6" LANE LINE

# Centerline Symmetrical around centerline Continuous two-way left turn lane Type II-A-A 40' 40' Type I-C

### CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

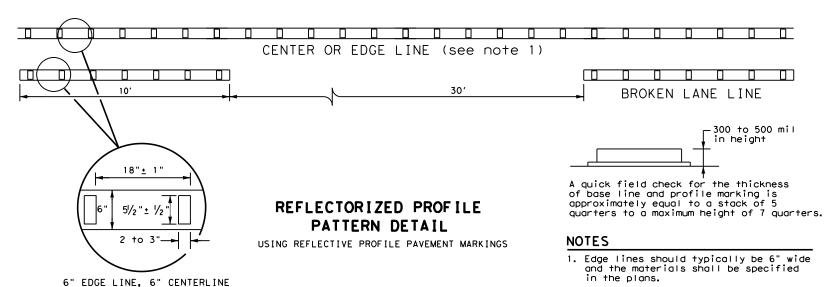


#### LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic. See Note 3.

2. Profile markings shall not be placed on roadways with a posted speed limit

of 45 MPH or less.

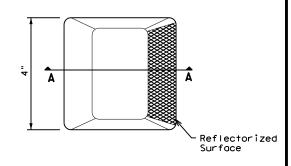


#### GENERAL NOTES

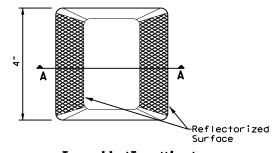
- All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
- On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal ioints.
- Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

| MATERIAL SPECIFICATIONS                   |          |  |  |  |  |
|---|----------|--|--|--|--|
| PAVEMENT MARKERS (REFLECTORIZED)          | DMS-4200 |  |  |  |  |
| EPOXY AND ADHESIVES                       | DMS-6100 |  |  |  |  |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS  | DMS-6130 |  |  |  |  |
| TRAFFIC PAINT                             | DMS-8200 |  |  |  |  |
| HOT APPLIED THERMOPLASTIC                 | DMS-8220 |  |  |  |  |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |  |  |  |  |

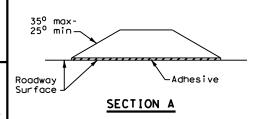
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



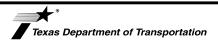
Type I (Top View)



Type II (Top View)



## RAISED PAVEMENT MARKERS



Traffic Safety Division Standard

# POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

| FILE: pm2-22.dgn            | DN:  |      | CK:     | DW:  |     | CK:       |
|-----------------------------|------|------|---------|------|-----|-----------|
| ℂTxDOT December 2022        | CONT | SECT | JOB     |      | ніс | SHWAY     |
| REVISIONS<br>4-77 8-00 6-20 | 0337 | 01   | 053     |      | SH  | 29        |
| 4-92 2-10 12-22             | DIST |      | COUNTY  |      |     | SHEET NO. |
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# NOTES 1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would

- Lane reduction pavenient markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
- 2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- 3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- 4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

|                 | D WARNING |                       |
|-----------------|-----------|-----------------------|
| Posted<br>Speed | D (ft)    | L (f†)                |
| 30 MPH          | 460       | $L = \frac{WS^2}{60}$ |
| 35 MPH          | 565       | L = WS                |
| 40 MPH          | 670       | 00                    |
| 45 MPH          | 775       |                       |
| 50 MPH          | 885       |                       |
| 55 MPH          | 990       |                       |
| 60 MPH          | 1,100     | L=WS                  |
| 65 MPH          | 1,200     |                       |
| 70 MPH          | 1,250     |                       |
| 75 MPH          | 1,350     |                       |

Type II-A-A Markers

20'

3 8'-16'

A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

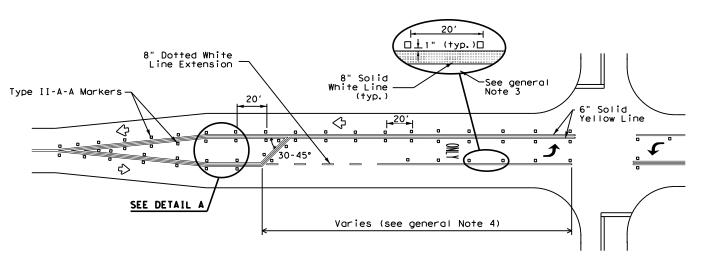
# TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

#### GENERAL NOTES

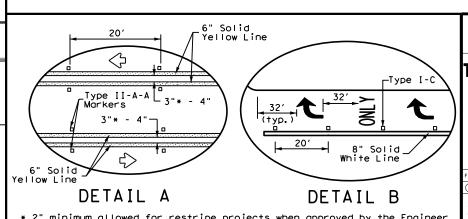
- 1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
- 2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
- 4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

| MATERIAL SPECIFICATIONS                   |          |  |  |  |  |
|---|----------|--|--|--|--|
| PAVEMENT MARKERS (REFLECTORIZED)          | DMS-4200 |  |  |  |  |
| EPOXY AND ADHESIVES                       | DMS-6100 |  |  |  |  |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS  | DMS-6130 |  |  |  |  |
| TRAFFIC PAINT                             | DMS-8200 |  |  |  |  |
| HOT APPLIED THERMOPLASTIC                 | DMS-8220 |  |  |  |  |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |  |  |  |  |

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



## TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS

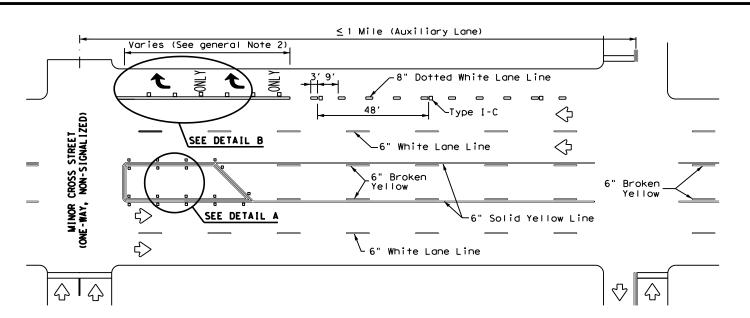




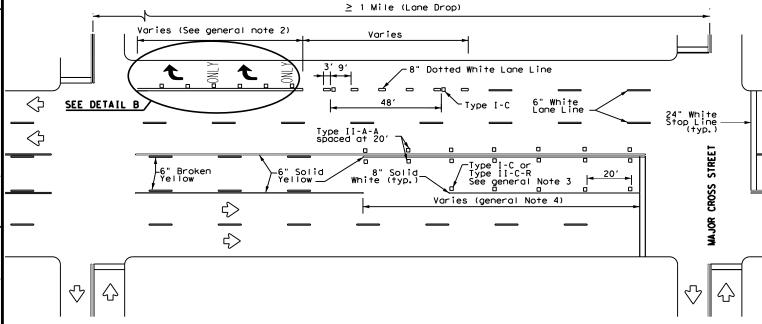
Traffic Safety Division Standard

# TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-22

| •                           |      | -    |         |      |     |           |
|-----------------------------|------|------|---------|------|-----|-----------|
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| REVISIONS<br>4-98 3-03 6-20 | 0337 | 01   | 053     |      | SH  | 29        |
| 5-00 2-10 12-22             | DIST |      | COUNTY  |      | 5   | SHEET NO. |
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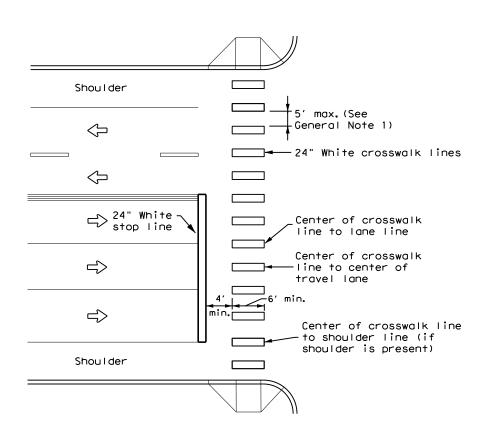


### TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

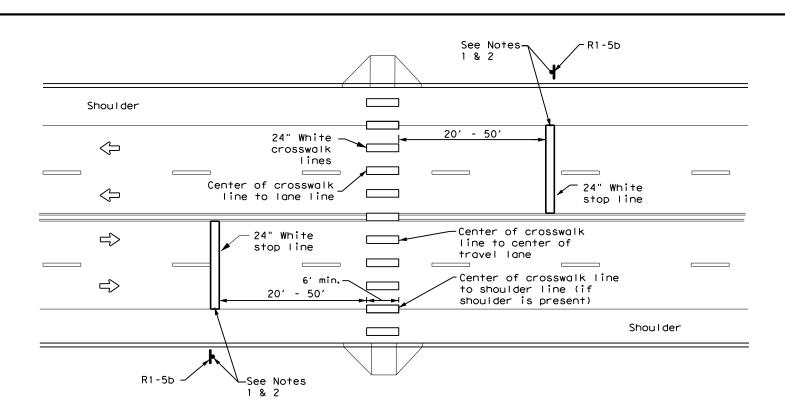


\* 2" minimum allowed for restripe projects when approved by the Engineer.

TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



HIGH-VISIBILITY LONGITUDINAL CROSSWALK
AT CONTROLLED APPROACH



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

#### GENERAL NOTES

- Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
- A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
- For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
- 4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
- 5. Each crosswalk shall be a minimum of 6' wide.
- 6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
- 7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

| MATERIAL SPECIFICATIONS                   |          |
|---|----------|
| PAVEMENT MARKERS (REFLECTORIZED)          | DMS-4200 |
| EPOXY AND ADHESIVES                       | DMS-6100 |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS  | DMS-6130 |
| TRAFFIC PAINT                             | DMS-8200 |
| HOT APPLIED THERMOPLASTIC                 | DMS-8220 |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

#### NOTES:

- Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
- Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.



Traffic Safety Division Standard

# CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

| FILE: pm4-22a.dgn    | DN:  |               | CK:    | DW: | CK:       |
|----------------------|------|---------------|--------|-----|-----------|
| ℂTxDOT December 2022 | CONT | SECT          | JOB    |     | H]GHWAY   |
| REVISIONS<br>6-20    | 0337 | 01            | 053    | 9   | SH 29     |
| 6-22                 | DIST |               | COUNTY |     | SHEET NO. |
| 12-22                | AUS  | JS WILLIAMSON |        | 191 |           |
| 222                  |      |               |        |     |           |

221

Sian Panel Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum. When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

SIGN SUPPORT DESCRIPTIVE CODES (Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

## Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP)) TWT = Thin-Walled Tubing (see SMD(TWT))

10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3)) S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

#### Number of Posts (1 or 2)

#### Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT)) UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))

- WS = Wedge Anchor Steel (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))

No more than 2 sign

U-bold

Sign clamps may be either the specific size clamp

posts should be located

within a 7 ft. circle.

SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3)) SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

#### Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP)) T = Prefab, "T" (see SMD(SLIP-1) to (SLIP-3), (TWT)) U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

IF REQUIRED 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))

Sign

Nut. lock

washer

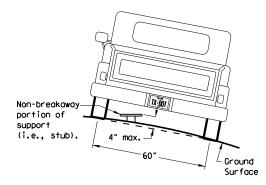
Nylon washer, flat

washer, lock washer,

BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3)) WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))

EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

> 7 ft. diameter

circle

Not Acceptable

Acceptable

Signs

Sign Post

Specific Clamp

3"

3 or 3 1/2"

3 1/2 or 4"

-Sign Panel

 $^{ackslash}$ Sign Panel

Universal Clamp

3 or 3 1/2"

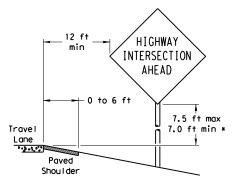
3 1/2 or 4"

4 1/2"

- Sign Bolt

Approximate Bolt Length

**PAVED SHOULDERS** 



#### LESS THAN 6 FT. WIDE

When the shoulder is 6 ft. or less in width. the sign must be placed at least 12 ft. from the edge of the travel lane.

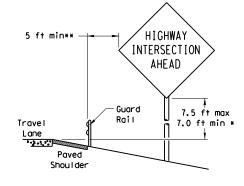
#### HIGHWAY 6 ft min -INTERSECTION AHEAD Greater than 6 ft 7.5 ft max Travel 7.0 ft min \* Lane Paved Shou I der

SIGN LOCATION

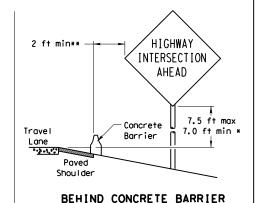
#### GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft, from the edge of the shoulder.

#### BEHIND BARRIER



BEHIND GUARDRAIL



\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.

RESTRICTED RIGHT-OF-WAY

Maximum

possible

Travel

Lane

(When 6 ft min, is not possible,)

7.5 ft max

7.0 ft min \*

HIGHWAY

INTERSECTION

AHEAD

#### \* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

T-INTERSECTION

12 ft min

Travel

Lane

as close to ROW as practical.

Paved Shoulder

Edge of Travel Lane

Paved

Shou I der

When this sign is needed at the end of a two-lane,

two way roadway, the right edge of the sign should

be in line with the centerline of the roadway. Place

← 6 ft min

7.5 ft max

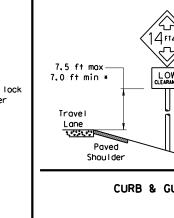
7.0 ft min \*

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by

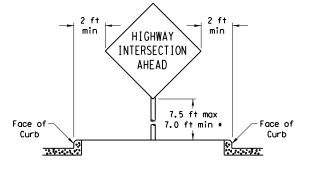
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

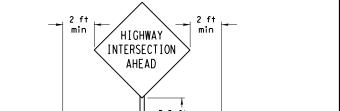
The website address is: http://www.txdot.gov/publications/traffic.htm



When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

#### CURB & GUTTER OR RAISED ISLAND





Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

\*\*\* Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme



# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) - 08

(STOP)

| © TxDOT July 2002 | DN: TXDOT |      | CK: TXDOT DW: TX |            | TXDOT | CK: TXDOT |
|-------------------|-----------|------|------------------|------------|-------|-----------|
| 9-08 REVISIONS    | CONT      | SECT | JOB              |            | ніс   | CHWAY     |
|                   | 0337      | 01   | 053              |            | S     | H 29      |
|                   | DIST      |      | COUNTY           | •          |       | SHEET NO. |
|                   | AUS       | ١    | NILLIAN          | <b>ISO</b> | N     | 192       |

## diameter circle diameter diameter Not Acceptable circle / Not Acceptable circle TYPICAL SIGN ATTACHMENT DETAIL Single Signs Back-to-Back

Nylon washer, flat

washer. lock washer

Clamp

Nylon washer, flat

washer, lock washer,

Pipe Diameter

2" nominal

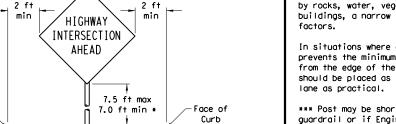
2 1/2" nominal

3" nominal

Clamo Bolt

# SIGNS WITH PLAQUES

# **EAST**



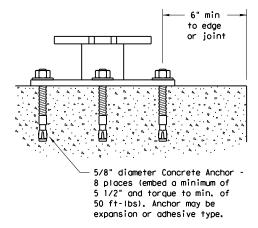
#### 10 BWG Tubing or Keeper Plate Schedule 80 Pipe (See General Note 3) Slip Base $\Box$ 5/8" structural bolts (3), nuts (3), and washers Washers (6) per ASTM A325 if required by or A449 and manufacture galvanized per Item 445 "Galvanizing." Bolt length is 2 1/2". 3/4 " diameter hole. 36" Provide a 7" x 1/2" diameter rod or #4 rebar. Class A concrete 42 12" min. 24" max. Non-reinforced concrete footing (shall be used unless noted elsewhere in the plans). Foundation should take approx. 2.5 cf of concrete. 12" Dia

SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

#### NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

#### CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normalweight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

#### GENERAL NOTES:

- 1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:

10 BWG Tubing (2.875" outside diameter)

0.134" nominal wall thickness

Seamless or electric-resistance welded steel tubing or pipe

Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008

Other steels may be used if they meet the following:

55,000 PSI minimum yield strength 70,000 PSI minimum tensile strength

20% minimum elongation in 2"

Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"

Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"

Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat

tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

Schedule 80 Pipe (2.875" outside diameter)

0.276" nominal wall thickness Steel tubing per ASTM A500 Gr C

Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:

46,000 PSI minimum yield strength

62,000 PSI minimum tensile strength

21% minimum elongation in 2"

Wall thickness (uncoated) shall be within the range of 0.248" to 0.304" Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"

Galvanization per ASTM A123

3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm

4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

#### ASSEMBLY PROCEDURE

#### Foundation

- 1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- 2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable. motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- 3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- 4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- 5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

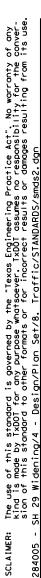
- 1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lame) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and
- 2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.



## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

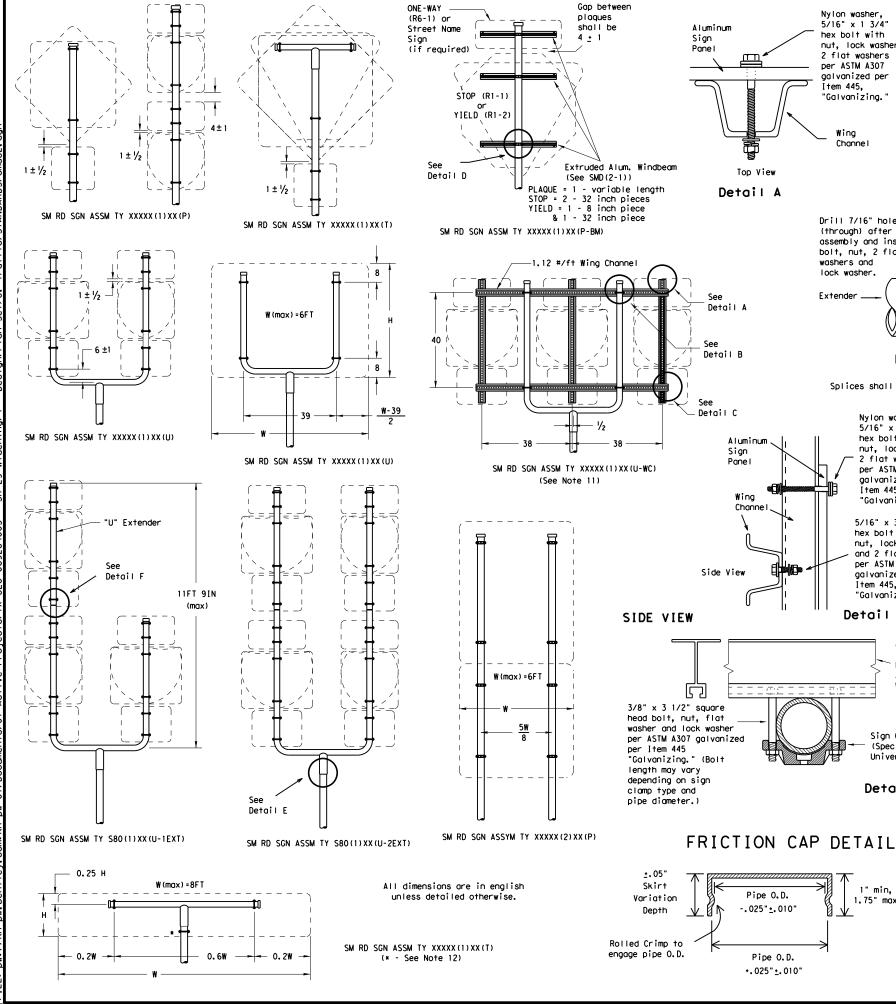
SMD (SL IP-1) -08

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| 9-08   | PEVISIONS     |         | SECT | JOB       |            | ніс   | HWAY      |
| 3 00   |               | 0337    | 01   | 053       |            | SH    | 29        |
|        |               | DIST    | Ι.   | COUNTY    | ·          |       | SHEET NO. |
|        |               | AUS     |      | WILLIAN   | <b>USC</b> | N     | 193       |

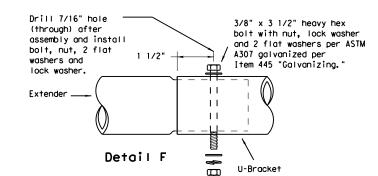




2:11:41 Dent lev



#### Nylon washer. 5/16" x 1 3/4" hex bolt with nut, lock washer, 2 flat washers per ASTM A307 Wing galvanized per Channe Item 445. Sign Clamp -"Galvanizing.' (Specific or Universal) 5/16" x 3 3/4" Wing hex bolt with Channe I nut. lock washer Top View and flat washer per ASTM A307 Top View Detail B aalvanized per Item 445, "Galvanizing." Detail A



Splices shall only be allowed behind the sign substrate.

Nylon washer,

5/16" x 1 3/4"

hex bolt with

nut, lock washer,

2 flat washers

per ASTM A307

aalvanized per

"Galvanizing."

nut, lock washer

Item 445.

5/16" x 3/4" hex bolt with

per ASTM A307

galvanized per Item 445.

"Galvanizing."

TOP VIEW

Extruded

Aluminum

Windbeam

Sign Clamp

Universal)

Detail D

(Specific or

Detail C

Wina

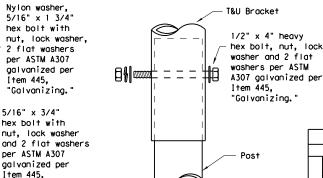
Channe I

Pipe O.D.

-.025"<u>-</u>.010"

Pipe O.D.

+. 025" +. 010"



Detail E Sign Clamp (Specific or Universal) 0

(see SMD(2-1))

#### GENERAL NOTES:

| 1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|----|--------------|------------|----------------|
|    | 10 BWG       | 1          | 16 SF          |
|    | 10 BWG       | 2          | 32 SF          |
|    | Sch 80       | 1          | 32 SF          |
|    | Sch 80       | 2          | 64 SF          |

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- 3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- 5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- 6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of
- greater height.
  7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently
- when impacted by an errant vehicle.

  8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- 9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- 10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- 11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- 12. Post open ends shall be fitted with Friction Caps.
- 13. Sign blanks shall be the sizes and shapes shown on the plans.

| REQUIRED SUPPORT |  |                                      |  |  |  |
|------------------|--|--------------------------------------|--|--|--|
|                  | SIGN DESCRIPTION                         | SUPPORT                              |  |  |  |
|                  | 48-inch STOP sign (R1-1)                 | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |  |  |  |
| ے                | 60-inch YIELD sign (R1-2)                | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |  |  |  |
| Regulatory       | 48×16-inch ONE-WAY sign (R6-1)           | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |  |  |  |
| Regu             | 36x48, 48x36, and 48x48-inch signs       | TY 10BWG(1)XX(T)                     |  |  |  |
|                  | 48x60-inch signs                         | TY S80(1)XX(T)                       |  |  |  |
|                  | 48x48-inch signs (diamond or square)     | TY 10BWG(1)XX(T)                     |  |  |  |
| g                | 48x60-inch signs                         | TY S80(1)XX(T)                       |  |  |  |
| Warning          | 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(1)XX(T)                     |  |  |  |
| ≨                | 48-inch School X-ing sign (S2-1)         | TY 10BWG(1)XX(T)                     |  |  |  |
|                  | Large Arrow sign (W1-6 & W1-7)           | TY 10BWG(1)XX(T)                     |  |  |  |
|                  | ·  | ·                                    |  |  |  |

DEALLIBED CURRAN



# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD (SLIP-2) - 08

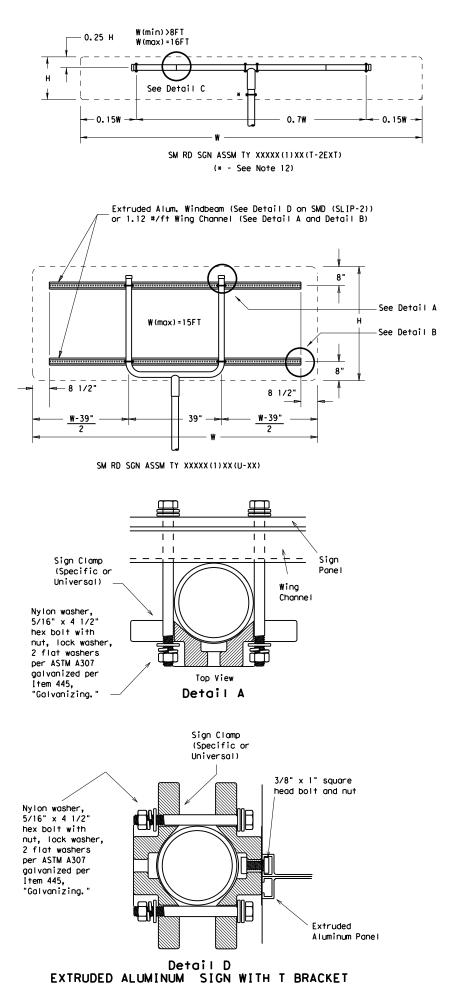
| © ⊺x | DOT July 2002 | DN: TXD | тот  | CK: TXDOT | DW:        | TXDOT | CK: TXDOT |
|------|---------------|---------|------|-----------|------------|-------|-----------|
| 9-08 | REVISIONS     | CONT    | SECT | JOB       |            | H1    | CHWAY     |
|      |               | 0337    | 01   | 053       |            | S     | 1 29      |
|      |               | DIST    |      | COUNTY    |            |       | SHEET NO. |
|      |               | AUS     |      | WILLIAN   | <b>USC</b> | N     | 194       |

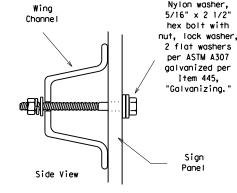
Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

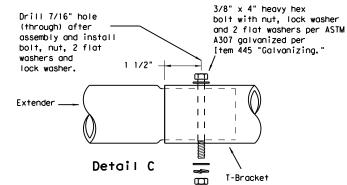
Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.











Splices shall only be allowed behind the sign substrate.

Sign

Clamps

(Specific or

Universal)

3/8" x 4 1/2"

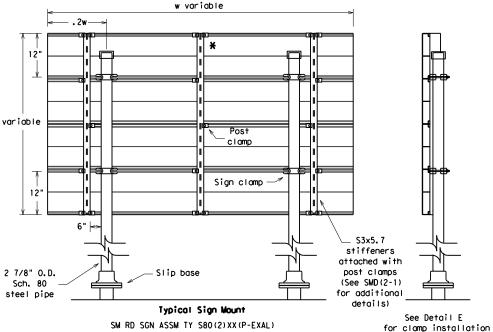
square head bolt, nut, flat washer and lock washer per

ASTM A307 galvanized

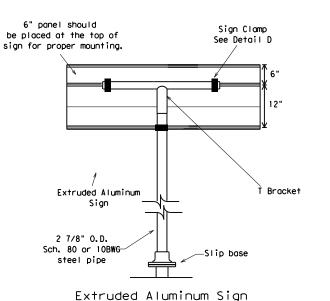
per Item 445.

"Galvanizina.

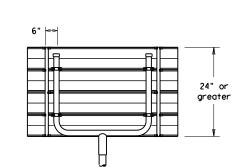
Detail E



SM RD SGN ASSM TY S80(2)XX(P-EXAL) f X Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



With T Bracket



Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details See Detail E for clamp installation

#### GENERAL NOTES:

| 1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|----|--------------|------------|----------------|
|    | 10 BWG       | 1          | 16 SF          |
|    | 10 BWG       | 2          | 32 SF          |
|    | Sch 80       | 1          | 32 SF          |
|    | Sch 80       | 2          | 64 SF          |

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- 3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- 5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- 6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
  7. When two triangular slipbase supports are used to
- support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- 9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- 10. Sign blanks shall be the sizes and shapes shown on
- 11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- 12.Post open ends shall be fitted with Friction Caps.

| REQUIRED SUPPORT                         |                                      |
|--|--------------------------------------|
| SIGN DESCRIPTION                         | SUPPORT                              |
| 48-inch STOP sign (RI-1)                 | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| 60-inch YIELD sign (R1-2)                | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| 48x16-inch ONE-WAY sign (R6-1)           | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| 36x48, 48x36, and 48x48-inch signs       | TY 10BWG(1)XX(T)                     |
| 48x60-inch signs                         | TY S80(1)XX(T)                       |
| 48x48-inch signs (diamond or square)     | TY 10BWG(1)XX(T)                     |
| 48x60-inch signs                         | TY S80(1)XX(T)                       |
| 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(1)XX(T)                     |
| 48-inch School X-ing sign (S2-1)         | TY 10BWG(1)XX(T)                     |
| Large Arrow sign (W1-6 & W1-7)           | TY 10BWG(1)XX(T)                     |



# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

| © txI          | 00T July 2002 | DN: TXD      | тот    | CK: TXDOT | DW: T | KDOT      | CK: TXDOT |
|----------------|---------------|--------------|--------|-----------|-------|-----------|-----------|
| 9-08 REVISIONS |               | CONT         | SECT   | JOB       |       | HIO       | SHWAY     |
|                |               | 0337         | 01     | 053       |       | SH        | 29        |
|                |               | DIST         | COUNTY |           |       | SHEET NO. |           |
|                |               | AUS WILLIAMS |        | NOSN      |       | 195       |           |

#### METHOD 1: WOOD EMBEDMENT

#### STEPS:

Step 1. Determine sign height (Hs), width (Ws), average mounting height from bottom of sign to ground (Hbs), and temporary guide sign wind zone.

Temporary guide sign wind zone is determined from Wind Velocity Worksheet.

(Page 30A on the Traffic Standards web page) and Table 1.

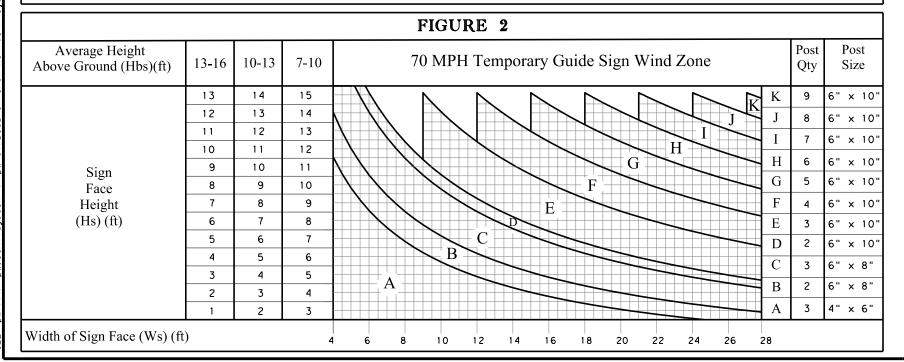
| TAB  | LE 1                                 |
|--|--------------------------------------|
| Wind Zone on<br>Wind Velocity<br>Worksheet | Temporary<br>Guide Sign<br>Wind Zone |
| 90 mph                                     | 70 mph                               |
| 80 mph                                     | 70 mph                               |
| 70 mph                                     | 60 mph                               |

Step 3. Determine minimum post embedment depth from Table 2. For cohesionless soils, another method should be used to determine embedment depth.

| TABLE 2             |                         |  |  |  |
|---------------------|-------------------------|--|--|--|
| Wooden<br>Post Size | Embedment<br>Depth (ft) |  |  |  |
| 4×6                 | 3                       |  |  |  |
| 6×8                 | 4                       |  |  |  |
| 6×10                | 5                       |  |  |  |

- Step 2. Determine number of posts and post size from temporary guide sign wind zone using Hs, Ws, Hbs below (Figure 1: 60 mph and Figure 2: 70 mph). Determine spacing of posts (A) and distance from edge of sign to outside posts (0.5A) from 'Post Spacing and Sign Placement' detail on TLRS(2).
- Step 4. Fabricate posts using 'Wood Post' detail on TLRS(2). Attach sign (plywood or extruded aluminum) using a method on TLRS(3). Wooden parts are not required to be painted.

|  |       |          |              | FIGURE 1                              |             |              |
|--|-------|----------|--------------|---------------------------------------|-------------|--------------|
| Average Height<br>Above Ground (Hbs)(ft) | 13-16 | 10-13    | 7-10         | 60 MPH Temporary Guide Sign Wind Zone | Post<br>Qty | Post<br>Size |
|  | 13    | 14       | 15 -         | JJJ                                   | 7           | 6" × 10"     |
|  | 12    | 13       | 14 -         |                                       | 6           | 6" × 10'     |
| G'                                       | 10    | 12<br>11 | 13 -<br>12 - | Н                                     | 5           | 6" × 10'     |
| Sign<br>Face                             | 9     | 10       | 11 -         | $\frac{G}{G}$                         | 4           | 6" × 10'     |
| Height                                   | 8     | 9        | 10 -         | F                                     | 3           | 6" × 10'     |
| (Hs) (ft)                                | 7     | 8        | 9 -          | DEE                                   | 2           | 6" × 10'     |
|  | 6     | 7        | 8 -          |                                       |             |              |
|  | 5     | 6        | 7 -          | B                                     | 3           | 6" × 8"      |
|  | 4     | 5        | 6 -          | c                                     | 2           | 6" × 8"      |
|  | 3     | 4        | 5 -          | A                                     | 3           | 4" × 6"      |
|  | 2     | 3        | 4 -          | A                                     | 2           | 4" × 6"      |
|  | 1     | 2        | 3 -          |                                       |             |              |
| Width of Sign Face (Ws) (f               | t)    |          | 4            | 6 8 10 12 14 16 18 20 22 24 26 28     |             |              |



### GENERAL NOTES

- See plans for specifications and pay item information. Temporary guide signs required for contractor changes to traffic control plan are subsidiary to item 502.
- 2. Contractor may use any of the 3 methods (Wood Embedment, Steel Embedment or Wood Skid) as long as sign height requirements are met and approved by the Engineer.
- 3. See SMD (2-3) for details on attaching panels and plaques to parent signs.
- 4. Nails are not allowed in temporary sign support structures.

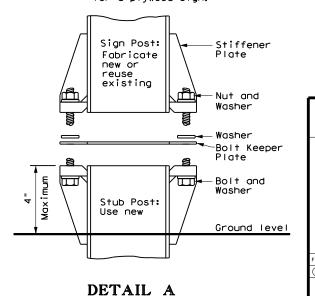
## METHOD 2: STEEL EMBEDMENT

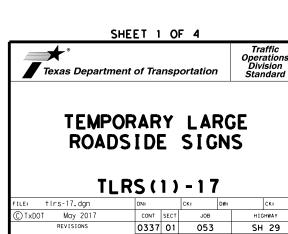
#### STEPS:

- Step 1. Determine sign height (Hs), width (Ws), average mounting height from bottom of sign to ground (Hbs), and wind zone from Wind Velocity Worksheet.
- Step 2. Determine number of posts, post size, and post spacing from SMD(2-3) and SMD(8W1). Alternatively, the sign posts from an existing sign may be used if 7' minimum height from pavement to bottom of sign can be maintained at new location. In this case, only a new stub post without concrete foundation is required. See Detail A and SMD(2-2) for more information.
- Step 3. Determine minimum stub post embedment depth from Table 3. No concrete foundation is required. For cohesionless soils, another method should be used to determine embedment depth.

| TABLE 3                    |                         |  |  |  |
|----------------------------|-------------------------|--|--|--|
| Steel Support<br>Post Size | Embedment<br>Depth (ft) |  |  |  |
| W6×9                       | 4                       |  |  |  |
| W6×12                      | 4.5                     |  |  |  |
| W6×15                      | 5                       |  |  |  |
| W8×18                      | 6                       |  |  |  |
| W8×21                      | 6.5                     |  |  |  |
| W10×22                     | 7.5                     |  |  |  |
| W10×26                     | 8                       |  |  |  |
| W12×26                     | 8.5                     |  |  |  |
| \$3×5.7                    | 3                       |  |  |  |
| S4x7.7                     | 3.5                     |  |  |  |

Step 4. Attach sign using SMD(2-3) for an extruded aluminum sign or using TLRS(3) for a plywood sign.





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warranty of any the conversion by use.

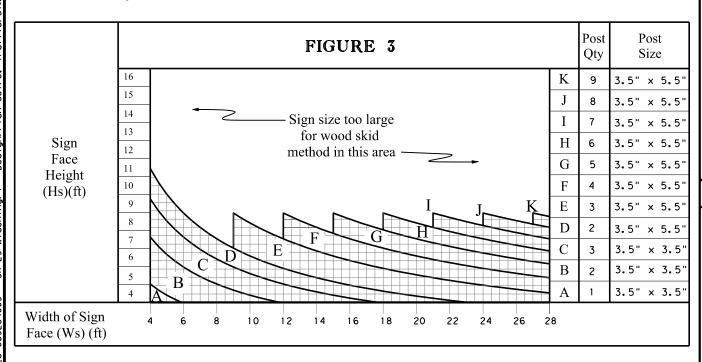
9/12/2024 2:12:12 PM DW://kh-DW.bentley.com:kh-DW.

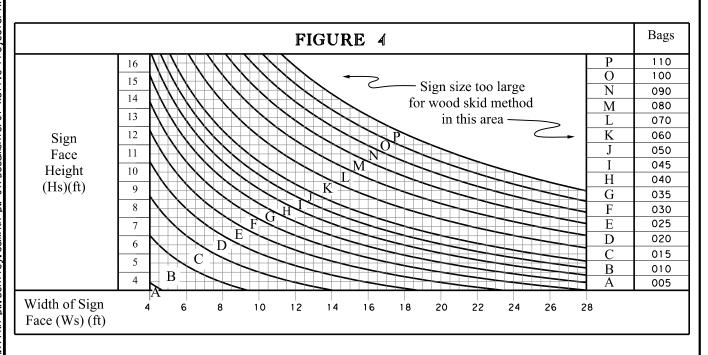
1117/

Step 2. Determine number of 4"x6" (nominal 3.5"x 5.5") posts from Figure 3 below. Determine spacing of posts (A) and distance from edge of sign to outside posts (0.5A) from 'Post Spacing and Sign Placement' detail.

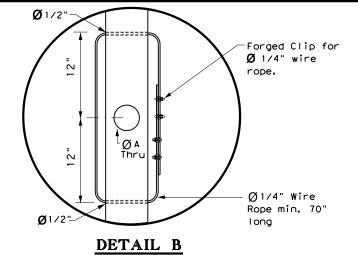
Step 3. Determine number of 40 pound sandbags from Figure 4.

Step 4. Assemble skid as shown on TLRS(4) standard. Attach sign (plywood or extruded aluminum) using a method on TLRS(3). Wooden parts are not required to be painted.





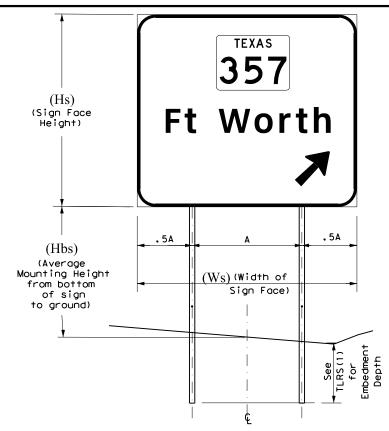
#### WIRE ROPE BREAKAWAY FEATURE



#### NOTES:

- 1. Wire rope breakaway feature required on all wooden posts. This breakaway feature includes the clamped cable with 2 holes to mount the cable, 4 cable clips, and hole A which the cable surrounds.
- 2. Breakaway feature is designed so wooden post fractures at hole A, with post staying attached to sign structure via the clamped cable.

#### POST SPACING AND SIGN PLACEMENT



#### WOODEN POST SPACING NOTES:

- 1. Spacing between posts: A = Ws / # of posts required
- 2. Spacing between edge of sign and outside posts: 0.5A

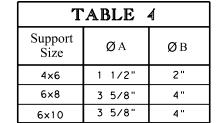
#### STEEL POST SPACING NOTE:

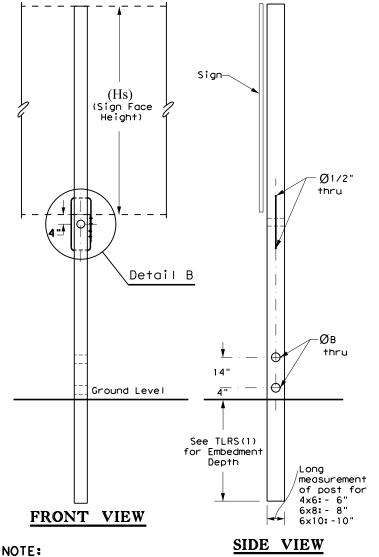
See SMD(2-3) for post spacing unless reusing existing sign posts.

#### SIGN PLACEMENT NOTE:

See SMD(2-3) for sign placement details.

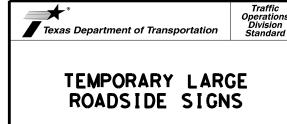
#### WOOD POST





All holes shown here are required for breakaway features to function properly.

SHEET 2 OF 4



Texas Department of Transportation

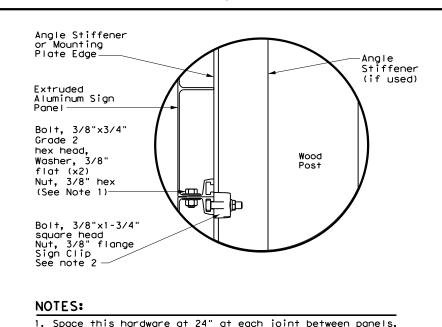
TLRS(2)-17

|                | AUS  | 1    | WILLIAN | ISON | 197       |
|----------------|------|------|---------|------|-----------|
|                | DIST |      | COUNTY  |      | SHEET NO. |
| REVISIONS      | 0337 | 01   | 053     |      | SH 29     |
| TxDOT May 2017 | CONT | SECT | JOB     |      | HIGHWAY   |
| ε: tirs-17.dgn | DN:  |      | CK:     | DW:  | CK:       |

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# ANGLE STIFFENER METHOD (WOOD POST) This face installed flush with L3x2x1/4" A36 front of wood post Wood Post thru TYPė TOP VIEW NOTES: 1. Drill holes evenly spaced from each edge of angle stiffener, with 2' between holes. 2. Attach 2 angle stiffeners to each post using SIDE VIEW A307 1/2" dia. x 2" long lag screws for 4x6 post, or A307 1/2" dia. x 3" long lag screws for 6x8

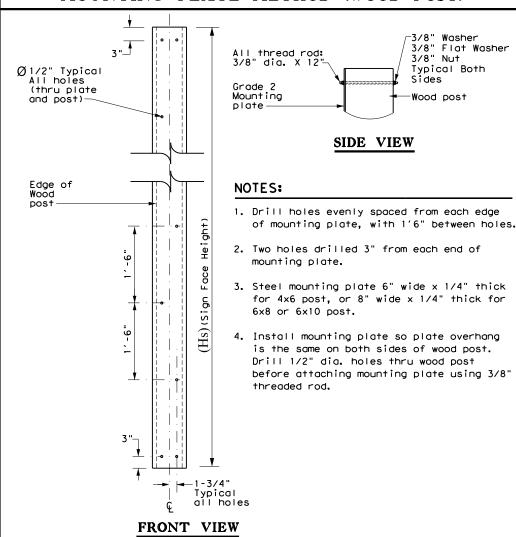
# MOUNTING PLATE AND ANGLE STIFFENER ATTACHMENT TO EXTRUDED ALUMINUM SIGN



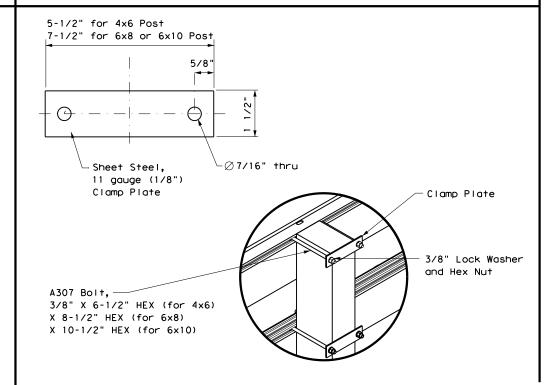
2. Install this hardware on both sides of the wood post

for proper attachment.

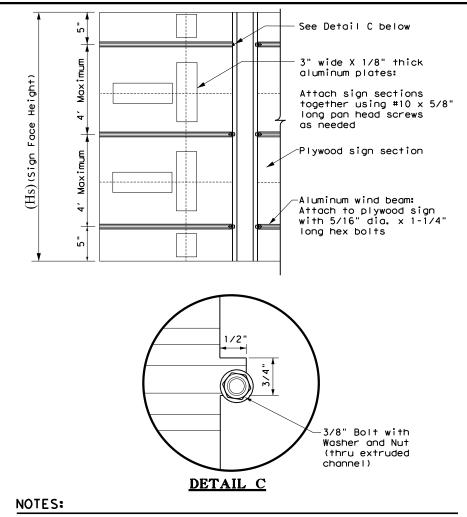
## MOUNTING PLATE METHOD (WOOD POST)



# CLAMP PLATE METHOD (WOOD POST)



#### MOUNTING A PLYWOOD SIGN



- 1. Recommended sign thickness 5/8".
- Attach an aluminum wind beam approx. 5" from the top and bottom of sign thru the width of the sign and then as needed so there is a maximum 4' spacing between beams.
- 3. Attach sign sections with aluminum plates as needed.
- 4. Attach sign to post using bolts with sign clips as shown in 'Mounting Plate and Angle Stiffener Attachment to Extruded Aluminum Sign' detail. On the top bolt, cut out a 1/2" wide x 3/4" tall notch and tighten the bolt in the notch with a nut and washer. A sign clip is not used here. See Detail C.
- 5. This option works for the angle stiffener or mounting plate methods. Clamp plate method not recommended with aluminum wind beams.
- Alternatively, contractor may drill holes thru plywood sign and attach
  to post using angle stiffener, mounting plate, or clamp plate method.
  Vertical bolt spacing should not be greater than 12" with 3/8" bolts.



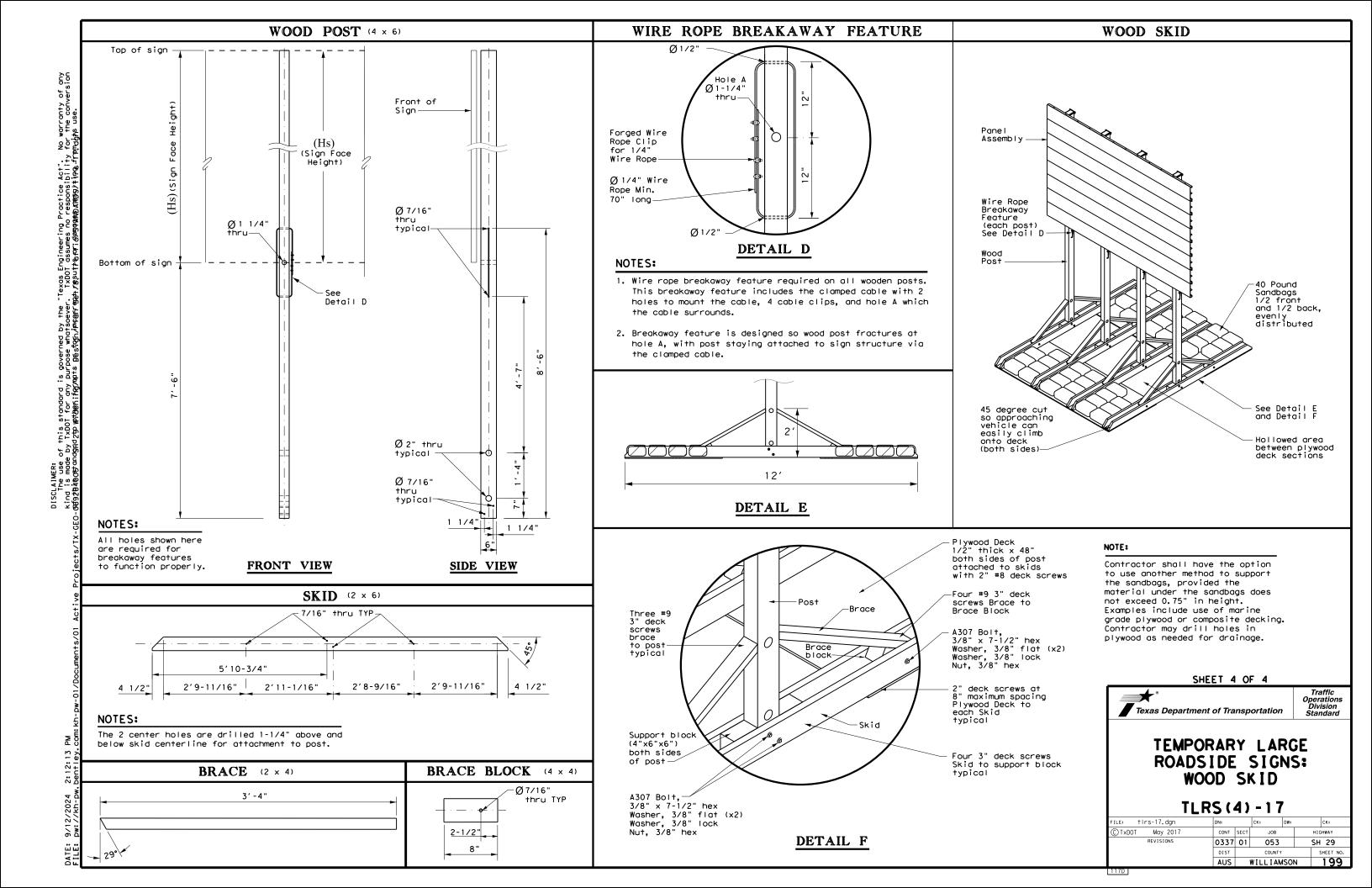
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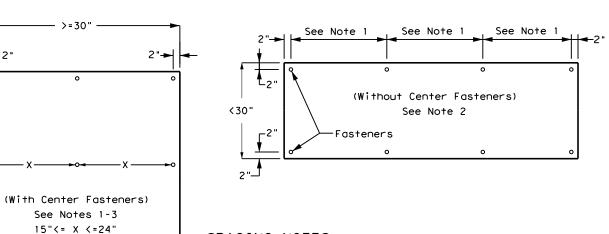
AUS WILLIAMSON

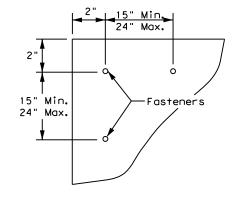
SH 29

11170



## OVERLAY PANEL SPACING DETAIL





## **EDGE FASTENER** SPACING DETAIL

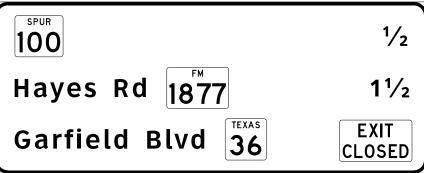
#### SPACING NOTES:

- 1. Edge fasteners should be placed 2" from edges of overlay panel, and be evenly spaced no less than 15" apart and no greater than 24" apart for the length of the panel.
- 2. For overlay panels measuring less than 30" on any side, only edge fasteners should be used.
- 3. Center fasteners should only be used for panels measuring 30" or greater on both sides. Center fasteners should be used evenly spaced and aligned with the edge fasteners along the longest side.
- 4. The CW26-1aT EXIT CLOSED sign panel and the CW26-1bT EXIT CLOSED sign panel may come with pre-drilled holes for installation. If no pre-drilled holes, refer to notes 1 and 2 above.

# 1/4"-1" Spacer Fasteners→ Existing Sign — 15" Min 24" Max Fasteners→ -Sign Cover

SIDE VIEW DETAIL

## EXIT CLOSED SIGN DETAILS



EXIT CLOSED SIGN PANEL (See detail 1)

WEST Height/2 **EXIT CLOSED** 20.2 Height/2 2 MILES 38.2 Identifier: CW26-1bT\*42x24; 1.50" Radius, No border, Orange; Width/2 Width/2 [EXIT] Black D 85) spacing; [CLOSED] Black D 85} spacing EXIT CLOSED SIGN PANEL

DETAIL 1

# (See detail 2)

## EXIT CLOSED SIGN PANEL NOTES:

-Fasteners

- When using an EXIT CLOSED (CW26-1bT) sign on an interchange sequence guide sign, place the EXIT CLOSED (CW26-1bT) sign panel horizontal in-line with the information for the closed exit and right-aligned with the distances shown for the other destinations.
- When using an EXIT CLOSED (CW26-1aT) sign on interchange guide sign(s), place the EXIT CLOSED (CW26-1aT) sign panel diagonally across the interchange guide sign(s) as per TMUTCD 6F.28.
- The EXIT CLOSED (CW26-1aT & CW26-1bT) signs should have a black legend on an orange background.

# **CLOSED** 47.2 Identifier: CW26-1aT\*90x18;

1.5" Radius, No border, Orange: [EXIT] Black D, [CLOSED] Black D 80) spacing;

DETAIL 2

#### GENERAL NOTES:

- 1. Permanent large guide signs that are in conflict with work zone conditions should be removed or covered until the message matches the roadway condition.
- 2. Sign panel overlays should be made of a rigid material (sheet aluminum, corrugated plastic, or other material as approved by the Engineer). The installation should allow adequate air flow between the overlay panel and the existing sign panel by providing a minimum spacer of 1/4" (1" maximum).
- 3. Spacers should be a material (such as plastic or nylon fiber) that will not harm the sign sheeting face.
- 4. #12 x 1\(\frac{1}{2}\)" self-drilling screw (fasteners) should be aluminum, galvanized. blue coated, or stainless steel.
- 5. Sign panel overlays used to cover all or part of a sign should be the same color as the background color of the sign to be covered with the exception of Exit Closed Sign Panels. The sign panel overlays should cover the conflicting or non-applicable sign information. See the Exit Closed Sign Panel detail and notes for sign panel overlay installations for closed exits.
- 6. Large extruded sign covers in work zones should only be used for long-term stationary work.
- 7. All covering material, mounting hardware, and spacers should be removed when panel overlay is removed.

#### **ASSEMBLY NOTES:**

- 1. Apply fasteners to the sheet aluminum overlays in accordance with the hole spacing in the Overlay Panel Spacing Detail.
- 2. Tape should not be applied to the sign sheeting surface. Pre-mask or application tape should be removed prior to exposure to sunlight.
- 3. For full sign covering applications, position the overlay panel's bottom edge flush with the bottom of the existing extruded sign panel and then position the overlay panel's lower left edge flush with the lower left edge of the bottom existing extruded panel section. For only covering a specific sign message, position the overlay panel's bottom edge first and then position the overlay panel's lower left edge to completely cover the conflicting or non-applicable message.
- 4. If additional overlay panels are needed, abut the next overlay panel to the first attached overlay panel and perform the same work as specified in steps above.



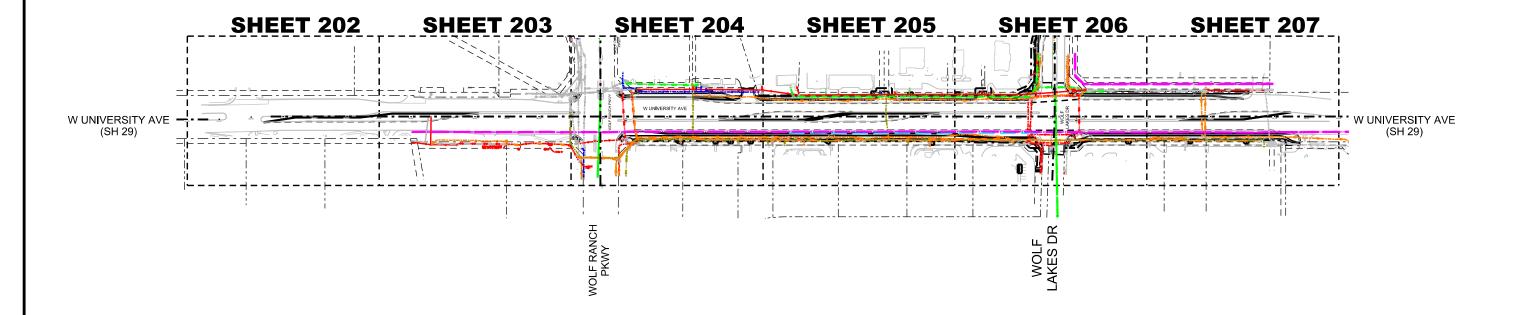
Traffic Safety Division Standard

**TEMPORARY** LARGE SIGN COVERING DETAILS

TS-CD-22

| FILE: †s-cd-22.dgn   | DN: TX | DOT  | ck: TXDOT | DW: T | XDOT | ck: TXDOT |
|----------------------|--------|------|-----------|-------|------|-----------|
| © TxDOT October 2022 | CONT   | SECT | JOB       |       | HIC  | GHWAY     |
| REVISIONS            | 0337   | 01   | 053       |       | SH   | 1 29      |
| 12-19<br>10-22       | DIST   |      | COUNTY    |       |      | SHEET NO. |
| 10 22                | AUS    |      | WILLIAN   | 1SON  | 1    | 200       |





#### SPECIAL NOTES

1. ALL PIPE SIZES WERE TAKEN FROM UTILITY
RECORDS WHERE POSSIBLE. THE UTILITIES DEPICTED WERE
INVESTIGATED BY THE RIOS GROUP, INC.. ALL OTHER PLAN
INFORMATION, NOTABLY THE BACKGROUND INFORMATION,
WAS PROVIDED BY OTHERS AND THE RIOS GROUP, INC.
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2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 07/28/2023. THE RIOS GROUP, INC. EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR NEW UTILITY INSTALLATIONS, MODIFICATIONS, AND/OR ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME OF FIELD INVESTIGATION. CALL TEXAS ONE CALL SYSTEM (800)245-4545 FOR UTILITY LOCATIONS 48 HOURS PRIOR TO ANY WORK.

4. WHERE POSSIBLE, WATER, GAS, AND COMMUNICATION SERVICE LINES WERE DESIGNATED. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS MAY NOT SHOW SERVICE LINE LOCATIONS. THEREFORE ALL SERVICE LINES MAY NOT BE SHOWN.

5. ALL UTILITY INFORMATION SHOWN HERON IS DEPICTED TO QUALITY LEVEL "D".

#### QUALITY LEVELS

QUALITY LEVEL "D" - INFORMATION DERIVED FROM EXISTING RECORDS AND/OR ORAL COLLECTION.

QUALITY LEVEL "C" - INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING INFORMATION TO QUALITY LEVEL "D" INFORMATION.

QUALITY LEVEL "B" - DESIGNATE: TWO-DIMENSIONAL HORIZONTAL MAPPING. THIS INFORMATION IS OBTAINED THROUGH THE APPLICATION AND INTERPRETATION OF APPROPRIATE NON-DESTRUCTIVE SURFACE GEOPHYSICAL METHODS. UTILITY INDICATIONS ARE REFERENCED TO ESTABLISHED SURVEY CONTROL. INCORPORATES QUALITY LEVELS "C" AND "D" INFORMATION TO PRODUCE QUALITY LEVEL "B" INFORMATION.

QUALITY LEVEL "A" - LOCATE: PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES AT A SPECIFIC POINT. DIAMETERS SHOWN ARE VERIFIED VISUALLY AND MAY NOT BE EXACT.

#### MATERIAL ABBREVIATIONS

STL - STEEL

PE - POLYETHYLENE

AC - TRANSITE

CI - CAST IRON

DI - DUCTILE IRON

PVC - POLYVINYL CHLORIDE

DBC - DIRECT BURIED CABLE
RCP - REINFORCED CONCRETE PIPE

VC - VITRIFIED CLAY

FG - FIBERGLASS

CSC - CONCRETE/STEEL CYLINDER

CMP - CORRUGATED METAL PIPE

CONC - CONCRETE

CLAY - CLAY

UNK - UNKNOWN

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE Industry practices. Where Indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification



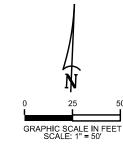


Texas Department of Transportation

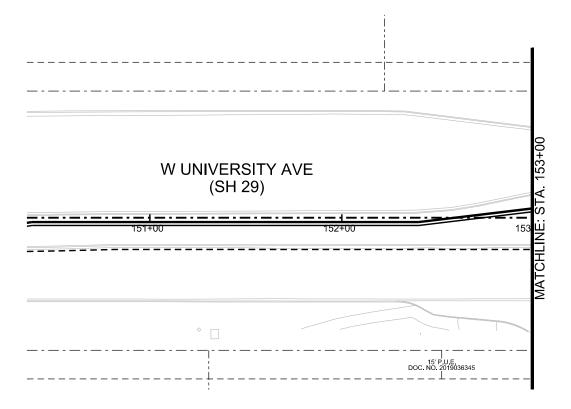
SH 29 AUSTIN DISTRICT GEORGETOWN, TEXAS PROPOSED

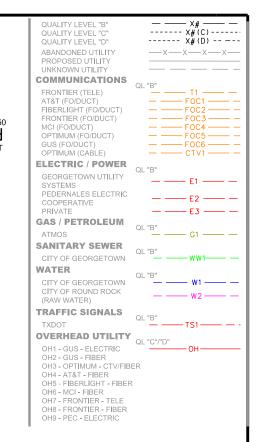
UTILITY LAYOUT

|      |      |            | 5     | HEET 1 OF 1 |  |
|------|------|------------|-------|-------------|--|
| CONT | SECT | JOB        |       | HIGHWAY     |  |
| 0337 | 01   | 053        | SH 29 |             |  |
| DIST |      | COUNTY     |       | SHEET NO.   |  |
| AUS  |      | WILLIAMSON | 201   |             |  |



# OUTSIDE OF SUE LIMITS NO SUE INVESTIGATION COMPLETED









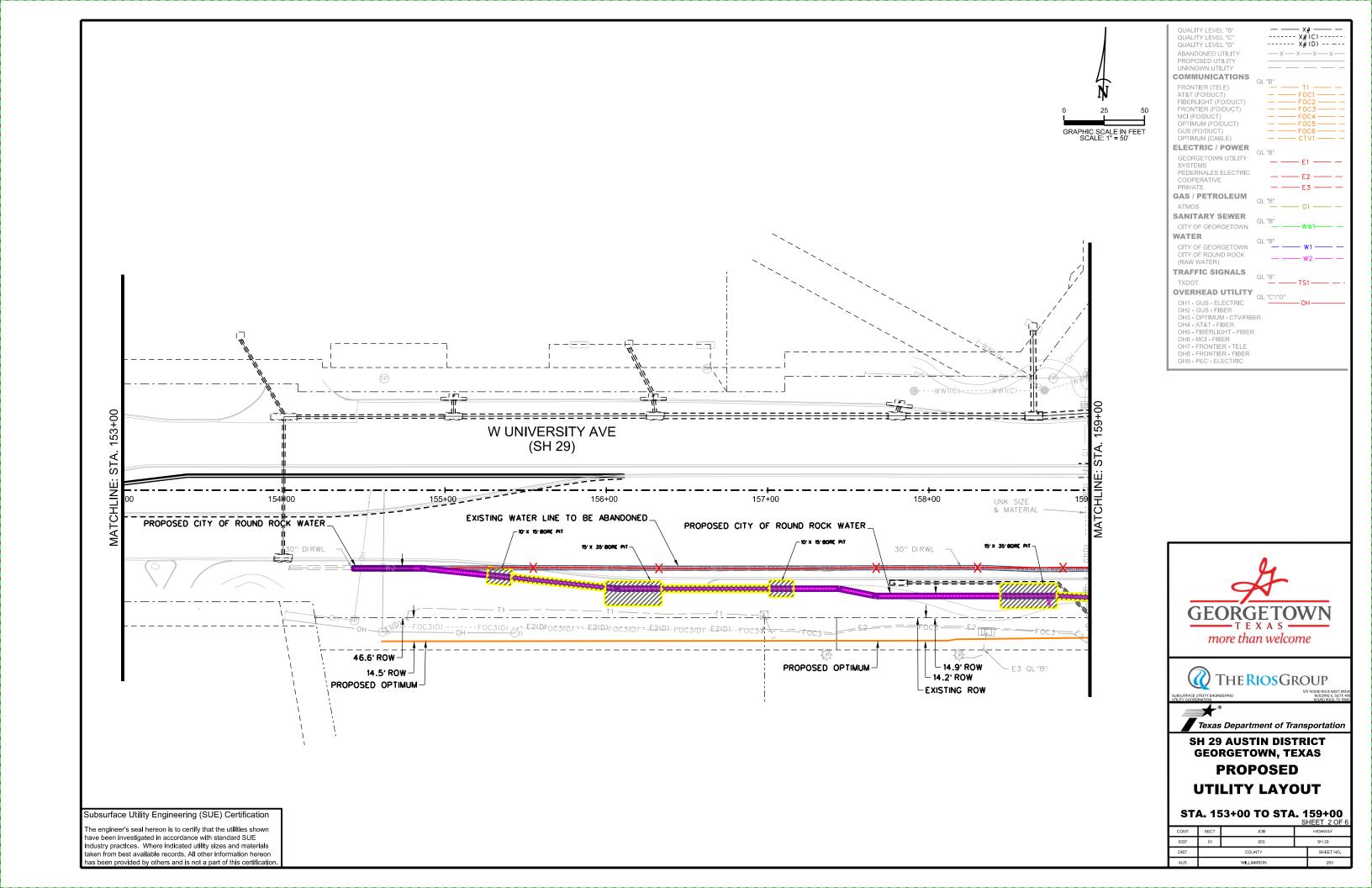
UBSURFACE UTLITY ENGINEERING 575 ROUNG BUILD ROLL BUILD

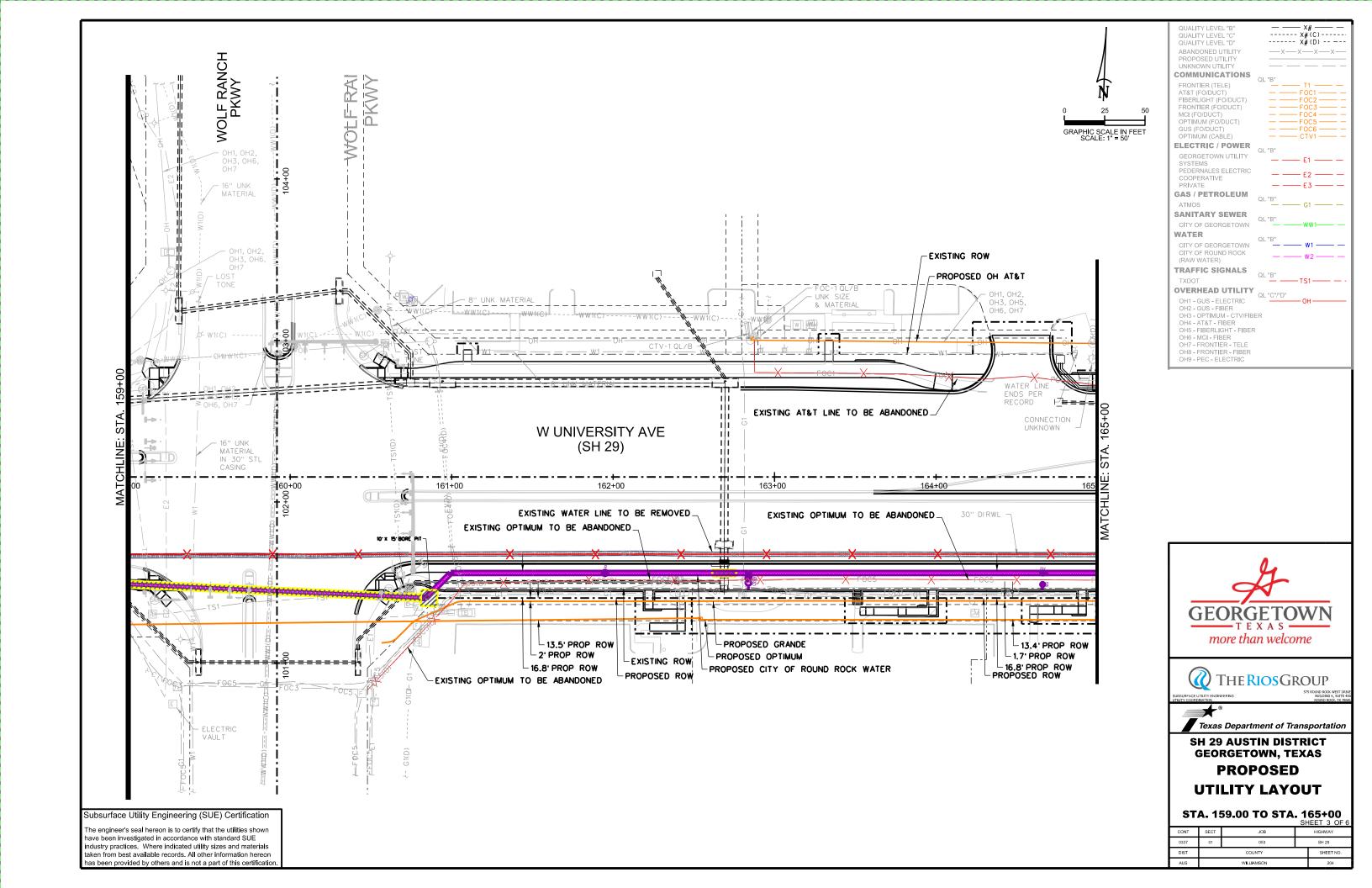
Texas Department of Transportation
SH 29 AUSTIN DISTRICT

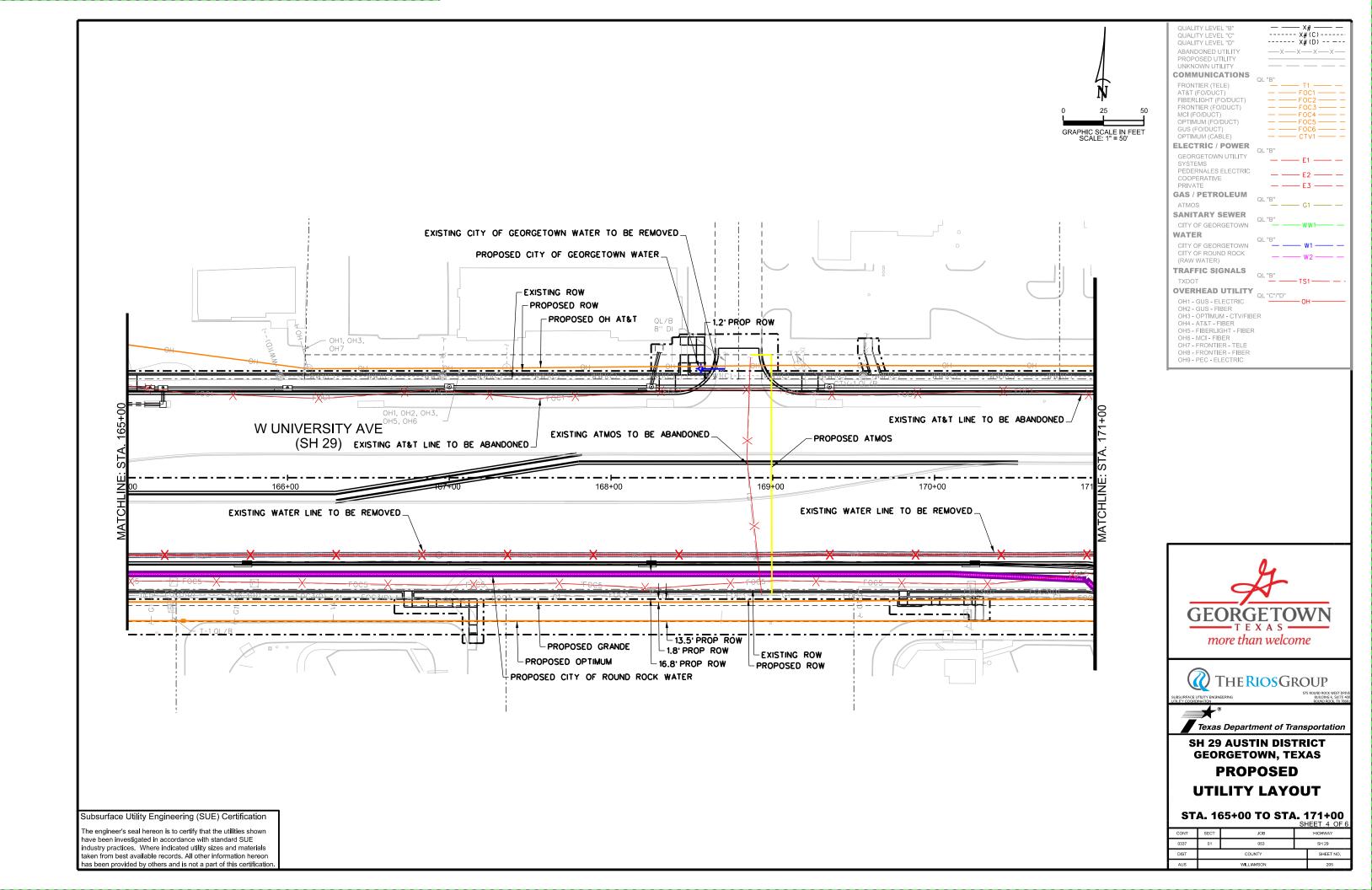
GEORGETOWN, TEXAS
PROPOSED
UTILITY LAYOUT

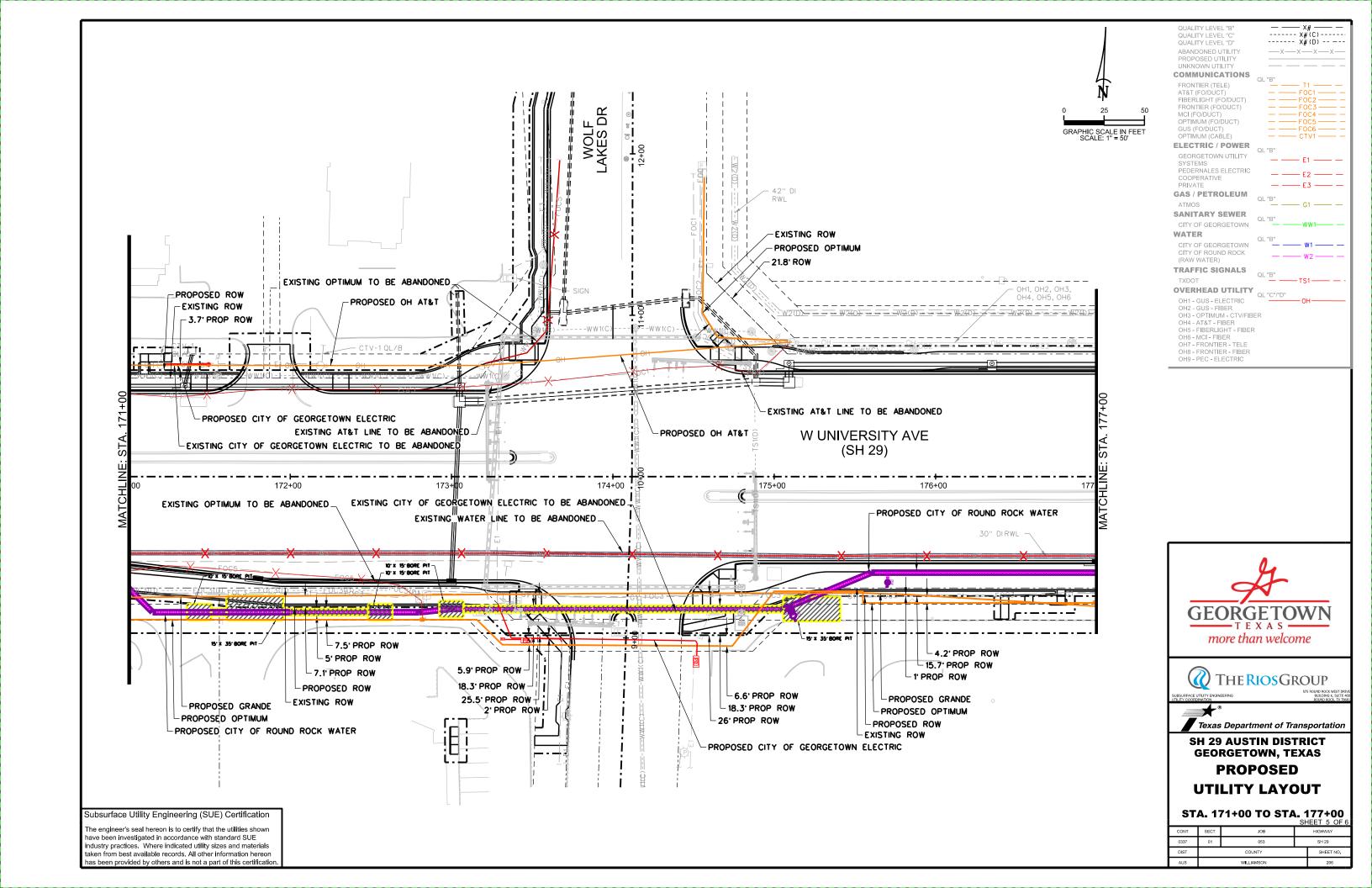
**BEGINNING TO STA. 153+00** 

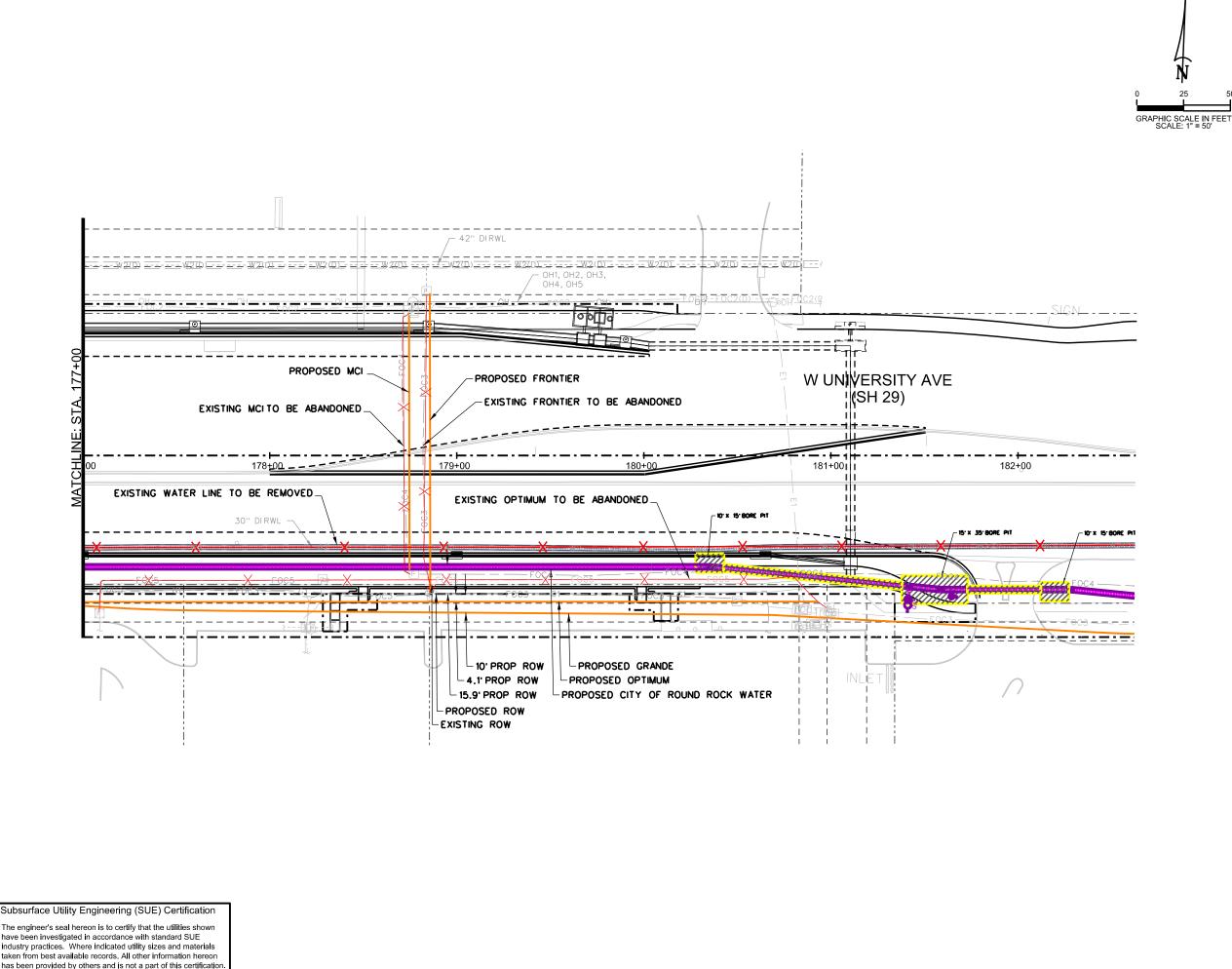
|      |        | SHEET 1 O | OF 6 |
|------|--------|-----------|------|
| SECT | JOB    | HIGHWAY   | ,    |
| 01   | 053    | SH 29     |      |
|      | COUNTY | SHEET NO  | NO.  |
|      |        |           |      |











----- X#(D) -- ---QUALITY LEVEL "D" ABANDONED UTILITY ---x---x---x--COMMUNICATIONS FRONTIER (TELE) AT&T (FO/DUCT) FIBERLIGHT (FO/DUCT) FRONTIER (FO/DUCT) MCI (FO/DUCT) GUS (FO/DUCT) OPTIMUM (CABLE) ELECTRIC / POWER GEORGETOWN UTILITY PEDERNALES ELECTRIC COOPERATIVE PRIVATE GAS / PETROLEUM SANITARY SEWER CITY OF GEORGETOWN WATER CITY OF GEORGETOWN CITY OF ROUND ROCK TRAFFIC SIGNALS TXDOT OVERHEAD UTILITY OH1 - GUS - ELECTRIC OH2 - GUS - FIBER
OH3 - OPTIMUM - CTV/FIBER
OH4 - AT&T - FIBER
OH5 - FIBERLIGHT - FIBER OH6 - MCI - FIBER
OH7 - FRONTIER - TELE
OH8 - FRONTIER - FIBER
OH9 - PEC - ELECTRIC





Texas Department of Transportation
SH 29 AUSTIN DISTRICT

PROPOSED
UTILITY LAYOUT

**STA. 177+00 TO END** 

| SHEEL | 6 0F 6 |
| SECT | JOB | HIGHWAY |
| 01 | 053 | SH 29 |
| COUNTY | SHEET NO. |
| WILLIAMSON | 207

Sediment Basins

# III. CULTURAL RESOURCES Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately. Required Action No Action Required Action No. immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills. IV. VEGETATION RESOURCES Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments. No Action Required Required Action Action No. V. FEDERAL LISTED. PROPOSED THREATENED. ENDANGERED SPECIES. CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS. No Action Required Required Action Action No. If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately. LIST OF ABBREVIATIONS Best Management Practice SPCC: Spill Prevention Control and Countermeasure Construction General Permit Storm Water Pollution Prevention Plan DSHS: Texas Department of State Health Services PCN: Pre-Construction Notification FHWA: Federal Highway Administration Project Specific Location MOA: Memorandum of Agreement TCFQ: Texas Commission on Environmental Quality Memorandum of Understanding TPDES: Texas Pollutant Discharge Elimination System Texas Parks and Wildlife Department Municipal Separate Stormwater Sewer System TPWD:

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories:

Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

If "No", then no further action is required.

If "Yes", then  $\mathsf{TxDOT}$  is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

| No Action Required | Required Action |
|--------------------|-----------------|
|                    |                 |

Action No.

#### VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required

Required Action

1. INSTALL AND MAINTAIN STORMTROOPERS



# ENVIRONMENTAL PERMITS. ISSUES AND COMMITMENTS

EPIC

| epic.dgn   | DN: <u>TxDOT</u> |            | ck: RG | DW: | VĒ      | ck: <u>AR</u> |
|--|------------------|------------|--------|-----|---------|---------------|
| DOT: February 2015   | CONT             | SECT       | JOB    |     | HIGHWAY |               |
| REVISIONS<br>2011 (DS)   | 0337             | 01         | 053    |     | SH 29   |               |
| 14 ADDED NOTE SECTION IV.  | DIST             | COUNTY     |        |     |         | SHEET NO.     |
| 2015 SECTION I (CHANGED ITEM 1122<br>W 506, ADDED GRASSY SWALES. | AUS              | WILLIAMSON |        |     | v 2     | 308           |

Stone Outlet Sediment Traps Sand Filter Systems Grassy Swales

MBTA: Migratory Bird Treaty Act Notice of Termination

Nationwide Permit

NOI: Notice of Intent

TxDOT: Texas Department of Transportation Threatened and Endangered Species

USACE: U.S. Army Corps of Engineers USFWS: U.S. Fish and Wildlife Service

#### STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

#### 1.0 SITE/PROJECT DESCRIPTION

#### 1.1 PROJECT CONTROL SECTION JOB (CSJ):

0337-01-053

#### 1.2 PROJECT LIMITS:

From: 0.161 MI W OF WOLF RANCH PARKWAY

To: 0.075 MI W OF IH-35 SB FR

#### 1.3 PROJECT COORDINATES:

BEGIN: (Lat) 30°37'58.49"N ,(Long) 97°42'13.25"W

END: (Lat) 30°37'59.04"N ,(Long) 97°41'35.87"W

#### 1.4 TOTAL PROJECT AREA (Acres): 4.27

1.5 TOTAL AREA TO BE DISTURBED (Acres): 12.99

#### 1.6 NATURE OF CONSTRUCTION ACTIVITY:

FOR THE CONSTRUCTION OF INTERSECTION

IMPROVEMENTS WITH RIGHT AND/OR LEFT TURN LANES.

#### 1.7 MAJOR SOIL TYPES:

| Soil Type                     | Description           |
|-------------------------------|-----------------------|
| GEORGETOWN STONY<br>CLAY LOAM | 1 TO 3 PERCENT SLOPES |
|                               |                       |
|                               |                       |
|                               |                       |
|                               |                       |
|                               |                       |
|                               |                       |
|                               |                       |

#### 1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

PSLs determined during preconstruction meeting

PSLs determined during construction

☒ No PSLs planned for construction

| Type | Sneet #S |
|------|----------|
|      |          |
|      |          |
|      |          |
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|      |          |

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

#### 1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- Mobilization
- ⋈ Install sediment and erosion controls
- X Blade existing topsoil into windrows, prep ROW, clear and grub
- ⋈ Remove existing pavement
- ⋈ Excavate and prepare subgrade for proposed pavement widenina
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ⋈ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☐ Install mow strip, MBGF, bridge rail
- ⋈ Place flex base
- ⋈ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ⋈ Revegetation of unpaved areas
- X Achieve site stabilization and remove sediment and erosion control measures

| Other: |  |  |  |  |
|--------|--|--|--|--|
| •      |  |  |  |  |

| Other: |  |  |  |
|--------|--|--|--|
|        |  |  |  |
|        |  |  |  |
|        |  |  |  |

#### 1.10 POTENTIAL POLLUTANTS AND SOURCES:

- X Sediment laden stormwater from stormwater conveyance over disturbed area
- X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- X Solvents, paints, adhesives, etc. from various construction
- X Transported soils from offsite vehicle tracking
- X Construction debris and waste from various construction
- X Contaminated water from excavation or dewatering pump-out
- X Sanitary waste from onsite restroom facilities
- X Long-term stockpiles of material and waste

| □ Other:   |  |  |
|------------|--|--|
|            |  |  |
| □ Other: _ |  |  |
|            |  |  |
| ☐ Other:   |  |  |

#### 1.11 RECEIVING WATERS:

**Tributaries** 

Х

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

**Classified Waterbody** 

| * Add (*) for impaired waterbodies | s with pollutant in (). |
|------------------------------------|-------------------------|

#### 1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years

□ Other:

| □ Other: |  |  |  |
|----------|--|--|--|
| <u> </u> |  |  |  |

#### 1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

M Day To Day Operational Control

X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)

X Post Construction Site Notice

----

X Submit NOI/CSN to local MS4

X Maintain schedule of major construction activities

X Install, maintain and modify BMPs

X Complete and submit Notice of Termination to TCEQ

| X Maintain SWP3 | records | tor 3 | 3 years |
|-----------------|---------|-------|---------|
| □ Othor:        |         |       |         |

| □ Other: |  |  |  |
|----------|--|--|--|
|          |  |  |  |
| □ Other: |  |  |  |

#### 1,14 LOCAL MUNICIPAL SEPARATE STORM SEWER **SYSTEM (MS4) OPERATOR COORDINATION:**

| MS4 Entity |
|------------|
|            |
|            |
|            |
|            |
|            |
|            |
|            |
|            |
|            |
|            |

#### STORMWATER POLLUTION PREVENTION PLAN (SWP3)



\* July 2023 Sheet 1 of 2

Texas Department of Transportation

| DIV. NO. |                | PROJECT NO. | NC NC       | ١. |  |
|----------|----------------|-------------|-------------|----|--|
|          |                |             | 20          | 9  |  |
| STATE    | STATE<br>DIST. |             | COUNTY      |    |  |
| TEXAS    | AUS            | WILI        | WILLIAMSON  |    |  |
| CONT.    | SECT.          | J0B         | HIGHWAY NO. |    |  |
| 0337     | 01             | 053         | SH 29       |    |  |

## STORMWATER POLLUTION PREVENTION PLAN (SWP3): 2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND **MAINTENANCE**

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

□ □ Vegetated Filter Strips

located in Attachment 1.2 of this SWP3

□ Other:

|              | EROSION CONTROL AND SOIL STABILIZATION BMPs:                |
|--------------|---|
| T/P          |   |
| X            | Protection of Existing Vegetation<br>Vegetated Buffer Zones |
|              | Mulching/ Hydromulching                                     |
|              | Soil Surface Treatments                                     |
|              | Temporary Seeding   |
|              | Permanent Planting, Sodding or Seeding                      |
| X 🗆          |   |
|              | Rock Filter Dams/ Rock Check Dams                           |
|              | Vertical Tracking   |
|              | Interceptor Swale   |
|              | Riprap  |
|              |   |
|              |   |
|              |   |
|              |   |
|              | Other:  |
|              |   |
|              |   |
|              | Other:  |
| 2.2 \$       | SEDIMENT CONTROL BMPs:                                      |
| T / P        |   |
| $\mathbf{X}$ | · · ·   |
|              | 3   |
| X            |   |
|              |   |
|              | Sandbag Berms   |
|              | Sediment Control Fence                                      |
|              | Stabilized Construction Exit                                |
|              | Floating Turbidity Barrier                                  |
|              | Vegetated Buffer Zones                                      |

□ Other:

□ Other: \_\_\_ □ Other:

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

#### T/P

□ □ Sediment Trap

| <ul> <li>□ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area</li> <li>□ 3,600 cubic feet of storage per acre drained</li> </ul> |
|---|
| Sedimentation Basin   |
| X Not required (<10 acres disturbed)  |
| □ Required (>10 acres) and implemented.   |
| □ Calculated volume runoff from 2-year, 24-hour storm<br>for each acre of disturbed area  |
| $\hfill \square$ 3,600 cubic feet of storage per acre drained   |
| □ Required (>10 acres), but not feasible due to:  |
| ☐ Available area/Site geometry  |
| ☐ Site slope/Drainage patterns  |
| ☐ Site soils/Geotechnical factors   |
| □ Public safety   |
| □ Other:  |
|   |

#### 2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

| Туре | Stationing |    |  |
|------|------------|----|--|
|      | From       | То |  |
|      |            |    |  |
|      |            |    |  |
|      |            |    |  |
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|      |            |    |  |

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

#### 2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit Daily street sweeping

| •        | • | - |  |
|----------|---|---|--|
| ☐ Other: |   |   |  |

| Other: |  |  |  |
|--------|--|--|--|
|        |  |  |  |

#### 2.5 POLLUTION PREVENTION MEASURES:

| ☐ Chemical | Management |
|------------|------------|
|------------|------------|

Concrete and Materials Waste Management

□ Other:

- Debris and Trash Management
- □ Dust Control
- □ Sanitary Facilities

| Carntar y | ٠ | aomitico |
|-----------|---|----------|
| Other:    |   |          |

| ☐ Other: |  |
|----------|--|
|          |  |

| ☐ Other: |  |  |
|----------|--|--|

| Other: |  |  |
|--------|--|--|
|        |  |  |

#### 2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

| Type | Stationing |    |
|------|------------|----|
| Туре | From       | То |
|      |            |    |
|      |            |    |
|      |            |    |
|      |            |    |
|      |            |    |
|      |            |    |
|      |            |    |
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|      |            |    |
|      |            |    |
|      |            |    |

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

#### 2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

X Fire hydrant flushings

X Irrigation drainage

X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)

X Potable water sources

X Springs

X Uncontaminated groundwater

X Water used to wash vehicles or control dust

X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

#### 2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

**2.9 INSPECTIONS:** All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

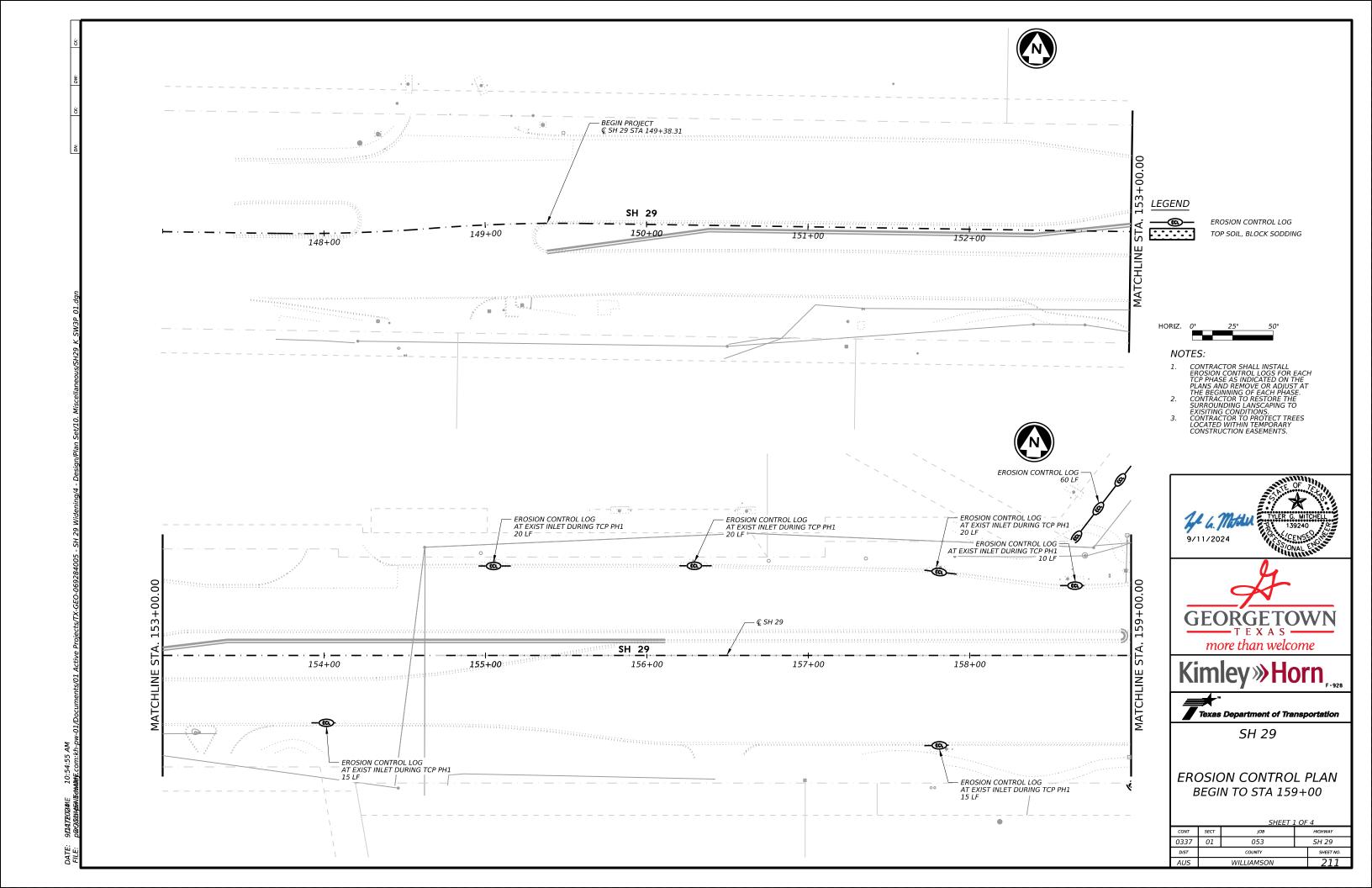
**2.10 MAINTENANCE:** Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

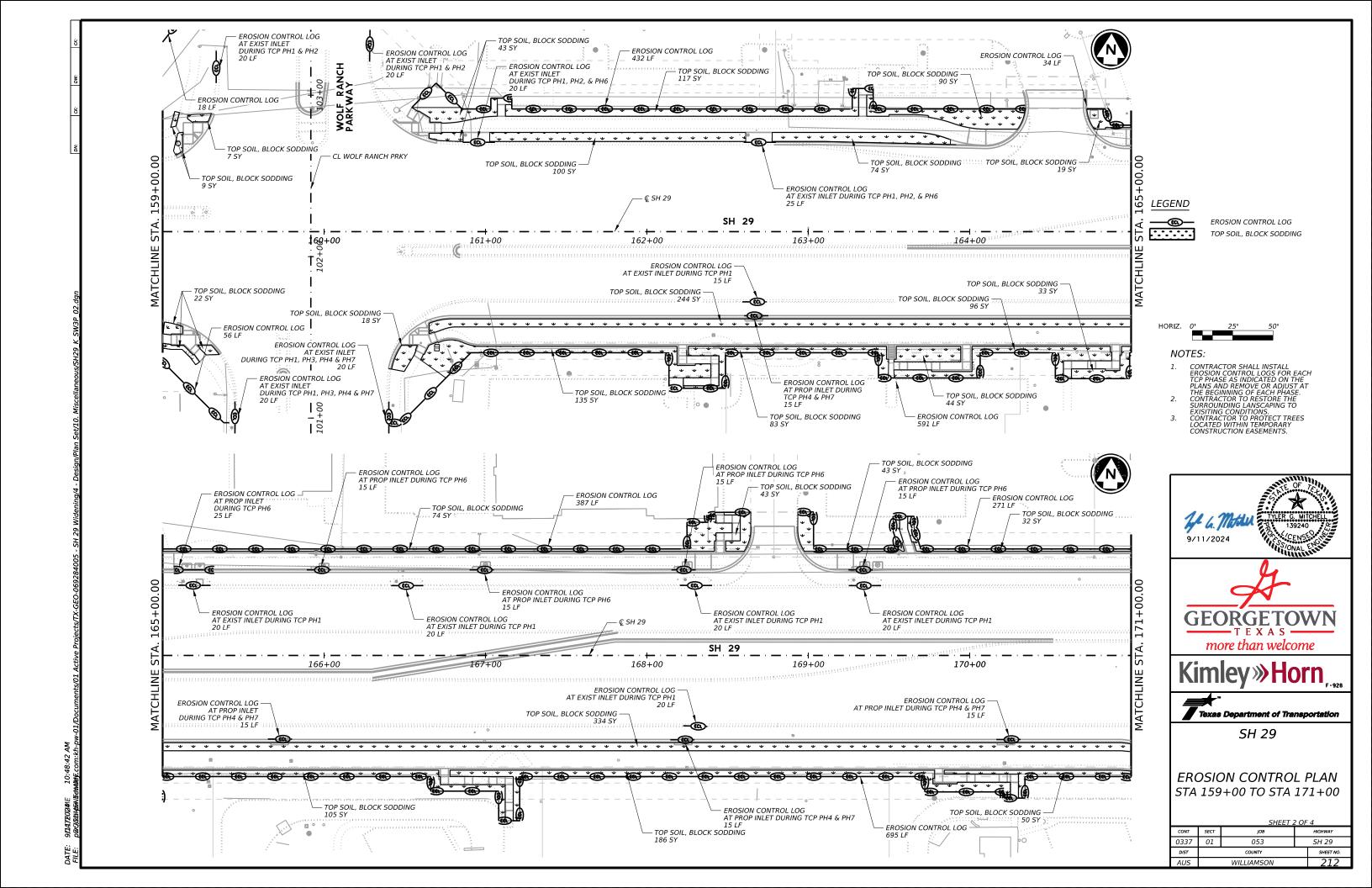
#### STORMWATER POLLUTION **PREVENTION PLAN (SWP3)**

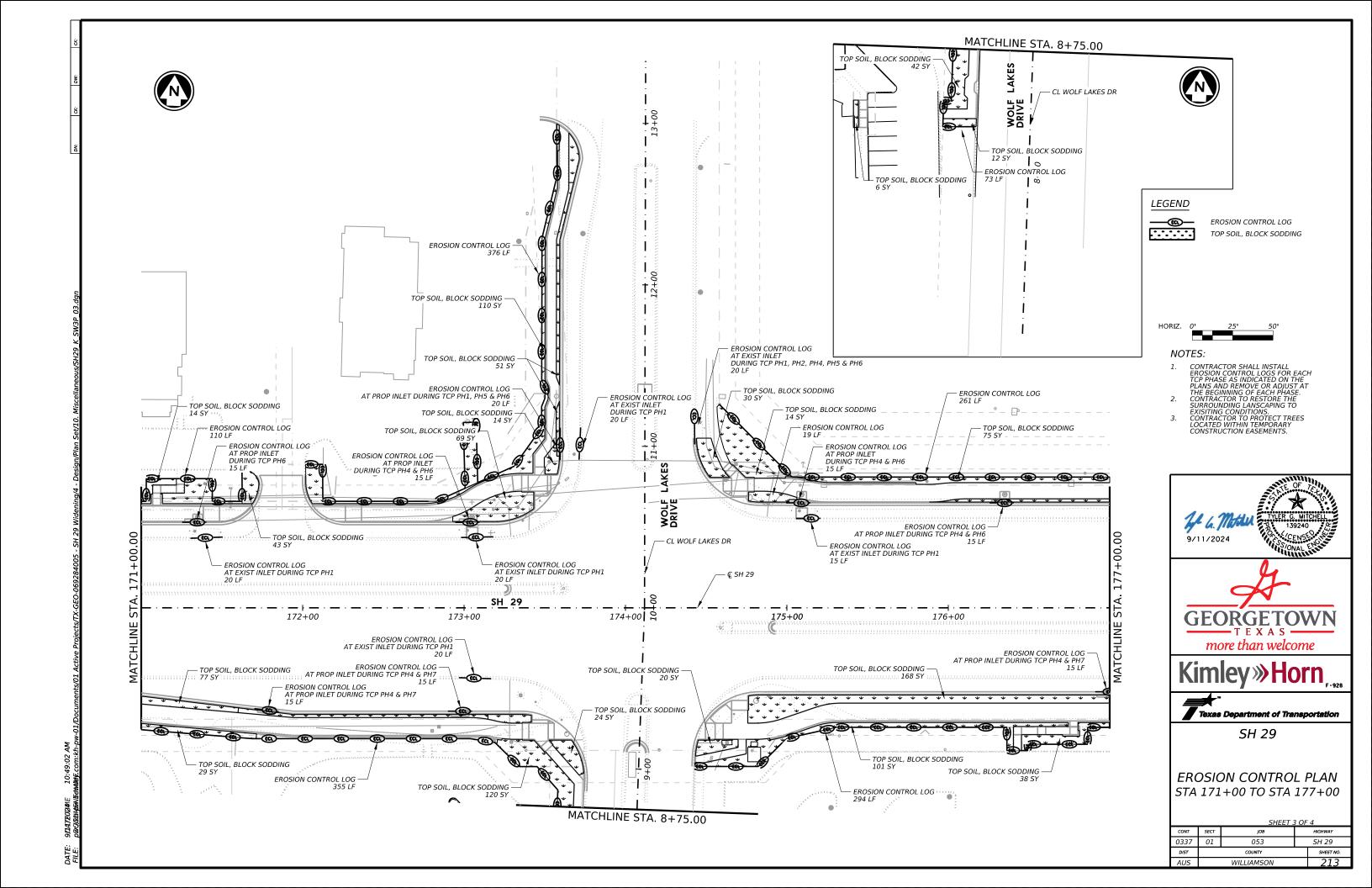


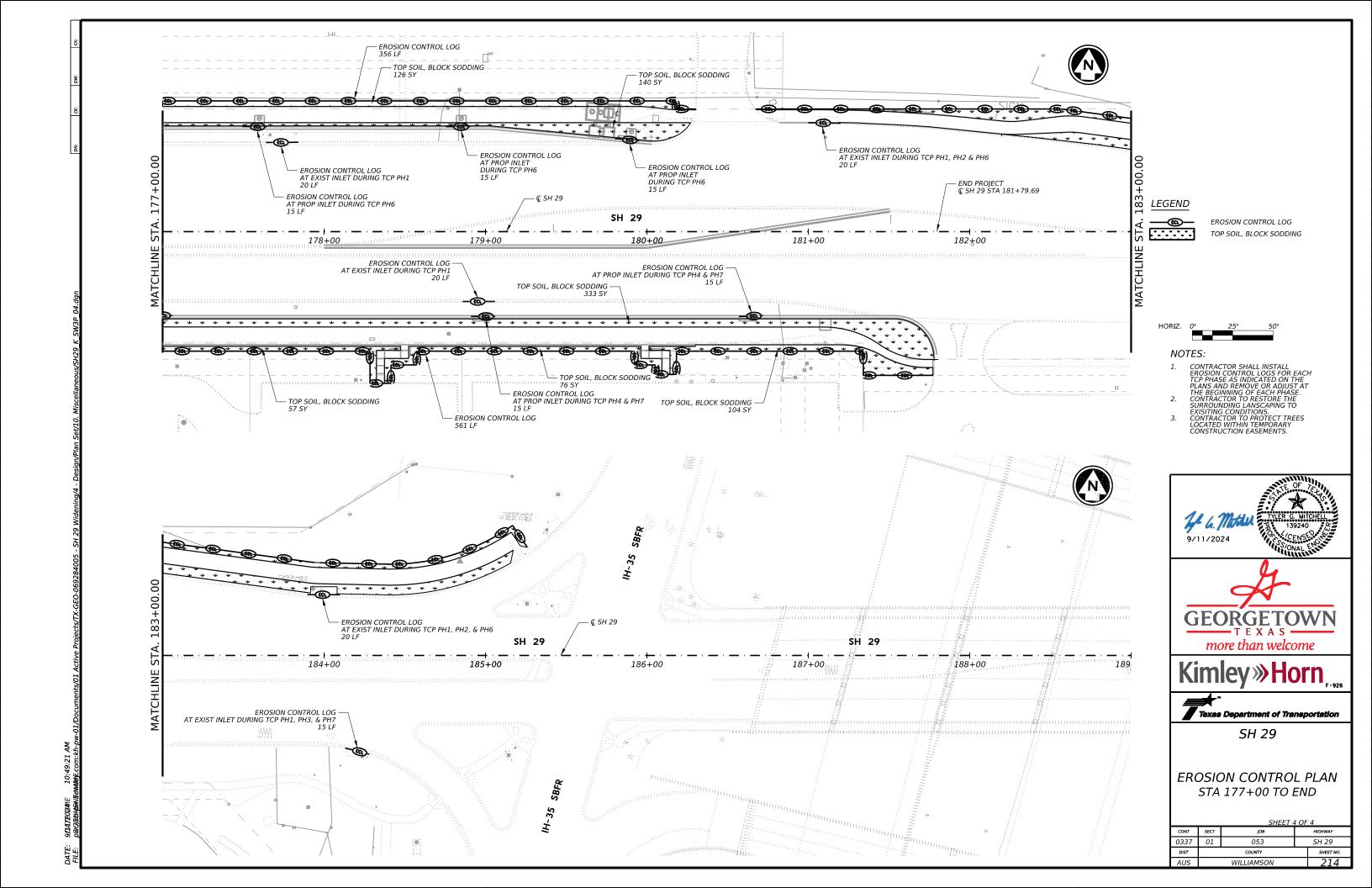
Texas Department of Transportation

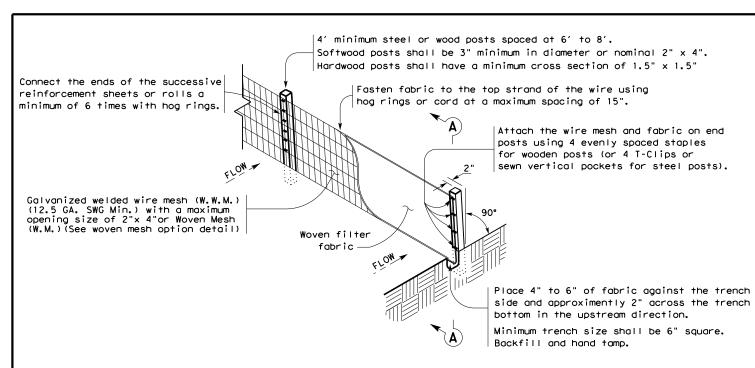
| FED. RD.<br>DIV. NO. |   | SHEET<br>NO.   |            |           |     |  |  |
|----------------------|---|----------------|------------|-----------|-----|--|--|
|                      |   |                |            |           | 210 |  |  |
| STATE                |   | STATE<br>DIST. | C          | COUNTY    |     |  |  |
| TEXAS                | 5 | AUS            | WILLIAMSON |           |     |  |  |
| CONT.                |   | SECT.          | JOB        | HIGHWAY N | ١0. |  |  |
| 0337                 | , | 01             | 053        | SH 29     | •   |  |  |



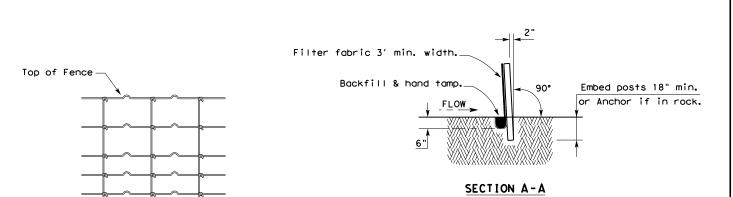








## TEMPORARY SEDIMENT CONTROL FENCE



#### HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

#### SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

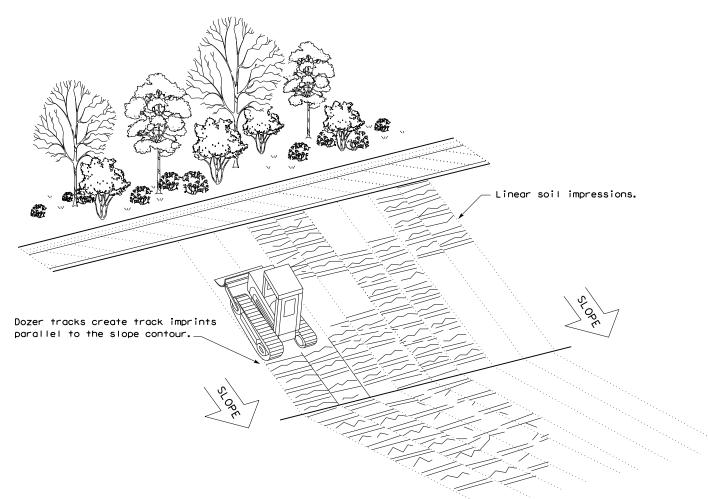
Sediment control fence should be sized to filter a maximum flow through rate of 100  ${\sf GPM/FT}^2$ . Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

#### **LEGEND**

Sediment Control Fence

#### GENERAL NOTES

- Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
- 2. Perform vertical tracking on slopes to temporarily stabilize soil.
- 3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
- 4. Do not exceed 12" between track impressions.
- 5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING



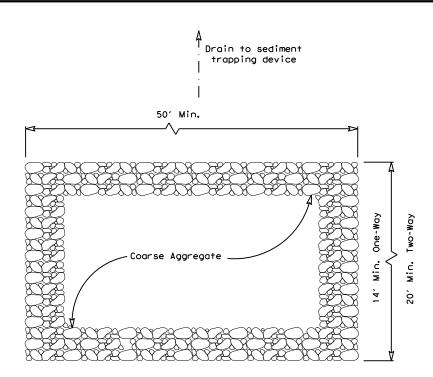
Design Division Standard

TEMPORARY EROSION,
SEDIMENT AND WATER
POLLUTION CONTROL MEASURES
FENCE & VERTICAL TRACKING

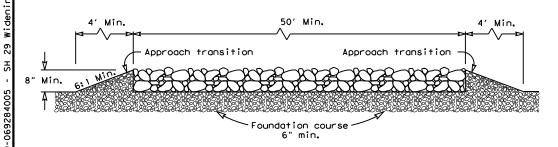
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| FILE: ec116        | DN: TxD | OT          | ck: KM  | DW: VP      | DN/CK: LS |
|--------------------|---------|-------------|---------|-------------|-----------|
| C TxDOT: JULY 2016 | CONT    | SECT        | JOB     | JOB HIGHWAY |           |
| REVISIONS          | 0337    | 01          | 01 053  |             | SH 29     |
|                    | DIST    | DIST COUNTY |         |             | SHEET NO. |
|                    | AUS     | ١           | VILLIAM | SON         | 215       |

A T E



#### PLAN VIEW



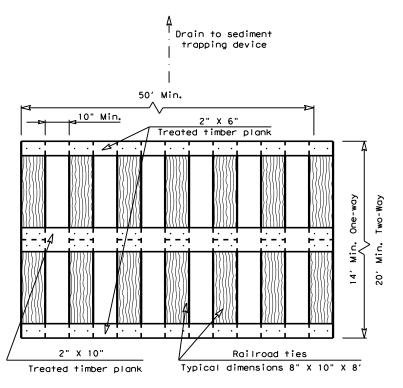
#### ELEVATION VIEW

#### CONSTRUCTION EXIT (TYPE 1)

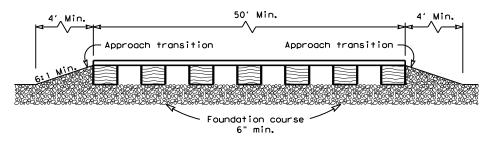
#### ROCK CONSTRUCTION (LONG TERM)

#### GENERAL NOTES (TYPE 1)

- 1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- 2. The coarse aggregate should be open graded with a size of 4" to 8".
- The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- 4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved
- 5. The construction exit shall be graded to allow drainage to a sediment trappina device.
- 6. The guidelines shown hereon are suggestions only and may be modified
- 7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



#### PLAN VIEW



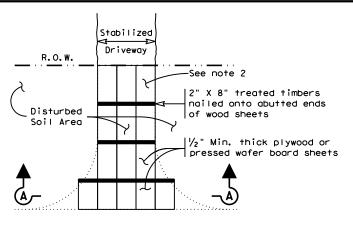
#### **ELEVATION VIEW**

#### CONSTRUCTION EXIT (TYPE 2)

#### TIMBER CONSTRUCTION (LONG TERM)

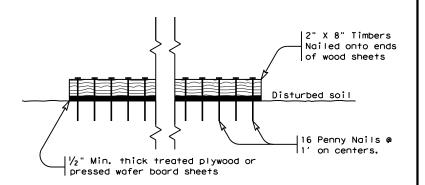
#### **GENERAL NOTES (TYPE 2)**

- 1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with  $\frac{1}{2}$ "x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- 5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit should be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the



Paved Roadway

#### PLAN VIEW



## SECTION A-A

#### CONSTRUCTION EXIT (TYPE 3) SHORT TERM

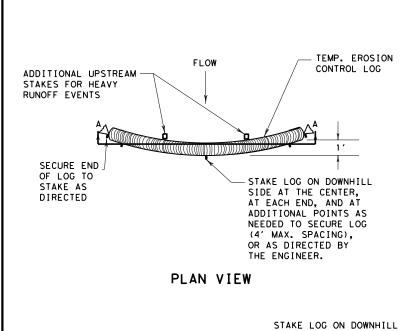
#### GENERAL NOTES (TYPE 3)

- 1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- 2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- 3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- 4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



TEMPORARY EROSION. SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC(3) - 16

| FILE: ec316       | DN: Tx[ | TOC  | ск: КМ   | DW: VP | DN/CK: LS |
|-------------------|---------|------|----------|--------|-----------|
| CTxDOT: JULY 2016 | CONT    | SECT | JOB      |        | HIGHWAY   |
| REVISIONS         | 0337    | 01   | 053      |        | SH 29     |
|                   | DIST    |      | COUNTY   |        | SHEET NO. |
|                   | ALIS    | ١ ١  | WILL TAM | ISON   | 216       |



#### FLOW ADDITIONAL UPSTREAM STAKES FOR HEAVY RUNOFF EVENTS SECURE END OF LOG TO STAKE AS DISTURBED AREA DIRECTED BACK OF CURB LIP OF GUTTER STAKE ON DOWNHILL SIDE OF TEMP. EROSION LOG AT 8' (ON CENTER) MAX. CONTROL LOG AS NEEDED TO SECURE LOG, OR AS DIRECTED BY THE ENGINEER.

PLAN VIEW

TEMP. EROSION

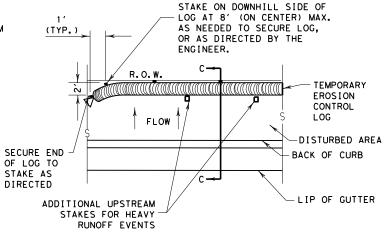
COMPOST CRADLE

UNDER EROSION

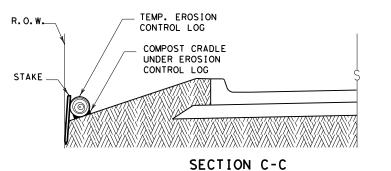
CONTROL LOG

<del>///\///\\///\\///\\///\\///\\</del>

CONTROL LOG



#### PLAN VIEW



EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

# CL-ROW

## IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE

ENGINEER. 2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.

**GENERAL NOTES:** 

1. EROSION CONTROL LOGS SHALL BE INSTALLED

- 3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
- FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
- STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
- 6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
- 7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
- SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
- TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
- 10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

### SECTION A-A EROSION CONTROL LOG DAM

NIN

SIDE AT THE CENTER,

AT EACH END, AND AT

AS DIRECTED BY THE

ENGINEER.

ADDITIONAL POINTS AS

NEEDED TO SECURE LOG

(4' MAX. SPACING), OR

ADDITIONAL UPSTREAM

STAKES FOR HEAVY

RUNOFF EVENTS

R. O. W.



#### LEGEND

CL-D - EROSION CONTROL LOG DAM

TEMP. EROSION-

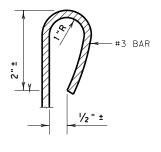
CONTROL LOG

(TYP.)

COMPOST CRADLE UNDER EROSION

CONTROL LOG

- -(cl-boc)- EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW - EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING -(CL-SST̀
- EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING -(CL - SSL`
- —(CL-DI EROSION CONTROL LOG AT DROP INLET
- (CL-CI EROSION CONTROL LOG AT CURB INLET
- ackslashcl-giackslash Erosion control log at curb & grate inlet



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

(CL - BOC)

REBAR STAKE DETAIL

#### SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

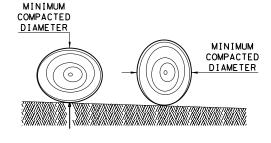
The drainage area for a sediment trap should not exceed Log Traps: 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

- 1. Within drainage ditches spaced as needed or min. 500' on center
- 2. Immediately preceding ditch inlets or drain inlets
- 3. Just before the drainage enters a water course 4. Just before the drainage leaves the right of way
- 5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

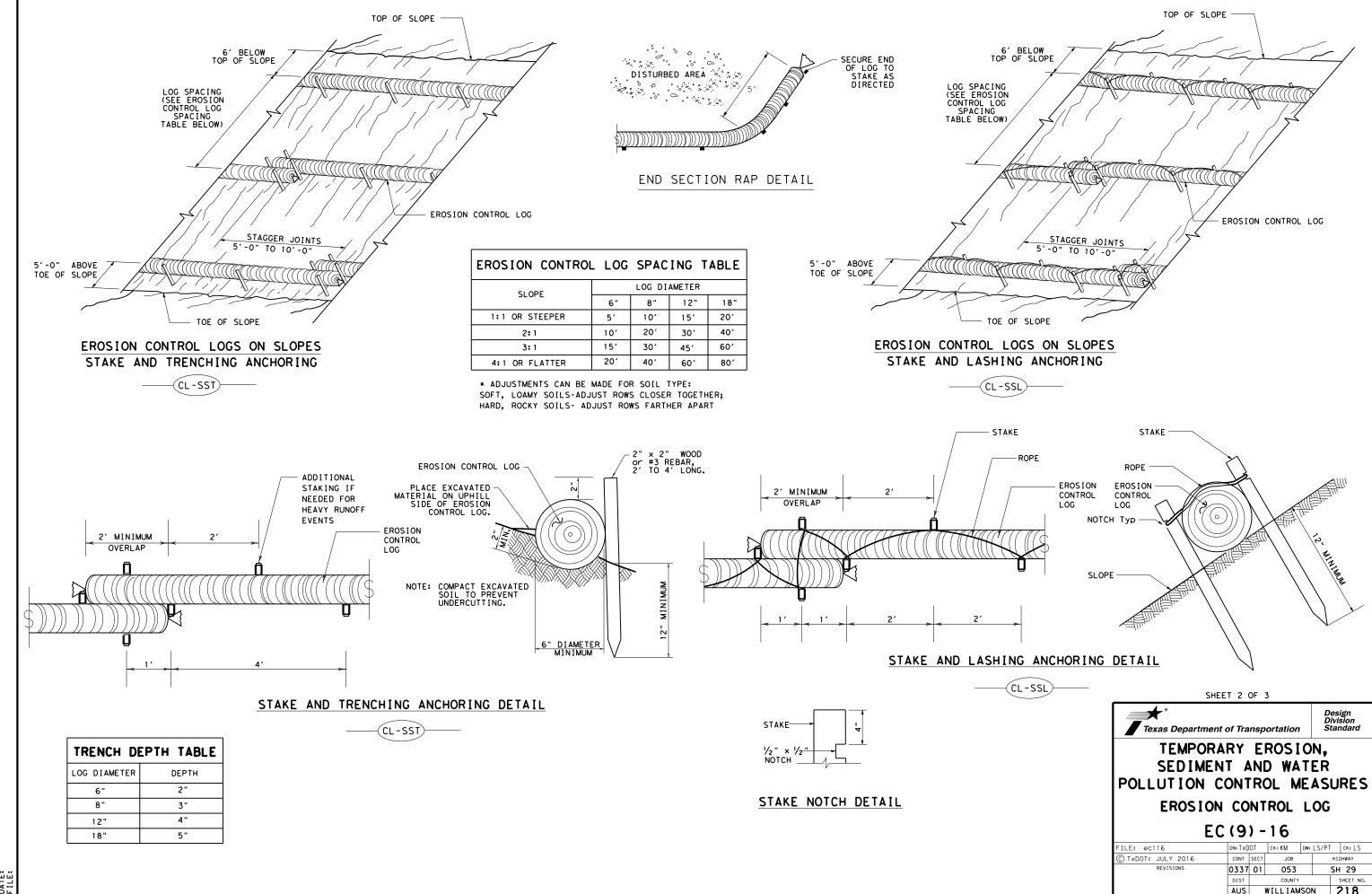


TEMPORARY EROSION. SEDIMENT AND WATER POLLUTION CONTROL MEASURES

**EROSION CONTROL LOG** 

EC(9) - 16

| FILE: ec916        | DN: TxD        | OT          | ck: KM | DW:         | LS/PT     | ck: LS |
|--------------------|----------------|-------------|--------|-------------|-----------|--------|
| C TxDOT: JULY 2016 | CONT           | SECT        | JOB    | JOB HIGHWAY |           | SHWAY  |
| REVISIONS          | 0337           | 01          | 053    |             | SH 29     |        |
|                    | DIST           | DIST COUNTY |        |             | SHEET NO. |        |
|                    | AUS WILLIAMSON |             | N 2    | 717         |           |        |



SECURE END OF LOG TO STAKE AS DIRECTED

TEMP. EROSION-CONTROL LOG

FLOW

EROSION CONTROL LOG AT DROP INLET

(CL-DÌ

CURB AND GRATE INLET

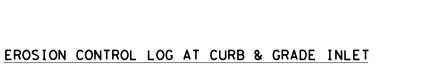
# (CL - G I)

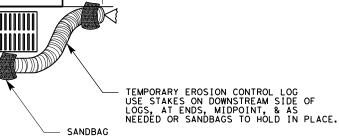
OVERLAP ENDS TIGHTLY 24" MINIMUM

COMPLETELY SURROUND
DRAINAGE ACCESS TO
AREA DRAIN INLETS WITH
EROSION CONTROL LOG

- FLOW

-STAKE OR USE SANDBAGS ON DOWNHILL SIDE OF LOG AS NEEDED TO HOLD IN PLACE (TYPICAL)





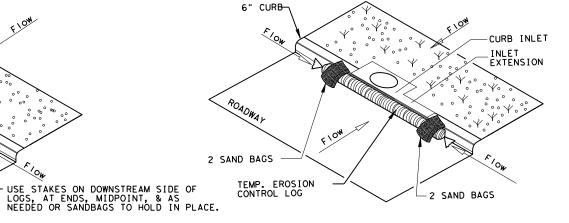


CURB

TEMP. EROSION CONTROL LOG

SANDBAG

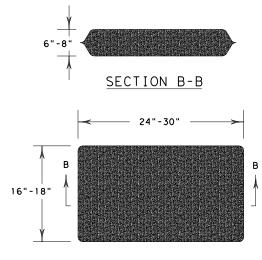




EROSION CONTROL LOG AT CURB INLET



NOTE: EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



SANDBAG DETAIL

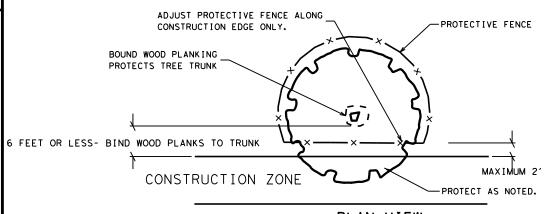
SHEET 3 OF 3 Design Division Standard Texas Department of Transportation

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES **EROSION CONTROL LOG** 

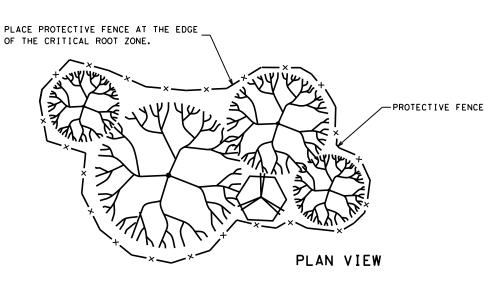
EC(9)-16

|                    | _       |              | _      |     |           |        |
|--------------------|---------|--------------|--------|-----|-----------|--------|
| FILE: ec916        | DN: Tx[ | OT           | ck: KM | DW: | LS/PT     | ck: LS |
| © TxDOT: JULY 2016 | CONT    | SECT         | JOB    |     | HI        | CHWAY  |
| REVISIONS          | 0337    | 01           | 053    |     | SH        | 1 29   |
|                    | DIST    | ST COUNTY    |        |     | SHEET NO. |        |
|                    | AUS     | S WILLIAMSON |        | v 2 | 219       |        |

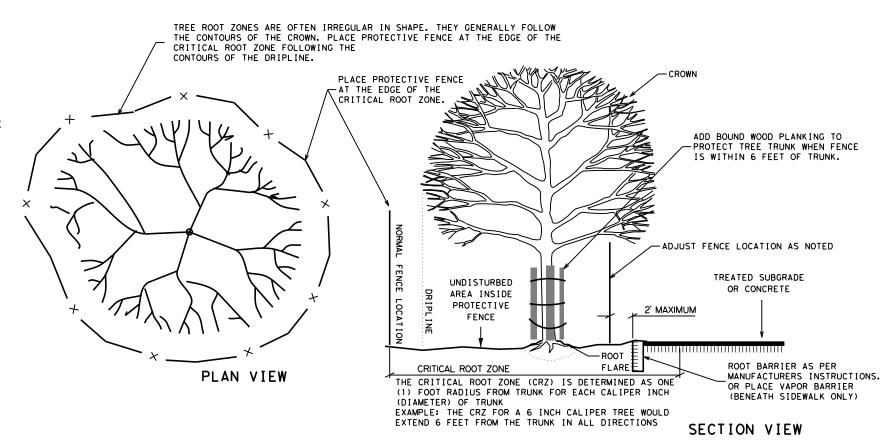
#### LINEAR CONSTRUCTION THROUGH STAND OF TREES



PLAN VIEW
PAVING UNDER TREES



TYPICAL TREE GROUPING PROTECTION



#### TYPICAL TREE PROTECTION

#### NOTES:

CRITICAL ROOT ZONE IS 1 FT. AWAY FROM TREE TRUNK FOR EVERY 1 IN. OF TREE DIAMETER MEASURED AT 4 FT. HEIGHT.

WATER TREES EVERY 2 WEEKS WITH A MINIMUM OF 100 GALLONS PER TREE.

SPRAY TREE WITH WATER TO REMOVE CONSTRUCTION DUST WHEN DIRECTED.

CONSTRUCTION FENCE SHALL BE 4 FT. TALL.

DO NOT PERFORM WORK OR STORE EQUIPMENT WITHIN PROTECTED AREA.

COVER THE CRITICAL ROOT ZONE BETWEEN THE PROTECTED AREA AND THE CONSTRUCTION ZONE WITH 4 IN. OF MULCH

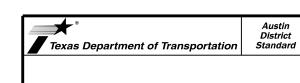
PERFORM TREE TRIMMING AND WOUND REPAIR PER STANDARD SPECIFICATIONS.

DAMAGED AND EXPOSED ROOTS SHALL BE TRIMMED AND TREATED PER STANDARD SPECIFICATIONS. BACKFILL EXPOSED ROOTS WITH TOPSOIL WITHIN 24 HOURS OF EXPOSURE.

PLACE PLASTIC UNDER CONCRETE PLACED IN THE CRITICAL ROOT ZONE.

PLACE A ROOT BARRIER IN THE CRITICAL ROOT ZONE AT THE EDGE OF TREATED SUBGRADE TO THE DEPTH OF THE SUBGRADE.

ALL WORK IS SUBSIDIARY TO BID ITEM.

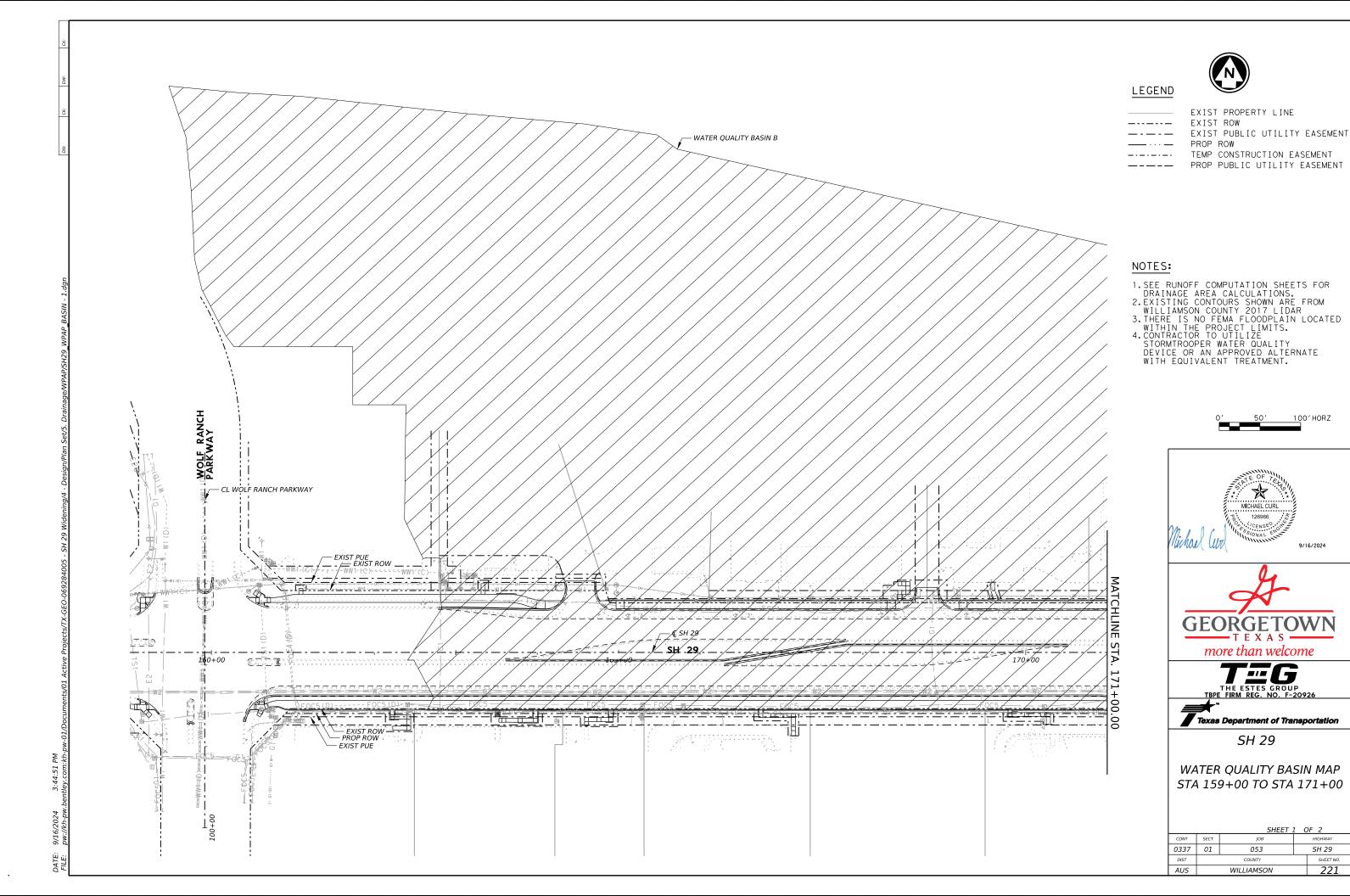


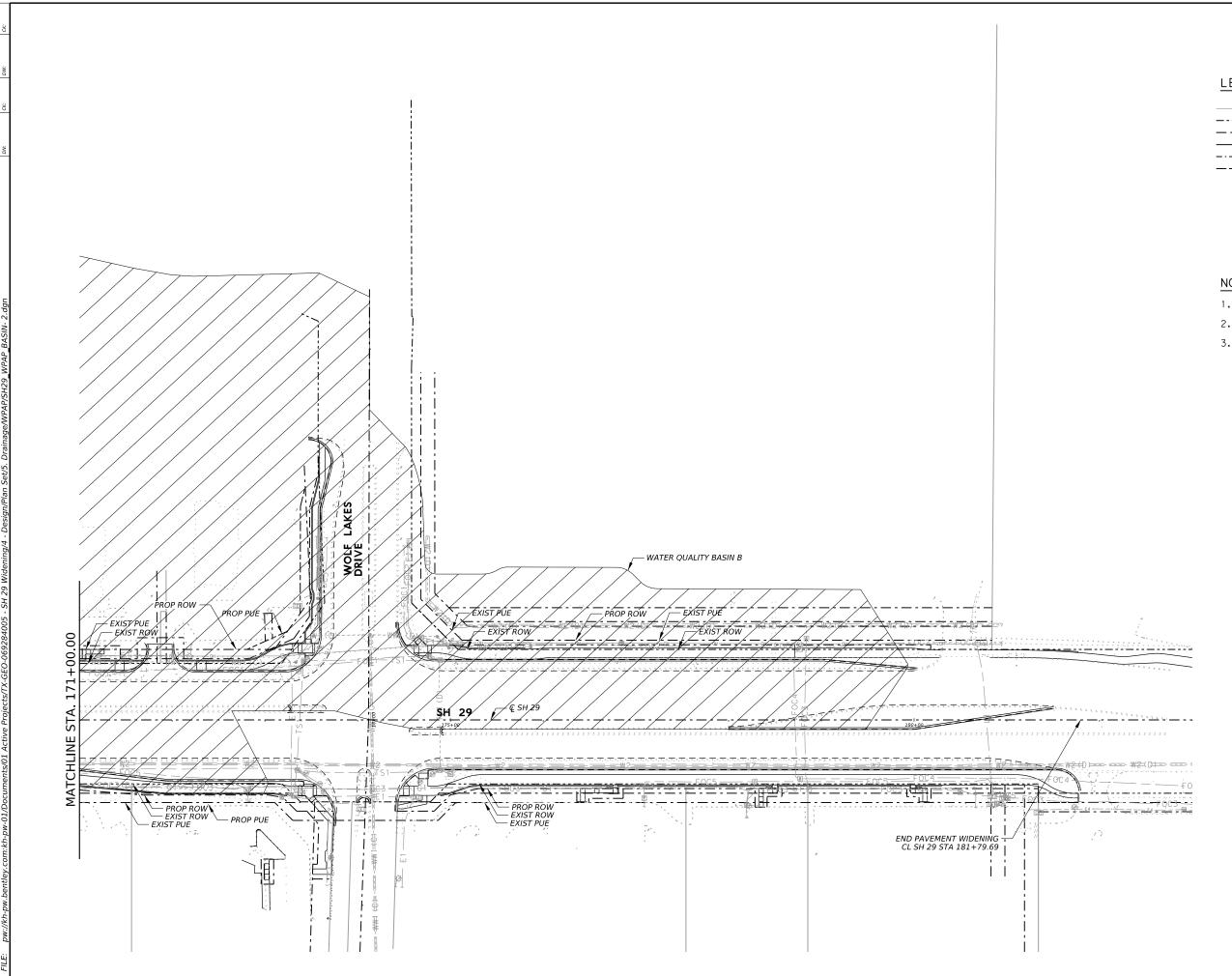
TREE PROTECTION

DETAILS

TPD-19(AUS)

DATE: 9/12/2024 2:31:19 PM FILE: pw://kh-pw.bentlev.com:kh-pw-01/Do







#### LEGEND

EXIST PROPERTY LINE EXIST ROW EXIST PUBLIC UTILITY EASEMENT PROP ROW TEMP CONSTRUCTION EASEMENT PROP PUBLIC UTILITY EASEMENT

#### NOTES:

- 1. SEE RUNOFF COMPUTATION SHEETS FOR DRAINAGE AREA CALCULATIONS.
  2. EXISTING CONTOURS SHOWN ARE FROM WILLIAMSON COUNTY 2017 LIDAR
  3. THERE IS NO FEMA FLOODPLAIN LOCATED WITHIN THE PROJECT LIMITS.











SH 29

WATER QUALITY BASIN MAP STA 171+00 TO END

| SHEET 2 OF 2 |      |        |           |         |  |  |  |
|--------------|------|--------|-----------|---------|--|--|--|
| CONT         | SECT | јов    |           | HIGHWAY |  |  |  |
| 0337         | 01   | 053    |           | SH 29   |  |  |  |
| DIST         |      | COUNTY | SHEET NO. |         |  |  |  |
| AUS          |      | 222    |           |         |  |  |  |

# Texas Commission on Environmental Quality TSS Removal Calculations per RG-348 (Addendum Item 3.4.20)

| AREA 1 DRAINAGE BASIN A                                      | TOTAL SITE DETAILS                            |
|--|---|
|  | Project Name: SH 29                           |
| STEP ONE: Required TSS Removal                               | Project Location: Georgetown, TX              |
|  | Date Prepared: 10/9/2024                      |
| EQUATION 3.3   | Prepared By: 0                                |
| $_{-}$ = 28.93(A, x P) (Georgetown Requires 85% TSS Removal) | Total Project Area to b 40.18                 |
| = Required TSS Removal (pounds)                              | $P_{re}$ -Development Impervious Area = 22.30 |
| A, = Net Increase in Impervius Area (acres)                  | Post-Development Impervious Area = 23.60      |
| P = Average Annual Precipitation (inches)                    | Composite Run-Off Coefficient = 0.59          |
|  | Required TSS Removal $Lm = 1137$              |
| Drainage Basin = 19.33 Acres                                 | County = Williamson                           |

110

0.99 - 1.23

| Pervious Area = 9.99<br>P = 32 | Acres<br>Inches |   | STO   | RMTROOPER   | _ |
|--------------------------------|-----------------|---|-------|-------------|---|
| $L_{m} = 875$                  | Lbs             |   | Model | E.A. @ 80%  |   |
|                                |                 |   | 5     | < 0.13      |   |
| STEP TWO: Select an Appropriat | te BMP          |   | 10    | 0.14 - 0.20 |   |
|                                |                 |   | 20    | 0.21 - 0.33 |   |
| Effective Area                 | =1.15           | $EA = (Ai \times 0.9) + (Ap \times 0.03)$ | 25    | 0.34 - 0.50 |   |
| StormTrooper SWA               |                 | ·   | 40    | 0.51 - 0.79 |   |
| Unit Surface Δrea              | _               | Sa. Ft.                                   | 70    | 0.80 - 0.98 |   |

EQUATION 3.4 Q = CiA, where:

Pre-Dev. Imp. Area = 8.39

Post-Dev. Imp. Area = 0.95

C = 0.45 Composite Run-Off Coefficient i = 1.10 Stormwater Quality Intensity A = 19.33 Drainage Basin Acreage Q = 9.57 Required Treatment Flow

Acres

**EQUATION 3.5** 

 $V_{-}=Q/A$ , where: Q=9.57 Required Treatment Flow A=913 Unit Surface Area  $V_{-}=9.76E-03$  Overflow Rate BMP Effeciency = 49%

#### STEP THREE: Calculate Fraction of Annual Runoff to be Treated

#### STEP FOUR: Calculate TSS Load Removed by BMPs

EQUATION 3.8  $L_{r} = (BMP \ Efficiency) \times P \times (A_{r} \times 34.6 + A_{r} \times 0.54)$   $L_{r} = Load \ Removed \ by \ BMP$   $Efficiency = TSS \ Removal \ Efficiency$   $Efficiency = TSS \ Removal \ Efficiency$   $Efficiency = Removal \ Removal$ 

A = 9.34 A = 9.99L = 5149 lbs







SH 29

WATER QUALITY CALCULATIONS

| SHEET 1 OF 1 |      |            |           |         |  |  |  |
|--------------|------|------------|-----------|---------|--|--|--|
| CONT         | SECT | JOB        |           | HIGHWAY |  |  |  |
| 0337         | 01   | 053        |           | SH 29   |  |  |  |
| DIST         |      | COUNTY     | SHEET NO. |         |  |  |  |
| AUS          |      | WILLIAMSON | 223       |         |  |  |  |

The following TCEQ requirements (Form TNRCC-0592, Rev. 5/01/02) are applicable to all work in recharge zones of the Edwards Aquifer in Hays, Travis and/or Williamson Counties and must be adhered to by the Contractor and all subcontractors:

- 1. Written construction notification must be given to the appropriate TCEQ regional office no later than 48 hours prior to commencement of the regulated activity. Information must include the date on which the regulated activity will commence, the name of the approved plan for the regulated activity, and the name of the prime contractor and the name and telephone number of the contact person.
- 2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
- 3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.
- 4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
- 5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the manufacturers specifications and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection Plan are required during construction. If inspections indicate a control has been used inappropriately, or incorrectly, the applicant must ensure that the contractor replace or modify the control for site situations. The controls must remain in place until disturbed areas are revegetated and the areas have become permanently stabilized.
- 6. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).
- 7. Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake must be provided that can indicate when the sediment occupies 50% of the basin volume.
- 8. Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).
- 9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.
- 10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
- 11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site: and the dates when stabilization measures are initiated.
- 12. The holder of any approved Edward Aquifer protection plan must notify the appropriate TCEQ regional office in writing and obtain approval from the executive director prior to initiating any of the following:
  - A. any physical or operational modification of any water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
  - B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
  - C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

#### TCEQ Regional Offices

Austin Regional Office 1921 Cedar Bend, Suite 150 Austin, Texas 78758-5336 Phone (512)339-2929 Fax (512)339-3795

San Antonio Regional Office 14250 Judson Road San Antonio, Texas 78233-4480 Phone (210)490-3096 Fax (210)545-4329



TCEQ Requirements for Recharge Zone of the Edwards Aquifer

Austin District Standard

|              | WII    | LLIAN   | <b>ISON</b> | 0337      | 01     | 053 | SH29    |
|--------------|--------|---------|-------------|-----------|--------|-----|---------|
|              | COUNTY |         |             | CONTROL   | SECT   | JOB | HIGHWAY |
| REVISIONS    | AUS    | 6       |             |           |        |     | 224     |
| © T×DOT 2003 | DIST   | FED REG | FEDERA      | AL AID PE | ROJECT |     | SHEET   |

#### **Texas Commission on Environmental Quality Water Pollution Abatement Plan General Construction Notes**

#### Edwards Aquifer Protection Program Construction Notes - Legal Disclaimer

The following/listed "construction notes" are intended to be advisory in nature only and do not constitute an approval or conditional approval by the Executive Director (ED), nor do they constitute a comprehensive listing of rules or conditions to be followed during construction. Further actions may be required to achieve compliance with TCEQ regulations found in Title 30. Texas Administrative Code (TAC). Chapters 213 and 217, as well as local ordinances and regulations providing for the protection of water quality. Additionally, nothing contained in the following/listed "construction notes" restricts the powers of the ED, the commission or any other governmental entity to prevent, correct, or curtail activities that result or may result in pollution of the Edwards Aquifer or hydrologically connected surface waters. The holder of any Edwards Aquifer Protection Plan containing "construction notes" is still responsible for compliance with Title 30, TAC, Chapters 213 or any other applicable TCEQ regulation, as well as all conditions of an Edwards Aquifer Protection Plan through all phases of plan implementation. Failure to comply with any condition of the ED's approval, whether or not in contradiction of any "construction notes," is a violation of TCEQ regulations and any violation is subject to administrative rules, orders, and penalties as provided under Title 30, TAC § 213.10 (relating to Enforcement). Such violations may also be subject to civil penalties and injunction. The following/listed "construction notes" in no way represent an approved exception by the ED to any part of Title 30 TAC, Chapters 213 and 217, or any other TCEQ applicable regulation

- A written notice of construction must be submitted to the TCEQ regional office at least 48 hours prior to the start of any regulated activities. This notice must include:
  - the name of the approved project:
  - the activity start date: and
  - the contact information of the prime contractor.
- All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan (WPAP) and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.
- If any sensitive feature(s) (caves, solution cavity, sink hole, etc.) is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. Construction activities may not be resumed until the TCEQ has reviewed and approved the appropriate protective measures in order to protect any sensitive feature and the Edwards Aquifer from potentially adverse impacts to water quality.
- No temporary or permanent hazardous substance storage tank shall be installed within 150 feet of a water supply source, distribution system, well, or sensitive feature.
- Prior to beginning any construction activity, all temporary erosion and sedimentation (E&S) control measures must be properly installed and maintained in accordance with the approved plans and manufacturers specifications. If inspections indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations. These controls must remain in place until the disturbed areas have been permanently stabilized.
- Any sediment that escapes the construction site must be collected and properly disposed of before the next rain event to ensure it is not washed into surface streams, sensitive features,
- Sediment must be removed from the sediment traps or sedimentation basins not later than

when it occupies 50% of the basin's design capacity.

- Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from being discharged offsite.
- All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the
- If portions of the site will have a temporary or permanent cease in construction activity lasting longer than 14 days, soil stabilization in those areas shall be initiated as soon as possible prior to the 14th day of inactivity. If activity will resume prior to the 21st day, stabilization measures are not required. If drought conditions or inclement weather prevent action by the 14th day, stabilization measures shall be initiated as soon as possible.
- The following records shall be maintained and made available to the TCEQ upon request:
  - the dates when major grading activities occur:
  - the dates when construction activities temporarily or permanently cease on a portion of the site: and
  - the dates when stabilization measures are initiated.
- The holder of any approved Edward Aquifer protection plan must notify the appropriate regional office in writing and obtain approval from the executive director prior to initiating any of the following:
  - any physical or operational modification of any water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
  - any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aguifer:
  - any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office 12100 Park 35 Circle, Building A Austin, Texas 78753-1808 Phone (512) 339-2929 Fax (512) 339-3795

San Antonio Regional Office 14250 Judson Road San Antonio, Texas 78233-4480 Phone (210) 490-3096 Fax (210) 545-4329

THESE GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON THE CONSTRUCTION PLANS PROVIDED TO THE CONTRACTOR AND ALL SUBCONTRACTORS.

TCEQ-0592 (Rev. July 15, 2015) Page 2 of 2





Texas Department of Transportation

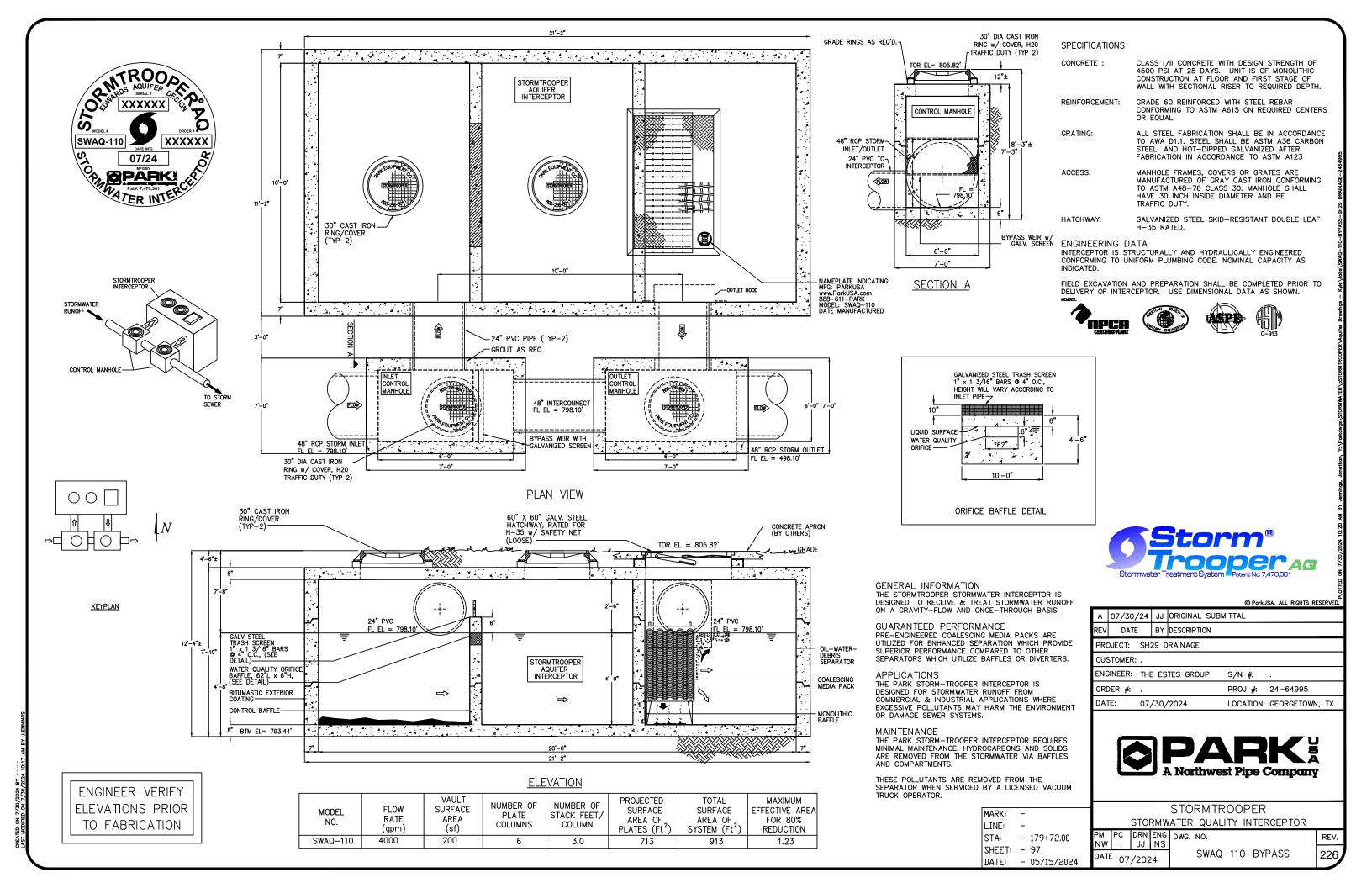
SH 29

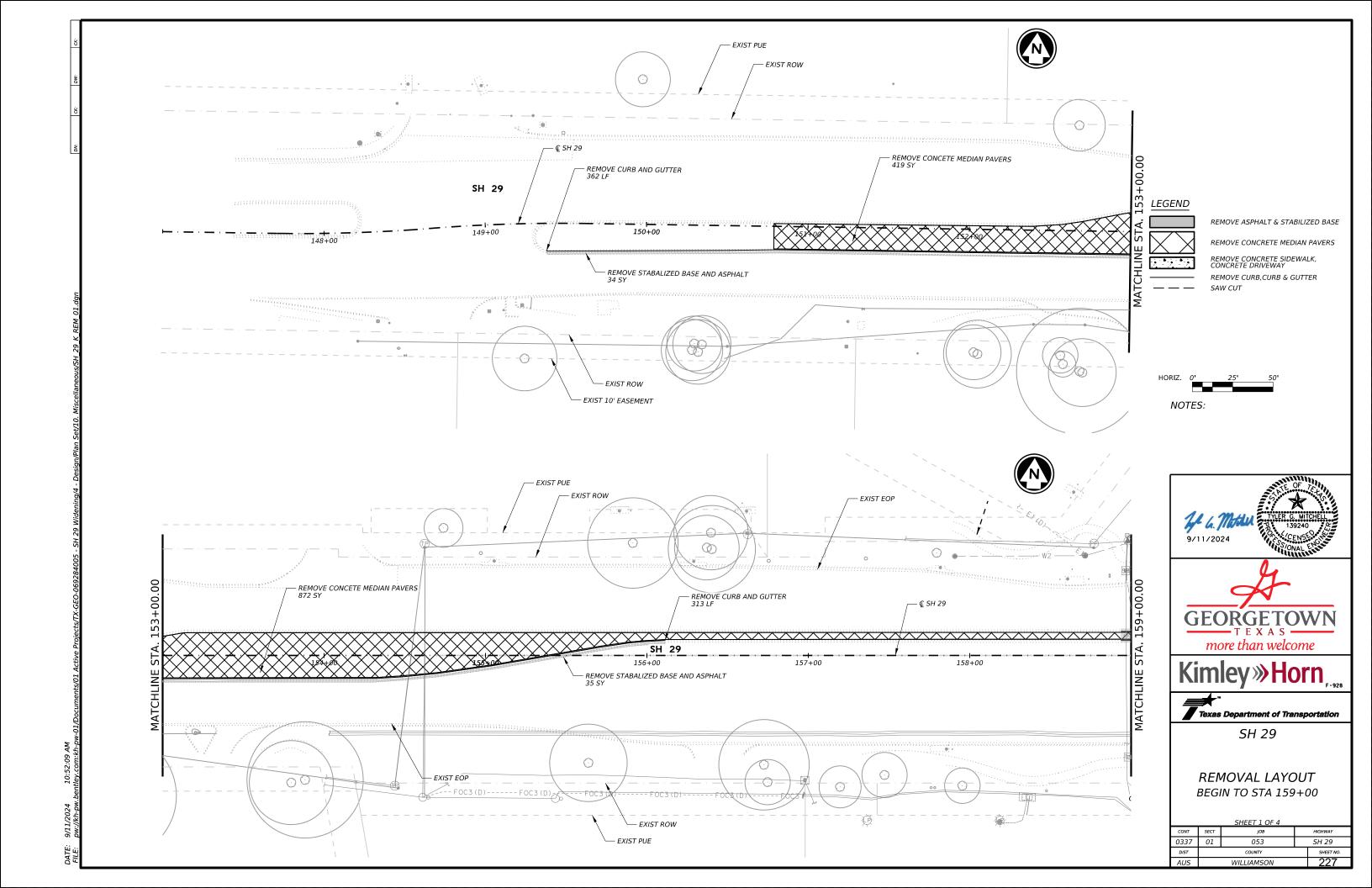
TCEQ WPAP **GENERAL** CONSTRUCTION NOTES

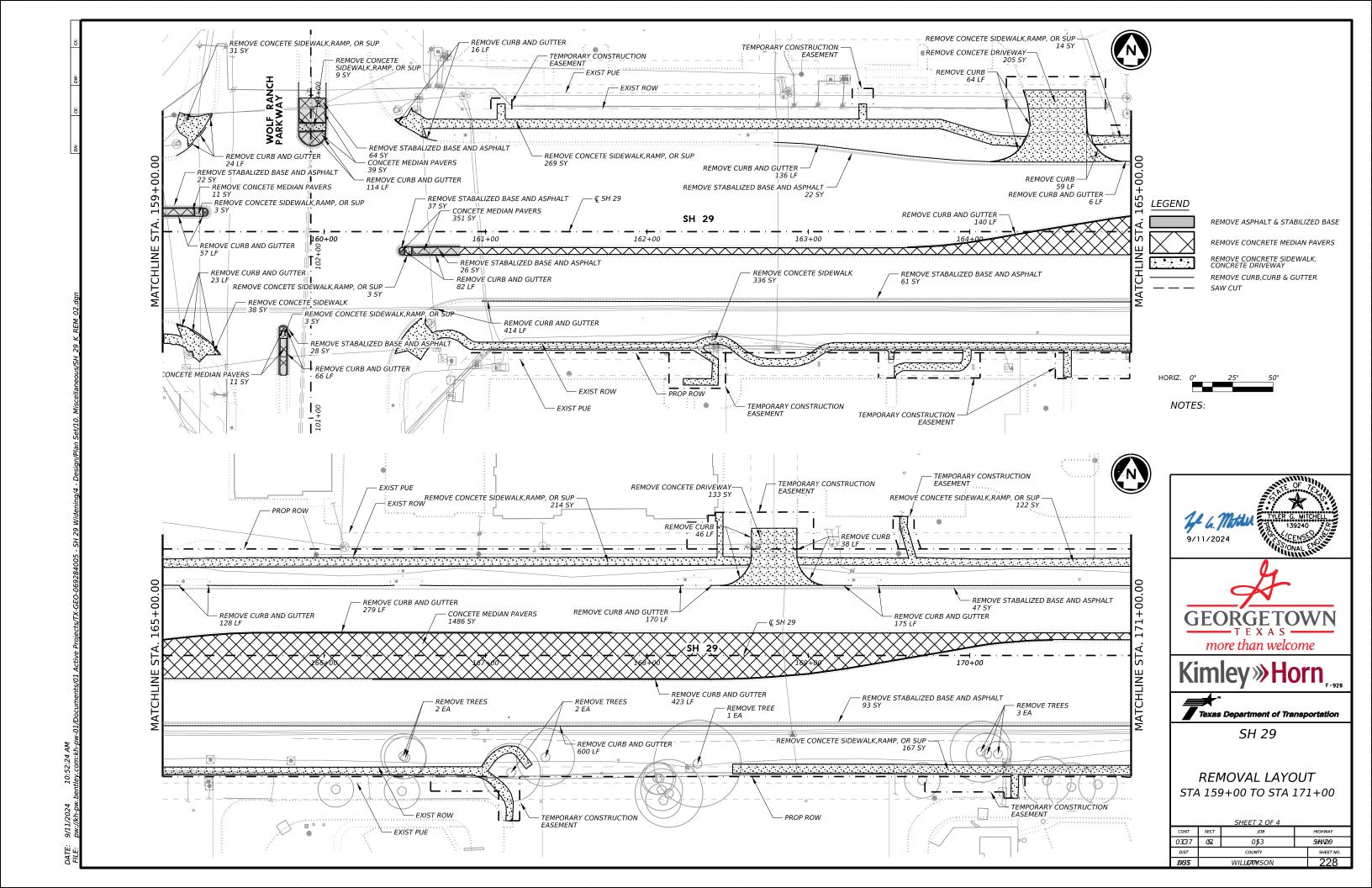
| CONT | SECT JOB |            | HIGHWAY   |
|------|----------|------------|-----------|
| 0337 | 01       | 053        | SH 29     |
| DIST |          | COUNTY     | SHEET NO. |
| AUS  |          | WILLIAMSON | 225       |

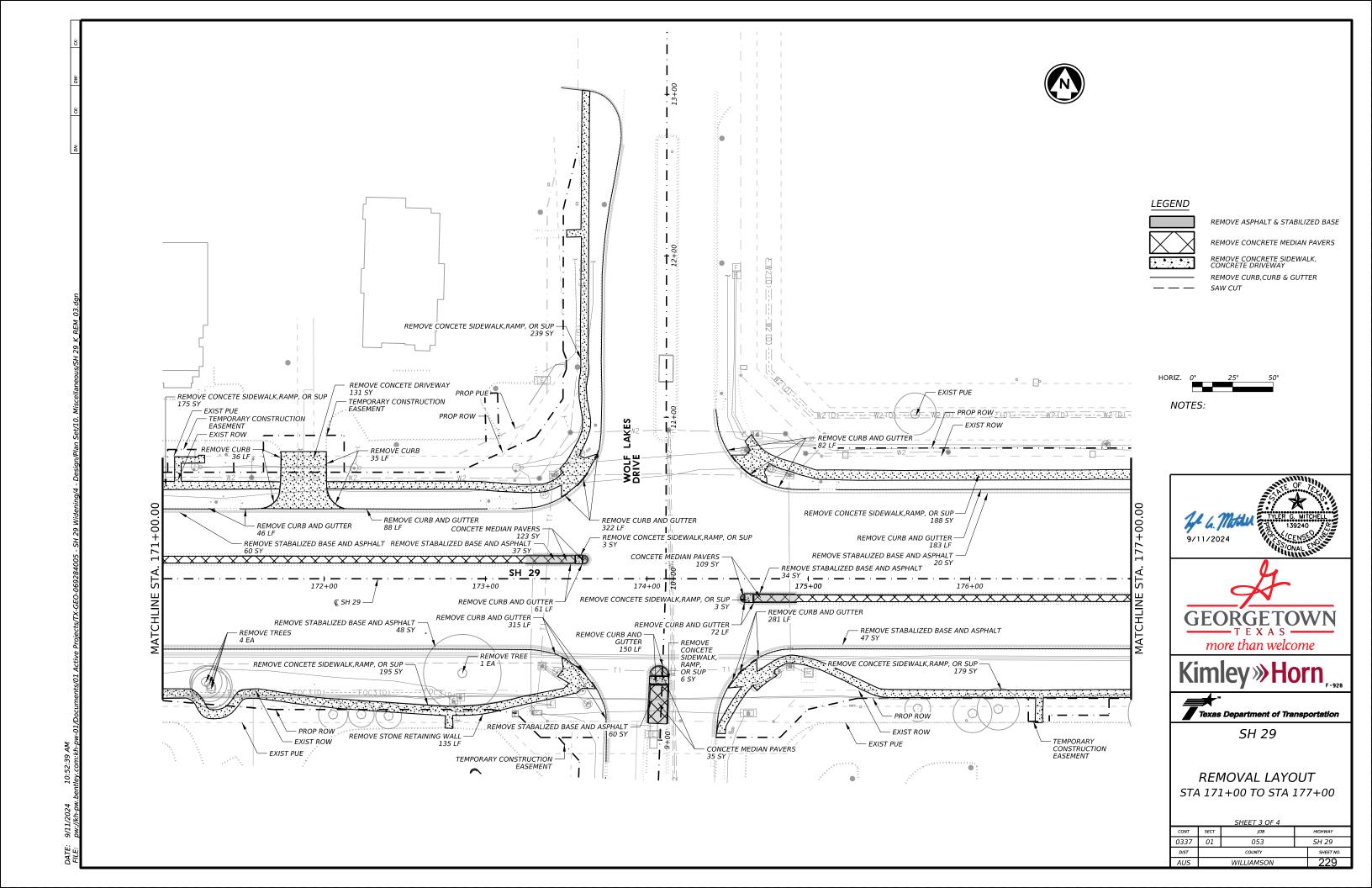
TCEQ-0592 (Rev. July 15, 2015)

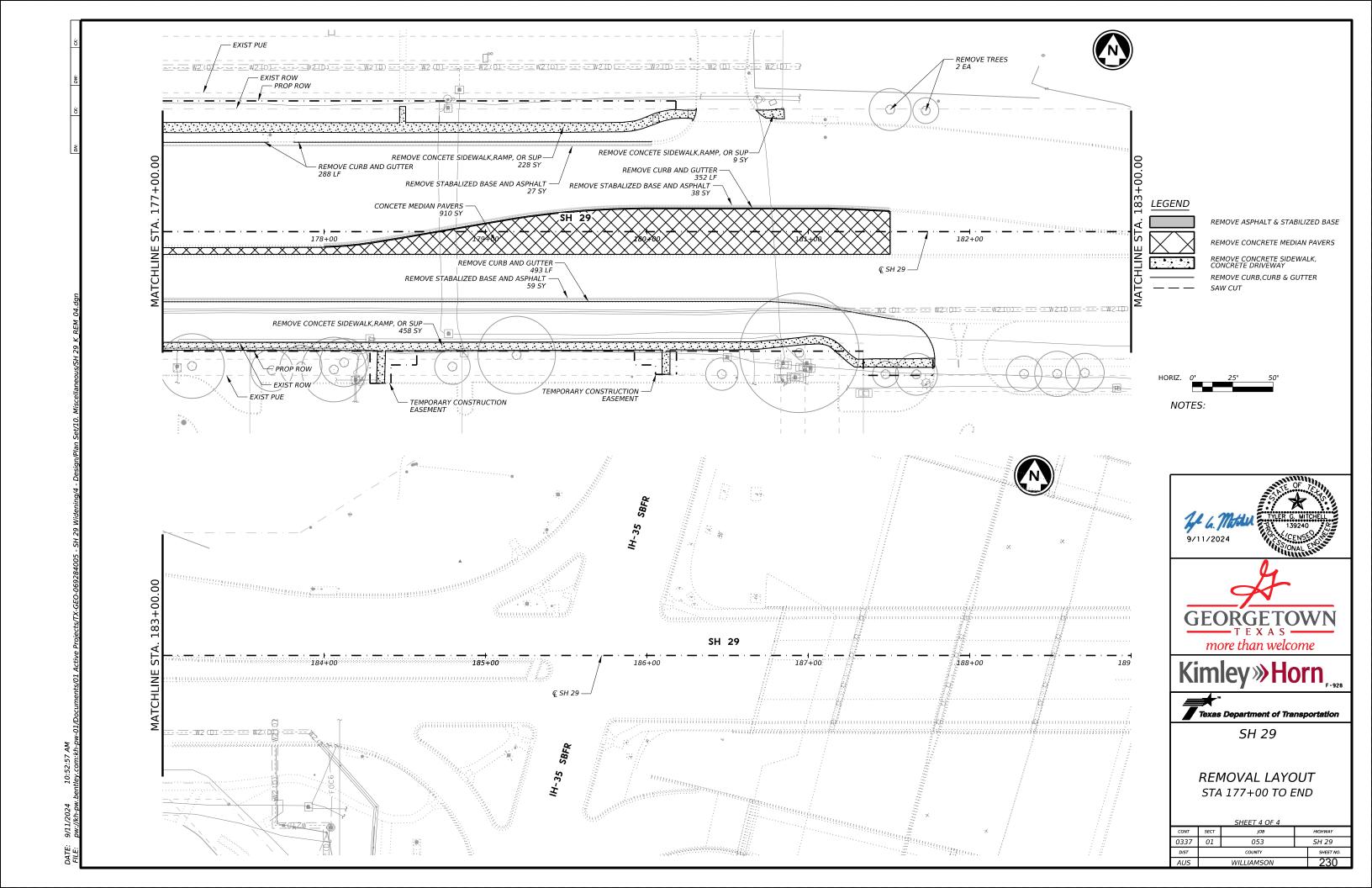
Page 1 of 2













SHEET NO.

3,3A-3J

4,4A-4C

14 - 17

18 - 42

113 - 124

125 - 134

158 - 167

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## STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

CC 337-1-29 STATE TEXAS AUS WILLIAMSON CONT. SECT. JOB HIGHWAY NO. 0337 01 029 SH 29

#### PLANS OF PROPOSED INDEX OF SHEETS STATE HIGHWAY IMPROVEMENT DESCRIPTION

STATE AID PROJECT NUMBER

CC 337-1-29

CSJ 0337-01-029

NET LENGTH OF PROJECT- 4675 FT - 0.89 MI

WILLIAMSON COUNTY

# LIMITS: FROM 0.23 MI. EAST OF D.B. WOOD TO IH 35 SBFR FOR THE CONSTRUCTION OF A NEW ROADWAY ALIGNMENT AND THE RECONSTRUCTION OF AN EXISTING ROAD CONSISTING OF GRADING, STRUCTURES, ASPHALT CONCRETE PAVING, SIGNING, AND PAVEMENT MARKINGS

DESIGN SPEED - 45 MPH

ADT (2004) - 18,400 VPD

FUTURE ADT (2024) = 32,800 VPD

#### **FINAL PLANS**

| FINAL CONTRACT COST              | \$6,039,405.35 |
|----------------------------------|----------------|
| DATE OF LETTING                  | 12/07/04       |
| DATE WORK BEGAN                  | 03/01/05       |
| DATE WORK COMPLETED AND ACCEPTED | 11/17/06       |
| CONTRACTORAUSTIN BRIDGE & RO     | AD, L.P.       |

#### **CHANGE ORDERS**

- 1. FOUR ITEMS ADDED TO CONTRACT
- 2. RELOCATE GT FEED SIGN
- REMOVE SGT; BACKHOE WK. FOR EROSION CTL
- TEMPORARY TABS
- 5. DELAYS DUE TO UTILITY CONFLICTS
- **CR 265 WEST REALIGNMENT**
- 7. SOIL RETENTION BLANKET
- 8. LOWER WATERLINE @265 W; TAS AT SBFR I-35
- 9. TRAFFIC CONTROL REVISIONS
- 10. CONDUIT CORRECTIONS; LT TURN SIGNAL MOD.
- 11. TIME EXTENSION FOR EB RT. TURN LN. @ CR 265W
- 12. GT FEED SUPPLY DRAINAGE
- 13. WOLF RANCH PKWY SIGN
- 14. REPLACE SIGN POSTS

END PROJECT STA. 186+70.00

CSJ 0337-01-029

REF MARKER NO.

GEORGETOWN NOT TO SCALE

HEREBY CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS BUILT PLANS AND SPECIFICATIONS.

\* TDLR INSPECTION REQUIRED

ACCORDANCE WITH STANDARD SHEETS
BC(1)-03 THRU BC(12)-03 AND THE "TEXAS
MANUAL ON UNIFORM TRAFFIC CONTROL
DEVICES."

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, MARCH 1, 1993 AND SPECIFICATION ITEMS
LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS
PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS, ANG, PATEL & YERBY, INC.

Chiang, Patel & Yerby, Inc.



Texas Department of Transportation ALL RIGHTS RESERVED

DISTRICT ENGINEER

DIRECTOR, TRAFFIC OPERATIONS DIVISION CONTRICT DESIGN ENGINEER

REQUIRED SIGNS SHALL BE PLACED IN

BEGIN PROJECT

STA. 139+95.00 CSJ 0337-01-029 REF MARKER NO. 552+1.590

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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

DATE OF TO

JAMES J. ROOHMS
9, 83383
9, CENS

NO. REVISION BY DATE

CP&Y Chiang, Patel & Yerby, Inc.



Texas Department of Transportation

SH 29

SUPPLEMENTAL INDEX

SHEET 3

COUNTY: WILLIAMSON

CONTROL: 0337-01-029

HIGHWAY: SH 29

#### **GENERAL NOTES:**

#### **Basis of Estimate**

|            |  |                                  | l         |            |  |
|------------|--|----------------------------------|-----------|------------|--|
| Ітем       | DESCRIPTION                                  | RATE **                          | Basis     | QUANTITY   |  |
| 160        | FURNISH & PLACE TOPSOIL                      | 1 CY/7 SY                        | 26,667 SY | 3810 CY    |  |
| 162        | MULCH SOD                                    | 1 CY/6 SY                        |           |            |  |
| 164        | SEEDING FOR EROSION CONTROL                  | 4840 SY/AC                       |           |            |  |
|            | DRILL (TEMP) WARM                            | 4840 SY/AC                       | 2.754 AC  | 13,333 SY  |  |
|            | DRILL (TEMP) COOL                            | 4840 SY/AC                       | 2.754 AC  | 13,333 SY  |  |
|            | DRILL (PERM)                                 | 4840 SY/AC                       | 5.509 AC  | 26,667 SY  |  |
| 166        | FERTILIZER (13-13-13)                        | 1/8 LB/SY                        | 26,667 SY | 3,333 CY   |  |
| 168        | VEGETATIVE WATERING                          |                                  |           |            |  |
|            | (Ітем 164)(Темр)                             | 10 GAL/SY                        | 26,667 SY | 267 MG     |  |
|            | (ITEM 164)(PERM)                             | 20 GAL/SY                        | 26,667 SY | 533 MG     |  |
| 204        | Sprinkling                                   |                                  |           | L          |  |
|            | (ITEM 132)                                   | 30 GAL/CY                        |           |            |  |
|            | (ITEM 160)                                   | 100 GAL/CY                       |           |            |  |
| 210        | ROLLING (FLAT WHEEL)                         |                                  |           |            |  |
|            | (ITEM 247)                                   | 1 HR/200 TON                     |           |            |  |
|            | (ITEM 316)                                   | 1 HR/6000 SY                     |           |            |  |
| 211        | ROLLING (TAMPING)<br>(ITEM 132)              | 1 HR/200 CY                      |           |            |  |
| 212        | ROLLING (HEAVY TAMPING)<br>(ITEM 132)        | 1 HR/200 CY                      |           |            |  |
| 213        | ROLLING (LIGHT PNEUMATIC TIRE)<br>(ITEM 132) | 1 HR/500 CY                      |           |            |  |
| 316        | ONE COURSE SURFACE TREATMENT (UNDERSEAL)     |                                  |           |            |  |
|            | ASPH (HFRS-2)                                | 0.30 GAL/SY                      | 11,560 SY | 3,468 GAL  |  |
|            | AGGR (TY B GR 5)                             | 1 CY/160 SY                      | 11,560 SY | 72 CY      |  |
| 3146       | ASPHALT CONCRETE PAVEMENT                    |                                  |           |            |  |
|            | (TY C)(SURF)(PG 70-22)                       | 110 LB/SY/IN                     | 63,155 SY | 6,947 TON  |  |
|            | (TY C)(PG 70-22)                             | 110 LB/SY/IN                     | 53,982 SY | 5,938 TON  |  |
|            | (TY B)(PG 70-22)                             | 110 LB/SY/IN 53,739 SY 8,867 TON |           |            |  |
| t Dan in 6 | (TY A)(PG 70-22)                             | 110 LB/SY/IN                     | 60,251 SY | 39,766 TON |  |

<sup>\*\*</sup> For informational purposes only

GENERAL NOTES SHEET A

PROJECT NUMBER: CC 337-1-29

COUNTY: WILLIAMSON CONTROL: 0337-01-029

SHEET 3

HIGHWAY: SH 29

Contract time charges shall continue to accrue through the Contractor's completion of the final punchlist.

The Contractor will be required to have weekly meetings with the Engineer to notify him/her of planned work for the upcoming week.

Prior to contract letting, reproducible earthwork cross sections will be available at the Area Engineer's office for borrowing by copying-service companies for making copies at the prospective bidder's expense. GEOPAK earthwork output listings for this project are available upon request on diskettes at the Area Engineer's office.

All construction equipment involved in roadway work shall be equipped, as approved by the Engineer, with a permanently mounted 360° revolving or strobe warning light with amber lens. This light shall have a minimum lens height of 5" and a diameter of 5". The light shall have a mounting height of not less than 6 feet above the roadway surface and shall be visible from all sides. This equipment shall also have attached at each side of the rear end of the vehicle an approved orange warning flag mounted not less than 6 feet above the roadway surface.

The Contractor's attention is directed to the fact that both overhead and underground utilities exist in the vicinity of this project. The exact location of underground utilities is not known. The Contractor shall contact the area utility companies for exact locations at least 48 hours prior to commencing any work that might affect present utilities.

The Contractor shall be responsible for sweeping, mowing and the removal of all litter, construction debris and surplus material on the right of way within the project limits to keep the site of the work in a neat and presentable condition at all times. This work will be considered subsidiary to the various bid items.

Trimming around signs and other obstructions will be required as directed by the Engineer. This work will be considered subsidiary to the various bid items.

The Contractor shall supply litter barrels in sufficient numbers, at locations designated by the Engineer, to control litter within the project. This shall be considered subsidiary to the various bid items.

The Contractor shall utilize a self-contained vacuum broom to sweep the roadway, keeping it free of sediment, as necessary and as directed by the Engineer. One self-contained vacuum broom shall be maintained in good condition at the project site at all times.

The Contractor shall protect all areas of the right of way, which are not included in the actual limits of the proposed construction areas from destruction. Care shall be exercised to prevent damage to trees, vegetation, and other natural surroundings. The areas not to be disturbed shall be determined by the Engineer. The Contractor shall, at his/her expense, restore any area

GENERAL NOTES SHEET B

SHEET 3A

**COUNTY: WILLIAMSON** 

CONTROL: 0337-01-029

HIGHWAY: SH 29

disturbed as a result of his/her operations to a condition as good as, or better than, that present prior to this contract.

All locations used for storing construction equipment, materials, and stockpiles of any type within the right of way shall be approved by the Engineer. Use of the right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance, as determined by the Engineer, will not exist.

The Contractor shall be responsible for marking every 100-foot station, and shall maintain the markings for the duration of the project. This work shall be considered subsidiary to the various bid items.

The project superintendent shall be English speaking and shall be available on the project at all times when work is being performed.

The scope of this contract will include partial signal construction including, but not limited to, modification of existing signal systems.

The Contractor shall be responsible for picking up material provided by the State from State stockyards.

#### SW3P/WPAP notes

TxDOT has assumed a U.S. Army Corps of Engineers (USACE) Nationwide Permit #14 for this project. This allows a maximum of 1/10 of an acre of permanent fill to be placed within the creek channel. If more than 1/10 of an acre will need to be filled, a pre-construction notice will need to be completed and mailed to the USACE or an additional permit will need to be obtained by the Contractor prior to construction. All areas temporarily disturbed during construction will be restored to original contours.

If any abandoned wells exist on the site or are found during construction of the proposed development, they shall be plugged in coordination with the Texas Commission on Environmental Quality (TCEQ). The Contractor shall cease construction operations in this area and notify the TxDOT Engineer, who will coordinate the proper plugging procedures with TCEQ.

Any drill holes resulting from core sampling on-site or down-gradient of the site shall be plugged with concrete, from the bottom of the hole to the top of the hole, so as not to allow water or contaminants to enter the subsurface environment.

Construction vehicles shall be restricted from traversing or utilizing existing roadways, unprotected construction areas, and areas with vegetative cover.

GENERAL NOTES

SHEET C

PROJECT NUMBER: CC 337-1-29

.....

SHEET 3A

COUNTY: WILLIAMSON

CONTROL: 0337-01-029

HIGHWAY: SH 29

Vehicles shall not be maintained on-site during construction, except at designated maintenance sites as approved by the Engineer.

Any soils contaminated during construction of the proposed project shall be transported from the site and properly disposed of off-site, off the recharge zone, and off any area draining to the recharge zone of the Edwards Aquifer.

During construction, wastewater generated on-site shall be collected by chemical toilets and shall be transported off the recharge zone and disposed of properly.

If any significant recharge features, such as sinkholes, caves, or any other subterranean openings are discovered during construction or core sampling, all activities near the feature must be immediately suspended and may not proceed until the TxDOT geologist is present to evaluate. The discovery may require TCEQ review and approval for the methods proposed to protect the aquifer from any potential adverse impacts.

Above-ground storage tanks kept on-site for construction purposes shall be located over bermed impervious liners to prevent any leakage into underlying soils. Additionally, the containment shall be sized to capture 150% of the total volume of fluids stored on-site within the storage area.

No blasting will be allowed within 300 feet of a geologic feature of significant recharge potential without consent of the Engineer. Known locations of these features are available from the Area Engineer.

#### ITEM 8

The schedule will be required to be submitted in a CPM format utilizing Suretrac or Primavera.

The Work Start date for this project shall be February 10, 2005.

#### ITEM 9

The Contractor shall provide full-time off-duty uniformed certified peace officers in officially marked police cruisers, as part of traffic control operations.

The peace officers shall be able to show proof of certification by the Texas Commission on Law Enforcement Standards.

#### **ITEM 100**

Removal of any obstructions on the right of way and not shown on the plans is included under Preparing Right of Way.

Burning of brush will not be permitted.

The Contractor may be required to remove objectionable material from the right of way by hand.

GENERAL NOTES

Sheet  $\mathbf{D}$ 

PROJECT NUMBER: CC 337-1-29 SHEET 3B

COUNTY: WILLIAMSON CONTROL: 0337-01-029

HIGHWAY: SH 29

#### **ITEM 100 & 132**

All compaction equipment shall be approved by the Engineer prior to all backfilling and embankment operations.

Detachable sheepsfoot-type wheel mounted on backhoes, trackhoes, and other similar equipment will not be allowed for compaction operations.

#### **ITEM 160**

The Engineer shall inspect all topsoil sources before digging begins. All off-site topsoil shall have a minimum PI of 20.

The actual depth of the topsoil shall be as approved by the Engineer.

The contractor shall provide measurements for payment of topsoil quantities prior to seeding.

#### **ITEM 164**

Paper mulch will not be permitted.

The seeded area shall be established and growing with the permanent grass, including adequate coverage as determined by the Engineer, before the job is accepted. If all other work is complete, time charges may be suspended until adequate coverage is obtained.

Ryegrass will not be permitted for temporary cover.

Areas to be seeded for temporary erosion control shall receive one-half the rate of fertilizer at the time of temporary seeding and the remaining half at the time of permanent seeding.

#### **ITEM 166**

Fertilizer shall be of 13-13-13 analysis.

#### **ITEM 168**

Watering applications shall constantly maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of 1/2" or greater, but shall be resumed before the soil dries out. Watering shall continue until grass is accepted by the Engineer. If the Contractor fails to water in a sufficient quantity and at times as directed by the Engineer to achieve the desired cover, the Engineer will not make payment for those specific waterings and the area in question will be reseeded at the Contractor's total expense.

The Contractor shall obtain water at a source that is metered or shall furnish the manufacturer's specifications showing the tank capacity for each truck used. The Contractor shall notify the Engineer prior to watering so that the Engineer may verify meter readings or truck counts.

GENERAL NOTES SHEET E

PROJECT NUMBER: CC 337-1-29 SHEET 3B

COUNTY: WILLIAMSON CONTROL: 0337-01-029

HIGHWAY: SH 29

#### **ITEM 204**

Sprinkling for the control of dust, as directed by the Engineer, will be required on this project. This work shall be considered subsidiary to the various bid items.

#### **ITEM 316**

The open season for application of asphalt is from April 1 to November 1 of each calendar year.

The seal coat shall be placed ahead of the asphaltic concrete pavement laying operation and at no time shall it be placed farther ahead than can be covered in one day with asphaltic concrete, unless otherwise authorized by the Engineer.

The aggregate classification shall be class B.

Loose and surplus aggregate shall be broomed off the surface as directed by the Engineer. This work shall be considered subsidiary to the various bid items.

All surfacing shall include transitions, tapers, and intersections to the limits as directed by the Engineer.

#### **ITEM 354**

The loose material shall be completely removed from the roadway prior to opening to traffic and shall remain the property of the Contractor and be disposed of outside the limits of the right of way at a location suitable to the Engineer.

A full lane width will be planed prior to opening to traffic at the end of a work period.

Two-inch depth of planing and texturing will be accomplished in two passes except single cut will be permitted if no more than 1-1/4 inch vertical offset is created against adjacent lanes when opened to traffic at the end of a work period.

Planing shall be tapered at bridge ends as approved by the Engineer. Prior to placing HMAC the tapered surface shall be planed to allow a minimum of 1-inch surface course to abut the bridge ends.

Transverse faces at ends of passes shall be tapered as directed by the Engineer.

#### **ITEM 400**

Any concrete or asphaltic concrete pavement areas shall be cut with the use of a saw, unless otherwise directed by the Engineer. This work shall be considered subsidiary to the various bid items

GENERAL NOTES SHEET F

SHEET 3C

**COUNTY: WILLIAMSON** 

CONTROL: 0337-01-029

HIGHWAY: SH 29

#### **ITEM 427**

All concrete structures shall receive a Surface Area II Class C surface finish in accordance with Item 427.

#### **ITEM 430**

The Contractor will be required to remove all silt from new water facilities including culverts, storm drainpipe, and inlets to provide silt free drainage structures at all times, as determined by the Engineer. This work will not be paid for directly but shall be considered subsidiary to Item 430.

Before project acceptance, the Contractor will be required to remove all construction debris from new and existing culverts as a result of his/her operations.

All concrete required for this item shall be Class 'C'.

#### **ITEM 432**

All class "B" concrete riprap shall be five (5) inches thick unless shown otherwise on plans.

Additional riprap may be required, as determined by the Engineer, near the end of project completion due to unanticipated erosion locations.

#### **ITEM 460**

Pipe ends may be cut in the field to match roadway side slopes. After the pipes have been cut, an asphalt base aluminum paint of good quality shall be applied to the cut ends.

All side road pipe lengths shall be verified in the field to conform to a side slope ratio of 6:1 from the pipe flowline to the base crown of the side road or street.

Ditches must be cut to grade prior to laying pipe.

#### **ITEM 465**

Inlet locations shall be adjusted, as directed by the Engineer, to the upstream side of driveways in order to accommodate driveway relocation.

Excavation and backfill, frames, grates, rings and covers shall be considered subsidiary to this

Temporary drainage shall be provided at each curb inlet and maintained until the final course of asphaltic concrete pavement is placed.

#### **ITEM 466**

Removal of existing headwalls and wingwalls will not be paid for directly but will be considered subsidiary to the various bid items.

GENERAL NOTES SHEET G

PROJECT NUMBER: CC 337-1-29

CONTROL: 0337-01-029

SHEET 3C.

HIGHWAY: SH 29

COUNTY: WILLIAMSON

**ITEM 467** 

Pipe ends shall be cut in the field to match roadway side slopes. After the pipes have been cut, an asphalt base aluminum paint of good quality shall be applied to the cut ends.

**ITEM 496** 

The Contractor shall provide the Engineer with a detailed plan for the removal of the existing structure. The plan, subject to approval by the Engineer, will include the schedule of removal and list of all equipment to be used.

**ITEM 502** 

For any roadway edge of 2 inches or greater adjacent to a roadway which is under traffic, the Contractor shall be required to incorporate and maintain a 3:1 safety wedge into the proposed construction.

The Traffic Control Plan (TCP) for this project shall be as shown in the plans, as detailed on the latest BC standard plan sheets, and as provided for in part VI of the Texas Manual on Uniform Traffic Control Devices. A minimum of two (2) flaggers, two (2) advance flashing arrow panels (TY C), signs as required, 28" minimum cones, and reflectorized drums will be required.

In addition to the Traffic Control Plans and the latest BC standard plan sheets, the Contractor shall provide within the limits of the project, standard barricades, warning signs, delineators, lights, 28" cones, and flaggers in sufficient numbers and any combination as considered necessary by the Engineer.

No daytime lane closures will be permitted.

Overnight lane closures will be permitted between the hours of 8:00 PM and 6:00 AM, Sunday thru Thursday. No overnight lane closures will be permitted on Friday or Saturday unless otherwise approved by the Engineer.

No weekend closures shall be allowed on the weekends, which include the following holidays: January 1<sup>st</sup>, the last Monday in May, July 4<sup>th</sup>, the first Monday in September, the fourth Thursday in November, December 25<sup>th</sup> and Easter weekend. No weekend closures shall be allowed on the weekends of special events that could be impacted by the construction, as determined by the Engineer. Unless otherwise directed by the Engineer, all equipment, vehicles, workers, etc., associated with these closures must be off the affected roadway(s) and all lanes re-opened by no later than noon of the Friday prior to these holidays and special events.

The Contractor will be required to maintain a minimum of one through lane in each direction during the daylight hours except with the written approval of the Engineer.

The Contractor shall place one TY III Barricade (8 feet) at each stockpile of material that is placed on the right of way and is located within 30 feet of the traveled way.

GENERAL NOTES

SHEET H

SHEET 3D

COUNTY: WILLIAMSON

CONTROL: 0337-01-029

HIGHWAY: SH 29

Any work requiring lane closures shall have appropriate portable changeable message boards functional at that location 2 weeks prior to the closures or as shown on the plans. These shall provide advance notice of the closures to the traveling public. The actual message to appear on the boards shall meet the approval of the Engineer.

The use of advance warning flashing arrow panels is required for the closing of traffic lanes. The Contractor shall be required to furnish one stand-by unit, in good working condition at the job site, ready for immediate use.

Access to all side streets and driveways shall be maintained at all times at the sole expense of the Contractor.

The Contractor will be required to furnish advisory speed signs in sufficient number as determined by the Engineer. The Contractor shall have sufficient manpower available to revise traffic control as directed by the Engineer.

For any roadway drop-off greater than 2 inches adjacent to a roadway, which is under traffic, the Contractor will be required to incorporate and maintain a 3:1 safety wedge into the proposed construction. All work involved shall be considered subsidiary to Item 502.

Projects limited to surfacing operations only will not require the use of Truck Mounted Attenuators.

The Contractor shall provide to the Engineer a letter certifying that all Truck-Mounted Attenuators (TMA) used on this project that were purchased on or after October 1, 1998, have been found to be crashworthy using the criteria outlined in the National Cooperative Research Program (NCHRP) Report 350. If the TMA was purchased prior to October 1, 1998, a letter certifying crashworthiness using the criteria outlined in either NCHRP Reports 230 or 350 shall be provided to the Engineer.

All permanent signs necessary for the operation of any roadway shall be installed by the Contractor prior to opening that section of roadway to traffic regardless of the phase during which the roadway construction occurs. The Contractor may erect the signs on temporary mounts until such time as the permanent mounts may be installed. Any costs associated with the temporary mounts shall be considered subsidiary to Item 502. Any signs, which are damaged by the Contractor's operations during construction or deemed insufficient by the Engineer, shall be repaired or replaced at the sole expense of the Contractor. The Engineer will be the sole judge of the adequacy of the sign(s).

#### **ITEM 504**

One (1) field office Type "B" structure will be required.

The Contractor shall construct a six feet chain link barrier fence around the field office at a site determined by the Engineer. This enclosure is to be approximately 100 feet x 100 feet, have one

GENERAL NOTES SHEET I

PROJECT NUMBER: CC 337-1-29

SHEET 3D

COUNTY: WILLIAMSON

CONTROL: 0337-01-029

HIGHWAY: SH 29

twelve foot vehicular gate, and is for the exclusive use of state personnel and state vehicular storage. A security light will be required. Upon completion of the project, the fence shall be removed and become the property of the Contractor. All required work and materials will not be paid for directly but shall be considered subsidiary to the various bid items.

When hot mix asphaltic concrete is being produced, the hot mix asphaltic concrete material supplier shall provide to TxDOT and/or their representative a computer and printer at the plant. This computer and printer will be located in the lab in which TxDOT testing is conducted. This computer will be for the sole use of TxDOT and/or their representative. This computer must be equipped with an Internet service provider, electronic mail software, and Microsoft® EXCEL. The operating system and all software must be compatible with the systems and software employed by TxDOT.

The Contractor shall furnish a Type D structure for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to the requirements of Item 504, this structure shall have a minimum height of 8 feet and provide a minimum of 400 square feet of gross floor area for permanently located asphalt plants or 200 square feet for temporary located plants serving one project. The floor area will be partitioned into a minimum of two interconnected rooms, each room furnished with an exterior door and a minimum of two windows. The floor shall have sufficient strength to support the testing equipment and have an impervious covering.

The Type D structure shall be adequately air conditioned and be furnished with a minimum of one desk, three chairs, one file cabinet, a telephone, and one built-in equipment storage cabinet for the storage of nuclear equipment. The cabinet shall be a minimum of 3 feet wide by 2 feet deep by 3 feet high and shall have provisions for locking securely. The structure shall be provided with a 240-volt electrical service entrance. The service shall consist of a minimum of four 120-volt circuits with 20-amp breakers and no more than two grounded convenience outlets per circuit and provisions for a minimum of two 220-volt ovens with vents to the outside. The structure shall have a minimum of two convenience outlets per wall, and a utility sink with an adequate clean potable water supply for testing. Space heaters for heating the structure are unacceptable. Portable structures shall be support blocked for stability and tied down.

If the asphalt content is determined by utilizing the ignition method, the structure shall provide for the following in lieu of the Item 504 requirements for asphalt content by extraction. The room to contain the ignition oven shall be adequately power ventilated and contain a NEMA 6-50R (208/240 V, 50 A) outlet within two feet of the ignition oven location, and an independent exhaust outlet to the outside no further than eight feet from the oven. The surface for the ignition oven location shall be level, sturdy, and fireproof with at least 0.5 feet clearance between the furnace and other vertical surfaces.

The Contractor will provide cleaning services to the field office as needed, but not less than once a week. This will include, but not be limited to sweeping and mopping floors, cleaning the toilet and lavatory, and emptying wastebaskets.

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An equivalent structure may be substituted in lieu of that specified under this item. Equivalent structure shall be as determined by the Engineer, and accepted only with his/her written approval.

A chemical toilet shall be provided adjacent to the field office for the exclusive use of state personnel assigned to this project.

#### **ITEM 512**

At such times when the Portable Concrete Traffic Barrier and connecting hardware is not required, these items shall be stockpiled within the limits of the project or at a location of equal haul distance as directed by the Engineer. The connecting hardware shall be bundled in order to prevent theft or loss at the storage facility. Upon completion of this project the Portable Concrete Barrier will be stockpiled at a location determined by the Engineer. This haul distance will not exceed five miles one way. The Contractor shall point and patch damaged barrier, as determined by the Engineer, prior to removal from project.

#### **ITEM 530**

Final driveway locations will be determined by the Engineer.

#### **ITEM 540**

Limits of the metal beam guard fence may be modified to the extent determined by the Engineer prior to erection.

All proposed MBGF should be new rail furnished from the Contractor's new stock. Timber posts shall be round, domed, and shall not be painted. Steel posts will be required at locations where the minimum embedment shown in the plans for wooden posts cannot be achieved. The steel post lengths shall be field verified prior to fabrication. Unless otherwise shown on the plans, the steel posts are subsidiary to this item.

When the roadway is constructed in one-half widths, the Contractor shall install all permanent metal beam guard fence and/or delineators on that section before opening the road to traffic.

Prior to beginning the installation of the proposed MBGF, the Contractor shall stake the locations for approval by the Engineer.

#### **ITEM 542**

All removed guardrail and end sections will become the property of the Contractor and be removed from the project.

#### **ITEM 556**

Pipe underdrains shall be placed as directed by the Engineer during construction.

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Filter material (Type F) shall meet the gradation requirements of concrete coarse aggregate (Grade 2, 3 or 4).

#### **ITEM 560**

Each new mailbox installation shall be supplemented with a Type 2 object marker placed on the mailbox support in a vertical position 6" below the bottom of the mailbox.

On tubular supports, reflective tape may be used to simulate a Type 2 marker. If reflective tape is used, it shall meet the requirements of departmental specification, D-9-8600. The simulated marker shall consist of three 2 ¾" x 2 ¾" pieces of yellow high intensity tape spaced 1" apart.

If delineator post supports are used, the Type 2 marker shall consist of OM-2SR or OM-2VP object markers. Bi-directional brackets may be required on Size 2 mailbox installations.

All labor and materials shall be considered subsidiary to Item 560.

#### **ITEM 580**

The Contractor shall be responsible for sweeping, mowing, and the removal of all litter on the right-of-way within the project limits to keep the site of the work in a neat and presentable condition at all times. Direct payment for this work will not be made for under this Item but will be considered subsidiary to Item 500 "Mobilization."

#### **ITEM 610**

Sections of roadway illumination for partial acceptance shall be by completed power stations and related circuits.

Luminaire ballasts furnished for this lighting system shall have a 240-volt operating range.

#### **ITEM 618**

Refer to plans and specifications for type of conduit. All couplings and connections shall be tight and waterproof. All proposed and existing conduit shall be brought into a pull box and elbowed unless otherwise shown. Where a conduit run terminates, a bushing shall be provided to protect the wire from abrasion. In the event any conduit shown on these plans or existing proves to be unusable due to location or damage; it will be the responsibility of the Contractor to replace such section of conduit with the size and type indicated on these plans. Any riprap, which must be removed to install conduit, shall be saw cut and replaced by like material and texture as directed by the Engineer.

Place conduit at a minimum depth of 24" unless otherwise shown on the plans or directed by the Engineer.

Conduit shall be placed in an area not exceeding 2 feet in any direction from a straight line and the depth of the conduit shall be 2 feet except when crossing a roadway where the depth shall not

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be more than 3 feet nor less than 1 foot below the bottom of the base material in the roadway when placed by the jacking or boring method. Any evidence of damage to the roadway during the jacking or boring operation shall be sufficient grounds to stop the method being used.

The conduit shall be placed on a two-inch sand cushion and then backfilled with a minimum of six inches sand fill. The remainder of the trench shall be backfilled with flexible base, soil, or two-sack concrete as required by the location of the conduit or as directed by the Engineer.

The open trench method of placing conduit will not be allowed unless prior approval is obtained from the Engineer.

When the specifications for electrical items require UL listed products, it will be construed to mean UL listed or CSA listed.

Rigid metal conduit elbows will not be utilized within the traffic signal installed within this contract. All conduit elbows and rigid metal extensions required to be installed on PVC conduit systems will not be paid for separately, but will be considered subsidiary to the various bid items of this project.

#### **ITEM 620**

All wiring not covered by the plans and specifications shall be in accordance with the National Electric Code (NEC) and the appropriate TxDOT standard sheets.

Provide breakaway electrical connectors for breakaway poles. Use Bussmann HEBW, Littelfuse LEB, Ferraz-Shawmut FEB, or equal on ungrounded conductors. For grounded conductors, use Bussmann HET, Littelfuse LET, Ferraz-Shawmut FEBN, or equal. These breakaway connectors have a white colored marking and a permanently installed solid neutral. See the latest RID (2) standard for additional details.

Electrical work performed by non-certified persons, as defined in Special Provision to Item 8, is not in accordance with the requirements of the Contract and may be rejected as unsuitable for use due to poor workmanship.

The required electrical certification course is available and is scheduled periodically by TEEX. Alternatively, contractors may purchase an entire course for their personnel to be held at a time and location of their choice as negotiated through TEEX. For more information, contact:

Texas Engineering Extension Service (TEEX)
TxDOT Electrical System Course
(979) 845-6563
(979) 845-6563

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#### **ITEM 628**

The Signal System will require 120/240-Volt power service provided by the local electric utility company. The Contractor is responsible for making all arrangements with the local electric utility for the establishment of new services.

Provide solid-state lighting contactors at services rated 60 amps or less, instead of the electromechanical contactors shown on the plans. Meet the following requirements for solid-state contactors:

- 1. Ensure the enclosure provides sufficient heat dissipation space. Consult the solid state contactor manufacturer for detailed calculations.
- 2. Surface mount the contactor in the enclosure.
- 3. Provide a 2 year limited warranty on defects and workmanship.
- 4. Ensure the contactor is rated for 240 volt input power and is capable of switching 120, 240, or 480 volt loads.
- 5. Mark the contactor with the part number.
- 6. Ensure the contactor is capable of operating between -40° F and 150° F.
- 7. Ensure the power module operates at 1200 Volts.
- 8. Provide zero crossing design type contactors.
- 9. Mount contactor onto an aluminum heat sink.
- 10. Equip the contactor with an over-temperature sensor set at 167° F that will switch off the contactor if the temperature is exceeded.
- 11. Ensure that the unit will automatically reset to normal operation after a high temperature switch off when the temperature returns to normal operating range.
- 12. Provide LED indicating light for control power applied.

#### **ITEM 644**

All small signs not detailed in the plans shall be built in accordance to the latest edition of the "Standard Highway Sign Designs for Texas." Where a sign size or particular legend is shown and such sign size or legend is not shown in the publication, the Contractor shall furnish the sign as detailed in the plans.

#### **ITEM 656**

The Contractor shall be allowed to field cut holes for anchor bolts only as directed by the Engineer.

The Contractor shall calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Contractor will install two (2) 3" PVC and one (1) 2" PVC conduits into the 48-A foundations from the adjacent signal ground box. Contractor will install one (1) 3" PVC and two (2) 2" PVC conduits into the 36-A foundations from the adjacent signal ground box. Contractor will install

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two (2) 2" PVC conduits into the 24-A foundations (Ped Poles) from the adjacent signal ground box. This work shall be considered subsidiary to Item 680.

#### **ITEM 662**

The Contractor shall be responsible for removing work zone pavement markings within 48 hours after permanent striping has been completed.

Use of temporary flexible-reflective tabs will not be allowed.

Foil backed pavement markings will not be allowed.

#### **ITEM 666**

Type I Reflectorized Pavement Markings shall be placed no sooner than 4 days after applying the final course of HMAC.

The Contractor shall be responsible for referencing existing channelizing islands, gores, and lane striping prior to commencing work. The referencing shall include a sketch of the layout, which shall be provided to the Engineer. The Engineer prior to installation of any permanent pavement markings shall approve placement of guidemarks. This work shall be considered subsidiary to the various bid items.

#### **ITEM 672**

Bituminous adhesive shall be used to bond all raised pavement markers to the pavement.

The bituminous adhesive shall be placed at a temperature range of 380° F to 390° F. The pavement marker shall be placed on the bituminous adhesive approximately twenty (20) seconds after the adhesive is placed on the pavement. The pavement marker shall rest solely on the adhesive and not the pavement surface. There shall be at least a one eighth (1/8) inch layer of bituminous adhesive between the pavement marker and the pavement surface.

Raised pavement markers shall be placed no sooner than 4 days after applying the final course of HMAC.

The raised pavement markers used for the broken white stripe (lane lines) shall be placed at 40-foot spacing unless otherwise directed by the Engineer.

#### **ITEM 677**

The Contractor will be responsible for removal and disposal of, off of the right of way, any existing raised pavement markings before beginning surfacing operations. The existing traffic buttons and/or pavement markers shall be removed by the Contractor daily, as work progresses, and as approved by the Engineer. This work shall be considered subsidiary to the various bid items.

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#### ITEM 680

The Contractor shall be responsible to take control of all signals within the project limits as shown in the plans, to commence within 30 days after the start of work. The Contractor's attention is directed to the fact that both overhead and underground utilities exist in the vicinity of this construction. The exact location of underground utilities is not certain. The Contractor shall contact the area utility companies for exact locations at least 48 hours prior to commencing any work that might affect present utilities. The contractor will be responsible for any costs associated with damage to the existing utilities.

This project shall consist of the installation of all of the materials necessary for a complete signal system as follows:

For this project, the complete Controller Assemblies, signal mast arms, illumination pole w/ arm and VIVDS Camera Systems (to include Mounting Brackets), will be provided by the Engineer. The contractor shall provide all other equipment, install foundations, and all field wiring which shall be properly labeled in accordance with the plans. The contractor shall also provide the foundation for the controller assembly. The Contractor shall install the controller on the completed foundation, connect all field wiring to the controller assembly's back panel, install the conflict monitor, and other equipment. The Engineer will install the signal programming and set the signal on flash. After it has been determined by the Engineer that the field wiring (including any video coax connections) and controller operation are satisfactory and all other requirements of the contract have been met, the Engineer will relieve the Contractor of any other responsibilities for the operation of the signal.

When assuming maintenance and operations of the traffic signal within the limits of this project, the Contractor will be allowed to use the existing Controller at IH-35 and SH 29 to keep the signal active during construction. The contractor shall make arrangements with the District Signal shop for access to the controller. All necessary work required for maintenance and operation of this Controller shall be considered subsidiary to this bid item.

The Contractor is responsible for furnishing all other materials, tools, and labor required to provide a completed installation in accordance with the plans and specifications. All new materials provided by the Contractor shall be new undepreciated stock.

All permanent signs mounted on the traffic signal wires, traffic signal poles, or traffic signal mast arms shall be furnished and installed by the Contractor. The cost of the signs, hardware and erecting the signs shall be subsidiary to Item 680, "Installation of Highway Traffic Signals."

The traffic signal shall not be placed into operation until all required striping is complete and all conflicting signing is removed.

The Contractor will be responsible for picking up materials provided by the State from the traffic signal shop at the Austin District Headquarters. The contractor will contact the traffic signal supervisor a minimum of two weeks prior to the need for the signal controller so that

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arrangements can be made for its availability. The traffic signal supervisor can be contacted at (512) 832-7200.

Airwings shall be installed on all mast arms 30 feet and over.

A State Force Account has been set up within the Project to reimburse the State for the cost of providing the Controller Assemblies, Mast Arm Poles, Spread Spectrum radios and antennas, luminaire pole with arm, and VIVDS Camera Systems (to include Mounting Brackets).

The signal at IH 35 and SH 29 will require the northbound frontage road signal heads and cameras to be rewired so they can be connected to the new controller. The existing conductor wires in the bridge railing conduits (two 2") will have to be removed in order to make room for the new wiring. No splices will be allowed. The contractor shall make arrangements for police officers to be on hand for traffic control while the signal is dark. The contractor will use the same size wire to reconnect the signal heads that was removed. The costs associated with this rewiring will be subsidiary to this bid item.

#### **ITEM 681**

Under this project there are two separate Temporary Traffic Signals. The temporary signal at IH 35 and SH 29 will use the existing signal poles on the southbound frontage road and controller until the final traffic control phase is complete, unless the pole on the island at the SW corner of this intersection needs moving. If a temporary pole is needed at this location the cost will be considered subsidiary to this bid item.

The temporary signal at CR 265 will be using the 30' poles from the 60' mast arm assemblies. During the different stages of construction, span wires will be attached to the poles in order to allow signal heads to move along the wires as needed. Extra conductor wire will be coiled up near the heads for these movements. This signal will be bagged until warrants are met.

The location of heads will have to be modified to meet requirements of the traffic control plans for both traffic signals found within this project. All costs related to the relocation of the signal heads will be considered subsidiary to this item. Video cameras will be provided by the State for these phases. Contractor is to notify the Austin District Signal Shop in advance of changes in traffic control so that video detection changes can be scheduled. The extra cameras (4) that are used for the temporary signal are to be returned to the State after their use is complete.

#### **ITEM 682**

The Signal Heads shall be made of Aluminum and shall be hooded and covered until the signal system is put into initial flash operation.

Each signal head shall be one way with the proper number of sections as shown in the plans. Each head shall be bright yellow in color.

All traffic signal heads installed within this project shall have back plates.

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The Contractor shall furnish all lamps required for the traffic signal installation. The Contractor shall at his own expense replace all burned out or defective lamps for a period of four (4) weeks from the date of the initial flash turn on. At the end of this four (4) week period, the Engineer will relieve the Contractor of any maintenance of the signal system.

LED traffic signal lamp will be required for traffic signal heads installed within this project. All LED lamps provided shall be listed on TxDOT's pre-qualified list. Do not use the "Precision" brand LEDs.

#### **ITEM 684**

A minimum of 2 feet for each cable run shall be left in each pull box and a minimum length of 2 feet shall be left in each steel pole in addition to the required length for each separate cable. For each conductor terminating in the controller cabinet, an extra 5-foot length will be provided. All conductors are to be continuous without splice from terminal point to terminal point or as otherwise directed by the Engineer. Wire nuts will not be permitted.

#### ITEM 3146

No HMAC (surface course) shall be placed until all roadways are completed.

Laydown operations shall be performed in such sequence that the longitudinal joint will be carried along without excess distance of lapback, not to exceed one day's operation, unless otherwise authorized by the Engineer.

All hot mix joints of 2 inches or greater will be laid with a device creating a maximum 3:1 notched wedge joint. All work involved shall be considered subsidiary to Item 502.

The transitions from newly placed HMACP to existing HMACP shall be accomplished by use of a milled transition to a butt joint. This transition shall run from 0 in. to 2 in at a 50:1 slope. The width shall equal the mat being laid. This joint shall consist of one paper joint wide minimum and will be cut with the use of a saw to ensure a clean transition. This work will be considered part of normal paving operations and will not be paid for directly, but shall be subsidiary to Item 3146

Any adjustments or changes made to a job mix formula must be submitted to the Austin District Laboratory prior to production of the new job mix formula.

The aggregate classification for the surface course HMAC shall be class B.

#### **ITEM 5519**

The Contractor shall furnish the State inspector with two (2) cellular phones. The cellular phones shall be small enough to carry on a belt holster. The Contractor shall obtain the Engineer's approval for the proposed cellular phones service plan prior to having it put into service.

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HIGHWAY: SH 29

#### **ITEM 5788**

The interlocking modular concrete paving units shall be placed as shown in the plans and details.

Placement of concrete pavers shall not take place until after installation of permanent signing and signals.

The paving units shall be delivered to the job site on pallets, and shall be bound in such a manner that no damage occurs to the product during any handling, hauling, and/or unloading.

Paving units shall be "Holland-Stone" as manufactured by Pavestone Co., 1900 Clovis Barker Road, San Marcos, Texas 78666, or approved equal. The paving unit thickness shall be 2-3/8 inches. The Contractor shall submit samples of colored pavers to the Engineer. The Engineer will determine the color to be used. The paving units shall conform to the ASTM designation C936-82.

The installation Contractor shall have a minimum 3 years experience in the installation of interlocking concrete pavers.

All edges of the installed paving units not restrained by the concrete curb and gutter shall be restrained by a Type F curb as shown on the plans and details.

Base material shall be prepared as detailed in the plans. The base shall be shaped to grade and cross section with an allowable tolerance of 1/4 inch.

The base shall be 3-3/8 inch below final grade for 2-3/8 inch pavers. The finished base surface shall be approved, by the Engineer, prior to placement of the sand laving course.

Once screed and leveled to the desired elevation, the sand laying course shall not be disturbed in any way.

Unless otherwise shown in the plans, the paving units shall be laid in such a manner that the desired pattern (90° herringbone bond) is maintained, and the joints between the units are as tight as possible. The joints between the units shall not exceed 1/8 inch.

Surplus material shall be left on the surface during construction to insure complete filling of joints. Upon completion of all installation work, the paver surface shall be swept and cleaned of all excess soil, foreign material, and stains.

#### **ITEM 5880**

In accordance with this Item, Pay Adjustment Schedule 2 and a Localized Roughness Penalty of \$500 per occurrence shall be used on this project.

Equipment used for determining ride quality shall be Type "B."

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#### **ITEM 6010**

The Contractor will contact the Traffic Signal Supervisor a minimum of two weeks prior to the need to begin the modification of the existing traffic signal. The Traffic Signal Supervisor can be contacted at (512) 832-7200.

The Contractor will deliver the signal poles, controller and VIVD system components removed within this contract to the Traffic Signal Shop at the Austin District Headquarters.

All other materials removed under this item and not designated for reuse or retention by the State shall become the property of the contractor and shall be removed from the right of way. All costs related to the disposal of these materials or to the delivery of these materials to the State shall be considered subsidiary to this Item.

#### **ITEM 6670**

The Contractor shall be responsible for providing Three (3) electronic portable changeable message signs (EPCMS) as part of the traffic control operations. Of these, One (1) shall serve as backup and shall be operational and available on the job site at all times during traffic control operations.

#### **ITEM 8288**

Under this item, the contractor will install Spread Spectrum systems at the two signals in this project. Antennas will be installed at the pole nearest the controller. The contractor will install the Spread Spectrum cable in continuous and separate runs from each antenna to the controller. Spread Spectrum cable shall not be installed in the same conduit as illumination conductors. An additional 10-foot length of the coax cable will be provided at the controller for final installation in the controller by State forces.

The State will install the Spread Spectrum radio into the controller, aim the antennae, and complete any other work that is necessary to bring the coordination of traffic signals into operation.

The contractor will provide the incidentals needed to install the radio cable. The Spread Spectrum radio coax cable to be provided by the Contractor will be Beldon LMR 600 or product approved by Austin District Signal Shop.

#### **ITEM 8970**

Within this project, the contractor will install a Video Imaging Vehicle Detection System (VIVDS) camera onto the traffic signal mast arm at the locations indicated in the set of plans. Such installation will be made utilizing the attachment mechanisms provided with the camera system. The Contractor will then attach and place the VIVDS communication cable (coaxial) and Traffic Signal Cable (TY A)(3 Conductor)(16 AWG) in continuous and separate runs from the VIVDS camera to the connection in the controller.

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State forces will then aim and adjust the camera and complete any other necessary work that is necessary to bring the traffic signals back into operation.

The entire Video Imaging Vehicle Detection System, to include the cameras and processor units, will be provided by the State. The VIVDS system also contains the attachment mechanisms needed to attach the cameras onto the mast arms.

The Contractor will provide the Traffic Signal Cable (TY A)(3 Conductor)(16 AWG) and VIVDS Communication Cable above, as well as any incidentals necessary to install them.

All costs associated with the installation of the cameras onto the traffic signal mast arms, as well as providing the Traffic Signal Cable and VIVDS Communication Cable, will be considered subsidiary to this item.

GENERAL NOTES

SHEET U

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|      |          |      |       |       |        |      |          | 13333.000  |          |      | 0535 |       | DRILL SEED (TEMP) (WARM)                  | SY       | 13333.000 |                                       |
|      |          |      |       |       |        |      |          | 13333.000  |          | 164  |      |       | DRILL SEED (TEMP) (COOL)                  | SY       | 13333.000 |                                       |
|      |          |      |       |       |        |      |          | 26667.000  |          | 164  |      | 006   | DRILL SEED (PERM) (RURAL) (CLAY)          | SY       | 26667.000 |                                       |
|      | ·        | ·    |       |       |        |      |          | 533.000    |          | 168  |      |       | VEGETATIVE WATERING                       | MG       | 533.000   |                                       |
|      |          |      |       |       |        |      |          | 267.000    |          |      | 0502 |       | VEG WATERING (TEMP EROSN CONTROL)         | MG       | 267.000   |                                       |
|      |          |      |       |       |        |      |          | 3468.000   |          |      | 0520 |       | ASPH (HFRS-2)                             | GAL      | 3468.000  |                                       |
|      |          |      |       |       |        |      | <u> </u> | 72.000     |          |      | 0521 |       | AGGR (TY B GR5)                           | CY       | 72.000    |                                       |
|      |          |      |       |       |        |      |          | 2480.000   |          | 354  | 0558 |       | PLANE ASPH CONC PAV (5")                  | SY       | 2480.000  |                                       |
|      |          |      |       |       |        |      |          | 3110.000   |          | 354  | 0573 |       | PLAN ASPH CONC PAV (0" TO 4")             | SY       | 3110.000  |                                       |
|      |          |      |       |       |        |      |          | 7771.000   |          | 400  | 0501 |       | STRUCT EXCAV                              | CY       | 7771.000  |                                       |
|      |          |      |       |       |        |      |          | 27.000     |          | 400  | 0504 |       | STRUCT EXCAV (CULV LARGE)                 | CY       | 27.000    |                                       |
|      |          |      |       |       |        |      |          | 4191.000   |          | 402  | 0501 |       | TRENCH EXCAV PROTECTION                   | LF       | 4191.000  |                                       |
|      |          |      |       |       |        |      |          | 188.000    |          | 432  | 0501 |       | RIPRAP (CONC) (CL B)                      | CY       | 188.000   |                                       |
|      |          |      |       |       |        |      |          | 39.000     |          | 460  | 0503 | 1     | CMP (GAL STL 18 IN)                       | LF       | 39.000    |                                       |
|      |          |      |       |       |        |      |          | 37.000     |          | 462  | 0510 | 003   | CONC BOX CULV (5 FT X 6 FT)               | LF.      | 37.000    |                                       |
|      |          |      |       |       |        |      |          | 1713.000   | ,        | 464  | 0519 | 003   | RC PIPE (CL IV) (18 IN)                   | LF       | 1713.000  |                                       |
|      |          |      |       |       |        |      |          | 795.000    |          | 464  |      | 003   | RC PIPE (CL IV) (24 IN)                   | LF       | 795.000   |                                       |
|      |          |      |       |       |        |      | <u> </u> | 282.000    |          | 464  |      | 003   | RC PIPE (CL IV) (30 IN)                   | LF       | 282.000   |                                       |
|      |          |      |       |       |        |      | <b>-</b> | 493.000    |          | 464  |      | 003   | RC PIPE (CL IV) (36 IN)                   | LF       | 493.000   |                                       |
|      | -        |      |       |       |        |      | <b></b>  | 354.000    |          | 464  |      |       | RC PIPE (CL IV) (42 IN)                   | LF       | 354.000   |                                       |
| ~    |          |      |       |       |        |      | ļ        | 1174.000   |          | 464  |      | 003   | RC PIPE (CL IV) (48 IN)                   | LF       | 1174.000  |                                       |
|      | 1        |      |       |       |        |      |          | 1.000      |          | 465  |      |       | MANH (COMPL) (TY A)                       | EA       | 1.000     | · · · · · · · · · · · · · · · · · · · |
|      |          |      |       |       |        |      |          | 11.000     | <u> </u> | 465  |      |       | INLET (COMPL) (TY II) (10')               | EA       | 11.000    |                                       |
|      |          |      |       |       |        |      |          | 18.000     |          | 465  |      |       | INLET (COMPL) (TY II) (15')               | EA       | 18.000    |                                       |
|      |          |      |       |       |        |      | <u> </u> | 4.000      |          | 465  |      |       | INLET (COMPL) (TY IIR) (10 FT)            | EA       | 4.000     |                                       |
|      |          |      |       |       |        |      |          |            |          | 465  |      |       | INLET (COMPL) (TY IIR) (15 FT)            | EA       | 3.000     |                                       |
|      |          |      |       |       |        |      |          | 3.000      |          | 466  |      | 007   | WINGWALL (PW-N) (H= 6 FT)                 | EA       | 2.000     |                                       |
|      |          |      |       |       |        |      |          | 4.000      |          | 467  |      |       | SAFE END TRT (TY II) (18 IN) (RCP) (6: 1) | EA       | 4.000     |                                       |
|      |          |      |       |       |        |      | <b></b>  | 2.000      |          | 467  |      | . 1   | SAFE END TRT (TY II) (18 IN) (CMP) (4: 1) | EA       | 2.000     |                                       |
|      |          |      |       |       |        |      | <b></b>  | 602.000    |          |      | 0504 |       | REMOV OLD STR (PIPE)                      | LF       | 602.000   |                                       |
|      |          |      |       |       |        |      |          | 22.000     |          |      | 0502 |       | REMOVE OLD STR (PIPE) (BOX CULVERT)       | LF       | 22.000    |                                       |
|      |          |      |       |       |        |      | <b></b>  | 1.000      |          |      | 0501 |       | MOBILIZATION                              | LS       | 1.000     |                                       |
|      | ļ        |      |       |       |        |      | <b></b>  |            |          |      |      |       | BARRICADES, SIGNS AND TRAF HANDLE         | MO       | 10.000    |                                       |
|      | <b>_</b> |      |       |       |        |      |          | 10.000     |          |      |      |       | CONSTRUCT DETOURS (CL 3)                  |          |           |                                       |
|      |          |      |       |       |        |      |          | 1198.000   |          |      | 0503 |       |   | SY<br>LF | 1198.000  |                                       |
|      |          |      |       |       |        |      |          | 200.000    |          |      |      |       | PORT CTB (LOW PRF TY 2) (MOVE & RESET)    |          | 200.000   |                                       |
|      |          |      |       |       |        |      | <u> </u> | 4240.000   |          |      |      |       | PORT CONC TRF BAR (LOW PRF TY 1) (REMOV   |          | 4240.000  |                                       |
|      |          |      |       |       |        |      | <b>.</b> | 4240.000   |          |      |      |       | PORT CTB (LOW PRF TY 1) (FURN & INSTL)    | LF       | 4240.000  |                                       |
|      |          |      |       |       |        |      |          | 400.000    |          |      |      |       | PORT CTB (LOW PRF TY 2) (FURN & INSTL)    | LF       | 400.000   |                                       |
|      |          |      |       |       |        |      |          | 4060.000   |          |      |      |       | PORT CTB (LOW PRF TY 1) (MOVE & RESET)    | LF       | 4060.000  |                                       |
|      |          |      |       |       |        |      |          | 400.000    |          |      |      |       | PORT CTB (LOW PRF TY 2) (REMOVE)          | LF       | 400.000   |                                       |
|      |          |      | -     |       |        |      | <u> </u> | 20627.000  |          |      | 0532 |       | CONC CURB & GUTTER (TY II)                | LF       | 20627.000 |                                       |
|      |          |      |       |       |        |      |          | 2163.000   |          |      |      |       | DRVWYS (CONC) (6 ")                       | SY       | 2163.000  |                                       |
|      |          |      |       |       |        |      |          | 643.000    |          | 531  | 0502 | 018   | CONCRETE SIDEWALKS                        | SY       | 643.000   |                                       |
|      |          |      |       |       |        |      |          | 89.000     |          | 531  | 0512 | 018   | CONCRETE SIDEWALK (MEDIAN CROSSINGS)      | SY       | 89.000    |                                       |
|      |          |      |       |       |        |      |          | 400.000    |          | 540  | 0504 | 1 024 | MTL BEAM GD FEN (BLKOUT) (12 GA)          | LF       | 400.000   |                                       |
|      |          |      |       |       |        |      | 1        | 200.000    |          | 5.45 | 050  |       | REMOV METAL BEAM GUARD FENCE              | LF       | 200.000   |                                       |

ESTIMATE

2

QUANTITY

SHEET

| STATE<br>DIST. NO. | COUNTY     | PROJECT NO. | SHEET<br>NO. |
|--------------------|------------|-------------|--------------|
| 14                 | WILLIAMSON | CC 337-1-29 | 4            |

|   |              |      |       |             |              |   |   | <del>~</del> | SUM          | <del></del>    |         |     |  | -        |                     |            |
|---|--------------|------|-------|-------------|--------------|---|---|--------------|--------------|----------------|---------|-----|--|----------|---------------------|------------|
| <del></del>                             |              |      |       |             |              |   |   | WILLIAMSON   |              |                | <b></b> |     |  | 11       |                     |            |
|   |              |      |       |             |              |   |   | CSJ 0337-0   | 01-029       |                | TEM     |     |  |          | TOTA                | <b>\ 1</b> |
|   |              |      |       | ·           | 1            |   |   |              | <u> L</u>    | _  (           | CODE    | Ξ   | DESCRIPTION  |          | 1017                | <b>1</b> ∟ |
|   |              |      |       |             |              |   |   | ROADWA       |              | [ <del>]</del> | 1 000   |     |  | 1 ± L    |                     |            |
| EST.                                    | FINAL        | EST. | FINAL | EST.        | FINAL        | EST.                                    | FINAL                                   | EST.         | FINAL        |                | Ses     | _   |  |          | EST.                | FINAL      |
|   | ļl           |      |       |             |              |   |   | 2.000        |              |                | 0503    |     | REMOV TERMINAL-ANCHOR SECTION  | EA       | 2.000               |            |
|   |              |      |       |             |              |   | ,                                       | 100.000      |              |                | 0507    |     | PIPE UNDDR (TY 7) (6 ")  | LF       | 100.000             |            |
|   | <b> </b>     |      |       |             |              |   |   | 9.000        |              | 560            | 0501    |     | MAILBOX INSTAL (SINGLE)  | EA       | 9.000               |            |
|   |              |      |       |             |              |   |   | 1.000        |              | 610            | 0532    |     | RDWY ILL ASSEM (SPECIAL)   | EA       | 1.000               |            |
|   | ļ            |      |       |             |              |   |   | 151.000      |              |                | 0511    | 4   | CONDUIT (PVC) (SCHD 40) (2 ")  | LF       | 151.000             |            |
|   |              |      |       |             |              |   |   | 4452.000     |              |                |         |     | CONDUIT (PVC) (SCHD 40) (3 ")  | LF       | 4452.000            |            |
|   |              |      |       |             |              |   |   | 50.000       |              | 618            | 0514    |     | CONDUIT (PVC) (SCHD 40) (4 ")  | LF       | 50.000              |            |
|   |              |      |       |             |              |   |   | 962.000      |              | 620            | 0503    |     | ELEC CONDUCTOR (NO. 8) BARE  | LF       | 962.000             |            |
|   |              |      |       |             |              |   |   | 33.000       |              | 620            | 0504    |     | ELEC CONDUCTOR (NO. 6) BARE  | LF       | 33.000              |            |
|   |              |      |       |             |              |   |   | 1059.000     |              | 620            | 0509    |     | ELEC CONDUCTOR (NO. 8) INSULATED   | LF       | 1059.000            |            |
|   |              |      |       |             |              |   |   | 263.000      |              | 620            | 0510    |     | ELEC CONDUCTOR (NO. 6) INSULATED   | LF       | 263.000             |            |
|   | -            |      |       |             |              |   |   | 8.000        |              | 624            | 0501    |     | GROUND BOX TY A (122311) W/APRON   | EA       | 8.000               |            |
|   | <del> </del> |      |       |             |              |   |   | 6.000        |              | 624            | 0503    |     | GROUND BOX TY C (162911) W/APRON   | EA       | 6.000               |            |
|   |              |      |       |             |              |   |   | 700.000      |              | 625            | 0501    |     | ZINC-COAT STL WIRE STRAND (1/4 IN)                                       | LF       | 700.000             |            |
|   | <u> </u>     |      |       |             |              |   |   | 700.000      |              | 625            | 0502    |     | ZINC-COAT STL WIRE STRAND (3/8 IN)                                       | LF       | 700.000             |            |
|   | <del> </del> |      |       |             |              |   |   | 2.000        |              | 628            | 0851    |     | ELC SRV TY D (120/240) 100 (NS) AL (E) PS (U)                            | EA       | 2.000               |            |
|   |              |      |       |             |              |   |   | 19.000       |              | 636            | 0501    |     | ALUM SIGNS (TY A)  | SF       | 19.000              |            |
|   | -            |      |       |             |              |   |   | 25.000       |              | 644            | 0608    |     | SM RD SGN ASSM TY TWT (1) UA (P)   | EA       | 25.000              |            |
|   |              |      |       |             |              |   |   | 8.000        |              | 644            | 0610    |     | SM RD SGN ASSM TY TWT (1) UA (T)   | EA       | 8.000               |            |
|   |              |      |       |             |              |   |   | 4.000        |              | 644            | 0614    |     | SM RD SGN ASSM TY 10BWG (1) SA (P)                                       | EA       | 4.000               |            |
|   |              |      |       |             |              |   |   | 4.000        |              | 644            | 0615    |     | SM RD SGN ASSM TY 10BWG (1) SA (P-BM)                                    | EA       | 4.000               |            |
|   | -            |      |       |             |              |   |   | 2.000        |              | 644            | 0619    |     | SM RD SGN ASSM TY 10BWG (1) SA (U)                                       | EA       | 2.000               |            |
|   | <del> </del> |      |       |             |              |   |   | 36.000       |              | 656            | 0510    |     | FND FOR TRAF SIG (24 IN DRIL SHFT)                                       | LF       | 36.000              |            |
|   |              |      |       |             |              |   |   | 27.000       |              | 656            | 0512    |     | FND FOR TRAF SIG (36 IN DRIL SHFT)                                       | LF       | 27.000              |            |
|   |              |      |       |             |              |   |   | 88.000       |              | 656            | 0514    | -   | FND FOR TRAF SIG (48 IN DRIL SHFT)                                       | LF       | 88.000              |            |
|   |              |      |       |             |              |   |   | 5.000        |              | 656            | 0518    |     | TRAF SIG CNTRL FND   | CY       | 5.000               |            |
| ······································  |              |      |       |             |              |   |   | 8.000        |              | 658            | 0501    |     | DEL ASM TY A (D-SW)  | EA       | 8.000               |            |
|   |              |      |       |             |              |   |   | 12.000       |              | 658            | 0580    |     | OBJ MRK ASM TY 4 (OM-4R)   | EA       | 12.000              |            |
| *************************************** |              |      |       |             |              | *************************************** |   | 1660.000     |              | 662            | 0502    | 007 | WRK ZN PAV MRK REMOV (W) (4") (SLD)                                      | LF       | 1660.000            |            |
|   |              |      |       |             |              |   |   | 296.000      |              | 662            |         | 007 | WRK ZN PAV MRK REMOV (W) (4") (BRK)                                      | LF       | 119.000             |            |
| *************************************** | <del> </del> |      |       |             |              |   | · . · · · · · · · · · · · · · · · · · · | 47.000       |              |                |         |     | WRK ZN PAV MRK REMOV (W) (8") (SLD) WRK ZN PAV MRK REMOV (W) (24") (SLD) | LF       | 296.000             |            |
|   |              |      |       |             |              |   |   | 3.000        |              | 662            | 0511    | 007 | WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (W) (ARROW)    | LF       | 47.000              | ***        |
|   |              |      |       |             |              |   |   | 3.000        |              |                |         |     | WRK ZN PAV MRK REMOV (W) (WORD)  | EA<br>EA | 3.000               |            |
|   |              |      |       |             |              |   |   | 2754.000     |              |                |         |     | WRK ZN PAV MRK REMOV (Y) (4") (SLD)                                      | LF       | 3.000<br>2754.000   |            |
|   |              |      |       |             |              |   |   | 481.000      |              |                |         |     | WRK ZN PAV MRK REMOV (Y) (4") (BRK)                                      | LF       | 481.000             | ·          |
|   | T            |      |       |             |              |   |   | 11865.000    |              |                |         |     | WRK ZN PAV MRK NON-REMOV (W) (4") (SLD)                                  | 1        | 11865.000           |            |
|   |              |      |       |             |              |   | ···                                     | 593.000      |              |                |         |     | WRK ZN PAV MRK NON-REMOV (W) (4") (BRK)                                  |          | 593.000             |            |
|   |              |      |       |             | <del>-</del> |   |   | 2348.000     |              |                |         |     | WRK ZN PAV MRK NON-REMOV (W) (8") (SLD)                                  |          | 2348.000            |            |
|   |              |      |       |             |              |   |   | 146.000      |              |                |         |     | WRK ZN PAV MRK NON-REMOV (W) (8") (LNDP)                                 |          | 146.000             |            |
|   |              |      |       |             |              |   |   | 351.000      |              |                |         |     | WRK ZN PAV MRK NON-REMOV (W) (24") (SLD)                                 |          | 351.000             |            |
|   |              |      |       |             |              |   |   | 18.000       |              |                | 0558    |     | WRK ZN PAV MRK NON-REMOV (W) (ARROW)                                     | EA       | 18.000              |            |
|   |              |      |       |             |              |   |   | 18.000       | <del></del>  |                | 0562    |     | WRK ZN PAV MRK NON-REMOV (W) (WORD)                                      | EA       | 18.000              |            |
|   |              |      |       |             |              |   |   | 21535.000    |              |                | 0569    |     | WRK ZN PAV MRK NON-REMOV (Y) (4") (SLD)                                  | LF       | 21535.000           |            |
|   |              |      |       |             |              |   |   | 3599.000     |              |                | 0570    |     | WRK ZN PAV MRK NON-REMOV (Y) (4") (BRK)                                  |          | 3599.000            | ·/         |
|   |              |      |       |             |              |   |   | 83.000       |              |                | 0576    | -   | WRK ZN PAV MRK NON-REMOV (Y) (24") (SLD)                                 |          | 83.000              |            |
|   |              |      |       |             |              |   |   | 2130.000     | <del></del>  |                |         | 042 |  | LF       |                     |            |
|   |              |      |       |             |              |   |   | 3309.000     |              |                |         |     | REFL PAV MRK TY I (W) (4") (BRK)   | LF L     | 2130.000            |            |
| *************************************** |              |      |       |             |              |   |   | 117.000      | <del>-</del> |                |         |     | REFL PAV MRK TY I (W) (4") (DOT)   | LF       | 3309.000            |            |
|   | t            |      |       | <del></del> |              |   |   | 6891.000     |              |                |         |     | REFL PAV MRK TY I (W) (8") (SLD)   | LF       | 117.000<br>6891.000 |            |

ESTIMATE & QUANTITY SHEET

STATE DIST. NO. COUNTY PROJECT NO. SHEET NO. 14 WILLIAMSON CC 337-1-29 4A

|      |              |         | (                                      |      |          |      | ESTIN        | <b>IATE</b>      | SUN                                   | 4ΜΔ        | \RY       | ·                                       |           |                 |       |
|------|--------------|---------|--|------|----------|------|--------------|------------------|---------------------------------------|------------|-----------|---|-----------|-----------------|-------|
|      |              |         |  |      |          |      |              | WILLIAMSON       | COUNTY                                |            |           |   | U         |                 |       |
|      |              |         |  |      |          |      |              | CSJ 0337-        | 01-029                                |            | TEM-      |   | N         | TOTA            | .1    |
|      | T            |         | T                                      |      | ·        |      |              |                  |                                       |            | CODE      | DESCRIPTION                             | '7        | 1014            | -     |
|      |              |         |  |      |          |      |              | HOADW            | AY                                    | TL         |           |   | + L       |                 |       |
| EST. | FINAL        | EST.    | FINAL                                  | EST. | FINAL    | EST. | FINAL        | EST.             | FINAL                                 | I TE       | 1 CESC NO |   |           | EST.            | FINAL |
|      |              |         |  |      |          |      |              | 140.000          |                                       | 666        | 0508 042  | REFL PAV MRK TY I (W) (8") (LNDP)       | LF        | 140.000         |       |
|      |              |         |  |      |          |      |              | 1930.000         |                                       | 666        | 0509 04   | REFL PAV MRK TY I (W) (12") (SLD)       | LF        | 1930.000        |       |
|      | <del> </del> |         |  |      |          |      |              | 1848.000         |                                       | 666        | 0512 04   | REFL PAV MRK TY I (W) (24") (SLD)       | LF        | 1848.000        |       |
|      |              |         |  |      |          |      |              | 44.000           |                                       | 666        | 0513 04   | REFL PAV MRK TY I (W) (ARROW)           | EA        | 44.000          |       |
|      |              |         |  |      | <u> </u> |      |              | 38.000           |                                       | 666        | 0517 04   | REFL PAV MRK TY I (W) (WORD)            | EA        | 38.000          |       |
|      |              |         |  |      |          |      |              | 6200.000         | · · · · · · · · · · · · · · · · · · · | 666        |           |   | LF        | 6200.000        |       |
|      | <b></b>      |         |  |      |          |      | <del> </del> | 901.000          |                                       | 666        |           |   | LF        | 901.000         |       |
|      |              |         |  |      |          |      |              | 187.000          |                                       | 666        |           |   | LF        | 187.000         |       |
|      |              |         |  |      |          |      | <del> </del> | 460.000          |                                       | 666        |           |   | LF        | 460.000         |       |
|      | <u> </u>     | <b></b> |  |      |          |      |              | 2130.000         |                                       | 666        |           |   | LF        | 2130.000        |       |
|      |              |         |  |      |          |      |              | 3309.000         |                                       | 666        |           |   | LF        | 3309.000        |       |
|      |              |         |  |      | <u> </u> |      |              | 117.000          |                                       | 666        |           |   | LF        | 117.000         |       |
|      | ļl           |         |  |      |          |      |              | 6891.000         |                                       | 666        |           |   | LF        | 6891.000        |       |
|      | <u> </u>     |         |  |      |          |      | <del> </del> | 140.000          |                                       | 666        |           |   | LF        | 140.000         |       |
|      |              |         |  |      |          |      |              | 1930.000         |                                       | 666        |           |   | LF        | 1930.000        |       |
|      |              |         |  |      |          |      |              | 1848.000         |                                       | 666        |           |   | LF        | 1848.000        |       |
|      |              |         |  |      |          |      |              |                  |                                       | 666        |           |   | EA        | 44.000          |       |
|      |              |         |  |      |          |      |              | 44.000<br>38.000 |                                       | 666        |           |   | EA        | 38.000          |       |
|      |              |         |  |      |          |      |              |                  |                                       |            |           |   | LF        | 6200.000        |       |
|      |              |         |  |      | <u> </u> |      |              | 6200.000         |                                       | 666        |           |   | LF        | 901.000         |       |
|      |              |         |  |      |          |      |              | 901.000          |                                       | 666        |           |   | LF        | 187.000         |       |
|      |              |         |  |      |          |      | <u> </u>     | 187.000          |                                       | 666        |           |   | LF        | 460.000         |       |
|      |              |         |  |      |          |      |              | 460.000          |                                       | 666        |           |   | EA        | 154.000         |       |
|      |              |         |  |      |          |      | <u> </u>     | 154.000          |                                       | 672        |           |   | EA        | 594.000         |       |
|      |              |         |  |      |          |      |              | 594.000          |                                       | 672        |           |   | EA        | 699.000         |       |
|      |              |         |  |      |          |      |              | 699.000          |                                       | 672        |           | ELIM EXT PAV MRK & MRKR (4")            | LF        | 9587.000        |       |
|      |              |         |  |      | <u> </u> |      |              | 9587.000         |                                       | 677        |           | ELIM EXT PAV MRK & MRKR (8")            | LF        | 292.000         |       |
|      |              |         |  |      | ļ        |      |              | 292.000          |                                       | 677<br>677 |           | ELIM EXT PAV MRK & MRKR (ARROW)         | EA        | 4.000           |       |
| ,,,, |              |         |  |      | <u> </u> |      |              | 4.000            |                                       |            |           | ELIM EXT PAV MRK & MRKR (WORD)          | EA        | 4.000           |       |
|      |              |         |  |      |          |      | <u> </u>     | 4.000            |                                       | 677        |           |   |           | 2.000           |       |
|      |              |         |  |      |          |      | <u> </u>     | 2.000            |                                       | 680        |           |   | EA        |                 |       |
|      |              |         |  |      |          |      | <b>_</b>     | 2.000            |                                       | 681        |           | TEMP TRAF SIGNALS FOR CONSTRUCTION      | EA<br>EA  | 2.000<br>14.000 |       |
|      |              |         |  |      | <b></b>  |      | <b>_</b>     | 14.000           |                                       | 682        |           | PED SIG SEC (2 INDICATIONS IN 1 SEC)    | EA        | 36.000          |       |
|      |              |         |  |      |          |      |              | 36.000           |                                       | 682        |           | BACK PLATE (5 SEC) (12 IN)              |           |                 |       |
|      |              |         | ************************************** |      |          |      |              | 1.000            | ·                                     |            | 0511      | BACK PLATE (5 SEC) (12 IN)              | EA<br>EA  | 1.000<br>68.000 |       |
|      |              |         |  |      | <u> </u> |      | <b>_</b>     | 68.000           |                                       |            | 0524      | VEH SIG SEC (12 IN) (W/O LENS & REFL)   |           | ļ., ,           |       |
|      |              |         |  |      |          |      | <u> </u>     | 279.000          |                                       |            | 0547      | TRAF SIG CBL (TY A) (7 CONDR) (14 AWG)  | LF        | 279.000         |       |
|      |              |         |  |      |          |      | <u> </u>     | 7164.000         |                                       |            | 0552      | TRAF SIG CBL (TY A) (3 CONDR) (16 AWG)  | LF<br>. c | 7164.000        |       |
|      |              |         |  |      |          |      |              | 2597.000         |                                       |            | 0565      | TRAF SIG CBL (TY A) (4 CONDR) (14 AWG)  | LF        | 2597.000        |       |
|      |              |         |  |      |          |      |              | 2061.000         |                                       |            | 0570      | TRAF SIG CBL (TY A) (5 CONDR) (14 AWG)  | LF        | 2061.000        |       |
|      |              |         |  |      |          |      |              | 6.000            |                                       |            | 0575 00   |   | EA        | 6.000           |       |
|      |              |         |  |      | <u> </u> |      |              | 14.000           |                                       |            | 0501      | PED DETECT (PUSH BTN)                   | EA        | 14.000          |       |
|      |              |         |  |      |          |      |              | 22.000           |                                       |            | 0501      | 12 IN LED TRF SIGNAL LAMP (RED BALL)    | EA        | 22.000          |       |
|      |              |         |  |      |          |      |              | 13.000           |                                       |            | 0502      | 12 IN LED TRF SIGNAL LAMP (YELLOW BAL   |           | 13.000          | .,    |
|      |              |         |  |      |          |      |              | 13.000           |                                       |            | 0503      | 12 IN LED TRF SIGNAL LAMP (GREEN BALL   |           | 13.000          |       |
|      |              |         |  |      |          |      |              | 9.000            |                                       |            | 0504      | 12 IN LED TRF SIGNAL LAMP (YEL ARW)     | EA        | 9.000           |       |
|      |              |         |  |      |          |      |              | 9.000            |                                       |            | 0505      | 12 IN LED TRF SIGNAL LAMP (GRN ARW)     | EA        | 9.000           |       |
|      |              |         |  |      |          |      |              | 3473.000         |                                       |            | 17 0501   | TRENCH SAFETY SYSTEMS                   | LF        | 3473.000        |       |
|      |              |         |  |      |          |      |              | 2259.000         |                                       |            | 17 0502   | PIPE (8IN) PVC (ASTM D3034 SDR-26) (WW) | LF        | 2259.000        |       |
|      |              |         |  |      |          |      |              | 508.000          |                                       |            | 17 0503   | PIPE (8IN) DI CL 350 (W)                | LF        | 508.000         |       |
|      |              |         |  |      | T        |      | l i          | 579.000          |                                       | 194        | 17 0504   | PIPE (16IN) DI CL 250 (W)               | LF        | 579.000         |       |

ESTIMATE

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QUANTITY

SHEET

STATE COUNTY PROJECT NO. SHEET NO. 14 WILLIAMSON CC 337-1-29 4B

|   |              |      |       |   |          |                                       | <u>E211</u>  | <b>.</b>     | SUN   | <u>1MA</u> | HY   |     |   |  |           |   |
|---|--------------|------|-------|---|----------|---------------------------------------|--------------|--------------|-------|------------|--|-----|---|--|-----------|---|
|   |              |      |       |   |          |                                       |              | CSJ 0337     |       |            | TEM-   |     | DESCRIPTION   | UN   | TOTAL     |   |
| EST.                                    | FINAL        | EST. | FINAL | EST.                                    | FINAL    | EST.                                  | FINAL        | ROAD<br>EST. | FINAL | Tl         | 7 858ET  | 1   | DESCRIPTION .   | I  |           |   |
| LJ1.                                    | TINAL        | L31. | FINAL | E31.                                    | FINAL    | E51.                                  | PINAL .      | 127.000      | FINAL |            | 0505   | NO  | PIPE (24IN) DI CL 200 (W)                                 |  | EST.      | FINAL                                   |
|   | <b>-</b>     |      |       |   |          |                                       |              | 292.000      |       |            | 0505   |     | ENCASEMENT PIPE (24IN) (STL)                              | LF   | 127.000   |   |
|   | <b> </b>     |      |       |   |          |                                       | <u> </u>     | 142.500      |       |            | 0507   |     | ENCASEMENT PIPE (241N) (STL)                              | LF   | 292.000   |   |
|   |              |      |       |   |          |                                       |              | 3.000        |       |            | 0508   |     | VALVES (GATE) (BIN) DIA                                   | LF   | 142.500   |   |
|   |              |      |       |   |          |                                       | ļ            | 1.000        |       |            | 0509   |     |   | EA   | 3.000     |   |
|   |              |      |       |   |          |                                       |              | 2.000        |       |            | 0509   |     | VALVE (GATE) (16IN) DIA<br>VALVE (GATE) (24IN) DIA        | EA   | 1.000     |   |
|   | <del> </del> |      |       |   |          |                                       | <del> </del> | 13.000       |       |            | 0510   |     | NEW MANHOLE (ALL DEPTHS) (4FT DIA)                        | EA   | 2.000     |   |
|   |              |      |       |   |          |                                       |              | 3.000        |       |            | 0511   |     | FIRE HYDRANT  | EA   | 13.000    |   |
| *************************************** |              |      |       |   |          |                                       | <del> </del> | 2.000        |       |            | 0512   |     |   | EA   | 3.000     |   |
|   |              |      |       |   |          |                                       | <u> </u>     | 39766.000    |       |            |  | 045 | NEW MANHOLE (ALL DEPTHS) (4FT DIA) DROP<br>HOT MIX (TY A) | EA   | 2.000     | <del></del>                             |
|   |              |      |       | *************************************** |          |                                       |              | 8867.000     |       |            |  |     | HOT MIX (TY B)  | TON  | 39766.000 |   |
|   |              |      |       |   | <b> </b> |                                       |              | 5938.000     |       |            |  |     | HOT MIX (TY C)  | TON  | 8867.000  |   |
| <del></del>                             |              |      |       |   |          |                                       |              | 6947.000     |       |            |  |     | HOT MIX (TY C) (SURF)                                     | TON  | 5938.000  |   |
|   |              |      |       |   | <b> </b> |                                       | <del> </del> | 67.000       |       |            | 0501   | 010 |   | TON  | 6947.000  |   |
|   | <del> </del> |      |       |   |          |                                       |              | 400.000      |       |            | 0501   |     | HEADER TYPE BRIDGE JOINT                                  | CF   | 67.000    |   |
|   |              |      |       |   |          |                                       |              | 170.000      |       |            |  |     | JOINT SEALANT   | LF   | 400.000   |   |
|   |              |      |       |   |          |                                       |              |              |       |            | 0504   |     | ROCK FILTER DAMS (TY 2)                                   | LF   | 170.000   |   |
| ****                                    | -            |      |       |   | <u> </u> |                                       | <del> </del> | 85.000       |       |            | 0505   |     | ROCK FILTER DAMS (REMOV & REPLAC) (TY 2)                  | <del></del>  | 85.000    |   |
|   | <del></del>  |      |       |   |          |                                       | -            | 170.000      |       |            | 0506   |     | ROCK FILTER DAMS (REMOV) (TY 2)                           | LF   | 170.000   |   |
|   |              |      |       |   |          |                                       | <u> </u>     | 330.000      |       |            | 0501   |     | CONSTRUCT EXIT (TY 1)                                     | SY   | 330.000   |   |
|   |              |      |       |   |          |                                       |              | 440.000      |       |            | 0502   |     | CONSTRUCT EXIT (REMOV & REPLAC) (TY 1)                    | SY   | 440.000   |   |
|   |              |      |       |   |          |                                       |              | 330.000      |       |            | 0503   |     | CONSTRUCT EXIT (REMOV) (TY 1)                             | SY   | 330.000   |   |
|   |              |      |       |   |          |                                       |              | 5227.000     |       |            | 0501   |     | TEMP SEDMT CONT FENCE                                     | LF   | 5227.000  |   |
|   | <b></b>      |      |       |   |          |                                       |              | 2614.000     |       |            | 0502   |     | TEMP SEDMT CONT FENCE (REMOVE & REPLAC)                   |  | 2614.000  |   |
|   | -            |      |       |   |          |                                       |              | 5227.000     |       |            | 0503   |     | TEMP SEDMT CONT FENCE (REMOV)                             | LF   | 5227.000  |   |
|   | -            |      |       |   |          |                                       |              | 96.000       |       |            | 0501   |     | DEAD END ROADWAY BARRICADE                                | LF   | 96.000    |   |
|   |              |      |       |   |          |                                       |              | 53055.000    |       |            | 0501   |     | LANDSCAPE PAVERS  | SF   | 53055.000 |   |
|   |              |      |       |   |          |                                       | <u> </u>     | 4.000        |       |            | 0501   |     | SINGLE GUARDRAIL TERM (TY I)                              | EA   | 4.000     | *************************************** |
|   | -            |      |       |   |          |                                       |              | 26.000       |       |            | 0501   |     | CURB RAMP AND LANDING (TY 1)                              | EA   | 26.000    |   |
|   |              |      |       |   |          |                                       |              | 6.000        |       |            | 0501   |     | RDWY LIGHT ON TRAF SGN POLE (250 WATT)                    | EA   | 6.000     |   |
|   |              |      |       | ~~~                                     |          | -                                     | <u> </u>     | 1.000        |       |            | 0501   |     | SALV TRAF SIGNALS   | EA   | 1.000     |   |
| ·                                       |              |      |       |   | ļ        |                                       | <u> </u>     | 168.000      |       |            | 0503   |     | PORT CHANGE MES SGN (TY I OR TY II)                       | DAY  | 168.000   |   |
|   |              |      |       |   |          | · · · · · · · · · · · · · · · · · · · | <del> </del> | 200.000      |       |            |  |     | COAXIAL CABLE   | LF   | 200.000   |   |
|   |              |      |       |   |          |                                       |              | 3582.000     |       | 8970       | 0505   | 001 | VIVDS COMMUNICATION CABLE (COAXIAL)                       | LF   | 3582.000  |   |
|   |              |      |       |   |          |                                       | ļ            |              |       |            | 4  |     |   |  |           |   |
|   |              |      |       |   |          |                                       |              |              |       |            | <b>↓</b> ——↓                                     |     |   |  |           |   |
|   |              |      |       |   |          |                                       |              |              |       |            | <b>  </b>  |     |   | 11   |           |   |
|   |              |      |       |   |          |                                       | ļ            |              |       |            | 1  |     | STATE FORCE ACCOUNT WORK (NON-PART)                       | $\bot$   |           |   |
|   |              |      | ****  |   |          |                                       |              |              |       |            | <del>                                     </del> |     | LABOR (RE-AIM CAMERAS)                                    | LS   | 1.000     |   |
|   | ļ            |      |       |   |          |                                       | <b></b>      |              |       |            | 1  |     |   |  |           |   |
|   |              |      |       |   |          | · · · · · · · · · · · · · · · · · · · | <b>_</b>     |              |       |            | 1  |     | MATERIAL FURNISHED BY THE STATE                           | 11   |           |   |
|   | ļ            |      |       |   |          |                                       | ļ            |              |       |            | <del>                                     </del> |     | SIGNAL SYSTEM   | LS   | 1.000     |   |
|   |              |      |       |   |          |                                       | <b></b>      |              |       |            | 1  |     |   |  |           |   |
| ···                                     |              |      |       |   |          |                                       |              |              |       |            | 1  |     |   | $oxed{oxed}$   |           |   |
|   |              |      |       | *************************************** |          |                                       | <b></b>      |              |       |            | +  |     |   | 11   |           |   |
| *************************************** | <b> </b>     |      |       |   |          |                                       | <b></b>      |              |       |            | 1  |     |   |  |           |   |
|   |              |      |       |   |          |                                       |              |              |       |            | 1  |     |   | $oxed{L}$  |           |   |
|   | <b> </b>     |      |       |   |          |                                       |              |              |       |            | 11   |     |   |  |           |   |
|   |              |      |       |   |          |                                       |              |              |       |            | igspace  |     |   |  |           |   |
|   |              |      |       |   |          |                                       |              |              |       |            | 1  |     |   | $oldsymbol{ol}}}}}}}}}}}}}}}}}}$ |           |   |
|   | 1 1          | 1    |       |   | . 1      |                                       | 1            | :            | 1     | 1          |  | - 1 |   |  |           |   |

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STATE DIST. NO. COUNTY PROJECT NO. SHEET NO.

14 WILLIAMSON CC 337-1-29 4C

## ROADWAY PLAN AND PROFILE SUMMARY

| SHEET<br>NO. | 0100 0502<br>PREP<br>R.O.W. | 0110 0501<br>EXCAV<br>(RDWY) | 0132 0518<br>EMBANK<br>(ORD COMP)<br>(TY B) (CL 3) | 0529 0532<br>CONC CURB<br>& GUTTER<br>(TY II) | 3146 0501<br>HOT MIX<br>(TY A) | 3146 0502<br>HOT MIX<br>(TY B) | 3146 0503<br>HOT MIX<br>(TY C) | 3146 0520<br>HOT MIX<br>(TY C) (SURF) | 0531 0502<br>CONCRETE<br>SIDEWALKS | 0531 0512<br>CONCRETE<br>SIDEWALK<br>(MED CROSSING) | 5866 0501<br>CURB RAMP<br>AND LANDING<br>(TY 1) | 4454 0501<br>HEADER TYPE<br>BRIDGE JOINT | 4454 0502<br>JOINT<br>SEALANT   | 0618 0513<br>CONDUIT<br>(PVC)(SCHD 40)<br>(3") | (TY C) W/ APRON<br>(162911) | 0354 0522<br>PLAN ASPH CONC<br>PAV (5") |
|--------------|-----------------------------|------------------------------|--|---|--------------------------------|--------------------------------|--------------------------------|---------------------------------------|------------------------------------|---|---|--|---|--|-----------------------------|---|
|              | <u> </u>                    | CY                           | CY   | LF  | TON                            | TON                            | TON                            | TON                                   | SY                                 | SY  | EA  | CF                                       | <u>LF</u>   | LF   | EA                          | SY                                      |
| 1 OF 8       | 1670                        | 2730                         | 1739   | 1210  | 3239                           | 732                            | 488                            | 1418                                  | n                                  | h n   | <u> </u>  | 0  | <u> </u>  |  |                             |   |
| 2 OF 8       | 1100                        | 7357                         | 873  | 3498  | 6246                           | 1336                           | 891                            | 891                                   | 0                                  | 0   | 0   | 0  | 0   | ů /  | n                           | 798                                     |
| 3 OF 8       | 1180                        | 7104                         | 733  | 3944  | 7557                           | 1674                           | 1116                           | 1028                                  | 251                                | 35  | 8   | 0  | 0   | 28   | 0                           | 574                                     |
| 4 OF 8       | 1100                        | 7872                         | 752  | 4000  | 7579                           | 1669                           | 1113                           | 1050                                  | 282                                | 39  | 8   | 0  | 0   | 0  | 0                           | 598                                     |
| 5 OF 8       | 1103                        | 4422                         | 292  | 2810  | 4804                           | 1082                           | 721                            | 998                                   | 110                                | 15  | 10  | 67                                       | 400   | 0  | 0                           | 510                                     |
| 6 OF 8       | 1100                        | 5121                         | 115  | 2926  | 6321                           | 1485                           | 990                            | 934                                   | 0                                  | 0   | 0   | 0  | 0   | 0  | 0                           | 0                                       |
| 7 OF 8       | 426                         | 2211                         | 0  | 1369  | 1942                           | 429                            | 286                            | 286                                   | 0                                  | 0   | 0 .   | 0  | 0   | 1620   | 4                           | 0                                       |
| 8 OF 8       | 535                         | 1244                         | 504  | 870   | 2078                           | 460                            | 333                            | 342                                   | 0                                  | 0   | 0   | 0  | De la companya della companya della companya de la companya della | 0  | 0                           | 0                                       |
|              |                             |                              |  |   |                                |                                |                                |                                       |                                    |   |   |  |   |  |                             |   |
| TOTAL        | 8134                        | 38231                        | 5008   | 20627   | 39766                          | 8867                           | 5938                           | 6947                                  | 643                                | 89  | 26  | 67                                       | 400   | 1620   | 4                           | 2480                                    |
|              |                             |                              |  |   |                                |                                |                                |                                       |                                    |   |   |  |   |  |                             |   |

| SHEET<br>NO. | 0354 0573<br>PLAN ASPH CONC<br>PAV (0" TO 4") | 0556 0507<br>PIPE UNDDR<br>(TY 7) (6") | 0316 0520<br>ASPH<br>(HFRS-2) | 0316 0521<br>AGGR<br>(T) B GR5) |
|--------------|---|--|-------------------------------|---------------------------------|
|              | SY  | LF                                     | GAL                           | CY                              |
| 1 OF 8       |   | 0                                      | 2535                          | 53                              |
| 2 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 3 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 4 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 5 OF 8       | 3110  | 0                                      | 933                           | 19                              |
| 6 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 7 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 8 OF 8       | 0   | 0                                      | 0                             | 0                               |
|              |   |  |                               |                                 |
| TOTAL        | 3110  | 100                                    | 3468                          | 72                              |

## DRIVEWAY SUMMARY

|         | DUIAEM   | AI SUMMAK   | ı                  |              |
|---------|--|-------------|--------------------|--------------|
|         |  | 0530 0501   | 0110 0501          | 0132 0518    |
| SHEET   | DRIVEWAY   | DRVWYS      | * EXCAVATION       | * EMBANK     |
| NO.     | NO.  | (CONC) (6") |                    | (ORD) (COMP) |
|         | 1  |             |                    | (TY B) (CL3) |
|         |  | SY          | CY                 | CY           |
| 1 OF 8  | <del>                                     </del> | 86          | 8                  | 0            |
| 1 OF 8  | 2  | 46          | 1 0                | 64           |
| 1 OF 8  | 3  | 46          | t ö                | 62           |
| 2 OF 8  | 4  | 73          | † <del>7</del> – – | 0            |
| 2 OF 8  | 5  | 46          | 1 0                | 40           |
| 2 OF 8  | 6  | 46          | 14                 | 0            |
| 2 OF 8  | 1 7  | 46          | 2                  | 10           |
| 3 OF 8  | 8  | 139         | 23                 | 0            |
| 3 OF 8  | 9  | 50          | 7                  | 0            |
| 3 OF 8  | 10   | 32          | 1 /                | 0            |
| 4 OF 8  | 11   | 32          | 6                  | 0            |
| 4 OF 8  | 12   | 125         | 68                 | 0            |
| 4 OF 8  | 13   | 73          | 15                 | 0            |
| 4 OF 8  | 14   | 403         | 5                  | 117          |
| 5 OF 8  | 15   | 50          | 12                 | 0            |
| 5 OF 8  | 16   | 71          | 10                 | 0            |
| 6 OF 8  | 17   | 121         | 2                  | 4            |
| 6 OF 8  | 18   | A78         | 47                 | 0            |
| 6 OF 8  | 19   | 106         | 12                 | 0            |
| .6 OF 8 | 20   | 96          | 26                 | 0            |
| 6 OF 8  | 21   | 99          | 18                 | 0            |
| 7 OF 8  | 22   | 109         | 35                 | 0            |
| 7 OF 8  | £3 ·   | 90          | 19                 | 0            |
| TOTAL   |  | 2163        | 337                | 297          |

FOR CONTRACTOR'S INFORMATION ONLY

| TRA | FFIC | SIGNAL | SHA   | AADY |
|-----|------|--------|-------|------|
| III |      |        | JUMIN |      |

|              |  |   |   | IIVA II   | C SIGNAL SU                                     | SIAIIAI DEV I                                   |   |  |  |  |
|--------------|--|---|---|---|---|---|---|--|--|--|
| INTERSECTION | 0610 0532<br>RDWY ILL<br>ASSEM (SPECIAL) | 0618 0511<br>CONDUIT<br>(PVC) (SCHD 40)<br>(2") | 0618 0513<br>CONDUIT<br>(PVC) (SCHD 40) | 0618 0514<br>CONDUIT<br>(PVC) (SCHD 40)<br>(4") | 0620 0503<br>ELEC.<br>CONDUCTOR<br>(NO. 8) BARE | 0620 0504<br>ELEC.<br>CONDUCTOR<br>(NO. 6) BARE | 0620 0509 ELEC. CONDUCTOR (NO. 8) INSULATED | 0620 0510<br>ELEC.<br>CONDUCTOR<br>(NO. 6) INSULATED | 0624 0501<br>GROUND BOX<br>TY A (122311)<br>W/ APRON | 0624 0503<br>GROUND BOX<br>TY C (162911)<br>W/ APRON |
|              | EA                                       | LF  | LF                                      | LF  | LF  | LF  | LF  | LF   | EA   | EA   |
| CR 265 WEST  |  | 17  | 1410                                    | 36  | 553   | 17  | 688   | 17   | 3  | 1  |
|              |  |   |   |   |   |   |   |  |  | •  |
| IH 35 SBFR   | 1  | 134   | 1422                                    | <b>14</b>                                       | 409   | 16  | 371   | 246  | 5  | 1  |
|              |  |   |   |   |   |   |   |  |  |  |
|              |  |   |   |   |   |   |   |  |  |  |
| TOTAL        | 1 1                                      | 151   | 2832                                    | 50  | 962   | 33  | 1059  | 263  | 8  | 2  |

| INTERSECTION | 0625 0501<br>ZINC-COAT | 0625 0502<br>ZINC-QOAT | 0628 0851<br>ELEC SERV TY D | 0656 0510<br>FND FOR | 0656 0512<br>FND FOR | 0656 0514<br>FND FOR | 0656 0518<br>TRAF SIG | 0680 0501<br>INSTAL OF | 0682 0505<br>PED SIG SEC | 0682 0509<br>BACK PLATE |
|--------------|------------------------|------------------------|-----------------------------|----------------------|----------------------|----------------------|-----------------------|------------------------|--------------------------|-------------------------|
|              | STL WIRE               | STL WIRE               | (120/240) 100(NS)           | TRAF SIG (24 IN      | TRAF SIG (36 IN      |                      | CNTRL FND             | HWY TRAF SIG           | (2 INDICATIONS           | (3 SEC)                 |
|              | STRAND (1/4 IN)        | STRAND (3/8 IN)        | AL(E) PS(U)                 | DRIL SHFT)           | DRIL SHFT)           | DRIL SHFT)           |                       | (ISOLATED)             | IN 1 SEC)                | (12 IN)                 |
|              | LF 🔀                   | LF                     | EA                          | LF                   | LF                   | LF                   | CY                    | EA                     | EA                       | EA                      |
|              |                        |                        |                             |                      |                      |                      |                       |                        |                          |                         |
| CR 265 WEST  | 70,8                   | 700                    | 1                           | 18                   |                      | 88                   | 2.22                  | 1                      | 8                        | 15                      |
|              |                        |                        |                             |                      |                      |                      |                       |                        |                          |                         |
| IH 35 SBFR   |                        |                        | 1                           | 18                   | 27                   | ·                    | 2.22                  | 1                      | 6                        | 21                      |
|              |                        |                        |                             |                      |                      |                      |                       |                        |                          |                         |
|              |                        |                        |                             |                      |                      |                      |                       |                        |                          |                         |
|              |                        |                        |                             |                      |                      |                      |                       |                        |                          |                         |
| JOTAL        | 700                    | 700                    | 2                           | 36                   | 27                   | 88                   | 5                     | 2                      | 14                       | 36                      |

| INTERSECTION | 0682 0511<br>BACK PLATE<br>(5 SEC)<br>(12 IN) | 0682 0524<br>VEH SIG SEC<br>(12 IN) W/O<br>LENS & REFL | 0684 0547<br>TRAF SIG CBL<br>(TY A) (7 CONDR)<br>(14 AWG) | 0684 0565<br>TRAF SIG CBL<br>(TY A) (4 CONDR)<br>(14 AWG) | 0684 0570<br>TRAF SIG CBL<br>(TY A) (5 CONDR)<br>(14 AWG) | 0686 0575<br>TRAF SIG POLE<br>(STL) MAS<br>(INSTAL) | 0688 0501 PED DETECT (PUSH BTN) | 1201 0501<br>12 IN LED TRF<br>SIGNAL LAMP<br>(RED BALL) | 1201 0502<br>12 IN LED TRF<br>SIGNAL LAMP<br>(YELLOW BALL) | 1201 0503<br>12 IN LED TRF<br>SIGNAL LAMP<br>(GREEN BALL) |
|--------------|---|--|---|---|---|---|---------------------------------|---|--|---|
|              | EA  | EA   | LF  | LF  | LF  | EA  | EA                              | EA  | EA   | EA  |
|              |   | ***  |   |   |   |   |                                 |   |  |   |
| CR 265 WEST  |   | 45   |   | 1911  | 1266  | 4   | 8                               | 15  | 8  | 8   |
|              |   |  |   |   |   |   |                                 |   |  |   |
| IH 35 SBFR   | 1   | 23   | 279   | 686   | 795   | 2   | 6                               | 7   | 5  | 5   |
|              |   |  |   |   |   |   |                                 |   |  |   |
|              |   |  |   |   |   |   |                                 |   |  |   |
|              |   |  |   |   |   |   |                                 |   |  |   |
| TOTAL        | 1   | 68   | 279   | 2597  | 2061  | 6   | 14                              | 22  | 13   | 13  |

| *************************************** |  |  |   |                                   |                                     |   |   |
|---|--|--|---|-----------------------------------|-------------------------------------|---|---|
| INTERSECTION                            | 1201 0504<br>12 IN LED TRF<br>SIGNAL LAMP<br>(YEL ARW) | 1201 0505<br>12 IN LED TRF<br>SIGNAL LAMP<br>(GRN ARW) | 6007 0501<br>RDWY LIGHT ON<br>TRAF SGN POLE<br>(250 WATT) | 6010 0501<br>SALV TRAF<br>SIGNALS | 8288 0504<br>RADIO COAX-<br>LMR 600 | 8970 0505<br>VIVDS COMM<br>CABLE<br>(COAXIAL) | 0684 0522<br>TRAF SIG CBL<br>(TY A) (3 CONDRI<br>(16 AWG) |
|   | EA   | EA   | EA  | EA                                | LF                                  | LF  | LF  |
| CR 265 WEST                             | 7  | 7 7  | 4   |                                   | 100                                 | 1004  | 1004  |
| IH 35 SBFR                              | 2  | 2  | 2   | 1                                 | 100                                 | 2578  | 2578  |
|   |  |  |   |                                   |                                     |   |   |
| TOTAL                                   | 9  | 9  | 6   | 1                                 | 200                                 | 3582  | 3582  |

REVISION BY DATE

Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

ROADWAY QUANTITIES SUMMARY SHEET

## ROADWAY PLAN AND PROFILE SUMMARY

| SHEET<br>NO. | 0100 0502<br>PREP<br>R.O.W. | 0110 0501<br>EXCAV<br>(RDWY) | 0132 0518<br>EMBANK<br>(ORD COMP)<br>(TY B) (CL 3) | 0529 0532<br>CONC CURB<br>& GUTTER<br>(TY II) | 3146 0501<br>HOT MIX<br>(TY A) | 3146 0502<br>HOT MIX<br>(TY B) | 3146 0503<br>HOT MIX<br>(TY C) | 3146 0520<br>HOT MIX<br>(TY C) (SURF) | 0531 0502<br>CONCRETE<br>SIDEWALKS | 0531 0512<br>CONCRETE<br>SIDEWALK<br>(MED CROSSING) | 5866 0501<br>CURB RAMP<br>AND LANDING<br>(TY 1) | 4454 0501<br>HEADER TYPE<br>BRIDGE JOINT         | 4454 0502<br>JOINT<br>SEALANT | 0618 0513<br>CONDUIT<br>(PVC)(SCHD 40)           | 0624 0503<br>GROUND BOX<br>(TY C) W/ APRON<br>(162911) | 0354 0522<br>PLAN ASPH CONC<br>PAV (5") |
|--------------|-----------------------------|------------------------------|--|---|--------------------------------|--------------------------------|--------------------------------|---------------------------------------|------------------------------------|---|---|--|-------------------------------|--|--|---|
|              | FT                          | CY                           | CY   | LF  | TON                            | TON                            | TON                            | TON                                   | SY                                 | SY  | EA  | CF   | LF                            | LF   | EA   | SY                                      |
|              | ļ                           |                              |  |   |                                |                                |                                |                                       |                                    |   |   |  |                               |  |  |   |
| 1 OF 8       | 1670                        | 2730                         | 1739   | 1210  | 3239                           | 732                            | 488                            | 1418                                  | 0                                  | 0   | 0   | 0  | 0                             | 0  | n  | 0                                       |
| 2 OF 8       | 1100                        | 7357                         | 873  | 3498  | 6246                           | 1336                           | 891                            | 891                                   | 0                                  | 0   | 0   | n  | n                             | 0  | 0  | 798                                     |
| 3 OF 8       | 1100                        | 7104                         | 733  | 3944  | 7557                           | 1674                           | 1116                           | 1028                                  | 251                                | 35  | 8   | <u> </u>   | 0                             | <u> </u>   | 0  | 574                                     |
| 4 OF 8       | 1100                        | 7872                         | 752  | 4000  | 7579                           | 1669                           | 1113                           | 1050                                  | 282                                | 30  | 8   | <u> </u>   | ň                             | <del>                                     </del> |  |   |
| 5 OF 8       | 1103                        | 4422                         | 292  | 2810  | 4804                           | 1082                           | 721                            | 998                                   | 110                                | 15  | 10  | 67   | 400                           | <del>                                     </del> | <del>                                     </del>       | 598                                     |
| 6 OF 8       | 1100                        | 5121                         | 115  | 2926  | 6321                           | 1485                           | 990                            | 934                                   | n                                  | <del>                                     </del>    | <u> </u>  | 07   | +00                           | <del>                                     </del> | <u>&gt;</u>  | 510                                     |
| 7 OF 8       | 426                         | 2211                         | n  | 1369  | 1942                           | 429                            | 286                            | 286                                   | <u> </u>                           | <del>                                     </del>    | <u> </u>  | <del>                                     </del> | <u> </u>                      | 1000   | ļ  | <u>v</u>                                |
| 8 OF 8       | 535                         | 1240                         | (487)  | 870   | 2078                           | 460                            | 333                            | 342                                   | <u>`</u>                           | <del>                                     </del>    | <u>v</u>  | <u> </u>   | <u> </u>                      | 1620   | 4  | 0                                       |
| <u> </u>     | <del> </del>                | <del>\ \ \ \ \</del>         | <del>  } ~0/ } .  </del>                           | 0/0   | 2078                           | 400                            | 333                            | 342                                   | <u>U</u>                           | ļ   | <u> </u>  | <u> </u>   | 0                             | 0  | 0  | 0                                       |
| TOTAL        | 8134                        | 38057                        | 4991   | 20627   | 39766                          | 8867                           | 5938                           | 6947                                  | 643                                | 89  | 26  | 67   | 400                           | 1620   | 4  | 2480                                    |

| SHEET<br>NO. | 0354 0573<br>PLAN ASPH CONC<br>PAV (0" TO 4") | 0556 0507<br>PIPE UNDDR<br>(TY 7) (6") | 0316 0520<br>ASPH<br>(HFRS-2) | 0316 0521<br>AGGR<br>(TY B GR5) |
|--------------|---|--|-------------------------------|---------------------------------|
|              | SY  | LF                                     | GAL                           | CY                              |
| 1 OF 8       | 0   | 0                                      | 2535                          | 53                              |
| 2 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 3 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 4 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 5 OF 8       | 3110  | 0                                      | 933                           | 19                              |
| 6 OF 8       | 0   | 0                                      | 0                             | 0 :                             |
| 7 OF 8       | 0   | 0                                      | 0                             | 0                               |
| 8 OF 8       | 0   | 0                                      | 0                             | 0                               |
| TOTAL        | 3110  | 100                                    | 3468                          | 72                              |

## DRIVEWAY SUMMARY

| SHEET  | DRIVEWAY | 0530 0501<br>DRVWYS | 0110 0501<br>* EXCAVATION | 0132 0518<br>* EMBANK |
|--------|----------|---------------------|---------------------------|-----------------------|
| NO.    | NO.      | (CONC) (6")         |                           | (ORD) (COMP)          |
|        |          |                     |                           | (TY B) (CL3)          |
|        |          | SY                  | CY                        | CY                    |
|        |          |                     |                           |                       |
| 1 OF 8 | 1        | 86                  | 8                         | 0                     |
| 1 OF 8 | 2        | 46                  | 0                         | 64                    |
| 1 OF 8 | 3        | 46                  | 0                         | 62                    |
| 2 OF 8 | 4        | 73                  | 7                         | 0                     |
| 2 OF 8 | 5        | 46                  | 0                         | 40                    |
| 2 OF 8 | 6        | 46                  | 14                        | 0                     |
| 2 OF 8 | 7        | 46                  | 2                         | 10                    |
| 3 OF 8 | 8        | 139                 | 23                        | 0                     |
| 3 OF 8 | 9        | 50                  | 7                         | 0                     |
| 3 OF 8 | 10       | 32                  | 1.                        | 0                     |
| 4 OF 8 | 11       | 32                  | 6                         | 0                     |
| 4 OF 8 | 12       | 125                 | 68                        | 0                     |
| 4 OF 8 | 13       | 73                  | 15                        | 0                     |
| 4 OF 8 | 14       | 403                 | 5                         | 117                   |
| 5 OF 8 | 15       | 50                  | 12                        | 0                     |
| 5 OF 8 | 16       | 71                  | 10                        | 0                     |
| 6 OF 8 | 17       | 121                 | 2                         | 4                     |
| 6 OF 8 | 18       | 178                 | 47                        | 0                     |
| 6 OF 8 | 19       | 106                 | 12                        | 0 ,                   |
| 6 OF 8 | 20       | 96                  | 26                        | 0                     |
| 6 OF 8 | 21       | 99                  | 18                        | 0                     |
| 7 OF 8 | 22       | 109                 | 35                        | 0                     |
| 7 OF 8 | 23       | 90                  | 19                        | 0                     |
| TOTAL  |          | 2163                | 337                       | 297                   |

\*FOR CONTRACTOR'S INFORMATION ONLY

## TRAFFIC SIGNAL SUMMARY

| INTERSECTION | 0610 0532<br>RDWY ILL<br>ASSEM (SPECIAL) | (2") | 0618 0513<br>CONDUIT<br>(PVC) (SCHD 40)<br>(3") | 0618 0514<br>CONDUIT<br>(PVC) (SCHD 40)<br>(4") | 0620 0503<br>ELEC.<br>CONDUCTOR<br>(NO. 8) BARE | 0620 0504<br>ELEC.<br>CONDUCTOR<br>(NO. 6) BARE | 0620 0509<br>ELEC.<br>CONDUCTOR<br>(NO. 8) INSULATED | 0620 0510<br>ELEC.<br>CONDUCTOR<br>(NO. 6) INSULATED | 0624 0501<br>GROUND BOX<br>TY A (122311)<br>W/ APRON | 0624 0503<br>GROUND BOX<br>TY C (162911<br>W/ APRON |
|--------------|--|------|---|---|---|---|--|--|--|---|
|              | EA                                       | LF   | LF LF   | LF .  | LF  | LF  | LF   | LF   | EA   | EA  |
| CR 265 WEST  |  | 17   | 1410  | 36  | 553   | 17  | 688  | 17   | 3  | 1   |
| IH 35 SBFR   | 1  | 134  | 1422  | 14  | 409   | 16  | 371  | 246  | 5  | 1   |
|              |  |      | ·   |   |   |   |  |  |  |   |
| TOTAL        | 1  | 151  | 2832  | 50  | 962   | 33  | 1059   | 263  | 8  | 2   |

| INTERSECTION | 0625 0501<br>ZINC-COAT<br>STL WIRE<br>STRAND (1/4 IN) |     |     |    | 0656 0512<br>FND FOR<br>TRAF SIG (36 IN<br>DRIL SHFT)<br>LF | 0656 0514<br>FND FOR<br>TRAF SIG (48 IN<br>DRIL SHFT) | 0656 0518<br>TRAF SIG<br>CNTRL FND | 0680 0501<br>INSTAL OF<br>HWY TRAF SIG<br>(ISOLATED) | 0682 0505<br>PED SIG SEC<br>(2 INDICATIONS<br>IN 1 SEC)<br>EA | 0682 0509<br>BACK PLATE<br>(3 SEC)<br>(12 IN)<br>EA |
|--------------|---|-----|-----|----|---|---|------------------------------------|--|---|---|
| CR 265 WEST  | 700   | 700 | 1   | 18 |   | 88  | 2.22                               | 1  | 8   | 15  |
| IH 35 SBFR   |   |     | · 1 | 18 | 27  |   | 2.22                               | 1  | 6   | 21  |
| TOTAL        | 700   | 700 | 2   | 36 | 27  | 88  | 5                                  | 2  | 14  | 36  |

| INTERSECTION | 0682 0511<br>BACK PLATE<br>(5 SEC)<br>(12 IN)<br>EA | 0682 0524<br>VEH SIG SEC<br>(12 IN) W/O<br>LENS & REFL | 0684 0547<br>TRAF SIG CBL<br>(TY A) (7 CONDR)<br>(14 AWG)<br>LF | 0684 0565<br>TRAF SIG CBL<br>(TY A) (4 CONDR)<br>(14 AWG)<br>LF | 0684 0570<br>TRAF SIG CBL<br>(TY A) (5 CONDR)<br>(14 AWG)<br>LF | 0686 0575<br>TRAF SIG POLE<br>(STL) MAS<br>(INSTAL)<br>EA | 0688 0501<br>PED<br>DETECT<br>(PUSH BTN)<br>EA | 1201 0501<br>12 IN LED TRF<br>SIGNAL LAMP<br>(RED BALL)<br>EA | 1201 0502<br>12 IN LED TRF<br>SIGNAL LAMP<br>(YELLOW BALL)<br>EA | 1201 0503<br>12 IN LED TRF<br>SIGNAL LAMP<br>(GREEN BALL)<br>EA |
|--------------|---|--|---|---|---|---|--|---|--|---|
| CR 265 WEST  |   | 45   |   | 1911  | 1266  | 4   | 8  | 15  | 8  | 8   |
| IH 35 SBFR   | 1   | 23   | 279   | 686   | 795   | 2   | 6  | . 7   | 5  | 5   |
|              |   |  |   |   |   |   |  |   |  |   |
| TOTAL        | 1   | 68   | 279   | 2597  | 2061  | 6   | 14   | 22  | 13   | 13  |

| INTERSECTION | 1201 0504<br>12 IN LED TRF<br>SIGNAL LAMP<br>(YEL ARW) | 1201 0505<br>12 IN LED TRF<br>SIGNAL LAMP<br>(GRN ARW)<br>EA | 6007 0501<br>RDWY LIGHT ON<br>TRAF SGN POLE<br>(250 WATT) | 6010 0501<br>SALV TRAF<br>SIGNALS | 8288 0504<br>RADIO COAX-<br>LMR 600 | 8970 0505<br>VIVDS COMM<br>CABLE<br>(COAXIAL) | 8970 0505<br>VIVDS POWER<br>CABLE (3CONDR)<br>(16 AWG) |
|--------------|--|--|---|-----------------------------------|-------------------------------------|---|--|
| CR 265 WEST  | 7  | 7  | 4   |                                   | 100                                 | 1004  | 1004   |
| IH 35 SBFR   | 2  | 2  | 2   | 1                                 | 100                                 | 2578  | 2578   |
|              |  |  |   |                                   |                                     |   |  |
| TOTAL        | 9  | 9  | 6   | 1                                 | 200                                 | 3582  | 3582   |

| CO 1 | UPDATED SBFR PROFILE | AJW | 12/08/04 |
|------|----------------------|-----|----------|
|      | 1                    |     | 1        |
| NO.  | REVISION             | BY  | DATE     |



Chiang, Patel & Yerby, Inc.



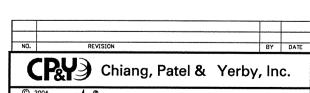
Texas Department of Transportation

# ROADWAY QUANTITIES SUMMARY SHEET

| esigned: | JWP | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       | ).         |    | IEET<br>10. |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-------------|
| ecked:   | JJR | 6                    | TEXAS  | CC    | 337-           | -129           | )          | 4  | 5           |
| awn:     | JWP | STATE<br>DIST, NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY        |
| necked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29          |

## TRAFFIC CONTROL SUMMARY

| SHEET           | 0502 0501<br>BARR SIGNS | 0508 0503<br>CONSTRUCT | 0512 0536<br>PORT CTB | 0512 0545<br>PORT CTB | 0512 0546<br>PORT CTB                            | 0512 0547<br>PORT CTB | 0512 0548<br>PORT CTB | 0512 0549<br>PORT CTB | 0662 0501<br>WRK ZN                              | 0662 0502<br>WRK ZN                              | 0662 0507<br>WRK ZN | 0662 0511<br>WRK ZN                              | 0662 0512<br>WRK ZN | 0662 0516<br>WRK ZN | 0662 0523<br>WRK ZN | 0662 0524<br>WRK ZN | 0662 0549<br>WRK ZN | 0662 0550<br>WRK ZN |
|-----------------|-------------------------|------------------------|-----------------------|-----------------------|--|-----------------------|-----------------------|-----------------------|--|--|---------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| NO.             | & TRAFF                 | DETOURS                | (LOW PRF TY 2)        | (LOW PRF TY 1)        | (LOW PRF TY 1)                                   |                       |                       |                       | PAV MRK  | PAV MRK  | PAV MRK             | PAV MRK  | PAV MRK             | PAV MRK             | PAV MRK             | PAV MRK             | PAV MRK             | PAV MRK             |
|                 | HANDLE                  | (CL 3)                 | (MOVE & RESET)        | (REMOVE)              | (FURN & INSTL)                                   | (FURN & INSTL)        | (MOVE & RESET)        | (REMOVE)              | REMOV  | REMOV  | REMOV               | REMOV  | REMOV               | REMOV               | REMOV               | REMOV               | NON-REMOV           | NON-REMOV           |
|                 |                         |                        |                       |                       |  |                       |                       |                       | (W) (4") (SLD)                                   |  |                     | (W) (24") (SLD)                                  | (W) (ARROW)         | (W) (WORD)          | (Y) (4") (SLD)      | (Y) (4") (BRK)      |                     | (W) (4") (BRK)      |
|                 | MO                      | SY                     | LF                    | LF                    | LF   | LF                    | LF                    | LF                    | LF   | LF   | LF                  | LF   | EA                  | EA                  | LF                  | LF                  | LF                  | LF                  |
| DUAGE A STED A  |                         |                        |                       |                       |  |                       |                       |                       |  |  |                     |  | <u></u>             |                     |                     |                     |                     |                     |
| PHASE 1, STEP 1 |                         |                        | <del> </del>          |                       |  |                       |                       |                       | <u> </u>   |  |                     |  |                     |                     |                     |                     |                     |                     |
| 1 OF 7          |                         | 0                      | 0                     | 0                     | 0  | 0                     | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 2 OF 7          |                         | 562                    | 0                     | 0                     | 230  | 20                    | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 3 OF 7          |                         | 309                    | 0                     | 0                     | 30   | 20                    | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 4 OF 7          |                         | 327                    | 0                     | 0                     | 160  | 40                    | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 5 OF 7          |                         | 0                      | 0                     | 0                     | 0  | 0                     | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 6 OF 7          |                         | 0                      | 0                     | 0                     | 160  | 40                    | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| 7 OF 7          |                         | 0                      | 0                     | <u> </u>              | 0  | 0                     | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| SUBTOTAL        |                         | 1198                   | 0                     | 0                     | 580  | 120                   | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| D               |                         |                        |                       |                       |  |                       |                       | ****                  |  |  |                     |  |                     |                     |                     |                     |                     |                     |
| PHASE 1, STEP 2 |                         |                        | ļ <u>.</u>            |                       |  |                       |                       |                       |  |  |                     |  |                     |                     |                     |                     |                     |                     |
| 1 OF 7          |                         | 0                      | <u> </u>              | 0                     | 0  | 0                     | 0                     | 00                    | 570  | 0  | 0                   | 0  | 0                   | 0                   | 1140                | 285                 | 0                   | 0                   |
| 2 OF 7          |                         | 0                      | 0                     | 0                     | 586  | 20                    | 0                     | 0                     | 884  | 0  | 0                   | 0  | 0                   | 0                   | 784                 | 196                 | 1186                | 0                   |
| 3 OF 7          |                         | 00                     | 0                     | 0                     | 994  | 40                    | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 1494                | 0                   |
| 4 OF 7          |                         | 0                      | 0                     | 0                     | 880  | 80                    | 0                     | 00                    | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 1020                | 0                   |
| 5 OF 7          |                         | 0                      | 0                     | 0                     | 790  | 120                   | 0                     | 0                     | 0  | 0  | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 910                 | 0                   |
| 6 OF 7          |                         | 0                      | 0                     | 0                     | 410  | 20                    | 0                     | 0                     | 203  | 118  | 293                 | 47   | 3                   | 3                   | 824                 | 0                   | 431                 | 0                   |
| 7 OF 7          |                         | 0                      | 0                     | 0                     | 0  | 0                     | 0                     | 00                    | 3  | 1  | 3                   | 0  | 0                   | 0                   | 6                   | 0                   | 0                   | 0                   |
| SUBTOTAL        |                         | 0                      | 0                     | 0                     | 3660   | 280                   | 0                     | 0                     | 1660   | 119  | 296                 | 47   | 3                   | 3                   | 2754                | 481                 | 5041                | 0                   |
| PHASE 1, STEP 3 |                         |                        |                       |                       | <u> </u>   |                       |                       |                       |  |  |                     |  |                     |                     | <del> </del>        | <u> </u>            |                     | <b></b>             |
| 1 OF 1          |                         | 0                      | 40                    | 0                     | 0  | 0                     | 120                   | 0                     | 0  | 0  | 0                   | 0  | 0                   | n                   | 1 0                 | <u> </u>            | 816                 | <u> </u>            |
| SUBTOTAL        |                         | 0                      | 40                    | 0                     | 0  | 0                     | 120                   | 0                     | 0  | Ö  | 0                   | Ö  | Ö                   | Ŏ                   | 0                   | Ö                   | 816                 | Ö                   |
| PHASE 2, STEP 1 |                         |                        |                       |                       |  |                       |                       |                       |  |  |                     |  |                     |                     |                     |                     |                     |                     |
| 10F 7           |                         | n                      | <u> </u>              | <u> </u>              | 0  | 0                     | 0                     | n                     | <u> </u>   | <del>   </del>                                   | 0                   | <del>                                     </del> | <del> </del>        | <u> </u>            | <del> </del>        |                     |                     | ļ                   |
| 2 OF 7          |                         | <u> </u>               | 60                    | 740                   | <u> </u>   | 0                     | 585                   | 60                    | <u> </u>   | <u> </u>   | 0                   | 0  | 0                   | 0                   | 0                   | 0                   | 570                 | 142                 |
| 3 OF 7          |                         | <del></del>            | n 00                  | 1100                  | 0  | 0                     | 1100                  | 60                    | <u> </u>   | <u> </u>   | <u> </u>            | 0  | 0                   | <u> </u>            | ļ <u>u</u>          | <u> </u>            | 1045                | 42                  |
| 4 OF 7          |                         | <del></del>            | 40                    | 890                   | <u> </u>   | <u>0</u>              | 890                   | 100                   | <del>                                     </del> | <del>                                     </del> | U                   | <u> </u>   | 0                   | 0                   | <u> </u>            | <u> </u>            | 1100                | 0                   |
| 5 OF 7          |                         | <u>0</u>               | 40                    | 935                   | <del>                                     </del> | <u> </u>              | 935                   | 160                   | <del>                                     </del> | <del>                                     </del> | <u> </u>            | 0  | 0                   | 0                   | 0                   | <u> </u>            | 930                 | 300                 |
| 6 OF 7          |                         | <u> </u>               | 20                    | 575                   | 0  | 0                     | 430                   | 20                    | <u> </u>   | <del>                                     </del> | 0                   | <u> </u>   | 0                   | <u>0</u>            | 1 0                 | 0                   | 769                 | 0                   |
| 7 OF 7          |                         | <u>_</u>               | - 20<br>n             | 3/3                   | 0  | 0                     | 430                   | 20                    | <del>                                     </del> | <del>                                     </del> | 0                   | 0  | 0                   | <u> </u>            | <u> </u>            | U                   | 1594                | 108                 |
| SUBTOTAL        |                         | 0                      | 160                   | 4240                  | 0  | 0                     | 3940                  | 400                   | 0  | <del>                                     </del> | 0                   | <del>                                     </del> | 0                   | <u> </u>            | <u>0</u>            | <u> </u>            | 0                   | 507                 |
|                 |                         |                        |                       | 7270                  | <del>                                     </del> |                       | 3370                  | 700                   | ļ  | - U  | U U                 | U  | U                   | <u> </u>            | U                   | U                   | 6008                | 593                 |
| TOTAL           | 10                      | 1198                   | 200                   | 4240                  | 4240   | 400                   | 4060                  | 400                   | 1660   | 119  | 296                 | 47   | 3                   | 3                   | 2754                | 481                 | 11865               | 593                 |
| h               | I                       |                        |                       |                       | 1  | . 30                  |                       |                       |  | 1 113  | 230                 | т/   |                     | ı                   | 1 2/34              | 1 +01               | 1 11003             | 1 282               |





2 OF 4

Texas Department of Transportation
SH 29

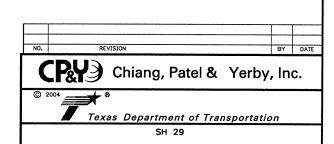
## ROADWAY QUANTITIES SUMMARY SHEET

| Designed: | AJW | FED. ROAD<br>DIV. NO., | STATE FEDERAL AID PROJECT NO. |      |                |                |            |    | EET<br>O. |
|-----------|-----|------------------------|-------------------------------|------|----------------|----------------|------------|----|-----------|
| Checked:  | JWP | 6                      | TEXAS                         | CC   | 337-           | -1-29          | )          | 6  |           |
| Drawn:    | DHS | STATE<br>DIST. NO.     | cou                           | NTY  | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY      |
| Checked:  | JJR | 14                     | WILLIA                        | MSON | 0337           | 01             | 029        | SH | 29        |

## TRAFFIC CONTROL SUMMARY

| CHECT           | 0662 0553    | 0662 0554<br>WRK ZN | 0662 0557    | 0662 0558   | 0662 0562  | 0662 0569      | 0662 0570 | 0662 0576  | 0672 0507   | 0672 0509   | 0677 0501 | 0677 0503 | 0677 0507 | 0677 0508    | 0681 0501    | *3146 0501                                       | *3146 0502                                       | *3146 0520                                       | 6670 0503     |
|-----------------|--------------|---------------------|--------------|-------------|------------|----------------|-----------|--|-------------|-------------|-----------|-----------|-----------|--------------|--------------|--|--|--|---------------|
| SHEET           | WRK ZN       |                     | WRK ZN       | WRK ZN      | WRK ZN     | WRK ZN         | WRK ZN    | WRK ZN   | RAIS        | RAIS        | ELIM EXT  | ELIM EXT  | ELIM EXT  | ELIM EXT     | TEMP TRAF    | HOT MIX  | HOT MIX  | HOT MIX  | PORT CHANGE   |
| NO.             | PAV MRK      | PAV MRK             | PAV MRK      | PAV MRK     | PAV MRK    | PAV MRK        | PAV MRK   | PAV MRK  | PAV MRKR    | PAV MRKR    | PAV MRK   | PAV MRK   | PAV MRK   | PAV MRK      | SIGNAL FOR   | (A YT)   | (TY B)   | (TY C) (SURF)                                    |               |
|                 | NON-REMOV    | NON-REMOV           | NON-REMOV    | NON-REMOV   | NON-REMOV  | NON-REMOV      | NON-REMOV | NON-REMOV  | CL B (REFL) | CL B (REFL) | & MRKR    | & MRKR    | & MRKR    | & MRKR       | CONSTRUCT    |  |  |  | ITY IOR TY II |
|                 |              | (W) (8") (LNDP)     |              | (W) (ARROW) | (W) (WORD) | (Y) (4") (SLD) |           |  | TY I-C      | TY II-A-A   | (4")      | (8")      | (ARROW)   | (WORD)       |              |  |  |  |               |
|                 | LF           | LF                  | LF           | EA          | EA         | LF             | LF        | LF LF  | EA          | EA          | LF        | LF        | EA        | EA           | EA           | TON  | TON  | TON  | DAY           |
| PHASE 1, STEP 1 |              |                     |              |             |            |                |           | <del>                                     </del> |             |             |           |           | l         |              | -            | <del> </del>                                     |  | ·  |               |
| 1 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 2 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 124  | 124  | 62   |               |
| 3 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 68   | 68   | 34   |               |
| 4 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 72   | 72   | 36   |               |
| 5 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 6 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 7 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| SUBTOTAL        | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 264  | 264  | 132  | 42            |
|                 |              |                     |              |             |            |                |           |  |             |             |           |           |           |              |              |  |  |  |               |
| PHASE 1, STEP 2 |              |                     |              |             |            |                |           |  |             |             |           |           |           |              |              |  |  |  |               |
| 1 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 29          | 1467      | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 2 OF 7          | 0            | 0                   | 0            | 0           | 0          | 1189           | 0         | 0  | 0           | 20          | 1800      | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 3 OF 7          | 0            | 0                   | 0            | 0           | 0          | 1280           | 320       | 83   | 0           | 32          | 1710      | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 4 OF 7          | 0            | 00                  | 0            | 0           | 0          | 2481           | 525       | 0  | 0           | 53          | 1650      | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 5 OF 7          | 0            | 0                   | 0            | 0           | 0          | 2200           | 550       | 0  | 0           | 55          | 1650      | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| 6 OF 7          | 423          | 0                   | 13           | 0           | 0          | 1073           | 117       | 0  | 12          | 12          | 1310      | 292       | 4         | 4            |              | 0  | 0  | 0  |               |
| 7 OF 7          | 0            | 0                   | 0            | 0           | 0          | 0              | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| SUBTOTAL        | 423          | 0                   | 13           | 0           | 0          | 8223           | 1512      | 83   | 12          | 201         | 9587      | 292       | 4         | 4            |              | 0  | 0  | 0  | 42            |
| PHASE 1, STEP 3 | <del> </del> |                     |              |             | <u> </u>   |                |           |  |             |             |           |           |           | <del> </del> | <del> </del> |  |  |  |               |
| 1 OF 1          | 0            | 0                   | 44           | 0           | 0          | 1353           | 0         | 0  | 0           | 0           | 0         | 0         | 0         | 0            |              | 0  | 0  | 0  |               |
| SUBTOTAL        | 0            | 0                   | 44           | 0           | 0          | 1353           | 0         | 0  | 0           | 0           | 0         | 0         | 0         | Ō            |              | Ö  | Ö  | Ö  | 42            |
| PHASE 2, STEP 1 |              |                     | <del> </del> |             | <u> </u>   | <b></b>        |           | <b> </b>   |             |             |           |           |           | <b>_</b>     |              |  | ļ  |  |               |
| 1 OF 7          | 0            | 0                   | 0            | 0           | 0          | 1140           | 285       | 1 0  | 15          | 29          | <u> </u>  | n         | 0         | <u> </u>     |              | <del>                                     </del> | <del>                                     </del> | <del>                                     </del> | <del></del>   |
| 2 OF 7          | Ō            | Ō                   | Ō            | Ö           | Ō          | 2010           | 503       | 1 0  | 5           | 51          | n         | n         | n n       | 0            | <del> </del> | <u> </u>   | <del>                                     </del> | 1 <u>0</u>                                       |               |
| 3 OF 7          | 0            | Ö                   | Ö            | Ö           | Ö          | 2200           | 550       | 1 0  | ō           | 55          | Ö         | Ŏ         | o o       | i ö          |              | <del>                                     </del> | <del>  0</del>                                   | <del>                                     </del> |               |
| 4 OF 7          | 898          | 0                   | 138          | 8           | 8          | 2248           | 315       | 0  | 30          | 29          | Ō         | l ō       | ō         | i ö          |              | 1 <u></u>  | <del>                                     </del> | <del>                                     </del> |               |
| 5 OF 7          | 596          | 46                  | 98           | 7           | 7          | 1950           | 338       | 0  | 7           | 20          | Ō         | ō         | Ō         | i o          |              | ň  | <u> </u>   | <del>                                     </del> | <del> </del>  |
| 6 OF 7          | 428          | 100                 | 58           | 3           | 3          | 2405           | 98        | 0  | 11          | 10          | Ö         | Ŏ         | Ŏ         | Ö            | <del> </del> | t ŏ  | <del>                                     </del> | <del>1                                    </del> |               |
| 7 OF 7          | 3            | 0                   | 0            | 0           | 0          | 6              | 0         | 0  | 0           | Ö           | ō         | ō         | ō         | Ö            |              | l ŏ  | 1 0  | 1 0  |               |
| SUBTOTAL        | 1925         | 146                 | 294          | 18          | 18         | 11959          | 2088      | 0  | 68          | 194         | 0         | Ö         | Ö         | Ö            |              | 0  | Ö  | 0  | 42            |
|                 |              |                     |              |             |            |                |           |  |             |             |           |           |           |              |              |  |  |  |               |
| TOTAL           | 2348         | 146                 | 351          | 18          | 18         | 21535          | 3599      | 83   | 80          | 395         | 9587      | 292       | 4         | 4            | 2            | 264  | 264  | 132  | 168           |

<sup>\*</sup> FOR CONTRACTOR'S INFORMATION ONLY



ROADWAY QUANTITIES SUMMARY SHEET

| Designed: | AJW | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PE      | OJECT NO       | ).         | SH | EET<br>O. |
|-----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-----------|
| Checked:  | JWP | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 7  | -         |
| Drawn:    | DHS | STATE<br>DIST. NO.   | COUR   | YIY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY      |
| Checked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29        |

## SIGNING, STRIPING, DELINEATION & MBGF SUMMARY

| CHEET                                   |        |       |      | 0666 0536 | 0666 0503 | 10666 0537 | 0666 0506 | 10666 0539 | 0666 0508 | 0666 0540 | 0666 0509 | 10666 0541 | 0666 0512 | 10666 0544                                       | 0666 0513  | 10666 0545   | 0666 0517 | 0666 0549 | 0666 0524 | 0666 0556 |        |         |
|---|--------|-------|------|-----------|-----------|------------|-----------|------------|-----------|-----------|-----------|------------|-----------|--|--|--------------|-----------|-----------|-----------|-----------|--------|---------|
| SHEET                                   | REFL P |       |      | AV MRK    | REFL P    |            | REFL P    |            |           | PAV MRK   |           | AV MRK     | REFL P    |  | REFL P.  |              | REFL P    | AV MRK    | REFL P    | AV MRK    | REFL P | PAV MRK |
| NO.                                     | (W)    | (4")  | (W)  | (4")      | (W)       | (4")       | (W)       | (8")       | (W        | . (8")    | (W)       | (12")      | (W) (     | 24")   | (W) (A   | RROW)        | (W) (V    | VORD)     | (Y)       | (4")      | (Y)    | (4")    |
|   | (S     | LD)   | (B   | RK)       | (D)       | OT)        | (SI       | _D)        | (L        | NDP)      | (SI       | LD)        | (SI       | _D)  |  |              | l         |           | l (Si     | LD)       | l (B   | RK)     |
|   | TYI    | TY II | TYI  | TY II     | TYI       | TY II      | TYI       | TY II      | TY I      | TY II     | TYI       | TY II      | TYI       | TY II  | TYI  | TYII         | TYI       | TY II     | TYI       | TY II     | TYI    | TY II   |
| *************************************** | LF     | LF    | LF   | LF        | LF        | LF         | LF        | LF         | LF        | LF        | LF        | LF         | LF        | LF   | LF   | LF           | LF        | LF        | LF        | LF        | LF     | LF      |
| 1 OF 8                                  | 1140   | 1140  | 285  | 285       | 0         | 0          | 0         | 0          | 0         | 0         | 0         | 0          | 0         | <del>                                     </del> | <del>                                     </del> | <del> </del> | <u> </u>  | <u> </u>  | 1140      | 1140      | 285    | 285     |
| 2 OF 8                                  | 990    | 990   | 550  | 550       | 0         | 0          | 0         | 0          | 0         | 0         | Ō         | Ō          | Ō         | Ō  | 0  | 0            | l ö       | n         | 2200      | 2200      | 550    | 550     |
| 3 OF 8                                  | 0      | 0     | 550  | 550       | 0         | 0          | 240       | 240        | 0         | 0         | 0         | 0          | 0         | Ö  | 3  | 3            | 3         | 3         | 1380      | 1380      | 66     | 66      |
| 4 OF 8                                  | 0      | 0     | 475  | 475       | 99        | 99         | 1450      | 1450       | 0         | 0         | 435       | 435        | 130       | 130  | 9  | 9            | 9         | 9         | 0         | 0         | 0      | 0       |
| 5 OF 8                                  | 0      | 0     | 488  | 488       | 0         | 0          | 1810      | 1810       | 19        | 19        | 403       | 403        | 542       | 542  | 10   | 10           | 6         | 6         | 0         | 0         | Ö      | 1 0     |
| 6 OF 8                                  | 0      | 0     | 506  | 506       | 18        | 18         | 1595      | 1595       | 121       | 121       | 371       | 371        | 329       | 329  | 8  | 8            | 8         | 8         | 710       | 710       | 0      | Ö       |
| 7 OF 8                                  | 0      | 0     | 92   | 92        | 0         | 0          | 330       | 330        | 0         | 0         | 301       | 301        | 231       | 231  | 3  | 3            | 1         | 1         | 91        | 91        | 0      | 0       |
| 8 OF 8                                  | 0      | 0     | 363  | 363       | 0         | 0          | 1466      | 1466       | 0         | 0         | 420       | 420        | 616       | 616  | 11   | 11           | 11        | 11        | 679       | 679       | 0      | 0       |
| TOTAL                                   | 2130   | 2130  | 3309 | 3309      | 117       | 117        | 6891      | 6891       | 140       | 140       | 19.30     | 1930       | 1848      | 1848   | 44   | 44           | 38        | 38        | 6200      | 6200      | 901    | 901     |

## SIGNING, STRIPING, DELINEATION & MBGF SUMMARY

|        | DESE 0520 | DESE DESE   | 10666 0532 | 10666 0563 | 10672 0507 | 10672 0600 | 0672 0610  | 0650 0501 | 10650 NEON | 10636 0601                                       | 0644 0608  | 10644 0610                                       | 0644 0614   | 0644 0615  | 0644 0610   | 0540 0501  | 0540 0507   | 0500 0501  | 15570 0504                                       | 10540 0504   | 1 5040 OF 04 | Ta. 20 0504                                      |
|--------|-----------|-------------|------------|------------|------------|------------|--|-----------|------------|--|------------|--|-------------|--|-------------|--|-------------|--|--|--------------|--------------|--|
| SHEET  | REFL P    | AV MPK      | REFL P     | AV MDV     | RAIS       | RAIS       | RAIS   | DEL ASM   | OBJ MRK    | ALLIM CICNE                                      | CM BD CCM  | SM RD SGN  | CM DD CCN   | CH DD CON  | CH DD CON   | 0542 0501  |             |  |  |              |              |  |
| NO     | (Y)       |             | (Y) (      |            |            | PAV MRKR   |  | TY A      | ASM        |  |            | •  |             |  |             | 1 1  | REMOVE      |  | DEAD END   |              |              | RIPRAP   |
| NO.    | (SI       |             | (SI        |            |            |            | CL B (REFL)                                      | ,         | TY 4       | (TY A)   | ASSM       | ASSM   | ASSM        | ASSM   |             | METAL BEAM                                       |             | INSTALL  | ROADWAY  | GD FEN       | GUARDRAIL    | (CONC)   |
|        | TYI       | _D/         | TV 1       | TY II      |            | TY II-A-A  |  | (0-2M)    | (OM-4R)    |  | TY TWT (1) | TY TWT (1)                                       |             | TY 10BWG(1)                                      |             |  | ANCHOR      | (SINGLE)   | BARRICADE  | (BLKOUT)     | TERM         | (CL B)   |
|        | 15        | 1 1 1 1 1 1 | 1 11 1     | 1 1 1      | FA EA      | FA         | EA EA  |           | (UM-4R)    |  | UA (P)     | UA (T)   | SA (P)      | SA (P-BM)  | SA (U)      | FENCE  | SECTION     |  | <del> </del>                                     | (12 GA)      | (TY I)       |  |
|        | <u> </u>  | <u> </u>    | <u> </u>   | L.F        | - EA       | - EA       | EA   | EA .      | EA         | <u> </u>   | LA         | EA   | EA          | LA   | LA          | Lr Lr  | <u>LA</u>   | LA_  | L.F  | Lt           | EA           | CY   |
| 1 OF 8 | 1         | n           | n          | 0          | 14         | 29         | <del>                                     </del> | 0         | <u> </u>   | <u> </u>   | <u> </u>   | <del>                                     </del> | <u> </u>    |  | _           | <del>                                     </del> |             | <del>                                     </del> | ļ  | <del> </del> | ļ <u>-</u>   | <del>                                     </del> |
| 2 OF 8 | 0         | n           | 1 <u>ñ</u> | i n        | 28         | 55         | <del>                                     </del> | 6         | i i        | <del>                                     </del> | 3          | <del>                                     </del> | <del></del> | <del>                                     </del> | <del></del> | 100  | <del></del> | <del>                                     </del> | <del>                                     </del> | 335          | 1 2          | <del>                                     </del> |
| 3 OF 8 | 0         | Ō           | 292        | 292        | 111        | 63         | 40   | 2         | Ö          | ň  | 3          | 1 2  | ň           | ñ  | <del></del> | 100  | <del></del> | 1  | <del>                                     </del> | 65           | 1 2          |  |
| 4 OF 8 | 0         | 0           | 0          | 0          | 0          | 0          | 169  | Ö         | Ō          | 19   | 5          | 2  | 0           | Ö  | Ö           | 0  | n i         | 5  | l n  | n            | n n          | 1 3  |
| 5 OF 8 | 0         | 0           | 0          | 0          | 0          | 0          | 135  | 0         | 0          | 0  | 2          | 2  | 0           | Ō  | Ō           | ō  | ō           | 2  | Ö  | l ö          | i n          | <b>—</b> i —                                     |
| 6 OF 8 | 187       | 187         | 155        | 155        | 21         | 27         | 170  | 0         | 0          | 0  | 6          | 2  | 3           | 0  | 2           | 0  | 0           | 0  | 0  | . 0          | Ō            | 3  |
| 7 OF 8 | 0         | 0           | 13         | 13         | 0          | 5          | 35   | 0         | 3          | 0  | 1          | 0  | 1           | 2  | 0           | 0  | 0           | 0  | 16   | 0            | 0            | 1 1  |
| 8 OF 8 | 0         | 0           | 0          | 0          | 0          | 20         | 150  | 0         | 9          | 0  | 5          | 0  | 0           | 2  | 0           | 0  | 0           | 0  | 80   | 0            | 0            | 2  |
|        |           |             |            |            |            | ļ          |  |           |            |  |            |  |             |  |             |  |             |  |  |              |              |  |
| TOTAL  | 187       | 187         | 460        | 460        | 74         | 199        | 699  | 8         | 12         | 19   | 25         | ] 8  | 4           | 4  | 2           | 200  | 2           | 9  | 96   | 400          | 4            | 20   |

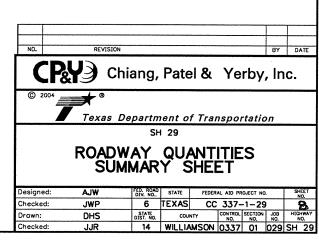
## EROSION CONTROL SUMMARY

|        | 0164 0537  | 0164 0535  | 0164 0569      | 0166 0509    | 0168 0501  | 0168 0502    | 5005 0504   | 5005 0505        | 5005 0506     | 5010 0501 | 5010 0502      | 5010 0503      |
|--------|------------|------------|----------------|--------------|------------|--------------|-------------|------------------|---------------|-----------|----------------|----------------|
| SHEET  | DRILL SEED | DRILL SEED | DRILL SEED     | * FERTILIZER | VEGETATIVE | VEG WATERING | ROCK FILTER | ROCK FILTER      | ROCK FILTER   | CONSTRUCT | CONSTRUCT      | CONSTRUCT      |
| NO.    | (TEMP)     | (TEMP)     | (PERM)         | (13-13-13)   | WATER      | (TEMP EROSN  | DAMS        | DAMS (REMOVE     | DAMS (REMOVE) | EXIT      | EXIT (REMOV &  | EXIT           |
|        | (COOL)     | (WARM)     | (RURAL) (CLAY) |              |            | CONTROL)     | (TY 2)      | & REPLAC) (TY 2) | (TY 2)        | (TY I)    | REPLAC) (TY I) | (REMOVE) (TYI) |
|        | SY         | SY         | SY             | TON          | MG         | MG           | LF          | LF               | LF            | SY        | SY             | SY             |
| 1 OF 7 | 1326       | 1326       | 2652           | 0.4          | 53         | 27           | 110         | 55               | 110           |           | -              |                |
| 2 OF 7 | 2694       | 2694       | 5388           | 0.7          | 108        | 54           | 0           | 0                | 0             |           |                |                |
| 3 OF 7 | 2449       | 2449       | 4899           | 0.6          | 98         | 49           | 0           | 0                | 0             |           |                |                |
| 4 OF 7 | 2408       | 2408       | 4815           | 0.6          | 96         | 48           | 0           | 0                | 0             |           |                |                |
| 5 OF 7 | 3209       | 3209       | 6418           | 0.8          | 128        | 64           | 60          | 30               | 60            |           |                |                |
| 6 OF 7 | 764        | 764        | 1529           | 0.2          | 31         | 15           | 0           | 0                | 0             |           |                |                |
| 7 OF 7 | 483        | 483        | 966            | 0.1          | 19         | 10           | 0           | 0                | 0             |           |                |                |
| TOTAL  | 13333      | 13333      | 26667          | 3.4          | 533        | 267          | 170         | 85               | 170           | 330       | 440            | 330            |

<sup>\*</sup> FOR CONTRACTOR'S INFORMATION ONLY

## EROSION CONTROL SUMMARY

|        | 5249 0501  | 5249 0502      | 5249 0503  | 0432 0501 | 0160 0506    | 5788 0501 |
|--------|------------|----------------|------------|-----------|--------------|-----------|
| SHEET  | TEMP SEDMT | TEMP SEDMT     | TEMP SEDMT | RIPRAP    | FURN & PLACE | LANDSCAPE |
| NO.    | CONT FENCE | CONT FENCE     | CONT FENCE | (CONC)    | TPSL         | PAVERS    |
|        | İ          | (REMOV&REPLAC) | (REMOVE)   | (CL B)    | (CL 2) (4")  |           |
|        | LF         | LF             | LF         | CY        | SY           | SF        |
| 1 OF 7 | 412        | 206            | 412        | 151       | 2652         | 0         |
| 2 OF 7 | 1011       | 506            | 1011       | 17        | 5388         | 13805     |
| 3 OF 7 | 1027       | 514            | 1027       | 0         | 4899         | 12133     |
| 4 OF 7 | 1046       | 523            | 1046       | 0         | 4815         | 8300      |
| 5 OF 7 | 624        | 312            | 624        | 0         | 6418         | 14403     |
| 6 OF 7 | 845        | 423            | 845        | 0         | 1529         | 2973      |
| 7 OF 7 | 262        | 131            | 262        | 0         | 966          | 1441      |
| TOTAL  | 5227       | 2614           | 5227       | 168       | 26667        | 53055     |

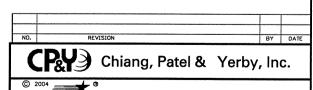


## SUMMARY OF INLETS & MANHOLES

| SHEET<br>NO. | DESIGNATION    | 0465 0510<br>MANH<br>(COMPL)<br>(TY A)  | 0465 0582<br>INLET<br>(COMPL)<br>(TY II)(10')    | 0465 0626<br>INLET<br>(COMPL)<br>(TY II) (15')   | 0465 0738<br>INLET<br>(COMPL)<br>(TY IIR) (10')  | 0465 0739<br>INLET<br>(COMPL)<br>(TY IIR) (15') |
|--------------|----------------|---|--|--|--|---|
|              |                | EA                                      | EA   | EA   | EA   | EA  |
| 1 OF 9       | CI-160         |   | ļ  |  | <del> </del>                                     | ļ   |
| 1 OF 9       | CI-165         |   |  |  | 1 1  | <del> </del>                                    |
| 2 OF 9       | CI-103         |   |  | <del> </del>                                     | <u> 1</u>  | <del> </del>                                    |
| 2 OF 9       | CI-5           |   | 1  |  | <del> </del>                                     | <del> </del>                                    |
| 2 OF 9       | CI-10          |   | <del>  </del>                                    |  | <u> </u>   | <del> </del>                                    |
| 2 OF 9       | CI-50          |   | <u> </u>   |  | <del>                                     </del> | <del> </del>                                    |
| 3 OF 9       | CI-30          |   | 1  |  | <del> </del>                                     | <del> </del>                                    |
| 3 OF 9       | CI-13          |   | <del>                                     </del> | <del></del>                                      | <b>-</b>   | <del> </del>                                    |
| 3 OF 9       | CI-20          | ····                                    | <del>                                     </del> | 1  | <u> </u>   | <del> </del>                                    |
| 3 OF 9       | CI-40<br>CI-45 |   | -  | <del> </del>                                     |  | <del> </del>                                    |
| 3 OF 9       | CI-45          |   | <del>                                     </del> | <del></del>                                      | <del></del>                                      |   |
| 3 OF 9       | CI-55          |   | <del> </del>                                     | 1 1  |  |   |
| 3 OF 9       | CI-65          |   | -  | <del>                                     </del> | <del> </del>                                     |   |
| 3 OF 9       | CI-70          |   | <del> </del>                                     |  | 1 1  |   |
| 3 OF 9       | CI-75          |   | <del> </del>                                     | <del> </del>                                     | <del> </del>                                     |   |
| 3 OF 9       | CI-80          |   |  | †  |  |   |
| 4 OF 9       | CI-85          | *************************************** |  | i  | <del> </del>                                     |   |
| 4 OF 9       | CI-90          |   |  |  | <u> </u>   |   |
| 4 OF 9       | CI-95          |   | 1  | i  |  |   |
| 4 OF 9       | CI-100         |   |  | i  |  |   |
| 4 OF 9       | CI-120         |   | 1  |  |  |   |
| 4 OF 9       | CI-125         |   |  | 1  |  |   |
| 4 OF 9       | CI-135         |   |  |  |  | 1   |
| 4 OF 9       | CI-140         |   |  |  |  | 1   |
| 5 OF 9       | CI-130         |   |  | 1  |  |   |
| 5 OF 9       | MH-5           | 1                                       |  |  |  |   |
| 5 OF 9       | CI-145         |   |  |  |  | 1   |
| 5 OF 9       | CI-150         |   |  | 1  |  |   |
| 5 OF 9       | ÇI-151         |   | 11   |  |  |   |
| 5 OF 9       | CI-155         |   | ļ1   |  | <u> </u>   |   |
| 6 OF 9       | CI-25          |   | ļ  | 11   |  |   |
| 6 OF 9       | CI-30A         |   | ļ <u>1</u>                                       |  |  |   |
| 6 OF 9       | CI-30          |   | 11   | <b></b>  | <b></b>  |   |
| 6 OF 9       | CI-35          |   | ļ  | 11   | <u> </u>   |   |
| 7 OF 9       | CI-105         |   | <u> </u>   | 11   |  |   |
| 7 OF 9       | CI-110         | *************************************** | ļ  | 1  | ļ  |   |
| 7 OF 9       | CI-115         |   | <del> 1</del>                                    |  |  |   |
|              |                |   | ļ  | ļ  | <u> </u>   |   |
|              |                |   |  | <del> </del>                                     |  |   |
|              | TOTAL          | 1                                       | 11   | 18   | 4  | 3   |

## SUMMARY OF EXISTING DRAINAGE STRUCTURES

| SHEET<br>NO. | STATION   | OFFSET    | DESCRIPTION      | DISPOSITION    | 0496 0549<br>REMOVE OLD<br>STR (PIPE)<br>(BOX CULV) | 0496 0504<br>REMOVE<br>OLD STR<br>PIPE |
|--------------|-----------|-----------|------------------|----------------|---|--|
|              |           |           |                  |                | LF  | LF                                     |
| 1 OF 9       | 145+16.83 | 22.00' LT | CULVERT 1        | TO BE EXTENDED | 20  |  |
| 1 OF 9       | 145+16.83 | 43.00' RT | CULVERT 1        | TO BE EXTENDED | 2   |  |
| 2 OF 9       | 150+23.90 | 30.41' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 25                                     |
| 3 OF 9       | 159+50.51 | 60.65' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 19                                     |
| 3 OF 9       | 160+20.92 | 32.51' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 25                                     |
| 3 OF 9       | 159+81.93 | 52.60' RT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 25                                     |
| 3 OF 9       | 162+96.57 | 32.20' LT | DRIVEWAY CULVERT | TO BE REMOVED  | ***************************************             | 26                                     |
| 3 OF 9       | 165+17.02 | 32.15' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 24                                     |
| 3 OF 9       | 166+84.87 | 32.30' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 24                                     |
| 4 OF 9       | 168+69.22 | 32.23' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 24                                     |
| 4 OF 9       | 169+93.50 | 32.28' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 36                                     |
| 4 OF 9       | 170+30.72 | 50.31' RT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 27                                     |
| 4 OF 9       | 171+83.29 | 32.62' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 22                                     |
| 4 OF 9       | 172+47.80 | 32.29' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 22                                     |
| 4 OF 9       | 173+17.89 | 31.90' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 22                                     |
| 4 OF 9       | 174+28.28 | 32.37' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 22                                     |
| 4 OF 9       | 175+90.35 | 32.61' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 22                                     |
| 4 OF 9       | 16+23.58  | 51.34' RT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 28                                     |
| 5 OF 9       | 181.74.97 | 51.29' RT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 46                                     |
| 5 OF 9       | 182+93.91 | 42.93' RT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 137                                    |
| 5 OF 9       | 182+98.10 | 41.06' LT | DRIVEWAY CULVERT | TO BE REMOVED  |   | 26                                     |
|              | TOTAL     |           |                  |                | 22  | 602                                    |



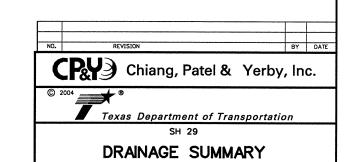
Texas Department of Transportation

DRAINAGE SUMMARY

| Designed: | WLA | FED. ROAD<br>DIV. NO | STATE   | FEDER | AL AID PE      | OJECT NO       | ١.         |      | EET<br>O. |
|-----------|-----|----------------------|---------|-------|----------------|----------------|------------|------|-----------|
| Checked:  | JWP | 6                    | TEXAS   | CC    | 337-           | -1-29          | )          | 9    |           |
| Drawn:    | DHS | STATE<br>DIST. NO.   | COUNT   | ΤΥ    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HIGH | IWAY      |
| Checked:  | JJR | 14                   | WILLIAN | MSON  | 0.3.37         | 01             | 029        | SH   | 29        |

## SUMMARY OF STORM SYSTEMS & CULVERTS

| . ,              |              |                  |                  | 0400 0501  | 0400 0504    | 0402 0501  | 0460 0503 | 0464 0519   | 0464 0520   | 0464 0521                             | 0464 0522    | 0464 0523  | 0464 0524    | 0462 0510    | 0466 0507                             | 0467 0680  | 0467 0688     |
|------------------|--------------|------------------|------------------|------------|--------------|------------|-----------|-------------|-------------|---------------------------------------|--------------|--|--------------|--------------|---------------------------------------|--|---------------|
| SHEET            |              |                  |                  | STRUCTURAL | STRUCTURAL   | TRENCH     | CMP       | RC PIPE     | RC PIPE     | RC PIPE                               | RC PIPE      | RC PIPE  | RC PIPE      | CONC BOX     | WINGWALL                              |  |               |
| NO.              | DESIGNATION  | FROM             | то               | EXCAVATION |              | EXCAVATION | (GAL STL) | (CL IV)     | (CL IV)     | (CL IV)                               | (CL IV)      | (CL IV)  | (CL IV)      | CULV         | (PW-0)                                | TRT. TY (II)                                     | TRT. TY (II)  |
|                  |              |                  |                  | 1          | (CULV SMALL) | PROTECTION | (18 IN)   | (18")       | (24")       | (30")                                 | (36")        | (42")  | (48")        | (SFT X 6FT)  | (H - 6 FT)                            | 18" RCP (6:1)                                    | 18" CMP (4:1) |
|                  |              |                  |                  | CY         | CY           | LF         | LF        | LF          | LF          | LF                                    | LF           | LF   | LF           | LF           | EA                                    | EA   | EA EA         |
|                  |              |                  |                  |            |              |            |           |             |             |                                       |              |  |              |              |                                       |  |               |
| 2 OF 9           | LINE A       | CI-50            | CI-1             | 77         |              | 69         |           | 84          |             |                                       |              |  |              |              |                                       |  |               |
| 2 OF 9           | LINE A       | CI-1             | CI-5             | 106        |              | 121        |           |             | 92          |                                       |              |  |              |              |                                       |  |               |
| 2 OF 9           | LINE A       | CI-5             | CI-10            | 148        |              | 125        |           |             |             | 115                                   |              |  |              |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-10            | CI-15            | 213        |              | 150        |           |             |             |                                       | 140          |  |              |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-15            | CI-20            | 122        |              | 85         |           |             |             |                                       | 75           |  |              |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-20            | JB-1             | 371        |              | 211        |           |             |             |                                       |              | 204  |              |              |                                       |  |               |
| 3 OF 9           | LINE A       | JB-1             | CI-40            | 52         |              | 20         |           |             |             |                                       |              | <u>[</u>   | 10           |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-40            | CI-45            | 511        |              | 174        |           |             |             |                                       |              |  | 159          |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-45            | CI-70            | 271        |              | 101        |           |             |             |                                       |              |  | 96           |              |                                       |  |               |
| 3 OF 9           | LINE A       | CI-70            | OUT              | 110        |              | 27         |           |             | ļ           |                                       |              |  | 24           |              |                                       |  |               |
| 3 OF 9           | LINE B       | CI-75            | CI-80            | 101        |              |            |           |             | 115         |                                       |              | ļ  |              |              |                                       |  |               |
| 3 OF 9           | LINE B       | CI-80            | CI-85            | 161        |              | 142        |           |             | 165         | ļ                                     |              |  |              |              |                                       |  |               |
| 4 OF 9<br>4 OF 9 | LINE B       | CI-85            | CI-90<br>CI-95   | 165<br>317 |              | 105        |           | <del></del> |             | <b></b>                               | 89           |  |              |              |                                       |  |               |
|                  | LINE B       | CI-90            |                  |            |              | 205        |           |             |             | <b></b>                               | 189          | ļ  | <u> </u>     |              |                                       |  |               |
| 4 OF 9           | LINE B       | CI-95            | CI-100           | 276        |              | 165        |           |             | ļ           |                                       |              | 150  |              |              |                                       |  |               |
| 4 OF 9<br>4 OF 9 | LINE B       | CI-100           | JB-2             | 603        |              | 184        |           |             |             |                                       | ļ            | <u> </u>   | 175          |              |                                       |  |               |
| 4 OF 9           | LINE B       | JB-2             | CI-120<br>CI-125 | 72         |              | 22         |           |             |             | ļ                                     |              |  | 17           | <b></b>      |                                       | <b></b>  |               |
| 5 OF 9           | LINE B       | CI-120           | CI-125           | 1062       |              | 265<br>336 |           |             |             |                                       | ļ            |  | 252          | ļ            |                                       | <u> </u>   |               |
| 5 OF 9           | LINE B       | CI-125<br>CI-130 | MH-5             | 275        |              | 102        |           |             | <u> </u>    | <b></b>                               | <u> </u>     |  | 320          | ļ            |                                       |  |               |
| 5 OF 9           | LINE B       | MH-5             | OUT              | 108        |              | 26         |           |             |             |                                       | ļ            | ļ  | 97           |              |                                       | ļ  |               |
| 6 OF 9           | LAT A-2      | CI-30            | CI-30A           | 177        |              | 224        |           | 213         | <u> </u>    | <b> </b>                              | <del> </del> |  | 24           | ļ            |                                       |  |               |
| 6 OF 9           | LAT A-2      | CI-30A           | CI-25            | 271        |              | 293        |           | 213         | 280         | <b> </b>                              | <del> </del> | <del> </del>                                     |              | ļ            |                                       |  |               |
| 6 OF 9           | LAT A-2      | CI-25            | CI-35            | 137        |              | 102        |           |             | 200         |                                       |              | <del> </del>                                     | <del> </del> |              |                                       |  |               |
| 6 OF 9           | LAT A-2      | CI-25            | JB-1             | 104        |              | 75         |           |             | <del></del> | 97<br>70                              |              |  |              | <b></b>      |                                       |  |               |
| 7 OF 9           | LAT B-3      | CI-110           | CI-105           | 247        |              | 290        |           | 274         |             | /0                                    |              | <del> </del>                                     | ļ            |              |                                       | <del> </del>                                     |               |
| 7 OF 9           | LAT B-3      | CI-105           | CI-115           | 91         |              | 78         |           | 2/4         | 73          |                                       | <del> </del> |  | <del> </del> |              |                                       |  | <b></b>       |
| 7 OF 9           | LAT B-3      | CI-115           | JB-2             | 93         |              | 71         |           |             | 70          | <del> </del>                          |              |  |              |              |                                       |  |               |
| 8 OF 9           | LAT A-3      | CI-55            | CI-60            | 127        |              |            |           | 176         | /           |                                       |              | <del> </del>                                     |              |              |                                       |  |               |
| 8 OF 9           | LAT A-3      | CI-60            | CI-65            | 59         |              | 4          |           | 95          |             | <del> </del>                          |              | <del>                                     </del> | <u> </u>     | <b></b>      |                                       | <b></b>  |               |
| 8 OF 9           | LAT A-3      | CI-65            | JB-1A            | 327        |              | 256        |           | 246         |             |                                       | <b>†</b>     | <del> </del>                                     | <del> </del> | l            |                                       |  |               |
| 8 OF 9           | LINE C       | CI-160           | OUT              |            |              |            |           | 6           |             | <u> </u>                              | <del> </del> |  | <del> </del> | <del> </del> |                                       |  | <del> </del>  |
| 8 OF 9           | LINE D       | CI-165           | OUT              |            |              |            |           | 5           |             |                                       |              |  | †            | <b></b>      | · · · · · · · · · · · · · · · · · · · | <del> </del>                                     |               |
| 9 OF 9           | LAT B-1      | CI-135           | CI-85            | 63         |              | 41         |           | 84          |             | · · · · · · · · · · · · · · · · · · · | <u> </u>     |  |              |              |                                       |  |               |
| 9 OF 9           | LAT B-2      | CI-140           | CI-100           | 65         |              | 55         |           | 84          |             | İ                                     |              |  |              |              |                                       |  |               |
| 9 OF 9           | LAT B-5      | CI-145           | MH-5             | 46         |              | 67         |           | 45          |             |                                       |              |  |              |              |                                       |  | <u> </u>      |
| 9 OF 9           | LINE E       | CI-150           | CI-151           | 50         |              |            |           | 137         |             |                                       |              |  |              |              |                                       | <u> </u>   |               |
| 9 OF 9           | LINE E       | CI-151           | OUT              | 28         |              |            |           | 85          |             |                                       |              |  |              |              |                                       | 1  |               |
| 9 OF 9           | LAT B-6      | CI-155           | OUT              | 28         |              |            |           | 99          |             |                                       |              |  |              |              |                                       | <del>                                     </del> | <u> </u>      |
|                  |              |                  |                  |            |              |            |           |             |             |                                       |              |  |              |              |                                       |  |               |
| 1 OF 1           | CULVERT #1   |                  |                  |            | 27           |            |           |             |             |                                       |              |  |              | 37           | 2                                     |  |               |
|                  | DRWY.CULV.#1 |                  |                  | ļ          |              |            |           | 80          |             |                                       |              |  |              |              |                                       | 2  |               |
| 1 OF 1           | DETOUR "A"   |                  |                  | ļ          |              |            | 39        |             |             |                                       |              |  |              |              |                                       |  | 2             |
| TOTAL            |              |                  | l                | 7771       | 27           | 4191       | 39        | 1713        | 795         | 282                                   | 493          | 354  | 1174         | 37           | 2                                     | 4  | 2             |



| Designed: | WLA | FED. ROAD<br>DIV. NO | STATE  | FEDER. | AL AID PR      | OJECT NO       | ı.         | SH<br>N | EÉT<br>O.  |
|-----------|-----|----------------------|--------|--------|----------------|----------------|------------|---------|------------|
| Checked:  | JWP | 6                    | TEXAS  | CC     | 337-           | -1-29          | )          | 10      | )          |
| Drawn:    | DHS | STATE<br>DIST. NO.   | cou    | NTY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |         | IWAY<br>O. |
| Checked:  | JJR | 14                   | WILLIA | MSON   | 0337           | 01             | 029        | SH      | 29         |

|               |             | AGV MWI IS     | ONCIO - IVWO 40                    |                       |                            |                               |                    | SM   | 8        | SGN ASSM   | \\XXX\  | (XXXX-X)XX(X)XXXX  |  |
|---------------|-------------|----------------|------------------------------------|-----------------------|----------------------------|-------------------------------|--------------------|--|----------|--|---|--|--|
|               | 2           | l              | JINIALL                            |                       |                            |                               |                    |  | -        | Anchor Type  |   |  |  |
| St/commos/st/ | SIGN<br>NO. | SIGN           | SIGN TEXT                          | SIGN                  | TYPE A REFLECTIVE SHEETING | ALUMINUM<br>TYPE A<br>PLYWOOD | ALUMINUM<br>TYPE G | FRP - Fiberglass TWT - Thin-Wall 10BWG - 10 BWG S80 - Sch 80 | Posts UE | UA = Univer-Conc UB = Univer-Bolt WA = Wedge-Conc SA = Slip-Conc | Mounting Do P = Prefab. "Plain" T = Prefab. "T" U = Prefab. "U" | ssignation  1EXT or 2EXT = # of Ext.  BM = Extruded Wind Beam WC = 1.12 #/ft Wing Chan.  EXAL = Extruded Alum, signs | RIPRAP<br>(CONC)<br>(CL B)<br>(VEG CONT) |
| <b>33ws</b>   | - ^         | R2-5A<br>R3-9  | REDUCE SPEED AHEAD RECIN           | 1 - 1 -               | O C                        |                               |                    | TWT  |          | Y)   | a. a  |  | 0.25                                     |
| ss01          |             | R2-1           | SPEED LIMIT XX                     | ×                     | ) U                        |                               |                    |  |          | 5  | •   |  | 63.0                                     |
| .100          | r           | R3-9<br>R2-1   | BEGIN<br>SPEED LIMIT XX            | 24" X 8"<br>24" X 30" | υυ                         |                               |                    | TWT  | -        | Υn   | <b>a</b>  |  | 0.25                                     |
| 09            | -           | 10.20          | 1                                  | 2                     |                            | ,                             |                    |  | -        |  |   |  |  |
|               |             | R3-90          | LANE INO WAT LEFT                  | 24" X 36"<br>24" X 8" | υ U                        | -                             |                    | I &  | -        | 5  | ı   |  | 0.25                                     |
| /200          | 2           | R3-9b          | CENTER LANE TWO WAY LEFT TURN ONLY | 24" X 36"             | U I                        | -                             |                    | TWT  | -        | Υn   | ď   |  | 0.25                                     |
| 14 0          | ٣           | R6-18          | BEGIN<br>ONF WAY —                 | 24" X 8"              | ט נ                        | -   -                         | +                  | TWT  | -        | Ν  | F   |  | 75.0                                     |
| 7: 4          | 4           | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" × 30"             | 0                          |                               |                    | TWT  | -        | ¥n   | - a   |  | 0.25                                     |
| 8: 29         | ဌ           | R6-1R          | ONE WAY                            | 36" X 12"             | U                          | -                             |                    | TWT  | -        | Ν  |   |  | 0.25                                     |
| AA E          | 1-          | 01.70          | TUDIO NOIT TANK MINE TUDIO         | 102 > 102             | ,                          | -                             |                    | TWT  | -        | V  | ٥   |  | 30.0                                     |
|               | 2           | R3-8           | DUEL LEFT TURN ONLY LANE           | 30" × 30"             | U                          | -                             | AT                 | ATTACHED TO M  | AST ARM  | ASS  |   |  | 2  |
|               |             | 03-1           | CR 365 W                           | .96 × .91             |                            |                               | AT                 | 임  | MAST AR  | A ASSEMBLY   |   |  |  |
|               | W 4         | R2-1           | SPEED LIMIT XX                     | 30" X 30"             | υc                         | - -                           |                    | TWT  | - -      | Y A  | <u>α</u> (  |  | 0.25                                     |
|               |             | R6-1R          | ONE WAY                            | 36" × 12"             | )<br>)                     | - -                           |                    | TWT  | - -      | 5 5  | <u> </u>  |  | 0.25                                     |
|               | 9           | R6-1R          | ONE WAY                            | 36" X 12"             | U                          | -                             |                    | TWT  | -        | ¥n   | F   |  | 0.25                                     |
|               | 7           | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" X 30"             | ပ                          | -                             |                    | TWT  | -        | ΝA   | ۵   |  | 0.25                                     |
|               | ω σ         | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" X 30"             | o c                        | - -                           | TA                 | ٢  | 1 APM    | UA<br>ASSEMBI V  | ۵   |  | 0.25                                     |
|               |             | 03-1           | SH 29                              | 30° X 30°             | ر                          | -                             | Z Z                | 임  |          | 4 ASSFMBI Y  |   |  |  |
|               | ₽           | R3-8           | DUEL LEFT TURN ONLY LANE           | 30" × 30"             | U                          | -                             | AT                 | ATTACHED TO M  | MAST ARM | A ASSEMBLY   |   |  |  |
| ď             | 1           | 0, 20          | ANI WAY                            | 11C+ \ 113E           |                            |                               |                    |  | 1        |  | ,   |  |  |
| ו             | -   ~       | R6-1R          | ONE WAY                            | 36" X 12"             | ن<br>د                     | - -                           | -                  | TwT  | -   -    | A N  | -  -  |  | 0.25                                     |
|               | , m         | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" × 30"             | o O                        | - -                           |                    | TWT  | - -      | NA U   | - a   |  | 0.25                                     |
|               | 4           | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" X 30"             | U                          | -                             |                    | TWT  | -        | Ν  | А   |  | 0.25                                     |
| 9             | Ŀ           | R6-1R          | ONF WAY                            | 36" X 12"             | U                          | 1-                            |                    | TWT  | -        | ΔII  | -   |  | 0.25                                     |
|               | 2           | R6-1R          | ONE WAY                            | 36" x 12"             | O                          | -                             |                    | TWT  | -        | Ν  |   |  | 0.25                                     |
|               | 2           | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" X 30"             | υ i                        | -                             |                    | TWT  | -        | UA   | Ь   |  | 0.25                                     |
|               | 4           | M3-38          | SOUTH<br>SOUTH                     | 30" X 12"             | ט ט                        |                               |                    | 10BWG  | -        | AS.  | ۵   |  | 0.25                                     |
|               |             | M1-1B2         | INTERSTATE 35                      | 24" X 24"             | S                          | -                             |                    |  |          |  |   |  |  |
|               |             | M6-1B          | +                                  | 24" X 12"             | ပ                          | -                             |                    |  |          |  |   |  |  |
|               | ın u        | W11A-2         | PEDESTRIAN CROSSWALK               | 30" × 30"             | ш                          |                               |                    | TWT  |          | VA S   | ۵ :   |  | 0.25                                     |
|               | •           | M3-4           | EAS!<br>WFST                       | 24" X 12"             | ی د                        | - -                           |                    | 2 0 0 0 0  | _        | Y A  | 0   |  | 0.25                                     |
|               |             | M1-6T          | SH 29                              | 24" X 24"             | υ                          | -                             |                    |  |          |  |   |  |  |
|               |             | M1-6T          | SH 29                              | 24" X 24"             | ပ                          | -                             |                    |  |          |  |   |  |  |
|               |             | M6-1           |                                    | 24" X 12"             | ပ                          | -                             |                    |  |          |  |   |  |  |
|               | 7           | M5-1           | RIGHT LANE MUST TURN RIGHT         | 30" X 30"             | U U                        | - -                           |                    | TWT  | -        | VI.  | ۵   |  | 30                                       |
|               | 80          | R3-7R          | RIGHT LANE MUST TURN RIGHT         | 30" × 30"             | U                          | -                             |                    | TWT  | -        | NA N   | . a.  |  | 0.25                                     |
|               | 6           | M3-1B          | NORTH                              | 24" X 12"             | ပ                          | -                             |                    | DBWG   | -        | SA   | ם   |  | 0.25                                     |
|               |             | M3-3B          | SOUTH<br>SECTATE 25                | 24" X 12"             | υ (                        | -  -                          |                    |  |          |  |   |  |  |
|               |             | M1-182         | INTERSTATE 35                      | 24" X 24"             | )<br>)                     | -   -                         |                    |  |          |  |   |  |  |
|               |             | M6-3B          | -                                  | 24" X 12"             | U                          | -                             |                    |  |          |  |   |  |  |
|               | ç           | M6-1B          | y minocoo minocoodo                | 24" X 12"             | O I                        | - -                           |                    |  |          |  |   |  |  |
|               | 2 =         | W11A-2<br>R1-2 | YEDES INDA CROSSWALK               | OC XOE                | יו כ                       | - -                           | +                  | TWT  | - -      | V S  | D. 0  |  | 0.25                                     |
|               | 12          | 03-1           | SH 29                              | 96 ×9                 | ,                          | +                             | AT                 | 2  | AST ARI  |  | L   |  | 0.23                                     |
|               | 13          | 03-1           | 1 1                                | .96 X .91             |                            |                               | AT                 | 0 7  | MAST ARM | A ASSEMBLY   |   |  |  |
|               | 14          | R3-8VAR        | INTERSECTION LANE CONTROL SIGN     | 48" X 30"             | ပ                          | -                             |                    |  | -        |  | ۵   |  | 0.25                                     |
|               | रु          | R3-8VAR        | INTERSECTION LANE CONTROL SIGN     | 48" X 30"             | ပ                          | -                             |                    | 10BWG  | -        | SA   | ۵   |  | 0.25                                     |
|               | 1           |                |                                    |                       |                            | 1                             |                    |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  | -        |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            | +                             | -                  |  | +        |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            |                               | -                  |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            | -                             | +                  |  |          |  |   |  |  |
|               |             |                |                                    |                       |                            |                               |                    |  |          |  |   | TOTAL  | کر<br>8                                  |
| 1 0           |             |                |                                    |                       |                            |                               |                    |  |          |  | ~   |  |  |

ALUMINUM SIGN BLANKS (TYPE A)

Square Ft. Min. Thickness

Less than 7.5 7.5 to 15 Greater than 15 0.080" 0.100" 0.125"

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

Reflective sheeting will be designated as:

Type C - High Specific Intensity Type D - Non-fluorescent Prismatic Type E - Fluorescent Prismatic

NO. REVISION BY DATE

CP Chiang, Patel & Yerby, Inc.

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Texas Department of Transportation

SH 29

SUMMARY OF SMALL SIGNS

| Designed: | GJT | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | ROJECT NO      | ١.         |     | EET |
|-----------|-----|----------------------|--------|-------|----------------|----------------|------------|-----|-----|
| Checked:  | SML | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | -11 | -   |
| Drawn:    | GJT | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |     | WAY |
| Checked:  | SML | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH  | 29  |

1 OF 2

|                         |             |                      |                                |                        |                            |                               |   | No   | 6                          | MOOV NOO   | ××× × ±                    | ·>>>->/>>/>  |  |
|-------------------------|-------------|----------------------|--------------------------------|------------------------|----------------------------|-------------------------------|---|--|----------------------------|--|----------------------------|--|--|
|                         | M           | SUMMARY              | OF SMALL SIGNS                 |                        |                            |                               | *************************************** |  | }                          |  |                            |  |  |
| SHEET NO. SHEET AND NO. | SIGN<br>NO. | SIGN<br>NOMENCLATURE |                                | SIGN<br>DIMENSIONS     | TYPE A REFLECTIVE SHEETING | ALUMINUM<br>TYPE A<br>PLYWOOD | ALUMINUM<br>TYPE G                      | Post Type<br>FRP - Fibergloss<br>TWT - Thin-Wall<br>108WG - 10 BWG<br>S80 - Sch 80 | Posts UB (1 or 2) WA SB SB | Anchor Type UA - Univer-Conc UB - Univer-Bolt WA - Wedge-Conc SA - Silp-Conc | Mounting De<br>P = Prefab. | Designation  1EXT or 2EXT - # of Ext.  BM - Extruded Wind Beam  WC - 1.12 #/ft Wing Chan. (v. EXTAL - Extruded Alum. signs | RIPRAP<br>(CONC)<br>(CL B)<br>(VEG CONT) |
| <b>5</b> 33wss          |             | R1-1<br>D3-1         | ST0P<br>SH 29                  | 30" X 30"<br>12" X 36" | U U                        |                               |   | 10BWG  | -                          |  | ď                          |  | 0.25                                     |
| ss02                    |             | 03-1                 | CR 265 E                       | 12" X 48"              | U                          | -                             |   |  |                            |  |                            |  |  |
| 1.100                   | 2           | R1-1<br>D3-1         | STOP<br>SH 29                  | 30" × 30"<br>12" × 36" | ပပ                         |                               |   | 10BWG  | -                          | SA   | ۵                          | BM   | 0.25                                     |
| 09                      |             | D3-1                 | CR 265 E                       | 12" × 48"              | U (                        | -                             |   |  |                            |  |                            |  |  |
| /22/2                   | ε ,         | R3-8                 | INTERSECTION LANE CONTROL SIGN | 30" X 48"              | ا ن د                      | - -                           |   | 10BWG  | -                          | SA   | ٥                          |  | 0.25                                     |
| 2004                    |             | W13-1                | ADVISORY SPEED LIMIT           | 30" X 30"<br>18" X 18" | u u                        |                               |   | I M I  | -                          | V N  | ב                          |  | 0.23                                     |
| <b>%</b> 07: 48         | -           | R1-1                 | 9018                           | 30" × 30"              | U                          | -                             |   | 10BWG  | -                          | SA   | d                          | ВМ   | 0.25                                     |
| 3: 29                   | 0           | R6-1R                | ONE WAY                        | 36" × 12"              | υ c                        | - -                           |   | TWT  | -                          | All  | c                          |  | 0.25                                     |
| AM                      | 2           | R3-7R                | RIGHT LANE MUST TURN RIGHT     | 30" × 30"              | o o                        |                               |   | TWT  | - -                        | AU ::  | . a                        |  | 0.25                                     |
|                         | 2           | R3-7R                | RIGHT LANE MUST TURN RIGHT     | 30" x 30"              | )<br>)<br>)                | -  -                          |   | TWT  | - -                        | A N  | ۵.                         |  | 0.25                                     |
|                         | 9 1         | R3-8                 | INTERSECTION LANE CONTROL SIGN | 30" X 30"              | ပ                          |                               |   | TWT  | _ -                        | NA<br>SA   | م ه                        | à  | 0.25                                     |
|                         |             | D3-1                 | CR 265                         | 30" X 30"<br>12" X 42" | ) U                        | -  -                          |   | 2 400  | +                          | 5  | 2                          | NA<br>C  | 0.23                                     |
|                         |             | 03-1                 | CR 265 W                       | 12" X 48"              | ပ                          | -                             |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  | +                          |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  | -                          |  |                            |  |  |
|                         | $oxed{T}$   |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  | +                          |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         | $\perp$     |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
|                         |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |
| 2                       |             |                      |                                |                        |                            |                               |   |  |                            |  | IJ                         | TOTAL  | 2.75 CY                                  |
| OF 2                    |             |                      |                                |                        |                            |                               |   |  |                            |  |                            |  |  |

ALUMINUM SIGN BLANKS (TYPE A)

Square Ft. Min. Thickness

Less than 7.5 7.5 to 15 Greater than 15 0.080" 0.100" 0.125"

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Chiang, Patel & Yerby, Inc.

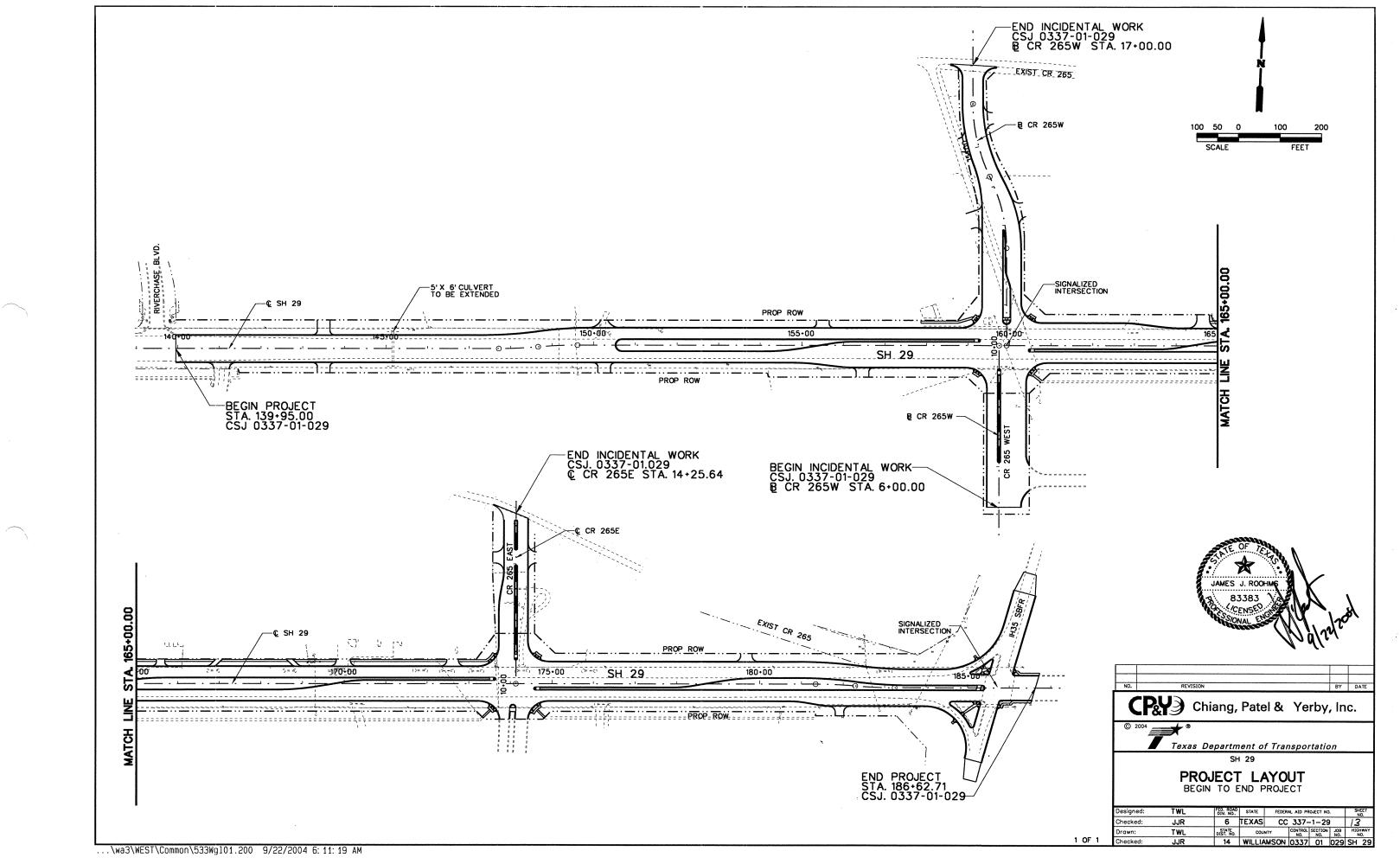
© 2004

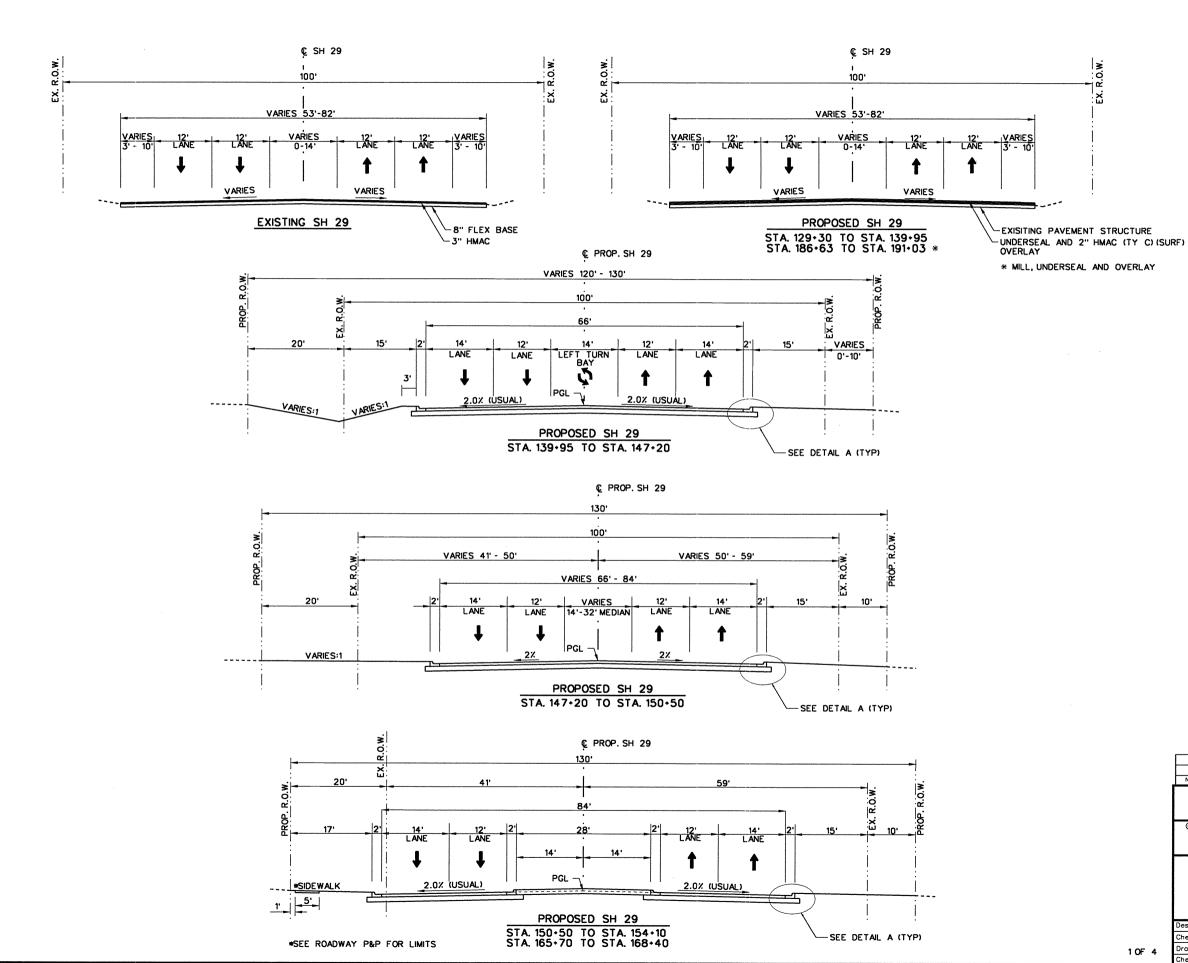
Texas Department of Transportation

SH 29

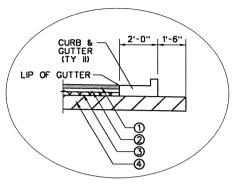
SUMMARY OF SMALL SIGNS

| Designed: | GJT | FED. ROAD<br>DIV. NO., | STATE    | FEDER. | AL AID PF      | OJECT NO       |            | SH<br>N | EET<br>O. |
|-----------|-----|------------------------|----------|--------|----------------|----------------|------------|---------|-----------|
| Checked:  | SML | 6                      | TEXAS    | CC     | 337-           | -1-29          | )          | 12      |           |
| Drawn:    | GJT | STATE<br>DIST. NO.     | cou      | NTY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |         | WAY       |
| Checked:  | SMI | 14                     | WII 1 14 | MSON   | 0337           | 01             | 020        | SH      | 29        |





① - 2" HMAC (TY C) (SURF) ② - 2" HMAC (TY C) ③ - 3" HMAC (TY B) ④ - 12" HMAC (TY A)

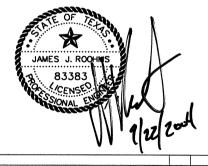


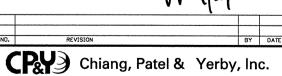
DETAIL A

#### NOTES:

1. FOR EXACT EDGE CONDITIONS, SEE CROSS SECTIONS.

2. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION TRANSITIONS AND EXACT ROADWAY CROSS SLOPES.

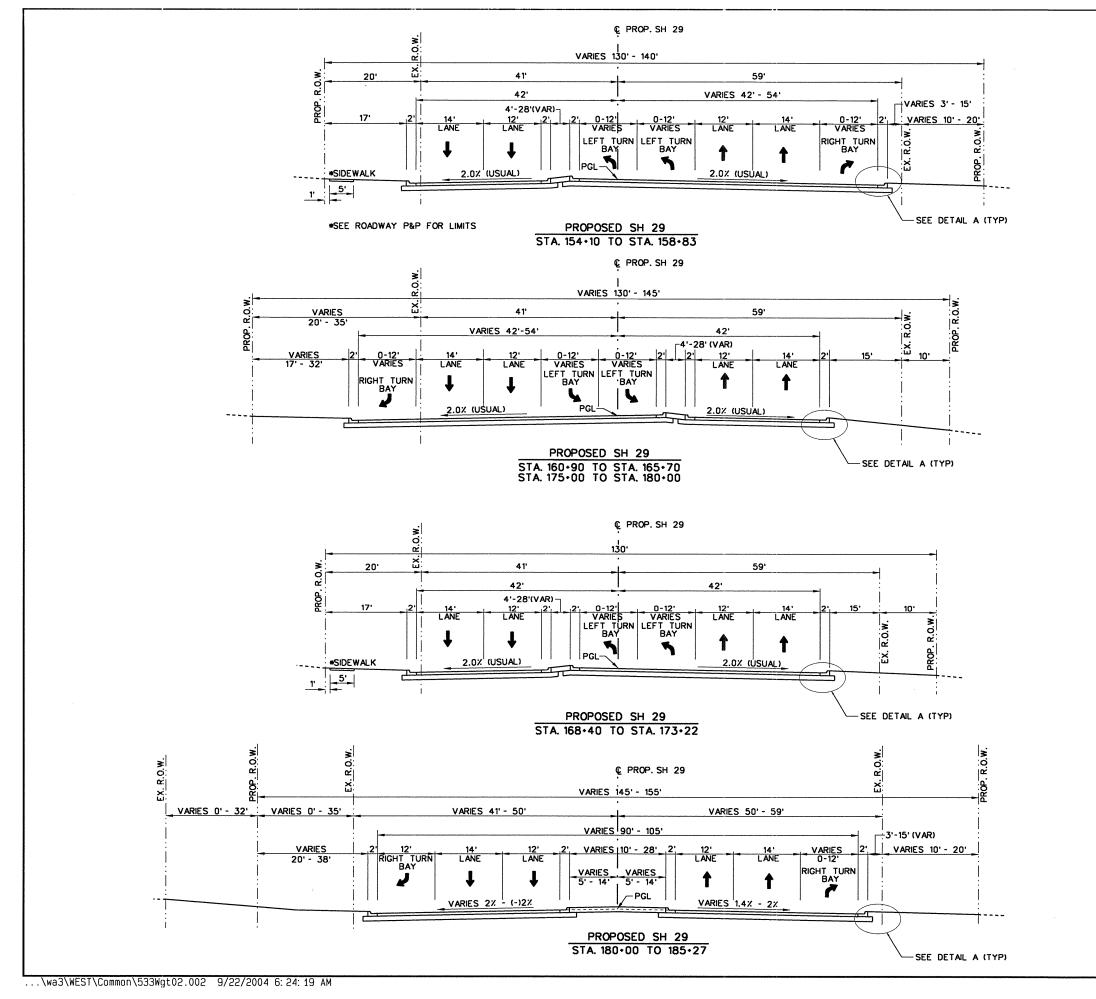




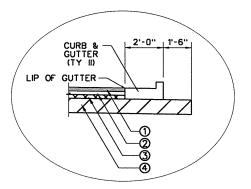
Texas Department of Transportation

TYPICAL SECTIONS
SH 29

DIV. NO.. STATE FEDERAL AID PROJECT NO. Designed: JJR KGM Drawn:



- 1) 2" HMAC (TY C) (SURF) 2) 2" HMAC (TY C) 3) 3" HMAC (TY B) 4) 12" HMAC (TY A)



DETAIL A

#### NOTES:

1. FOR EXACT EDGE CONDITIONS, SEE CROSS SECTIONS.

2. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION TRANSITIONS AND EXACT ROADWAY CROSS SLOPES.

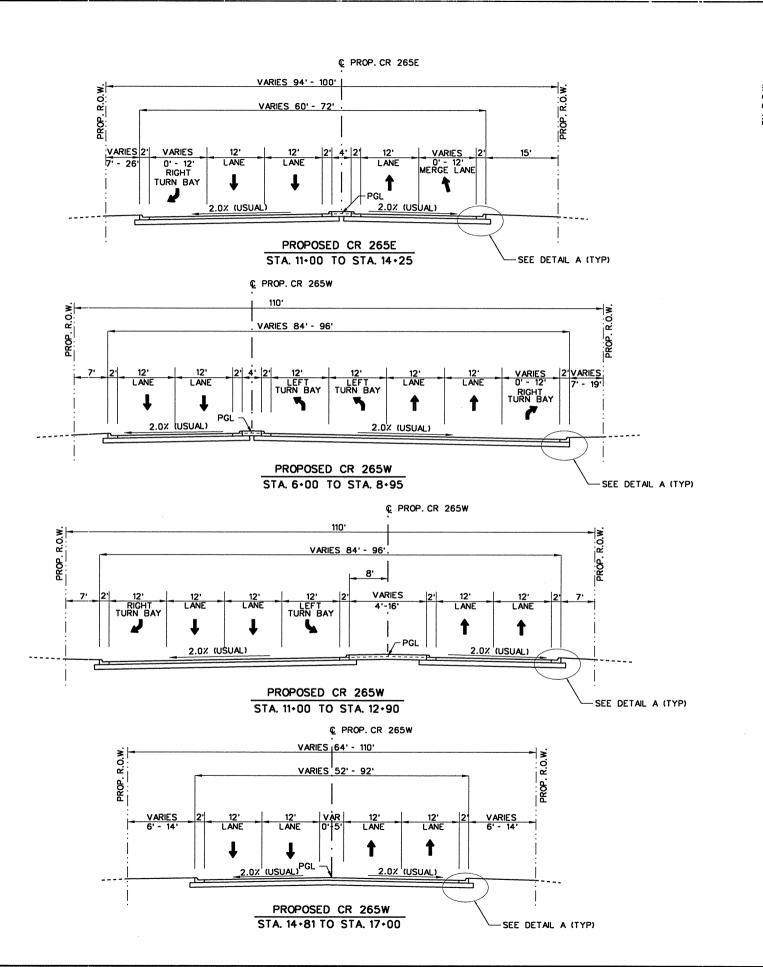


Chiang, Patel & Yerby, Inc.

TYPICAL SECTIONS SH 29

Texas Department of Transportation

Designed: Checked: JJR KGM



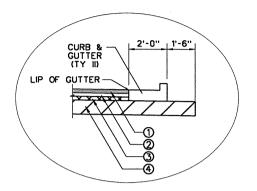
① - 2" HMAC (TY C) (SURF) ② - 2" HMAC (TY C) ③ - 3" HMAC (TY B) ④ - 12" HMAC (TY A)

€ CR 265

VARIES 14' - 18'

VARIES VARIES

EXISTING CR 265W



DETAIL A

#### NOTES:

1. FOR EXACT EDGE CONDITIONS, SEE CROSS SECTIONS.

2. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION TRANSITIONS AND EXACT ROADWAY CROSS SLOPES.

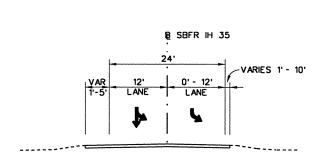


Chiang, Patel & Yerby, Inc.

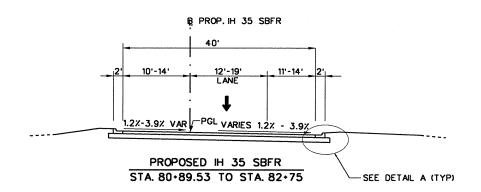
Texas Department of Transportation

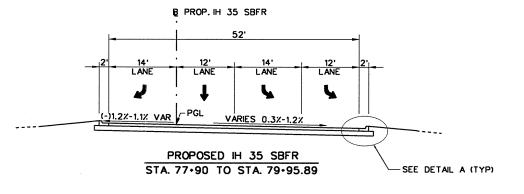
TYPICAL SECTIONS CROSS STREETS

Designed: 6 TEXAS CC 337-1-29 Checked: JJR | STATE | COUNTY | CONTROL | SECTION | JOB | HICHWAY | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | KGM Drawn:

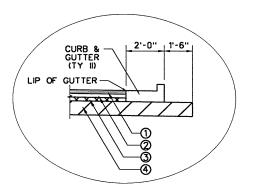


EXISTING IH 35 SBFR
STA. 77-90 TO STA. 79-95.89
STA. 80-89.53 TO STA. 82-75





① - 2" HMAC (TY C) (SURF)
② - 2" HMAC (TY C)
③ - 3" HMAC (TY B)
④ - 12" HMAC (TY A)



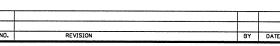
DETAIL A

#### NOTES:

1. FOR EXACT EDGE CONDITIONS, SEE CROSS SECTIONS.

2. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION TRANSITIONS AND EXACT ROADWAY CROSS SLOPES.





Chiang, Patel & Yerby, Inc.



Texas Department of Transportation

SH 29

## TYPICAL SECTIONS IH 35 SBFR

| esigned: | JWP | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PE      | OJECT NO       | ١.         |    | EET<br>O. |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-----------|
| hecked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 17 | -         |
| rawn:    | KGM | STATE<br>DIST. NO.   | cour   | VTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY      |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0.3.37         | 01             | 029        | SH | 29        |

#### PHASE 1. STEP 1

PHASE 1, STEP 1 CONSISTS OF CONSTRUCTING TEMPORARY PAVEMENT WIDENING ON THE SOUTH SIDE OF SH 29 AND CONSTRUCTING DRAINAGE LINES "A" & "B" UNDER EXISTING PAVEMENT. TRAFFIC SHALL REMAIN ON EXISTING PAVEMENT AND SHALL CONSIST OF TWO LANES IN EACH DIRECTION WITH A CONTINUOUS LEFT TURN LANE WHERE SHOWN IN THE PLANS.

- 1. PLACE TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS AS SHOWN IN THE PLANS. TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS SHALL BE IN COMPLIANCE WITH THE TMUTCD.
- 2. DRAINAGE LINE "A" CROSSING AT STA 162+69 AND DRAINAGE LINE "B" CROSSING AT STA 181+10 SHALL BE CONSTRUCTED. TRAFFIC CONTROL SHALL FOLLOW TXDOT STANDARD TCP (2-4) AND AUSTIN DISTRICT STANDARD "CUTTING AND RESTORING PAYEMENT".
- 3. CONSTRUCT DOWNSTREAM END OF CULVERT NO.1 PRIOR TO PLACING TEMPORARY PAVEMENT WIDENING.
- 4. TEMPORARY PAVEMENT WIDENING SHALL BE PLACED ALONG THE SOUTH SIDE OF SH 29 FROM STA 137+70.71 TO STA 149+78.05. TRAFFIC CONTROL SHALL FOLLOW TXDOT STANDARD TCP (2-1).
- 5. CONSTRUCT DETOUR "A" ALONG EXISTING CR 265 WEST TO SH 29 AS SHOWN IN THE PLANS.
- 6. PERMANENT SIGNAL FOUNDATIONS AND POLES SHALL BE INSTALLED AT THE INTERSECTION OF CR 265 WEST AND SH 29. SEE TEMPORARY SIGNAL PLANS FOR ADDITIONAL INFORMATION.

#### PHASE 2. STEP 1

PHASE 2, STEP 1 CONSISTS OF CONSTRUCTING THE SOUTH HALF OF SH 29. TRAFFIC SHALL BE PLACED ON PROPOSED PAVEMENT CONSTRUCTED IN PHASE 1, STEPS 1, 2 & 3. TRAFFIC SHALL CONSIST OF ONE LANE IN EACH DIRECTION WITH A CENTER DUAL LEFT TURN LANE.

- 1. PLACE TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS AS SHOWN IN THE PLANS. TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS SHALL BE IN COMPLIANCE WITH THE TMUTCD.
- 2. CULVERTS AND DRAINAGE SYSTEMS SHALL BE PLACED AS SHOWN IN THE PLANS.
- 3. CONSTRUCT PROPOSED PAVEMENT TO THE SOUTH AS SHOWN IN THE PLANS. ACCESS TO PRIVATE PROPERTY SHALL REMAIN OPEN AT ALL TIMES.
- 4. CONSTRUCTION OF SOUTHBOUND FRONTAGE RD AND SH 29 INTERSECTION SHALL BE COMPLETED DURING NIGHTTIME HOURS (FROM 8PM TO 6AM) ONLY USING FULL DEPTH ASPHALTIC PAVEMENT. TRAFFIC SHALL BE RESTORED EACH MORNING TO THE CONFIGURATION SHOWN IN THE PLANS. TRANSITIONS FROM PROPOSED TO EXISTING PAVEMENTS SHALL BE PLACED AND APPROVED BY THE ENGINEER PRIOR TO OPENING TRAFFIC ONTO PROPOSED PAVEMENT.
- 5. PLACE FINAL OVERLAY AND SIGNING AND STRIPING ON THE SOUTH HALF OF SH  $\,29.$

#### PHASE 1. STEP 2

PHASE 1, STEP 2 CONSISTS OF CONSTRUCTING THE NORTH HALF OF SH 29. TRAFFIC SHALL REMAIN ON EXISTING PAVEMENT AND SHALL CONSIST OF ONE LANE IN EACH DIRECTION WITH A CENTER DUAL LEFT TURN LANE.

- 1. PLACE TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS AS SHOWN IN THE PLANS. TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS SHALL BE IN COMPLIANCE WITH THE TMUTCD.
- 2. SH 29 ALTERNATE ROUTE SIGNING SHALL BE INSTALLED AND REMAIN IN PLACE THROUGH PHASE 2, STEP 1. REFER TO SHEET 41 FOR LAYOUT.
- 3. CULVERTS AND DRAINAGE SYSTEMS SHALL BE PLACED AS SHOWN IN THE PLANS.
- 4. CONSTRUCT PROPOSED PAVEMENT TO THE NORTH AS SHOWN IN THE PLANS. CONSTRUCT TEMPORARY PAVEMENT WIDENING AS SHOWN IN THE PLANS. ACCESS TO PRIVATE PROPERTY SHALL REMAIN OPEN AT ALL TIMES.
- 5. CONSTRUCTION OF SOUTHBOUND FRONTAGE RD AND SH 29 INTERSECTION SHALL BE COMPLETED DURING NIGHTTIME HOURS (FROM 8PM TO 6AM) ONLY. TRAFFIC SHALL BE RESTORED EACH MORNING TO THE CONFIGURATION SHOWN IN THE PLANS. TRANSITIONS FROM PROPOSED TO EXISTING PAVEMENTS SHALL BE PLACED AND APPROVED BY THE ENGINEER PRIOR TO OPENING TRAFFIC ONTO PROPOSED PAVEMENT.
- 6. MEDIANS ALONG SH 29 WILL NOT BE CONSTRUCTED DURING THIS PHASE, BUT MEDIANS ALONG CR 265 EAST AND CR 265 WEST WILL BE CONSTRUCTED.

#### PHASE 1. STEP 3

PHASE 1, STEP 3 CONSISTS OF CONSTRUCTING THE REMAINING PORTION OF CR 265 WEST, TRAFFIC SHALL BE PLACED ONTO PROPOSED CR 265 WEST PAVEMENT CONSTRUCTED IN PREVIOUS STEP AND SHALL CONSIST OF ONE LANE IN EACH DIRECTION. TRAFFIC ALONG SH 29 SHALL REMAIN IN PLACE FROM PHASE 1, STEP 2.

- 1. PLACE TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS AS SHOWN IN THE PLANS. TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS SHALL BE IN COMPLIANCE WITH THE TMUTCD. MOVE AND RESET LOW PROFILE CONCRETE BARRIER PLACED IN PHASE 1, STEP 2 AT INTERSECTION OF CR 265 WEST.
- 2. DRAINAGE SYSTEMS SHALL BE PLACED AS SHOWN IN THE PLANS.
- 3. CONSTRUCT PROPOSED PAVEMENT ALONG CR 265 WEST AS SHOWN IN THE PLANS. ACCESS TO PRIVATE PROPERTY SHALL REMAIN OPEN AT ALL TIMES.

#### PHASE 3. STEP 1

PHASE 3, STEP 1 CONSISTS OF CONSTRUCTING THE CENTER MEDIANS ALONG SH 29, BEGINNING 2 IN. MILLING PROCESS & PLACING FINAL OVERLAY AND SIGNING AND STRIPING ON THE NORTH HALF OF THE JOB. EASTBOUND TRAFFIC SHALL BE PLACED IN ITS FINAL LOCATION ON THE SOUTH HALF OF SH 29. WESTBOUND TRAFFIC SHALL BE PLACED ON THE NORTH HALF OF SH 29, UTILIZING PROPOSED PAVEMENT AND STRIPING CONSTRUCTED IN PREVIOUS PHASE. WESTBOUND TRAFFIC SHALL BE PLACED INTO ITS FINAL LOCATION AS SHOWN IN THE SIGNING & STRIPING PLANS AFTER CONSTRUCTING THE CENTER MEDIANS.

- 1. BEGIN 5 IN. MILLING PROCESS OF TEMPORARY PAVEMENT WIDENING PLACED IN PHASE 1, STEP 2 ALONG CENTER MEDIANS OF SH 29, AND CONSTRUCT THE CENTER MEDIANS ALONG SH 29.
- 2. ONCE MEDIAN CONSTRUCTION HAS BEEN COMPLETED, BEGIN THE 2 IN. MILLING PROCESS ALONG SH 29 FROM STA. 186+62.63 TO STA 190-03. ONCE MILLING PROCESS HAS BEEN COMPLETED, PLACE FINAL OVERLAY. TRAFFIC CONTROL SHALL FOLLOW TXDOT STANDARD TCP (7-1).
- 3. ONCE FINAL OVERLAY IS IN PLACE, FINAL SIGNING AND STRIPING SHALL BE PLACED. INSTALL THE REMAINING PERMANENT TRAFFIC SIGNAL ASSEMBLIES AND REMOVE TEMPORARY TRAFFIC SIGNALS.



NO. REVISION BY DATE

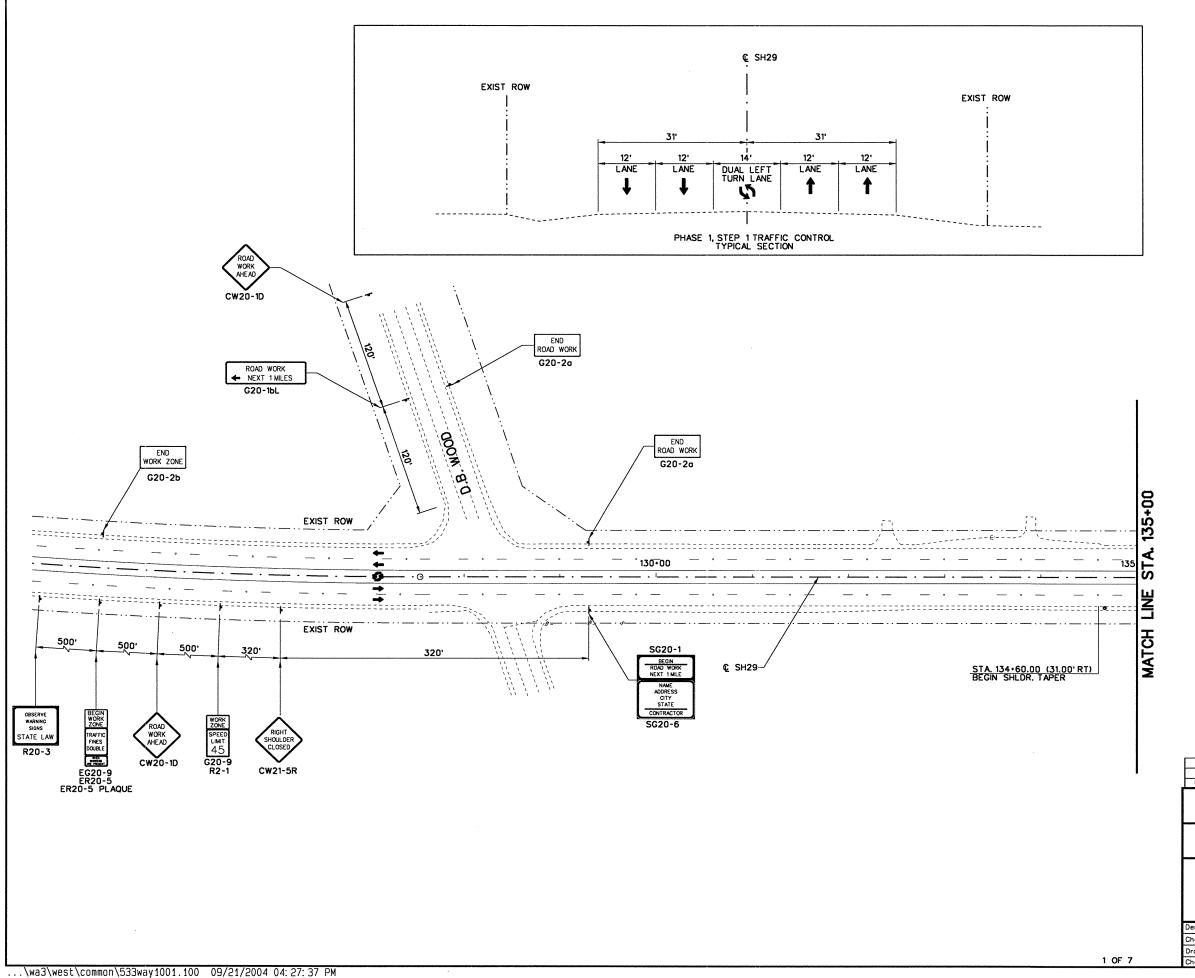
Chiang, Patel & Yerby, Inc.

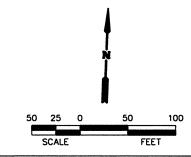
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Texas Department of Transportation

TRAFFIC CONTROL PLANS

| esigned: | SML | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       | ).         |    | EET  |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|------|
| hecked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 18 | 3    |
| rawn:    | SML | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29   |





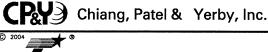
PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)



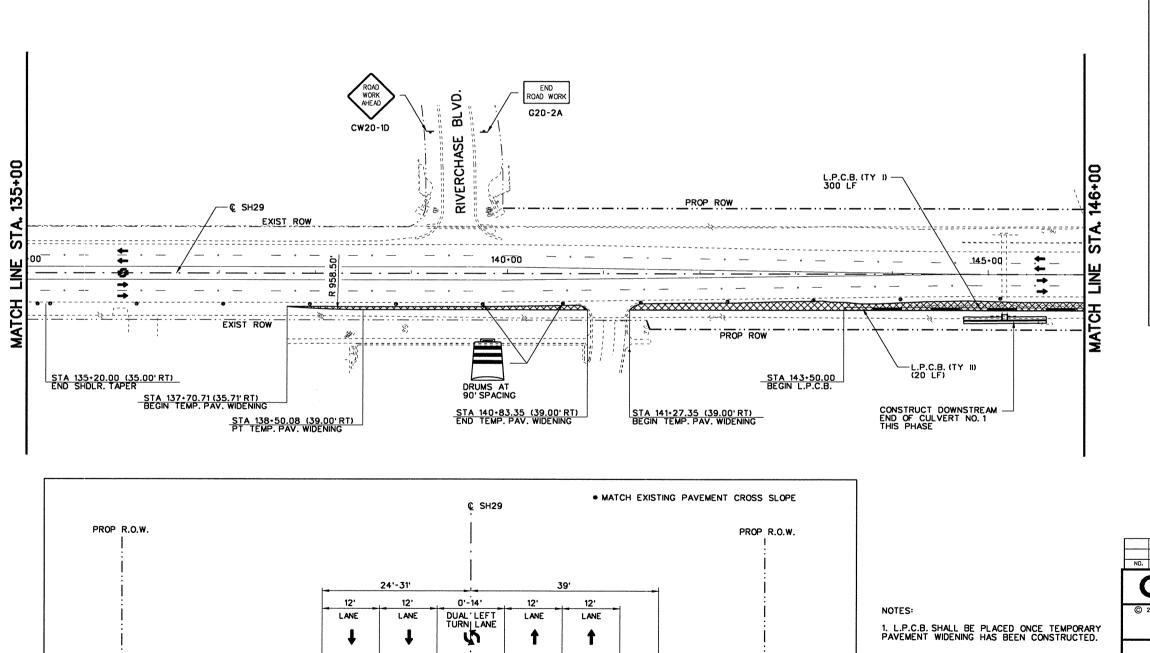


Texas Department of Transportation

TRAFFIC CONTROL PLANS

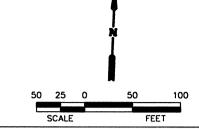
PHASE 1, STEP 1 BEGIN PROJECT TO STA 135+00

hecked: JJR 6 TEXAS CC 337-1-29 STATE COUNTY CONTROL SECTION JOB NO. NO. NO. NO. Orawn: KGM



TEMPORARY PAVEMENT (2" HMAC TY C (SURF), 4" HMAC TY B & 4" HMAC TY A)

PHASE 1, STEP 1 TRAFFIC CONTROL TYPICAL SECTION



LEGEND

PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- (T) WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- (E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (H) WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- (K) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- M) WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- S WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- (TY III) BARRICADE
- LOW PROFILE CONC. BARRIER (L.P.C.B.)



NO. REVISION BY DATE

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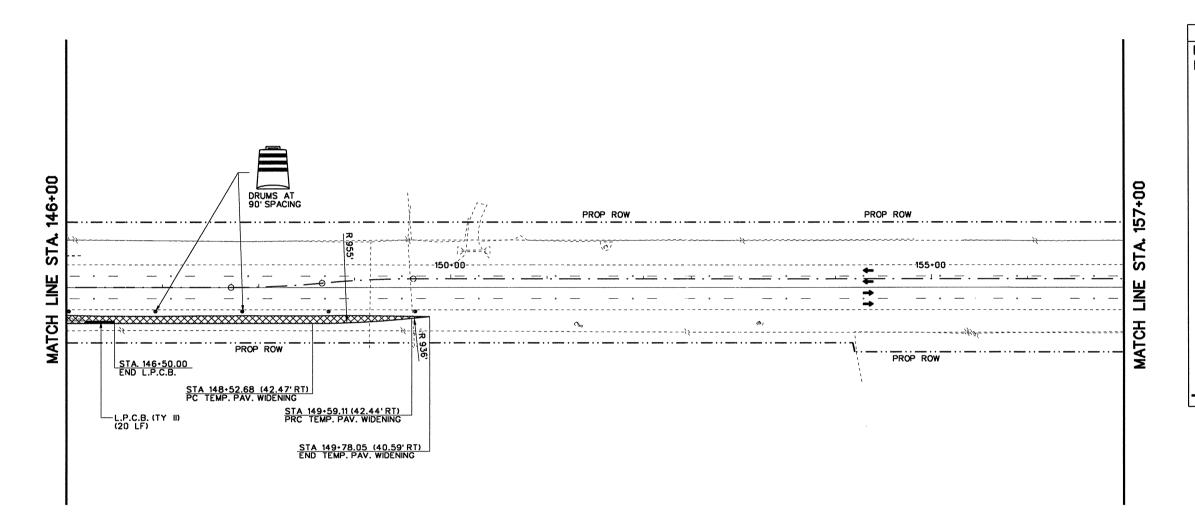
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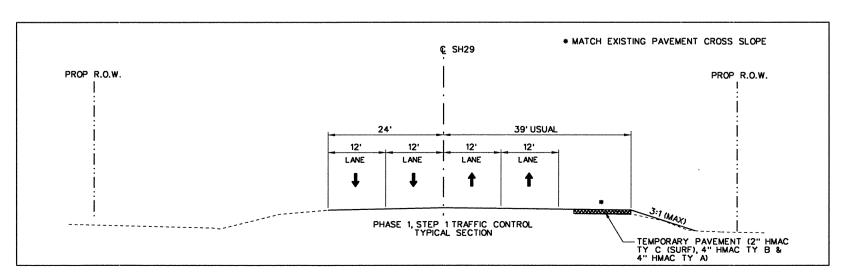
Texas Department of Transportation

SH 29

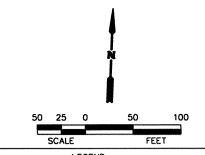
TRAFFIC CONTROL PLANS
PHASE 1, STEP 1
STA. 135+00 TO STA. 146+00

OF 7





1. L.P.C.B. SHALL BE PLACED ONCE TEMPORARY PAVEMENT WIDENING HAS BEEN CONSTRUCTED.



LEGEND

PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV) WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- → (TY III) BARRICADE

----LOW PROFILE CONC. BARRIER (L.P.C.B.)



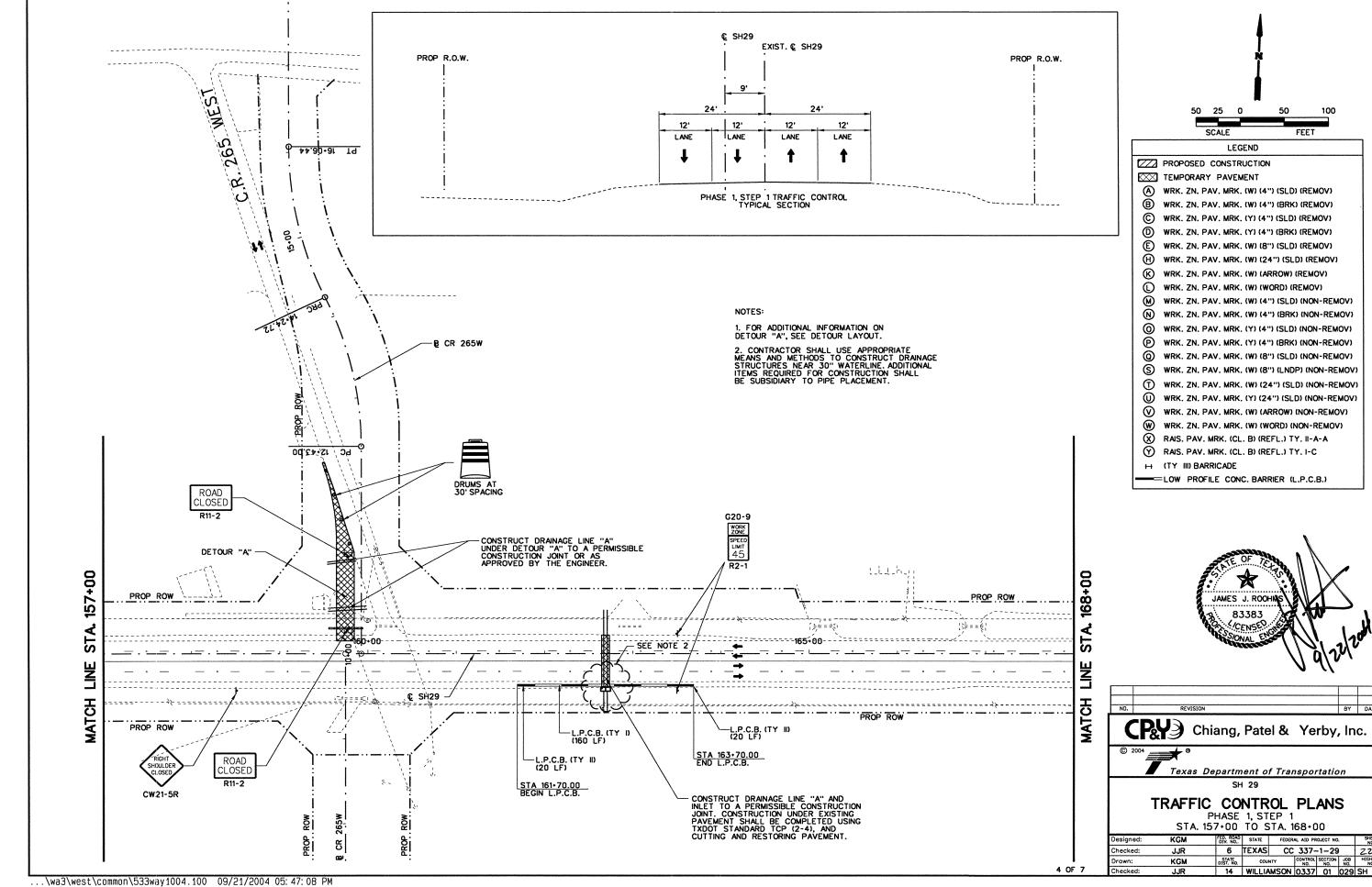
Chiang, Patel & Yerby, Inc.



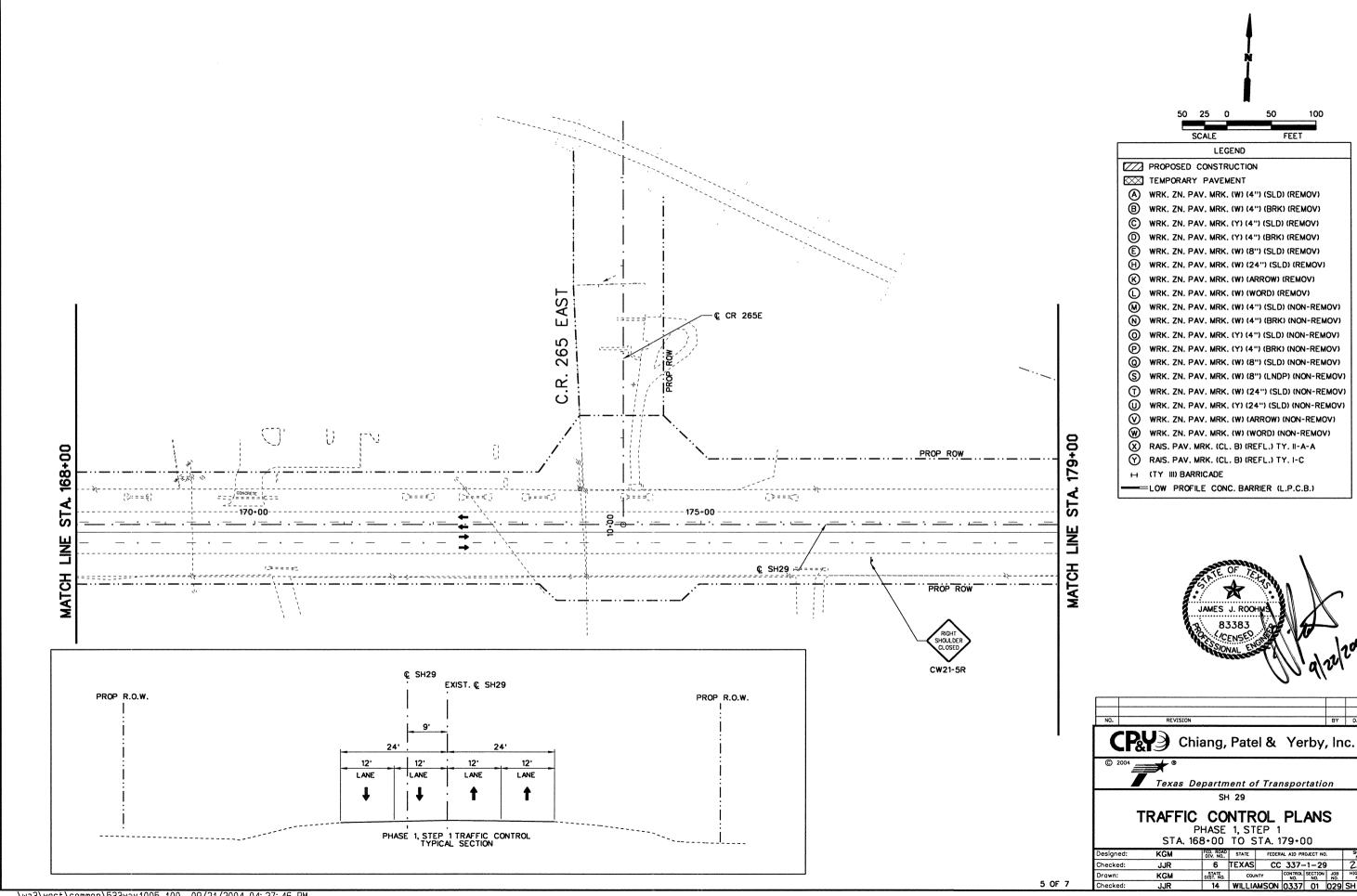
Texas Department of Transportation

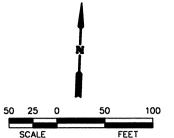
TRAFFIC CONTROL PLANS PHASE 1, STEP 1

STA. 146+00 TO STA. 157+00 Drawn: KGM



| STATE | COUNTY | CONTROL SECTION | JOB | HIGHWAY | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | N





PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- B WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- © WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (W) (24") (SLD) (REMOV)
- (W) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- (S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- T WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- W WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

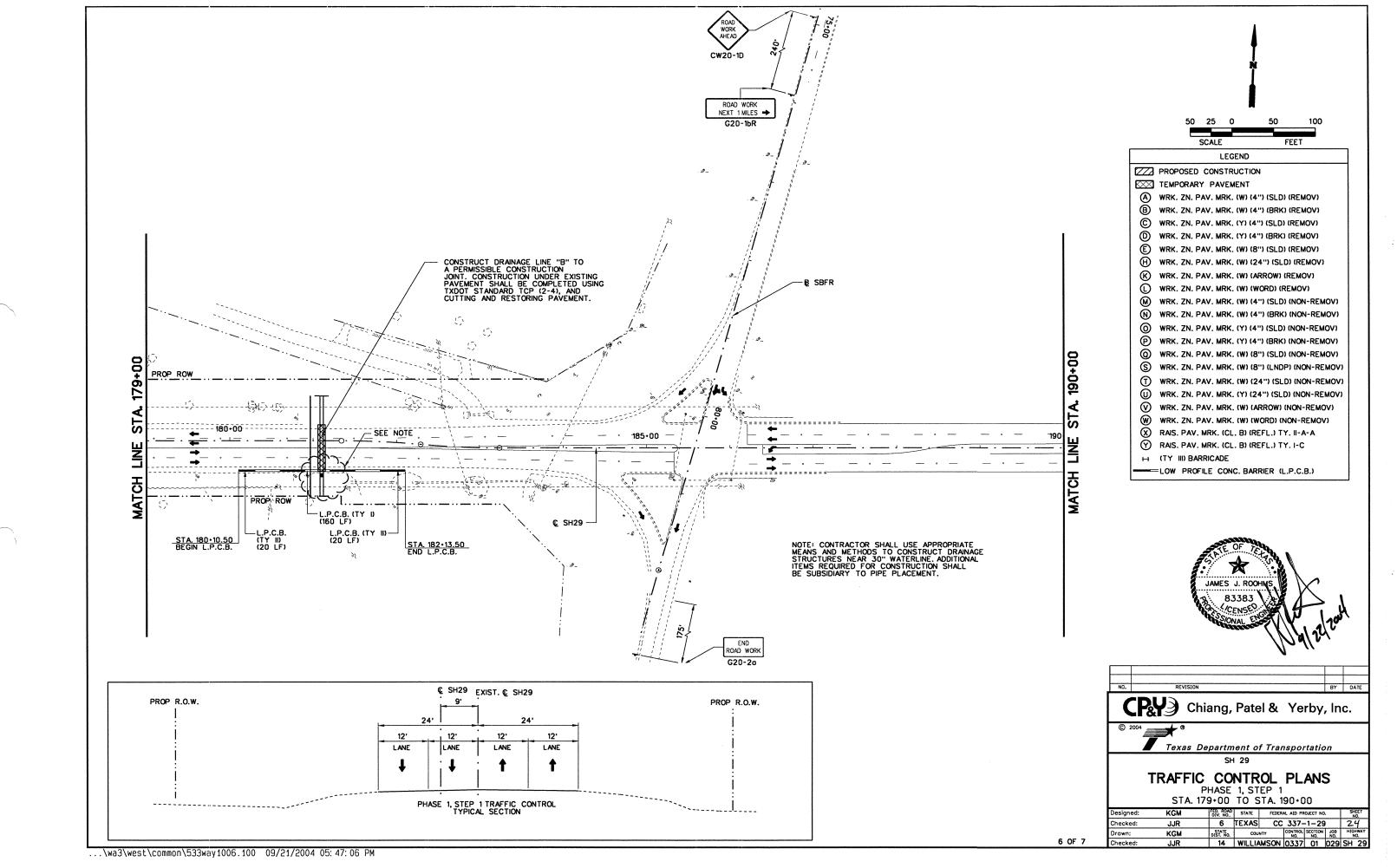


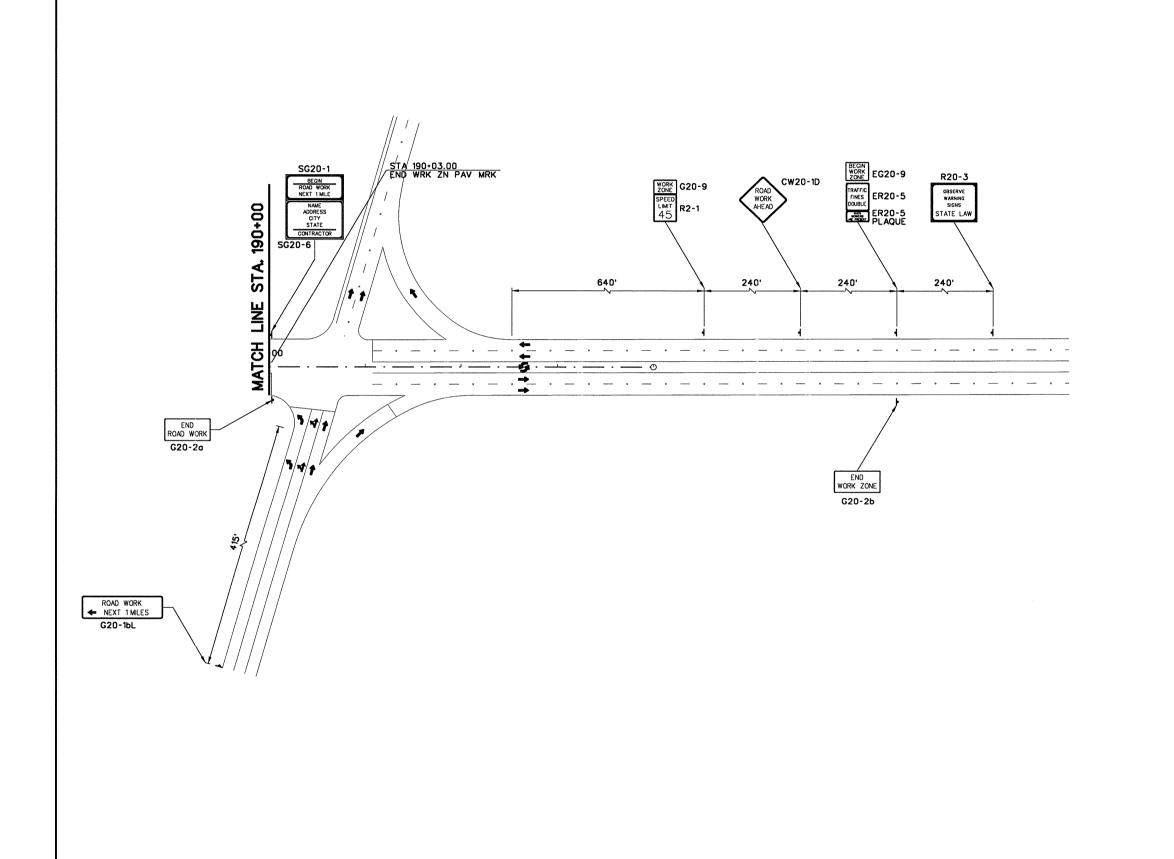


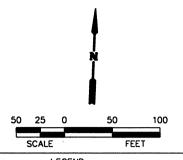
TRAFFIC CONTROL PLANS PHASE 1, STEP 1

6 TEXAS CC 337-1-29

| STATE | COUNTY | CONTROL | SECTION | JOB | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | KGM







PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- (B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- © WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- (S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)





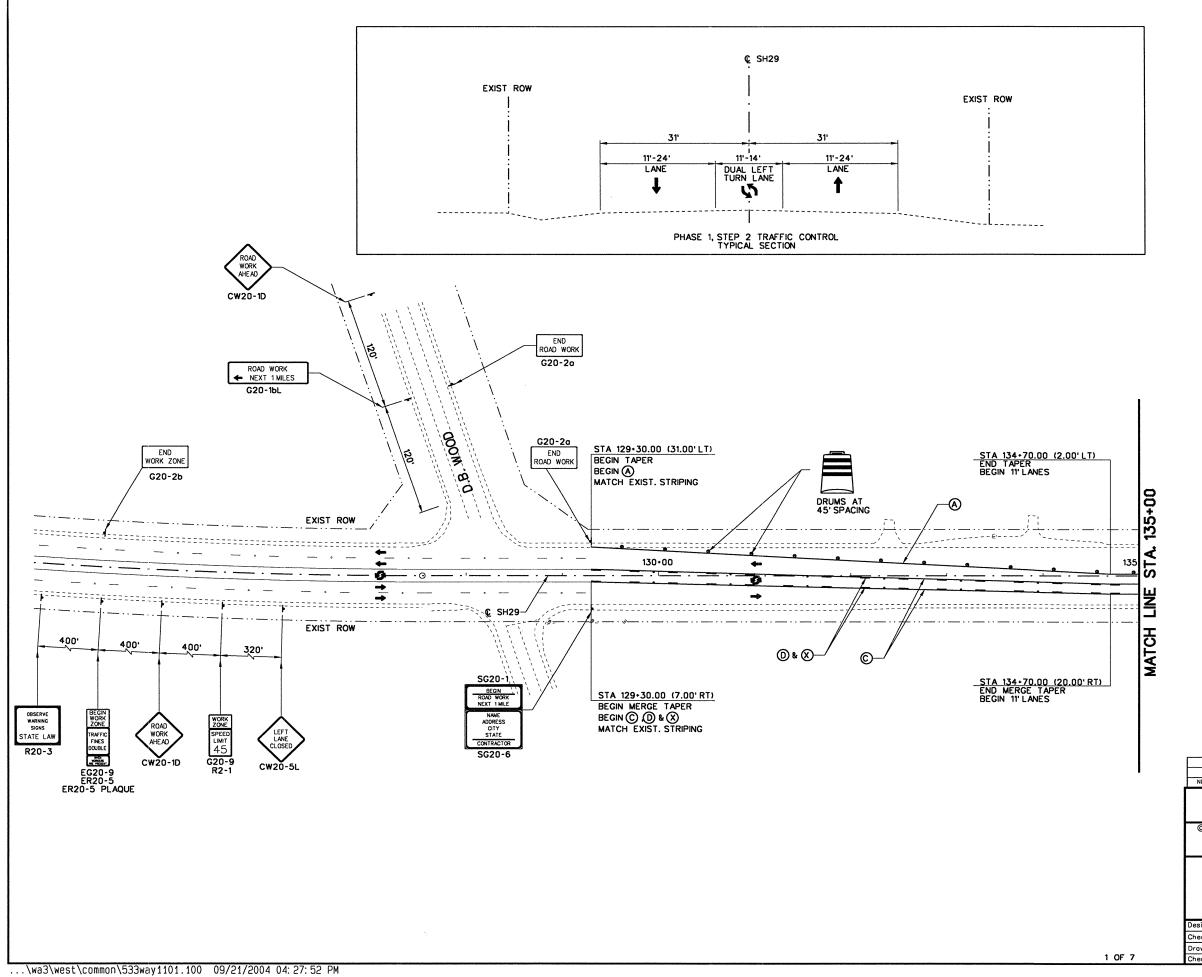
Chiang, Patel & Yerby, Inc.

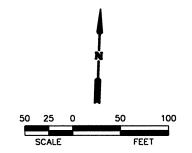
Texas Department of Transportation

TRAFFIC CONTROL PLANS

PHASE 1, STEP 1 STA. 190+00 TO END PROJECT

ED. ROAD DIV. NO.. STATE FEDERAL AID PROJECT NO. Designed: 6 TEXAS CC 337-1-29 | STATE | COUNTY | CONTROL | SECTION | JOB | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. Drawn: KGM





PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV) RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- (TY III) BARRICADE

LOW PROFILE CONC. BARRIER (L.P.C.B.)





Chiang, Patel & Yerby, Inc.

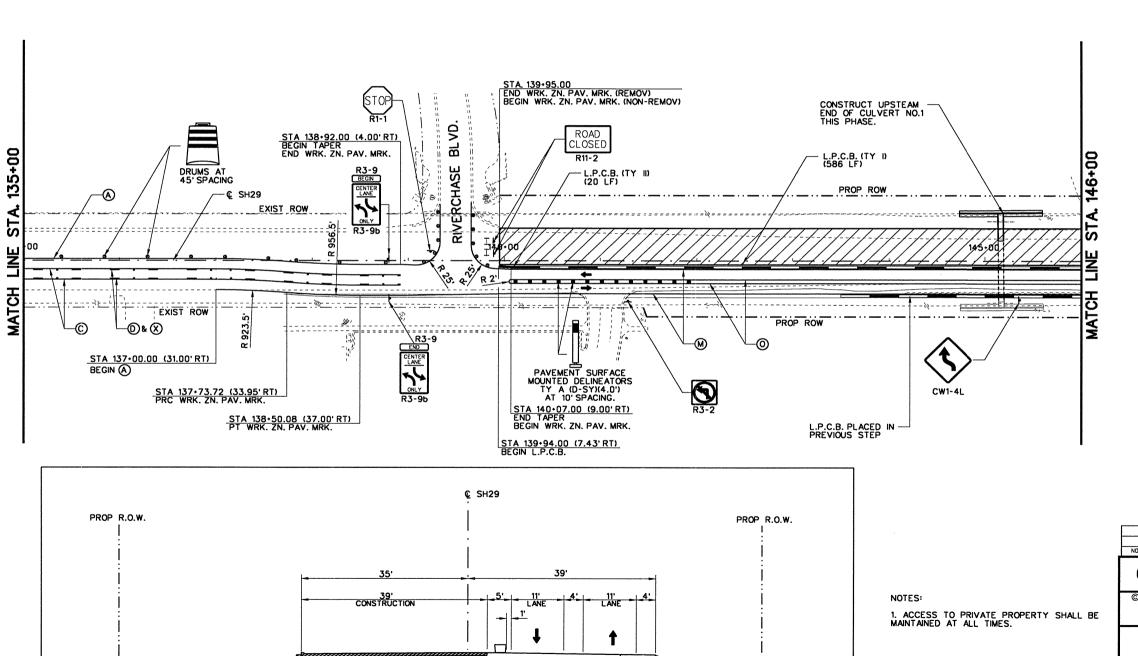
Texas Department of Transportation SH 29

TRAFFIC CONTROL PLANS

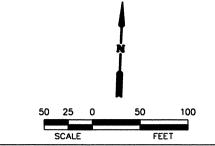
PHASE 1, STEP 2 BEGIN PROJECT TO STA 135+00

6 TEXAS CC 337-1-29 ZC

| STATE | COUNTY | COUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTY | SECTION | SOB. MICHAEL
| STATE | SCOUNTY | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTION | SOB. MICHAEL
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| STATE | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTION | SOB. MICHAEL
| STATE | SCOUNTROL SECTIO Checked: JJR



PHASE 1, STEP 2 TRAFFIC CONTROL TYPICAL SECTION



#### LEGEND

PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- (B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- © WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- (Y) (4") (BRK) (REMOV)
- (E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (H) WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- ~
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- (WRK, ZN. PAV, MRK, (W) (8") (SLD) (NON-REMOV)
- S WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- T WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- (V) WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- W WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

---LOW PROFILE CONC. BARRIER (L.P.C.B.)



NO. REVISION BY DATE

2004

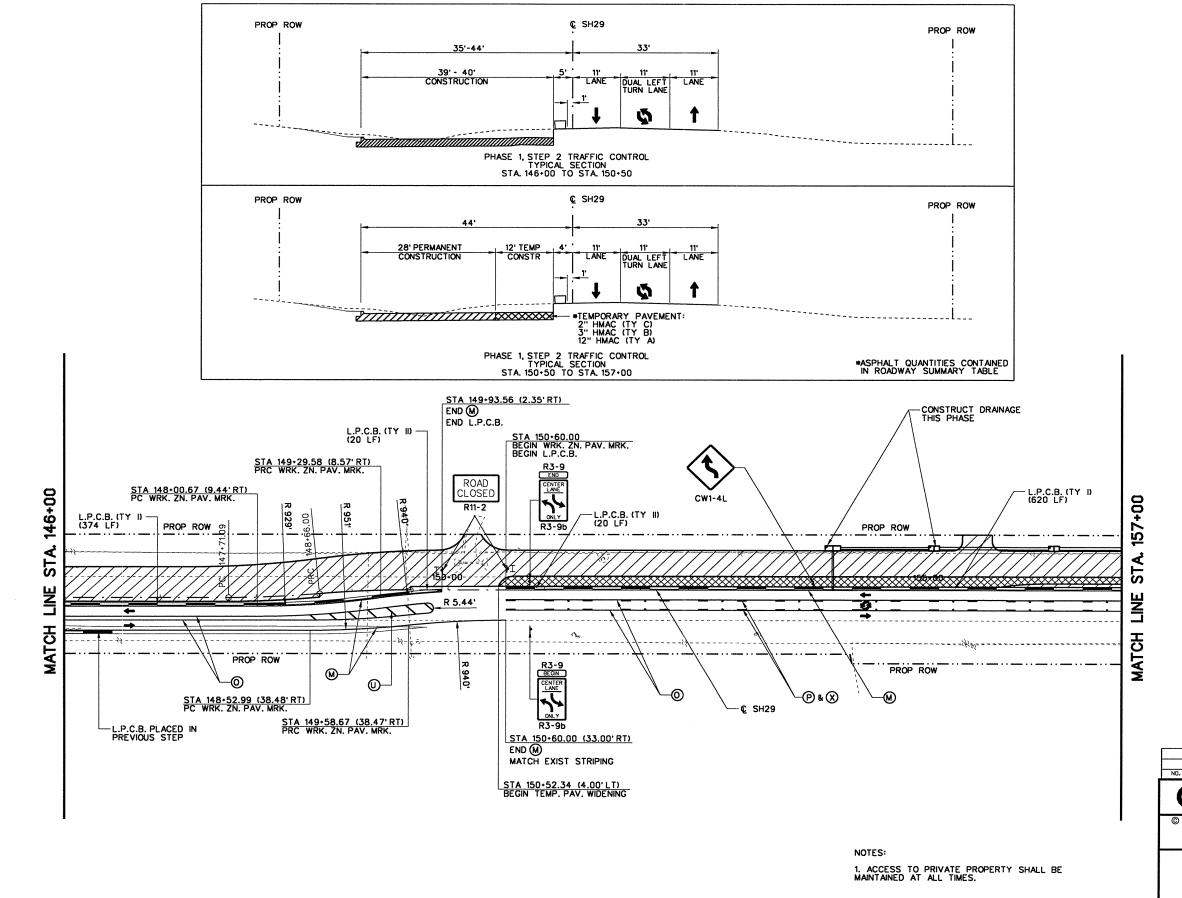
Chiang, Patel & Yerby, Inc.

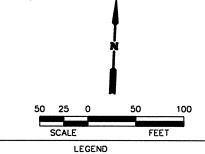
Texas Department of Transportation

TRAFFIC CONTROL PLANS
PHASE 1, STEP 2

2 OF 7

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PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS, PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)



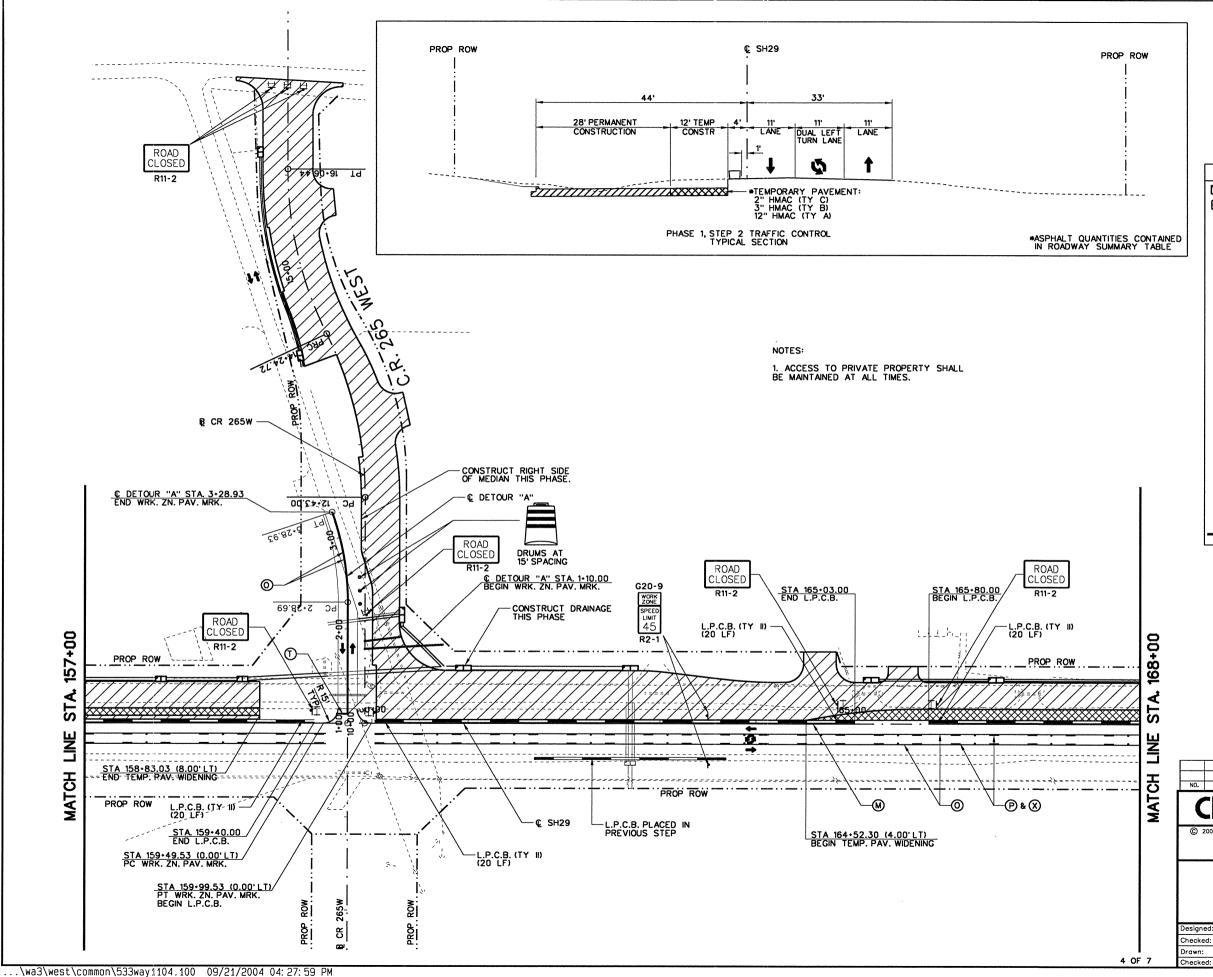
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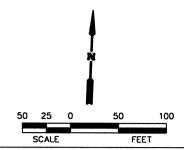
Texas Department of Transportation

TRAFFIC CONTROL PLANS PHASE 1, STEP 2

STA. 146+00 TO STA. 157+00

FED. ROAD STATE FEDERAL AID PROJECT NO. esigned: 6 TEXAS CC 337-1-29 28 Checked: | STATE | COUNTY | CONTROL SECTION | JOB | HIGHWAY | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | N KGM





PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- (B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- © WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- H WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- M) WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- N WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- (P) WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- S WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- T WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

LOW PROFILE CONC. BARRIER (L.P.C.B.)



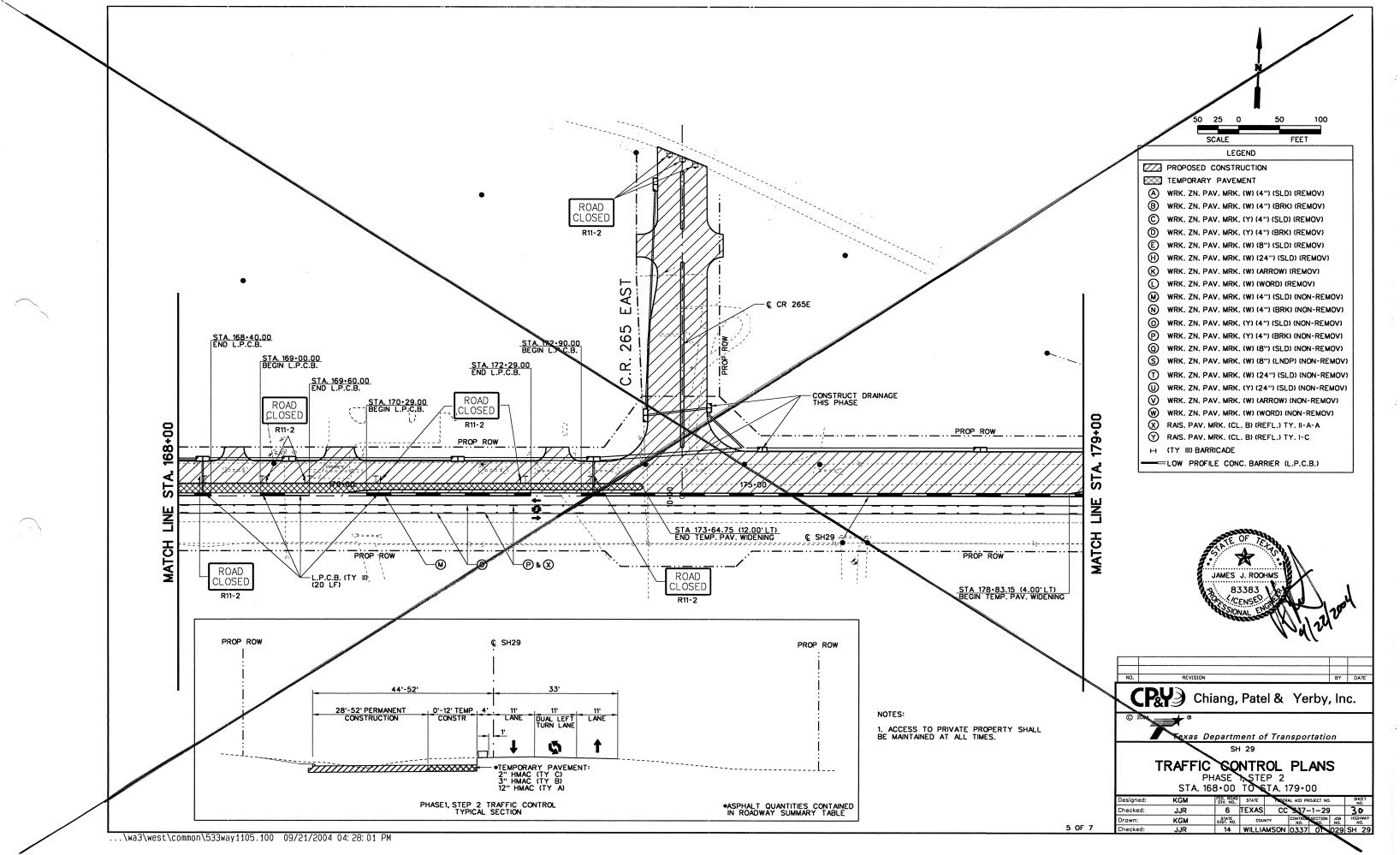
Chiang, Patel & Yerby, Inc.

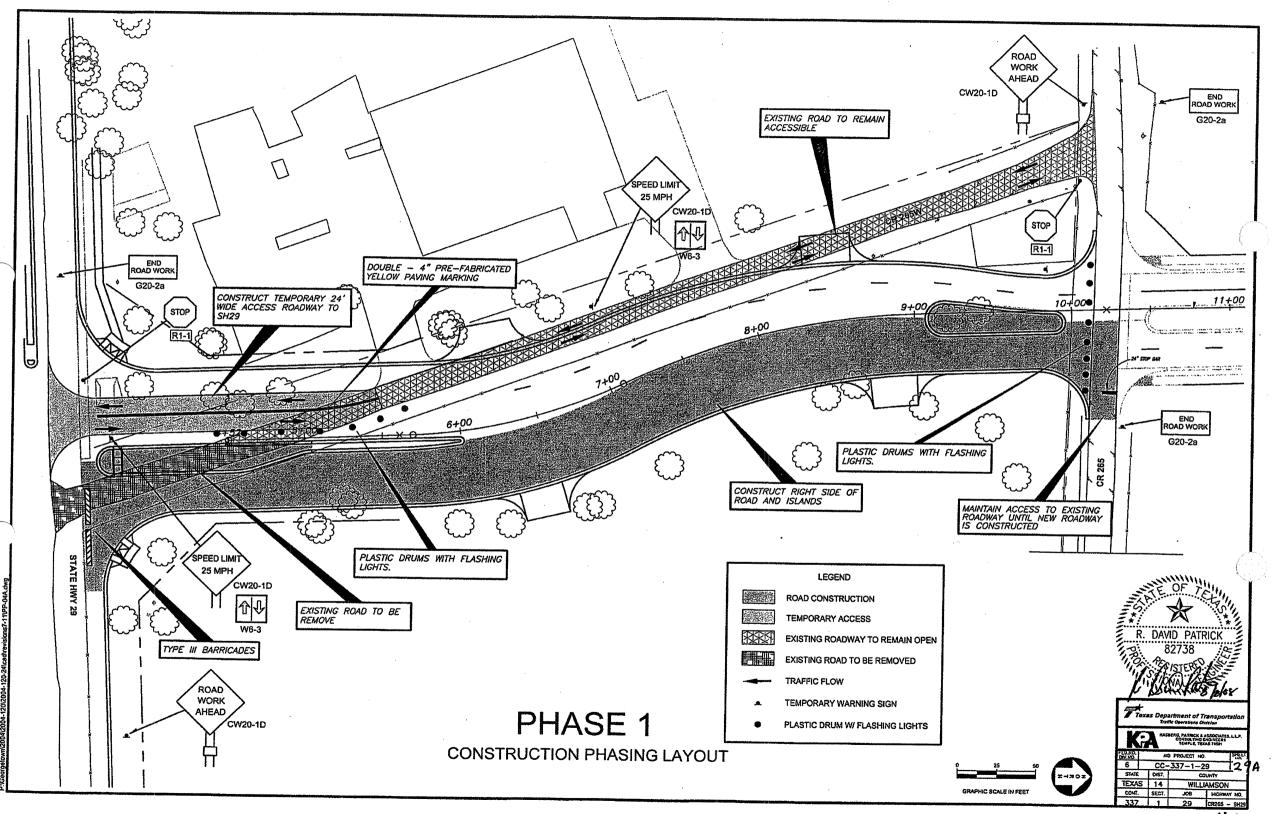
2004

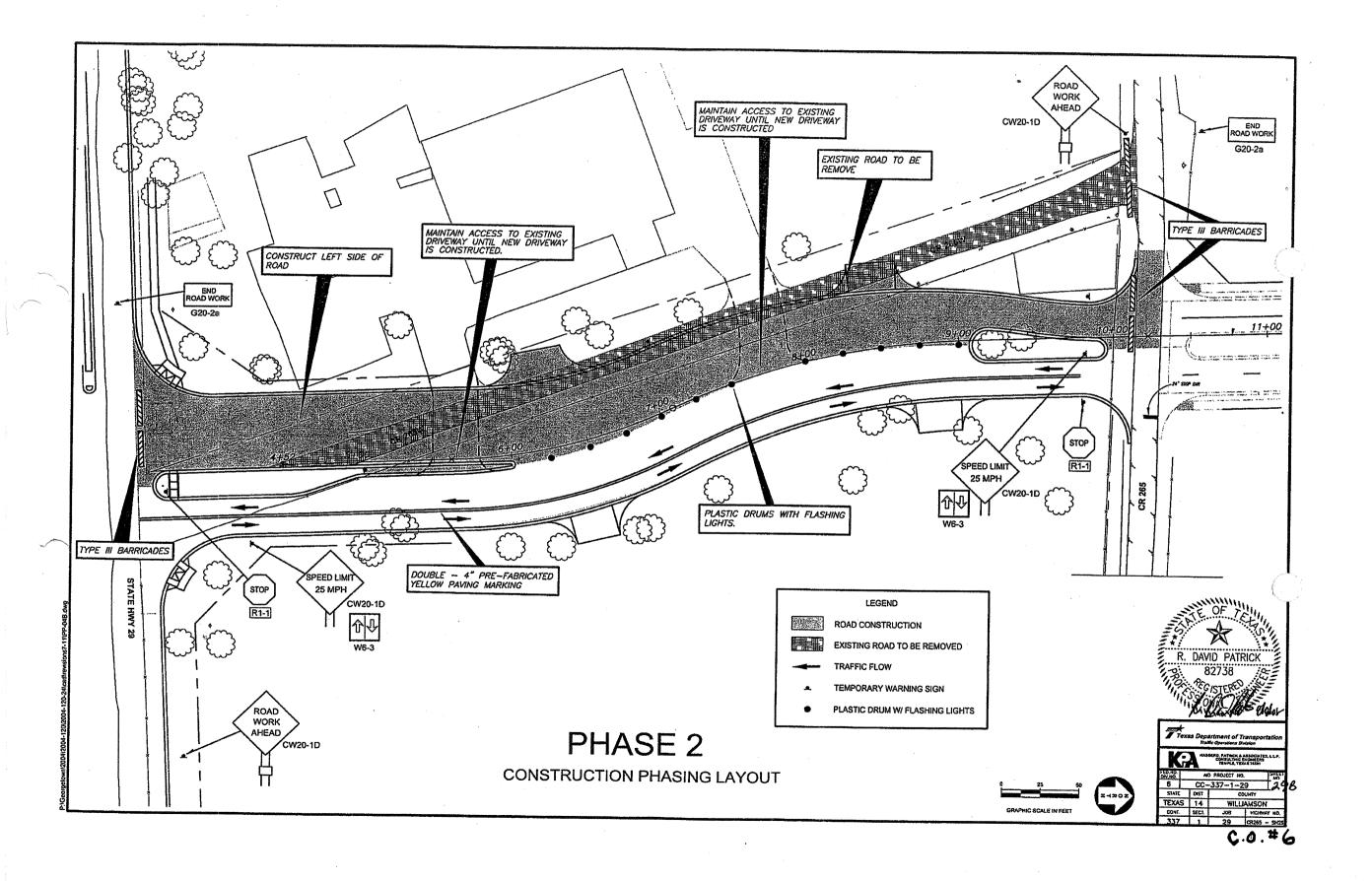
Texas Department of Transportation

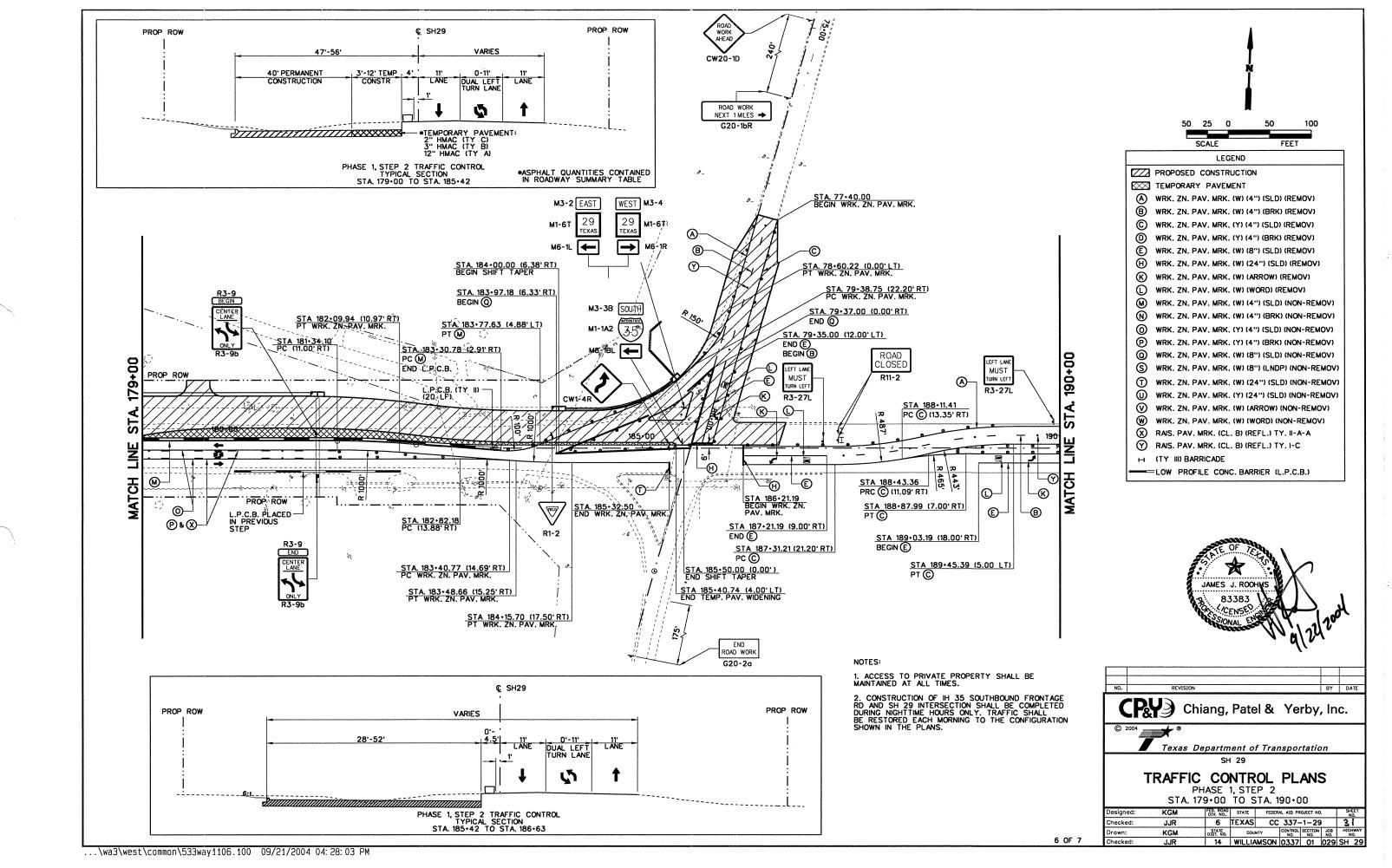
SH 29

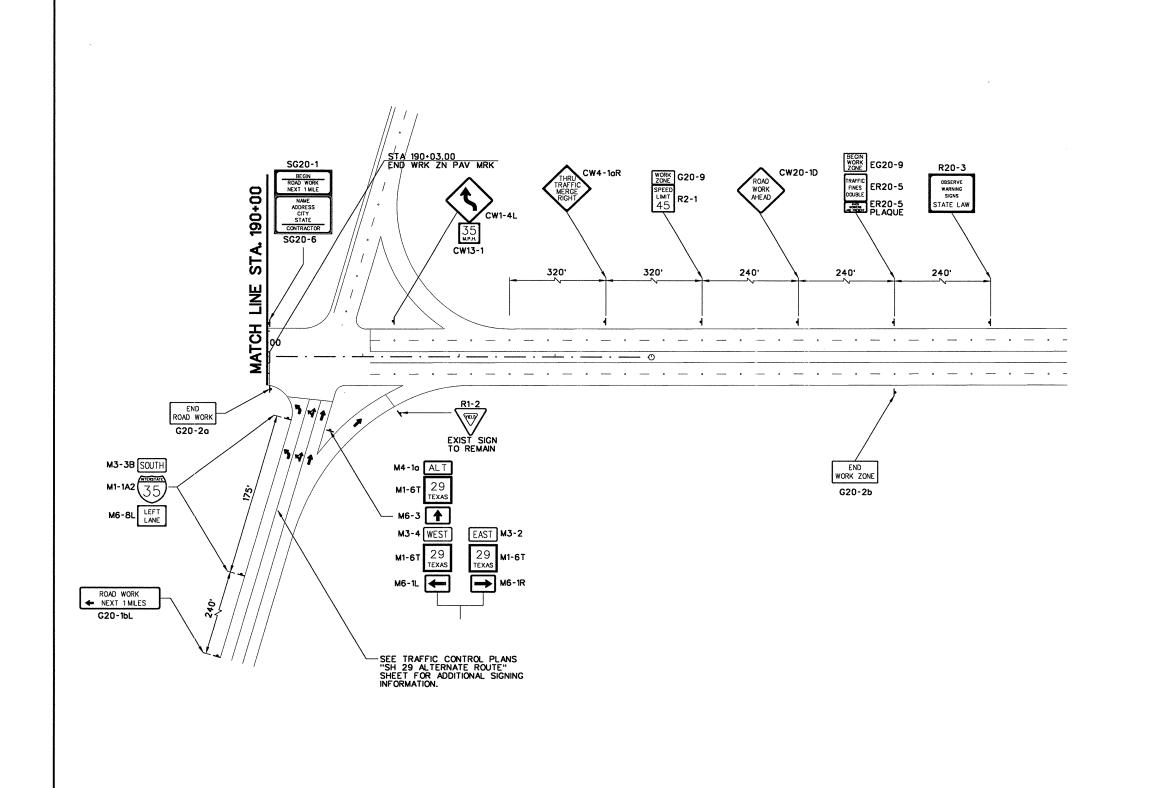
TRAFFIC CONTROL PLANS
PHASE 1, STEP 2
STA. 157+00 TO STA. 168+00

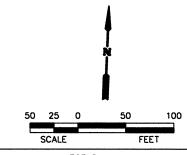










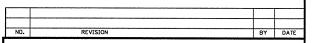


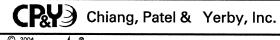
PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- (D) WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- (E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- ~
- H) WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- (K) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- (W) (8") (SLD) (NON-REMOV)
- S WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- ) WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS, PAV, MRK. (CL. B) (REFL.) TY, II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE



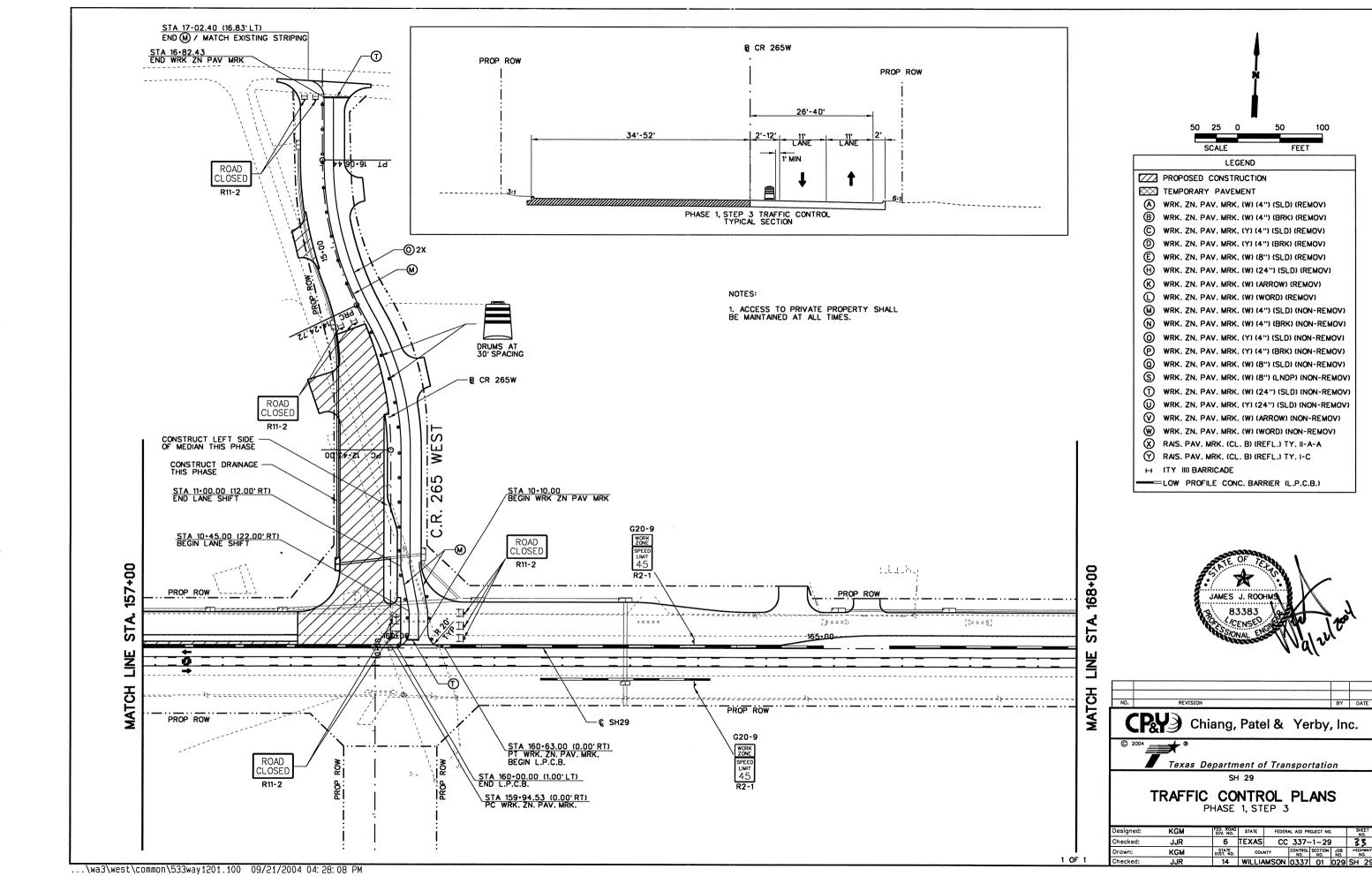


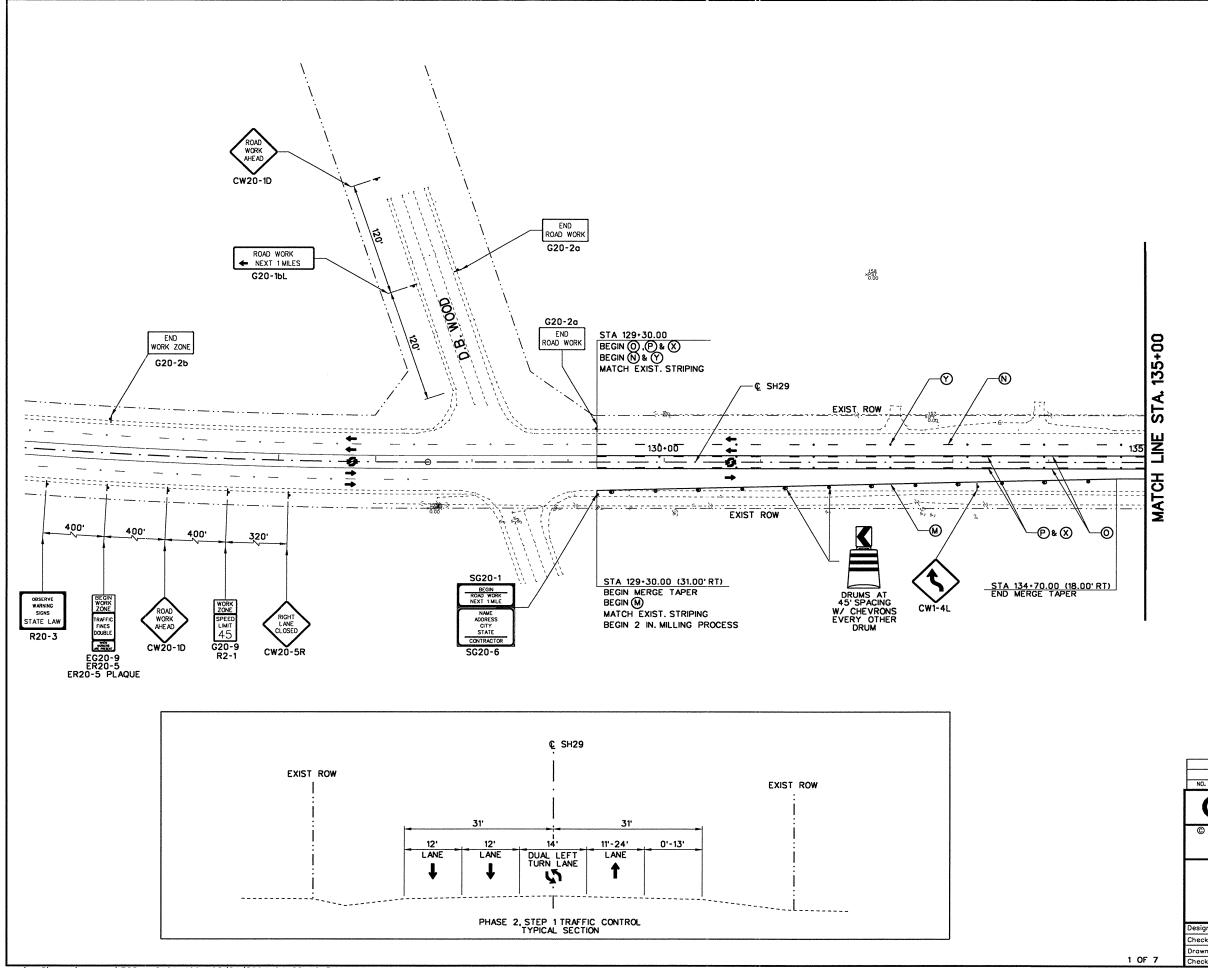


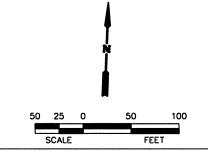
Texas Department of Transportation

TRAFFIC CONTROL PLANS

PHASE 1, STEP 2 STA. 190+00 TO END PROJECT







PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- B WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- (SLD) (REMOV)
- (D) WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- E WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (H) WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- (K) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- (M) WRK, ZN, PAV, MRK, (W) (4") (SLD) (NON-REMOV)
- N WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- ) WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
  ) RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)



NO. REVISION BY DATE

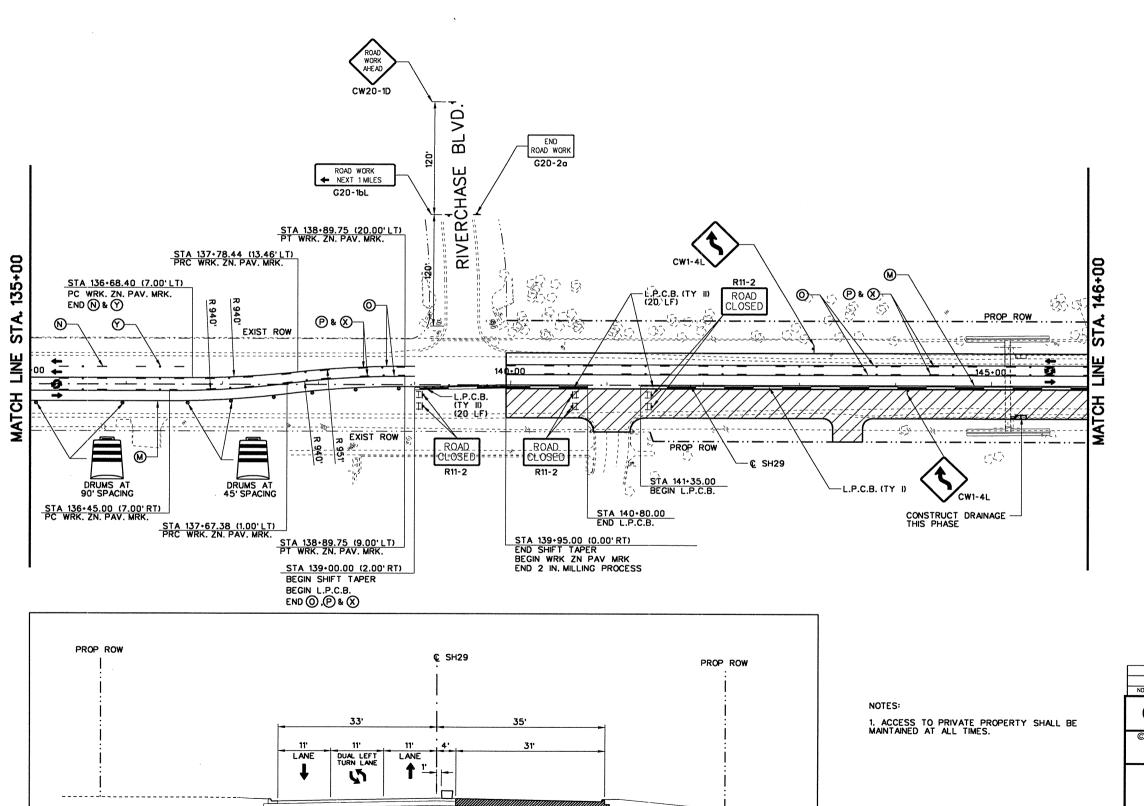
CP Y Chiang, Patel & Yerby, Inc.

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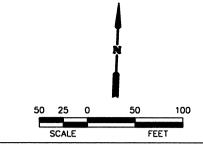
Texas Department of Transportation

TRAFFIC CONTROL PLANS

PHASE 2, STEP 1
BEGIN PROJECT TO STA. 135+00



PHASE 2, STEP 1 TRAFFIC CONTROL TYPICAL SECTION



LEGEND

PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- → (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)



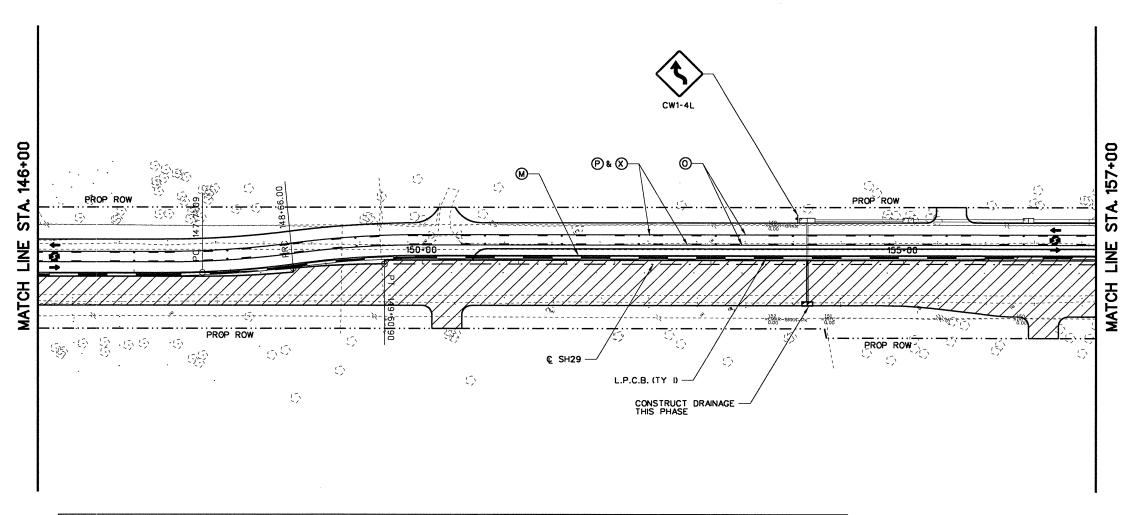
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

TRAFFIC CONTROL PLANS PHASE 2, STEP 1

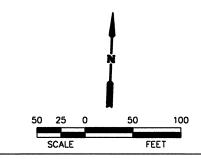
STA. 135+00 TO STA. 146+00 hecked: JJR KGM

2 OF 7



PROP ROW PROP ROW 33'-42' 35'-44' 31'-48' LANE DUAL LEFT TURN LANE LANE PHASE 2, STEP 1 TRAFFIC CONTROL TYPICAL SECTION

1. ACCESS TO PRIVATE PROPERTY SHALL BE MAINTAINED AT ALL TIMES.



LEGEND

PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- (S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV) RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- (Y) RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE

----LOW PROFILE CONC. BARRIER (L.P.C.B.)



Chiang, Patel & Yerby, Inc.

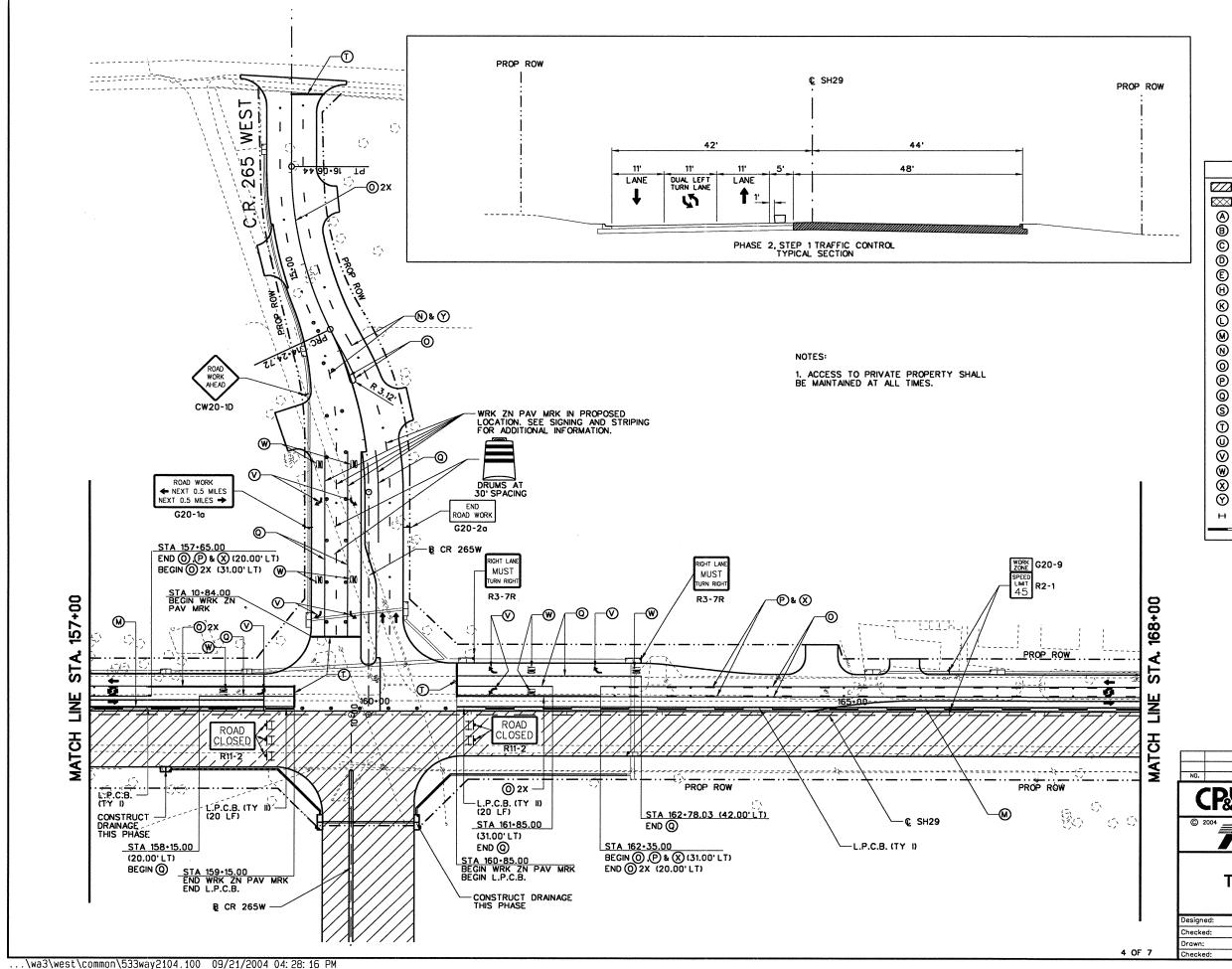
Texas Department of Transportation

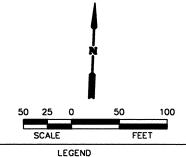
TRAFFIC CONTROL PLANS

PHASE 2, STEP 1 STA. 146+00 TO STA. 157+00

hecked:

3 OF 7





CLOC

PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- H) WRK. ZN. PAV. MRK. (W) (24") (SLD) (REMOV)
- (W) (ARROW) (REMOV)
- (L) WRK. ZN. PAV. MRK. (W) (WORD) (REMOV
- W WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- T) WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- W WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- H (TY III) BARRICADE



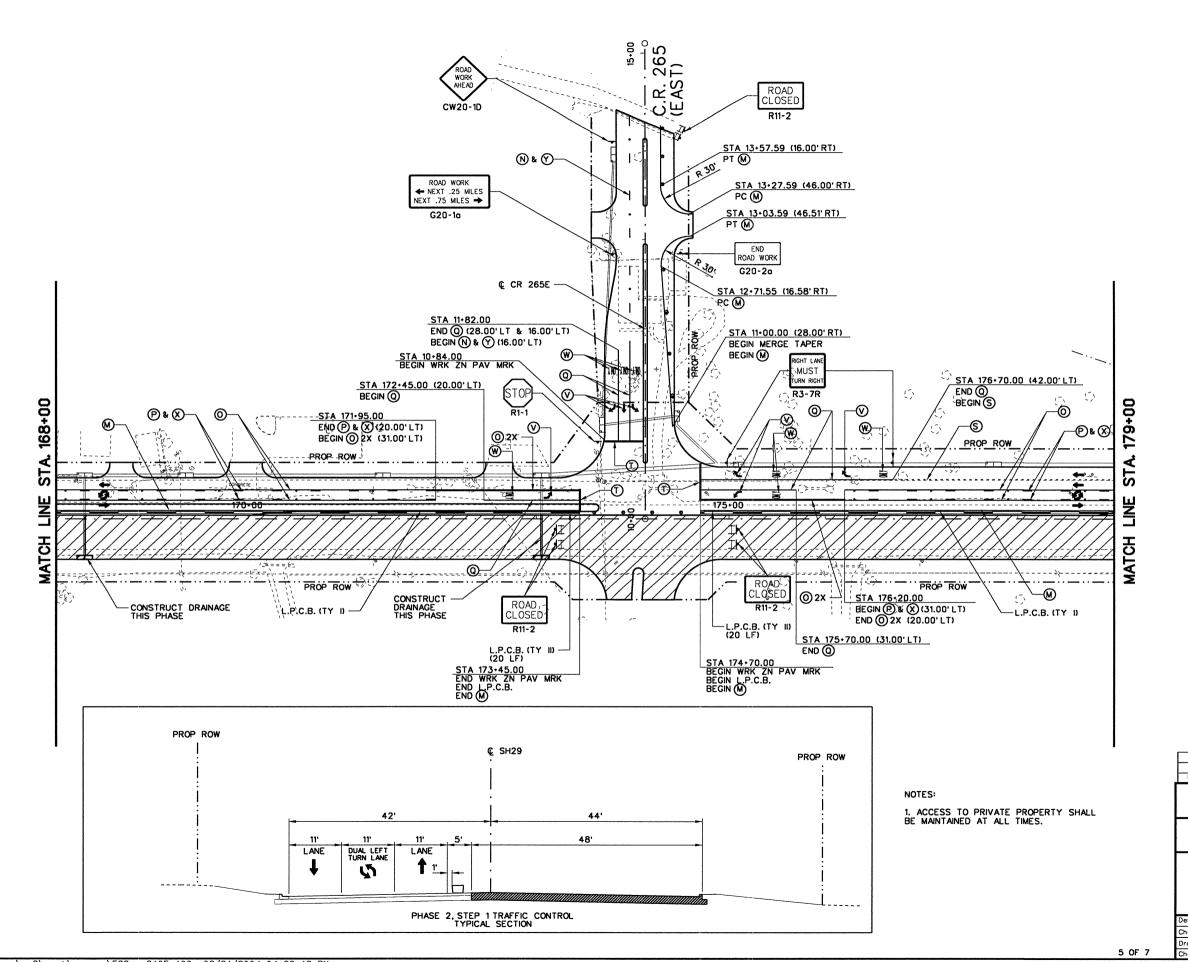
NO. REVISION BY DATE

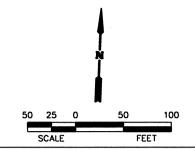


Chiang, Patel & Yerby, Inc.

SH 29

TRAFFIC CONTROL PLANS
PHASE 2, STEP 1
STA. 157+00 TO STA. 168+00





PROPOSED CONSTRUCTION

#### TEMPORARY PAVEMENT

- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- C) WRK, ZN, PAV, MRK, (Y) (4") (SLD) (REMOV
- WRK. 2N. PAV. MRK. (1) (4 ) (SLU) (REMO
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (REMOV)
- (E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (REMOV) WRK, ZN. PAV, MRK, (W) (24") (SLD) (REMOV)
- (K) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- (M) WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- P WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- The state of the s
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- (S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- (WKK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)

  WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- Y RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- ) INAS. PAV. MICK. ICE. BI INEFE.I II.
- → (TY III) BARRICADE

----LOW PROFILE CONC. BARRIER (L.P.C.B.)



NO. REVISION BY DATE



Chiang, Patel & Yerby, Inc.

Texas Department of Transportation
SH 29

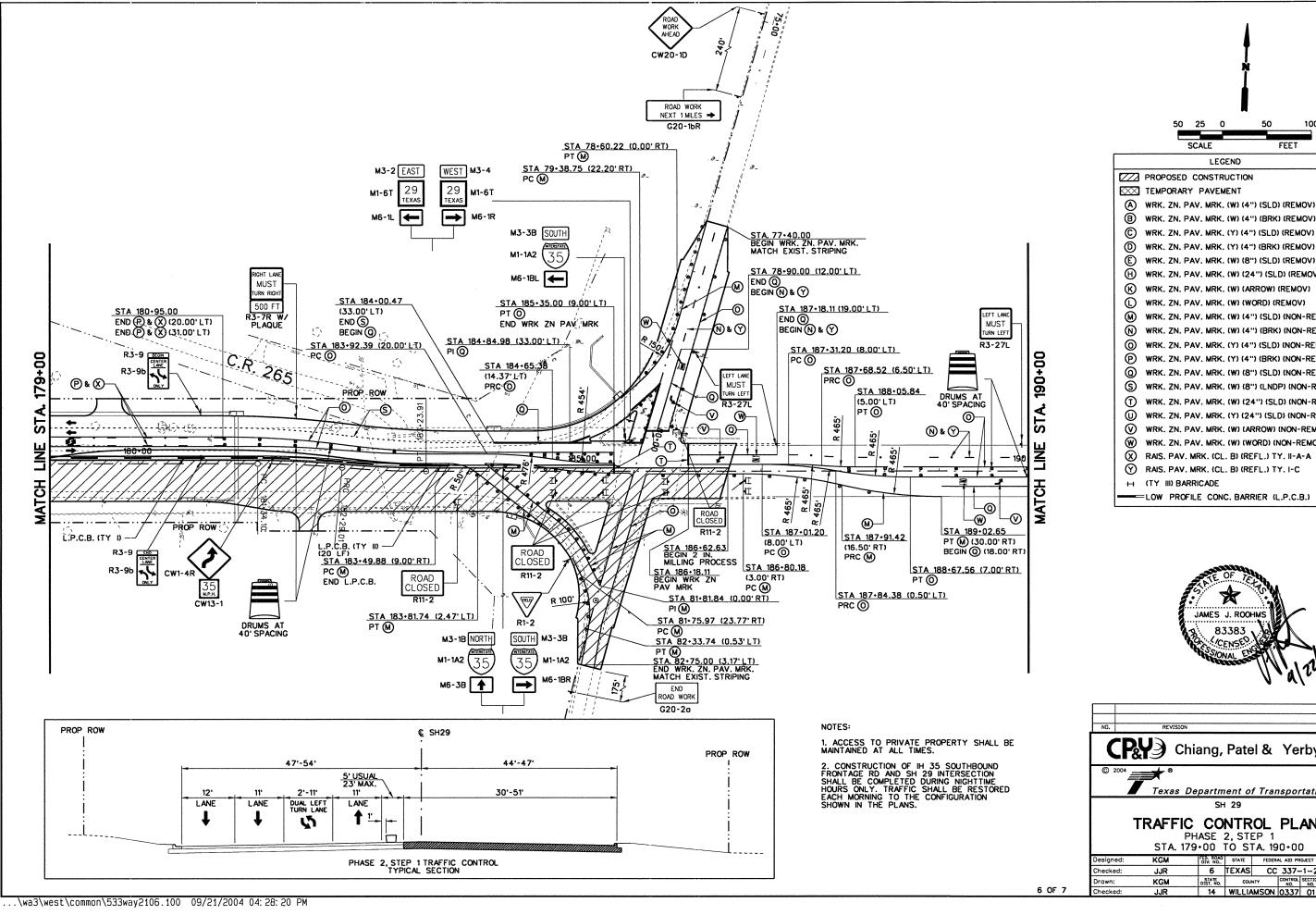
TRAFFIC CONTROL PLANS

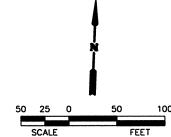
PHASE 2, STEP 1
STA. 168+00 TO STA. 179+00

 esigned:
 KGM
 FED. ROAD (DT. NO.)
 STATE
 FEDERAL AID PROJECT NO.
 SMEET (NO.)

 hecked:
 JJR
 6
 TEXAS
 CC 337-1-29
 38

 rawn:
 KGM
 NG. TEXAS
 COUNTY
 CONTROL SECTION (NO.)





- WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)

- WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- WRK. ZN, PAV. MRK. (W) (24") (SLD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C

LOW PROFILE CONC. BARRIER (L.P.C.B.)

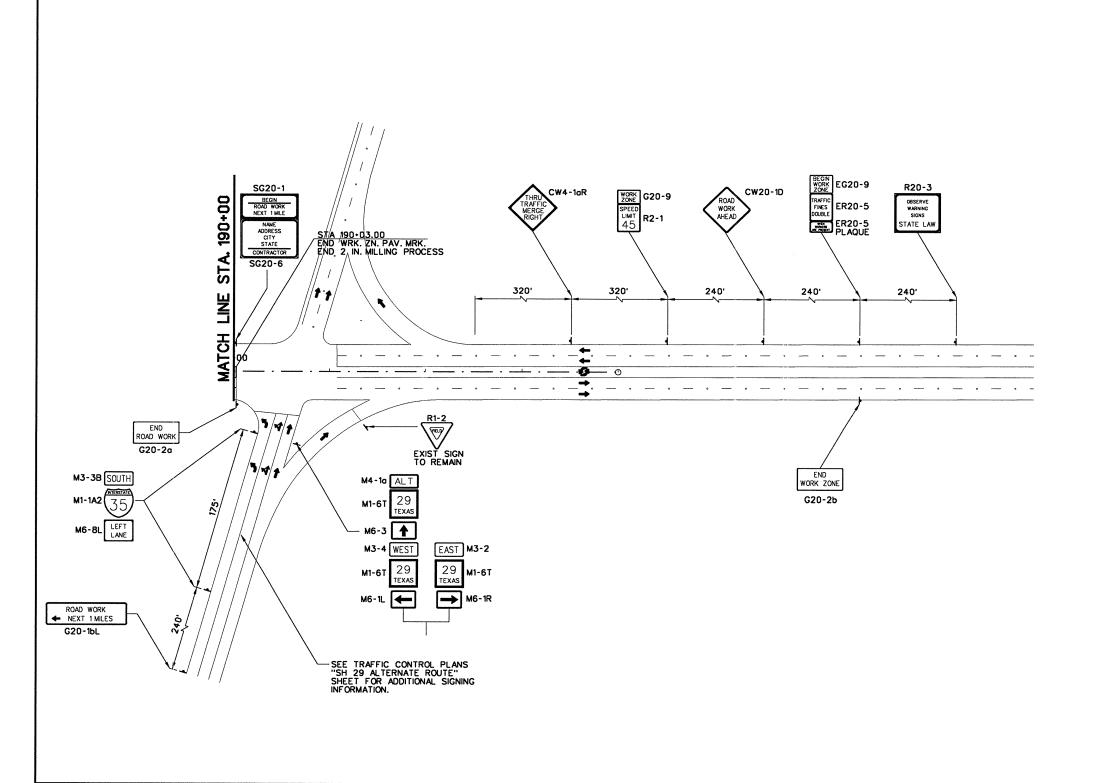


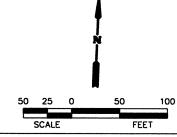
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

TRAFFIC CONTROL PLANS PHASE 2, STEP 1

6 TEXAS CC 337-1-29 STATE COUNTY CONTROL SECTION JOB NO. NO. NO. NO. 14 WILLIAMSON 0337 01 029 SH 29





PROPOSED CONSTRUCTION

TEMPORARY PAVEMENT

- (A) WRK. ZN. PAV. MRK. (W) (4") (SLD) (REMOV)
- (B) WRK. ZN. PAV. MRK. (W) (4") (BRK) (REMOV)
- © WRK. ZN. PAV. MRK. (Y) (4") (SLD) (REMOV)
- (Y) (4") (BRK) (REMOV)
- (E) WRK. ZN. PAV. MRK. (W) (8") (SLD) (REMOV)
- (W) (24") (SLD) (REMOV)
- (K) WRK. ZN. PAV. MRK. (W) (ARROW) (REMOV)
- WRK. ZN. PAV. MRK. (W) (WORD) (REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (4") (SLD) (NON-REMOV)
- P WRK. ZN. PAV. MRK. (Y) (4") (BRK) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (8") (SLD) (NON-REMOV)
- (S) WRK. ZN. PAV. MRK. (W) (8") (LNDP) (NON-REMOV)
- (T) WRK. ZN. PAV. MRK. (W) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (Y) (24") (SLD) (NON-REMOV)
- WRK. ZN. PAV. MRK. (W) (ARROW) (NON-REMOV)
- W WRK. ZN. PAV. MRK. (W) (WORD) (NON-REMOV)
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. II-A-A
- RAIS. PAV. MRK. (CL. B) (REFL.) TY. I-C
- → (TY III) BARRICADE

=LOW PROFILE CONC. BARRIER (L.P.C.B.)



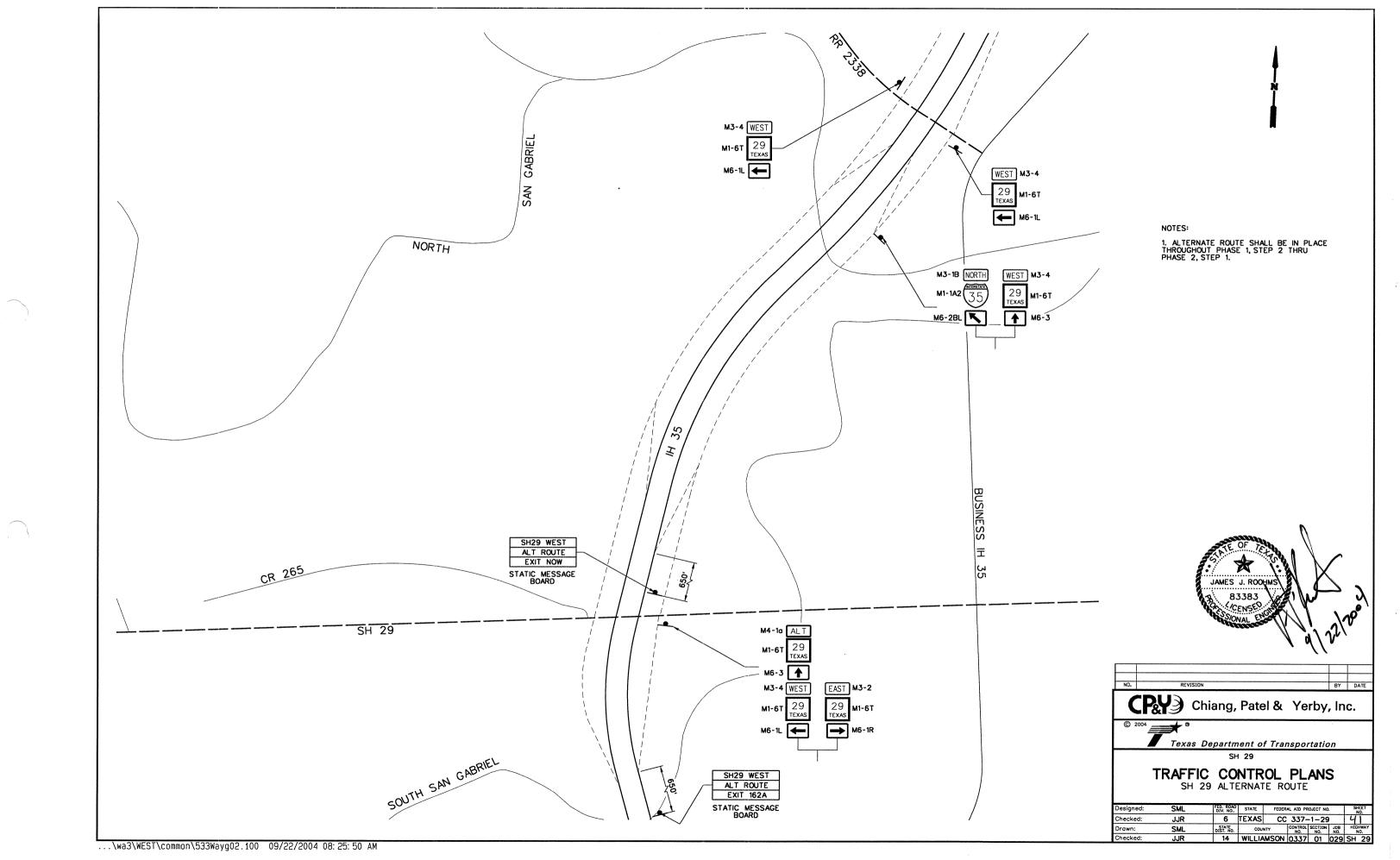


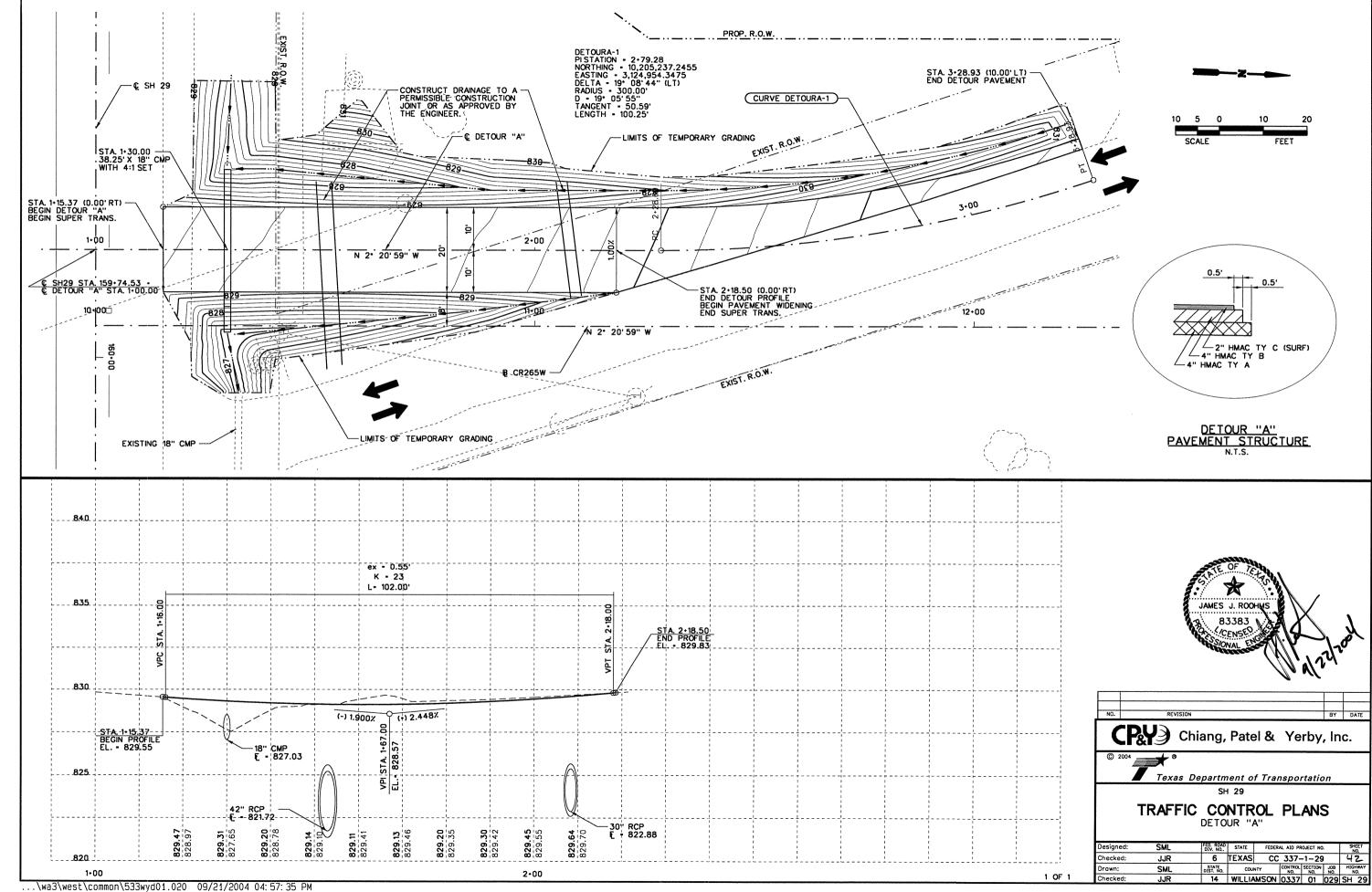
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

TRAFFIC CONTROL PLANS PHASE 2, STEP 1 STA. 190+00 TO END PROJECT

FED. ROAD STATE FEDERAL AID PROJECT NO. KGM Checked: Drawn: KGM





# Barricade and Construction (BC) Standard Sheets General Notes: A

- 1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of traffic control devices, construction pavement markings, and typical construction signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- 2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- 4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- 5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO) "Policy on the Geometric Design of Highways and Streets" or the TxDOT "Roadway Design Manual".
- 6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor will erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign will be revised to show appropriate work zone distance.
- 7. The Engineer may require duplicate construction warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- 9. The traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- 10. As shown on BC(2), the OBSERVE WARNING SIGNS STATE LAW, BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits.
- 11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- 12. The Engineer has the final decision on the location of all traffic control devices.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3120
Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us
Click on "About TxDOT",
Click on "Functional Organizational Chart",
Click on Traffic Operations Box,
Click on "Compliant Work Zone Traffic Control Devices",
again click on "Compliant Work Zone Traffic Control Devices".
This site is printable.

4/03 Revision

Revised General Notes



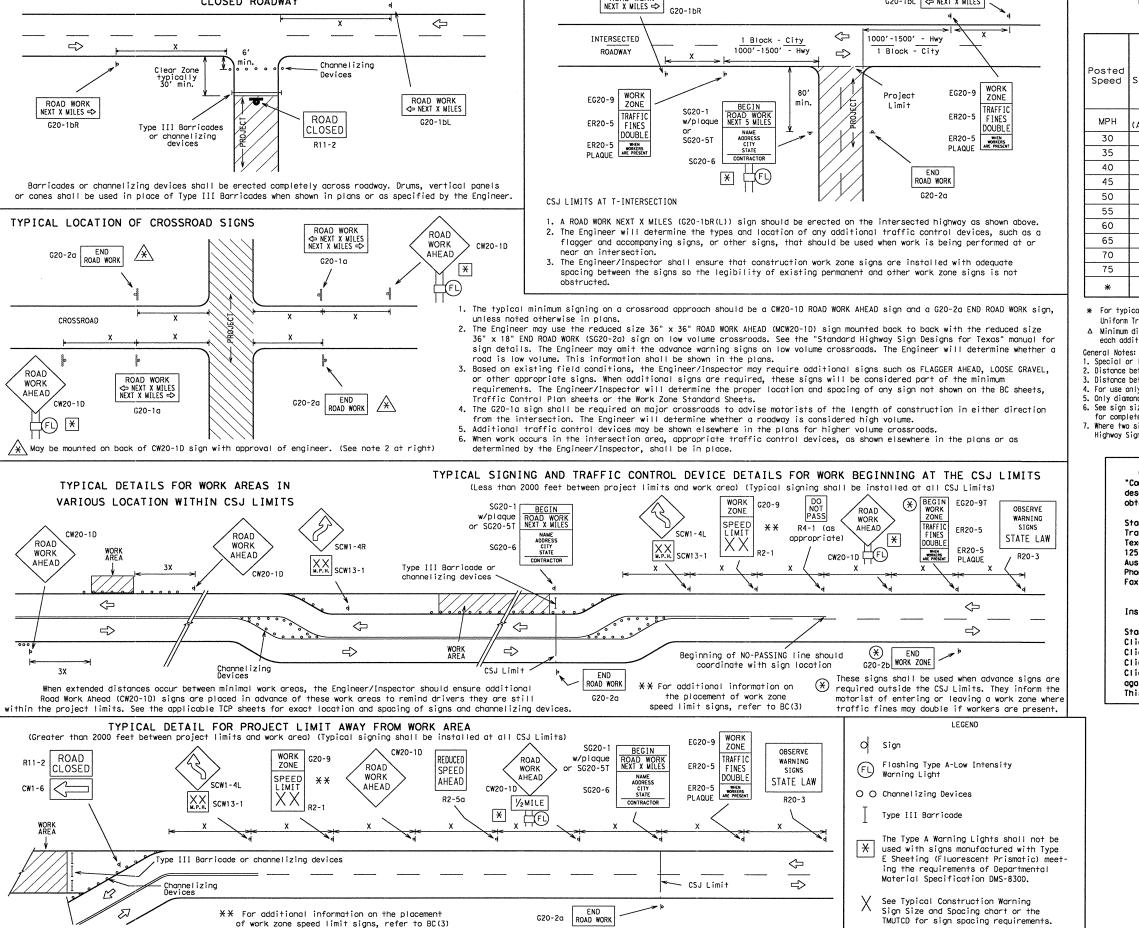
STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS

1 of 12

BC(1)-03

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|          |                   | WILLI             | AMSON     | 0337        | 01      | 029   | SH 29     |



ROAD WORK

#### TYPICAL CONSTRUCTION WARNING SIGN SIZE 1,5,6 AND SPACING

| Posted<br>Speed | Sign<br>Spacing<br>"X" | Intermed<br>Stati<br>Approach<br>Sig<br>CW20 | erm Or iate-term onary Warning gns and Series |                      | r<br>uration<br>Warning                     | Other<br>Warning<br>Signs |
|-----------------|------------------------|--|---|----------------------|---|---------------------------|
| MPH             | Feet<br>(Apprx.)       | Standard inches                              | Minimum⁴<br>inches                            | Standard<br>inches 7 | Minimum <sup>4</sup><br>inches <sup>7</sup> | Standard<br>inches 7      |
| 30              | 120                    | 48 × 48                                      | 36 × 36                                       | 30 × 30              | 24 × 24                                     | 30 × 30                   |
| 35              | 160                    |  |   | or<br>36 x 36        | or<br>30 x 30                               | or<br>36 x 36             |
| 40              | 240                    |  | ↓   |                      | 4   |                           |
| 45              | 320                    |  |   |                      |   |                           |
| 50              | 400                    |  | Use<br>Standard                               |                      | Use<br>Standard                             |                           |
| 55              | 500 <sup>2</sup>       |  | Size  | - ↓                  | Size  | ↓                         |
| 60              | 600 <sup>2</sup>       |  |   | 48 × 48              |   | 48 × 48                   |
| 65              | 700 2                  |  |   |                      |   |                           |
| 70              | 800 <sup>2</sup>       |  |   |                      |   |                           |
| 75              | 900 <sup>2</sup>       |  |   |                      |   |                           |
| *               | * 3                    | - ↓  | ↓   | <b>+</b>             | <b>+</b>                                    | <b>4</b>                  |

- \* For typical sign spacings on expressways and freeways, see Part VI of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.
- $\Delta$  Minimum distance from work area to first Advance Warning sign and/or distance between

ROAD WORK

G20-1bL 

→ NEXT X MILES

T-INTERSECTION

1. Special or larger size signs may be used as necessary.

- 2. Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have \( \frac{1}{2} \) mile or more advance warning.
- 4. For use only on secondary roads or city streets where speeds are low.
- Only diamond shaped warning sign sizes are indicated.
   See sign size listing in "TMUTCD", Appendix A or the "Standard Highway Sign Design" manual for complete list of available sign design sizes.
- 7. Where two sizes are listed, see sign size listing in "TMUTCD", Appendix A or the "Standard Highway Sign Design" manual for proper size.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fax (512) 416-3299

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Click on Traffic Operations Box,

Click on "Compliant Work Zone Traffic Control Devices", again click on "Compliant Work Zone Traffic Control Devices".

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# BARRICADE AND CONSTRUCTION PROJECT LIMIT STANDARD

2 of 12

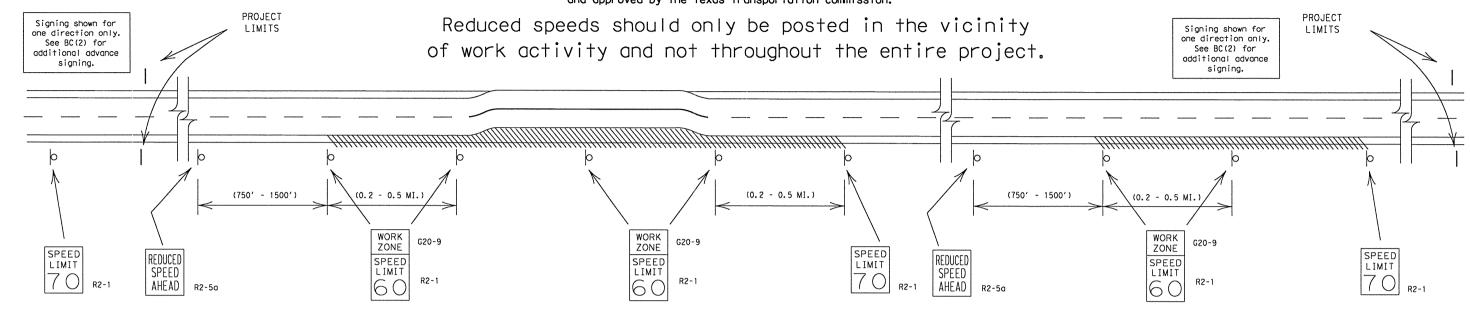
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CLOSED ROADWAY

# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission.



#### GUIDANCE FOR USE:

#### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMIT signs should be posted and visible to the motorists at all times. Work activity in the area of reduced speed zone should be greater than 12 consecutive hours per day. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width
- f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

## SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, work activity is within 15 feet of pavement edge or actually on the pavement.

SHORT TERM WORK ZONE SPEED LIMIT signs should be posted and visible to the motorists only when work activity is present. Work activity in the area of reduced speed should be less than 12 consecutive hours. When work activity is not present, signs should be covered with an approved sign cover or removed from work area.

#### GENERAL NOTES:

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
   Regulatory work zone speed signs (R2-1) should be removed during periods when they are not needed to minimize interference with traffic.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 4. Frequency of speed limit signs should be:
  40 mph and greater 0.2 to 2 miles
  35 mph and less 0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background.
- Fabrication, errection and maintenance of REDUCED SPEED AHEAD sign, WORK ZONE plaque and SPEED LIMIT signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless otherwise noted.
- 8. Techniques that may help reduce traffic speeds.
- (In order of effectiveness.)
- A. Flagger stationed next to sign.
- B. Law enforcement.
- C. Portable changeable message sign (PCMS).
- D. Low-power radar transmitter.
- 9. Refer to "Work Zone Speed Limit Work Sheets 1 and 2" to determine when a construction speed zone should be required.



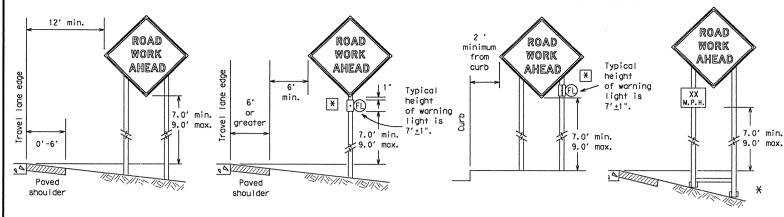
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT STANDARD

3 of 12

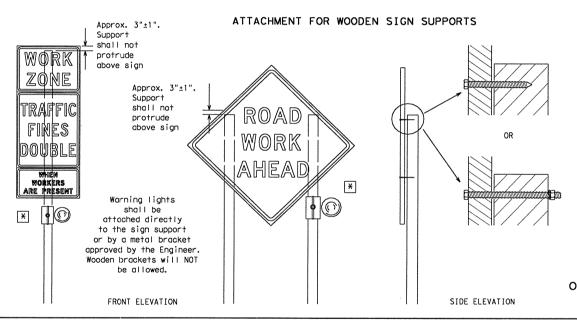
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|           |                   | WILL              | [ AMSON   | 0337                | 01  | 029     | SH       | 29    |  |

#### TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



- It is the intent of these plans to provide positive guidance to motorists throughout the project limits by the use of signs, pavement markings, delineation and/or channelizing devices. All traffic control devices shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" list (CWZTCD)
  - \* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.



Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails will NOT be allowed.

Each sian shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Supports shall not be extended or repaired by splicing or other means.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

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- Flashing Type A Low Intensity Warning Light
- The Type A Warning lights shall not be used with Type E Sheeting (Fluorescent Prismatic) meeting the requirements

#### CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- 1. Permanent signs are used to give notice of traffic laws or regulations. call attention to conditions that are potentially hazardous to traffic operations. show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route quidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the rondway condition.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- 6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary

#### GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- Nails shall NOT be used to attach signs to any support.
- 5. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- 6. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes. The additional signs requested by the Engineer/Inspector shall not be subsidiary.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so that the Engineer can verify the correct procedures are being followed.
- 8. The contractor is responsible for sign installations and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
- 10. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

#### Duration of Work (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part VI)

- The types of sign supports, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring that the sign support and substrate meets crashworthiness and length of work requirements.
- a. Long-term stationary work that occupies a location more than 3 days.
- Intermediate-term stationary work that occupies a location from overnight to 3 days.
- Short-term stationary daytime work that occupies a location from 1 to 12 hours. Short, duration - work that occupies a location up to 1 hour.
- e. Mobile work that moves intermittently or continuously. Does not stop for more than 15 minutes at a time.

#### SIGN MOUNTING HEIGHT

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9.0 feet, above the paved surface regardless of work duration.
- The Engineer may allow the use of smaller size construction warning signs on secondary roads or city streets where speeds are low if the sign size is listed as an option on the "Typical Construction Warning Sign Size and Spacing" chart shown on BC(2).
- The Contractor shall furnish the sign sizes shown in plans, the BC Sheets, the TCP sheets or as directed by the Engineer. SIGN SUBSTRATES

- The Contractor shall ensure that the sign substrate is allowed for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign faces.

#### REFLECTIVE SHEETING

- 1. Reflectorized signs shall be constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 or DMS-8310. The DMS specifications can be accessed from the following web address:
  - http://manuals.dot.state.tx.us:80/dynaweb/colmates/dms/@Generic BookView
- 2. White sheeting, meeting the requirements of DMS-8300 Type C (High Specific Intensity), shall be used for signs with white background and channelizing devices.
- 3. Orange sheeting, meeting the requirements of DMS-8300 Type E (Fluorescent Prismatic), shall be used for signs with orange backgrounds. SIGN LETTERS
- 1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

#### REMOVING OR COVERING

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This type of sign support meets the crashworthiness standards regardless of the direction of impact. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- These materials can damage the retroreflectivity of sign sheeting. Signs shall be removed upon completion of the work.

#### SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular
- Rubber (such as tire inner tubes) shall NOT be used for sandbags.
- Rubber ballasts (such as those used with cones or edgeline channelizers) shall NOT be used as sign support weights.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.



BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES STANDARD

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BC(4) - 03

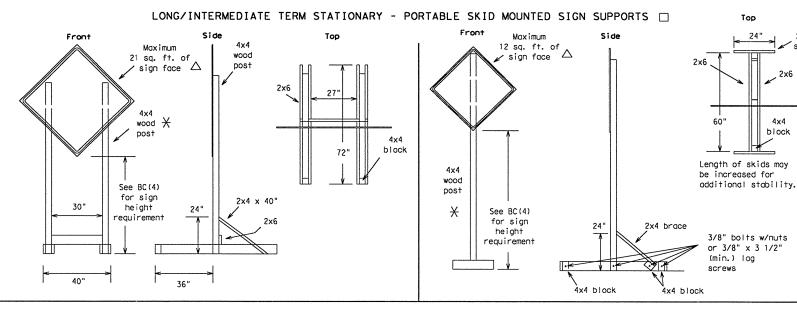
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|       |          | WILL              | LAMSON    | 0337                | 01             | 029   | SH 29     |

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## EXAMPLES OF SKID MOUNTED SIGN SUPPORTS

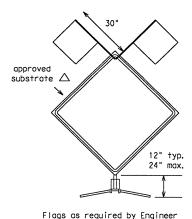
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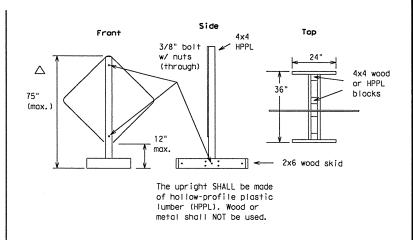


#### SHORT TERM STATIONARY/SHORT DURATION - PORTABLE SIGN SUPPORTS |

For Daytime use only. 1 Foot Mounting Height

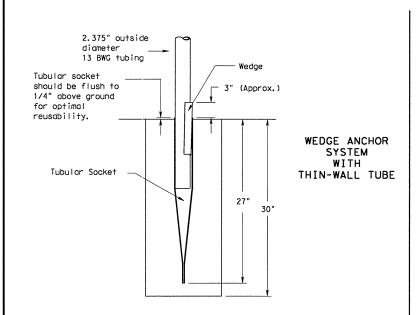


or as shown on plans



# EXAMPLES OF GROUND MOUNTED SIGN SUPPORTS

WING CHANNEL



The wedge anchor system with thin wall tubing may be used to support up to 10 sq. ft. of sign area.

Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18 inches. When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18 inches or provide a minimum foundation depth of 30 inches. If solid rock is encountered, the socket/stub may be reduced in length as required to a min. length of 18 inches. Any material removed from the socket/stub shall be from the bottom and the clearance requirements shown above must still be adhered to. The inner surfaces of the socket/stub must remain free of debris.

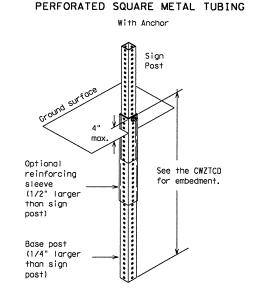
Install Wedge Anchor System per manufacturer recommendations.

Attach the sign to the sign post.

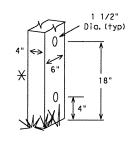
Insert the sign post into the socket and align the sign face with the roadway. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

Supports shall be straight within 1/4 inch per 5 feet of length and shall have a smooth, uniform finish free from defects affecting strength or appearance. Any bolt holes and sheared ends shall be free from burrs.

# Lap-splice/base bolted anchor See the CWZTCD



Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



Direction

of Traffic

#### WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

| Nominal |        | Maximum     | Minimum   | Drilled  |
|---------|--------|-------------|-----------|----------|
| Post    | No. of | Sq. feet of | Soil      | Hole(s)  |
| Size    | Posts  | Sign Face   | Embedment | Required |
| 4 x 4   | 1      | 12          | 36"       | NO       |
| 4 x 4   | 2      | 21          | 36"       | NO       |
| 4 x 6   | 1      | 21          | 36"       | YES      |
| 4 x 6   | 2      | 36          | 36"       | YES      |

No more than 2 sign posts shall be mounted within a 7 ft. circle.

When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

☐ See BC(4) for definition of "Work Duration."

X Sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

 $\triangle$  See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

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#### STANDARD PLANS Texas Department of Transportation Traffic Operations Division

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT STANDARD

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BC(5)-03

| TxDOT  | 11-4-0            | )2                | DN: - JWT           | cx:- GRB | C       | r:-FDN | ck: - CAL |  |
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|        |                   | COU               | NTY                 | CONTROL  | SECTION | J08    | HIGHWAY   |  |
|        |                   | WILL              | IAMSON              | 0337     | 01      | 029    | SH 29     |  |

# PORTABLE CHANGEABLE MESSAGE SIGNS

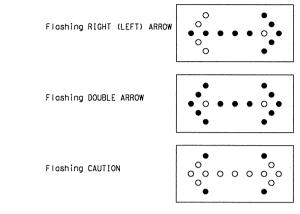
- 1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 2. PCMS placed on the shoulder or within the R-O-W, but are not behind a concrete traffic barrier shall have a minimum of four plastic drums placed perpendicular to traffic, on the upstream side of the PCMS.
- 3. Messages on PCMS should contain no more than 8 words (four to eight characters per word), not including simple words such as "TO,"
- 4. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed.
- Each phase of the message should convey a single thought.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED. " Do not use the term "RAMP."
- 7. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- Specify the actual days of the week; e.g., TUES THROUGH FRI or TUES-FRI in the coming week that work activity will occur.
- 9. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- 10. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for two seconds each.
- 11. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 12. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- 13. Do not use the words "Danger" or "Caution" in message.
- 14. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- 15. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 16. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be obbrevioted.

| Word or Phrase           | Abbreviation  | Word or Phrase | Abbreviation |
|--------------------------|---|----------------|--------------|
| Access Road              | ACCES RD  | Miles          | MI           |
| Air Quality              | AIR QLTY  | Miles Per Hour | MPH          |
| Avenue                   | AVE   | Time Minutes   | Time MIN     |
| Best Route               | BEST RTE  | Monday         | MON          |
| Boulevard                | BLVD  | Normal         | NORM         |
| Bridge                   | BRDG  | North          | N            |
| Cannot                   | CANT  | Parking        | PKING        |
| Center                   | CNTR  | Parking Lot    | PRK LOT      |
| Construction<br>Ahead    | CONST AHEAD   | Road           | RD           |
| Detour Route             | DETOUR RTE  | Right Lane     | RGT LN       |
| East                     | E   | Saturday       | SAT          |
| Emergency                | EMER  | Service Road   | SERV RD      |
| Emergency Vehicle        | EMER VEH  | Shoulder       | SHLDR        |
| Entrance, Enter          | ENT   | Slippery       | SLIP         |
| Express Lanes            | EXP LANE  | South          | S            |
| Expressway               | EXPWY   | Speed          | SPD          |
| Distance Feet            | Distance FT   | Street         | ST           |
| Fog Ahead                | FOG AHD   | Sunday         | SUN          |
| Freeway                  | FRWY, FWY   | Telephone      | PHONE        |
| Freeway Blocked          | FWY BLKD  | Thursday       | THURS        |
| Friday                   | FRI   | To Downtown    | TO DWNTN     |
| Hazardous Driving        | HAZ DRIVING   | Traffic        | TRAF         |
| Highway                  | HWY   | Travelers      | TRVLRS       |
| Hours                    | HR  | Tuesday        | TUES         |
| Information              | INFO  | Turnpike       | Name TRNPK   |
| Left                     | LFT   | Upper Level    | UPPR LVL     |
| Left Lane                | LFT LN  | Warning        | WARN         |
| Lane Closed              | LN CLSD   | Wednesday      | WED          |
| Lower Level              | LOWR LVL  | Weight Limit   | WT LIMIT     |
| Maintenance              | MAINT   | Wet Pavement   | WET PVMT     |
| Roadway<br>designation # | IH-number,<br>US-number,<br>SH-number,<br>FM-number | West           | W            |

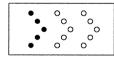
WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND CONCRETE TRAFFIC BARRIER.

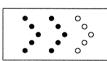
# TYPICAL FLASHING ARROW PANEL

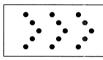
- 1. The Flashing Arrow Panel should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- 2. Flashing Arrow Panels should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
- The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Panel.
- 4. The Flashing Arrow Panel should be able to display the following symbols:



- 5. The "CAUTION" display consists of four corner lamps flashing simultaneously.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Panel shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- 10. The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.







- 11. The Flashing Arrow Panel shall be mounted on a vehicle, trailer or other suitable support.
- 12. A Flashing Arrow Panel SHOULD NOT BE USED to laterally shift all lanes of traffic on a multi-lane roadway at once.

#### REQUIREMENTS

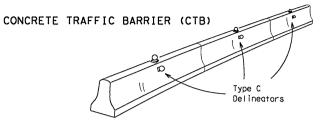
| TYPE | MINIMUM<br>SIZE | MINIMUM NUMBER<br>OF PANEL LAMPS | MINIMUM<br>VISIBILITY<br>DISTANCE |
|------|-----------------|----------------------------------|-----------------------------------|
| B    | 30 x 60         | 13                               | 3/4 mile                          |
| C    | 48 x 96         | 15                               | 1 mile                            |

ATTENTION: Flashing Arrow Panels shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW PANEL FROM THE RIGHT-OF-WAY OR PLACE THE ARROW PANEL BEHIND CONCRETE TRAFFIC BARRIER.

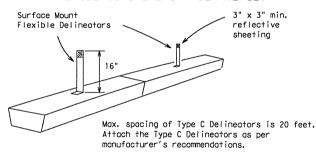
# TYPE C DELINEATORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

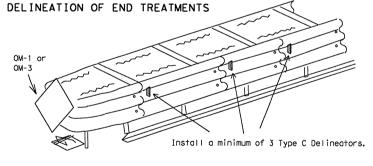
- Type C Delineators shall be prequalified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Type C Delineators can be found at the following Web site: ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/dms8600preq.pdf.
- 2. Color of delineators shall be as specified in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD). The cost of the Type C Delineators shall be considered subsidiary to Item 502.



- 3. Two (2) Type C Delineators should be mounted on each section of CTB in approximately the midsection of the CTB. The Type C Delineator on the side of the CTB shall be installed directly below the Type C Delineator mounted on top of the CTB.
- 4. Maximum spacing of Type C Delineators is 40 feet.
- 5. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- 6. Attach Type C Delineators on CTB as per manufacturer's recommendations.
- 7. Missing or damaged Type C Delineators shall be replaced as directed by

#### LOW PROFILE CONCRETE BARRIER (LPCB)





|             | APPROACHIN | G TRAFFIC |  |  |
|-------------|------------|-----------|--|--|
|             | BOTH SIDES | ONE SIDE  |  |  |
|             |            | OM-3      |  |  |
| DELINEATION | OM-1       | or        |  |  |
|             | OM-1       | Vertical  |  |  |
|             |            | Pane I    |  |  |

Attach the Type C Delineators as per manufacturer's recommendations.

## WARNING LIGHTS

- Warning lights shall meet the requirements of the TMUTCD.
   Warning lights shall NOT be installed on barricades.
- 3. Type A-Low Intensity Flashing Warning Lights are commonly used with signs. They are intended to warn of an approaching potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type E Sheeting (Fluorescent Prismatic) meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.

# FND TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fox (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us Click on "About TxDOT". Click on "Functional Organizational Chart". Click on Traffic Operations Box. Click on "Compliant Work Zone Traffic Control Devices". again click on "Compliant Work Zone Traffic Control Devices". This site is printable.



#### STANDARD PLANS

Texas Department of Transportation Traffic Operations Division

BARRICADE AND CONSTRUCTION ARROW & MESSAGE SIGNS. REFLECTORS & WARNING LIGHT STANDARD

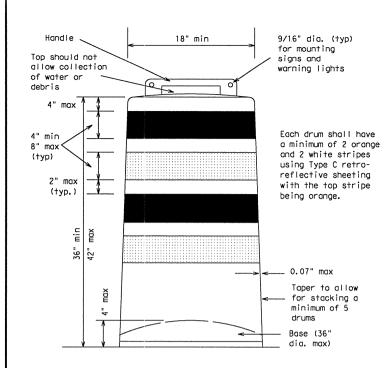
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| EVISIONS | STATE<br>DESTRICT | FEDERAL<br>REGION | F         | EDERAL AID PROJECT |         |       | SHEET     |
|          | AUS               | 6                 | C         | CC 337-1-29        |         | 48    |           |
| COUNTY   |                   |                   | Y         | CONTROL            | SECTION | JOB   | HIGHWAY   |
|          |                   | WILLIA            | AMSON     | 0337               | 01      | 029   | SH 29     |

## TRUCK-MOUNTED ATTENUATORS

- 1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350).
- 2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- 3. Refer to the dates shown in the CWZTCD to ensure that the TMA meets the age requirements and the crashworthiness criteria established by the Federal Highway Administration (FHWA) for TMAs.
- 4. Refer to the CWZTCD for a list of approved TMAs.
- 5. TMAs are required on freeways unless otherwise noted in the plans.
- 6. A TMA should be used anytime that it can be positioned approximately 100 feet or less in advance of the area of crew exposure without adversely affecting the work performance.
- 7. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is on extended distance from the TMA.



#### GENERAL NOTES

- Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- 2. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- The Contractor shall have a maximum of 24 hours to replace any plastic drums or other traffic control devices identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

Prequalified plastic drums shall meet the following requirements:

#### GENERAL DESIGN REQUIREMENTS

- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- 2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- 4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- 5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, delineator reflector unit or non-plywood sign.
- The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
- Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a minimum unballasted weight of 7.7 lbs. and maximum unballasted weight of 11 lbs. The wall of the drum

body shall be a minimum of 0.07 inch in thickness. Weight of any drum supplied shall not vary more than 0.5 lb. from that of the pregualified sample.

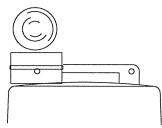
 Drum and base shall be marked with manufacturer's name and model number.

#### RETROREFLECTIVE SHEETING

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Flat Surface Reflective Sheeting." High Specific Intensity (Type C) retroreflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, checking, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

#### BALLAST

- 1. Unballosted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- 4. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- 5. Ballast shall not be placed on top of drums.
- . Adhesives may be used to secure base of drums to pavement.



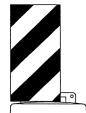
Type C Warning Light or approved substitute mounted adjacent to the travel way.

#### WARNING LIGHTS AND DELINEATORS MOUNTED ON PLASTIC DRUMS

- Type A flashing warning lights are intended to warn drivers that they
  are approaching or are in a potentially hazardous area.
- Type A flashing warning lights are not intended for delineation and shall not be used in a series.
- Type C steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- 4. Type A and Type C warning lights shall be installed at locations as detailed on other sheets in the plans.
- 5. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 6. Type A Class 1, Type A Class 2, or Type B Reflector Units (D & OM Standard) may be attached to drums to delineate the intended vehicular path. The color of the reflector unit shall correspond to the pavement marking it is supplementing or for which it is substituting (left edgeline-yellow or right edgeline-white). The reflective unit shall be attached to the handle of the drum using the mounting hole nearest the travel lane and shall be aligned perpendicular to approaching traffic.
- Delineators may be used as directed by the Engineer. Delineators may not be used as a substitute for warning lights.



18" x 24" Sign (Maxim∪m Sign Dimension) Chevron CW1-8, Driveway sign D7Oa, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals
sloping down towards
travel way

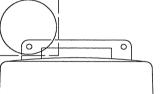
# Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

# SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type E (Fluorescent Prismatic) sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Flat Surface Reflective Sheeting," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type C (High Specific Intensity). Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- 6. Mounting bolts and nuts shall be fully engaged and adequately torqued.

  Bolts should not extend more than 1/2 inch beyond nuts.

# WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C WARNING LIGHTS

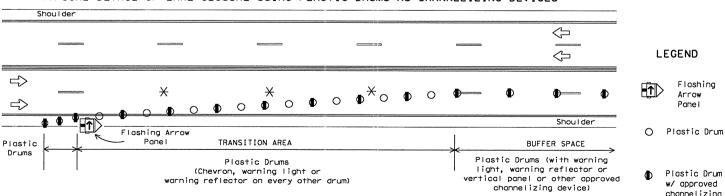


Warning reflector may be round or square.

Must have a reflective surface
area of at least 30 square inches

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
   Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- 6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type D (Non-fluorescent Prismatic).
- 7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- 8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.

# TYPICAL DETAIL OF LANE CLOSURE USING PLASTIC DRUMS AS CHANNELIZING DEVICES



Provide adequate sight distance when placing lane closures. Do not place lane closures in vertical or horizontal curves.

See BC(8) for table showing the spacing of channelizing devices in the taper and tangent section.

X NOTE: Lane lines shall be removed when the lane closure occupies a location for longer than 2 weeks.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fax (512) 416-3299

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Click on "Compliant Work Zone Traffic Control Devices",
again click on "Compliant Work Zone Traffic Control Devices".
This site is printable.



BARRICADE AND CONSTRUCTION
PLASTIC DRUM
STANDARD

1\_

Revised note

device

4/03 Revision

7 of 12 BC (7) -03

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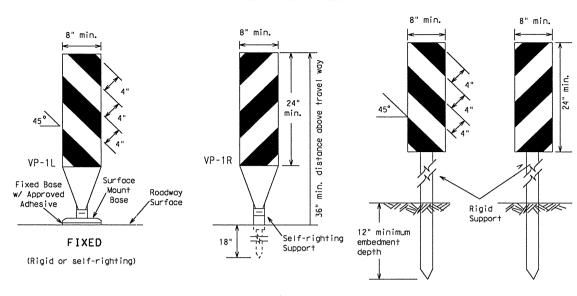
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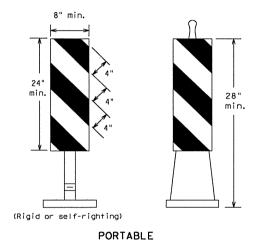
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## CHANNELIZING DEVICES

#### **VERTICAL PANELS**



#### DRIVEABLE



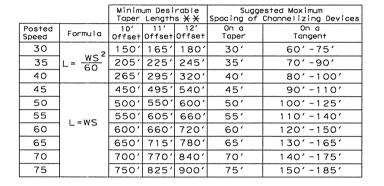
- 1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other greas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
- 3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- 4. VP's used on expressways, freeways, and on high speed roadways shall have a minimum of 2 square feet of retroreflective area facing traffic.
- 5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List"
- 6. Sheeting for the VP's shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless noted otherwise.

#### **CHEVRONS**

- 1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- 3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- 4. To be effective, the chevron should be
- visible for at least 500 feet. 5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type E (Fluorescent Prismatic) conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall be black vinyl non-reflective decal sheeting meeting the requirements of DMS-8320.

GENERAL NOTES:

- 1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- 2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- 3. Channelizing devices on self-righting supports should be used in work zone greas where channelizing devices are frequently impacted by erront vehicles or vehicle related wind austs making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alianment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh approximately 35 lbs.
- 6. Payement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- 7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final payement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.
- 8. Examples on this sheet are the most commonly used channelizing devices in work zones. For other devices, refer to the CWZTCD.



\*X Taper lengths have been rounded off. L=Length of Toper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

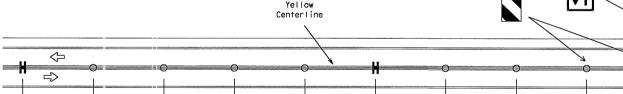
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Click on "Compliant Work Zone Traffic Control Devices", again click on "Compliant Work Zone Traffic Control Devices". This site is printable.



Double









Opposing

Lane

Divider

w/Fixed

Base





VP or Tubular Marker w/Fixed Base

#### STANDARD PLANS Texas Department of Transportation Traffic Operations Division

Refer to BC and/or TCP

 $\Diamond$ 

 $\Rightarrow$ 

sheets for approach

requirements.

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

8 of 12

BC(8) - 03

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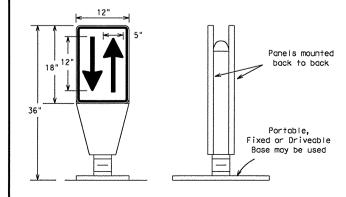
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| REVISIONS | STATE    | FEDERAL<br>REGION | FEDERAL AID PROJECT |           |         |       |     |
|           | AUS      | 6                 | CC 337-1-29         |           |         |       |     |
|           |          | COUNTY            | ,                   | CONTROL   | SECTION | J08   |     |
|           |          | WILLIA            | MSON                | 0337      | 01      | 029   | 1   |

# OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



- 1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust. The OTLD is placed on a flexible selfrighting support that returns to an upright position when impacted by a vehicle.
- 2. The OTLD may be used in combination with simple tubular markers or vertical panels (vp's).
- 3. Spacing between the OTLD shall not exceed 500 feet. Tubular markers or vp's placed between the OTLD's should not exceed 100 foot spacing.
- 4. The OTLD shall be orange with a black nonreflective legend. Sheeting for the OTLD shall be retroreflective Type E (Fluorescent Prismatic) conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall be black viny! non-reflective decal sheeting meeting the requirements of DMS-8320.

36"

Fixed Base w/ Approved Adhesive

(Driveable Base, or Flexible

Support can be used?

/\ Spacing between the VP's or tubular markers shall not exceed 100 feet. On roadways with speeds less than 45 MPH, spacing between the tubular markers or VP's shall be as shown on the channelizing spacing table shown on this page. If the table shows spacing greater than 100 feet based on the roadway speed, then use a maximum of 100 feet spacing between the tubular markers or VP's. Every fifth channelizing device shall be an OTLD. Spacing between the OTLD shall not exceed 500 feet. When using this type of traffic control set-up, the OTLD, VP's or tubular markers shall have the fixed base with approved adhesive per the manufacturer's recommendations.

#### TYPE III BARRICADES

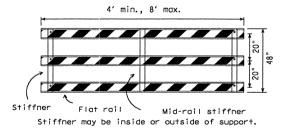
- Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type III Barricades and a list of all materials used in the construction of Type III Baricades.
- Type III Barricades shall be used at each end of construction projects closed to all traffic.
- 3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade.
- Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
- Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
- Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
- 7. Warning lights shall NOT be installed on barricades.
- 8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.

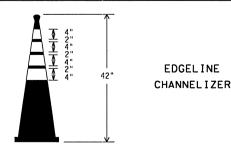
Barricades shall NOT be used as a sign support.

#### TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



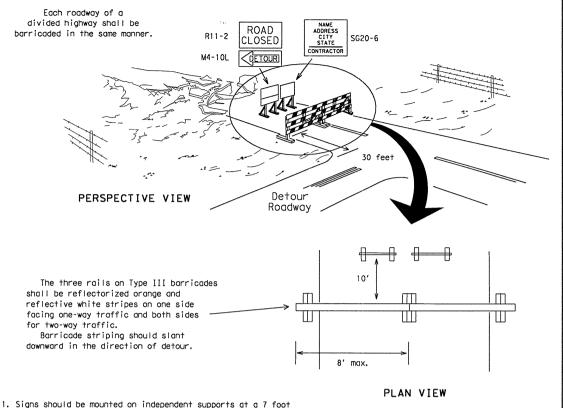
# TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



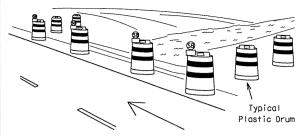


- This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane.
- This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
- . This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
- 4. The base must weigh a minimum of 30 lbs.

#### TYPE III BARRICADE (POST AND SKID) TYPICAL APPLICATION

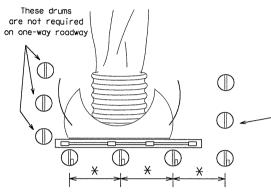


CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



PERSPECTIVE VIEW

1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



PLAN VIEW

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessory. (minimum of 2 and maximum of 4 drums)

 Moximum spacing between drums shall be 10 feet. A minimum of two drums shall be used across the work grea.

Legend

Plastic drum

Plastic drum with steady burn light

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3120
Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

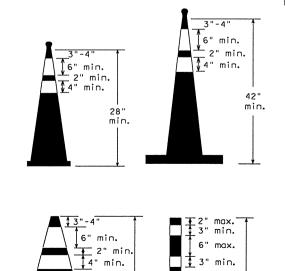
Start at website - www.dot.state.tx.us
Click on "About TxDOT".

Click on "Functional Organizational Chart",

Click on Traffic Operations Box,
Click on "Compliant Work Zone Traffic Control Devices",
again click on "Compliant Work Zone Traffic Control Devices".

This site is printable.

CONES



28"

min.

mounting height in center of roadway. The signs should be a

2. Advance signing shall be as specified elsewhere in the plans.

minimum of 10 feet behind Type III Barricades.

Traffic cones and tubular markers shall be a minimum of 28 inches in height when

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs.

- Iraffic cones and tubular markers shall be a minimum of 28 inches in height when used either on freeways or at nighttime.
   Cones or tubular markers shall be predominantly orange, fluorescent red-orange, or
- fluorescent yellow-orange. They should be kept clean and bright for maximum visibility.

  3. Cones used only for daytime operations do not require the reflectorized bonds.
- 3. Cones used only for daytime operations do not require the reflectorized bands.
  4. Cones used for nighttime operations shall be reflectorized. Reflectorized material shall have a smooth, sealed outer surface that displays the same approximate color during the day and night. The reflectorized bands shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
- 5. When used at night, appropriate personnel shall ensure that cones and tubular markers remain in their proper location and in an upright position.
- 6. Reflectorization of cones shall consist of a minimum 6 inch band placed at least 3 inches but not more than 4 inches from the top, supplemented by a minimum 4 inch band spaced a minimum of 2 inches below the 6 inch band.
- Reflectorization of tubular markers shall be a minimum of two 3 inch bands placed a maximum of 2 inches from the top with a maximum of 6 inches between bands. The reflectorized bands shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
- 8. One-piece cones or tubular markers are generally suitable for temporary usage (up to 8 hours) with other channelization devices such as vertical panels, drums or two-piece cones for long term usage. Care should be taken to ensure they remain in their proper location and in an upright position.
- 9. Cones or tubular markers used on each project shall be of the same size and shape.
  10. The handle may be designed as a hook or other shape, fabricated from non-rigid materials similar to the cone material, and may extend up to a maximum of 8 inches above the top of cone. Length of the handle shall not be considered with regard to the overall height of the cone.



STANDARD PLANS
Texas Department of Transportation

Traffic Operations Division

BARRICADE AND CONSTRUCTION
TYPE III BARRICADE
& CONES STANDARD

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BC(9)-03

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| SIONS | STATE     | FEDERAL<br>REGION | FE        |                               | T33HZ   |     |          |
|       | AUS       | 6                 | C         |                               | 51      |     |          |
|       | COUNTY    |                   |           | CONTROL                       | SECTION | J08 | H] GHWAY |
|       | MUSMVITTA |                   |           | 0337                          | 01      | 020 | SH 20    |

#### WORK ZONE PAVEMENT MARKINGS

#### **GENERAL**

- The Contractor shall be responsible for maintaining work zone and existing povement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- 2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- 6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and the sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

#### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(11).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.
- 3. A list of prequalified reflective raised pavement markers can be found at the following web site:
- ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/dms4200preq.pdf
  4. A list of prequalified non-reflective traffic buttons can be found at the following web site:
- ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/4300preq.pdf

#### PREFABRICATED PAVEMENT MARKINGS

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241. A list of prequalified products can be found at the following web site:
- ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/pavemark.pdf
  2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240 or the TXDOT Purchase Specification No. 550-74-89. A list of prequalified products and a copy of the TXDOT Purchase Specifications can be found at web sites: ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/pavement.pdf ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/tss/tss377.pdf

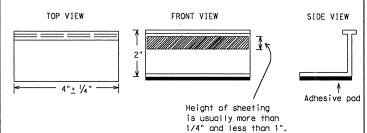
#### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- 3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 150 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria shall be replaced as required by the Engineer at the expense of the Contractor.

#### REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway, shall be removed or obliterated before the roadway is opened to traffic
- The above shall not apply to detours in place for less than two weeks, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a disernible marking, by any method that does not materially damage the surface or texture of the pavement.
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- 7. Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.

#### Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the randway.
  - A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
  - B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- 3. Small design variances may be noted between tab manufacturers.

# Raised Pavement Markers used as Guidemarks

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised povement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.
- Guidemarks shall be designated as:
  YELLOW (two amber reflective surfaces with yellow body).
  WHITE (one silver reflective surface with white body).

# DEPARTMENTAL MATERIAL SPECIFICATIONS

PAVEMENT MARKERS (REFLECTORIZED)

TRAFFIC BUTTONS

EPOXY AND ADHESIVES

BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS

PREFABRICATED PAVEMENT MARKINGS-PERMANENT

DMS-8240

PREFABRICATED PAVEMENT MARKINGS-REMOVABLE

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS DMS-8241

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS DMS-8241

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3120
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This site is printable.



# STANDARD PLANS Texas Department of Transportation

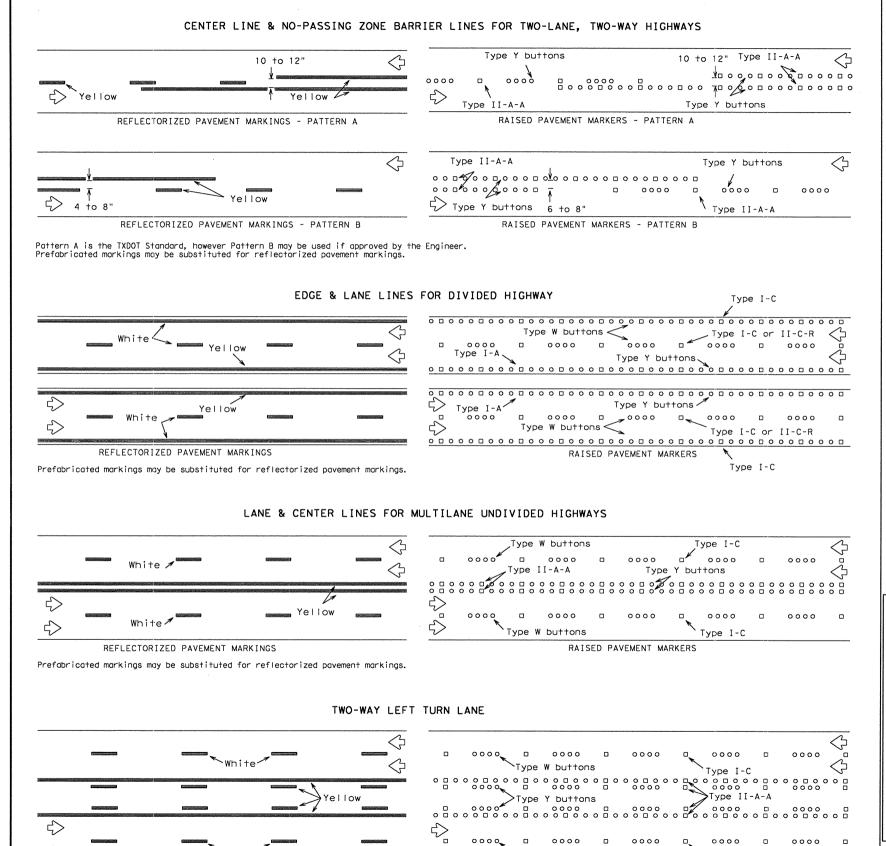
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS STANDARD

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BC(10)-03

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|--------------|-------------------|-------------------|----------|------------|---------|-----|-----------|--|
| © TxDOT      | Febru             | ry 1998           | DN: - LR | cx:-DTN    | DW:     | FDN | cx: - CAL |  |
| REVISIONS    | STATE<br>DISTRICT | FEDERAL<br>REGION |          |            | SHEET   |     |           |  |
| 1-97<br>2-98 | AUS               | 6                 |          | CC 337-1-2 | 29      |     | 52        |  |
| 1-02         |                   | COUNT             | Y        | CONTROL    | SECTION | J08 | H1GH#AY   |  |
| 11-02        |                   | WILLI             | MSON     | 0337       | 01      | 029 | SH 29     |  |

# PAVEMENT MARKING PATTERNS

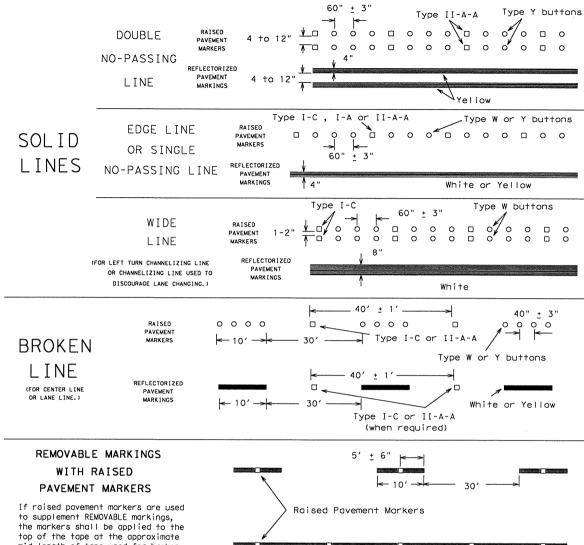


Type W buttons

RAISED PAVEMENT MARKERS

Type I-C

# STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers

and tape.

20' + 1'

Centerline only - not to be used on edge lines

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 Fost 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fox (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

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Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item "RAISED PAVEMENT MARKERS."



#### STANDARD PLANS

Texas Department of Transportation Traffic Operations Division

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS STANDARD

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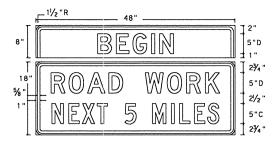
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CTxDOT February 1998 DN:-LR cx:-DTN Dx:-FDN STATE FEDERAL DISTRICT REGION SHEET 2-94 AUS 6 CC 337-1-29 H1GHWAY WILLIAMSON 0337 01 029 SH 29

REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.

\White



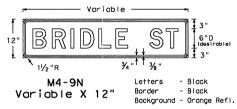
SG20-1 w/plaque Numbers 48" X 26"

Letters - Black - Black

Background - Orange Refl.



SG20-5T 48" X 24" Letters - Black Numbers - Black Border - Black Background - Orange Refl.



The M4-9R,L or S sign is to be used to detour local streets or roads that are not a State or Federal numbered highway; however, it should not be used in lieu of the M4-10 sign at the beginning of the deor Federal numbered routes.

Also, when the M4-9R, L or S sign is used, a sign (M4-9N) with the name of the street being detoured may be mounted above it.



Background - White Refl.

Letters - Black

Background - White Refl.

121/2'

61/2"

- White Refl.

- White Refl.

Background - Green Refl.

- Block

Border

24" WORKERS ARE PRESENT

36" X 18"

R20-5

Plaque

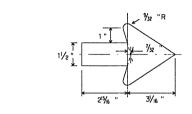
24" X 12"

48" ---

Letters

Arrow

Border



33% "

Symbol

\_ R=1<mark>½"</mark> 18" \_

D-70a

18" X 18"

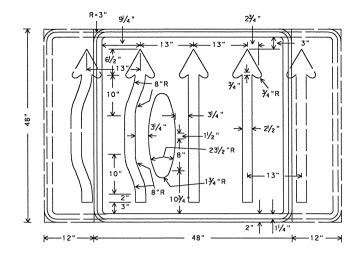
- White Refl. Background - Blue Refl.

Letters - White Refl. - White Refl.



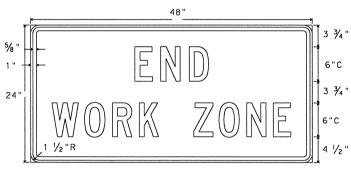
Letters - White Refl D-70S Symbol - White Refl. - White Refl. 42" X 14" Border Background - Blue Refl.

\* Alternate first line legend for D-70S



CW24-2 Var. X 48"

A mirror image may be used to show proper lane alignment.



G20-2b 48" X 24" Letters - Black Border - Black Background - Orange Refl.

10"F

E5-2 48" X 48"

Letters - Black Border - Black Background - Orange Refl.

> DEPARTMENT MATERIAL SPECIFICATIONS PLYWOOD SIGN BLANKS DMS-7100 ALUMINUM SIGN BLANKS FLAT SURFACE REFLECTIVE SHEETING
> VINYL NON-REFLECTIVE DECAL SHEETING DMS-8300 DMS-8320

REFLECTIVE SHEETING OR OTHER MATERIAL COLOR USAGE TYPE C (HIGH SPECIFIC INTENSITY) BLUE BACKGROUND BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) RED GREEN BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) ORANGE BACKGROUND TYPE E (FLUORESCENT PRISMATIC) BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) LEGEND & BORDERS VINYL NON-REFLECTIVE DECAL SHEETING LEGEND & BORDERS TYPE C (HIGH SPECIFIC INTENSITY)



24" X 24"

Border - Black

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be

42"

E5-1a

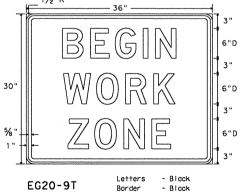
48" X 42"

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fax (512) 416-3299

obtained by contacting:

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us Click on "About TxDOT", Click on "Functional Organizational Chart", Click on Traffic Operations Box, Click on "Compliant Work Zone Traffic Control Devices", again click on "Compliant Work Zone Traffic Control Devices". This site is printable.



36" X 30"

Background - Orange Refl.

15/6"->

171/4'

B-1 Arrow Detail



Letters - Black Background - Orange Refl.



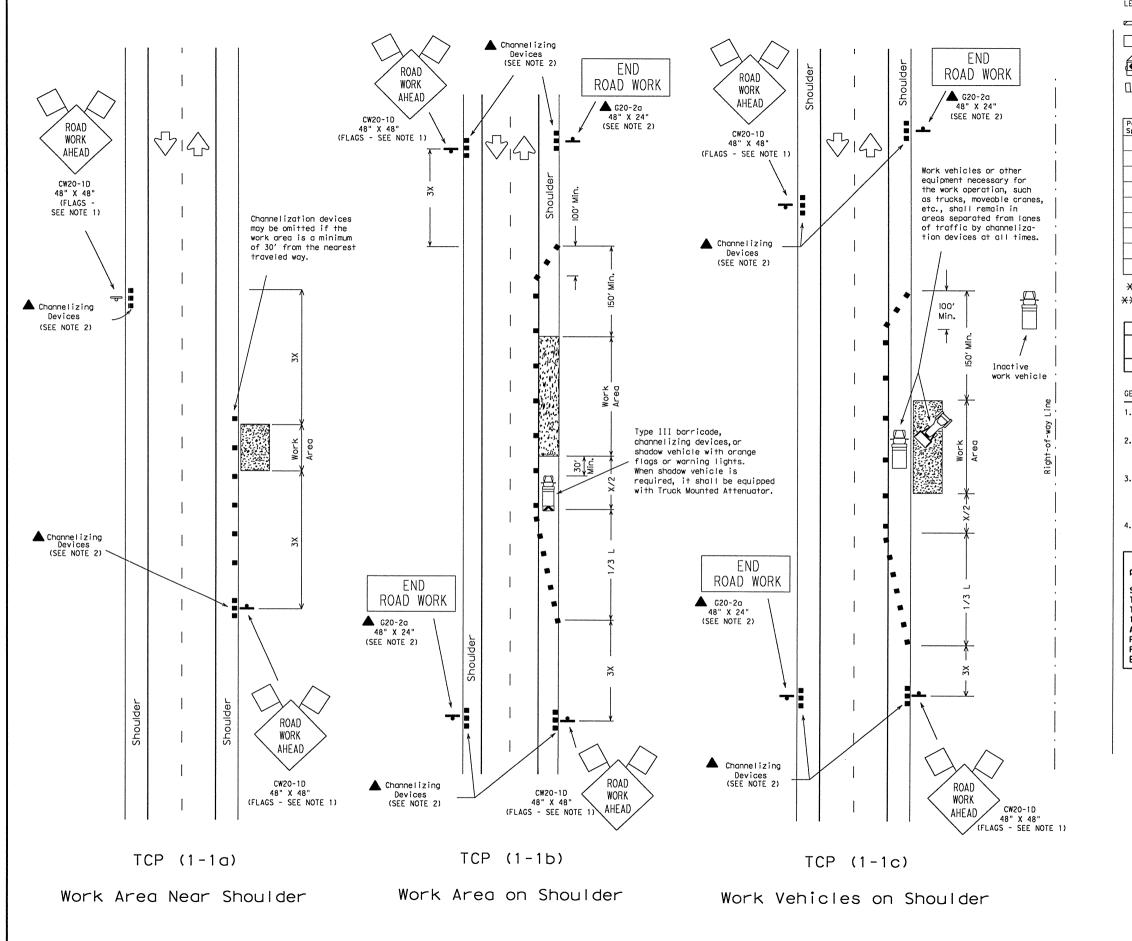
STANDARD PLANS Texas Department of Transportation Traffic Operations Division

BARRICADE AND CONSTRUCTION REGULATORY & GUIDE SIGNS **STANDARDS** 

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BC(12)-03

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|----------------|--------|-------------------|-----------|---------------------|---------|--------|-----------|--|--|
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| 10-99<br>11-02 | AUS    | 6                 | С         | CC 337-1-29         |         |        |           |  |  |
|                |        | COUNT             |           | CONTROL             | SECTION | JOB    | HIGHWAY   |  |  |
|                |        | WILLIA            | MSON      | 0337                | 01      | 029    | SH 29     |  |  |



Type III Barricade Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Portable Changeable
Flashing Arrow Panel Message Sign

Flagger Sign Post

|                              |                       | Minimum Desirable<br>Taper Lengths <del>X</del> <del>X</del> |               |               |               | ested Maximum<br>ing of Device | Minimum<br>Sign Spacing |
|------------------------------|-----------------------|--|---------------|---------------|---------------|--------------------------------|-------------------------|
| Posted<br>Speed <del>X</del> | Formula               | 10'<br>Offset  | 11'<br>Offset | 12'<br>Offset | On a<br>Taper | On a<br>Tangent                | X<br>Distance           |
| 30                           | 2                     | 150′   | 165′          | 180'          | 30'           | 60′-75′                        | 120′                    |
| 35                           | $L = \frac{WS^2}{60}$ | 2051   | 225'          | 245'          | 35′           | 70′-90′                        | 160′                    |
| 40                           |                       | 2651   | 295′          | 320'          | 40'           | 80'-100'                       | 240'                    |
| 45                           |                       | 450'   | 4951          | 540'          | 45′           | 90′-110′                       | 320'                    |
| 50                           |                       | 500′   | 550′          | 600′          | 50′           | 100'-125'                      | 400′                    |
| 55                           | 1 - WC                | 550′   | 605′          | 660′          | 55′           | 110′-140′                      | 500′                    |
| 60                           | L=WS                  | 600'   | 660′          | 720'          | 60′           | 120'-150'                      | * 600'                  |
| 65                           |                       | 650′   | 715′          | 7801          | 65′           | 130'-165'                      | * 700'                  |
| 70                           |                       | 700′   | 770′          | 840'          | 70′           | 140′-175′                      | * 800'                  |

\* Conventional Roads Only

XXTaper lengths have been rounded off.

L=Length of Taper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

|        |                   | TYPICAL USAGE:           |                                 |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        | 1                 | 1                        |                                 |                         |

#### GENERAL NOTES:

- Unless otherwise stated in the plans, flags attached to signs are REQUIRED.
- 2. All traffic control devices illustrated are  $\underline{\textit{REQUIRED}}$ , except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- 3. On high speed facilities advance warning signs should be installed approximately 3X from the work area or from the beginning of a lane or shoulder taper. On low speed facilities the advance warning signs should be placed based on the "X" minimum distance.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARDemailgw.dot.state.tx.us

The requirement for shadow vehicles will be listed in the project GENERAL NOTES,

Item 502, Barricades, Signs and Traffic Handling.



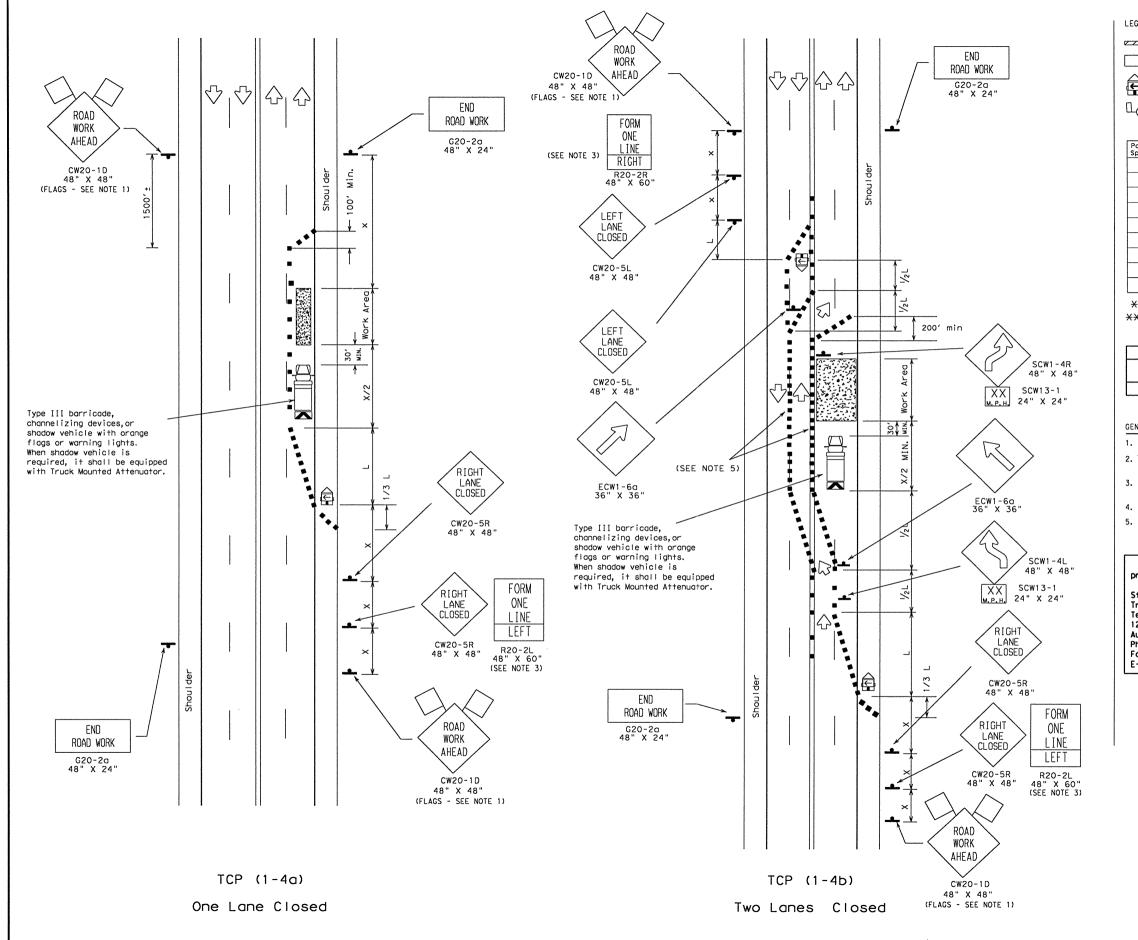
# STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(1-1)-98

| © TxDOT      | Decemb | er 198            | 85 DN:-LR | ck: - MT | DW: - DN | ck: - MT | NEG NO.: |
|--------------|--------|-------------------|-----------|----------|----------|----------|----------|
| REVISIONS    | STATE  | FEDERAL<br>REGION |           | SHEET    |          |          |          |
| 2-94<br>8-95 | AUS    | 6                 |           | 55       |          |          |          |
| 1-97         |        | COU               | NIY       | CONTROL  | SECTION  | J08      | HIGHWAY  |
| 4-98         |        | WILL              | IAMSON    | 033      | 7 01     | 029      | SH 29    |



LEGEND . Type III Barricade ■ ■ Channelizing Devices Truck Mounted Attenuator Heavy Work Vehicle Portable Changeable Trailer Mounted Flashing Arrow Panel Message Sign Sign Post Flagger

|                              |                       | Minimum Desirable<br>Taper Lengths X X               |      |               |     | ested Maximum<br>ing of Device | Minimum<br>Sign Spacing |
|------------------------------|-----------------------|--|------|---------------|-----|--------------------------------|-------------------------|
| Posted<br>Speed <del>X</del> | Formula               | 10' 11' 12' On a On a<br>Offset Offset Taper Tangent |      | X<br>Distance |     |                                |                         |
| 30                           | 2                     | 150′   | 1651 | 1801          | 30′ | 60′-75′                        | 120′                    |
| 35                           | $L = \frac{WS^2}{60}$ | 2051   | 225′ | 245'          | 35′ | 70′-90′                        | 160′                    |
| 40                           | 00                    | 265′   | 295′ | 320'          | 40' | 80′-100′                       | 240'                    |
| 45                           |                       | 450'   | 495′ | 540'          | 45′ | 90′-110′                       | 320'                    |
| 50                           |                       | 500′   | 550′ | 600′          | 501 | 100′-125′                      | 400′                    |
| 55                           | L=WS                  | 550′   | 605′ | 660'          | 55′ | 110′-140′                      | 500'                    |
| 60                           | L-W3                  | 600'   | 660′ | 720'          | 60′ | 120'-150'                      | ¥ 600'                  |
| 65                           |                       | 650′   | 715′ | 780′          | 65′ | 130′-165′                      | <del>X</del> 700′       |
| 70                           |                       | 700′   | 770′ | 840'          | 70′ | 140'-175'                      | * 800'                  |

\* Conventional Roads Only

\*\* Toper lengths have been rounded off.

L=Length of Taper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

|        |                   | TYPICAL USAGE            | •                               |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        | 1                 | 1                        |                                 |                         |

#### GENERAL NOTES:

- 1. Unless otherwise stated in the plans, flags attached to the signs are
- REQUIRED.

  2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

  3. The FORM ONE LANE LEFT sign may be used following the RIGHT LANE CLOSED sign. Spacing distance between signs should be the minimum distance indicated.
- 4. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.
  5. If povement markings are not removed and traffic is directed over
- a double yellow centerline, the maximum spacing of channelizing devices in a tangent section should be no greater than 10 feet.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3335 Fax (512) 416-3161 E-mail TRF-STANDARD@mailgw.dot.state.tx.us

> The requirement for shadow vehicles will be listed in the project GENERAL NOTES. Item 502, Barricades, Signs and Traffic Handling.



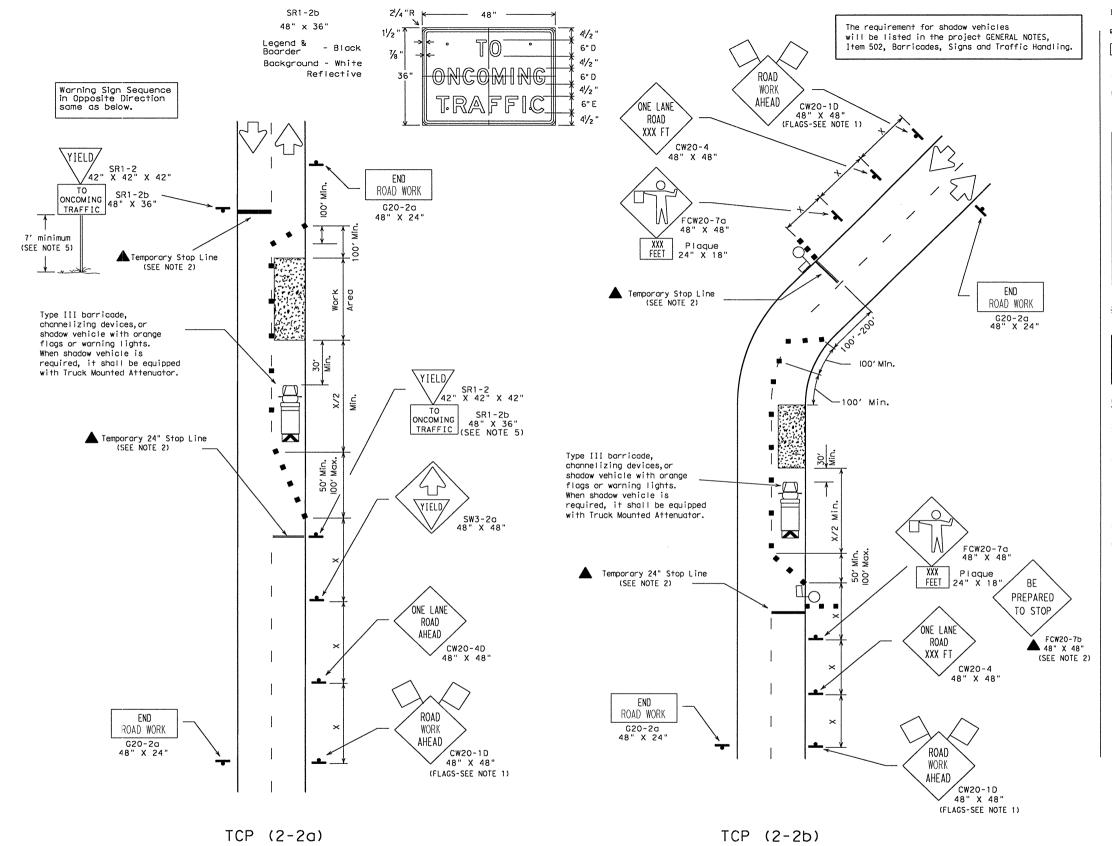
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP (1-4)-98

| © TxDOT                    | Decemb            | er 198            | 5 DN:-LR            | CK | ∷-MT    | ow: - Di | N     | ck: - MT | NEG NO.: | - 1   |
|----------------------------|-------------------|-------------------|---------------------|----|---------|----------|-------|----------|----------|-------|
| REVISIONS                  | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERAL AID PROJECT |    |         |          |       | SI       | EET      |       |
| 2-94<br>8-95 AUS 6 CC 337- |                   |                   |                     |    |         | 337-1-29 |       |          |          | 6     |
| 1-97                       | COUNTY            |                   |                     |    | CONTROL | SEC      | T (ON | JOB      | ні       | SHWAY |
| 4-98                       |                   | WILLIAMSON        |                     |    |         | 7   0    | 01    | 029      | SH       | 29    |



2-Lane Roadway Without Paved Shoulders One Lane Closed Adequate Field of View 2-Lane Roadway Without Paved Shoulders One Lane Closed Inadequate Field of View Type III Barricade Channelizing Devices Flag

Heavy Work Vehicle Truck Mounted Attenuator

Trailer Mounted Portable Changeable
Flashing Arrow Panel Message Sign

Flagger Sign Post

|                              |                       | Minimum Desirable<br>Taper Lengths 💥 💥 |               |               |               | ested Maximum<br>ing of Device | Minimum<br>Sign Spacing |
|------------------------------|-----------------------|--|---------------|---------------|---------------|--------------------------------|-------------------------|
| Posted<br>Speed <del>X</del> | Formula               | 10'<br>Offset                          | 11'<br>Offset | 12'<br>Offset | On a<br>Taper | On a<br>Tangent                | X<br>Distance           |
| 30                           | 2                     | 150'                                   | 165′          | 180′          | 30'           | 60'-75'                        | 120'                    |
| 35                           | $L = \frac{WS^2}{60}$ | 2051                                   | 225'          | 245'          | 35′           | 70'-90'                        | 160′                    |
| 40                           | 00                    | 265'                                   | 295′          | 320′          | 40'           | 80'-100'                       | 240′                    |
| 45                           |                       | 450'                                   | 495'          | 540'          | 45'           | 90'-110'                       | 320′                    |
| 50                           |                       | 500'                                   | 550′          | 6001          | 50′           | 100'-125'                      | 400'                    |
| 55                           | L=WS                  | 550'                                   | 6051          | 660′          | 55′           | 110'-140'                      | 500′                    |
| 60                           | L=W5                  | 600'                                   | 660'          | 7201          | 60′           | 120'-150'                      | * 600'                  |
| 65                           |                       | 650'                                   | 715′          | 780′          | 65′           | 130′-165′                      | * 700'                  |
| 70                           |                       | 700′                                   | 770′          | 840'          | 70′           | 140'-175'                      | <del>*</del> 800'       |

X Conventional Roads Only

\*X Taper lengths have been rounded off.

L=Length of Taper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

|        |                   | TYPICAL USAGE:           |                                 |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        | 1                 | 1                        | 1                               |                         |

#### GENERAL NOTES:

- Flags attached to signs are <u>REQUIRED.</u>
- All traffic control devices illustrated are <u>REQUIRED</u>, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- The BE PREPARED TO STOP sign may be installed after the ONE LANE ROAD XXX FT sign, but proper sign spacing shall be maintained.
- 4. YIELD sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work zones should be no longer than one half city block. In rural areas on roadways with less than 4000 ADT and work areas should be no longer than 400'.
- YIELD TO ONCOMING TRAFFIC sign shall be placed on a support at a 7' minimum mounting height.
- Flaggers should use two-way radios or other methods of communication to control traffic.
- Length of work area should be based on the ability of flaggers to communicate.
- 8. For intermediate term situations, when it is not feasible to remove and restore powement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.



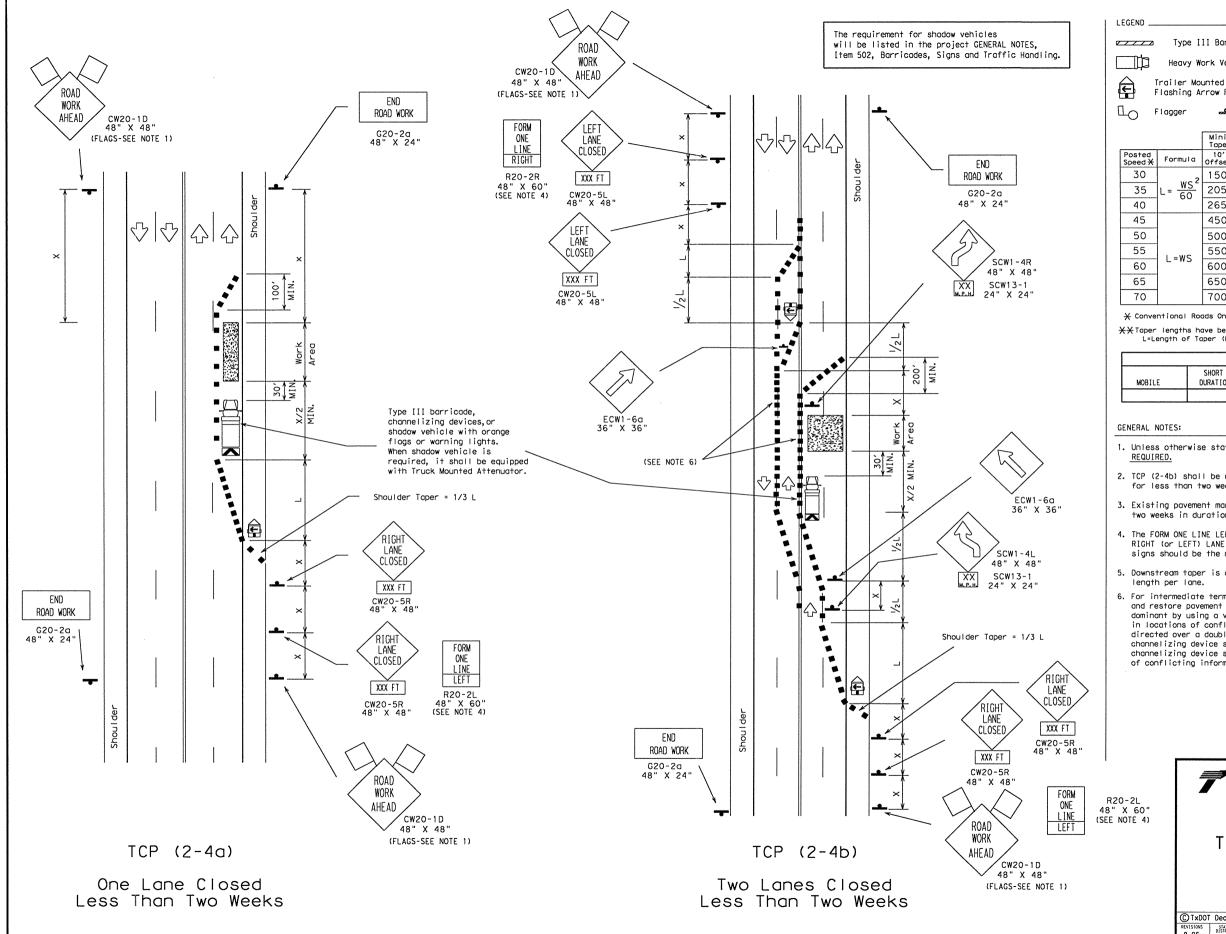
STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(2-2)-03

| © TxD01           | Decemb                      | er 1985           | 5 ON:-LR | cx: - MT    | tw: - DN | ck: - MT | NEG NO.: |  |  |
|-------------------|-----------------------------|-------------------|----------|-------------|----------|----------|----------|--|--|
| REVISIONS<br>8-95 | STATE                       | FEDERAL<br>REGION |          | SHEET       |          |          |          |  |  |
| 1-97              | AUS                         | 6                 |          | CC 337-1-29 |          |          |          |  |  |
| 4-98              |                             | COUN              | TY       | CONTROL     | SECTION  | J08      | HIGHWAY  |  |  |
| 3-03              | 3-03 WILLIAMSON 0337 01 029 |                   |          |             |          |          | SH 29    |  |  |



Type III Barricade ■ ■ Channelizing Devices Heavy Work Vehicle Truck Mounted Attenuator

Portable Changeable

Message Sign

Flashing Arrow Panel

Sign Post

|                              |                       | Minimum Desirable<br>Taper Lengths <del>X</del> <del>X</del> |               |               |               | ested Maximum<br>ing of Device | Minimum<br>Sign Spacing |
|------------------------------|-----------------------|--|---------------|---------------|---------------|--------------------------------|-------------------------|
| Posted<br>Speed <del>X</del> | Formula               | 10'<br>Offset  | 11'<br>Offset | 12'<br>Offset | On a<br>Taper | On a<br>Tangent                | X<br>Distance           |
| 30                           | 2                     | 150′   | 165′          | 180′          | 30′           | 60′-75′                        | 120'                    |
| 35                           | $L = \frac{WS^2}{60}$ | 205′   | 225′          | 245'          | 35′           | 70′-90′                        | 160′                    |
| 40                           | 00                    | 265′   | 295′          | 320′          | 40'           | 80′-100′                       | 240'                    |
| 45                           |                       | 450′   | 495′          | 540′          | 45′           | 90′-110′                       | 320′                    |
| 50                           |                       | 500′   | 550′          | 6001          | 50′           | 100'-125'                      | 400′                    |
| 55                           | L=WS                  | 550′   | 605′          | 660′          | 55′           | 110′-140′                      | 500′                    |
| 60                           | L-W3                  | 600'   | 660′          | 720'          | 60′           | 120'-150'                      | * 600'                  |

\* Conventional Roads Only

\*\*X\*Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

650' 715' 780' 65' 130' -165' \* 700'

700' 770' 840' 70' 140' -175' \* 800'

|        |                   | TYPICAL USAGE:           |                                 |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        |                   | 1                        | 1                               |                         |

- 1. Unless otherwise stated in the plans, flags attached to signs are
- 2. TCP (2-4b) shall be used only on projects that will be at a location for less than two weeks.
- 3. Existing pavement markings may remain in place for projects less than two weeks in duration.
- 4. The FORM ONE LINE LEFT (or RIGHT) sign may be used following the RIGHT (or LEFT) LANE CLOSED XXX FT sign. Spacing distance between signs should be the minimum distance indicated.
- 5. Downstream taper is optional. When used, it should be 100' minimum length per lane.
- 6. For intermediate term situations, when it is not feasible to remove and restore povement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the grea of conflicting information and not the entire work zone.

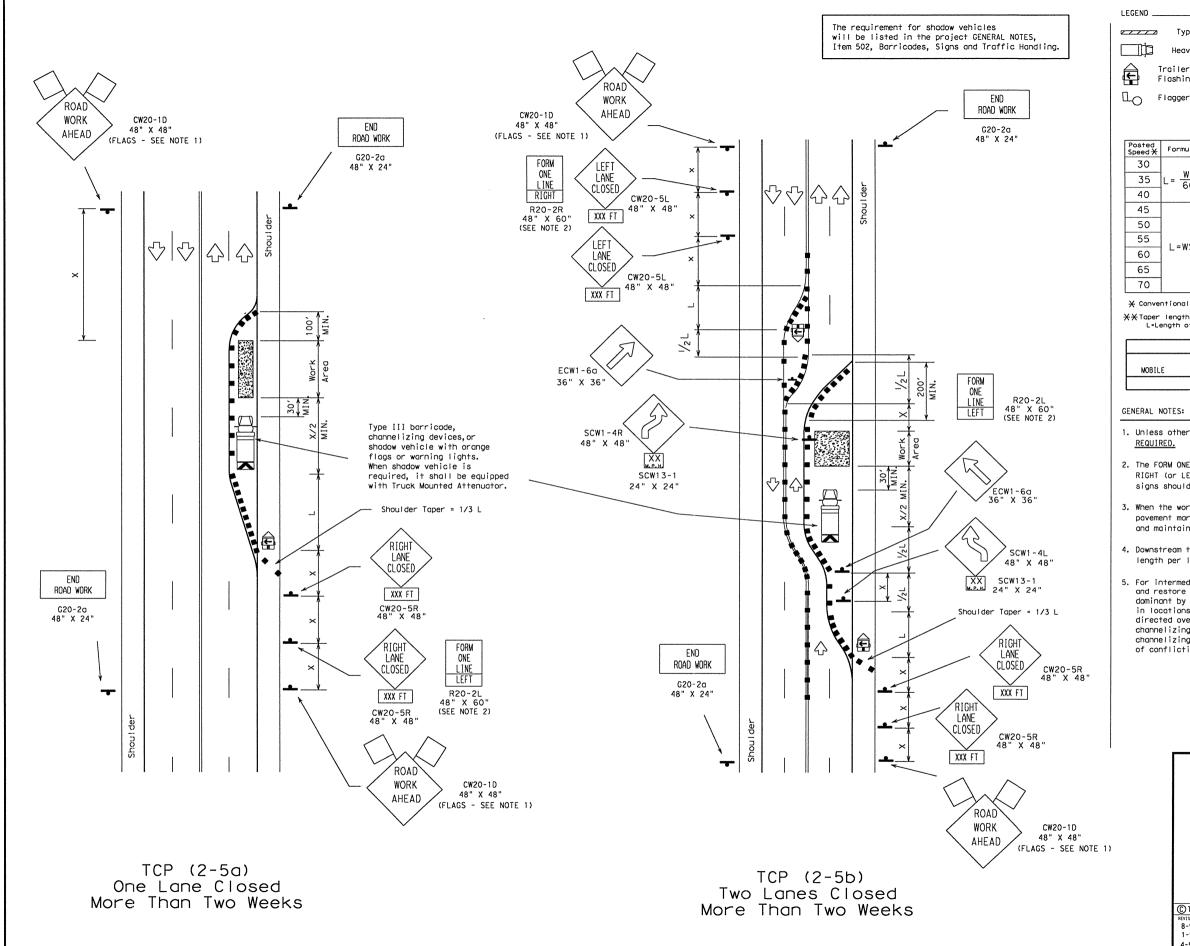
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(2-4)-03

| TXDOT           | Decemb            | er 198            | 15   DN: - LR | cx: - MT            | DW: - DN    | cx: - DM | NEG NO.: |  |  |
|-----------------|-------------------|-------------------|---------------|---------------------|-------------|----------|----------|--|--|
| VISIONS<br>3-95 | STATE<br>DISTRICT | FEDERAL<br>REGION |               | FEDERAL AID PROJECT |             |          |          |  |  |
| 1-97            | AUS               | 6                 |               | CC 337-             | CC 337-1-29 |          |          |  |  |
| 1-98            | -,                |                   |               | CONTRO              | L SECTION   | J08      | HIGHWAY  |  |  |
| 3-03            |                   | WILL              | IAMSON        | 033                 | 7 01        | 029      | SH 29    |  |  |



Type III Barricade ■ ■ Channelizing Devices Truck Mounted Attenuator Portable Changeable Trailer Mounted M Message Sign Flashing Arrow Panel

|                              |                    |               | um Desi<br>Length |               |               | ested Maximum<br>ing of Device | Minimum<br>Sign Spacing |
|------------------------------|--------------------|---------------|-------------------|---------------|---------------|--------------------------------|-------------------------|
| Posted<br>Speed <del>X</del> | Formula            | 10'<br>Offset | 11'<br>Offset     | 12'<br>Offset | On a<br>Taper | On a<br>Tangent                | X<br>Distance           |
| 30                           | 2                  | 150'          | 165′              | 180′          | 30'           | 601-751                        | 120'                    |
| 35                           | L= WS <sup>2</sup> | 205′          | 225′              | 2451          | 35′           | 70′-90′                        | 160′                    |
| 40                           |                    | 265′          | 295′              | 3201          | 40'           | 80′-100′                       | 240′                    |
| 45                           |                    | 450'          | 4951              | 540′          | 45′           | 90′-110′                       | 320′                    |
| 50                           |                    | 500′          | 550′              | 600'          | 50′           | 100'-125'                      | 400′                    |
| 55                           | L=WS               | 550'          | 605′              | 660′          | 55′           | 110′-140′                      | 500′                    |
| 60                           | ] L=W2             | 600'          | 660'              | 720'          | 60′           | 120'-150'                      | * 600'                  |
| 65                           |                    | 650′          | 715′              | 780′          | 65′           | 130′-165′                      | * 700'                  |
| 70                           |                    | 700′          | 770′              | 840'          | 70′           | 140'-175'                      | * 800'                  |

\* Conventional Roads Only

L=Length of Taper (FT.) W=Width of Offset (FT.) S\*Posted Speed (MPH)

|        |                   | TYPICAL USAGE:           |                                 |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        |                   |                          | 1                               | 1                       |

- 1. Unless otherwise stated in the plans, flags attached to signs are
- 2. The FORM ONE LINE LEFT (or RIGHT) sign may be used following the RIGHT (or LEFT) LANE CLOSED XXX FT sign. Spacing distance between signs should be the minimum distance indicated.
- 3. When the work zone will be in place more than two weeks, conflicting pavement markings shall be removed. New markings shall be installed and maintained to the satisfaction of the Engineer.
- 4. Downstream taper is optional. When used, it should be 100' minimum length per lane.
- 5. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

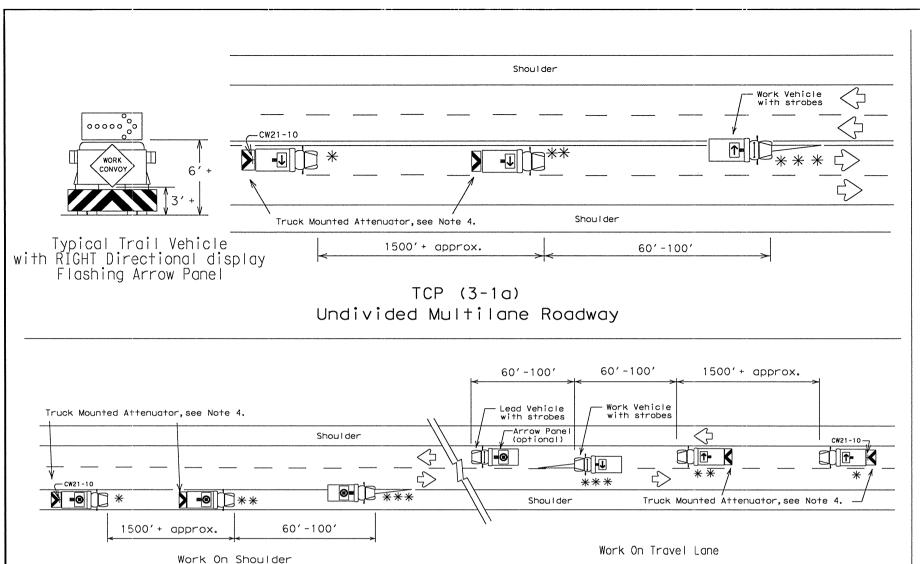


STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division

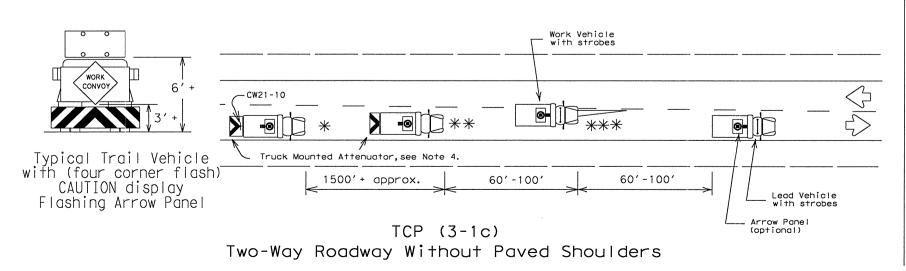
TRAFFIC CONTROL PLAN

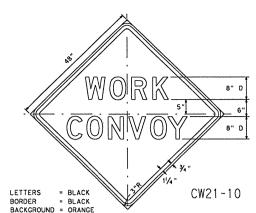
TCP (2-5) -03

| (C) TxD01         | Decemb            | er 1985           | DN:-LR | СК: -           | on: - DN | ck: - MT | NEG NO.: |
|-------------------|-------------------|-------------------|--------|-----------------|----------|----------|----------|
| REVISIONS<br>8-95 | STATE<br>DISTRICT | FEDERAL<br>REGION |        | FEDERAL AID PRO | JECT     |          | SHEET    |
| 1-97              | AUS               | 6                 |        | CC 337-1        | -29      |          | 59       |
| 4-98              |                   | COUNT             | Y      | CONTROL         | SECTION  | J08      | H1GHWAY  |
| 3-03              |                   | WILLI             | AMSON  | 033             | 7 01     | 029      | SH 20    |



TCP (3-1b) Two-Way Roadway With Paved Shoulders





#### Legend:

- \* TRAIL VEHICLE
- \* \* SHADOW VEHICLE
- \* WORK VEHICLE
  - Truck mounted Truck mount attenuator
- HEAVY WORK VEHICLE

Arrow Panel Displays

RIGHT Directional

← LEFT Directional

RIGHT or LEFT Directional

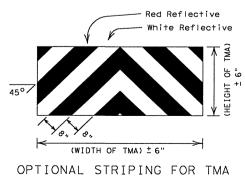
CAUTION mode

#### GENERAL NOTES:

- 1. TRAIL, SHADOW, LEAD, and work vehicles shall be equipped with arrow panels as illustrated. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- 2. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
- 3. The use of yellow rotating beacons or strobe lights on vehicles are required unless otherwise stated elsewhere in the plans.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and the TRAIL VEHICLE are required.
- Optional striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION D-9-8300, TYPE C.
- Flashing Arrow Panels shall be Type B or Type C as per BC Standards. The panel operation shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy
- Vehicle spacing between TRAIL VEHICLE and SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3335 Fax (512) 416-3161 E-mail TRF-STANDARD@mailgw.dot.state.tx.us



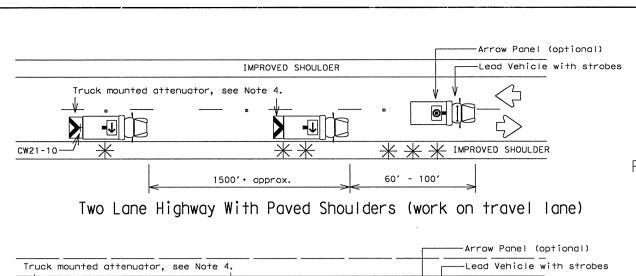
STRIPING FOR TMA WILL BE REQUIRED ON ALL PROJECTS AWARDED AFTER JANUARY 1, 2000 Shadow and trail vehicle shall be equipped with Truck Mounted Attenuator.



TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1) -98

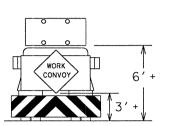
| TXDOT      | Decemb | er 198            | 5 DN:-LR | CK: -           | ow: - DN | ck: - DM | NEG NO.: |  |
|------------|--------|-------------------|----------|-----------------|----------|----------|----------|--|
| VISIONS    | STATE  | FEDERAL<br>REGION |          | FEDERAL ALD PRO | JECT     |          | SHEET    |  |
| -94<br>-95 | AUS    | 6                 |          | CC 337-1-29     |          |          |          |  |
| -97        |        | COUN              | TY       | CONTROL         | SECTION  | JOB      | HIGHWAY  |  |
| -98        |        | WILLI             | AMSON    | 033             | 7 01     | 029      | SH 29    |  |



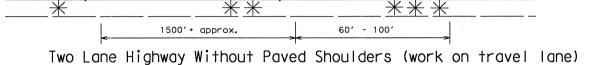


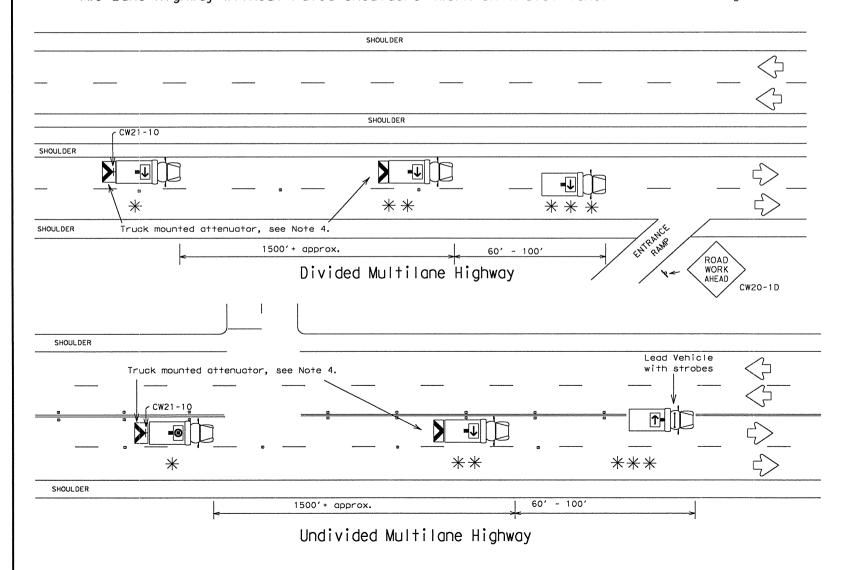
00000

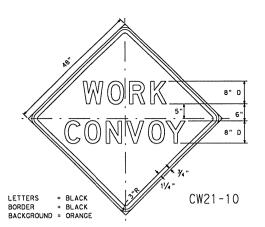
RIGHT Directional display Flashing Arrow Panel



TYPICAL TRAIL VEHICLE with (four corner flash) CAUTION display Flashing Arrow Pănel







\* TRAIL VEHICLE

\* \* SHADOW VEHICLE

\* WORK VEHICLE

Legend:

Truck mounted attenuator

HEAVY WORK VEHICLE

Arrow Panel Displays

RIGHT Directional

LEFT Directional

RIGHT or LEFT Directional

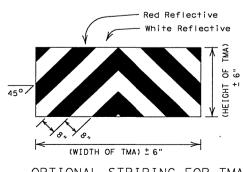
CAUTION mode

#### GENERAL NOTES:

- 1. TRAIL, SHADOW, LEAD, and work vehicles shall be equipped with arrow panels as illustrated. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic valume, and sight distance restrictions.
- All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
  3. The use of yellow rotating beacons or strobe lights on vehicles are required unless otherwise stated
- elsewhere in the plans.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and the TRAIL VEHICLE are required.
- 5. Optional striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION D-9-8300, TYPE C.
- 6. Flashing Arrow Panels shall be Type B or Type C as per BC Standards. The panel operation shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between TRAIL VEHICLE and SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3335 Fax (512) 416-3161 E-mail TRF-STANDARDemailgw.dot.state.tx.us



OPTIONAL STRIPING FOR TMA

STRIPING FOR TMA WILL BE REQUIRED ON ALL PROJECTS AWARDED AFTER JANUARY 1, 2000

Shadow and trail vehicle shall be equipped with Truck Mounted Attenuator.



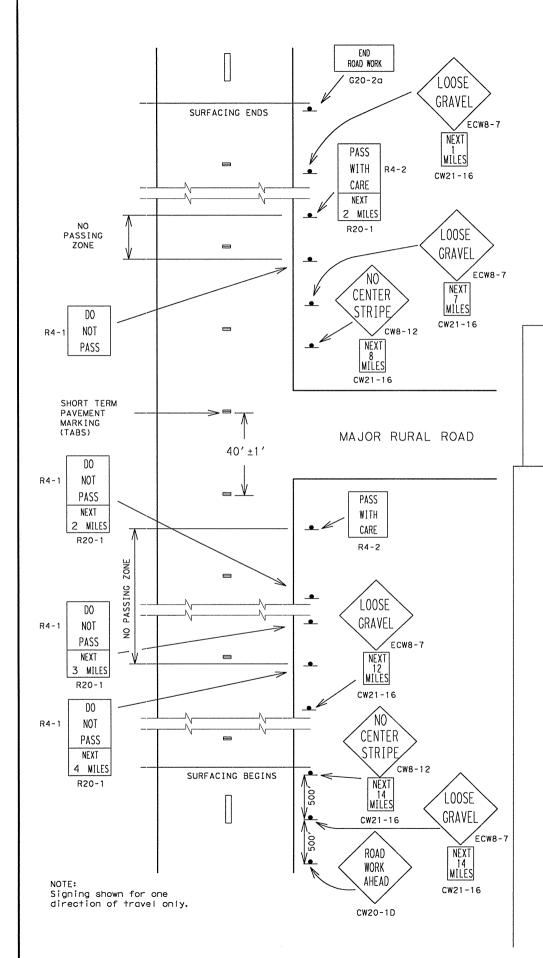
# STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

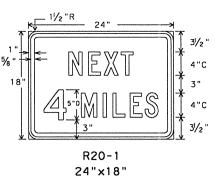
Traffic Operations Division

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION TCP (3-3) -98

| C TxDOT      | Septem | ber 19            | 87 DN:- LR | CK: -               | DR: - DN | ck: - DM | NEG NO.: |  |  |
|--------------|--------|-------------------|------------|---------------------|----------|----------|----------|--|--|
| REVISIONS    | STATE  | FEDERAL<br>REGION |            | FEDERAL AID PROJECT |          |          |          |  |  |
| 2-94<br>8-95 | AUS    | 6                 |            | CC 337-             | 1-29     |          | 61       |  |  |
| 1-97         |        | cou               | NTY        | CONTROL             | SECTION  | J0B      | H1GHWAY  |  |  |
| 4-98         |        | MITI I            | IAMSONI    | 033                 | 7 01     | 020      | CH 20    |  |  |

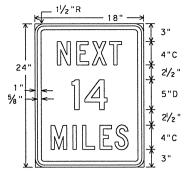
CW21-10





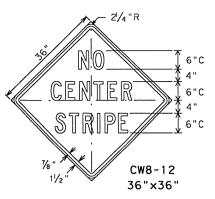
Legend - Black Border - Black Background - White Refl.

FOR USE WITH REGULATORY SIGNS ONLY



CW21-16 18"×24"

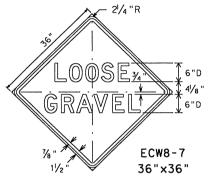
Legend - Black Border - Black Background - Orange Refl.



Legend - Black Border - Black Background - Orange Refl. STRIPE 8"C

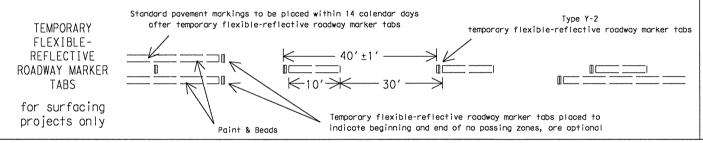
SCW8-12
48"×48"

Legend - Black Border - Black Background - Orange Refl.



Legend - Black Border - Black Background - Orange Refi.

FOR USE WITH CONSTRUCTION WARNING SIGNS ONLY



#### GENERAL NOTES

The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where the surfacing operation has covered or obliterated existing povement markings. These traffic control devices are to be used to supplement those required by BC Standards.

#### "DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

Prior to the beginning of construction, all currently striped no-passing zones should be signed with the DO NOT PASS sign (R4-1) and PASS WITH CARE sign (R4-2) placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing powement markings.

At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined and signed as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES sign (R20-1) may be used at the beginning of such zones. The DO NOT PASS and NEXT XX MILES signs should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of a no-passing zone may be signed with a PASS WITH CARE and NEXT XX MILES sign.

Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS and NEXT XX MILES sign should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, care must be taken to place DO NOT PASS and PASS WITH CARE signs in order to sign the beginning and end of the no-passing zones in the area where the surfacing operation has stopped for the day.

R4-1 and R4-2 signs should be mounted on fixed supports as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

#### "NO CENTER STRIPE" SIGN (CW21-15)

At the time construction activity obliterates the existing centerline (low volume roads may not have an existing centerline), a NO CENTER STRIPE sign (CW8-12) should be erected at each end of the work area and just beyond major rural intersections and other location deemed necessary by the Engineer. Where possible, the signs erected at each end of the work area should be located in such a manner that drivers can read the sign and immediately see the change to no centerline. The NO CENTER STRIPE sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The NO CENTER STRIPE sign should be erected as detailed on BC Standards. These signs are to remain in place until standard povement markings are placed.

#### "LOOSE GRAVEL" SIGN (ECW8-7)

When construction begins, a LOOSE GRAVEL sign (ECW8-7) should be erected at each end of the work area and repeated at intervals of approximately two (2) miles in rural areas and closer in urban areas. The LOOSE GRAVEL sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The LOOSE GRAVEL sign should be erected as detailed on BC Standards. They should remain in place until the loose gravel condition no longer exists.

#### PAVEMENT MARKINGS

Short term povement markings for surfacing projects shall use Temporary Flexible-reflective Roadway Marker Tobs. Tobs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tobs will be placed at the spacing indicated. Tobs should be applied to the povement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept the cover over the reflective strip shall be removed. Tobs shall NOT be used to simulate edge lines.

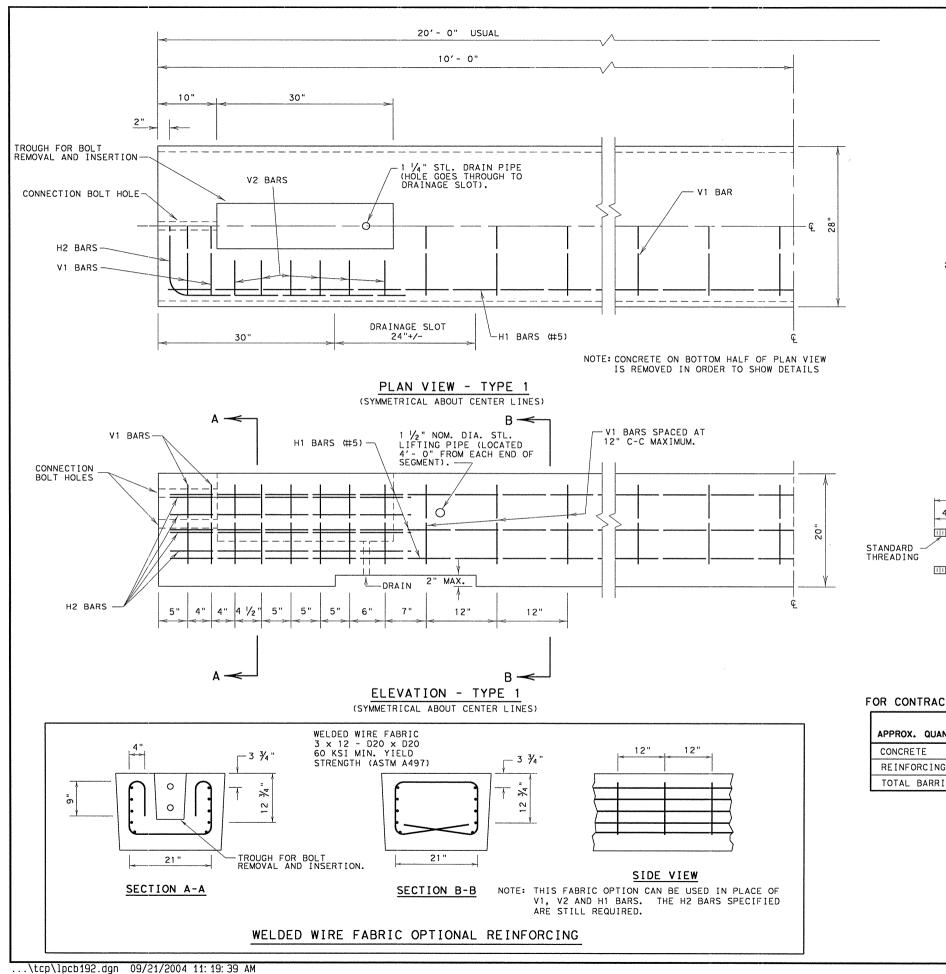
Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

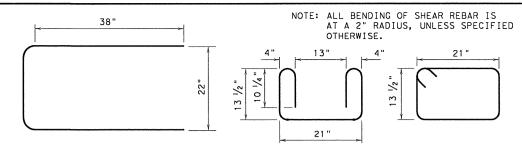
Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARDemailgw.dot.state.tx.us

|        |                   | TYPICAL USAGE:           |                                 |                         |
|--------|-------------------|--------------------------|---------------------------------|-------------------------|
| MOBILE | SHORT<br>DURATION | SHORT TERM<br>STATIONARY | INTERMEDIATE<br>TERM STATIONARY | LONG TERM<br>STATIONARY |
|        | 1                 | 1                        | 1                               | 1                       |



TRAFFIC CONTROL DETAILS
for
SURFACING OPERATIONS
TCP(7-1)-98





#### H2 BAR (#5)

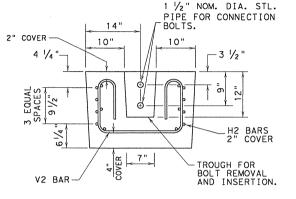
(GRADE 60 MIN.)

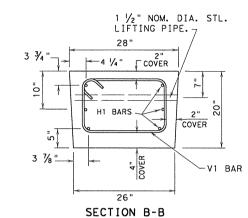
NOTE: H2 REBAR IS TO BE BENT AT A 3" RADIUS.

# V2 BAR (#4)

V1 BAR (#4)

# REINFORCING STEEL DETAILS





#### SECTION A-A

└ 1 ¼" DIA. SHAFT

1 1/4" HEX. NUT-

#### GENERAL NOTES

- 1. BARRIER LENGTH SHALL BE 20 FEET (+/- 1 INCH) UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- 2. ALL CONCRETE, REINFORCEMENT, ANCHOR BOLTS, BLOCKING, ETC., AS SHOWN ARE CONSIDERED AS PART OF THE BARRIER FOR PAYMENT.
- 3. ALL CONCRETE SHALL BE CLASS A, C, OR H, UNLESS OTHERWISE SPECIFIED.
- 4. ALL REINFORCING STEEL SHALL BE GRADE 40, UNLESS OTHERWISE SPECIFIED.
- 5. CHAMFER ALL EDGES 3/4 INCH, AS DIRECTED BY THE ENGINEER.
- STEEL PIPE SHALL BE HOT DIP GALVANIZED IN CONFORMANCE TO ASTM DESIGNATION A123. BOLTS, NUTS AND WASHERS SHALL BE HOT-DIP GALVANIZED TO ASTM DESIGNATION A153.
- 7. BOLTS SHALL CONFORM TO ASTM A36. NUTS SHALL CONFORM TO A307 REQUIREMENTS AND SHALL BE TAPPED OR CHASED AFTER GALVANIZING. BOLTS AND NUTS SHALL HAVE CLASS 2A AND 2B FIT TOLERANCES.
- 8. THE BARRIER SHOULD BE LIGHT IN COLOR AND SHOULD BE SUPPLEMENTED BY DELINEATION AS DETAILED ELSEWHERE IN THE PLANS.



TEXAS DEPARTMENT OF TRANSPORTATION

LOW PROFILE CONCRETE BARRIER

(PORTABLE AND PRECAST)

LPCB (1) -92
SHEET 1 OF 2

 
 © TXDOT SEPTEMBER 1992
 feb.rd foliving.
 state foliving.
 federal ald project no.
 SMEET NO.

 6
 TEXAS
 CC 337-1-29
 €3

 514TK 01ST-NO.
 COUNTY
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 SECT.
 Job
 HIGHBAY NO.

 AUS
 WILLIAMSON
 0337
 01
 029
 SH 29

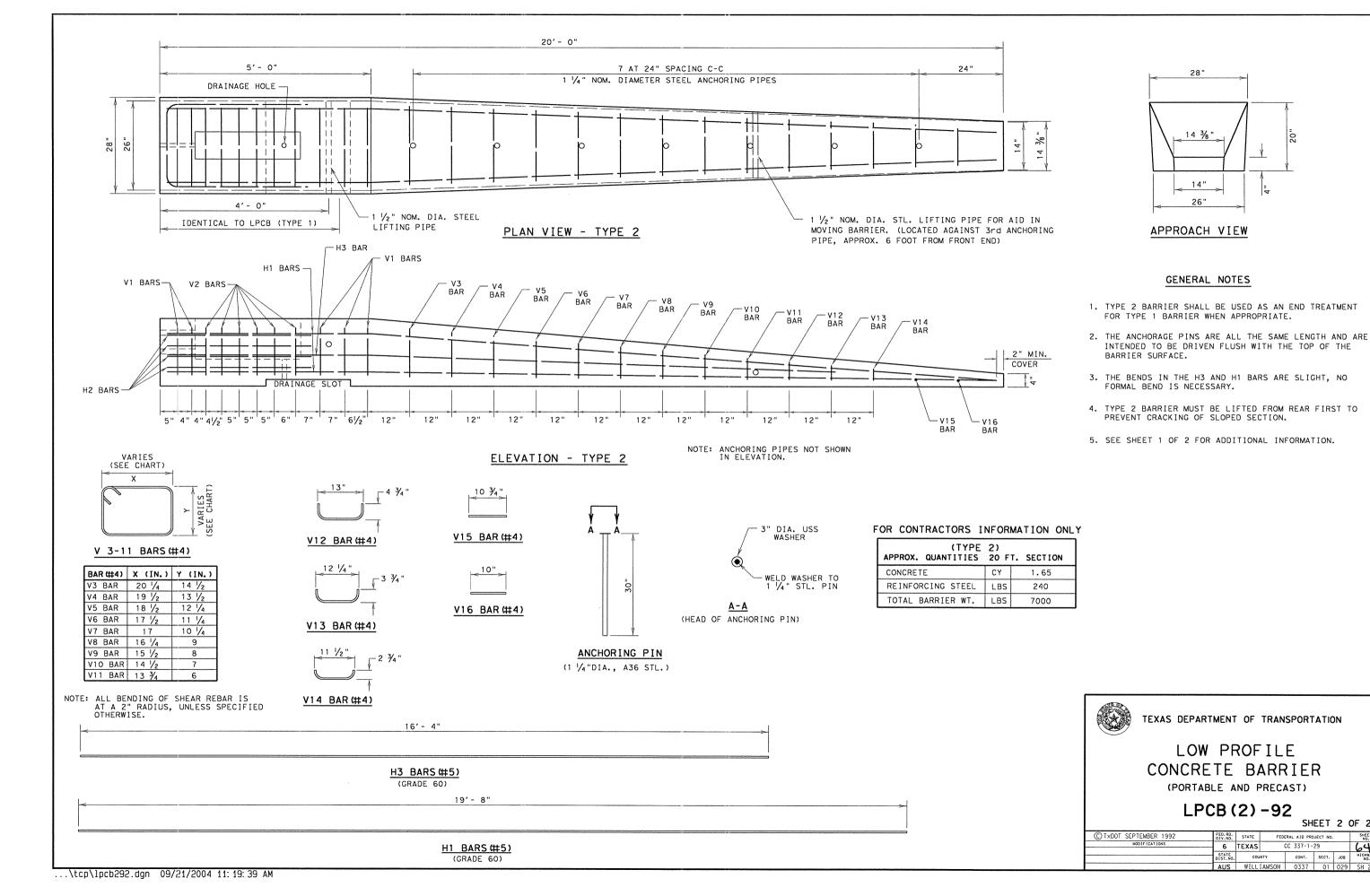
# FOR CONTRACTORS INFORMATION ONLY

26"

STANDARD USS WASHER, GRADE 5.

CONNECTION BOLT

| (TYPE APPROX. QUANTITIES |     | T. SECTION |
|--------------------------|-----|------------|
| CONCRETE                 | CY  | 2.6        |
| REINFORCING STEEL        | LBS | 330        |
| TOTAL BARRIER WT.        | LBS | 11000      |



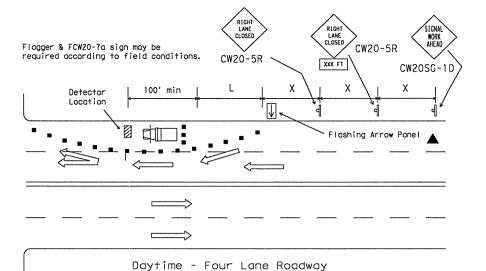
14" 26"

SHEET 2 OF 2

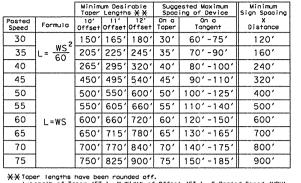
STATE FEDERAL AID PROJECT NO. CC 337-1-29

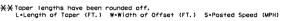
STATE DIST. NO. COUNTY CONT. SECT. JOB

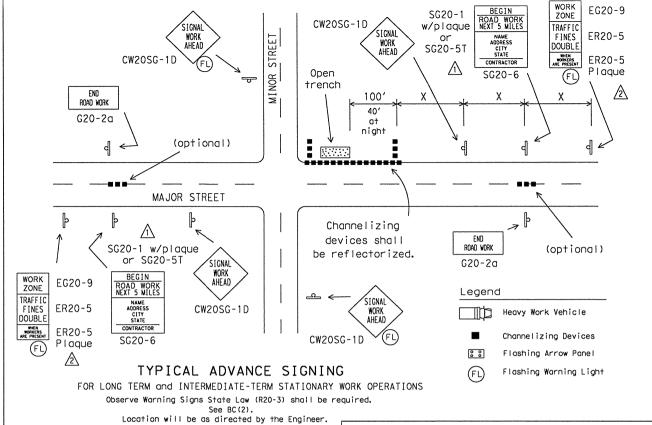
6 TEXAS



|                 |                       | Minimum Desirable Suggested Maximum Taper Lengths ** Spacing of Device |               |               |               | Minimum<br>Sign Spacing |               |
|-----------------|-----------------------|--|---------------|---------------|---------------|-------------------------|---------------|
| Posted<br>Speed | Formula               | 10'<br>Offset  | 11'<br>Offset | 12'<br>Offset | On a<br>Taper | On a<br>Tangent         | X<br>Distance |
| 30              | $L = \frac{WS^2}{60}$ | 150′   | 165'          | 180'          | 30'           | 60′-75′                 | 120'          |
| 35              |                       | 205'   | 225'          | 245'          | 35′           | 70′-90′                 | 160'          |
| 40              |                       | 2651   | 2951          | 3201          | 40'           | 80'-100'                | 240'          |
| 45              |                       | 450'   | 4951          | 540'          | 45′           | 90'-110'                | 320'          |
| 50              |                       | 500'   | 550′          | 600'          | 50′           | 100'-125'               | 400′          |
| 55              |                       | 550′   | 605′          | 660′          | 55′           | 110'-140'               | 500'          |
| 60              | L=WS                  | 600'   | 660'          | 720'          | 601           | 120'-150'               | 600'          |
| 65              |                       | 650'   | 715'          | 780'          | 65′           | 130'-165'               | 700′          |
| 70              |                       | 700'   | 770'          | 840'          | 70'           | 140'-175'               | 800'          |
| 75              |                       | 750′   | 825′          | 900'          | 75′           | 150'-185'               | 9001          |







Detector Location Paved Shoulder Paved Shoulder ■ Flashing Arrow Panel (in CAUTION mode) KEEP Payed Shoulder RIGHT Paved Shoulder R4-7b Flagger & CW20-7a sign may be CW2OSG-1D required according to field conditions. SIGNAL WORK AHEAD Daytime - Two Lane Roadway CW20SG-1D

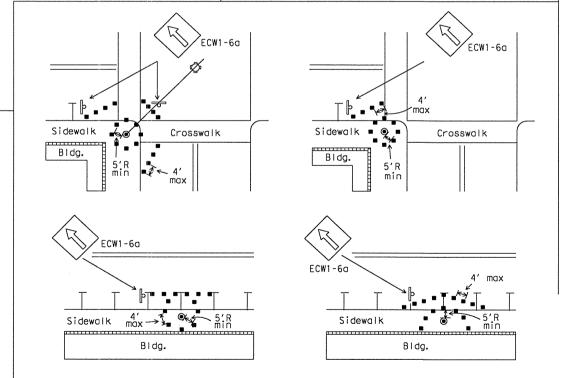
TYPICAL DETECTOR INSTALLATION OR OTHER WORK OPERATIONS THAT ARE SHORT TERM OR SHORT DURATION

Nighttime Channelizing Devices shall be reflectorized.

SIGNAL WORK AHEAD KEEP RIGHT CW2OSG-1D CW2OSG-1D R4-7b  $\Diamond$ ₹> KEEP SIGNAL WORK AHEAD RIGHT  $\Diamond$ R4-7b KEEP CW2OSG-1D RIGHT CW2OSG-1D R4-7b

> TYPICAL HANGING SIGNAL INSTALLATIONS OR OTHER WORK OPERATIONS THAT ARE SHORT TERM OR SHORT DURATION

> > \* Advance warning channelizing devices are optional.



Channelizing devices should not be placed closer than 5 foot radius (minimum) to signal poles. Parking may be eliminated by placing channelizing devices in spaces. If pedestrian walkways are blocked, refer to the Texas Manual on Uniform Traffic Control Devices (TMUTCD) Part 6.

#### TYPICAL RESTRICTED PEDESTRIAN MOVEMENTS

FOR ALL WORK OPERATIONS REGARDLESS OF WORK DURATION

▲ The arrow panel may be omitted when stated elsewhere in the plans.

1. Typical channelizing device is the 28" cone.

2. Plastic drums or vertical panels may be used if approved by the Engineer.

3. For several closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits.

4. See details elsewhere in the plans for advance signing requirements.

5. Advance signs shall be in place when signal construction operations are in progress.

6. The contractor shall remove advance signs when no

construction operations are underway. 7. Obstructions or hazards at the work area shall be clearly

marked and delineated at all times.

8. All holes, trenches or other hazardous greas shall be

adequately protected by lights or other protective devices. 9. Trenches shall be covered or surrounded with orange plastic

construction fence as directed by the Engineer. 10. Flagger and FCW20-7a sign may be required according to

field conditions. 11. Vehicles parked in roadway shall be equipped with two

12. High level flags at corners of vehicle may also be used.

13. Work operations that require work vehicle in traveled way 20 minutes or less may use cones, high level flags and

strobes as advance warning devices.

14. Cones should only be placed around vehicle.15. Flaggers may be used on high speed rural intersections.



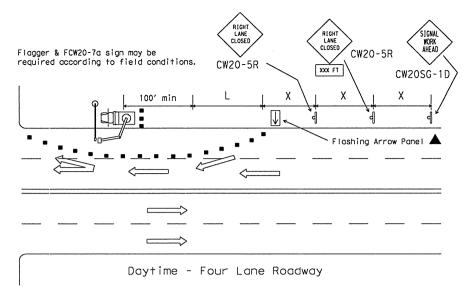
TRAFFIC SIGNAL INSTALLATION TYPICAL DETAILS

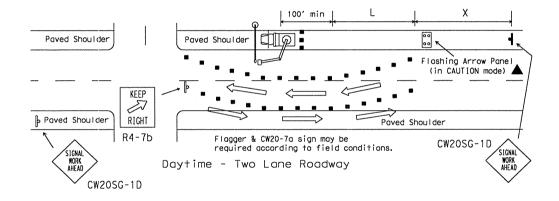
SHEET 1 OF 2

WZ (BTS-1)-03

| C) TXDOT     | April             | 1992              | DN: - GRB | cx: - GRB           |               | ™:-FDN | cx: - CAL |
|--------------|-------------------|-------------------|-----------|---------------------|---------------|--------|-----------|
| EVISIONS     | STATE<br>DISTRICT | FEDERAL<br>REGION |           | FEDERAL AID PROJECT | L AID PROJECT |        |           |
| 2-98<br>4-98 | AUS               | 6                 |           | 65                  |               |        |           |
| 10-99        |                   | COUN              | ΙΤΥ       | CONTROL             | SECTION       | ON JOB | HIGHWAY   |
| 3-03         |                   | WILLI             | AMSON     | 0337                | 01            | 029    | SH 29     |

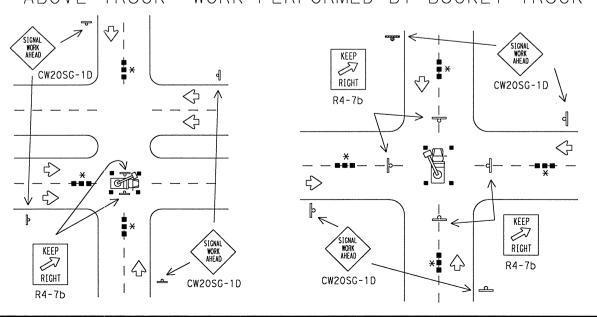
# "ABOVE LANE" WORK PERFORMED BY BUCKET TRUCK





# TRUCK" WORK PERFORMED BY BUCKET

▲ The arrow panel may be omitted when stated elsewhere in the plans.



GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- Nails shall NOT be used to attach signs to any support.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the gareed upon changes. The additional signs requested by the Engineer/Inspector shall not he subsidiary
- 7. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so that the Engineer can verify the correct procedures are being followed.
- The contractor is responsible for sign installations and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- 9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification
- 10. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

#### Duration of Work (as defined by the TMUTCD Part 6)

The types of sign supports, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring that the sign support and substrate meets crashworthiness and length of work requirements.

- a. Long-term stationary is work that occupies a location more than 3 days.
- b. Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.
- c. Short-term stationary is daytime work that occupies a location for more than 1 hour, but less than 12 hours.
- d. Short duration is work that occupies a location up to 1 hour.
- e. Mobile is work that moves intermittently or continuously.

#### SIGN MOUNTING HEIGHT

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

#### REMOVING OR COVERING

- 1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This type of sign support meets the crashworthiness standards regardless of the direction of impact. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic.
- Burlop shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face. These materials can damage the retroreflectivity of sign sheeting.
- 7. Signs shall be removed upon completion of the work.

## SIGN SUPPORT WEIGHTS

- 1. Where sign supports require the use of weights to keep from turning over. the use of sandbags with dry, cohesionless sand is recommended.

  2. The sandbags will be tied shut to keep the sand from spilling and to
- maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact.
- Rubber (such as tire inner tubes) shall NOT be used for sandbags.
- Rubber ballasts (such as those used with cones or edgeline channelizers) shall NOT be used as sign support weights.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Troffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us Click on "About TxDOT", Click on "Organizational Chart",

Click on Traffic Operations Box, Click on "Compliant Work Zone Traffic Control Devices",

Click on "View PDF".

This site is printable.

## DEPARTMENTAL MATERIAL SPECIFICATIONS

| PLYWOOD SIGN BLANKS               | DMS-7100 |
|-----------------------------------|----------|
| ALUMINUM SIGN BLANKS              | DMS-7110 |
| FLAT SURFACE REFLECTIVE SHEETING  | DMS-8300 |
| FLEXIBLE ROLL-UP REFLECTIVE SIGNS | DMS-8310 |
| VINYL NON-REFLECTIVE SHEETING     | DMS-8320 |

COLOR USAGE SHEETING MATERIAL

ORANGE BACKGROUND TYPE E (FLUORESCENT PRISMATIC) WHITE BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) LEGEND & BORDERS TYPE C (HIGH SPECIFIC INTENSITY) LEGEND & BORDERS VINYL NON-REFLECTIVE SHEETING



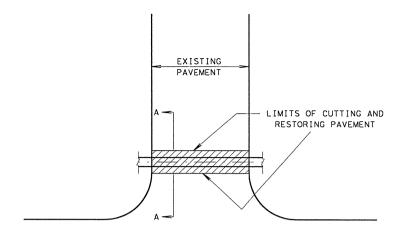
Traffic Operations Division TRAFFIC SIGNAL

INSTALLATION BARRICADES AND SIGNS

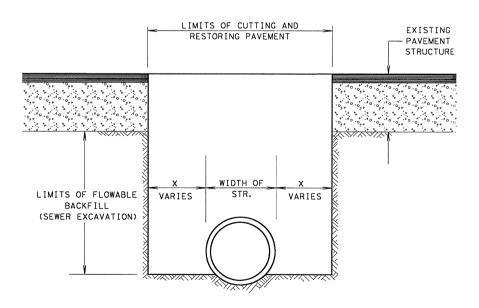
SHEET 2 OF 2

WZ(BTS-2)-03

| © TxDOT           | April             | 1992              | DN: - GRB           | cx: - GRB  | Di      | ⊭-FDN | cx: - CAL |
|-------------------|-------------------|-------------------|---------------------|------------|---------|-------|-----------|
| REVISIONS<br>2-98 | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERAL AID PROJECT |            |         |       | SHEET     |
| 4-98              |                   |                   |                     | CC 337-1-2 | 66      |       |           |
| 10-99 cou         |                   |                   | ęfy                 | CONTROL    | SECTION | J08   | HIGHWAY   |
| 3-03              |                   | WILL              | MOON                | 0337       | 0.1     | 029   | SH 20     |



PLAN VIEW



SECTION A-A

# TABLE OF STANDARD EXCAVATION WIDTHS FOR RC PIPE

| Ρ   | IPE     | ×   | WIDTH OF CUTTING AND |  |  |
|-----|---------|-----|----------------------|--|--|
| ID  | OD      | _ ^ | RESTORING PAVEMENT   |  |  |
| 18" | 22 1/2" | 1'  | 3.88′                |  |  |
| 24" | 29 1/2" | 1'  | 4.46′                |  |  |
| 30" | 37"     | 1'  | 5.08'                |  |  |
| 36" | 44"     | 1′  | 5.67'                |  |  |
| 42" | 51"     | 1'  | 6.25'                |  |  |
| 48" | 58"     | 2'  | 8.83'                |  |  |
| 54" | 65"     | 2'  | 9. 42'               |  |  |
| 60" | 72"     | 2'  | 10.00′               |  |  |
| 66" | 79"     | 2'  | 10.58′               |  |  |
| 72" | 86"     | 2'  | 11.17'               |  |  |
| 78" | 93"     | 2'  | 11.75′               |  |  |
| 84" | 100"    | 2'  | 12.33'               |  |  |
| 96" | 114"    | 2'  | 13.50'               |  |  |

WIDTH OF CUTTING AND RESTORING PAVEMENT FOR INSTALLATION OF STORM DRAIN STRUCTURES SHALL BE TAKEN AS THE OVERALL WIDTH OF THE STRUCTURE PLUS:

- 2 FEET FOR STRUCTURES WITH AN INSIDE DIMENSION OF 42" OR LESS OR.
- 4 FEET FOR STRUCTURES WITH AN INSIDE DIMENSION GREATER THAN 42".

#### GENERAL NOTES:

ANY WORK PERFORMED OR DAMAGE TO THE EXISTING PAVEMENT OUTSIDE THE LIMITS SHOWN WILL NOT BE PAID FOR AND SHALL BE REPAIRED AT THE SOLE EXPENSE OF THE CONTRACTOR.

REPLACEMENT MATERIAL SHALL BE AN ASPHALT STABILIZED PAVING MATERIAL, FLOWABLE BACKFILL OR CLASS A CONCRETE AS REQUIRED BY EXISTING CONDITIONS OR AN EQUIVALENT MATERIAL APPROVED BY THE ENGINEER. THE THICKNESS OF THE REPLACEMENT MATERIAL (S) SHALL BE EQUIVALENT TO THE THICKNESS OF THE EXISTING PAVEMENT STRUCTURE.

PAYMENT FOR CUTTING AND RESTORING PAVEMENT AS SHOWN SHALL BE MADE AT THE UNIT PRICE BID FOR "CUTTING AND RESTORING PAVEMENT".

# CUTTING AND RESTORING PAVEMENT DETAILS

AUSTIN DISTRICT

|   | ORIGINAL DRAWING:     |      | cutnrese. dgn | FED. RD.<br>DIV. NO. | PROJECT NO.        |            |             |
|---|-----------------------|------|---------------|----------------------|--------------------|------------|-------------|
|   | DATE                  | REV1 | SIONS         | 6                    | CC                 | 337-1-29   |             |
|   | 10/98 District Update |      |               | STATE                | STATE<br>DIST. NO. |            |             |
|   |                       |      |               | TEXAS                | AUS                | WILLIAMSON |             |
| _ |                       |      |               | CONT.                | SECT.              | J08        | HIGHWAY NO. |
|   |                       |      |               | 0337                 | 01                 | 029        | SH 29       |

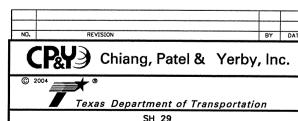
© 1998 TxDOT

```
Beginning chain CLSH29W description
                                                                                                                        Curve Data
*-----
                                                                                   Curve CLSH29W-4
                      10,204,917.11 E
                                          3,121,744.82 Sta
                                                              127+54.29
                                                                                                       182+76.50 N
                                                                                                                                                3,127,261,74
                                                                                    P.I. Station
                                                                                                                         10.205.143.48 E
                                                                                                     5° 26' 15.28" (LT)
                                                                                    Delta
Course from 100 to PC CLSH29W-1 N 87° 39' 01.31" E
                                                       Dist 2,016.80
                                                                                                     5* 43' 46,48"
                                                                                    Degree
                                                                                    Tangent
                                                                                                           47.49
                                    Curve Data
                                                                                    Length
                                                                                                            94.90
                                    *----#
                                                                                    Radius
                                                                                                          1,000.00
Curve CLSH29W-1
                                                                                    External -
P.I. Station
                   148+18.58 N
                                     10.205.001.74 E
                                                           3,123,807.37
                                                                                                            94.87
                                                                                   Long Chord
                 5° 26' 15 45" (LT)
Delta
                                                                                    Mid. Ord. -
                                                                                                          1.13
                 5* 43' 46.48"
Degree
                                                                                    P.C. Station
                                                                                                        182+29.01 N
                                                                                                                         10.205,146.04 E
                                                                                                                                               3,127,214,32
Tangent
                       47.49
                                                                                   P.T. Station
                                                                                                       183+23.91 N
                                                                                                                         10,205,145.43 E
                                                                                                                                               3,127,309.19
Length
                        94.90
                                                                                   C.C.
                                                                                                               10,206,144.59 E
                                                                                                                                      3,127,268.19
Radius
                      1,000.00
                                                                                              - S 86° 54' 43.38" E
                                                                                   Back
External
                      1.13
                                                                                    Ahead
                                                                                              • N 87• 39' 01.33" E
Long Chord
                        94.87
                                                                                   Chord Bear * S 89° 37' 51.02" E
Mid. Ord. -
                       1.13
P.C. Station
                   147+71.09 N
                                      10,204,999,79 E
                                                            3.123.759.93
                                                                                   Course from PT CLSH29W-4 to 125 N 87° 39' 01.33" E
                                                                                                                                            Dist 1,076.09
P.T. Station
                   148+66.00 N
                                      10,205,008.18 E
                                                            3,123,854.42
                                                  3,123,718.93
C.C.
                           10,205,998.95 E
                                                                                                          10.205,189.54 E
                                                                                                                                3,128,384,37 Sta
                                                                                                                                                    194+00.00
           - N 87* 39' 01.31" E
Back
          - N 82* 12' 45.86" E
Ahead
                                                                                    Chord Bear = N 84° 55' 53.59" E
                                                                                   Ending chain CLSH29W description
Course from PT CLSH29W-1 to PC CLSH29W-2 S 82° 12' 45.77" W
                                                                     Dist 0.00
                                    Curve Data
Curve CLSH29W-2
P.I. Station
                   149+13.49 N
                                     10,205,014.61 E
                                                          3,123,901.47
                                                                                 Beginning chain BLN265W description
                 5° 26' 15.48" (RT)
                                                                                 5* 43' 46.48"
Degree
                       47.49
Tangent
                                                                                 Point 220
                                                                                                        10,205,058.85 E
                                                                                                                              3,124,979.68 Sta
                                                                                                                                                   10+00.00
                        94.90
Lenath
                     1.000.00
Rodius
                                                                                 Course from 220 to PC BLN265W-1 N 2° 20'58.66" W
                                                                                                                                             Dist 243.00
External
                      1.13
                        94.87
Long Chord
                                                                                                                      Curve Data
                      1 13
Mid. Ord. -
                   148+66.00 N
                                      10,205,008.18 E
P.C. Station
                                                            3,123,854.42
                                                                                 Curve BLN265W-1
P.T. Station
                   149+60.90 N
                                      10,205,016.56 E
                                                            3,123,948.92
                                                                                 P.I. Station
                                                                                                     13+35.46 N
                                                                                                                       10,205,394.03 E
                                                                                                                                             3,124,965.93
C.C.
                            10,204,017.40 E
                                                 3,123,989.92
                                                                                 Delta
                                                                                                  26° 01' 47.04" (LT)
          - N 82* 12' 45.86" E
Back
                                                                                                  14* 19' 26.20"
                                                                                 Degree
Ahead
          - N 87° 39' 01.34" E
                                                                                 Tongent
                                                                                                        92.46
Chord Bear - N 84° 55' 53.60" E
                                                                                 Length
                                                                                                         181.72
                                                                                                        400.00
                                                                                 Radius
Course from PT CLSH29W-2 to PC CLSH29W-3 N 87° 39' 01.34" E
                                                                  Dist 3,173.20
                                                                                 External
                                                                                                       10.55
                                                                                 Long Chord
                                                                                                         180.16
                                    Curve Data
                                                                                 Mid. Ord. -
                                                                                                       10.28
                                                                                 P.C. Station
                                                                                                      12+43.00 N
                                                                                                                       10,205,301.65 E
                                                                                                                                              3,124,969.72
Curve CLSH29W-3
                                                                                 P.T. Station
                                                                                                      14+24.72 N
                                                                                                                       10,205,475.37 E
                                                                                                                                              3,124,921.98
P.I. Station
                   181+81.59 N
                                    10,205,148.60 E
                                                          3,127,166.90
                                                                                                             10,205,285.25 E
                 5° 26' 15 28" (RT)
Delta
                                                                                             - N 2° 20' 58.66" W
Degree
                 5* 43' 46 48"
                                                                                            - N 28° 22' 45.70" W
Tangent
                       47.49
                                                                                 Chord Bear . N 15° 21' 52.18" W
Length
                        94 90
Rodius
                     1.000.00
                                                                                 Course from PT BLN265W-1 to PC BLN265W-2 S 28° 22' 43.48" E
                                                                                                                                                   Dist 0.00
External
                      1.13
Long Chord
                        94.87
                                                                                                                     Curve Data
Mid. Ord. -
                      113
P.C. Station
                   181+34.10 N
                                     10,205,146.65 E
                                                           3,127,119.45
                                                                                 Curve BLN265W-2
P.T. Station
                   182+29.01 N
                                    10,205,146.04 E
                                                           3,127,214.32
                                                                                 P.I. Station
                                                                                                     15+17.18 N
                                                                                                                      10,205,556.72 E
                                                                                                                                            3,124,878.04
C.C.
                           10,204,147.49 E
                                                 3,127,160.45
                                                                                                  26° 01' 47.05" (RT)
                                                                                 Delta
           - N 87° 39' 01.34" E
                                                                                                  14* 19' 26.20"
                                                                                 Degree
Ahead
          - S 86* 54' 43.38" E
                                                                                 Tangent
                                                                                                        92.46
Chord Bear - S 89° 37' 51.02" E
                                                                                 Length
                                                                                                        181.72
                                                                                 Radius
                                                                                                        400.00
Course from PT CLSH29W-3 to PC CLSH29W-4 S 86° 54' 43.07" E
                                                                   Dist 0.00
                                                                                 External
                                                                                                       10.55
                                                                                 Long Chord
                                                                                                         180.16
                                                                                                       10.28
                                                                                 P.C. Station
                                                                                                      14+24.72 N
                                                                                                                       10,205,475.37 E
                                                                                                                                              3,124,921.98
                                                                                 P.T. Station
                                                                                                      16+06.44 N
                                                                                                                       10,205,649.09 E
                                                                                                                                              3,124,874.25
                                                                                                            10,205,665.49 E
                                                                                                                                   3,125,273.91
                                                                                            - N 28° 22' 45.70" W
                                                                                 Back
                                                                                 Ahead
                                                                                            - N 2° 20' 58.65" W
                                                                                 Chord Bear - N 15° 21' 52.18" W
                                                                                 Course from PT BLN265W-2 to 235 N 2* 20' 58.65" W
                                                                                                                                              Dist 195.15
                                                                                 Point 235
                                                                                                       10,205,844.08 E
                                                                                                                              3,124,866.25 Sta
                                                                                                                                                   18+01.59
   ALL BEARINGS ARE BASED ON GRID BEARINGS. DISTANCES
                                                                                 ARE SURFACE DISTANCES. COORDINATES ARE SURFACE
                                                                                 Ending chain BLN265W description
   VALUES BASED ON THE TEXAS STATE PLANE COORDINATE
   SYSTEM, NAD (83), CENTRAL ZONE USING A COMBINED
```

Beginning chain BLS265W description Point 200 10,204,558.53 E 3,124,982.20 Sta 5+00.00 Course from 200 to 205 N 2º 20'58.69" W Dist 500.00 Point 205 10.205.058.11 E 3,124,961,70 Sta 10+00.00 Ending chain BLS265W description Beginning chain CLCR265E description 10,205,117.09 E 3,126,398.93 Sto 10.00.00 Course from 250 to 255 N 2° 20' 58.66" W Dist 510.51 Point 255 10,205,627.17 E 3,126,378.00 Sto 15+10.51

Ending chain CLCR265E description





# HORIZONTAL ALIGNMENT DATA SHEET

SURFACE ADJUSTMENT FACTOR OF 1.00013.

Beginning chain BLSBFR description ...... 10,207,620.64 E Point 400 3,128,203.93 Sta 54+85.77 Course from 400 to PC BLSBFR-1 S 21° 02' 08.69" W Dist 136.62 Curve Data Curve BLSBFR-1 P.I. Station 60+21.86 N 10,207,120.27 E 3,128,011.50 7° 37' 05.60" (LT) Delta 0° 57' 17.75" Degree Tangent 399.48 797.78 Length Radius 6,000.00 External • 13.28 Long Chord -797.19 Mid. Ord. -13.25 P.C. Station 56+22.38 N 10,207,493.13 E 3,128,154.89 P.T. Station 64+20.16 N 10,206,731.70 E 3,127,918.80 C.C. 10,205,339.43 E 3,133,755.03 - S 21. 02.08.69. W Back - S 13° 25' 03.09" W Ahead Chord Bear . S 17. 13' 35.89" W Course from PT BLSBFR-1 to PC BLSBFR-2 S 13° 25' 03.09" W Dist 1,779.41 Curve Data \*----Curve BLSBFR-2 P.I. Station 89+61.09 N 10,204,260.12 E 3,127,329.19 Delta 28° 29' 10.83" (LT) 1° 54' 35.49" Degree 761.52 Tangent Length 1,491.54 3,000.00 Radius External • 95.14 Long Chord -1,476.23 Mid. Ord. -92.22 P.C. Station 81+99.57 N 10,205,000.86 E 3,127,505.89 P.T. Station 96+91.11 N 10,203,524.79 E 3,127,527.17 C.C. 10,204,304.72 E 3,130,424.01 • S 13• 25' 03.09" W Ahead - S 15° 04' 07.74" E Chord Bear - S 0° 49' 32.33" E Course from PT BLSBFR-2 to PC BLSBFR-3 S 15° 04' 07.74" E Dist 1,344.36 

BEARING BASIS:
ALL BEARINGS ARE BASED ON GRID BEARINGS. DISTANCES
ARE SURFACE DISTANCES. COORDINATES ARE SURFACE
VALUES BASED ON THE TEXAS STATE PLANE COORDINATE
SYSTEM, NAD (83), CENTRAL ZONE USING A COMBINED

Ending chain BLSBFR description

Beginning chain DETOURA description Point 600 10,205,058.11 E 3,124,961.70 Sta 1+00.00 Course from 600 to PC DETOURA-1 N 2° 20' 58.63" W Dist 128.69 Curve Data \*----\* Curve DETOURA-1 P.I. Station 2+79.28 N 10,205,237.25 E 3,124,954.35 Delta 19° 08' 43.96" (LT) Degree 19\* 05' 54.94" 50.59 Tangent Length 100.25 Rodius 300.00 External -4.24 Long Chord -99.78 Mid. Ord. • 4.18 P.C. Station 2+28.69 N 10,205,186.69 E 3,124,956.42 P.T. Station 3+28.93 N 10,205,284.32 E 3,124,935.81 3,124,656.67 C.C. 10,205,174.39 E • N 2• 20' 58.63" W Back Ahead - N 21° 29' 42.59" W Chord Bear - N 11° 55' 20.61" W Course from PT DETOURA-1 to 602 N 21° 29' 42.47" W Dist 0.00 10,205,284.32 E 3,124,935.81 Sta 3+28.93

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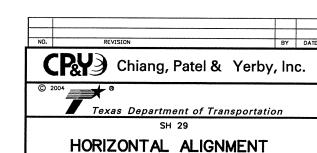
Ending chain DETOURA description

JAMES J. ROOHINS

8 83383

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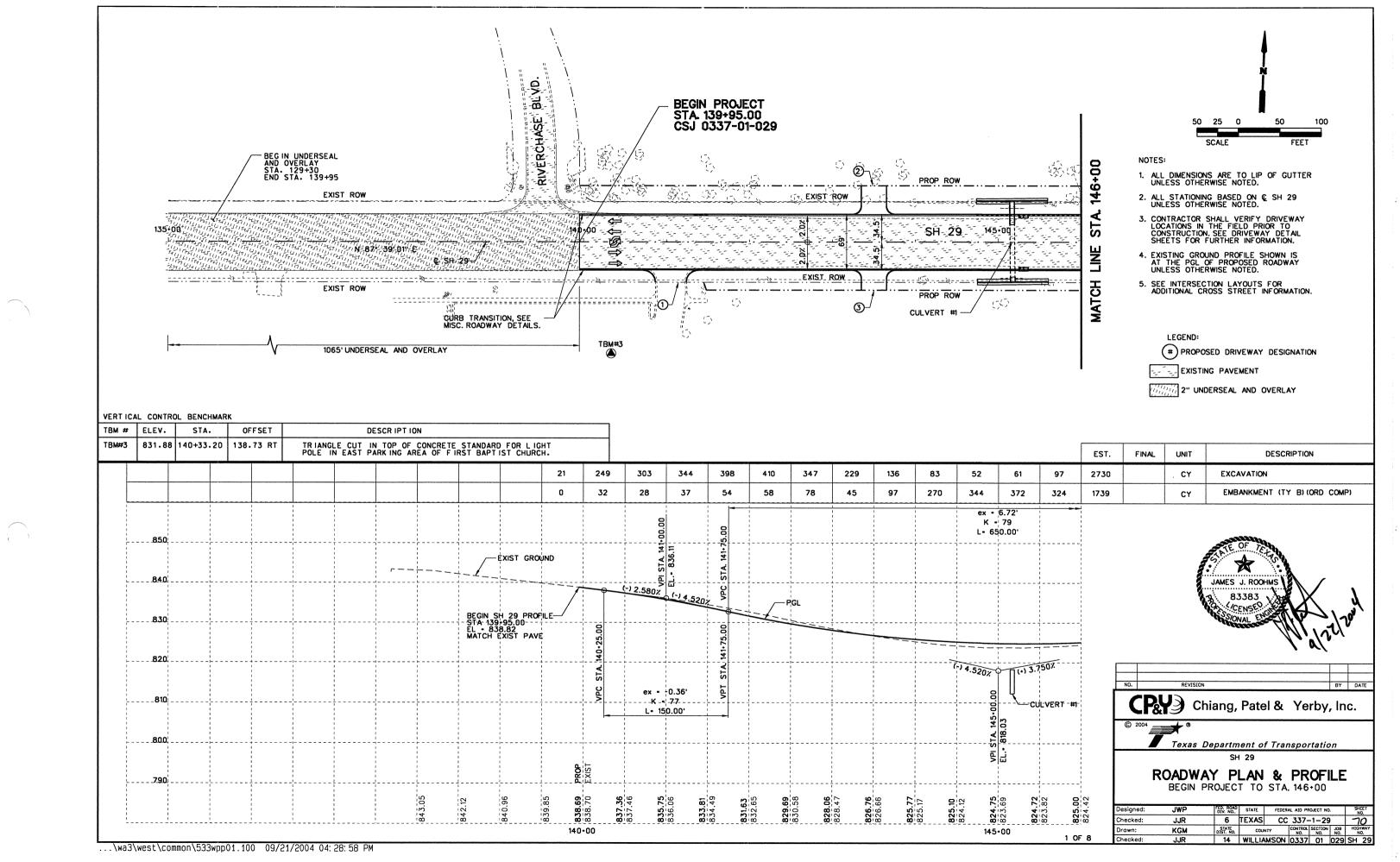
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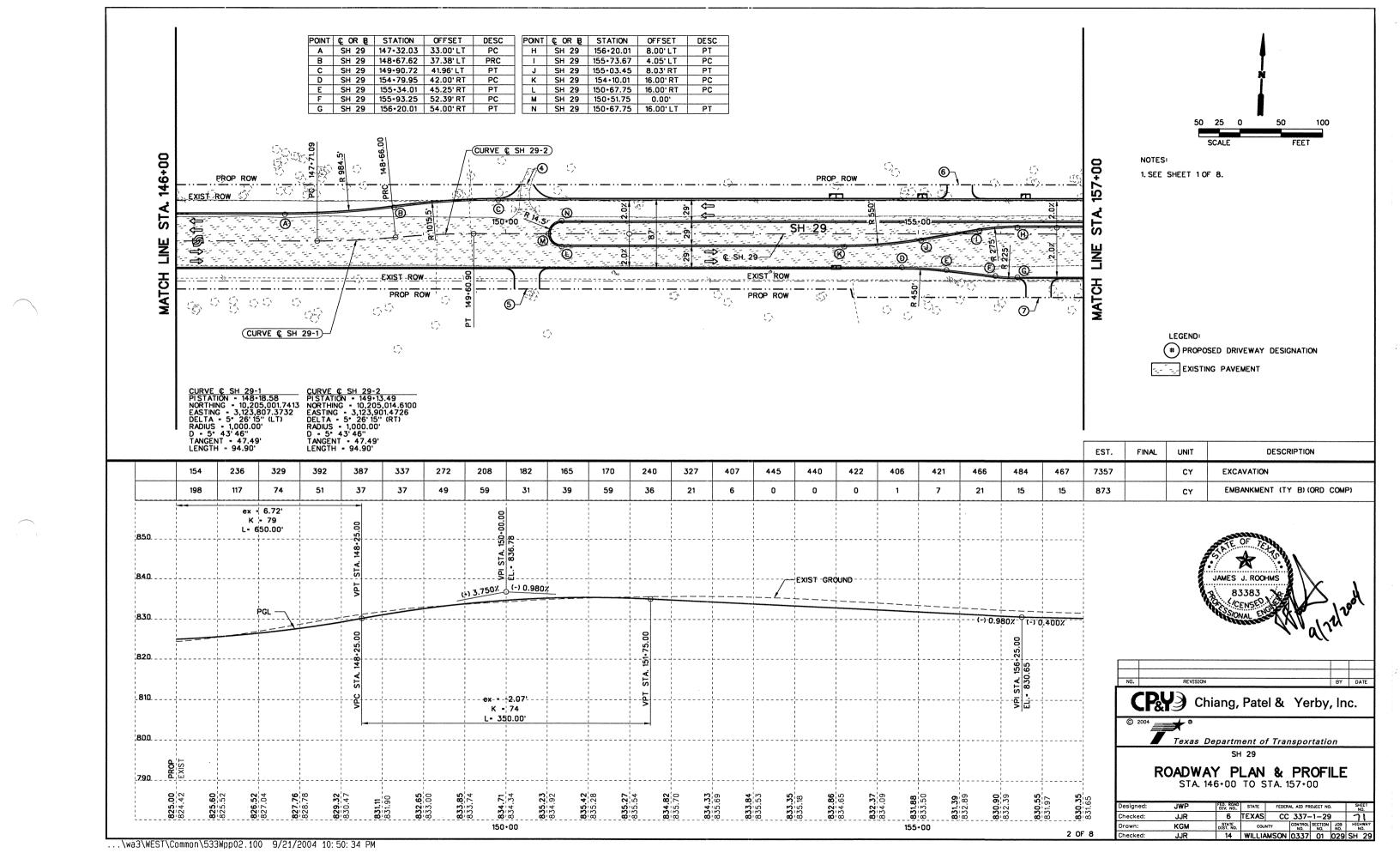


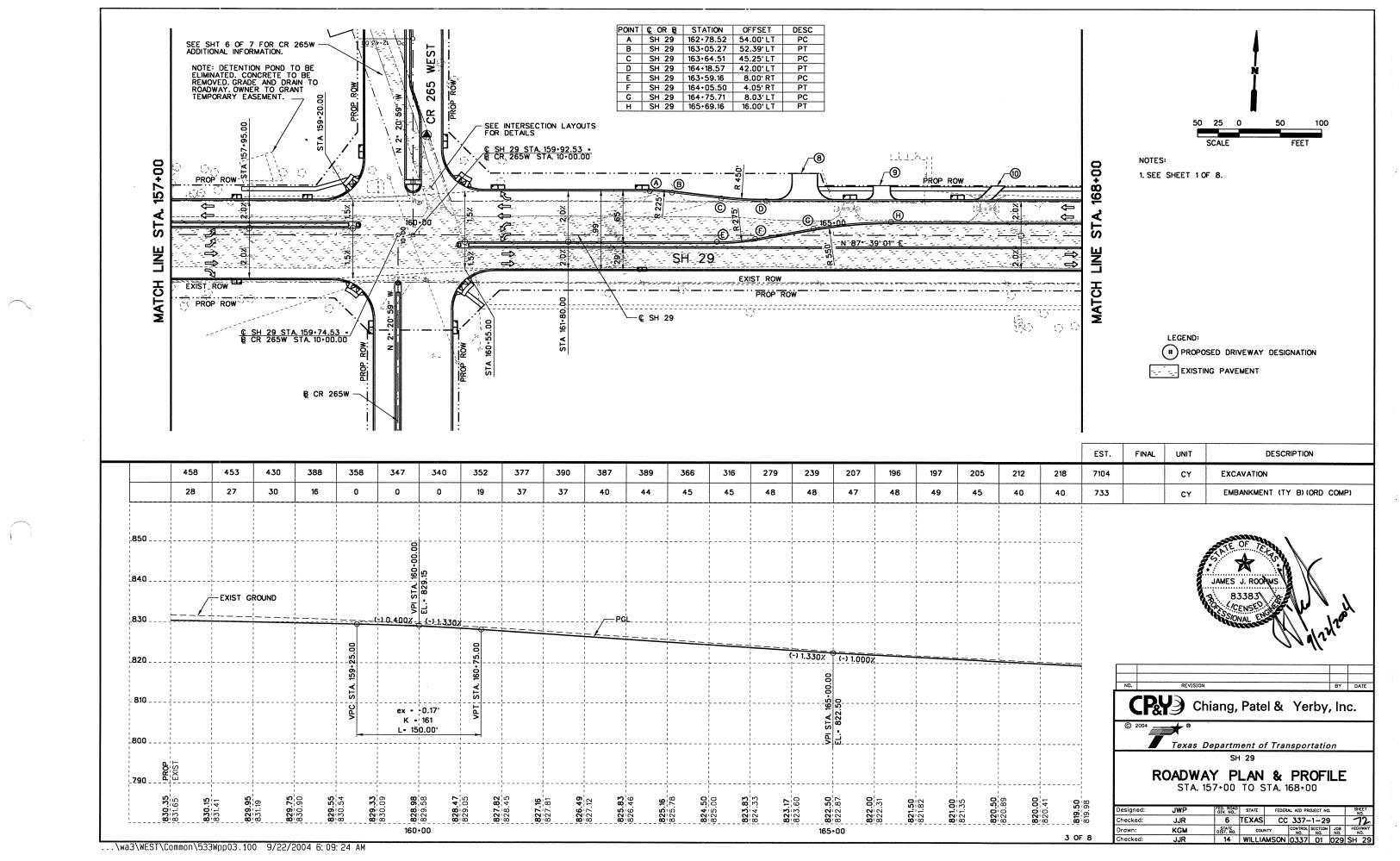
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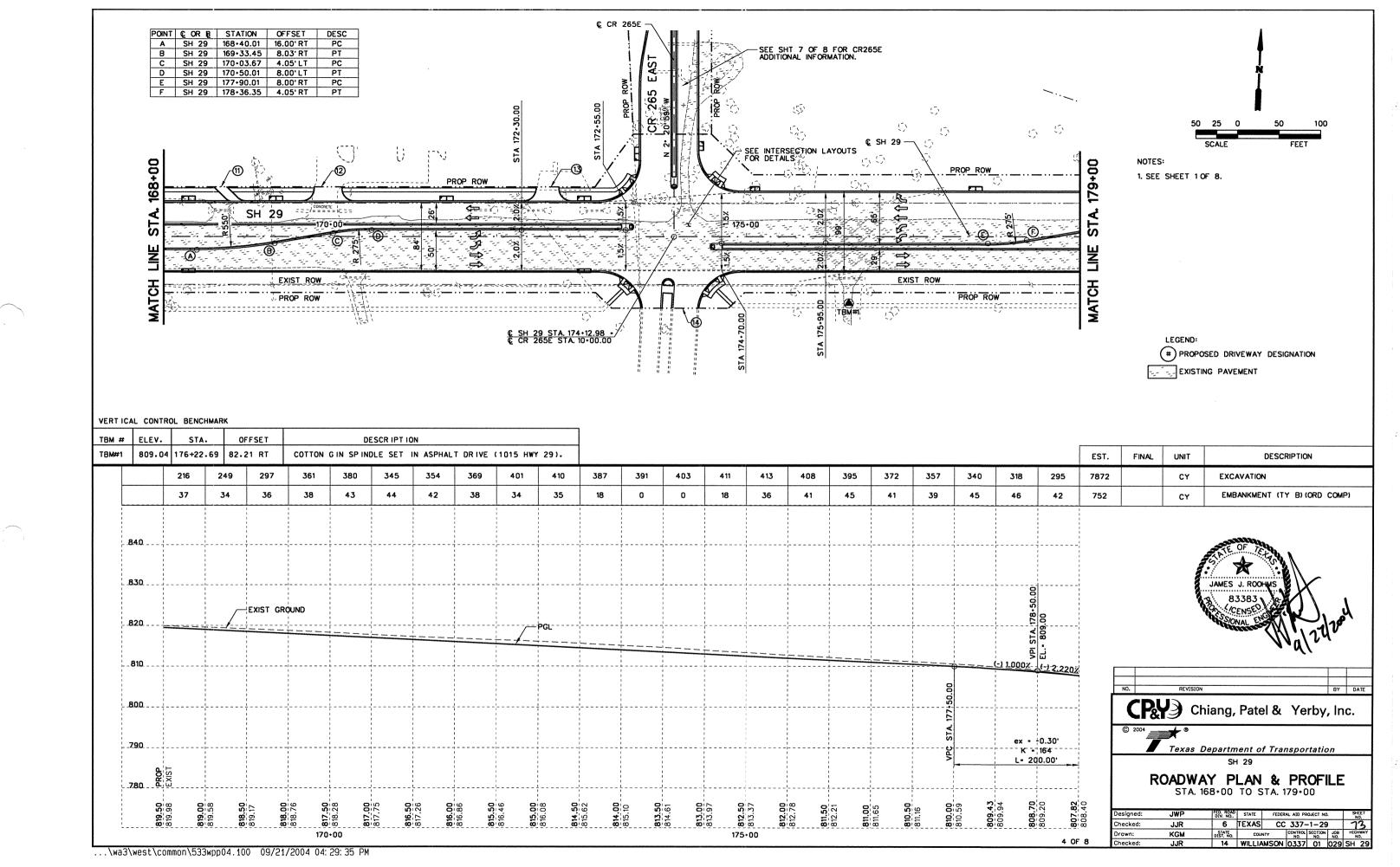
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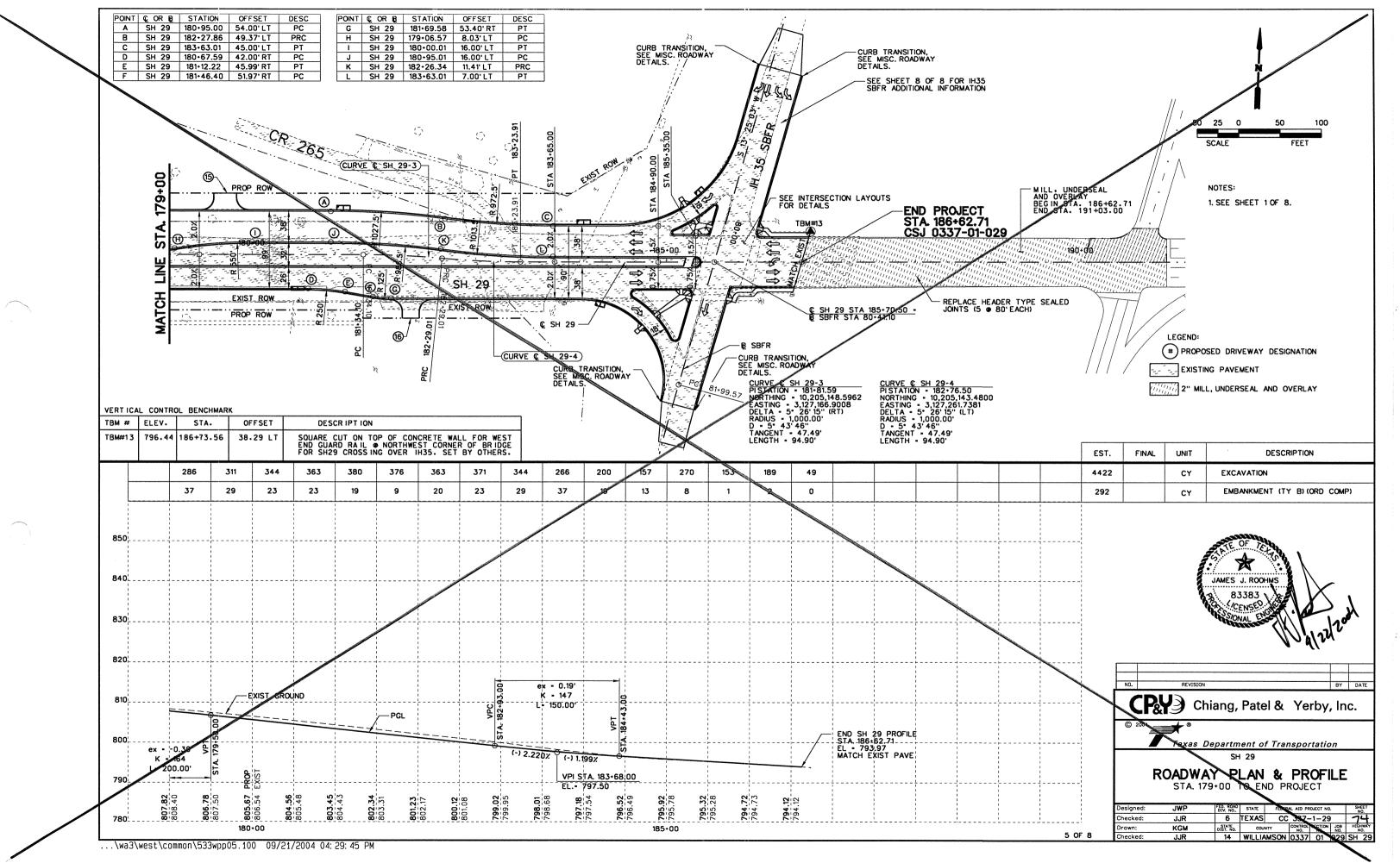
SURFACE ADJUSTMENT FACTOR OF 1.00013.

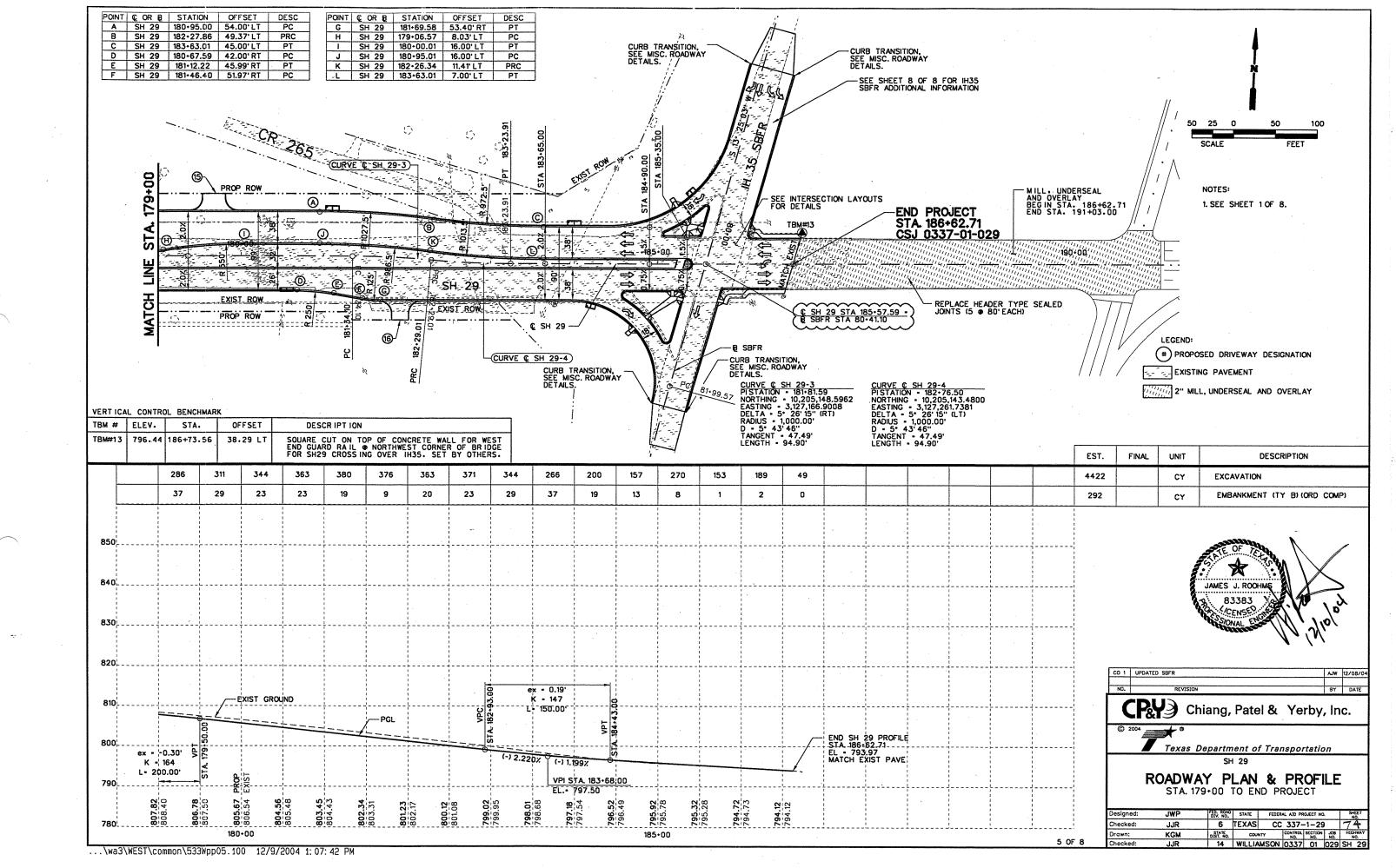


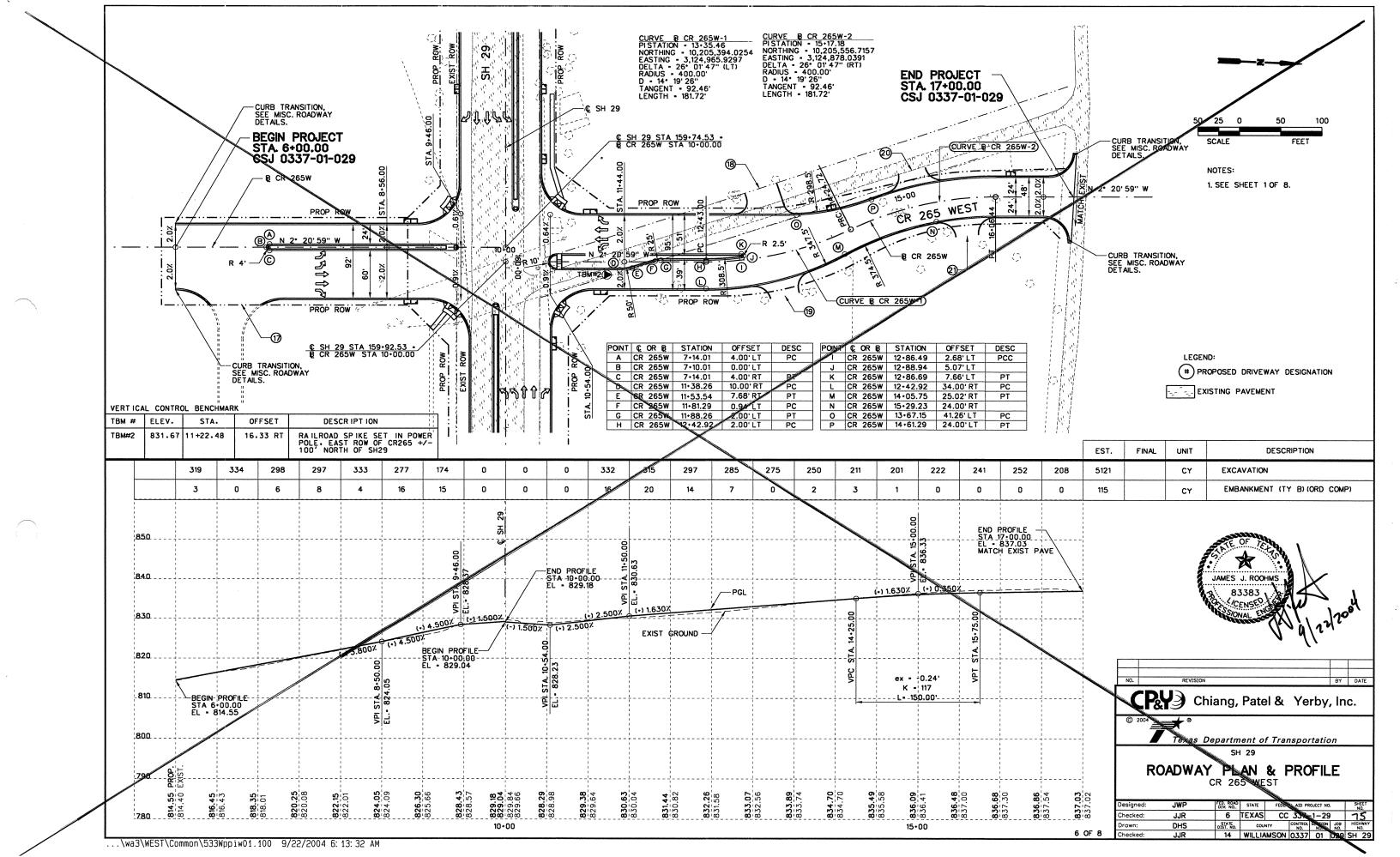


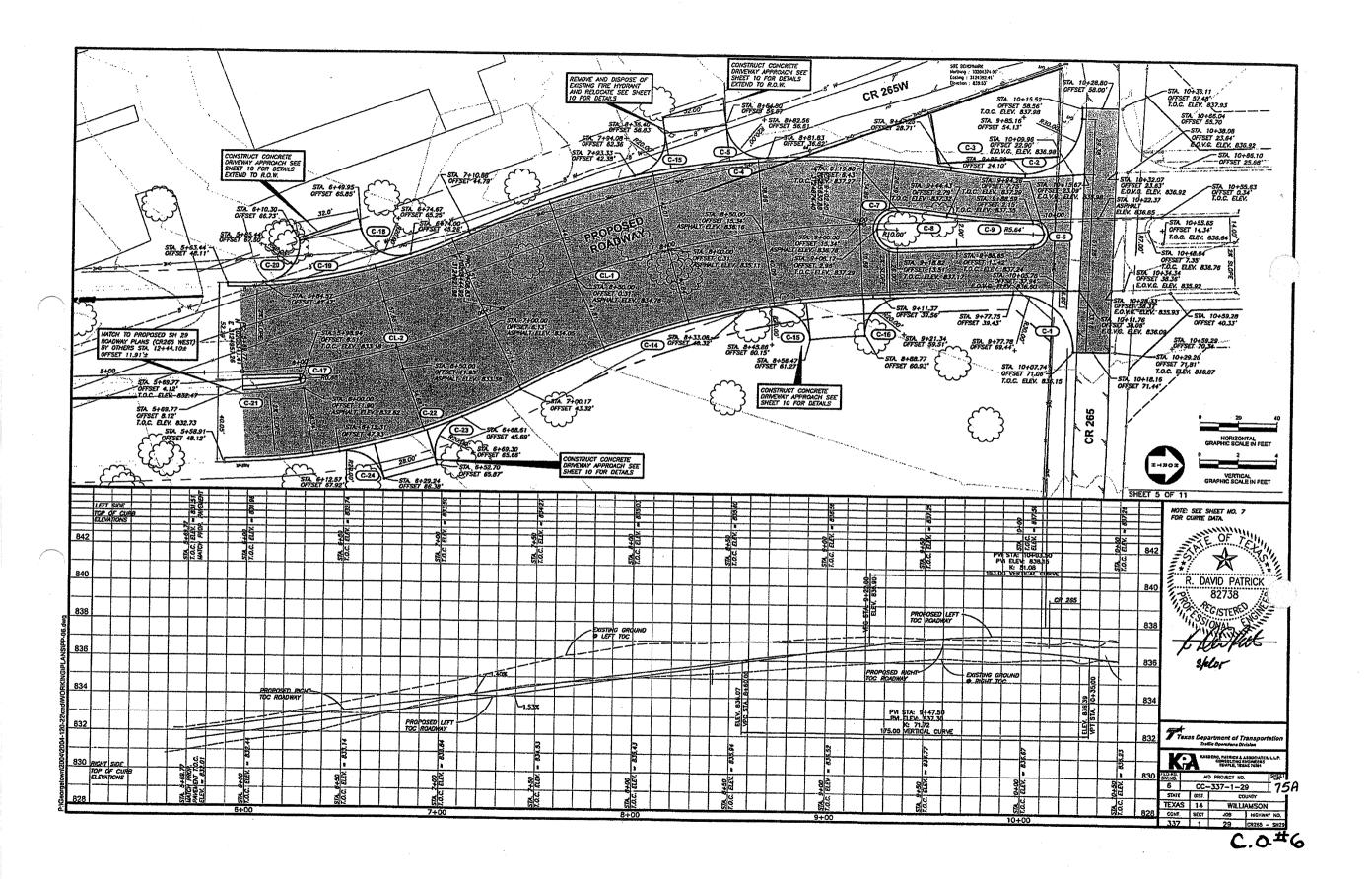


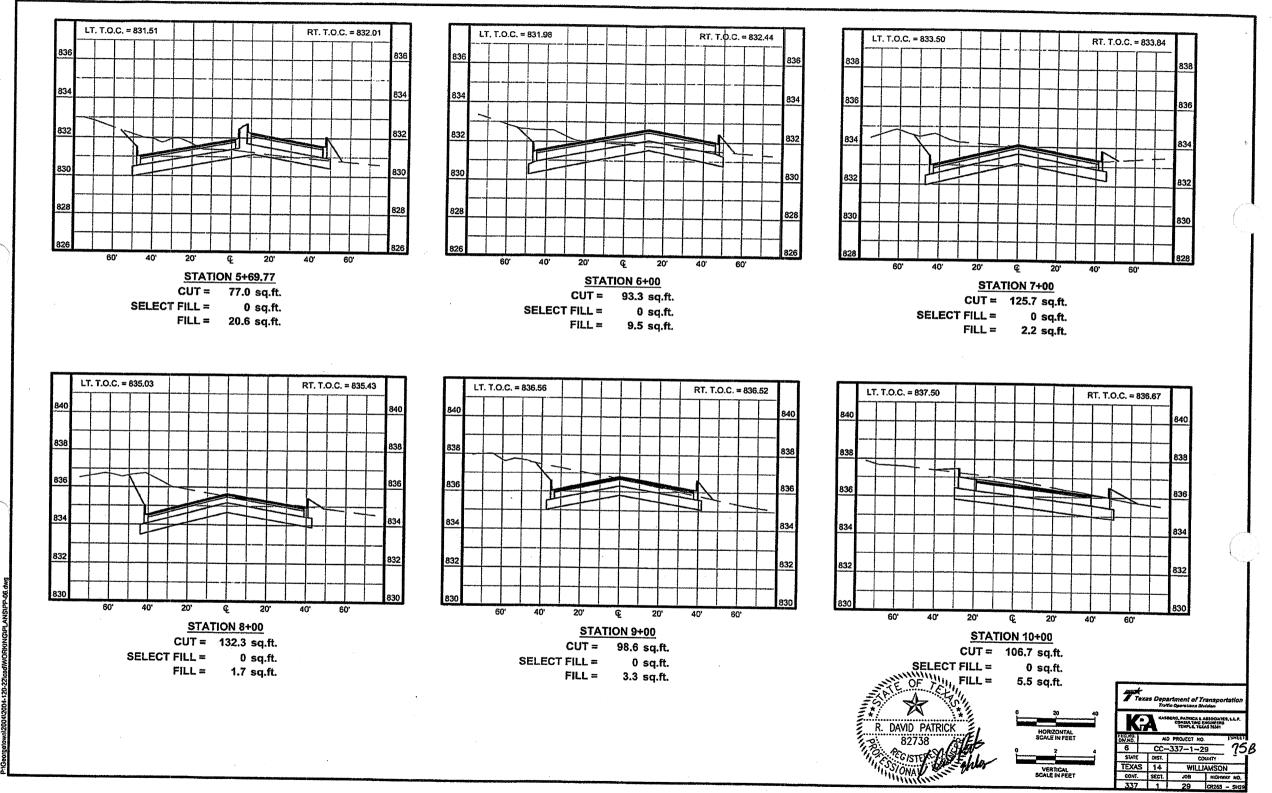






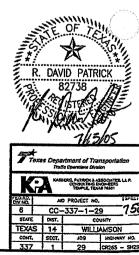






C.O.#6

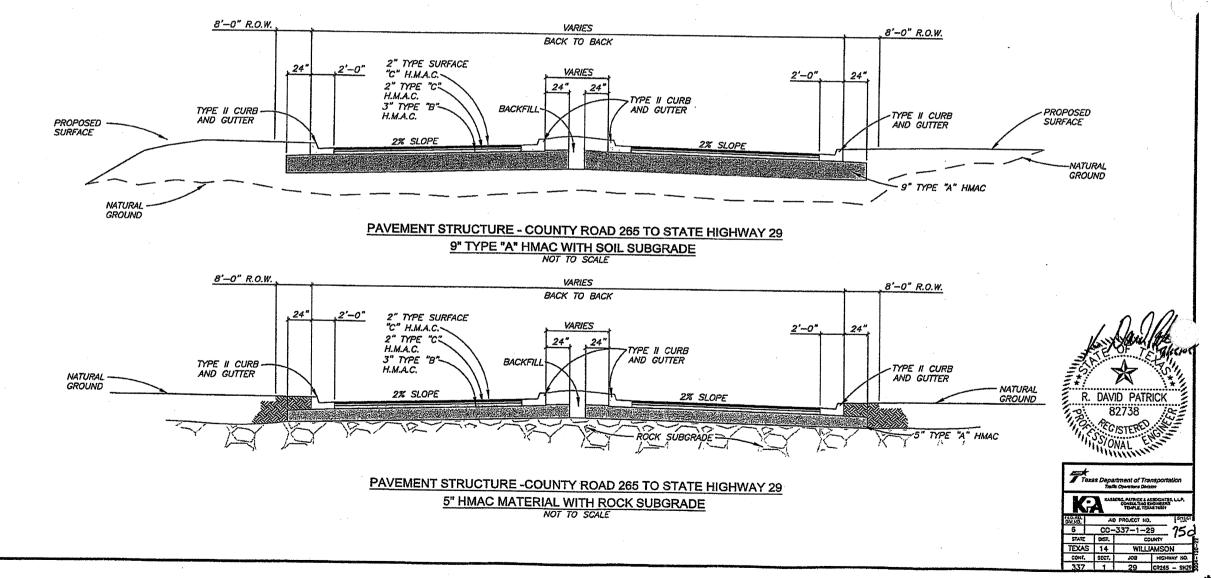
|           |         | CURVE D     | ATA     |         |         |
|-----------|---------|-------------|---------|---------|---------|
| Curve No. | Radius  | Delta Angle | Tangent | Length  | Chord   |
| CL-01     | 413.51' | 26°47'05"   | 98.45'  | 193.30' | 191.55' |
| CL-02     | 320.00' | 24°55'26"   | 70.72'  | 139.20' | 138.11' |
| C-01      | 30.00'  | 93°10'06"   | 31,71'  | 48.78'  | 43.58'  |
| C-02      | 30.00   | 86°41'03"   | 28.41'  | 45.54'  | 41.32'  |
| C-03      | 288.00' | 7°37'43"    | 19.20'  | 38.35'  | 38.32'  |
| C-04      | 426.00' | 34°11'57"   | 131.05' | 254.27' | 250.52' |
| C-05      | 20.00'  | 87°16'35"   | 19.07'  | 30,47'  | 27.60'  |
| C-06      | 5.64'   | 180°00'00"  | -       | 17.71'  | 11.27'  |
| C-07      | 10.00'  | 186°26'10"  | •       | 32,54'  | 10.97'  |
| C-09      | 314.00' | 8°07′08"    | 22.28'  | 44.49'  | 44.30'  |
|           |         |             |         |         |         |
| C-14      | 400.00' | 27°09'30"   | 96.62'  | 189.60' | 187.83  |
| C-15      | 20.00'  | 95°08'00"   | 21.88'  | 33.21'  | 29.52   |
| C-16      | 20.00'  | 96°40'48"   | 22.48'  | 33.75'  | 29.88   |
| C-17      | 0.66'   | 172°25'41"  | 9.97'   | 1.99'   | 1,32    |
| C-18      | 20.00'  | 92"08'18"   | 20.76'  | 32.16'  | 28,81   |
| C-19      | 278.24' | 26°26'45"   | 65.38'  | 128.43' | 127.29  |
| C-20      | 20.00'  | 92°08'24"   | 20.76'  | 32.16'  | 28.81   |
| C-21      | 308.00  | 7°14'21"    | 19.48'  | 38.91'  | 38.89   |
| C-22      | 313.00' | 26°56'24"   | 74.97'  | 147.17' | 145.82  |
| C-23      | 25.00'  | 73°30'15"   | 18.61'  | 31.97'  | 29.82   |
| C-24      | 20.00'  | 84°58'22"   | 18.32'  | 29.66'  | 27.02   |
| C-25      | 20.00'  | 85°21'35"   | 18,44'  | 29.80'  | 27.12   |

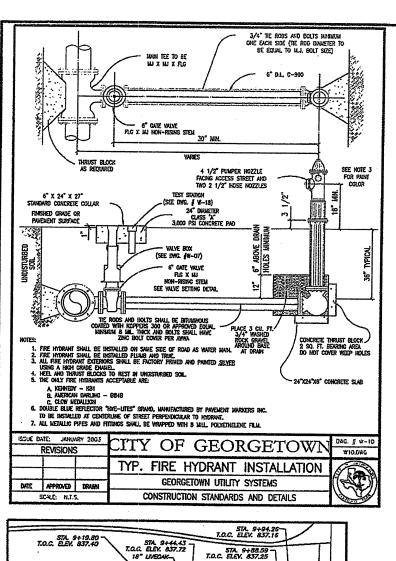


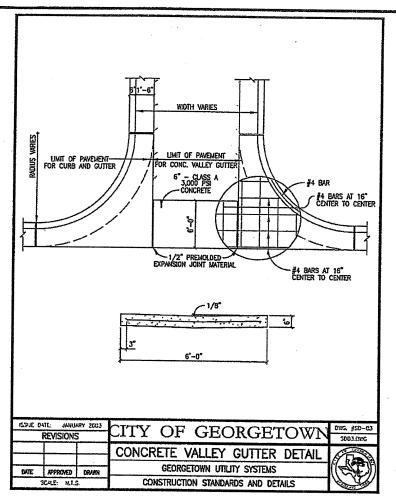
#### NOTES

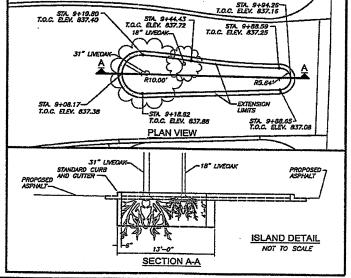
- SEE DETAIL THIS SHEET FOR RIVERY TO STATE HIGHWAY 29 CONNECTOR.
- SEE DETAIL THIS SHEET FOR RIVERY TO STATE HIGHWAY 29 CONNECTOR.

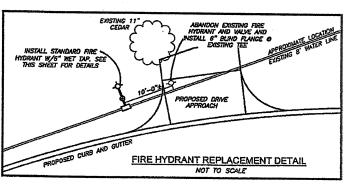
  CONSTRUCTION AREAS SHOULD BE STRIPPED OF ALL VEGETATION, LOOSE TOPSOIL, ORGANICS, ETC. ROOTS OF TREES TO BE REMOVED WITHIN CONSTRUCTION AREAS SHOULD BE GRÜBBED TO FÜLL DEPTHS. SITE STRIPPING COULD FREQUENTLY LOOSEN LIMESTONE ROCKS AND BOULDERS, WHICH SHOULD BE EXCAVATED AND REMOVED FROM THE CONSTRUCTION AREAS. THE EXPOSED SOIL SUBGRADE AREAS SHOULD BE CAREPULLY PROOFROLLED WITH A 20-TON PNEUMATIC ROLLER OR EQUIVALENT EQUIPMENT TO DETECT WEAK ZONES. WEAK AREAS DETECTED DURING PROOFROLLING, AS WELL AS ZONES CONTAINING DEBRIS OR ORGANICS AND VOIDS RESULTING FROM REMOVAL OF ROOTS, TREES, BOULDERS, ETC., SHOULD BE REMOVED AND REMPLACED WITH SOILS EXHIBITING SIMILAR CLASSIFICATION, MOISTURE CONTENT, AND DENSITY AS THE ADJACENT IN-SITU SOILS. EXPOSED LIMESTONE SUBGRADE SHOULD BE CLEANED SUFFICIENTLY AND ANY VOIDS FILLED WITH CRUSHED LIMESTONE BASE MATERIAL. PROPER SITE DRAINAGE SHOULD BE MAINTAINED DURING CONSTRUCTION DELAYS AND/OR INHIBIT SITE ACCESS.
- NATURAL SUBGRADE AND SUBGRADE FILL THE NATURAL SUBGRADE THAT IS DISTURBED AND ANY SOILS PLACED AS FILL WITHIN THE ROADWAY ALIGNMENT SHOULD BE COMPACTED TO WITHIN A RANGE OF 95% TO 100% OF TEX-113—E MAXIMUM DRY DENSITY AT A MOISTURE CONTENT NOT LESS THAN OPTIMUM MOISTURE CONTENT.
- 4. COMPACTED FILL MATERIAL TO BE PLACED FOR THE ROADWAY SECTION OF RIVERY TO STATE HIGHWAY 29 CONNECTOR SHOULD HAVE A PLASTICITY INDEX (PI) OF NO GREATER THAN 20 BUT NO LESS THAN 7 (7>PI<20). ALSO, THE FILL MATERIAL SHOULD HAVE A LIQUID LIMIT (LL) LESS THAN 40 (LL<40). THE FILL MATERIAL SHOULD CONSIST OF SELECT, NON-EXPANSIVE MATERIAL WITH SUFFICIENT SOIL BINDER TO ASSIST IN PROPER COMPACTION. THE FILL MATERIAL MAY CONSIST OF CLAYEY SAND, OR CLAYEY GRAVEL (SC OR GC). SILTY SAND OR CLEAN SAND IS NOT RECOMMENDED. ALL PROPOSED FILL MATERIAL SHALL BE SUBMITTED FOR EVALUATION AS TO SUITABILITY. THE COMPACTIVE EFFORT AND SPECIFIC REQUIREMENTS OF THE FINISHED PRODUCT ARE AS STATED IN 11EM 6 ABOVE.



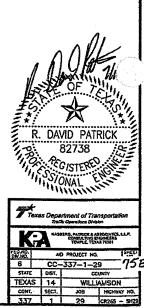


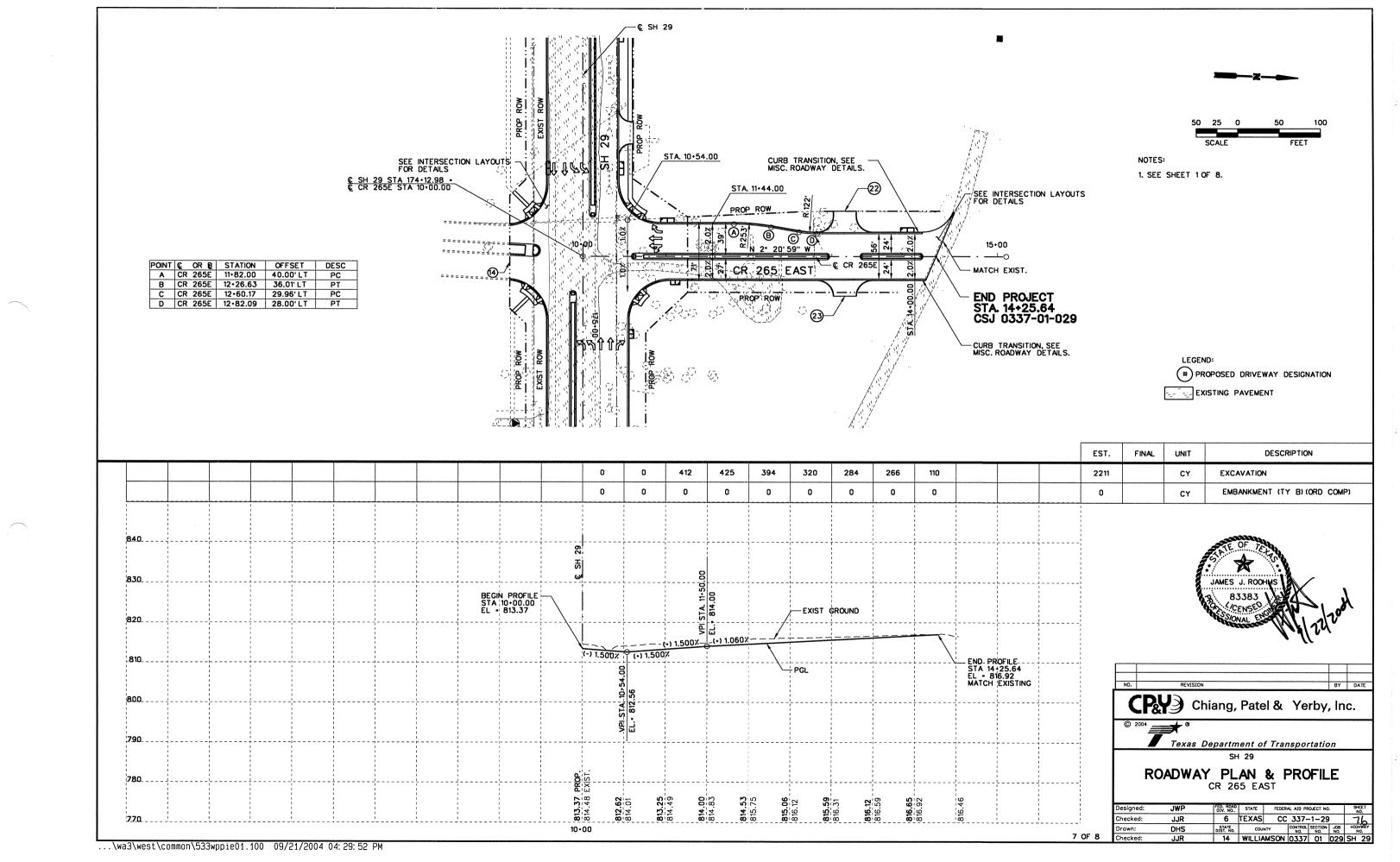


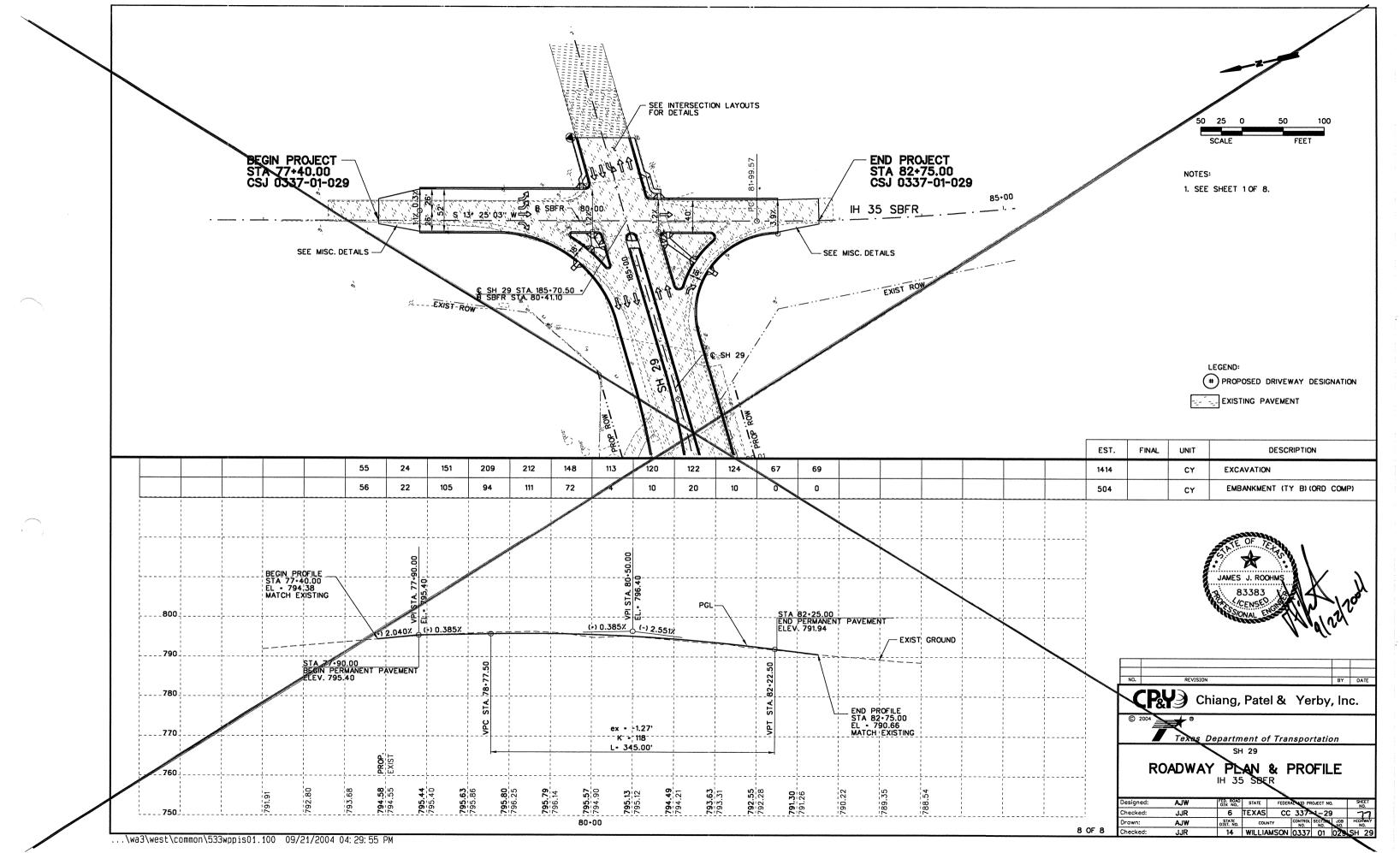


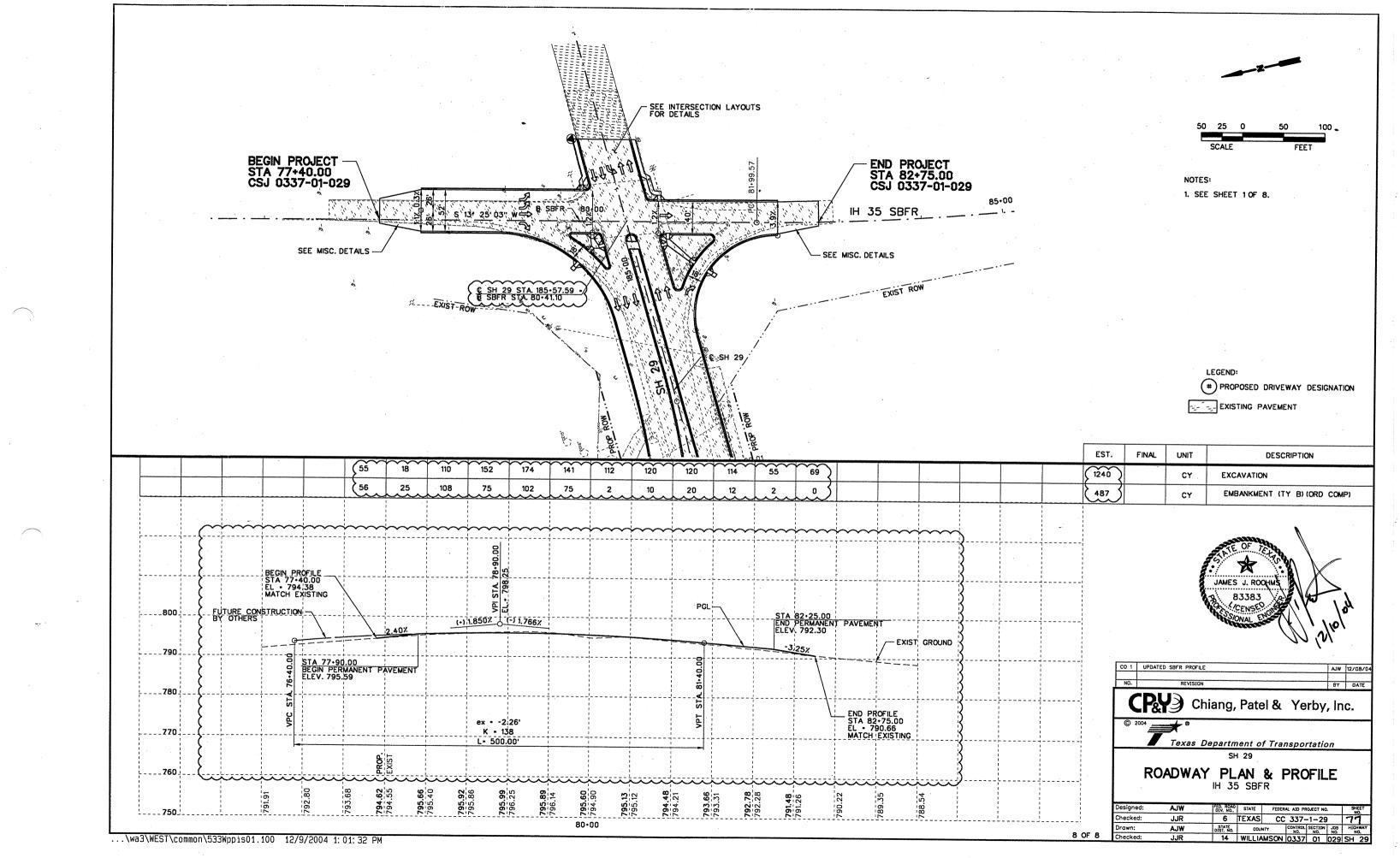


MISC. DETAILS

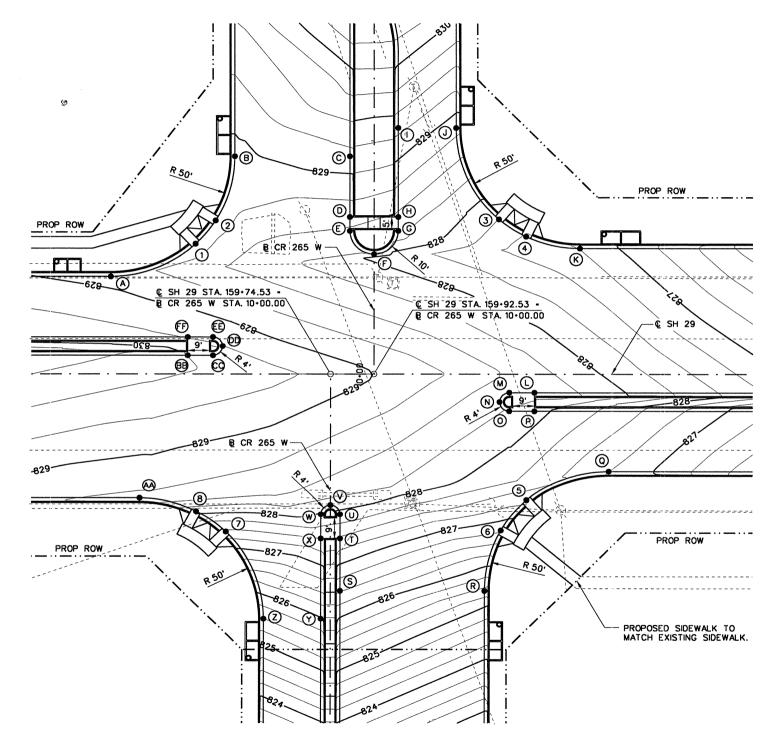








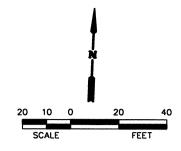
# SH 29 AND CR 265 WEST



|             |                |        | r         |                |        |
|-------------|----------------|--------|-----------|----------------|--------|
| PT          | PT<br>DESCRIP. | Œ      | STA.      | OFFSET<br>(FT) | ELEV.  |
| A           | PCR            | SH29   | 158+83.03 | -42.00         | 828.91 |
| $^{f B}$    | PTR            | CR265W | 10+93.50  | -58.00         | 828.92 |
| 0           | EOP            | CR265W | 10+93.50  | -10.00         | 829.17 |
| 0           | EOP            | CR265W | 10+67.50  | -10.00         | 828.59 |
| E           | PCR            | CR265W | 10+61.50  | -10.00         | 828.47 |
| Ē           | EOP            | CR265W | 10+51.50  | 0.00           | 828.19 |
| <u></u>     | PTR            | CR265W | 10+61.50  | 10.00          | 828.32 |
| Œ           | EOP            | CR265W | 10+67.50  | 10.00          | 828.45 |
| 0           | EOP            | CR265W | 11+05.50  | 10.00          | 829.32 |
| 0           | PCR            | CR265W | 11+05.50  | 34.00          | 828.84 |
| (K)         | PTR            | SH29   | 160+78.04 | -54.00         | 827.24 |
| (L)         | EOP            | SH29   | 160+59.25 | 8.00           | 828.35 |
| M           | PCR            | SH29   | 160+48.75 | 8.00           | 828.36 |
| N           | EOP            | SH29   | 160+44.75 | 12.00          | 828.32 |
| 0           | PTR            | SH29   | 160+48.75 | 16.00          | 828.24 |
| P           | EOP            | SH29   | 160+59.25 | 16.00          | 828.10 |
| 0           | PTR            | SH29   | 160+90.03 | 42.00          | 827.25 |
| R           | PCR            | CR265W | 9+06.50   | 64.00          | 825.41 |
| (S)         | EOP            | CR265W | 9+06.50   | 4.00           | 826.52 |
| T           | EOP            | CR265W | 9+28.50   | 4.00           | 827.46 |
| (U)         | PTR            | CR265W | 9+39.00   | 4.00           | 827.92 |
| <b>(V)</b>  | EOP            | CR265W | 9+43.00   | 0.00           | 828.12 |
| W           | PCR            | CR265W | 9+39.00   | -4.00          | 827.98 |
| <b>(X)</b>  | EOP            | CR265W | 9+28.50   | -4.00          | 827.50 |
| 9           | EOP            | CR265W | 8+94.50   | -4.00          | 825.97 |
| ②           | PTR            | CR265W | 8+94.50   | -28.00         | 825.49 |
| <b>(A)</b>  | PCR            | SH29   | 158+95.03 | 54.00          | 828.70 |
| <b>69</b>   | EOP            | SH29   | 159+15.00 | -8.00          | 829.49 |
| 60          | PCR            | SH29   | 159+25.50 | -8.00          | 829.33 |
| <b>6</b>    | EOP            | SH29   | 159+29.50 | -12.00         | 829.25 |
| Œ           | PTR            | SH29   | 159+25.50 | -16.00         | 829.20 |
| <b>(FF)</b> | EOP            | SH29   | 159+15.00 | -16.00         | 829.24 |

#### CURB RAMPS AND LANDINGS (TY 1)

| PT  | Œ    | STA.      | OFFSET<br>(FT) | ELEV.  |
|-----|------|-----------|----------------|--------|
| 0   | SH29 | 159+18.28 | -55.95         | 828.87 |
| @   | SH29 | 159+26.58 | -66.00         | 828.88 |
| 3   | SH29 | 160+44.40 | -66.50         | 827.75 |
| •   | SH29 | 160+55.73 | -59.08         | 827.48 |
| (5) | SH29 | 160+55.98 | 54.86          | 827.32 |
| 6   | SH29 | 160+45.29 | 68.00          | 826.79 |
| (b) | SH29 | 159+30.85 | 68.51          | 827.45 |
| (8) | SH29 | 159+18.53 | 59.67          | 828.09 |



#### NOTES

- 1. SEE INTERSECTING STREET PROFILES FOR CENTERLINE PGL INFORMATION.
- 2. SPOT ELEVATIONS ARE PROVIDED AT LIP OF GUTTER/EDGE OF PAVEMENT OR CENTERLINE UNLESS NOTED OTHERWISE.
- 3. CURB RADII SHOWN ARE TO THE FACE OF CURB UNLESS NOTED OTHERWISE.
- 4. FOR FURTHER INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEET.
- 5. OFFSETS SHOWN AS POSITIVE ARE TO THE RIGHT OF BASELINE. OFFSETS SHOWN AS NEGATIVE ARE TO THE LEFT OF BASELINE.
- 6. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.



| Т   |          |    |      |
|-----|----------|----|------|
| NO. | REVISION | BY | DATE |
|     | -DII2    |    |      |

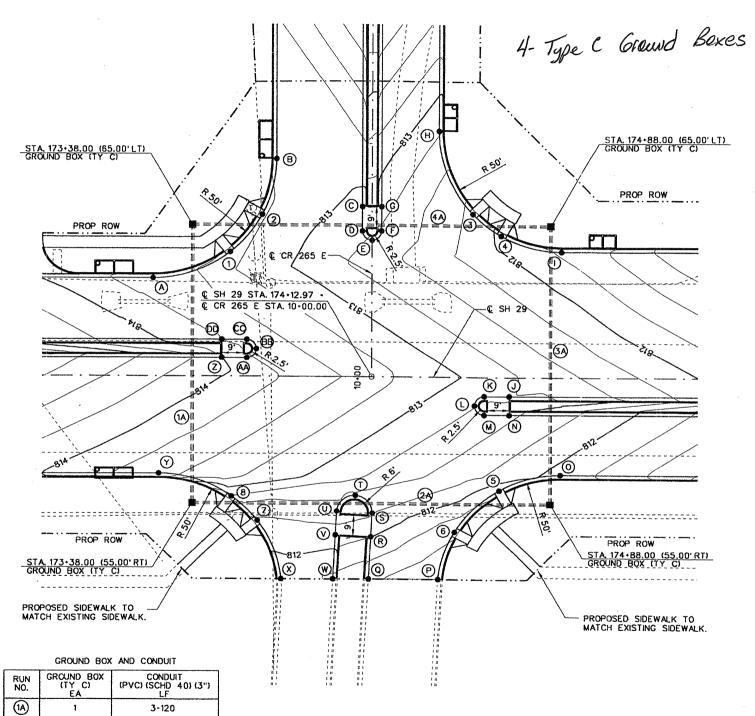
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

INTERSECTION LAYOUTS
CR 265 WEST

| esigned: | GJT | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | ROJECT NO      | λ.         |    | EET<br>O. |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-----------|
| hecked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | ).         | 7  | 8         |
| )rawn:   | GJT | STATE<br>DIST. NO.   | con    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | IWAY      |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29        |

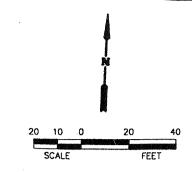
# SH 29 AND CR 265 EAST



| PT         | PT<br>DESCRIP.  | Ć.     | STA.        | OFFSET<br>(FT) | ELEV.  |
|------------|-----------------|--------|-------------|----------------|--------|
| A          | PCR             | SH29   | 173-21.48   | -42.00         | 813.59 |
| ₿          | PTR             | CR265E | 10+93.50    | -40.00         | 813.20 |
| ©          | EOP             | CR265E | 10+73.00    | -4.00          | 812.91 |
| 0          | PCR             | CR265E | 10+62.50    | -4.00          | 812.80 |
| (E)        | EOP             | CR265E | 10+58.57    | 0.00           | 812.72 |
| Ð          | PTR             | CR265E | 10+62.50    | 4.00           | 812.73 |
| <u>©</u>   | EOP             | CR265E | 10-73.00    | 4.00           | 612.84 |
| H          | PCR             | CR265E | 11-05.50    | 28.00          | 812.78 |
| ①          | PTR             | SH29   | 174-92.48   | -54.00         | 811.71 |
| <u> </u>   | EOP             | SH29   | 174+70.55   | 8.00           | 812.78 |
| ĸ          | PCR             | SH29   | 174+60.05   | 8.00           | 812.78 |
| <b>(L)</b> | EOP             | SH29   | 174+56.05   | 12.00          | 812.76 |
| M          | PTR             | SH29   | 174+60.05   | 16.00          | 812.66 |
| N          | EOP             | SH29   | 174+70.55   | 16.00          | 812.55 |
| 0          | PTR -           | SH29   | 174+92.16   | 42.00          | 811.91 |
| P          | PCR             | SH29   | 174+40.92   | 88.27          | 811.27 |
| @          | EOP             | SH29   | 174+11.82   | 88.29          | 811.56 |
| R          | EOP             | SH29   | 174+12.79   | 69.81          | 812.01 |
| <u>(S)</u> | PTR             | SH29   | 174+13.34   | 59.32          | 812.27 |
| T          | EOP             | SH29   | 174 • 06.27 | 51.44          | 812.42 |
| 0          | PCR             | SH29   | 173+98.36   | 58.47          | 812.39 |
| $\odot$    | E0 <del>P</del> | SH29   | 173+97.81   | 69.02          | 812.13 |
| W          | EOP             | SH29   | 173-96.80   | 88.30          | 811.71 |
| 8          | PTR             | SH29   | 173+75.17   | 88.30          | 811.92 |
| <b>(Y)</b> | PCR             | SH29   | 173+23.93   | 42.00          | 813.58 |
| ②          | EOP             | SH29   | 173+50.25   | -8.00          | 814.00 |
| <b>(A)</b> | PCR             | SH29   | 173+60.75   | -8.00          | 813.78 |
| <b>®</b>   | EOP             | SH29   | 173+64.75   | -12.00         | 813.68 |
| 69         | PTR             | SH29   | 173+60.75   | -16.00         | 813.66 |
| <u>@</u>   | EOP             | SH29   | 173+50.25   | -16.00         | 813.76 |
|            |                 |        |             |                |        |

#### CURB RAMPS AND LANDINGS (TY 1)

| PΤ       | Ę    | STA.      | OFFSET<br>(FT) | ELEV.  |
|----------|------|-----------|----------------|--------|
| 0        | SH29 | 173+53.75 | -53.37         | 813.44 |
| 2        | SH29 | 173•67.04 | -69.50         | 813.32 |
| 3        | SH29 | 174+55.17 | -70.00         | 812.17 |
| 4        | SH29 | 174+67.05 | -60.72         | 811.96 |
| <b>⑤</b> | SH29 | 174+66.32 | 49.00          | 811.85 |
| 6        | SH29 | 174+47.75 | 67.51          | 811.57 |
| 7        | SH29 | 173+65.21 | 62.77          | 812.21 |
| 8        | SH29 | 173+54.35 | 51.99          | 812.67 |



NOTES: SEE SHEET 1 OF 4.



C.O.#9

NO. REVISION BY DATE

CP&Y Chiang, Patel & Yerby, Inc.



Texas Department of Transportation

SH 29

# INTERSECTION LAYOUTS CR 265 EAST

| esigned: | GJT | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PE | OJECT NO       |           |   | EET<br>O, |
|----------|-----|----------------------|--------|-------|-----------|----------------|-----------|---|-----------|
| Checked: | JJR | 6                    | TEXAS  | CC    | 337-      | -1-29          | )         | - | 19        |
| )rown:   | GJT | STATE<br>DIST. NO.   | cou    | YTY   | CONTROL   | SECTION<br>NO. | JO9<br>NO |   | WAY<br>O. |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0337      | 01             | 029       |   |           |

3-150 3-120

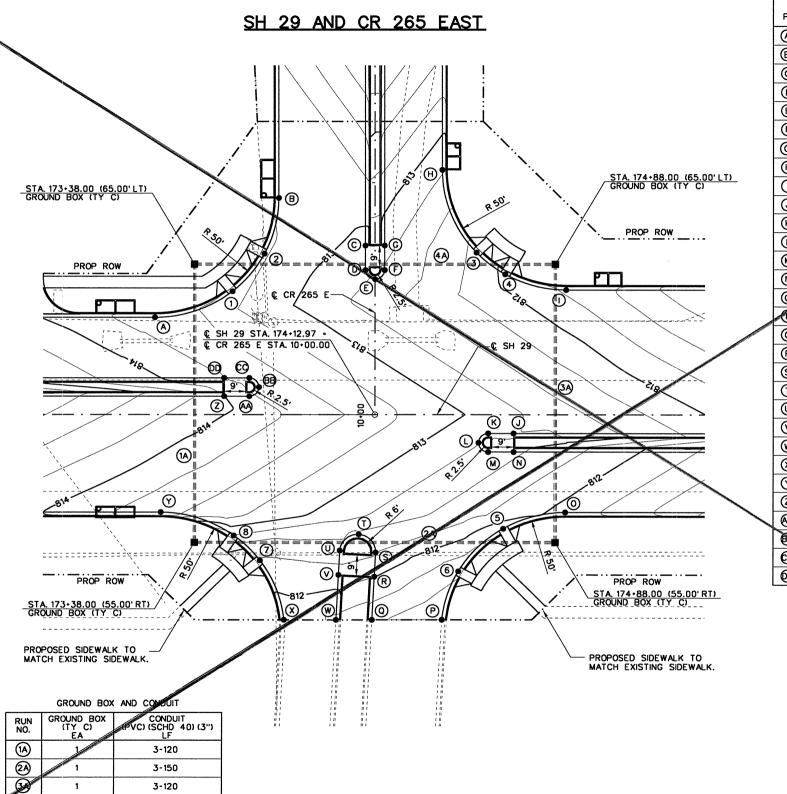
3-150

1620

2A 3A

(4A)

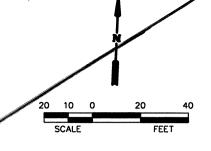
TOTAL





CURB RAMPS AND LANDINGS (TY 1)

|     |      |           |                | •      |
|-----|------|-----------|----------------|--------|
| PT  | Ę    | STA.      | OFFSET<br>(FT) | ELEV.  |
| 0   | SH29 | 173+53.75 | -53.37         | 813.44 |
| 2   | SH29 | 173+67.04 | -69.50         | 813.32 |
| 3   | SH29 | 174+55.17 | -70.00         | 812.17 |
| 4   | SH29 | 174+67.05 | -60.72         | 811.96 |
| (5) | SH29 | 174+66.32 | 49.00          | 811.85 |
| 6   | SH29 | 174+47.75 | 67.51          | 811.57 |
| 7   | SH29 | 173+65.21 | 62.77          | 812.21 |
| 8   | SH29 | 173+54.35 | 51.99          | 812.67 |



NOTES: SEE SHEET 1 OF 4.



NO. REVISION BY DATE

Chiang, Patel & Yerby, Inc.

Texas Department of Transportation
SH 29

INTERSECTION LAYOUTS

CR 265 EAST

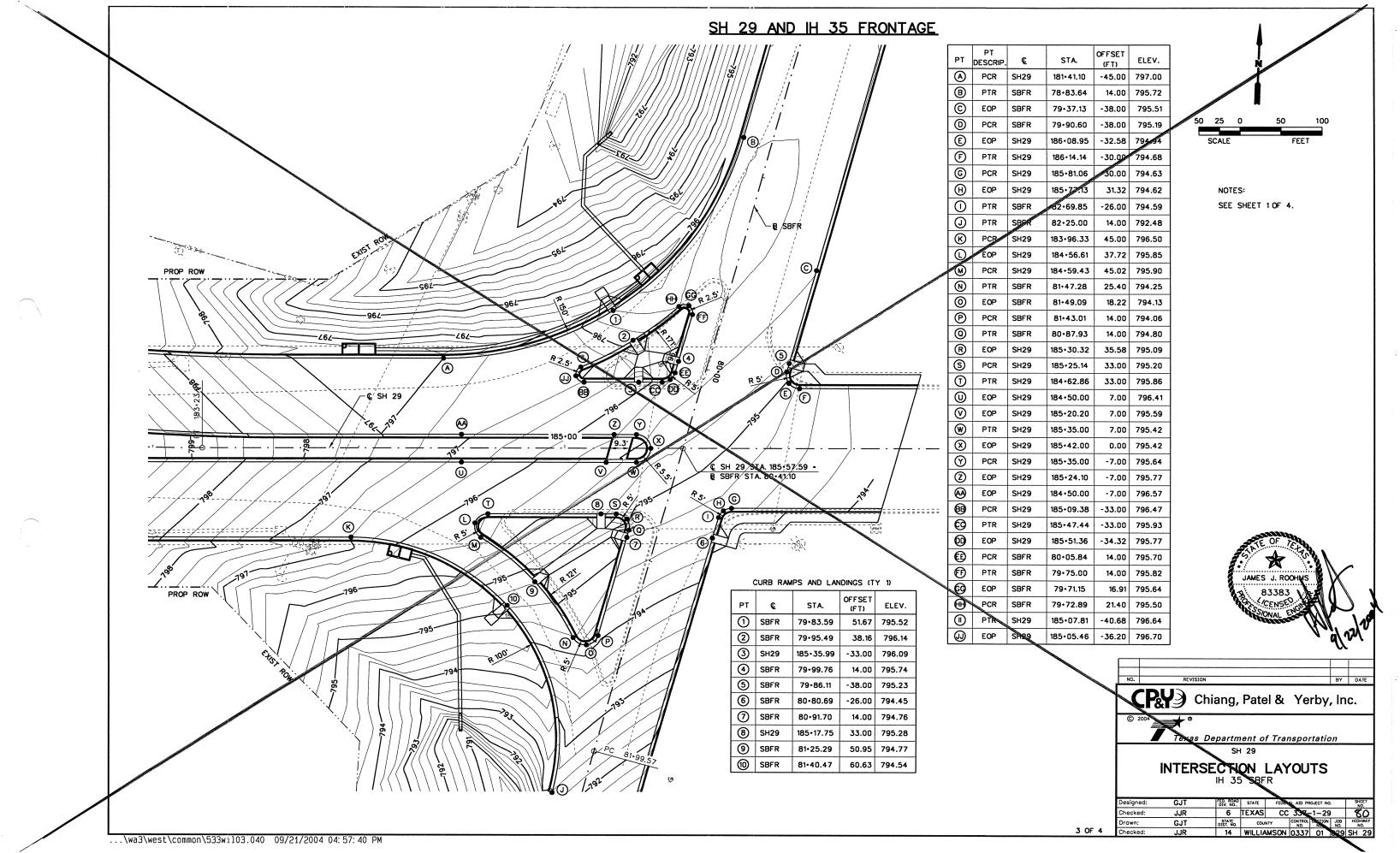
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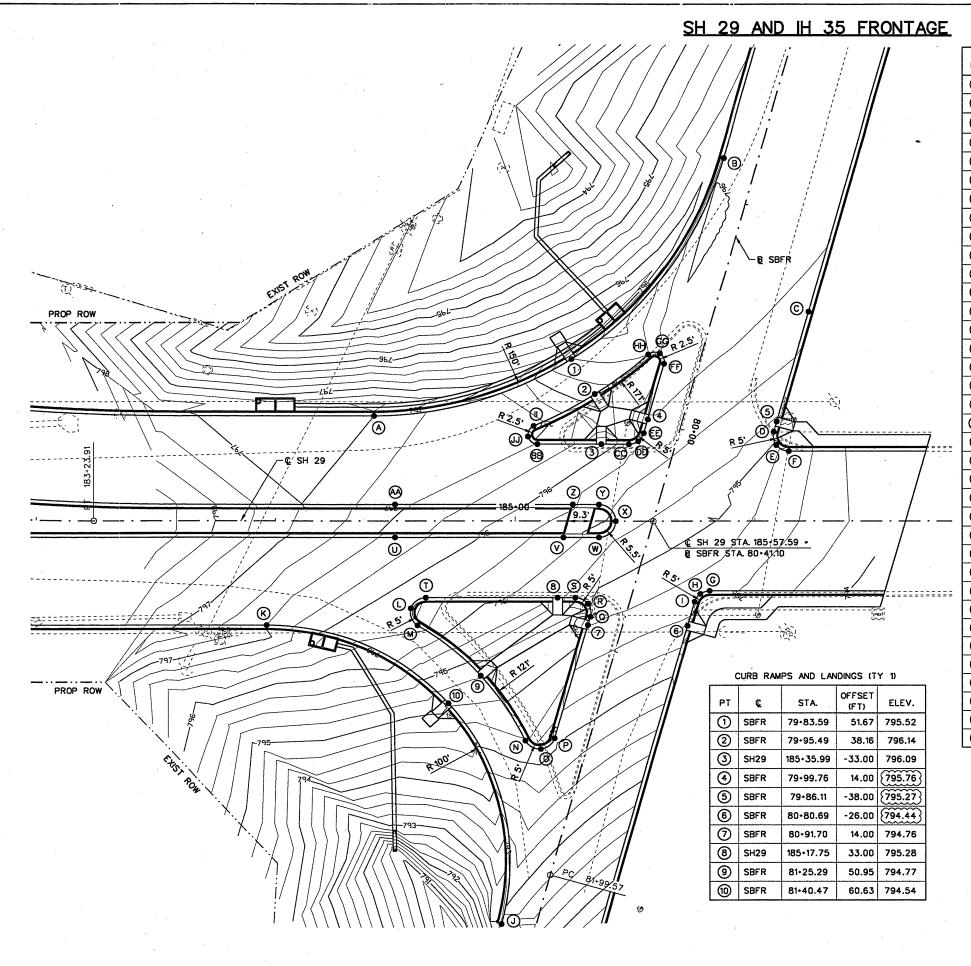
3-150

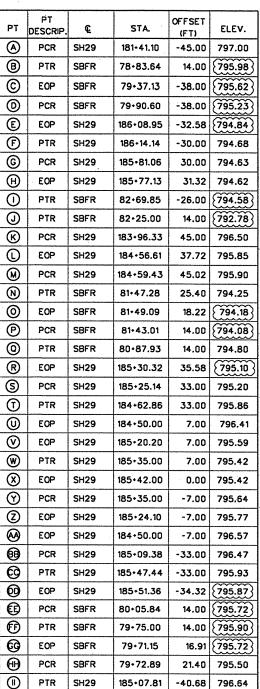
1620

**4**A

TOTAL

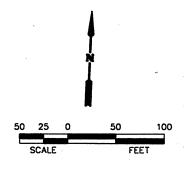






EOP

SH29



SEE SHEET 1.0F 4.



| <br> | WLA | 12/08/04 |
|------|-----|----------|
| <br> | BY  | DATE     |
|      |     |          |



-36.20 796.70

Chiang, Patel & Yerby, Inc.

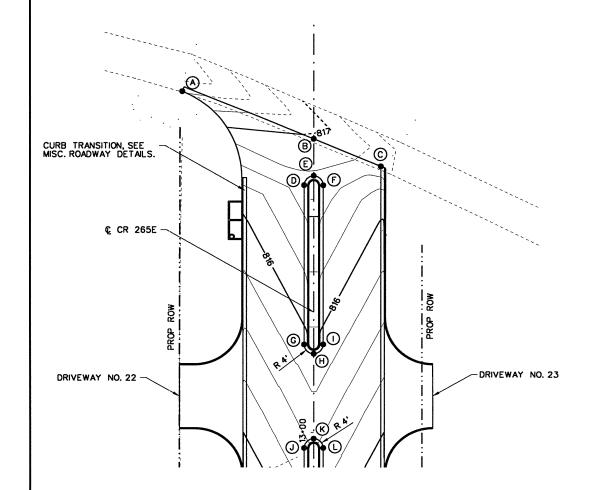
Texas Department of Transportation

# INTERSECTION LAYOUTS IH 35 SBFR

| esigned: | GJT   | FED. ROAD<br>DIV. NO | STATE  | FEDER. | AL AID PR      | OJECT NO       | L.         | SHI  |     |
|----------|-------|----------------------|--------|--------|----------------|----------------|------------|------|-----|
| hecked:  | JJR   | 6                    | TEXAS  | CC     | 337-           | -1-29          | )          | 80   | 7   |
| rawn:    | GJT   | STATE<br>DIST, NO.   | COUN   | (TY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HIGH | WAY |
| hecked:  | .I.IR | 14                   | WILLIA | MOON   | 0337           | 01             | 020        | Ü    | 20  |

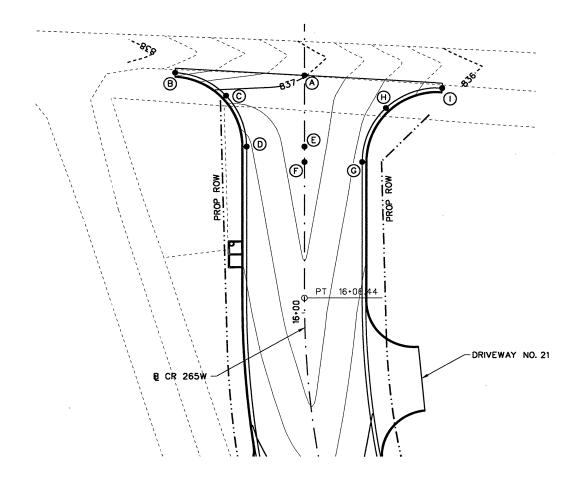
185+05.46

# CR 265E AND EXIST CR 265

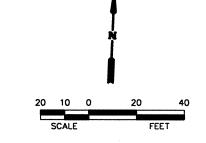


|            | ·              |        |          | ·              |        |
|------------|----------------|--------|----------|----------------|--------|
| РТ         | PT<br>DESCRIP. | Œ      | STA.     | OFFSET<br>(FT) | ELEV.  |
| <b>(A)</b> | EOP            | CR265E | 14+46.17 | -54.66         | 817.53 |
| B          | Œ              | CR265E | 14+25.64 | 0.00           | 816.95 |
| 0          | EOP            | CR265E | 14+14.01 | 28.00          | 816.66 |
| 0          | PCR            | CR265E | 14+06.04 | -4.00          | 816.64 |
| E          | EOP            | CR265E | 14+09.97 | 0.00           | 816.71 |
| (F)        | PTR            | CR265E | 14+05.97 | 4.00           | 816.64 |
| ©          | PCR            | CR265E | 13+37.89 | -4.00          | 815.91 |
| Θ          | EOP            | CR265E | 13+33.89 | 0.00           | 815.90 |
| 0          | PTR            | CR265E | 13+37.89 | 4.00           | 815.91 |
| 0          | PCR            | CR265E | 12+93.29 | -4.00          | 815.44 |
| ®          | EOP            | CR265E | 12+97.29 | 0.00           | 815.53 |
| (L)        | PTR            | CR265E | 12+93.29 | 4.00           | 815.44 |

# CR 265W AND EXIST CR 265



| PT       | PT<br>DESCRIP. | Œ      | STA.     | OFFSET<br>(FT) | ELEV.  |
|----------|----------------|--------|----------|----------------|--------|
| A        | Œ              | CR265W | 17+01.41 | 0.00           | 837.01 |
| B        | PTR            | CR265W | 17+02.56 | -53.65         | 837.68 |
| ©        | EOP            | CR265W | 16+92.72 | -32.58         | 836.88 |
| 0        | PCR            | CR265W | 16+71.11 | -24.00         | 836.46 |
| (E)      | Ę.             | CR265W | 16+71.11 | 0.00           | 836.93 |
| (F)      | Œ              | CR265W | 16+64.53 | 0.00           | 836.91 |
| <u>©</u> | PCR            | CR265W | 16+64.53 | 24.00          | 836.43 |
| Θ        | EOP            | CR265W | 16+87.45 | 33.89          | 836.38 |
| 0        | PTR            | CR265W | 16+95.98 | 57.35          | 836.12 |



NOTES: SEE SHEET 1 OF 4.



NO. REVISION BY DATE

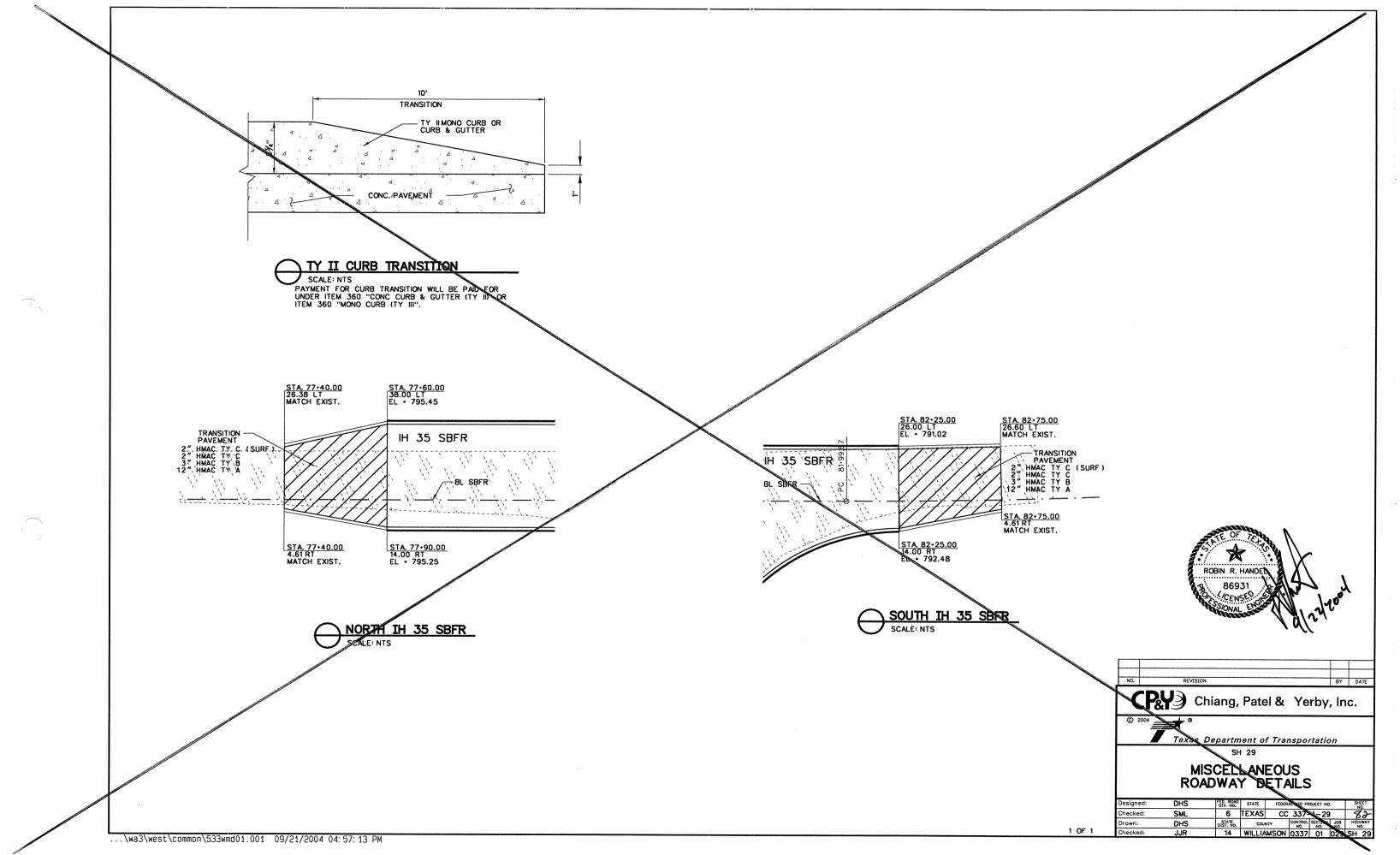
Chiang, Patel & Yerby, Inc.

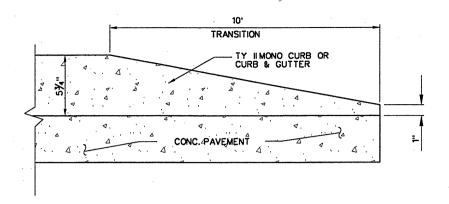


Texas Department of Transportation

INTERSECTION LAYOUTS
CR 265 WEST AND EAST

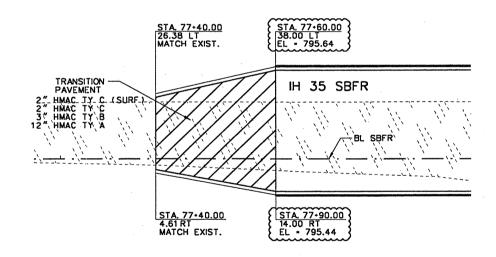
| esigned: | GJT | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       | ).         |    | EET<br>IO. |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|------------|
| hecked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 8  | 18         |
| rawn:    | GJT | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY       |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0337           |                | 029        | SH | 29         |



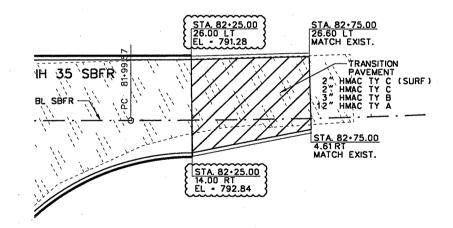


TY II CURB TRANSITION

SCALE: NTS
PAYMENT FOR CURB TRANSITION WILL BE PAID FOR UNDER ITEM 360 "CONC CURB & GUTTER (TY II)" OR ITEM 360 "MONO CURB (TY II)".



NORTH IH 35 SBFR
SCALE: NTS



SOUTH IH 35 SBFR
SCALE: NTS



| CO 1 | UPDATED SBFR PROFILE | AJW | 12/08/0 |
|------|----------------------|-----|---------|
|      |                      |     |         |
| NO.  | REVISION             | BY  | DATE    |

Chiang, Patel & Yerby, Inc.

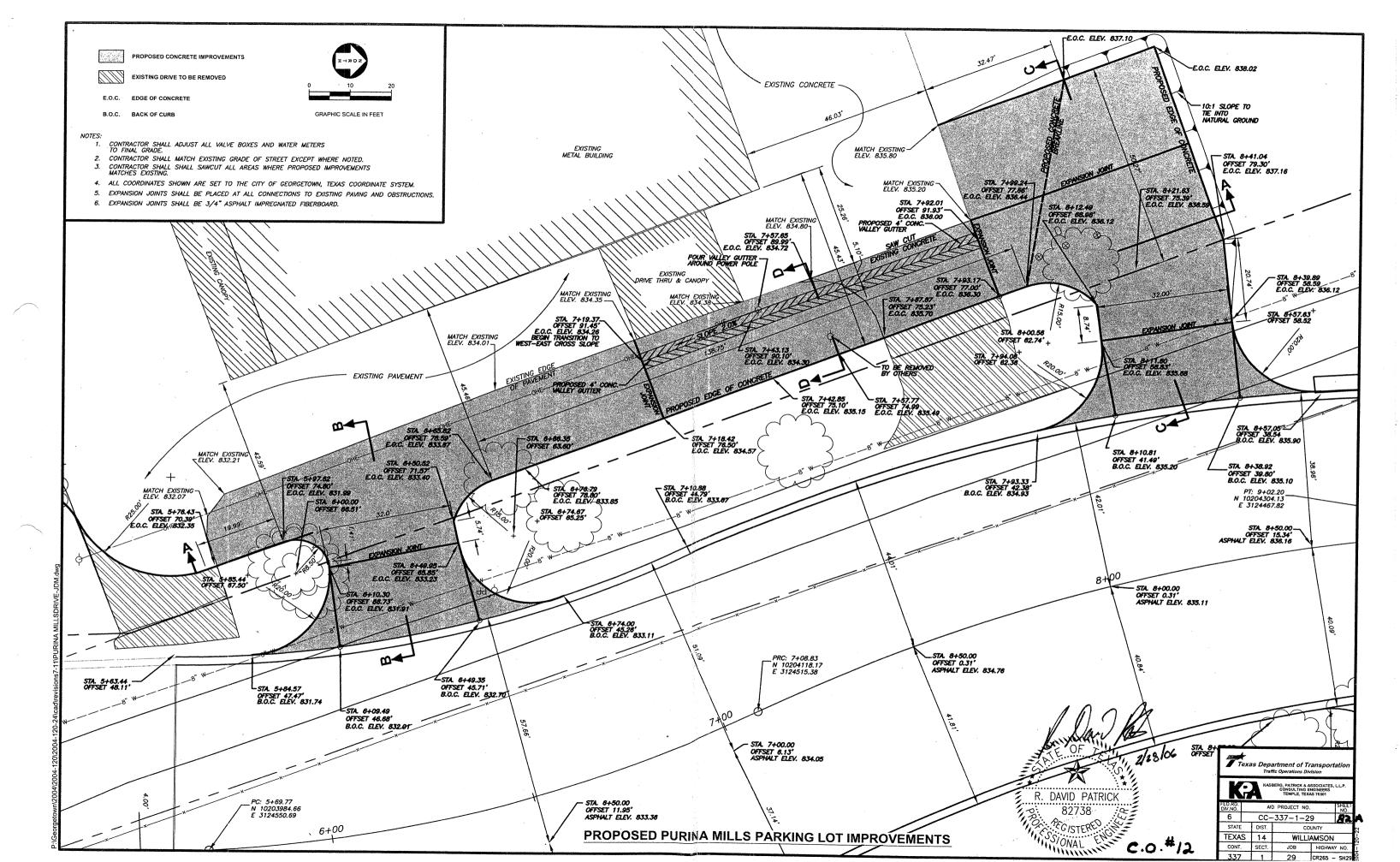


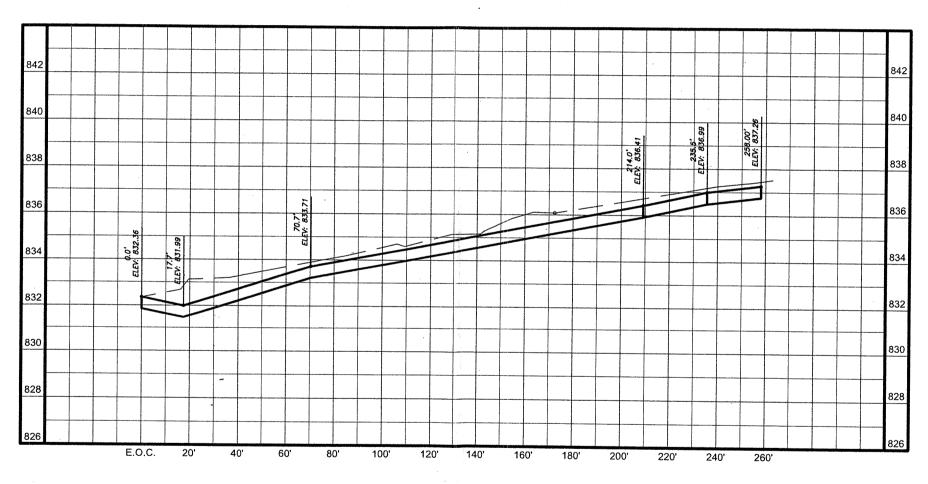
Texas Department of Transportation

SH 29

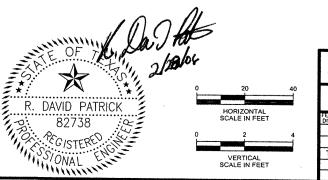
# MISCELLANEOUS ROADWAY DETAILS

| Designed: | DHS | FED. ROAD<br>DIV. NO | STATE  | FEDER. | AL AID PR      | OJECT NO       | ۲          | SH<br>N | EET<br>O. |
|-----------|-----|----------------------|--------|--------|----------------|----------------|------------|---------|-----------|
| Checked:  | SML | 6                    | TEXAS  | CC     | 337-           | -1-29          |            | 8       | 2         |
| Drawn:    | DHS | STATE<br>DIST. NO.   | cou    | NTY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |         | IWAY      |
| Checked:  | JJR | 14                   | WILLIA | MSON   | 0337           | 01             | 029        | SH      | 29        |

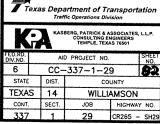


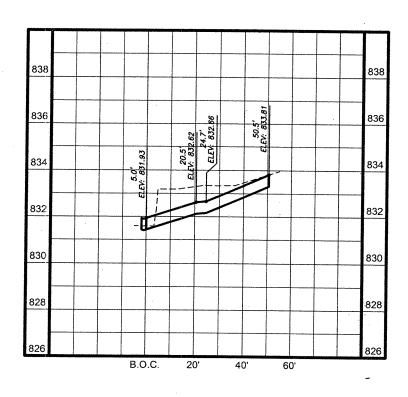


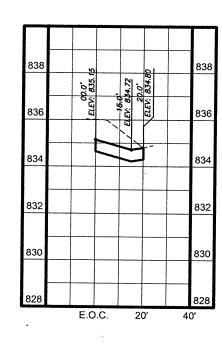
**SECTION A-A** 



C.O.#12







**SECTION B-B** 

**SECTION C-C** 

**SECTION D-D** 



Texas Department of Transportation
Traffic Operations Division

KASBERG, PATRICK & ASSOCIATES, LL. CONSULTING ENGINEERS, LT. EMPLE, EXAS 19901

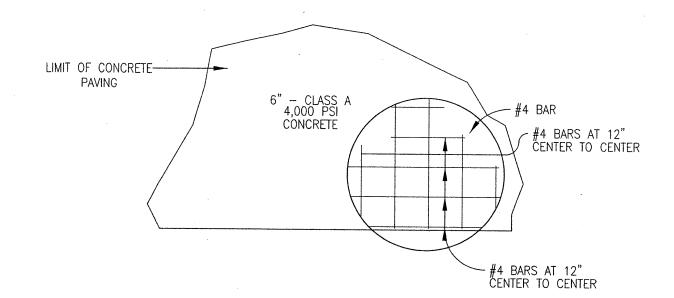
FED.RD.
DIV.NO.

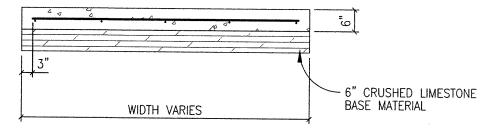
AID PROJECT NO.

ST.

- 1. MAXIMUM WIDTH OF APPROACH SHALL BE 24'-0" FOR RESIDENTIAL, 30'-0" FOR NON-RESIDENTIAL UNDIVIDED AND 45'-0" FOR NON-RESIDENTIAL DIVIDED.
- 2. DRIVEWAY PERMITS TO BE ACQUIRED FROM CITY INSPECTION OFFICE.
- 3. SPACING OF DRIVEWAY CUTS SHALL BE AS REQUIRED BY SECTIONS 33043 33044 OF THE CITY'S SUBDIVISION REGULATIONS.
- 4. MINIMUM WIDTH OF APPROACH SHALL BE 10'-0" FOR RESIDENTIAL AND 15'-0" FOR NON-RESIDENTIAL.
- 5. LINEAR "RADIUS" AT CORNERS, PERMITTED FOR "SINGLE FAMILY" OR "TWO FAMILY" RESIDENTIAL DRIVEWAY APPROACH.
- 6. SIDEWALK LOCATION TO BE APPROVED BY CITY ENGINEER PRIOR TO FINAL DESIGN.

| ISSUE D | ATE: JANUA    | ARY 2003 | CITY OF GEORGETOWN                    | DWG. #SD-15  |
|---------|---------------|----------|---------------------------------------|--------------|
|         | REVISIONS     | )        | CITT OF GEORGETOWN                    | SD16.DWG     |
|         |               |          | CONCRETE DRIVEWAY APPROACH<br>TYPICAL | GEORGE STATE |
| DATE    | APPROVED      | DRAWN    | GEORGETOWN UTILITY SYSTEMS            |              |
|         | SCALE: N.T.S. |          | CONSTRUCTION STANDARDS AND DETAILS    | TODED 1848   |





#### NOTE:

IN THE EVENT THAT LIMESTONE SUBGRADE IS FOUND THE CONTRACTOR MAY ELIMINATE THE 6" OF CRUSHED LIMESTONE BASE MATERIAL.

# CONCRETE PAVING DETAIL

NOT TO SCALE



C.O.#12

Texas Department of Transportation

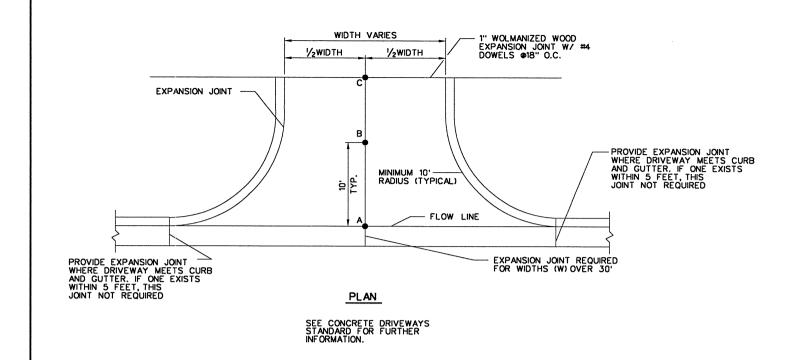
FEO.RD. AID PROJECT NO. SHEET NO. AID PROJECT NO. SHEET NO. STATE DIST. COUNTY

TEXAS 14 WILLIAMSON

JOB HIGHWAY N

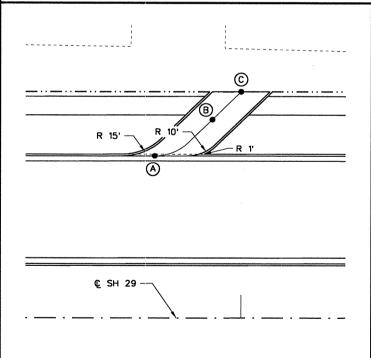
MISC. DETAILS

NOT TO SCALE



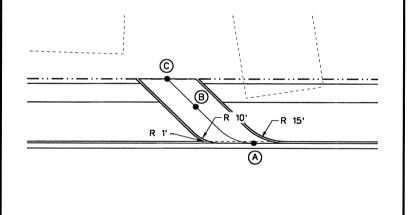
| ROADWAY | DRWYNO.    | STATION      | WIDTH  |          | A        | E        | }       | C        |         |
|---------|------------|--------------|--------|----------|----------|----------|---------|----------|---------|
| NOADWA! | DIXW 1 NO. | STATION      | WIDIII | OFFSET   | ELEV     | OFFSET   | ELEV    | OFFSET   | ELEV    |
| SH 29   | 1          | 141 • 05. 00 | 37.00  | 34.50    | 834.88   | 44. 50   | 835. 23 | 50.00    | 833. 87 |
| SH 29   | 2          | 143+50.00    | 30.00  | -34.50   | 826. 07  | - 55. 00 | 827.63  | - 70. 00 | 826. 79 |
| SH 29   | 3          | 143+50.00    | 30.00  | 34.50    | 826.07   | 44.50    | 826. 27 | 60.00    | 821.26  |
| SH 29   | 4          | 150+25.50    | 16.00  | -43.50   | 834.15   | -53.50   | 834. 35 | -61.00   | 834. 85 |
| SH 29   | 5          | 150+25.50    | 30.00  | 43. 50   | 834.15   | 53. 50   | 834. 35 | 69.00    | 831.10  |
| SH 29   | 6          | 155+50.00    | 30.00  | -43.50   | 830. 52  | - 53. 50 | 830. 95 | -61.00   | 831.27  |
| SH 29   | 7          | 156+45.50    | 30.00  | 55. 50   | 829. 46  | 65. 50   | 829.66  | 79.00    | 828. 57 |
| SH 29   | 8          | 164+65.25    | 30.00  | -43.50   | 822.10   | -53.50   | 822. 93 | - 76. 00 | 823. 38 |
| SH 29   | 9          | 165+58.25    | 20.00  | - 43. 50 | 821.05   | - 53. 50 | 821.71  | -61.00   | 821.86  |
| SH 29   | 10         | 166+77.32    | 10.00  | -43.50   | 819.86   | -        | -       | -        | -       |
| SH 29   | 11         | 168+90.69    | 10.00  | - 43. 50 | 817, 73  | -        | -       | -        | -       |
| SH 29   | 12         | 169+97.50    | 33. 00 | -43.50   | 816.66   | -        | -       | -        | -       |
| SH 29   | 13         | 172+61.00    | 27. 00 | -43.50   | 814.08   | - 53. 50 | 815.38  | -61.00   | 815.53  |
| SH 29   | 14         | 174+06.77    | 65. 76 | 42.00    | 81 2. 81 | -        | -       | -        | -       |
| SH 29   | 15         | 179+67.50    | 27. 00 | - 55. 50 | 805. 29  | - 65. 50 | 805. 77 | - 76. 00 | 806. 27 |
| SH 29   | 16         | 181+96.00    | 20.00  | 53.87    | 800. 28  | 63. 87   | 800. 48 | 77. 37   | 800. 29 |
| CR 265W | 17         | 6+66.50      | 27. 00 | 64.00    | 815.81   | 73. 05   | 815.99  | -        | -       |
| CR 265W | 18         | 13+30.13     | 40.00  | -51.26   | 832. 54  | -        | -       | -        | -       |
| CR 265W | 19         | 13+28.00     | 35. 00 | 33. 00   | 832.87   | 43. 03   | 833. 07 | 53. 02   | 832.90  |
| CR 265W | 20         | 15+14.00     | 33. 00 | - 25. 50 | 835. 72  | - 35. 50 | 836. 46 | -44.00   | 837.10  |
| CR 265W | 21         | 15+67.00     | 27. 00 | 25. 50   | 836. 06  | 35. 50   | 836. 25 | 47. 09   | 836. 46 |
| CR 265E | 22         | 13+15.59     | 27.00  | -29.50   | 815.17   | - 39. 50 | 815.88  | - 55. 82 | 817.03  |
| CR 265E | 23         | 13+15.59     | 27. 00 | 29.50    | 815.17   | 39. 50   | 815.50  | 49.50    | 815.82  |

\* SEE DRIVEWAY DETAILS BELOW AND ON SHEET 2 FOR FURTHER INFORMATION.



| PT         | PT<br>DESCRIP | STA.      | OFFSET<br>(FT) | ELEV<br>(FT) |
|------------|---------------|-----------|----------------|--------------|
| <u>(A)</u> | GL            | 166+77.32 | -43.50         | 819.86       |
| B          | Œ             | 166+92.50 | -53.50         | 821.05       |
| 0          | ME            | 167+00.00 | -61.00         | 821.11       |

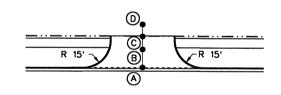
DRIVEWAY 10

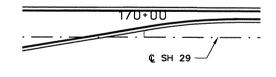


| PT         | PT<br>DESCRIP | STA.      | OFFSET<br>(FT) | ELEV<br>(FT) |
|------------|---------------|-----------|----------------|--------------|
| <u>(A)</u> | GL            | 168+90.69 | -43.50         | 817.73       |
| B          | Œ             | 168+75.52 | -53.50         | 819.40       |
| ©          | ME            | 168+68.00 | -61.00         | 819.51       |

© SH 29 -

DRIVEWAY 11





| PT | PT<br>DESCRIP | STA.      | OFFSET<br>(FT) | ELEV<br>(FT) |
|----|---------------|-----------|----------------|--------------|
| A  | GL            | 169+97.50 | -43.50         | 816.66       |
| B  | Œ.            | 169+97.50 | -53.74         | 817.89       |
| 0  | Œ             | 169+97.50 | -60.74         | 818.03       |
| Θ  | ME            | 169+97.50 | -71.85         | 819.35       |

DRIVEWAY 12

#### NOTES:

1. OFFSETS SHOWN AS POSITIVE ARE TO THE RIGHT OF BASELINE. OFFSETS SHOWN AS NEGATIVE ARE TO THE LEFT OF THE BASELINE.

2. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

3. POINT DESCRIPTIONS ARE DEFINED AS FOLLOWS:

@ - CENTERLINE
GL - GUTTER LINE
PC - POINT OF CURVATURE
PT - POINT OF TANGENCY
ME - MATCH EXISTING



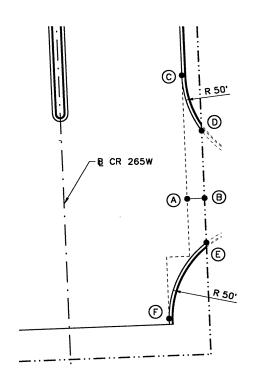
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

SH 29

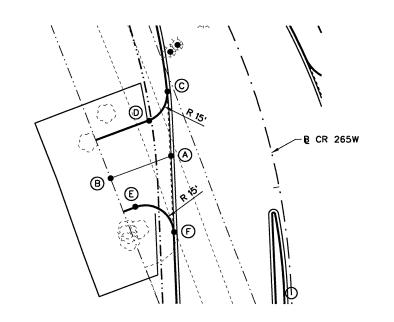
DRIVEWAY DETAILS

| Designed: | AJW | FED. ROAD<br>DIV. NO | STATE   | FEDER | AL AID PR      | OJECT NO       | ١.         |    | EET<br>IO. |
|-----------|-----|----------------------|---------|-------|----------------|----------------|------------|----|------------|
| Checked:  | DHS | 6                    | TEXAS   | CC    | 337-           | -1-29          | )          | 9  | 3          |
| Drawn:    | DHS | STATE<br>DIST. NO.   | COUNT   | ſΥ    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY       |
| Checked:  | PAS | 14                   | WILLIAN | ASON  | 0337           | 01             | 029        | SH | 20         |



| PT         | PT<br>DESCRIP | STA.    | OFFSET<br>(FT) | ELEV<br>(FT) |
|------------|---------------|---------|----------------|--------------|
| <b>(A)</b> | GL            | 6+73.65 | 64.00          | 815.81       |
| B          | ME            | 6+73.65 | 73.05          | 815.99       |
| 0          | PT            | 7+32.34 | 64.00          | 818.30       |
| 0          | PC            | 7+02.29 | 73.05          | 817.34       |
| (L)        | PC            | 6+43.03 | 73.05          | 815.09       |
| (E)        | PT            | 6+03.09 | 52.00          | 813.39       |
|            |               |         |                |              |

# DRIVEWAY 17



| РТ | PT<br>DESCRIP | STA.     | OFFSET<br>(FT) | ELEV<br>(FT) |
|----|---------------|----------|----------------|--------------|
| A  | GL            | 13+30.13 | -51.26         | 832.54       |
| B  | ME            | 13+25.73 | -84.69         | 833.56       |
| 0  | PT            | 13+67.58 | -42.71         | 833.33       |
| 0  | PC            | 13+54.58 | -56.88         | 833.80       |
| E  | PC            | 13+04.00 | -75.47         | 832.88       |
| Ð  | PT            | 12+84.05 | -57.70         | 831.67       |

# DRIVEWAY 18

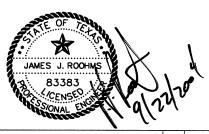
## NOTES:

1. OFFSETS SHOWN AS POSITIVE ARE TO THE RIGHT OF BASELINE. OFFSETS SHOWN AS NEGATIVE ARE TO THE LEFT OF THE BASELINE.

2. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

3. POINT DESCRIPTIONS ARE DEFINED AS FOLLOWS:

Q - CENTERLINE
GL - GUTTER LINE
PC - POINT OF CURVATURE
PT - POINT OF TANGENCY
ME - MATCH EXISTING



Chiang, Patel & Yerby, Inc.

2 OF 2

Texas Department of Transportation

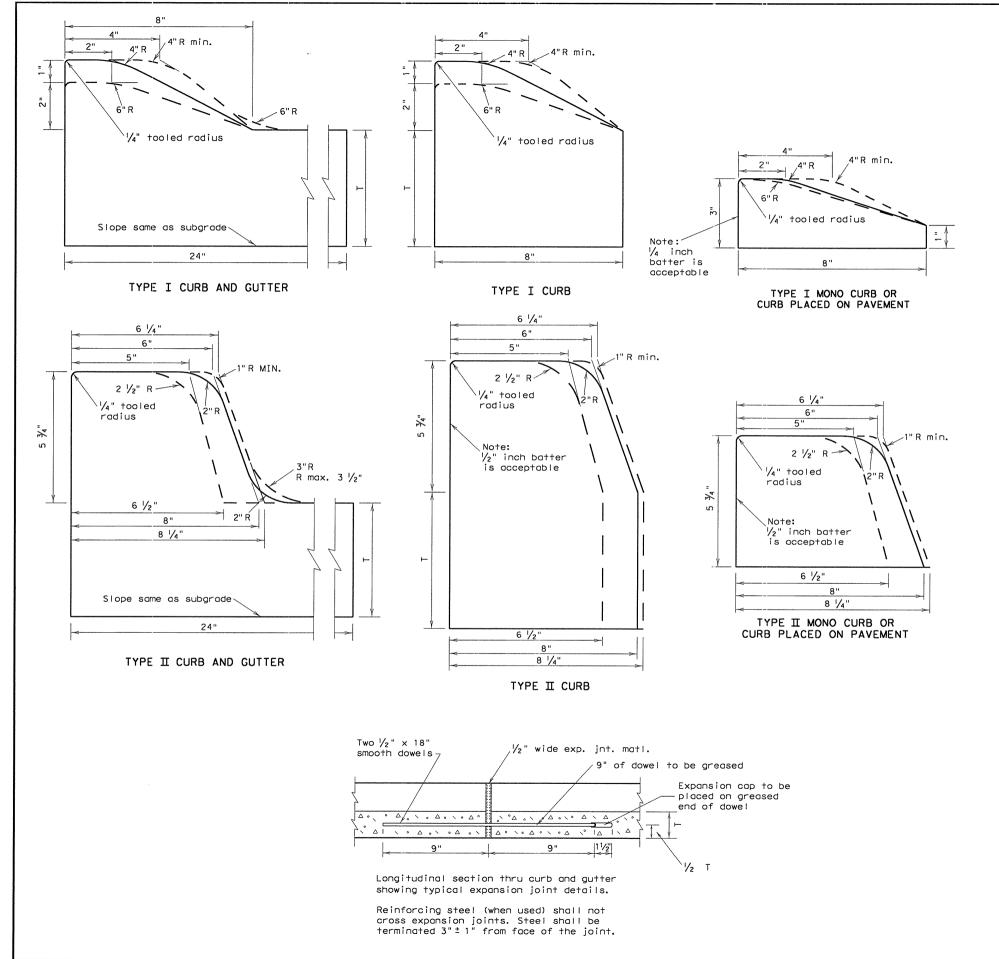
DRIVEWAY DETAILS

| Designed: | AJW | DIV. NO            | STATE  | FEDER | AL AID PR      | ROJECT NO      | L.         |    | EET<br>O. |
|-----------|-----|--------------------|--------|-------|----------------|----------------|------------|----|-----------|
| Checked:  | DHS | 6                  | TEXAS  | CC    | 337-           | -1-29          | )          | 8  | 44        |
| Drawn:    | DHS | STATE<br>DIST. NO. | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | IWAY      |
| Checked:  | PAS | 14                 | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29        |

|   | € SH 29                                | <b>a</b> |
|---|--|----------|
|   | A ==================================== | <u>(</u> |
| 3 | (X)                                    | 2        |
| \$                                      |  |          |

| РТ   | PT<br>DESCRIP | STA.      | OFFSET<br>(FT) | ELEV<br>(FT) |
|------|---------------|-----------|----------------|--------------|
| A    | GL            | 174+06.77 | 42.00          | 812.81       |
| B    | ME            | 174+04.35 | 88.29          | 812.12       |
| 0    | PC            | 173+23.93 | 42.00          | 813.58       |
| 9    | PT            | 173+75.17 | 88.30          | 811.92       |
| (Li) | PT            | 174+92.16 | 42.00          | 811.91       |
| Œ    | PC            | 174+40.92 | 88.27          | 811.27       |

# DRIVEWAY 14 SEE INTERSECTION LAYOUTS FOR FURTHER INFORMATION



#### GENERAL NOTES

- Contractor may use existing forms if the cross section lies within the band shown by dotted lines. If new forms are to be purchased, leased, or constructed they shall conform to the solid line.
- 2. When reinforcing steel is required or placed at contractor's option, one of the following schemes of reinforcement shall be required. The manner of placement and location shall be to the satisfaction of the Engineer.
  - a. Type I, or Type II, curb and gutter reinforcement shall have longitudinal reinforcing bars as follows: Three #3, two #4, two #5, or one #6.
  - b. All types of curb (reinf.) shall have one #3 or #4 bar for longitudinal reinforcement.
- 3. Reinforcing bars shall be lapped a minimum of 15".
- 4. When curb or curb and gutter is placed by a separate pour adjacent to or atop concrete pavement, curb or curb and gutter shall be tied to pavement in a manner satisfactory to the engineer with 8-inch long #3 or #4 bars spaced at 5 feet and expansion and/or contraction joints of curb or curb and gutter shall match those of pavement.

When curb and curb and gutter is not constructed adjacent to concrete pavement, the following shall govern:

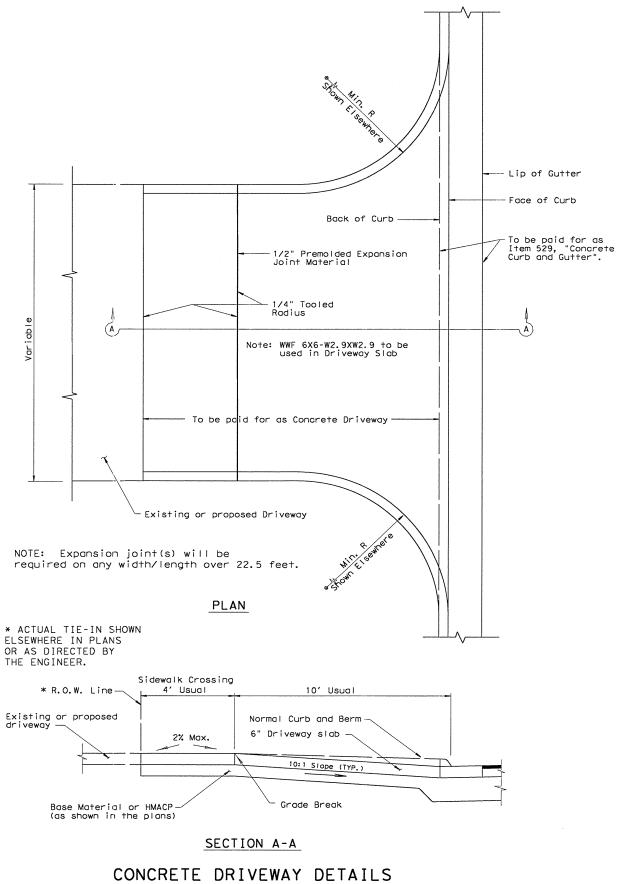
- a. Reinforced curb or curb and gutter shall have no contraction joints.
- b. Non-reinforced curb or curb and gutter shall have formed, tooled or sawed contraction joints at 10'±. The depth of these joints shall be sufficient to ensure cracking at the joints.
- c. Reinforcing curb or curb and gutter shall have expansion joints at points of curvature and at intervals no greater than 120'in all curves and at structures such as bridges, box culverts, curb inlets, etc.
- d. Non-reinforced curb or curb and gutter shall have expansion joints at points of curvature on curves of radius less than 25' and at structures such as bridges, box culverts, curb inlets, etc.
- 5. One-half inch expansion joint material shall be provided where curb or curb gutter is adjacent to sidewalk or riprap.
- 6. Unless otherwise shown, transitions between curbs or curbs and gutters of differing cross section shall be accomplished over a 20 foot length or as approved by the Engineer.
- 7. At contractor's option, dimension "T" may be thickness of pavement structure. In no case shall it be less than 6".
- 8. See the RAMP standard sheet for information on curb ramps and sidewalks crossing driveways.



# CONCRETE CURB AND CURB AND GUTTER

CCCG-01

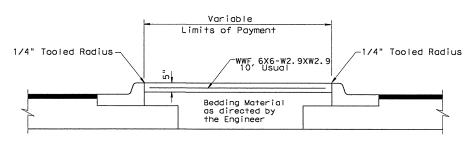
| ILE:   | cccg01.DGN | DN: MAM | ck: RA            | R DW: RAF | CK: W     | MAN    | NEG: |       |    |
|--------|------------|---------|-------------------|-----------|-----------|--------|------|-------|----|
| (C) To | DOT 1995   | DIST    | FED REG           | FEDER     | AL AID PE | ROJECT | Γ +  | SHEE  | т  |
|        | REVISIONS  | AUS     | AUS 6 CC 337-1-29 |           |           |        | 83   | 5     |    |
|        |            |         | COUN              | TY        | CONTROL   | SECT   | JOB  | HIGHW | ΑY |
|        |            |         | WILLIA            | MSON      | 0337      | 01     | 029  | SH 2  | 29 |



Payment for Driveways shall be in accordance with Item 530, "Driveways".

Grade break shall not exceed 8% unless otherwise directed by the Engineer.

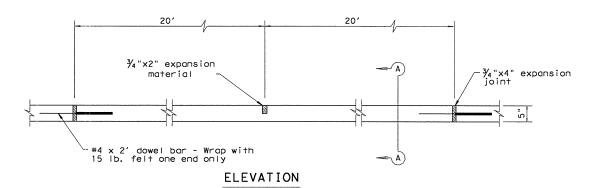
Absolute minimum sidewalk crossing width is 3' for driveway width of 20' or less.

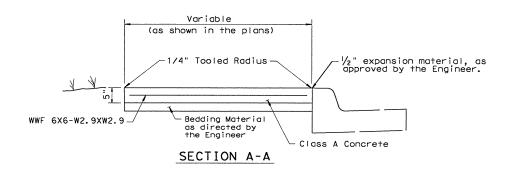


## RIPRAP MEDIAN DETAIL

Riprap shall be Class B Concrete.

Payment of Riprap Median shall be in accordance with Item 432, "Riprap".





#### SIDEWALK DETAILS

A  $\frac{3}{4}$ " expansion joint will be placed each 40' (max.) and at sidewalk ends. Expansion joints shall be continuous with adjacent curb and gutter joints. A  $\frac{1}{4}$ " tooled radius to be placed at all joints.

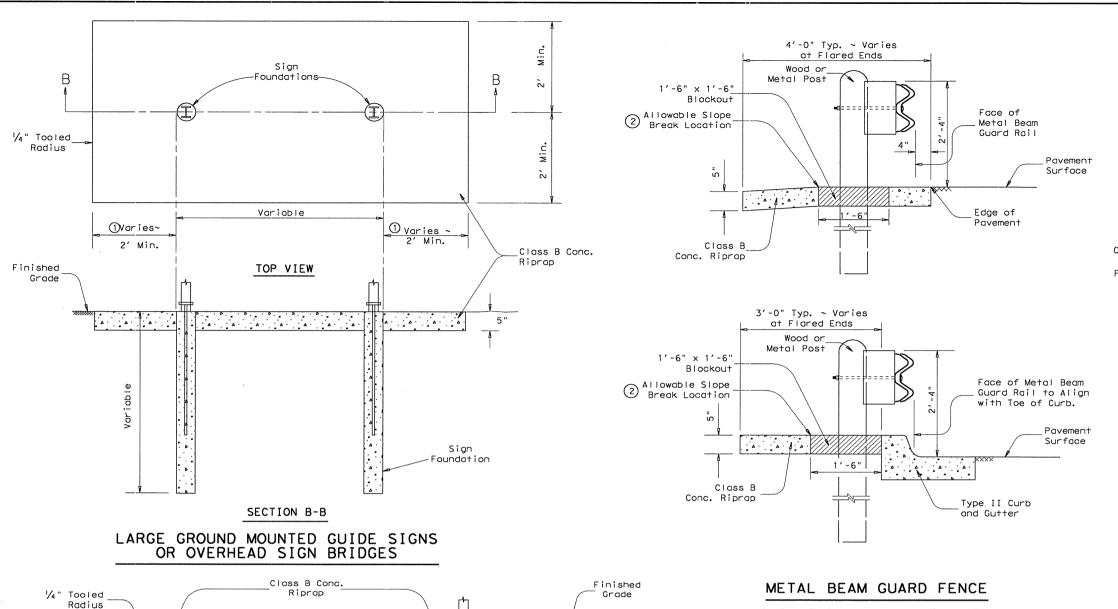
The cross slope of the sidewalk shall not exceed 2%.

Payment for sidewalk shall be in accordance with Item 531, "Sidewalks". See Statewide PED standard for additional pedestrian element criteria.



CONCRETE DRIVEWAYS, SIDEWALKS AND RIPRAP MEDIANS AUSTIN DISTRICT STANDARD

| © TxD0T 2002                               |    | DIST | FED REG  | FEDER | AL AID PR | OJECT |     | SHEET   |
|--|----|------|----------|-------|-----------|-------|-----|---------|
| REVISIONS<br>4/03 District Update          |    | AUS  | 6        | CC    | 337-1-    | 29    |     | 86      |
| RIPRAP MEDIANSWAYS,<br>RIPRAP MEDIANSWAYS, | ** |      | COUNTY   |       | CONTROL   |       | JOB | HIGHWAY |
|  | ** | Y    | VILLIAMS | NC    | 0337      | 01    | 029 | SH 29   |



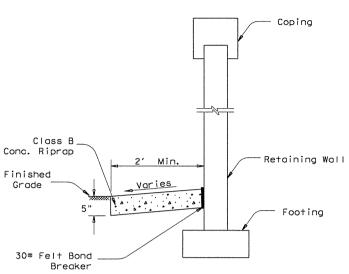
Sian

SECTION A-A

Foundation

1'-6" x 1'-6" Blockout to be filled with 2 sack Grout after Riprap has been placed. This shall be subsidiary to Item 432, "Riprap".

- ① For large Ground Mounted Guide Signs, the Riprap should extend to the outside lateral edges of the signs. However, in those instances where the edge of the sign does not extend 2'-0" from the post, a 2'-0" minimum dimension will be utilized.
- ① For Overhead Sign Bridges and Cantilever Sign Mounts the dimensions shall be measured from outside edge of Drill Shafts.
- For rehabilitation type projects that do not involve reworking the front slope behind the Metal Beam Guard Fence, a break in the slope is allowed as shown or as approved by the Engineer but shall be 4:1 or flatter. For all other projects, the Riprap Mow Strip shall be placed at 10:1 or flatter or as approved by the Engineer. Unless paid for under separate bid items, earthwork required to adjust the slope as shown or as directed by the Engineer shall be considered subsidiary to Item 432, "Riprap".



# RETAINING WALL

#### **GENERAL NOTES:**

This treatment shall be provided for Signs, Metal Beam Guard Fence and Retaining Walls that require vegetation control as shown in the plans or as directed by the Engineer.

Payment for Riprap shall be in accordance with Item 432, "Riprap". Reinforcement for Riprap shall be WWF 6X6-W2.9XW2.9.

Care should be taken to ensure that the finished grade of Riprop matches finished grade of adjacent topsoil.

Riprap depth shall be 5" unless otherwise shown in the plans.

The thickness of the Concrete Riprap shall not be applied to the sign Drilled Shaft foundation resulting in the shortening of the required Drilled Shaft length.

Unless otherwise shown, the Metal Beam Guard Fence posts shall be centered in the 1'-6"X1'-6" Blockout for Grout.



...\paving\vc-03.dgn 09/21/2004 01: 47: 46 PM

TOP VIEW

Sign

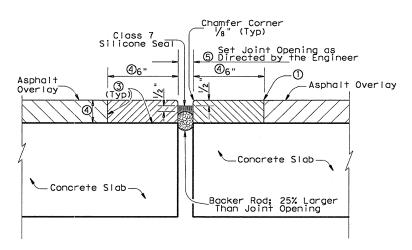
① Varies ~

2' Min.

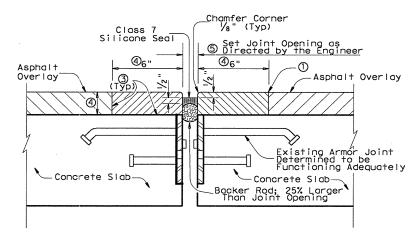
CANTILEVER SIGNS

Detail shall be used on small roadside signs only when shown elsewhere in the plans or as directed by the Engineer.

oundation



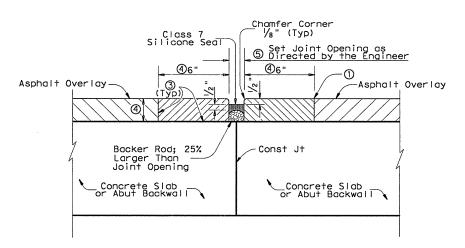
# SECTION AT NEW SLAB WIDENING



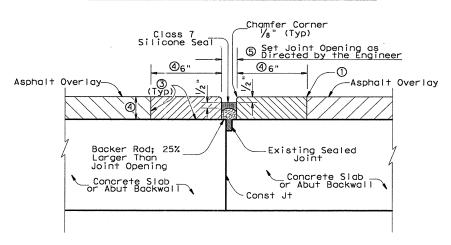
SECTION AT EXISTING ARMOR JOINT

# TYPE A HEADER JOINT DETAILS

(See Table for Type A Joint Locations)



# SECTION AT NEW SLAB WIDENING



SECTION AT EXISTING SEALED JOINT

# TYPE B HEADER JOINT DETAILS

(See Table for Type B Joint Locations)

## Header Joint Location Table

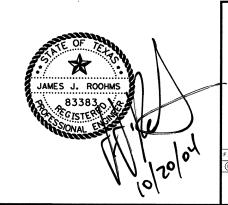
| Joint Type<br>Structure    | Type "A"<br>Header Jt         | Type "B"<br>Header Jt              |
|----------------------------|-------------------------------|------------------------------------|
| SH 29 - IH 35<br>STRUCTURE | 2 LOCATIONS -<br>AT ABUTMENTS | 3 LOCATIONS -<br>AT INTERIOR BENTS |
|                            |                               |                                    |
|                            |                               |                                    |
|                            |                               |                                    |
|                            |                               |                                    |
|                            |                               |                                    |

#### NOTES:

- ① Saw cut overlay to top of deck and remove material to expose existing joint.
- ② Condition of existing Armor Joint shall be determined prior to placing nosing/header material. The entire length of existing joint shall be checked and any portion that is determined unsound by the Engineer shall be removed as directed by the Engineer. The existing seal shall be removed and disposed of. If joint is determined to be loose, removal shall be paid for under "EXTRA WORK AS DIRECTED BY THE ENGINEER".
- ③ Surfaces where nosing/header material is to be placed shall be clean and dry in accordance with the manufacturer's specifications.
- ① The thickness of the header shall match the thickness of the overlay. The thickness of the overlay is approximately 2" but may vary. If the thickness of the overlay exceeds 3", the width of the header shall be set at two times the thickness.
- (5) Joint opening shall match existing for Type "A" Header Joint; Use 1" Joint opening for Type "B" Header Joint.
- © Extend sealant up into rail or curb 6 inches on low side or sides of deck. Prepare surfaces where sealant is to be placed in accordance with manufacturers specifications.

# HEADER TYPE SEALED JOINT DETAILS

Measurement and Payment shall be in accordance with Special Specification Item 4454, "Header Type Bridge Joint with or without Sealant". Header shall be paid for by cubic foot and sealant shall be paid for by the linear foot.

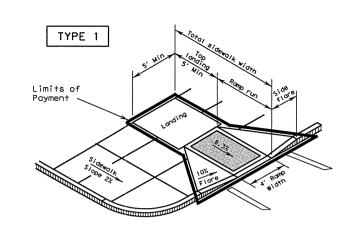


HS20 LOADING

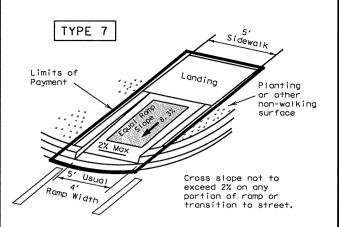
Texas Department of Transportation

Design Division (Bridge)

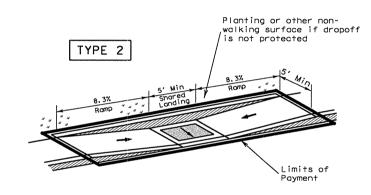
# HEADER TYPE SEALED JOINTS



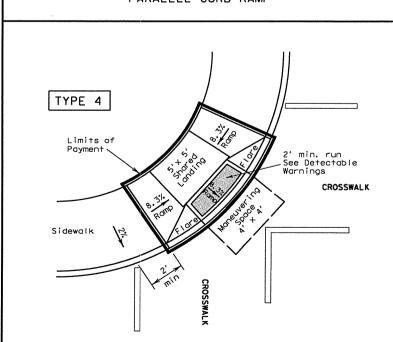
PERPENDICULAR CURB RAMP



DIRECTIONAL RAMP WITHIN RADIUS



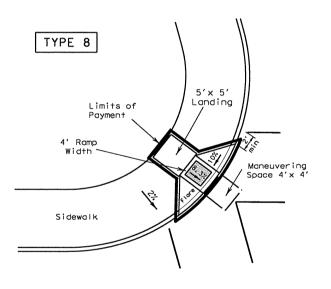
PARALLEL CURB RAMP



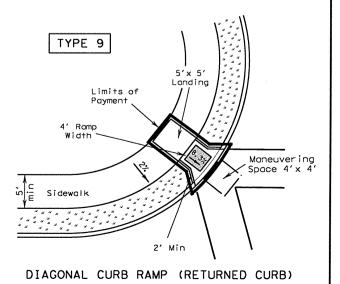
DIAGONAL COMBINATION CURB RAMP

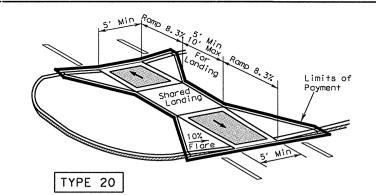
Radius and Contained in Crosswalk

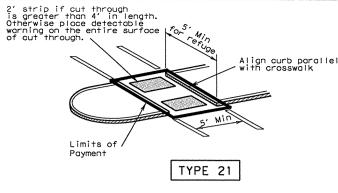
Perpendicular to the Tangent of the Curb



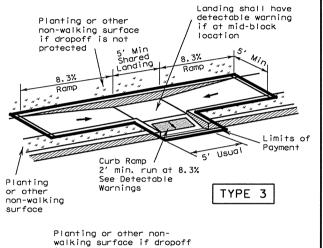
DIAGONAL CURB RAMP (FLARED SIDES)

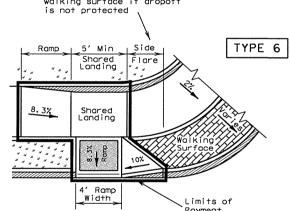




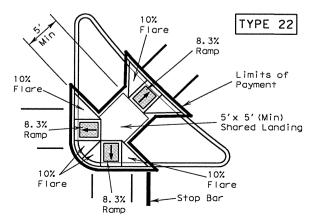


## CURB RAMPS AT MEDIAN ISLANDS





COMBINATION CURB RAMPS



COMBINATION ISLAND RAMPS

#### General Notes

 $\frac{\text{All slopes}}{\text{still}}$  drain properly should be used. Ramp length or grade of approach sidewalks may be adjusted as directed by the Engineer.

The minimum sidewalk width is 5'. Where a 5' sidewalk can not be provided due to site constraints, a minimum 3' sidewalk with 5'x 5' passing areas at intervals not to exceed 200 ft is required.

Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.

Maneuvering space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.

Maximum allowable cross slope on sidewalk and ramp surfaces is 2%.

Curb ramps with returned curbs may be used only where pedestrians would not normally walk across the ramp. Otherwise, flared sides shall be provided.

All concrete surfaces shall receive a light broom finish unless noted otherwise in the plans.

Ramp textures must consist of truncated domed surfaces. Textures are required to be detectable underfoot. Surfaces that would allow water to accumulate are prohibited.

Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) prepared and administered by the Texas Department of Licensing and Regulation (TDLR).

Raised medians separate opposing directions of traffic and provide a refuge area for pedestrians unable to cross the entire roadway in the allotted signal phase. To serve as a refuge area, the median should be a minimum of 5' wide. Medians should be designed to provide accessible passage over or through them.

Small channelization islands, which can not provide a minimum  $5^\prime x\ 5^\prime$  landing at the top of ramps, shall be cut through level with the surface of the street.

Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, ramps shall be aligned with theoretical crosswalks, or as directed by the Engineer.

Existing features that comply with TAS may remain in place unless otherwise shown on the plans.

Handrails are not required on curb ramps. Curb ramps shall be provided wherever on accessible route crosses (penetrates) a curb.

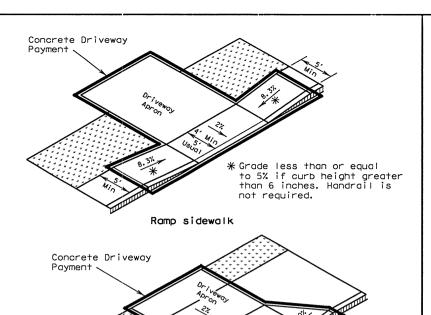
Shaded areas indicate locations of detectable warnings. (Color / light reflective value and texture contrast)  $\,$ 

Curb ramps and landings shall be constructed and paid for in accordance with Item, "Curb ramp and Landing". Street curb transitions and curb bevels will be paid for in accordance with Item, "Concrete Curb, Gutter and Combined Curb and Gutter".

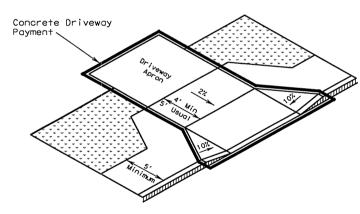


PED-02

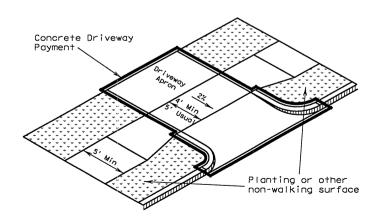
SHEET 1 OF 3



#### Wide sidewalk

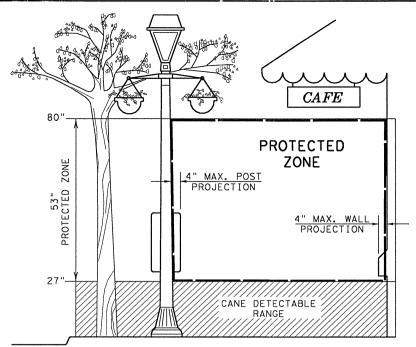


Apron offset sidewalk



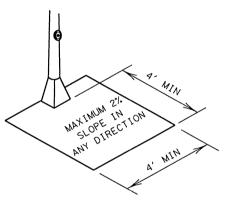
Setback sidewalk

SIDEWALK TREATMENT AT DRIVEWAYS

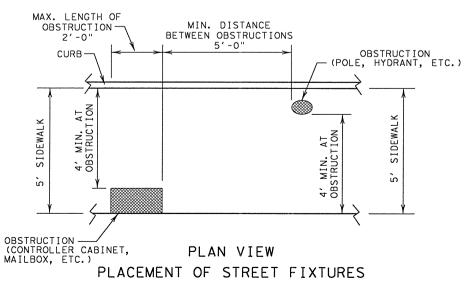


#### PROTECTED ZONE

In pedestrian circulation area, maximum 4" projection for post or wall mounted objects between 27"and 80" above the surface.



CLEAR GROUND SPACE AT PEDESTRIAN PUSH BUTTON



(ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' x 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.)

#### General Notes

All slopes are maximum allowable. The least possible slope that will still drain properly should be used.

Traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items shall be placed so not to obstruct the accessible route.

Usual sidewalk cross slope equals 1.5%. The maximum allowable sidewalk cross slope equals 2%.

Street grades and cross slopes shall be as shown elsewhere in the plans.

Existing features that comply with TAS may remain in place unless otherwise shown on the plans

Changes in level greater than  $\frac{1}{4}$  inch are not permitted.

Any part of the accessible route with a slope greater than 1:20 (5%) shall be considered a ramp. If a ramp has a rise greater than 6 inches or a horizontal projection greater than 72 inches, then it shall have handrails on both sides, with the following exceptions:

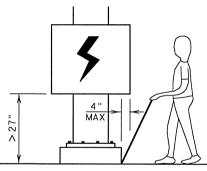
At ramp sidewalks shown at far left.

Handrails are not required on curb ramps. Curb ramps shall be provided wherever an accessible route crosses (penetrates) a curb.

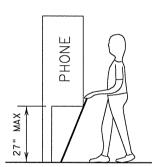
The least possible grade should be used to maximize accessibility. Where structurally impractical to achieve TAS compliance, the running slope of sidewalks and crosswalks, within the public right of way, may follow the grade of the parallel roadway without invoking Texas Accessibility Standards (TAS) variances for landings or handrails. Where a continuous grade greater than 5% must be provided, handrails may be desirable on one or both sides of the sidewalk to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions.

Parabolic crowns may require adjustment in crosswalk areas to limit the crosswalk grade to 5%.

Driveways and turnouts shall be constructed and paid for in accordance with Item, "Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".



When an obstruction of a height greater than 27" from the surface would create a protrusion of more than 4" into the pedestrian circulation area, construct additional curb or foundation at the bottom to provide a maximum 4" overhang.



Protruding objects of a height  $\leq$  27" are detectable by cane and do not require additional treatment.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

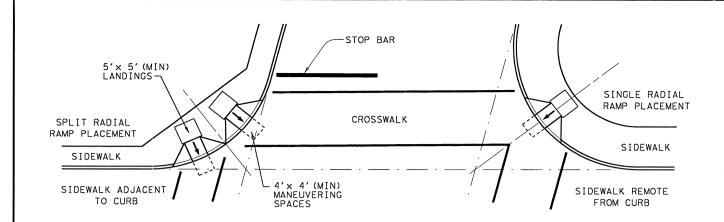


# PEDESTRIAN FACILITIES SIDEWALKS

PED-02

SHEET 2 OF 3

| .E: ped02.dgn     | DN: M | AM    | CK: MAM | DW: BGD     |        | CK: |         |
|-------------------|-------|-------|---------|-------------|--------|-----|---------|
| ©TxDOT March 2002 | DIST  | FED R | EG FEDE | RAL AID P   | ROJECT |     | SHEET   |
| REVISIONS         | AUS   | 6     | (       | CC 337-1-29 |        |     |         |
|                   |       | COL   | JNTY    | CONTROL     | SECT   | JOB | HIGHWAY |
|                   |       | WILL  | LANCON  | 0337        | 01     | 020 | CH 20   |



SKEWED INTERSECTION WITH "LARGE" RADIUS

## 5'x 5' (MIN) LANDINGS STOP RAR SIDEWALK CROSSWALK SIDEWALK SIDEWALK ADJACENT SIDEWALK REMOTE MANEUVERING TO CURB FROM CURB SPACES

#### General Notes

Street grades and cross slopes shall be as shown elsewhere in the plans.  $\,$ 

Ramps are shown here without detectable warnings for simplicity. Detectable warnings are required at the locations shown on the PED Standard (Sheet 1 of 3) and in accordance with the

Small channelization islands, which can not provide a minimum 5' x 5' landing at the top of ramps, shall be cut through level with the surface of the street.

SIDEWALK

SIDEWALK REMOTE

FROM CURB

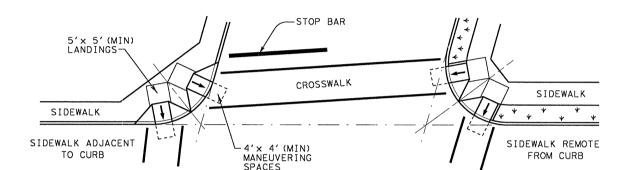
. 15′MIN

MID-BLOCK PLACEMENT

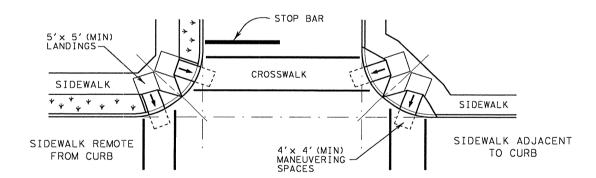
PERPENDICULAR RAMPS

Î5'MIN

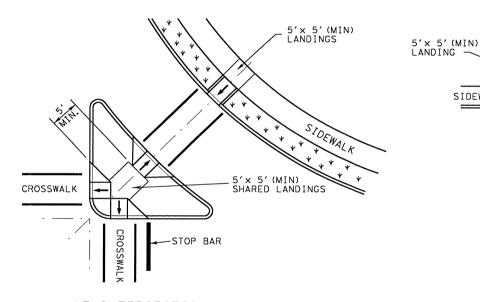
## NORMAL INTERSECTION WITH "LARGE" RADIUS



## SKEWED INTERSECTION WITH "SMALL" RADIUS



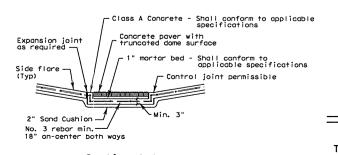
NORMAL INTERSECTION WITH "SMALL" RADIUS



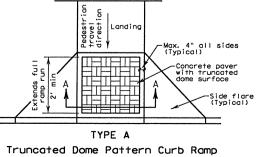
AT INTERSECTION W/FREE RIGHT TURN & ISLAND

# TYPICAL CROSSING LAYOUTS

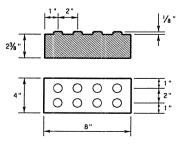
# SEE SHEET 1 OF 3 FOR DETAILS AND DIMENSIONS



Section A-A



DETECTABLE WARNINGS



Concrete paver with truncated dome surface

#### General Notes

Concrete paver units shall meet all requirements of ASTM C-936, C-33, and shall be laid in a two by two unit basket weave pattern, unless shown otherwise in the plans.

Domes shall be aligned in the direction of pedestrian travel.

Concrete paver units shall have a truncated dome top surface for detectable warning to pedestrians.

Concrete paver unit color for the ramp shall be a contrasting color that provides a light reflective value that significantly contrasts with the adjacent surfaces. The color of the concrete pover units shall be shown elsewhere in the plans. (Adjacent surfaces include side flores).

Concrete paver units shall be saw cut only and any cut unit shall not be less than 25 percent of a full unit.



SIDEWALK

SIDEWALK ADJACENT TO CURB

Texas Department of Transportation Design Division (Roadway)

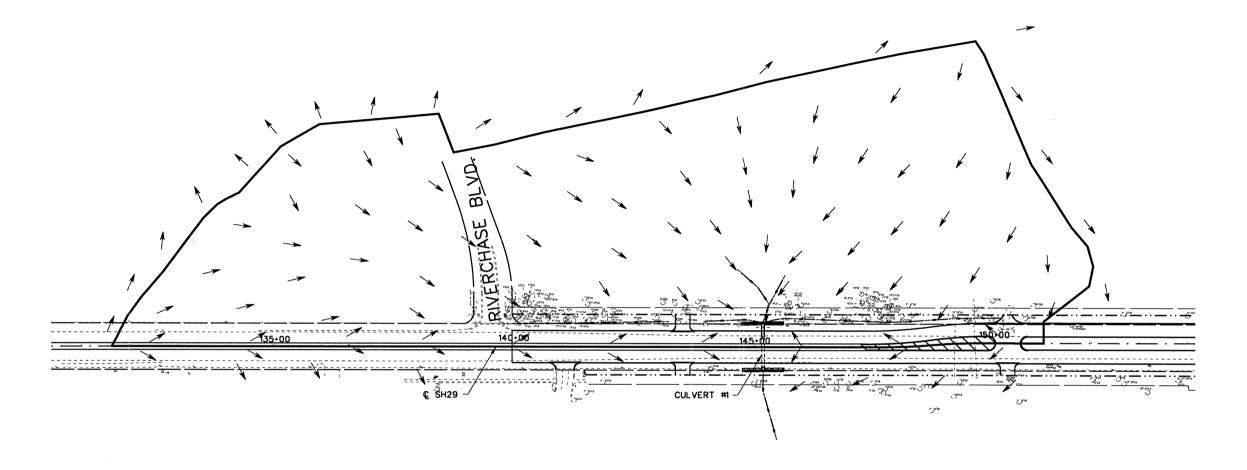
# PEDESTRIAN FACILITIES

INTERSECTION LAYOUTS DETECTABLE WARNINGS

PED-02

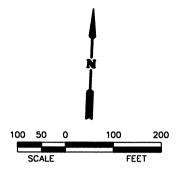
SHEET 3 OF 3

| FILE:     | ped02.dgn      | DN: M | AM       | CK: MAM | DW: BGD     |        | CK: |         |
|-----------|----------------|-------|----------|---------|-------------|--------|-----|---------|
| © TxE     | 00T March 2002 | DIST  | FED RE   | G FED   | ERAL AID P  | ROJECT | •   | SHEET   |
| REVISIONS |                | AUS   | 6        | C       | CC 337-1-29 |        |     | 91      |
|           |                |       | COU      | NTY     | CONTROL     | SECT   | JOB | HIGHWAY |
|           |                |       | MITTER T | AMCON   | 0777        | 0.1    | 000 | CU 20   |



 DRIVEWAY CULVERT NO.
 UPSTREAM € STATION OFFSET € ELEV.
 DOWNSTREAM € STATION OFFSET € ELEV.
 CULVERT DESCRIPTION DESCRIPTION

 1
 145+16.34
 52.0' LT.
 812.35
 145+17.31
 50.0' LT.
 811.55
 1-5'X6' SBC



# LEGEND:

DRAINAGE AREA NUMBER

TO DRAINAGE AREA (ACRE)

DRAINAGE FLOW DIRECTION



NO. REVISION BY DATE

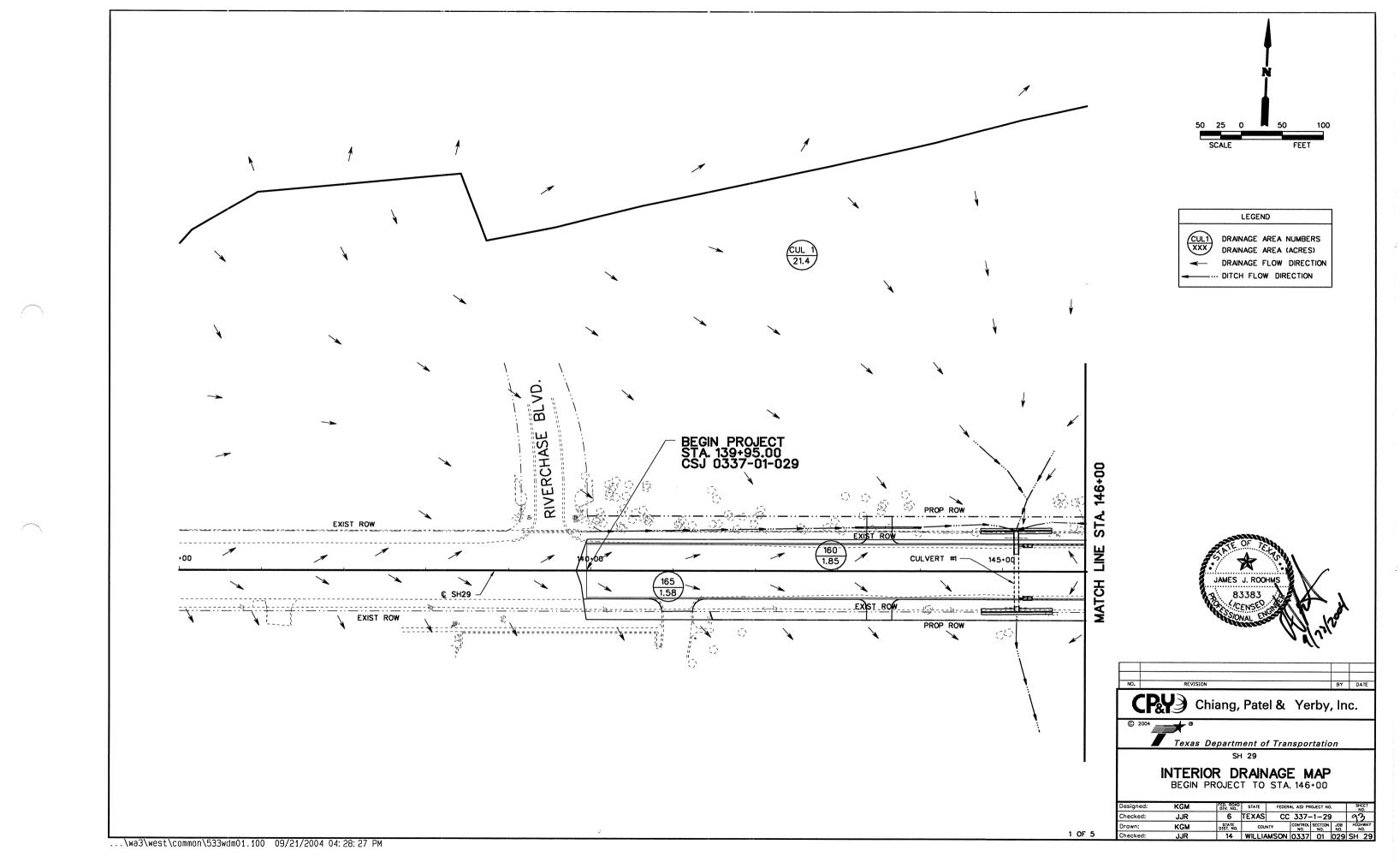
© 2004 \*\*\*

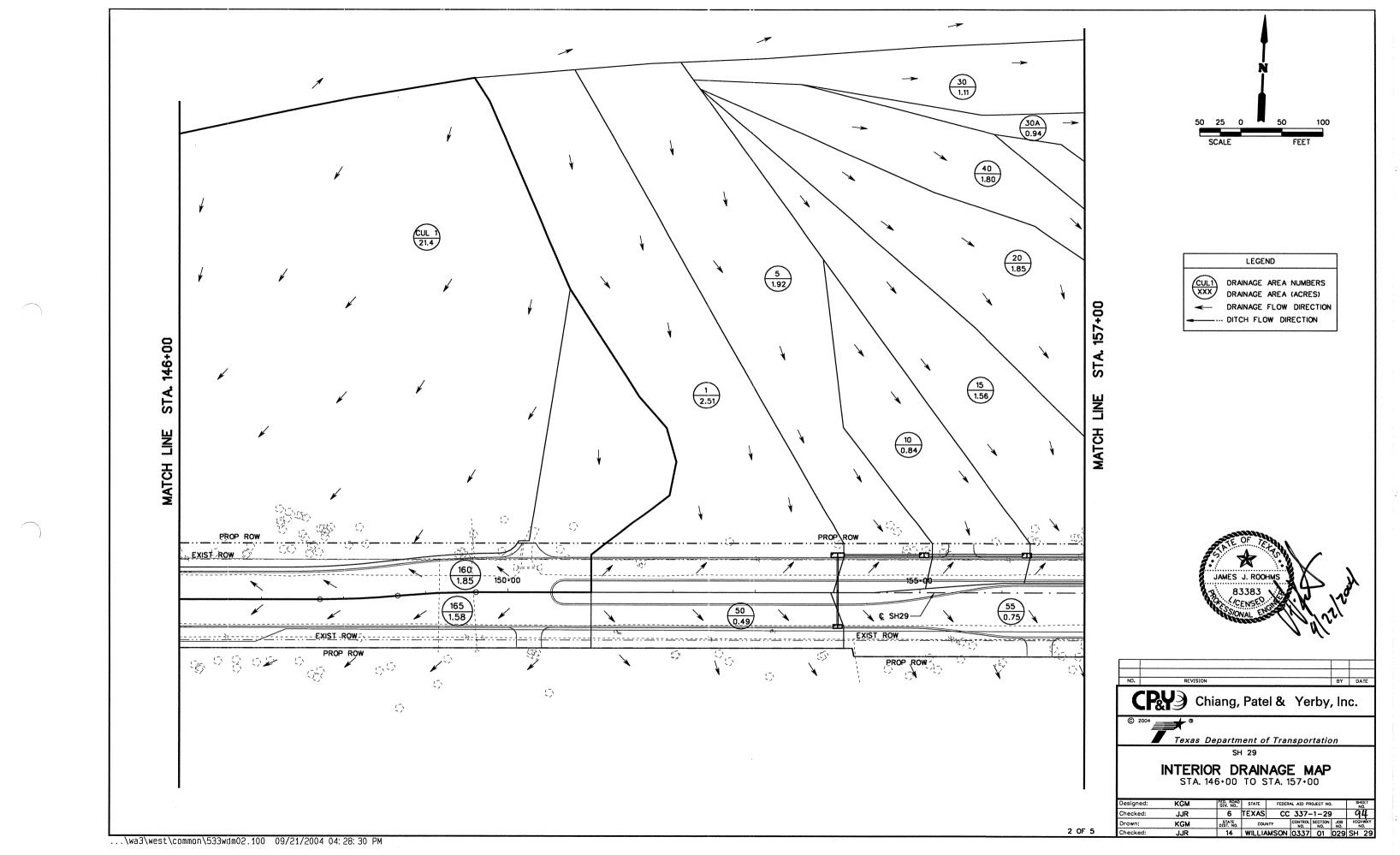
Chiang, Patel & Yerby, Inc.

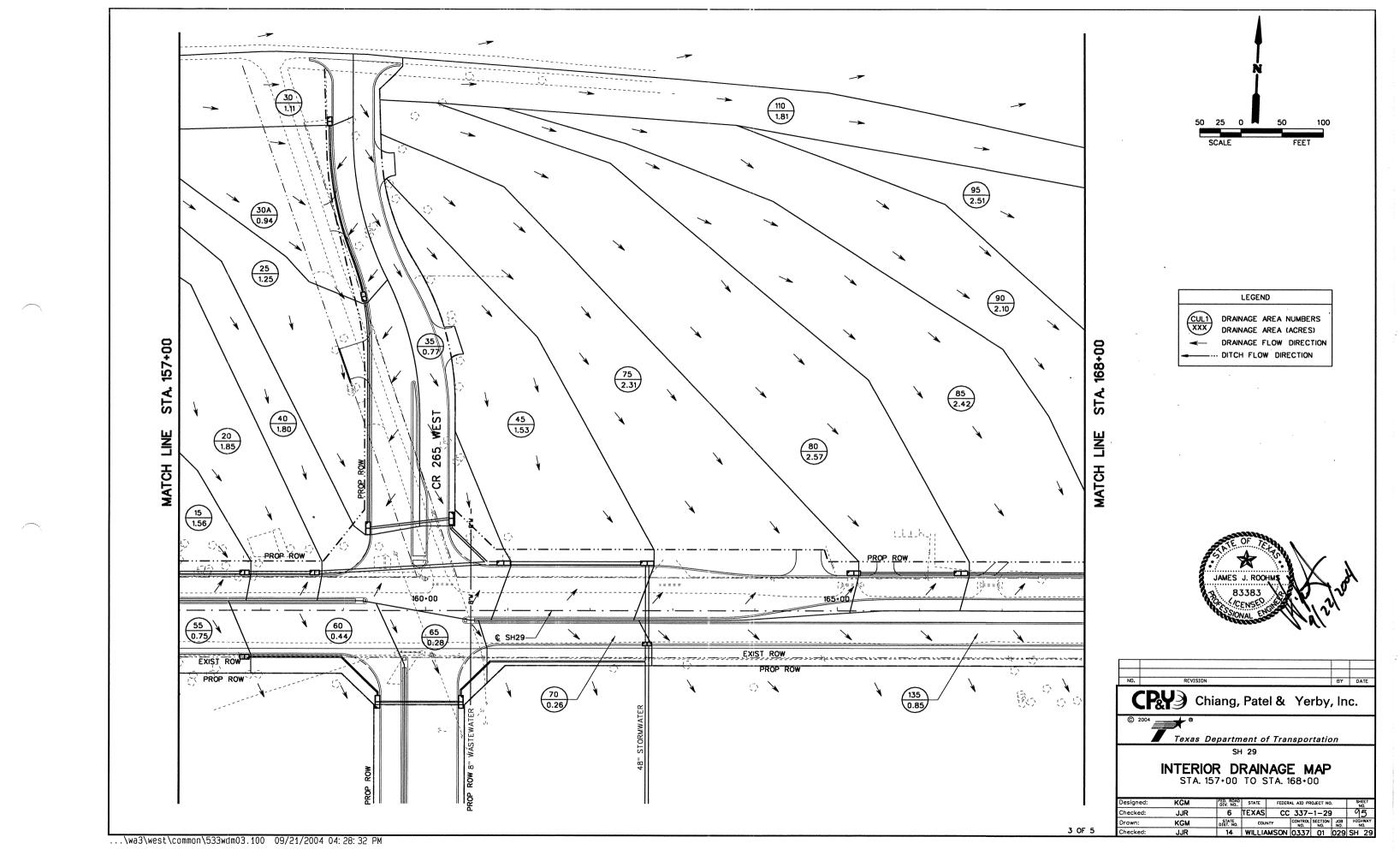
Texas Department of Transportation

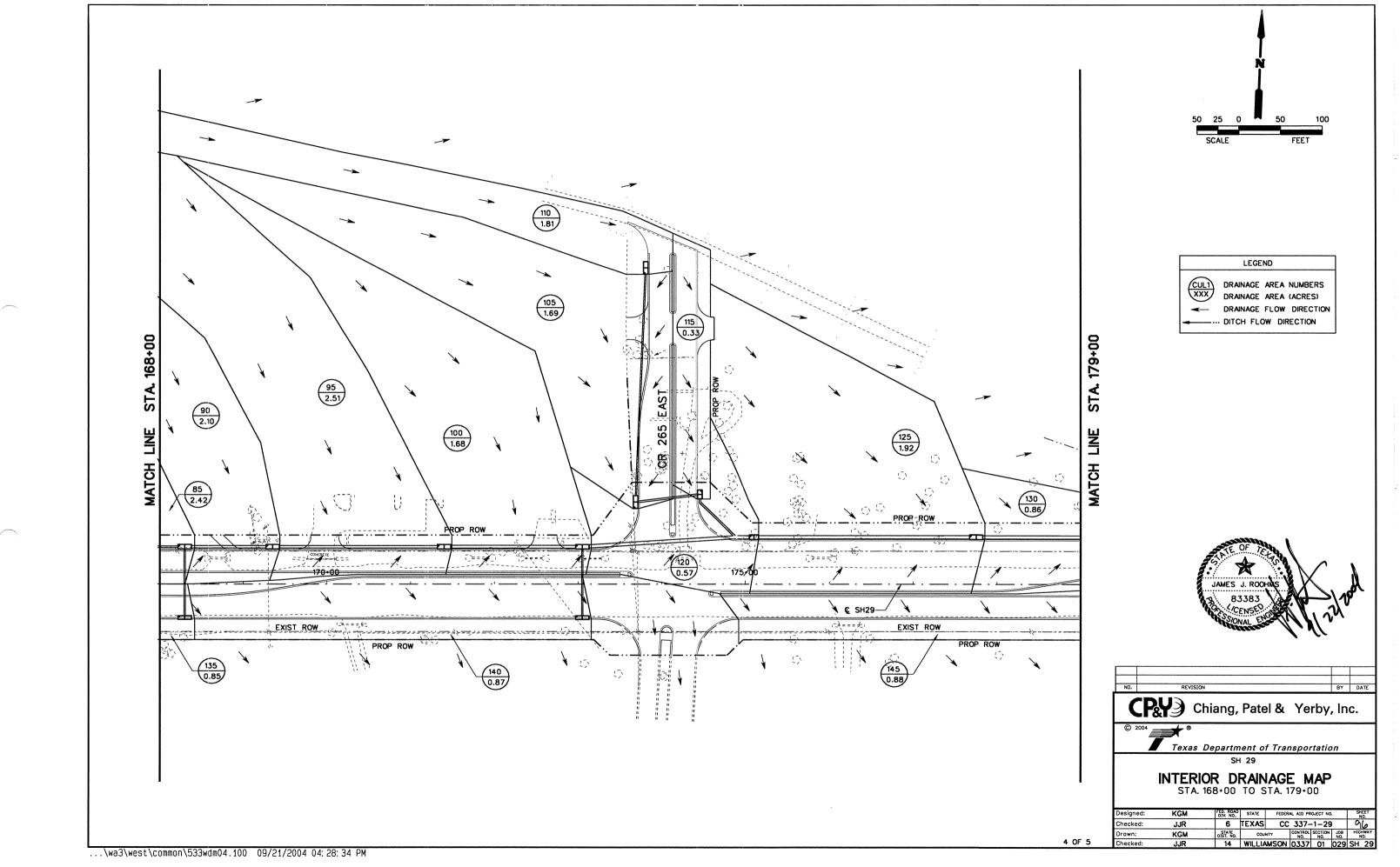
EXTERIOR DRAINAGE MAP

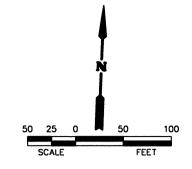
| esigned: | JWP | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       | ).         | SHEET<br>NO.  |
|----------|-----|----------------------|--------|-------|----------------|----------------|------------|---------------|
| hecked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 92            |
| rawn:    | KGM | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HICHWA<br>NO. |
| hecked:  | JJR | 14                   | WILLIA | MSON  | 0.3.37         | 01             | 029        | SH 2          |

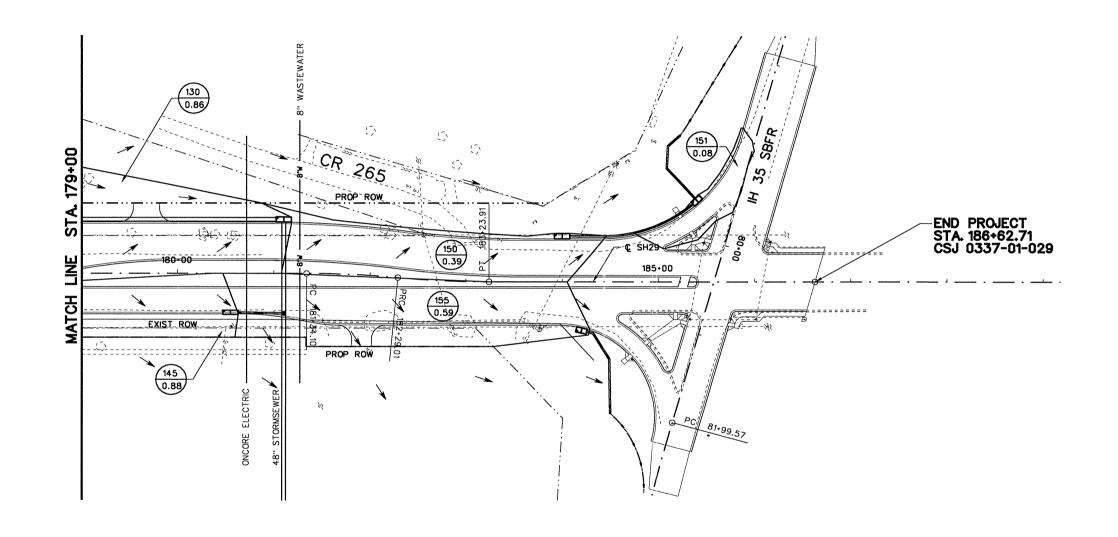


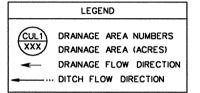




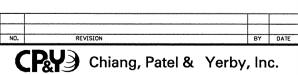












Texas Department of Transportation

INTERIOR DRAINAGE MAP STA. 179+00 TO END PROJECT

| Designed: | KGM | FED. ROAD<br>DIV. NO., | STATE  | FEDERAL AID PROJECT NO. |                |                |            |    | EET<br>O. |
|-----------|-----|------------------------|--------|-------------------------|----------------|----------------|------------|----|-----------|
| Checked:  | JJR | 6                      | TEXAS  | CC                      | 337-           | -1-29          | )          | 9  | 7         |
| Drawn:    | KGM | STATE<br>DIST. NO.     | cou    | NTY                     | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | WAY       |
| Checked:  | JJR | 14                     | WILLIA | MSON                    | 0337           | 01             | 029        | SH | 29        |

DESIGN FREQUENCY : 10 Years MEASUREMENT UNITS: ENGLISH

PROJECT DESCRIPTION : STORMSEWER SYSTEM A

Runoff Computation for Design Frequency.

2.51

0.32

0.84

0.09

1.85

1.25

0.77

1.80

1.53

0.49

0.31

0.75

0.44

0.28

1.79

OUTPUT FOR DESIGN FREQUENCY of: 10 Years 

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

(ocre) (min) (min)

10.00

Pavement

10.00

Pavement 0.75 Undeveloped

10.00

10.00

10.00

10.00

10.00

10.00

Pavement

10.00

10.00

0.18 Undeveloped

0.24 Undeveloped

0.10 Undeveloped

0.03 Undeveloped

0.12 Undeveloped

Undeveloped

1.56 10.00 10.00

0.94 10.00 10.00

10.00

1.40 Undeveloped

0.85 Undeveloped

0.06 Pavement 1.79 Undeveloped

0.40 Pavement

0.49 Pavement 0.28 Undeveloped

0.40 Pavement

0.26 Pavement 1.27 Undeveloped

0.51 Pavement

0.34 Pavement

0.25 Pavement

0.26 10.00

0.14 Payement

1.92 10.00

0.13 Pavement

0.11 Pavement 1.45 Undeveloped

1.11 10.00

0.22 Pavement 0.89 Undeveloped

0.25 Pavement

0.69 Undeveloped

2.19 Undeveloped

Intensity

(in/hr)

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

PROJECT NAME : SH29 WEST JOB NUMBER : TXD0153-3

0.333

0.9

0.25

0.32

0.9

0.25

0.271

0.25

0.458

0.9

0.25

0.664

0.9

0.25

0.394

0.25

0.36

0.9

0.25

0.661

0.9

0.25

0.692

0.9

0.25

0.752

0.9 0.25

0.9

0.6

0.9 0.25

0.294

0.25

0.296

0.25

0.379

0.9

0.9

0.25

0.25 CI-30A 0.423

0.9

0.9

0.9

0.9

ID

C 1-1

C I-10

C 1-20

C 1-25

C 1-35

C 1-40

C 1-45

C 1-50

C 1-55

C 1-60

C 1-65

C 1-70

C 1-30

Run @ 9/7/2004 10:29:59 AM

Supply Q

(cfs)

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

Version 3.05, Jan. 25, 2002

Total Q

(cfs)

\_\_\_\_\_

6.666

2.142

4.001

4.567

4.077

5.664

4.400

2.585

4.141

2.641

1.855

1.245

4.504

3.682

3.355

3.171

On Grade Inlet Configuration Data

C 1-70

C I-15

C 1-5

Curb

Curb

Curb

| Inlet  | Inlet | Inlet          | SI   | opes  | Gut   | ter   | Gro           | ote . | Pond Width   | Critic        |
|--------|-------|----------------|------|-------|-------|-------|---------------|-------|--------------|---------------|
| ID     | Туре  | Length<br>(ft) | Long | Trans | n     | Depr. | Width<br>(ft) | Туре  | Allowed (ft) | Elev.<br>(ft) |
| C I-1  | Curb  | 15.00          | 1.00 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 830.52        |
| C I-10 | Curb  | 10.00          | 0.40 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 828.29        |
| C 1-20 | Curb  | 10.00          | 0.40 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 827.45        |
| C 1-25 | Curb  | 15.00          | 2.50 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 826.78        |
| C 1-35 | Curb  | 15.00          | 2.50 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 827.58        |
| C 1-40 | Curb  | 15.00          | 1.33 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 825.47        |
| C 1-45 | Curb  | 15.00          | 1.33 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 823.00        |
| C 1-50 | Curb  | 10.00          | 1.00 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 830.52        |
| C 1-55 | Curb  | 10.00          | 0.40 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 827.45        |
| C 1-60 | Curb  | 15.00          | 4.50 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 823.70        |
| C 1-65 | Curb  | 15.00          | 4.50 | 2.00  | 0.014 | 0.33  | n/a           | n/a   | 14.00        | 822.98        |

n/a

n/a n/a

n/a n/a

n/a n/a

n/a n/a

14.00

14.00

14.00

14.00

14.00

823.24

829.49

827.69

834.79

831.07

10.00 1.33 2.00 0.014 0.33

10.00 0.98 2.00 0.014 0.33

10.00 0.40 2.00 0.014 0.33

CI-30 Curb 10.00 0.35 2.00 0.014 0.33

CI-30A Curb 10.00 1.63 2.00 0.014 0.33

| 0n | Grade | Inlets | Conmputation | Data. |
|----|-------|--------|--------------|-------|
|    |       |        |              |       |

| Inlet   | Inlet | Total Q | Intercept | 0 В   | yposs  | To inlet | Required | Actual | Ponded |
|---------|-------|---------|-----------|-------|--------|----------|----------|--------|--------|
| ID      | Type  |         | Capacity  | Allow | Actual | ID       | Length   | Length | Width  |
|         |       | (cfs)   | (cfs)     | (cfs) | (cfs)  |          | (ft)     | (ft)   | (ft)   |
| C I-1   | Curb  | 6.666   | 6.663     | 0.003 | 0.003  | C 1-5    | 15.22    | 15.00  | 13.95  |
| C I-10  | Curb  | 2.318   | 2.318     | 0.000 | 0.000  |          | 6.67     | 10.00  | 11.15  |
| C 1-20  | Curb  | 4.001   | 4.001     | 0.000 | 0.000  |          | 9.25     | 10.00  | 13.70  |
| C 1-25  | Curb  | 4.603   | 4.603     | 0.000 | 0.000  |          | 14.86    | 15.00  | 10.25  |
| C 1-35  | Curb  | 4.077   | 4.077     | 0.000 | 0.000  |          | 13.86    | 15.00  | 9.80   |
| C 1-40  | Curb  | 5.664   | 5.664     | 0.000 | 0.000  |          | 14.64    | 15.00  | 12.45  |
| C 1-45  | Curb  | 4.400   | 4.400     | 0.000 | 0.000  |          | 12.59    | 15.00  | 11.30  |
| C 1-50  | Curb  | 2.585   | 2.585     | 0.000 | 0.000  |          | 8.69     | 10.00  | 9.80   |
| C 1-55  | Curb  | 4.141   | 4.141     | 0.000 | 0.000  |          | 9.43     | 10.00  | 13.85  |
| C1-60   | Curb  | 2.641   | 2.641     | 0.000 | 0.000  |          | 12.49    | 15.00  | 7.45   |
| C 1-65  | Curb  | 1.855   | 1.855     | 0.000 | 0.000  |          | 10.37    | 15.00  | 6.50   |
| C 1-70  | Curb  | 1.245   | 1.245     | 0.000 | 0.000  |          | 6.22     | 10.00  | 7.05   |
| C 1-5   | Curb  | 4.507   | 4.331     | 0.176 | 0.176  | C I-10   | 11.98    | 10.00  | 12.10  |
| C 1-15  | Curb  | 3.682   | 3.682     | 0.000 | 0.000  |          | 8.78     | 10.00  | 13.25  |
| C 1-30  | Curb  | 3.355   | 3.355     | 0.000 | 0.000  |          | 8.08     | 10.00  | 13.15  |
| C 1-30A | Curb  | 3.171   | 3.136     | 0.900 | 0.036  | C 1-25   | 10.90    | 10.00  | 9.65   |
|         |       |         |           |       |        |          |          |        |        |

## Cumulative Junction Discharge Computations

| Node    | Node   | Weighted | Cumulat. | Cumulat. | Intens. | User     | Additional 🚵 | Total   |
|---------|--------|----------|----------|----------|---------|----------|--------------|---------|
| I.D.    | Type   | C-Value  | Dr.Area  | Tc       |         | Supply Q | 0 in Node    | Disch   |
|         |        |          | (acres)  | (min)    | (in/hr) | cfs)     | (cfs)        | (cfs)   |
| C I-1   | Curb   | 0.387    | 3.00     | 10.26    | 7.89    | 0.000    | 8.51         | 17.659  |
| C I-10  | Curb   | 0.346    | 5.76     | 10.70    | 7.75    | 0.000    | 17.63        | 33.073  |
| C 1-20  | Curb   | 0.322    | 9.17     | 11.24    | 7.59    | 0.000    | 29.27        | 51.690  |
| C 1-25  | Curb   | 0.421    | 3.30     | 11.03    | 7.65    | 0.000    | 8.73         | 19.365  |
| C 1-35  | Curb   | 0.467    | 4.07     | 11.18    | 7.60    | 0.000    | 9.74         | 24.196  |
| C 1-40  | Curb   | 0.370    | 15.04    | 11.63    | 7.47    | 0.000    | 44.04        | 85.640  |
| C 1-45  | Curb   | 0.369    | 16.57    | 11.95    | 7.38    | 0.000    | 48.60        | 93.760  |
| C 1-50  | Curb   | 0.661    | 0.49     | 10.00    | 7.98    | 0.000    | 0.65         | 3.235   |
| C 1-55  | Curb   | 0.692    | 0.75     | 10.00    | 7.98    | 0.000    | 0.86         | 5.001   |
| C 1-60  | Curb   | 0.714    | 1.19     | 10.44    | 7.83    | 0.000    | 1.22         | 7.879   |
| C 1-65  | Curb   | 0.736    | 1.47     | 10.76    | 7.73    | 0.000    | 1.33         | 9.701   |
| C 1-70  | Curb   | 0.373    | 16.83    | 12.12    | 7.33    | 0.000    | 49.03        | 95.042  |
| C 1-5   | Curb   | 0.350    | 4.92     | 10.47    | 7.82    | 0.000    | 14.94        | 28.426  |
| C I-15  | Curb   | 0.335    | 7.32     | 11.09    | 7.63    | 0.000    | 22.84        | 41.565  |
| C 1-30  | Curb   | 0.379    | 1.11     | 10.00    | 7.98    | 0.000    | 3.20         | 6.555   |
| JB-1    | Jnc+B: | k 0.367  | 13.24    | 11.60    | 7.48    | 0.000    | 39.01        | 75.347  |
| JB-1A   | Jnc+B: | k 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 50.36        | 104.235 |
| C 1-30A | Curb   | 0.399    | 2.05     | 10.50    | 7.81    | 0.000    | 5.68         | 12.073  |
| EX-IN   | Jnc+B: | k 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 50.36        | 104.235 |
| EX-A1   | Jnc+B: | k 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 50.36        | 104.235 |
| EX-A2   | Jnc†B: | k 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 50.36        | 104.235 |
| EX-A3   | Jnc+B: | k 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 62.57        | 116.445 |
| EX-A4   | Jnc+B: | c 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 89.02        | 142.895 |
| EX-A5   | JnctB: | c 0.402  | 18.30    | 12.16    | 7.32    | 0.000    | 96.55        | 150.425 |
| OUT     | 0u+1+  | 0.402    | 18.30    | 12.16    | 7.32    | 0.000    | 96.55        | 150.425 |

# Conveyance Configuration Data

| Run# | Node   | I.D.    | Flowline | e Elev. |         |      |      |        |       |         |
|------|--------|---------|----------|---------|---------|------|------|--------|-------|---------|
|      | US     | DS      | . US     | DS      | Shape # | Span | Rise | Length | Slope | n_value |
|      |        |         | (ft)     | (ft)    |         | (ft) | (ft) | (ft)   | (%)   |         |
| 1    | C I-1  | C 1-5   | 827.20   | 826.20  | Circ 1  | 0.00 | 2.00 | 104.93 | 0.95  | 0.012   |
| 2    | C 1-5  | C 1-10  | 825.70   | 824.70  | Circ 1  | 0.00 | 2.50 | 121.57 | 0.82  | 0.012   |
| 3    | C I-10 | C 1-15  | 824.20   | 823.70  | Circ 1  | 0.00 | 3.00 | 153.63 | 0.33  | 0.012   |
| 4    | C I-15 | C 1-20  | 823.70   | 823.00  | Circ 1  | 0.00 | 3.00 | 86.18  | 0.81  | 0.012   |
| 5    | C 1-20 | JB-1    | 822.50   | 821.00  | Circ 1  | 0.00 | 3.50 | 210.62 | 0.71  | 0.012   |
| 7    | JB-1   | C 1-40  | 820.50   | 820.36  | Circ 1  | 0.00 | 4.00 | 19.72  | 0.71  | 0.012   |
| 8    | C1-40  | C 1-45  | 818.72   | 818.00  | Circ 1  | 0.00 | 4.00 | 173.51 | 0.41  | 0.012   |
| 9    | C 1-45 | C 1-70  | 818.00   | 817.50  | Circ 1  | 0.00 | 4.00 | 100.64 | 0.50  | 0.012   |
| 10   | C 1-30 | C 1-30A | 833.00   | 830.00  | Circ 1  | 0.00 | 1.50 | 223.15 | 1.34  | 0.012   |
| 11   | C1-30A | C 1-25  | 829.50   | 825.00  | Circ 1  | 0.00 | 2.00 | 292.65 | 1.54  | 0.012   |
| 12   | C 1-50 | C I-1   | 828.70   | 827.70  | Circ 1  | 0.00 | 1.50 | 91.00  | 1.10  | 0.012   |
| 13   | C 1-55 | C1-60   | 824.50   | 821.50  | Circ 1  | 0.00 | 1.50 | 192.53 | 1.56  | 0.012   |
| 16   | C1-70  | JB-1A   | 810.91   | 810.80  | Circ 1  | 0.00 | 4.00 | 21.92  | 0.50  | 0.012   |
| 14   | C1-60  | C 1-65  | 821.50   | 821.00  | Circ 1  | 0.00 | 1.50 | 100.50 | 0.50  | 0.012   |
| 15   | C 1-65 | JB-1A   | 820.00   | 812.05  | Circ 1  | 0.00 | 1.50 | 253.05 | 3.14  | 0.012   |
| 17   | JB-1A  | EX-IN   | 810.80   | 810.77  | Circ 1  | 0.00 | 4.00 | 5.00   | 0.66  | 0.012   |
| 18   | C 1-25 | C 1-35  | 824.00   | 822.00  | Circ 1  | 0.00 | 2.50 | 101.88 | 1.96  | 0.012   |
| 19   | C 1-35 | JB-1    | 822.00   | 821.50  | Circ 1  | 0.00 | 2.50 | 74.75  | 0.67  | 0.012   |
| 20   | EX-IN  | EX-A1   | 810.77   | 805.20  | Circ 1  | 0.00 | 4.00 | 303.00 | 1.84  | 0.012   |
| 21   | EX-A1  | EX-A2   | 802.40   | 800.50  | Circ 1  | 0.00 | 4.00 | 75.00  | 2.53  | 0.012   |
| 22   | EX-A2  | EX-A3   | 797.18   | 795.00  | Circ 1  | 0.00 | 4.00 | 88.00  | 2.48  | 0.012   |
| 23   | EX-A3  | EX-A4   | 791.33   | 783.10  | Circ 1  | 0.00 | 4.50 | 387.00 | 2.13  | 0.012   |
| 24   | EX-A4  | EX-A5   | 782.60   | 780.12  | Circ 1  | 0.00 | 5.00 | 123.00 | 2.02  | 0.012   |
| 25   | EX-A5  | OUT     | 771.98   | 770.00  | Circ 1  | 0.00 | 5.00 | 110.00 | 1.80  | 0.012   |

Conveyance Hydraulic Computations. Tailwater = 0.000 (ft)

|       | Hydraulic        | Gradelin | =======<br>R | Dep  | ======<br>th | Vel   | ======<br>ocity |        |        | Junc  |
|-------|------------------|----------|--------------|------|--------------|-------|-----------------|--------|--------|-------|
| Run#  | US Elev          |          | Fr.Slope     |      |              |       | Actual          | Q      | Cap    | Loss  |
| 11011 | (ft)             | (ft)     | (%)          | (ft) | (ft)         | (f/s) | (f/s)           | (cfs)  | (cfs)  | (ft)  |
| 1*    | 828.48           | 827.48   | 0.519        | 1.28 | 1.28         | 8.31  | 8.31            | 17.66  | 23.93  | 0.000 |
| 2*    | 827.24           | 826.24   | 0.409        | 1.54 | 1.54         | 8.94  | 8.94            | 28.43  | 40.31  | 0.000 |
| 3     | 826.22           | 825.57   | 0.209        | 2.02 | 2.02         | 6.55  | 6.55            | 33.07  | 41.23  | 0.000 |
| 4*    | 825.45           | 824.75   | 0.331        | 1.75 | 1.75         | 9.74  | 9.74            | 41.56  | 65.13  | 0.000 |
| 5*    | 824.37           | 822.87   | 0.225        | 1.87 | 1.87         | 9.86  | 9.86            | 51.69  | 91.99  | 0.000 |
| 7*    | 822.67           | 822.53   | 0.234        | 2.17 | 2.17         | 10.81 | 10.81           | 75.35  | 131.14 | 0.000 |
| 8     | 821.56           | 820.84   | 0.303        | 2.84 | 2.84         | 8.96  | 8.96            | 85.64  | 100.26 | 0.000 |
| 9*    | 820.84           | 820.34   | 0.363        | 2.84 | 2.84         | 9.81  | 9.81            | 93.76  | 109.70 | 0.000 |
| 10*   | 833.75           | 830.75   | 0.332        | 0.75 | 0.75         | 7.46  | 7.46            | 6.55   | 13.20  | 0.000 |
| 11*   | 830.38           | 825.88   | 0.243        | 0.88 | 0.88         | 9.14  | 9.14            | 12.07  | 30.40  | 0.000 |
| 12*   | 829.23           | 828.48   | 0.081        | 0.53 | 0.78         | 5.75  | 3.48            | 3.23   | 11.93  | 0.000 |
| 13*   | 825.12           | 822.70   | 0.193        | 0.62 | 1.20         | 7.33  | 3.31            | 5.00   | 14.21  | 0.000 |
| 16*   | 813.79           | 813.68   | 0.373        | 2.88 | 2.88         | 9.83  | 9.83            | 95.04  | 110.25 | 0.000 |
| 14    | 822.70           | 822.09   | 0.479        | 1.20 | 1.20         | 5.22  | 5.22            | 7.88   | 8.03   | 0.000 |
| 15*   | 821.20           | 813.58   | 0.726        | 0.73 | 1.50         | 11.32 | 5.49            | 9.70   | 20.18  | 0.000 |
| 17*   | 813.58           | 813.55   | 0.449        | 2.78 | 2.78         | 11.18 | 11.18           | 104.24 | 126.44 | 0.000 |
| 18*   | 824.99           | 823.48   | 0.190        | 0.96 | 1.48         | 11.20 | 6.38            | 19.37  | 62.27  | 0.000 |
| 19*   | 823.48           | 822.98   | 0.296        | 1.48 | 1.48         | 7.97  | 7.97            | 24.20  | 36.35  | 0.000 |
| 20*   | 812.75           | 807.18   | 0.449        | 1.98 | 1.98         | 16.76 | 16.76           | 104.24 | 210.98 | 0.000 |
| 21*   | 804.21           | 802.31   | 0.449        | 1.81 | 1.81         | 18.89 | 18.89           | 104.24 | 247.75 | 0.000 |
| 22*   | 799.00           | 796.82   | 0.449        | 1.82 | 1.82         | 18.73 | 18.73           | 104.24 | 245.00 | 0.000 |
| 23*   | 793.24           | 785.01   | 0.299        | 1.91 | 1.91         | 18.15 | 18.15           | 116.45 | 310.75 | 0.000 |
| 24*   | 784.66           | 782.18   | 0.256        | 2.06 | 2.06         | 18.72 | 18.72           | 142.90 | 400.73 | 0.000 |
| 25*   | 774.17<br>====== | 772.19   | 0.284        | 2.19 | 2.19         | 18.16 |                 | 150.43 |        | 0.000 |

- \* Super critical flow.
- @ EXISTING STORMSEWER SYSTEM.

1 OF 4

Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

WINSTORM COMPUTATIONS

| Designed: | KGM | FED. ROAD<br>DIV. NO | STATE  | E FEDERAL AID PROJECT NO. |                |                | SHE        |      |    |
|-----------|-----|----------------------|--------|---------------------------|----------------|----------------|------------|------|----|
| Checked:  | JJR | 6                    | TEXAS  | CC                        | 337-           | -1-29          | 1          | 9    | 8  |
| Drawn:    | KGM | STATE<br>DIST. NO.   | cou    | NTY                       | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HIGH |    |
| Checked:  | JJR | 14                   | WILLIA | MSON                      | 0337           | 01             | 029        | SH   | 29 |

ADDITIONAL Q IN PROPOSED NODE IS THE Q CALCULATED FOR A FUTURE DEVELOPED C VALUE OF 0.07 MINUS THE Q VALUE CALCULATED WITH THE UNDEVELOPED C VALUE OF 0.25



SYSTEM A

DESIGN FREQUENCY : 10 Years

MEASUREMENT UNITS: ENGLISH

PROJECT DESCRIPTION : STORMSEWER SYSTEM B

Runoff Computation for Design Frequency.

Area

2.31

2.57

2.10

2.51

1.68

1.69

0.25

1.81 0.32

0.57

1.92

0.86

0.85

0.87

0.88

OUTPUT FOR DESIGN FREQUENCY of: 10 Years

\_\_\_\_\_\_\_

(acre) (min) (min)

10.00

1.94 Undeveloped

2.42 Undeveloped

1.99 Undeveloped

2.33 Undeveloped

1.54 Undeveloped

1.44 Undeveloped

1.49 Undeveloped

0.09 Undeveloped

0.22 Undeveloped

1.50 Undeveloped

0.38 Undeveloped

10.00

10.00

10.00

0.28 Undeveloped

0.36 Undeveloped

2.24 Undeveloped

10.00

10.00

10.00

0.33 10.00

0.24 Pavement

0.35 Pavement

0.42 Pavement

0.48 Pavement

0.52 Pavement 0.33 Undeveloped

0.59 Payement

0.52 Pavement

2.42 10.00

0.18 Pavement

10.00

10.00

10.00

Pavement

10.00

Pavement

10.00

10.00

0.37 Pavement

0.15 Pavement

0.11 Payement

0.18 Pavement

0.14 Pavement

Tc Used

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

10.00

Intensity

(in/hr)

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

7.98

PROJECT NAME : SH29 WEST

JOB NUMBER : TXD0153-3

C Value

0.354

0.9

0.25

0.288

0.284

0.9

0.25

0.297

0.9

0.25

0.25

0.25

0.25

0.9

0.25

0.25

0.25

0.25

0.9

0.634

0.9

0.25

0.298

0.25

CI-100 0.304

CI-105 0.346

CI-110 0.365

CI-115 0.723

CI-120 0.649

CI-125 0.392

CI-130 0.613

CI-135 0.648

CI-140 0.691

C I-145

C 1-85

0.9

C 1-75

C 1-80

C 1-90

C1-95

Run @ 9/7/2004 10:52:40 AM

Supply Q

(cfs)

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

0.000

Version 3.05. Jan. 25. 2002

Total Q

(cfs)

6.526

5.904

4.759

5.940

4.077

4.667

5.270

1.903

2.952

6.007

4.204

4.392

4.795

4.452

5.760

ID

On Grade Inlet Configuration Data Inlet inlet inlet Slopes Grate Gutter

Pond Width Critic Width Type Allowed Fiev. (f+) (ft) (ft) (ft) 819.96 n/a n/a

n/a n/a

14.00

816.86

Type Length Long Trans n Depr. (f+) (%) (%) Curb 15.00 1.30 2.00 0.014 0.33 15.00 1.00 2.00 0.014 0.33 Curb n/a n/a 14.00 Curb 15.00 1.00 2.00 0.014 0.33 n/a n/a 14.00 15.00 1.00 2.00 0.014 0.33 Curb n/a n/a 14.00 Curb 15.00 1.00 2.00 0.014 0.33 n/a n/a 14.00 15.00 1.50 2.00 0.014 0.33 n/a n/a 14.00 15.00 1.06 2.00 0.014 0.33 14.00 D/0 D/0

C 1-75 C 1-80 818.66 C1-90 815.81 C1-95 813.76 C I-100 812.22 CI-105 Curb 810.98 CI-110 Curb 814.49 CI-115 Curb 10.00 1.50 2.00 0.014 0.33 n/a n/a 14.00 811.36 C1-120 10.00 1.00 2.00 0.014 0.33 Curb n/a n/a 14.00 809.99 C 1-125 Curb 15.00 1.00 2.00 0.014 0.33 n/a n/a14.00 807.16 CI-130 Curb 15.00 1.00 2.00 0.014 0.33 n/a 14.00 800.65 C I-135 Curb 15.00 1.00 2.00 0.014 0.33 n/a n/a 14.00 816.86 CI-140 Curb 15.00 1.00 2.00 0.014 0.33 n/a n/a 14.00 812.22 15.00 2.20 2.00 0.014 0.33 CI-145 Curb n/a n/a 14.00 802.11

On Grade Inlets Commoutation Data.

CI-85 Curb 15.00 1.00 2.00 0.014 0.33

| In let<br>ID | Inlet<br>Type | Total Q<br>(cfs) | Intercept<br>Capacity<br>(cfs) | Q B<br>Allow<br>(cfs) | ypass<br>Actual<br>(cfs) | To inlet | Required<br>Length<br>(ft) | Actual<br>Length<br>(ft) | Ponded<br>Width<br>(ft) |
|--------------|---------------|------------------|--------------------------------|-----------------------|--------------------------|----------|----------------------------|--------------------------|-------------------------|
| <br>C I-75   | Curb          | 6.526            | 6.491                          | 0.036                 | 0.036                    | C I-80   | 15.88                      | 15.00                    | 13.20                   |
| C1-80        | Curb          | 5.939            | 5.939                          | 0.000                 | 0.000                    | C, 00    | 14.18                      | 15.00                    | 13.35                   |
| C1-90        | Curb          | 4.759            | 4.759                          | 0.000                 | 0.000                    |          | 12.42                      | 15.00                    | 12.30                   |
| C1-95        | Curb          | 5.940            | 5.940                          | 0.000                 | 0.000                    |          | 14.18                      | 15.00                    | 13.35                   |
| C 1-100      |               | 4.077            | 4.077                          | 0.000                 | 0.000                    |          | 11.33                      | 15.00                    | 11.60                   |
| C I-105      |               | 4.667            | 4.667                          | 0.000                 | 0.000                    |          | 13.38                      | 15.00                    | 11.30                   |
| C I-110      |               | 5.270            | 5.270                          | 0.000                 | 0.000                    |          | 13.37                      | 15.00                    | 12.65                   |
| C 1-115      |               | 1.903            | 1.903                          | 0.000                 | 0.000                    |          | 8.04                       | 10.00                    | 8.10                    |
| C I-120      |               | 2.952            | 2.952                          | 0.000                 | 0.000                    |          | 9.39                       | 10.00                    | 10.30                   |
| C 1-125      |               | 6.007            | 6.007                          | 0.000                 | 0.000                    |          | 14.31                      | 15.00                    | 13.45                   |
| C I-130      |               | 4.204            | 4.204                          | 0.000                 | 0.000                    |          | 11.54                      | 15.00                    | 11.75                   |
| C I-135      |               | 4.392            | 4.392                          | 0.000                 | 0.000                    |          | 11.85                      | 15.00                    | 11.95                   |
| C1-140       |               | 4.795            | 4.795                          | 0.000                 | 0.000                    |          | 12.49                      | 15.00                    | 12.35                   |
| C I-145      |               | 4.452            | 4.452                          | 0.000                 | 0.000                    |          | 14.16                      | 15.00                    | 10.35                   |
| C 1-85       |               | 5.760            | 5.760                          | 0.000                 | 0.000                    |          | 13.93                      | 15.00                    | 13.20                   |

Cumulative Junction Discharge Computations

| Node<br>I.D. | Node<br>Type | Weighted<br>C-Value | Dr.Area | Cumulat.<br>To | Intens. | User<br>Supply 0 | Additional<br>Q in Node | Total<br>Disch |
|--------------|--------------|---------------------|---------|----------------|---------|------------------|-------------------------|----------------|
|              |              |                     | (acres) | (min)<br>      | (in/hr) | cfs)             | (cfs)                   | (cfs)          |
| C 1-75       | Curb         | 0.354               | 2.31    | 10.00          | 7.98    | 0.000            | 6.96                    | 13.486         |
| C 1-80       | Curb         | 0.319               | 4.88    | 10.26          | 7.89    | 0.000            | 15.65                   | 27.946         |
| C 1-90       | Curb         | 0.334               | 10.25   | 10.71          | 7.75    | 0.000            | 32.01                   | 58.564         |
| C 1-95       | Curb         | 0.327               | 12.76   | 11.01          | 7.65    | 0.000            | 40.37                   | 72.300         |
| C I-100      | Curb         | 0.345               | 15.31   | 11.29          | 7.57    | 0.000            | 46.91                   | 86.905         |
| C 1-105      | Curb         | 0.356               | 3.50    | 10.65          | 7.77    | 0.000            | 10.52                   | 20.194         |
| C I-110      | Curb         | 0.365               | 1.81    | 10.00          | 7.98    | 0.000            | 5.35                    | 10.620         |
| C I-115      | Curb         | 0.387               | 3.83    | 10.77          | 7.73    | 0.000            | 10.84                   | 22.309         |
| C I-120      | Curb         | 0.362               | 19.71   | 11.63          | 7.47    | 0.000            | 58.54                   | 111.873        |
| C I-125      | Curb         | 0.365               | 21.63   | 12.05          | 7.35    | 0.000            | 63.93                   | 121.952        |
| C I-130      | Curb         | 0.374               | 22.49   | 12.53          | 7.22    | 0.000            | 65.29                   | 126.077        |
| C I-135      | Curb         | 0.648               | 0.85    | 10.00          | 7.98    | 0.000            | 1.18                    | 5.572          |
| C1-140       | Curb         | 0.691               | 0.87    | 10.00          | 7.98    | 0.000            | 1.01                    | 5.805          |
| C I-145      | Curb         | 0.634               | 0.88    | 10.00          | 7.98    | 0.000            | 1.29                    | 5.742          |
| C 1-85       | Curb         | 0.347               | 8.15    | 10.55          | 7.80    | 0.000            | 24.87                   | 46.943         |
| JB-2         | Junct        | 0.354               | 19.14   | 11.59          | 7.48    | 0.000            | 57.75                   | 108.388        |
| MH-5         | CircMr       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 66.58                   | 131.054        |
| JB-3         | Jnc+B>       | 0.000               | 0.00    | 0.00           | 0.00    | 0.000            | 0.00                    | 0.000          |
| EX-IN        | Jnc+B>       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 66.58                   | 131.054        |
| EX-B1        | Jnc+B>       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 91.87                   | 156.344        |
| EX-B2        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 116.96                  | 181.434        |
| EX-83        | Jnc+Bx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 155.14                  | 219.614        |
| EX-84        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 176.64                  | 241.114        |
| EX-B5        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 241.13                  | 305.604        |
| EX-B6        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 265.41                  | 329.884        |
| EX-B7        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 272.80                  | 337.274        |
| EX-B8        | JnctBx       | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 332.41                  | 396.884        |
| OUT          | 0u+1+        | 0.384               | 23.37   | 12.68          | 7.18    | 0.000            | 332.41                  | 396.884        |

|      | •       | •       | ation Date |        |         |      |      |        |       |         |
|------|---------|---------|------------|--------|---------|------|------|--------|-------|---------|
| Run# |         |         | Flowline   |        |         |      |      |        |       |         |
|      | US      | DS      | us         | DS     | Shape # | Span | Rise | Length | Slope | n_value |
|      |         |         | (ft)       | (ft)   |         | (ft) | (ft) | (ft)   | (%)   |         |
| 1    | C 1-75  | C 1-80  | 817.50     | 816.00 | Circ 1  | 0.00 | 2.00 | 131.46 | 1.14  | 0.012   |
| 2    | C 1-80  | C 1-85  | 816.00     | 813.50 | Circ 1  | 0.00 | 2.00 | 181.77 | 1.38  | 0.012   |
| 3    | C 1-85  | C 1-90  | 812.50     | 811.50 | Circ 1  | 0.00 | 3.00 | 101.83 | 0.98  | 0.012   |
| 4    | C 1-90  | C 1-95  | 811.50     | 809.50 | Circ 1  | 0.00 | 3.00 | 205.62 | 0.97  | 0.012   |
| 5    | C 1-95  | C I-100 | 809.00     | 808.00 | Circ 1  | 0.00 | 3.50 | 166.54 | 0.60  | 0.012   |
| 6    | C I-100 | JB-2    | 804.94     | 803.92 | Circ 1  | 0.00 | 4.00 | 182.32 | 0.56  | 0.012   |
| 8    | JB-2    | C I-120 | 803.92     | 803.79 | Circ 1  | 0.00 | 4.00 | 22.68  | 0.57  | 0.012   |
| 9    | C 1-120 | C I-125 | 803.50     | 802.00 | Circ 1  | 0.00 | 4.00 | 267.51 | 0.56  | 0.012   |
| 10   | C I-125 | C I-130 | 798.20     | 796.00 | Circ 1  | 0.00 | 4.00 | 333.10 | 0.66  | 0.012   |
| 11   | C I-130 | MH-5    | 796.00     | 795.30 | Circ 1  | 0.00 | 4.00 | 101.55 | 0.69  | 0.012   |
| 12   | C 1-135 | C 1-85  | 815.00     | 814.00 | Circ 1  | 0.00 | 1.50 | 88.22  | 1.13  | 0.012   |
| 13   | C1-140  | C I-100 | 810.40     | 810.00 | Circ 1  | 0.00 | 1.50 | 88.53  | 0.45  | 0.012   |
| 14   | CI-110  | C I-105 | 812.00     | 809.00 | Circ 1  | 0.00 | 1.50 | 289.48 | 1.04  | 0.012   |
| 15   | C 1-105 | C I-115 | 808.50     | 807.25 | Circ 1  | 0.00 | 2.00 | 77.69  | 1.61  | 0.012   |
| 16   | C I-115 | JB-2    | 807.25     | 804.92 | Circ 1  | 0.00 | 2.00 | 70.48  | 3.31  | 0.012   |
| 17   | MH-5    | EX-IN   | 789.64     | 789.48 | Circ 1  | 0.00 | 4.00 | 25.89  | 0.62  | 0.012   |
| 18   | C I-145 | MH-5    | 798.50     | 797.80 | Circ 1  | 0.00 | 1.50 | 55.35  | 1.26  | 0.012   |
| 19   | EX-IN   | EX-B1   | 789.48     | 788.12 | Circ 1  | 0.00 | 4.00 | 224.11 | 0.61  | 0.012   |
| 20   | EX-B1   | EX-B2   | 788.12     | 787.25 | Circ 1  | 0.00 | 4.00 | 142.00 | 0.61  | 0.012   |
| 21   | EX-B2   | EX-B3   | 786.25     | 783.50 | Circ 1  | 0.00 | 5.00 | 373.00 | 0.74  | 0.012   |
| 22   | EX-B3   | EX-B4   | 782.50     | 781.00 | Circ 1  | 0.00 | 5.00 | 173.00 | 0.87  | 0.012   |
| 23   | EX-B4   | EX-B5   | 780.00     | 770.62 | Circ 1  | 0.00 | 5.00 | 469.00 | 2.00  | 0.012   |
| 24   | EX-B5   | EX-B6   | 769.12     | 766.10 | Circ 1  | 0.00 | 6.50 | 242.00 | 1.25  | 0.012   |
| 25   | EX-B6   | EX-B7   | 763.52     | 760.50 | Circ 1  | 0.00 | 6.50 | 150.00 | 2.01  | 0.012   |
| 26   | EX-B7   | EX-B8   | 760.50     | 757.02 | Circ 1  | 0.00 | 6.50 | 233.00 | 1.49  | 0.012   |
| 27   | EX-B8   | OUT     | 755.00     | 754.00 | Circ 1  | 0.00 | 6.50 | 60.00  |       | 0.012   |

Conveyance Hydraulic Computations. Tailwater = 0.000 (ft)

|      | Hydraulic | Gradelin | е        | Dep   | th     | Veld  | city   | city Jun |        |       |  |
|------|-----------|----------|----------|-------|--------|-------|--------|----------|--------|-------|--|
| Run# | US Elev   |          | Fr.Slope | Unif. | Actual | Unif. | Actual | 0        | Cap    | Loss  |  |
|      | (ft)      | (ft)     | (%)      | (ft)  | (ft)   | (f/s) | (f/s)  | (cfs)    | (cfs)  | (ft   |  |
| 1*   | 818.52    | 817.59   | 0.303    | 1.02  | 1.59   | 8.42  | 5.02   | 13.49    | 26.18  | 0.000 |  |
| 2*   | 817.59    | 815.09   | 1.300    | 1.59  | 1.59   | 10.41 | 10.41  | 27.95    | 28.75  | 0.000 |  |
| 3*   | 814.32    | 813.57   | 0.422    | 1.77  | 2.07   | 10.82 | 9.00   | 46.94    | 71.62  | 0.00  |  |
| 4*   | 813.57    | 811.57   | 0.657    | 2.07  | 2.07   | 11.23 | 11.23  | 58.56    | 71.27  | 0.00  |  |
| 5*   | 811.49    | 810.49   | 0.440    | 2.49  | 2.49   | 9.88  | 9.88   | 72.30    | 84.47  | 0.000 |  |
| 6*   | 807.52    | 806.95   | 0.312    | 2.56  | 3.03   | 10.22 | 8.51   | 86.90    | 116.41 | 0.00  |  |
| 8*   | 806.95    | 806.82   | 0.485    | 3.03  | 3.03   | 10.61 | 10.61  | 108.39   | 117.83 | 0.000 |  |
| 9*   | 806.63    | 805.13   | 0.517    | 3.13  | 3.13   | 10.62 | 10.62  | 111.87   | 116.54 | 0.000 |  |
| 10*  | 801.36    | 799.19   | 0.614    | 3.16  | 3.19   | 11.47 | 11.36  | 121.95   | 126.48 | 0.00  |  |
| 11*  | 799.19    | 798.49   | 0.656    | 3.19  | 3.19   | 11.74 | 11.74  | 126.08   | 129.22 | 0.00  |  |
| 12*  | 815.71    | 814.71   | 0.240    | 0.71  | 0.71   | 6.71  | 6.71   | 5.57     | 12.12  | 0.00  |  |
| 13   | 811.38    | 810.93   | 0.260    | 0.98  | 0.98   | 4.72  | 4.72   | 5.80     | 7.65   | 0.00  |  |
| 14*  | 813.13    | 810.13   | 0.871    | 1.13  | 1.13   | 7.43  | 7.43   | 10.62    | 11.59  | 0.00  |  |
| 15*  | 809.72    | 808.94   | 0.679    | 1.17  | 1.69   | 10.56 | 7.15   | 20.19    | 31.09  | 0.00  |  |
| 16*  | 808.94    | 806.95   | 0.828    | 1.00  | 2.00   | 14.20 | 7.10   | 22.31    | 44.58  | 0.00  |  |
| 17   | 794.87    | 794.69   | 0.709    | 3.75  | 4.00   | 10.71 | 10.43  | 131.05   | 122.35 | 0.00  |  |
| 18*  | 799.20    | 798.50   | 0.255    | 0.70  | 0.70   | 7.06  | 7.06   | 5.74     | 12.80  | 0.00  |  |
| 19   | 794.69    | 793.10   | 0.709    | 3.75  | 4.00   | 10.71 | 10.43  | 131.05   | 121.24 | 0.00  |  |
| 20   | 793.10    | 790.89   | 1.009    | 4.00  | 4.00   | 12.44 | 12.44  | 156.34   | 121.82 | 0.00  |  |
| 21*  | 789.49    | 786.74   | 0.413    | 3.24  | 3.24   | 13.47 | 13.47  | 181.43   | 242.30 | 0.00  |  |
| 22*  | 786.00    | 784.50   | 0.606    | 3.50  | 3.50   | 14.98 | 14.98  | 219.61   | 262.76 | 0.00  |  |
| 23*  | 782.80    | 773.42   | 0.730    | 2.80  | 2.80   | 21.29 | 21.29  | 241.11   | 399.11 | 0.00  |  |
| 24*  | 772.29    | 769.27   | 0.289    | 3.17  | 3.17   | 18.99 |        | 305.60   |        | 0.00  |  |
| 25*  | 766.57    | 763.70   | 0.337    | 2.89  | 3.20   | 23.09 |        | 329.88   |        | 0.00  |  |
| 26*  | 763.70    | 760.22   | 0.353    | 3.20  | 3.20   | 20.74 |        | 337.27   |        | 0.00  |  |
| 27*  | 758.40    | 757.40   | 0.488    | 3.40  | 3.40   | 22.57 |        | 396.88   |        | 0.00  |  |

\* Super critical flow.

Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

WINSTORM COMPUTATIONS SYSTEM B

| Designed: | KGM | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       |            | SHEET<br>NO.   |
|-----------|-----|----------------------|--------|-------|----------------|----------------|------------|----------------|
| Checked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 99             |
| Drawn:    | KGM | STATE<br>DIST, NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HICHWAY<br>NO. |
| Checked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH 29          |

@ EXISTING STORMSEWER SYSTEM.

ADDITIONAL Q IN PROPOSED NODE IS THE Q CALCULATED FOR A FUTURE DEVELOPED C VALUE OF 0.07 MINUS THE Q VALUE CALCULATED WITH THE UNDEVELOPED C VALUE OF 0.25



Version 3.05, Jan. 25, 2002 Run @ 8/17/2004 6:20:54 PM

WinStorm (STORM DRAIN DESIGN)

Version 3.05, Jan. 25, 2002 Run @ 8/17/2004 6:21:49 PM

PROJECT NAME : SH29 WEST JOB NUMBER : TXD0153-3

PROJECT DESCRIPTION : STORMSEWER SYSTEM C

DESIGN FREQUENCY : 10 Years

MEASUREMENT UNITS: ENGLISH

#### OUTPUT FOR DESIGN FREQUENCY of: 10 Years

| Rupoff  | Computation | for Design | Frequency  |
|---------|-------------|------------|------------|
| KUIIOTT | COMBUTATION | TO DESIGN  | rreducity. |

| ID      | C Value | Area<br>(acre) | Tc<br>(min) | Tc Used<br>(min) | Intensity<br>(in/hr) | Supply Q (cfs) | Total Q<br>(cfs) |
|---------|---------|----------------|-------------|------------------|----------------------|----------------|------------------|
| C I-160 | 0.58    | 1.85           | 10.00       | 10.00            | 7.98                 | 0.000          | 8.564            |
|         | 0.9     | 0.94           | Pavement    | •                |                      |                |                  |
|         | 0.25    | 0.91           | Undevelo    | ped              |                      |                |                  |

#### Sag Inlets Configuration Data.

| inlet in   |     | Length/<br>Perim.<br>(ft) | Area | Long | Trans | •    | Trans |       | utter<br>DeprW<br>(ft) | Depth<br>Allowed<br>(ft) | Critic<br>Elev.<br>(ft) |
|------------|-----|---------------------------|------|------|-------|------|-------|-------|------------------------|--------------------------|-------------------------|
| C I-160 CL | urb | 10.00                     | n/a  | 4.52 | 2.00  | 3.75 | 2.00  | 0.014 | 1.50                   | 0.50                     | 822.53                  |

#### Sag Inlets Computation Data.

| Inlet<br>ID | iniet<br>Type | Length | Gra<br>Perim |     | Total 0 | Inlet<br>Capacity | Total<br>Head | Ponded<br>Left | Width<br>Right |  |
|-------------|---------------|--------|--------------|-----|---------|-------------------|---------------|----------------|----------------|--|
| 10          | 1,700         | (ft)   | (f+)         |     | (cfs)   | (cfs)             | (ft)          | (ft)           | (ft)           |  |
| C I-160     | Curb          | 10.00  | n/a          | n/a | 8.564   | 10.327            | 0.441         | 8.90           | 9.25           |  |

# Cumulative Junction Discharge Computations

| Node<br>I.D. |       | Weighted<br>C-Value | Dr.Area | Cumulat.<br>Tc<br>(min) |      |       | Additional 🔊<br>Q in Node<br>(cfs) | Total<br>Disch.<br>(cfs) |
|--------------|-------|---------------------|---------|-------------------------|------|-------|------------------------------------|--------------------------|
| C I-160      | Curb  | 0.580               | 1.85    | 10.00                   | 7.98 | 0.000 | 3.27                               | 11.831                   |
| OUT          | 0u+1+ | 0.580               | 1.85    | 10.00                   | 7.98 | 0.000 | 3.27                               | 11.831                   |

# Conveyance Configuration Data

| Run# | Node    | 1.D. | Flowline   | Elev.      |         |      |      |                |              |         |
|------|---------|------|------------|------------|---------|------|------|----------------|--------------|---------|
|      | US      | DS   | US<br>(ft) | DS<br>(ft) | Shape # | •    |      | Length<br>(ft) | Slope<br>(%) | n_value |
| 1    | C 1-160 | OUT  | 817.00     | 816.83     | Circ 1  | 0.00 | 1.50 | 11.27          | 1.51         | 0.012   |

# Conveyance Hydraulic Computations. Tailwater = 0.000 (ft)

|      | Hydraulic       | =======<br>e    | Depth Velo |      |                | ======<br>ocity | Junc  |       |              |              |
|------|-----------------|-----------------|------------|------|----------------|-----------------|-------|-------|--------------|--------------|
| Run# | US Elev<br>(ft) | DS Elev<br>(ft) | Fr.Slope   | _    | Actual<br>(ft) | _               | (f/s) | (cfs) | Cap<br>(cfs) | Loss<br>(ft) |
| 1*   | 818.06          | 817.89          | 1.081      | 1.06 | 1.06           | 8.86            | 8.86  | 11.83 | 13.98        | 0.000        |

\* Super critical flow.

PROJECT NAME : SH29 WEST JOB NUMBER : TXD0153-3

PROJECT DESCRIPTION : STORMSEWER SYSTEM D

DESIGN FREQUENCY : 10 Years MEASUREMENT UNITS: ENGLISH

#### OUTPUT FOR DESIGN FREQUENCY of: 10 Years \_\_\_\_\_

# Runoff Computation for Design Frequency.

| ID      | C Value | Area<br>(acre) | Tc<br>(min) | Tc Used<br>(min) | Intensity<br>(in/hr) | Supply Q (cfs) | Total ()<br>(cfs) |
|---------|---------|----------------|-------------|------------------|----------------------|----------------|-------------------|
| C I-165 | 0.644   | 1.58           | 10.00       | 10.00            | 7.98                 | 0.000          | 8.134             |
|         | 0.9     | 0.96           | Pavemen-    | t                |                      |                |                   |
|         | 0.25    | 0.62           | Undevelo    | oped             |                      |                |                   |

#### Sag Inlets Configuration Data.

| InTet<br>ID |      | Perim. | Area | •         | Right-Slope<br>Long Trans<br>(%) (%) | Gutter<br>n DeprW<br>(ft) | Depth<br>Allowed<br>(ft) | Critic<br>Elev.<br>(ft) |
|-------------|------|--------|------|-----------|--------------------------------------|---------------------------|--------------------------|-------------------------|
| C I-165     | Curb | 10.00  | n/a  | 4.52 2.00 | 3.75 2.00 0                          | .014 1.50                 | 0.50                     | 822.53                  |

#### Sag Inlets Computation Data.

| Inlet<br>ID | Inlet<br>Type |       | Grat<br>Perim<br>(ft) | Area |       | Inlet<br>Capacity<br>(cfs) | Head  | Ponded<br>Left<br>(ft) | Right |
|-------------|---------------|-------|-----------------------|------|-------|----------------------------|-------|------------------------|-------|
| C I-165     | Curb          | 10.00 | n/a                   | n/a  | 8.134 | 10.327                     | 0.426 | 8.75                   | 9.05  |

# Cumulative Junction Discharge Computations

| ======         | =====         |                     |                                |                         |              |                          |                                    |                          |
|----------------|---------------|---------------------|--------------------------------|-------------------------|--------------|--------------------------|------------------------------------|--------------------------|
| Node<br>I.D.   |               | Weighted<br>C-Value | Cumulat.<br>Dr.Area<br>(acres) | Cumulat.<br>Tc<br>(min) | (in/hr)      | User<br>Supply 0<br>cfs) | Additional 🚵<br>0 in Node<br>(cfs) | Total<br>Disch.<br>(cfs) |
| C 1-165<br>OUT | Curb<br>Outlt | 0.644<br>0.644      | 1.58<br>1.58                   | 10.00<br>10.00          | 7.98<br>7.98 | 0.000<br>0.000           | 2.22<br>2.22                       | 10.354<br>10.354         |

# Conveyance Configuration Data

| Run# | Node<br>US | I.D.<br>DS | Flowline<br>US<br>(ft) | DS     | Shape # |      |      | Length<br>(ft) |      | n_value |
|------|------------|------------|------------------------|--------|---------|------|------|----------------|------|---------|
| 1    | C I-165    | OUT        | 817.00                 | 816.80 | Circ 1  | 0.00 | 1.50 | 10.48          | 1.91 | 0.012   |

# Conveyance Hydraulic Computations. Tailwater = 0.000 (ft)

| ==== | Hydraulic       | Gradelin        | =======<br>e | Dep           | ======<br>th | Vel | ======<br>ocity |            |       | Junc         |
|------|-----------------|-----------------|--------------|---------------|--------------|-----|-----------------|------------|-------|--------------|
| Run# | US Elev<br>(ft) | DS Elev<br>(ft) | Fr.Slope     | Unif.<br>(ft) |              |     | (f/s)           | Q<br>(cfs) | (cfs) | Loss<br>(ft) |
| 1*   | 817.89          | 817.69          |              | 0.89          | 0.89         |     | 9.51            |            |       |              |

\* Super critical flow.

ADDITIONAL Q IN PROPOSED NODE IS THE Q CALCULATED FOR A FUTURE DEVELOPED C VALUE OF 0.07 MINUS THE O VALUE CALCULATED WITH THE UNDEVELOPED C VALUE OF 0.25



CP&Y Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

WINSTORM COMPUTATIONS

| esigned: | KGM | FED. ROAD<br>DIV. NO | STATE | FEDER | AL AID PR      | OJECT NO       |            | SHI | EET<br>O.  |
|----------|-----|----------------------|-------|-------|----------------|----------------|------------|-----|------------|
| necked:  | JJR | 6                    | TEXAS | CC    | 337-           | -1-29          | )          | 10  | ٥          |
| rawn;    | KGM | STATE<br>DIST. NO.   | COUN  | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |     | IWAY<br>O. |
| necked:  | JJR | 14                   | WELLA | MOON  | 0337           | 01             | 020        | CH  | 20         |

SYSTEM C AND D

WinStorm (STORM DRAIN DESIGN)

Run @ 8/20/2004 1:46:07 PM

PROJECT NAME : SH29 WEST JOB NUMBER : TXD0153-3

PROJECT DESCRIPTION : STORMSEWER SYSTEM E

DESIGN FREQUENCY : 10 Years MEASUREMENT UNITS: ENGLISH

# OUTPUT FOR DESIGN FREQUENCY of: 10 Years

## Runoff Computation for Design Frequency.

| ID      | C Value | Area<br>(acre) | Tc<br>(min) | Tc Used<br>(min) | Intensity<br>(in/hr) | Supply Q (cfs) | Total Q<br>(cfs) |
|---------|---------|----------------|-------------|------------------|----------------------|----------------|------------------|
| C I-150 | 0.85    | 0.39           | 10.00       | 10.00            | 7.98                 | 0.000          | 2.645            |
|         | 0.9     | 0.36           | Pavement    |                  |                      |                |                  |
|         | 0.25    | 0.03           | Undevelo    | ped              |                      |                |                  |
| C I-151 | 0.9     | 0.08           | 10.00       | 10.00            | 7.98                 | 0.000          | 0.574            |
|         | 0.9     | 0.08           | Pavement    |                  |                      |                |                  |
| C 1-155 | 0.724   | 0.59           | 10.00       | 10.00            | 7.98                 | 0.000          | 3.407            |
|         | 0.9     | 0.43           | Pavement    |                  |                      |                |                  |
|         | 0.25    | 0.16           | Undevelo    | oed              |                      |                |                  |

#### On Grade Inlet Configuration Data

| Inlet   | Inlet | inlet          | Slopes |              | Gutter |               | Grate         |      | Pond Width   | Critic        |  |
|---------|-------|----------------|--------|--------------|--------|---------------|---------------|------|--------------|---------------|--|
| ID      | Туре  | Length<br>(ft) | -      | Trans<br>(%) | n      | Depr.<br>(ft) | Width<br>(ft) | Туре | Allowed (ft) | Elev.<br>(ft) |  |
| C 1-155 | Curb  | 10.00          | 1.20   | 1.72         | 0.014  | 0.33          | n/a           | n/a  | 14.00        | 794.47        |  |

#### On Grade Inlets Commoutation Data.

| Inlet<br>ID | iniet<br>Type |       | Intercept<br>Capacity<br>(cfs) |       | Actual | Required<br>Length<br>(ft) | Actual<br>Length<br>(ft) |       |
|-------------|---------------|-------|--------------------------------|-------|--------|----------------------------|--------------------------|-------|
| C I-155     | Curb          | 3.407 | 3.369                          | 0.038 | 0.038  | <br>10.90                  | 10.00                    | 11.51 |

# Sag Inlets Configuration Data.

| Inlet<br>ID        | Perim. | Area | •                      | Right-Slope<br>Long Trans<br>(%) (%) | Gutter<br>n DeprW<br>(ft) | Depth<br>Allowed<br>(ft) | Critic<br>Elev.<br>(ft) |
|--------------------|--------|------|------------------------|--------------------------------------|---------------------------|--------------------------|-------------------------|
| C I-150<br>C I-151 | <br>   |      | 1.20 1.10<br>1.81 2.00 | 0.50 0.60<br>0.74 2.00               | 0.014 1.50<br>0.014 1.50  | 0.50<br>0.50             | 795.29<br>793.64        |

# Sag Inlets Computation Data.

|         | inlet<br>Type | Length | Gra<br>Perim | _    | Total Q | Inlet<br>Capacity | Tota i<br>Head | Ponded<br>Left | Width<br>Right |  |
|---------|---------------|--------|--------------|------|---------|-------------------|----------------|----------------|----------------|--|
|         |               | (ft)   | (ft)         | (sf) | (cfs)   | (cfs)             | (ft)           | (ft)           | (ft)           |  |
| C I-150 | Curb          | 10.00  | n/a          | n/a  | 2.645   | 10.327            | 0.202          | 13.27          | 10.00          |  |
| CI-151  | Curb          | 10.00  | n/a          | n/a  | 0.574   | 10.327            | 0.073          | 3.85           | 4.55           |  |

ADD IT IONAL Q IN PROPOSED NODE IS THE Q CALCULATED FOR A FUTURE DEVELOPED C VALUE OF 0.07 MINUS THE Q VALUE CALCULATED WITH THE UNDEVELOPED C VALUE OF 0.25

# Version 3.05, Jan. 25, 2002 Cumulative Junction Discharge Computations

| Node<br>I.D. | Node<br>Type | Weighted<br>C-Value | Cumulat.<br>Dr.Area<br>(acres) | Cumulat.<br>Tc<br>(min) | <pre>intens. (in/hr)</pre> | User<br>Supply Q<br>cfs) | Additional 🚵<br>0 in Node<br>(cfs) | Total<br>Disch.<br>(cfs) |
|--------------|--------------|---------------------|--------------------------------|-------------------------|----------------------------|--------------------------|------------------------------------|--------------------------|
| C I-150      | Curb         | 0.850               | 0.39                           | 10.00                   | 7.98                       | 0.000                    | 0.11                               | 2.755                    |
| C I-151      | Curb         | 0.859               | 0.47                           | 10.50                   | 7.81                       | 0.000                    | 0.11                               | 3.263                    |
| C I-155      | Curb         | 0.000               | 0.00                           | 0.00                    | 0.00                       | 0.000                    | 0.00                               | 0.000                    |
| OUT          | 0u+1+        | 0.859               | 0.47                           | 10.50                   | 7.81                       | 0.000                    | 0.11                               | 3.263                    |

# Conveyance Configuration Data

| ==== | =====      |                |                       | =======          | ======= |   | ====== | =======        | ====== | ======= |  |
|------|------------|----------------|-----------------------|------------------|---------|---|--------|----------------|--------|---------|--|
| Run# | Node<br>US | 1.D.<br>DS     | Flowlin<br>US<br>(ft) | DS               | Shape # | • |        | Length<br>(ft) | Slope  | n_value |  |
|      |            | C 1-151<br>OUT |                       | 792.24<br>791.50 |         |   |        |                |        |         |  |

#### Conveyance Hydraulic Computations. Tailwater = 0.000 (ft)

|      | Hydraulic | Gradelin        | е        | Dep           | th   | Vel  | ocity           |            |              | Junc         |
|------|-----------|-----------------|----------|---------------|------|------|-----------------|------------|--------------|--------------|
| Run# |           | DS Elev<br>(ft) | Fr.Slope | Unif.<br>(ft) |      |      | Actual<br>(f/s) | Q<br>(cfs) | Cap<br>(cfs) | Loss<br>(ft) |
| 1*   | 794.03    | 792.81          | 0.059    | 0.53          | 0.57 | 4.97 | 4.43            | 2.75       | 10.45        | 0.000        |
| 2*   | 792.81    | 792.07          | 0.082    | 0.57          | 0.57 | 5.24 | 5.24            |            | 10.45        | 0.000        |

\* Super critical flow.

DESCRIPTION:

TEXAS HYDRAUL IC SYSTEM.

CULVERT (ver. 1.0) Tue Sep 21 15:29:48 2004

# CULVERT HYDRAUL IC COMPUTATIONS

|         |          | -    |       |        |        |         |
|---------|----------|------|-------|--------|--------|---------|
| CULVERT | NAME:    | PROP | CULV  | Input  | Units: | English |
| PROJECT | NAME:    | SH29 | WEST  | 0utput | Units: | English |
| PROJECT | CONTROL: | CSJ: |       |        |        | -       |
| COUNTY: |          | WILL | AMSON |        |        |         |

ANALYZE SINGLE OPENING CULVERT

PROP CULV

MATERIAL: CONCRETE SHAPE: CONCRETE BOX. ENTRANCE: BEVEL TO SLOPE PROFILE: BROKEN BACK CULVERT

FREQUENCY: 25 YEAR DISCHARGE: 144.00 cfs TAILWATER: 817.55 ft FREQUENCY: 100 YEAR DISCHARGE: 181.00 cfs

TAILWATER ELEVATION (computed).

n value: 0.0120 Ke value: 0.2000

CULVERT RISE = 6.00 ft CULVERT SPAN = 5.00 ft BARRELS = 1

INLET station: 0.00 elevation: 812.35 ft OUTLET station: 102.00 811.55 ft elevation:

#### BROKEN BACK CULVERT CONFIGURATION

|      |         |        | UPSTR | REAM   | DOWNS  | STREAM |  |  |
|------|---------|--------|-------|--------|--------|--------|--|--|
| Unit | Slope   | Length | Sta.  | Elev.  | Sta.   | Elev.  |  |  |
| 1    | 0.00133 | 30.00  | 0.00  | 812.35 | 30.00  | 812.31 |  |  |
| 2    | 0.00015 | 65.00  | 30.00 | 812.31 | 95.00  | 812.30 |  |  |
| 3    | 0.10776 | 7.00   | 95.00 | 812.30 | 102.00 | 811.55 |  |  |
|      |         |        |       |        |        |        |  |  |

# Cross section profile (XY Coordinates) ft

| X     | Y      | x      | Υ .    | x     | Y      |
|-------|--------|--------|--------|-------|--------|
| 0.00  | 815.06 | 10.00  | 814.06 | 20.00 | 817.26 |
| 30.00 | 811.72 | 40.00  | 811.70 | 50.00 | 811.68 |
| 60.00 | 811.70 | 70.00  | 812.13 | 80.00 | 811.94 |
| 90.00 | 812.13 | 100.00 | 812.86 |       |        |

CULVERT OUTPUT RUN NO = 1

TAILWATER ELEVATION: 812.31 ft (computed).

ANALYSIS for discharge frequency of: 25 YEAR

Barls. Opb Rise Span Length Max.HW Calc.HW HW Control Veloc. Out.depth elev elev cfs ft ft ft f† ft ft ft/s ft 1 144.00 6.00 5.00 102.00 0.00 816.05 3.70 Outlet 14.09 2.04

inlet control depth = 4.50 ft Outlet control depth = 3.70 ft

Normal depth = 0.92 ft Culvert slope = Critical depth = 2.95 ft Critical slope = 0.00414

CULVERT OUTPUT RUN NO = 2 2

TAILWATER ELEVATION: 812.38 ft (computed).

Barls. Opb Rise Span Length Max.HW Calc.HW HW Control Veloc. Out.depth elev elev cfs ft ft ft ft ft ft

1 181.00 6.00 5.00 102.00 0.00 816.64 4.29 Outlet 14.83 2.44 Inlet control depth = 5.31 ft 4.29 ft

Normal depth = 1.08 ft Culvert slope = 0.00784 Critical depth = 3.44 ft Critical slope = 0.00441

RUNING MESSAGES LIST:

Outlet control depth =

\*Computation: Hydraulic jump occurs within culvert.

NORMAL TERMINATION OF THYSYS. CULVERT.



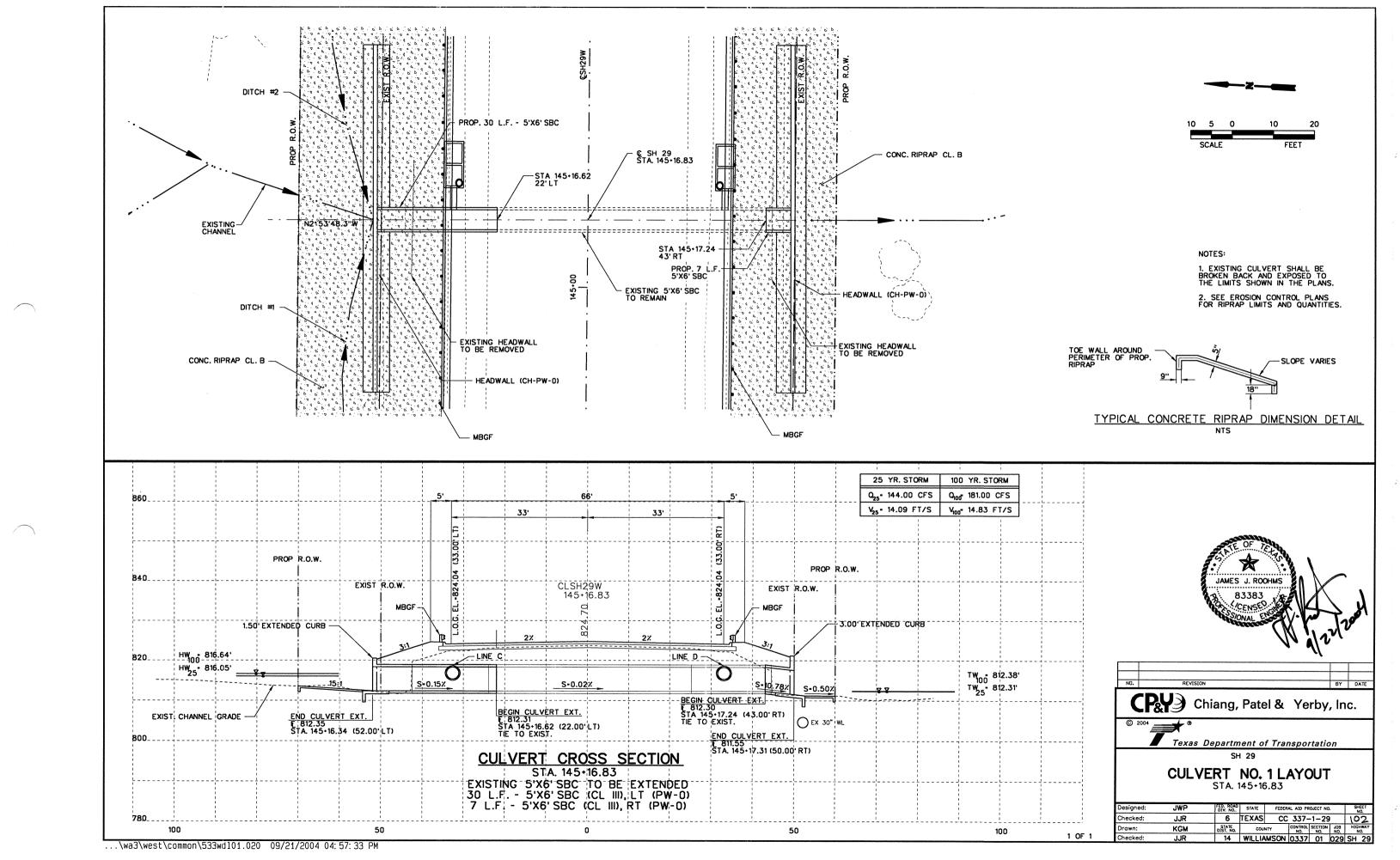
Chiang, Patel & Yerby, Inc.

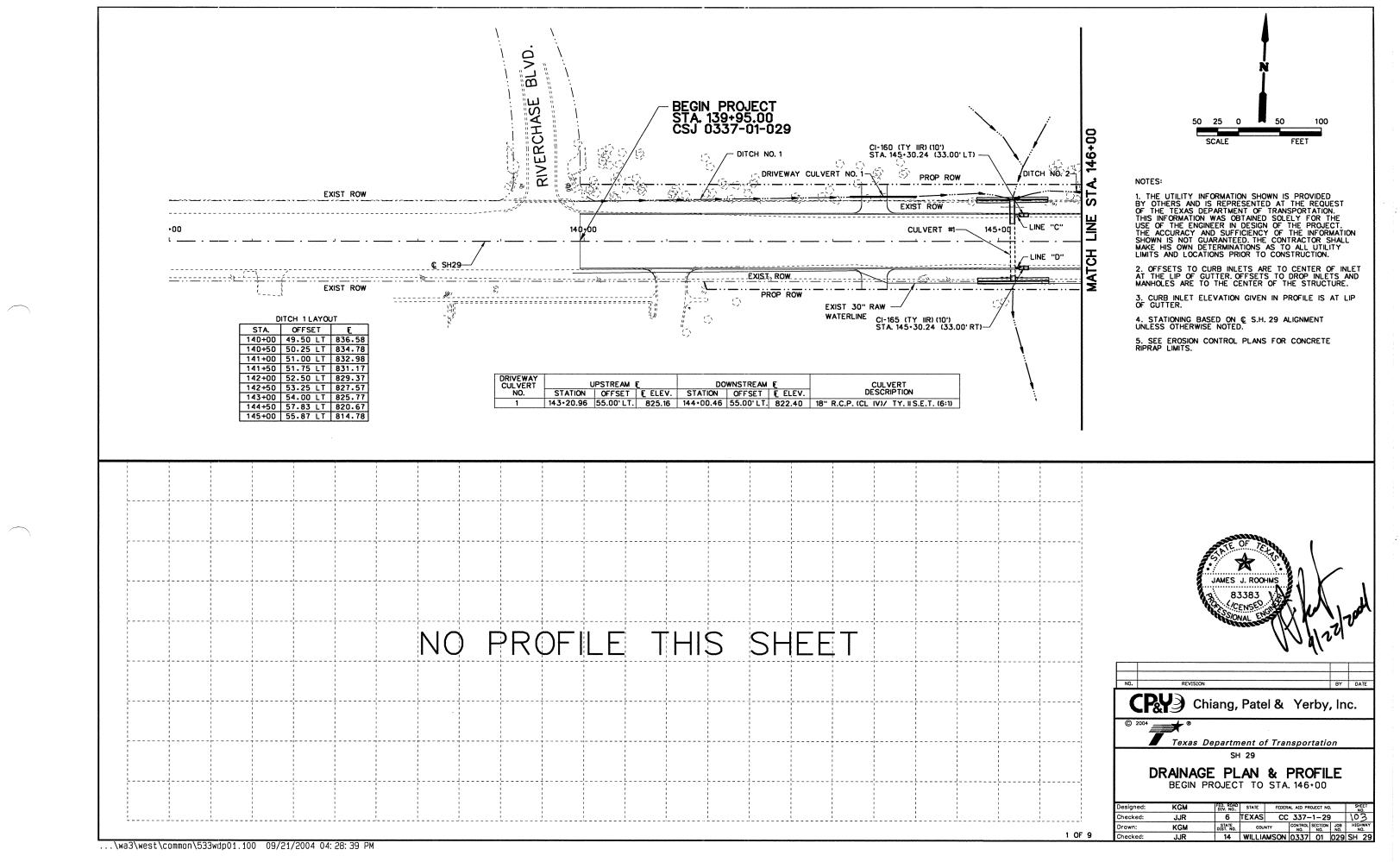
# WINSTORM COMPUTATIONS SYSTEM E CULVERT COMPUTATIONS

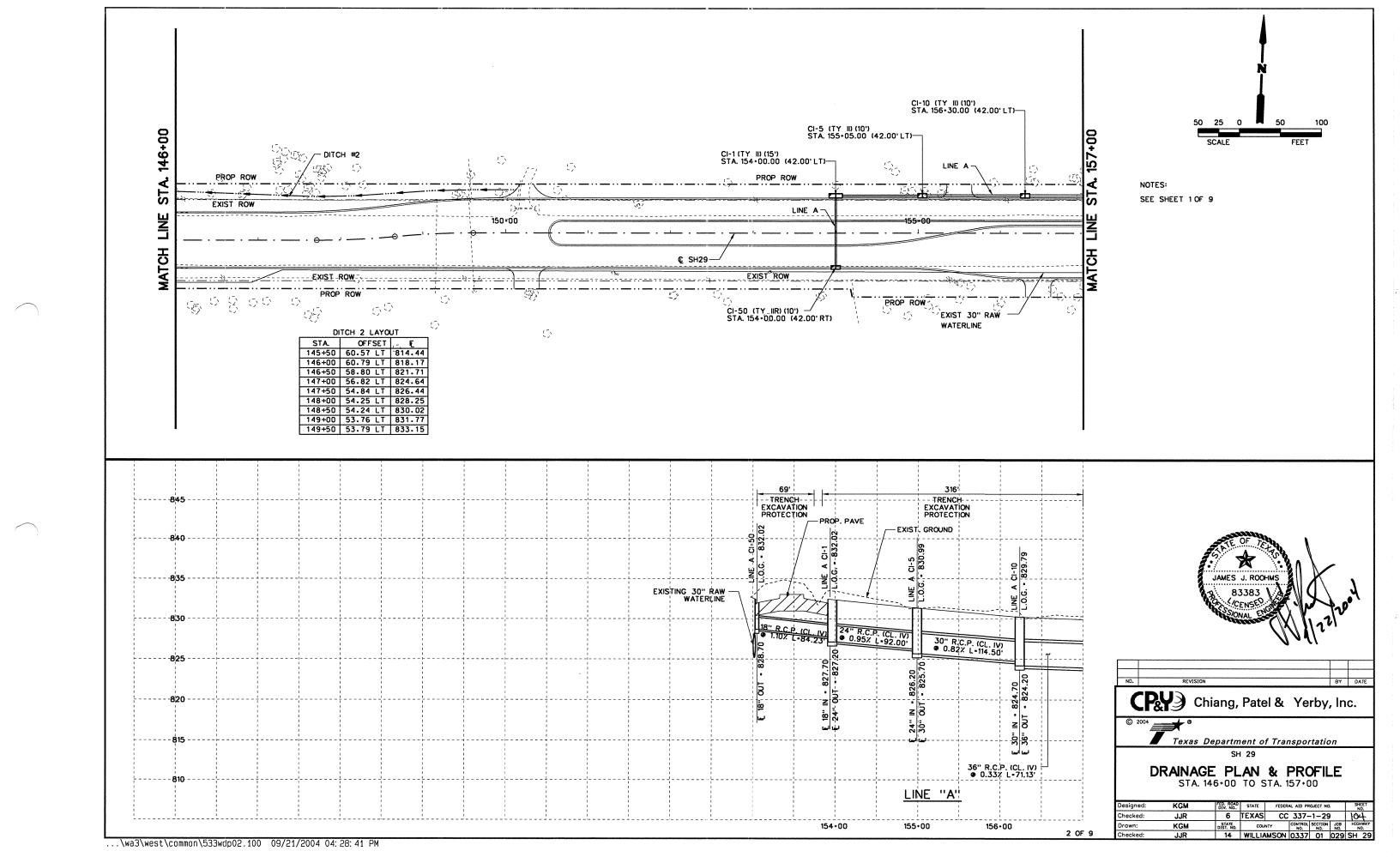
ED. ROAD STATE FEDERAL AID PROJECT NO. Designed: Checked: 6 TEXAS CC 337-1-29 (0) | STATE | COUNTY | CONTROL | SECTION | JOB | HICHWAY | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | Drawn: KGM Checked:

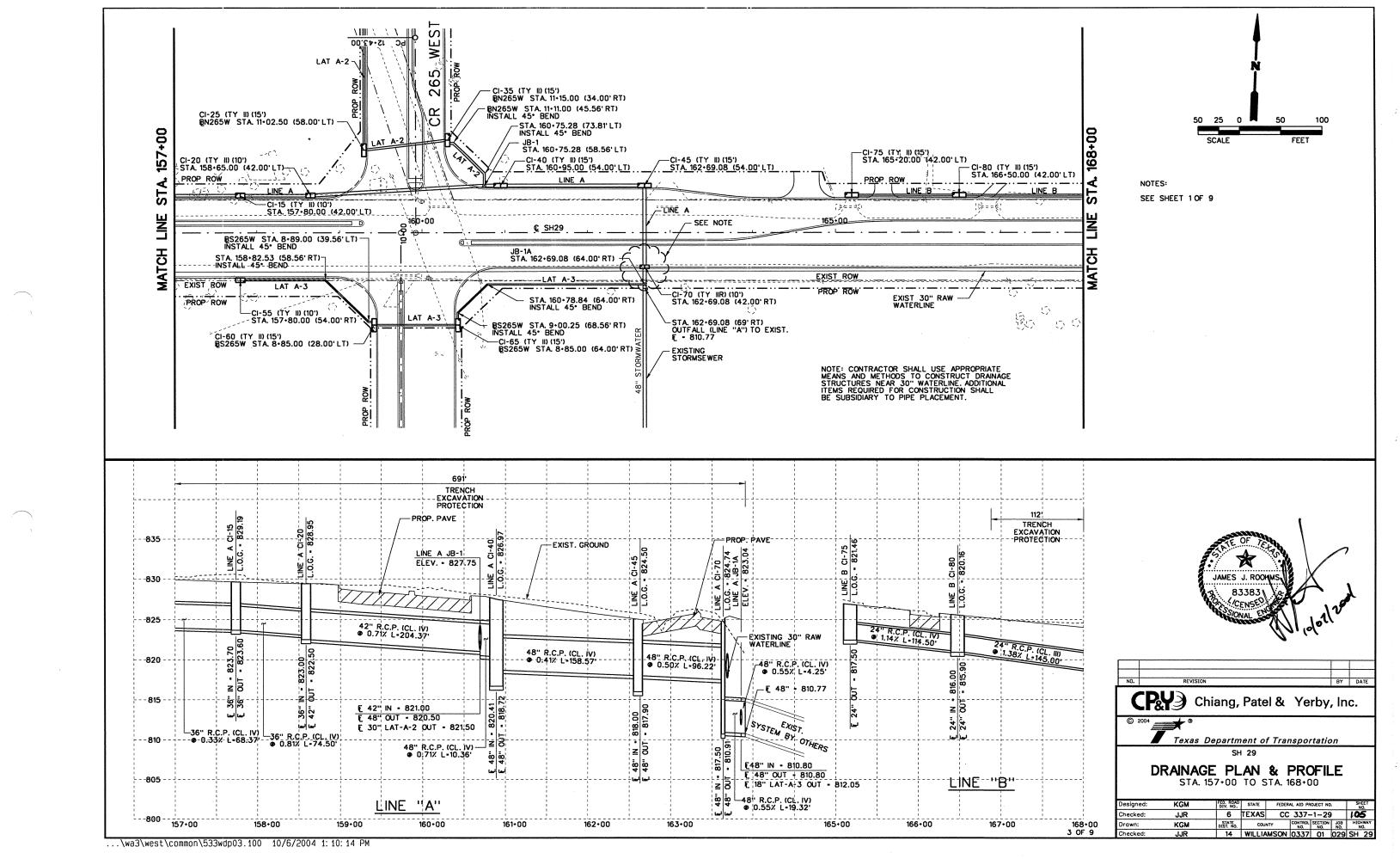
Texas Department of Transportation

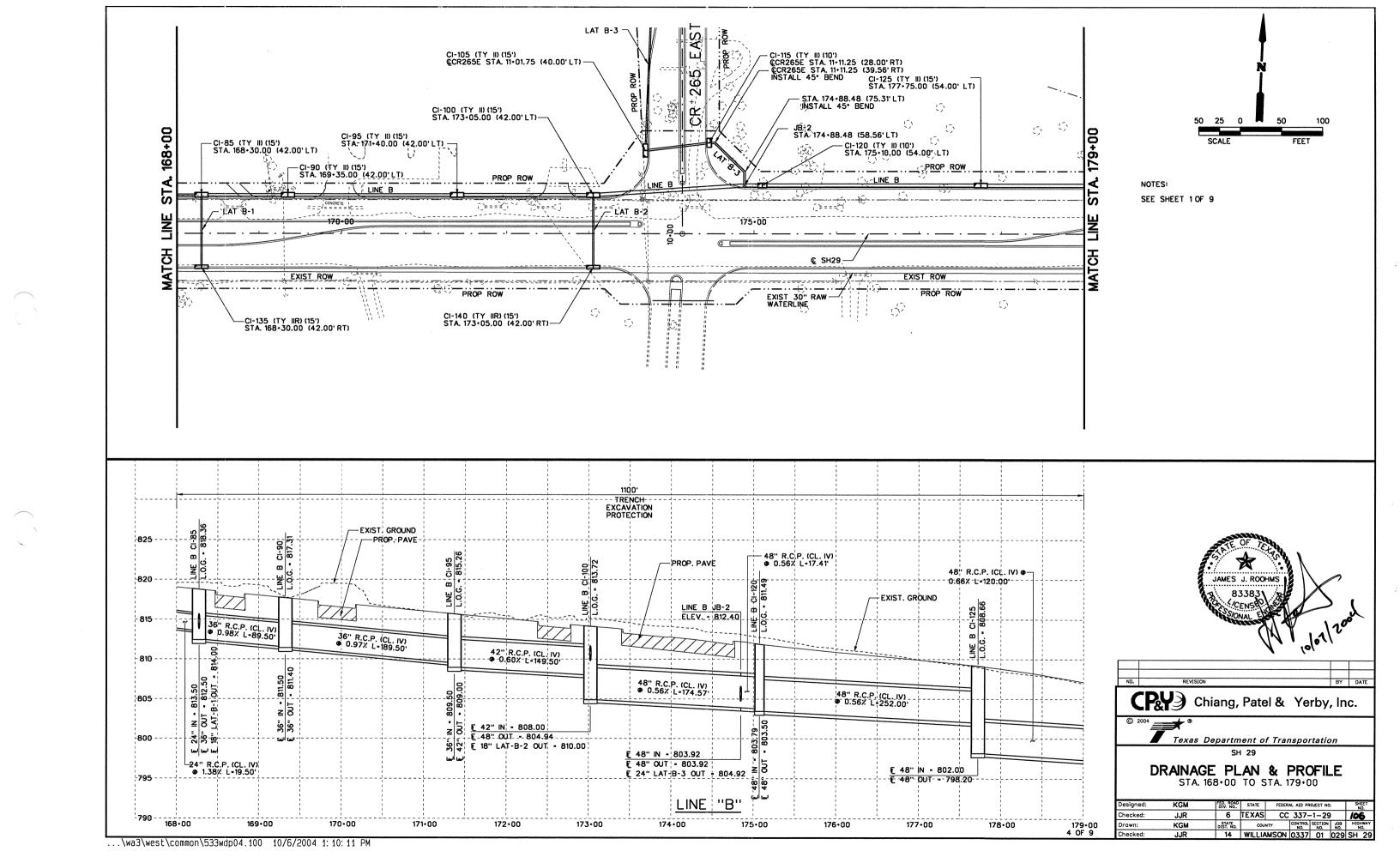
4 OF 4

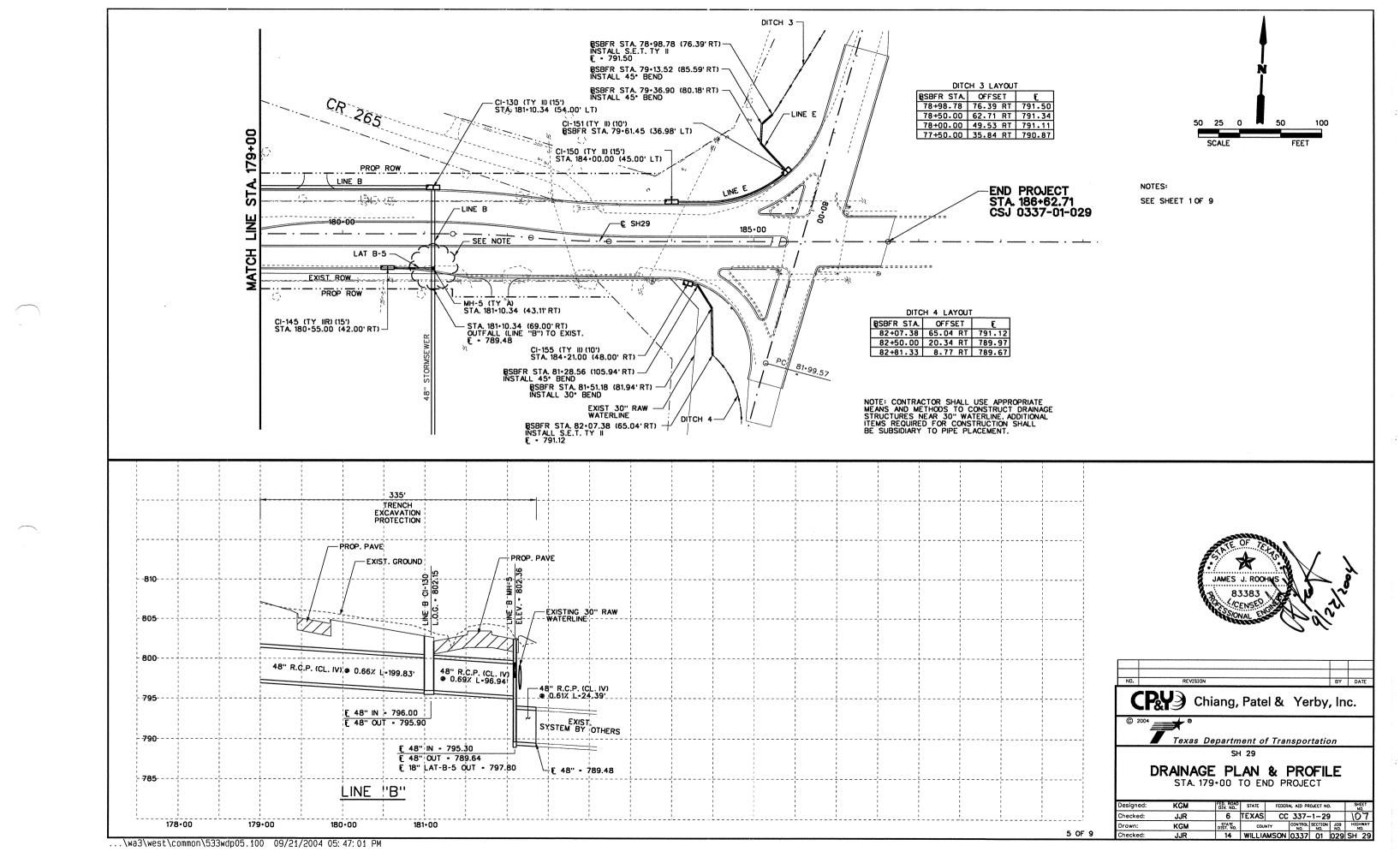


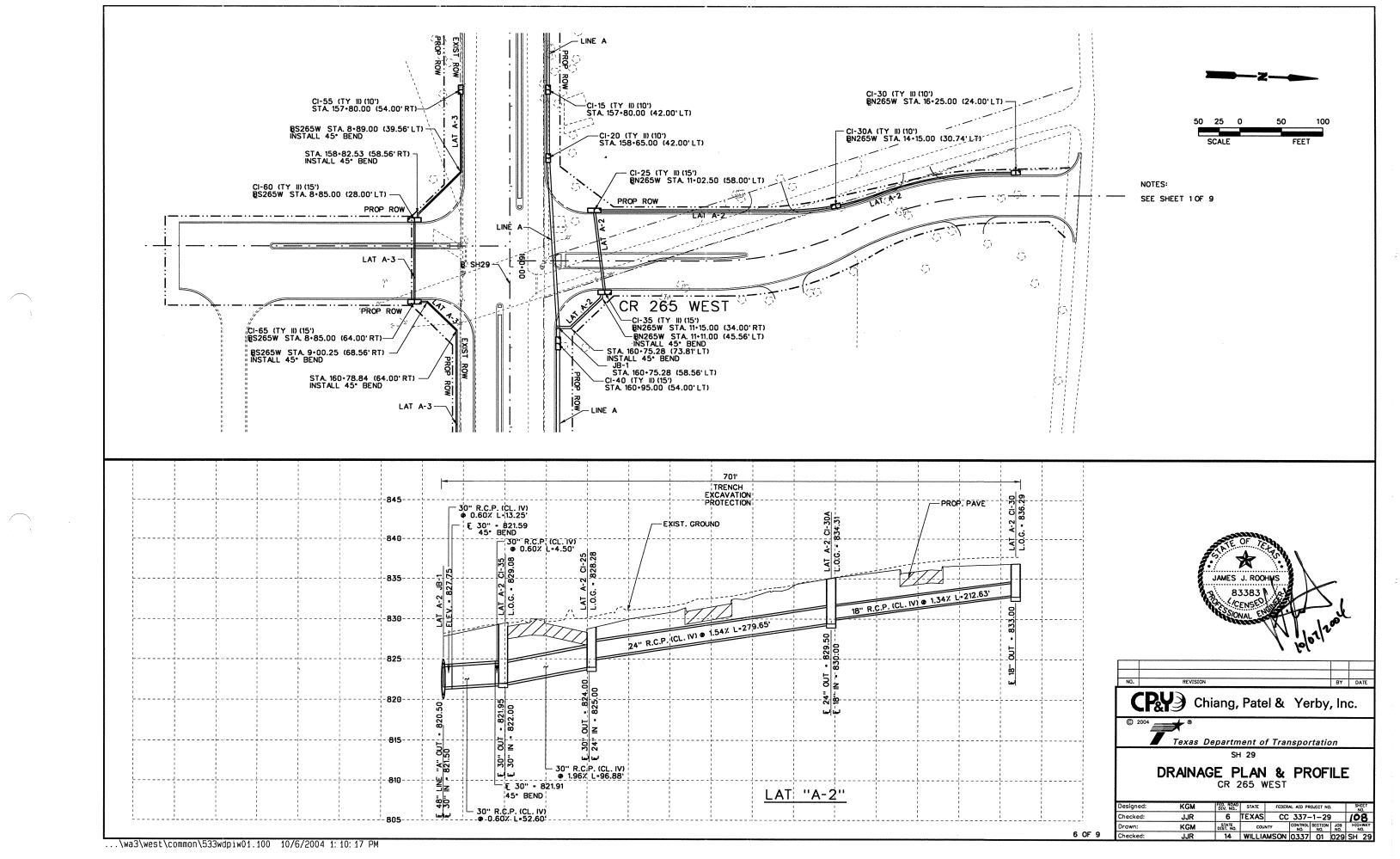


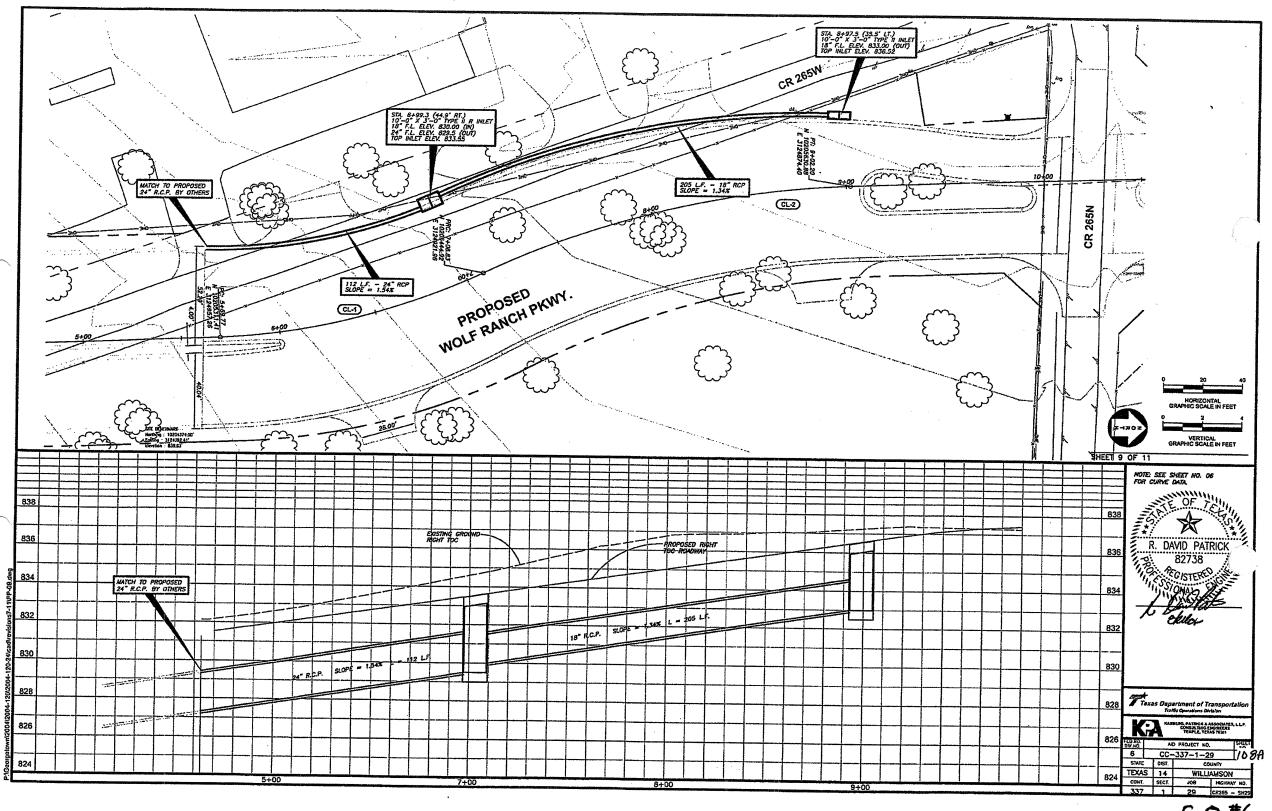


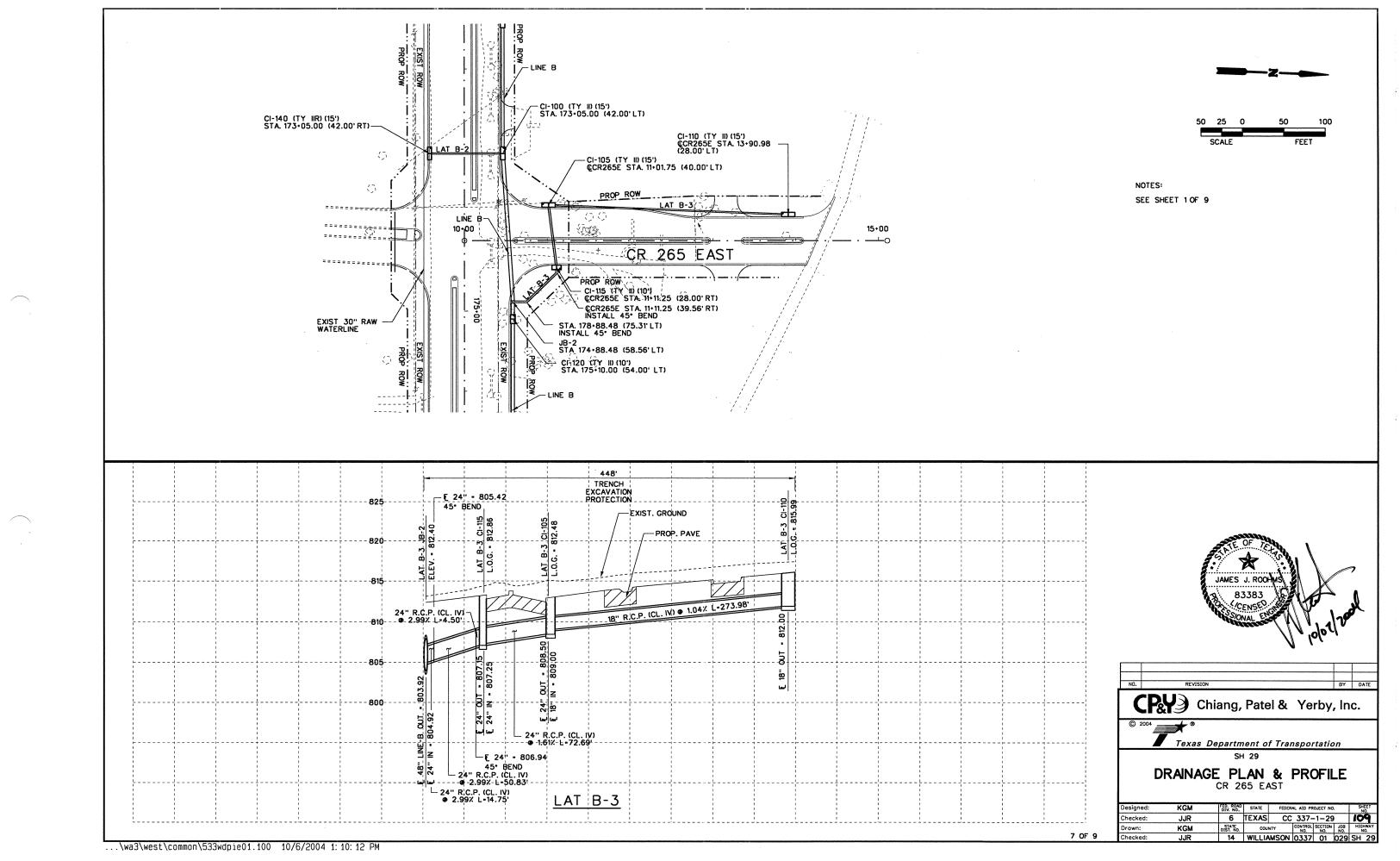


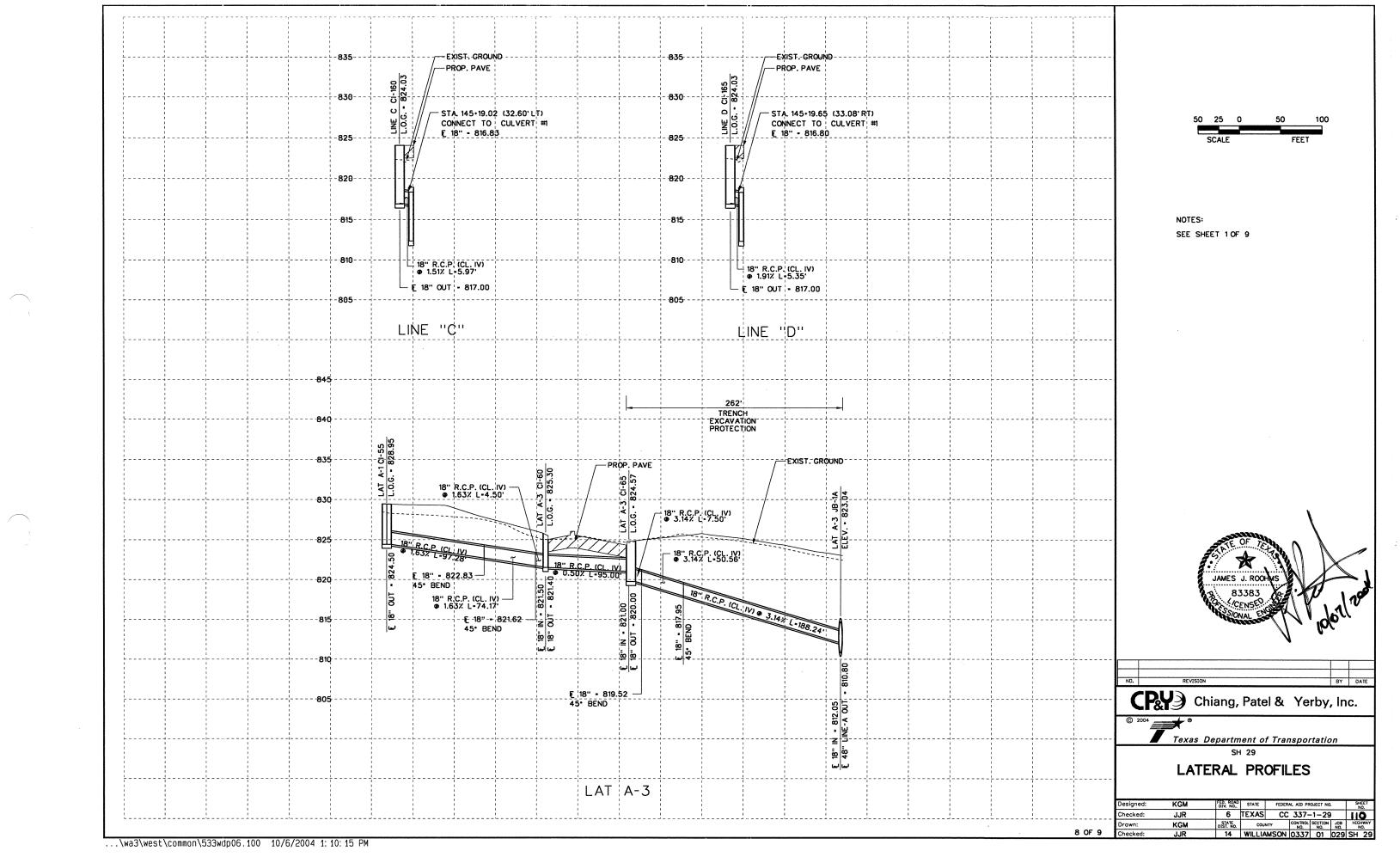


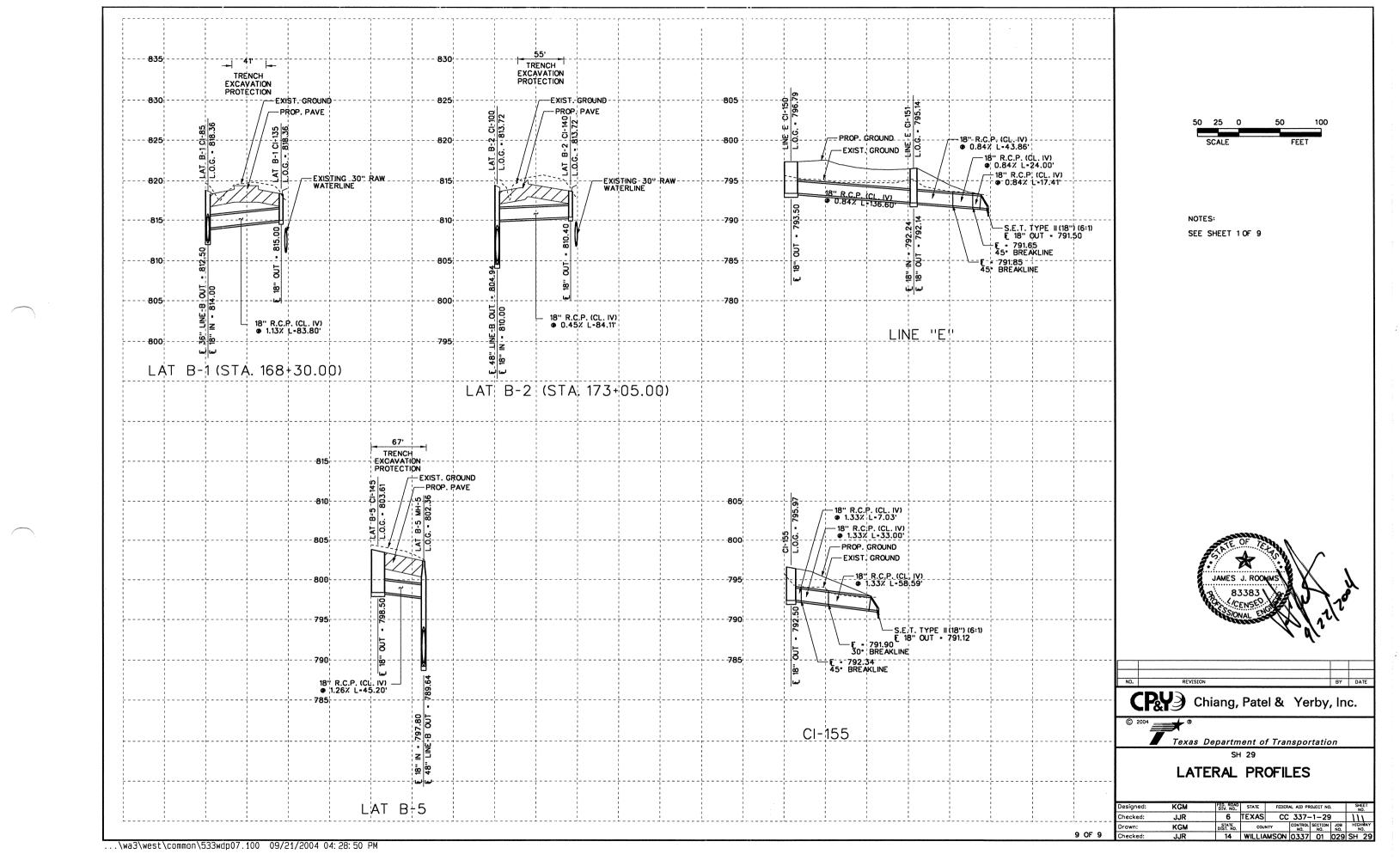












| Culvert Station and/or Creek name | Description of | Max  | Applicable  | Applicable            | Skew                                   | Side          | Ī            | U          | С            | 1) Hw          | A           | В           | Lw          | L†w            | A†w         | Riprap | (2)Class       | 3Class          | Total         |
|-----------------------------------|----------------|--|-------------|-----------------------|--|---------------|--------------|------------|--------------|----------------|-------------|-------------|-------------|----------------|-------------|--------|----------------|-----------------|---------------|
| followed by applicable end        | Box Culvert    | Fill   | Box         | Wingwall              | Angle                                  | Slope         | Culvert      | E .        | Estimated    | 8              | Curb to     | Offset      | Length of   | Culvert        | Anchor      | Apron  | "C"            | "C"             | Wingwall      |
| (Lt, Rt or Both)                  | No. Spans ~    | Height   | Culvert     | or End                | (0°,15°,                               | or Channel    | Top Slab     | Wall       | Curb         | of             | End of      | of End of   | Longest     | Toewall        | Toewall     |        | Conc           | Conc            | Area          |
|                                   | Span X Height  | (F+)   | Standard    | Treatment<br>Standard | 30° or                                 | Slope Ratio   | 1            | i .        | Height       | Wingwall       | Wingwall    | Wingwall    | Wingwall    | Length         | Length      | (C.Y.) |                | (Wingwall)      |               |
| Culvert #1 STA 145+16.83 (LT)     | 1 ~ 6' × 6'    | 6′   | SCC - 5 & 6 |                       | 45°)<br>0°                             | (SL:1)<br>3:1 | (In)<br>7"   | (In)<br>7" | (F+)<br>1.5' | (F†)<br>8.083' | (F+)<br>N/A | (F+)<br>N/A | (F+)<br>40' | (F+)<br>6.167' | (F†)<br>N/A | 0.0    | (C.Y.)<br>0.34 | (C.Y.)<br>44.04 | (S.F.)<br>647 |
| Culvert #1 STA 145+16.83 (RT)     | 1 ~ 6' × 6'    | 6'   | SCC - 5 & 6 |                       | 0°                                     | 3:1           | 7"           | 7"         | 3.0'         | 9.583'         | N/A         | N/A         | 40′         | 6.167'         | N/A         | 0.0    | 0.69           | 54.33           | 767           |
|                                   |                | <del>                                     </del> |             |                       |  |               | <del> </del> | İ          | 3.0          | 3.303          |             | 1           | 10          | 0.101          |             | 0.0    | 0.03           | 31.33           | 101           |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       | *****                                  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               | <u> </u>     |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             | ļ                     |  | ļ             | ļ            |            |              |                |             |             |             |                |             |        |                |                 | <u> </u>      |
|                                   |                |  | <u> </u>    | <u> </u>              | ************************************** |               |              |            |              |                |             | ļ           |             |                |             |        |                |                 | -             |
|                                   |                |  |             |                       |  |               | <del> </del> |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                | <del> </del>                                     |             |                       |  |               | <del> </del> |            |              |                |             |             |             |                |             |        |                |                 | <del> </del>  |
|                                   |                |  |             |                       |  |               |              | <b></b>    |              |                |             |             |             |                |             |        |                |                 | <del> </del>  |
|                                   |                | <u> </u>   | <b>†</b>    | ļ                     |  |               | +            |            |              |                |             |             |             |                |             |        |                |                 | <del> </del>  |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             | <u> </u>    |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       | ****                                   |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |
|                                   |                |  |             |                       |  |               |              |            |              |                |             |             |             |                |             |        |                |                 |               |

NOTES:

Skew Angle = 0° for SW-0, FW-0, SETB-SW-0, and SETB-FW-0 standards.

30° Maximum for Safety End Treatment SL:1 = Horizontal:1 Vertical

Side Slope at culvert for Flared or Straight Wingwalls. Channel Slope for Parallel Wingwalls. Slope shall be 3:1 or flatter for Safety End Treatments.

- T = Box Culvert Top Slab Thickness. Can be found on the applicable Box Culvert Standard.
- U = Box Culvert Wall Thickness. Can be found on the applicable Box Culvert Standard.
- C = Curb Height.

See applicable wing or end treatment standards for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area. Hw = Height of Wingwall.

- A = Distance from Face of Curb to End of Wingwall (Not applicable to Parallel or Straight Wingwalls).
- B = Offset of End of Wingwall (Not applicable to Parallel or Straight Wingwalls). Lw = Length of Longest Wingwall.
- Ltw = Length of Culvert Toewall (Not applicable when using Riprap Apron).
  Atw = Length of Anchor Toewall (Applicable to Safety End Treatment only).

Total Wingwall Area = Wingwall area in S.F. for two wingwalls (one structure end) if Lt or Rt. Area for four wingwalls (two structure ends) if Both.

- 1) The wall heights shown will be rounded to the nearest Foot for bidding purposes.
- (2) Concrete volume shown is for box culvert curb only. Curb concrete is considered part of the Box Culvert for payment.
- 3 Concrete volume shown is total of wing, footing, culvert toewall (if any), anchor toewall (if any) and wingwall toewall. Riprap apron, culvert and curb quantities are not included.

# GENERAL NOTES:

This sheet is a supplement to the Box Culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the Box Culvert Wingwalls and Safety End Treatments.

An Excel 97 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site.

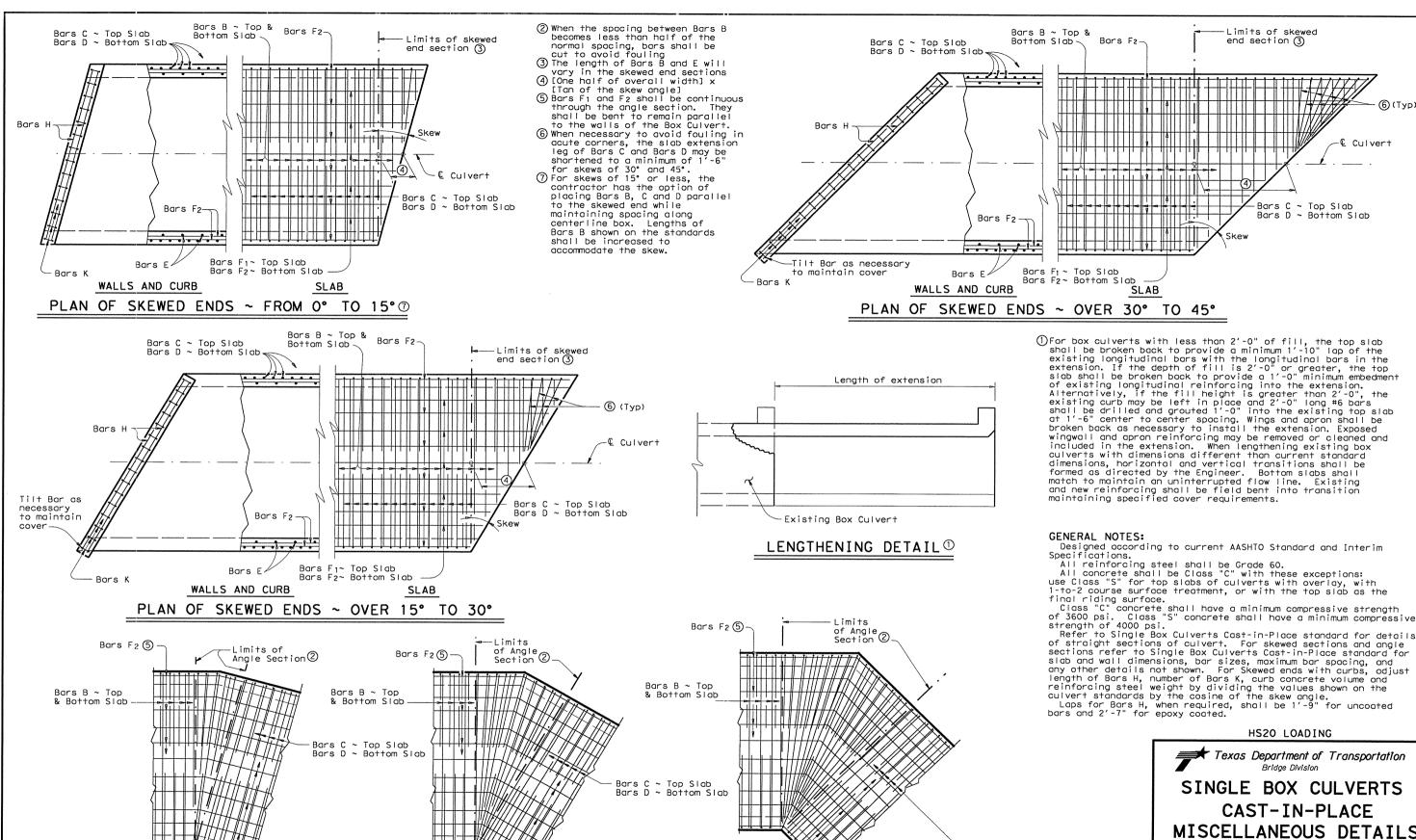




**BOX CULVERT SUPPLEMENT** WINGS AND END TREATMENTS

BCS

| ь    | csstde1.dgn |      | DN:  | GAF  | CK:  | CAT    | DW:   | Tx[ | OOT  | CK: | G    | ٩F  |  |
|------|-------------|------|------|------|------|--------|-------|-----|------|-----|------|-----|--|
| xDOT | September   | 2000 | DIST | RICT | -    | FEDERA | LAID  | PRO | JECT |     | SHE  | ΕT  |  |
|      | REVISIONS   |      | A    | US   |      | CC     | 337-1 | -29 | 3    |     | 11   | 2   |  |
|      |             |      |      | CO   | YTNU |        | CONT  | 30L | SECT | JOB | HIGH | WAY |  |
|      |             |      |      | WILL | LAMS | ON     | 0.33  | 37  | 01   | 029 | SH   | 29  |  |



Bars F<sub>1</sub> ~ Top Slab Bars F<sub>2</sub> ~ Bottom Slab(5)

Bars C ~ Top Slab

PLAN OF ANGLE SECTION ~

OVER 30° TO 45°

Bars D ~ Bottom Slab

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

€ Culvert

DN: GAF CK: LMW DW: BWH/TXDOT CK: GAF ILE: sccmdste.dan TxDOT December 2003 DISTRICT FEDERAL AID PROJECT AUS CC 337-1-29 CONTROL SECT JOB HIGHW 0337 01 029 SH WILLIAMSON

PLAN OF ANGLE SECTION ~

FROM 0° TO 15°

Bars F<sub>1</sub> ~ Top Slab

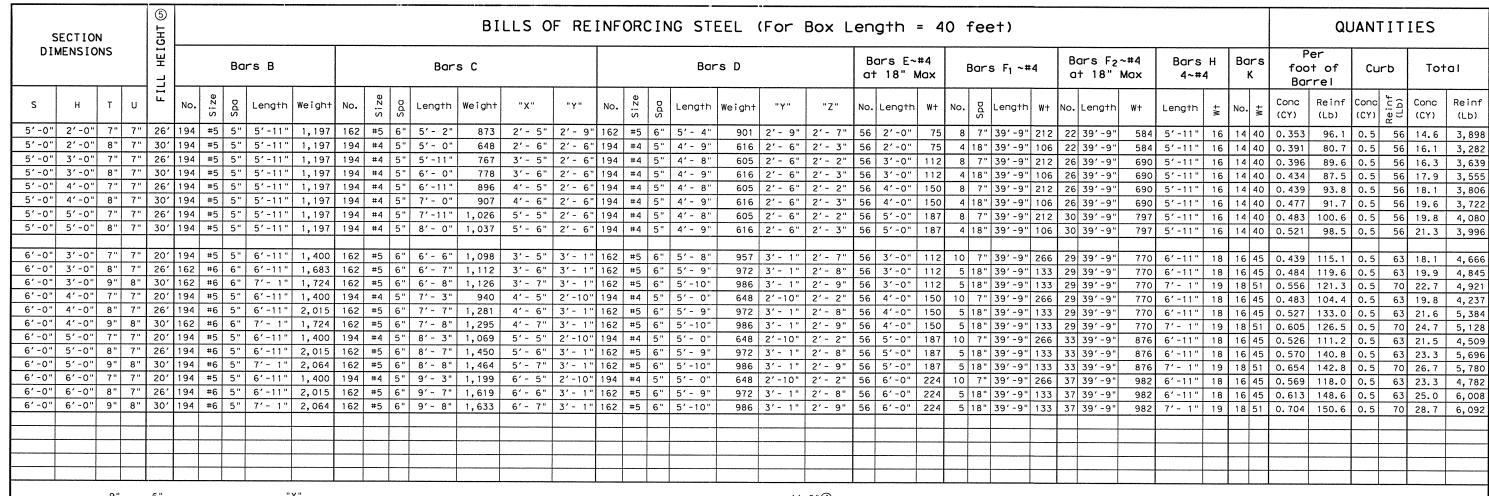
Bars F2 ~ Bottom Slab (5)-

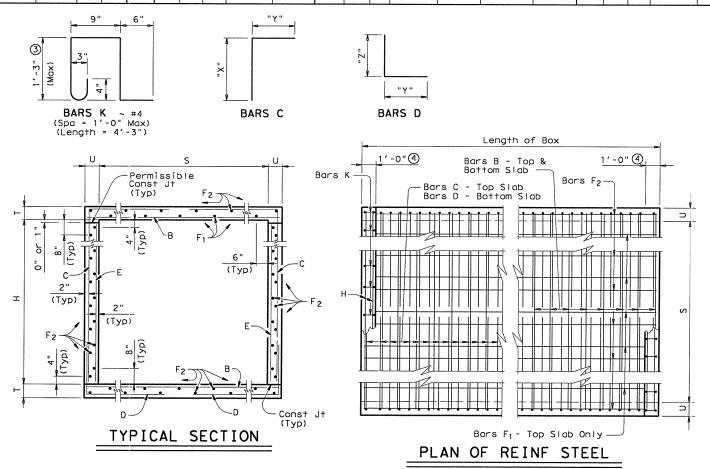
PLAN OF ANGLE SECTION ~

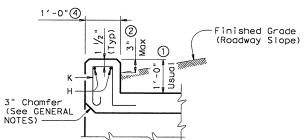
OVER 15° TO 30°

Bars F<sub>1</sub> ~ Top Slab

Bars F2 ~ Bottom Slab (5)







# SECTION THRU CURB

- ① 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with bridge rail, other than T6, refer to RAC standard.
- ② For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs shall project no more than 3" above finished grade.
  - For structures with bridge rail, curbs shall
- be flush with finished grade. Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- 3 For curbs less than 1'-0" high, tilt bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, bars K may be omitted.
- 4 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.
- (5) For each box size, minimum fill height shown shall be used for all culverts with less than 2'-0" of fill.

# GENERAL NOTES:

Designed according to current AASHTO Standard and Interim Specifications.

Designed to the maximum fill heights shown.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" with these exceptions: use Class "S" for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the

final riding surface.

Class "C" concrete shall have a minimum compressive strength of 3600 psi. Class "S" concrete shall have a minimum compressive strength of 4000 psi.

Reinforcing bars shall be adjusted to provide a minimum of

1  $\frac{1}{4}$  inches clear cover. The bottom edge of the top slab shall be chamfered 3 inches

Construction joints shown at the flow line may be raised a maximum of 6 inches at the Contractor's option. If this option is used, Bars E may be cut off or raised, and Bars C and D may

See Standard SCC-MD for skewed ends, angle sections and lengthening details.

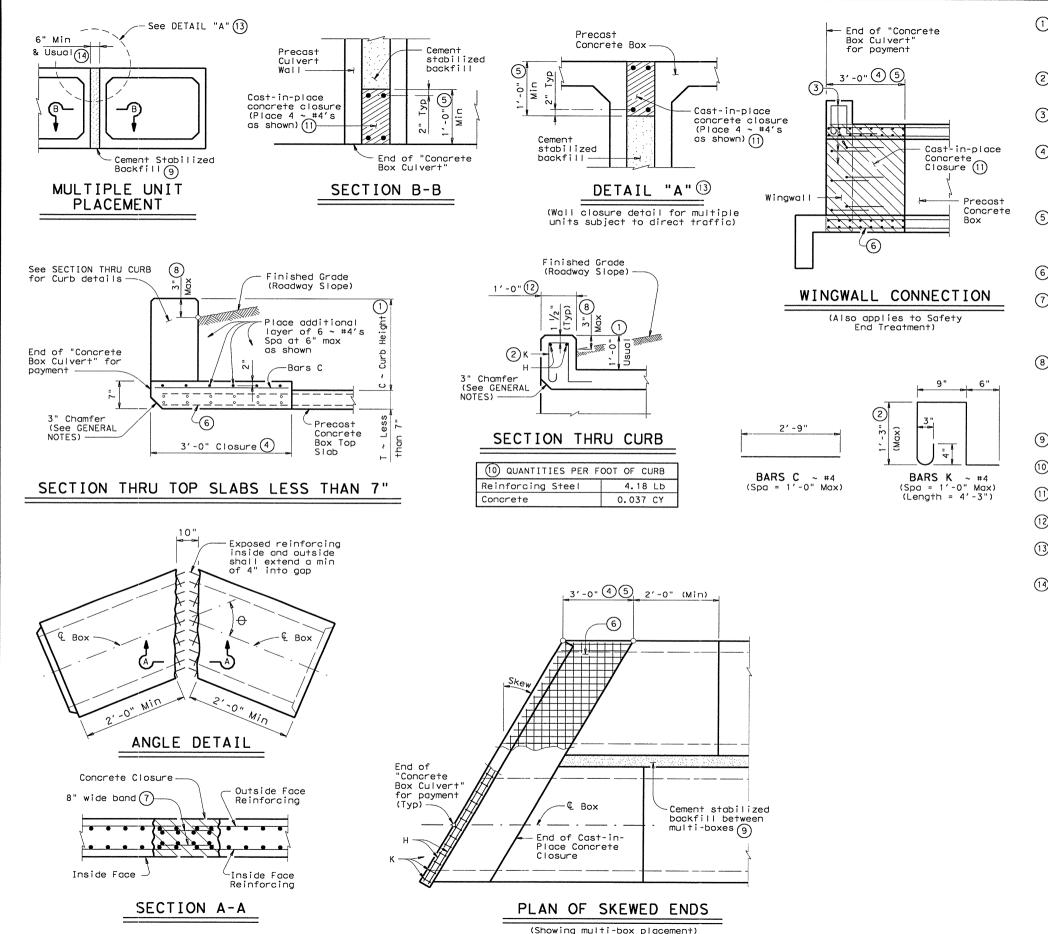
#### HS20 LOADING



SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL

SCC-5 & 6

| ILE: SCC5   | i6ste.do | n               | DN: | GAF   | CK:  | LMW  | DW:     | BWH/T   | xDOT | CK:    | G.A | ٩F |
|-------------|----------|-----------------|-----|-------|------|------|---------|---------|------|--------|-----|----|
| C) TxDOT De | ecember  | 2003            | DIS | TRICT |      | FED  | ERAL    | AID PRO | JECT |        | SHE | EΤ |
| RE          |          | AUS CC 337-1-29 |     |       |      |      |         |         | 111  | 7      |     |    |
|             |          | COUNTY          |     |       |      |      | CONTROL | SECT    | JOB  | H [ GH | YAW |    |
|             |          |                 |     | WIL   | LIAN | ISON |         | 0337    | 01   | 029    | SH  | 29 |



- (1) 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with bridge rail, other than T6, refer to RAC standard.
- 2 For curbs less than 1'-0" high, tilt Bars K or reduce bor height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- (3) Curb, Wingwall or Safety End Treatment reinforcing shall extend into concrete closure. Any reinforcing that does not fit into the closure shall be bent or trimmed as necessary.
- (4) Cast-in-place concrete closure shall be 3'-0" min. Boxes shall be cast short or broken back in the field. All reinforcing in the closure shall be the same size and spacing as in the precast box section. Except where shown otherwise, the cast-in-place closure shall be flush with the inside and outside faces of the precast box section.
- For multiple unit placements the length of the closure for the interior walls may be adjusted as necessary. The length of the top slab, bottom slab, and exterior wall closure shall not be less than 3'-0". See Section B-B detail when interior walls are cast full length.
- 6 Precast box reinforcing shall extend a minimum of 2'-9" into concrete closure (Typ).
- Bands of reinforcing matching the inside and outside face reinforcing shall be placed in the gaps of the top and bottom slabs. A band matching the outside face reinforcing of the wall shall be placed in the gaps of the walls (placed in the outside face only). The bands shall be tack welded to the exposed reinforcing at each point of contact.
- 8 For vehicle safety, the following requirements must be met:

   For structures without bridge rail, curbs shall project no more than 3" above finished grade.
   For structures with bridge rail, curbs shall be flush with
  - finished grade.
  - Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- (9) Cement Stabilized Backfill between boxes is considered part of the Box Culvert for payment.
- (10) All curb concrete and reinforcing is considered part of the Box
- (1) Any additional concrete and reinforcing required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
- 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.
- (13) For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in DETAIL "A".
- This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

# GENERAL NOTES:

Designed according to current AASHTO Standard and Interim Specifications.

All closure concrete shall be Class "C" with a minimum

compressive strength of 3600 psi and shall be placed according to the Item, "Concrete Structures".

Any additional concrete required for the closures shall be considered as subsidiary to the Concrete Box Culvert.

Refer to the Single Box Culverts Precast standard for details not shown

The bottom edge of the top slab closure shall be chamfered 3 inches at the entrance.

HS20 LOADING

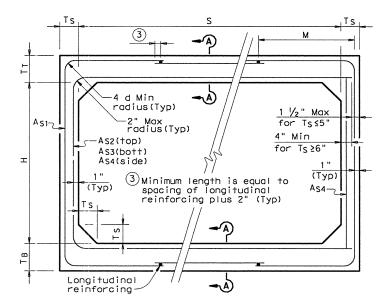
# Texas Department of Transportation Bridge Division **BOX CULVERTS PRECAST**

MISCELLANEOUS DETAILS

# SCP-MD

| ILE: scpmdste.dgn   | DN: GAF  | CK: LMW | DW:  | BWH/T   | xDOT | CK: | GAF       |
|---------------------|----------|---------|------|---------|------|-----|-----------|
| TxDOT December 2003 | DISTRICT | FED     | ERAL | AID PRO | JECT |     | SHEET     |
| REVISIONS           | AUS      |         | CC 3 | 37-1-29 | )    |     | 115       |
|                     | C        | OUNTY   |      | CONTROL | SECT | J08 | H [ GHWAY |
|                     | WII      | LIAMSON |      | 0337    | 01   | 029 | SH 29     |

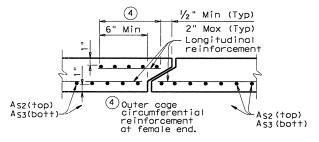
|           |                         |                |                |                |          |           | (               | вох             | DAT             | 4               |  |                 |                 |                 |                  |                  |
|-----------|-------------------------|----------------|----------------|----------------|----------|-----------|-----------------|-----------------|-----------------|-----------------|--|-----------------|-----------------|-----------------|------------------|------------------|
| SEC       | SECTION DIMENSIONS FILL |                |                |                |          |           |                 |                 | REI             | NFORC           | ING (i   | n²/f+)          | (2)             |                 | Lift             | Governing        |
| s         | н                       | T <sub>T</sub> | T <sub>B</sub> | T <sub>S</sub> | Height   | (Min)     | A <sub>S1</sub> | A <sub>S2</sub> | A <sub>S3</sub> | A <sub>S4</sub> | A <sub>S7</sub>                                  | A <sub>S8</sub> | A <sub>S5</sub> | A <sub>S6</sub> | Weight<br>(Tons) | ASTM<br>Standard |
| (ft)<br>6 | (ft)<br>3               | (in)<br>8      | (in)<br>7      | (in)<br>7      | (f+)     | (in)<br>- | 0.30            | 0.42            | 0.21            | 0.17            | 0.19   | 0.17            | 0.19            | 0.19            | 7.9              | C 850            |
| 6         | 3                       | 7              | 7              | 7              | 2        | 29        | 0.30            | 0. 29           | 0.22            | 0.17            | -  | -               | -               | 0.13            | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 3        | 24        | 0.21            | 0.19            | 0.18            | 0.17            | -  | -               | -               | -               | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 4        | 24        | 0.18            | 0.17            | 0.17            | 0.17            | -  | -               | -               | -               | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 5        | 24        | 0.17            | 0.17            | 0.17            | 0.17            | -  | -               | -               |                 | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 6        | 23        | 0.17            | 0.17            | 0.17            | 0.17            | <u> </u>   |                 | -               |                 | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 10       | 23        | 0.17            | 0.18            | 0.18            | 0.17            |  | -               | -               | -               | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 12       | 23        | 0.23            | 0.20            | 0.21            | 0.17            | <del>                                     </del> | -               | -               | <del>-</del> -  | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 14       | 23        | 0.26            | 0.26            | 0.26            | 0.17            |  |                 | -               | -               | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 16       | 23        | 0.28            | 0.29            | 0.29            | 0.17            | -  | -               | -               | -               | 7.5              | C 789            |
| 6         | 3                       | 7              | 7              | 7              | 18       | 23        | 0.31            | 0.32            | 0.32            | 0.17            | -  | -               | -               | -               | 7.5              | C 789            |
| 6         | 4                       | 8              | 7              | 7              | < 2      |           | 0.26            | 0.46            | 0.24            | 0.17            | 0.19   | 0.17            | 0.20            | 0.19            | 8.6              | C 850            |
| 6         | 4                       | 7              | 7              | 7              | 2        | 28        | 0.26            | 0.33            | 0.26            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 3        | 25        | 0.18            | 0.22            | 0.21            | 0.17            | -  | -               | -               |                 | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 5        | 24        | 0.17            | 0.19            | 0.19            | 0.17            | -  | -               | -               |                 | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 6        | 23        | 0.17            | 0.18            | 0.19            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 8        | 23        | 0.17            | 0.20            | 0.13            | 0.17            | <del> </del>                                     | <del></del>     | <del>  -</del>  | <del> </del>    | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 10       | 22        | 0.18            | 0.23            | 0.24            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 12       | 22        | 0.20            | 0.26            | 0.26            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 14       | 22        | 0.22            | 0.29            | 0.30            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 16       | 22        | 0.24            | 0.32            | 0.33            | 0.17            | -  | _               | -               | _               | 8.2              | C 789            |
| 6         | 4                       | 7              | 7              | 7              | 18       | 22        | 0.27            | 0.35            | 0.36            | 0.17            | -  | -               | -               | -               | 8.2              | C 789            |
| 6         | 5                       | 8              | 7              | 7              | < 2      | -         | 0.23            | 0.48            | 0.26            | 0.17            | 0.19   | 0.17            | 0.21            | 0.19            | 9.3              | C 850            |
| 6         | 5<br>5                  | 7              | 7              | 7              | 2        | 33        | 0.24            | 0.36            | 0.29            | 0.17            | -  | -               | -               | -               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 3<br>6   | 27<br>25  | 0.17            | 0.24            | 0.23            | 0.17            | <u> </u>   | -               | -               | -               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 8        | 23        | 0.17            | 0.21            | 0.22            | 0.17            | <del></del>                                      | _               | _               |                 | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 10       | 23        | 0.17            | 0.24            | 0.25            | 0.17            | -  | -               | -               | -               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 12       | 23        | 0.17            | 0.27            | 0.29            | 0.17            | -  | -               | -               | -               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 14       | 23        | 0.19            | 0.31            | 0.32            | 0.17            | -  | -               | -               | _               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 16       | 22        | 0.21            | 0.34            | 0.35            | 0.17            | -  | -               |                 | -               | 8.9              | C 789            |
| 6         | 5                       | 7              | 7              | 7              | 18       | 22        | 0.23            | 0.37            | 0.39            | 0,17            | -  | -               | -               | -               | 8.9              | C 789            |
| 6         | 6                       | 8<br>7         | 7              | 7              | < 2      | -         | 0.20            | 0.51            | 0.29            | 0.17            | 0.19   | 0.17            | 0.22            | 0.19            | 10.0             | C 850            |
| 6         | 6                       | 7              | 7              | 7              | 3        | 48<br>33  | 0.22            | 0.39            | 0.31            | 0.17            | -  | -               | -               | -               | 9.6              | C 789<br>C 789   |
| 6         | 6                       | 7              | 7              | 7              | 4        | 29        |                 |                 |                 |                 | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 5        | 27        | 0.17            | 0.21            | 0.22            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 6        | 26        | 0.17            | 0.21            | 0.22            | 0.17            | _  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 8        | 25        | 0.17            | 0.22            | 0.24            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 10       | 24        | 0.17            | 0.25            | 0.27            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 12       | 24        | 0.17            | 0.28            | 0.30            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 14       | 24        | 0.17            | 0.32            | 0.33            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
| 6         | 6                       | 7              | 7              | 7              | 16<br>18 | 24        | 0.19            | 0.35            | 0.37            | 0.17            | -  | -               | -               | -               | 9.6              | C 789            |
|           | 3                       | ,              |                |                | 10       | 2.5       | 0.21            | 0.30            | 0.40            | 0.11            | _  | _               |                 |                 | 3.0              | C 109            |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
|           |                         |                |                |                |          |           |                 |                 |                 |                 |  |                 |                 |                 |                  |                  |
| L         |                         |                |                |                | L        |           |                 | L               |                 |                 | L  |                 |                 |                 |                  |                  |



C789 CORNER OPTION "A"

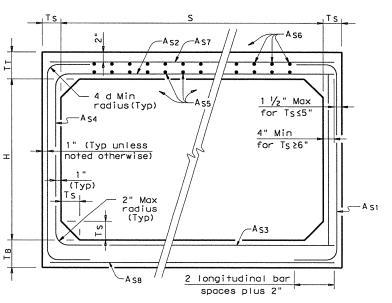
C789 CORNER OPTION "B"

# ASTM C789 STANDARD



SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)



C850 CORNER OPTION "A"

C850 CORNER OPTION "B"

# ASTM C850 STANDARD

# GENERAL NOTES:

ILE: scp06ste.dgn

CTxDOT December 2003

Designs shown conform to ASTM C789 or ASTM C850. Refer to ASTM C789 or ASTM C850 for information or details not shown.

C850 for information or details not shown. For ASTM C789 designs, all reinforcing steel shall have a minimum specified yield stress of 65 ksi. For ASTM C850 designs, all reinforcing steel shall have a minimum specified yield stress of 60 ksi. All concrete shall be Class "H" Concrete with a minimum 28 day compressive strength of 5,000 psi. See SCP-MD standard sheet for miscel-

See SCP-MD standard sheet for miscel-

See SCP-MD standard sheet for miscellaneous details and notes not shown.
Designed to the maximum fill height shown.
In lieu of furnishing the designs shown on
this sheet, the contractor may furnish an
alternate design that is equal to or exceeds
the box design for the design fill height in
the table. Shop plans for alternate designs
shall be submitted in accordance with Item
"Precast Concrete Structures".

HS20 LOADING



# SINGLE BOX CULVERTS **PRECAST**

6'-0" SPAN

DISTRICT

AUS

COUNTY

SCP-6 DN: GAF CK: LMW DW: BWH/TxDOT CK: GAF FEDERAL AID PROJECT CC 337-1-29

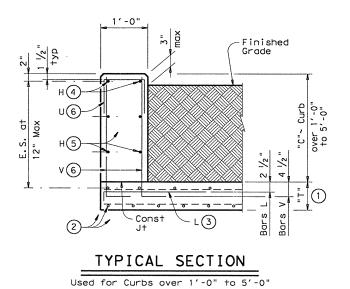
> CONTROL SECT JOB HIGH 0337 01 029 SH 29

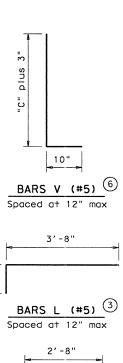
SHEET

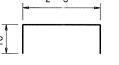
116

1) For Box Length = 8'-0"

(2) As1 thru As4, As7 and As8 are minimum required areas of reinforcement per linear foot of box length. AS6 and AS5 are minimum required areas of reinforcement per linear foot of box width.







OPTIONAL BARS L (#5) 37 Spaced at 12" max



BARS U (#4) 6 Spaced at 12" max

- (1) "T" is equal to the culvert top slab thickness. For Precast Boxes with slabs less than 7", see SCP-MD Standard for additional details.
- (2) Normal culvert slab bars adjusted as necessary to clear obstructions.
- 3) Place bars L as shown. Tilt hook as necessary to maintain cover.
- (4) Place normal culvert curb bars H (#4) as shown. Adjust as necessary to clear obstructions.
- (5) Additional bars H (#4) as required to maintain 12" max spa.
- (6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" max. Adjust length of bars V as necessary to maintain clear cover.
- $\begin{picture}(60,0)\put(0,0){\line(1,0){10}}\put(0,0){\line(1,0){10}$ closure pour.
- 8 Quantities shown are for contractor's information only. Quantities are per linear foot of curb length. The values for each section type in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

| COND                  | QUANTIT.        | 163 6                     |
|-----------------------|-----------------|---------------------------|
| Curb<br>Height<br>"C" | Conc<br>(CY/LF) | Reinf<br>Steel<br>(Lb/LF) |
| 1'-0"                 | 0.037           | 8.9                       |
| 1'-6"                 | 0.056           | 14.3                      |
| 2'-0"                 | 0.074           | 15.4                      |
| 2′-6"                 | 0.093           | 17.7                      |
| 3′-0"                 | 0.111           | 18.8                      |
| 3′-6"                 | 0.130           | 21.2                      |
| 4'-0"                 | 0.148           | 22.2                      |
| 4′-6"                 | 0.167           | 24.6                      |
| 5′-0"                 | 0.185           | 25.6                      |

**GENERAL NOTES:** 

Designed according to current AASHTO Standard and Interim Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T6 railing. These details are not suitable for the mounting of other rail types. For new construction using T6 railing, use the T6-CM

standards.

All reinforcing shall be Grade 60. Adjust reinforcing as necessary to provide 1  $\frac{1}{4}$ " cover. All concrete for curbs shall be Class "C" with a minimum compressive strength of 3600 psi.

This Curb shall be considered as part of the Box Culvert for payment.

For vehicle safety, the top of the curb shall project no more than 3" above the finished



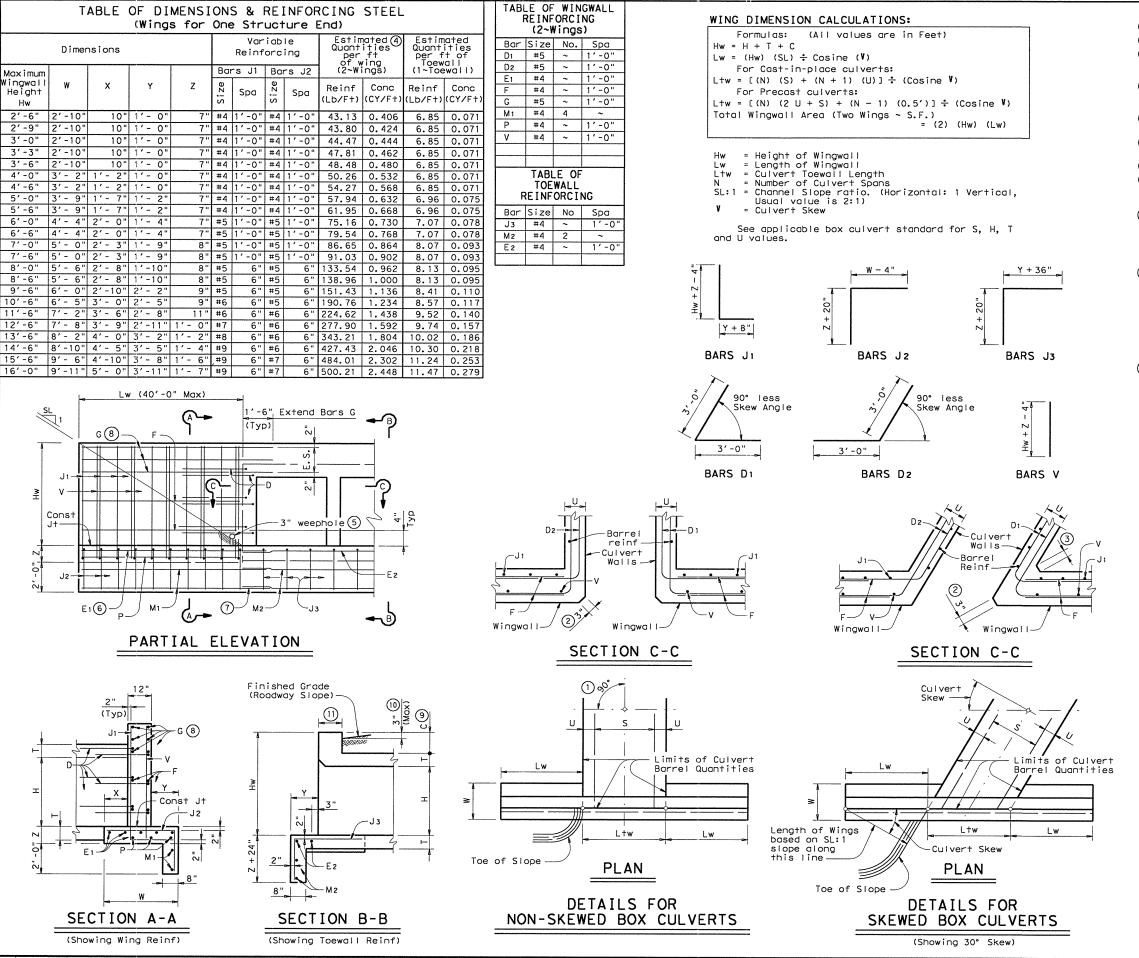
Texas Department of Transportation Bridge Division

# EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

**ECD** 

| .E: e | odstde1.do | )n   | DN:  | GAF  | CK:   |        | DW:    | Txt | OOT  | CK: | GA   | ١F  |
|-------|------------|------|------|------|-------|--------|--------|-----|------|-----|------|-----|
| TxDOT | December   | 2003 | DIST | RICT |       | FEDERA | LAID   | PRO | JECT |     | SHE  | ΕT  |
|       | REVISIONS  |      |      |      |       |        |        |     |      |     | 11   | 7   |
|       |            |      | C    |      | OUNTY |        | CONTRO |     | SECT | JOB | HIGH | WAY |
|       |            |      |      | WILL | IAMSO | N      | 033    | 37  | 01   | 029 | SH   | 29  |



- (1) Skew Angle = 0°
- (2) At discharge end, chamfer may be  $\frac{3}{4}$ ".
- 3 For 15° Skew ~ 1" For 30° Skew ~ 2" For 45° Skew ~ 3"
- (4) Quantities shown are for two wings. To determine total quantities for two wings, multiply the tabulated values by Lw.
- (5) Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
- (7) Lap Bars Mı 1′-6" minimum with Bars M2.
- (8) Bars C shall be equally spaced at 1'-0" maximum, placed as shown. There shall be at least 4 Bars G per wing.
- 9 0" min to 5'-0" max. For T6 or C6 Rail, see T6-CM standard for additional details. For all other rail types, refer to the RAC standard. For curbs without rail and greater than 1'-0" high, see ECD standard for additional details. Estimated curb heights are shown elsewhere in the plans.
- (10) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs shall project no more than 3" above finished grade.
   For structures with bridge rail, curbs shall be
- flush with finished grade.
- Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- 11) 1'-0" typical. 2'-0" typical when RAC standard is referenced elsewhere in the plans.

# **GENERAL NOTES:**

- Designed according to current AASHTO Standard and Interim Specifications.

  All reinforcing steel shall be Grade 60.

  All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.

  All reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.

  When structure is founded on solid rock, depth of toewalls for culverts and winawalls may be reduced
- toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.

  See BCS sheet for additional dimensions and

The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

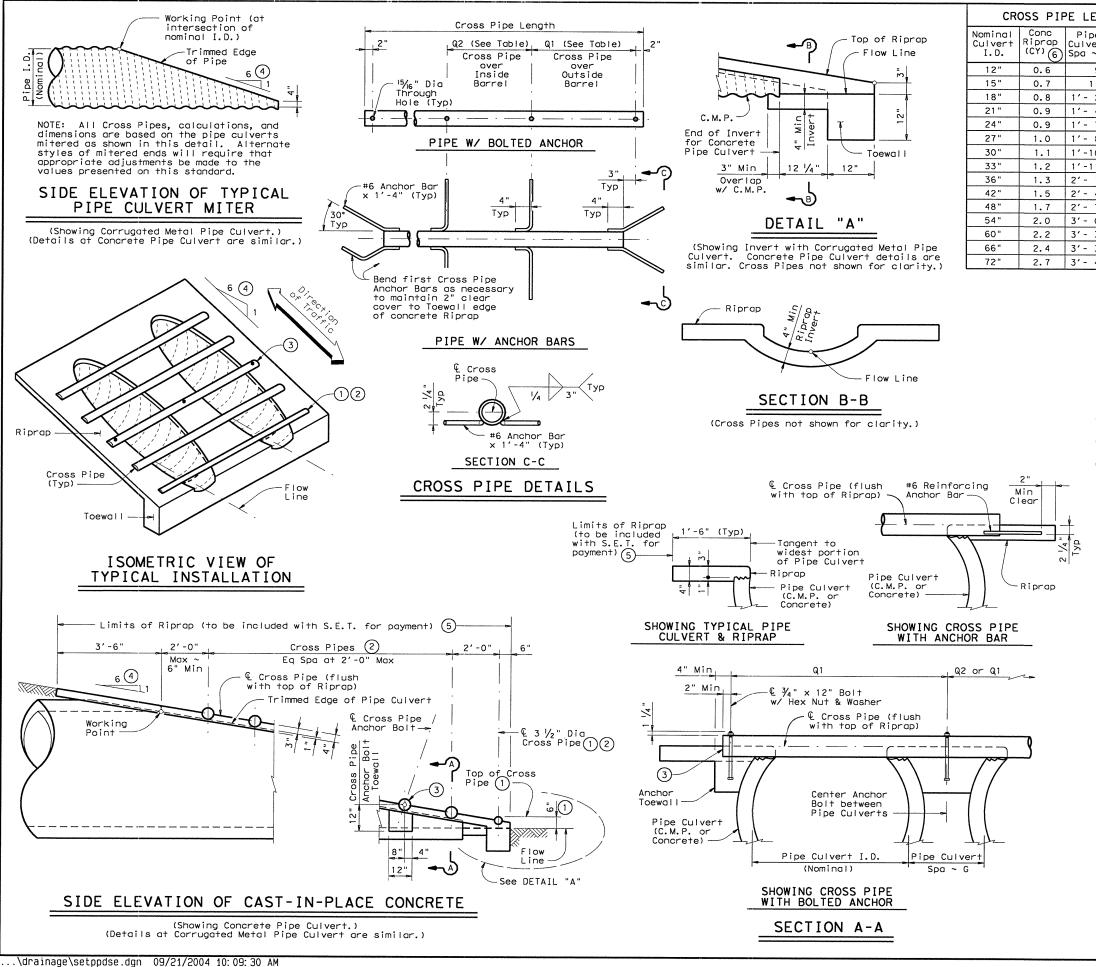


Texas Department of Transportation Bridge Division

# CONCRETE WINGWALLS WITH PARALLEL WINGS FOR

FOR SKEWED AND NON-SKEWED BOX CULVERTS

ILE: pwstde01.dgn DN: GAF CK: CAT DW: TXDOT CK: GAF C)TxDOT December 2003 DISTRICT AUS CC 337-1-29 118 CONTROL SECT 0337 01 029 SH



- CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES 2 Single Pipe Multi-Conditions for Q2 Culvert Borrel use of Cross Pipes Pipe Size Barrel Spa ~ G ~ Q1 ~ Q1 9" N/A 2'- 1" 1'- 9" 11" N/A 2'-5" 2'-2" 3" Std 1'- 2" N/A 2'-10" 2'- 8" 3 or more Pipe Culverts 3.500" O.D. 1'- 4" N/A 3'- 2" 3'- 1" N/A 3'- 6" 3'- 7" 1'- 7" 1'- 8" N/A 3'-10" 3'-11" 3 or more Pipe Culverts 3 ½" S+d (4.000" O.D. 1'-10" N/A 4'- 2" 4'- 4" 2 or more Pipe Culverts 4'- 2" 4'- 5" 4'- 8" 1'-11" All Pipe Culverts 2'- 1" 4'-5" 4'-9" 5'-1' 4" S†d (4.500" O.D. All Pipe Culverts 2'- 4" 4'-11" 5'- 5" 5'-10" 2'- 7" 5'- 5" 6'- 0" 6'- 7" 3'- 0" 5'-11" 6'- 9" 7'- 6" 5" S†d (5.563" O.D. 3'- 3" 6'- 5" 7'- 4" 8'- 3" All Pipe Culverts 3'- 3" | 6'-11" | 7'-10" | 8'- 9" 2.7 3'-4" 7'-5" 8'-5" 9'-4"
  - The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
  - Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3  $\frac{1}{2}$ " Standard Pipe (4" 0.0.).
  - The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the boilted connection details.
  - (4) Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.
  - Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".
  - Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

# **GENERAL NOTES:**

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control ror use in Those installations where out of cont vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes. Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in

the Price Bid for each Safety End Treatment. Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307. All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

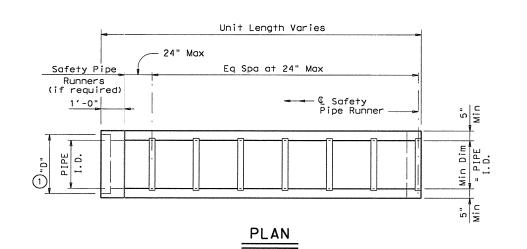


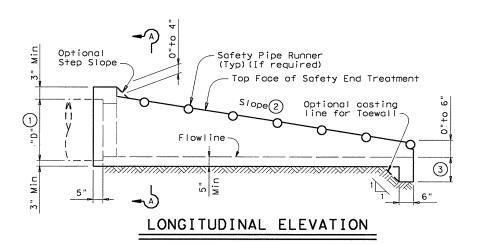
# SAFETY END TREATMENT

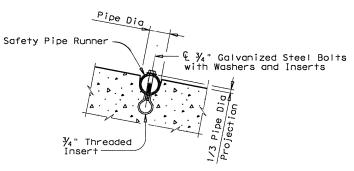
FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

| FILE: setppdse.dgn    | DN: GAF  | CK: CAT   | Dw: J      | RP    | CK: | GAF     |
|-----------------------|----------|-----------|------------|-------|-----|---------|
| © TxDOT December 2003 | DISTRICT | FEDER     | AL AID PRO | DJECT |     | SHEET   |
| REVISIONS             | AUS      | CC        | 337-1-29   | )     |     | 119     |
|                       | co       | YTAUC     | CONTROL    | SECT  | JOB | H[GHWAY |
|                       | WIL      | I LAMSONI | 0777       | 01    | 020 | CU OO   |

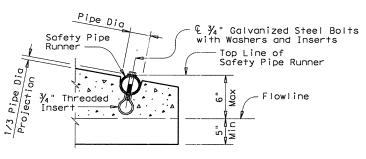




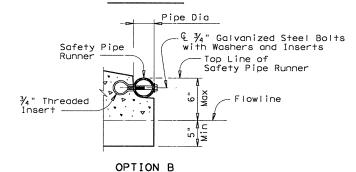


# INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

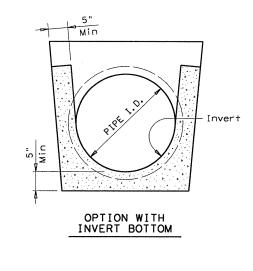


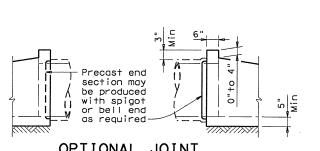
# OPTION A



# END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)





OPTIONAL JOINT

(Showing joint between RCP and Precast Safety End Treatment)

| PIPE | PIPE<br>WALL "B" | , 1<br>"D" | MAXIMUM |            | PIPE R<br>REQU |                      |                 | NNER SIZ |        |
|------|------------------|------------|---------|------------|----------------|----------------------|-----------------|----------|--------|
| I.D. | THICKNESS        |            | SLOPE   | OF<br>UNIT | SINGLE<br>PIPE | MULTIPLE<br>PIPE     | NOMINAL<br>DIA. | 0. D.    | I.D.   |
| 12"  | 2"               | 17"        | 6: 1    | 4'-9"      | No             | Yes, for<br>>2 pipes | 3" STD          | 3.500"   | 3.068" |
| 15"  | 2 1/4"           | 20 ½"      | 6: 1    | 6′-5"      | No             | Yes, for<br>>2 pipes | 3" STD          | 3.500"   | 3.068" |
| 18"  | 2 ½"             | 24"        | 6: 1    | 8'-0"      | No             | Yes, for<br>>2 pipes | 3" STD          | 3.500"   | 3.068" |
| 24"  | 3"               | 31"        | 6: 1    | 11'-3"     | No             | Yes, for<br>>2 pipes | 3" STD          | 3.500"   | 3.068" |
| 30"  | 3 ½"             | 38 ½"      | 6: 1    | 14'-8"     | No             | Yes                  | 4" STD          | 4.500"   | 4.026" |
| 36"  | 4"               | 45 ½"      | 6:1     | 17'-11"    | Yes            | Yes                  | 4" STD          | 4.500"   | 4.026" |
| 42"  | 4 ½"             | 52 ½"      | 6:1     | 21'-2"     | Yes            | Yes                  | 4" STD          | 4.500"   | 4.026" |
|      |                  |            |         |            |                |                      |                 |          |        |

- ① Dimension "D" is based on ASTM C-76, Class III, Wall "B" thickness. If any other wall thickness is used, dimension "D" must be adjusted accordingly.
- 2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- Toewall to be used only when dimension is shown elsewhere in the plans.
- (4) The top 4" of void between Precast End Treatments shall be filled with concrete Riprap and shall be considered subsidiary to Safety End Treatment.
- (5) Clear distance between pipes shall be adjusted to provide for the minimum distance between safety end treatments.
- 6 Cement stabilized bedding and backfill shall be in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill shall be considered subsidiary to the Item "Safety End Treatment". When concrete riprop is specified around the safety end treatment, backfill shall be as directed by Engineer.

# **GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item "Safety End Treatment". When Precast Safety End Treatment is used as a Contractor's alternate to mitered RCP, Riprap will not be required unless noted otherwise on

Manufacture of this product shall conform to requirements of
Item "Safety End Treatment" except as noted below:

A. Minimum reinforcing shall be #4 at 6" (Grade 40)
 or #4 at 9" (Grade 60) each way or 6 x 6 - W12 x W12
 or 5 x 5 - W10 x W10 welded wire fabric.

B. Concrete for precast (steel formed) sections shall be Class "C"
 with a minimum compressive strength of 3600 psi.

At the option and expense of the Contractor the next larger size
of Safety End Treatment may be furnished; as long as the "D" dimension
cast is that of the required size of pine

cast is that of the required size of pipe.

Pipe Runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Pipe Runners shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52. All steel components except reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

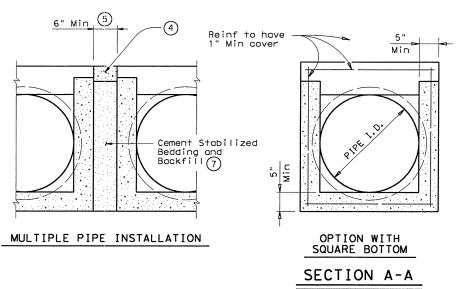


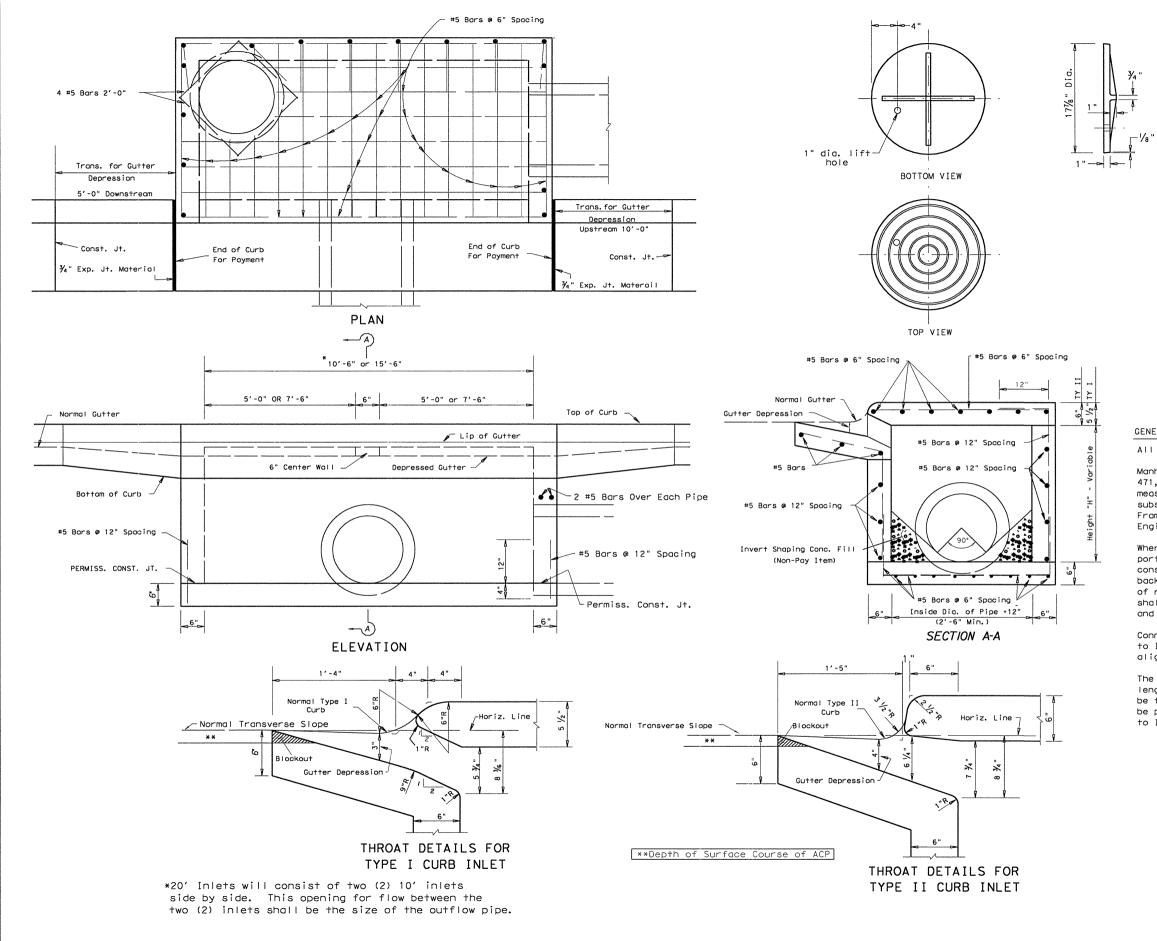
# PRECAST SAFETY END TREATMENT

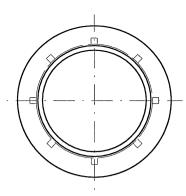
TYPE II ~ PARALLEL DRAINAGE

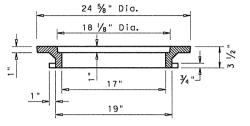
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|---|---|---|---|---|---|---|
| D | C | ᆮ | т | _ | C | D |
|   | J | _ |   |   | J |   |

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|--------------------|------|----------|------|------------------------------------|-----|---------|------|-----|--------|
|                    | 2003 | DISTRICT |      | FEDERAL AID PROJECT<br>CC 337-1-29 |     |         |      |     | SHEET  |
| REVISIONS          |      |          |      |                                    |     |         |      |     | 120    |
|                    |      |          | CO   | YTML                               |     | CONTROL | SECT | JOB | HIGHWA |
|                    |      |          | WILL | LAMS                               | ON  | 0337    | 01   | 029 | SH 20  |









Approximate Weight 170 lbs.

# RING AND COVER DETAILS

V-1846-1 or Equal

# GENERAL NOTES:

All concrete shall be class "A."

Manhole, Rings and Covers will be in accordance with Item 471, "Frames, Grates, Rings and Covers" except for measurement and payment. These items shall be considered subsidiary to the bid item for Curb Inlet. An alternate Frame and Cover will be accepted at the approval of the Engineer.

Where Inlets are proposed at existing Inlet locations, portions of the existing Inlet shall be utilized in the new construction as directed by the Engineer. All breakbacks necessary to tie to new construction, and all removal of remaining portions of existing Inlet not be utilized, shall be considered subsidiary work to Item 465, "Manholes and Inlets."

Connecting pipes should enter within 10 degrees of normal to Inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

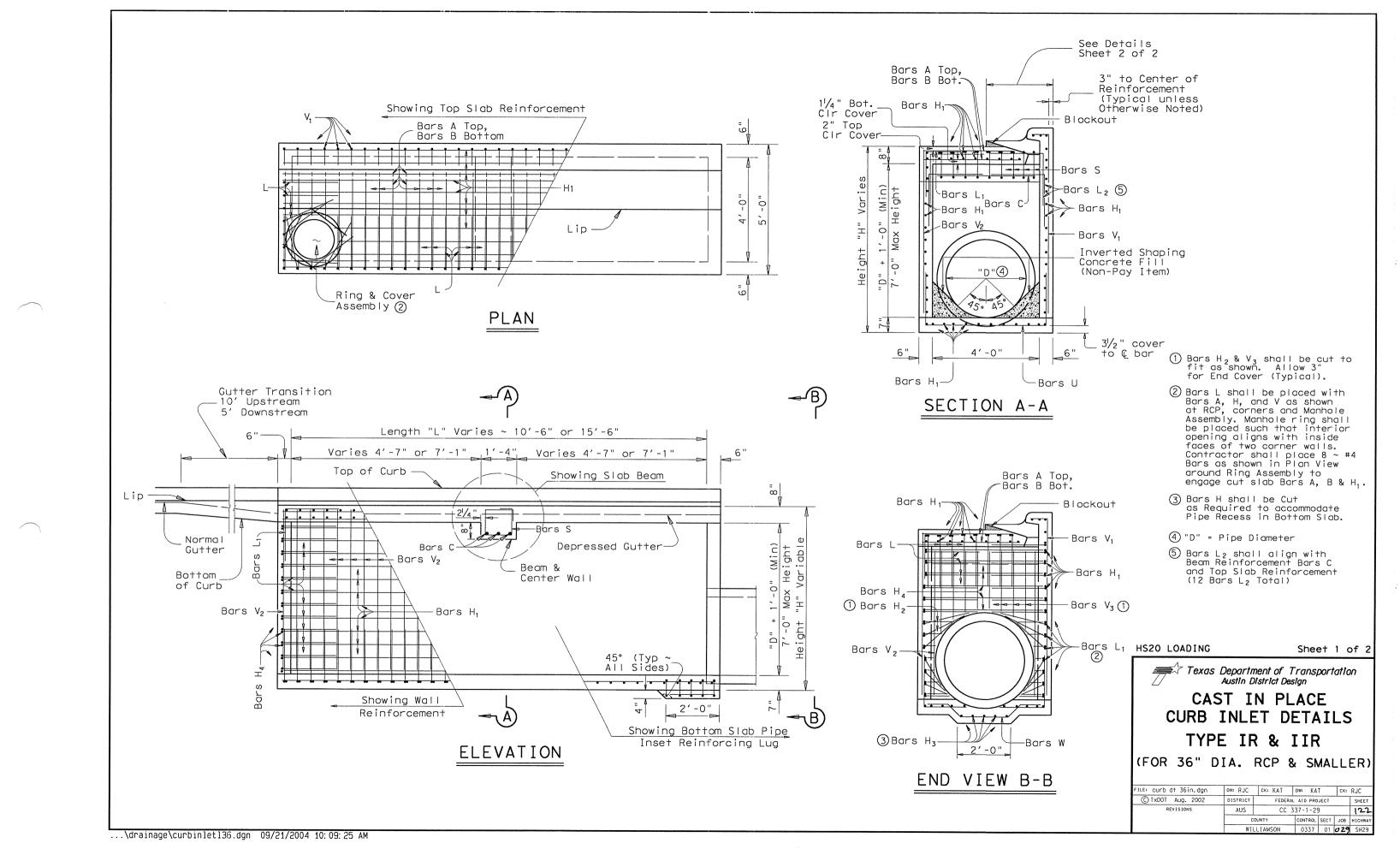
The Contractor shall provide gutter blockouts for the length of each Inlet for temporary drainage and shall be filled after final roadway paving. This work will not be paid for directly, but will be considered subsidiary to Item 465, "Manholes and Inlets."

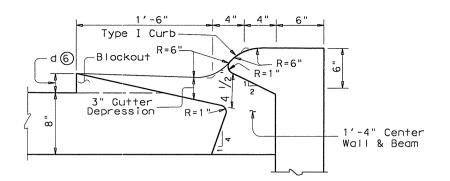


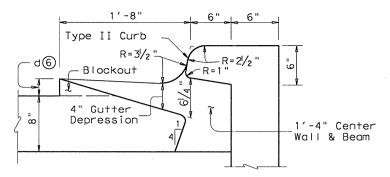
# CURB INLET DETAILS TYPES I & II

Austin District Standard

| © TxD0T   | 2003                 | DIST | FED REG | FEDERA | AL AID PE | ROJECT |     | SHEET   |
|-----------|----------------------|------|---------|--------|-----------|--------|-----|---------|
| REVISIONS |                      | AUS  | 6       | CC     | 337-1     | 121    |     |         |
| 3/03 DIS  | 3/03 District Update |      | COUNT   | Υ      | CONTROL   | SECT   | JOB | H1GHWAY |
|           |                      |      | WILLIA  | MSON   | 0337      | 01     | 029 | SH 29   |







THROAT DETAILS TYPE IIR INLETS

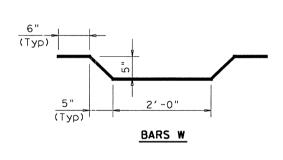
#### BAR TABLE BAR SIZE MAX. SPA. #5 5" #5 С #8 As Shown H 1 #5 6" H<sub>2</sub> #5 6" H<sub>3</sub> #5 6" H<sub>4</sub> #5 6" #5 6" #8 As Shown #4 U #5 6" V 1 #5 6" 6" V 2 #5 ٧¸ #5 6" W #5 6"

# THROAT DETAILS TYPE IR INLETS

(6) "d" = Depth of Overlay.

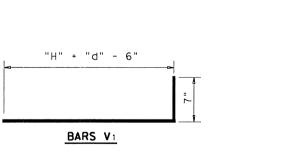
# A ~ 3'-0" B ~ 3'-7" C ~ 3'-8" H<sub>1</sub> ~ "L" + 6" H<sub>2</sub> ~ Cut to Fit H<sub>3</sub> ~ 1'-8" H<sub>4</sub> ~ 4'-6" V<sub>2</sub> ~ "H" - 11" V<sub>3</sub> ~ Cut to Fit

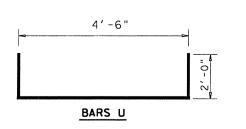
BARS A, B, C, H<sub>1</sub>, H<sub>2</sub>, H<sub>3</sub>, H<sub>4</sub>, V<sub>2</sub>, & V<sub>3</sub>

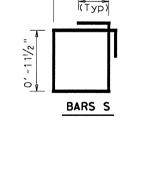


# TOP VIEW TOP VIEW 17½" Dia. 18½" Dia. 18½" Dia. 1" dia. lift hole Approximate Weight 240 lbs. BOTTOM VIEW

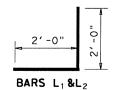
RING AND COVER DETAILS







10'-111/2"



# **GENERAL NOTES:**

All concrete shall be Class "A"

Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings".
Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings.
Aluminum alloy castings shall not be permitted. Ring and cover shall be considered subsidiary to the inlet bid item.

If two inlets are to be installed end to end, contractor shall install equivalent opening or pipe segment in end walls between boxes. Each end wall between inlet boxes shall be reinforced as shown for single box.

The Contractor may build inlets in stages so that base laying operations may be continuous over the top of the inlet. Any additional excavation required below finished base grade, within roadway limits, shall be backfilled with Class "B" Conc (Riprap).

Work or materials involved for inlet stage construction will not be paid for directly, but shall be considered subsidiary to the bid items involved.

Where inlets are proposed at existing inlet locations, portions of the existing inlet shall be utilized in the new construction as directed by the Engineer. All break-back necessary to provide for tie to new construction and all removal of remaining portions of existing inlet not to be utilized shall be considered subsidiary work to Item 465, "Manholes and Inlets."

Connecting pipes should enter within 10 degrees of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

The Contractor shall provide gutter blockout(s) for the length of each inlet for temporary drainage. Blockout(s) shall be filled after final roadway paving. This work will not be paid for directly, but will be considered subsidiary to Item 465, "Manholes and Inlets."

HS20 LOADING

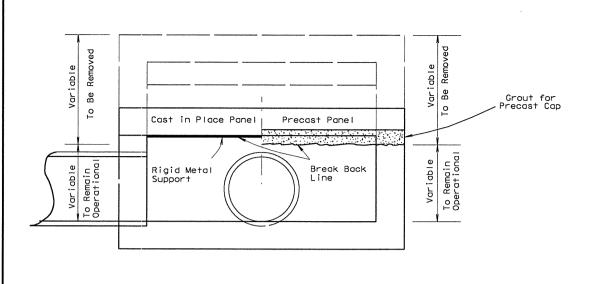
Sheet 2 of 2

Texas Department of Transportation Austin District Design

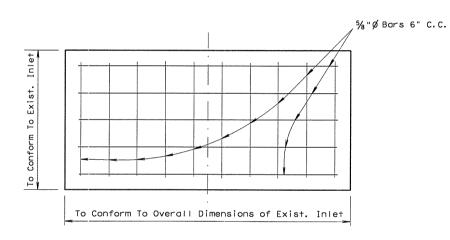
CAST IN PLACE CURB INLET DETAILS TYPE IR & IIR

(FOR 36" DIA. RCP & SMALLER)

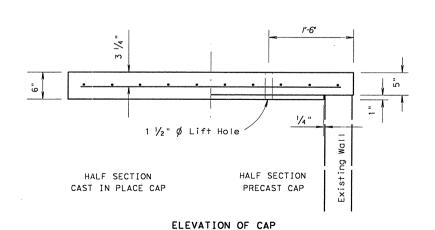
| FILE: curb dt 36in.dgn | DN: RJC  | CK: KAT                      | DW: KA | T | CK; | RJC     |
|------------------------|----------|------------------------------|--------|---|-----|---------|
| © TxDOT Aug. 2002      | DISTRICT | DISTRICT FEDERAL AID PROJECT |        |   |     |         |
| REVISIONS              | AUS      | CC 337-1-29                  |        |   |     | 123     |
|                        | C        | COUNTY                       |        |   | JOB | HIGHWAY |
|                        | WIL      | WILLIAMSON                   |        |   | 029 | SH29    |

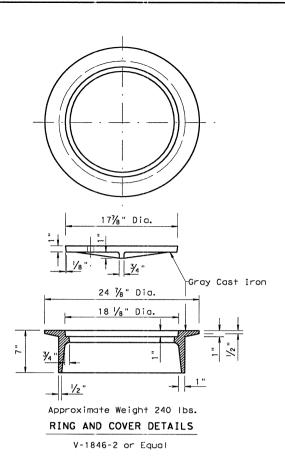


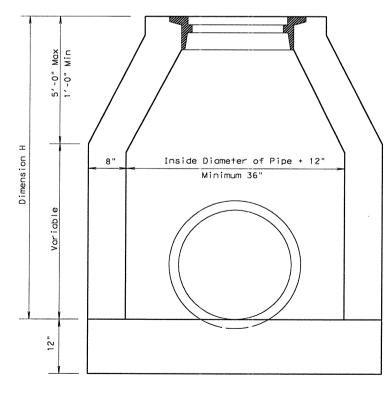
# ELEVATION OF CAPPED INLET



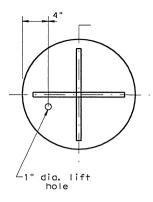
# PLAN VIEW OF CAP

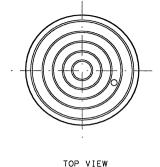






C SECTION OF MANHOLE





BOTTOM VIEW

# GENERAL NOTES :

All Concrete shall be Class "A".

Manhole walls shall be constructed of concrete sewer brick, precast concrete, or concrete blocks. Maximum size of concrete block shall be 8"x8"x16".

Existing inlets to be capped shall be fitted with either a precast or cast in place cap, as directed by the Engineer. Noncorroding rigid metal shall be used to form the bottom of the cast in place cap. The size and shape shall conform to the inside dimensions of the inlet and the form shall be suspended such that no inside support will be required.

Payment for existing inlets to be capped shall be in accordance with Item 479, "Adjusting Manholes and Inlets".

Inlets shown to be removed may be capped as directed by the Engineer.

Excavation and backfill, frames, grates, rings and covers will not be paid for directly but shall be considered subsidiary to Item 466, "Headwalls and Wingwalls" or Item 465, "Manholes and Inlets."

Connecting pipes should enter within 10 degrees of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

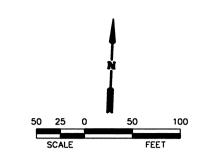
Alternate frame and cover may be used as approved by the Engineer.

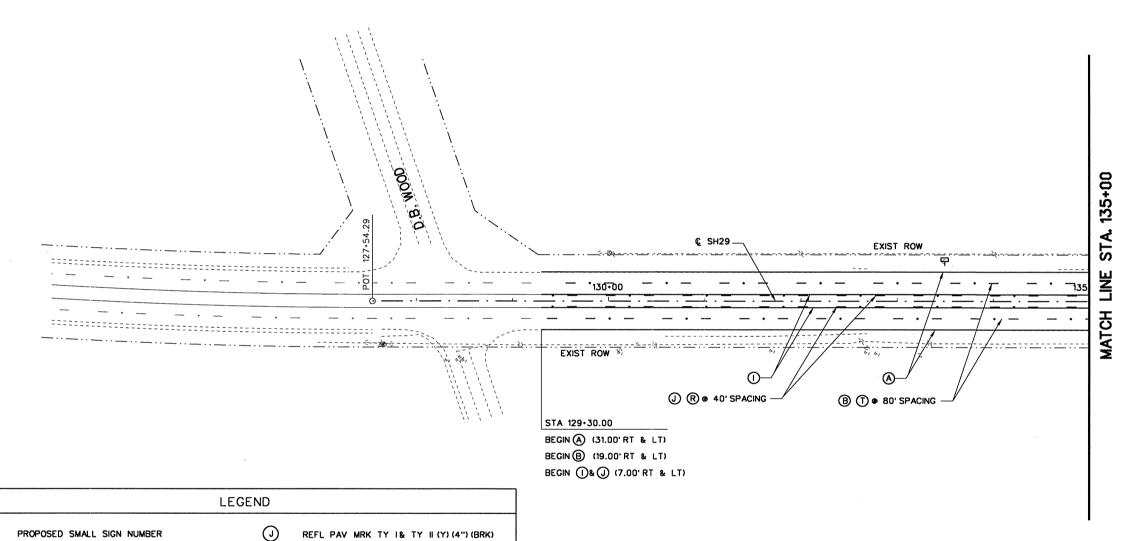


# MANHOLE TYPE A AND CAPPED INLET DETAILS

Austin District Standard

| C) TxDOT 2003                     | DIST | FED REC    | FEDER       | AL AID PE | ROJECT |     | SHEET     |
|-----------------------------------|------|------------|-------------|-----------|--------|-----|-----------|
| REVISIONS<br>3/03 District Update | AUS  | 6          | CC 337-1-29 |           |        |     | 124       |
| 3703 District opdate              |      | COUNTY     |             |           | SECT   | JOB | H [ GHWAY |
|                                   | 3    | WILLIAMSON |             |           | 01     | 029 | SH 29     |





NOTES:

1. SIGN LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED TO MEET ROADWAY CONDITIONS AS APPROVED BY THE ENGINEER.

2. SEE PROPOSED TYPICAL SECTION FOR LANE LINE OFFSETS.

3. ALL STATIONS REFER TO SH 29 UNLESS NOTED OTHERWISE.



Chiang, Patel & Yerby, Inc.

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Texas Department of Transportation

SH 29

SIGNING, STRIPING,
DELINEATION & MBGF LAYOUT

N REFL PAV MRK TY I& TY II (Y) (24") (SLD)

O RAIS PAV MRKR CL B (REFL) TY II-C-R

R RAIS PAV MRKR CL B (REFL) TY II-A-A

S REFL PAV MRK TY I& TY II (W) (4") (DOT)

T RAIS PAV MRK CL B (REFL) TY I-C

DBJECT MARKER (OM-4R)

DELINEATOR (D-SW) (A)

P PROPOSED MAILBOX ASSEMBLY (SINGLE)

REFL PAV MRK TY I& TY II (Y) (8") (SLD)

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EXIST. SIGN TO BE REMOVED & RELOCATED

REFL PAV MRK TY I& TY II (W) (4") (SLD)

REFL PAV MRK TY I& TY II (W) (4") (BRK)

REFL PAV MRK TY I& TY II (W) (8") (SLD)

REFL PAV MRK TY I& TY II (W) (12") (SLD)

REFL PAV MRK TY I& TY II (W) (24") (SLD)

REFL PAV MRK TY I& TY II (W) (ARROW)

REFL PAV MRK TY I& TY II (W) (WORD)

REFL PAV MRK TY 1& TY II (W) (8") (LNDP)

REFL PAV MRK TY I& TY II (Y) (4") (SLD)

SINGLE MAILBOX

TY III BARRICADE

lack

(C)

**(** 

(E)

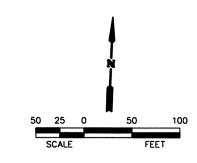
**©** 

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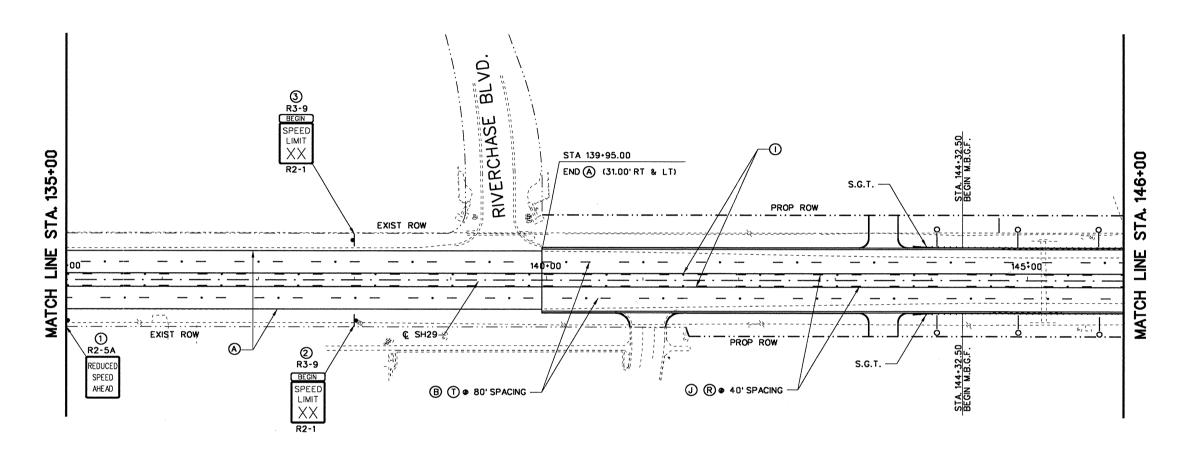
PROPOSED SMALL SIGN

1 OF 8

hecked.



NOTES: SEE SHEET 1 OF 8



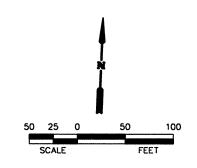
|          | LE                                       | GEND     |  |
|----------|--|----------|--|
| #        | PROPOSED SMALL SIGN NUMBER               | <b>J</b> | REFL PAV MRK TY I& TY II (Y) (4") (BRK)  |
| 尸        | EXIST. SIGN TO BE REMOVED & RELOCATED    | (L)      | REFL PAV MRK TY I& TY II (Y) (8") (SLD)  |
| ዋ        | SINGLE MAILBOX                           | N        | REFL PAV MRK TY I& TY II (Y) (24") (SLD) |
| þ        | PROPOSED SMALL SIGN                      | 0        | RAIS PAV MRKR CL B (REFL) TY II-C-R      |
| I        | TY III BARRICADE                         | R        | RAIS PAV MRKR CL B (REFL) TY II-A-A      |
| A        | REFL PAV MRK TY I& TY II (W) (4") (SLD)  | S        | REFL PAV MRK TY I& TY II (W) (4") (DOT)  |
| B        | REFL PAV MRK TY I& TY II (W) (4") (BRK)  | T        | RAIS PAV MRK CL B (REFL) TY I-C          |
| (©       | REFL PAV MRK TY I& TY II (W) (8") (SLD)  | 70       | OBJECT MARKER (OM-4R)                    |
| <u>0</u> | REFL PAV MRK TY I& TY II (W) (12") (SLD) | 0        | DELINEATOR (D-SW) (A)                    |
| Ē        | REFL PAV MRK TY I& TY II (W) (24") (SLD) | 早        | PROPOSED MAILBOX ASSEMBLY (SINGLE)       |
| F        | REFL PAV MRK TY I& TY II (W) (ARROW)     |          |  |
| <b>©</b> | REFL PAV MRK TY I& TY II (W) (WORD)      |          |  |
| (H)      | REFL PAV MRK TY I& TY II (W) (8") (LNDP) |          |  |
| 1        | REFL PAV MRK TY I& TY II (Y) (4") (SLD)  |          |  |
|          |  |          |  |

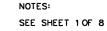


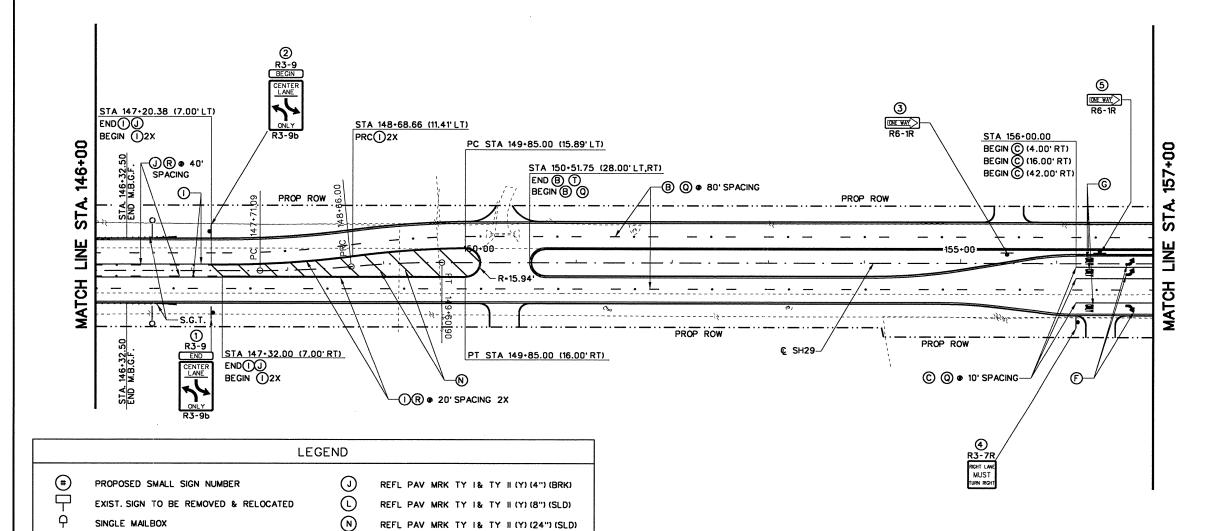
|        |                                 |       | ·    |
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| NO.    | REVISION                        | BY    | DATE |
| CI     | Chiang, Patel & Yerb            | y, In | c.   |
| © 2004 | Texas Department of Transportat | ion   |      |
|        | SH 29                           |       |      |
|        | SICNING STRIPING                |       |      |

| SIGNING | STRIPING | WBGF LAYOUT | STA. 135+00 | TO | STA. 146+00 | STA. 135+00 | TO | STA. 146+00 | STA. 135+00 | STATE | FEDERAL AID PROJECT NO. | SHEET | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE | STATE |

2 OF 8







REFL PAV MRK TY I& TY II (Y) (24") (SLD)

RAIS PAV MRKR CL B (REFL) TY II-C-R

RAIS PAV MRKR CL B (REFL) TY II-A-A

PROPOSED MAILBOX ASSEMBLY (SINGLE)

RAIS PAV MRK CL B (REFL) TY I-C

OBJECT MARKER (OM-4R)

DELINEATOR (D-SW) (A)

REFL PAV MRK TY I& TY II (W) (4") (DOT)

0

R

1



Chiang, Patel & Yerby, Inc.

Texas Department of Transportation SH 29

SIGNING, STRIPING, DELINEATION & MBGF LAYOUT STA. 146+00 TO STA. 157+00

hecked:

REFL PAV MRK TY I& TY II (W) (4") (SLD)

REFL PAV MRK TY I& TY II (W) (4") (BRK)

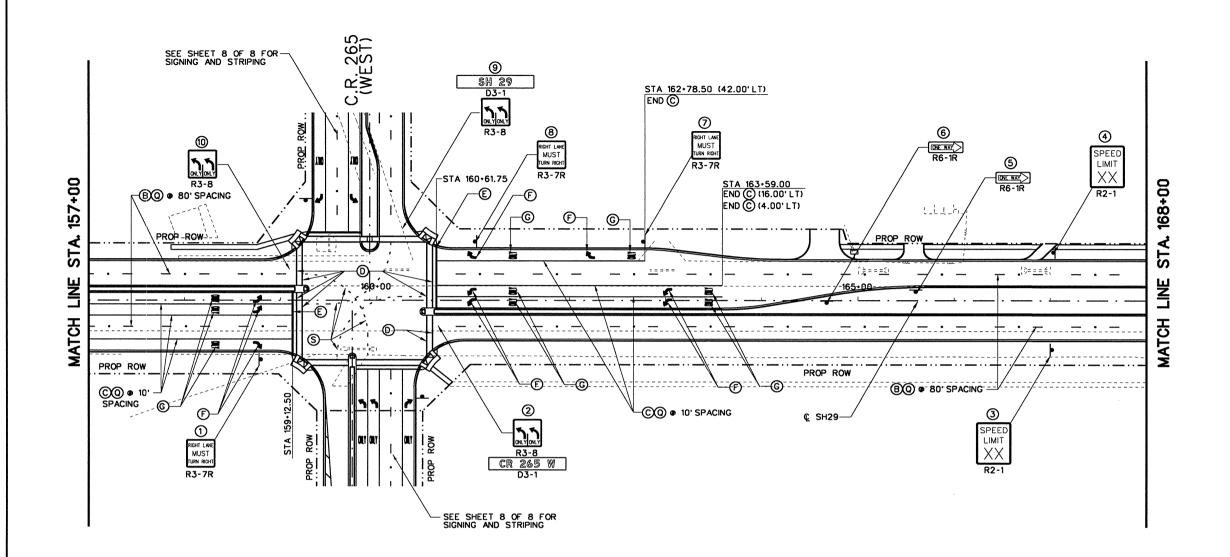
REFL PAV MRK TY I& TY II (W) (8") (SLD)

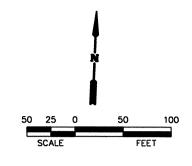
SINGLE MAILBOX

TY III BARRICADE

 $\bigcirc$ 

PROPOSED SMALL SIGN





NOTES: SEE SHEET 1 OF 8

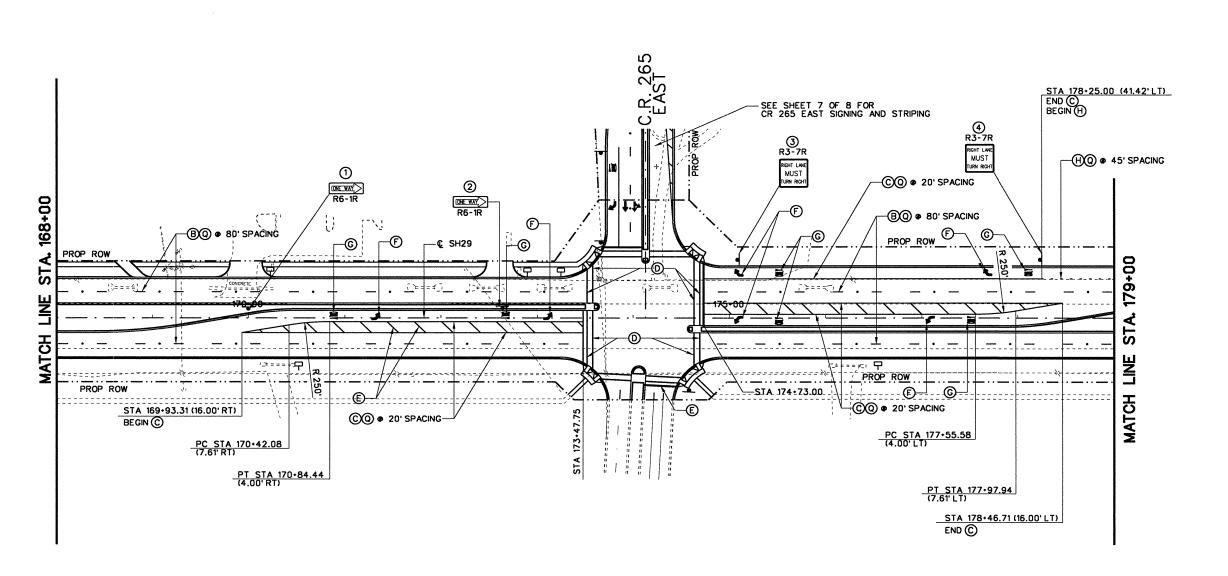


Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

SIGNING, STRIPING DELINEATION & MBGF LAYOUT STA. 157+00 TO STA. 168+00

|          | LE                                       | GEND     |  |
|----------|--|----------|--|
| #        | PROPOSED SMALL SIGN NUMBER               | <u> </u> | REFL PAV MRK TY I& TY II (Y) (4") (BRK)  |
| 9        | EXIST. SIGN TO BE REMOVED & RELOCATED    | (L)      | REFL PAV MRK TY I& TY II (Y) (8") (SLD)  |
| Ą        | SINGLE MAILBOX                           | N        | REFL PAV MRK TY I& TY II (Y) (24") (SLD) |
| þ        | PROPOSED SMALL SIGN                      | <b>@</b> | RAIS PAV MRKR CL B (REFL) TY II-C-R      |
| I        | TY III BARRICADE                         | R        | RAIS PAV MRKR CL B (REFL) TY II-A-A      |
| lack     | REFL PAV MRK TY I& TY II (W) (4") (SLD)  | S        | REFL PAV MRK TY I& TY II (W) (4") (DOT)  |
| B        | REFL PAV MRK TY I& TY II (W) (4") (BRK)  | T        | RAIS PAV MRK CL B (REFL) TY I-C          |
| ©        | REFL PAV MRK TY I& TY II (W) (8") (SLD)  |          | OBJECT MARKER (OM-4R)                    |
| 0        | REFL PAV MRK TY I& TY II (W) (12") (SLD) | 0        | DELINEATOR (D-SW) (A)                    |
| Ē        | REFL PAV MRK TY I& TY II (W) (24") (SLD) | 早        | PROPOSED MAILBOX ASSEMBLY (SINGLE)       |
| F        | REFL PAV MRK TY I& TY II (W) (ARROW)     |          |  |
| <b>©</b> | REFL PAV MRK TY I& TY II (W) (WORD)      |          |  |
| (H)      | REFL PAV MRK TY I& TY II (W) (8") (LNDP) |          |  |
| 1        | REFL PAV MRK TY I& TY II (Y) (4") (SLD)  |          |  |





LEGEND PROPOSED SMALL SIGN NUMBER REFL PAV MRK TY I& TY II (Y) (4") (BRK) EXIST. SIGN TO BE REMOVED & RELOCATED REFL PAV MRK TY I& TY II (Y) (8") (SLD)  $\bigcirc$ SINGLE MAILBOX REFL PAV MRK TY I& TY II (Y) (24") (SLD) PROPOSED SMALL SIGN 0 RAIS PAV MRKR CL B (REFL) TY II-C-R TY III BARRICADE RAIS PAV MRKR CL B (REFL) TY II-A-A REFL PAV MRK TY I& TY II (W) (4") (DOT) REFL PAV MRK TY I& TY II (W) (4") (SLD) RAIS PAV MRK CL B (REFL) TY I-C REFL PAV MRK TY I& TY II (W) (4") (BRK) OBJECT MARKER (OM-4R) REFL PAV MRK TY I& TY II (W) (8") (SLD) DELINEATOR (D-SW) (A) **(** REFL PAV MRK TY I& TY II (W) (12") (SLD) PROPOSED MAILBOX ASSEMBLY (SINGLE) REFL PAV MRK TY I& TY II (W) (24") (SLD) F REFL PAV MRK TY I& TY II (W) (ARROW) REFL PAV MRK TY I& TY II (W) (WORD) REFL PAV MRK TY I& TY II (W) (8") (LNDP) ① REFL PAV MRK TY I& TY II (Y) (4") (SLD)

NO. REVISION BY DATE

CP&Y Chiang, Patel & Yerby, Inc.

NOTES:

SEE SHEET 1 OF 8

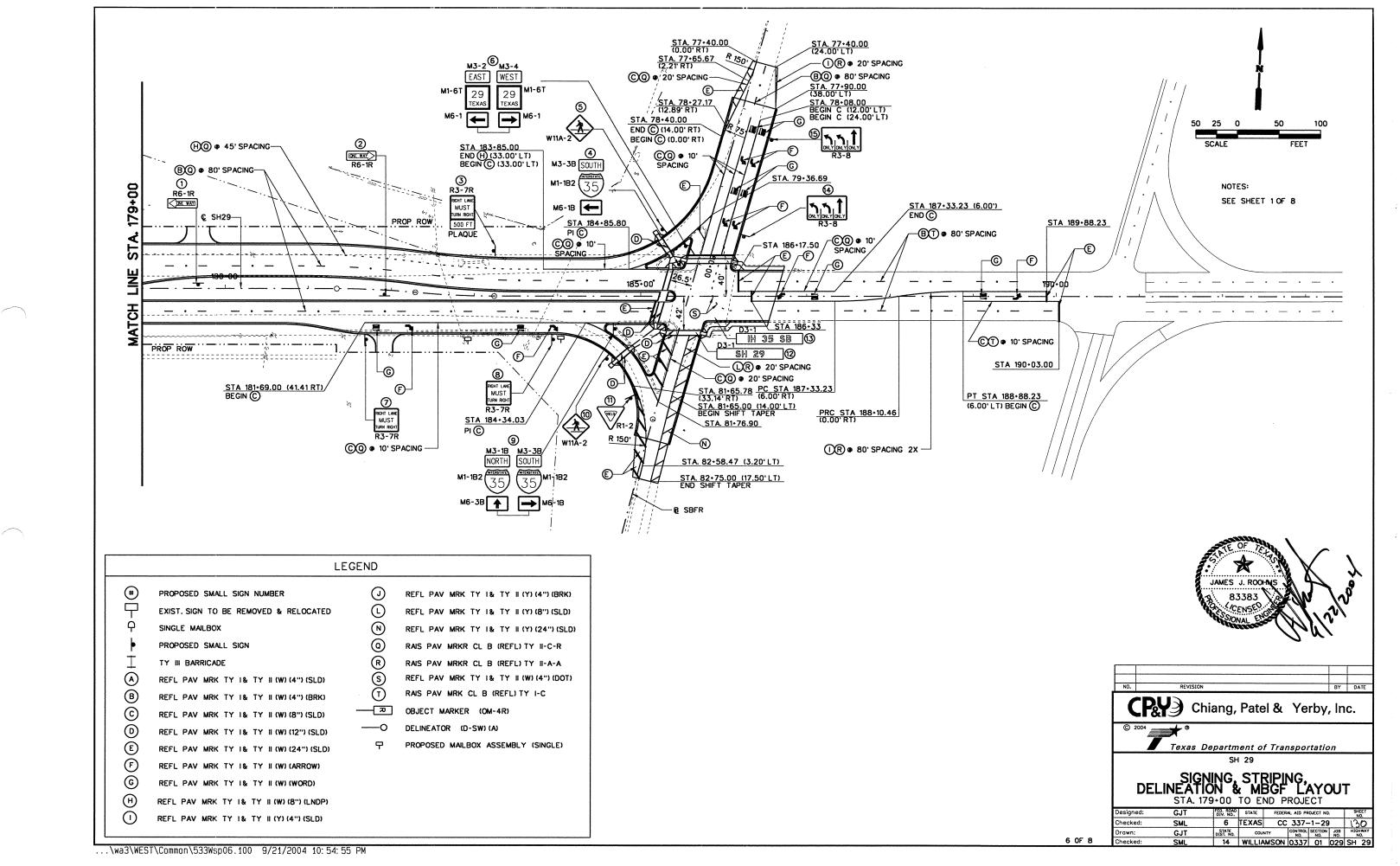
2004

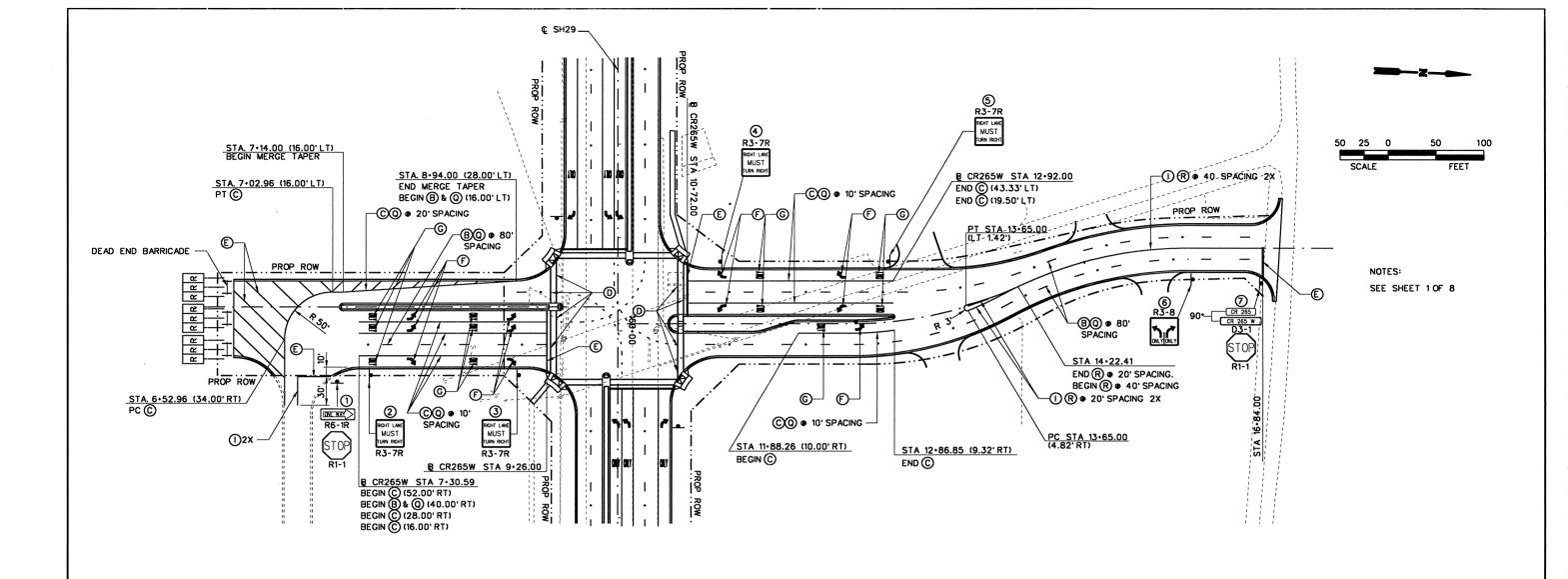
Texas Department of Transportation

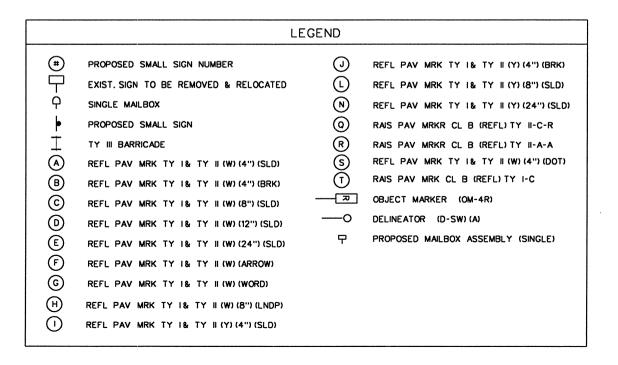
SH 29

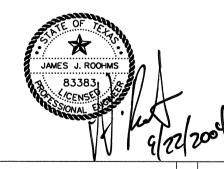
SIGNING, STRIPING, DELINIATION & MBGF LAYOUT STA. 168-00 TO STA. 179-00

5 OF 8









NO. REVISION BY DATE

CP& Chiang, Patel & Yerby, Inc.

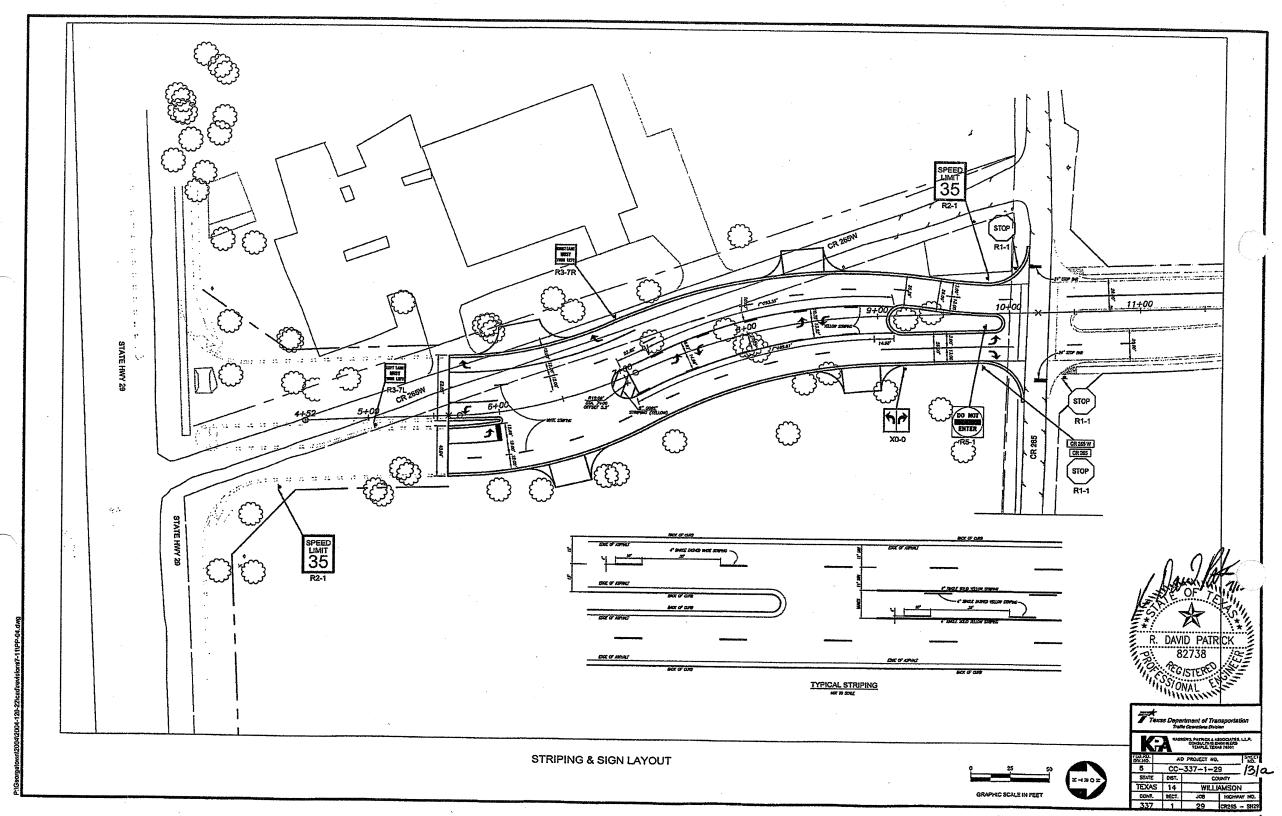


7 OF 8

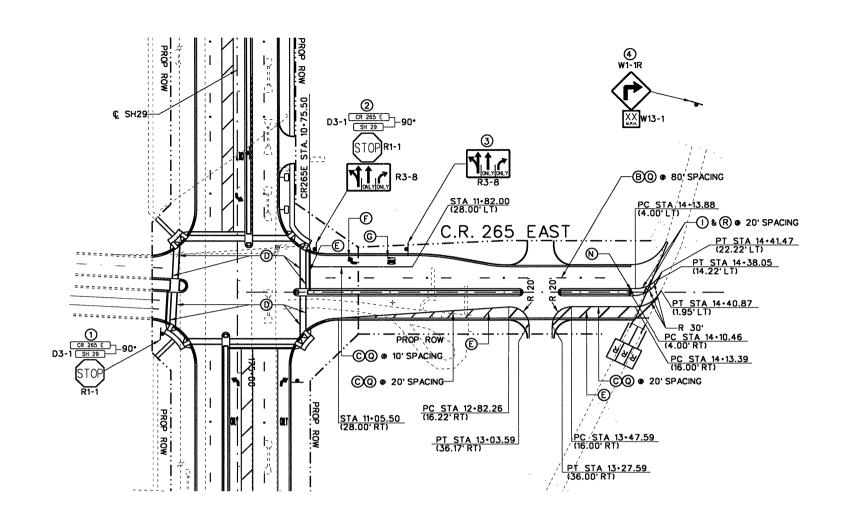
Texas Department of Transportation
SH 29

SIGNING, STRIPING, DELINEATION & MBGF LAYOUT

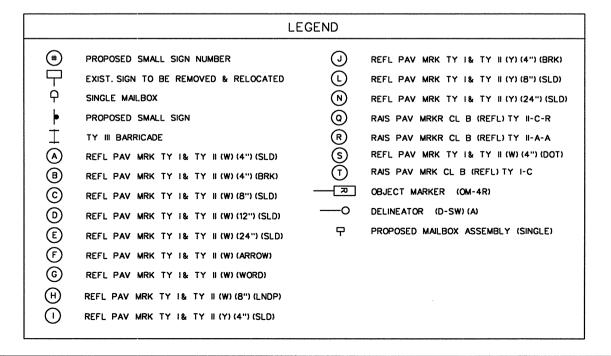
| Designed: | GJT  | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PE      | ROJECT NO      |            | SHI  |    |
|-----------|------|----------------------|--------|-------|----------------|----------------|------------|------|----|
| Checked:  | SML. | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 13   | 1  |
| Drawn:    | GJT  | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HIGH |    |
| Checked:  | SML  | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH   | 29 |



C.O.#6









Chiang, Patel & Yerby, Inc.

NOTES:

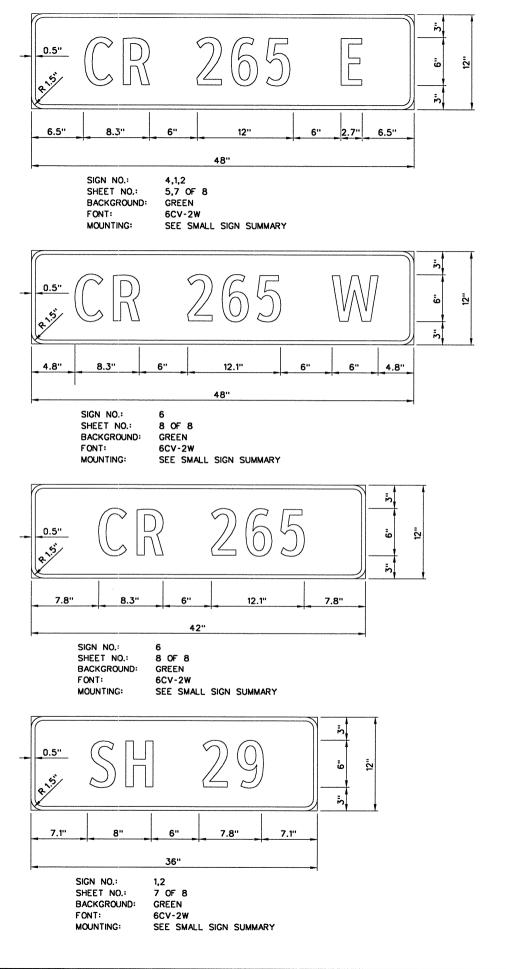
SEE SHEET 1 OF 8

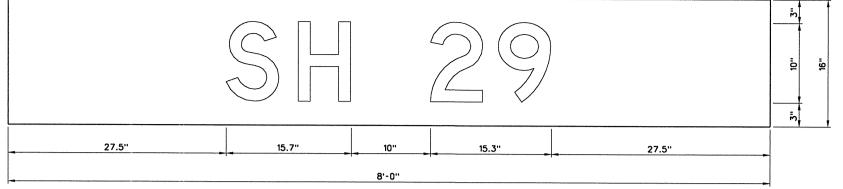


Texas Department of Transportation

SIGNING, STRIPING, DELINEATION & MBGF LAYOUT CR 265 EAST

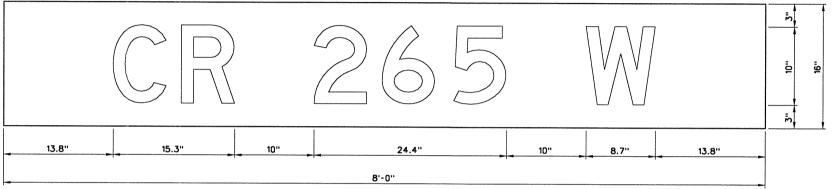
| Designed: | GJT | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PR      | OJECT NO       | ١.         |    | EET<br>O. |
|-----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-----------|
| Checked:  | SML | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 17 | 32        |
| Drawn:    | GJT | STATE<br>DIST. NO.   | COUN   | TY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | WAY       |
| Checked:  | SML | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29        |





9,12 4,6 OF 8 GREEN SIGN NO.: SHEET NO .: BACKGROUND: FONT: SERIES D

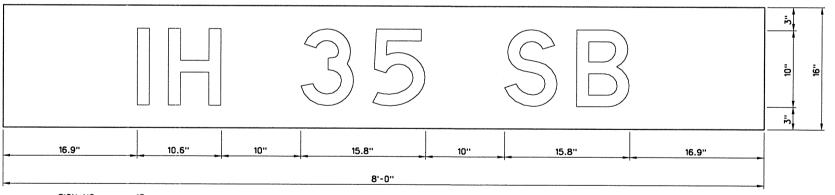
MOUNTING: SEE SMALL SIGN SUMMARY



SIGN NO.: SHEET NO .: 4 OF 8 BACKGROUND: GREEN FONT:

SERIES D

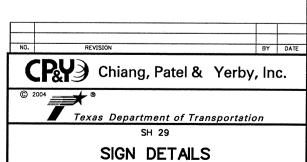
MOUNTING: SEE SMALL SIGN SUMMARY



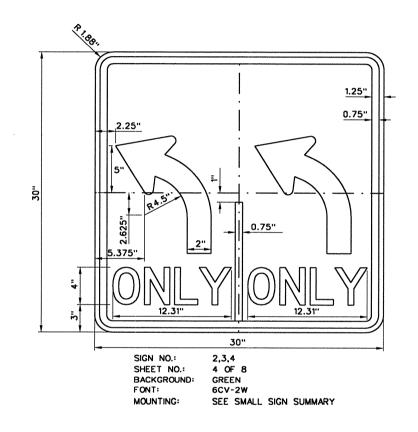
SIGN NO.: SHEET NO.: 13 6 OF 8 BACKGROUND: GREEN FONT: SERIES D MOUNTING: SEE SMALL SIGN SUMMARY

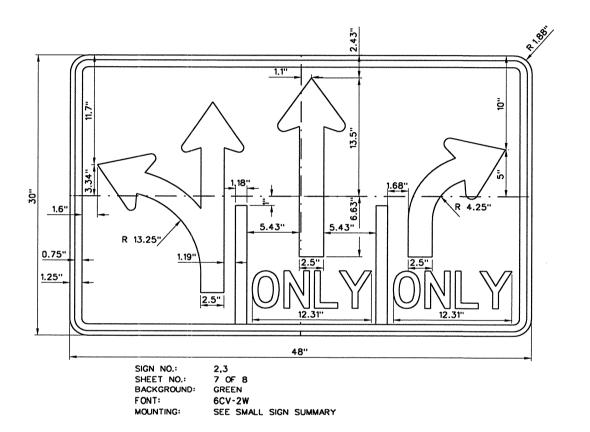


1 OF 2



SML Checked: GJT SML







2 OF 2

| NO. | <br>Chiang, Patel & | Vorby | BY | DATE |
|-----|---------------------|-------|----|------|
|     |                     |       |    |      |

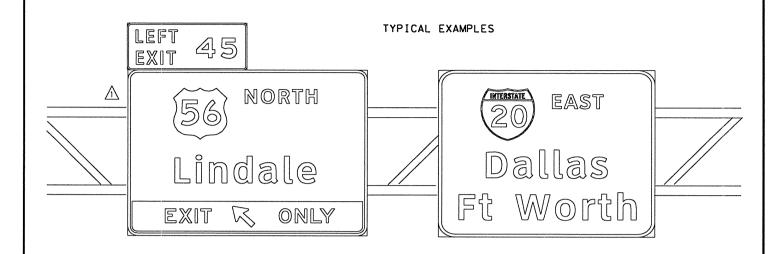
© 2004

Texas Department of Transportation

SIGN DETAILS

| esigned: | GJT | FED. ROAD<br>DIV. NO., | STATE  | FEDER. | AL AID PF      | ROJECT NO      | ).         |    | EET<br>IO. |
|----------|-----|------------------------|--------|--------|----------------|----------------|------------|----|------------|
| hecked:  | SML | 6                      | TEXAS  | CC     | 337-           | -1-29          | )          | 13 | 34         |
| rawn:    | GJT | STATE<br>DIST. NO.     | cou    | NTY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY       |
| hecked:  | SML | 14                     | WILLIA | MSON   | 0337           |                | 029        |    | 29         |

## REQUIREMENTS FOR OVERHEAD GUIDE SIGNS



#### DEPARTMENT MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS DMS-7110
FLAT SURFACE REFLECTIVE SHEETING DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING DMS-8320

OVERHEAD GUIDE SIGNS AND EXIT NUMBER PANELS

USAGE

COLOR

SIGN SHEETING

BACKGROUND ALL

ALL T

TYPE D (NON-FLUORESCENT PRISMATIC)
(Type VIII or Type IX only)
TYPE D (NON-FLUORESCENT PRISMATIC)

LEGEND & BORDERS WHITE
LEGEND & BORDERS BLACK

(Type VIII or Type IX only)
VINYL NON-REFLECTIVE DECAL SHEETING

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Black legends shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F). White legends shall use the Clearview Alphabet.

The following Clearview fonts shall be used to replace the existing FHWA lettering, when not specified in the SHSD or in the plans.

B CV-1W C CV-2W D CV-3W E CV-4W Emod CV-5WR F CV-6W

- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- 4. Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to background sheeting, or combination

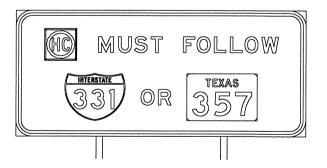
- White legends shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- 6. Dimensions shown for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in radius as much as 1 inch. Borders and corner radii must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded.
- 7. Sign substrate shall be any material that meets the Department Material Specification requirements for permanent sign substrates. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
- Requirements for attachments are found on Standard Plan Sheet TSR(2).
   Mounting details for overhead sign shall be as detailed elsewhere
- in the plans or the supplier's choice, subject to approval by the engineer.
- 10. Background sheeting shall be applied to the extruded aluminum panels per sheeting manufacturer's recommendations. Sheeting shall overlap each extrusion's horizontal edge and will not be allowed to bridge the horizontal gap between extrusions.

## REQUIREMENTS FOR LARGE GROUND-MOUNTED GUIDE SIGNS

#### TYPICAL EXAMPLES



Texas Southern
University
EXIT 45



#### DEPARTMENT MATERIAL SPECIFICATIONS

| PLYWOOD SIGN BLANKS                 | DMS-7100 |
|-------------------------------------|----------|
| ALUMINUM SIGN BLANKS                | DMS-7110 |
| FLAT SURFACE REFLECTIVE SHEETING    | DMS-8300 |
| VINYL NON-REFLECTIVE DECAL SHEETING | DMS-8320 |

#### LARGE GROUND-MOUNTED SIGNS AND EXIT NUMBER PANELS

USAGE COLOR

SIGN SHEETING

BACKGROUND ALL LEGEND & BORDERS WHITE TYPE C (HIGH SPECIFIC INTENSITY)
TYPE D (NON-FLUORESCENT PRISMATIC)

(Type LEGEND & BORDERS BLACK VINYL NON-REI

(Type VIII or Type IX only)
VINYL NON-REFLECTIVE DECAL SHEETING

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Black legends shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
   White legends shall use the Clearview Alphabet.

The following Clearview fonts shall be used to replace the existing  ${\sf FHWA}$  lettering, when not specified in the SHSD or in the plans.

B CV-1W C CV-2W D CV-3W E CV-4W Emod CV-5WR F CV-6W

- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to background sheeting, or combination thereof.
- White legends shall be cut-out white sheeting applied to green background sheeting.
- 6. Dimensions shown for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in radius as much as 1 inch. Borders and corner radii must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded.
- 7. Sign substrate shall be any material that meets the Department Material Specification requirements for permanent sign substrates. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
- Requirements for attachments are found on Standard Plan Sheet TSR(2).
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.
- 10. Background sheeting shall be applied to the extruded aluminum panels per sheeting manufacturer's recommendations. Sheeting shall overlop each extrusion's horizontal edge and will not be allowed to bridge the horizontal gap between extrusions.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf

# STANDARD PLANS Texas Department of Transportation Traffic Operations Division

# TYPICAL SIGN REQUIREMENTS

TSR(1)-03

| Company | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Control | Cont

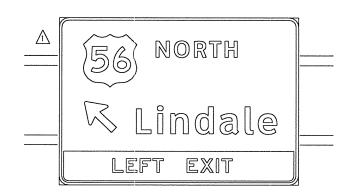
12/03 Revision

Modify
location of

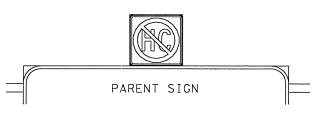
2 Modify

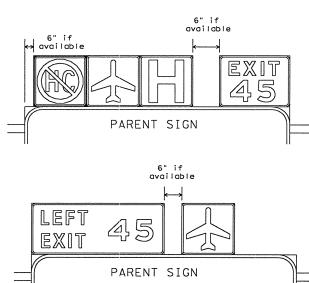
## REQUIREMENTS FOR ATTACHMENTS TO GUIDE SIGNS

#### TYPICAL EXAMPLES









#### DEPARTMENT MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS DMS-7110
FLAT SURFACE REFLECTIVE SHEETING DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING DMS-8320

USAGE COLOR SIGN SHEETING

BACKGROUND ALL TYPE D (NON-FLUORESCENT PRISMATIC)
(Type VIII or Type IX only)

LEGEND & BORDERS WHITE TYPE D (NON-FLUORESCENT PRISMATIC)
(Type VIII or Type IX only)

LEGEND & BORDERS BLACK VINYL NON-REFLECTIVE DECAL SHEETING

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- 2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to white background sheeting, or combination thereof.
- White legends shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legends shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
- 7. Attachments should be one piece sheet aluminum alloy (Type A). Route Markers and other attachments to the parent sign face shall be 0.063 inch thick. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick. Direct applied attachments may be used when approved by the Engineer.
- The priority for Routing Plaques shall be (left to right) Hazardous Cargo, Airport then Hospital. See examples for mounting location.
- Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(6). Mounting details of attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.



## REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

#### TYPICAL EXAMPLES

EXIT CONLY



LEFT EXIT

#### DEPARTMENT MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS DMS-7110
FLAT SURFACE REFLECTIVE SHEETING DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING DMS-8320

#### OVERHEAD EXIT PANELS

USAGE COLOR SIGN SHEETING

BACKGROUND YELLOW TYPE D (NON-FLUORESCENT PRISMATIC)
(Type VIII or Type IX only)
LEGEND BLACK VINYL NON-REFLECTIVE DECAL SHEETING

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes may be adjusted during plan preparation to fit actual parent sign sizes if necessary.
- Exit Panel legends shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets E Series.
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to yellow background sheeting, or combination thereof.
- Panels should be 0.063 inch thick sheet aluminum alloy (Type A).
   Direct applied attachment may be used when approved by the Engineer.
- Mounting details for Exit Only Panels are shown on Standard Plan Sheet TSR(6).

ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf



## STANDARD PLANS

Texas Department of Transportation
Traffic Operations Division

TYPICAL SIGN REQUIREMENTS

TSR(2)-03

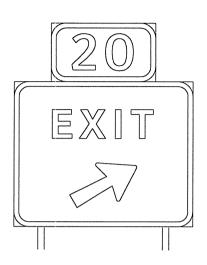
12/03 Revision

Modify
location of
shield.

Change to new standard

## REQUIREMENTS FOR E SERIES STANDARD GUIDE SIGNS

#### TYPICAL EXAMPLES





#### DEPARTMENT MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS DMS-7100
ALUMINUM SIGN BLANKS DMS-7110
FLAT SURFACE REFLECTIVE SHEETING DMS-8300

#### GROUND-MOUNTED SIGNS

COLOR

USAGE

SIGN SHEETING

BACKGROUND ALL LEGEND & BORDERS WHITE

TYPE C (HIGH SPECIFIC INTENSITY)
TYPE D (NON-FLUORESCENT PRISMATIC)
(Type VIII or Type IX only)

#### GENERAL NOTES:

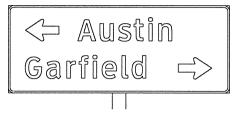
- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes may be adjusted during plan preparation to fit actual parent sign sizes if necessary.
- White legends shall use the Clearview Alphabet.
  The following Clearview fonts shall be used to replace the existing
  Federal Highway Administration (FHWA) Standard Highway Alphabets,
  when not specified in the SHSD, or in the plans.

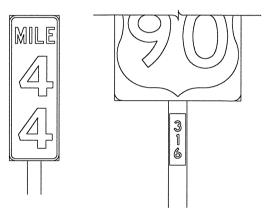
B CV-1W C CV-2W D CV-3W E CV-4W Emod CV-5WR F CV-6W

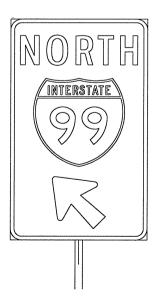
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- 4. White legends shall be cut-out white sheeting applied to colored background sheeting.
- 5. Dimensions shown for borders and corner radii are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in radius as much as 1 inch. Borders and corner radii must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded.
- 6. Sign substrate shall be any material that meets the Department Material Specification requirements for permanent sign substrates. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
- 7. Requirements for attachments are found on Standard Plan Sheet TSR(2).
- 8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

## REQUIREMENTS FOR GREEN D AND I SERIES GUIDE SIGNS A

#### TYPICAL EXAMPLES







#### DEPARTMENT MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS ALUMINUM SIGN BLANKS DMS-7100 DMS-7110

|   | Square Ft.      | Min. Thickness |
|---|-----------------|----------------|
| Г | Less than 7.5   | 0.080          |
|   | 7.5 to 15       | 0.100          |
|   | Greater than 15 | 0.125          |

FLAT SURFACE REFLECTIVE SHEETING DMS-8300

#### GROUND-MOUNTED SIGNS

USAGE COI

COLOR

BACKGROUND ALL LEGEND & BORDERS WHITE SIGN SHEETING

TYPE C (HIGH SPECIFIC INTENSITY)
TYPE D (NON-FLUORESCENT PRISMATIC)

(Type VIII or Type IX only)

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- White legends shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B CV-1W
C CV-2W
D CV-3W
E CV-4W
Emod CV-5WR
F CV-6W

- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- White legends shall be cut-out white sheeting applied to green background sheeting.
- 5. Dimensions shown for borders and corner radii are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in radius as much as 1 inch. Borders and corner radii must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded.
- 6. Sign substrate shall be any material that meets the Department
- Material Specification requirements for permanent sign substrates.
  7. Requirements for attachments are found on Standard Plan Sheet TSR(2).
- 8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf

# Те

## STANDARD PLANS

Texas Department of Transportation
Traffic Operations Division

## TYPICAL SIGN REQUIREMENTS

TSR(3)-03

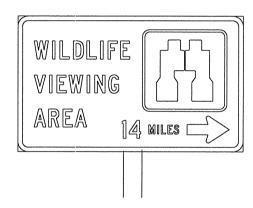
12/03 Revision

Added I Series to title

## REQUIREMENTS FOR BLUE AND BROWN D SERIES GUIDE SIGNS

TYPICAL EXAMPLES





#### DEPARTMENT MATERIAL SPECIFICATIONS

FLAT SURFACE REFLECTIVE SHEETING

PLYWOOD SIGN BLANKS ALUMINUM SIGN BLANKS DMS-7100

| Square Ft.      | Min. Thickness |
|-----------------|----------------|
| Less than 7.5   | 0.080          |
| 7.5 to 15       | 0.100          |
| Greater than 15 | 0.125          |

DMS-8300

SIGN SHEETING

#### GROUND-MOUNTED SIGNS

USAGE COLOR

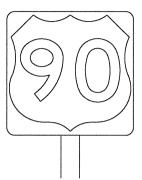
BACKGROUND ALL TYPE C (HIGH SPECIFIC INTENSITY)
LEGEND & BORDERS WHITE TYPE C (HIGH SPECIFIC INTENSITY)

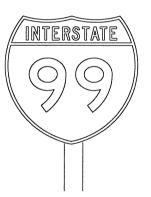
#### GENERAL NOTES

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tobulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Blue and brown D-series signs shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- 4. White legends shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- 5. Dimensions shown for borders and corner radii are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in radius as much as 1 inch. Borders and corner radii must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded.
- 6. Sign substrate shall be any material that meets the Department Material Specification requirements for permanent sign substrates.
- 7. Requirements for attachments are found on Standard Plan Sheet TSR(2).
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE MARKERS

#### TYPICAL EXAMPLES







#### DEPARTMENT MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS DMS-7100
ALUMINUM SIGN BLANKS DMS-7110
FLAT SURFACE REFLECTIVE SHEETING DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING DMS-8320

USAGE COLOR SIGN SHEETING

BACKGROUND ALL TYPE C (HIGH SPECIFIC INTENSITY)
LEGEND & BORDERS WHITE TYPE C (HIGH SPECIFIC INTENSITY)
LEGEND & BORDERS BLACK VINYL NON-REFLECTIVE DECAL SHEETING

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to white background sheeting, or combination thereof.
- 5. White legends shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Independent mounted Route Marker sign blanks, for 24 inch markers shall be 0.080 inch thick, 36 inch markers shall be 0.100 inch thick, one piece sheet aluminum alloy (Type A).
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf



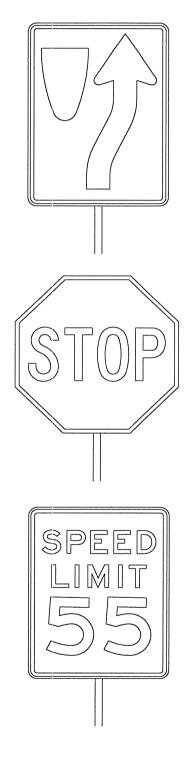
TYPICAL SIGN REQUIREMENTS

TSR (4) -03

| TxDOT          | Octobe | r 2003            | ON: - BAS   | cx:- GRB          | C               | #:-FDN | ck: - CAL |  |  |
|----------------|--------|-------------------|-------------|-------------------|-----------------|--------|-----------|--|--|
| 1510NS<br>2-03 | STATE  | FEDERAL<br>REGION | FE          | DERAL AID PROJECT | RAL AID PROJECT |        |           |  |  |
| 2-03           | AUS 6  |                   | CC 337-1-29 |                   |                 | 138    |           |  |  |
|                |        | COUNTY            |             | CONTROL           | SECTION         | J08    | HIGHWAY   |  |  |
|                |        | WILLIA            | MSON        | 0337              | 01              | 029    | SH 20     |  |  |

## REQUIREMENTS FOR REGULATORY SIGNS

#### TYPICAL EXAMPLES



#### DEPARTMENT MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS ALUMINUM SIGN BLANKS DMS-7100 DMS-7110

| Square Ft.      | Min. Thickness |
|-----------------|----------------|
| Less than 7.5   | 0.080          |
| 7.5 to 15       | 0.100          |
| Greater than 15 | 0.125          |

FLAT SURFACE REFLECTIVE SHEETING
VINYL NON-REFLECTIVE DECAL SHEETING

DMS-8300 DMS-8320

USAGE COLOR

BACKGROUND ALL TYP
LEGEND & BORDERS WHITE TYP
LEGEND & BORDERS BLACK VIN

TYPE C (HIGH SPECIFIC INTENSITY)
TYPE C (HIGH SPECIFIC INTENSITY)
VINYL NON-REFLECTIVE DECAL SHEETING

SIGN SHEETING

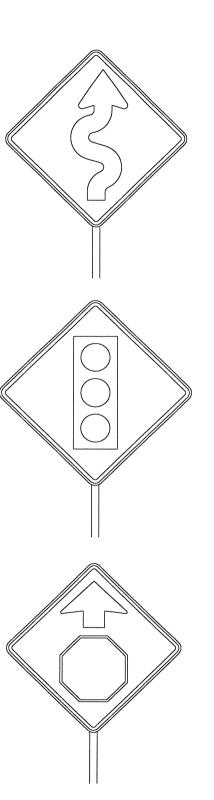
#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tobulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Regulatory sign legends shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
   Lateral spacing between letters and numerals shall conform with the
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to white background sheeting, or combination thereof.
- 5. White legends shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legends shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Department Material Specification requirements for permanent sign substrates.
- 8. Requirements for attachments are found on Standard Plan Sheet TSR(2).

  9. Mounting datails for reading mounted sings are shown in the
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

## REQUIREMENTS FOR WARNING SIGNS

#### TYPICAL EXAMPLES



#### DEPARTMENT MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS

DMS-7110

| Square Ft.      | Min. Thickness |
|-----------------|----------------|
| Less than 7.5   | 0.080          |
| 7.5 to 15       | 0.100          |
| Greater than 15 | 0.125          |

FLAT SURFACE REFLECTIVE SHEETING VINYL NON-REFLECTIVE DECAL SHEETING

COLOR

DMS-8300 DMS-8320

USAGE

SIGN SHEETING

BACKGROUND YELLOW
LEGEND & BORDERS BLACK
LEGEND ALL OTHER

YELLOW TYPE E (FLUORESCENT PRISMATIC)
BLACK VINYL NON-REFLECTIVE DECAL SHEETING
ALL OTHER TYPE D (NON-FLUORESCENT PRISMATIC)

(Type VIII or Type IX only)

#### GENERAL NOTES:

- Signs to be furnished, should be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Warning sign legends shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legends shall provide a balanced appearance when spacing is not shown.
- Black legend shall be applied by screening process or cut-out vinyl non-reflective decal sheeting to background sheeting, or combination thereof.
- Colored legends shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
- 6. Requirements for attachments are found on Standard Plan Sheet TSR(2).
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf



## STANDARD PLANS

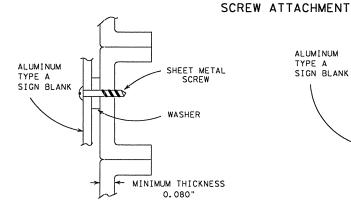
Texas Department of Transportation
Traffic Operations Division

TYPICAL SIGN REQUIREMENTS

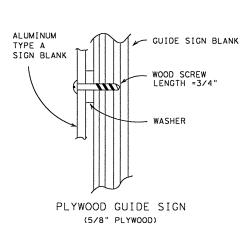
TSR(5)-03

| <b>xDOT</b> | Octobe            | er 2003           | DN: - BAS | cx:- GRB    | 0       | ⊮:-FDN | CK: - CAL |
|-------------|-------------------|-------------------|-----------|-------------|---------|--------|-----------|
| SNOT        | STATE<br>DISTRICT | FEDERAL<br>REGION |           | SHEET       |         |        |           |
| 03          | AUS               | 6                 |           | CC 337-1-29 |         |        |           |
|             |                   | COUNT             | (         | CONTROL     | SECTION | JOB    | HIGHWAY   |
|             |                   | WILLIA            | AMSON     | 0337        | 01      | 029    | SH 29     |

### TYPICAL ATTACHMENT OF ROUTE MARKERS AND "EXIT ONLY" PANELS TO GUIDE SIGNS



ALUMINUM GUIDE SIGNS (EXTRUDED ALUMINUM PANELS)



PLYWOOD GUIDE SIGN

Type C

"Down" arrow

(5/8" PLYWOOD)

- GUIDE SIGN BLANK

1/4" NUT AND BOLT

\_\_ LOCK WASHER

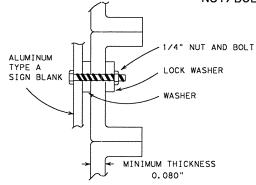
WASHER

## NUT/BOLT ATTACHMENT

ALUMINUM

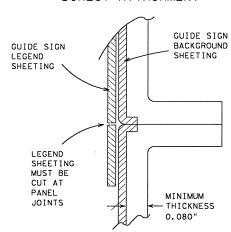
SIGN BLANK

TYPE A



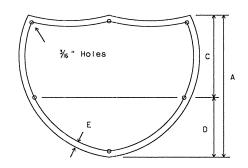
ALUMINUM GUIDE SIGNS (EXTRUDED ALUMINUM PANELS)





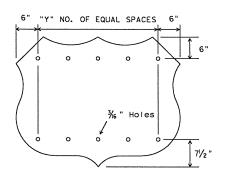
GUIDE SIGN LEGEND (APPLIED DIRECTLY TO EXTRUDED ALUMINUM PANELS)

### SIGN BLANK PUNCHING DETAILS FOR ROUTE MARKERS WHEN ATTACHED TO GUIDE SIGN



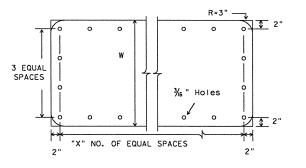
INTERSTATE ROUTE MARKERS

| Α  | С  | D  | Ε    |
|----|----|----|------|
| 36 | 21 | 15 | 11/2 |
| 48 | 28 | 20 | 13/4 |



U.S. ROUTE MARKERS

| Sign Size | "Y" |
|-----------|-----|
| 24×24     | 2   |
| 30×24     | 3   |
| 36×36     | 3   |
| 45×36     | 4   |
| 48×48     | 4   |
| 60×48     | 5   |



STATE ROUTE MARKERS

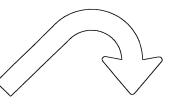
| No. of<br>Digits | W  | Х |
|------------------|----|---|
| 4                | 24 | 4 |
| 4                | 36 | 5 |
| 4                | 48 | 6 |
| 3                | 24 | 3 |
| 3                | 36 | 4 |
| 3                | 48 | 5 |

### ARROW DETAILS

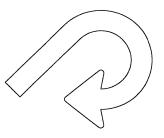
for Large Ground-Mounted and Overhead Guide Signs



| TYPE | LETTER SIZE             |
|------|-------------------------|
| A-I  | 10.67" U/L and 10" Caps |
| A-2  | 13.33" U/L and 12" Caps |
| A-3  | 16" U/L                 |
| B-I  | 10.67" U/L and 10" Caps |
| B-2  | 13.33" U/L and 12" Caps |
| B-3  | 16" U/L                 |



E3 and E3a

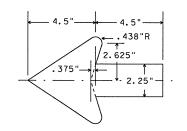


E4 and E4a

| CODE        | USED ON SIGN NO. |
|-------------|------------------|
| E-3 & E-4   | E5-3 and E5-4    |
| E-3a & E-4a | E5-3a and E5-4a  |

### ARROW DETAILS

for Distance and Destination Signs

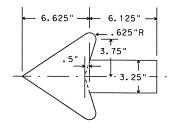


Standard 2.25" arrow to be used with 6 inch letters.

12/03 Revision

⚠ Modify details of

arrows.



Standard 3.25" arrow to be used with 8 inch letters.

STANDARD PLANS

Texas Department of Transportation
Traffic Operations Division

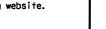
TYPICAL SIGN REQUIREMENTS

TSR(6)-03

© TxDOT October 2003 | DN:-BAS | CK:-GRB | DN:-FDN REVISIONS STATE FEDERAL REGION AUS 6 CC 337-1-29 140 WILLIAMSON 0337 01 029 SH 29

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website. ftp://ftp.dot.state.tx.us/pub/txdot-info/trf/shsd/Navigate.pdf





## SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

#### Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))

TWT = Thin-Walled Tubing (see SMD(TWT))

10BWG = 10 BWG Tubing (see SMD(SLIP-1) to SMD(SLIP-3)) S80 = Schedule 80 Pipe (see SMD(SLIP-1) to SMD(SLIP-3))

#### Number of Posts (1 or 2) -

#### Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and SMD(TWT))

- UB = Universal Anchor Bolted down (see SMD(FRP) and SMD(TWT)) WA = Wedge Anchor - (see SMD(TWT))
- SA = Slipbase Concreted (see SMD(SLIP-1) to SMD(SLIP-3))
- SB = Slipbase Bolted Down (see SMD(SLIP-1) to SMD(SLIP-3))

#### Sian Mounting Designation

- P = Prefab. "Plain" (see SMD(SLIP-1) to (3), SMD(TWT), SMD(FRP))|
- T = Prefab. "T" (see SMD(SLIP-1) to (3), SMD(TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (3)) IF REQUIRED

No more than 2 sign

posts should be located

within a 7 ft. circle.

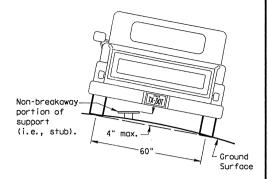
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (3), SMD(TWT)) |
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (3))

#### EXAL = Extruded Aluminum sign panels (see SMD(SLIP-3))

7 ft.

diameter

## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

7 ft.

digmeter

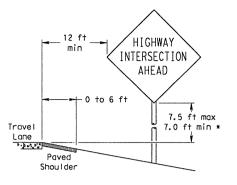
circle

Not Acceptable

Not Acceptable

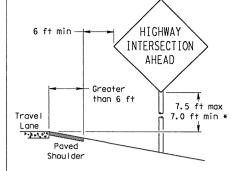
## SIGN LOCATION

### PAVED SHOULDERS



LESS THAN 6 FT. WIDE

When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width. the sign must be placed at least 6 ft. from the edge of the shoulder.

## - 12 ft min - 6 ft min 7.5 ft max 7.0 ft min \* Travel Lane

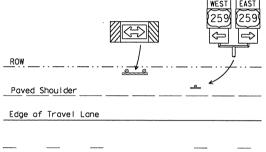
T-INTERSECTION

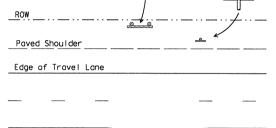
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

\* . 5 . 5 . 5

Paved

Shoul der







that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Texas Universal Triangular Slipbase System components and Wedge Anchor System

The website address is: ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/ standard/traffic/slip.pdf



#### STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division

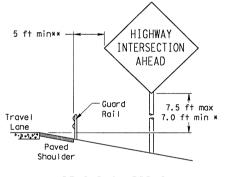
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) -02

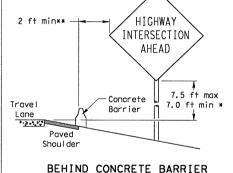
(STOP

| © 1x001   | July 2            | 002               | ON: - BAS           | ck: - GRB | DW  | FDN     | cx: - CAL |
|-----------|-------------------|-------------------|---------------------|-----------|-----|---------|-----------|
| REVISIONS | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERAL AID PROJECT |           |     |         | SHEET     |
| AUS 6     |                   |                   | CC 337-1-29         |           |     |         | 141       |
|           | COUN              | ITY               | CONTROL             | SECTION   | J08 | HIGHWAY |           |
|           |                   | WILLI             | AMSON               | 0337      | 0.1 | 029     | SH 29     |

# BEHIND BARRIER



BEHIND GUARDRAIL



\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.

## TYPICAL SIGN ATTACHMENT DETAIL

Not Acceptable

7 ft.

diameter

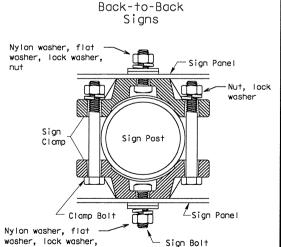
circle

## Single Signs U-bolt Sign Post - Nut. lock washer Nylon washer, flat Sign Panel $^{ extstyle oxedsymbol eta}$ washer. lock washer.

Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum and 1 3/4 inch for plywood signs.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp



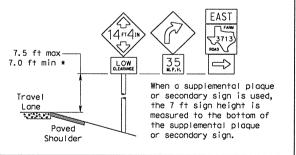
diameter

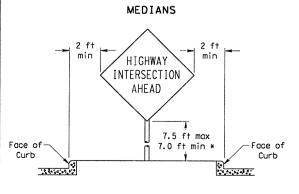
circle

Acceptable

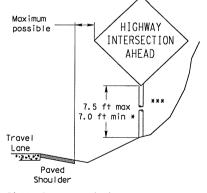
|                | Approximate Bolt Length |                 |  |
|----------------|-------------------------|-----------------|--|
| Pipe Diameter  | Specific Clamp          | Universal Clamp |  |
| 2" nominal     | 3"                      | 3 or 3 1/2"     |  |
| 2 1/2" nominal | 3 or 3 1/2"             | 3 1/2 or 4"     |  |
| 3" nominal     | 3 1/2 or 4"             | 4 1/2"          |  |

#### SIGNS WITH PLAQUES





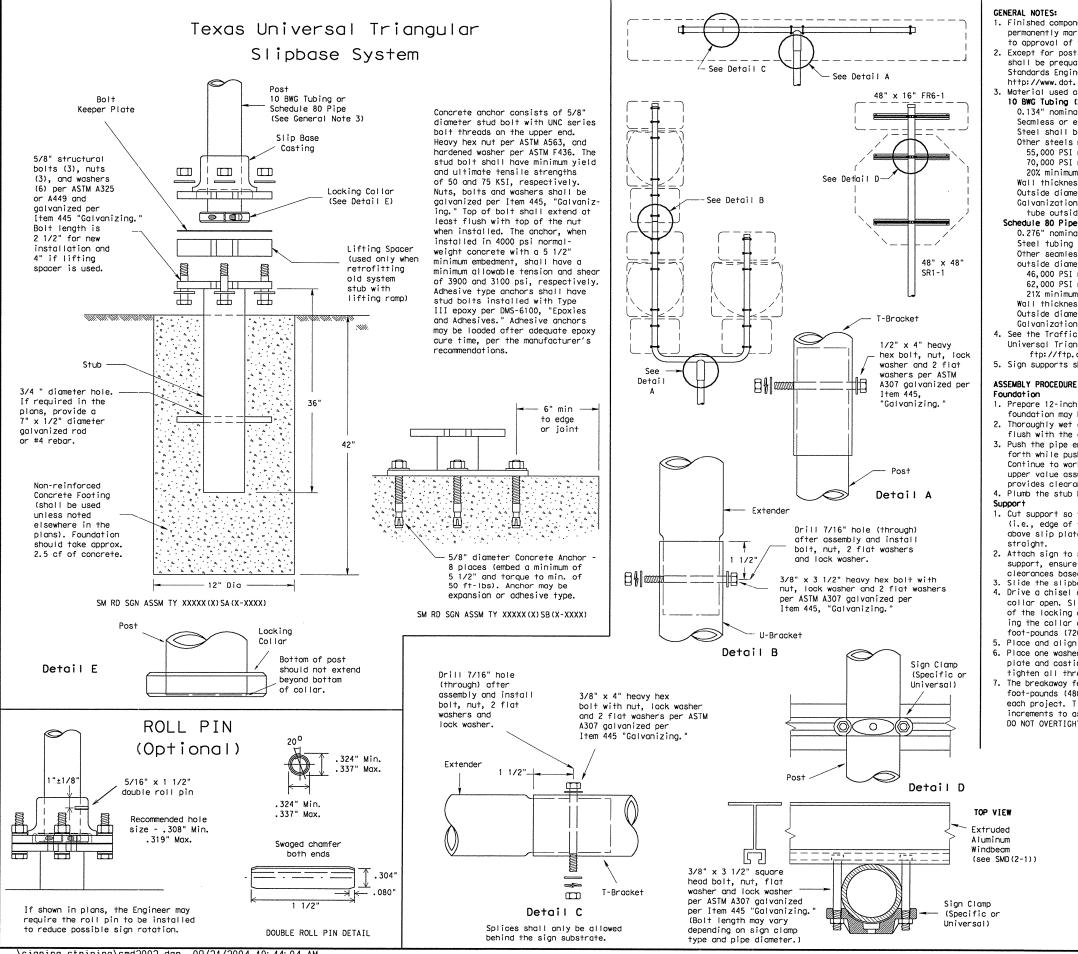
## RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lone as practical.

\*\*\* Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme



- 1. Finished components, except posts (10 BWC Tubing and Schedule 80 Pipe) and clamps, shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- 2. Except for posts (10 BWG Tubing and Schedule 80 Pipe), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the TxDOT Traffic Standards Engineer, or the Traffic Operations Division website. The website address is: http://www.dot.state.tx.us/insdtdot/orgchart/trf/trfeng/
- 3. Material used as post with this system shall conform to the following specifications:

#### 10 BWG Tubing (2.875" outside diameter)

0.134" nominal wall thickness

Seamless or electric-resistance welded steel tubing or pipe

Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008

Other steels may be used if they meet the following:

55,000 PSI minimum yield strength 70,000 PSI minimum tensile strength

20% minimum elongation in 2"

Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"

Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"

Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

Schedule 80 Pipe (2.875" outside diameter)

0.276" nominal wall thickness

Steel tubing per ASTM A500 Gr C

Other seamless or electric-resistance welded steel tubing or pipe with equivalent

outside diameter and wall thickness may be used if they meet the following:

46,000 PSI minimum yield strength 62,000 PSI minimum tensile strength

21% minimum elongation in 2"

Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"

Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"

Galvanization per ASTM A123

- 4. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is:
- ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/traffic/slip.pdf
- 5. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

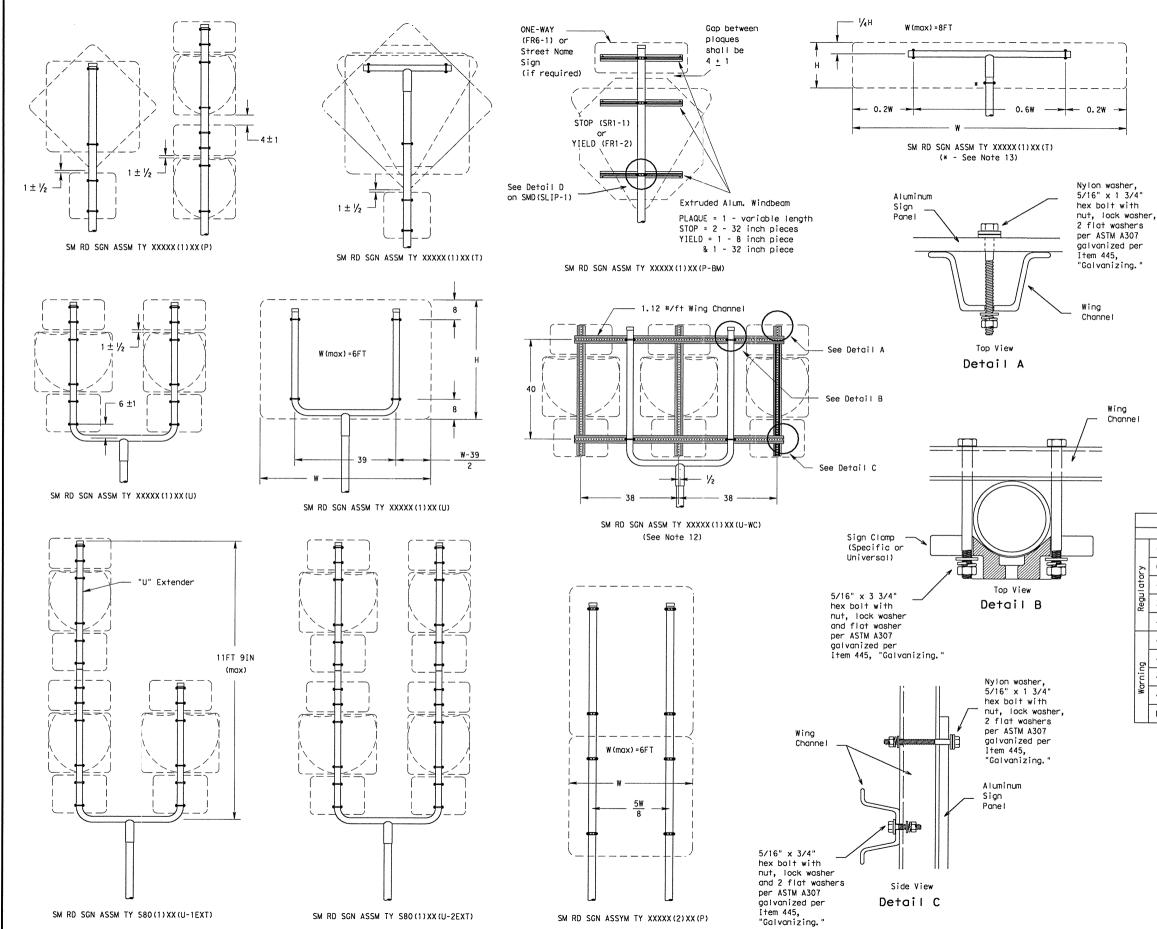
- 1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- 2. Thoroughly wet and mix concrete in a container. Place concrete into hole until it is approximately flush with the ground.
- 3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground. The upper value assures that an impacting vehicle should not snag on the footing. The lower value provides clearance for assembly.
- 4. Plumb the stub by using a torpedo level on the slip plate. Allow concrete adequate time to set.
- 1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and
- 2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.
- 3. Slide the slipbase casting onto the lower end of the sign support.
- 4. Drive a chisel or a flat-blade screwdriver into the cut on the locking collar to slightly pry the collar open. Slide the collar onto the end of the pipe so the edge of the pipe is between the face of the locking collar and the end of the edge bevel. A dead-blow hammer may be useful in positioning the collar correctly. Remove the tool used to pry the collar open. Torque the allen bolt to 60 foot-pounds (720 inch-pounds). DO NOT OVERTIGHTEN.
- 5. Place and align bolt keeper plate on slip plate and lift assembled sign and support into position.
- 6. Place one washer on each bolt and insert them through keeper plate and the notches on the slip plate and casting. After inserting each bolt, place one washer and a nut on the bolt and handtighten all three.
- 7. The breakaway features of this system will work when all three bolts are tightened between 40 to 80 foot-pounds (480 to 960 inch-pounds). The Engineer shall determine the appropriate bolt torque for each project. Tighten all bolts by working around the support in approximately 10 foot-pound increments to assure a balanced tension in the balts. All three balts shall be torqued the same. DO NOT OVERTIGHTEN.



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD (SLIP-1) -02

| © TxDOT   | July 2            | 2002              | ON: - BAS           | ck: - GRB | DW:     | - FDN | ck: - CAL |
|-----------|-------------------|-------------------|---------------------|-----------|---------|-------|-----------|
| REVISIONS | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERAL AID PROJECT |           |         |       | SHEET     |
|           | AUS               | 6                 | CC 337-1-29         |           |         | 142   |           |
| -         |                   | COU               | NTY                 | CONTROL.  | SECTION | J08   | HIGHWAY   |
|           | WILLIAMSON        |                   |                     | 0337      | 01      | 029   | SH 29     |



#### GENERAL NOTES:

| 1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|----|--------------|------------|----------------|
|    | 10 BWG       | 1          | 16 SF          |
|    | 10 BWG       | 2          | 32 SF          |
|    | Sch 80       | 1          | 32 SF          |
|    | Sch 80       | 2          | 64 SF          |

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
   Sign supports shall not be spliced except where shown.
- Sign supports shall not be spliced except where shown.
   Sign support posts shall not be spliced.
- 4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- 5. Plywood signs shall conform to Departmental Material Specification DMS-7100 and shall be 5/8 inches thick.
  6. Signs that require specific supports due to reasons
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- 8. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
   Excess pipe, winged channel, or windbeam shall be cut
- 10. Excess pipe, winged channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- 11. The Engineer may allow the use of an expanded foam foundation. A list of approved suppliers of expanding foam may be obtained from the Traffic Operations Division (TRF) or from the TRF website.

  The website address is:
- http://www.dot.state.tx.us/insdtdot/orgchart/trf/trfeng/
  12.Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1
- maximum allowable amount per Note 1.

  13. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.

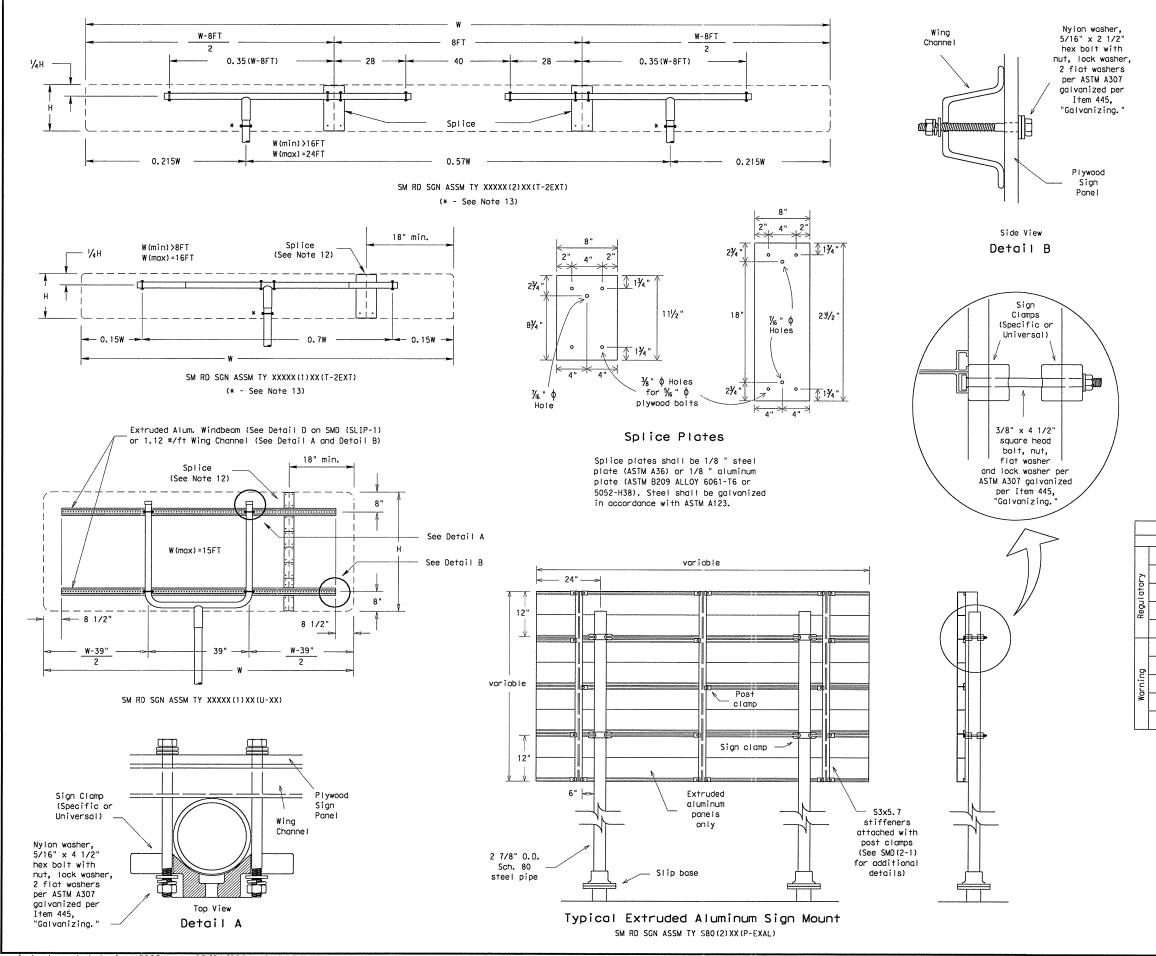
|            | REQUIRED SUPPORT                          |   |
|------------|---|---|
|            | SIGN DESCRIPTION                          | SUPPORT                                 |
|            | 48-inch STOP sign (SR1-1)                 | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)    |
| ۲          | 60-inch YIELD sign (FR1-2)                | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)    |
| Regulatory | 48x16-inch ONE-WAY sign (FR6-1)           | TY 10BWG(1)XX(T)<br>TY 10BWG(1)XX(P-BM) |
| Regu       | 36x48, 48x36, and 48x48-inch signs        | TY 10BWG(1)XX(T)                        |
|            | 48x60-inch signs                          | TY S80(1)XX(T)                          |
|            | 48x48-inch signs (diamond or square)      | TY 10BWG(1)XX(T)                        |
| g.         | 48x60-inch signs                          | TY S80(1)XX(T)                          |
| Warning    | 48-inch Advance School X-ing sign (SS1-1) | TY 10BWG(1)XX(T)                        |
| ¥          | 48-inch School X-ing sign (SS2-1)         | TY 10BWG(1)XX(T)                        |
|            | Large Arrow sign (W1-6 & W1-7)            | TY 10BWG(1)XX(T)                        |



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-02

| © TxD01   | July 2 | 2002              | DN: - BAS           | cx: - GRB   | DW.     | FDN   | cx: - CAL |
|-----------|--------|-------------------|---------------------|-------------|---------|-------|-----------|
| REVISIONS | STATE  | FEDERAL<br>REGION | FEDERAL AID PROJECT |             |         | SHEET |           |
| AUS 6     |        |                   | (                   | CC 337-1-29 |         |       | 143       |
|           |        | COUNT             | Y                   | CONTROL     | SECTION | J08   | H1GHWAY   |
|           |        | WILLI.            | AMSON               | 0337        | 0.1     | 029   | SH 29     |



#### GENERAL NOTES:

| 1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|----|--------------|------------|----------------|
| Ī  | 10 BWG       | 1          | 16 SF          |
| Ī  | 10 BWG       | 2          | 32 SF          |
|    | Sch 80       | 1          | 32 SF          |
|    | Sch 80       | 2          | 64 SF          |

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- 3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- 4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- 5. Plywood signs shall conform to Departmental Material Specification DMS-7100 and shall be 5/8 inches thick.
  6. Signs that require specific supports due to reasons
- in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.

  7. For horizontal rectangular signs, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- 8. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently
- when impacted by an errant vehicle.

  9. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- 10. Excess pipe, winged channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing.
- 11. The Engineer may allow the use of an expanded foam foundation. A list of approved suppliers of expanding foam may be obtained from the Traffic Operations Division (TRF) or from the TRF website. The website address is: http://www.dot.state.tx.us/insdtdot/orgchart/trf/trfeng/
- 12. Sign blanks shall be the sizes and shapes shown on the plans. Unless otherwise shown, no panel on multipanel plywood signs shall have a dimension less than 18 inches. Plywood signs 4 feet by 8 feet or smaller in either dimension shall be of one piece construction.
- 13. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.

|            | REQUIRED SUPPORT                          |                                      |
|------------|---|--------------------------------------|
|            | SIGN DESCRIPTION                          | SUPPORT                              |
|            | 48-inch STOP sign (SR1-1)                 | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| کے         | 60-inch YIELD sign (FR1-2)                | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| Regulatory | 48x16-inch ONE-WAY sign (FR6-1)           | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| Regu       | 36x48, 48x36, and 48x48-inch signs        | TY 10BWG(1)XX(T)                     |
|            | 48x60-inch signs                          | TY S80(1)XX(T)                       |
|            | 48x48-inch signs (diamond or square)      | TY 10BWG(1)XX(T)                     |
| 5          | 48x60-inch signs                          | TY S80(1)XX(T)                       |
| Warning    | 48-inch Advance School X-ing sign (SS1-1) | TY 10BWG(1)XX(T)                     |
| ¥          | 48-inch School X-ing sign (SS2-1)         | TY 10BWG(1)XX(T)                     |
|            | Large Arrow sign (W1-6 & W1-7)            | TY 10BWG(1)XX(T)                     |



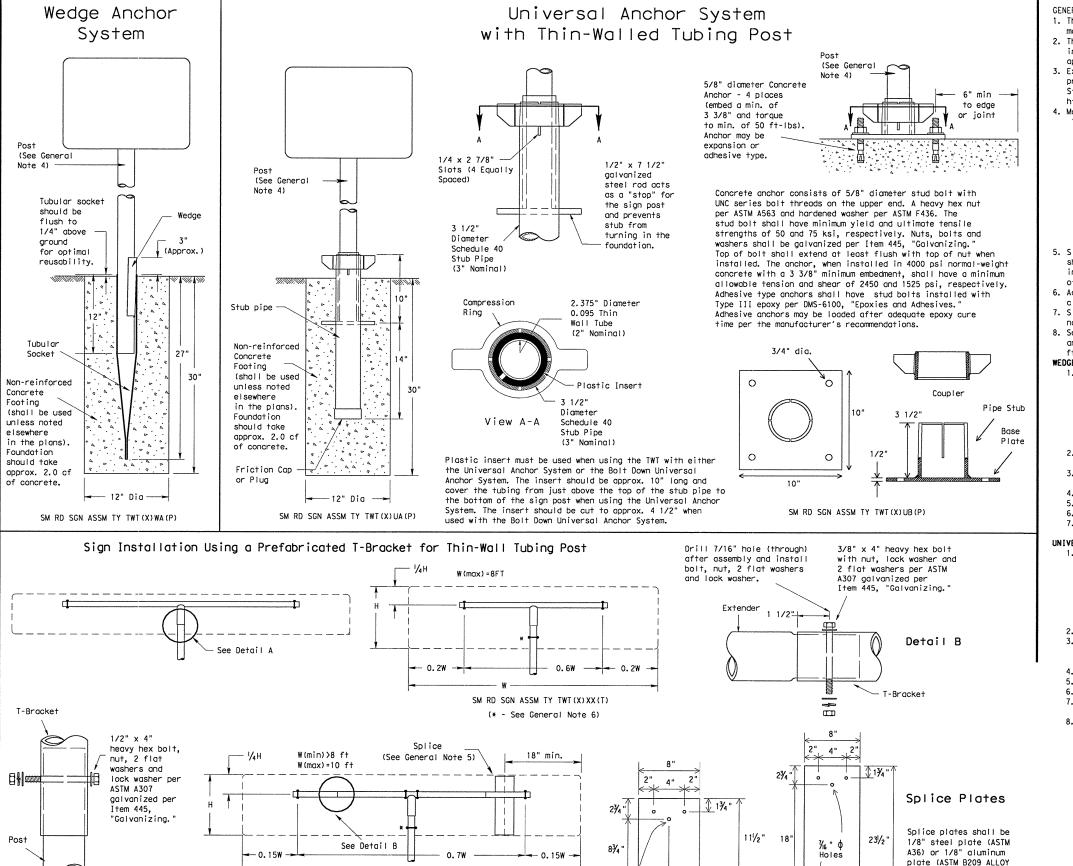
### STANDARD PLANS

Texas Department of Transportation Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-02

|           |                   |                   |           |                     | <del></del> |         |        |           |  |
|-----------|-------------------|-------------------|-----------|---------------------|-------------|---------|--------|-----------|--|
| © TxDOT   | July 2            | 2002              | on: - BAS |                     | ck: - GRB   | DIF     | :- FDN | ck: - CAL |  |
| REVISIONS | STATE<br>DISTRICT | FEDERAL<br>REGION |           | FEDERAL AID PROJECT |             |         |        |           |  |
|           | AUS               | 6                 |           | CC 337-1-29         |             |         |        |           |  |
| COUNTY    |                   |                   |           |                     | CONTROL     | SECTION | J08    | H I GHWAY |  |
|           |                   | WILL              | IAMSON    |                     | 0337        | 01      | 029    | SH 29     |  |



SM RD SGN ASSM TY TWT(X)XX(T-2EXT)

(\* - See General Note 6)

For horizontal rectangular signs, T-brackets may be used for signs up to 24" in height.

Square footage of signs may not exceed 10 sf on this system.

GENERAL NOTES:

- 1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
- 2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
- 3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the TxDOT Traffic Standards Engineer, or the Traffic Operations Division website. The website address is:
- http://www.dot.state.tx.us/insdtdot/orgchart/trf/trfeng Material used as post with this system shall conform to the following specifications:

13 BWG Tubing (2.375" outside diameter)

0.095" nominal wall thickness Seamless or electric-resistance welded steel tubing

Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008

Other steels may be used if they meet the following:

55,000 PSI minimum yield strength

70,000 PSI minimum tensile strength

18% minimum elongation in 2"

Wall thickness (uncoated) shall be within the range of .083" to .099" Outside diameter (uncoated) shall be within the range of 2.369" to 2.381" Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire

- 5. Sign blanks shall be the sizes and shapes shown on the plans. Unless otherwise shown, no panel on multipanel plywood signs shall have a dimension less than 18 inches. Plywood signs 4 feet by 8 feet or smaller in either dimension shall be of one piece construction.
- 6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
- 7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- 8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is:

## ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/traffic/slip.pdf

#### WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

- 1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- 2. Thoroughly wet and mix concrete in a container. Place concrete into hole until it is approximately flush with the ground.
- 3. Insert tubular socket into concrete until top of socket is approximately 1/4 " above the concrete footing.
- 4. Plumb the socket and allow concrete adequate time to set.
- 5. Attach the sign to the sign post.
- 6. Insert the sign post into socket and align sign face with roadway.
- 7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

## UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

- . Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- Insert base post in hole to depths shown and backfill hole with concrete. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain
- above the top of the concrete foundation. 4. Attach the sign to the sign post.

6061-T6 or 5052-H38.)

in accordance with

ASTM A123.

%" ♦ Holes for \% " \phi 2\% "

plywood boits -

Steel shall be galvanized

- 5. Install plastic insert around bottom of post.
- 6. Insert sign post into base post. Lower until the post comes to rest on steel rod. Seat compression ring using a hammer. Typically, the top of compression ring
- will be approximately level with top of stub post when optimally installed. 8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

| © TxD01   | July 2            | 2002              | DN: - BAS |                     | ck: - GRB | 01      | :-FDN | ck: - CAL |  |
|-----------|-------------------|-------------------|-----------|---------------------|-----------|---------|-------|-----------|--|
| REVISIONS | STATE<br>DISTRICT | FEDERAL<br>REGION |           | FEDERAL AID PROJECT |           |         |       |           |  |
| AUS 6     |                   |                   |           | CC                  | 337-1-29  | 9       |       | 145       |  |
|           | COUNTY            |                   |           |                     | CONTROL   | SECTION | JOB   | HIGHNAY   |  |
|           |                   | WILL              | AMSON     |                     | 0337      | 0.1     | 029   | SH 29     |  |

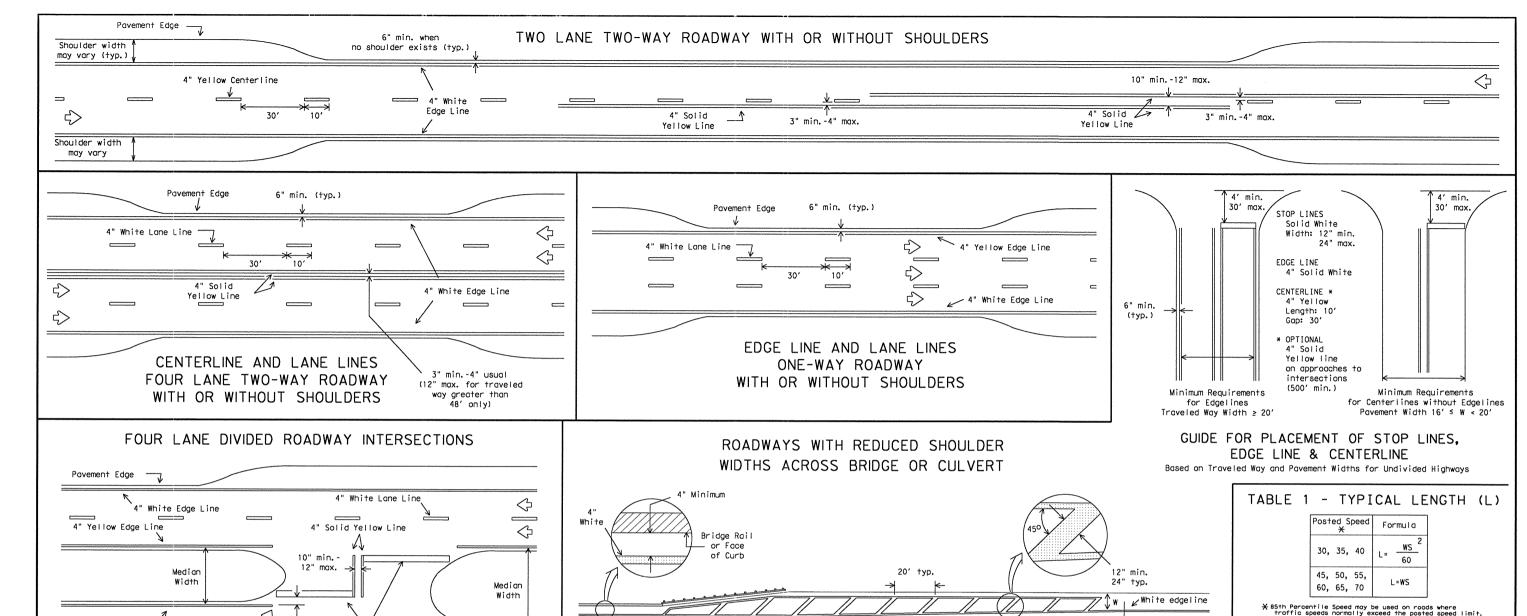
SMD (TWT) -02

9/16" hole may need

post to accommodate

to be drilled through

Detail A



#### EXAMPLES:

An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the crosshatchina should be:  $L = 8 \times 70 = 560 \text{ ft.}$ 

A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the cross-

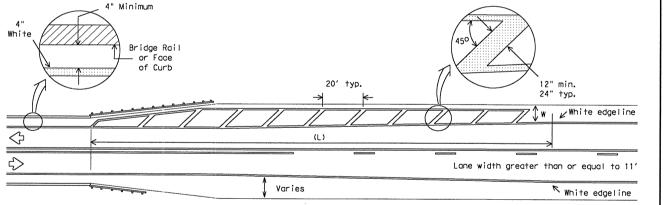
 $L = 4(40)^2 / 60 = 106.67$  ft. rounded to 110 ft.



## TYPICAL STANDARD PAVEMENT MARKINGS

PM(1) - 03

| 1 | (C) IXDOI    | Novemb            | NOVEMBER 1978   DN:-BAS   CK:-GRB   DN:-FDN   CK:-CAL   N |      |                     |           |     |         |  |  |
|---|--------------|-------------------|---|------|---------------------|-----------|-----|---------|--|--|
| ı | REVISIONS    | STATE<br>DISTRICT | FEDERAL<br>REGION   |      | FEDERAL AID PROJECT |           |     |         |  |  |
| ı | 8-95<br>5-00 | AUS               | 6   |      | CC 337-1-29         |           |     |         |  |  |
| ı | 8-00         |                   | COUN  | TY   | CONTROL             | . SECTION | J08 | HIGHWAY |  |  |
| ı | 3-03         |                   | WILLIA  | MSON | 0337                | 01        | 029 | SH 29   |  |  |



#### NOTES:

- 1. No-passing zone on bridge approach is optional but if used, it shall be a minimum 500 feet long.
- 2. For crosshatching length (L) see Table 1.
- 3. The width of the offset (W) and the required crosshatching width is the full shoulder width in advance of the bridge.
- 4. The crosshatching should be required if the shoulder width in advance of the bridge is 4 foot or wider and any reduction in shoulder width across the bridge occurs.
- 5. For guard fence details, refer elsewhere in the plans.

#### GENERAL NOTES:

4" Yellow Edge Line

8" Solid White Channelizing Line

4" White Edge Line

Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

5>

All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median

traveled way to edge of traveled way. The median excludes turn lanes. The median width might be

different between intersections, interchanges and of opposite approaches of the same intersection.

width is defined as the area between two roadways of a divided highway measured from edge of

The narrow median width will be the controlling width to determine if markings are required.

48" min. from edgeline to stop/yield line

12"-24" White Stop or Yield Line

4" White Lane Line

The traveled way includes only that portion of the roadway used for vehicular travel and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to inside of edgeline of a two lane roadway.

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

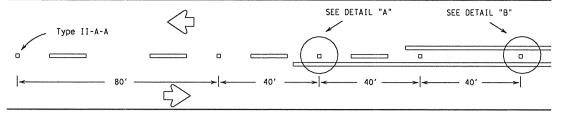
SPECIFICATION REFERENCE TABLE MATERIAL SPECIFICATIONS PAVEMENT MARKERS (REFLECT.) DMS-4200 DMS-6100 BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS DMS-6130

## YIELD LINES 3 to 12'

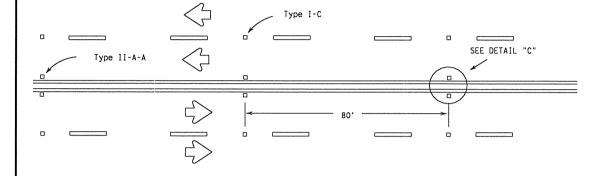
FOR POSTED SPEED EQUAL TO OR GREATER THAN 45 MPH

FOR POSTED SPEED EQUAL TO OR LESS THAN 40 MPH

## REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

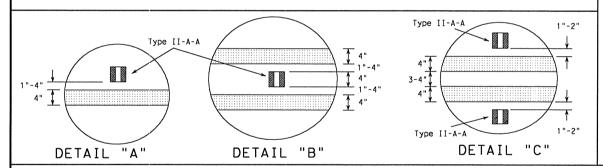


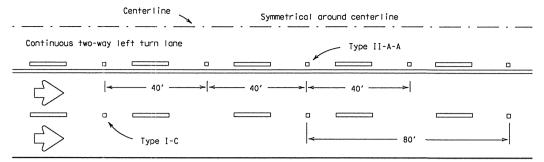
## CENTERLINE FOR ALL TWO LANE ROADWAYS



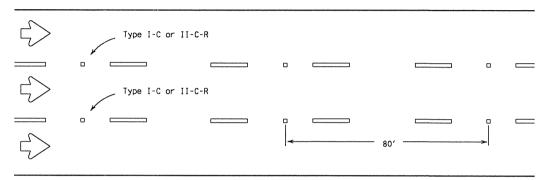
## CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.





## CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



## LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

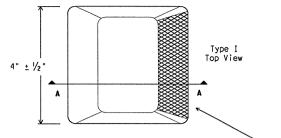
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

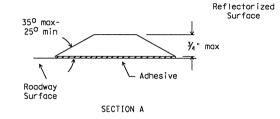
As required by the Engineer or shown elsewhere in the plans, Type II-C-R or Type I-C markers may be placed on 40-foot centers for the below listed conditions:

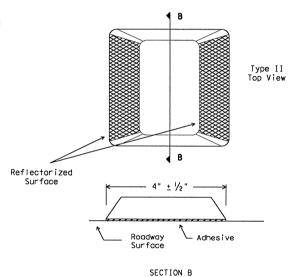
- 1. horizontal curves,
- 2. continuously illuminated sections,
- 3. high volume roadways4. or roadways where safety concerns exist.

### RAISED PAVEMENT MARKERS

(REFLECTORIZED)







#### GENERAL NOTES:

All raised pavement markers placed in broken lines shall be placed in line with and midway between

On concrete pavements the raised pavement markers should be placed to one side of the longitudinal

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECT.) BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS

SPECIFICATION REFERENCE TABLE

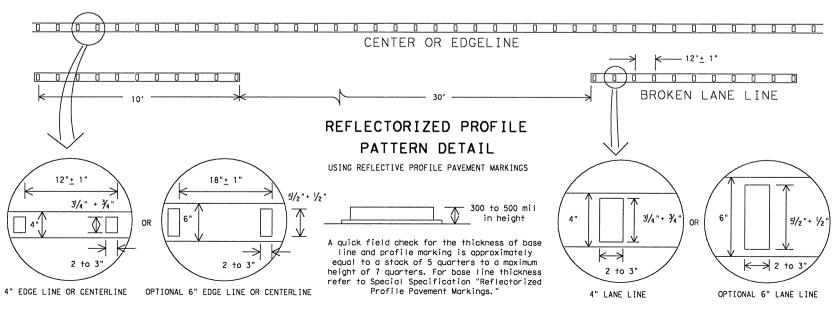
DMS-4200 DMS-6100

## STANDARD PLANS Texas Department of Transportation Traffic Operations Division

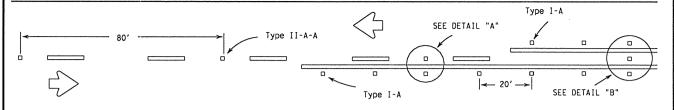
POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS

PM(2)-00A

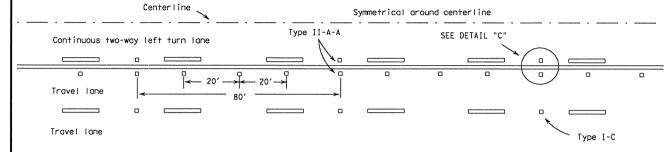
| C) TxDO1         | April             | 1977              | DN: - BAS | cx: - GRB           | DW: -   | FDN | ck: - CAL |  |  |  |
|------------------|-------------------|-------------------|-----------|---------------------|---------|-----|-----------|--|--|--|
| EVISIONS<br>0-86 | STATE<br>DISTRICT | FEDERAL<br>REGION | FEC       | FEDERAL AID PROJECT |         |     |           |  |  |  |
| 0-86<br>4-92     | AUS               | 6                 | CC        | CC 337-1-29         |         |     |           |  |  |  |
| 5-00             | COUNTY            |                   |           | CONTROL             | SECTION | JOB | HIGHWAY   |  |  |  |
| 3-00             |                   | WILLI             | AMSON     | 0337                | 01      | 029 | SH 20     |  |  |  |



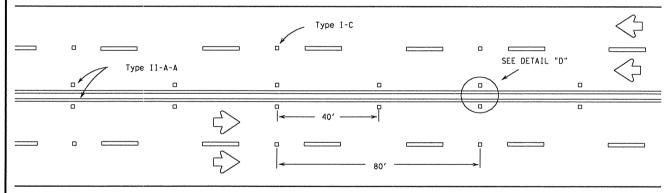
## REFLECTIVE RAISED PAVEMENT MARKERS USED TO SUPPLEMENT STANDARD PAVEMENT MARKINGS



### CENTERLINE & NO-PASSING LINES FOR 2 LANE TWO-WAY HWYS 24 FT. OR WIDER

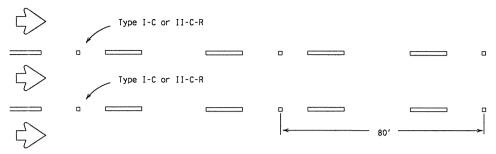


### CENTERLINES & LANE LINES FOR TWO-WAY LEFT TURN LANE



## CENTERLINE & LANE LINES FOR 4 LANE TWO-WAY HIGHWAYS

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.

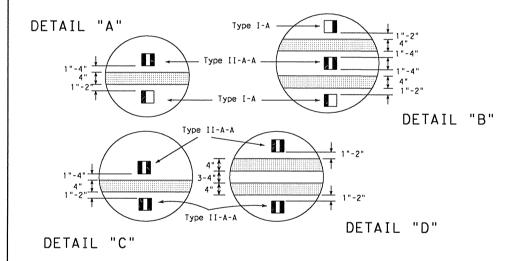


### LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

As required by the Engineer or shown elsewhere in the plans, Type II-C-R or Type I-C markers may be placed on 40-foot centers for the below listed conditions:

- 1. horizontal curves,
- 2. continuously illuminated sections,
- 3. high volume roadways
- 4. or roadways where safety concerns exist.



#### CENTER OR EDGELINE BROKEN LANE LINE REFLECTORIZED PROFILE PATTERN DETAIL 12"± 1" 18"± 1" USING REFLECTIVE PROFILE PAVEMENT MARKINGS 31/4" + 3/4" 300 to 500 mil 31/4"+ 3/4 in height 51/2"+ A quick field check for the thickness of base $\rightarrow$ line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters. For base line thickness 2 to 3" refer to Special Specification "Reflectorized Profile Pavement Markings. 4" EDGE LINE OR CENTERLINE OPTIONAL 6" EDGE LINE OR CENTERLINE 4" LANE LINE OPTIONAL 6" LANE LINE

#### GENERAL NOTES:

All raised povement markers placed in broken lines shall be placed in line with and midway between the stripes.

On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

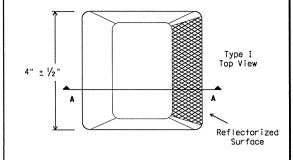
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

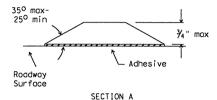
SPECIFICATION REFERENCE TABLE
MATERIAL SPECIFICATIONS
PAVEMENT MARKERS (REFLECT.)

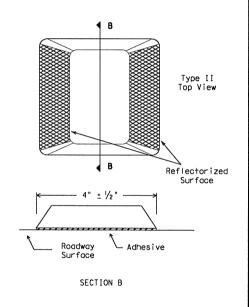
PAVEMENT MARKERS (REFLECT.) DMS-4200
EPOXY DMS-6100
BITUMINOUS ADHESIVE FOR PAVE. MKS. DMS-6130

## RAISED PAVEMENT MARKERS

(REFLECTORIZED)







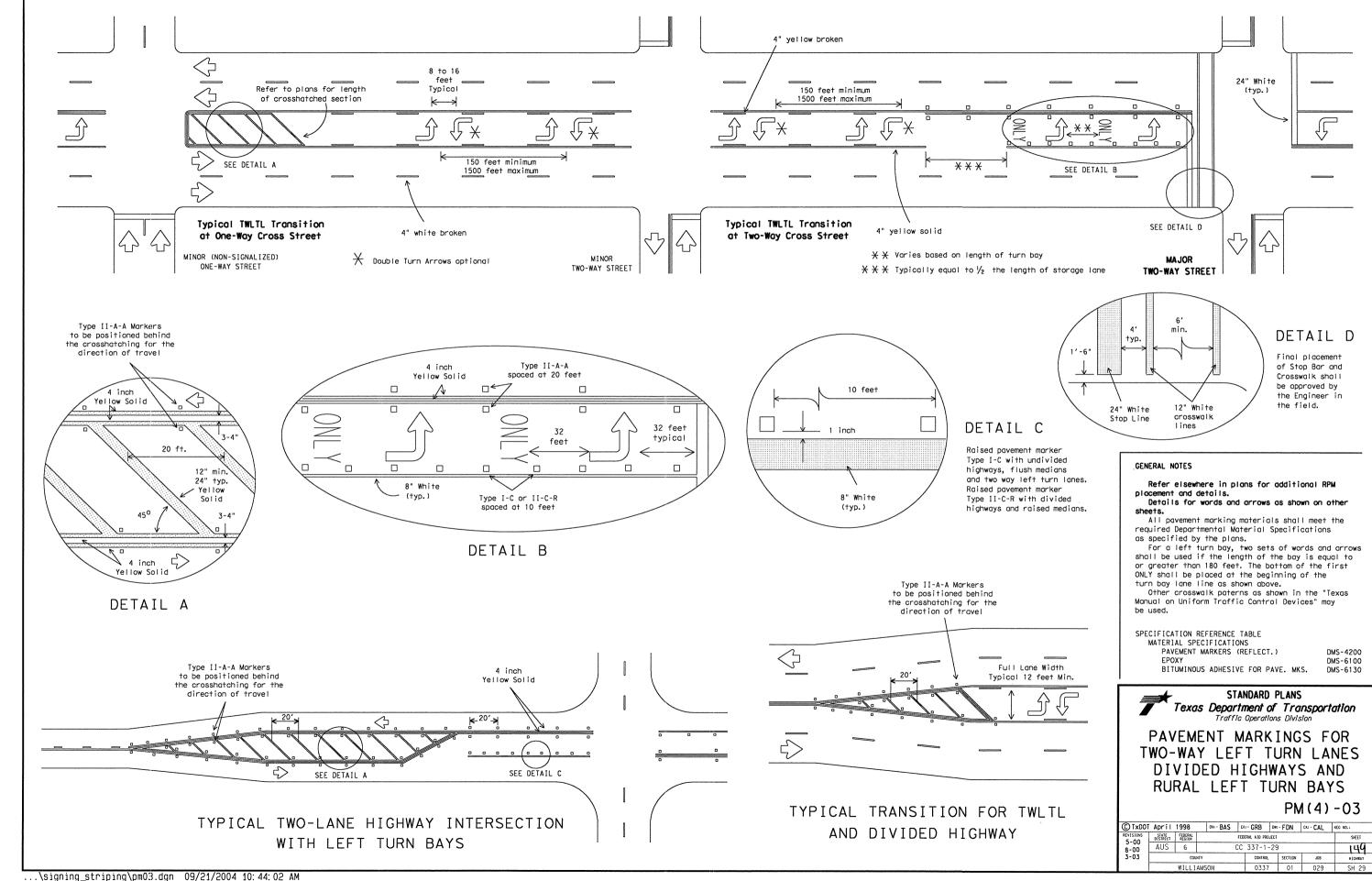


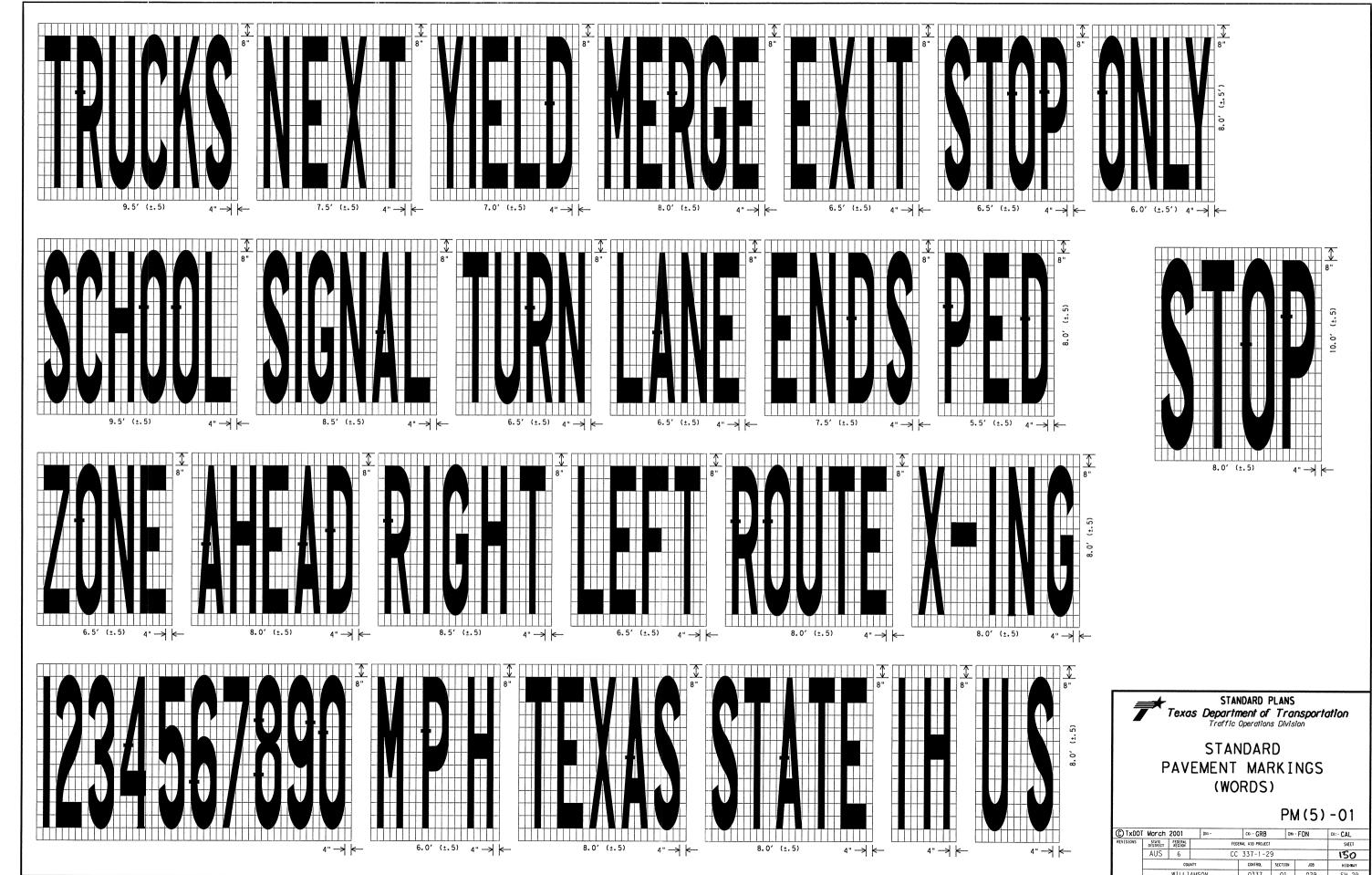
SUPPLEMENTAL MARKINGS USING RAISED PAVEMENT MARKERS REFLECTORIZED PROFILE MARKINGS

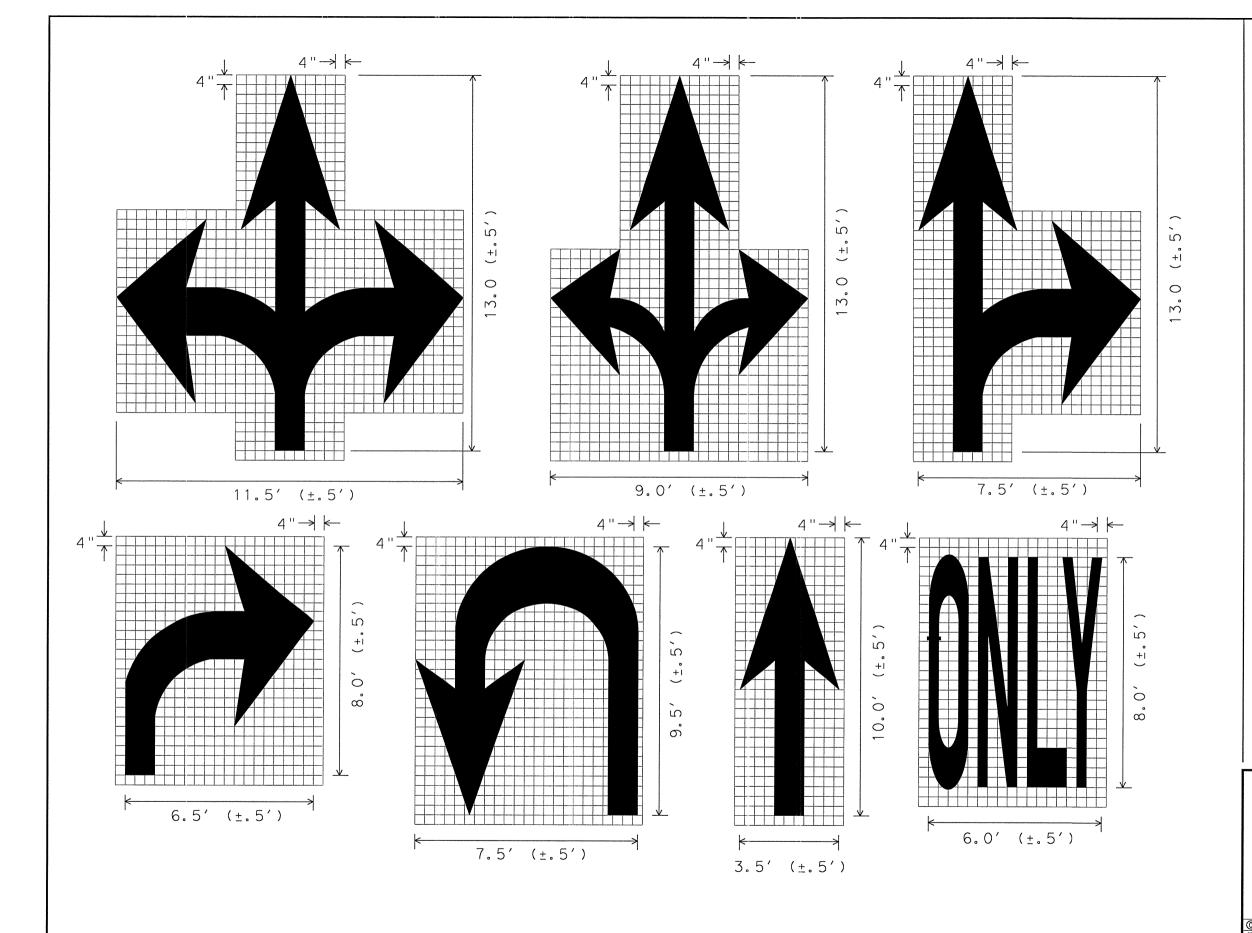
PM(3)-00A

| ©TxDOT April 1977 |       |                   | DN: - BAS | ck: - GRB           | ow: - FDN | CK: - CAL | NEG NO.: |  |  |  |
|-------------------|-------|-------------------|-----------|---------------------|-----------|-----------|----------|--|--|--|
| REVISIONS         | STATE | FEDERAL<br>REGION |           | FEDERAL ALO PROJECT |           |           |          |  |  |  |
| 10-86<br>4-92     | AUS   | 6                 |           | 148                 |           |           |          |  |  |  |
| 5-00              |       | cou               | NTY       | CONTROL             | SECTION   | JOB       | HEGHWAY  |  |  |  |
| 9-00              |       | WILLI             | AMCOM     | 0337                | 0.1       | 020       | CIL 20   |  |  |  |

...\signing\_striping\pm03.dgn 09/21/2004 10:44:03 AM







GENERAL NOTES;

- 1. Minimum 8 foot white markings should be used, unless otherwise noted. If message consists of more than one word, it should be placed with first word nearest the driver.
- 2. These details are standard size for normal 2. These details are standard size for normal installation; sizes may be reduced approximately one-third for low speed urban conditions; larger sizes may be needed for freeways, above average speed conditions or other critical locations.

  3. The longitudinal space between markings should be at least four times the height of the markings, on low speed roads, but should not exceed ten times the height under any condition.

  4. Markings considered appropriate for use when
- 4. Markings considered appropriate for use when warranted include the following:
- A. Regulatory

RIGHT (LEFT) TURN ONLY

25 MPH

SYMBOL ARROWS B. Warning

STOP AHEAD SIGNAL AHEAD

SCHOOL SCHOOL X-ING

PED X-ING R X R (see RCPM standard)

C. Guide

ROUTE XXX

STATE XXX

Other words or symbols may be necessary under certain conditions

- 5. Uncontrolled use of pavement markings can result in driver confusion. Word and symbol markings should be no more than three lines.
  6. The word "STOP" shall not be used on the pavement
- unless accompanied by a Stop line and Stop sign. The word "STOP" shall not be placed on the pavement in advance to a stop line, unless every vehicle is required to stop at all times.
- 7. Pavement markings should generally be no more than one lane in width, with School messages being the exception. For details of School and School crossing pavement markings, refer to Part VII of the "Texas Manual on Uniform Traffic Control Devices".
- 8. Spacing between letters should be approximately 4 inches. The width of letters may vary depending on the width of the travel lanes.
- 9. Lane-Use arrow markings may be used to convey either guidance or mandatory messages. Arrows used to convey a mandatory movement must be accompanied by standard signs and the pavement marking word "ONLY". 10. Pavement markings are to be located as specified elsewhere in the plans.

| SPACING BETWEEN LINES OF PAVEMENT MARKINGS |   |  |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|--|
| MPH SPACING                                |   |  |  |  |  |  |  |  |
| ≤ 45                                       | MINIMUM<br>4 TIMES THE LETTER<br>HEIGHT   |  |  |  |  |  |  |  |
| > 45                                       | MINIMUM - 4 TIMES<br>THE LETTER HEIGHT<br>MAXIMUM - 10 TIMES<br>THE LETTER HEIGHT |  |  |  |  |  |  |  |

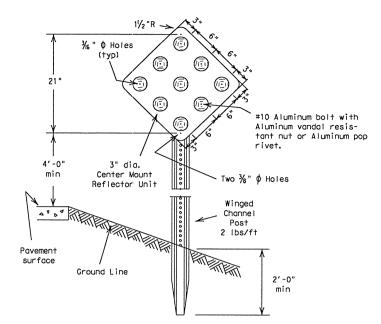


## STANDARD PAVEMENT MARKINGS (ARROWS)

PM(6)-01

| TxDOT  | March      | 2001              | DN: - | ck: - GRB | DW      | - FDN | cx: - CAL |
|--------|------------|-------------------|-------|-----------|---------|-------|-----------|
| ISIONS | STATE      | FEDERAL<br>REGION |       | SHEET     |         |       |           |
|        | AUS        | 6                 |       | 151       |         |       |           |
|        |            | COUNT             | Y     | CONTROL   | SECTION | J08   | H1GHWAY   |
| ſ      | WILLIAMSON |                   |       | 0337      | 01      | 029   | CH 20     |

#### OBJECT MARKER TYPES 1 and 4



TYPE 1 and 4 Object Markers shall consist of Type (B) Center Mount Reflector Units mounted on 0.080" thick sheet aluminum conforming with ASTM B-209 Alloy

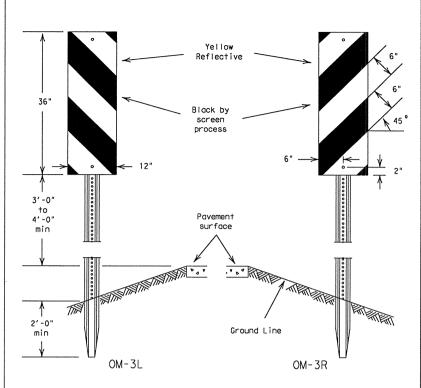
TYPE 1 OM-1R

18" x 18" Reflector Unit - YELLOW Background - (YELLOW - Non-Reflective)

18" x 18" Reflector Unit - RED Background - (RED - Non-Reflective)

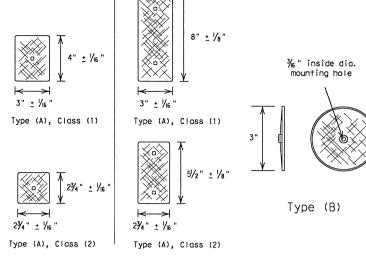
TYPE 4 OM-4R

## OBJECT MARKER TYPE 3



Sign blank to be .080" thick sheet aluminum conforming to ASTM 8-209 Alloy 6061-T6. Reflective sheeting shall be in accordance with Departmental Material Specification, D-9-8300. Type C.

## TYPICAL REFLECTOR UNITS



Type (A)

Type (A) - Reflective sheeting with pressure sensitive backing. For certain (non-flexible post) applications, reflective sheeting may be directly applied to approved metal, plastic or fiberglass backplate with 17/64" square mounting hole.

> It is the contractor's option to provide Class (1) or Class (2) reflective sheeting in accordance with Departmental Material Specification D-9-8600. All reflector units per delineator or object marker shall be of the same type and class of reflective sheeting.

Type (B) - Centermount acrylic plastic prismatic reflector.

SPECIFICATION REFERENCE TABLE
MATERIALS AND TESTS DIVISION SPECIFICATIONS FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (DRIVEABLE & SURFACE MOUNT TYPES) FLAT SURFACE REFLECTIVE SHEETING, TYPE C

(HIGH SPECIFIC INTENSITY) NON-REFLECTIVE BACKGROUND COATING DELINEATOR AND OBJECT MARKER

D-9-8300 D-9-8500 D-9-8600

#### GENERAL NOTES:

- 1) Delineators shall be uniformly placed not less than 2 feet nor more than 8 feet from the edge of shoulder or the face of unmountable curb. They may be placed in line with guardrail where guardrail is used.
- 2) Object markers shall be located at points designated on the plan.

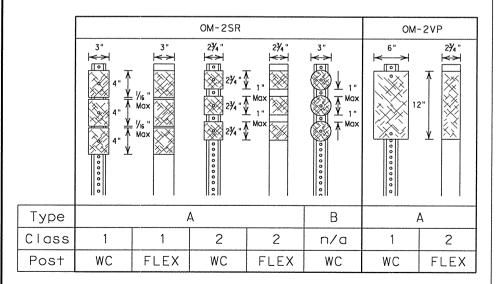
When used for marking objects in the roadway or 8 feet or less from the shoulder or curb, the mounting height to the bottom of the object marker should nor mally be 4 feet above the surface of the negrest traffic lane. When used to mark objects more than 8 feet from the shoulder or curb, the mounting height to the bottom of the object marker may be 4 feet above the ground line.

When object markers or markings are applied to a hazardous object which by its nature required a lower or higher mounting, the vertical mounting height may vary according to need.

- 3) Hardware shall be galvanized steel, stainless steel, or aluminum, except as noted.
- 4) Posts for supporting delineators and Type 2 object markers shall be 1.12 lbs/ft winged channel.
- 5) Type 1, 3 and 4 object marker posts shall be 2 lbs/ft winged channel.
- 6) Delineator and object markers shall be in accordance with Department Material Specification D-9-8600.

## OBJECT MARKERS TYPE 2

YELLOW (R-reflector unit, P-panel)

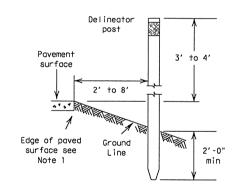


ALL REFLECTOR UNITS ARE YELLOW WC-wing channel post (1.12 lbs/ft) FLEX-flexible post (driveable and semi-driveable)

#### DOUBLE: D-DY or D-DW SINGLE: D-SY, D-SW or D-SR Double delineators may be constructed of one large or two small reflector units. **<>** $|\langle\rangle|$ **←>** 2¾"\ 2¾ " 🖟 В Α Type В Δ Class 2 n/a 2 n/a WC FLEX WC Post FLEX WC WC FLEX WC FLEX WC

DELINEATORS

Length of post may vary to meet field conditions. REFLECTOR UNITS: W-white, Y-yellow, R-red WC-wing channel post (1.12 lbs/ft) FLEX-flexible post (driveable and semi-driveable)



TYPICAL INSTALLATION



**DELINEATORS & OBJECT MARKERS** 

(1 of 2)

D & OM(1)-95

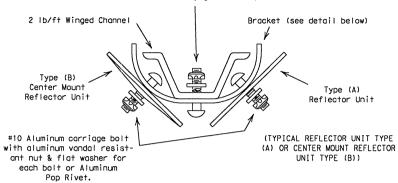
| © TxDOT      | January 1981 | ON: - LR          | CK: -             | ow: - DN    | CK: -     |         | NEG NO.: |         |
|--------------|--------------|-------------------|-------------------|-------------|-----------|---------|----------|---------|
|              | REVISIONS    | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERA      | L AID PRO | JECT    |          | SHEET   |
| 1-82<br>4-92 |              | AUS               | 6                 | CC 337-1-29 |           |         | 152      |         |
| 8-95         |              |                   | COUNTY            |             |           | SECTION | JOB      | HIGHWAY |
|              |              |                   | WILLIA            | MSON        | 0337      | 01      | 029      | SH 29   |

## PLAN VIEW OF BIDIRECTIONAL MOUNTING

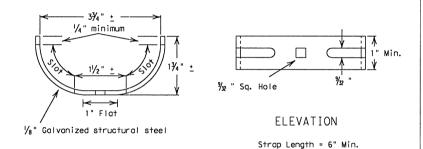
For Single Delineators Only

Post oriented as directed by Engineer

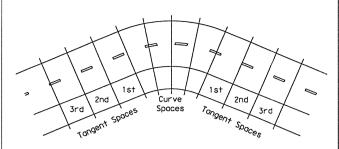
1/4" Steel carriage bolt with steel vandal resistant nut and one flat washer, galvanized per ASTM.



## BIDIRECTIONAL BRACKET



## DELINEATORS FOR CURVES OR TANGENT SECTIONS

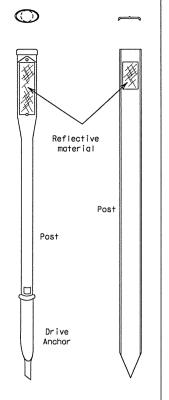


The delineator spacing, S, on the curve is found from the formula S= $3\sqrt{R-50}$ , where R is the radius of the curve in feet. The first spaces immediately in advance of and beyond the curve are 2.0xS, the second spaces are 3.0xS, and the third spaces are 6.0xS but not to exceed 300 feet. Distance for spaces rounded to nearest 5 feet.

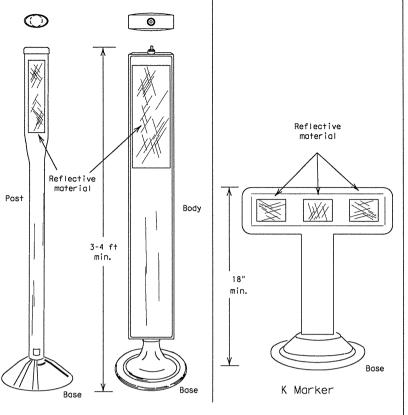
Spacing for Highway Delineators on Horizontal Curve

| Degree | Radius on | Spacing on | Spacing in Advance of and Beyond Curves |              |             |  |  |
|--------|-----------|------------|---|--------------|-------------|--|--|
| of     | Curve     | Curve      | First Space                             | Second Space | Third Space |  |  |
| Curve  | Feet      | Feet       | Feet                                    | Feet         | Feet        |  |  |
| 1      | 5730      | 225        | 700                                     |              |             |  |  |
| 2      | 2865      | 160        | 300                                     |              |             |  |  |
| 3      | 1910      | 130        | 260                                     | 300          | 300         |  |  |
| 4      | 1433      | 110        | 225                                     |              |             |  |  |
| 5      | 1146      | 100        | 200                                     |              |             |  |  |
| 6      | 955       | 90         | 185                                     | 275          |             |  |  |
| 7      | 819       | 85         | 165                                     | 250          | 300         |  |  |
| 8      | 716       | 75         | 155                                     | 230          |             |  |  |
| 9      | 637       | 75         | 1 45                                    | 220          |             |  |  |
| 10     | 573       | 70         | 135                                     | 205          |             |  |  |
| 11     | 521       | 65         | 130                                     | 195          |             |  |  |
| 12     | 478       | 60         | 125                                     | 185          |             |  |  |

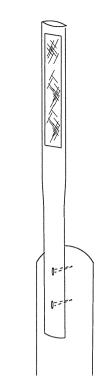
## FLEXIBLE POSTS



Driveable or Semi-Driveable Delineator Posts Install to manufacturer's recommendations



Pavement Surface Mount
Surface mounted delineator posts may use epoxy, or hot bituminous adhesive to mount post to flat surface.

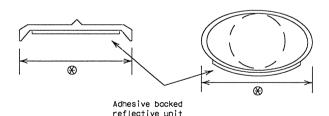


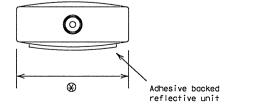
Guardrail Post Surface Mount

## PLAN VIEW OF MONODIRECTIONAL MOUNTINGS

PLAN VIEW

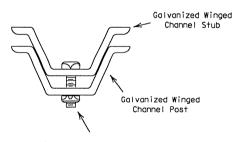
For Single and Double Delineators and Object Marker types OM-2YP(a) & OM-2SR





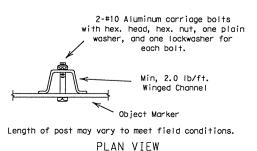
igotimes Not less than 3  $\frac{1}{4}$ ".

Various Cross Sections may be furnished if projected width of reflective unit appears to be  $3" \pm \frac{3}{8}"$ .



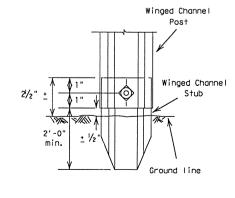
% " Φ Standard Galvanized or Zinc plated square or hex. head machine bolt with nut.

PLAN VIEW



## BREAK AWAY CHANNEL POST

For Object Marker Types 1,3 and 4 (where specified in the plans)



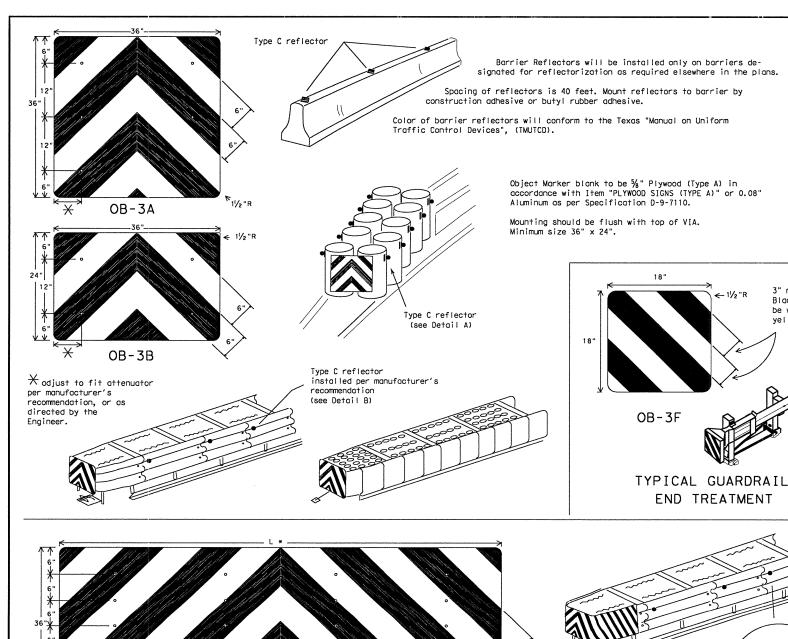
PARTIAL ELEVATION

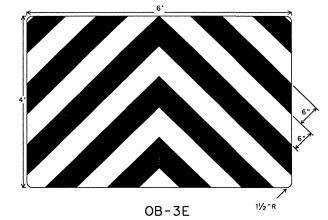


DELINEATORS & OBJECT MARKERS

(2 of 2)

D & OM(2) - 95





EXIT TYPE C REFLECTOR Detail A BACK PANEL (OPTIONAL)

## GENERAL NOTES:

- 1. Back Panel (OB-3E) shall be made of 5/8" plywood (Type A) panels unless otherwise noted in the plans.
- 2. Back panel will be mounted independent of the attenuator. The minimum mounting height is flush with
- 3. Alternating flashing yellow lights may be added. Lights should be mounted minimum 72" above pavement.
- 4. Attenuator may have additional yellow reflective and black striping, and/or reflectors placed on sides. CHEVRONS (W1-8) may be erected to delineate roadway curvature beyond the attenuator. These additional devices will be installed if required elsewhere in the plans.
- 5. Mount Bock Panel per details on SMD Standards, or as detailed elsewhere in the plans.

#### GENERAL NOTES: OBJECT MARKERS

3" minimum to 4" maximum.

Black stripes may be wider than

- 1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification D-9-8300, Type C. Background shall be yellow reflective and Chevron shall be black.
- 2. Object markers OB-3C, OB-3D and OB-3F may be fabricated from reflective sheeting applied to:
- (a) galvanized sheet metal gauge 24 to 28 per ASTM A366.025 nominal, aluminum sheet of 6061-T6 or 5052-H38 alloy approximately .065 inch thickness,
- (b) low or medium density polyethylene approximately 0.08 inch thickness, or
  (c) other material as specified in the plans or approved by the Engineer.

  3. OB-3F is intended for use only with guardrail end treatments (i.e. GET, CAT, BEST, BRAKEMASTER, SENTRE, etc.). OM-BF may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and
- have no wrinkles, air bubbles, cuts or tears. 4. Size may be reduced to fit smaller devices, however, the minimum size shall be:
- (a) 24 x 24 inches for attenuators, and
- (b) 18 x 18 inches for guardrail end treatments.
- 5. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
  6. When traffic passes only on one side of attenuator, only the OM-3 marker should be installed. OM-3 should be installed per the requirements of D & OM Standards with a minimum mounting height of 18 inches.

#### TYPE C REFLECTORS

- 1. Type C reflectors shall consist of a reflector unit attached to a bracket to facilitate delineator mounting on attenuators, guardrails and concrete traffic barriers.
- 2. Type C reflectors may also be used to delineate side of attenuator, guardrail and concrete traffic barrier.
- 3. Type C reflectors shall meet the requirements of D-9-8600.

| TRAFFIC FLOW                |       |       |       | ONE SIDE |      |      |      |
|-----------------------------|-------|-------|-------|----------|------|------|------|
| ATTENUATOR TYPE             | OB-3A | 0B-3B | OB-3C | 0B-3D    | L    | OM-1 |      |
| GREAT                       | NR    | 1     | NR    | 1        | 96"  | 1    |      |
| Steel Drum                  | 1     | 1     | 1     | 1        | 114" | 1    |      |
| Hydraulic                   | 1     | 1     | NR    | NR       | NR   | 1    | OM-3 |
| Hex Foam                    | 1     | 1     | NR    | NR       | NR   | 1    | OM-3 |
| Low Maintenance             | NR    | 1     | NR    | 1        | 96"  | 1    |      |
| Sand Filled Plastic Modules | NR    | NR    | NR    | NR       | NR   | 1    |      |
| Sand Tire                   | NR    | NR    | NR    | NR       | NR   | 1    |      |

NR - Not Recommended



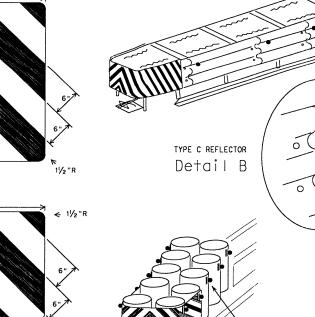
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division

DELINEATORS &

**OBJECT MARKERS** FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-98

| © TxDOT      | Decemb            | er 198            | 19 DN:-LR | CK: -               | DW: - DN   | CK: - | NEG NO.: |  |  |
|--------------|-------------------|-------------------|-----------|---------------------|------------|-------|----------|--|--|
| REVISIONS    | STATE<br>DISTRICT | FEDERAL<br>REGION |           | FEDERAL AID PROJECT |            |       |          |  |  |
| 4-90<br>4-92 | AUS               | 6                 |           | CC 337-1-29         |            |       |          |  |  |
| 8-95         |                   | COU               | NTY       | CONTRI              | OL SECTION | JOB   | HIGHWAY  |  |  |
| 4-98         |                   | WILLI             | AMSON     | 033                 | 7 01       | 029   | SH 29    |  |  |



Type C reflector

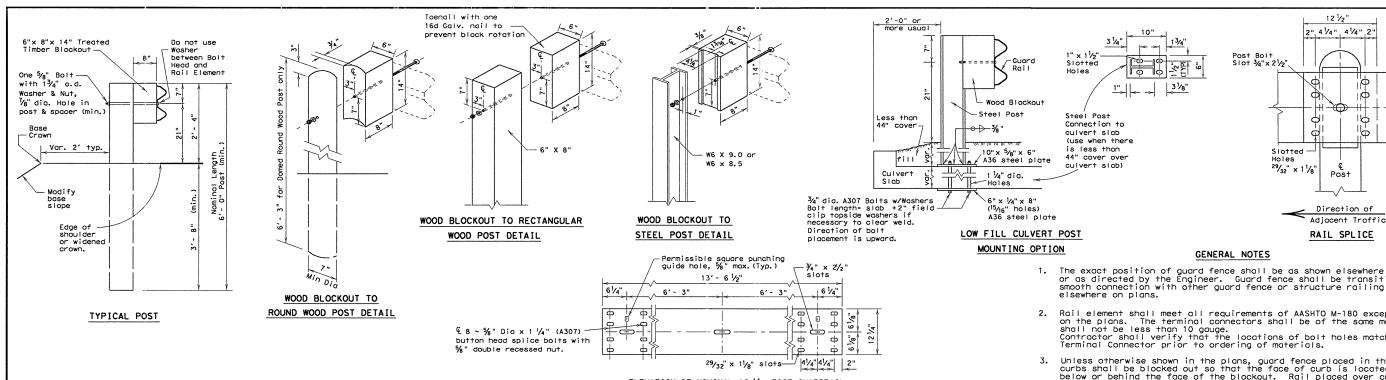
manufacturers recommendation, or as Minimum size 96" x 24". directed by the Engineer.

OB-3C

OB-3D

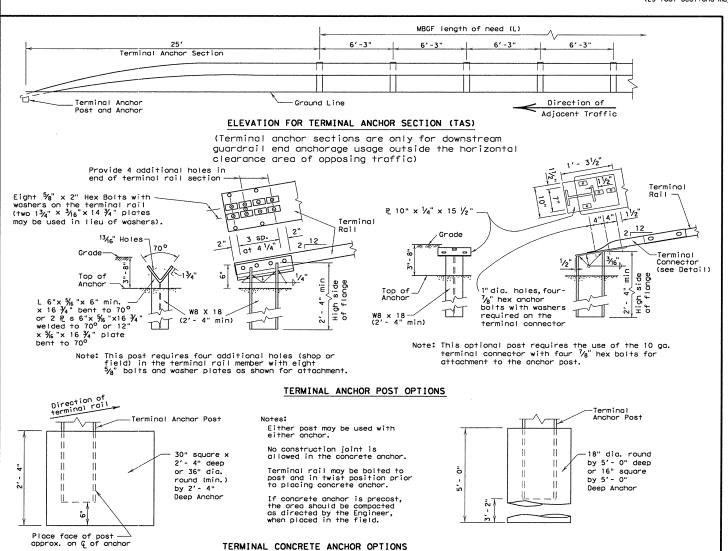
Mounting should be flush with top of attenuator.

X spacing adjusted to attach through centerline of drum, per attenuator



ELEVATION OF NOMINAL 12 1/2 FOOT GUARDRAIL

(25 foot sections may also be supplied)

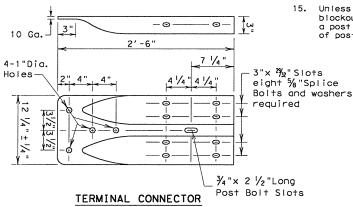


## 2" spacer to steel post and rail to Post Bolt 1 1/4" Splice Bolt Oval Shoulder

#### SPLICE BOLT

- A) 1 1/4" spacer to steel post hex bolt. 2" rail to
- (B) (% " hex bolts required for terminal connector)

TERMINAL CONNECTOR : The terminal connector may also be used on the MBGF(TL2) transition (See MBGF(TL2) Standard Sheet), or on the downstream end of a concrete rail located outside the horizontal clearance area of opposing traffic. (See BED Standard Sheet)



- The exact position of guard fence shall be as shown elsewhere on the plans or as directed by the Engineer. Guard fence shall be transitioned to a smooth connection with other guard fence or structure railing as shown
- Rail element shall meet all requirements of AASHTO M-180 except as modified on the plans. The terminal connectors shall be of the same material, but shall not be less than 10 gauge.
  Contractor shall verify that the locations of bolt holes match those in the Terminal Connector prior to ordering of materials.

121/2"

 $\odot$ 

Post

Direction of

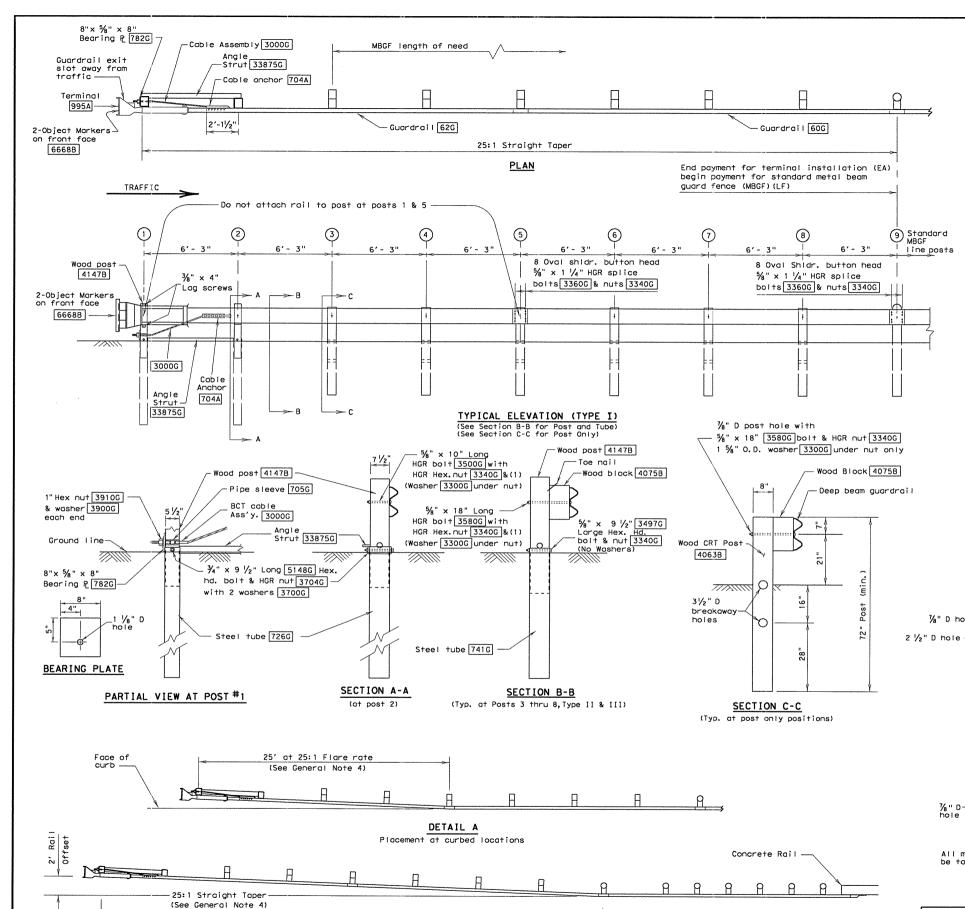
- Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be blocked out so that the face of curb is located directly below or behind the face of the blockout. Rail placed over curbs shall be installed so that the post bolt is located approximately 21-inches above the gutter pan or roadway surface.
- 4. Unless otherwise shown in the plans, MBGF shall be placed with the face of rail directly above the shoulder edge (or curbface) except for upstream
- 5. At the option of the Contractor, the rail elements for the guard fence may be furnished in either 12 ½ or 25 foot nominal lengths with post bolt slots for connection to posts.
- The terminal anchor post shall be set in Class "A" concrete in (unless otherwise shown on plans) in accordance with Item, "Portland Cement Concrete". Concrete shall be subsidiary to the bid item requiring construction of the terminal rail section and anchorage system.
- 7. An anchor other than to a terminal anchor post shall consist of a connection similar to the rail splice or similar to the terminal connector.
- Galvanized washers used with the eight  $\frac{5}{8}$ " splice bolts and nuts that are provided for terminal connectors and/or terminal anchor posts shall be 1  $\frac{3}{4}$ " x  $\frac{3}{8}$ " x  $\frac{3}{16}$ ", or 1" i.d. and 2" o.d. x 0.134" (ANSI B27.2) narrow Type A plain washers.
- Special fabrication will be required at installations having a curvature of less than 150' radius.
- Button head post bolts (A307) shall be of sufficient length to extend through the full thickness of the nut and no more than  $\frac{7}{4}$ " beyond it. Button head splice bolts (A307) are  $\frac{7}{6}$ "x 1  $\frac{1}{4}$ " with a  $\frac{7}{6}$ " double recessed nut. Fittings (bolts, nuts, and washers) shall be in accordance with Item, Metal for Structures". Fittings shall be subsidiary.
- 11. Crown will be widened to accommodate guard fence.
- 12. If guardrail is placed on a side slope away from the pavement edge, then the slope rate between the edge of the pavement and the face of the barrier will be 1V:10H or flatter.
- Posts shall not be set full depth in concrete.
- Where solid rock is encountered or where shown on the plans, the diameter of the holes shall be approximately 12 inches, the backfilling shall be with a cohesionless material, and embedment depth shall be 1'-6" or more as directed by the Engineer.
- 15. Unless otherwise directed by the Engineer, a composite material post and/or blockout from the Department approved list of suppliers may be substituted for a post and/or blockout of similar dimensions. The list of approved suppliers of posts and blockouts will be maintained by the Construction Division, TxDOT.



ILE: mbgf03a.dgn DN: MAM CK: MAM DW: RAR CK: MAM NEG: DIST FED REG FEDERAL AID PROJECT . SHEE REVISIONS AUS 6 CC 337-1-29 155 CONTROL SECT JOB HIGHWA 0337 01 029 SH WILLIAMSON

© TxDOT JULY 1994

R = Radius D = Diameter



50' SGT

...\signing\_striping\sgt703a.dgn 09/21/2004 10: 44: 03 AM

DETAIL B

Usual minimum placement to protect bridge ends

#### GENERAL NOTES

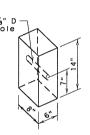
1. The Type of SGT unit will be specified elsewhere in the plans. Numbers in circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the

Post & Tube Options
De I Posts (1) the
De II Posts (1) the
De III Posts (1) the Posts ③ thru ⑧ Posts ⑤ thru ⑧

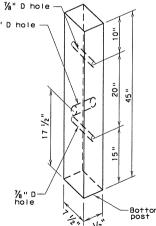
2. If the SGT system must be placed on a radius, the minimum radius is 150 feet.

- None
- 3. All bolts, nuts, coble assemblies, coble anchors, steel tubes & bearing plates shall be galvanized.
- 4. For non-curb installations, the MBGF will be flored at a rate of 25:1 over the first 50 foot of the system to prevent the terminal head from encroaching on the shoulder. The flare may be decreased or eliminated for specific installations if directed by the Engineer. A 25:1 flare rate will be used at curb sections, beginning at post number 5 and ending at post number one.
- 5. The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary
- 6. The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
- When rock excavation is encountered, a 12 inch diameter post hole, 20 inches deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2 ½ inches deep to provide drainage. The steel tube sleeves will be field cut to 20 inches in length placed in the hole and backfilled with adequately compacted material excavated from the hole.
- 8. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
- 9. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
- 10. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
- 11. An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).
- 12. A special site evaluation should be considered, prior to using this end treatment where there is less than 25 feet between the extrusion side of the end treatment and any adjacent driving lane.

POST & TUBE OPTIONS



WOOD BLOCKOUT 4075B



All measurements should WOOD POST

4147B

|      | POST | & | TUBE | OPT | IONS |            |
|------|------|---|------|-----|------|------------|
| Туре | I    | Р | osts | 1   | thru | 2          |
| Type | ΙI   | Ρ | osts | ①   | thru | <u>(4)</u> |
| Туре | III  | Ρ | osts | ①   | thru | 8          |

MBGF Transition

Variable transition length and post

| Code<br># | I   | ΙI  | Type<br>III<br>Qty. | DESCRIPTION   |  |  |  |  |  |
|-----------|-----|-----|---------------------|---|--|--|--|--|--|
| 62G       | 1   | 1   | 1                   | #1 Deep Beam Guardrail (12 Ga) at 25′                                 |  |  |  |  |  |
| 60G       | 1   | 1   | 1                   | #2 Deep Beam Guardrail (12 Ga) at 25′                                 |  |  |  |  |  |
| 726G      | 2   | 2   | 2                   | Steel Tube - 6"x 8"x 72"x 1/8" min                                    |  |  |  |  |  |
| 741G      | 0   | 2   | 6                   | Steel Tube - 6" $\times$ 8" $\times$ 54" $\times$ $\frac{1}{8}$ " min |  |  |  |  |  |
| 4147B     | 2   | 4   | 8                   | ood Posts - 5 1/2" x 7 1/2" x 45"                                     |  |  |  |  |  |
| 4063B     | 6   | 4   | 0                   | Wood CRT Posts - 6"x 8"x 72"  |  |  |  |  |  |
| 4075B     | 6   | 6   | 6                   | Wood Block - 6"x 8"x 14"  |  |  |  |  |  |
| 705G      | 1   | 1   | 1                   | Pipe Sleeve - 2" std. pipe x 5 1/2"                                   |  |  |  |  |  |
| 782G      | . 1 | 1   | 1                   | Bearing Plate - 8"x 8"x 5%"   |  |  |  |  |  |
| 704A      | 1   | 1   | 1                   | Cable Anchor  |  |  |  |  |  |
| 3000G     | 1   | 1   | 1                   | Cable Assembly (¾" x 78")   |  |  |  |  |  |
| 33875G    | 1   | . 1 | 1                   | Angle Strut   |  |  |  |  |  |
| 995A      | 1   | 1   | 1                   | ET-2000 Plus Guardrail Terminal                                       |  |  |  |  |  |
|           |     |     |                     |   |  |  |  |  |  |
|           |     |     |                     | HARDWARE  |  |  |  |  |  |
| 5148G     | 2   | 2   | 2                   | $\frac{3}{4}$ " x 9 $\frac{1}{2}$ " Hex Hd (Top of tubes 1&2)A325     |  |  |  |  |  |
| 3300G     | 7   | 7   | 7                   | % " Washers   |  |  |  |  |  |
| 3478G     | 2   | 2   | 2                   | 5/8" × 7 1/2" Hex Bol+  |  |  |  |  |  |
| 3500G     | 1   | 1   | 1                   | $\frac{5}{8}$ " x 10" Post Bolt (Post 2 of LET)                       |  |  |  |  |  |
| 3580G     | 6   | 6   | 6                   | ⅓" × 18" HGR Post Bolt (posts 3) thru (8))                            |  |  |  |  |  |
| 3360G     | 16  | 16  | 16                  | 5/8" x 1 1/4" HGR Splice Bolt   |  |  |  |  |  |
| 3340G     | 25  | 27  | 31                  | %" HGR Nut (16-spl, 7-posts)  |  |  |  |  |  |
| 4228G     | 2   | 2   | 2                   | 3/8" x 4" Lag Screw   |  |  |  |  |  |
| 3910G     | 2   | 2   | 2                   | 1" Hex Nut (Anchor Cable)   |  |  |  |  |  |
|           | _   |     |                     |   |  |  |  |  |  |

2 Object Marker (12" x 12")

3704G 2 2 2 ½ " Heavy Hex Nut 3497G 0 2 6 ½ " x 9 ½" Hex Hd (Top of Tubes 3-8) A307

BILL OF MATERIAL



3700G 4 4 4 3/4" Washer

3900G 2 2 2 1" Washer (Anchor Cable)

Texas Department of Transportation Design Division (Roadway)

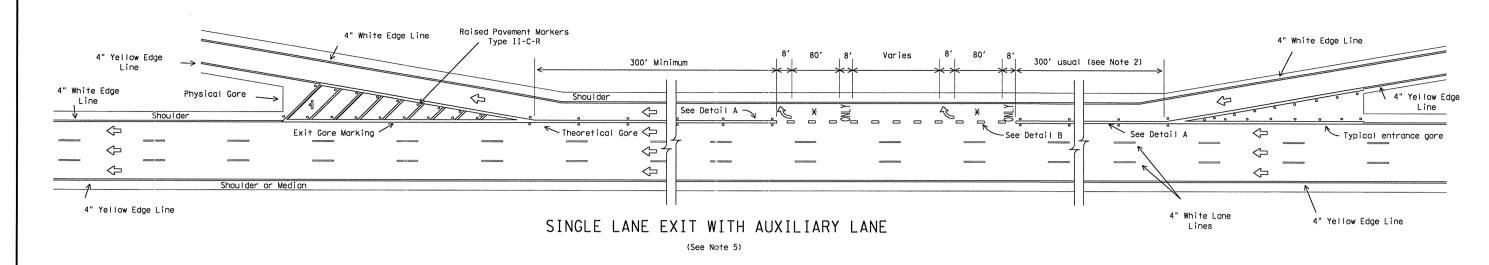
## SINGLE GUARDRAIL TERMINAL

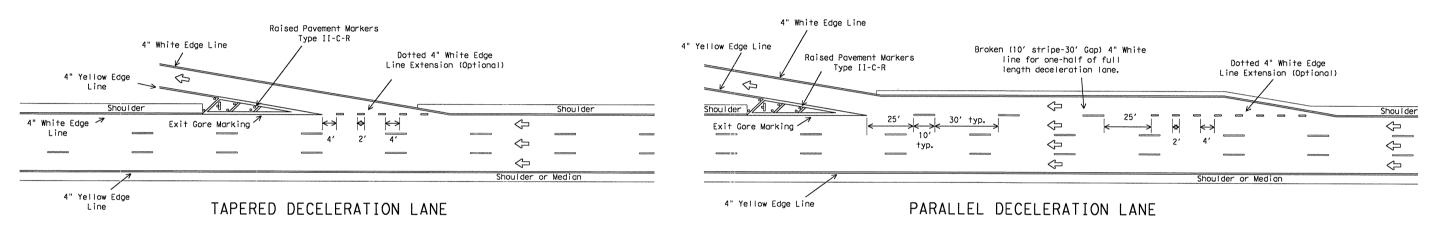
(ET-2000 PLUS) (WOOD POST)

SGT (7) -03A

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|--------|--------------|-----|------|-----------------|---------|---------|--------|--------|---------|--|
| ① Tx00 | T APRIL 1997 |     | DIST | FED REG         | FEDERA  | L AID P | ROJECT | •      | SHEET   |  |
|        | REVISIONS    | AUS | 6    | CC 337-1-29 15( |         |         |        | 156    |         |  |
| v      |              |     |      | COUNTY          |         | CONTROL | SECT   | JOB    | HIGHWAY |  |
|        |              |     |      | WILLIAMS        | ON      | 0337    | 01     | 029    | SH 29   |  |

R = Radius D = Diameter





#### LEGEND

- OM-2, or approved surface mount object marker installed 2 to 10 feet from Physical Gore. Mounting height is approximately 36 inches.

#### GENERAL NOTES:

1. Pavement markings shall be white except as otherwise noted.

2. Length of 12" white line may vary depending on location.

- 3. Lane drop markings are to be used to separate lanes that are required to go in different directions.
- 4. A lane drop (EXIT ONLY) condition is typically when the nearest entrance ramp is greater than 2000 feet upstream of the exit ramp, measured from theoretical gore of entrance ramp to theoretical gore of exit ramp.

DMS-4200

5. All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

### SPECIFICATION REFERENCE TABLE

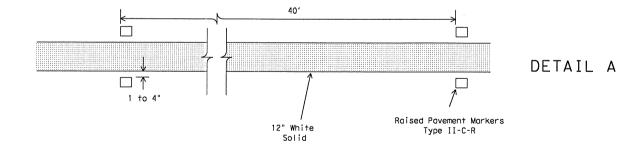
MATERIAL SPECIFICATIONS PAVEMENT MARKERS (REFLECT.)

DMS-6100 BITUMINOUS ADHESIVE FOR PAVE. MKS. DMS-6130

← - Denotes direction of traffic.

- Pavement marking arrows (white).

- Arrow markings are optional, however "ONLY" is required if arrow is used.



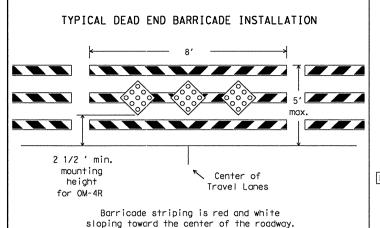
## 45′ DETAIL B 12" Raised Pavement Markers White Type II-C-R

### STANDARD PLANS Texas Department of Transportation Traffic Operations Division

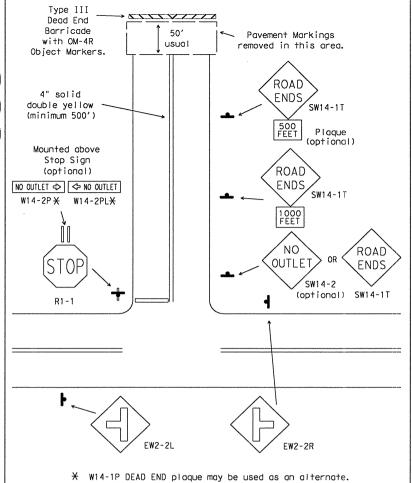
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

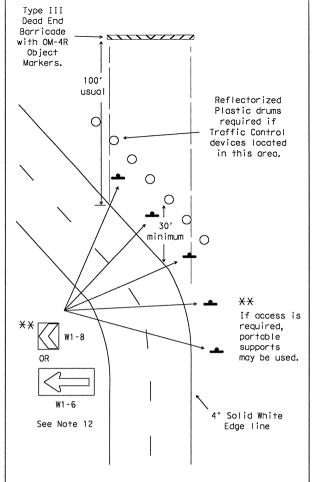
FPM(2)-00A

| TxDOT    | Februc            | ry 1977           | ON: - BAS | cx: - GRB          | DW: -   | FDN | cx: - CAL |  |  |
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| SIONS    | STATE<br>DISTRICT | FEDERAL<br>REGION | F         | EDERAL AID PROJECT |         |     | SHEET     |  |  |
| 92<br>95 | AUS               | 6 CC 337-1-29     |           |                    |         |     | 157       |  |  |
| 0        |                   | CGUNT             | Y         | CONTROL            | SECTION | JOB | HIGHWAY   |  |  |
| 00       |                   | WILLI.            | AMSON     | 0337               | 01      | 029 | SH 29     |  |  |



(See Note 1)





Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer Traffic Operations Division - TE Texas Department of Transportation 125 East 11th Street Austin, Texas 78701-2483 Phone (512) 416-3120 Fox (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us Click on "About TxDOT". Click on "Organizational Chart". Click on Traffic Operations Box. Click on "Compliant Work Zone Traffic Control Devices".

Click on "View PDF". This site is printable.

Devices shown for one direction of travel

DEPARTMENTAL MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS DMS-7100 ALUMINUM SIGN BLANKS DMS-7110 SIGN HARDWARE DMS-7120 WINGED CHANNEL POSTS DMS-7130 FLAT SURFACE REFLECTIVE SHEETING DMS-8300 VINYL NON-REFLECTIVE DECAL SHEETING DMS-8320 DELINEATORS AND OBJECT MARKERS DMS-8600

COLOR

USAGE SHEETING MATERIAL

RED BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) WHITE BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) YELLOW BACKGROUND TYPE C (HIGH SPECIFIC INTENSITY) BLACK LEGEND & BORDERS VINYL NON-REFLECTIVE SHEETING

- 1. Barricade striping shall be red and white reflective sheeting for all permanent road closures. Orange and white reflective sheeting may be substituted for locations where duration of road closure is expected to be 18 months or less. or when approved by the Engineer. Red and orange reflective sheeting shall not be combined on barricades or locations.
- 2. Barricades shall be designed and constructed to Compliant Work Zone Traffic Control Device List (CWZTCD) standards in a first-class workmanship manner of clean sound material. Components made of lumber shall be painted with a minimum of two coats of white paint to ensure thorough coverage and a uniform white color. Barricade striping material shall meet the color and retroreflective requirements of Departmental Material Specification DMS-8300. Type C.
- 3. Post type breakaway supports shall be used as barricade supports. Barricades may be fabricated with "skid" supports if approved by the Engineer. Skid supports should be anchored using sand bags to prevent movement. For construction details of post (fixed Type III barricades) see CWZTCD list Part D.2.f. The dead end road barricades may also be anchored to the pavement using the bolt down median anchor manufactered by Universal Anchor System shown on SMD(FRP). The barricades shall be built using FRP posts and approved rails as shown on the CWZTCD List.
- 4. Barricades shall not be placed parallel to traffic unless a minimum adequate clear zone of 30 feet from edge of travel lane is provided.
- 5. A minimum of one 8-foot wide barricade and three OM-4R object markers shall be required for all locations. Barricades shall extend across all travel lanes and shoulders if shoulders are present. Barricades may be extended to the ROW as directed by Engineer.
- 6. Stockpiled materials shall not be placed on traffic side of barricades. 7. OM-4 object markers shall be mounted to the middle rail using two 1/2" through
- bolts with flat washers and lock washers. 8. OM-4 object markers shall be constructed of 0.063 aluminum and shall meet the color and reflective requirements of DMS-8300 Type C and DMS-8600.
- 9. Plastic drums shall meet the requirements as listed on the CWZTCD list or the BC Standards. Plastic drums may be anchored with adhesive to prevent movement.
- 10. All signs and chevrons shall be installed with hardware and support at the minimum mounting height in accordance with the SMD and BC Standards. Signs shall be mounted at a 7 foot minimum height. Signs shall not be attached to barricades.
- 11. Motorists should be able to see at least three chevron signs as they approach the curve and as they drive through the curve from either direction.
- 12. Delineation devices such as the chevron or large arrow signs shall only be placed on the outside portion of a curve.

#### GENERAL NOTE FOR SIGNS:

- 1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" (TMUTCD), latest edition, and any approved changes thereto.
- 2. Lateral spacing of text shall provide a balanced appearance.
- 3. All materials shall conform to Departmental Material Specifications. 4. Legend shall be black and applied by screening process, cut-out vinyl nonreflective sheeting or combination thereof.
- 5. Sign blanks shall be any material that meets the DMS requirements for permenant sian substrates.



STANDARD PLANS Texas Department of Transportation Traffic Operations Division

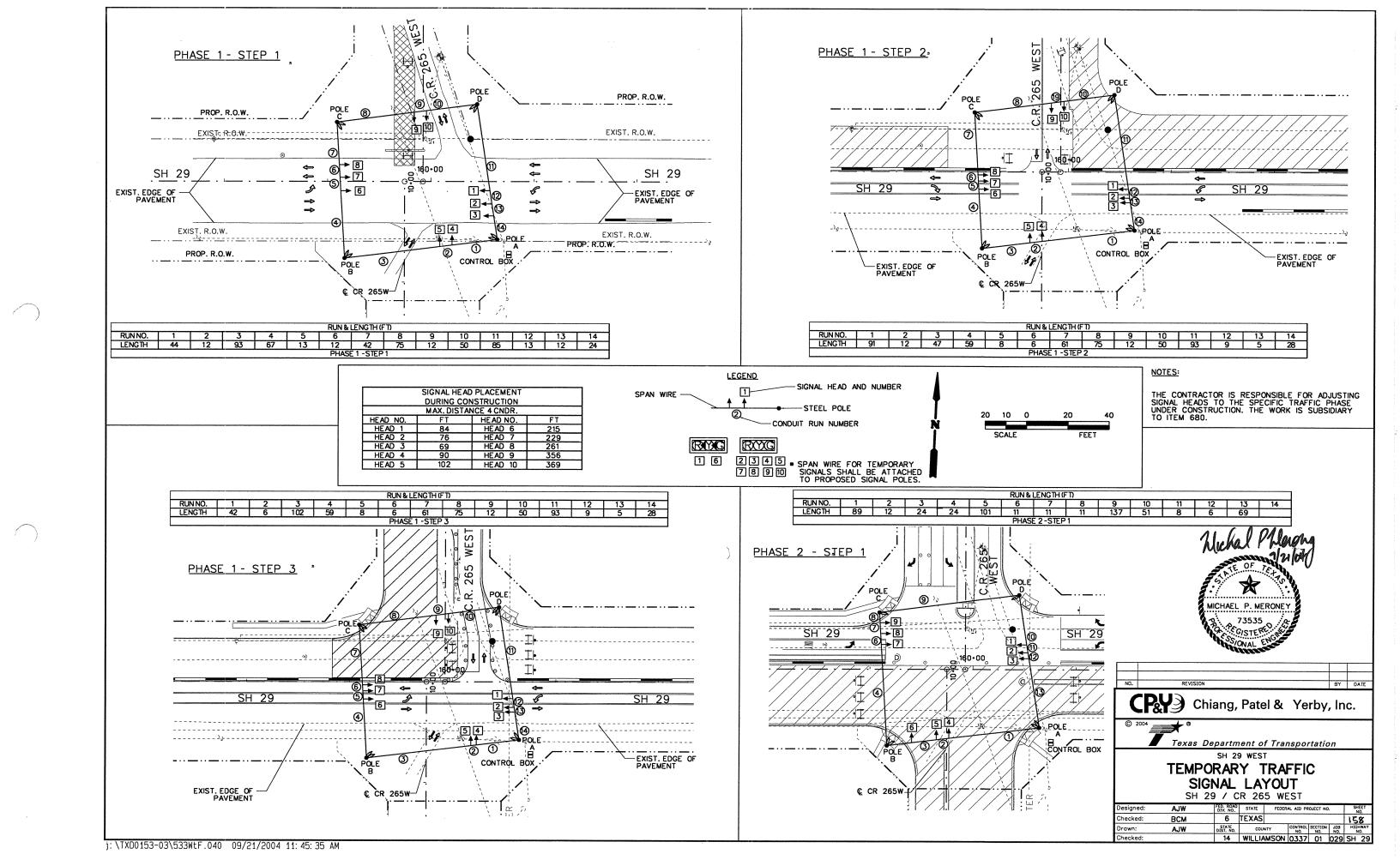
WORK ZONE DEAD END

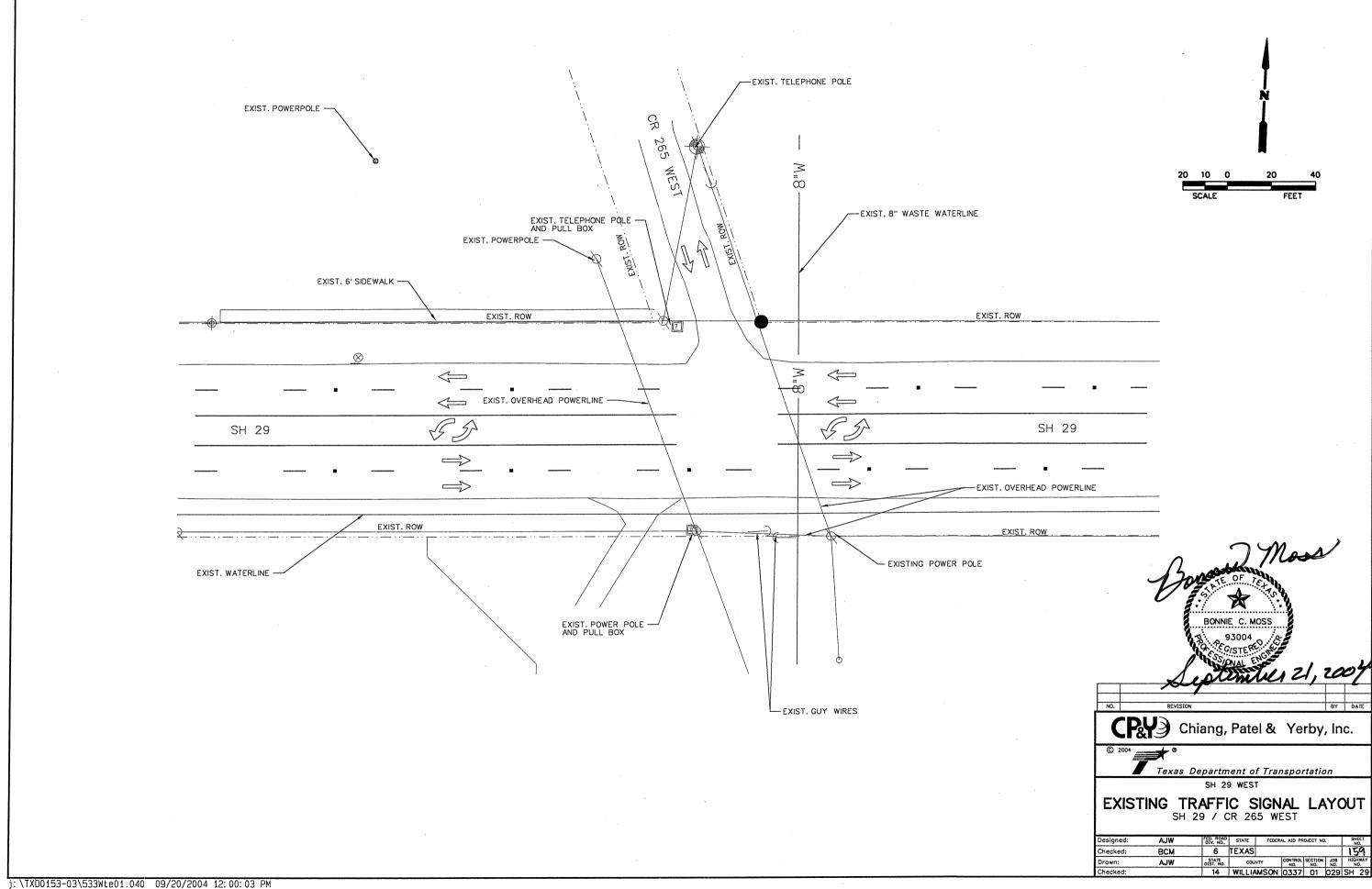
ROADWAY DETAILS

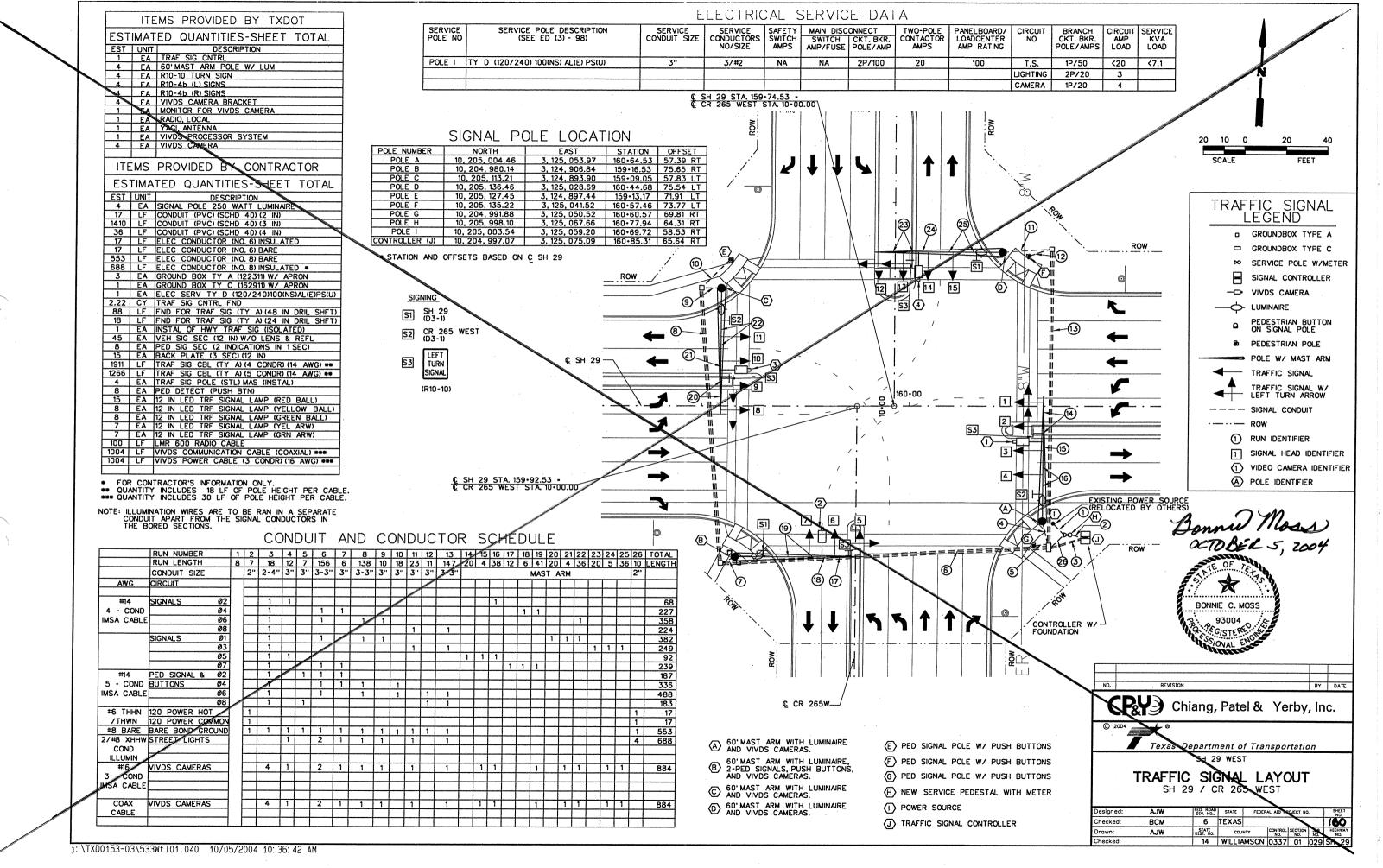
WZ (DERD) -03

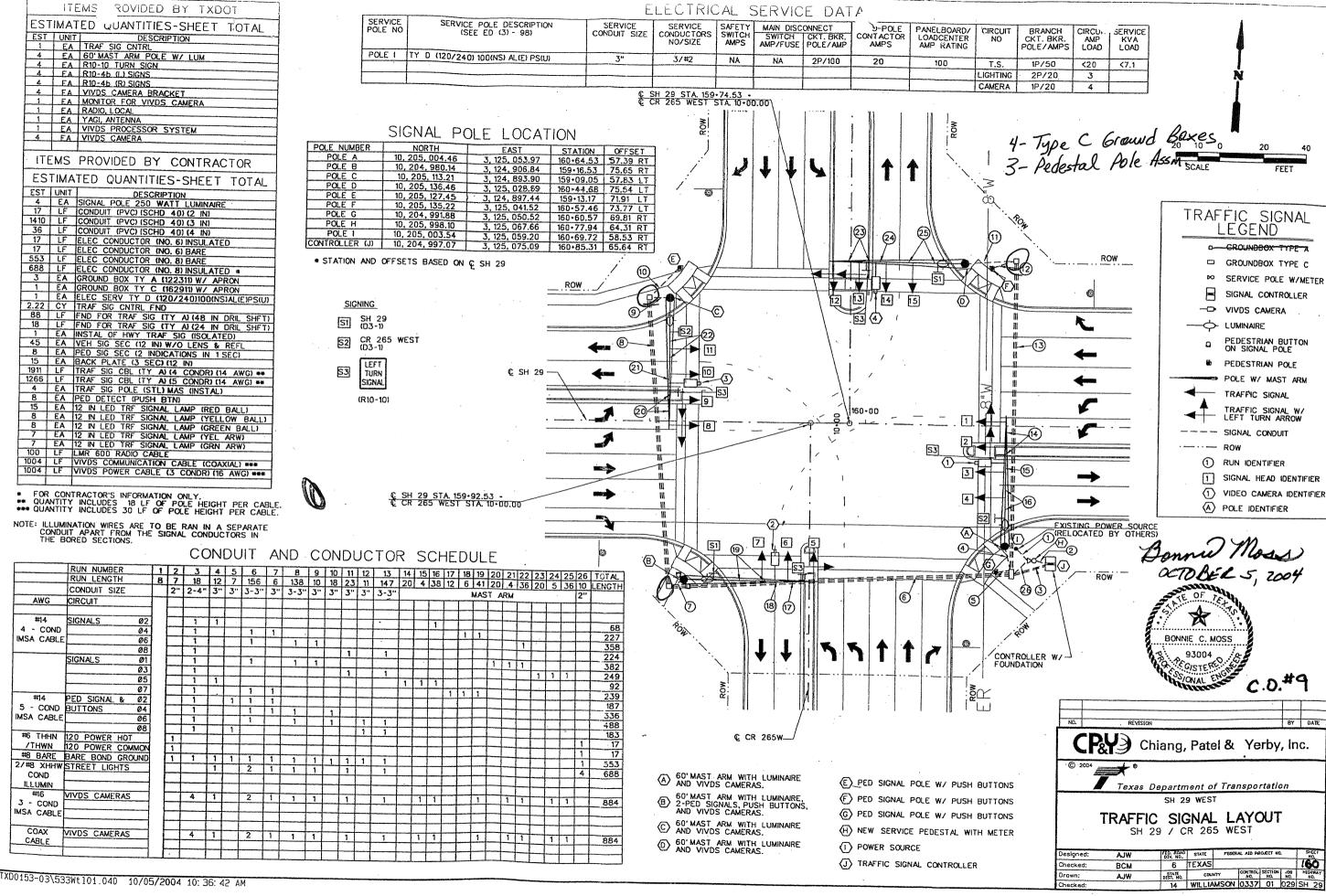
| TxDOT | August            | 1995              | DN: - LR/MT | ck: - GRB           | DH:     | - FDN | ck: - CA | L    |  |
|-------|-------------------|-------------------|-------------|---------------------|---------|-------|----------|------|--|
| 1-97  | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDE        | FEDERAL AID PROJECT |         |       |          |      |  |
| 2-98  | AUS               | 6                 | CC          | 157 A               |         |       |          |      |  |
| 4-98  |                   | cou               | NTY         | CONTROL             | SECTION | J08   | HIG      | HWAY |  |
| 3-03  |                   | WILL              | IAMSON      | 0337                | 01      | 029   | SH       | 29   |  |

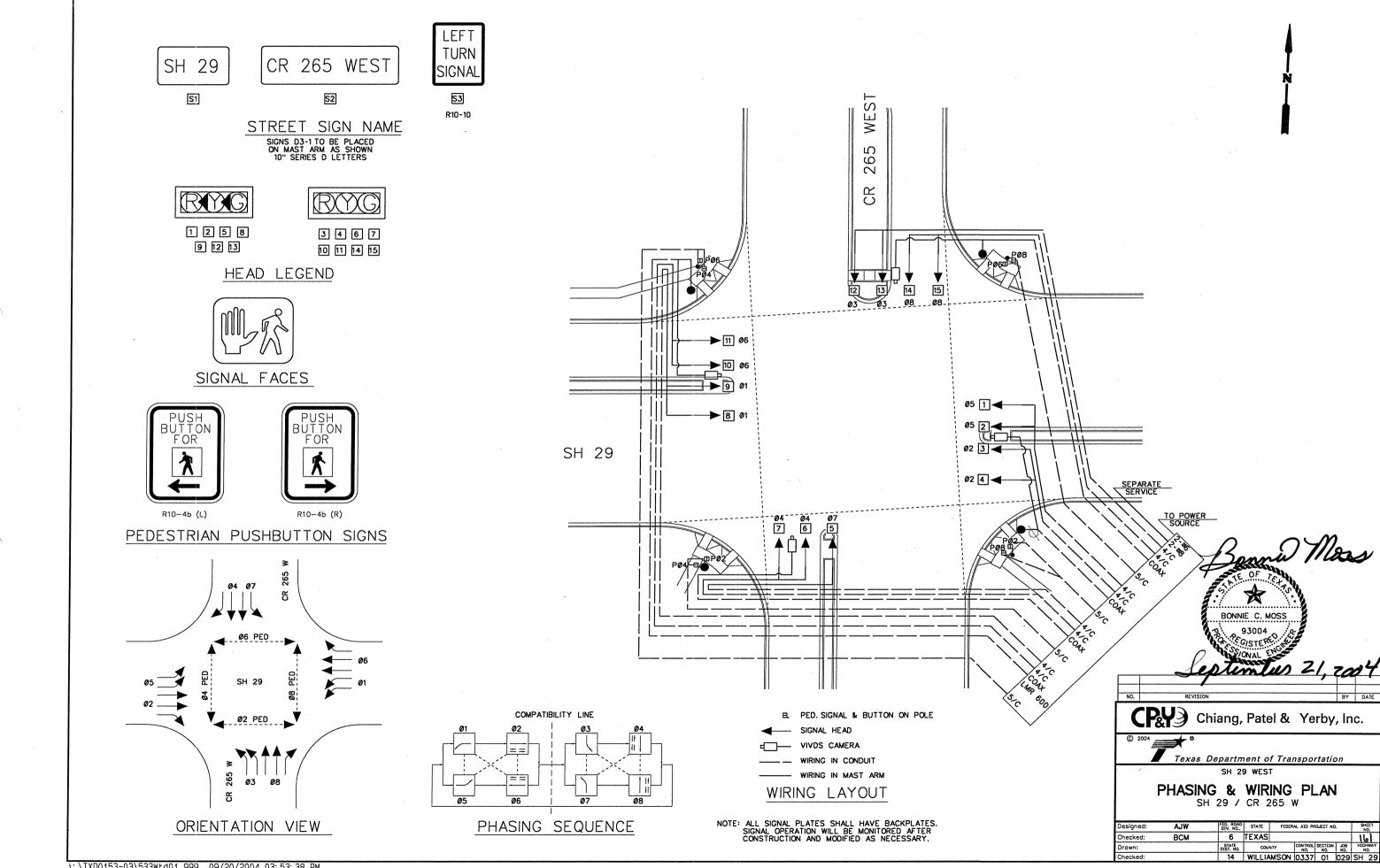
SW14-1T - Black Letters Border - Black 36" X 36" Background - Yellow Refl.

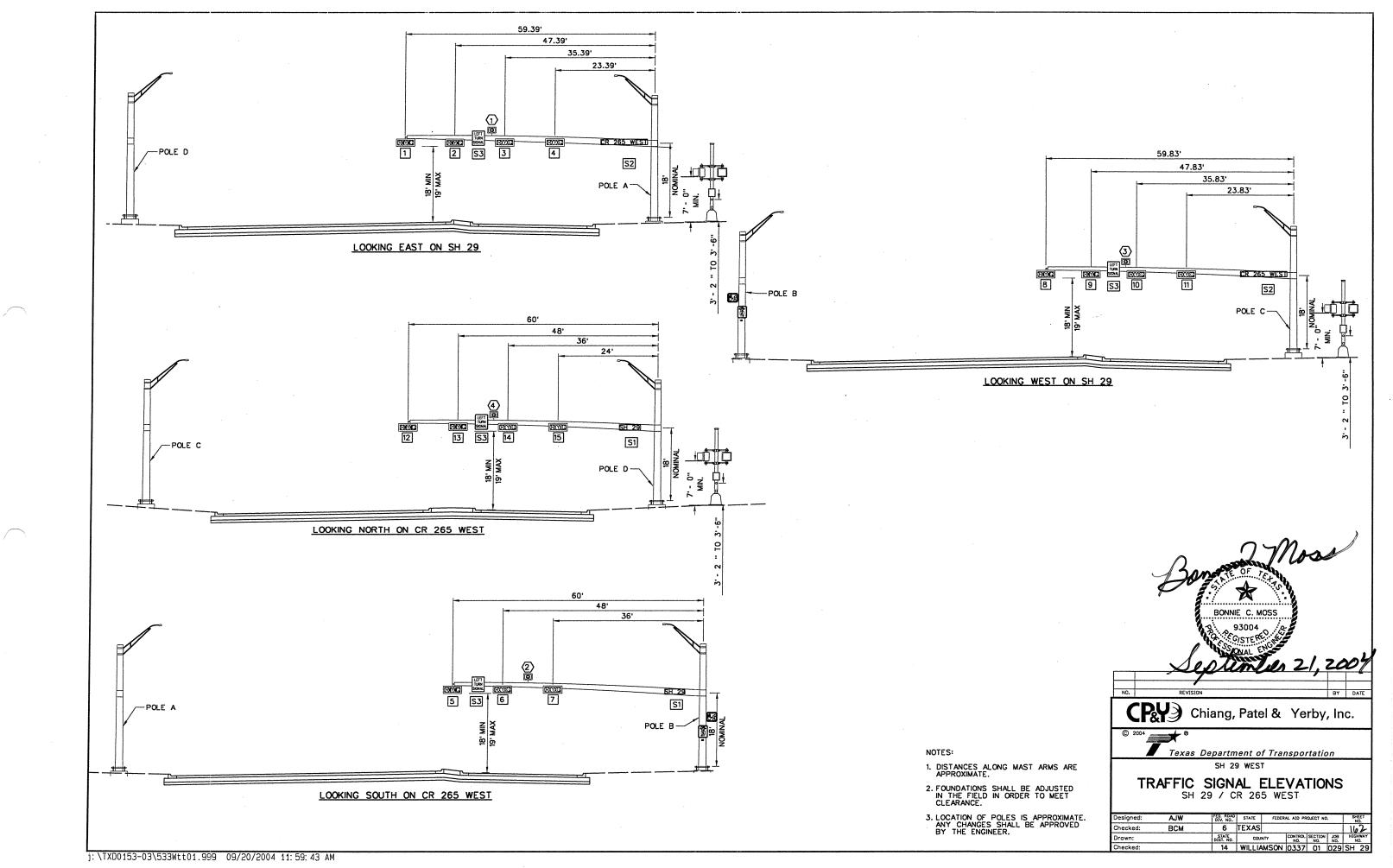


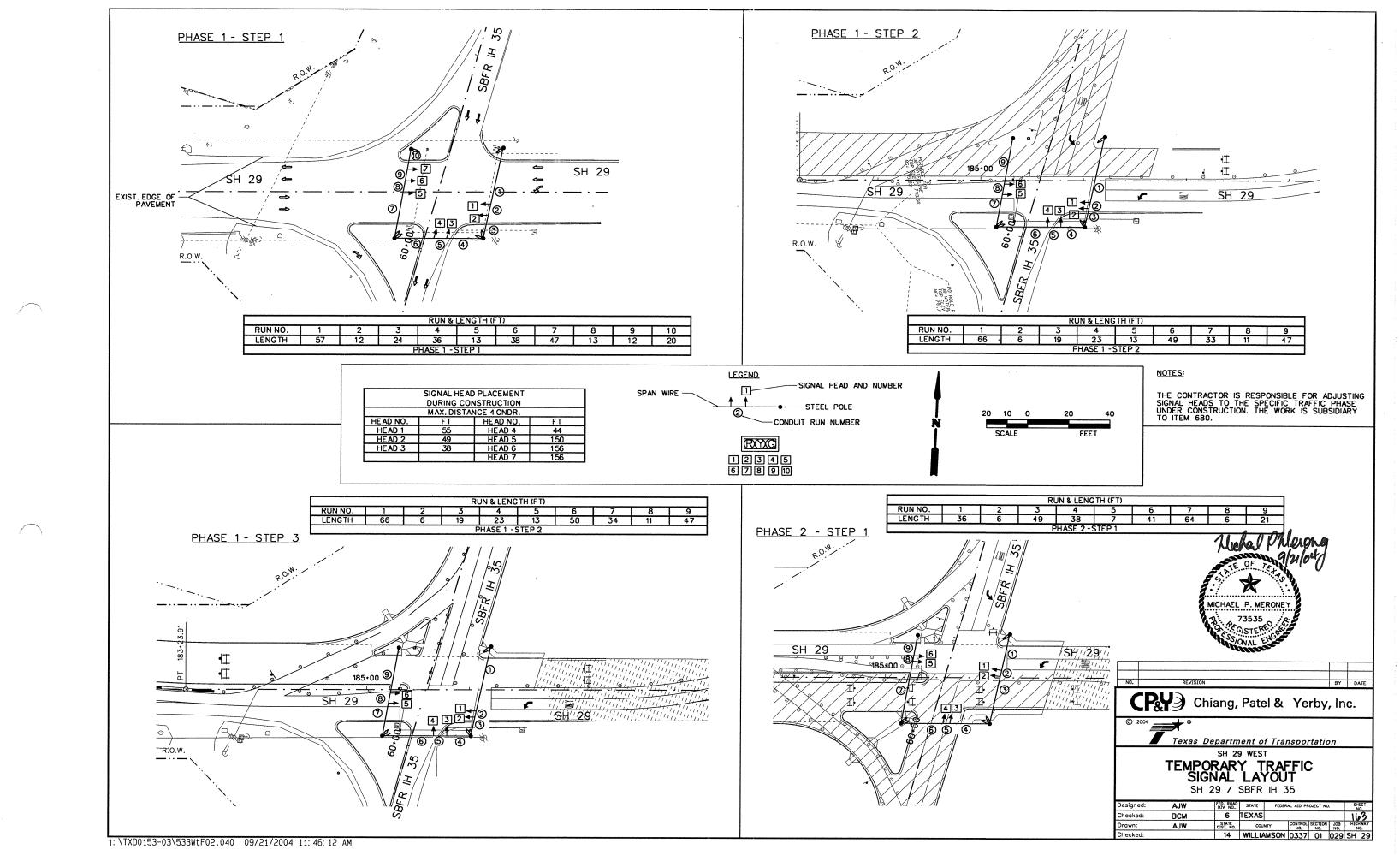


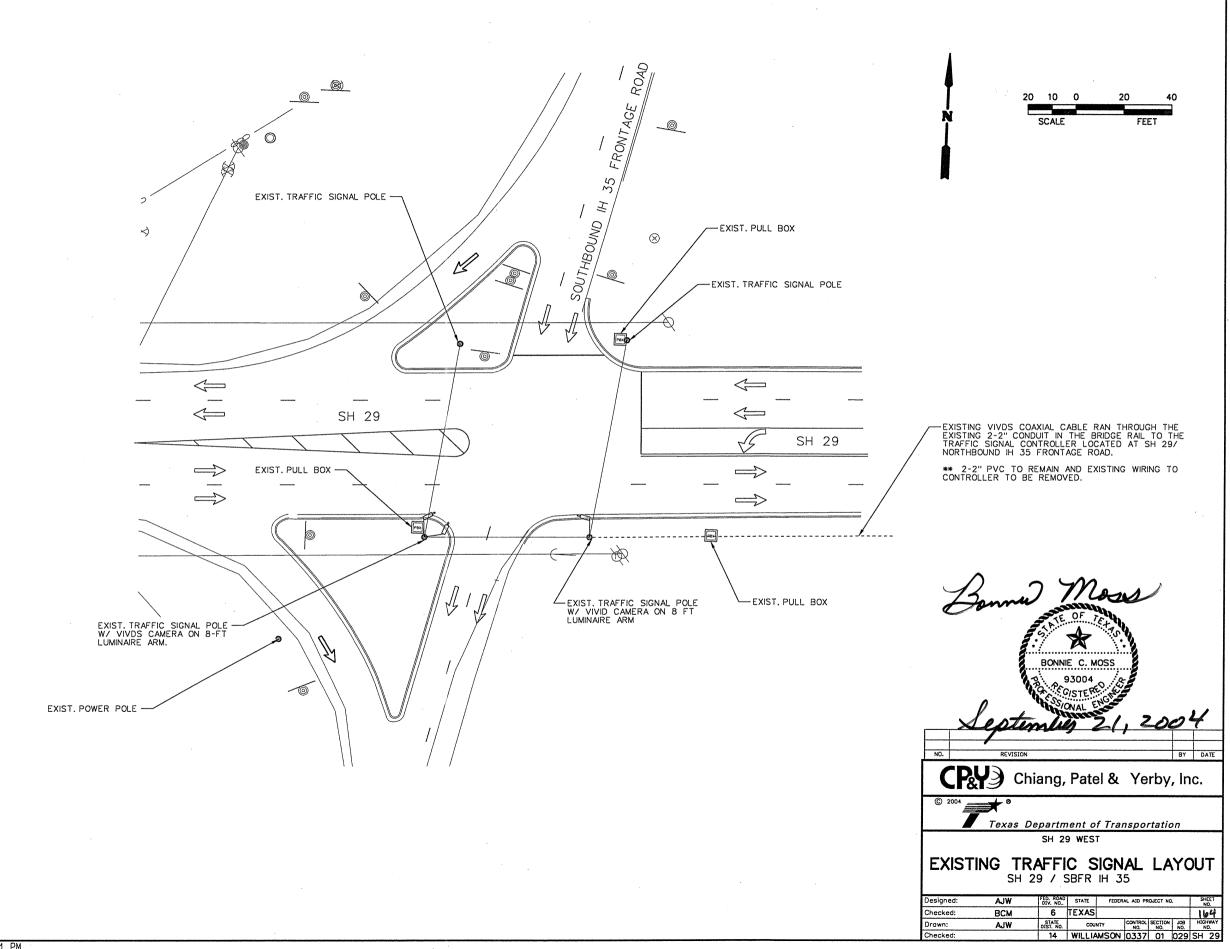




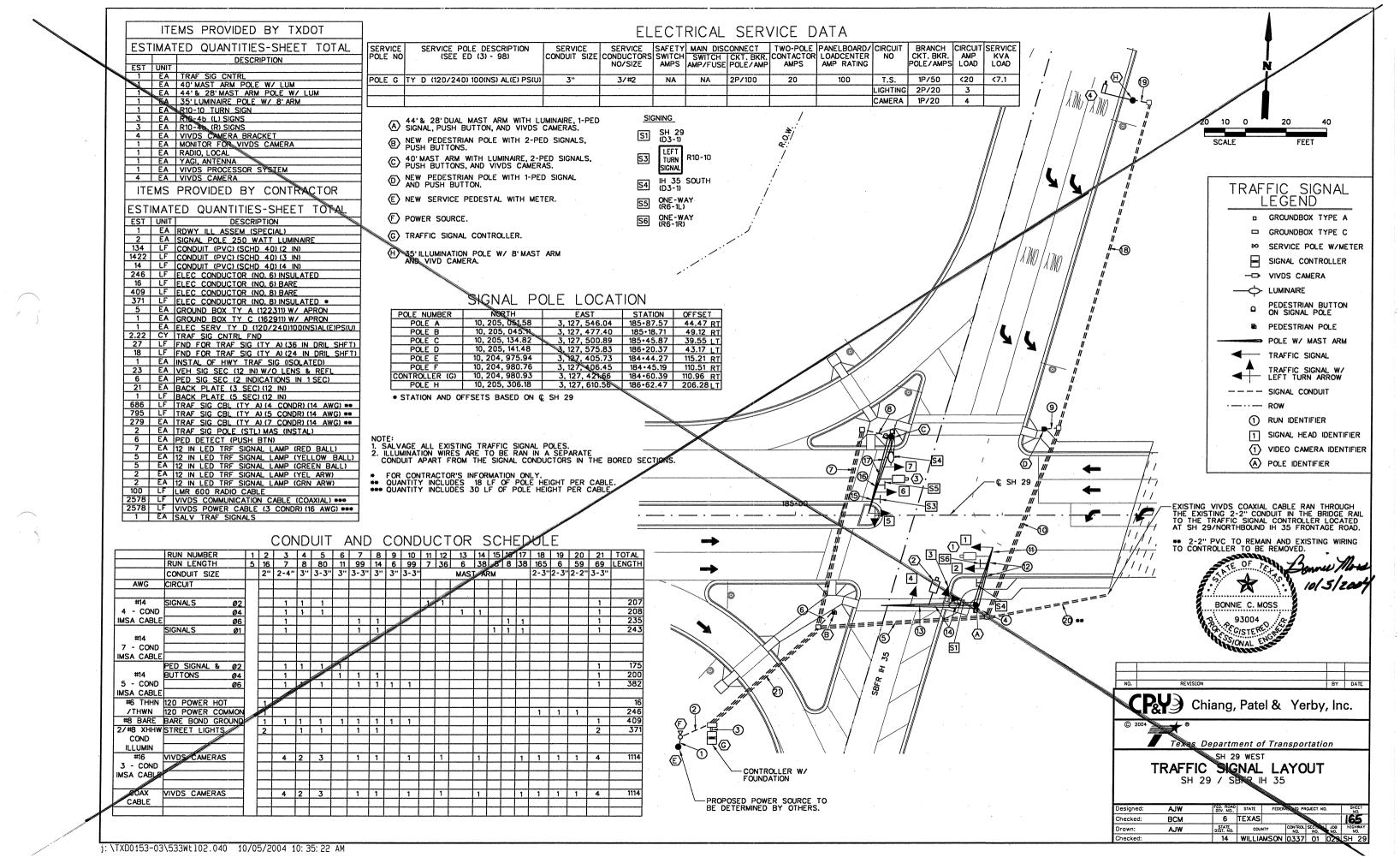


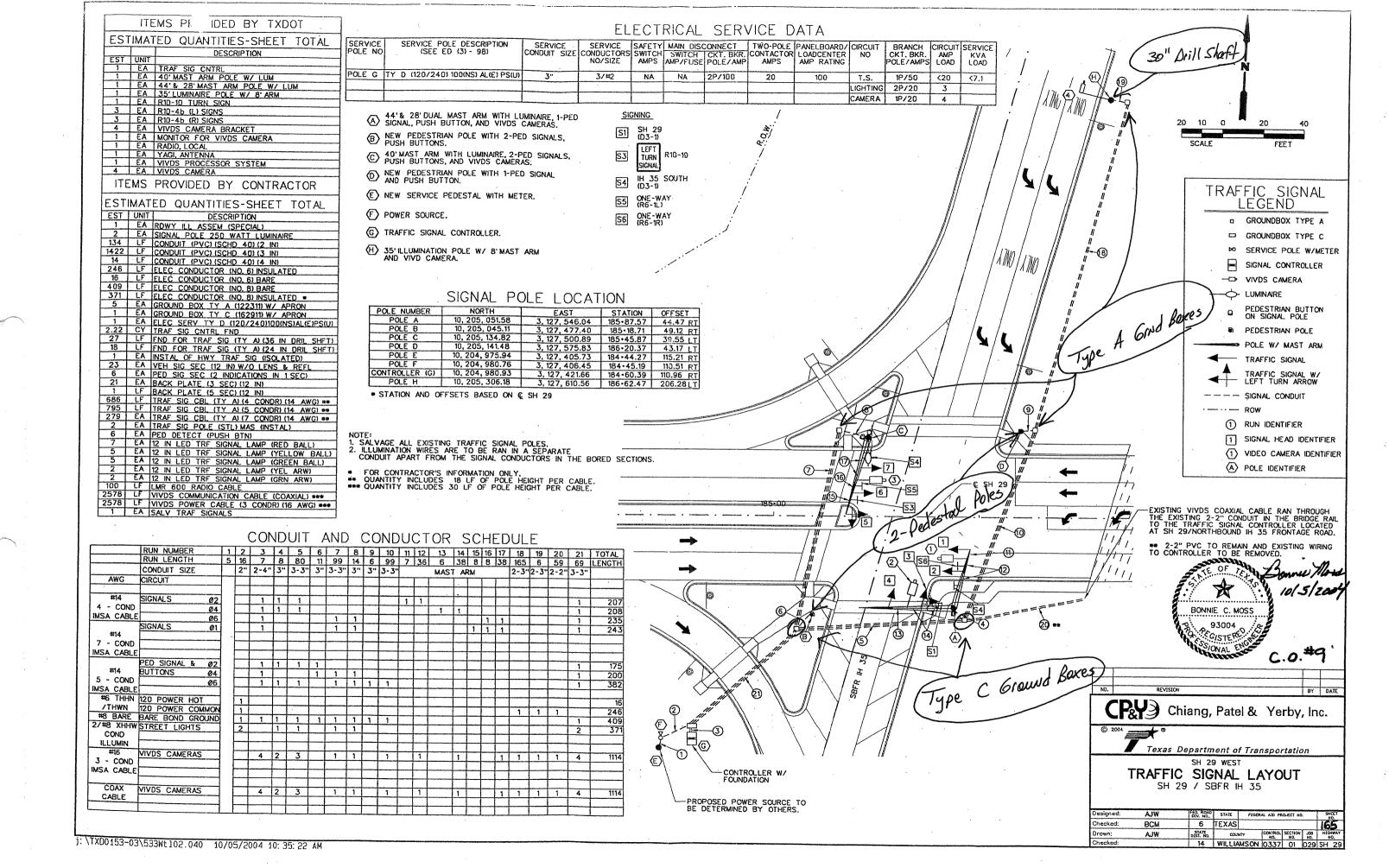


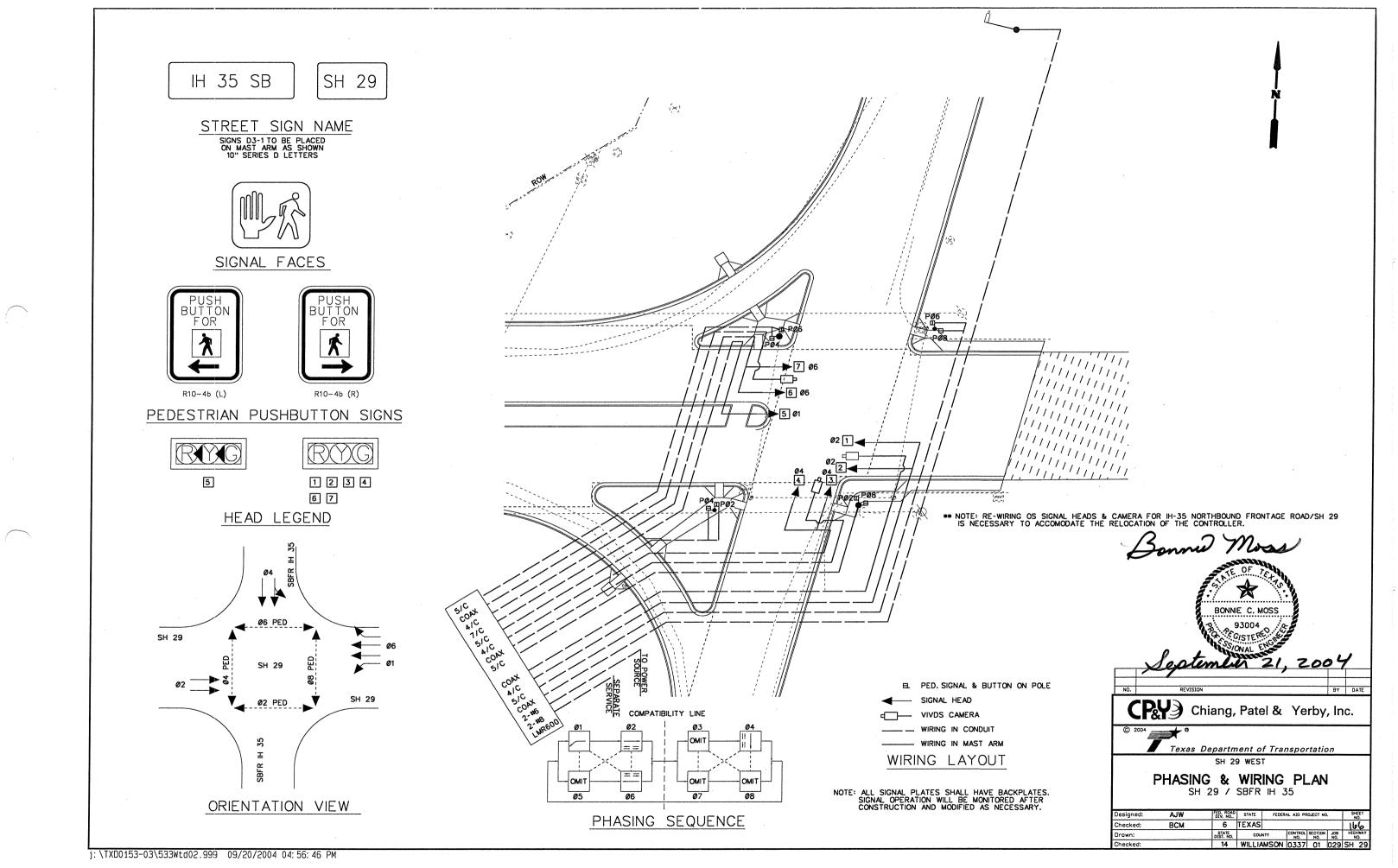


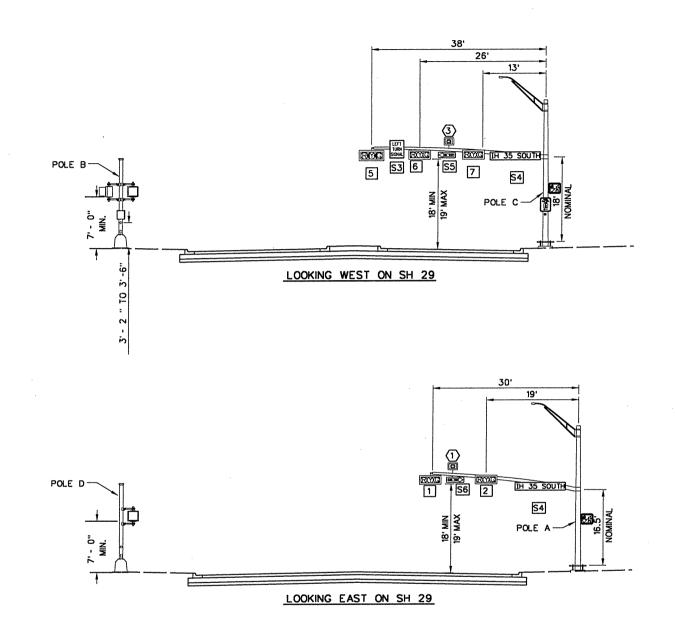


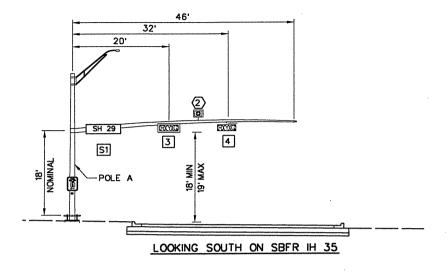
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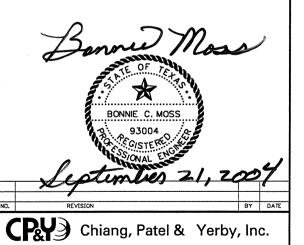




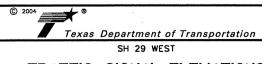


### NOTES:

- LOCATION OF POLES IS APPROXIMATE. ANY CHANGES SHALL BE APPROVED BY THE ENGINEER.

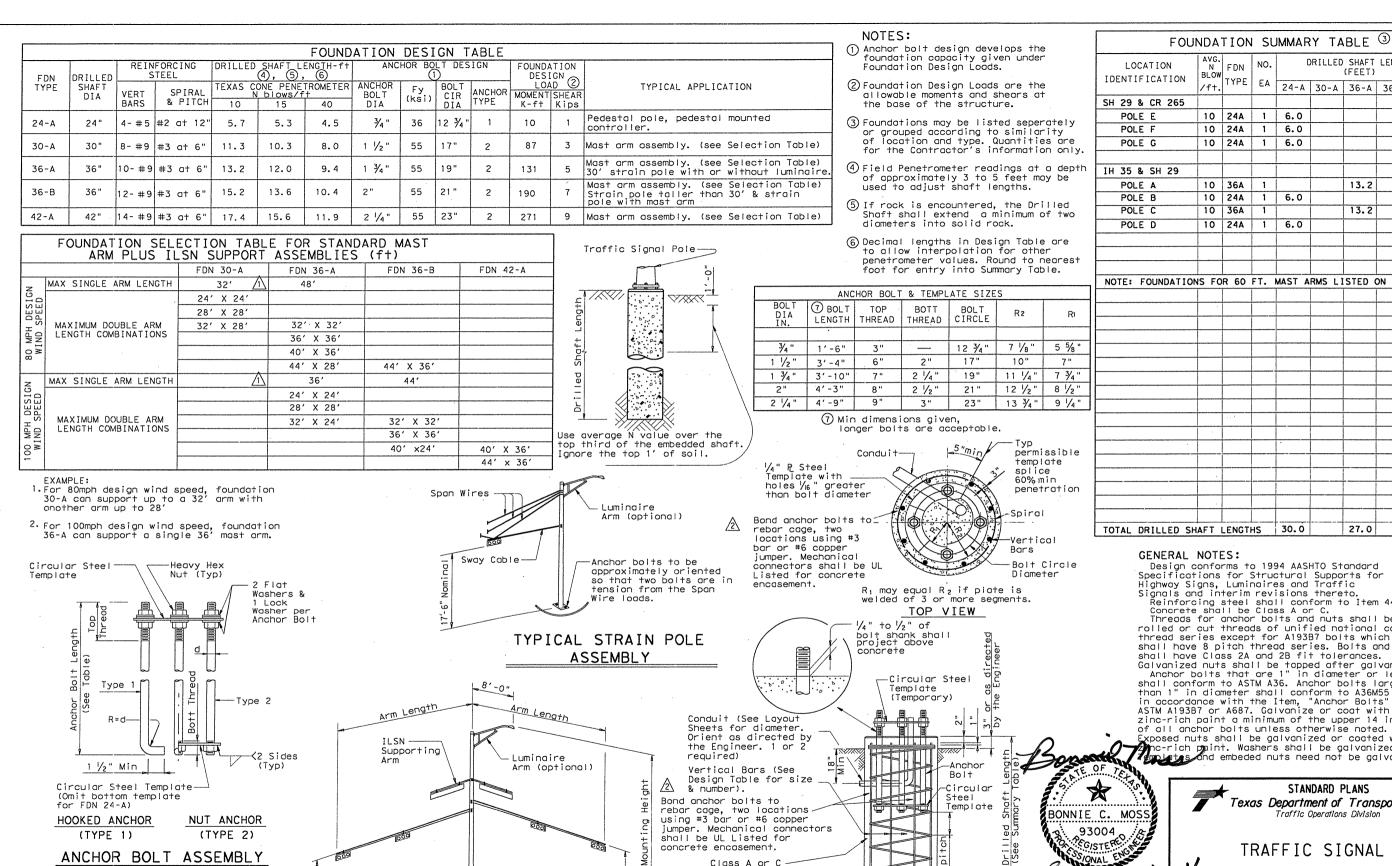


- DISTANCES ALONG MAST ARMS ARE APPROXIMATE.
- 2. FOUNDATIONS SHALL BE ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCE.



TRAFFIC SIGNAL ELEVATIONS
SH 29 / SBFR IH 35

| signed: | AJW | DIV. NO            | STATE  | FEDER | AL AID PR      | OJECT NO       | ).         |    | EET<br>IO.     |
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| ecked:  |     | 14                 | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29             |



AVG. N FDN DRILLED SHAFT LENGTH 6 (FEET) RI OW TYPE | EA | 24-A 30-A 36-A 36-B 42-A 10 24A 1 6.0 10 24A 1 6.0 10 24A 1 6.0 10 36A 1 13.2 10 24A 1 6.0 10 | 36A | 1 | 13.2 10 24A 1 6.0 NOTE: FOUNDATIONS FOR 60 FT. MAST ARMS LISTED ON LMA(4)-01 TOTAL DRILLED SHAFT LENGTHS | 30.0 27.0

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440. Concrete shall be Class A or C.

Threads for anchor bolts and nuts shall be rolled or cut threads of unified national coarse thread series except for A193B7 bolts which shall have 8 pitch thread series. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Anchor bolts larger than 1" in diameter shall conform to A36M55 in accordance with the Item, "Anchor Bolts" or ASTM A193B7 or A687. Galvanize or coat with zinc-rich paint a minimum of the upper 14 inches of all anchor bolts unless otherwise noted. xposed nuts shall be galvanized or coated with

Anc-rich point. Washers shall be galvanized.

STANDARD PLANS Texas Department of Transportation

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-99

C) TxDOT August 1995 M:-MS ck: - JSY REVISIONS STATE FEDERAL DISTRICT REGION SHEET 5-96 12 6 168 CONTROL SECTION JOB WILLIAMSON 0337 01 029 SH 29

INSTALLATION PROCEDURE:

Threads of anchor bolts shall be coated with pipe joint compound prior to installation of upper nuts when erecting pole. After pole is plumbed and in permanent

alignment, the exposed threads of painted bolts shall be cleaned and an additional coating of zinc-rich paint applied to seal the bolt thread-nut joint.

TYPICAL MAST ARM **ASSEMBLY** 

Class A or Concrete Spiral, 3 flat turns top & 1 flat turn bottom. (See Design Table for size & pitch) Vertical bars may rest on bottom of drilled hole if material is firm enough ELEVATION

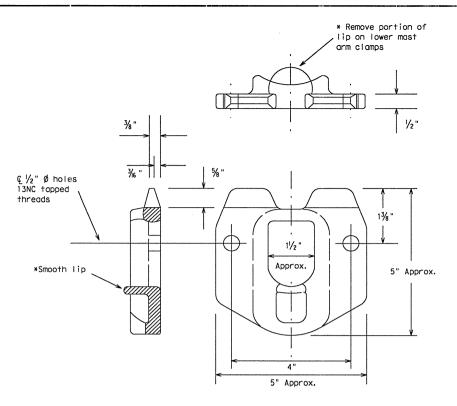
to do so when

Changed to Facilitate new 1 terminal strip enclosure

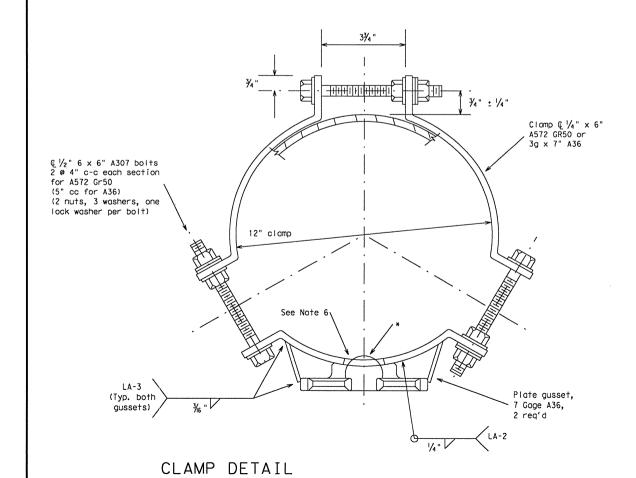
Drilled Shaft Dia

FOUNDATION DETAILS

Changed from ground rod to UFER around



POLE SIMPLEX DETAILS

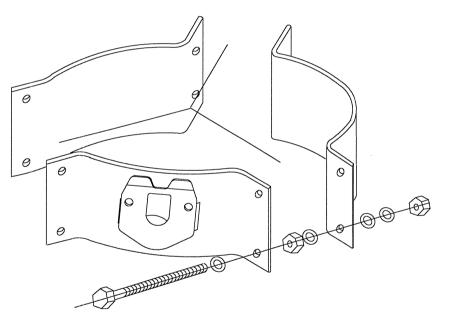


### OTHER MATERIALS:

- 1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and elongation in 2 inches of 22 percent.
- 2. A36M50 steel may be used in lieu of ASTM A572 CR50.
- 3. Welded tabs and backplates shall be ASTM A-36 steel or better.
- 4. Nylon insert locknuts shall conform to ASTM A563.

### GENERAL NOTES:

- 1. Materials and fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
- 2. All parts shall be galvanized after fabrication in accordance with ASTM 153 or 123. The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
- 3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts,  $\frac{1}{2}$  in. X  $\frac{1}{2}$  in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
- Design conforms to 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 75 lb. Luminaire having an effective projected area (actual area times drog coefficient) of 1.4 sq.ft.,12 ft. maximum arm length.
- 5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
- 6. Approximately 2 in. diameter hale in upper mast arm clamp.



**PROJECTION** 

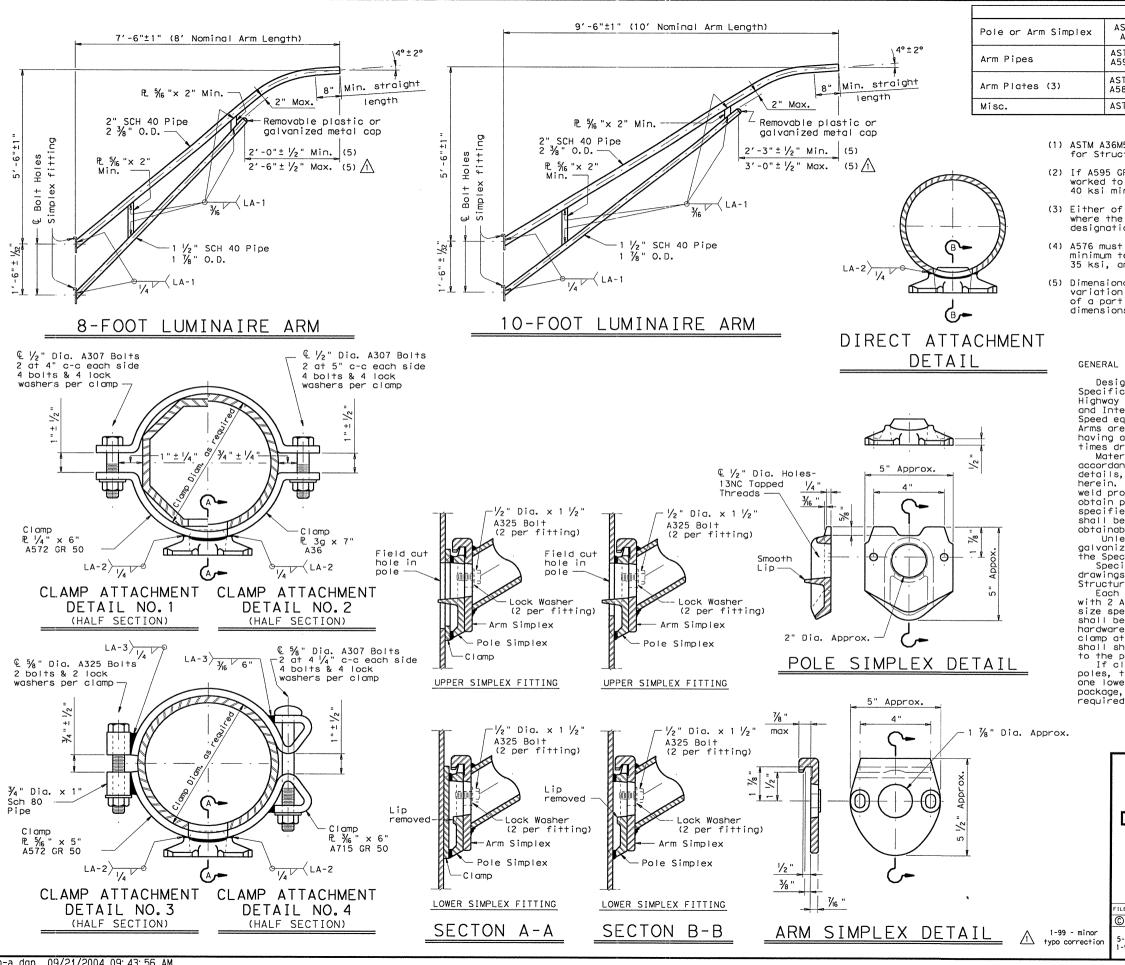
For 8.9 - 12 inch diameter Signal Poles (Two reg'd for each mast arm)



### CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-99

| TxDO         | Г      |                   | DN: - KAB   | cx: - RES         | DW: | - FDN   | cx: - CAL |
|--------------|--------|-------------------|-------------|-------------------|-----|---------|-----------|
| SIONS<br>-99 | STATE  | FEDERAL<br>REGION | FE          | DERAL AID PROJECT |     |         | SHEET     |
| - 33         | AUS    | 6                 | CC 337-1-29 |                   |     |         | 1.69      |
|              | COUNTY |                   | CONTROL     | SECTION           | J08 | HEGHWAY |           |
|              |        | WILL              | IAMSON      | 0337              | 01  | 029     | SH 29     |



- MATERIALS ASTM A27 GR 65-35 or A148 GR 80-50 or A576 GR 1021 (4) or A36 (Arm only) ASTM A53 GR A or B or A500 GR B or A501 or A595 (2) or A715 GR 50 ASTM A36 or A572 GR50 (1) or A595 GR A or ASTM designations as noted
  - (1) ASTM A36M50 steel as described in Item 442 "Metal for Structures" may be used in lieu of A 572 GR 50.
  - (2) If A595 GR A material is used, arm need not be cold worked to A595 requirements, but material must have 40 ksi minimum yield prior to fabrication.
  - (3) Either of the materials listed for pates may be used where the drawings do not specify a particular ASTM designation.
  - (4) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
  - (5) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor.

Arms are designed to support a 75 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.5 sq. ft.

Materials and fabrication shall be in accordance with the Specificatons and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice. Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with

the Specifications. Special designs require submission of shop drawings in accordance with the item "Steel

Structures".

Each pole simplex fitting shall be supplied with 2 A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans. If clamp assemblies are ordered without

poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



ARM DETAILS

LUM-A-99

DN: LEH CK: JSY DW: LTT CK: TEB STD: lum-a.dan © TxDOT August 1995 DIST FED REG FEDERAL AID PROJECT . CC 337-1-29 AUS 6 170 CONTROL SECT JOB HIGHW WILLIAMSON 0337 01 029 SH

#### GENERAL NOTES:

Details herein apply to roadway lighting installations bid under the following Specification Items: Roadway Illumination Assemblies, Relocate Roadway Illumination Assemblies, Foundations for Signs, Traffic Signals and Roadway Illumination Assemblies, and Special Specifications relating to roadway lighting. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Material and installation shall comply with the applicable provisions of the National Electrical Code, National Electrical Manufacturers Association and, when required, Underwriters Laboratories standards. Where manufacturer's provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the State such warranties or augrantees

The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Erection and/or removal of poles and luminaires located near overhead electrical lines shall be accomplished using established industry and utility safety practices and in accordance with laws governing such work. The Contractor shall consult with the appropriate utility company prior to beginning such work.

#### II. ROADWAY ILLUMINATION ASSEMBLIES

#### A. General

- 1. Structural Support Design for Luminaires. Lighting standards shall be designed in accordance with the latest issue of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." All poles shall be designed for 80 mph wind loads. An additional 1.3 gust factor shall be applied to the wind loads. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. Manufacturer's shop drawings shall include the ASTM designations for all material to be used. See paragraph II. B. for additional requirements for the transformer base.
- 2. Slip Joint Poles. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint. The longitudinal seam weld on the outer shaft at the slip joint end shall be a full penetration weld for a minimum of the slip joint length plus 6 inches.
- 3. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with most arm combinations as shown in the plans. All most arms shall be designed for a 55-pound luminaire having an effective projected area of 1.6 square feet.
- 4. Minor Damage Repair. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, or damaged areas on galvanized poles and mast arms shall be thoroughly cleaned by wire brushing. The cleaned area shall be painted with two coats of zinc rich paint containing a minimum of 84% metallic zinc.
- 5. Pole Bonding Means. All shoe base poles, including poles on concrete traffic barriers, shall have a grounding lug with 1/2-13 NC female threads inside the pole near the hand hale, minimum of 3 full threads.
- 6. Hand Holes. All shoe base poles shall have hand holes with reinforcing frames and covers. The openings on all poles shall be approximately 4 inches x 10 inches located approximately 10 inches from the bottom of the pole and, except for poles mounted on concrete traffic barrier, shall be placed 90 degrees to most arm unless otherwise noted on the plans. For poles mounted on concrete median barrier, all hand holes shall be on the same side of the median.
- 7. CTB Poles. Poles installed on concrete traffic barrier shall also meet the requirements of CTB details.
- 8. J-Hooks. All poles shall be equipped with a J-hook inside the pole, near the top for supporting vertical conductors.
- 9. Base Plate Bolt Circle. For bolt circles for poles mounted on CTB, see CTBI(4) or SSCB(4). For poles placed on existing bridge brackets or existing foundations, bolt circle shall be coordinated with anchor bolts in place. For other bolt circles, See RID(6).

### 10. Steel Poles.

- a. Steel poles shall be fabricated in accordance with the Item "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration, except that weld shall be full penetration within 6 inches of circumferential base plate welds. All welding shall be in accordance with the ANSI/AWS Structural Code D1.1. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Unless otherwise shown on the plans, poles and hardware shall be galvanized in accordance with Item 445, "Galvanizing".
- b. Pole components shall be constructed using the following materials: Shaft: ASTM A-572 Grade 50 or ASTM A-595 Grade A (50 KSI min. yield) or ASTM A36M50. Base Plate: ASTM A-27 Grade 65-35 or ASTM A-36.

Mast Arm Connector: ASTM A-27 Grade 65-35.

Mast Arms: Steel pipe ASTM A-53 Grade A or B or ASTM A-501 with 20% elongation in 2 inches or A-513 TY I with minimum 30 KSI yield and 15% elongation in 2 inches.

Pole Cap: Pole cap shall be zinc die-cast, aluminum, or galvanized metal, secured by three stainless steel or

Pole Hardware: All bolts except most arm connection bolts shall be stainless steel or standard steel galvanized ASTM A-153 Class C or D, or B-695 Class 50. Mast arm connection bolts shall be ASTM A-325, ASTM A-321 or ASTM A-193 Grade B-7, galvanized as above. Nuts and washers shall be compatible with the bolts and shall be stainless steel or steel, galvanized as above. Lock washers shall be provided on all bolted connections.

#### 11. Aluminum Poles.

- a. Aluminum poles shall be fabricated in accordance with "Structural Welding, Aluminum" ANSI/AWS D1.2.
- b. Pole components shall be constructed using the following material:

Shaft: ASTM B-221 or B-241 Alloy 6063-T6, ASTM B-209 Alloy 5086-H34, ASTM B-221 Alloy 6005-T5. Base Flange: ASTM B-26 Alloy 356.0-T6 or ASTM B-108 Alloy A356.0-T6 (Structural strength test required). Most Arm Fitting: ASTM B-209 Alloy 6061-T6 or ASTM B-221 Alloy 6005-T5.

Mast Arms: ASTM B-241 Alloy 6061-T6 or Alloy 6063-T6.

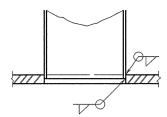
Pole Cap: ASTM B-209 Alloy 5086-H32 or ASTM B-108 or B-26 Alloy 356.0-T6.

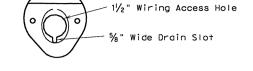
Bolts: Stainless Steel AISI 300. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

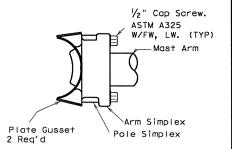
- 12. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
- 13. Installation of high strength bolts. The tightening of nuts on high strength bolts shall be in accordance with the Item 447 "Structural Bolting."
- 14. Roadway Illumination Assembly poles shall be erected plumb and true. Top of foundation shall be struck level so the pole will be plumb. Shoe base poles may use leveling nuts to plumb pole. Shims and leveling nuts shall not be used under transformer bases. Grout shall not be placed between base plate or flange and the foundation.
- 15. In each pole, continuous color-coded stranded No. 12 AWG copper Type XHHW or other approved XLP conductors shall be connected to the line side of each ballast.
- 16. Acorn nuts will not be allowed for attaching pole to transformer base or foundation. Nut covers will not be allowed.
- 17. Fabrication tolerances shall be as shown on Fabrication Tolerances Table.

#### B. Transformer Base

1. Transformer base shall be cast from aluminum, ASTM B-108 or B-26 Alloy 356.0-T6, or other material approved by the Engineer, and shall be furnished with eight 1/2 inch thick flat washers as recommended by the manufacturer. Transformer base bolt circles (Top and Bottom) shall match bolt circles for poles and foundations shown on RID (6).







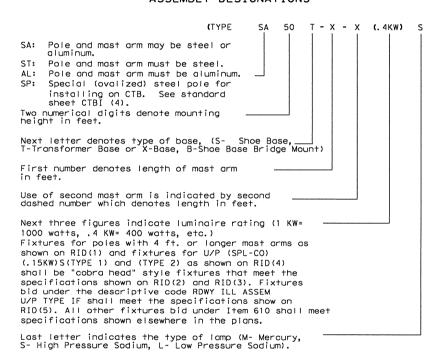
MAST ARM TO POLE SHAFT CONNECTION

# SECTION POLE SHAFT TO BASE PLATE

## MAST ARM CONNECTOR

Steel Poles Only Aluminum Pole Connector Shall Be Clamp-on Type

### EXPLANATION OF ROADWAY ILLUMINATON ASSEMBLY DESIGNATIONS



 $X \times 2.5$  for poles with 4' mast arms.

MH = Mounting Height

= Shaft Length = Spread (Mast arm length) = SL + 5' + (T-Base dimension) = SL + 5' (Shoe Base)

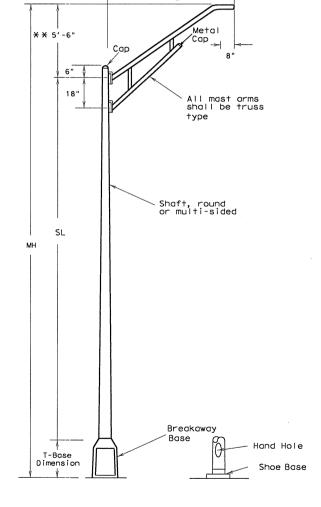


### STANDARD PLANS Texas Department of Transportation Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

RID(1)-04

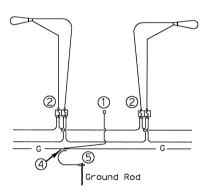
1/04 Revision Modify fixture specifications C) TxDOT January 1992 DN:- KB ck: - KB ow: - FDN STATE FEDERAL DISTRICT REGION FEDERAL AID PROJEC SHEET 5-93 AUS 6 CC 337-1-29 171 CONTROL SECTION JOB WILLIAMSON 0337 01 029 SH 29

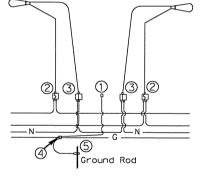


### ROADWAY ILLUMINATION ASSEMBLY

- 2. Transformer base shall be approximately 15-20 inches high and shall have a door approximately 13 inches x 8 inches x 9 1/4 inches or as otherwise approved by the Engineer. Screw or bolts for attachment of door to base shall be stainless steel. Four machine bolts with four nuts, eight 1/2 inch flat washers and four lock washer, galvanized ASTM A-153 Class C or D, or B-695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A-563 grade DH galvanized. A 1/2-13 NC female threaded grounding lug shall be provided inside the transformer base near the bottom.
- 3. The X-base shall be made from extruded aluminum channel and aluminum plate. The base breakaway features shall rely on bolt shear and not on bolt torque. Bolt shall have torque controlled break-off hex-head. Bolt shall be Aluminum Association type 2024-T4 aluminum. X-base channel shall be connected with aluminum bolts. Bolt shall be left hand thread and shall not be interchangeable with any other bolt not designed specifically for use with the X-base.
- 4. All breakaway bases shall meet the breakaway requirements of the AASTHO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," latest edition, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to meet or exceed the full designed plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with shop drawings. Shop drawings shall show breakaway base model number and manufacturer's name or load.
- 5. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
- 6. Doors for transformer bases shall be made of plastic, fiberglass or other non-aluminum material approved by the Engineer. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.
- C. Cobra Head Style Fixtures.
- 1. Fixture shall be UL listed for wet locations and shall be labeled IEC Standard 60529-IP 65 or better. Fixtures shall have UL label on the inside near the ballast. Fixture shall have a permanent label inside the fixture indicating the date of manufacture of the fixture. Fixture shall have wattage label per ANSI 136.15.
- 2. Fixture housing, lens frame, and door (if any) shall be die cast aluminum. Aluminum for housing shall be 96% copper free. Fixture mounting means shall be to a two inch pipe arm. Fixture shall be equipped with a four bolt clamp capable of being adjusted plus or minus five degrees from level. Fixture shall meet 3G peak to peak vibration test per ANSI 136.31. Fixture shall meet IESNA cutoff requirements.
- 3. Fixture shall have a level bubble attached to the housing. Level bubble shall be clearly visible from the ground (up to 50 ft mounting heights). Level bubble shall be sensitive to one degree (max) changes in position at any point within five degrees (min) of the level position. Photometric testing will be done with the fixture in the level position as indicated by level bubble. Fixture shall be installed in the level position.
- 4. EPA shall not exceed 1.6 square feet.
- 5. Fixture shall be equipped with a three prong photocell receptacle with shorting cap installed.
- 6. For fixtures to be installed on galvanized poles, the fixture housing shall be painted light gray. All other fixtures shall be painted to match poles or as approved by the Engineer.
- 7. Paint for fixtures shall be a thermoset powder coat system. Paint system must meet 1000 hour salt spray test per ASTM B117. Paint thickness shall be a nominal thickness of 2.5 mil and shall exhibit no pigment loss upon 50 double-rubs using Methyl Ethyl Ketone (MEK) solvent per ASTM 05402, Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs.
- 8. All hardware, brackets, nuts, bolts, washers, ballast tray, and parts shall be made of Type 316 stainless steel, except
- a. Hardware, brackets, and ballast tray may be made out of aluminum, of adequate thickness as approved by the Engineer. b. 4 bolts, 4 flat washers, 4 lock washers, and clamp that attach the luminaire to the arm shall be galvanized to ASTM 123 or 153.
- c. All stainless steel nuts shall have nylon throat locking means.
- d. Glass lens retainer spring clips may be galvanized steel in accordance with ASTM A153.
- 9. Lamps socket shall meet the following requirements.
- a. Socket shall be porcelain insulated.
- b. Socket shall have a nickel plated copper alloy screw shell,
- c. Socket shall be equipped with a spring tensioned contact.
- Contact shall be nickel plated copper alloy or stainless steel. Spring shall be nickel plated copper alloy or stainless steel.
- d. Screws holding screw shell into socket, if any, shall be nickel plated copper alloy or stainless steel.
- e. Socket electrical ratings shall meet or exceed the following
  - 600 Volt
- 1500 Watt
- iii. 5000 Volt Pulse
- iv. UL listed per UL 496.
- v. Socket shall be modul base.
- 10. Optical assemblies shall meet the following requirements.
  - a. Reflectors shall be polished aluminum with Alzak or equal coating.
- b. Reflectors shall not have any reflecting surface painted, except that, when approved by the Engineer, some surfaces may be painted with 92% reflective white paint.
- c. Reflectors may be one piece or segmented as follows.
- i. One piece reflectors:
  - 1. One piece reflectors shall be sealed directly to the glass lens forming an airtight envelope. The reflector to glass lens seal shall be closed cell silicone, either seamless or with a vulcanized seam.
- 2. Lamp socket shall be non-adjustable and mounted to the reflector so that lamp center is consistent. Gasket between lamp support bracket and the reflector/lens assembly shall be a one piece seamless silicon gasket.
- ii. Segmented reflectors:
  - 1. Segments shall attach at both ends (or opposite sides if segments are square) of the segment to a rigid aluminum base plate and side wall support assembly. Class lens to lens frame shall be sealed with a one piece seamless silicone gasket or RTV sealant.
- d. Optical assembly shall be equipped with a lamp support in addition to the lamp socket to ensure that the lamp center is positioned as intended.
- 11. Lens shall be clear heat tempered or borosilicate sag or flat glass, minimum 3/16" thick.
- 12. Luminaires for pole mounting shall not be fused. Luminaires for wall or underpass mounting shall be internally fused
- 13. Fixture shall be equipped with a two position terminal block for landing supply wires. Terminal block shall meet the following requirements.
  - a. Insulation shall be porcelain or phenolic material. Phenolic terminal block will be of adequate construction as approved by the Engineer.
  - b. Terminals shall be made of nickel or tin plated brass, or of aluminum.
- 14. Fixture shall be equipped with MOV surge protection in accordance with IEEE recommendations.
  - a. MOV shall be connected from line to neutral or from line to line.
- b. MOV shall be installed on the terminal block.

| Fabrication Tolerances Table           |  |                    |  |  |  |  |
|--|--|--------------------|--|--|--|--|
| <u>Part</u> <u>Dimension</u> Tolerance |  |                    |  |  |  |  |
|  | Shaft length                                 | ± 1"               |  |  |  |  |
|  | I.D. of outside piece of slip fitting pieces | + 1/8 " - 1/16 "   |  |  |  |  |
|  | O.D. of inside piece of slip fitting pieces  | + 1/32 " - 1/8 "   |  |  |  |  |
|  | Shaft diameter: other                        | + 3/16 "           |  |  |  |  |
| Pole Asssembly                         | Out of "round"                               | 1/4 "              |  |  |  |  |
|  | Straightness of shaft                        | ± 1/4 " in 10 ft   |  |  |  |  |
|  | Twist in shaft                               | 4° in 50 ft        |  |  |  |  |
|  | Perpendicular to baseplate                   | 1/8 " in 24"       |  |  |  |  |
|  | Pole centered on baseplate                   | ± 1/4 "            |  |  |  |  |
|  | Location of Attachments                      | ± 1/4 "            |  |  |  |  |
|  | Arm Length                                   | ± 3"               |  |  |  |  |
|  | Arm Rise                                     | ± 1 3/4 " in 10 ft |  |  |  |  |
|  | Arm Diameter                                 | ± 3/16 "           |  |  |  |  |
| Arm Assembly                           | Overall length or width                      | ± 1/4 "            |  |  |  |  |
| AT III AGGGIID TY                      | Thickness                                    | + 1/4 " - 1/16 "   |  |  |  |  |
|  | Deviation from flat                          | 1/8 " in 12"       |  |  |  |  |
|  | Spacing between holes                        | ± 3/32 "           |  |  |  |  |
|  | Anchor bolt hole size                        | ± 1/16 "           |  |  |  |  |
|  | Leng†h                                       | + 1" - 1/4 "       |  |  |  |  |
| Anchor Bolt                            | Threaded length                              | + 1 1/2 " - 1/8 "  |  |  |  |  |
|  | Galvanized length (if required)              | + 8" - 1/4 "       |  |  |  |  |
| Miscellaneous                          | Bolt hole spacing                            | ± 1/16 "           |  |  |  |  |
| wit see it dileous                     | Strut location in truss arms                 | ± 1 1/2 "          |  |  |  |  |





### FOR THREE-WIRE CIRCUIT-CENTER GROUNDED

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR FOR 120/240 VOLT SERVICE.

### FOUR-WIRE CIRCUIT-CENTER GROUNDED

LUMINAIRES SERVED AT 240V (240/480 VOLT SERVICE)

1/04 Revision

Modify fixture specifications

### NOTES:

- Pole Bonding Connector Blackburn TTC3 or Weaver TGC3 or equal.
- Fused Connector-All electrical connectors for breakaway poles shall be watertight and shall be designed as breakaway (Buchannan 65U, Bussmann HEBW, Littelfuse LEB or equal). All fuses shall be time-delay types. 10 Amp (Littelfuse FLQ, Bussman FNQ or equal).
- \* (3) Un-fused Connector-All electrical connections for neutrals shall be watertight. For breakaway poles, connections shall be designed as breakaway, shall have a white color marking, and shall have a permanently installed solid neutral (Buchannan 200. Bussmann HET, Littelfuse LET or equal). Dummy/Neutral fuse shall be Bussman NTS-R-3 or equal.
- Split Bolt or other connector.
- Ground Rod Clamp Blackburn GG58H, Burndy GKP635, or eaual.

\*For Transformer Base Poles. On Shoe Base Poles omit un-fused connector for neutral conductor.



Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

RID(2) - 04

| TOOL C | Januar            | y 1992            | อพ: - KB    | ck:- KB            | 01      | :- FDN | ck: - CAL |
|--------|-------------------|-------------------|-------------|--------------------|---------|--------|-----------|
| 5-93   | STATE<br>DISTRICT | FEDERAL<br>REGION |             | FEDERAL A1D PROJEC | ĭ       |        | SHEET     |
| 10-93  | AUS               | 6                 | CC 337-1-29 |                    |         |        | 172       |
| 0-98   |                   | cour              | ITY         | CONTROL            | SECTION | JOB    | HEGHWAY   |
| 1-04   |                   | WILL              | MOSMA       | 0337               | 0.1     | 020    | CH 20     |

- 15. Ballasts shall meet the following requirements and shall pass tests in accordance with Test Method Tex-1130-T, Ballasts of Lighting Assemblies.
  - a. Ballast and starter shall be mounted on a removable stainless steel or aluminum tray of adequate thickness as approved by the engineer.
  - b. A wiring diagram for the fixture shall be inside fixture on or near the ballast.
- c. Ballast shall be copper winding magnetic regulating three isolated coil ballast.
- d. Ballast shall have a ballast factor between .95 and 1.0.
- e. When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of plus10 percent and minus 10 percent shall not exceed the following:
  - 220 Watts for 150 watt nominal lamp rating 440 Watts for 250 watt nominal lamp rating
- iii. 552 Watts for 400 watt nominal lamp rating
- f. During fluctuation of the test voltage of plus 10 percent and minus 10 percent, the lamp wattage fluctuation shall not exceed a total of 20 percent and ballast shall maintain lamp wattage within the following limits.
  - 110 Watts minimum and 180 Watts maximum for 150 Watt nominal lamp rating
- 175 Watts minimum and 370 Watts maximum for 250 Watt nominal lamp rating
- iii. 280 Watts minimum and 475 Watts maximum for 400 Watt nominal lamp rating
- g. The power factor of any ballast, when tested at the circuit voltage indicated on the plans, shall not be less than 90
- h. Ballasts shall be permanently and clearly marked to indicate following:
  - Lamp type
  - Catalog number
- iii. Voltage rating
- iv. Connection diagram
- v. Manufacturer
- vi. UL listina
- 16. The electronic starting aid shall meet the following requirements and shall pass tests in accordance with Test Method Tex-1140-T, Electronic Starting Aids of High Pressure Sodium Vapor Lighting Assembles.
  - a. Starting aid shall provide a starting pulse with an amplitude of 2500 volts minimum, 4000 volts maximum.
  - b. The pulse width shall be a minimum of 0.8 microseconds at 2250 volts.
  - c. The pulse shall occur when the open circuit voltage is equal to or greater than 90 percent of peak open circuit voltage.
  - d. Pulse repetition rate shall be a minimum of one per cycle
  - e. Pulse current shall be a minimum of 0.18 amperes.
  - f. The starting aid shall discontinue to pulse when, either,
    - the lamp starts, or
  - ii. after a minimum of 3 minutes and a maximum of 10 minutes if the lamp fails to start.
- 17. Lamps shall meet the following specifications
  - a. Lamps shall be Osram Sylvania Lumalux Plus high pressure sodium (HPS) lamps of the wattages shown on the plans. No alternates will be allowed.
  - b. Lamps shall fully extinguish at end of usable lamp life and remain extinguished without cycling.
  - c. Lamps that burn at reduced output at end of life are not acceptable.
  - d. Lamps shall meet the Federal Toxic Characteristic Leachate Procedure (TCLP).
  - e. 150 watt lamps shall be 55 volt.
  - f. Lamp shall be supplied with the fixture.
- 18. Photometrics. Fixtures shall meet the following photometric requirements using published photometric data and photometric data obtained by testing sampled fixtures.
  - a. 150 Watt mast arm (underpass) mounted luminaire shall meet IESNA Medium Cutoff requirements. The fixtures shall provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 110.0 feet by 30.0 feet, when mounted 20.0 feet above the midpoint of either long side of the surface grea.
  - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 50:1 within the above mentioned rectangular area.
  - b. The 250-watt mast arm mounted luminaire shall meet IESNA cutoff requirements and, when mounted 40.0 feet above the midpoint of either long side of a rectangular area 190 feet by 45 feet, shall provide a minimum intensity of 0.20 footcandle at any point on the surface of this area. Light intensities measured in footcandles along a line parallel to and 20.0 feet in from the long side of the previously defined rectangular area above which the luminaire is mounted shall decrease at a rate not to exceed 0.50 footcandle in any 5.0 foot interval along the aforementioned line from 10.0 to 90.0 feet on both sides of the luminaire and shall not be less than 0.30 footcandle at any point along such a line.
  - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.
  - c. The 400-watt mast arm mounted luminaire shall meet IESNA cutoff requirements and, when mounted 50.0 feet above the midpoint of either long side of a rectangular area 220.0 feet by 60.0 feet, shall provide a measured minimum intensity of 0.20 footcandle at any point on the surface of this area. Light intensities measured in footcandles along a line parallel to and 30.0 feet in from the long side of the previously defined rectangular area above which the luminaire is mounted shall decrease at a rate not to exceed 0.75 footcandle in any 10.0 foot interval along the aforementioned line from 10.0 to 90.0 feet on both sides of the luminaire and shall not be less than 0.30 footcandle at any point along such a line.
  - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.
- 19. Photometric data shall be consistent from fixture to fixture. Unless otherwise approved by the Engineer, the photometric performance shall match published data (or approved photometric reports submitted during the prequalification process as the typical photometric output in lieu of published data) as follows:
  - a. Point of maximum candela shall be within 5 degrees horizontally and vertically.
- b. Maximum candela shall be within 20 percent of published maximum candela.
- c. Fixture efficiency shall be within 10 percent of published efficiency. 20. All luminaires shall be pre-qualified. No alternates will be considered.
  - a. Only materials, with approved product codes or designations, from prequalified producers are accepted on bids. The Construction Division (CST) of the Texas Department of Transportation (TxDOT) maintains the material producers list of approved producer product codes or designations. Use the following website to view this list:
    - http://www.dot.state.tx.us/business/materialproducerlist.htm

Use of pregualified material does not relieve the contractor of the responsibility to ensure that the material meets specifications. All materials, including those shown on the prequalified material list, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.

b. Contractor shall notify the Engineer in writing as to which fixture from the list of approved fixtures will be supplied.

- c. A manufacturer desiring to have a fixture listed as a pre-qualified fixture shall:
  - i. Submit a sample of each type of luminaire and all pertinent data, including published photometric data and recently tested photometric data (IES format, both "averaged" and both sides of "un-averaged" data) to:

118 East Riverside Dr. Austin, TX 78704

- ii. Manufacturer must demonstrate a commitment to quality
- iii. Manufacturer shall prepare and submit a QA/QC program documentation with the following minimum requirements 1. Written statement of the companies QA/QC policy
  - 2. QA/QC person is employed that has special QA/QC training and has QA/QC as their primary job responsibility
  - 3. A written procedure specifically for handling orders for fixtures built to TxDOT specifications.
- 4. A written procedure for keeping track of fixtures built, certified, and tested for TxDOT orders.
- 5. A check list of features for TxDOT fixtures with QA/QC person signature.
- d. Prequalification samples, if approved, will not be returned to the manufacturer but will be retained by TxDOT for comparison testing. Once a fixture has been approved, no changes shall be made in any material or manufacturing methods without prior approval of the Department. Unapproved changes will result in rejection of fixtures.
- e. In addition, luminaires will be tested for compliance with this specification. Luminaires that inconsistently pass testing or that are inconsistent with published photometric information will be removed from the pre-qualified list at the discretion of the engineer.
- 21. Sampling. Sample in accordance with Text Method Tex-1110-T, Sampling Lighting Assemblies.
- 22. Warranty. Any fixture failing within five years of installation will be replaced by the manufacturer with a fixture that passes all testing, delivered to the project location.
- 23. Testing. The manufacturer shall conduct electrical testing required in paragraphs 15 and 16, and all photometric testing shall be at the manufacturer's expense and at the following rates.
  - a. From each lot or manufacturing run, the manufacturer shall select one completed fixture of each 25, with a minimum of two and a maximum of 5, to be photometrically tested at an independent test lab approved by TxDOT.
  - Testing shall provide IES photometric report in two formats:
  - 1. Standard averaged format for asymmetric fixtures
  - 2. Un-averaged format showing both sides, un-averaged data may be supplied in two files or as otherwise approved
  - ii. Test data shall be supplied directly to TRF-TE electronically for evaluation prior to shipping fixtures to the
  - iii. Test reports shall include:
    - 1. TxDOT's Control-Section-Job number, maintenance contract number, or purchase order number that the fixtures are assigned to,
    - 2. a unique fixture test number per fixture,
    - 3. date of manufacture, and
    - 4. quantities supplied and lot number per fixture type.
  - iv. Unique lab report number shall be written on the top of the fixture housing with permanent marker. Test lab shall keep results for 5 years and shall make all documentation available to TxDOT.
  - Manufacturer shall keep records of manufacturing lots, test reports, lot quantities, and other pertinent details. Such records shall be submitted to the Department upon request.
  - Manufacturer shall make available to TxDOT inspectors upon request, all manufacturing facilities involved in the production of fixtures intended to be used on TxDOT projects, inventories of fixtures produced to TxDOT specifications, and records of fixture testing and tracking.
  - b. Departmental Test Reporting. Departmental test reports will be issued as follows:
  - i. For projects requiring 1-15 fixtures of a particular wattage, TRF will authorize a passing test report when the following steps have been completed.
  - 1. a review of the submittal letter from the contractor to the Engineer identifying the fixture to be supplied,
  - 2. a review of test reports supplied by the manufacturer shows that the fixtures meet the photometric requirements of this specification, and 3. a review of the history of testing from that manufacturer shows consistent passing of the electrical.
  - photometric, and fixture construction quality requirements. ii. For projects with 16 or more fixtures of a particular wattage, TRF will authorize a passing test report when the
  - following steps have been completed. 1. a review of the submittal letter from the contractor to the Engineer identifying the fixture to be supplied,
  - 2. a review of test reports supplied by the manufacturer shows that the fixtures meet the photometric requirements of this specification, and
  - 3. a review of the history of testing from that manufacturer shows consistent passing of the photometric and fixture construction quality requirements.
  - 4. Fixtures are shipped to the project and two fixtures are sampled and tested by the Engineer in accordance with Texas Test Method Tex 1110-T.
  - 5. A review of the photometric test reports from the Departments lab show compliance with this specification and comparison to photometric reports supplied by the manufacturer are within the tolerances allowed by this



ROADWAY ILLUMINATION DETAILS

RID(3) - 04

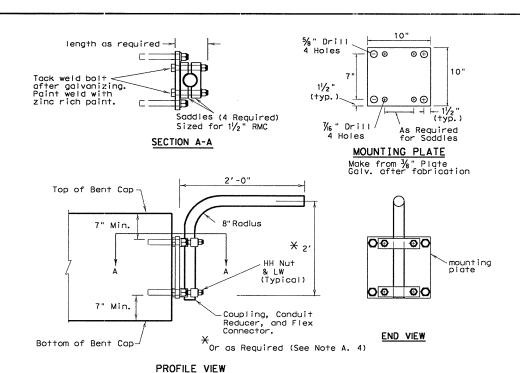
173

HIGHWAY

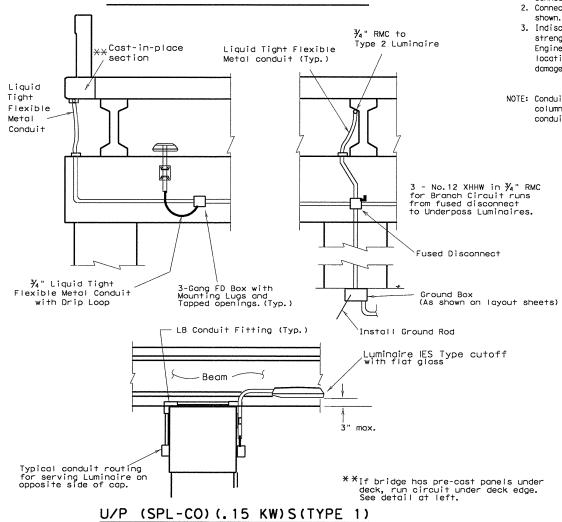
C) TxDOT January 1992 DN:- KB cx:- KB DW: - FDN CK: - CAL STATE FEDERAL DISTRICT REGION 5-93 AUS 6 CC 337-1-29 CONTROL SECTION JOB 1-04 WILLIAMSON 0337 01 029

1/04 Revision

Modify fixture specifications



### UNDERPASS LIGHTING ARM TYPE 1



#### NOTES:

- A. ALL 150 watt H.P.S. LUMINAIRES
- 1. Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
- 2. All conductors and conduit will be paid for under the items "Conduit" and "Electrical Conductor", unless otherwise shown on the plans. See lighting layout sheets.
- 3. A ground rod shall be installed and attached to the equipment grounding conductor in all ground boxes containing conduit that extends above grade six inches or more. All RMC in these boxes shall have grounding bushings and shall be properly bonded.
- 4. Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and layout sheet. Where practicable place luminaires so the bottom of luminaire is above the bottom of the beam, maximum of 3 inches. (See detail.)
- 5. All boits, nuts and washers shall be galvanized, ASTM A-153.
- 6. Fabrication of brackets and support arms will not be paid for directly but shall be subsidiary to Item 610, "Roadway Illumination Assemblies."
- 7. A Heavy Duty, 480 volt or 600 volt, 30 amp fused disconnect switch in NEMA 3R enclosure shall be installed in circuits to switch underpass luminaires. Switch shall be mounted 10 feet (minimum) above grade on columns or bent caps as approved by the Engineer. Contractor shall modify switch to allow padlocking in the "ON" and in the "OFF" positions. 20 amp fuses shall be installed. Furnishing and installing disconnect switches for underpass lighting fixtures shall not be paid for separately but shall be subsidiary to the various bid items of the

#### B. TYPE 1

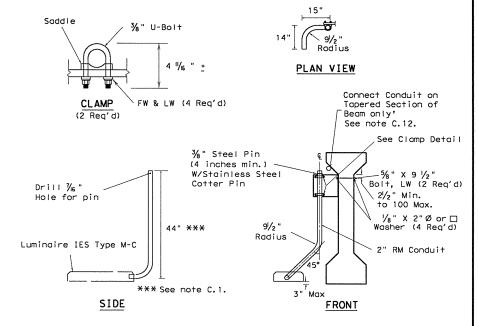
- 1. Type 1 arm shaft shall be 1 1/2 inch rigid metal conduit (1.90" O.D., 0.145" wall). 2. Anchor bolts for Type ! luminaire shall be 3/8 inch bolt or stud expansion anchors with minimum pull out of 3000 lb each, with 4 inch minimum embedment, and lock washers.
- 3. Attach conduit to plate with 4 saddles, four 3/8" (min.) bolts, HHN & LW.

#### C. TYPE 2

- 1. Type 2 arm shaft shall be 2 inch rigid metal conduit (2.375" 0.D., 0.154" wall). Reduce conduit length for Type C concrete beams. Field cutting and threading will be permitted. Paint cut and threaded areas with zinc rich paint after conduit is connected to adjacent fitting.
- 2. Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 inch.
- 3. Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Drilling location and method shall be only as directed by the Engineer. See location of underpass lighting mounting bracket detail. The locations given in the table are such that reinforcing strands will not be damaged.

NOTE: Conduit on Columns, Caps, and Slab is shown surface mounted. For all new columns and caps, Contractor shall embed conduit in concrete. Embedded conduit shall be PVC. Metal junction boxes and conduit shall be grounded.

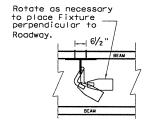
PLAN VIEW



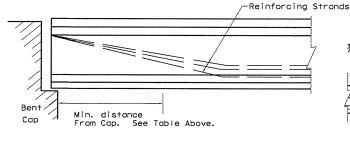
### UNDERPASS LIGHTING ARM TYPE 2

| Bridge Span<br>Length | Minimum Distance From Bent<br>Cap to Fixture Mounting Arm |
|-----------------------|---|
| ≤50′                  | 10'   |
| 50'-70'               | 15′   |
| 70'-90'               | 20′   |
| >90'                  | 25′   |

See detail below



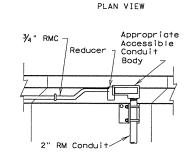
FIXTURE ORIENTATION



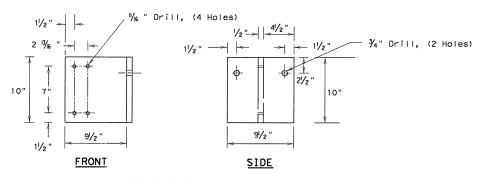
### LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET

1/04 Revision

Modify fixture specifications







### BRACKET DETAIL

Make From  $\frac{1}{2}$ " Plate (ASTM A-36) Galvanize after fabrication, ASTM A-123

U/P (SPL-CO) (.15 KW) S (TYPE 2)



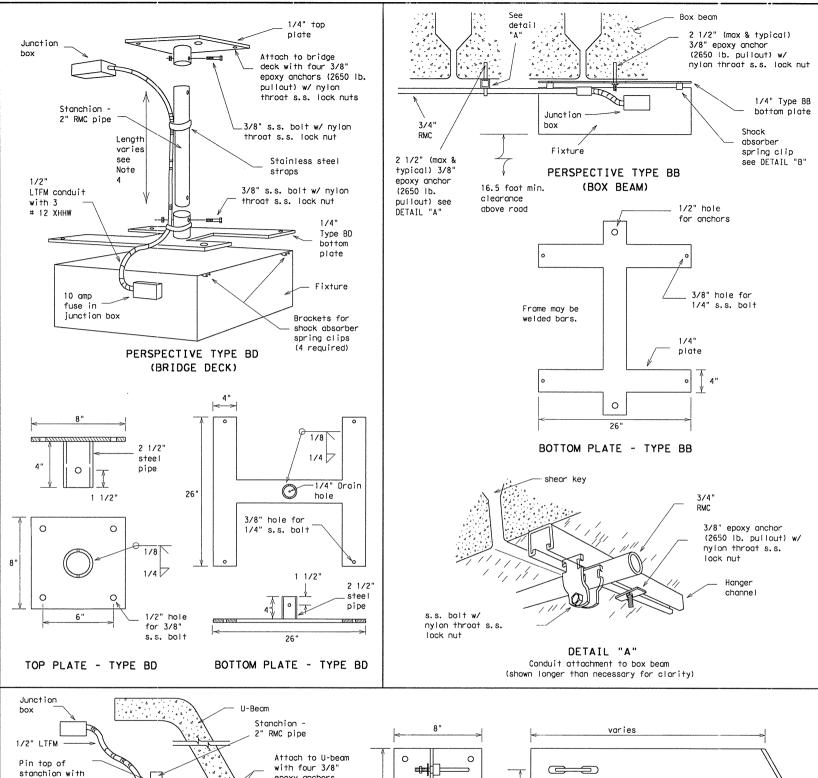
# STANDARD PLANS

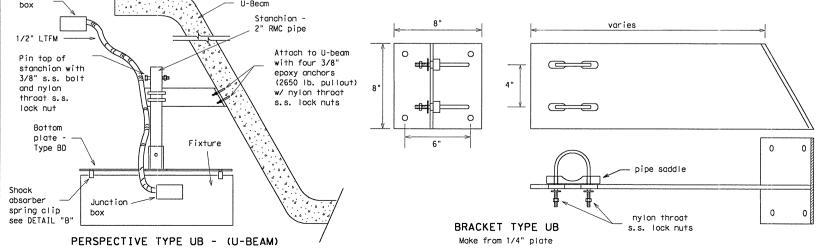
Texas Department of Transportation Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

RID(4) - 04

| C) TXDOT   | Januar            | y 1992            | DN: - KB | ck: - KB         | DW: | - FDN   | cx: - CAL |
|--|-------------------|-------------------|----------|------------------|-----|---------|-----------|
| 5-93   | STATE<br>DISTRICT | FEDERAL<br>REGION | FED      | ERAL AID PROJECT |     |         | SHEET     |
| 10-93 AUS 6 CC 337-1-29 10-98 COUNTY CONTROL SECTION JOB |                   |                   |          |                  |     | 174     |           |
|  |                   |                   |          |                  | JOB | HIGHNAY |           |
| 1-04   |                   | WILLI             | AMSON    | 0337             | 01  | 029     | SH 29     |



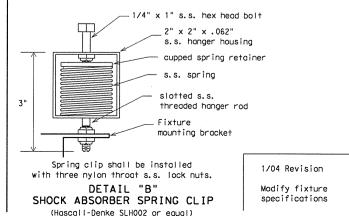


GENERAL NOTES:

- 1. These details apply to Roadway Illumination Assemblies bid under Item 610, "Roadway Illumination Assemblies," under the descriptive code, "Rdwy III Assem U/P Type IF." All associated hardware, mounting assemblies, parts, junction boxes, lamps, lenses, brackets, tools and labor required to install the underpass lighting assembly will not be paid for directly but shall be subsidiary to the various items of the contract, except that conduit, and conductors supplying the fixtures will be paid for separately. Mounting channel for conduit supports will not be paid for directly but shall be subsidiary to the various bid items of the contract.
- 2. See RID (4) for general routing of conduits under bridge structures. New bent caps and columns shall have conduit embedded in concrete. One disconnect switch shall be installed for each group of underpass luminaires at each underpass or as shown on the lighting layout sheets. Disconnect switches shall be mounted on bent cap or header walls as shown on the plans or as directed by the Engineer. Disconnect switches shall be 30 amps, of the voltage rating of the circuit, fused for 20 amps unless shown otherwise on the plans. Disconnect switches shall not be paid for directly but shall be subsidiary to the
- 3. Indiscriminate drilling into pre-cast concrete beams will not be allowed. Drill only as shown or as specifically approved
- 4. Cut stanchion to position fixture even with bottom of beams. Adjust stanchion to seat all the way into the 2 1/2 inch pipe to reduce rattling, then field drill and pin with bolt as shown. Do not oversize hole for pin. Repair cut ends and drilled hole galvanizing with three coats zinc rich paint (dry completely between coats).
- 5. Hot dip galvanize all steel parts in accordance with Item 445, "Galvanizing."
- 6. Adjust stanchion for bracket Type WB for vertical stanchion with fixture even with bottom of beam.
- 7. Fixture shall meet the following requirements.
- a. Fixture shall be a maximum of 28 inches square and 10 inches deep (mounting feet and junction box may extend outside the 28 inch square).
- b. Fixture lamp(s) shall be one 150-watt Osram Sylvania Icetron induction fluorescent or one Philips QL 165 watt induction fluorescent. (240 volt or 120 volt only). External transformers will not be allowed.
- c. Fixture shall be a full cutoff flat glass luminaire emitting a symmetric or asymmetric light pattern. Reflector shall be polished aluminum and shall be at least 95% efficient in reflecting light. Fixture lens retainer shall be positioned so as to not block light emitted from the fixture, i.e. shall not protrude over the reflecting surface.
- d. When operating at 12,000 lumens and when mounted at 15 feet above the midpoint of a circular area, the radius of which is defined below, the fixture shall provide minimum light levels as shown below;
- 0.2 foot-candles in a 35 ft radius
- 1.0 one foot-candle in a 22 ft radius iii. 2.0 foot-candles in a 19 ft radius
- iv. Maximum of 27.0 foot-candles at any point in a 35ft radius.
- e. Fixture photometrics shall match photometrics of published data.
- f. Housing shall be made from aluminum sheeting (0.10 inch min), stainless steel (14 ga. Min) or cast aluminum. All seams shall be continuously welded. Fixture housing shall be sturdy and of good workmanship. Fixture housing shall have external mounting feet. Housing shall not have any penetrations except that wiring from the external junction box may penetrate to the ballast compartment. Such penetration shall be factory sealed with potting compound or CGB connector. All openings or construction joints in housing shall be effectively sealed.
- g. Lens shall be heat tempered C73 flat glass, minimum 5/32 inch thick. Lens frame shall be sealed with continuous closed cell neoprene (EDPM) or silicon gasket material as approved by the engineer. Gasket shall be a minimum of 9/16 inch wide and 1/8 inch thick. Lens frame shall contact gasket with a minimum 9/16 inch return flange footing. Frame and housing shall have welded seams ground flush to provide flat surface for gasket contact. Lens shall be securely screwed to the housing with a minimum of 8 number 10 stainless steel screws. Screws shall have Teflon, neoprene, or silicon washers. In addition, the lens frame shall be sealed shut at the factory with RTV 501 sealant.
- h. Wire attachment shall be through a junction box rigidly secured to the side of the fixture housing. Junction box shall be a minimum of 3/16 inch thick aluminum (Adelet) or hot dipped galvanized cast iron walls (FD type) and shall have a threaded knockout for 3/4 inch conduit. Wiring entry into fixture shall be sealed with sealing compound in a minimum 1 inch length nipple or by use of a CGB connector when cord is used. Box back wall shall be sealed to the fixture
- i. Fixtures shall be painted completely inside and outside with gray paint similar in color to "cobra head" luminaires. When other colors are shown on the plans, color shall be as approved by the engineer.
- j. Fixtures shall be certified, in writing, by the lamp manufacturer to be capable of sufficient heat dissipation. Certification shall be submitted for approval with fixture submittal. Icetron lamps shall be supported at each end of the lamp. Lamp manufacturer and fixture manufacturer shall provide a written 60,000-hour life replacement warranty for the fixture/lamp combination for the underpass installation conditions of this project. Lamps/fixture shall be considered failed if light output drops below 60% of rated lumens. Warranty shall be submitted for approval with the fixture
- k. Only materials, with approved product codes or designations, from prequalified producers are accepted on bids. The Construction Division (CST) of the Texas Department of Transportation (TxDOT) maintains the material producers list of approved producer product codes or designations. Use the following website to view this list: http://www.dot.state.tx.us/business/materialproducerlist.htm

Use of prequalified material does not relieve the contractor of the responsibility to ensure that the material meets specifications. All materials, including those shown on the prequalified material list, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.

- I. All anchors into concrete shall be stainless steel and may be either expansion or epoxy, minimum 1000 lb. pull out, unless otherwise shown.
- 8. For box beam construction, if 16.5 foot clearance cannot be obtained, see Engineer for alternative underpass lighting.
- 9. Dimensions of brackets shall be adjusted as necessary to accompdate fixtures being supplied. Use Type BD for double T-beam mounting. Other mounting arrangements may be as approved by the Engineer.



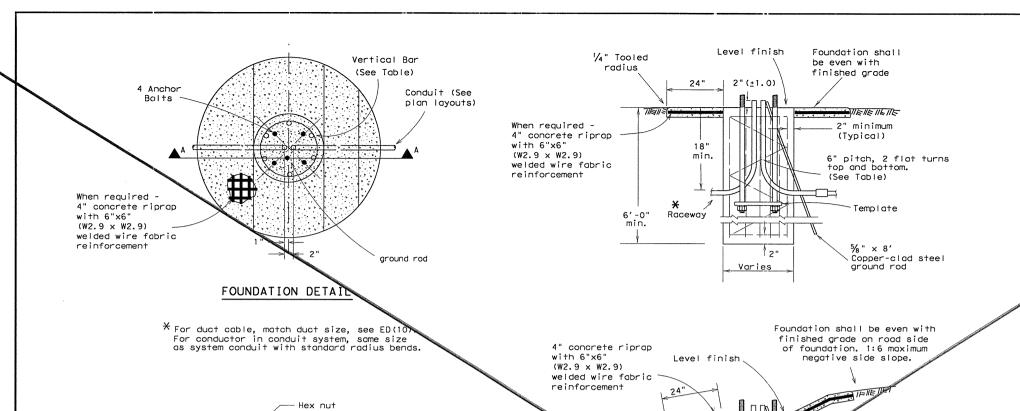
Texas Department of Transportation Traffic Operations Division ROADWAY

STANDARD PLANS

ILLUMINATION DETAILS

RID(5) - 04

| (C) TxDOT         | June 2            | 2002              | on: - KB            | ck: - KB | DH: -   | FDN   | ck: - CAL |
|-------------------|-------------------|-------------------|---------------------|----------|---------|-------|-----------|
| REVISIONS<br>1-04 | STATE<br>DISTRICT | FEDERAL<br>REGION | FEDERAL AID PROJECT |          |         | SHEET |           |
| 1-04              | AUS               | 6                 | CC 337-1-29         |          |         | 175   |           |
|                   | COUNTY            |                   | VIY                 | CONTROL  | SECTION | J08   | HIGHWAY   |
|                   |                   | WILL              | TAMSON              | 0337     | 01      | 029   | SH 29     |



| Breakaway Pole Plac  | cement, see note 5  |
|--|---|
| Roadway Functional<br>Classification                           | ** Pole Offset (#stance<br>to transforme<br>base, tole ance + 6in0in. |
| Freeway mainlanes<br>(roadways with<br>full control of access) | 15 ft minimum and typical)<br>from lane edge                          |
| All curbed, 45 mph<br>or less design speed                     | 2.5 ft minimum (15 ft<br>desirable) from curb face                    |
| All others   | 10 ft minimum* (15 ft<br>desirable) from lane edge                    |
|  |   |

\*or as close to ROW line as is practicable

\*\*all brokaway poles should have 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent procedument on other travel lanes. See design guidelines.

| FOUNDATIONS |       |        |             |         |  |
|-------------|-------|--------|-------------|---------|--|
| FND.        | DRILL | SHAFT  | REINFORCING |         |  |
| TYPE        | DIA.  | LENGTH | BAR         | SPIRAL  |  |
| Α           | 30 in | 6 ft   | 6-#4        | #2 or 3 |  |
| В           | 30 in | 8 ft   | 6-#5        | #2 or 3 |  |
| С           | 30 in | 10 ft  | 6-#6        | #3      |  |

|   | BOLT CIRCLES AND ANCHOR BOLTS |            |           |         |                          |  |  |
|---|-------------------------------|------------|-----------|---------|--------------------------|--|--|
| Γ | MOUNTING                      | POLE       | BOLT      | CIRCLE  | BOLT                     |  |  |
| L | HEIGHT                        | BASE PLATE | SHOE BASE | *T-BASE | SIZE                     |  |  |
|   | LESS THAN<br>40 ft            | 13 in      | 13 in     | 14 in   | 1 in.<br>X 30 in.        |  |  |
|   | 40 ft<br>OR GREATER           | 15 in      | 15 in     | 171/4in | **<br>1½ in.<br>X 30 in. |  |  |

\* AND X-BASE \*\* 1" FOR X-BASE

2" minimum (Typical)

Template

Copper-clad steel

5%" × 8'

6" pitch, 2 flat turns top and bottom.
(See Table)

18'

6'-0" min. min.

Varies

SECTION A-A

PAY QUANTITY OF RIPRAP PER FOUNDATION

| (Install only          | y when shown       | on the plans.)         |
|------------------------|--------------------|------------------------|
| FOUNDATION<br>DIAMETER | RIPRAP<br>DIAMETER | RIPRAP<br>(CONC)(CL A) |
| 30 in.                 | 78 in.             | 0.35 CY                |

 Foundations will be paid for under the Item "Foundations for Signs, Traffic Signals and Roadway Illumination Assemblies", unless otherwise shown on the plans. Top 6 inches of foundation shall be formed and struck level.

2. Anchor bolts for all poles, except CTB-mounted poles, shall be A-36M55 Anchor Bolts. Anchor bolts for CTB mounted poles shall be steel, ASTM A-325 or A-321 threaded rod. Muts for CTB anchor bolts shall be ASTM A-563 Grade D heavy hex, galvanized. The top 8 inches of all anchor bolts shall be galvanized per ASTM A-153. Anchor bolts in foundations shall be 1 1/4 inches x 30 inches for mounting heights less than 40 feet.\* Anchor bolts shall have to end threaded not less than 5 inches and furnished with galvanized hex nuts, 1/2 inch flat washers (T-base), lock wishers (shoe base) and template. The lower end of the bolt shall be threaded and furnished with nut and template. When bolts with rolled threads are furnished, bolt body need not be full size. See CTB and SSCB details for michor bolts in concrete traffic barriers. Anchor bolts and nuts shall have Class 2A and 2B fit. Nuts shall be tagged and chased after galvanizing.

Top anchor bolt template, 1/4" plate

Top of foundation

Bottom anchor bolt template 3/8" plate

3 places

-- Lock washer

3. Concrete shall be Class A or

ROADWAY ILLUMINATION ASSEMBLY FOUNDATIONS

4. A minimum of two conduits shall be installed in each foundation. See lighting layout sheets for locations of foundations with more than two conduits. Any unused conduits in foundations shall be capped on both ends.

5. Unless otherwise dimensioned on the plans, breakaway roadway illumination assemblies should be located as shown in the placement table. Non-breakaway illumination assemblies should be protected from vehicular impact (i.e. 2 feet behind guard rail of mounted atop traffic barrier) or located outside the clear zone, except that 2.5 feet from curb face is minimum desired for light poles on city streets, 45 mph or less, see design guidelines for further information.

6. Anchor bolt template shall not be supplied with flat washers. Transformer base shall be held with 1/2 inch thick washers supplied with base. No washers or shims shall be used under transformer base.

Riprap shall be placed around the foundtion when called for elsewhere in the plans.

Conduit location in foundation is critical for new style breakaway devices. Conduits shall be placed 2 inches apart on centerline as shown in foundation details.

\* Except that anchor bolts shall be 1 inch x 30 inches for all X-base poles.

ANCHOR BOLT DETAIL



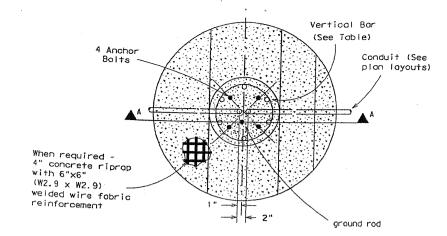
STANDARD PLANS
Texas Department of Transportation
Traffic Operations Division

ROADWAY
ILLUMINATION
DETAILS

RID(6)-04

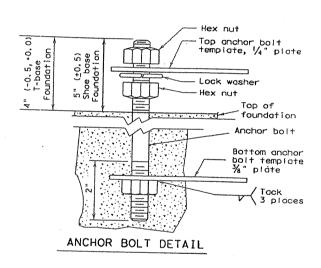
1/04 Revision

Modify fixture specifications

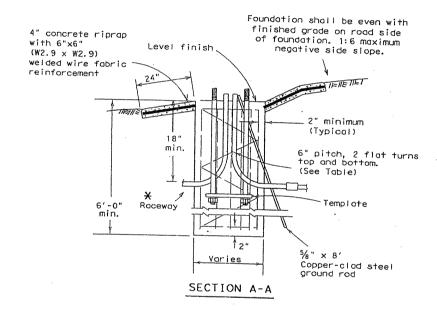


### FOUNDATION DETAIL

 $\times$  For duct cable, match duct size, see ED(10). For conductor in conduit system, same size as system conduit with standard radius bends.



#### Level finish 1/4" Tooled Foundation shall radius be even with finished grade 1 2"(±1.0) WIETE TE TE When required -4" concrete riprop with 6"x6" 2" minimum (Typical) 18" (W2.9 x W2.9) min. welded wire fabric 6" pitch, 2 flat turns top and bottom. reinforcement (See Toble) Template 6'-0" min %" × 8' 12" Copper-clad steel Varies



| Breokaway Pole Pla   | cement, see note 5   |
|--|--|
| Roadway Functional<br>Classification                           | ** Pole Offset (distance<br>to transformer<br>base, tolerance + 6in0in.) |
| Freeway mainlanes<br>(roadways with<br>full control of access) | 15 ft (minimum and typical)<br>from lane edge                            |
| All curbed, 45 mph<br>or less design speed                     | 2.5 ft minimum (15 ft<br>desirable) from curb face                       |
| All others   | 10 ft minimum* (15 ft<br>desirable) from lane edge                       |

\*or as close to ROW line as is practicable

\*\*all breakaway poles should have 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on other travel lanes. See design guidelines.

30" Drill Shaft -> a

1/04 Revision

Modify fixture

specifications

|   | FOUNDATIONS                  |       |        |      |         |   |  |  |  |  |  |
|---|------------------------------|-------|--------|------|---------|---|--|--|--|--|--|
|   | FND. DRILL SHAFT REINFORCING |       |        |      |         |   |  |  |  |  |  |
|   | TYPE                         | DIA.  | LENGTH | BAR  | SPIRAL  | L |  |  |  |  |  |
| / | Α                            | 30 in | 6 ft   | 6-#4 | #2 or 3 |   |  |  |  |  |  |
|   | В                            | 30 in | 8 f†   | 6-#5 | #2 or 3 |   |  |  |  |  |  |
|   | C 30 in 10 ft 6-#6 #3        |       |        |      |         |   |  |  |  |  |  |

| BOLT CIRCLES AND ANCHOR BOLTS |            |           |          |                          |  |  |  |  |
|-------------------------------|------------|-----------|----------|--------------------------|--|--|--|--|
| MOUNTING                      | POLE       | BOLT      | BOLT     |                          |  |  |  |  |
| HEIGHT                        | BASE PLATE | SHOE BASE | *T-BASE  | SIZE                     |  |  |  |  |
| LESS THAN<br>40 ft            | 13 in      | 13 in     | 14 in    | 1 in.<br>X 30 in.        |  |  |  |  |
| 40 ft<br>OR GREATER           | 15 in      | 15 in     | 171/4 in | **<br>1¼ in.<br>X 30 in. |  |  |  |  |
|                               |            |           |          |                          |  |  |  |  |

\* AND X-BASE \*\* 1" FOR X-BASE

> PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans.) FOUNDATION RIPRAP RIPRAP DIAMETER DIAMETER (CONC) (CL A) 30 in. 78 in. 0.35 CY

> > C.O. #9

STANDARD PLANS Texas Department of Transportation Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

RID(6) - 04

C) TxDOT January 1992 OH:- KB ck:- K8 ON:- FDN STATE PEDERAL DESTRICT REGION 10-93 FEOCRAL ALD PROJECT AUS 6 CC 337-1-29 2-94 10-98 CONTROL SECTION 1-04 0337 01 029

### ROADWAY ILLUMINATION ASSEMBLY FOUNDATIONS

1. Foundations will be paid for under the Item "Foundations for Signs, Traffic Signals and Roadway Illumination Assemblies", unless otherwise shown on the plans. Top 6 inches of foundation shall be formed and struck level.

2. Anchor bolts for all poles, except CTB-mounted poles, shall be A-36M55 Anchor Bolts. Anchor bolts for CTB mounted poles shall be steel, ASTM A-325 or A-321 threaded rod. Nuts for CTB anchor bolts shall be ASTM A-563 Grade D heavy hex, galvanized. The top 8 inches of all anchor bolts shall be galvanized per ASTM A-153. Anchor bolts in foundations shall be 1 1/4 inches x 30 inches for mounting heights 40 feet and greater, 1 inch x 30 inches for mounting heights less than 40 feet.\* Anchor bolts shall have top end threaded not less than 5 inches and furnished with galvanized hex nuts, 1/2 inch flat washers (T-base), lock washers (shoe base) and template. The lower end of the bolt shall be threaded and furnished with nut and template. When bolts with rolled threads are furnished, bolt body need not be full size. See CTB and SSCB details for anchor bolts in concrete traffic barriers. Anchor bolts and nuts shall have Class 2A and 2B fit. Nuts shall be tapped and chased after galvanizing.

3. Concrete shall be Class A or C.

4. A minimum of two conduits shall be installed in each foundation. See lighting layout sheets for locations of foundations with more than two conduits. Any unused conduits in foundations shall be capped on both ends.

5. Unless otherwise dimensioned on the plans, breakaway roadway illumination assemblies should be located as shown in the placement table. Non-breakaway illumination assemblies should be protected from vehicular impact (i.e. 2 feet behind guard rail or mounted atop troffic barrier) or located outside the clear zone, except that 2.5 feet from curb face is minimum desired for light poles on city streets, 45 mph or less, see design guidelines for further information.

6. Anchor bolt template shall not be supplied with flat washers. Transformer base shall be held with 1/2 inch thick washers supplied with base. No washers or shims shall be used under transformer base.

Riprap shall be placed around the foundtion when called for elsewhere in the plans.

8. Conduit location in foundation is critical for new style breakaway devices. Conduits shall be placed 2 inches apart on centerline as shown in foundation details.

 $\star$  Except that anchor boilts shall be 1 inch x 30 inches for all X-base pales.

|             | Arm    |                | ROUND | POLES           |      |        |                | POLYG | ONAL POL        | ES   |        |                    |
|-------------|--------|----------------|-------|-----------------|------|--------|----------------|-------|-----------------|------|--------|--------------------|
|             | Length | D <sub>B</sub> | D19   | D <sub>24</sub> | D 30 | 1) thk | D <sub>B</sub> | D19   | D <sub>24</sub> | D 30 | 1) thk | Foundation<br>Type |
|             | ft.    | in.            | in.   | in.             | in.  | in.    | in.            | in.   | in.             | in.  | in.    |                    |
|             | 20     | 10.5           | 7.8   | 7.1             | 6.3  | .179   | 11.5           | 8.5   | 7.7             | 6.8  | .179   | 30-A               |
|             | 24     | 11.0           | 8.3   | 7.6             | 6.8  | .179   | 12.0           | 9.0   | 8.2             | 7.3  | .179   | 30-A               |
|             | 28     | 11.5           | 8.8   | 8.1             | 7.3  | .179   | 12.5           | 9.5   | 8.7             | 7.8  | .179   | 30-A               |
|             | 32     | 12.5           | 9.8   | 9.1             | 8.3  | .179   | 12.0           | 9.0   | 8.2             | 7.3  | . 239  | 30-A               |
| $\triangle$ | 36     | 12.0           | 9.3   | 8.6             | 7.8  | . 239  | 12.5           | 9.5   | 8.7             | 7.8  | . 239  | 36-A               |
|             | 40     | 12.0           | 9.3   | 8.6             | 7.8  | . 239  | 13.5           | 10.5  | 9.7             | 8.8  | . 239  | 36-A               |
|             | 44     | 12.5           | 9.8   | 9.1             | 8.3  | . 239  | 14.0           | 11.0  | 10.2            | 9.3  | . 239  | 36-A               |
|             | 48     | 13.0           | 10.3  | 9.6             | 8.8  | . 239  | 15.0           | 12.0  | 11.2            | 10.3 | .239   | 36-A               |

| Arm    |                | ROUND | ARMS           |        |        | POLYGONAL ARMS |      |                  |        |        |  |
|--------|----------------|-------|----------------|--------|--------|----------------|------|------------------|--------|--------|--|
| Length | L <sub>1</sub> | D,    | D <sub>2</sub> | 1) thk | Rise   | L,             | D,   | 2 D <sub>2</sub> | 1) thk | Rise   |  |
| ft.    | ft.            | in.   | in.            | in.    | Kise   | ft.            | in.  | in.              | in.    | піве   |  |
| 20     | 19.1           | 6.5   | 3.8            | .179   | 1'-9"  | 19.1           | 7.0  | 3.5              | .179   | 1′-8"  |  |
| 24     | 23.1           | 7.5   | 4.3            | .179   | 1'-10" | 23.1           | 7.5  | 3.5              | .179   | 1'-9"  |  |
| 28     | 27.1           | 8.0   | 4.2            | .179   | 1'-11" | 27.1           | 8.0  | 3.5              | .179   | 1'-10" |  |
| 32     | 31.0           | 9.0   | 4.7            | .179   | 2'-1"  | 31.0           | 9.0  | 3.5              | .179   | 2'-0"  |  |
| 36     | 35.0           | 9.5   | 4.6            | .179   | 2'-4"  | 35.0           | 10.0 | 3.5              | .179   | 2'-1"  |  |
| 40     | 39.0           | 9.5   | 4.1            | . 239  | 2′-8"  | 39.0           | 9.5  | 3.5              | .239   | 2'-3"  |  |
| 44     | 43.0           | 10.0  | 4.1            | .239   | 2'-11" | 43.0           | 10.0 | 3.5              | .239   | 2′-6"  |  |
| 48     | 47.0           | 10.5  | 4.1            | .239   | 3'-4"  | 47.0           | 11.0 | 3.5              | .239   | 2′-9"  |  |

 $D_B$  = Pole Base O.D.

Dig = Pole Top O.D. with no Luminaire

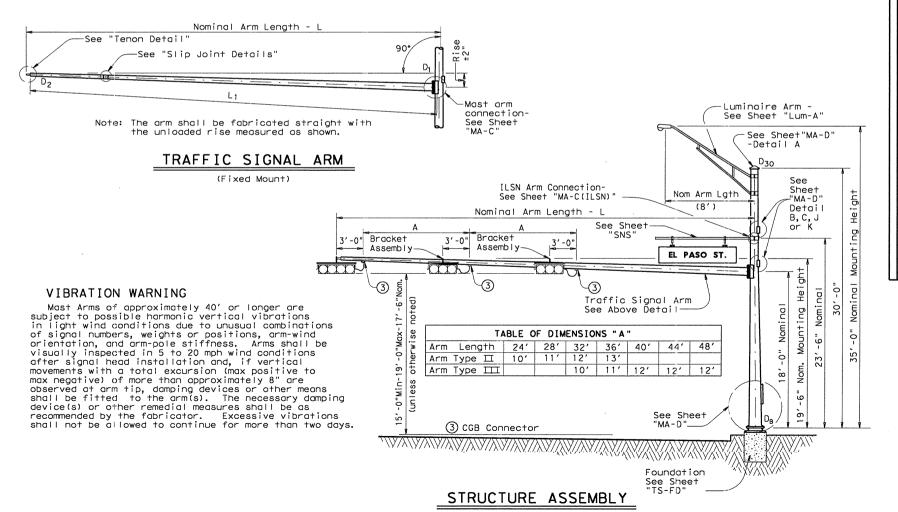
 $D_2$  = Arm End O.D. = Shaft Length = Nominal Arm Length

and no ILSN D<sub>24</sub> = Pole Top O.D. with ILSN w/out Luminaire

D<sub>30</sub> = Pole Top O.D. with Luminaire

 $D_1$  = Arm Base O.D.

- (1) Thickness shown are minimums, thicker materials may be used.
- $\bigcirc$   $\mathbb{D}_2$  may be increased by up to 1" for polygonal arms.



### SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

|                          | 30' Poles Wi | th Luminaire                                   | 24' Poles W                     | ith ILSN | 19' Poles With No<br>Luminaire and No ILSN<br>See note above |          |  |
|--------------------------|--------------|--|---------------------------------|----------|--|----------|--|
| Nominal<br>Arm<br>Length | (or two if I | re plus: One<br>LSN attached)<br>ole, clamp-on | Above ho<br>plus one<br>hand ho | e small  |  |          |  |
| f†                       | Designation  | Quantity                                       | Designation                     | Quantity | Designation  | Quantity |  |
| 20                       | 20L-80       |  | 205-80                          |          | 20-80  |          |  |
| 24                       | 24L-80       |  | 245-80                          |          | 24-80  |          |  |
| 28                       | 28L-80       |  | 285-80                          |          | 28-80  |          |  |
| 32                       | 32L-80       |  | 325-80                          |          | 32-80  |          |  |
| 36                       | 36L-80       |  | 36S-80                          |          | 36-80  |          |  |
| 40                       | 40L-80       |  | 40S-80                          |          | 40-80  |          |  |
| 44                       | 44L-80       |  | 445-80                          |          | 44-80  |          |  |
| 48                       | 48L-80       |  | 485-80                          |          | 48-80  |          |  |

Traffic Signal Arms (1 per Pole)

Ship each arm with the listed equipment attached

| irairic                  | o Signai Arms ( | i per role/ | Ship each arm with the fisted equipment attached                               |             |             |                        |  |  |  |
|--------------------------|-----------------|-------------|--|-------------|-------------|------------------------|--|--|--|
|                          | Type I Arm (    | 1 Signal)   | Type Ⅲ Arm   | (2 Signals) | Type Ⅲ Arm  | Type Ⅲ Arm (3 Signals) |  |  |  |
| Nominal<br>Arm<br>Length | 1 CGB con       | nnector     | 1 Bracket Assembly 2 Bracket Assembli and 2 CGB Connectors and 3 CGB Connector |             |             |                        |  |  |  |
| f†                       | Designation     | Quantity    | Designation  | Quantity    | Designation | Quantity               |  |  |  |
| 20                       | 201-80          |             |  |             |             |                        |  |  |  |
| 24                       | 241-80          |             | 24∐-80   |             | ,           |                        |  |  |  |
| 28                       | 281-80          |             | 28∐-80   |             |             |                        |  |  |  |
| 32                       |                 |             | 32∐-80   | . "         | 32111-80    |                        |  |  |  |
| 36                       |                 |             | 36II-80  |             | 36111-80    |                        |  |  |  |
| 40                       |                 |             |  |             | 40111-80    |                        |  |  |  |
| 44                       |                 |             |  |             | 44111-80    |                        |  |  |  |
| 48                       |                 |             |  |             | 48111-80    |                        |  |  |  |

Luminaire Arms (1 per 30' pole)

| Nominal Arm Length | Quantity |
|--------------------|----------|
| 8' Arm             |          |

4 Supply Option "A" unless otherwise noted

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

| Nominal Arm Length | Quantity |
|--------------------|----------|
| 7' Arm             |          |
| 9' Arm             |          |
|                    |          |

Anchor Bolt Assemblies (1 per pole)

| Anchor<br>Bolt<br>Diameter | Anchor<br>Bolt<br>Length | Quantity |
|----------------------------|--------------------------|----------|
| 1 1/2"                     | 3'-4"                    |          |
| 1 3/4"                     | 3'-10"                   |          |
|                            |                          |          |

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, 4 lock washers and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2



Texas Department of Transportation Traffic Operations Division

### TRAFFIC SIGNAL SUPPORT STRUCTURES

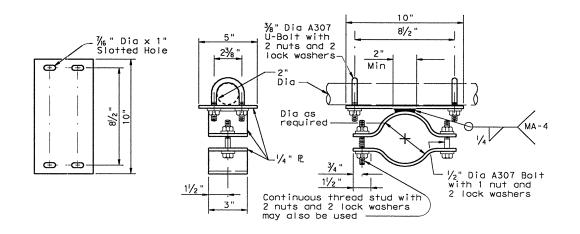
SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)

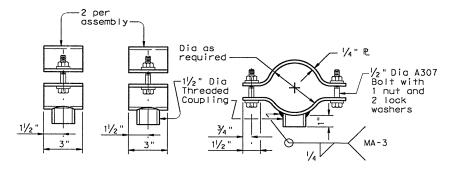
SMA-80(1)-99

SMA-80.DGN DN: MS CK: JSY DW: MMF CK: JSY CTxDOT August 1995 DIST FED REG FEDERAL AID PROJECT . SHEET CC 337-1-29 REVISIONS AUS 6 5-96 CONTROL SECT JOB HIGHWA 0337 01 029 SH 29

11/99 Revision

Changed to Facilitate new A ferminal strip enclosure



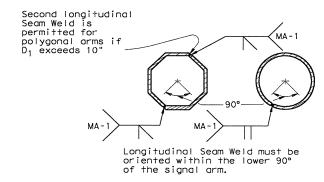


Stainless steel bands and cast bracket as in "Astro-Brac" with 1½" Dia Threaded Coupling.

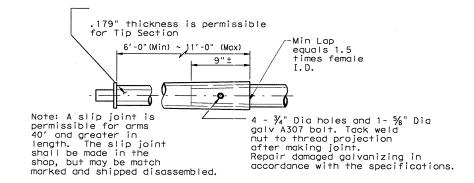
BRACKET ASSEMBLY
OPTION C

### BRACKET ASSEMBLY DETAILS OPTION A

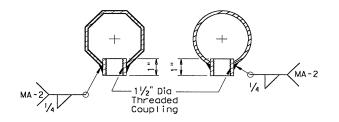
BRACKET ASSEMBLY DETAILS OPTION B



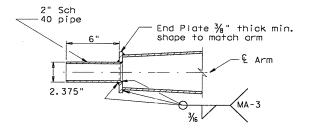
### ARM WELD DETAIL



### SLIP JOINT DETAIL



COUPLING DETAILS



TENON DETAIL

### **GENERAL NOTES:**

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 aust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 75 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.5 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Miscellaneous welds which do not call for preapproved weld procedures are nevertheless subject to rejection for poor workmanship. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and the Specifications.

Unless otherwise noted, all parts shall be galvanized in accordance with the Specifications.

Special design require submission of shop drawings in accordance with the item "Steel Structures".

SHEET 2 OF 2

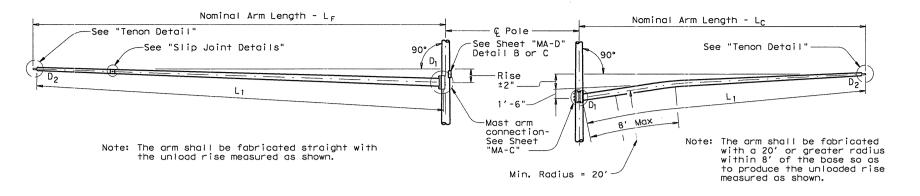


# TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)

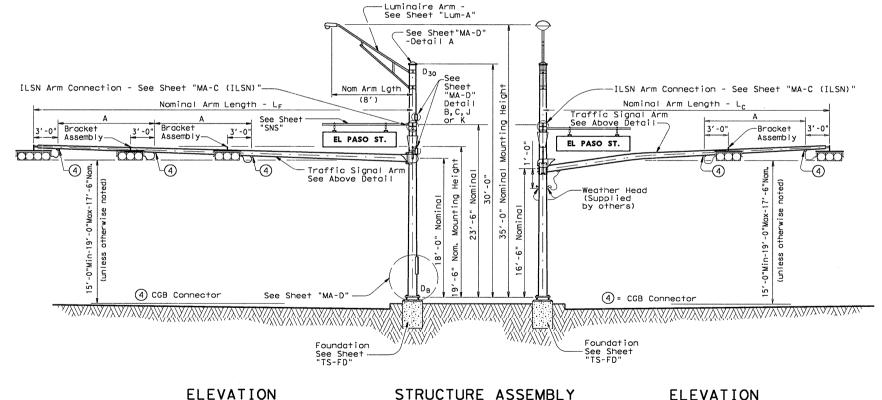
SMA-80(2)-96

| E: SMA-80.DGN     | DN: N | AS .    | ck: JSY     | DW: N     | MF     | CK: | JSY     |
|-------------------|-------|---------|-------------|-----------|--------|-----|---------|
| TxDOT August 1995 | DIST  | FED REG | FEDER       | AL AID PE | ROJECT |     | SHEET   |
| REVISIONS<br>96   | AUS   | 6       | CC          | 337-1-    | 29     |     | 178     |
| 30                |       | COUNTY  |             |           | SECT   | JOB | HIGHWAY |
|                   |       | WILLIA  | IAMSON 0337 |           |        | 029 | SH 29   |



### FIXED MOUNT TRAFFIC SIGNAL ARM

### CLAMP-ON TRAFFIC SIGNAL ARM



ELEVATION (Showing fixed mount arm)

(Showing clamp mount arm)

|     |        | TAB | LE O | F DIM | ENSIO | NS "A' |     |     |
|-----|--------|-----|------|-------|-------|--------|-----|-----|
| Arm | Length | ٦   | 24'  | 28'   | 32'   | 36'    | 40' | 44  |
| Arm | Type I | I   | 10'  | 11'   | 12'   | 13'    |     |     |
| Arm | Type I | П   |      |       | 10'   | 11'    | 12' | 12' |

### VIBRATION WARNING

Mast Arms of approximately 40'-0" or longer are subject to possible harmonic vertical vibrations in light wind conditions due to unusual combinations of signal numbers, weights or positions, arm-wind orientation, and arm-pole stiffness.

Arms shall be visually inspected in 5 to 20 mph wind conditions after signal head installation and, if vertical movements with a total excursion (max positive to max negative) of more than approximately 8" are observed at arm tip, damping devices or other means shall be fitted to the arm(s).

The necessary damping device(s) or other remedial measures shall be as recommended by the fabricator. Excessive vibrations shall not be allowed to continue for more than two days.

### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name signs and two traffic signal arms with length combinations as tabulated. The specified luminaire load applied at the end of luminaire arm equals 75 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.5 sa ft. specified internally lighted street name sign applied 4'-6" from the centerline of the pole equals 85 lbs vertical dead load plus the horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Miscellaneous welds which do not call for preapproved weld procedures are nevertheless subject to rejection for poor workmanship. Material, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and the Specifications.

Unless otherwise noted, all parts shall be galvanized in

Special designs require submission of shop drawings in accordance with the item "Steel Structures".

SHEET 1 OF 3



Texas Department of Transportation Traffic Operations Division

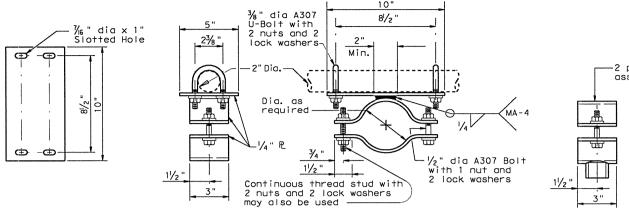
TRAFFIC SIGNAL SUPPORT STRUCTURES

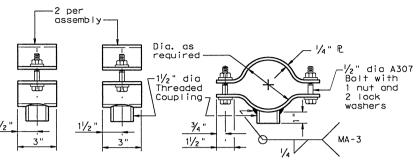
DUAL MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

DMA-80 (1)-96

| ILE: DMA-80.DGN     | DN: N | AS         | ck: JS | Y DW: I     | MMF    | CK: | JSY     |
|---------------------|-------|------------|--------|-------------|--------|-----|---------|
| C TxDOT August 1995 | DIST  | FED REC    | FE     | DERAL AID P | ROJECT |     | SHEET   |
| REVISIONS           | AUS   | 6          | -      | CC 337-1-   | -29    |     | 179     |
| 3-90                |       | COUNTY     |        |             | SECT   | JOB | HIGHWAY |
|                     |       | WILLIAMSON |        |             | 01     | 029 | SH 29   |



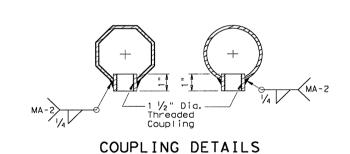


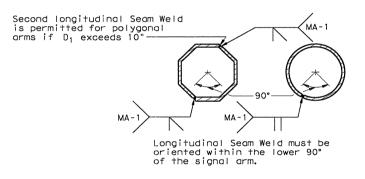
Stainless steel bands and cast bracket as in "Astro-Brac" with 1½" dia Threaded Coupling.

BRACKET ASSEMBLY DETAILS OPTION C

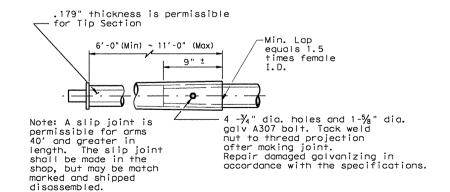
### BRACKET ASSEMBLY DETAILS OPTION A

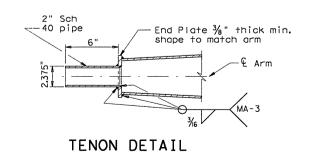
BRACKET ASSEMBLY DETAILS OPTION B





### ARM WELD DETAIL





Texas Department of Transportation

TRAFFIC SIGNAL

# SUPPORT STRUCTURES

DUAL MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

DMA-80 (2)-96

| FILE:  | DMA-80.DGN    | DN:  | AS .       | CK: | JSY    | DW:     | MF     | CK: | JSY     |
|--------|---------------|------|------------|-----|--------|---------|--------|-----|---------|
| © TxDO | T August 1995 | DIST | FED REG    |     | FEDERA | L AID P | ROJECT | ۰   | SHEET   |
| 5-96   | REVISIONS     | AUS  | 6          |     | CC     | 337-1-  | 29     |     | 180     |
| 3-90   |               |      | COUNTY     |     |        | CONTROL | SECT   | JOB | HIGHWAY |
|        |               |      | WILLIAMSON |     |        | 0337    | 01     | 029 | SH 29   |

### SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers and any additional hardware listed in the table.

| Nom       | inal     | 30' Poles Wi                     | <del></del>   | 24' Poles V | /ith ILSN   | 19' Poles With |   |
|-----------|----------|----------------------------------|---------------|-------------|-------------|----------------|---|
| Ar<br>Len | m<br>gth | See note above<br>two if ILSN at | tached) small | See note o  |             | and no         |   |
| LF        | Lc       | hand hole, cla                   | mp-on simplex |             |             | 300 71010      | 25010                                   |
| ft.       | ft.      | Designation                      | Quantity      | Designation | Quantity    | Designation    | Quantity                                |
| 20        | 20       | 2020L-80                         |               | 20205-80    |             | 2020-80        |   |
| 24        | 20       | 2420L-80                         |               | 24205-80    |             | 2420-80        |   |
| 24        | 24       | 2424L-80                         |               | 24245-80    |             | 2424-80        |   |
|           | 20       | 2820L-80                         |               | 2820S-80    |             | 2820-80        |   |
| 28        | 24       | 2824L-80                         |               | 28245-80    |             | 2824-80        |   |
|           | 28       | 2828L-80                         |               | 28285-80    |             | 2828-80        |   |
|           | 20       | 3220L-80                         |               | 3220S-80    |             | 3220-80        |   |
| 7.0       | 24       | 3224L-80                         |               | 32245-80    |             | 3224-80        |   |
| 32        | 28       | 3228L-80                         |               | 32285-80    |             | 3228-80        |   |
|           | 32       | 3232L-80                         |               | 32325-80    |             | 3232-80        |   |
|           | 20       | 3620L-80                         |               | 3620S-80    |             | 3620-80        |   |
|           | 24       | 3624L-80                         |               | 36245-80    |             | 3624-80        |   |
| 36        | 28       | 3628L-80                         |               | 36285-80    |             | 3628-80        |   |
|           | 32       | 3632L-80                         |               | 36325-80    |             | 3632-80        |   |
|           | 36       | 3636L-80                         |               | 36365-80    |             | 3636-80        |   |
|           | 20       | 4020L-80                         |               | 4020S-80    |             | 4020-80        |   |
|           | 24       | 4024L-80                         |               | 40245-80    |             | 4024-80        |   |
| 40        | 28       | 4028L-80                         |               | 40285-80    |             | 4028-80        |   |
|           | 32       | 4032L-80                         |               | 4032S-80    |             | 4032-80        |   |
|           | 36       | 4036L-80                         |               | 4036S-80    |             | 4036-80        |   |
|           | 20       | 4420L-80                         |               | 4420S-80    |             | 4420-80        |   |
|           | 24       | 4424L-80                         |               | 4424S-80    |             | 4424-80        |   |
| 44        | 28       | 4428L-80                         |               | 44285-80    |             | 4428-80        |   |
|           | 32       | 4432L-80                         |               | 44325-80    |             | 4432-80        | *************************************** |
|           | 36       | 4436L-80                         |               | 4436S-80    | <del></del> | 4436-80        | *************************************** |

|                          | Type I Arm ( | 1 Signal) | Type ∐ Arm  | (2 Signals)                | Type III Arm                                | (3 Signals) |  |
|--------------------------|--------------|-----------|-------------|----------------------------|---|-------------|--|
| Nominal<br>Arm<br>Length | 1 CGB cor    |           | 1 Bracket   | Assembly (1)<br>Connectors | 2 Bracket Assemblies 1 and 3 CGB Connectors |             |  |
| ft.                      | Designation  | Quantity  | Designation | Quantity                   | Designation                                 | Quantity    |  |
| 20                       | 20I-80       |           |             |                            |   |             |  |
| 24                       | 241-80       |           | 24∐-80      |                            |   |             |  |
| 28                       | 281-80       |           | 28∐-80      |                            |   |             |  |
| 32                       |              |           | 32Ⅲ-80      |                            | 32111-80                                    |             |  |
| 36                       |              |           | 36II-80     |                            | 36III-80                                    |             |  |
| 40                       |              |           |             |                            | 40111-80                                    |             |  |
| 44                       |              |           |             | /                          | 44777-80                                    |             |  |

| Traffi                   | c Signal Arms  | (Clamp-On Moun-            | t) (1 per pole)                                    | Ship each arm                         | w/ the listed   | equipment attached |  |
|--------------------------|----------------|----------------------------|--|---------------------------------------|---|--------------------|--|
|                          | Type I Arm (   | 1 Signal)                  | Type ∐ Arm   | (2 Signals)                           | Type III Arm  | (3 Signals)        |  |
| Nominal<br>Arm<br>Length | 2 000 0011160  | tor and 1<br>s and washers | 1 Bracket Asse<br>Connectors, ar<br>w/bolts and wo | embly 1,3 CGB<br>nd 1 clamp<br>ashers | 2 Bracket Assemblies (1), 4 CGB<br>Connectors, and 1 clamp w/bolts<br>and washers |                    |  |
| ft.                      | Designation    | Quantity                   | Designation  | Quantity                              | Designation   | Quantity           |  |
| 20                       | 20I-80         |                            |  |                                       |   |                    |  |
| 24                       | 241-80         |                            | 24Ⅲ-80   |                                       |   |                    |  |
| 28                       | 28I-80         |                            | 28Ⅲ-80   |                                       |   |                    |  |
| 32                       |                |                            | 32Ⅲ-80   |                                       | 32III-80  |                    |  |
| 36                       |                |                            | 36Ⅲ-80   |                                       | 36Ⅲ-80  |                    |  |
| Lumino                   | niro Arme (1 e | 201 201                    |  |                                       |   |                    |  |

| Nominal Arm Length     | Quantity     |
|------------------------|--------------|
| 8' Arm                 |              |
| Anchor Bolt Assemblies | (1 per pole) |

ILSN Arm (1 or 2 per pole) ship with clamps, bolts and washers

| Nor | ninal Arı | m Length | Quantity |
|-----|-----------|----------|----------|
| 7'  | Arm       |          |          |
| 9'  | Arm       |          |          |

|   | Anchor<br>Bolt<br>Diameter | Anchor<br>Bolt<br>Length | Quantity |
|---|----------------------------|--------------------------|----------|
| ı | 1 1/2"                     | 3'-4"                    |          |
| l | 1 3/4"                     | 3'-10"                   |          |
| ı | 2"                         | 4'-3"                    |          |

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, 4 lock washers and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

① Supply Option "A" unless otherwise noted

| AR  | MS  |                | ROUND | POLES           |      |       |      | POL  | YGONAL F        | POLES |       | <u> </u>           |
|-----|-----|----------------|-------|-----------------|------|-------|------|------|-----------------|-------|-------|--------------------|
| LF  | Lc  | D <sub>B</sub> | D19   | D <sub>24</sub> | D 30 | 2)thk | Dв   | D19  | D <sub>24</sub> | D 30  | 2)thk | Foundation<br>Type |
| ft. | ft. | in.            | in.   | in.             | in.  | in.   | in.  | in.  | in.             | in.   | in.   | 1,700              |
| 20  | 20  | 11.5           | 8.8   | 8.1             | 7.3  | .179  | 12.5 | 9.5  | 8.7             | 7.8   | .179  | 30-A               |
| 24  | 20  | 12.0           | 9.3   | 8.6             | 7.8  | .179  | 13.0 | 10.0 | 9.2             | 8.3   | .179  | 30-A               |
| 24  | 24  | 12.0           | 9.3   | 8.6             | 7.8  | .179  | 13.0 | 10.0 | 9.2             | 8.3   | . 239 | 30-A               |
|     | 20  | 12.5           | 9.8   | 9.1             | 8.3  | .179  | 12.0 | 9.0  | 8.2             | 7.3   | . 239 | 30-A               |
| 28  | 24  | 12.5           | 9.8   | 9.1             | 8.3  | .179  | 12.0 | 9.0  | 8.2             | 7.3   | . 239 | 30-A               |
|     | 28  | 13.0           | 10.3  | 9.6             | 8.8  | .179  | 12.5 | 9.5  | 8.7             | 7.8   | . 239 | 30-A               |
|     | 20  | 13.0           | 10.3  | 9.6             | 8.8  | .179  | 12.5 | 9.5  | 8.7             | 7.8   | . 239 | 30-A               |
|     | 24  | 13.0           | 10.3  | 9.6             | 8.8  | .179  | 12.5 | 9.5  | 8.7             | 7.8   | . 239 | 30-A               |
| 32  | 28  | 12.0           | 9.3   | 8.6             | 7.8  | . 239 | 13.0 | 10.0 | 9.2             | 8.3   | . 239 | 30-A               |
|     | 32  | 12.0           | 9.3   | 8.6             | 7.8  | . 239 | 13.5 | 10.5 | 9.7             | 8.8   | . 239 | 36-A               |
|     | 20  | 12.0           | 9.3   | 8.6             | 7.8  | . 239 | 13.5 | 10.5 | 9.7             | 8.8   | . 239 | 36-A               |
|     | 24  | 12.0           | 9.3   | 8.6             | 7.8  | . 239 | 13.5 | 10.5 | 9.7             | 8.8   | . 239 | 36-A               |
| 36  | 28  | 12.5           | 9.8   | 9.1             | 8.3  | .239  | 13.5 | 10.5 | 9.7             | 8.8   | . 239 | 36-A               |
|     | 32  | 12.5           | 9.8   | 9.1             | 8.3  | .239  | 13.5 | 10.5 | 9.7             | 8.8   | . 239 | 36-A               |
|     | 36  | 12.5           | 9.8   | 9.1             | 8.3  | .239  | 14.0 | 11.0 | 10.2            | 9.3   | . 239 | 36-A               |
|     | 20  | 12.5           | 9.8   | 9.1             | 8.3  | . 239 | 14.0 | 11.0 | 10.2            | 9.3   | . 239 | 36-A               |
| 1   | 24  | 12.5           | 9.8   | 9.1             | 8.3  | . 239 | 14.0 | 11.0 | 10.2            | 9.3   | . 239 | 36-A               |
| 40  | 28  | 13.0           | 10.3  | 9.6             | 8.8  | . 239 | 14.0 | 11.0 | 10.2            | 9.3   | . 239 | 36-A               |
|     | 32  | 13.0           | 10.3  | 9.6             | 8.8  | .239  | 15.0 | 12.0 | 11.2            | 10.3  | . 239 | 36-A               |
|     | 36  | 13.5           | 10.8  | 10.1            | 9.3  | .239  | 15.0 | 12.0 | 11.2            | 10.3  | . 239 | 36-A               |
|     | 20  | 13.5           | 10.8  | 10.1            | 9.3  | .239  | 15.0 | 12.0 | 11.2            | 10.3  | . 239 | 36-A               |
|     | 24  | 13.5           | 10.8  | 10.1            | 9.3  | .239  | 15.0 | 12.0 | 11.2            | 10.3  | . 239 | 36-A               |
| 44  | 28  | 13.5           | 10.8  | 10.1            | 9.3  | . 239 | 15.0 | 12.0 | 11.2            | 10.3  | . 239 | 36-A               |
|     | 32  | 14.0           | 11.3  | 10.6            | 9.8  | .239  | 15.5 | 12.5 | 11.7            | 10.8  | . 239 | 36-B               |
|     | 36  | 14.0           | 11.3  | 10.6            | 9.8  | .239  | 15.5 | 12.5 | 11.7            | 10.8  | . 239 | 36-B               |

| Arm      |      | ROUND          | ARMS |       |        | POLYGONAL ARMS |                |       |        |        |  |
|----------|------|----------------|------|-------|--------|----------------|----------------|-------|--------|--------|--|
| LF or LC | Lı   | D <sub>1</sub> | D 2  | 2 thk | Rise   | L,             | D <sub>1</sub> | 3 D 2 | 2) thk | Rise   |  |
| ft.      | ft.  | in.            | in.  | in.   | Rise   | ft.            | in.            | in.   | in.    | Rise   |  |
| 20       | 19.1 | 6.5            | 3.8  | .179  | 1′-9"  | 19.1           | 7.0            | 3.5   | .179   | 1′-8"  |  |
| 24       | 23.1 | 7.5            | 4.3  | .179  | 1′-10" | 23.1           | 7.5            | 3.5   | .179   | 1′-9"  |  |
| 28       | 27.1 | 8.0            | 4.2  | .179  | 1'-11" | 27.1           | 8.0            | 3.5   | .179   | 1'-10" |  |
| 32       | 31.0 | 9.0            | 4.7  | .179  | 2'-1"  | 31.0           | 9.0            | 3.5   | .179   | 2′-0"  |  |
| 36       | 35.0 | 9.5            | 4.6  | .179  | 2'-4"  | 35.0           | 10.0           | 3.5   | .179   | 2'-1"  |  |
| 40       | 39.0 | 9.5            | 4.1  | . 239 | 2′-8"  | 39.0           | 9.5            | 3.5   | . 239  | 2'-3"  |  |
| 44       | 43.0 | 10.0           | 4.1  | . 239 | 2'-11" | 43.0           | 10.0           | 3.5   | . 239  | 2'-6"  |  |

D<sub>B</sub> = Pole Base O.D.
D<sub>19</sub> = Pole Top O.D.
with no Luminaire and no ILSN
D<sub>24</sub> = Pole Top O.D. with ILSN
w/out Luminaire
D<sub>30</sub> = Pole Top O.D.
with Luminaire

② Thickness shown are minimums, thicker materials may be used.

 $\begin{tabular}{ll} \begin{tabular}{ll} \beg$ 

D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
LF = Fixed Arm Length
LC = Clamp-on Arm Length
(36' Max)

SHEET 3 OF 3



Texas Department of Transportation

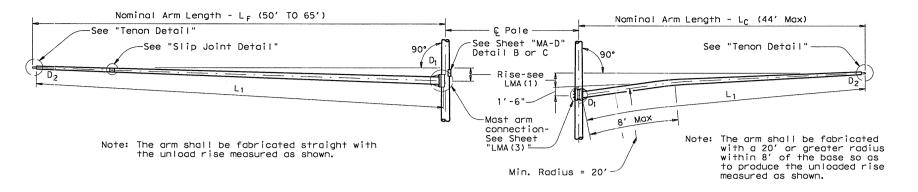
Traffic Operations Division

### TRAFFIC SIGNAL SUPPORT STRUCTURES

DUAL MAST ARM ASSEMBLY (80 MPH WIND ZONE)

DMA-80 (3)-96

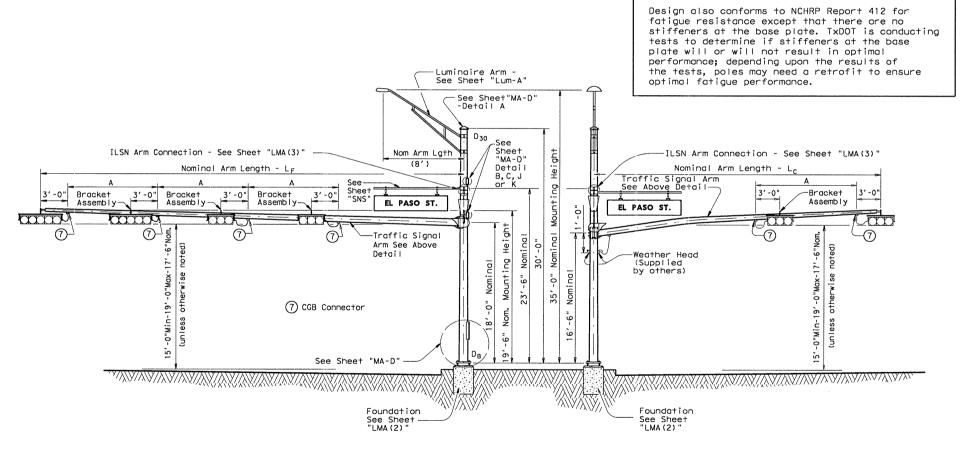
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|---------------------|-------|------------|---------|-------------|--------|-----|---------|
| C)TxDOT August 1995 | DIST  | FED REG    | FEDER   | AL AID PE   | ROJECT | e   | SHEET   |
| REVISIONS           | AUS   | 6          | CC      | CC 337-1-29 |        |     |         |
| 5-96                |       | COUNTY     |         |             | SECT   | JOB | HIGHWAY |
|                     |       | WILLIAMSON |         |             | 01     | 029 | SH 29   |



### FIXED MOUNT TRAFFIC SIGNAL ARM

### CLAMP-ON TRAFFIC SIGNAL ARM

(If required, See DMA-80 or DMA-100 Standard Sheets for Clamp-on Arm Details)



ELEVATION
(Showing fixed mount arm)

STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp mount arm)

| TABLE OF DIMENSIONS "A" |     |     |     |     |     |     |     |     |     |     |  |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Arm Length              | 24' | 28' | 32' | 36' | 40' | 44' | 50' | 55' | 60' | 65' |  |
| Arm Type Ⅱ              | 10' | 11' | 12' | 13' |     |     |     |     |     |     |  |
| Arm Type Ⅲ              |     |     | 10' | 11′ | 12' | 12' |     |     |     |     |  |
| Arm Type IV             |     |     |     |     |     |     | 12' | 12' | 12' | 12' |  |

### VIBRATION WARNING

Mast Arms of approximately 40′-0" or longer are subject to possible harmonic vertical vibrations in light wind conditions due to unusual combinations of signal numbers, weights or positions, arm-wind orientation, and arm-pole stiffness.

Arms shall be visually inspected in 5 to 20 mph wind conditions after signal head installation and, if vertical movements with a total

Arms shall be visually inspected in 5 to 20 mph wind conditions after signal head installation and, if vertical movements with a total excursion (max positive to max negative) of more than approximately 8" are observed at arm tip, damping devices or other means shall be fitted to the arm(s).

The necessary damping device(s) or other remedial measures shall be as recommended by the fabricator. Excessive vibrations shall not be allowed to continue for more than two days.

If damping plate is used, the size shall be 16" x 66". The plate must be installed directly above traffic light located nearest the free end.

### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name signs and two traffic signal arms with limited length combinations. The specified luminaire load applied at the end of luminaire arm equals 75 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.5 sq ft. The specified internally lighted street name sign applied 4'-6" from the centerline of the pole equals 85 lbs vertical dead load plus the horizontal wind load on an effective projected area of 11.5 sq ft. For 50 ft. to 65 ft.fixed-mount mast arm the specified signal load applied at the end of the traffic signal arm equals 310 lbs vertical dead load plus the horizontal wind load on an effective projected area of 52.0 sq ft. (actual area times drag coefficient). For clamp-on mast arm, the specified signal load applied at the end of the traffic signal arms equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft. (actual area times drag cofficient).

Except as noted in sheets 1 thru 3 of 3, also refer to Standard Sheet "MA-D" for pole details, "LUM-A for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Miscellaneous welds which do not call for preapproved weld procedures are nevertheless subject to rejection for poor workmanship. Material, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and the Specifications.

Unless otherwise noted, all parts shall be galvanized in accordance with the Specifications.

Special designs require submission of shop drawings in accordance with the item "Steel Structures".



Sheet 1 of 4

 © TXDOT JULY 2000
 DN- JSY
 CK:- ARC
 DN:- TGG
 CK:- JSY

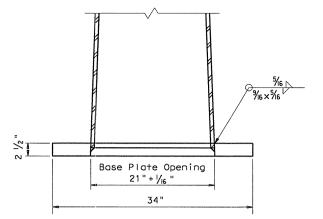
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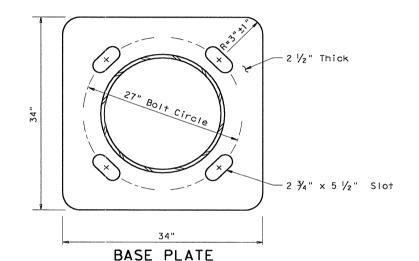
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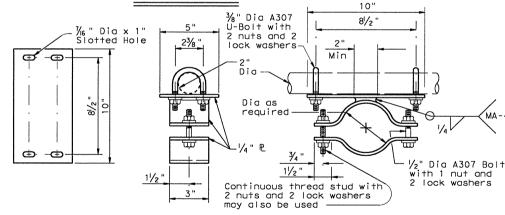
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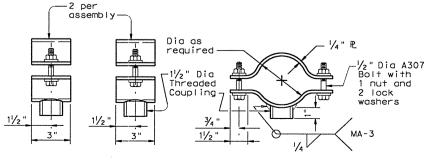


### POLE CONNECTION TO BASE PLATE

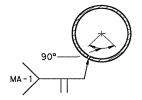




### BRACKET ASSEMBLY DETAILS OPTION A

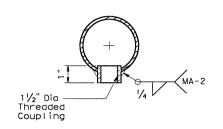


BRACKET ASSEMBLY DETAILS OPTION B

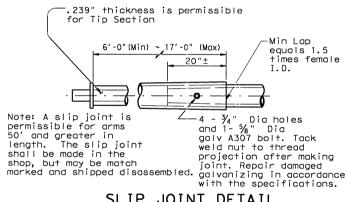


Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.

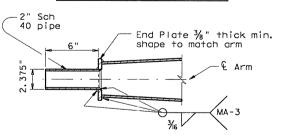
### ARM WELD DETAIL



### COUPLING DETAIL



### SLIP JOINT DETAIL



## TENON DETAIL

Stainless steel bands and cast bracket as in "Astro-Brac" with 1½" Dia Threaded

BRACKET ASSEMBLY OPTION C

| Arm                  |                |      |                 |      |       |                    |
|----------------------|----------------|------|-----------------|------|-------|--------------------|
| Length               | D <sub>B</sub> | D19  | D <sub>24</sub> | D 30 | ① thk | Foundation<br>Type |
| ft.                  | in.            | in.  | in.             | in.  | in.   | .,,,,,             |
| 50′, 55′<br>60′, 65′ | 21.0           | 18.3 | 17.6            | 16.8 | .3125 | 48-A               |

| Arm    | ROUND ARMS |      |                |       |        |  |  |
|--------|------------|------|----------------|-------|--------|--|--|
| Length | L,         | D,   | D <sub>2</sub> | ① thk | Rise   |  |  |
| ft.    | ft.        | in.  | in.            | in.   | (±2")  |  |  |
| 50     | 49         | 18.5 | 11.7           | .3125 | 3'- 3" |  |  |
| 55     | 54         | 18.5 | 11.0           | .3125 | 3'- 7" |  |  |
| 60     | 59         | 18.5 | 10.3           | .3125 | 3'-11" |  |  |
| 65     | 64         | 18.5 | 9.6            | .3125 | 4'- 4" |  |  |

DB = Pole Base O.D. Die Pole Top O.D. with no Luminaire and no ILSN

D<sub>24</sub> = Pole Top O.D. with ILSN

w/out Luminaire D<sub>30</sub> = Pole Top O.D. with Luminaire

= Arm Base O.D.

17 Thickness shown is minimum, thicker materials may be used.

| ANCHOR BOLT & TEMPLATE SIZE |             |               |                  |                |     |     |  |
|-----------------------------|-------------|---------------|------------------|----------------|-----|-----|--|
| Bolt<br>Dia<br>in           | Length<br>‡ | Top<br>Thread | Bottom<br>Thread | Bolt<br>Circle | R2  | Rı  |  |
| 2 1/2"                      | 5′-3"       | 10"           | 3"               | 27"            | 16" | 11" |  |

<sup>†</sup>Min dimension given, longer bolts are acceptable.

- 1) Anchor bolt design develops the foundation capacity given under Foundation Design Laods.
- Poundation Design Loads are the allowable moments and shears at the base of the structure.
- (3) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- 4) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- (5) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

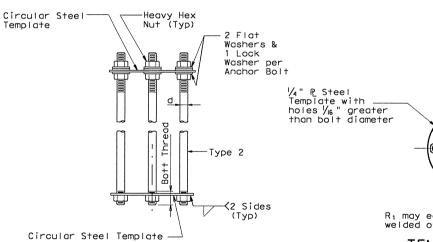
| FOUNDATION DESIGN TABLE |                     |              |                   |         |           |          |             |             |            |                |                |            |           |            |
|-------------------------|---------------------|--------------|-------------------|---------|-----------|----------|-------------|-------------|------------|----------------|----------------|------------|-----------|------------|
| FDN<br>TYPE             | DRILLED SHAFT DIA V |              | FORCING<br>TEEL   | DRILLED | SHAFT LE  | NGTH-ft  | ANC         | HOR BOI     | T DES      | IGN            | FOUNDA<br>DESI | GN @       |           |            |
|                         |                     | VERT<br>BARS | SPIRAL<br>& PITCH | TEXAS C | ONE PENET | <u>†</u> | BOLT        | Fy<br>(ksi) | BOLT       | ANCHOR<br>TYPE | MOMENT         | SHEAR      | TYPICAL A | PPLICATION |
| 48-A                    | 48"                 |              | #4 at 6"          | 21.9    | 15        | 14.7     | DIA<br>2 ½" | 55          | DIA<br>27" | 2              | K-ft<br>490    | Kips<br>10 | Mast arm  | assembly.  |
|                         | 1                   |              |                   |         |           |          |             |             |            |                |                |            |           | 1          |

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

 $D_2$  = Arm End O.D.

= Shaft Length

= Nominal Arm Length



NUT ANCHOR (TYPE 2) ANCHOR BOLT ASSEMBLY

Bolt Circle R<sub>1</sub> may equal R<sub>2</sub> if plate is welded of 3 or more segments. TEMPLATE DETAIL

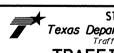
Typ

permissible

penetration

template

splice



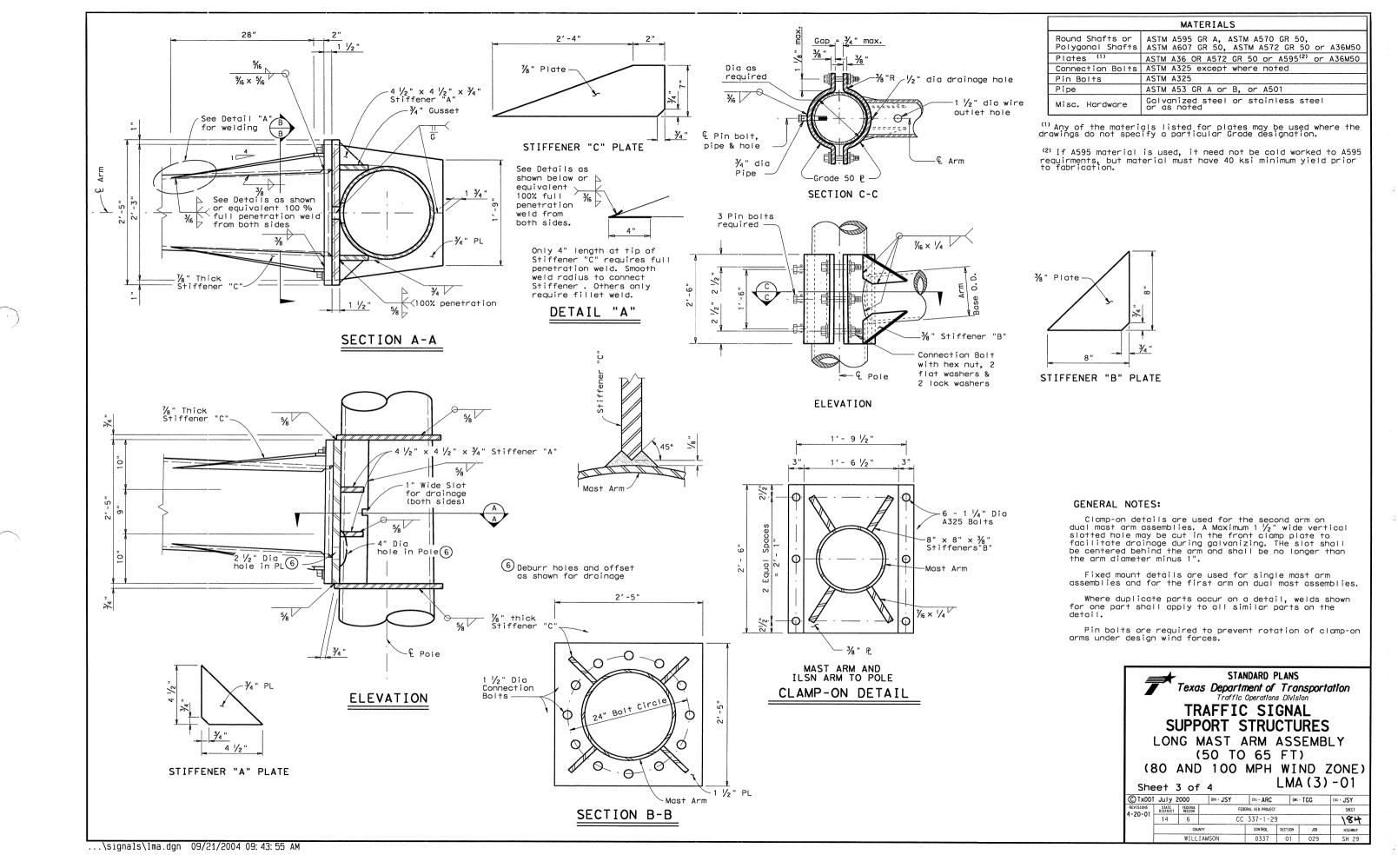
STANDARD PLANS Texas Department of Transportation Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY

(50 TO 65 FT) (80 AND 100 MPH WIND ZONE) LMA(2)-01

Sheet 2 of 4 TxDOT July 2000 DN: - JSY CK: - ARC DW: - TGG ck: - JSY REVISIONS STATE FEDERAL DISTRICT REGION FEDERAL AID PROJECT CC 337-1-29 183 CONTROL SECTION JOB WILLIAMSON 0337 01 029

...\signals\lma.dgn 09/21/2004 09: 43: 55 AM



|      |            |               | Shippin                              | g Parts List |             |                    |   |
|------|------------|---------------|--------------------------------------|--------------|-------------|--------------------|---|
|      |            |               | following attach<br>ny additional ha |              |             | cap, fixed arm con | nection                                 |
| Nomi |            |               | ith Luminaire                        | 24' Poles    |             | 19' Pole           | s with no                               |
| Arm  |            |               | e plus: one (or                      | See note al  |             |                    | and no ILSN                             |
| Leng | th         |               | ttached) small                       | one small l  |             | See note           |   |
| Long | •••        | 1             | amp-on simplex                       | one one i    | 10110 11010 | 300 71011          | o above                                 |
|      |            | nana nore, or |                                      | Mast Arm     |             |                    |   |
| Lf f | † <u>.</u> | Designation   | Quantity                             | Designation  | Quantity    | Designation        | Quantity                                |
| 50   |            | 50L           |                                      | 50\$         |             | 50                 |   |
| 55   |            | 55L           |                                      | 55S          |             | 55                 |   |
| 60   |            | 60L           | 4                                    | 60\$         |             | 60                 |   |
| 65   |            | 65L           | •                                    | 65S          |             | 65                 |   |
|      |            |               | Dual                                 | Mast Arm     | I           |                    |   |
| Lf   | Lc         |               |                                      |              |             |                    |   |
| ft.  | ft.        | Designation   | Quantity                             | Designation  | Quantity    | Designation        | Quantity                                |
| 50   | 20         | 5020L         |                                      | 5020S        |             | 5020               |   |
|      | 24         | 5024L         |                                      | 50245        |             | 5024               |   |
|      | 28         | 5028L         |                                      | 5028S        |             | 5028               |   |
|      | 32         | 5032L         |                                      | 50325        |             | 5032               |   |
|      | 36         | 5036L         |                                      | 5036S        |             | 5036               | *************************************** |
|      | 40         | 5040L         |                                      | 5040S        |             | 5040               |   |
|      | 44         | 5044L         |                                      | 50445        |             | 5044               |   |
| 55   | 20         | 5520L         |                                      | 5520S        |             | 5520               |   |
|      | 24         | 5524L         |                                      | 5524\$       |             | 5524               |   |
|      | 28         | 5528L         |                                      | 5528S        |             | 5528               |   |
|      | 32         | 5532L         |                                      | 5532S        |             | 5532               |   |
|      | 36         | 5536L         |                                      | 5536S        |             | 5536               |   |
|      | 40         | 5540L         |                                      | 5540S        |             | 5540               |   |
|      | 44         | 5544L         |                                      | 5544S        |             | 5544               |   |
| 60   | 20         | 6020L         |                                      | 6020S        |             | 6020               |   |
|      | 24         | 6024L         |                                      | 60245        |             | 6024               |   |
|      | 28         | 6028L         |                                      | 60285        |             | 6028               |   |
|      | 32         | 6032L         |                                      | 60325        |             | 6032               |   |
|      | 36         | 6036L         |                                      | 6036S        |             | 6036               |   |
|      | 40         | 6040L         |                                      | 6040S        |             | 6040               |   |
|      | 44         | 6044L         |                                      | 60445        |             | 6044               |   |
| 55   | 20         | 6520L         |                                      | 6520S        |             | 6520               |   |
|      | 24         | 6524L         |                                      | 65245        |             | 6524               |   |
|      | 28         | 6528L         |                                      | 65285        |             | 6528               |   |
|      | 32         | 6532L         |                                      | 6532S        |             | 6532               |   |
|      | 36         | 6536L         |                                      | 6536S        |             | 6536               |   |
|      | 40         | 6540L         |                                      | 6540S        |             | 6540               |   |
|      | 44         | 6544L         |                                      | 6544S        |             | 6544               |   |

|        | 40      | 6540L                                   |          | (    | 5540S           |
|--------|---------|---|----------|------|-----------------|
|        | 44      | 6544L                                   |          | (    | 5544S           |
| Fou    | ndation | Summary Table *                         | *        |      |                 |
|        | L       | ocation                                 | Avg. N   | No.  | Drill Shaft *** |
| Ident. |         |   | Blow/ft. | Each | Length (feet)   |
|        |         | •                                       |          |      | 48-A            |
|        | SH 29   | 9 & CR 265W                             |          |      |                 |
|        | POLE:   | S A, B, C & D                           | 10       | 4    | 22/EA           |
|        |         |   |          |      |                 |
|        |         |   |          |      |                 |
|        |         |   |          |      |                 |
|        |         | *************************************** |          |      |                 |
|        |         |   |          |      |                 |
|        |         |   |          | -    |                 |
|        |         |   |          |      |                 |
|        |         |   |          | I    |                 |

Total Drill Shaft Length

### Notes

- \* Supply Option "A" unless otherwise noted
- \*\* Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- \*\*\* Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

|   |                           |             | Shi  | ipping |  |  |  |
|---|---------------------------|-------------|------|--------|--|--|--|
| Traffic Signal Arms (Fixed Mount) (1 per pole |                           |             |      |        |  |  |  |
| Ship eacl                                     | n arm with lister         | d equipment | atto | iched  |  |  |  |
| Nominal                                       | Type IV Arm (4 Signals) * |             |      |        |  |  |  |
| Arm   | 3 Bracket Assembly *      |             |      |        |  |  |  |
| Length  | and 4 CGB Connectors      |             |      |        |  |  |  |
| ft.   | Designation               | Quantity    |      |        |  |  |  |
| 50  | 50IV                      |             |      |        |  |  |  |
| 55  | 55 I V                    |             |      |        |  |  |  |
| 60  | 60 I V                    |             |      |        |  |  |  |
| 65  | 65 I V                    |             |      |        |  |  |  |
|   |                           |             |      |        |  |  |  |

|                    | <u> </u>                                  |               |
|--------------------|---|---------------|
| hipping Parts List |   |               |
| er pole)           |   |               |
| rached             | Luminaire Arms (1                         | per 30' pole) |
| <u> </u>           | Nominal Arm Length                        | Quantity      |
|                    | 8' Arm                                    |               |
|                    | ILSN Arm (Max. 2 per pol<br>clamps, bolts |               |
|                    | Nominal Arm Length                        | Quantity      |
| -                  | 7' Arm                                    |               |
|                    | 9' Arm                                    |               |

| Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached |                 |               |                 |              |                 |                            |  |  |
|---|-----------------|---------------|-----------------|--------------|-----------------|----------------------------|--|--|
|   | Type I Arm (    | 1 Signal)     | Type II Arm (   | 2 Signals) * | Type III Arm    | Type III Arm (3 Signals) * |  |  |
| Nominal   | 2 CGB connector | r and 1 clamp | 1 Bracket Asser | nbly * and 3 | 2 Bracket Asser | nbly * and 4               |  |  |
| Arm   | w/bolts and     | d washers     | CGB connectors, | and 1 clamp  | CGB connectors, | and 1 clamp                |  |  |
| Length  |                 |               | w/bolts and     | washers      | w/bolts and     | washers                    |  |  |
| ft.   | Designation     | Quantity      | Designation     | Quantity     | Designation     | Quantity                   |  |  |
| 20  | 201-80          |               |                 |              |                 |                            |  |  |
| 24  | 241-80          |               | 2411-80         |              |                 |                            |  |  |
| 28  | 281-80          |               | 2811-80         |              |                 |                            |  |  |
| 32  |                 |               | 3211-80         |              | 32111-80        |                            |  |  |
| 36  |                 |               | 3611-80         |              | 36111-80        |                            |  |  |
| 40  |                 |               |                 |              | 40111-80        |                            |  |  |
| 44  |                 |               |                 |              | 44111-80        |                            |  |  |

| Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached  |                 |               |                 |              |                |               |  |
|---|-----------------|---------------|-----------------|--------------|----------------|---------------|--|
| Type I Arm (1 Signal) Type II Arm (2 Signals) * Type III Arm (3 Signals) * |                 |               |                 |              |                | (3 Signals) * |  |
| Nominal   | 2 CGB connector | r and 1 clamp | 1 Bracket Assen | nbly * and 3 | 2 Bracket Asse | embly * and 4 |  |
| Arm   | w/bolts and     | d washers     | CGB connectors, | and 1 clamp  | CGB connectors | , and 1 clamp |  |
| Length  |                 |               | w/bolts and     | washers      | •              |               |  |
| ft.   | Designation     | Quantity      | Designation     | Quantity     | Designation    | Quantity      |  |
| 20  | 201-100         |               |                 |              |                |               |  |
| 24  | 241-100         | ·             | 2411-100        |              |                |               |  |
| 28  | 281-100         |               | 2811-100        |              |                |               |  |
| 32  |                 |               | 3211-100        |              | 32111-100      |               |  |
| 36  |                 |               | 36 I I - 100    |              | 36111-100      |               |  |
| 40  |                 |               |                 |              | 40111-100      |               |  |
| 44  |                 |               |                 |              | 44111-100      |               |  |

| Anchor Bo | olt Assemblies | (1 per pole) |
|-----------|----------------|--------------|
| Anchor    | Anchor         |              |
| Bol†      | Bolt           |              |
| Diameter  | Length         | Quantity     |
| 2 1/2 "   | 5' - 3"        |              |

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, 4 lock washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Abbreviations

Fixed Arm Length

Clamp-on Arm

Length (44' Max.)



LONG MAST ARM ASSEMBLY PARTS LIST

LMA(4)-01

| ,,,, |                   |                   |            |                     |         |           |           |  |  |
|------|-------------------|-------------------|------------|---------------------|---------|-----------|-----------|--|--|
| xDOT | Novemb            | er 200            | 0 DN: - JK | ck:- GRB            |         | DM: - FDN | cx: - CAL |  |  |
| ONS  | STATE<br>DISTRICT | FEDERAL<br>REGION |            | FEDERAL AID PROJECT |         |           |           |  |  |
| -01  | 14                | 6                 |            |                     |         |           |           |  |  |
|      |                   | COUN              | iTY        | CONTROL             | SECTION | 108       | HIGHWAY   |  |  |
|      |                   | WILLI             | AMSON      | 0337                | 01      | 029       | SH 29     |  |  |

#### GENERAL REQUIREMENTS FOR ALL ELECTRICAL WORK

The location of all conductors, conduits, junction boxes, ground boxes, and electrical services is diagrammatic only and may be shifted by the Engineer to accommodate local conditions.

Materials shall be new and unused. Materials and installation shall comply with the applicable provisions of the National Electrical Code (NEC), National Electrical Manufacturers Association (NEMA) standards, and shall be Underwriters Laboratories (UL) Listed unless otherwise shown on the plans or specifications or approved by the Engineer in writing. Faulty fabrication or poor workmaship in any material, equipment, or installation shall be justification for rejection. When reference is made to UL, it can be considered to mean a Nationally Recognized Independent Testing Lab (NRTL). Comparable standards of Canadian Standard Association, Electrical Testing Laboratories or Factory Mutual can be equal to the referenced UL standard. Where reference is made to NEMA listed devices, IEC listed devices shall not be considered to be an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing.

With the exception of high strength bolts, miscellaneous nuts, bolts and hardware may be stainless steel when plans specify galvanized, provided that bolts are 1/2 inch or less in diameter. The Contractor shall provide the following electrical test instruments as required by the Engineer to confirm compliance with the contract and the NEC. Those test instruments are voltmeter, amp probe, megger (1000 volt DC) and torque wrenches. All meters shall have been properly calibrated within one year. Calibration certification shall be provided to the Engineer upon request. Calibration certification tag shall also be applied to the meter. The Contractor shall operate meters during inspection as requested by the Engineer. Grounding shall be as shown on the plans and in accordance with the NEC. Metallic conduit, light poles, luminaires on bridge structures, and all metal enclosures shall be bonded to the system-grounding conductor. The ground rod in each ground box or junction box at the bridge ends, and in each ground box installed for underposs lighting will also be bonded to the system grounding conductor. The grounding conductor shall be bare or, if insulated, shall be green. Ground rods, connectors, and bonding jumpers will not be paid for separately, but will be subsidiary to the various bid items.

#### SUBMITTALS:

The contractor shall submit for approval six (6) copies of catalog cut sheets for each of the following three (3) categories. Category 1. Electrical services including photocell.

Catagory 2. Breakaway disconnects, heat shrink tubing, heat shrink filler tape, GelCaps and ground boxes which will include loading capacity certification.

Category 3. Highmast assembly kits, when applicable. See Item 614 "Highmast Illumination Assemblies". Submittals shall be legible and shall be marked to indicate which product on a cut sheet is to be supplied. Where manufacturers provide warranties and guarantees as a customary trade practice, the Contractor shall furnish to the State such warranties and guarantees.

Any deviation from plans or specifications, including deviations due to plan error shauld be prominently displayed on the submittal. Any changes not prominently noted in submittal and incorporated into the work without proper authorization will constitute grounds for rejection of that portion of the work.

#### II. CONDUIT

#### A. MATERIALS

- 1. Conduit and fittings shall be UL Listed for the intended use shown on plan sheets.
- 2. Conduit shall be the type shown by descriptive code or shown elsewhere on the plans. Substitution of the various types of conduits will not be permitted. All flexible conduit in rigid metallic conduit (RMC) systems shall be Liquidtight Flexible Mon-metallic conduit (LFNC).
- 3. All exposed conduits shall be RMC, unless otherwise specifically shown on the plans. All metal conduit shall be properly grounded.
- 4. Couplings, connectors, conduit bodies, grounding bushings, and offset nipples for RMC shall be electro-zinc plated steel or hot dipped galvanized malleable iron, threaded or threadless compression type, rain-tight and shall be UL listed for the intended use.
- 5. Expansion joints for metal conduit shall be provided with an internal or external bonding jumper and shall be UL listed.
- 6. Unless otherwise shown on the plans, junction box minimum sizes shall be in accordance with the following table which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes are present, the conductors shall be counted as if all are of the larger size. Situations not applicable to the table shall be sized in accordance with NEC 370-28.

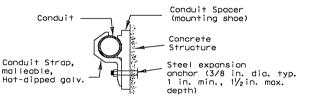
| AWG | 3 CONDUCTORS   | 5 CONDUCTORS   | 7 CONDUCTORS   |
|-----|----------------|----------------|----------------|
| #1  | 10" x 10" x 4" | 12" x 12" x 4" | 16" x 16" x 4" |
| #2  | 8" × 8" × 4"   | 10" x 10" x 4" | 12" x 12" x 4" |
| #4  | 8" x 8" x 4"   | 10" x 10" x 4" | 10" x 10" x 4" |
| #6  | 8" x 8" x 4"   | 8" x 8" x 4"   | 10" x 10" x 4" |
| #8  | 8" x 8" x 4"   | 8" x 8" x 4"   | 8" x 8" x 4"   |

- 7. RMC system junction boxes equal to or smaller, in any dimension, than 12 x 12 x 6 (HxWxD), surface mounted and containing conductors #8 or larger, shall be hot dipped galvanized cost iron with minimum wall thickness of 3/16 inch, shall have external mounting lugs, and shall be UL listed Crouse-Hinds Type WAB, OZ/Gedney Type YS or approved equal. Unless otherwise shown elsewhere on the plans, RMC system junction boxes larger than the aforementioned boxes but equal to or smaller, in any dimension, than 18 x 18 x 6 (HxWxD) shall be 14-ga. stainless steel; RMC system junction boxes larger than 18 x 18 x 6 (HxWxD) shall be 12-ga. stainless steel. All metal junction boxes shall be equipped with a threaded hole or lug for grounding. Stainless steel boxes 12 x 12 x 6 and larger need not be UL Listed but shall meet the other requirements of the NEC and shall have ribs, stiffeners, or thicker metal and shall have external mounting feet. Junction boxes with an internal volume of more than 100 cu. in. may be supported by connection of two or more rigid metal conduits, where specifically shown on the plans or where approved by the Engineer.
- 8. Junction boxes containing only #10 or #12 AWG conductors shall be Crouse Hinds Type GRFX, Appleton Type JBOX, two-gang FD, or similar approved cast iron box. Boxes shall be sized according to NEC Table 370-16(a).
- 9. IMC and EMT conduit shall not be used unless specifically required by the plan layout sheets. Junction boxes in EMT conduit systems shall be made from galvanized sheeting and shall be UL listed and approved for outdoor use, unless otherwise noted on the plans. Sheet metal junction boxes shall be sized in accordance with the NEC. Junction boxes for IMC conduit systems shall meet the requirements of boxes used with RMC systems.
- 10. Junction boxes in PVC conduit systems shall be PVC, intended for outdoor use, unless otherwise noted on the plans.
- 11. Elbows in PVC conduit systems one inch and larger shall be rigid metal, with the exception of traffic signal systems which may have PVC elbows instead of rigid. If any part of the rigid metal elbow is buried less than 18 inches underground the elbow and rigid metal extension shall be grounded. Grounding shall be accomplished by means of a grounding bushing installed on the extension. Unless specifically shown on the plans, rigid metal elbows containing, or entering ground boxes containing only communications conductors, loop detectors, or other low voltage power limited circuits need not be grounded unless a ground wire is present in the conduit or ground box. The rigid metal elbows located in concrete foundations may be extended with PVC conduit and need not be grounded provided that the end of the elbow nearest the end of the conduit run exiting the foundation is at least 2 inches below the concrete. RMC elbows will not be eliminated. RMC elbows will not be paid for directly, but will be subsidiary to various bid items.
- 12. High-Density Polyethylene (HDPE) conduit shall meet the requirements of Item 622, Duct Cable, except that the HDPE conduit, when bid under Item 618, Conduit, shall not contain factory installed conductors. Fittings for HDPE conduit shall be UL listed as an electrical conduit connector or shall be thermally fused using an electrically heated wound wire resistance welding method. HDPE conduit may be substituted for bored schedule 40 or schedule 80 PVC conduit. When such substitution is made, bored HDPE shall be schedule 40 of the size PVC being replaced. The HDPE conduit shall transition to PVC (or RMC elbow when required) at the bore pit. Size and schedule shall be as shown on the plans. Substituted conduit may not be extended to ground boxes or foundations; RMC elbows shall be installed at ground boxes and foundations. RMC elbows will not be eliminated.
- 13. All conduit support hardware including straps, nuts, bolts, screws, retaining anchors and washers shall be hot dipped galvanized or stainless steel. Strut type conduit straps shall be stainless steel or hot dipped galvanized. Strut type straps need not be made of malleable type material. Stamped-coamium plated straps will not be allowed. Straps having only one mounting hole shall not be allowed for use on conduits 2 inches and larger with the exception of electrical service poles where stainless steel standoff straps will be allowed. Two piece conduit straps designed to be used with a mounting shoe shall be installed only with the correctly sized shoe.

#### B. CONSTRUCTION METHODS

- 1. Conduit in structures shall have expansion fittings at structure expansion joints. All straight runs of RMC conduit exposed on structures such as bridges shall have expansion joints installed at maximum intervals of 150 feet. Expansion joints shall be installed so they allow for movement of the conduit. Installation of the joint in such a manner that will not allow for movement shall be repaired at no expense to the state. The method of determining the final setting length of the expansion joint shall be provided to the Engineer upon request.
- 2. Conduit supports shall be spaced at maximum intervals of 5 feet. Conduit spacers shall be used with metal conduit placed on surfaces of concrete structures (See conduit mounting options).
- 3. Conduit supports shall not be attached directly to prestressed concrete beams except as shown specifically in the plans and approved by the Engineer.
- 4. Unless otherwise shown on the plans, conduit placed beneath existing roadways, driveways, or sidewalks, or after the base or surfacing operation has begun, shall be accomplished by jacking or boring. The Contractor shall back fill and compact the bare pits to the battom of the conduit prior to installing connection, conduit or duct cable to prevent bending of the connection.
- pits to the bottom of the conduit prior to installing connecting conduit or duct cable to prevent bending of the connection.

  5. Conduit trenched in the subgrade of new roadways shall be backfilled with excavated material, unless otherwise noted on the plans. Conduit trenched in the sub-base of new roadways shall be backfilled with cement-stabilized base.
- 6. Open ends of all conduit and raceways shall be fitted with temporary caps or plugs to prevent entry of dirt, debris and rodents during construction. The temporary cap may be constructed of duct tape, but in all cases shall be tightly fixed to the conduit and shall be durable. The contractor shall clean out the conduit and prove it clear in accordance with Standard Specifications Item 618.3 prior to installing any conductors.
- 7. Conduit entry into the top of enclosures such as safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes shall be made weatherproof using conduit sealing hubs, or threaded bosses.
- 8. A bonding jumper shall be installed from each grounding bushing to the nearest grounding rod, grounding lug, and/or equipment grounding conductor. All jumpers shall be the same size as equipment grounding conductor. Conduit used as casing under roadways for duct cable need not be grounded if duct extends full length through the casing. At electrical services, grounding electrode conductor shall be a solid Conper #6 AWG.
- 9. Metal junction boxes shall be bonded to the grounding conductor in accordance with the NEC.
- 10. Conduits entering ground boxes shall be placed so that the conduit ends shall be not less than 3 inches nor more than 6 inches from bottom of box (See ground box detail on sheet ED(3).
- 11. Conduit ends shall be sealed with heat shrink boots with waterproof sealant, urethane foam, or by other methods approved by the Engineer. Sealing shall be done after completion of any required pull tests. Duct tape shall not be used as a permanent conduit sealant. Silicone caulking shall not be used as a sealant.
- 12. All strut mounting material and hardware shall be hot-dip galvanized or shall be stainless steel. The cut ends of strut and non-galvanized rigid metal conduit threads shall be coated with a zinc rich paint (90% or more zinc content). Zinc rich paint may only be used to touch up galvanized material as allowed under item 445.6 galvanizing. The painting of non-galvanized material with a zinc rich paint shall not be considered as an approved alternative for galvanized materials.
- 13. All PVC conduit terminations shall be fitted with bushings or bell ends. All metal conduit terminations shall be fitted with a grounding type bushing.



3/8 " Dia.

x 3" long

Kwikbolt,

Parabolt,

or equal.

conc. anchor

Threaded

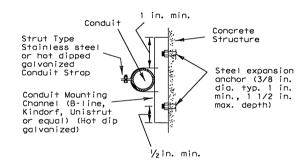
coupling

Lock

Conduit

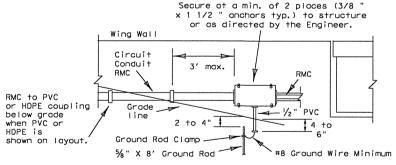
### CONDUIT MOUNTING OPTIONS

(Attachment to concrete surfaces)
(See para. II.B.2)



NOTES

end.



### TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

Existing

Bridge

Slab

3/8 " Dia. linked

eyerods welded, Elcen Fig. 690, Grinnel Fig. 278X,

Adjustable

or equal

hanger Blow Knox Fig. 9 Elcen Fig. 13,

or equal

2" min.

### CONDUIT HANGER DETAIL

(Attachment to horizontal surfaces)
Hangers need not be UL listed for
electrical use
ie: plumber pipe hangers
are acceptable

5/03 Revision

Revised notes.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

ኢ.) Ground rod clamp to be UL listed

conduits to equipment grounding

junction box from underground.

8 inches of 1/2 inch PVC conduit

conductor and grounding electrode

conductor using listed connector.

2.) For conduit placed in structure,

4.) Seal all conduits entering the

5.) Install bell end or bushing on

6.) Ground rod to be driven within

1/2 " PVC conduit both ends.

use flush-mounted box.

3.) Bond junction box and metal

for direct burial.

ELECTRICAL DETAILS-CONDUIT

ED(1)-03

| ) TxDOT       | Januar            | y 1992            | DN:-KB | ck:- JW        | ow: - DN | ck: - GC | NEG NO.: |  |  |  |
|---------------|-------------------|-------------------|--------|----------------|----------|----------|----------|--|--|--|
| VISIONS       | STATE<br>DISTRICT | FEDERAL<br>REGION | F      | EDERAL AID PRO | JECT     |          | SHEET    |  |  |  |
| 4-98<br>12-00 | AUS               | 6                 |        | CC 337-1-29    |          |          |          |  |  |  |
| 3-03          |                   | cou               | NTY    | CONTROL        | SECTION  | J08      | HIGHWAY  |  |  |  |
| 5-03          |                   | WILL              | IAMSON | 033            | 7 01     | 029      | SH 29    |  |  |  |

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### I. ELECTRICAL CONDUCTORS

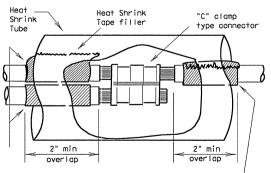
#### A. MATERIALS

- 1. Insulated conductors shall be NEC Type XHHW. Insulated conductors shall be color coded in accordance with the NEC, articles 200, 250, and 310; i.e. Insulation of grounded conductors (neutrals) shall be white. Grounding conductors (ground wires) shall be bare or insulation shall be green. Insulation of ungrounded conductors (hots) shall be any color except green, white, or gray. Identification of conductors #6 American Wire Guage (AWG) and smaller shall be by continuous jacket color. Color coding of electrical conductors #4 AWG and larger shall be either by continuous color jacket or by colored tape. Colored tape marker shall consist of a half-lap of tape covering a 6-inch length of conductor.
- 2. Where two or more circuits are present in one conduit or enclosure, the conductors of each circuit shall be identified by a permanent non-metallic tag at each accessible location. The tag shall be fastened to the conductors by two plastic straps. Each tag shall indicate circuit number, letter, or other identification shown in the plans.
- 3. Grounding electrode conductor #6 AWG for bonding to ground rod at electrical service, shall be solid. Connection of conductor to ground rod shall be made using UL Listed connectors designed for such purposes.
- 4. Heat Shrink Tape filler shall be used to seal the ends of heat shrink tubing around two or more conductors that are insulated with heat shrink tubing. Tape material shall have a minimum dielectric strength of 225 volts per mil and shall be cross-linked butyl rubber. Tape shall be supplied in rolls and shall have a backing (release paper) to prevent the tape from sticking to itself.
- 6. Heat shrink tubing shall be heavy wall, UL listed for 600 volts or greater and shall have factory applied internal sealant.
- 6. GelCaps shall be UL listed for 600-volt applications. GelCap shall have see-through elastomer molded cover. Cover shall be filled with high dielectric insulating gel silicone sealant to provide waterseal. Cover shall be held in place by snap-lock, molded clamp made of UV stoble polypropylene.
- 7. Splicing materials, insulating materials, breakaway disconnects, GelCaps and fuse holders will not be paid for directly but shall be subsidiary to various bid items.

#### B. CONSTRUCTION METHODS

- 1. After conductors have been installed in conduit, a pull test shall be made on conductors. When any length of conductor cannot be freely pulled, the Contractor shall make any needed alterations or repairs at no expense to the State.
- 2. The Contractor shall perform insulation resistance tests in accordance with Item 620, "Electrical Conductors." The Contractor shall coordinate with the Engineer to witness the tests.
- 3. A sufficient length of conductor for making up connections shall be left in ground boxes (2 feet minimum, 3 feet maximum, to point of splice, 3 feet minimum, 4 feet maximum, when conductor is pulled through with no splice), enclosures, weatherheads and pole bases (1 foot minimum, 1.5 feet maximum).
- 4. Splices shall be made only in junction boxes, ground boxes, pole bases, or electrical enclosures and shall be made with listed compression or screw type pressure connectors, terminal blocks, bolted lugs, or split bolt connectors. Splices shall be insulated with heavy wall heat shrink tubing or GelCaps and shall be made so as to provide a watertight splice. Heat shrink sleeve shall overlop conductor insulation a minimum of 2 inches on both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, the Contractor shall increase the diameter of the conductors insulation using heat shrink filler tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Tape shall be visible after completion of all splices. Where filler tape is used but not visible, the Engineer shall approve each individual splice by conducting a physical inspection of each splice. When it appears the tubing has been burned, or overheated the tubing shall be considered to be defective and shall be replaced.
- 5. GelCaps when used in place of heat shrink method of splicing, shall be sized and installed according to manufacturer's specifications. ( Raychem GelCap and GelCap SL or equal.)
- 6. Wire nuts may be used for #8 AWG or smaller conductors in above-ground junction boxes, but not in pole bases or ground boxes.

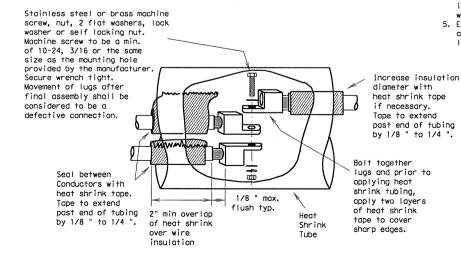
  Wire nuts shall be positioned upright to prevent the accumulation of water. Wire nuts used at these locations shall have factory applied waterproof sealant.
- 7. Conductors in illumination poles shall be supported by a J-hook in the top of the pole.
- 8. All conductors bid under Item 620 "Electrical Conductors" shall have breakaway electrical disconnects installed anytime conductors pass through a break-away support device.
- 9. For terminating the conductors, insulation-jacketing material shall be removed in such a manner as to not nick any of the individual strands of the conductor. When individual conductor strands are removed, the conductor shall be considered to be damaged.
- 10. When a conductor or cable has been damaged, or fails to pass an insulation resistance test, the conductor shall be replaced.
- 11. Duct tape, black electrical tape, or wire nuts shall not be used in the repair of a damaged conductor.
- 12. For terminations, no more than one wire may be installed under a single pressure connector, unless the device is listed for more than one wire.
- 13. Conductors connected to break-away in line fuse holders must be installed in accordance with the specific manufacturer's installation instructions. Where threaded connections are made, they shall be properly torqued. Where crimp type connections are made, crimps shall be made using properly sized crimping pliers. Proper conductor terminations are critical to the safe operation of break-away devices.
- 14. Water proofing boots shall be properly trimmed to fit snugly around the conductor so as to provide a water proof connection. No more than one wire may enter a single opening in any one boot. Water proofing boots must provide the correct number of openings. Where only one wire is to be connected to a boot, the boot may not be a two wire type.



Seal between Conductors with heat shrink tape. Tape to extend past end of tubing by 1/8 " to 1/4". Increase insulation diameter with heat shrink tape if necessary. Tape to extend past end of tubing by 1/8 " to 1/4".

### SPLICE OPTION 1

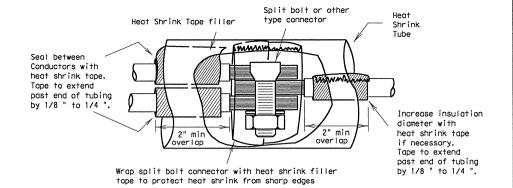
C-CLAMP

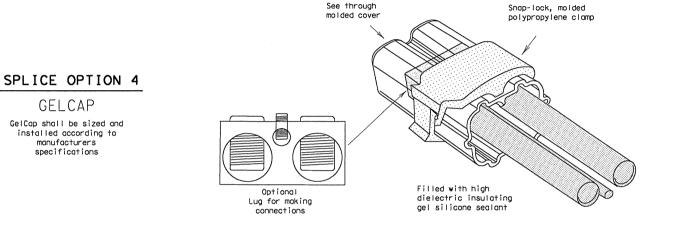


SPLICE OPTION 2
BOLTED WIRE LUGS

SPLICE OPTION 3

SPLIT BOLT





15. All conduits that contain circuit wiring of 50 volts or more shall contain an equipment grounding conductor (EGC). Conduit for traffic signals shall have an EGC, with a minimum size of #8 AWG stranded. Unless otherwise shown on the plans, the EGC for all other conduits shall be the same AWG size as the largest current carrying conductor contained in that conduit. The EGC shall be paid for item 620-Electrical Conductors.

#### C. TEMPORARY WIRING

- 1. Temporary conductors and electrical equipment to provide power for utilization equipment, shall be installed in accordance with the NEC article 305. All temporary wiring materials and methods shall comply with the standard sheets. All power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade, supplied from a utility power source, shall be provided with a ground fault circuit interrupter.
- Residual current protective devices (GFCI) may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
- 3. Where wire nuts are approved for temporary wiring, they shall be of the self-sealing type.
  4. All conductor splices must be contained within a listed enclosure, ground box or the splices will be more than ten feet above grade vertically and more than five feet horizontally from any metal structure. Where temporary conductors are installed in any area that is likely to be subjected to vehicle traffic, or mobile construction equipment, the vertical clearance to ground shall be at least 18 feet when measured at the lowest point. Where power conductors are to be supported by a span wire, the span wire shall be properly grounded.
- 5. Existing conduit containing service conductors uncovered during the construction process shall be repaired in a timely manner in accordance with the NEC. Existing non-metallic conduit exposed during construction shall not be left exposed above grade, or with less than eighteen inches of cover, without protective methods approved by the Engineer.



### ELECTRICAL DETAILS-CONDUCTORS

ED(2) - 03

| © TxDOT            | Januar            | y 1992            | en: - KB | ck:- JW             | DN: - DN | cx: - GC | NEG NO.: |  |  |  |
|--------------------|-------------------|-------------------|----------|---------------------|----------|----------|----------|--|--|--|
| REVISIONS<br>10-93 | STATE<br>DISTRICT | FEDERAL<br>REGION |          | FEDERAL AID PROJECT |          |          |          |  |  |  |
| 4-98               | AUS               | 6                 |          | CC 337-1-29         |          |          |          |  |  |  |
| 12-00              |                   | COU               | NTY      | CONTROL             | SECTION  | J08      | HIGHWAY  |  |  |  |
| 3-03               |                   | WILL              | IAMSON   | 033                 | 7 01     | 029      | SH 29    |  |  |  |

#### II. GROUND RODS

#### A. MATERIALS

- 1. All ground rods installed at electrical services, including supplemental lightning protection ground rods specified by the plans in other locations such as pole bases, shall be capper clad and UL listed. Rods shall be a minimum of meter of 5/8 inch. The length shall be a minimum of 8 feet. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets.
- 2. Ground rod clamps shall be listed to be in direct contact with the soil. Where concrete encasement is required, the clamp shall be listed for concrete encasement.

#### B. CONSTRUCTION METHODS

- 1. Ground rods installed in locations such as pole bases, to provide supplemental lightning protection need not be totally in contact with the soil. Where called for in the plans, rods may be encased in soil or concrete or any combination of soil and concrete. When concrete encased, the connection of the conductor to the rod shall be readily accessible for inspection or repairs. When driven into the soil the upper end shall be between 2 to 4 inches below finished grade. Ground rods shall not be placed in the same drilled hale as a timber pole.
- 2. Ground rods shall be installed such that the end imprinted with the rod's part number is installed as being the upper end.
- 3. Non-conductive coatings such as concrete splatter shall be removed from the rod at the clamp location.
- 4. Routing of lightning protection ground rod wires shall be run as short and straight as possible. Where bends are required they shall have a minimum radius of four inches.
- 5. Unless specifically called for by the plans, conduits used for ground rod wires shall be non-metallic. Where metal conduits are specified, a grounding bushing and properly sized bonding jumper shall be provided and properly installed on each end.
- 6. Where rocky soil or a solid rock bottom is encountered when driving a ground rod and the horizontal trench placement method is the only viable solution, written authorization from the Engineer must be obtained.

### III. GROUND BOX

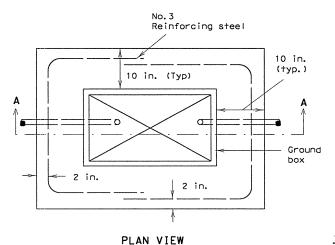
#### A. MATERIALS

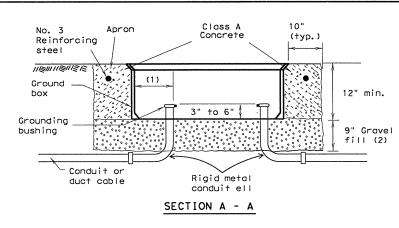
- 1. Ground boxes 16x30x24 inches (WxLxD) or smaller shall be polymer concrete of the type required by the descriptive code shown elsewhere. Larger ground boxes shall be as shown elsewhere in the plans.
- 2. All ground boxes and covers shall be permanently marked either by impress or by permanent ink, with manufacturer's model number and manufacturer's name or logo.
- 3. Covers shall be boited down, and boit holes in the box shall be arranged to drain dirt.
- 4. Ground box Types A, B, C, D & E shall meet the following requirements:
- a. Ground boxes and covers be manufactured from polymer concrete reinforced with continuous strands of woven or stitched borosilicate fiberglass cloth. The polymer concrete shall be made from catalyzed polyester resin, sand and aggregate, and shall have a minimum compressive strength of 11,000 psi. Polymer concrete containing chopped fiberglass or fiberglass reinforced plastic is not acceptable.
- b. Minimum inside dimensions shall be as follows (width x length x depth):
- Type A shall be 11.5 inches x 21 inches x 10 inches. (122311)
- Type B shall be 11.5 inches x 21 inches x 20 inches, (122322)
- Type C shall be 15.25 inches x 28.25 inches x 10 inches, (162911)
- Type D shall be 15.25 inches x 28.25 inches x 20 inches, (162922) Type E shall be 11.5 inches x 21 inches x 16 inches, (122317)
- c. Bottom edge of box or extension shall be footed with a minimum 1 1/4 inch flange.
- d. Ground boxes shall withstand 600 lbs. per sq. ft. applied over the entire sidewall with less than 1/4 inch deflection per foot length of box. Ground boxes and covers shall withstand a test loading of 20,000 lbs. over a 10 inch by 10 inch area centered on the cover with less than 1/2 inch deflection. Ground boxes and covers shall meet Western Underground Standards 3.6. Manufacturer shall supply certification by an independent laboratory or sealed by a Texas-Licensed
- e. Covers shall be 2 inch (nominal) thick polymer concrete. All hardware shall be stainless steel. Cover shall be secured with two 1/2 inch stainless steel bolts. Bolts shall be self-retaining and shall withstand a minimum of 70 ft-lbs. torque and shall have a minimum 750 lbs. straight pull out strength. Nuts shall be floating and shall provide a minimum of 1/2 inch movement from the center of the nut. Covers shall be skid resistant, minimum 0.5 coefficient of friction. Covers shall be interchangeable between manufacturers and shall conform to the dimensions shown herein. Unless otherwise approved by the Engineer, cover shall be legibly imprinted with the following words in minimum 1 inch letters:
  - Ground Boxes containing wiring for traffic signals shall be labeled, Danger High Voltage Traffic Signal. Ground boxes containing wiring for illumination systems shall be labeled, Danger High Voltage Illumination. Ground boxes containing wiring for traffic management systems shall be labeled, Danger High Voltage Traffic Management.
  - Ground boxes containing wiring for sign illumination systems shall be labeled, Danger High Voltage Sign Illumination.
  - Ground boxes containing wiring for traffic signals that also contain illumination, powered by the signal electrical service, shall be labeled, Danger High Voltage Traffic Signal.

### B. CONSTRUCTION METHODS



- 1. Ground boxes shall be set on a 9 inch (minimum) bed of aggregate from 3/4 " up to 2" in size. Aggregate shall be in place prior to setting box and conduits shall be capped. Any gravel or dirt in conduit shall be removed.
- 2. When required by Item descriptive code, construction of an apron encasing a ground box including concrete and reinforcing steel shall not be paid for directly but shall be subsidiary to the ground box. Reinforcing steel may be field bent. Concrete for aprons shall be considered miscellaneous concrete for testing purposes. Aprons shall be cast in place.
- 3. Conduit holes may be cut in the walls of type B & D boxes at least 18 inches beneath the cover.
- 4. If, within the limits of this project, the Contractor must utilize an existing ground box equipped with a metal cover, the Contractor shall bond the cover to the grounding conductor with a 3 foot long flexible stranded jumper the same size as the grounding conductor. Connection of bonding jumper to metal ground cover shall not be paid for directly but shall be subsidIary to various bid items. The box(es) must be clearly shown on the plans with plan notes fully describing the work required.
- 5. If there are other ground boxes with metal Covers within the project limits but not involved in the contract, the Engineer may direct the Contractor to ground the covers, designating and identifying the specific boxes in writing. This work will be paid for separately.
- 6. Termination to metal ground box covers shall be made using a tank ground type lug.

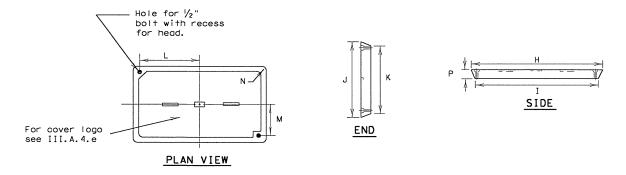




### APRON FOR GROUND BOXES

(Where required)

- (1) Final position of end of conduit shall not exceed one-half the distance to the side of box opposite the conduit entry.
- (2) Place gravel "under" the box. not "in" the box. Gravel should not encroach on the interior volume of the box.
- (3) Install bushing on the upper end of all ells.
- (4) Where a ground rod is present in the ground box, connect it to any and all equipment grounding conductors using a listed connector.
- (5) Maintain sufficient space between all conduits so as to allow for proper installation of bushings.
- (6) All conduits shall be installed in a neat and workmanlike manner.
- (7) All conduits installed in the ground box shall be sealed after completion of conductor installation and any required pull tests. Silicone shall not be used as sealant.



### GROUND BOX COVER

| GROUND BOX COVER DIMENSIONS |                         |               |        |        |        |       |       |   |  |  |
|-----------------------------|-------------------------|---------------|--------|--------|--------|-------|-------|---|--|--|
| вох                         | BOX DIMENSIONS (INCHES) |               |        |        |        |       |       |   |  |  |
| SIZE                        | Н                       | H I J K L M N |        |        |        |       |       |   |  |  |
| А, В & Е                    | 23 1/4                  | 23            | 13 3/4 | 13 1/2 | 9 1/8  | 5 1/8 | 1 3/8 | 2 |  |  |
| C & D                       | 30 ½                    | 30 1/4        | 17 1/2 | 17 1/4 | 13 1/4 | 6 ¾   | 1 3/8 | 2 |  |  |



ELECTRICAL DETAILS-GROUND BOXES

ED(3) - 03

5/03 Revision Revised notes.

| xDOT      | Januar  | y 1992 | ом: - KB | ck: - JW | DW: - DN   | ck: - GC | NEG NO.: |  |
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| ONS<br>98 | STATE FEDERAL DISTRICT REGION FEDERAL AID PROJECT |        |          |          |            |          | SHEET    |  |
| 00        | AUS   |        | 188      |          |            |          |          |  |
| 03        |   | COUN   | ГҮ       | CONTR    | OL SECTION | JOB      | HIGHWAY  |  |
| 03        |   | WILLI  | AMSON    | 03:      | 37 01      | 029      | SH 29    |  |

#### ELECTRICAL SERVICES NOTES

All work, materials, services, and incidentals, whether or not specifically shown on the plans, which may be necessary for a complete and proper electrical service installation as specified in the plans to obtain electrical power shall be gaid for, performed, furnished and installed by the Contractor. The Contractor shall contact the Utility for metering and shall comply with all Utility requirements.

Primary line extensions, connection charges, meter charges, and other charges by the Utility company to provide power to the location shown, when required, shall be paid for under force account work. The costs associated with these charges shall be approved by the Engineer prior to engaging the Utility company to do the work. The Contractor shall consult with the appropriate Utility to determine costs and requirements, and shall coordinate the Utility's work as approved by the Engineer. The Contractor shall be reimbursed only the amount billed by the Utility. No additional amount for supervision of the Utility's work will be paid.

Materials shall be new and unused, materials and installation shall comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards and shall be Underwriters Laboratories (UL) Listed. Electrical Service conduits, conductors, disconnects, contactors, circuit breaker panel sizes, and branch circuit breakers, shall be as shown in the Electrical Service Data elsewhere in the plans. Faulty fabrication or poor workmanship in any material, equipment, or installation shall be justification for rejection.

The Contractor shall submit for approval no less than six (6) copies of catalog cut sheets on electrical service materials. Submittals shall be legible and shall be marked to indicate which product on a cut-sheet is to be supplied. Where manufacturers provide warranties and

guarantees as a customary trade practice, Contractor shall furnish to the State such warranties or guarantees.

The Contractor shall provide locks keyed with Master #2195 for all lockable electrical enclosures. Keys and locks become property of the State. Unless otherwise approved by the Engineer, enclosures shall not be energized until locks are provided and all boits are installed.

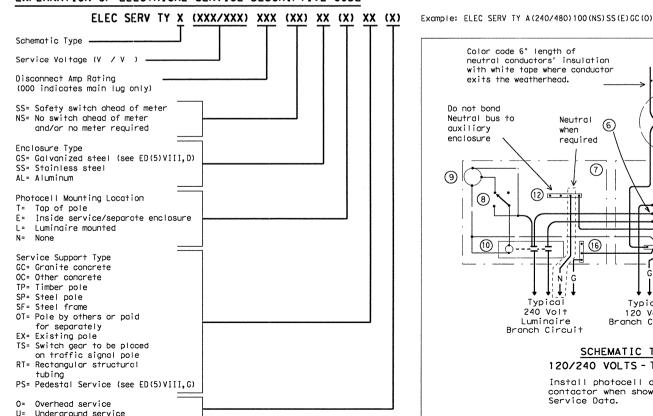
Circuit directories, where provided, shall be filled out. All breakers and components in shop built panels and enclosures shall be labeled with duo-colored plastic labels. Letters shall be a minimum 3/8 " in height.

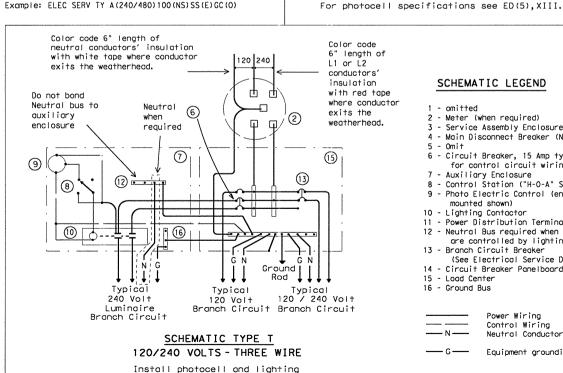
Enclosures with external disconnects that de-energize all equipment inside the enclosure, need not have dead front trim, except that incoming line terminations shall be protected from incidental contact.

- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used. All wiring and components shall be rated for 75 degrees C. Minimum size for service entrance conductors shall be #6 XHHW. Safety Switch. A safety switch, placed chead of the meter, shall only be used when specified by the Utility and when shown on the
- Electrical Service Data. The switch shall be UL Listed, heavy duty type, 600 volt, unfused, with a UL type 3R enclosure and equipped with a solid neutral (s/n) assembly. The switch shall be padlockable in the "on" position. Service Type. Electrical service types A, C, D, and T shall be as schematically detailed on ED(4) or ED(5). Other service types shall be as detailed elsewhere on the plans.
- III. Branch Circuit Breakers. Circuit breakers shall be thermal magnetic and have a minimum interrupting capacity of 10.000 amps and a voltage rating compatible with their use. Circuit breakers shall be sized as shown in the electrical service data. Circuit breakers in panelboards and load centers shall be full size and designed exclusively for the panelboard or load center in use. Tandem and half-width breakers shall not be used. All circuit breakers shall be permanently and clearly marked identifying the circuit or device supplied. Circuit breakers shall be UL Listed to UL489.
- IV. Circuit Breaker Panelboard, Panelboards shall be UL Listed, Panelboards shall have copper busses, a minimum of 6 one-pole spaces or as required in the electrical service data, and when required will be rated for service equipment. Enclosure shall meet or exceed UL type 3R classification. Panelboards shall have a threaded hub conduit entry for conduit entering the top of the enclosure. Circuit breakers shall be bolt-in type only.
- Circuit Breaker Load Center. Load centers shall be UL Listed.

  Load centers for type I services may have copper or aluminum busses, all other load centers will be copper bus only. Load center will have a minimum of 4 one-pole spaces, and shall be rated for service equipment. Enclosure shall meet UL type 3R classification. Load centers shall have a threaded hub conduit entry for conduit entering the top of the enclosure. Circuit breakers shall be plug-in type only. Load centers for type T services shall accomodate a maximum of 6 one-pole breakers.
- Separate or Auxiliary Enclosure. Separate enclosures for HOA, photocell and lighting contactors for types D & T Services shall be a UL Listed assembly with outer door. Interior shall have dead front trim. HOA switch operator shall extend through the dead front trim. Photocell shall be mounted inside the enclosure as described in paragraph XIII when required by descriptive code. Separate enclosures shall meet the construction requirements of paragraph VIII. E, except that separate enclosure shall not have external operating handle, need not have a data pocket and door may latch at only one point. All equipment may be located in one enclosure instead of two, when approved by the
- VII. Where a Type D or T service is provided, laminated "as built" drawings are required as shown on ED(5) VIII E; shall be delivered before completion of the work, to the Engineer in lieu of placement within these smaller enclosures. Conduit may not enter the back wall of a service enclosure penetrating the equipment mounting panel. Provide grounding bushings on all metal conduits, terminate bonding jumper to grounding bus. Grounding bushing is not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss

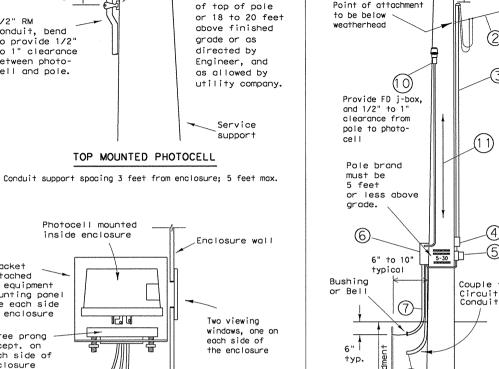
### EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE





contactor when shown on Electrical

Service Data.



Cut top of

run off when

required by

pole to enhance

serving utility

(1)

2" to 6"

4" typ.

1 - Class 5 pole, height as required

- 2 Service drop from utility company
- (attached below weatherhead) 3 - Service conduit and service
- entrance conductors (RMC)
- (See Electrical Service Data) 4 - Safety switch (when required)
- 5 Meter (when required)
- Service enclosure
- 7 No. 6 bare grounding electrode conductor in 1/2 " PVC to ground rod - extend 1/2 " PVC 6" underground.
- · 5/8 " x 8' Copper clad ground rod - drive ground rod completely underground unless otherwise approved by the Engineer.
- 9 RM conduit same size as branch circuit conduit.
- Photocell and conduit if top mounted.
- (See Electrical Service Data) When required by the serving utility provide bare #6 awa copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor to a height of 8 ft above finish grade.

### LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- (If applicable) - Liquidtight flexible metal conduit, may be used when meter and service enclosure are mounted 90 to 180 degrees to each other. Size shall be some as service entrance conduit.
- LFMC shall not exceed 3 ft. and shall be securely supported within one ft. of each end. No strap required for LEMC shorter then 12"
- Each end of LFMC must have a grounding bushing or be terminated with a
- arounding fitting. A neutral conductor must be installed within the LFMC.
- Bend in liquidtight flexible metal
- conduit shall not exceed 180 degrees. A pull test is required on all
- installed conductors, at least six inches of free conductor movement shall be demonstrated to the satisfaction of the Engineer.

### SERVICE SUPPORT TYPE TP (0) (timber pole, overhead service, typical arrangement)

Upper end of ground rod to be 2" to 4" below finished grade

### TIMBER POLE NOTES

- 1. Conduit and electrical conductors attached to the electrical service pole and underground within 12 inches of service pole shall not be paid for directly but shall be subsidiary to the service pole.
- Pole top mounted photocell, install on north side of pole or in service enclosure as required. See Electrical Service Data.
- 3. Attach meter and service equipment with stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Gain pole as required to provide flat surfaces for each strut. Paint ends of galvanized channel with zinc rich paint. Gain depth 5/8" max. Gain height 1 7/8" max. Strut to be 1" max. deep, and 1 5/8" wide max. Secure each strut section to imber pole with two galvanized or SS lag bolts, 1/4" diameter min. by 1 1/2" length min. Place flat cut galvanized or SS washer on each lag bolt. Gain pole in a neat and workmanlike manner.
- Embedment depth shall be as required in Item 627 Treated Timber Poles.

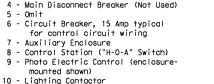
5. Poles trimmed for excess length shall be trimmed from the top end only.



ELECTRICAL DETAILS-SERVICE SCHEMATICS AND SUPPORT-TYPE TP (OVERHEAD)

ED(4) - 03

| C) TxDOT      | April | 1998              | en: - KB | cx:- JW | ow: - D | N     | ck: - GC | NEG NO.: |
|---------------|-------|-------------------|----------|---------|---------|-------|----------|----------|
| 12-00<br>3-03 | STATE | FEDERAL<br>REGION |          | SHEET   |         |       |          |          |
|               | AUS   | 6                 |          | CC 337- | 1-29    | 189   |          |          |
|               |       | cou               | NTY      | CONTR   | X SE    | CTION | JOB      | HIGHNAY  |
|               |       | WILL              | IAMSON   | 03:     | 37      | 01    | 029      | SH 29    |



Conduit mounting

Kindorf, B-line

or equal)

TOP MOUNTED PHOTOCELL

channel (Unistrut,

Within 6" to 8"

11 - Power Distribution Terminal Blocks (Not Used) 12 - Neutral Bus required when 120 v. lights

are controlled by lighting contactor 13 - Bronch Circuit Breaker

SCHEMATIC LEGEND

2 - Meter (when required)

- Service Assembly Enclosure

(See Electrical Service Data) 14 - Circuit Breaker Panelboard (Not Used)

15 - Load Center 16 - Ground Bus

Standard 3-prong

Photocell

Receptocle

and photocell

Type FD Box

Conduit, bend

to provide 1/2"

to 1" clearance

between photo-

cell and pole.

Brocket

attached

to equipment

mounting panel

one each side

of enclosure

Three prong

each side of

recept. on

enclosure

6"

Photocell mounted

ENCLOSURE MOUNTED PHOTOCELL

inside enclosure

Control Wiring Neutral Conductor (when required-to serve 120 v. loads only Equipment grounding conductor-always required

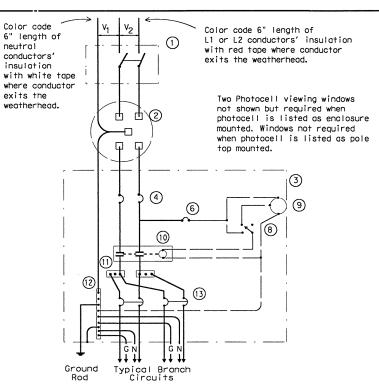
#### SERVICE ENCLOSURE NOTES

- VIII. Service Assembly Enclosures. All service assemblies and enclosures shall be UL Listed for the intended purpose
  - A. Shop built or shop assembled service assemblies (all types except Type T and Type D without lighting contactor or enclosure mounted photo cell) and all auxilliary equipment enclosures mounted with service equipment and paid for as part of Item 628, "Electrical Services", shall be built or assembled by a UL Listed Industrial Control Panel shop and shall have a unique serial numbered UL Label with the words "LISTED ENCLOSED INDUSTRIAL CONTROL PANEL". The same or an additional label shall have the name, location, and phone number of the shop, the UL file number of the shop, the shop order or drawing number, date of manufacture or assembly, and the line voltage. The service assembly enclosure shall also be labeled "SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT".
  - B. Conduit entries into the top of enclosures shall have threaded hub. Conduit entries through the equipment mounting back plate will not
  - C. All service enclosure front doors shall be permanently labeled "DANGER HIGH VOLTAGE". Label shall be a self sticking type, intended for outdoor installation. Lettering style, layout and colors of red, black and white shall be as required by OSHA. Label letters shall be 1 to 1 1/2 inches high or as high as the enclosure door width will permit for smaller services. Separate or auxiliary lighting enclosures need not be OSHA labeled when mounted in the same viewing plane as the service enclosure front door. Where only one type of load is served by the service, the service door shall be marked using duo-colored plastic labels or self adhesive vinyl weather resistant labels, minimum of 1 inch high; applied in a neat and workmanlike manner. On the label will be the service number shown on the plans as well as identifying the load served specifically (i.e. lighting, landscaping, signals, traffic management or other wording as directed by the Engineer). Safety switches need not be OSHA labeled unless specifically required by the serving utility.
  - D. Type GS enclosures will only be allowed for service Types D and T without an enclosure mounted photocell and/or lighting contactor and the Type C panelboard. This spec will allow an "off the shelf" product meeting these specifications to be used. Type GS enclosures shall be made from pre-galvanized steel sheeting, hot dipped galvanized steel, or powder coat painted steel unless shown differently on the plans. Steel enclosures shall be painted inside and outside; galvanized enclosures may be painted. Unless otherwise approved by the Engineer, painted enclosures shall be gray, beige, white or light green. Panelboard/loadcenter enclosures shall meet UL type 3R requirements, shall have a dead front trim, and an outer padlockable door preventing unauthorized persons from operating contained equipment. Galvanized steel is no longer allowed for Types A, C, or custom-built D or T enclosures. If GS is shown in the descriptive code for any of these, an AL shall be provided.
  - E. Type AL enclosures for service Types A and C shall meet UL type 3R requirements and shall also meet additional requirements of this paragraph. The enclosure shall have both a main disconnect remote operator handle and a door latch handle. Die-cast handles are not acceptable. The main disconnect remote operator shall be flange-mounted, shall interlock the door when in the "on" position, and shall be padlockable in both the "on" or "off" positions. Door latch shall latch at two or more points, operate by a handle separate from disconnect switch and be capable of being locked. Door closure clamps will not be allowed. Lock must be keyed to Master #2195. All the enclosures shall have either a continuous stainless steel piano hinge with stainless steel pin or enclosures less than 30 inches may have two heavy duty hinges, those over 30 inches must have three. Heavy duty two and three point hinges shall have a 0.185 inch minimum diameter electro-zinc plated steel pin or a stainless steel pin. Two point hinged doors shall be rated for 56 lbs of loading. Three point hinged doors shall be rated for 70 lbs of loading. The door shall have an attached data pocket constructed of either thermoplastic or metal. Pocket shall be 12" x 12", unless that size will not fit in enclosure. The pocket shall then be as large as possible, as approved by the Engineer, and mechanically attached with stainless steel nuts and bolts, or stainless steel or aluminum rivets. Enclosure shall include an equipment mounting panel installed inside the enclosure on collar studs or tapped bosses, and constructed of a minimum 12 guage galvanized steel. Equipment mounting panels shall not be painted. Enclosure shall have factory installed external mounting feet. Enclosure door shall be capable of opening at least 130 degrees, with orm or other approved means to hold the door open. Only the enclosure exterior will be primed and painted. Paint color shall be beige or gray and shall be powder coat paint as shown below. Condensation drainage shall be provided in the bottom of the enclosure before leaving the factory. The Contractor shall prepare and submit a schematic drawing unique to an individual service. The approved drawing shall be laminated and placed in the document pocket of the service at the time of shipment to the job site. All applicable wiring diagrams and plan sheet layouts for all equipment and branch breaker circuits supplied by that service shall also be laminated and placed in the document pocket prior to shipping. Type AL enclosures for Type D and T services with enclosure mounted photocell and/or lighting contactor shall have the loadcenter interior mounted in an enclosure with properly adapted dead front trim. Types D and T shall not have a loadcenter exterior "can" mounted inside another enclosure meeting these specifications. (Do not put one enclosure inside another enclosure). Types D and T with enclosure mounted photocell and/or lighting contactor shall meet the additional requirements of this paragraph except that remote-operating handle will not be provided.
  - F. Type SS enclosures for Type A and C shall meet all the requirements above for their respective type AL. Type SS enclosures for D and T shall meet all the requirements above for their respective type AL. Stainless Steel shall not be painted.
  - PS enclosure shall be as detailed and specified on ED(8). Galvanized steel will not be allowed for any pedestal service. If GS is shown in the descriptive code on AL will be provided.
- IX. Powder Coat Paint. Powder coating shall be either a polyester thermosetting resin, a zinc rich primer with a TGIC (triglycidyl isocyanurate) powder overcoating, or a zinc-rich epoxy powder, applied by either electrostatic spray or fluidized bed immersion, high temperature over cured, high density, low gloss, 4 mil thick (minimum), coating. Adhesion shall meet the 5A or 5B classifications of ASTM D3359. Finish shall be uniform in appearance and free of scratches.
- Main Disconnect. Main disconnect device shall be a circuit breaker, as specified in the Electrical Service Data, shall be two or three pole, and rated for the voltage and amperage specified. Circuit breaker shall be an UL Listed thermal-magnetic circuit breaker controlled by flange-mounted remote operator in the service assembly enclosure when required. Circuit breakers shall have a minimum interrupting rating of 10,000 Amps. When the utility company provides a transformer larger than 50 KVA, Contractor shall verify that the available fault current is less than the circuit breaker amps interrupting capacity (AIC) rating and shall provide documentation from the Utility to the Engineer. Documentation shall be submitted at the same time as other electrical submittals. Circuit breaker shall be UL Listed to UL489. No backfed breakers will be allowed for use as a main disconnect.
- Control Circuit. Control circuit protection shall be 15 amp circuit breaker.
- XII. Control Station ("H-O-A" Switch). Control station shall be a maintained-contact, three position selector switch in an UL type enclosure. Switch shall be rated 600 volts and shall be fitted with "Hand-Off-Auto" legend.
- XIII.Photo Electric Control. Photo electric control shall consist of a photocell, internal lightning arrester, and relay or bimetallic switch mounted inside a weatherproof enclosure with standard 3-prong twist lock photocell plug and receptable. The enclosure shall be made of poly-acrylic with clear acrylic window. Enclosure chassis shall be molded thermosetting plastic. The photocell shall have a polyethylene gasket, and shall have a hermetically sealed codmium sulfide cell. The arrester shall have an enclosed type expulsion arrester rated 2.0 kV sparkover with 5,000 amps follow-through. Relay or switch shall be time delay type with normally closed contacts. Photo electric control shall be rated a minimum of 1800 VA, voltage as required. Enclosure mounted photocells shall be the same as above except that the photocell shall be mounted inside the enclosure. The enclosure shall have two acrylic paned windows, or other material approved by the Engineer, one on each side of the enclosure. Each window shall be rectangular approximately one inch by two inches, round 2 inch diameter, or as otherwise approved by the Engineer. Bracket and photocell's receptacle will be mounted inside enclosure next to each window. Except for window side, 2" of clearance is required on all sides of photocell for ease of replacement. The photocell's receptacle is held in place by two mounting screws on bracket and located next to each window of the enclosure. The 3-prong twist lock photocell shall be mounted in a position to receive light from the window closest to the photocell. The photocell shall be mounted in a position to receive light from one window. Top of pole mounted photocells shall be mounted as shown on ED(4). The Contractor shall be responsible for proper operation of the photo-electric control. The Contractor shall move and/or adjust or shield the photocell from stray or ambient nighttime light or shall make any other adjustments required for proper operation. The photocell shall face North when practicable. Unless otherwise shown on the plans, the photocell shall turn on the illumination system at 1.0 +(-) 0.5 footcandle and turn off the illumination system at two footcandles higher the
- XIV. Lighting Contactor. Lighting contactor shall be a UL Listed NEMA rated lighting contactor, two-pole or multipole as required, electrically held type designed to control high pressure sodium lighting loads, with silver alloy double break contacts rated at 240 volts, 480 volts or 600 volts as required. Lighting contactor shall not be the DIN rail mounted type.
- Power Distribution Terminal Blocks. Power distribution terminal blocks shall be rated for 600 volts and shall be used for line side connections to branch circuit breakers where more than one circuit breaker is required. Lugs on blocks shall be properly sized for conductors being used. Only one conductor shall be placed under each lug.
- XVI. Neutral/Ground Bus. Neutral/ground bus shall be a factory made bus permanently bonded to the enclosure with properly sized lugs for grounding and neutral conductors.

#### SCHEMATIC LEGEND

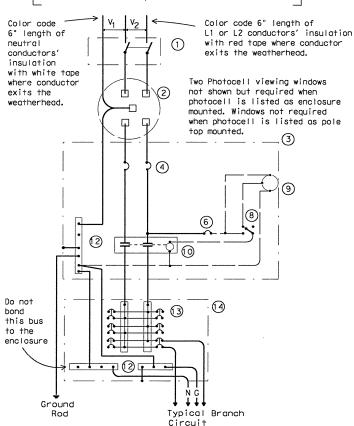
- Safety Switch (when required)
- Meter (when required)
- 3 Service Assembly Enclosure
- Main Disconnect Breaker (See Electrical Service Data)
- 6 Circuit Breaker, 15Amp
- 7 Auxiliary Enclosure
- 8 Control Station ("H-O-A" Switch)
- 9 Photo Electric Control (enclosure-mounted shown)
- 10 Lighting Contactor
- 11 Power Distribution Terminal Blocks

- 12 Neutral/Ground Bus
- 13 Branch Circuit Breaker (See Electrical Service Data)
  14 Circuit Breaker Panelboard (See Electrical Service Data)
- (If Type C is shown as AL or SS on descriptive code, this is the service assembly enclosure only. Panelboard enclosure is GS unless otherwise noted.
- - Power Wiring Control Wiring
- Neutral Conductor (when required) serve 120 v. loads only) ---- N -----
  - Equipment grounding conductor-always required



### SCHEMATIC TYPE A THREE WIRE

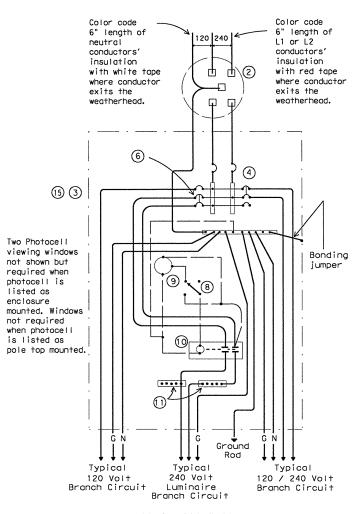
Maximum feeder circuit size (High Mast Poles): 100 amps for two pole 480V, 125 amps for one or two pole 120V or 240V. Maximum branch circuit size: 50 amps.



### SCHEMATIC TYPE C

### THREE WIRE

Maximum feeder circuit size (High Mast Poles): 100 amps for two pole 480V, 125 amps for one or two pole 120V or 240V. Maximum branch circuit size: 50 amps.

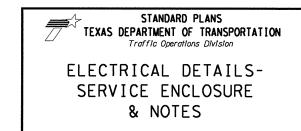


### SCHEMATIC TYPE D 120/240 VOLTS - THREE WIRE

Install photocell and lighting contactor when shown on Electrical Service Data. See Type D service notes.

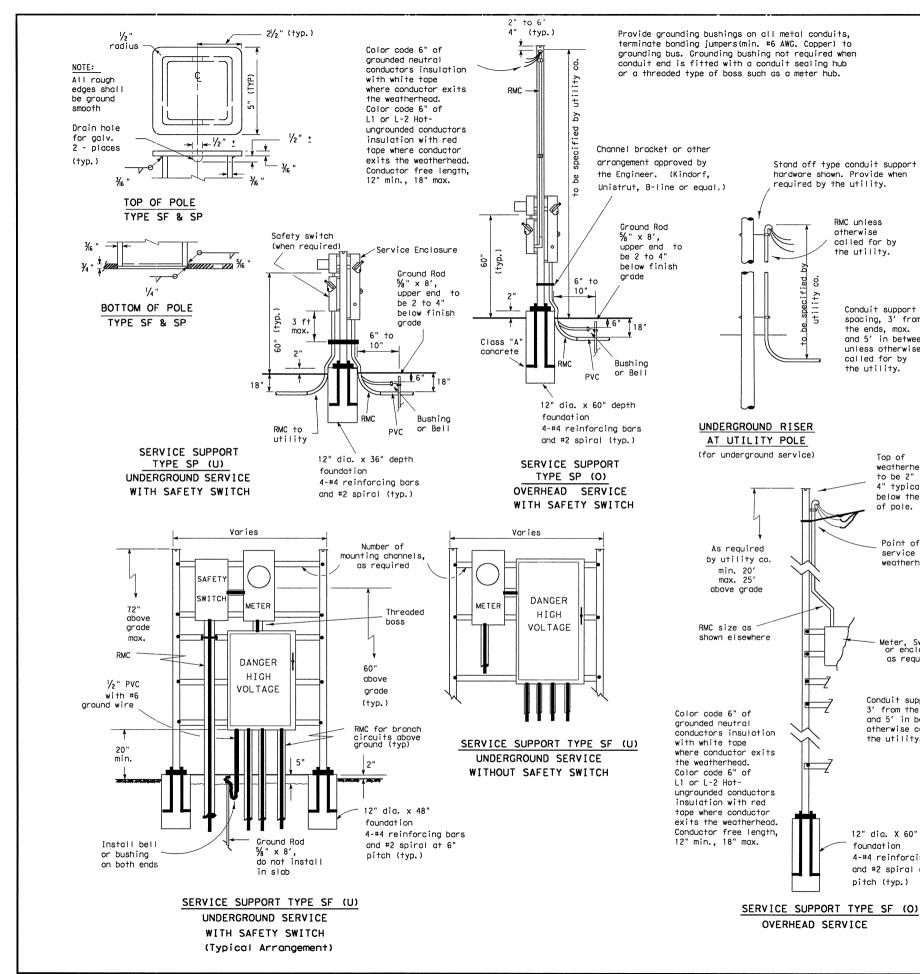
### TYPE D SERVICE NOTES

Photocell and lighting contactor shall be located either in the same UL type 3R enclosure with load center or, if approved by Engineer, in separate enclosure. There shall be a window on each side of enclosure to allow operation of photocell. Both photocell contactor and breaker area shall have dead front trim. Enclosure, except for RT and PS supports, shall not exceed 36 inches in height or 16 inches in width unless approved by the Engineer. Ty D load center with lighting controls or TY D separate lighting control enclosure shall have power distribution blocks for a minimum of 4, #8 conductors per phase.



C TxDOT April 1998 DN:- KB CK:- JW DW:- DN CK:- GC NEG NO.: 12-00 STATE FEDERAL REGION FEDERAL AID PROJECT CC 337-1-29 190 AUS 6 CONTROL SECTION JOB HIGHWAY WILLIAMSON 0337 01 029

ED(5)-03



Conduit support spacing, 3' from

the ends, max. and 5' in between

unless otherwise

Top of

weatherhead

4" typical

of pole.

below the top

weatherhead

or enclosure.

as required

Conduit support spacing,

and 5' in between unless

otherwise called for by

the utility.

12" dia. X 60'

4-#4 reinforcing bars

and #2 spiral at 6"

foundation

pitch (typ.)

3' from the ends, max.

Point of attachment of

service drop to be below

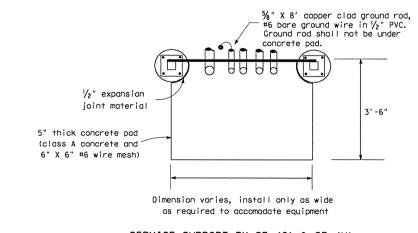
to be 2" to 6".

called for by

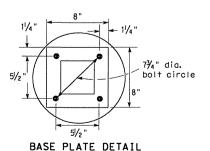
the utility.

- 1. Support Type SP and SF: Fabricated from 4" x 4" x 3/16 " square structural tubing, ASTM A500 Grade A or G or equal. Base plate shall be 3/4 " plate, ASTM A36 or equal. All equipment and conduit shall be mounted on galvanized channel strut, 1 1/2 " x 1 5/8 " x 12 guage galvanized steel channel (Unistrut, Kindorf, B-line or equal) clamped with channel hardware, bolted or welded to vertical member as approved by the
- 2. Paint field cut ends of all channels with zinc-rich paint.
- 3. All Steel Poles (SP and SF) shall be hot-dip galvanized after fabrication. Poles for overhead service shall be fitted with eyebolt or similar fitting, as approved by the utility company, for attachment of sevice drop to the pole.
- 4. All conduit and conductors attached to the electrical service and within 12 inches of the electrical service will not be paid for directly, but shall be subsidiary to the electrical service. All conduit and conductors from the utility company pole to the point 12 inches from the electrical service, including conduit and conductors required for the utility pole riser when furnished by the Contractor, will be paid
- 5. All mounting hardware and installation details of services shall be in accordance with utility company specifications.
- 6. Anchor bolts for underground service supports shall be 3/4" x 18" x 4" (dia. x length x hook length). Anchor bolts for overhead services shall be 3/4" x 56" x 4". Anchor bolts shall be provided with leveling nuts.
- 7. Conduit for grounding electrode conductor (ground rod wire) shall be 1/2" PVC. All other conduit on electrical services shall be rigid metal conduit. Service entrance conduit size shall be as shown elsewhere. Conduit for branch circuit entry to enclosure shall be the same size as that shown on the layout sheets for branch circuit conduit. Rigid metal conduit shall extend to the rigid metal elbow and then be coupled to the type conduit shown on the layout for that particular branch circuit. RMC shall have grounding bushings in enclosures.
- 8. If pole is painted, each separate painted piece shall have a bonding jumper attached to a tapped hale.
- 9. Sheet metal screws are not allowed for bonding. Provide 1/4-20 machine screws. Remove all non-conductive material at contact points. Terminate bonding jumper using listed device. Bonding jumper min. #6 AWG Copper. Make up all threaded bonding connections wrench tight.
- 10. Conduits entering enclosure from underground shall be sealed at both ends. Silicone sealant will not be
- 11. Ground rod clamp to be UL listed for direct burial.
- 12. Service entrance conductors shall exit separately bushed non-metallic openings in weatherhead.

  13. Free conductor at weatherhead to be 12 in. min., 18 in. max., or as required by utility. Color code grounded-neutral conductor with white tape covering 6 in. of conductor. Color code L1 or L2 Hot un-grounded conductor with red tape covering 6 in. of conductor. Service drop and service entrance conductors must not contact metal pole in such a manner as to result in abrasion of insulated conductors.
- 14. Conduit support spacing to be max. 3 ft. from ends, and max. 5 ft. in between.
- 15. Shop drawings are not required for service support structure unless specifically stated elsewhere or as directed by the Engineer.
- 16. Service enclosure to be labeled as specified on ED(5) VIII C.
- 17. Liquidtight flexible metal conduit (LFMC) may be used between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. LFMC shall be the same size as service entrance conduit. LFMC shall not exceed 3 ft. and shall be securely supported within one foot of each end. LFMC shorter then 12" need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. A neutral conductor must be installed within the LFMC. Bend in LFMC shall not exceed 180 degrees. A pull test is required on all installed conductors, at least six inches of free conductor movement shall be demonstrated to the satisfaction of the Engineer.



### SERVICE SUPPORT TY SF (O) & SF (U) TOP VIEW



BASE PLATE DETAIL TYPE SF & SP

### STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division

ELECTRICAL DETAILS-SERVICE SUPPORT TYPES SF & SP

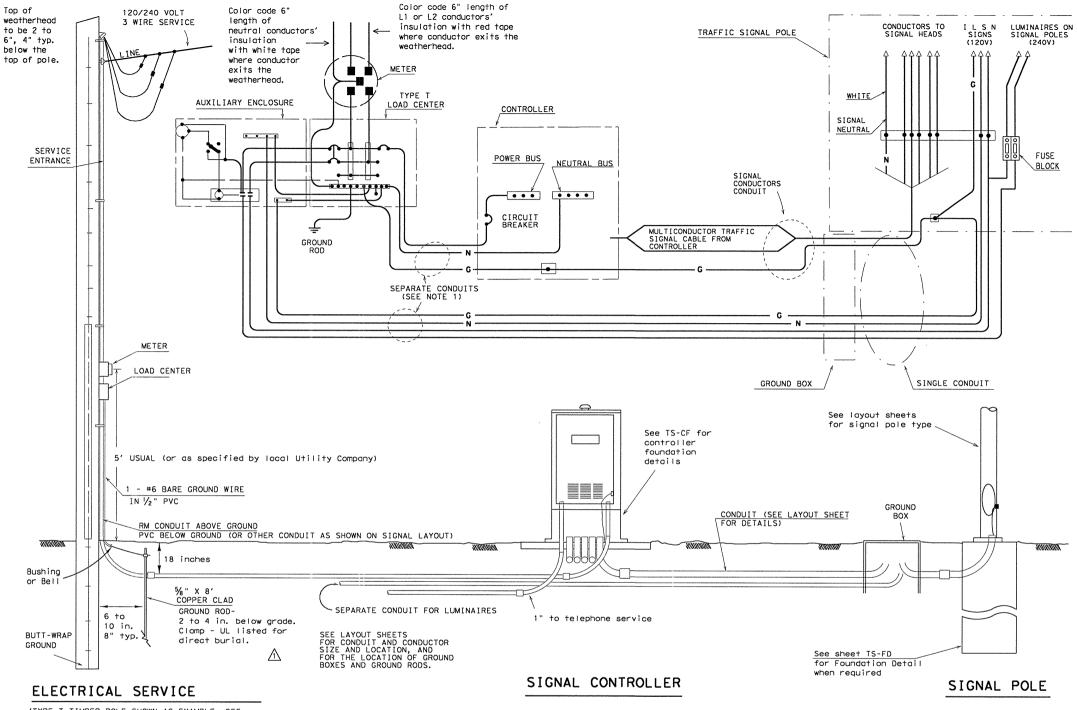
ED(6) - 03

C) TXDOT January 1992 | DN:-KB | CK:-JW | DN:-DN | CK:-GC | NEG NO.: STATE FEDERAL DISTRICT REGION 4-98 CC 337-1-29 AUS 6 12-00 CONTROL SECTION JOB 0337 01 029

#### NOTES:

- 1. Luminaire conductors shall not be looped through controller cabinet.
- 2. Electrical system to include an equipment grounding conductor noted here as "G". All exposed metal parts are to be bonded to grounding conductor.
- 3. Photocell, when required, shall be mounted at top of pole or in enclosure as shown on ED(4) and ED(5) and as required by descriptive code.
- 4. Roadway lighting fixtures, when required, shall be in accordance with the material and construction methods of the Item, "Roadway Illumination Assemblies" except for the test period for proper operation of the luminaires. Installed roadway lighting luminaires and internally lighted street name signs shall be tested for proper operation as a part of the associated traffic signal system.
- 5. Internally lighted street name signs (ILSN), when required, shall be in accordance with the Item "Internally Lighted Street Name Signs". Because of the electrical isolation of ILSN hinges, a #12 green grounding conductor shall be run to the ILSN fixture.
- 6. Install ground rod at alternate location when directed by the Engineer. Maintain a minimum of 8 ft in contact with the earth.
- 7. Liquidtight flexible metal conduit (LFMC), may be used when meter and service enclosure are mounted 90 to 180 degrees to each other. LFMC shall be same size as service entrance conduit. LFMC shall not exceed 3 ft. and shall be securely supported within one foot of each end. No strap required for a LFMC shorter than 12". Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. A neutral conductor must be installed within the LFMC. Bend in liquidtight flexible metal conduit shall not exceed 180 degrees.
- 8. Minimum embedment depth as per Item 627 Treated Timber Poles.
- 9. Pole to be set plumb.
- 10. Back fill thoroughly tamped in 6 in. lifts. Place 6 inches additional backfill above grade around pole base to allow for settling, as per Item 627.

  11. Excess pole length shall be trimmed from the top at a
- slope to aid water run off.
- 12. Gain pole two places for each meter, service, separate or auxiliary enclosure. See ED(4) for details.
- All illumination and power conductors to be pull tested and megged. Do not meg traffic signal cable.
- 14. Enclosures are to be locked, and ground box covers are to be bolted before power is applied to the circuit.
- 15. Conduits entering top of enclosures to be fitted with conduit sealing hub or threaded boss, such as meter hub. Off-set nipple, when required, shall not be zinc-diepressure cast. All metal conduits not connected to conduit sealing hub, or threaded boss must have a grounding bushing. Terminate bonding jumper to ground bus. All conduits entering enclosures shall be sealed. Silicone shall not be allowed.



(TYPE T TIMBER POLE SHOWN AS EXAMPLE, SEE ELECTRICAL DETAILS, LAYOUT SHEETS, AND ELECTRICAL SERVICE DATA SHEET FOR SERVICE REQUIRED AND FOR DETAILS.

Unless shown elsewhere in the plans, electrical service data for Types D and T shall be as follows.

| ELECTRICAL SERVICE DATA                      |                                     |                                   |                          |   |                                      |  |                  |                                  |             |  |
|--|-------------------------------------|-----------------------------------|--------------------------|---|--------------------------------------|--|------------------|----------------------------------|-------------|--|
| ELECTRICAL SERVICE<br>DESCRIPTION(SEE ED(4)) | SERVICE<br>CONDUIT<br>SIZE<br>(RMC) | SERVICE<br>CONDUCTORS<br>NO./SIZE | SAFETY<br>SWITCH<br>AMPS | MAIN<br>DISCONNECT<br>CKT. BRK.<br>POLE/AMP | TWO-POLE<br>CONTACTOR<br>AMPS<br>*** | PANELBD./<br>LOADCENTER<br>AMP RATING<br>(MIN) | CIRCUIT<br>NO.   | BRANCH<br>CKT. BRK.<br>POLE/AMPS | KVA<br>LOAD |  |
| TY D (120/240)070(NS)AL(E)**(*)              | 11/4                                | 3/#4                              | N/A                      | 2P/70                                       | 30                                   | 100  | T.S.<br>Lighting | 1P/50<br>2P/15                   | <7.1        |  |
| TY T (120/240)000(NS)GS(E)**(*)              | 11/4                                | 3/#4                              | N/A                      | None  | 30                                   | 70   | T.S.<br>Lighting | 1P/50<br>2P/15                   | <7.1        |  |

\*\*\* Eliminate photocell, contactor and seperate enclosure if lighting, or internally lighted signs are not required by plans

- \*\* See descriptive code in estimate for service support type.
- \* See descriptive code in estimate for overhead or underground service.

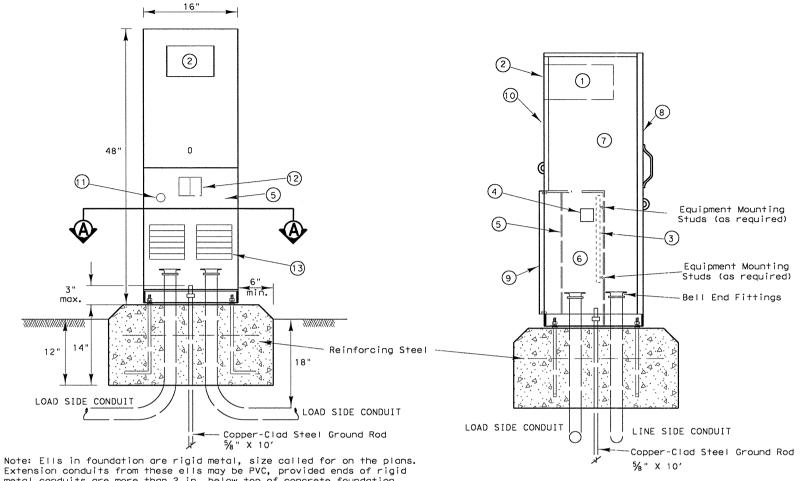
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division ELECTRICAL DETAILS-TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS ED(7) - 03

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C TXDOT January 1992 DN:-KB CK:-JW DN:-DN CK:-GC NEG NO.: 5/03 Revision STATE FEDERAL DISTRICT REGION 4-98 AUS 6 CC 337-1-29 Revised notes. CONTROL SECTION JOB

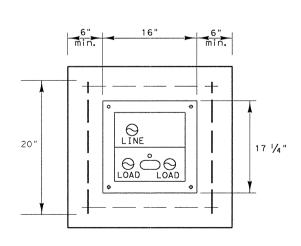
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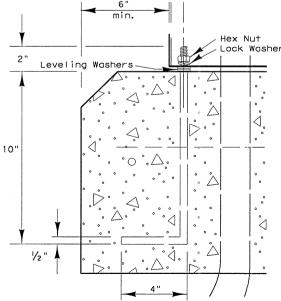
metal conduits are more than 2 in. below top of concrete foundation. Where extension conduits are metal, grounding bushing must be installed and a bonding jumper properly terminated.

### FRONT VIEW

Ty C shown, Ty A similar except that Ty A shall have individual circuit breakers mounted on a equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A



ANCHOR BOLT

DETAIL

SIDE VIEW

#### GENERAL NOTES

- 1. The pedestal service shall be UL type 3R, and shall be constructed of a minimum of 12 guage stainless steel or aluminum as required by descriptive code. Stainless steel shall not be painted. For aluminum, the finish shall be an electrostatic applied polyurethane baked on powder, light green in color, or color as shown elsewhere and as approved by the Engineer. The front of the interior dead front trim shall be permanently labeled, "Danger High Voltage" with OSHA style label. The exterior of the pedestal service door shall be permanently labeled with a placard as to its use (i.e. Roadway Lighting, Traffic Signals, etc.). Placard shall be neat and professional in appearance. Lettering shall be 1" minimum height.
- Utility Access Door shall have stainless steel piano hinge and provisions for padlocking.
- Pedestal door shall have stainless steel piano hinge and stainless steel latch with provisions for padlocking.
- Meter Access shall be hinged and capable of padlocking.
- 5. All mounting hardware and installation details of services shall be in accordance with utility company specifications. The Contractor is responsible for contacting the local utility company and obtaining their approval of pedestal details prior to making submittal to the Department and prior to constructing the electrical pedestal service. Any changes
- required by the utility company shall be noted on the submittals.

  Meter Socket shall be a minimum of 100 amp rating and shall comply with the local utility requirements.
- 7. Photoelectric Control shall meet the requirements as shown on ED(5). Shield to control stray light is allowable. The Contractor shall be responsible for proper operation of the photo-electric control. The Contractor shall move and/or adjust or shield the photocell from stray or ambient nighttime light or shall make any other adjustments required for proper operation. The photocell shall face North when practicable. Unless otherwise shown on the plans, the photocell shall turn on the illumination system at 1.0 +(-) 0.5 footcandle and turn off the illumination system at two footcandles higher than turn on.
- 8. The Control Station (H-O-A Switch) shall be as shown on ED(5) except that H-O-A Switch operating handle shall protrude through hinged deadfront trim and NEMA 1 enclosure will not be required.
- 9. Concrete for pedestal service foundation shall be class A or C and shall be in accordance with Item 420, "CONCRETE STRUCTURES", except that concrete will not be paid for directly
- but shall be considered subsidiary to Item 628, "ELECTRICAL SERVICES".

  10. Reinforcing steel shall be #4 rebar in accordance with Item 440, "REINFORCING STEEL".
- 11. Anchor boits shall be A36M55 in accordance with Item 449, "ANCHOR BOLTS". Anchor boits shall be/ $\frac{1}{2}$  inch x 12 inches x 4 inches (dia. x length x hook length).

  12. All conduit and conductors attached to the pedestal service and within 12 inches of the
- pedestal service will not be paid for directly, but shall be subsidiary to the pedestal service. All service conduit and conductors from the utility company transformer to a point 12 inches from the pedestal service shall be paid for separately. Service conduit shall be the size and type as shown in the Electrical Service Data.

  13. Dimensions may vary to accommodate required equipment, utility company requirements, or
- manufacturer's standard equipment dimensions. The Contractor shall submit to the Engineer for approval, six (6) copies of brochures and/or drawings of the pedestal service to be supplied, including actual dimensions, and a paint color sample.
- 14. A separate enclosure as shown on ED(4) or ED(5) for photocell shall not be used for pedestal services. Photocell shall be installed as shown here.
- 15. The pedestal door shall have a mechanically attached data pocket on the inside. Pocket shall be either metal or thermoplastic and shall measure at least 12 inches by 12 inches. The Contractor shall prepare and submit a schematic drawing unique to an individual service. The approved drawing shall be laminated and placed in the document pocket of the service at the time of shipment to the job site. All applicable wiring diagrams and plan sheet layouts for all equipment and branch breaker circuits supplied by that service shall also be laminated and placed in the document pocket prior to shipping.



- 16. Ground rod clamp to be UL listed for direct burial. All non-conductive coating to be removed from ground rod at clamp lacation. Ground rod wire to be #6 AWG solid copper etal conduit ells to have grounding bushing and bonding jumpers correctly installed.
  - 17. All conduits entering enclosures from underground must be sealed. Silicone shall not be
  - 18. All conductors shall be megged and pull tested. Traffic signal cable not to be megged after connection, as electronics will be damaged.
  - 19. Top of concrete foundation to be finished in a neat and workman like manner. If leveling washers are used, no more than/½in. height shall be used at any one corner. Maximum dip or rise in foundation is not to exceed/s in per foot. When properly installed, top of service enclosure shall read level front to back and side to side within/s in. Rocking or movement of the service enclosure shall be repaired by the contractor at no cost to the state.
  - 20. Liquidtight flexible metal conduit shall not be allowed on PS type services.

### LEGEND

- METER SOCKET, (when required)
- METER SOCKET WINDOW, (when required) EQUIPMENT MOUNTING PANEL
- PHOTO ELECTRIC CONTROL WINDOW. (when required)
- HINGED DEADFRONT TRIM LOAD SIDE CONDUIT AREA
- LINE SIDE CONDUIT AREA
- UTILITY ACCESS DOOR, with handle
- PEDESTAL DOOR
- 10. HINGED METER ACCESS
- 11. CONTROL STATION (H-O-A Switch)
- 12. MAIN DISCONNECT
- 13. BRANCH CIRCUIT BREAKERS

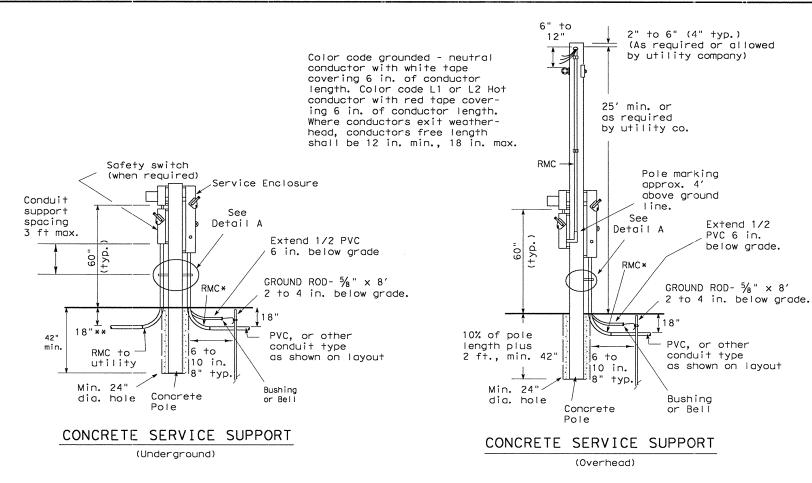


ELECTRICAL DETAILS ELECTRICAL SERVICE SUPPORT PEDESTAL SERVICE TYPE PS

ED(8) - 03

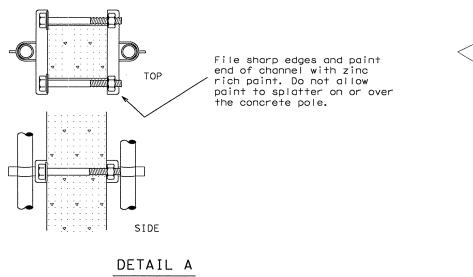
C TXDOT April 1998 | DN:- KB | CK:- JW | DN:- DN | CK:- GC | NEG NO.: 5/03 Revision 12-00 STATE FEDERAL DISTRICT REGION CC 337-1-29 AUS 6 A Revised 5-03 CONTROL SECTION JOB WILLIAMSON 0337 01 029

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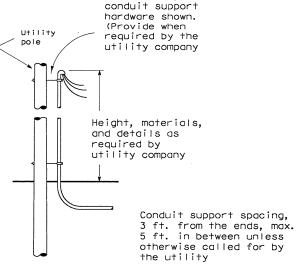
\*same size as branch circuit conduit shown on layout sheets.

\*\* or as required by utility company.



Channel bracket or other arrangement approved by the Engineer. (Kindorf, Unistrut, B-line or equal)

Note: Attach channels with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel with long bolts, or other secure mounting as approved by the Engineer. Bolts galvanized in accordance with ASTM A153. Channel shall be galvanized.



Stand off type

#### UTILITY POLE CONNECTIONS

(When underground service is required by descriptive code and utility is overhead.)

#### NOTES:

Electrical service support structures bid as type GC or OC shall be concrete poles and shall meet the following specifications.

1. Poles shall be prestressed concrete and suitable for direct embedment into the ground without special foundations.

Poles bid as type "GC" shall be a granite concrete mixture consisting of gray Portland cement with exposed pink granite aggregate. Poles bid as type "OC" shall be other concrete mixture as shown elsewhere on the plans or as directed by the Engineer.

- 3. Poles greater than 10 ' shall be square in cross-section, with chamfered corners, and shall have a standard taper of 0.162 inch per foot. Cross sectional dimensions shall not deviate by more than 3/8 inch. Poles 10' or less may be tapered .162"/ft or may be non-tapered. The allowable tolerance shall be plus 3 inches and -2 inches in the overall length. The width of the bottom face of the pole as it is cast may be less than the top face. All small cavities shall be cleaned, saturated with water and then filled with mortar. A small cavity is defined as one larger than 1/4 inch but smaller than 3/4 inch in diameter, and less than 3/8 inch deep. Larger non-structural cavities and spalls shall be repaired by opening side of the damaged area on a 1 to 1 slope using a mechanical grinder, cleaning thoroughly and filling with a high-strength non-shrink concrete repair material. Poles with other defects may be repaired only upon authorization of and using the method prescribed by the Engineer.
- 4. The end of each steel reinforcing strand in the tip and butt shall be burned back to a minimum depth of 1/2 inch. The holes left by the removal of the strand shall be thoroughly cleaned of any loose residue. The holes shall then be completely filled with non-shrink grout and smoothed evenly with tip or butt surface.
- 5. Prestressing strands shall have a minimum concrete cover of 1 1/4 inch.
- 6. A straight line joining the edge of the pole at the butt and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 3/8 inch for each 10 feet of length.
- 7. The chloride content of the concrete mix, including all ingredients shall be 0.4 pounds per cubic yard, or less.
- 8. Concrete used in poles shall have a compressive strength at transfer of not less than 4,000 PSI, and a 28-day compressive strength of not less than 7,000 PSI.
- 9. Materials shall comply with the latest version of the following standards:
- a) Portland Cement ASTM C105
- b) Admixtures ASTM C494
- c) Aggregates ASTM C33 or C330d) Reinforcing Bars ASTM A615
- e) Cold-Drown Spiral Wire ASTM A82
- f) Prestressing Strand, 270K ASTM A416
- 10. Poles greater than 10' shall have a 4 inch tip and 3/8 inch strands. Poles 10' or less shall have a 5 inch min. tip and 3/8 inch strands. Pole shall have a load capacity of greater than 1188 lbs. applied 2 ft. below tip.
- 11. Poles shall be capable of withstanding single point pick up from the horizontal position when lifting from a point 30% of the overall length down from the tip.
- 12. All poles shall be marked by imprinting on one face. Marking shall indicate manufacturer's name, year of manufacture, length and name or type of pole. Marking shall be located approximately 4 ft. above ground line.
- 13. Dunnage points, two-point pickup locations for handling pole in horizontal position, and one-point pickup locations for use in raising the pole to a vertical position and handling in setting operation shall be marked on the pole with durable ink or paint or cast into the pole. These marks shall be small but conspicuous.
- 14. Poles shall be embedded 42 inches or 10% of length plus 2 ft. into the ground whichever is greater.
- 15. When required by utility company for overhead services, poles longer than 10 feet shall have a #6 solid ground wire running the entire length exiting within 6 inches from the top and bottom of the pole. The Contractor shall connect the bottom to a butt wrap or butt plate grounding device.
- 16.All conduit and conductors attached to the service support and within 12 inches of the service support will not be paid for directly, but shall be subsidiary to the electrical service. All conduit and conductors from the utility company pole to a point 12 inches from the service support, including conduit and conductors required for the utility pole riser when furnished by the Contractor, will be paid for separately.
- 17.All mounting hardware and installation details of services shall be in accordance with utility company specifications.
- 18.All conduit on service supports shall be rigid metal conduit except the conduit for grounding electrode conductor (ground rod wire) shall be 1/2 inch PVC. Service entrance conduit size shall be as shown elsewhere. Conduit for branch circuit entry to enclosure shall be the same size as that shown on the layout sheets for branch circuit conduit. Rigid metal conduit shall extend a minimum of six inches underground and then coupled to the type conduit shown on the layout for that particular branch circuit. RMC shall have grounding bushings in enclosures.
- 19. Backfill shall be in accordance with Item 400 except for measurement and payment. Backfilling will not be paid for directly but shall be subsidiary to the various bid items.
- 20. Liquid tight flexible metal conduit (LFMC), may be used when meter and service enclosure are mounted 90 to 180 degrees to each other. LFMC shall not exceed 3 ft. and shall be securely supported within one ft. of each end. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. A neutral conductor must be installed within the LFMC. Bend in LFMC shall not exceed 180 degrees. LFMC may not be installed on utility company owned poles. A pull test is required on all installed conductors, at least six inches of free conductor movement shall be demonstrated to the satisfaction of the Engineer.
- 21. Contractor may order concrete service support structures with 3/4" hole near top of pole for eye bolt type bracket. Eye bolt bracket may be installed as means of overhead service drop anchoring point by utility. Pole may also be center drilled in the field for installation of eye bolt bracket. When used, install bracket 6" to 12" below weatherhead.



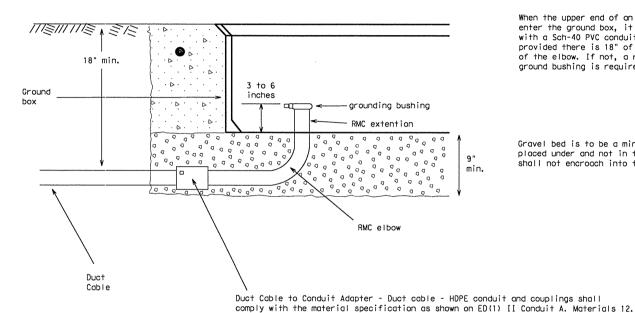
ELECTRICAL DETAILS-SERVICE SUPPORT TYPES GC AND OC

ED(9)-03

| © TxD01 | April | 1998              | DN: - KB | cx:- JW             | DW: - | DN      | ck: - GC | NEG NO.: |  |
|---------|-------|-------------------|----------|---------------------|-------|---------|----------|----------|--|
| 12-00   | STATE | FEDERAL<br>REGION |          | FEDERAL AID PROJECT |       |         |          |          |  |
| 3-03    | AUS   | 6                 |          | 194                 |       |         |          |          |  |
|         |       | cou               | NTY      | CONTRI              | r.    | SECTION | JOB      | HIGHWAY  |  |
|         |       | WILL              | IAMSON   | 03                  | 37    | 01      | 029      | SH 29    |  |

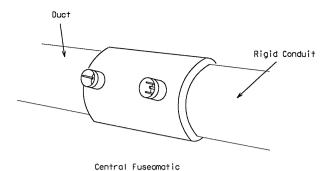
#### I. DUCT CABLE

- A. Duct cable shall be placed by the open trench method at a minimum depth of 18 inches. Bends in duct cable shall be made in the manner recommended by the manufacturer; minimum bending radius shall be 20 inches for 1 1/2 inch duct and 26 inches for 2 inch duct. Unless otherwise approved by the Engineer in writing, duct cable shall be 2 inch diameter. Handling of duct cable reels and installation of duct shall be as recommended by the manufacturer. Duct for duct cable is designed as a conduit system and shall be considered as such in NEC interpretations. Conductors shall not be spliced within a duct. Duct entering a ground box or foundation shall be coupled to a RMC elbow.
- B. Duct cable shall have factory installed conductors. AWG size of electrical conductors shall be as called for in the plans or as required by the National Electrical Code. Conduit bid as High Density Polyethylene (HDPE) conduit shall meet the requirements of duct cable except that the conduit shall be supplied without factory installed conductors. HDPE conduit may be substituted for duct cable. After HDPE conduit is installed, conductors shall be installed. AWG size of electrical conductors shall be as called for in the plans.
- C. Duct cable shall be extended through conduit casings in one continuous length without connection to the casing.
- D. After duct cable has been installed, a pull test will be made on conductors. If conductors cannot be freely pulled, Contractor shall replace or otherwise adjust installation to free up the conductors. Duct cable ends shall be sealed with foom electrical conduit sealant or with heat-shrinking material after pull test is completed.
- E. Sufficient clearance shall be left between each conduit ell so the bonding bushings may be correctly installed. Conduit cover is shown as 18 inches minimum, where run under a road, the minimum cover requirement is 24 inches.
- F. All duct splices shall be by means of UL listed fittings, threaded duct with PVC threaded connector or UL listed tiewrap fitting or central Fusamatic electrically heated fusing conduit coupling installed in accordance with the manufacturer's instructions and approved by the Engineer. Glue on connectors, water pipefittings and heat shrink tubing splices will not be allowed.

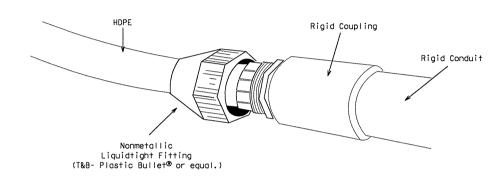


When the upper end of an RMC Ell does not enter the ground box, it may be extended with a Sch-40 PVC conduit nipple and bell end, provided there is 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.

Grave! bed is to be a min, of 9 inches deep, placed under and not in the ground box. Grave! shall not encroach into the interior of the box.

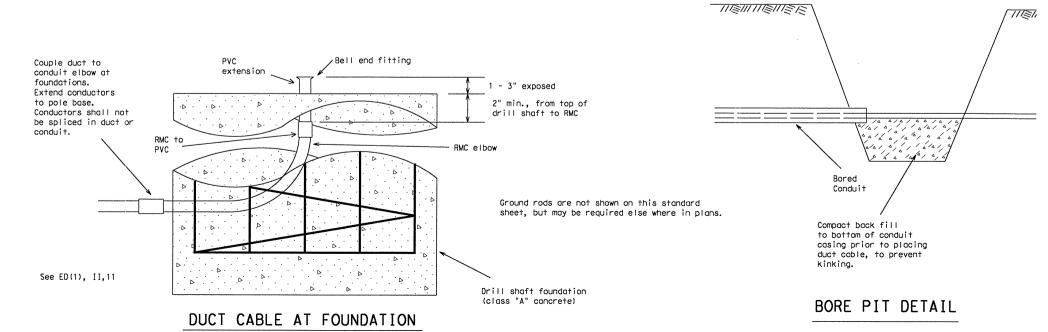


Electrically Heated Fusing Conduit Coupling



EXAMPLES OF PROPER CONNECTIONS

#### DUCT CABLE AT GROUND BOX

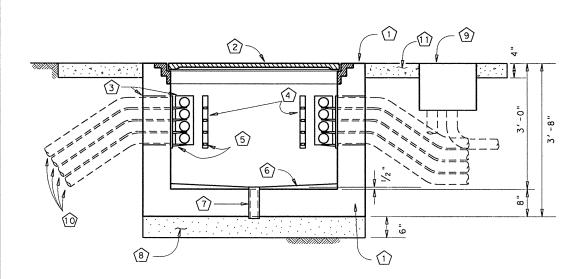




ELECTRICAL DETAILS-DUCT CABLE

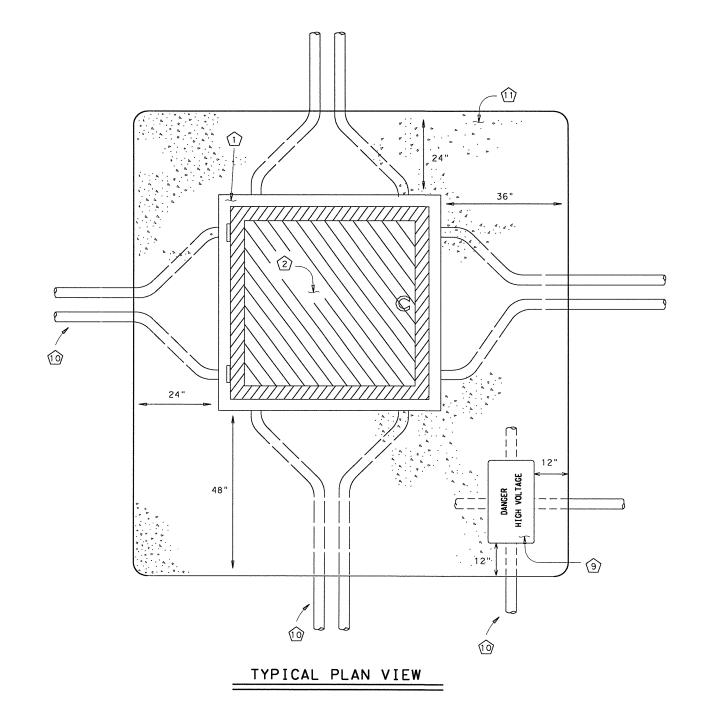
ED(10)-03

| © TxDOT            | April             | 1998              | on: - KB | ck: - JW            | DM: - DN | cx: - GC | NEG NO.: |  |  |
|--------------------|-------------------|-------------------|----------|---------------------|----------|----------|----------|--|--|
| REVISIONS<br>12-00 | STATE<br>DISTRICT | FEDERAL<br>REGION |          | FEDERAL AID PROJECT |          |          |          |  |  |
| 3-03               | AUS               | 6                 |          | CC 337-1-29         |          |          |          |  |  |
|                    |                   | cou               | NTY      | CONTROL             | SECTION  | J08      | HIGHWAY  |  |  |
|                    |                   | WILL              | IAMSON   | 033                 | 7 01     | 029      | SH 29    |  |  |



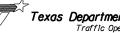
#### TYPICAL VERTICAL SECTION

- Concrete ground box Type J shall be 48" by 48" inside dimension and shall have AASHTO HS 20 wheel loading structural design. Fabricator shall submit shop drawings sealed by a Texas Licensed Structural Engineer. Shop drawings and calculations shall be for the box and lid as a unit.
- (2) Lid and ring shall be cast from Gray Iron in accordance with AASHTO M306, and shall be suitable for HS 20 loading or better. Proof-load testing certification in accordance with AASHTO M 306 shall be submitted. Lid shall have type T hinges and type G handles, and shall have a safety device to prevent accidental closing once the lid has been opened. Lid shall be cast with "TXDOT CONNUMICATIONS" in one inch lettering on top. Lid and ring shall be supplied together, and shall have no sharp edges. Shop drawings shall be submitted. (Neenah Foundry R-6662-TH, or equal.)
- (3) 18" by 9" knockout in concrete
- (4) Cable rack Joslyn J5124, Chance C203-1124 or equivalent
- (5) Cable rach hooks Joslyn J5131A, Chance C203-1131 or equivalent
- 6) Concrete drain invert, 1/2" pitch from center to walls
- (7) 3" drain
- (8) Filter material Grade 3 aggregate or finer. See ITEM 302
- RPM ground box, as called for in layouts, for electrical power conductors and traffic signal cables. See ED(3) for ground box details
- (10) Conduits (See layouts for number, details, specifications, and sizes)
- (11) Concrete riprap apron, Bid as ITEM 432. 1 cubic yard minimum



#### GENERAL NOTES

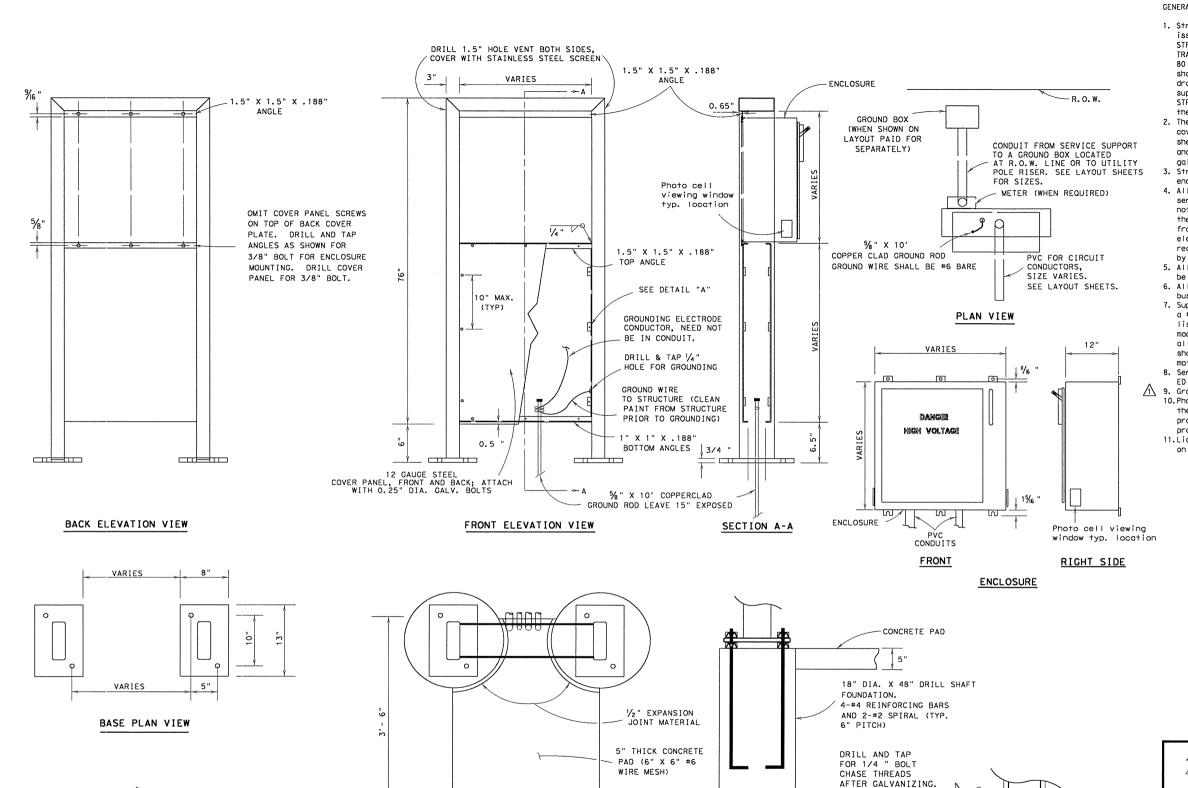
- 1) Illumination, traffic signal and other conductors carrying full voltages (50 volts or greater) shall not enter the communications ground box, but shall be run into an adjacent RPM ground box, as shown in the detail.
- 2) Conductors in the Type J ground box shall be laid on the racks and secured in place with plastic ties. At no time shall any conductor be run through the center of the box. Contractor shall arrange conduit runs so cables shall enter and exit the box without violating the required bend radius or running throught the center of the
- 3) Riprap shown is the minimum required. Riprap shall extend to protect all conduits with less than the minimum allowed ground cover.
- 4) Conduits shall not extend inside the box more than 1", including the required bell end fitting or bushing. Conduits shall be securely grounted in place with Portland cement completely filling the knockout window around the conduits.
- 5) Rigrap and boxes shall be cast flat with a maximum slope of 0.25% (3" over 10').
- 6) Payment concrete ground box Type J shall be bid as ITEM 628. RPM ground box and riprap shall be bid separately.



Texas Department of Transportation Traffic Operations Division

CONCRETE GROUND BOX (TYPE J) FOR TRAFFIC MANAGEMENT SYSTEMS ED(11)-03

| © TxDOT | TxDOT July 2000   |                   |        | OT July 2000 DN:- JM CK:- DN:- DN CK:- JM |         |     |         |  |  | NEG NO.: |
|---------|-------------------|-------------------|--------|---|---------|-----|---------|--|--|----------|
| 9-00    | STATE<br>DISTRICT | FEDERAL<br>REGION |        | FEDERAL A10 PRO                           | JECT    |     | SHEET   |  |  |          |
| 12-00   | AUS               | 6                 |        | CC 337-1-                                 | -29     |     | 196     |  |  |          |
| 3-03    |                   | cour              | VTY    | CONTROL                                   | SECTION | JOB | HIGHWAY |  |  |          |
|         |                   | WILL              | IAMSON | 033                                       | 7 01    | 029 | SH 29   |  |  |          |



CLASS A CONCRETE

FOUNDATION

ELEVATION

1" X 1/4" X 1" TABS

0.65"

DETAIL A

" DIA. BOLTS

5/03 Revision

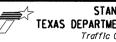
A Revised notes.

#### GENERAL NOTES:

- Structure shall be designed in accordance with latest issue of AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS." Structures shall be designed for 80 mph wind load with 1.3 gust factor. Shop drawings shall include ASTM material designations. Shop drawings shall be submitted for the electrical service support in accordance with Item 441, "STEEL STRUCTURES." Catalog cut sheets shall be submitted for the enclosure and equipment.
- 2. The structure shall be galvanized. Twelve gauge sheet covers and enclosure may be made from pre-galvanized sheeting. When shown elsewhere on the plans, structure and outside of enclosure may be painted in lieu of aalvanizina.
- 3. Structure mounting dimensions may vary to match enclosure provided.
- 4. All conduit and conductors attached to the electrical service and within 12" of the electrical service will not be paid for directly, but shall be subsidiary to the electrical service. All conduit and conductors from the utility company pole to a point 12" from the electrical service, including conduit and conductors required for the utility pole riser, when furnished by the Contractor, will be paid for separately.
- 5. All conduits entering enclosures from underground to be sealed. Silicone will not be allowed.
- 6. All PVC conduits to be fitted with a bell end or bushing.
- 7. Support structure to be bonded to the ground rod using a #6 AWG Copper Bonding jumper to be terminated with a listed eyelet type connector connected to a 1/4-20 SS machine screw-bolt. Sheet metal screws will not be allowed for bonding. All threaded bonding connections shall be made up wrench tight. All non-conductive materials to be removed from contact surfaces.
- 8. Service enclosures to be labeled and steciled see ED(5) VIII C.
- 9. Ground rod clamp to be UL listed for direct burial. 10. Photo cell viewing window location on each side of the service enclosure to be clear of obstructure and provide a clear line of sight view and allow for the proper light level sensing by the photo cell.
- 11. Liquidtight flexible metal conduit may not be used on type RT(U) service supports.

| STRUCTU       | JRE DATA               |  |  |  |  |
|---------------|------------------------|--|--|--|--|
| TUBULAR POLE  | ANCHOR BOLTS           |  |  |  |  |
| MEMBER SIZE   | DIA.X LENGTH<br>X HOOK |  |  |  |  |
| 8" X 3"X 3/6" | 5/8" X 16" X 4"        |  |  |  |  |

| COMPONENT         | ASTM         |
|-------------------|--------------|
| TUBING<br>MEMBERS | A500 GRADE A |
| BASE PLATES       | A36          |
| ANCHOR BOLTS      | A307 or A36  |



#### STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION Traffic Operations Division

ELECTRICAL DETAILS-

ELECTRICAL SERVICE SUPPORT TYPE RT (U)

ED(12)-03

| TXDOT           | Januar | y 1992            | on: - KB | ck:- JW             | ow: - DN | cx: - GC | NEG NO.: |  |  |  |
|-----------------|--------|-------------------|----------|---------------------|----------|----------|----------|--|--|--|
| VISIONS<br>4-98 | STATE  | FEDERAL<br>REGION | FE       | FEDERAL AID PROJECT |          |          |          |  |  |  |
| 12-00           | AUS    | 6                 | CC       | CC 337-1-29         |          |          |          |  |  |  |
| 3-03            |        | cou               | VTY      | CONTROL             | SECTION  | J08      | HIGHWAY  |  |  |  |
| 5-03            |        | WILL              | [ AMSON  | 033                 | 7 01     | 029      | SH 29    |  |  |  |

BOTTOM OF POLE

1/4" /

DIMENSION VARIES, INSTALL ONLY AS WIDE AS REQUIRED TO ACCOMODATE EQUIPMENT AND FOUNDATION

PLAN VIEW

#### GROUND BOX - Type - Battery Box

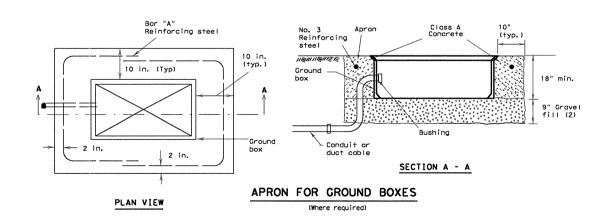
#### A. MATERIALS

- 1. Battery box ground boxes shall be constructed such that it will be possible to install and accompdate up to 4 batteries measuring 8"  $\times$  13.5"  $\times$  10" (W  $\times$  L  $\times$  D).
- 2. All battery box ground boxes and covers shall be permanently marked either by impress or by permanent ink, with manufacturer's model number and manufacturer's name or logo.
- 3. Covers shall be bolted down, and bolt holes in the box shall be arranged to drain dirt.
- 4. Battery box ground boxes shall meet the following requirements:
- a. Battery box cover and cover ring will be manufactured from polymer concrete reinforced with continuous strands of woven or stitched borosilicate fiberalass cloth. The polymer concrete shall be made from catalyzed polyester resin, sand and aggregate, and shall have a minimum compressive strength of 11,000 psi. Polymer concrete containing chopped fiberglass or fiberglass reinforced plastic is not acceptable.

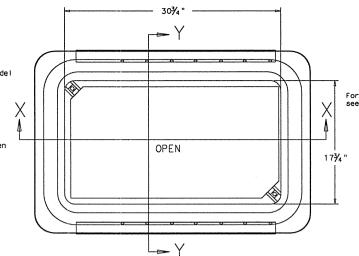
  b. Battery box ground box walls will be manufactured from fiberglass reinforced plastic reinforced with continuos strands of woven
- or stitched borosilicate fiberglass cloth. The fiberglass reinforced plastic shall be made from catalyzed polyester resin, lightweight filler and reinforced with woven roving and shall have a minimum compressive strength of 7,500 psi.
- c. Minimum inside dimensions shall be at least as follows (width x length x depth): Battery box shall be at least 15 1/4 inches x 28 1/4 inches x 14 1/2 inches.
- d. Bottom edge of box or extension shall be footed with a minimum 1/2 inch flange.
- e. Battery ground boxes shall withstand 600 lbs. per sq. ft. applied over the entire sidewall with less than Vainch deflection per foot length of box. Ground boxes and covers shall withstand a test loading of 20,000 lbs. over a 10 inch by 20 inch area centered on the cover with less than  $\frac{1}{2}$  inch deflection. Battery ground boxes and covers shall meet Western Underground Standards 3.6. Manufacturer shall supply certification by an independent laboratory or sealed by a Texas-Licensed
- f. Covers shall be 2 inch thick polymer concrete. All hardware shall be stainless steel. Cover shall be secured with two 1/2 inch stainless steel bolts. Bolts shall be self-retaining and shall withstand a minimum of 70 ft-lbs. torque and shall have a minimum 750 lbs. straight pull out strength. Nuts shall be floating and shall provide a minimum of 1/2 inch movement from the center of the nut. Covers shall be skid resistant, minimum 0.5 coefficient of friction. Covers shall be interchangeable between manufacturers and shall conform to the dimensions shown herein. Unless otherwise approved by the Engineer, cover shall be legibly labeled, "Traffic Signals Danger High Voltage" in minimum 1 inch
- g. The battery box shall be supplied with predrilled holes to accept % inch stainless steel rods. The holes shall be installed 1  $\frac{1}{2}$  inches (+/-  $\frac{1}{2}$  inches) above the bottom edge of the box along the length of the box at 3  $\frac{1}{2}$  inch centers beginning 4 1/2 inches from the edge of the box.
- h. A minimum of seven 1/2 inch stainless steel rods threaded on both ends shall come equipped to be inserted in the predrilled holes to serve as a rack sufficient to accommodate up to four batteries. The rods shall be secured in place utilizing  $\frac{1}{2}$ " stainless steel (s.s.) nuts and  $\frac{1}{2}$ " X 1" s.s. flat washers.
- i. Ground boxes of the type specified above shall meet the requirements shown above. The Contractor will be permitted to furnish like materials of any manufacturer provided they are of equal quality and comply with the specifications.
- i. Two 🖟 plastic sheets measuring a nominal 6" x 24" shall be supplied which are to be placed on the secured rods upon which the batteries (supplied by others) are to be set.
- k. A minimum of four battery "bell jars" and respective tie down straps are to be supplied. These bell jars are inverted over the batteries and strapped to the batteries.

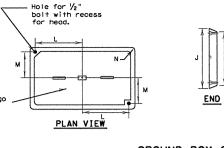
#### B. CONSTRUCTION METHODS

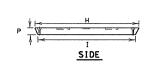
- Battery box ground boxes shall be set on a 9 inch (minimum) bed of coarse No. 1 aggregate as defined by Item 421. Gravel shall be
  in place prior to setting box and conduits shall be capped. Any gravel or dirt in conduit shall be removed.
   Construction of an apron encasing the battery box ground box including concrete and reinforcing
  steel is required and shall not be paid for directly but shall be subsidiary to the ground box. Reinforcing steel may be field bent.
- Concrete for aprons shall be considered miscellaneous concrete for testing purposes. Aprons shall be cost in place.
- 3. Any holes cut into the sidewall of battery box ground boxes shall be accomplished using a round hole saw or other method approved by the Engineer.



- (1) Place gravel "under" the box. not "in" the box. Gravel should not encroach on the interior volume of the box.
- (2) Install bushing on the upper end of all ells.
- (3) All conduits shall be installed in a neat and workmanlike manner.

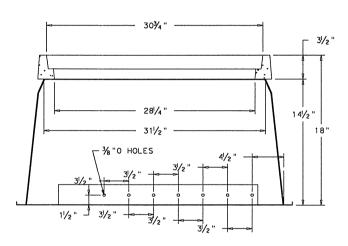


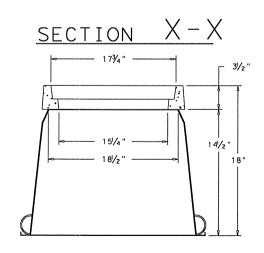




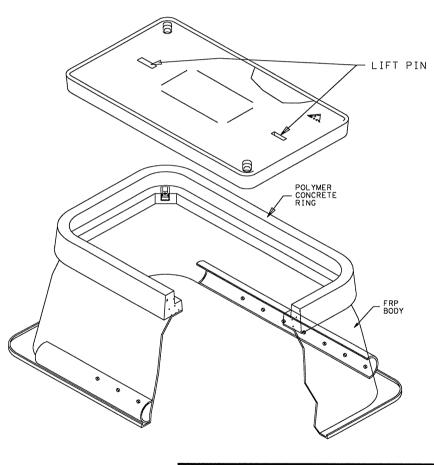
#### GROUND BOX COVER

|             | GI     | ROUND  | вох со | VER DI | MENSIO | NS  |       |   |
|-------------|--------|--------|--------|--------|--------|-----|-------|---|
| вох         | DIME   | NSIONS | S (IN  | CHES)  |        |     |       |   |
| SIZE        | Н      | I      | J      | К      | L      | М   | N     | Р |
| Battery box | 30 1/2 | 30 1/4 | 17 1/2 | 17 1/4 | 13 1/4 | 6 ¾ | 1 3/8 | 2 |









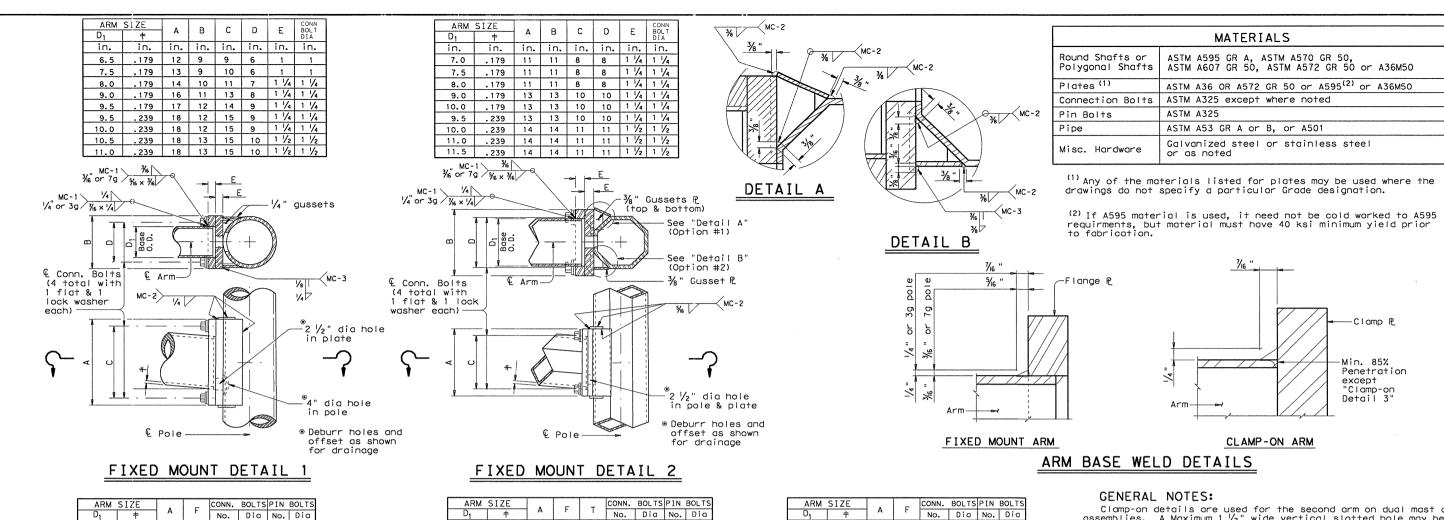


#### STANDARD PLANS Texas Department of Transportation Traffic Operations Division

ELECTRICAL DETAILS GROUND BOXES/ BATTERY BOX

ED(13) - 03

| DTxD01   | TxDOT May 2003    |                   |        | ck: - BV            | cx:-BV ox:-HW |     |         |  |  |
|----------|-------------------|-------------------|--------|---------------------|---------------|-----|---------|--|--|
| EVISIONS | STATE<br>DISTRICT | FEDERAL<br>REGION |        | FEDERAL AID PROJECT |               |     |         |  |  |
|          | AUS               | 6                 |        | 198                 |               |     |         |  |  |
|          |                   | cou               | NTY    | CONTROL             | SECTION       | JOB | H]GHWAY |  |  |
|          |                   | WILL              | IAMSON | 0337                | 01            | 029 | SH 29   |  |  |



in.

7.0

7.5

8.0

9.0

9.5

10.0

Dia as

required

₹16

€ Pin bolt,

3rd bolt

required

¾" dia Pipe —

where

pipe & hole-

 $\frac{1}{2}$ " dia drainage hole

Min. 85%

/MC-4

o

Connection Bolt with hex nut, 2 flat washers & 2 lock washers

Penetration

-1  $\frac{1}{2}$ " dia wire outlet hole

%" ₽ may

of welded

be bent instead in.

in. lin.

8

.179 12 8

.179 16 10

.179 18 10

.179 | 14 |

in. | ea. | in. | ea. | in.

4

7/8 4

7/8 4

.239 18 10 1 6 1 3 \( \frac{1}{2} \)8 .239 18 10 1 6 1 3 \( \frac{1}{2} \)8

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1  $\frac{1}{2}$ " wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

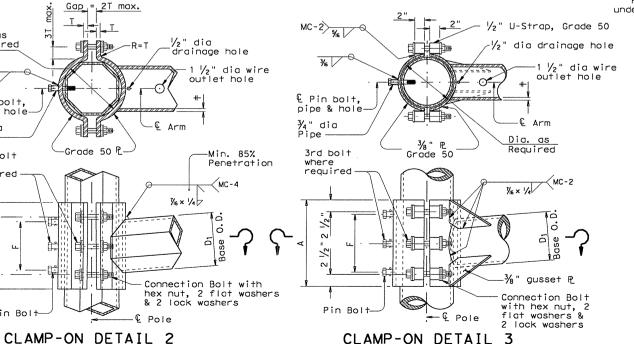
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

#### NOT

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and  $\frac{7}{4}$ " dia pipe shall have  $\frac{7}{16}$ " dia holes for a  $\frac{7}{8}$ " dia galvanized cotter pin. Back clamp plate shall be furnished with a  $\frac{7}{4}$ " dia hole for each pin bolt. An  $\frac{7}{16}$ " dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



in.

.179

9.5 .179 18

9.5 .239 18

8.0

9.0

in.

10.0 .239 18 12 6 1 3

.179 12

.179 | 14

.179 16

in. ea. in. ea. in.

12 6 1 3 %

12 6 1 3

1 2 5/8

1 2

8 4

8 4

10 4

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY

# FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-96

| TILE: MA   | -C.DGN    | DN: N  | is        | CK:  | JSY         | DW: N  | MF     | CK: | JSY     |  |
|------------|-----------|--------|-----------|------|-------------|--------|--------|-----|---------|--|
| C TxDOT Au | gust 1995 | DIST   | FED REC   | :    | FEDERAL     | AID PE | ROJECT | •   | SHEET   |  |
|            | VISIONS   | AUS    | 6         |      | CC 337-1-29 |        |        |     | 199     |  |
| 5-96       |           | COUNTY |           |      | C           | ONTROL | SECT   | J08 | HIGHWAY |  |
|            |           | Y      | /ILL I AI | MSON |             | 0337   | 01     | 029 | SH 29   |  |

Pin Bolt-

in. in. ea. in. ea. in.

.179 12 8 4 \* 1/8 2 5/8

.179 18 12 4 1 1/4 3 1/8

.239 18 12 4 1 1/4 3 5/8

.239 18 12 4 1 1/4 3 5/8

14 8 4

14 8 4

\*1" Dia connection bolts are permissible

CLAMP-ON DETAIL 1

16 10 4

in.

.179

.179

6.5

8.0

9.0

9.5

9.5

Dia as

€ Pin bolt,

pipe & hole

¾" dia Pipe —

3rd bolt

required

2

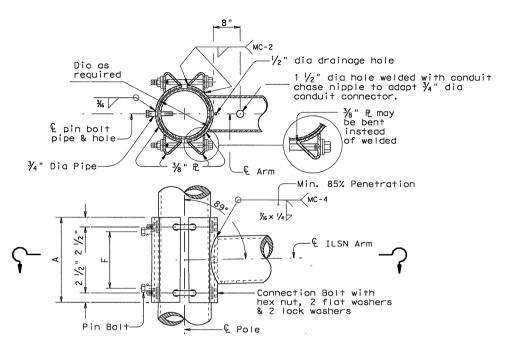
2

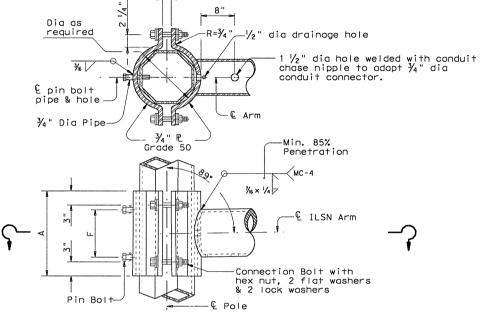
required

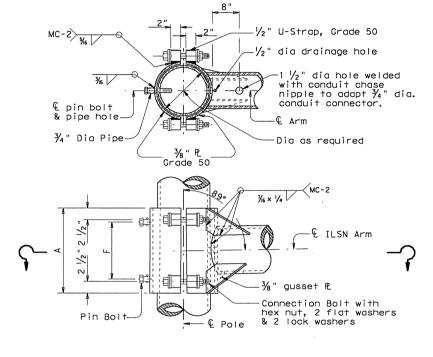
₹6

| TABLE OF DIMENSIONS                                |     |     |       |       |       |       |     |  |
|--|-----|-----|-------|-------|-------|-------|-----|--|
| for ILSN Support Arm Clamp-on<br>Details 1,2 and 3 |     |     |       |       |       |       |     |  |
| ILSN ARM SIZE                                      | Α   | _   | CONN. | BOLTS | PIN E | BOLTS |     |  |
|  | Α   | А   | A     | No.   | Dia   | No.   | Dia |  |
| 3 in. dia  | in. | in. | ea.   | in.   | ea.   | in.   |     |  |
| Schedule<br>40 Pipe                                | 10  | 8   | 4     | 3/4   | 2     | 5/8   |     |  |

 $Gap_1 = 1 \frac{1}{2}$  max.







#### ILSN CLAMP-ON DETAIL 2

#### ILSN CLAMP-ON DETAIL 3

#### GENERAL NOTES:

Clamp-on details shall be used for ILSN support arm assemblies. A 1  $\frac{1}{2}$ " inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

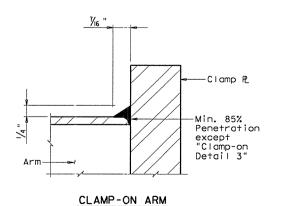
Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

ILSN CLAMP-ON DETAIL 1

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.  $\,$ 

#### NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and  $\frac{7}{4}$ " dia pipe shall have  $\frac{7}{16}$ " dia holes for a  $\frac{7}{8}$ " dia galvanized cotter pin. Back clamp plate shall be furnished with a  $\frac{7}{4}$ " dia hole for each pin bolt. An  $\frac{17}{16}$ " dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



ARM BASE WELD DETAILS

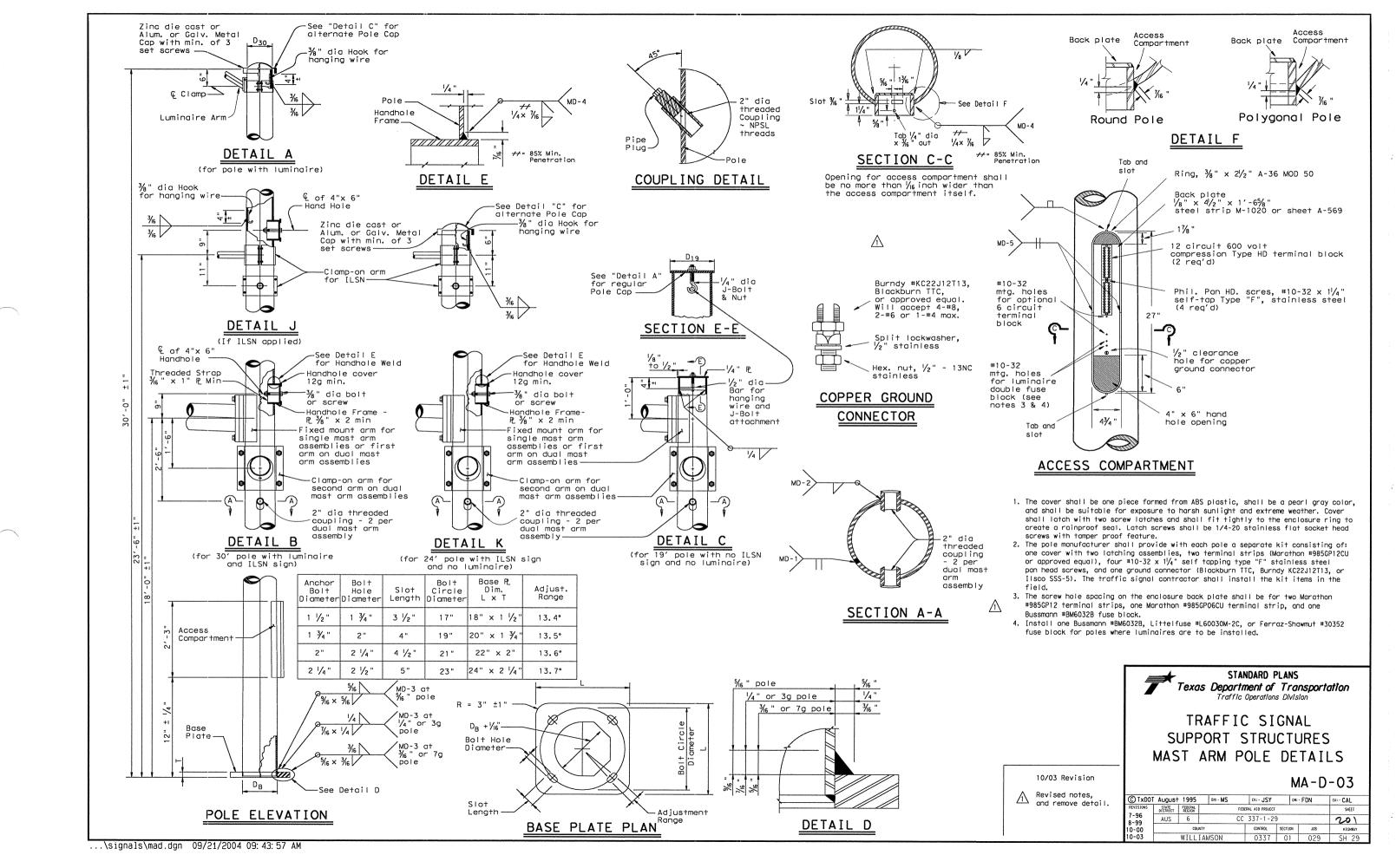
## Texas Department of Transportation Traffic Operations Division

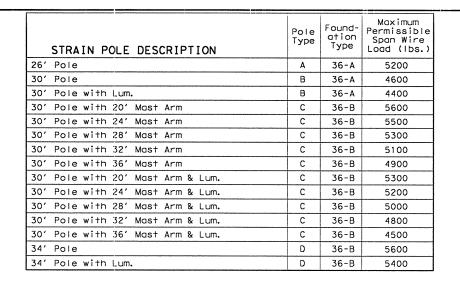
#### STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST-ARM CONNECTIONS

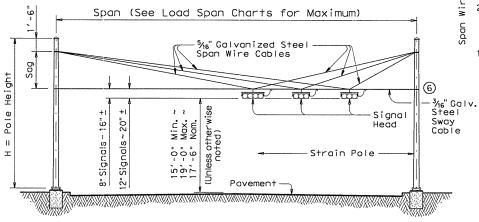
MA-C(ILSN)-96

| E: MA-CILSN. DGN  | DN: N      | IS      | ck: JSY | DW:      | MF     | CK: | JSY     |    |
|-------------------|------------|---------|---------|----------|--------|-----|---------|----|
| TxDOT August 1995 | DIST       | FED REC | FEDER   | AL AID P | ROJECT |     | SHEE    | T  |
| REVISIONS         | AUS        | 6       | CC      | 337-1-   | 29     |     | 201     | b  |
| -96               |            | COUNTY  |         |          | SECT   | JOB | H I GHW | A  |
|                   | WILLIAMSON |         |         | 0337     | 01     | 029 | SH 2    | 20 |

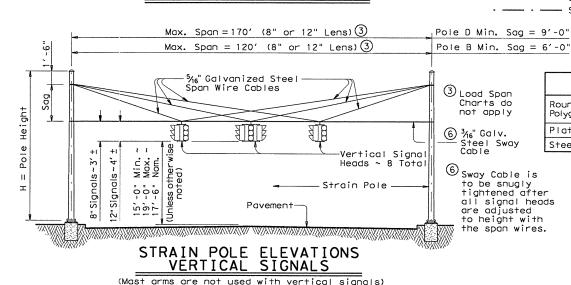




2 Numbers on charts indicate the number of signal heads on the span. The total span wire design load is based on one 5-section head and one or more additional 3-section head(s). Design wind pressures on cables are assumed as 1.0 lb/ft. Weight of span wire cables (one per signal head) is assumed as 0.65 lb/ft which includes an allowance for conductor cables and miscellaneous hardware. The effect of the sway cable on load distribution is ignored as it is assumed to break at design wind conditions. When a pole supports 2 spans, the span wire design loads for both spans should be added vectorially to determine the design load for that pole.

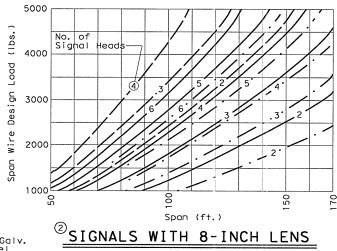


## STRAIN POLE ELEVATIONS HORIZONTAL SIGNALS



5000 4000 g 3000 Des 2000 Signal Heads Span (ft.)

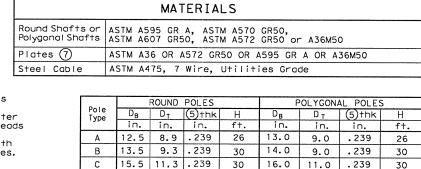
SIGNALS WITH 12-INCH LENS



| Signal Head Type    | Wt. Per Head | Wind Area �  |
|---------------------|--------------|--------------|
| 5-Section, 12" Lens | 125 lbs      | 9.6 sq. ft.  |
| 5-Section, 8" Lens  | 70 lbs       | 4.8 sq. ft.  |
| 3-Section, 12" Lens | 75 lbs       | 5.64 sq. ft. |
| 3-Section. 8" Lens  | 45 lbs       | 3.0 sq f+    |

♦ Effective projected design wind area (actual area times drag coefficient)

- Sag = 4'-6" (26' or 30' Pole) - Sag = 8'-0" (30' or 34' Pole) - - Sag = 11'-6" (34' Pole)



15.5 10.7 .239 34 16.0 11.0 .239 34  $D_B$  = Pole Base O.D.  $D \tau = Pole Top O.D.$ H = Pole Height SHIPPING PARTS LIST

| Poles        | : (Without Traff | ic Signal Arm)    |          |                 |   |          |
|--------------|------------------|-------------------|----------|-----------------|---|----------|
|              | Strain poles wit | h Luminaire       |          | Strain poles w  | ithout Luminaire                              | >        |
| Pole<br>Type | hardware attache | , pole cap, 2 cla |          | hardware attac  | e with the follo<br>ched:<br>use, pole cap an | J        |
|              | Description      | Designation       | Quantity | Description     | Designation                                   | Quantity |
| Α            |                  |                   |          | 26' Strain Pole | SP 26 A-80                                    |          |
| В            | 30' Strain Pole  | SPL 30 B-80       |          | 30' Strain Pole | SP 30 B-80                                    |          |
| D            | 34' Strain Pole  | SPL 34 D-80       |          | 34' Strain Pole | SP 34 D-80                                    |          |
|              |                  |                   |          |                 |   |          |

Poles (With Traffic Signal Arm)

|              | Strain poles     | with Luminaire    | Strain poles without Luminaire |                |                   |          |  |  |
|--------------|------------------|-------------------|--------------------------------|----------------|-------------------|----------|--|--|
| Pole<br>Type | hardware attache | e, pole cap, clam | 1                              | hardware atta  | oase, pole cap ar | J        |  |  |
|              | Description      | Designation       | Quantity                       | Description    | Designation       | Quantity |  |  |
| С            | 30' SPw/TS Arm   | SPL 30 C-80       |                                | 30' SPW/TS Arm | SP 30 C-80        |          |  |  |

Traffic Signal Arms (For Type C poles)

|                          | Type I Arm  | (1 Signal) | Type II Arm   | (2 Signals)            | Type III Arm (   | 3 Signals) |  |
|--------------------------|---|------------|---|------------------------|--|------------|--|
| Nominal<br>Arm<br>Length | Ship each Type I Arm with the following hardware attached: 2 CGB Connectors, 1 clamp with bolts and washers |            | Ship each Type the following attached: 1 Bracket Asse Connectors and with bolts and | hardware  mbly , 3 CGB | Ship each Type III Arm with the following hardware attached:  2 Bracket Assemblies , 4 CGB Connectors and 1 clamp with bolts and washers |            |  |
| ft.                      | Designation   | Quantity   | Designation   | Quantity               | Designation  | Quantity   |  |
| 20                       | 20 I -80  |            |   |                        |  |            |  |
| 24                       | 24 I -80  |            | 24 II -80   |                        |  |            |  |
| 28                       | 28 I -80  |            | 28 II -80   | ,                      |  |            |  |
| 32                       |   |            | 32 II -80   |                        | 32 III -80   |            |  |
| 36                       |   |            | 36 II -80   |                        | 36 III -80   |            |  |

Anchor Bolt Assemblies (1 per pole) Templates may be removed for shipment. Anchor Anchor Bolt Diameter Length

1 3/4" 3'-10" 4'-3"

Luminaire Arms Nominal Arm Length Quantity 8' Arm

Each Anchor Bolt Assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, 4 lock washers and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

(1) Supply Option "A" unless otherwise noted. See Sheet "DMA-80"

7 Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

5 Thickness shown are minimum, thicker materials may be used.

SHEET 1 OF 2

Texas Department of Transportation Traffic Operations Division

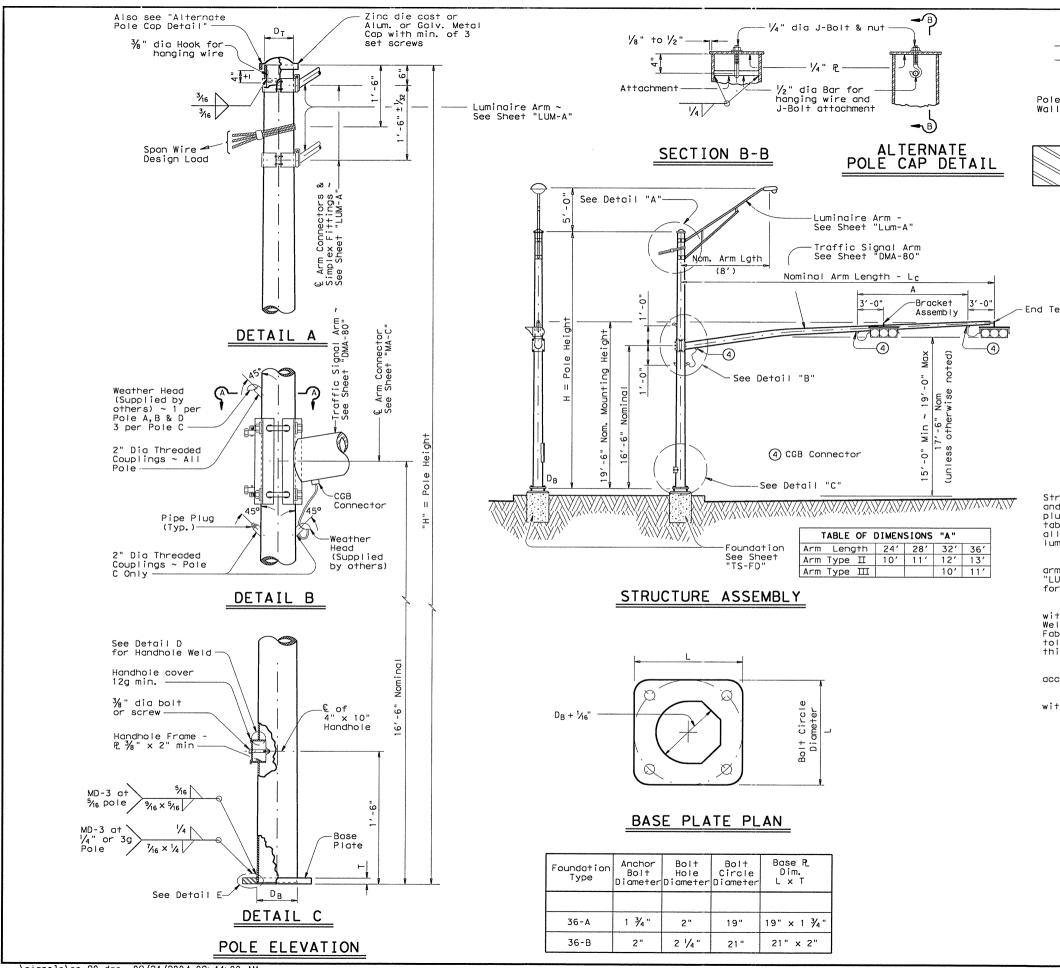
TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

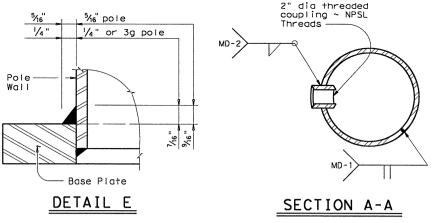
(80 MPH WIND ZONE)

SP-80(1)-96

| FILE: | SP80.DGN      | DN: | MS   | CK: JSY  | DW: BR | CK:     | JSY    | NEG: |         |
|-------|---------------|-----|------|----------|--------|---------|--------|------|---------|
| © TxD | OT March 1996 |     | TRIO | FED REG  | FEDERA | AID P   | ROJECT | г •  | SHEET   |
|       | REVISIONS     |     | AUS  | 6        | CC 3   | 37-1-   | 29     |      | 202     |
| 6-96  |               |     |      | COUNTY   |        | CONTROL | SECT   | JOB  | HIGHWAY |
|       |               | Γ   |      | WILLIAMS | SON    | 0337    | 01     | 029  | SH 29   |

...\signals\sp-80.dgn 09/21/2004 09: 44: 00 AM





### GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. The maximum permissible span wire design loads tabulated are calculated at a stress load of 1.4 times the basic allowable stress. A simultaneous wind on the pole, mast arm, and luminaire is also included.

DETAIL D

See standard sheet "DMA-80" for details of clamp-on traffic signal arms, sheet "MA-C" for traffic signal arm connection details, sheet "LUM-A" for luminaire arm and connection details, and sheet "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and the Specifications.

Unless otherwise noted, all parts shall be galvanized in accordance with the Specifications.

8 85% Min.

Special design require submission of shop drawings in accordance with the item "Steel Structures".

SHEET 2 OF 2

Pole

Frame

Handho Le

Wall

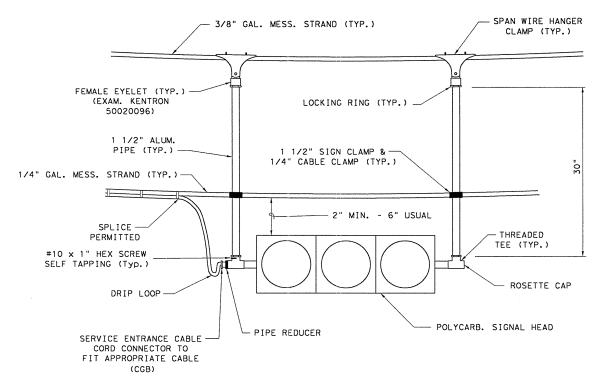


TRAFFIC SIGNAL
SUPPORT STRUCTURES
STRAIN POLE ASSEMBLIES

(80 MPH WIND ZONE)

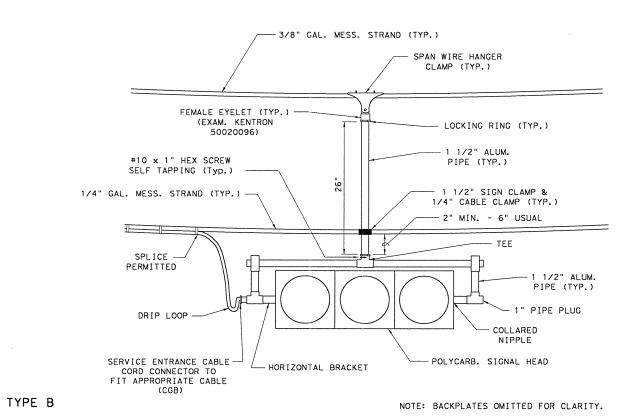
SP-80(2)-96

| FILE:  | SP80.DGN     | DN: MS | CK: JSY | DW: BR  | CK:     | ISY    | NEG: |         |
|--------|--------------|--------|---------|---------|---------|--------|------|---------|
| © TxDO | T March 1996 | DIST   | FED REG | FEDERAL | AID P   | ROJECT |      | SHEET   |
| 6-96   | REVISIONS    | AUS    | 6       | CC      | 337-1   | -29    |      | 203     |
| 0-90   |              |        | COUNTY  | (       | CONTROL | SECT   | JOB  | HIGHWAY |
|        |              |        | WILLIAM | SON     | 0337    | 01     | 029  | SH 29   |



TYPE A

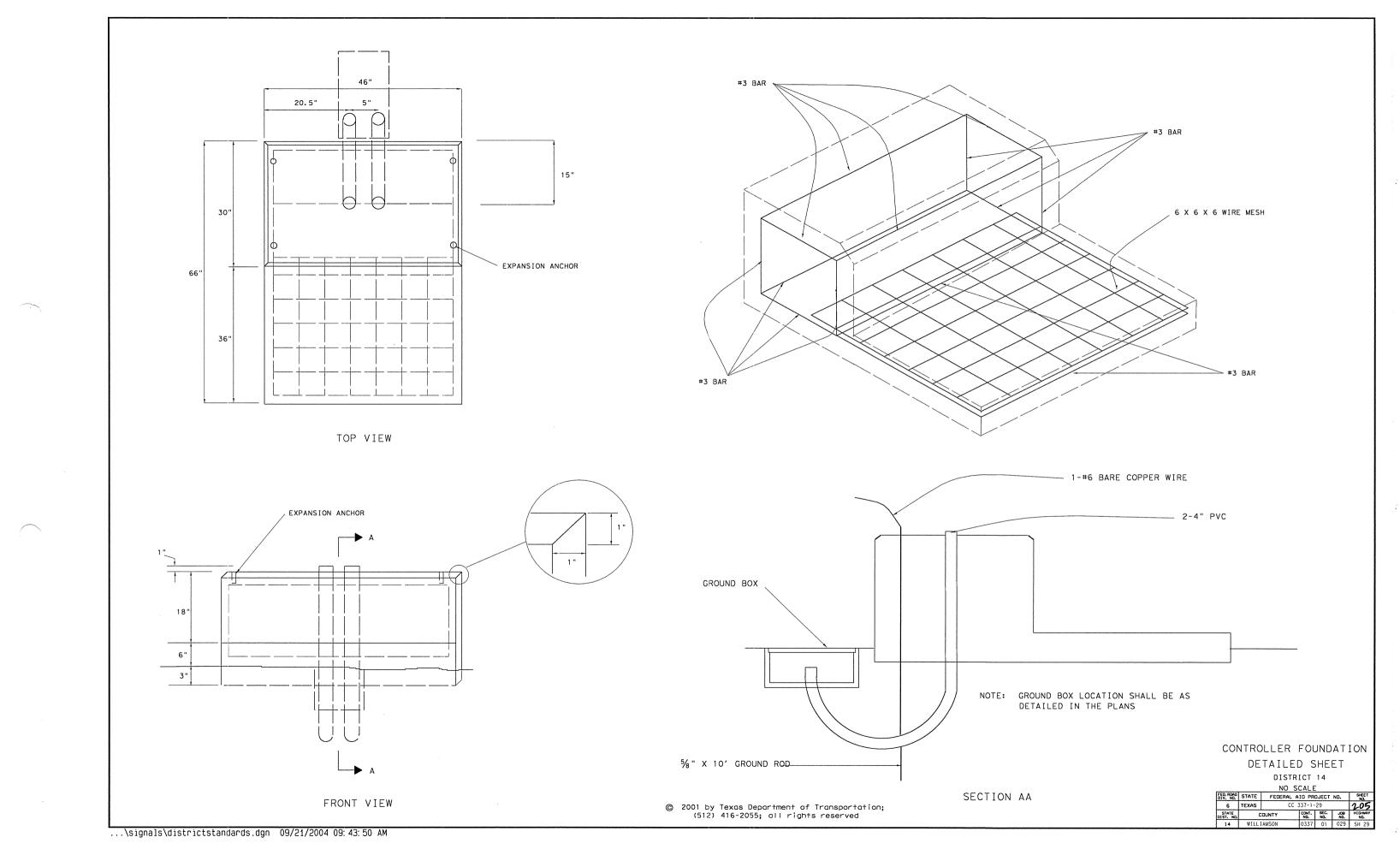
NOTE: BACKPLATES OMITTED FOR CLARITY.



SIGNAL HEAD HORIZONTAL SPAN WIRE MOUNT DISTRICT

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| FED. ROAD<br>DIV. NO. | STATE | FEDERAL | AID PR       | DJECT       | NO.        | SHEET<br>NO.   |   |
|-----------------------|-------|---------|--------------|-------------|------------|----------------|---|
| 6                     | TEXAS | CC      | 337-1-       | 29          |            | 200            | 7 |
| STATE<br>DIST. NO.    | C     | COUNTY  | CONT.<br>NO. | SEC.<br>NO. | J08<br>N0. | HIGHWAY<br>NO. | 7 |
| 14                    | WIL   | LIAMSON | 0337         | 01          | 029        | SH 29          |   |
|                       |       |         |              |             |            |                |   |



#### PROJECT INFORMATION

#### PROJECT LIMITS:

SH 29 IN WILLIAMSON COUNTY FROM D.B. WOOD TO IH 35.

#### PROJECT DESCRIPTION:

CONSTRUCTION CONSISTS OF A NEW ROADWAY ALIGNMENT AND THE RECONSTRUCTION OF AN EXISTING ROAD CONSISTING OF GRADING, STRUCTURES, ASPHALT CONCRETE PAVING, SIGNING, AND PAVEMENT MARKINGS.

#### LIST OF NON-STORM WATER DISCHARGES:

(NONE)

#### LIST OF SUPPORT ACTIVITIES TO BE PART OF SW3P:

1. EXCAVATED FILL MATERIAL STOCKPILE SITE.

#### LIST OF OFF-SITE / UTILITY INSTALLATIONS:

- 1. CONCRETE PLANT (CONCRETE TO BE OBTAINED FROM A COMMERCIAL SOURCE)
- 2. ASPHALT PLANT (ASPHALTIC MATERIAL TO BE OBTAINED FROM A COMMERCIAL COURSE)
- CONTRACTOR'S DISPOSAL SITE. (FACILITY TO BE SECURED SOLELY BY THE CONTRACTOR)
- CONTRACTOR'S PROJECT FIELD OFFICE/YARD. (FACILITY TO BE OPERATED SOLELY BY THE CONTRACTOR)

#### THREATENED/ENDANGERED SPECIES DETERMINATION:

WILLIAMSON COUNTY IS LISTED AS HAVING HABITAT FOR ENDANGERED/
THREATENED SPECIES. NO KNOWN OCCURRENCES OF ENDANGERED
OR THREATENED SPECIES HAVE BEEN DOCUMENTED WITHIN THE
PROJECT AREA. PROJECT ACTIVITIES AND STORM WATER DISCHARGE
SHOULD HAVE NO ADVERSE IMPACT ON LISTED SPECIES. REFER TO
PROJECT ENVIRONMENTAL ASSESMENT FOR MORE INFORMATION.

#### NATIONAL REGISTER OF HISTORICAL PLACES DETERMINATION:

DATA SEARCH AND SITE SURVEY PERFORMED AS PART OF THIS PROJECT'S ENVIRONMENTAL ASSESSMENT FOUND NO HISTORICALLY SIGNIFICANT PROPERTIES TO BE AFFECTED BY THIS PROJECT. REFER TO THIS PROJECT'S ENVIRONMENTAL ASSESSMENT FOR MORE INFORMATION.

#### NAME OF RECEIVING WATERS:

RUNOFF WATER FROM THIS PROPOSED CONSTRUCTION WOULD FLOW INTO THE SOUTH FORK OF SAN GABRIEL RIVER. THIS PORTION OF THE SAN GABRIEL RIVER IS SEGMENT NUMBER 1250 OF THE BRAZOS RIVER BASIN.

#### MAJOR SOIL DISTURBING ACTIVITIES:

SOIL DISTURBING ACTIVITIES ON THIS PROJECT WILL INCLUDE PREPARING THE R.O.W., GRADING, EXCAVATION AND EMBANKMENT FOR THE ROADWAYS, CULVERT EXTENTIONS, EROSION AND SEDIMENT CONTROL AND TOPSOIL WORK FOR FINAL PLANTING AND SEEDING.

TOTAL PROJECT AREA:

22.34 ACRES

TOTAL AREA TO BE DISTURBED:

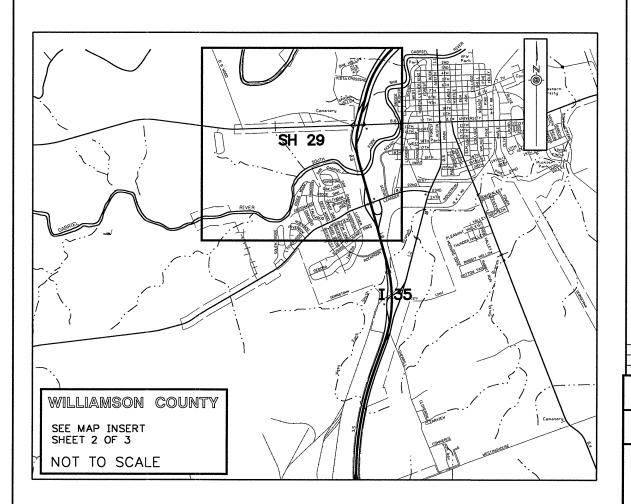
20.11 ACRES (90%)

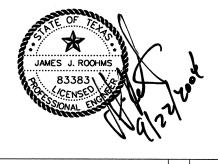
#### WEIGHTED RUNOFF COEFFICIENT (AFTER CONSTRUCTION):

0.42

#### EXISTING CONDITION OF SOIL & VEGETATIVE:

EXISTING SOILS ON THE PROJECT CONSIST FAT CLAY, SANDY LEAN CLAY AND SANDY FAT CLAY. THESE SOILS ARE COVERED ABOUT 85 PERCENT WITH TREES AND VARIOUS GRASSES.





CP&Y Chiang, Patel & Yerby, Inc.

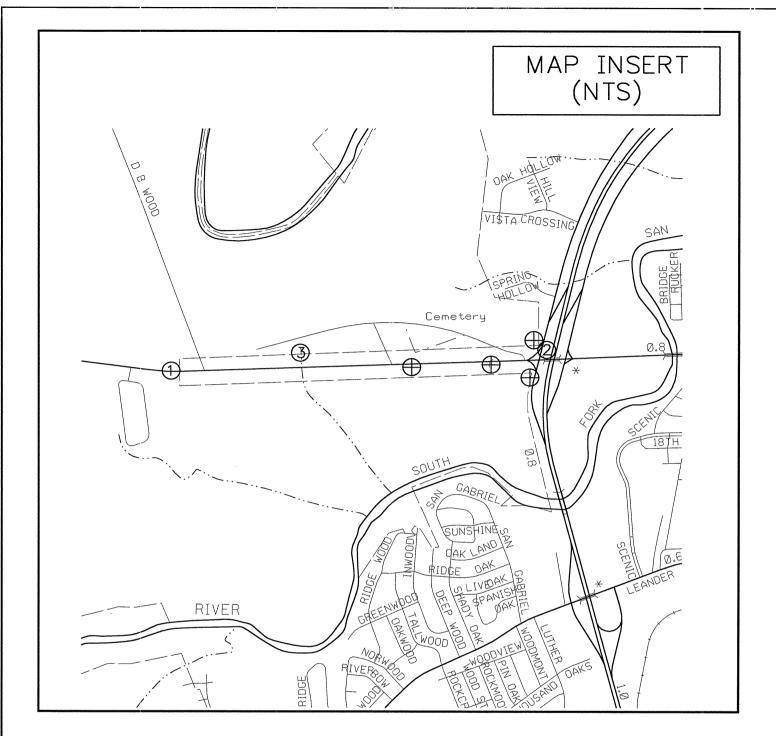


Texas Department of Transportation

SH 2

# TXDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

| Designed: | AJW | FED. ROAD<br>DIV. NO | STATE  | FEDER | AL AID PE      | ROJECT NO      | ١.         |    | EET<br>IO.  |
|-----------|-----|----------------------|--------|-------|----------------|----------------|------------|----|-------------|
| Checked:  | JJR | 6                    | TEXAS  | CC    | 337-           | -1-29          | )          | 20 | <i>م</i> ا( |
| Drawn:    | AJW | STATE<br>DIST. NO.   | cou    | NTY   | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. |    | HWAY        |
| Checked:  | JJR | 14                   | WILLIA | MSON  | 0337           | 01             | 029        | SH | 29          |

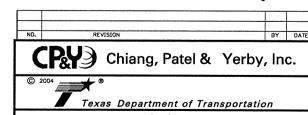


# MAP LEGEND 1 - BEGIN PROJECT CSJ 0337-01-029 STA 139+95.00 3 - RECEIVING SURFACE WATER - LOCATION OF STORM WATER CSJ 0337-01-029 STA 186+62.71

#### LIST OF SW3P SUPPORTING DOCUMENTS.

- 1. REFER TO DRAINAGE PLAN AND SW3P SHEETS FOR:
- a) AREA OF SOIL DISTURBANCE
- b) LOCATIONS OF STRUCTURAL AND NON-STRUCTURAL CONTROL MEASURES
- c) LOCATIONS OF STABILIZATION PRACTICES
- d) LOCATIONS OF IMPERVIOUS SIDE SLOPE TREATMENTS
- 2. REFER TO DRAINAGE PLAN & SW3P SHEETS FOR:
- PROPOSED STORM DRAIN IMPROVEMENT AND DISCHARGE LOCATIONS.
- b) DRAINAGE PATTERNS OF COMPLETE SECTION.
- 3. REFER TO EC STANDARDS FOR STORM WATER CONTROL MEASURES AND CONSTRUCTION DETAILS.





TXDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

| Designed: | KGM | FED. ROAD<br>DIV. NO | STATE  | FEDER. | AL AID PE      | ROJECT NO      | L          | SHEET<br>NO. |
|-----------|-----|----------------------|--------|--------|----------------|----------------|------------|--------------|
| Checked:  | JJR | 6                    | TEXAS  | CC     | 337-           | -1-29          | )          | 20           |
| Drawn:    | KGM | STATE<br>DIST. NO.   | COUN   | ITY    | CONTROL<br>NO. | SECTION<br>NO. | JOB<br>NO. | HIGHWA'      |
| Checked:  | JJR | 14                   | WILLIA | MSON   | 0337           | 01             | 029        | SH 29        |

#### NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) **ACTIVITIES:**

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:

- INSTALL STORMWATER CONTROLS IN DITCHES. INSTALL CONSTRUCTION EXITS. REFER TO EROSION CONTROL SHEETS FOR LOCATIONS.
- INSTALL PERIMETER CONTROLS AND EROSION CONTROL DEVICES AS SPECIFIED IN THE EROSION CONTROL PLANS.
- 3. CONSTRUCT BASE AND PAVEMENT SECTION AS SHOWN IN PHASE I TRAFFIC CONTROL PLANS.
- REPEAT STEPS 1 THROUGH 3 FOR PHASE II.
- WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS STABILIZED AND APPROVED BY THE PROJECT ENGINEER. REMOVE ALL TEMPORARY STRUCTURAL CONTROLS AND RESEED ANY AREAS DISTURBED BY THEIR REMOVAL.

#### EROSION AND SEDIMENT CONTROLS

#### SOIL STABILIZATION PRACTICES:

- X TEMPORARY SEEDING
- X PERMANENT PLANTING, SODDING, OR SEEDING
- X MULCHING
- SOIL RETENTION BLANKET
- **BUFFER ZONES**
- X PRESERVATION OF NATURAL RESOURCES

#### NOTE:

- 1. INSTALL TEMPORARY SEEDING
- 2. INSTALL PERMANENT SEEDING
- 3. PLACE MULCH ON DISTURBED AREA AFTER SEEDING OPERATION.

OTHER: DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED, EITHER TEMPORARILY OR PERMANENTLY, SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITIES ARE SCHEDULED TO RESUME AND DO SO WITHIN 21 DAYS.

#### STRUCTURAL PRACTICES:

T SILT FENCES
T HAY BALES ROCK BERMS PIPE SLOPE DRAINS PAVED FLUMES P CURBS AND GUTTERS P STORM SEWERS T ROCK BEDDING AT CONSTRUCTION EXIT TIMBER MATTING AT CONSTRUCTION EXIT DIVERSION, INTERCEPTOR, OR PERIMETER DIKES DIVERSION, INTERCEPTOR, OR PERIMETER SWALES DIVERSION DIKE AND SWALE COMBINATIONS CHANNEL LINERS SEDIMENT TRAPS SEDIMENT BASINS STORM INLET SEDIMENT TRAP STONE OUTLET STRUCTURES VELOCITY CONTROL DEVICES SAND BAGS

#### NOTE:

- 1. INSTALL TEMPORARY SILT FENCES AT DOWNSTREAM DITCH OUTFALLS AND AT OTHER LOCATIONS AS CONSTRUCTION ACTIVITIES DICTATE.
- 2. INSTALL TEMPORARY ROCK FILTER DAMS ALONG AT DOWNSTREAM DITCH OUTFALLS AND AT OTHER LOCATIONS AS CONSTRUCTION ACTIVITIES DICTATE.

#### OTHER EROSION AND SEDIMENT CONTROLS:

#### **MAINTENANCE:**

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE, BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMAGE FROM HEAVY EQUIPMENT. THE AREAS ADJACENT TO CREEKS AND DRAINAGEWAYS SHALL HAVE PRIORITY FOLLOWED BY DEVICES PROTECTING STORM SEWER INLETS.

#### INSPECTION:

AN INSPECTION WILL BE PERFORMED BY A TXDOT INSPECTOR EVERY WEEK AS WELL AS AFTER EVERY HALF INCH OR MORE OF RAIN (AS RECORDED ON A NON-FREEZING RAIN GAUGE TO BE LOCATED AT THE PROJECT SITE). AN INSPECTION AND MAINTENANCE REPORT WILL BE MADE PER EACH INSPECTION. BASED ON THE INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED PER THE INSPECTION REPORT.

#### WASTE MATERIALS:

ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER. THE DUMPSTER WILL MEET ALL STATE AND LOCAL CITY SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE WILL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER WILL BE EMPTIED AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION, AND THE TRASH WILL BE HAULED TO A LOCAL DUMP. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

#### HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

AT A MINIMUM. ANY PRODUCTS IN THE FOLLOWING CATAGORIES ARE CONSIDERED TO BE HAZARDOUS: PAINTS. ACIDS FOR CLEANING MASONRY SURFACES, OTHER CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE TXDOT PROJECT MANAGER SHOULD BE CONTACTED IMMEDIATELY.

#### **SANITARY WASTE:**

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

#### OFF SITE VEHICLE TRACKING:

- X HAUL ROADS DAMPENED FOR DUST CONTROL
- X LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- X EXCESS DIRT ON ROAD REMOVED DAILY
- X STABILIZED CONSTRUCTION ENTRANCE

#### REMARKS:

DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WETLAND, WATERBODY, OR STREAMBED.

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS, ALL WATER WAYS SHALL BE CLEARED AS SOON AS PRACTICABLE OF TEMPORARY EMBANKMENT, DEBRIS, OR OTHER OBSTRUCTIONS



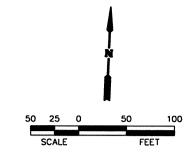
Chiang, Patel & Yerby, Inc.

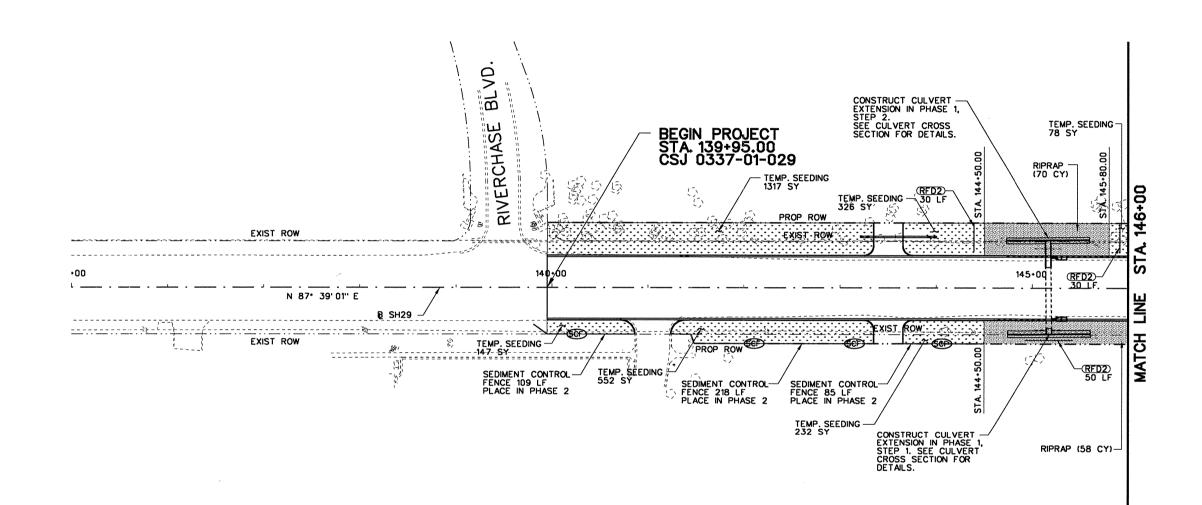
SH 29 TXDOT STORM WATER POLLUTION

Texas Department of Transportation

ED. ROAD STATE FEDERAL AID PROJECT NO. AJW 6 TEXAS CC 337-1-29 20% hecked: JJR 

PREVENTION PLAN (SW3P)





#### **LEGEND**

SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

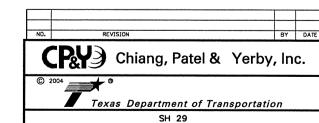
SEEDING/VEGETATION

LANDSCAPE PAVERS

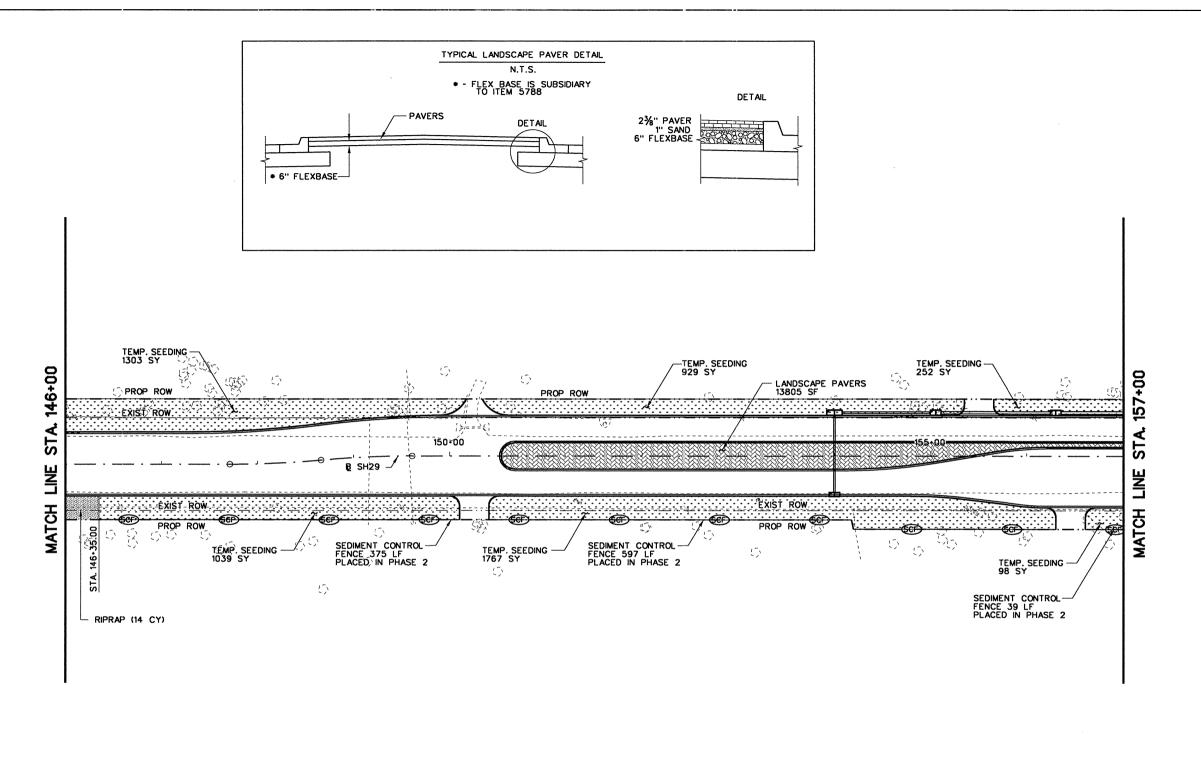
#### NOTES:

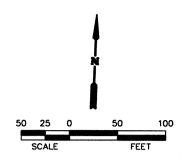
- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS EC(1) - EC(3) AND EC(6) EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
- ALL PERIMETER SEDIMENT CONTROL FENCE TO REMAIN UNTIL END OF CONSTRUCTION.
- 3. ALL ROCK FILTER DAMS WILL BE PLACED DURING PHASE 1-1 AND WILL REMAIN UNTIL END OF CONSTRUCTION.
- 4. ALL INLETS ALONG WESTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 1-1.
- 5. ALL INLETS ALONG EASTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 2.
- ALL INLETS WILL HAVE INLET
   PROTECTION UNTIL END OF
   CONSTRUCTION.





EROSION CONTROL PLAN
BEGIN PROJECT TO STA. 146+00





#### **LEGEND**

(RFD2) TYPE 2 ROCK FILTER DAM

SEEDING/VEGETATION

LANDSCAPE PAVERS

#### NOTES:

- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS EC(1) - EC(3) AND EC(6) EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
- ALL PERIMETER SEDIMENT CONTROL FENCE TO REMAIN UNTIL END OF CONSTRUCTION.
- 3. ALL ROCK FILTER DAMS WILL BE PLACED DURING PHASE 1-1 AND WILL REMAIN UNTIL END OF CONSTRUCTION.
- ALL INLETS ALONG WESTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 1-1.
- 5. ALL INLETS ALONG EASTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 2.
- 6. ALL INLETS WILL HAVE INLET PROTECTION UNTIL END OF CONSTRUCTION.



REVISION BY DATE

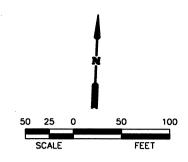
CP&Y Chiang, Patel & Yerby, Inc.

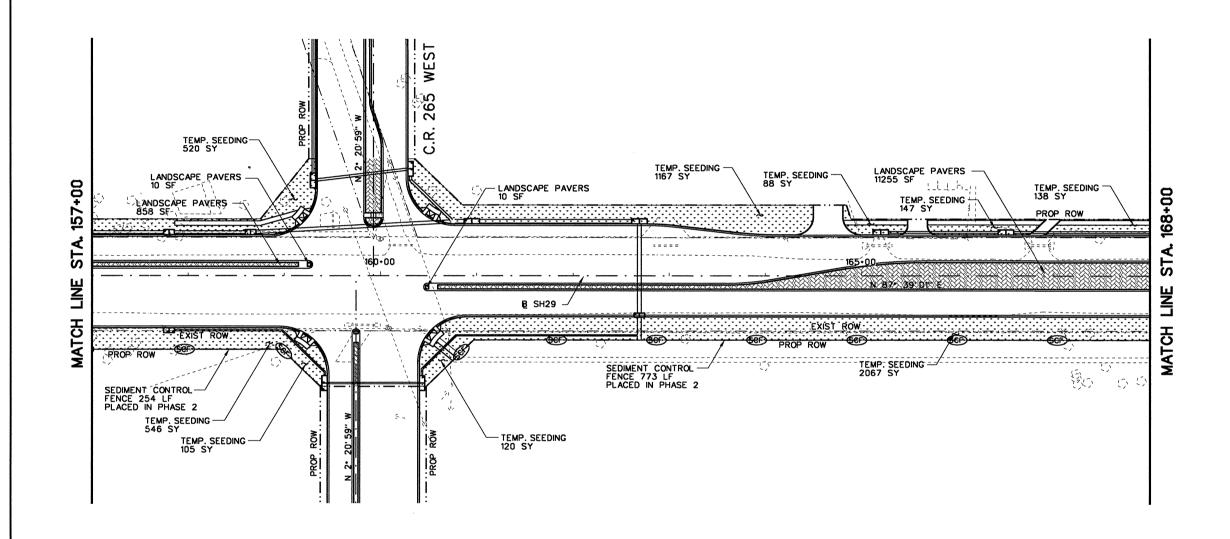
2004 ®

Texas Department of Transportation

SH 29

EROSION CONTROL PLAN STA. 146+00 TO STA. 157+00





#### **LEGEND**

SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

----

SEEDING/VEGETATION

LANDSCAPE PAVERS

#### NOTES:

- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS EC(1) - EC(3) AND EC(6) EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
- 2. ALL PERIMETER SEDIMENT CONTROL FENCE TO REMAIN UNTIL END OF CONSTRUCTION.
- 3. ALL ROCK FILTER DAMS WILL BE PLACED DURING PHASE 1-1 AND WILL REMAIN UNTIL END OF CONSTRUCTION.
- 4. ALL INLETS ALONG WESTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 1-1.
- 5. ALL INLETS ALONG EASTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 2.
- 6. ALL INLETS WILL HAVE INLET PROTECTION UNTIL END OF CONSTRUCTION.



CPAY Chiang, Patel & Yerby, Inc.

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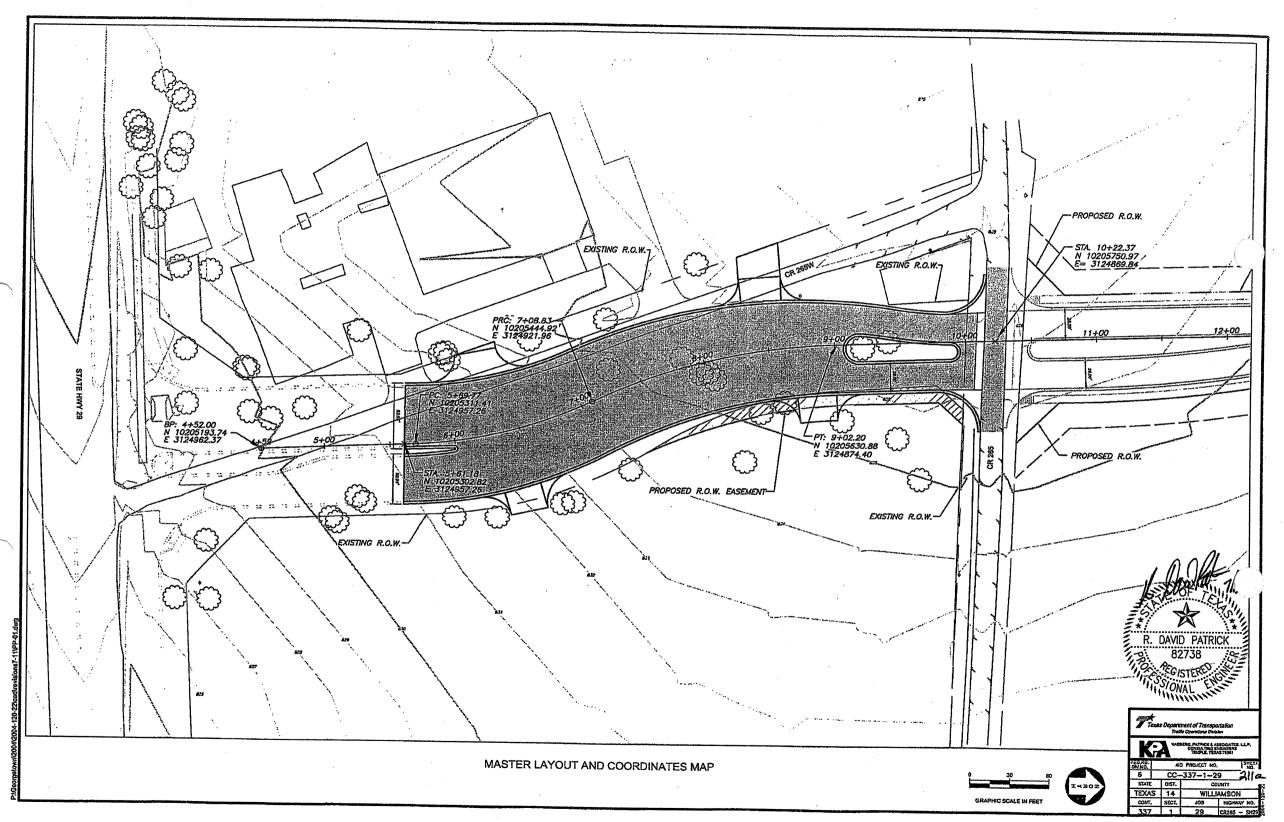
Texas Department of Transportation

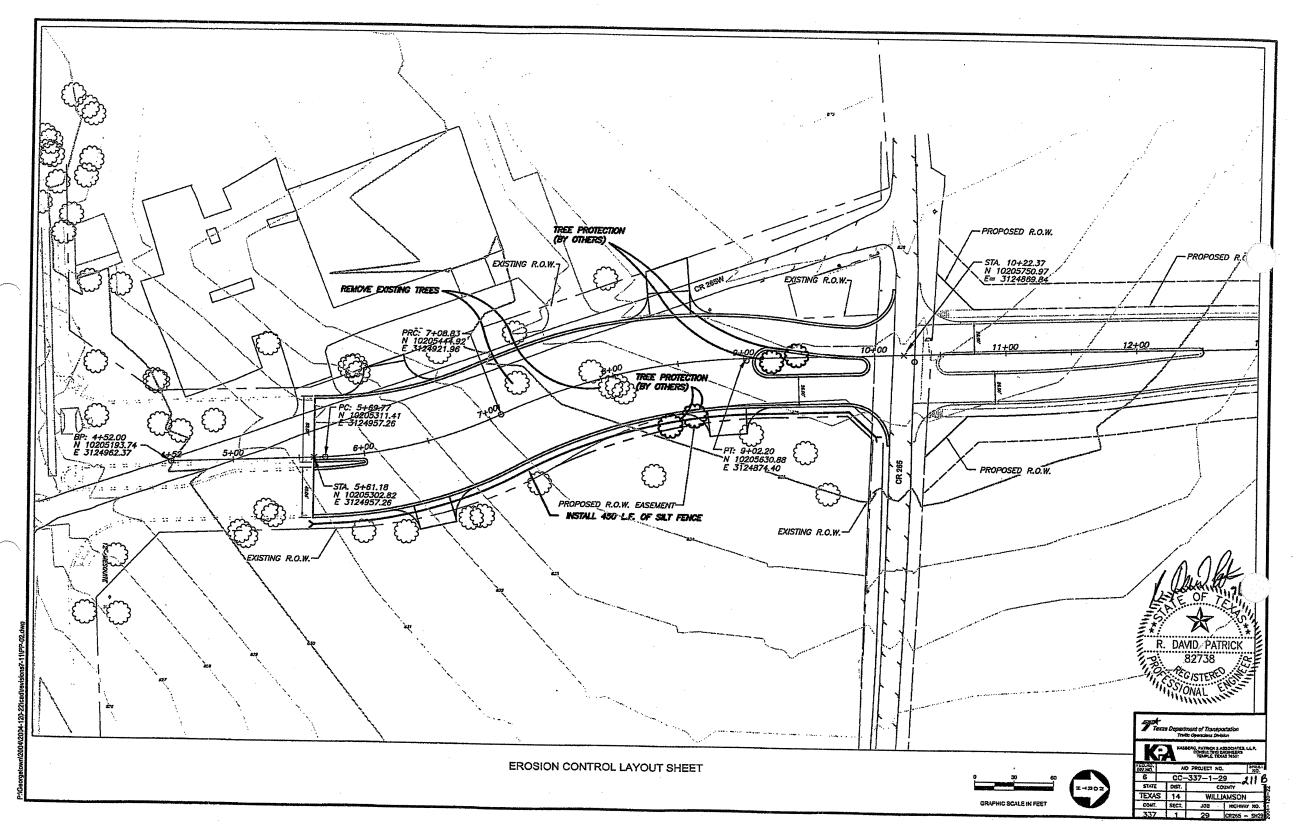
SH 20

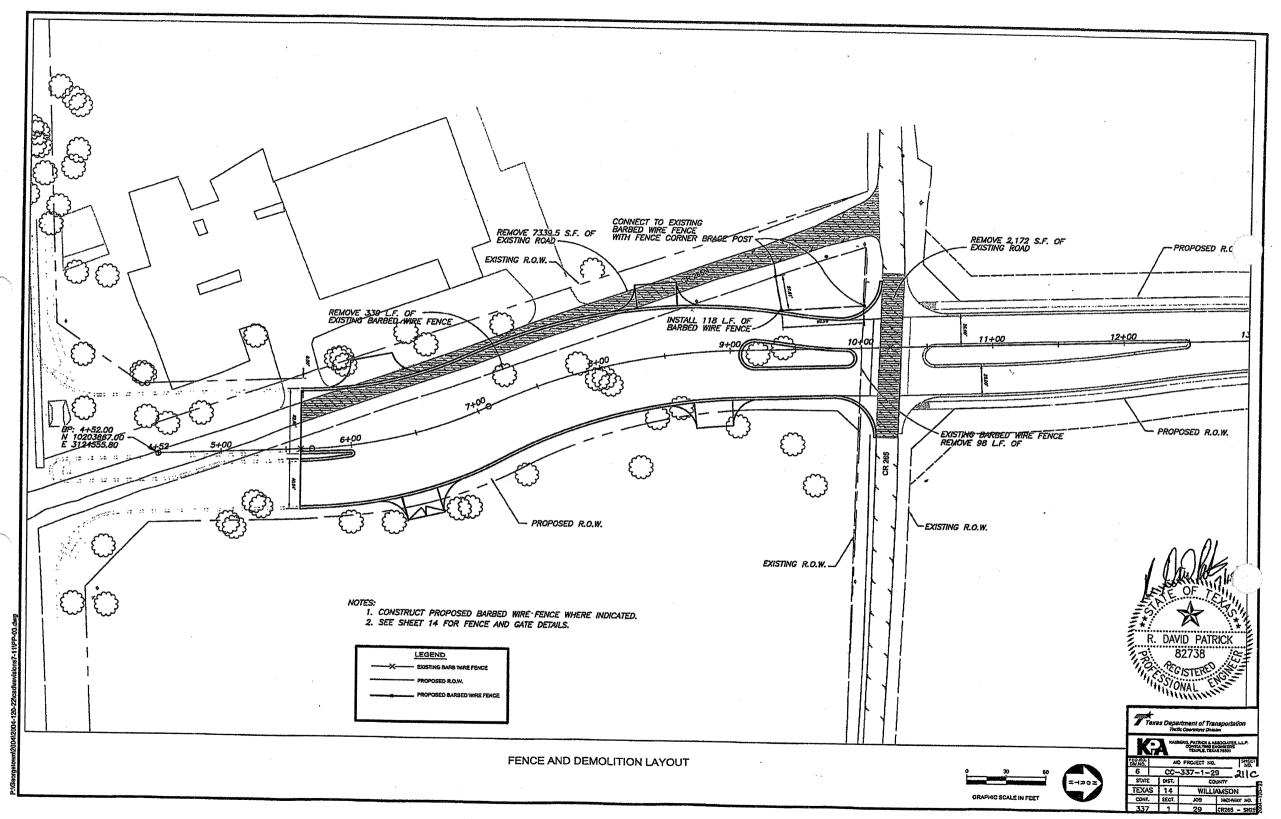
EROSION CONTROL PLAN STA. 157+00 TO STA. 168+00

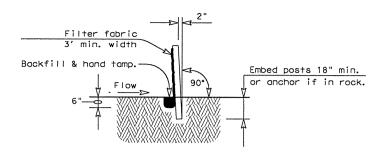
 Designed:
 AJW
 (FED. ROAD) (DIV. ROL. (DIV

3 OF 7









#### SECTION A-A

#### SEDIMENT CONTROL FENCE USAGE GUIDELINES

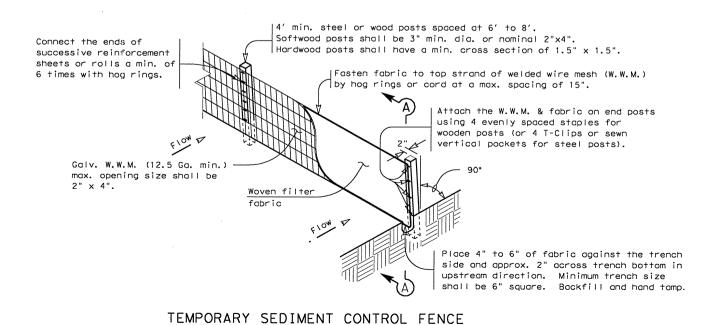
A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

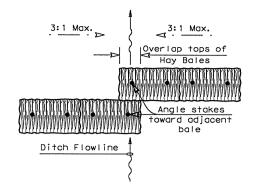
Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

#### PLAN SHEET LEGEND

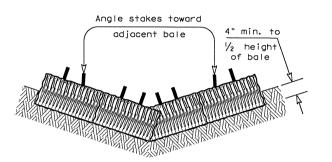
#### GENERAL NOTES

 The guidelines shown hereon are suggestions only and may be modified by the Engineer.





#### PLAN VIEW



#### PROFILE VIEW

#### PLANS SHEET LEGEND

#### BALED HAY USAGE GUIDELINES

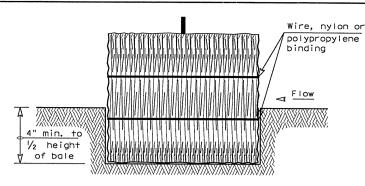
A Baled Hay installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A two year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT2 of cross sectional area. Baled hay may be used at the following locations:

- Where the runoff approaching the baled hay flows over disturbed soil for less than 100'. If the slope of the disturbed soil exceeds 10%, the length of slope upstream the baled hay should be less than 50'.
- 2. Where the installation will be required for less than 3 months.
- 3. Where the contributing drainage area is less than  $\frac{1}{2}$  acre.

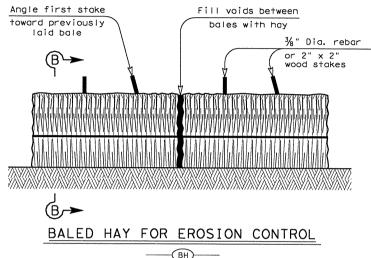
For Baled Hay installations in small ditches, the additional following considerations apply:

- The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
- The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the balled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.



#### SECTION B-B



#### GENERAL NOTES

- 1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
- Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetative matter.
- 3. Hay bales shall be embedded in the soil a minimum of 4" and where possible  $\frac{1}{2}$  the height of the bale.
- Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
- . Hay bales shall be securely anchored in place with  $\frac{1}{8}$ " Diarebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
- . The guidelines shown hereon are suggestions only and may be modified by the Engineer.

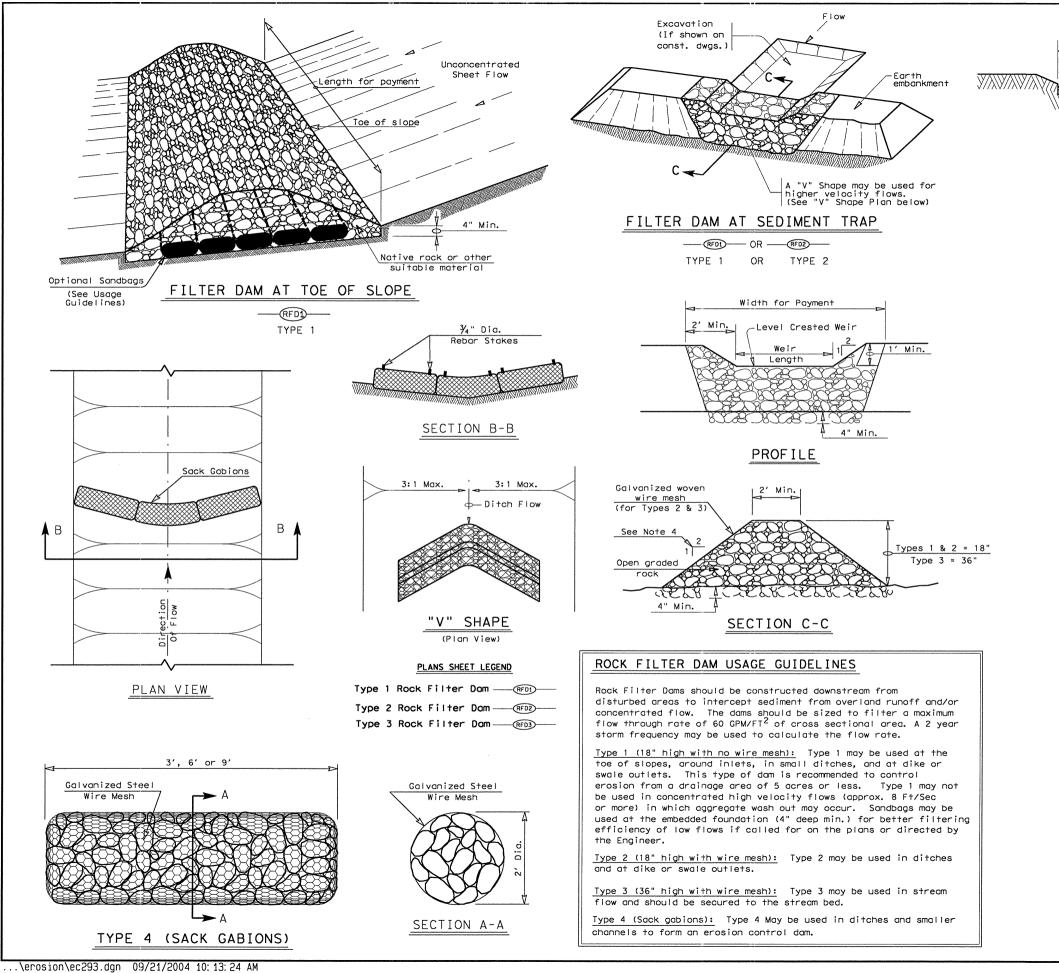


TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCED & BALED HAY

EC(1)-93

| FILE:   | EC193.DGN | DN: HEJ  | cx: HEJ | DW: BGD    |      | CK: |         |
|---------|-----------|----------|---------|------------|------|-----|---------|
| © TxDOT | JUNE 1993 | DISTRICT | FEDER   | AL AID PRO | JECT |     | SHEET   |
|         | REVISIONS | AUS      | CC      | 337-1-29   |      |     | 216     |
|         |           | co       | UNTY    | CONTROL    | SECT | JOB | HICHWAY |
|         |           | WILL     | IAMSON  | 0337       | 01   | 029 | SH 29   |



#### FILTER DAM AT CHANNEL SECTIONS

Width for payment



#### GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.

Galvanized Woven Wire Mesh

<sup>7</sup>}}\\

SEE NOTE 6

(for Types 2 & 3)

- 2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
- 3. The rock filter dam dimensions shall be as indicated on the
- 4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
- 5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
- 6. Filter dams should be embedded a minimum of 4" into existing around.
- 7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
- Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. In stream use the mesh should be secured or staked to the stream bed prior to aggregate placement.
- 9. Sack Gabions should be staked down with  $\frac{1}{4}$ " dia. rebar stakes.
- 10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

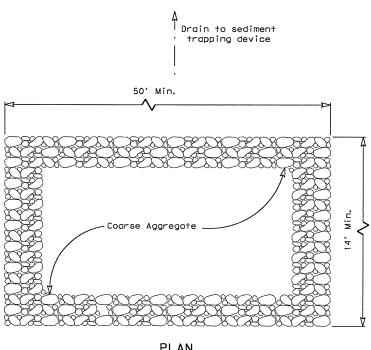


#### TEMPORARY EROSION. SEDIMENT AND WATER POLLUTION CONTROL MEASURES

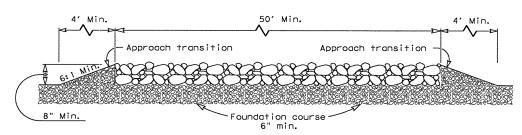
ROCK FILTER DAMS

EC(2) - 93

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| TxDOT JUNE 1993 | DISTRICT | FEDERA        | L AID PRO | JECT | _/  | SHEET   |
| REVISIONS       | AUS      | CC 337-1-29 2 |           |      |     | 217     |
|                 | CC       | DUNTY         | CONTROL   | SECT | J08 | HIGHWAY |
|                 | WILL     | IAMSON        | 0337      | 01   | 029 | SH 29   |



PLAN

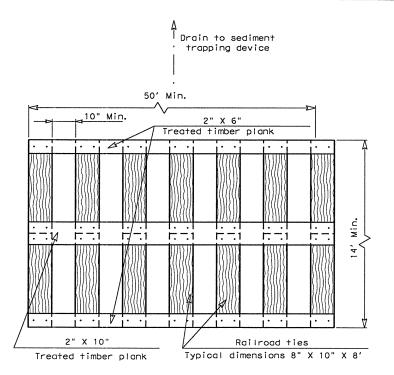


#### **PROFILE**

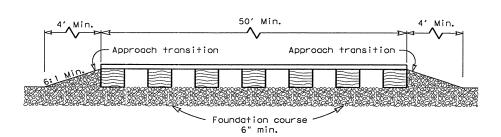
#### CONSTRUCTION EXIT (TYPE 1)

#### GENERAL NOTES

- 1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- 2. The coarse aggregate should be open graded with a size of 4" to 8".
- 3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base. bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit shall be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.



#### **PLAN**

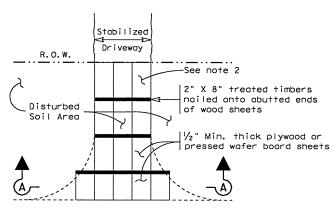


#### **PROFILE**

#### CONSTRUCTION EXIT (TYPE 2)

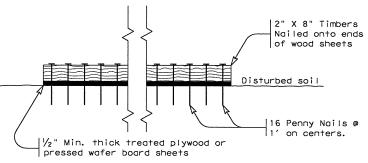
#### GENERAL NOTES

- 1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with  $\frac{1}{2}$ "x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- 4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- 5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- 6. The construction exit should be graded to allow drainage to a sediment trapping device.
- 7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



Paved Roadway

#### **PLAN**



#### SECTION A-A

#### CONSTRUCTION EXIT (TYPE 3)

#### GENERAL NOTES

- 1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- 2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- 3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- 4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

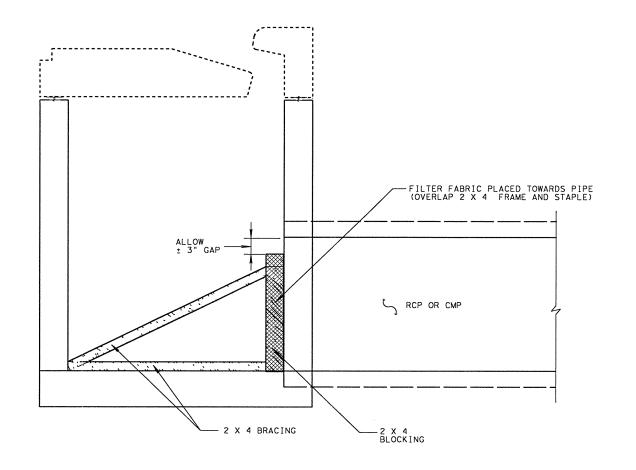


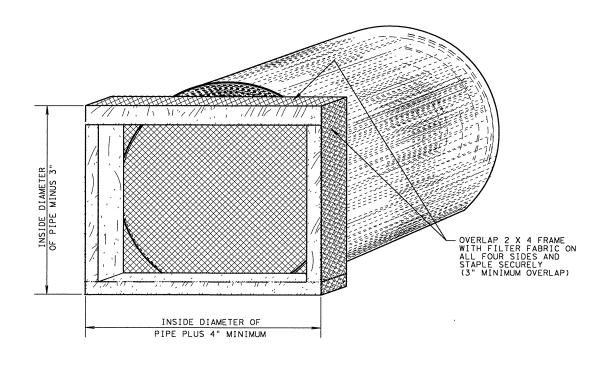
#### TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3) - 93

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|---------|-----------|----------|---------|-----------|------|-----|---------|
| C TxDOT | JUNE 1993 | DISTRICT | FEDERA  | L AID PRO | JECT |     | SHEET   |
|         | REVISIONS | AUS      | CC      | 337-1-2   | 9    |     | 218     |
|         |           | co       | COUNTY  |           | SECT | JOB | HIGHWAY |
|         |           | WILL     | LAMSON  | 0337      | 0.1  | 029 | SH 29   |





#### GENERAL NOTES:

"STORM INLET SEDIMENT TRAPS" SHALL BE PLACED IN ALL PROPOSED AND EXISTING CURB INLETS AND DROP INLETS SHOWN ON THE PLANS OR UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

THE LATERAL BRACING SHALL BE PLACED IN A MANNER AS TO ADEQUATELY SECURE THE FILTER FRAME TO THE SIDE OF THE INLET, INSURING THE PROPER FUNCTION OF THE SEDIMENT TRAP.

FILTER FABRIC MAY BE IDENTICAL TO THAT SPECIFIED IN THE BID ITEM "TEMPORARY SEDIMENT CONTROL FENCE." OTHER MATERIAL MAY BE USED UPON APPROVAL OF THE ENGINEER.

THE "STORM INLET SEDIMENT TRAP" SHALL BE INSTALLED AT THE EARLIEST TIME POSSIBLE DURING CONSTRUCTION AS DESCRIBED IN THE SW3P OR AS DIRECTED BY THE ENGINEER.

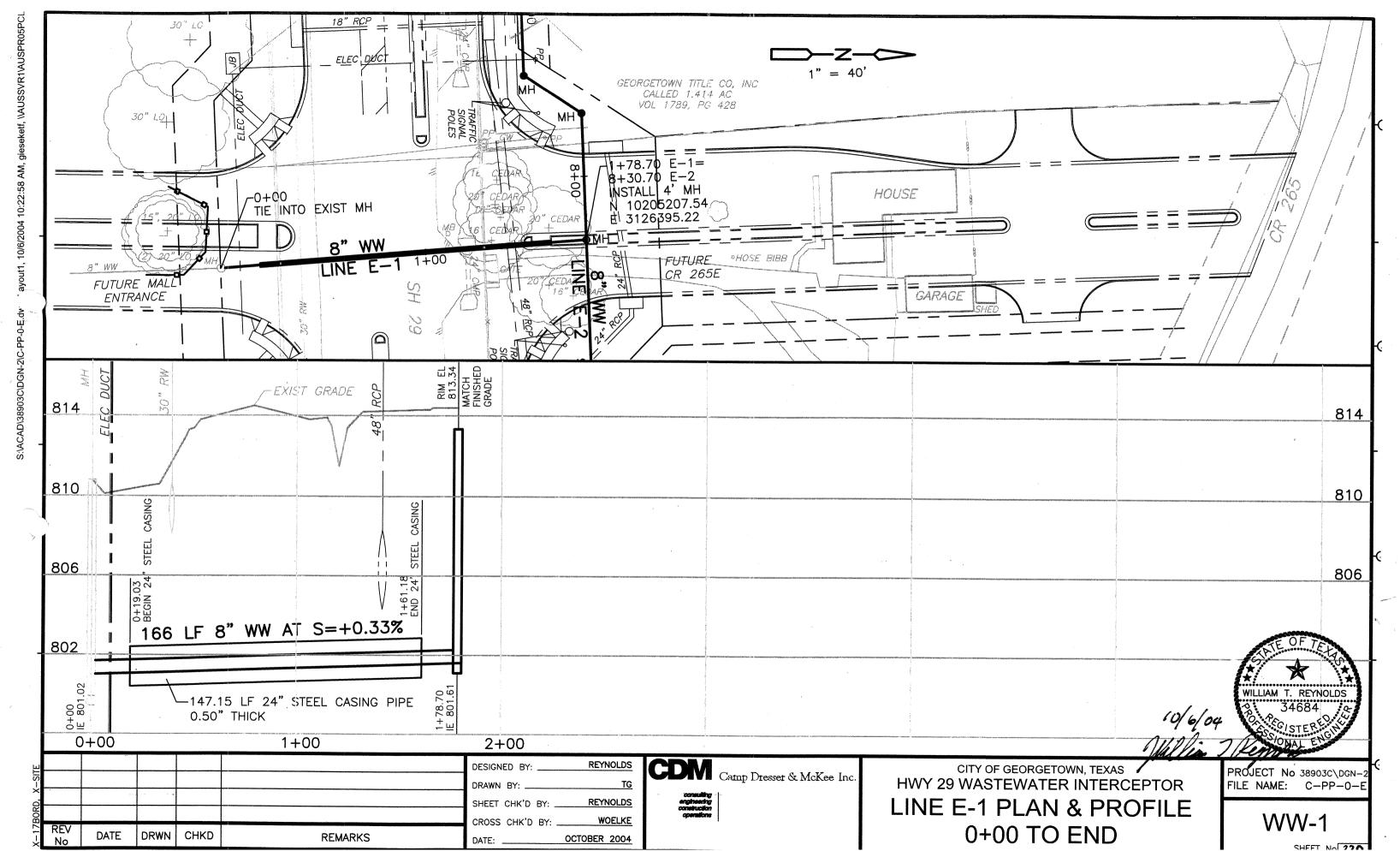
THE CONTRACTOR WILL BE REQUIRED TO PERFORM PERIODIC MAINTENANCE OF THE SEDIMENT TRAP AND REMOVE ACCUMULATED SILT AS DIRECTED BY THE ENGINEER.

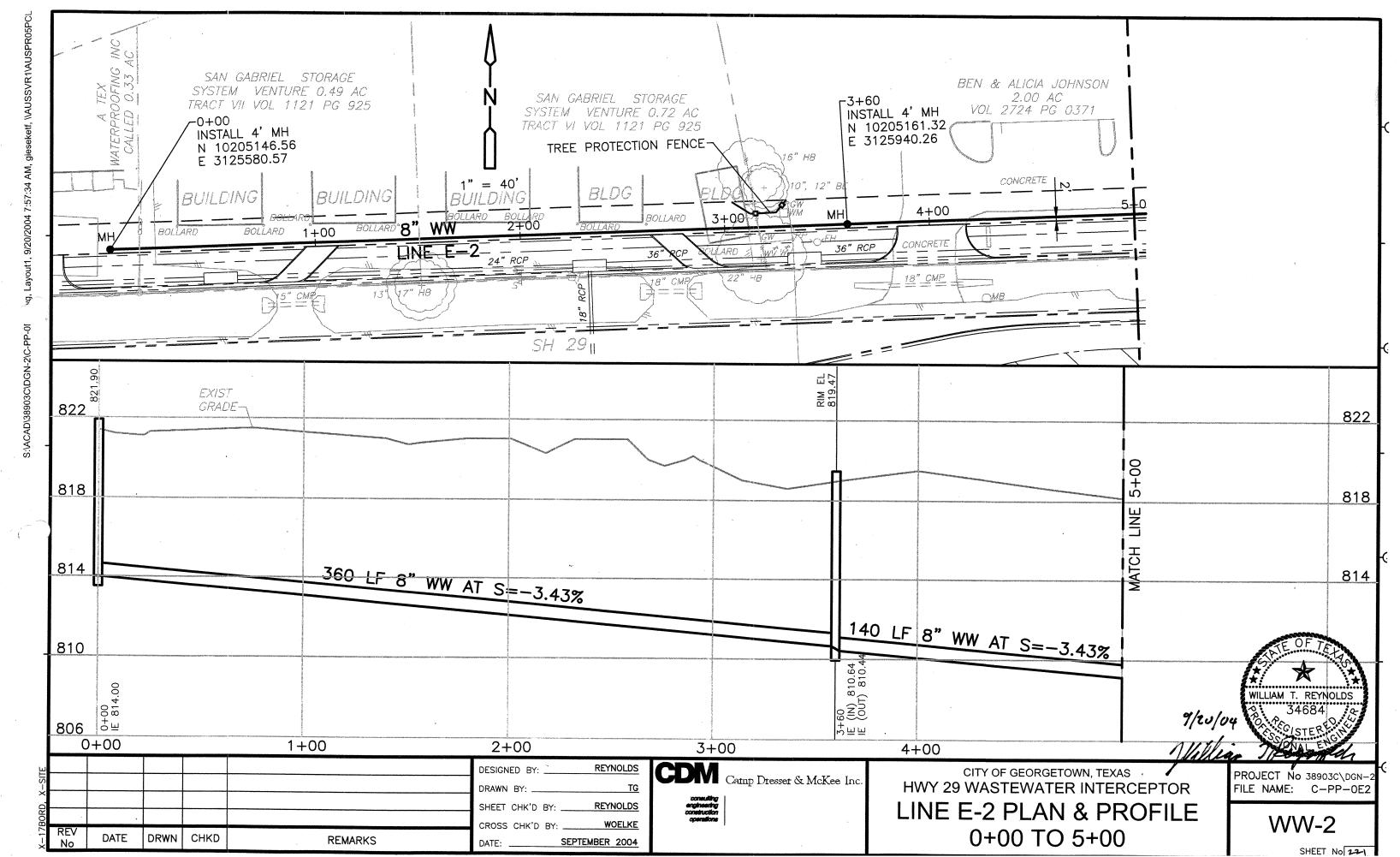
"STORM INLET SEDIMENT TRAP" SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED AS DETERMINED SOLELY BY THE ENGINEER.

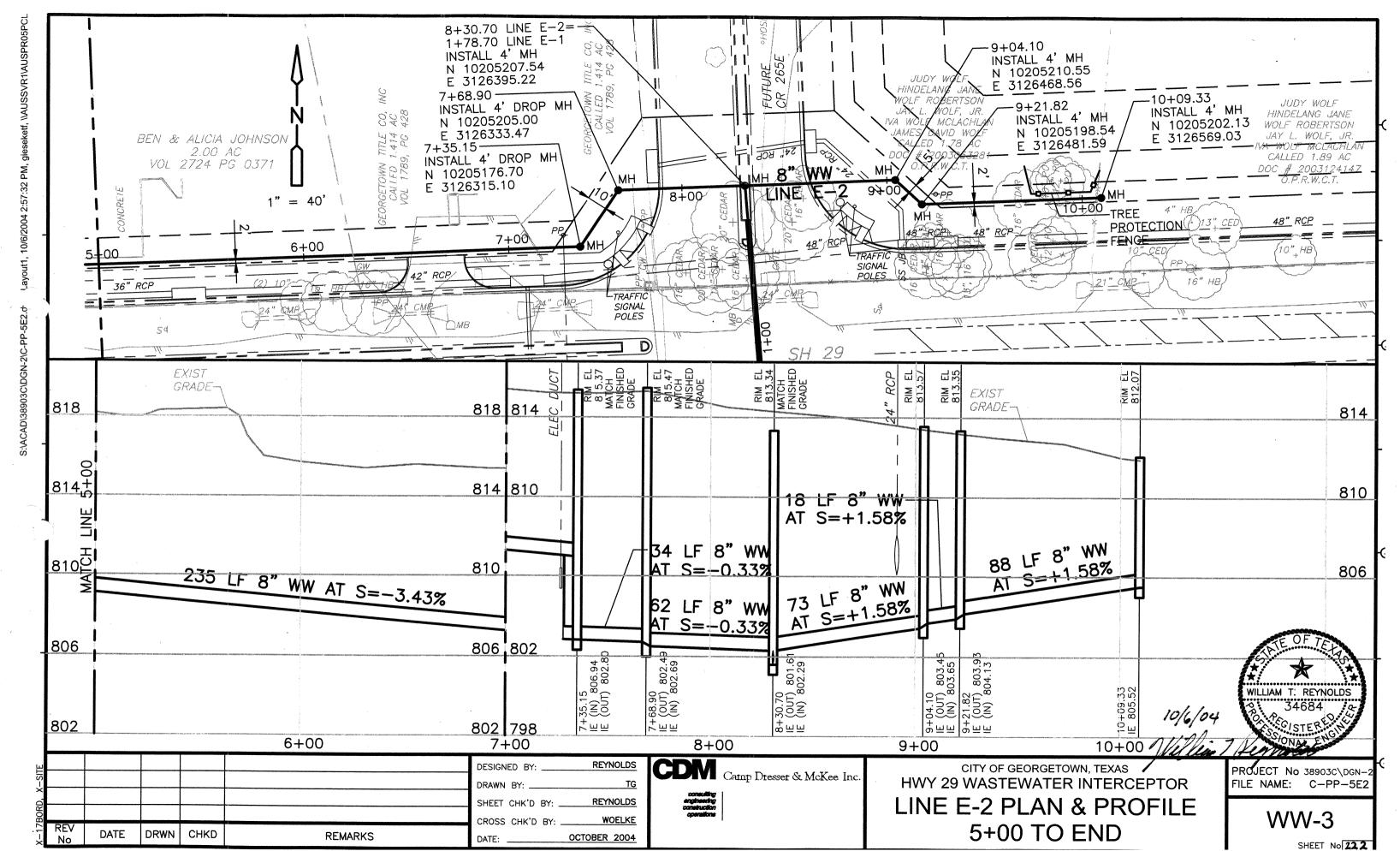
PAYMENT FOR MATERAILS, INSTALLATION, REMOVAL OF ACCUMULATED SILT & PERIODIC MAINTENANCE OF THE "STORM INLET SEDIMENT TRAP" SHALL BE SUBSIDIARY TO BID ITEM 465.

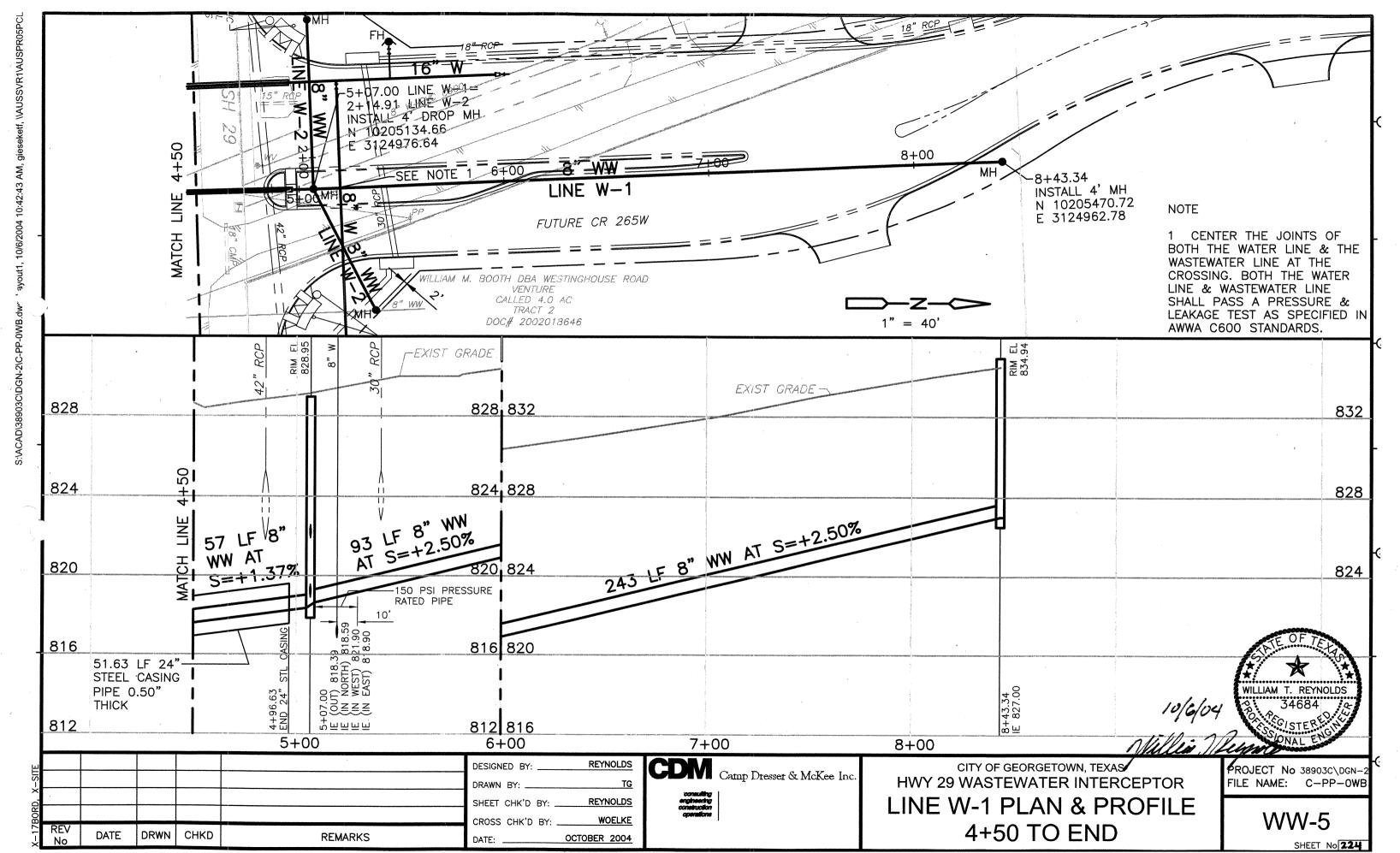
# STORM INLET SEDIMENT TRAP DETAILS AUSTIN DISTRICT

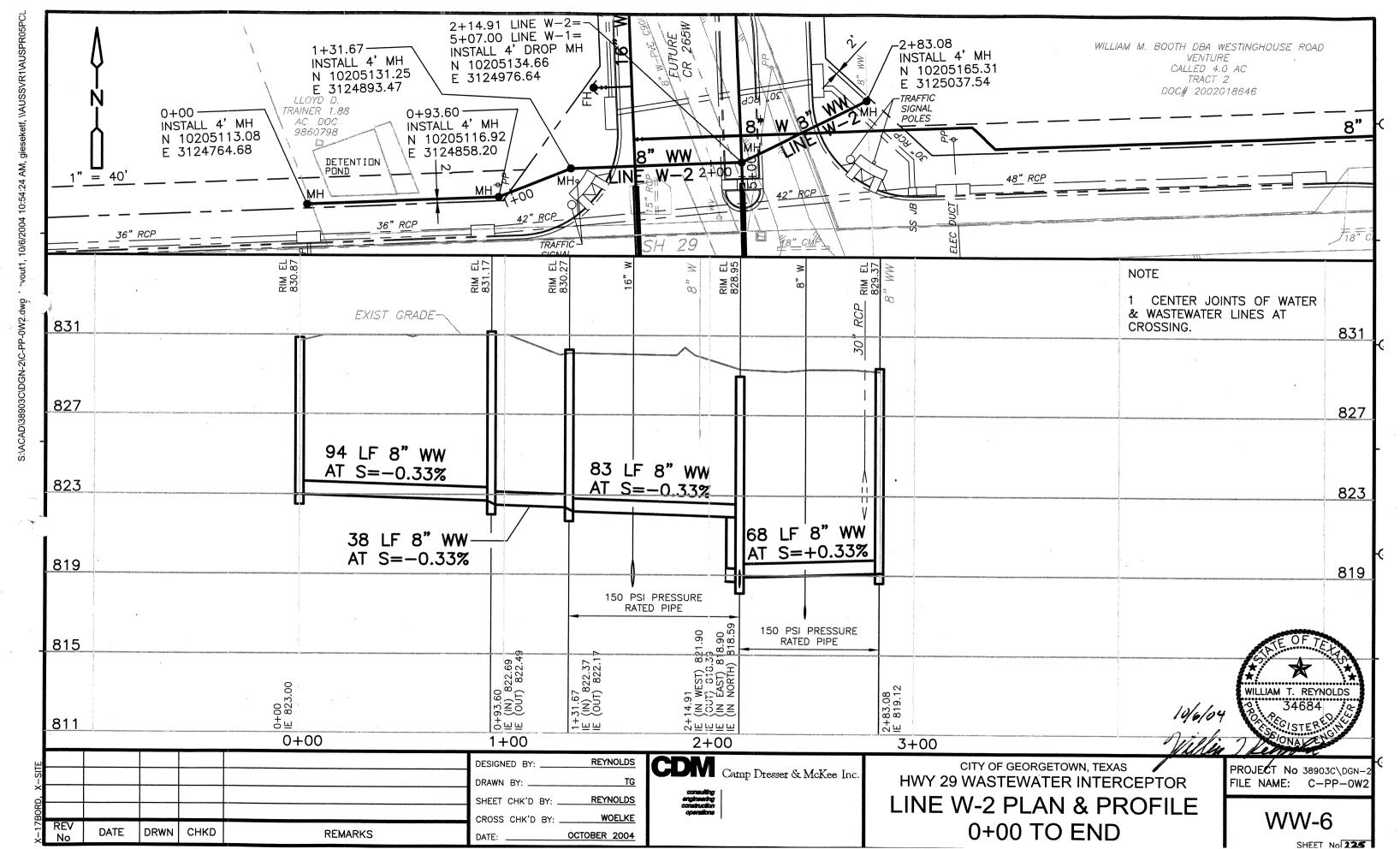
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|-----|--------|----------------|--------------|----------------------|--------------------|-----------|--------------|
| - [ | DATE   | R              | EVISIONS     | 6                    | CC 3               | 37-1-29   | 219          |
|     | 10/98  | District Updat | e            | STATE                | STATE<br>DIST. NO. |           | COUNTY       |
| - 1 |        |                |              | TEXAS                | AUS                | WIL       | LIAMSON      |
| ΛŦ  |        |                |              | CONT.                | SECT.              | JOB       | HIGHWAY NO.  |
| ОТ  |        |                |              | 0337                 | 01                 | 029       | SH 29        |

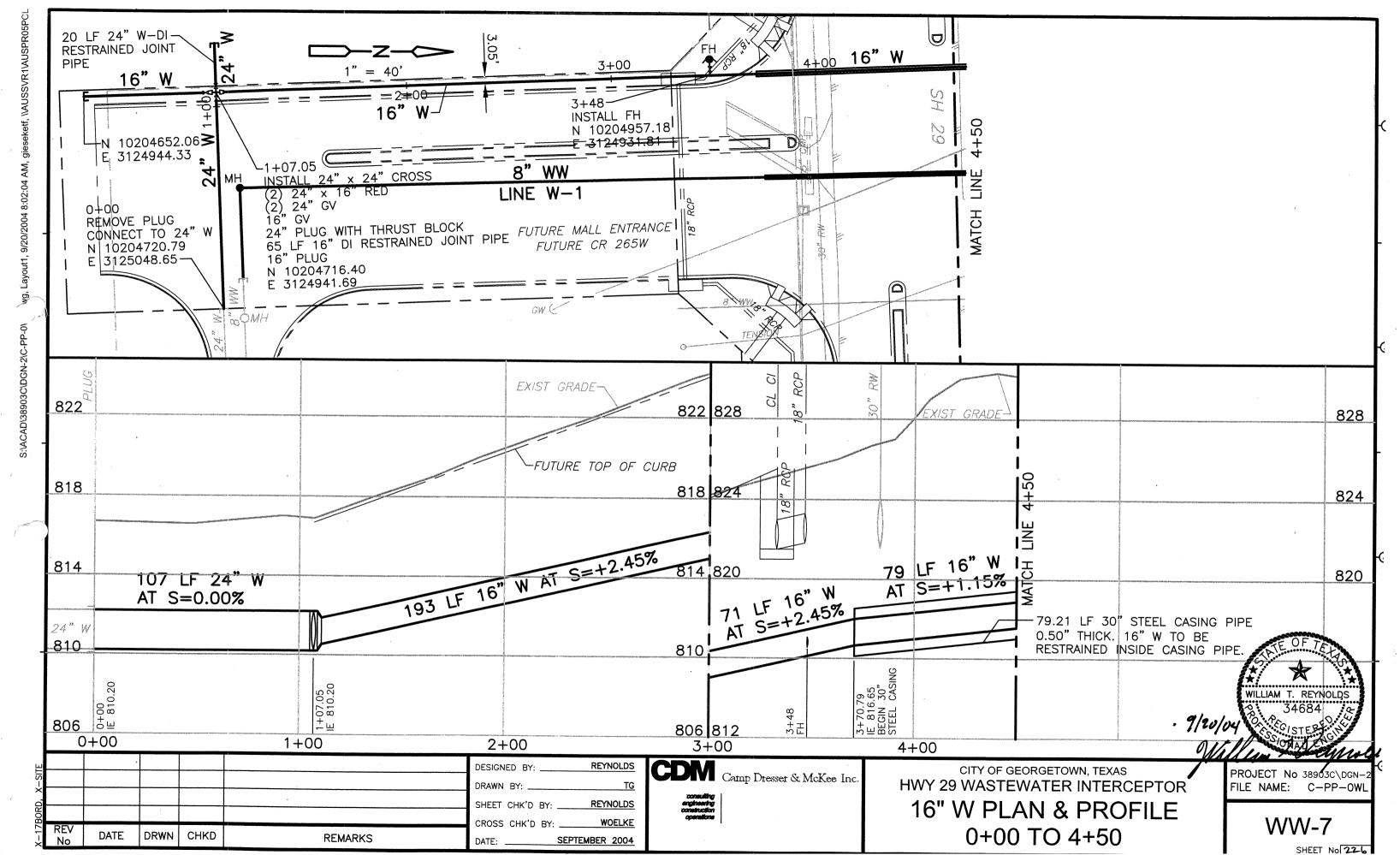


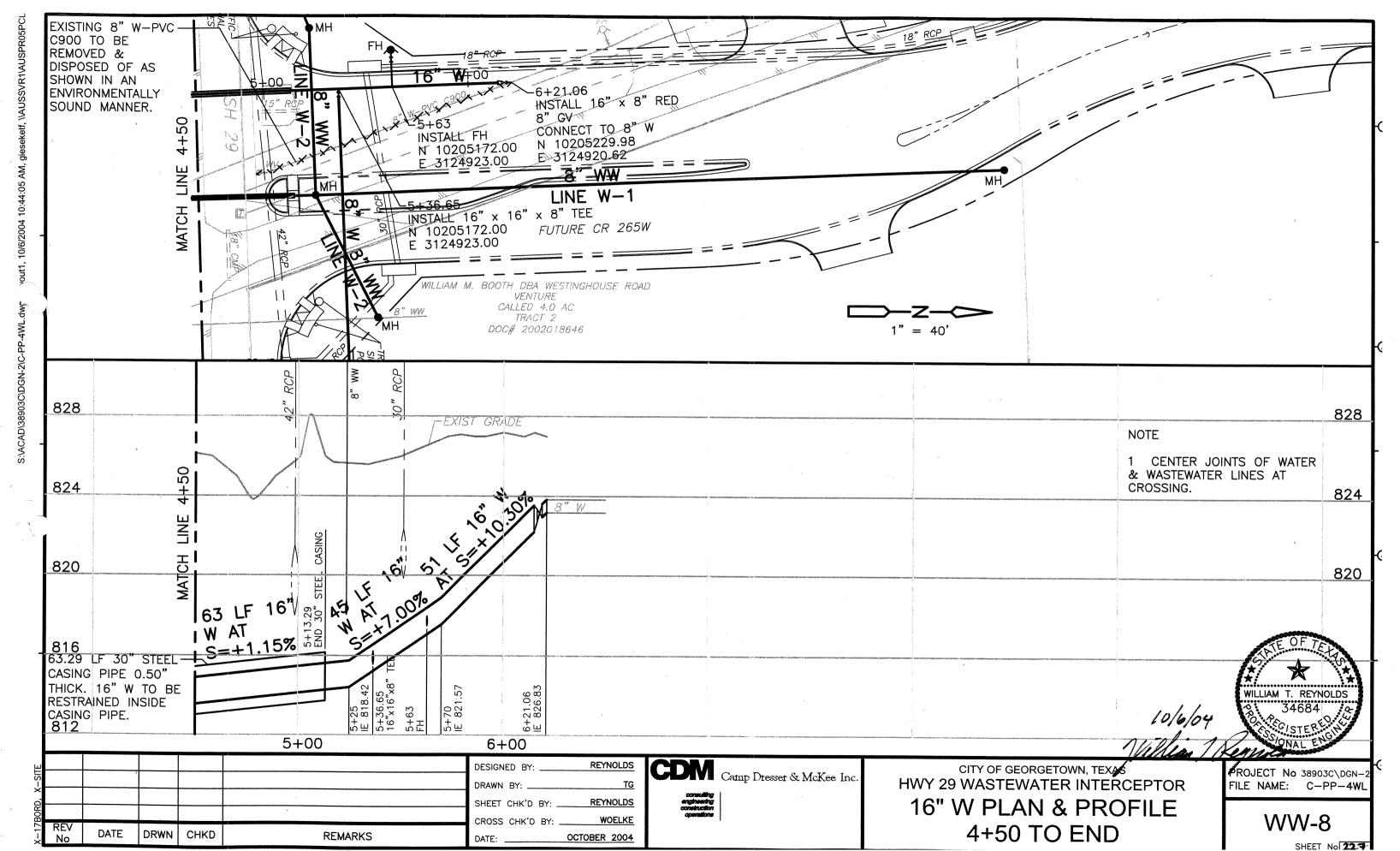


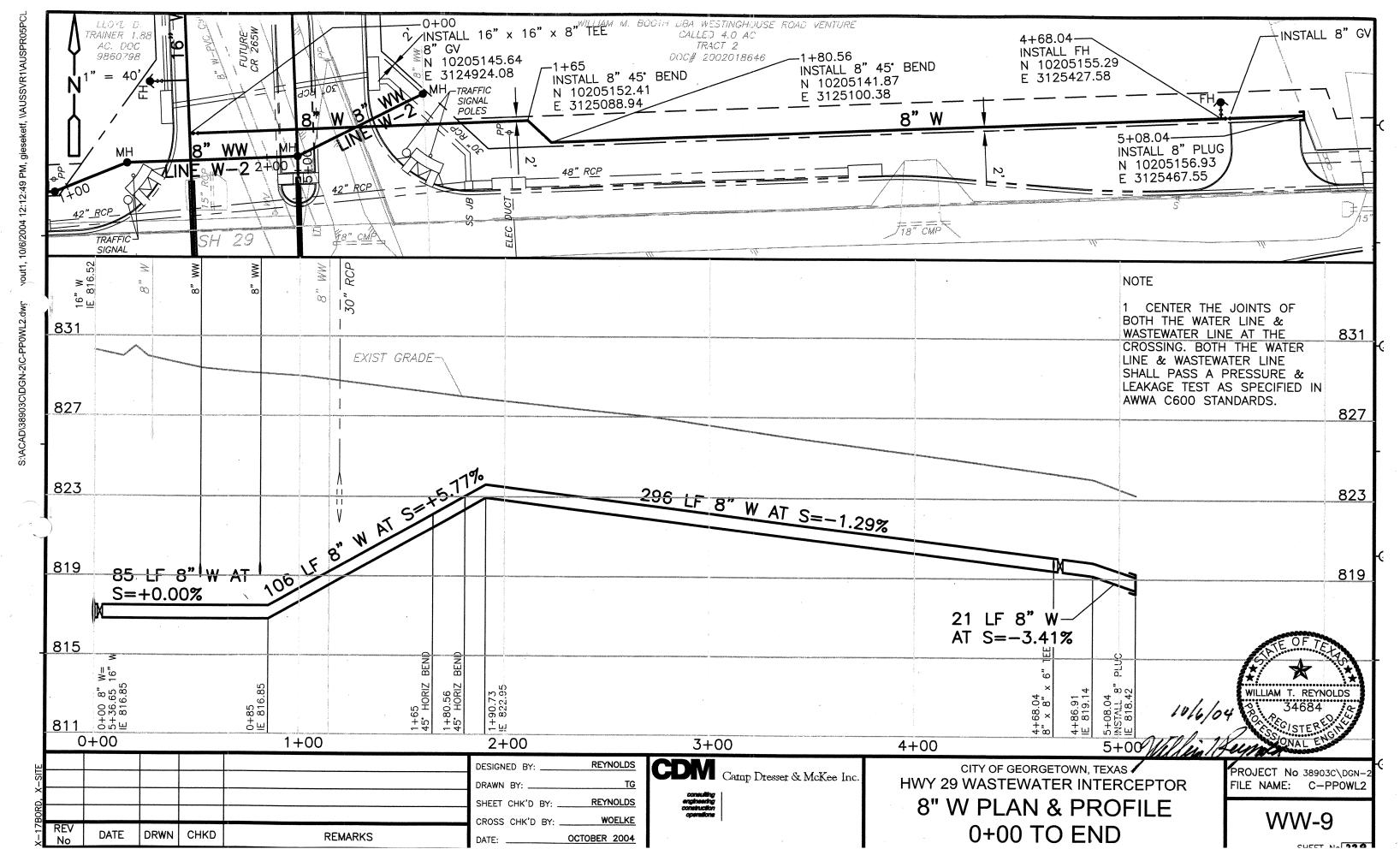


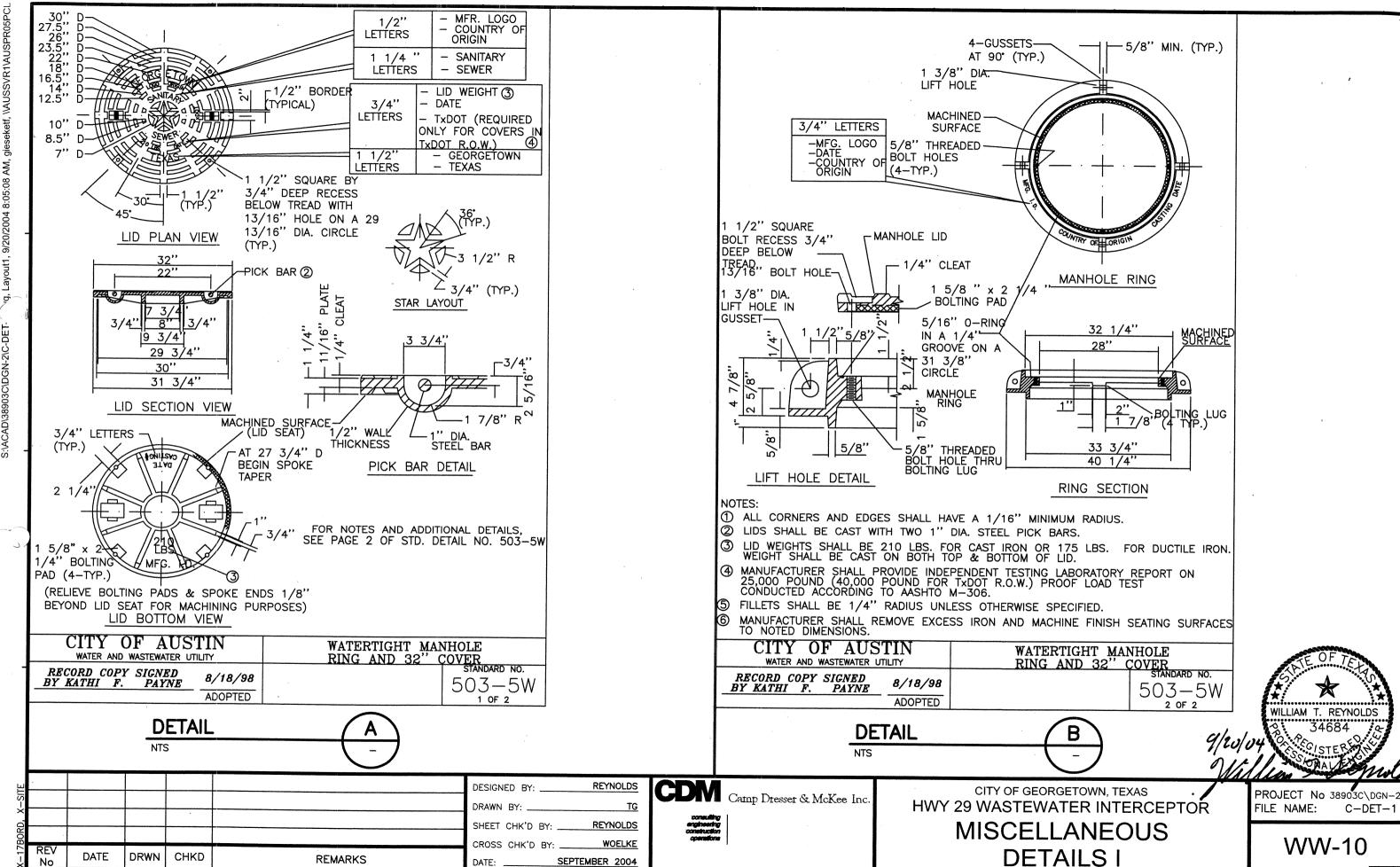




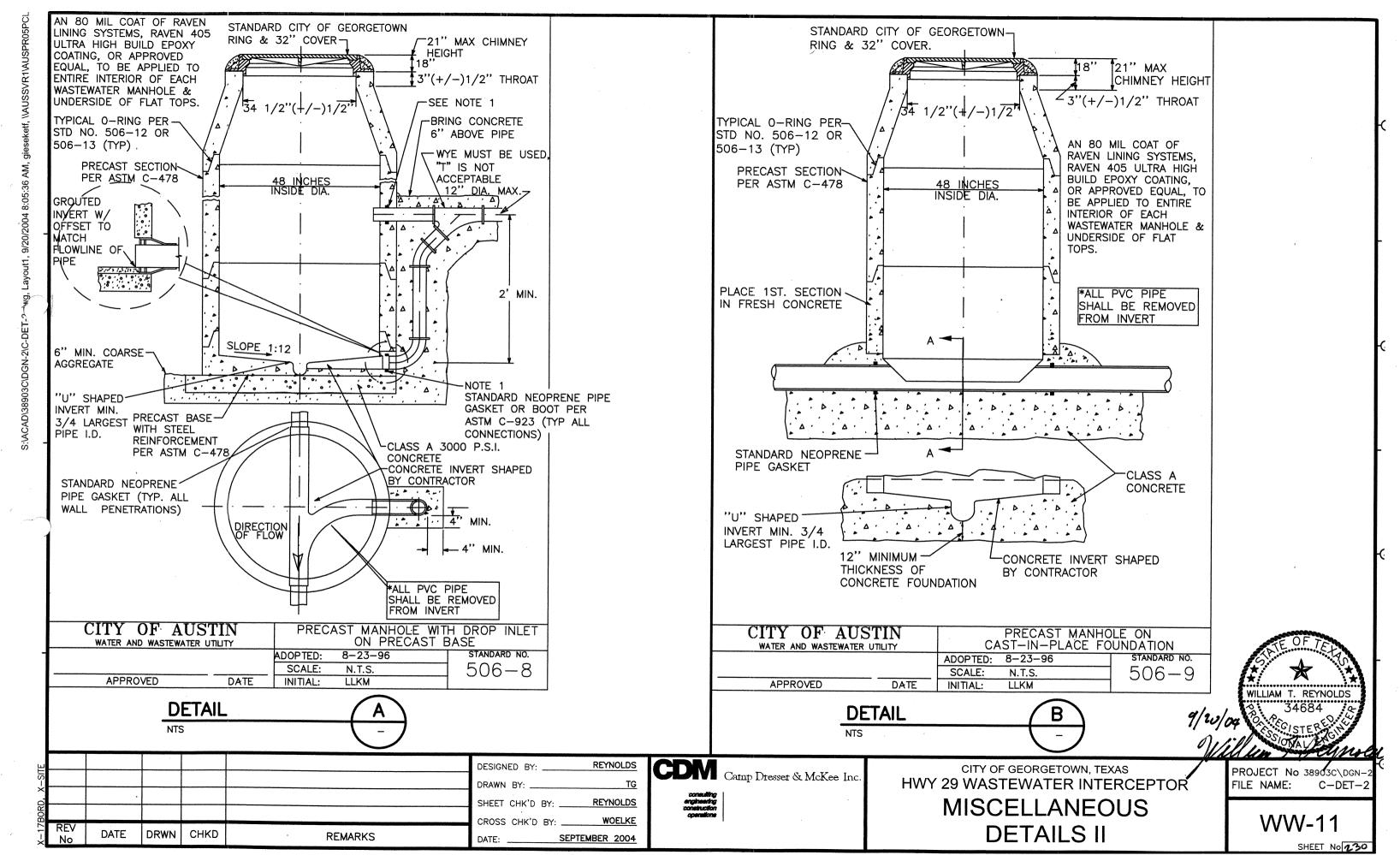


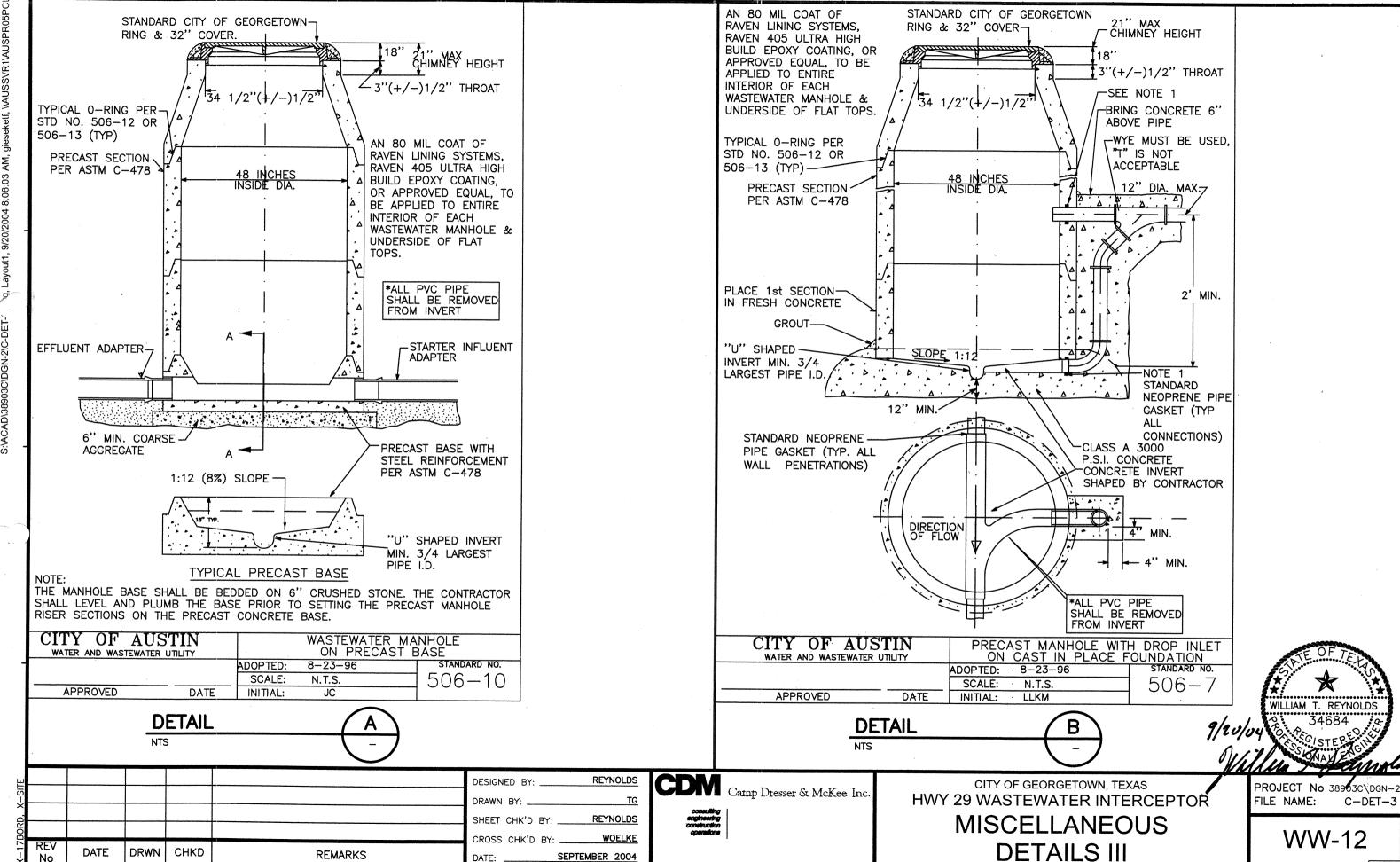






SHEET No 229

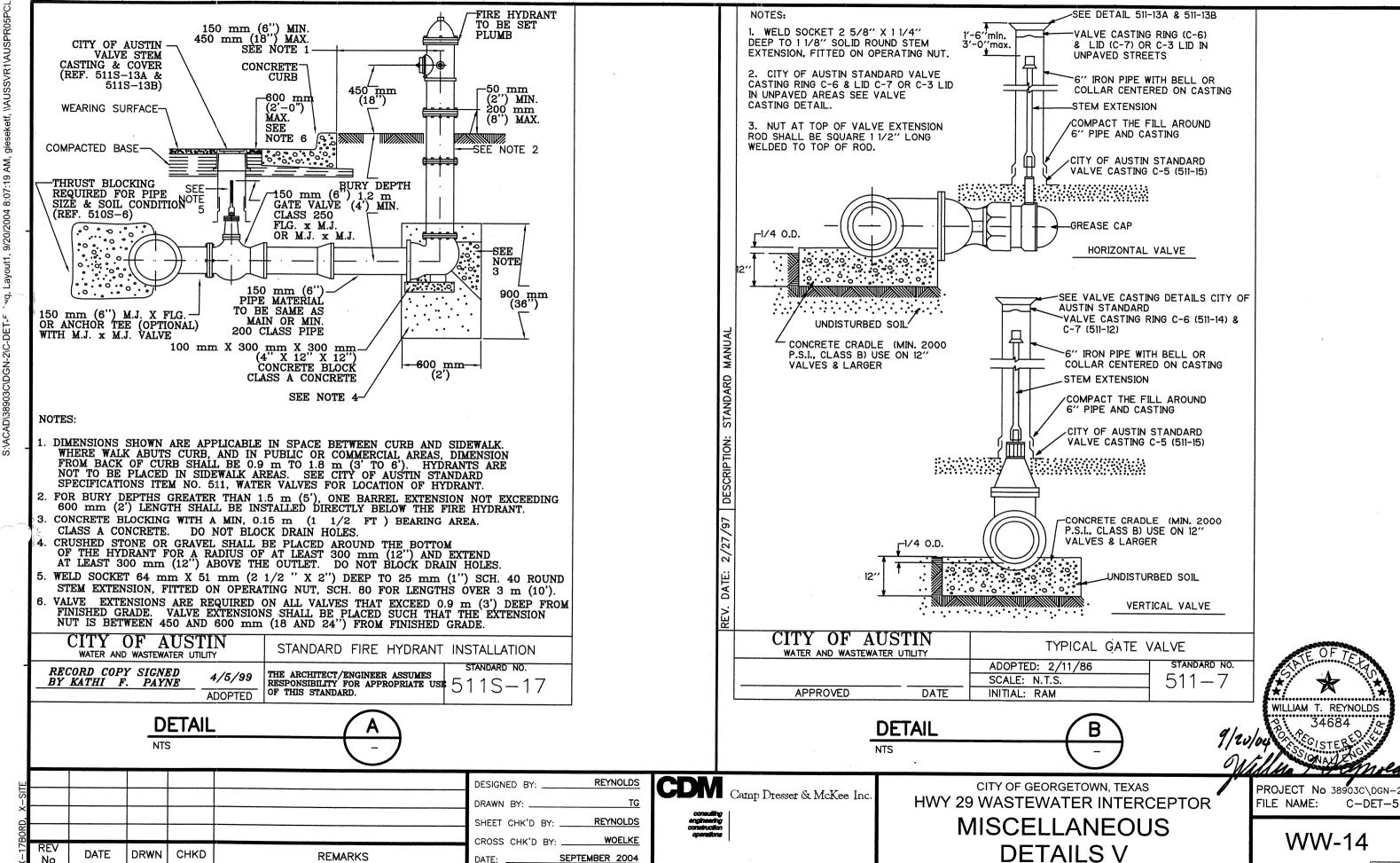


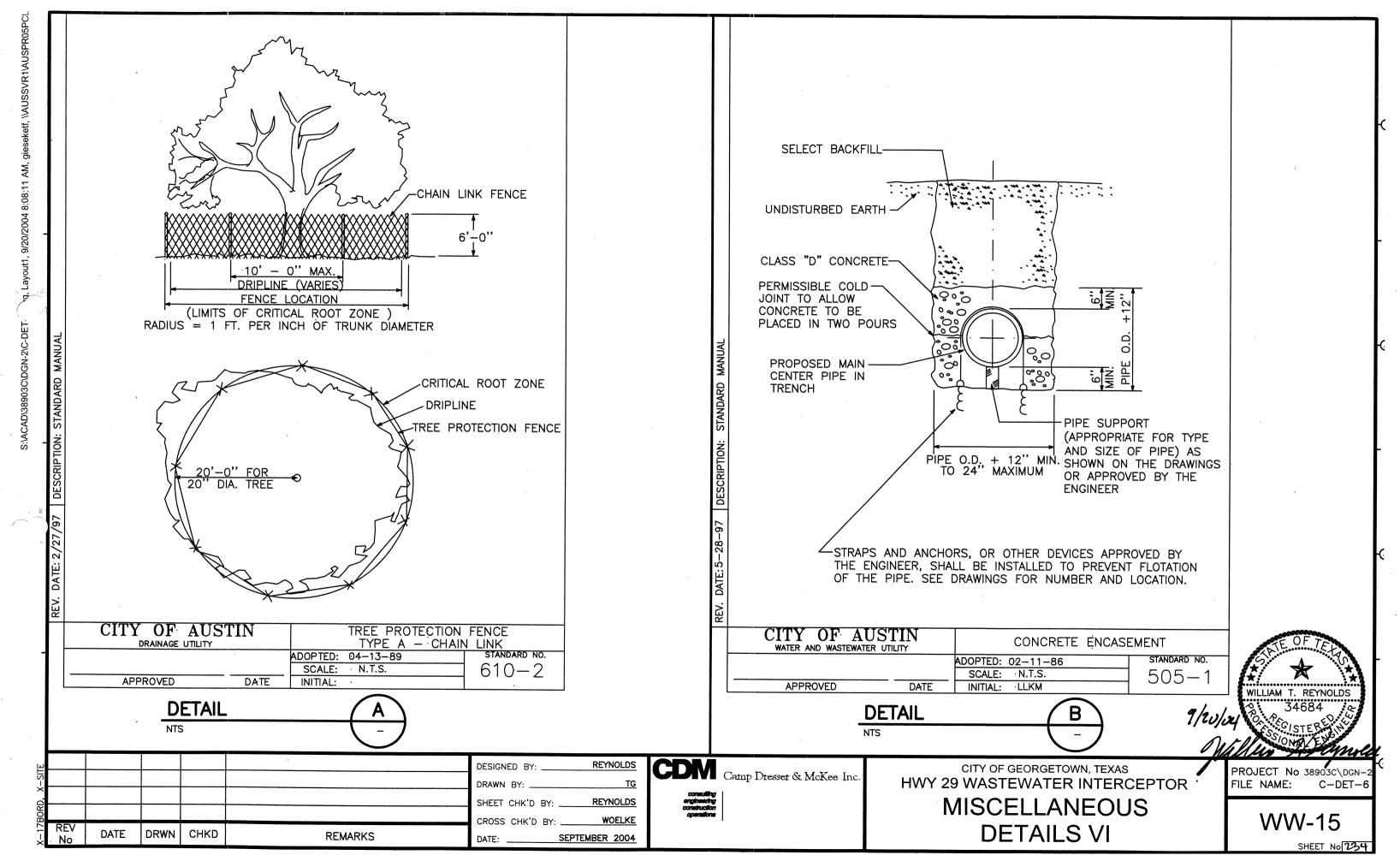


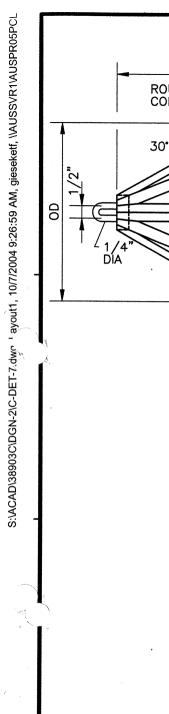
SEPTEMBER 2004

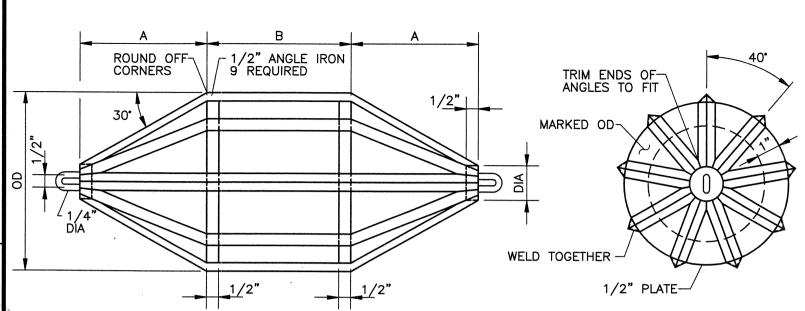
DATE:

**REMARKS** 









| PIPE<br>SIZE<br>(IN) | A<br>(IN) | B<br>(IN) | MANDREL OD<br>PVC (SDR 26)<br>ASTM D3034<br>(IN) | DIA<br>(IN) |
|----------------------|-----------|-----------|--|-------------|
| 8                    | 5.3       | 6         | 7.36   | 1.40        |

SIDE OR TOP VIEW

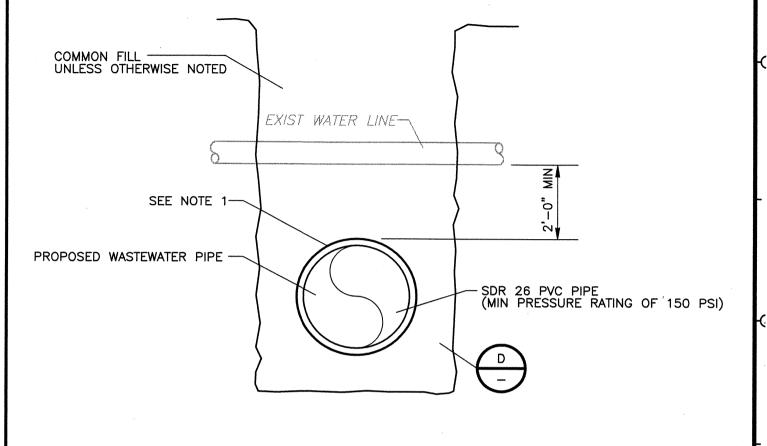
**DEFLECTION TESTING MANDREL** 

DETAIL A

| DESIGNED BY: | REYNOLDS | | DRAWN BY: | TG | SHEET CHK'D BY: | REYNOLDS | SHEET CHK'D BY: | REYNOLDS | CROSS CHK'D BY: | WOELKE | OCTOBER 2004



**END VIEW** 



NOTE

1 CONTRACTOR SHALL CENTER ONE JOINT OF 8 INCH SDR 26 PVC, 150 PRESSURE RATED SERIES, PER ASTM D2241, WASTEWATER PIPE BENEATH 6 INCH OR LARGER WATER LINE. INSTALL A WATER TIGHT ADAPTOR BY SPECIFIED FITTINGS, OR EQUAL, AT FITTINGS.

WATER LINE CROSSING OF WASTEWATER LINE

DETAIL B

10/7/04



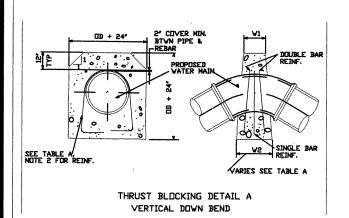
CITY OF GEORGETOWN, TEXAS
HWY 29 WASTEWATER INTERCEPTOR

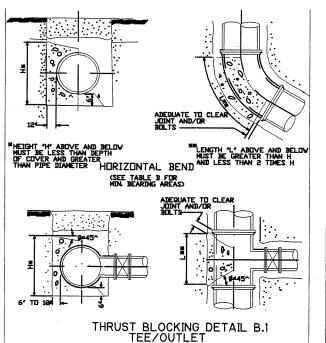
MISCELLANEOUS DETAILS VII

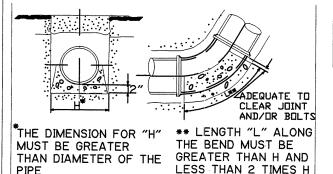
PROJECT No 38903C\DGN-FILE NAME: C-DET-7

WW-16

SHFFT No 235







(SEE TABLE B FOR MIN. BEARING AREAS)

THRUST BLOCKING DETAIL B.2
VERTICAL BEND UPWARD
(SEE TABLE B FUR
MIN. BEARING AREAS)

PIPE

# TABLE A UPWARD THRUST GRAVITY BLOCKS

| U1           |                          | י בביי             | 21/2                        |
|--------------|--------------------------|--------------------|-----------------------------|
| PIPE<br>DIA. | 90T .NIM<br>Kal)WI HTŒIW | ANGLE<br>(degrees) | BOTTOM<br>WIDTH-<br>W2 (In) |
|              |                          | 0-5                | SEE NOTE 3                  |
| 6 <b>"</b>   | 6"                       | 5-15               | 24                          |
| U            | 0                        | 15-25              | 48                          |
|              |                          | <b>≻</b> 25        | SEE NOTE 1                  |
|              |                          | 0-5                | SEE NOTE 3                  |
| 8"           | 6"                       | 5-9                | 30                          |
| 0            | 0                        | 9-15               | 36                          |
|              |                          | <b>≻</b> 15        | SEE NOTE 1                  |
|              |                          | 0-5                | SEE NOTE 3                  |
| 12"          | 6 <b>"</b>               | 5-15               | 48                          |
|              |                          | <b>&gt;</b> 15     | SEE NOTE 1                  |
|              | ·                        | 0-5                | SEE NOTE 3                  |
| 16 <b>"</b>  | 12"                      | 5-10               | 60                          |
| 10           | 1-                       | 10-15              | 96                          |
|              |                          | <b>►</b> 15        | SEE NOTE 1                  |
|              |                          |                    |                             |
| 24" THRL     | ) 36" dia.               | <b>≻</b> 5.0       | SEE NOTE 1                  |
|              |                          |                    |                             |
|              |                          |                    |                             |
| 42" THRU     | 48" dia.                 | <b>≻</b> 3.0       | SEE NOTE 1                  |
|              |                          |                    |                             |
|              |                          |                    |                             |

NOTE 1: FOR ANGLES GREATER THAN THOSE INDICATED RESTRAINED JOINTS SHALL BE INSTALLED

NOTE 2: REINFORCEMENT SHALL BE PROVIDED AS FOLLOWS

6"-12" PIPE 1#5 14"-30" PIPE 2#5'S 2#7'S 36"-48" PIPE

NOTE 3: FOR JOINT DEFLECTIONS LESS THAN 5 DEGREES, NO HORIZONTAL OR VERTICAL THRUST RESTRAINT IS REQUIRED FOR PIPES LESS THAN 42" IN DIAMETER.

# TABLE B MINIMUM THRUST BLOCK AREAS H [ft] x L [ft]

|         |      |        | 6" PIP | Ε      |        | 8' PIPE 12' PIPE |        |        | 16' PIPE 24' PIPE |        |        | 36' PIPE |        |        | 48' PIPE |        |        |        |        |        |        |        |
|---------|------|--------|--------|--------|--------|------------------|--------|--------|-------------------|--------|--------|----------|--------|--------|----------|--------|--------|--------|--------|--------|--------|--------|
|         |      | SOIL A | SDIF B | SDIL C | SOIL A | SOIL B           | SDIL C | SOIL A | SOIL B            | SOIL C | SDIL A | SOIL B   | SOIL C | SOIL A | SOIL E   | SDIL C | SOIL A | SOIL B | SDIL C | SDIL A | SOIL B | SDIL C |
| 6^-17^  | AREA | 2.48   | 1.00   | 1.00   | 4.28   | 1.07             | 1.00   | 9.12   | 2.28              | 1.14   | 15.80  | 3.95     | 1.98   | 34.76  | 8.69     | 4.34   | RESTR. | 19.16  | 9.58   | RESTR. | 33.70  | 16.85  |
| 17^-29^ | AREA | 4.20   | 1.05   | 1.00   | 7.24   | 1.81             | 1.00   | 15.44  | 3.86              | 1.93   | RESTR. | 6.70     | 3.35   | RESTR. | 14.73    | 7.36   | RESTR. | 32.45  | 16.22  | RESTR. | 57.10  | 28.46  |
| 29^-40^ | AREA | 5.76   | 1.44   | 1.00   | 9.92   | 2.48             | 1.24   | RESTR. | 5.27              | 2.64   | RESTR. | 9.15     | 4.58   | RESTR. | 20.11    | 10.05  | RESTR. | RESTR. | 22.16  | RESTR. | RESTR. | 39.04  |
| 40^-51^ | AREA | RESTR. | 1.81   | 1.00   | RESTR. | 3.12             | 1.56   | RESTR. | 6.63              | 3.32   | RESTR. | 11.52    | 5.76   | RESTR. | 25.32    | 12.66  | RESTR. | RESTR. | 27.90  | RESTR. | RESTR. | 49.08  |
| 51^-68^ | AREA | RESTR. | 2.35   | 1.18   | RESTR. | 4.05             | 2.02   | RESTR. | 8.61              | 4.30   | RESTR. | 14.96    | 7.48   | RESTR. | 32.89    | 16.44  | RESTR. | RESTR. | 36.24  | RESTR. | RESTR. | RESTR. |
| 68^-89^ | AREA | RESTR. | 2.97   | 1.48   | RESTR. | 5.12             | 2.56   | RESTR. | 10.89             | 5.44   | RESTR. | 18.92    | 9.46   | RESTR. | RESTR    | 20.79  | RESTR. | RESTR. | RESTR. | RESTR. | RESTR. | RESTR. |

USE SOIL A COLUMN FOR PLACEMENT OF CONCRETE AGAINST SOFT SOIL( SEE SOIL A ) USE SOIL B COLUMN FOR PLACEMENT OF CONCRETE AGAINST STABLE OR FIRM SOIL. ( SEE SOIL B ) USE SOIL B COLUMN FOR PLACEMENT OF CONCRETE AGAINST MIXED SOIL AND ROCK.

USE SOIL C COLUMN FOR PLACEMENT OF CONCRETE AGAINST LIMESTONE ROCK. ( SEE SOIL C )

TG

RESTR. - REFER TO TABLE "C" FOR RESTRAINED JOINT LENGTHS

| SDIL | DESCRIPTION BE                                 | EARING CAPACITY |
|------|--|-----------------|
| A    | SOFT SOIL OR LOOSE SAND                        | 1000 Lb/Sq.Ft.  |
| B    | STABLE OR FIRM SOIL AND/OR WEATHERED LIMESTONE | 4000 Lb/Sq.Ft.  |
| C    | SOLID LIMESTONE ROCK                           | 8000 Lb/Sq.Ft.  |

DETAIL

WILLIAM T. REYNOLDS

TABLE C
THRUST RESTRAINT LENGTHS FOR
POLYETHYLENE ENCASED DUCTILE IRON PIPE

19

15

36

28

64

43

64 52

NOTE - RESTRAINED JOINT LENGTHS SHALL BE BASED

EXISTING GROUND ELEVATION, WHICHEVER IS LESS

DEPTH FROM PROPOSED GRADE LINE OR

RESTRAINED LENGTH FEET

11-1/4^

[150psi working + 50% surge = 225psi]

80

4.0

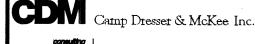
6.0

10.0

12

12 12 12

REYNOLDS DESIGNED BY: DRAWN BY: **REYNOLDS** SHEET CHK'D BY: WOELKE CROSS CHK'D BY: DATE DRWN CHKD **REMARKS** SEPTEMBER 2004 DATE:

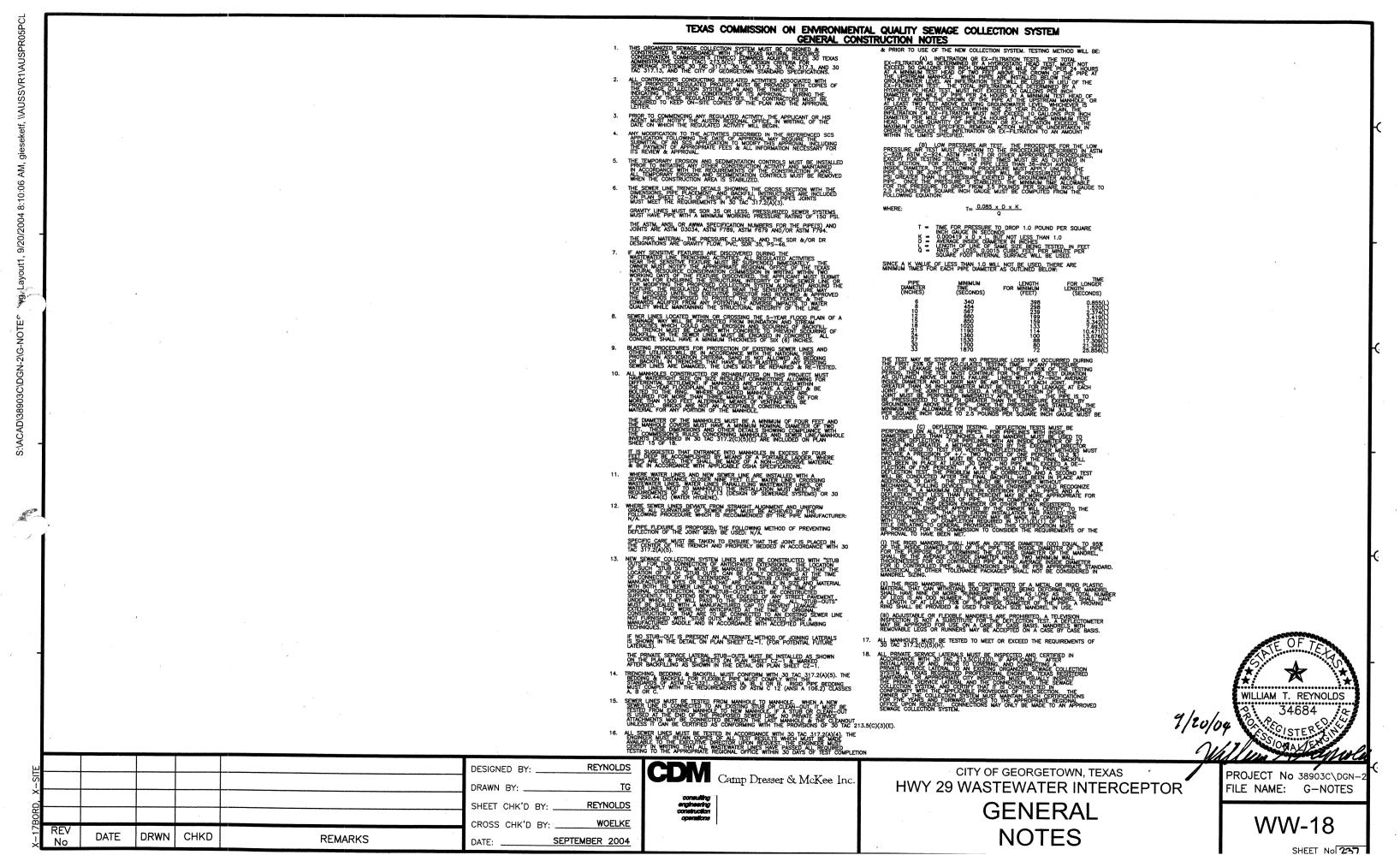


CITY OF GEORGETOWN, TEXAS HWY 29 WASTEWATER INTERCEPTOR

> **MISCELLANEOUS DETAILS VIII**

PROJECT No 38903C\DGN-FILE NAME: C-DET-8

WW-17



# WATER & WASTEWATER MAINS SUMMARY

|               | i                        |                                      |   |  |   |   | ,  | PIPE  |  |  |  |                                     |
|---------------|--------------------------|--------------------------------------|---|--|---|---|--|---|--|--|--|-------------------------------------|
|               |                          |                                      |   |  | PIPE  | PIPE  | PIPE   | 8-INCH PVC  |  |  |  |                                     |
| ENCASEMENT    | ENCASEMENT               | NEW MANHOLES                         | DROP MANHOLES   | TRENCH   | 24-INCH DI  | 16-INCH DI  | 8-INCH DI  | ASTM D3034  | VALVE  | VALVE  | VALVE  |                                     |
| PIPE          | PIPÈ                     | 4-FOOT DIAMETER                      | 4-FOOT DIAMETER   | SAFETY   | CL 200  | CL 250  | CL 350   | SDR-26  | GATE   |  |  | FIRE                                |
| 30-INCH STEEL | 24-INCH STEEL            | ALL DEPTHS                           | ALL DEPTHS  | SYSTEM   | WATER   | WATER   | WATER  | WASTEWATER  | 24-INCH DIA  |  |  |                                     |
|               |                          |                                      |   |  |   |   |  |   |  |  |  |                                     |
| LF            | LF                       | EA                                   | EA  | LF   | LF  | LF  | LF   | LF  | EA   | EA   | EA   | EA                                  |
|               |                          |                                      |   |  |   |   |  |   |  |  |  |                                     |
|               | 147.14                   | 1                                    |   | 179  |   |   |  | 179   |  |  |  |                                     |
|               |                          | 2                                    |   | 500  |   |   |  | 500   |  |  |  |                                     |
|               |                          | £ <b>4</b>                           | 1   | 509  |   |   | :  | 509   |  |  |  |                                     |
|               |                          | 1                                    |   | 395  |   |   |  | 395   |  |  |  |                                     |
|               | 51.63                    | 1                                    | 1   | 393  |   |   | ν  | 393   |  |  |  |                                     |
|               |                          | 4                                    |   | 283  |   |   |  | 283   |  |  |  |                                     |
| 79.21         |                          |                                      | ·   | 535  | 127   | 408   |  |   | 2  | 1  |  | 1                                   |
| 63.29         |                          |                                      |   | 171  |   | 171   |  |   |  |  | 1  | 1                                   |
|               |                          |                                      |   | 508  |   |   | 508  |   |  |  | 2  | 1                                   |
| 142.5         | 292                      | 13                                   | 2   | 3473   | 127   | 570   | 509  | 2250  | 2  |  |  | 3                                   |
|               | 30-INCH STEEL  LF  79.21 | PIPE 30-INCH STEEL 24-INCH STEEL  LF | PIPE 30-INCH STEEL PIPE 24-INCH STEEL 4-FOOT DIAMETER ALL DEPTHS  LF LF EA  147.14 1 2 4-FOOT DIAMETER ALL DEPTHS  147.14 1 2 4 79.21 51.63 1 79.21 63.29 | PIPE 30-INCH STEEL         PIPE 24-INCH STEEL         4-FOOT DIAMETER ALL DEPTHS         4-FOOT DIAMETER ALL DEPTHS           LF         LF         EA         EA           147.14         1         2           4         1         1           93.23         1         1           51.63         1         1           79.21         63.29 | PIPE 30-INCH STEEL         PIPE 24-INCH STEEL         4-FOOT DIAMETER ALL DEPTHS         4-FOOT DIAMETER ALL DEPTHS         SAFETY SYSTEM           LF         LF         EA         EA         LF           147.14         1         179           2         500           4         1         509           93.23         1         395           51.63         1         1         393           79.21         535         535           63.29         171         508 | ENCASEMENT PIPE 30-INCH STEEL         ENCASEMENT PIPE 24-INCH STEEL         NEW MANHOLES 4-FOOT DIAMETER ALL DEPTHS         DROP MANHOLES 4-FOOT DIAMETER ALL DEPTHS         TRENCH SAFETY S | ENCASEMENT PIPE 30-INCH STEEL         ENCASEMENT PIPE 24-INCH STEEL         NEW MANHOLES 4-FOOT DIAMETER ALL DEPTHS         DROP MANHOLES 4-FOOT DIAMETER ALL DEPTHS         TRENCH SAFETY SAFETY SYSTEM         24-INCH DI CL 250 WATER         CL 250 WATER           LF         LF         EA         EA         LF         LF <td< td=""><td>  ENCASEMENT   PIPE   30-INCH STEEL   24-INCH DI CL 250</td><td>  ENCASEMENT   PIPE   30-INCH STEEL   24-INCH DI</td><td>ENCASEMENT PIPE 10-10-10-10-10-10-10-10-10-10-10-10-10-1</td><td>ENCASEMENT PIPE 30-INCH STEEL 24-INCH DIA SAFETY SYSTEM WATER WATER WATER WATER WATER WASTEWATER 24-INCH DIA 16-INCH DIA 179</td><td>ENCASEMENT PIPE 30-INCH STEEL    LF</td></td<> | ENCASEMENT   PIPE   30-INCH STEEL   24-INCH DI CL 250 | ENCASEMENT   PIPE   30-INCH STEEL   24-INCH DI | ENCASEMENT PIPE 10-10-10-10-10-10-10-10-10-10-10-10-10-1 | ENCASEMENT PIPE 30-INCH STEEL 24-INCH DIA SAFETY SYSTEM WATER WATER WATER WATER WATER WASTEWATER 24-INCH DIA 16-INCH DIA 179 | ENCASEMENT PIPE 30-INCH STEEL    LF |

10/6/04

WILLIAM T. REYNOLDS
34684

SSIONAL ENGINEER

| DESIGNED BY: REYNOLDS | DRAWN BY: TG | SHEET CHK'D BY: REYNOLDS | SHEET CHK'D BY: REYNOLDS | CROSS CHK'D BY: WOELKE | WOELKE | DATE: OCTOBER 2004

CDN Camp Dresser & McKee Inc.

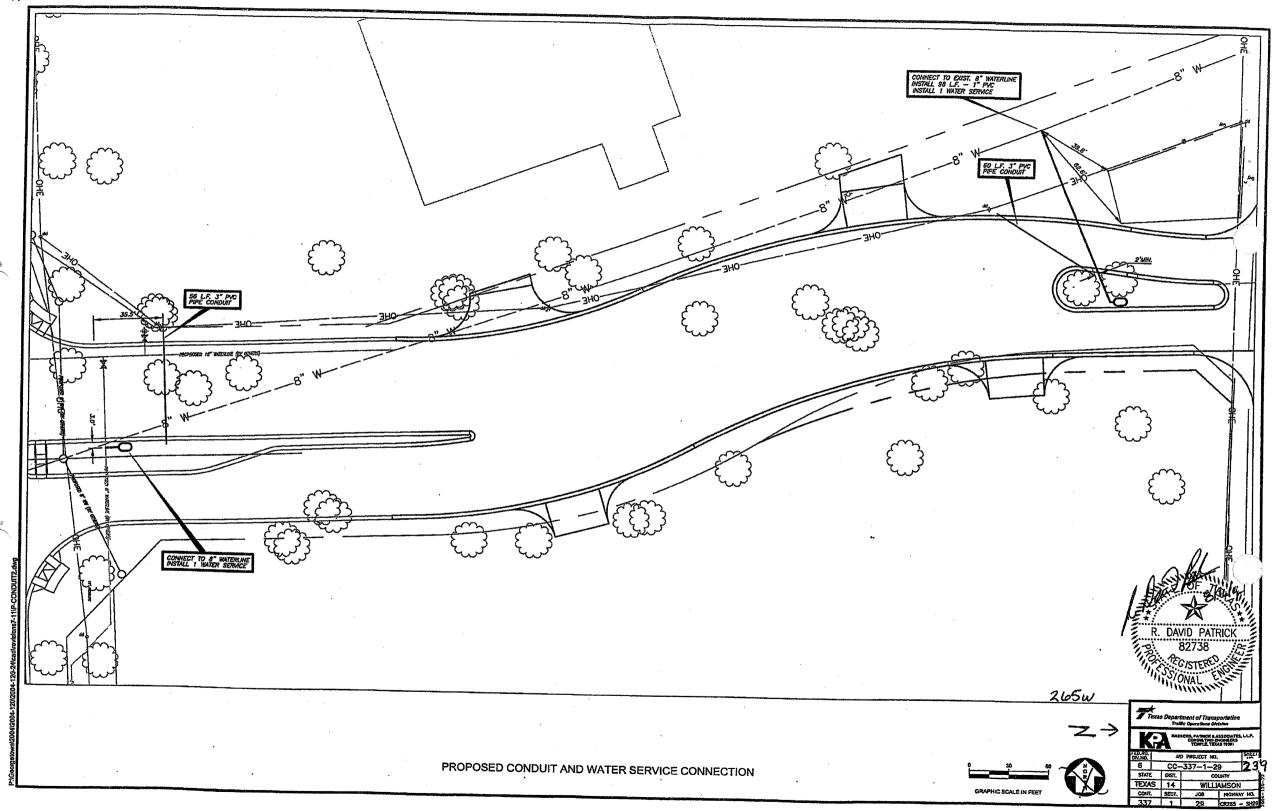
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CITY OF GEORGETOWN, TEXAS
HWY 29 WASTEWATER INTERCEPTOR

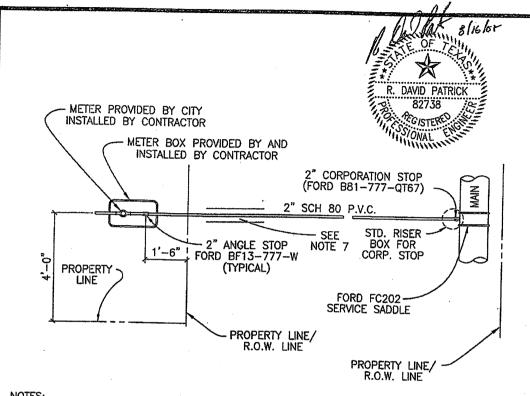
WATER & WW QUANTITIES SUMMARY SHEET

ROJECT No 38903C\DGN-FILE NAME: F-QUANT

WW-19



C.O.#6

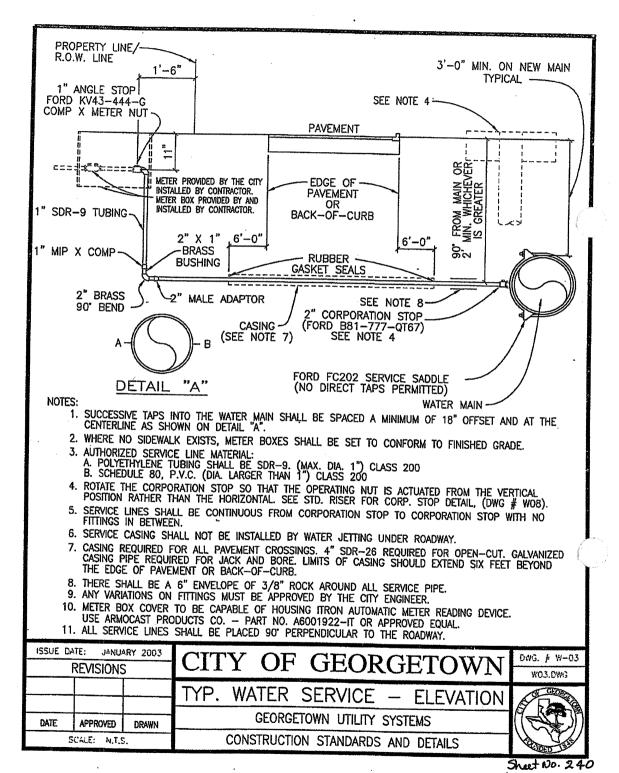


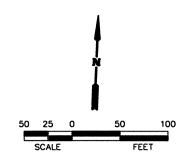
#### NOTES:

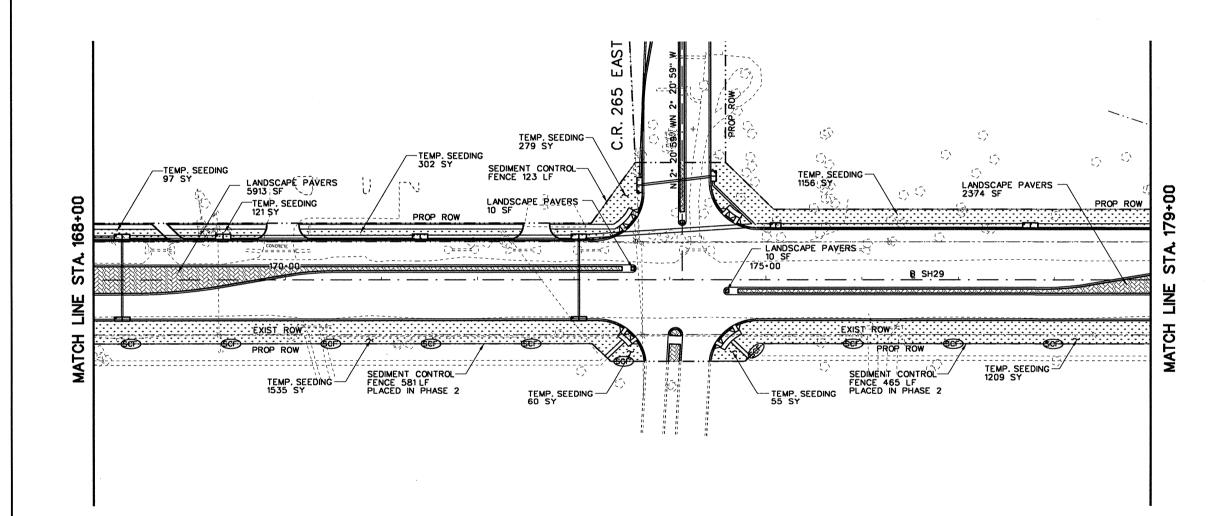
- 1. AUTHORIZED SERVICE LINE MATERIAL:
  A. POLYETHYLENE TUBING SDR 9. (MAX. DIA. 1") CLASS 200
  B. SCHEDULE 80, P.V.C. (DIA. LARGER THAN 1") CLASS 200
- 2. ANGLE STOP SHALL BE 1" MINIMUM.
- 3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
- 4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
- 5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
- 6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
- 7. THERE SHALL BE A 6" ENVELOPE OF 3/8" ROCK AROUND ALL SERVICE PIPE.
- 8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
- 9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.

10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

| ISSUE D  | REVISIONS    | RY 2003 | CITY OF GEORGETOWN                 | DWG. ∮ W-04 |
|----------|--------------|---------|------------------------------------|-------------|
| <u> </u> | IVEA1210142  | ·       | OLIT OF GEORGETOWN                 | W04.DWG     |
| ļ        |              |         | SINGLE WATER SERVICE — PLAN        |             |
| DATE     | APPROVED     | DRAWN   | GEORGETOWN UTILITY SYSTEMS         |             |
|          | SCALE: N.T.S | ò.      | CONSTRUCTION STANDARDS AND DETAILS |             |







SCF SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

SEEDING/VEGETATION

LANDSCAPE PAVERS

#### NOTES:

- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS ECTI) ECT. AND ECT. EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
- 2. ALL PERIMETER SEDIMENT CONTROL FENCE TO REMAIN UNTIL END OF CONSTRUCTION.
- 3. ALL ROCK FILTER DAMS WILL BE PLACED DURING PHASE 1-1 AND WILL REMAIN UNTIL END OF CONSTRUCTION.
- 4. ALL INLETS ALONG WESTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 1-1.
- 5. ALL INLETS ALONG EASTBOUND SH 29 WILL BE CONSTRUCTED IN PHASE 2.
- 6. ALL INLETS WILL HAVE INLET PROTECTION UNTIL END OF CONSTRUCTION.

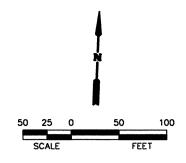


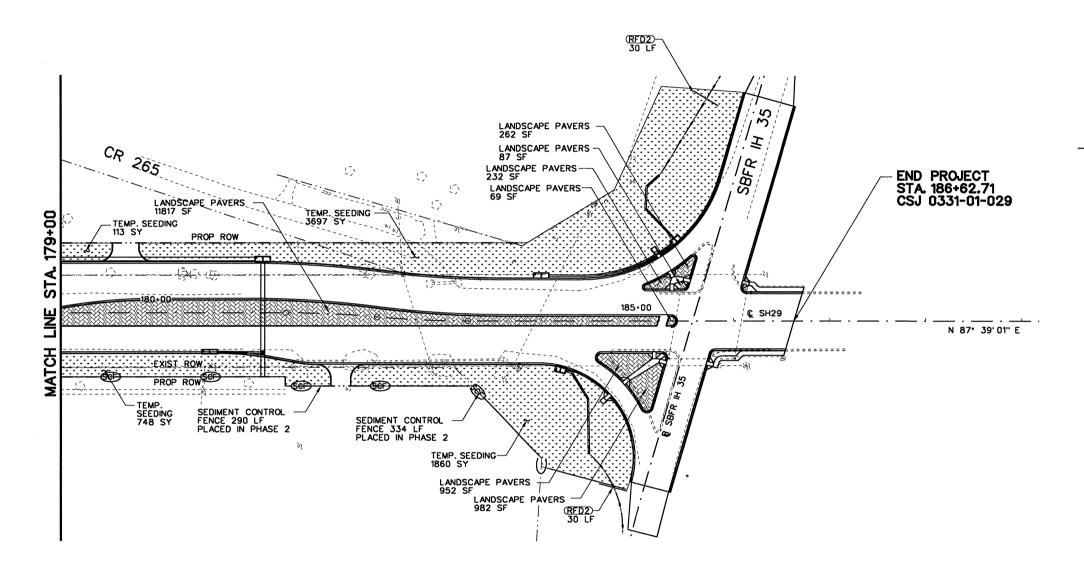
Chiang, Patel & Yerby, Inc.

Texas Department of Transportation SH 29

EROSION CONTROL PLAN STA. 168+00 TO STA. 179+00

FED. ROAD DIV. NO.. STATE FEDERAL AID PROJECT NO. 6 TEXAS CC 337-1-29 JJR | STATE | COUNTY | CONTROL | SECTION | JOB | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. | NO. AJW





-SCF- SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

SEEDING/VEGETATION

LANDSCAPE PAVERS

NOTES:

- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS EC(1) - EC(3) AND EC(6) EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
- ALL PERIMETER SEDIMENT CONTROL FENCE TO REMAIN UNTIL END OF CONSTRUCTION.
- 3. ALL ROCK FILTER DAMS WILL BE PLACED DURING PHASE 1-1 AND WILL REMAIN UNTIL END OF CONSTRUCTION.
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- 6. ALL INLETS WILL HAVE INLET PROTECTION UNTIL END OF CONSTRUCTION.



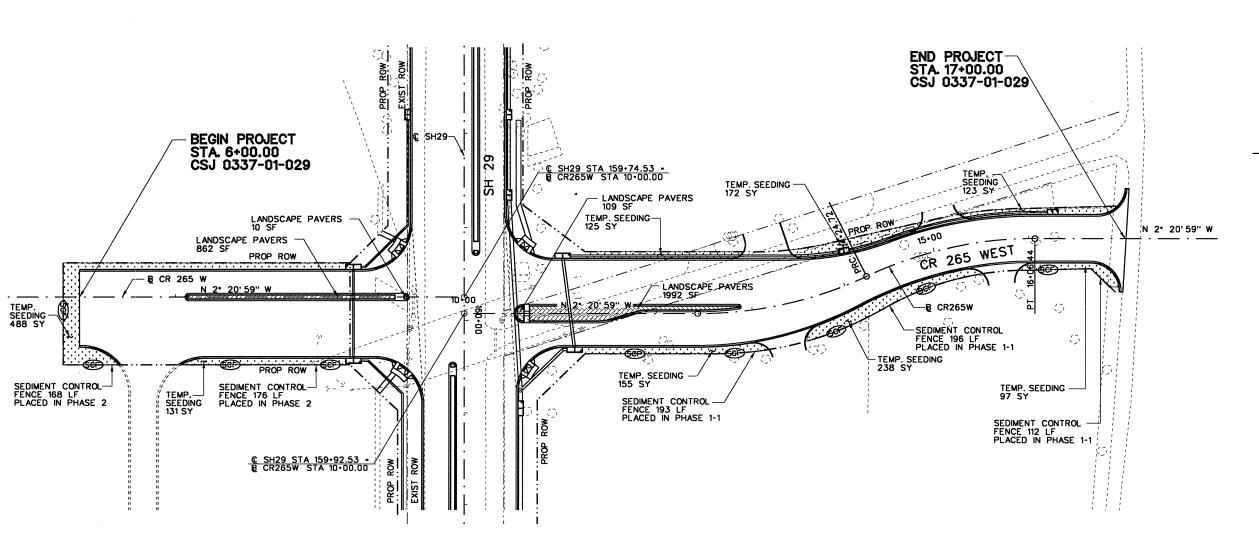
NO. REVISION BY DATE

Chiang, Patel & Yerby, Inc.

Texas Department of Transportation

EROSION CONTROL PLAN STA. 179+00 TO END PROJECT

5 OF 7





----SCF- SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

SEEDING/VEGETATION

LANDSCAPE PAVERS

#### NOTES:

- 1. ALL STRUCTURES TO BE PLACED AS SHOWN IN STANDARDS EC1) - EC3 AND EC60 EXCEPT AS SHOWN IN MISCELLANEOUS DETAILS.
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Chiang, Patel & Yerby, Inc.

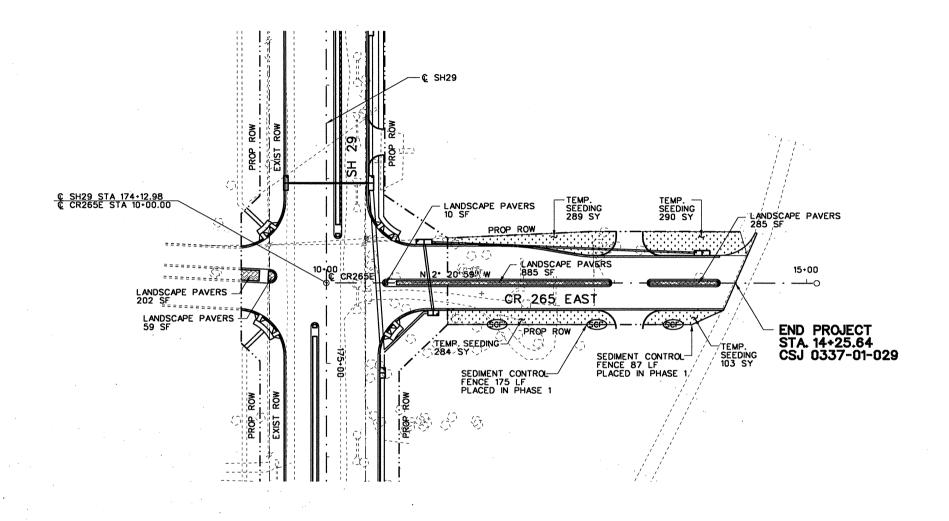
Texas Department of Transportation

SH 29

EROSION CONTROL PLAN
CR 265 WEST

6 OF 7





-SCF SEDIMENT CONTROL FENCE

(RFD2) TYPE 2 ROCK FILTER DAM

SEEDING/VEGETATION

LANDSCAPE PAVERS

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NO. REVISION BY DATE

CP Chiang, Patel & Yerby, Inc.



Texas Department of Transportation

SH 29

EROSION CONTROL PLAN
CR 265 EAST