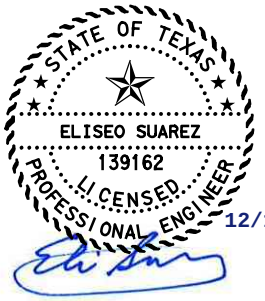


12/14/2023

Water Pollution Abatement Plan

FM 3351 at Cibolo Creek

Bridge Replacement

Bexar/Comal County: 0.013 miles north of the Bexar County Line.

Texas Department of Transportation: San Antonio District

December 14, 2023

TEXAS P.E. FIRM REGISTRATION NO. F-754

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

1. 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: http://www.tceq.texas.gov/field/eapp.

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.

1. Regulated Entity Name: FM 3351 at Cibolo Creek					**2. Regulated Entity No.:** New			
3. Customer Name: TxDOT					**4. Customer No.:** CN600803456			
5. Project Type: (Please circle/check one)	New		Modification		Extension		Exception	
6. Plan Type: (Please circle/check one)	WPAP	CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	Residential		Non-residential			**8. Site (acres):**		12.06
9. Application Fee:	N/A		**10. Permanent BMP(s):**			Engineered Vegetative Filter Strips		
11. SCS (Linear Ft.):	N/A		**12. AST/UST (No. Tanks):**			N/A		
13. County:	Bexar and Comal County		**14. Watershed:**			Headwaters Cibolo Creek		

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.)	___	___	___
Region (1 req.)	___	___	___
County(ies)	___	___	___
Groundwater Conservation District(s)	___Edwards Aquifer Authority ___Barton Springs/ Edwards Aquifer ___Hays Trinity ___Plum Creek	___Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	___Austin ___Buda ___Dripping Springs ___Kyle ___Mountain City ___San Marcos ___Wimberley ___Woodcreek	___Austin ___Bee Cave ___Pflugerville ___Rollingwood ___Round Rock ___Sunset Valley ___West Lake Hills	___Austin ___Cedar Park ___Florence ___Georgetown ___Jerrell ___Leander ___Liberty Hill ___Pflugerville ___Round Rock

San Antonio Region					
County:	**Bexar**	**Comal**	**Kinney**	**Medina**	**Uvalde**
Original (1 req.)	_1_	_1_	___	___	___
Region (1 req.)	_1_	_1_	___	___	___
County(ies)	_1_	_1_	___	___	___
Groundwater Conservation District(s)	_1_ Edwards Aquifer Authority _1_Trinity-Glen Rose	_1_Edwards Aquifer Authority	___Kinney	___EAA ___Medina	___EAA ___Uvalde
City(ies) Jurisdiction	___Castle Hills _1_Fair Oaks Ranch ___Helotes ___Hill Country Village ___Hollywood Park ___San Antonio (SAWS) ___Shavano Park	___Bulverde _1_Fair Oaks Ranch ___Garden Ridge ___New Braunfels ___Schertz	NA	_1_San Antonio ETJ (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.

Brian Witherell

Print Name of Customer/Authorized Agent

Signature of Customer/Authorized Agent

2-5-2024

Date

FOR TCEQ INTERNAL USE ONLY				
Date(s)Reviewed:		Date Administratively Complete:		
Received From:		Correct Number of Copies:		
Received By:		Distribution Date:		
EAPP File Number:		Complex:		
Admin. Review(s) (No.):		No. AR Rounds:		
Delinquent Fees (Y/N):		Review Time Spent:		
Lat./Long. Verified:		SOS Customer Verification:		
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):	
Core Data Form Complete (Y/N):			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

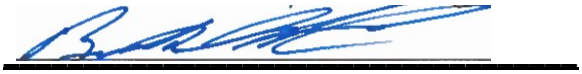
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer.

The application was prepared by:

Print Name of Customer/Agent: Brian Witherell

Date: 2/9/2024

Signature of Customer/Agent:



Project Information

1. Regulated Entity (Project) Name: FM 3351 (≈0.013 mi North of Bexar County Line) at Cibolo Creek
2. County: Bexar and Comal County
3. Stream Basin(s): Headwaters Cibolo Creek Watershed
4. Groundwater Conservation District (if applicable): Trinity Glen Rose GCD; Comal Trinity GCD; Edward's Aquifer Authority
5. Customer (Applicant):

   Contact Person: Charles Benavidez
   Entity: Texas Department of Transportation
   Mailing Address: 4615 NW Loop 410
   City, State: San Antonio, TXZip: 78229
   Telephone: 210-615-5825
   Email Address: charles.benavidez@@txdot.gov

6. Agent (Representative):

   Contact Person: Brian Witherell
   Entity: Texas Department of Transportation
   Mailing Address: 4615 NW Loop 410
   City, State: San Antonio, TX Zip: 78229
   Telephone: 210- 615-1110
   Email Address: Brian.Witherell@txdot.gov

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: N/A
   Entity: N/A
   Mailing Address: N/A
   City, State: N/A Zip: N/A
   Telephone: N/A
   Email Address: N/A

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: _____

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 (TZ)
    ☐ Contributing Zone within Transition Zone (CZ/TZ)
    ☐ Zone not regulated by EAPP

12. ☒ **Attachment C - Project Description**. A detailed narrative description of the proposed project is attached. The project description is consistent throughout the application and contains, at a minimum, the following details:

    ☒ Complete site area [Acres]
    ☒ Offsite upgradient stormwater areas to be captured
    ☒ Impervious area [Acres]
    ☒ Permanent BMP(s)
    ☒ Proposed site use
    ☒ Existing roadway (paved and/or unpaved)
    ☒ Structures to be demolished [Include demo phase]
    ☐ Major interim phases

13. Existing project site conditions are noted below:

    ☒ Existing paved and/or unpaved roads
    ☐ Undeveloped (Cleared)
    ☐ Undeveloped (Undisturbed/Not cleared)
    ☐ Existing commercial site
    ☐ Existing industrial site
    ☐ Existing residential site
    ☐ Other: _____

14. ☒ **Attachment D - Factors Affecting Surface Water Quality**. A detailed description of all factors that could affect surface water quality is attached.

15. ☒ Only inert materials as defined by 30 TAC §330.3 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: _____

17. Right of Way (R.O.W.) and Pavement Area:

    R.O.W. for project: 12.06 (ac.)
    Length: 3352 ft.
    Width: varies from 126 ft. to 182 ft.
    Impervious cover (IC): 5.08 (ac.)
    Total of Pavement area 5.08 (ac.) ÷ R.O.W. area 12.06 (ac.) x 100 = 42% IC.

    ☒ CAD program was used to determine areas.
    ☒ Number of travel lanes: proposed: 3, existing: 2
    ☒ Typical widths of lanes: 11 (ft.)
    ☒ Are intersections also being improved? (Y/N) N

Site Plan Requirements

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

18. ☒ The Site Plan must have a minimum scale of 1" = 400'.
    Site Plan Scale: 1" = 50'

19. 100-year floodplain boundaries:

    ☒ 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):Effective Zone AE Floodplain source Comal FEMA Firm Panel 48091C0355F effective September 3, 2009 and Bexar County FEMA Firm Panel 48029C0105F effective September 29, 2010.

    ☐ No part of the project site is located within the 100-year floodplain.

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: Cibolo Creek
    ☒ 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. ☒ Show locations of major structural and nonstructural controls. These are the temporary and permanent best management practices. Include the following:

    ☐ Show design and location of any hazardous materials traps.
    ☒ Show design at outfalls of major control structures and conveyances.
    ☒ A description of the BMPs and measures that prevent pollutants from entering surface streams.

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. Temporary aboveground storage tank facilities:

    ☐ Temporary aboveground storage tank facilities will be located on this site. Show on site plan.
    ☒ Temporary aboveground storage tank facilities will not be located on this site.

28. ☒ Plan(s) also include:

    ☒ Sidewalks ☒ Shared-use paths
    ☐ Related turn lanes ☐ Off-site improvements and staging areas

☒ Demolition plans ☐ Utility relocations
☐ Other improved areas: _____

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 designed, and will be constructed, operated, and maintained to ensure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance accepted by the executive director.

    ☒ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.
    ☐ A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used: _____

30. ☒ **Attachment E - BMPs for Upgradient (Offsite) Stormwater.**

    ☒ A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is attached.
    ☐ No surface water, groundwater or stormwater originates upgradient from the site and flows across the site, and an explanation is attached.
    ☒ Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, and an explanation is attached.

31. ☒ **Attachment F - BMPs for On-site Stormwater**.

    ☒ A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is attached.
    ☐ Permanent BMPs or measures are not required to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff, and an explanation is attached.

32. ☒ **Attachment G - Construction Plans**. Construction plans and design calculations for the proposed permanent BMPs and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer, and are signed, sealed, and dated. Construction plans for the proposed permanent BMPs and measures are attached and include all proposed structural plans and specifications, and appropriate details.

    ☒ Major bridge cross-sections, and roadway 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:

    ☒ Prepared and certified by the engineer designing the permanent BMPs and measures.
    ☒ Signed by the owner or responsible party.
    ☒ Outlines specific procedures for documenting inspections, maintenance, repairs, and, if necessary, retrofit.
    ☒ Contains a discussion of recordkeeping procedures.

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.
    ☒ 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. ☒ 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).

    ☒ TxDOT roadway project.

ROADWAY APPLICATION SECTION
TCEQ-20872
ATTACHMENT A – ATTACHMENT K

ATTACHMENT A – Road Map

See attached.

ATTACHMENT B – USGS Quadrangle
See attached.

ATTACHMENT C – Project Description
The Texas Department of Transportation (TxDOT) San Antonio District (15) proposes to replace the existing bridge at of FM 3351 at Cibolo Creek in Bexar and Comal County, approximately 0.013 miles north of the Bexar County Line. The overall project is approximately 0.63 miles in length; the project is located within Federal Emergency Management Agency (FEMA) FIRM Panel 48091C0355F effective September 3, 2009, and FIRM panel 48029C0105F effective September 29, 2010, and conflicts with a designated Zone AE floodplain along Cibolo Creek.

The existing roadway and bridge on FM 3351 at Cibolo Creek consist of two 12 ft travel lanes, one lane in each direction, with 1 ft shoulders.

The proposed project would demolish and replace bridge on FM 3351 to include two 11-foot lanes with a 12 ft dual turn lane and 0-5 ft shoulders, and 10ft shared use path. Right-of-way will be acquired.

This is a standalone project and is not part of a large plan of development.

Based on calculations made by project design engineers using Microstation™, the total project area is approximately 12.06 acres; there are 3.37 acres of existing impervious cover in the ROW in the Recharge Zone. The proposed project would add 1.71 acres of impervious cover in the ROW in the Recharge Zone. Upon completion, there would be 5.08 acres of impervious cover in the Recharge Zone. These values and the corresponding total suspended solids removal and treatment calculations are shown on the "Water Pollution Abatement Plan Calculations" sheet (Sheets No. 252-258 in the included construction plans). The permanent BMPs will conform with guidance TCEQ RG348 (updated July 2005) and include Engineered Vegetative Filter Strips. The Geologic Assessment identified two geological features within the project limits. These features are located adjacent or underneath the existing bridge and have low recharge potential (they are not sensitive features). They will be inside the construction limits and may receive flow from the construction limits before, during or after construction.

ATTACHMENT D – Factors Affecting Surface Water Quality
Factors affecting water quality include contaminated stormwater from construction activities and vehicular traffic carried directly to Cibolo Creek (Headwaters Cibolo Creek Watershed). Pollutants from the construction site may include dirt from grading, chemicals from cementing, and oils from asphalt paving and paints. Pollutants from vehicular traffic, such as oil and dirt, are expected on finished pavement.

ATTACHMENT E – BMPs for Upgradient (Offsite) Stormwater
For the FM 3351 (Bridge Replacement) at Cibolo Creek, upgradient stormwater will be collected in roadside ditches and conveyed into Cibolo Creek. Permanent topsoil & seeding, soil retention

blankets, stone riprap, and gabion mattress/gabions will be placed to allow vegetation to establish in the ditches and protect them from erosion.

ATTACHMENT F – BMPs for On-site Stormwater
Engineered Vegetative Filter Strips will be used to remove TSS from on-site stormwater. The treatment is designed to exceed TCEQ requirements. See attached "Proposed Internal Drainage Area Map" and WPAP Impervious Areas Existing/Proposed. All engineered vegetative filter strips are located above the 100-yr water surface elevation.

ATTACHMENT G – Construction Plans (FM 3351 at Cibolo Creek Plan Set)
See attached plans.

ATTACHMENT H – Inspection, Maintenance, Repair, and Retrofit Plan
See attached plan.

ATTACHMENT I – Pilot-Scale Field Testing Plan
N/A

ATTACHMENT J – Measures for Minimizing Surface Stream Contamination
The project includes engineered vegetative filter strips to minimize the impacts of the project on stream flows. As a result, the project represents only a minor change from existing conditions and would not substantially impact stream flashing, the creation of stronger flows and in-stream velocities. Riprap (Stone Protection) is proposed between the existing bank and proposed abutments in order to reduce erosion underneath the proposed bridge structure.

Refer to Construction Plans (FM 3351 at Cibolo Creek Plan Set) Sheet No. 245-246 for additional details.

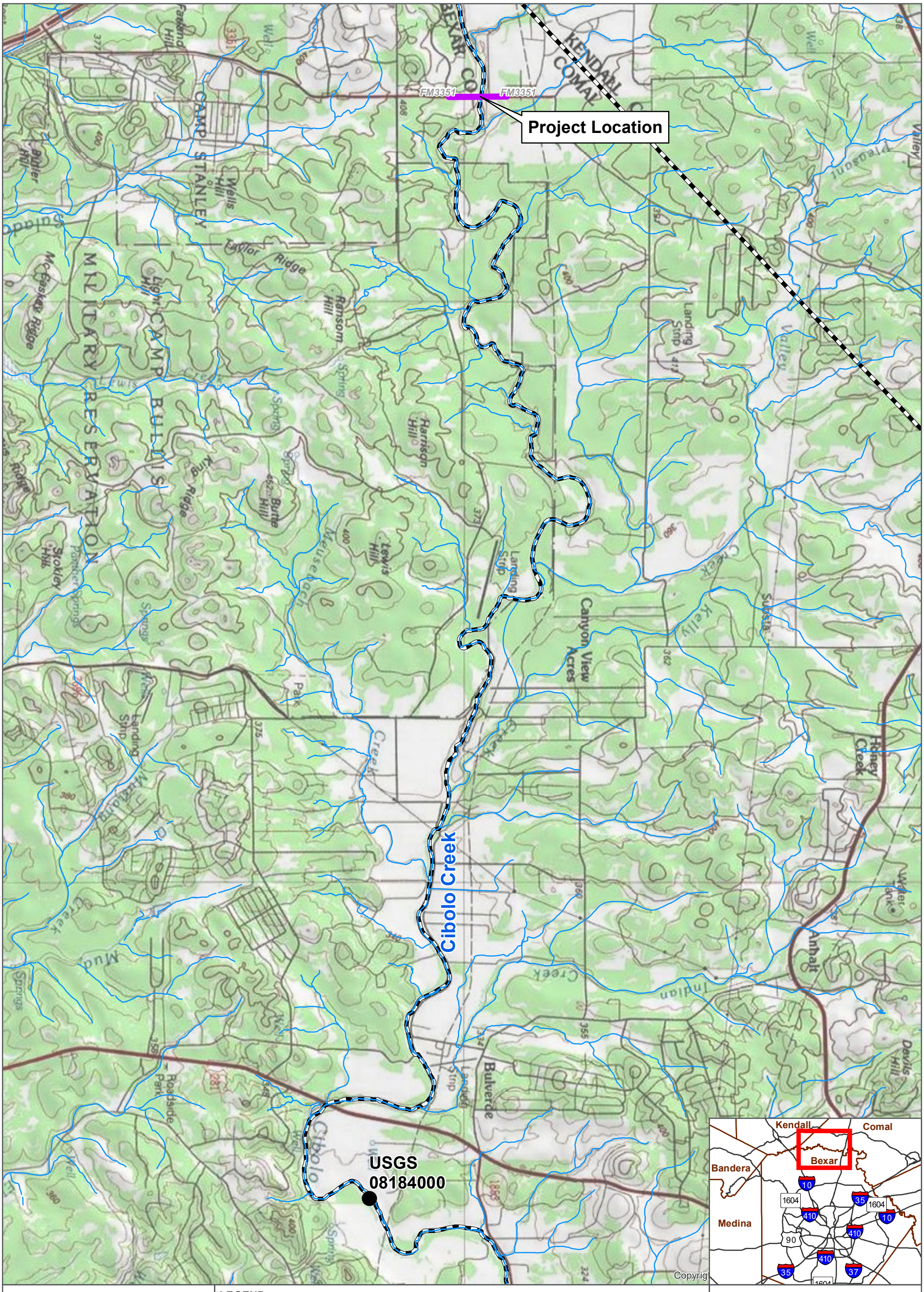
The TxDOT San Antonio District's Spill Response Procedures for spills not caused by the contractor are attached.

ATTACHMENT K – Volume and Character of Storm Water
Stormwater runoff from the project area will be collected in roadside ditches and conveyed to Cibolo Creek. The volume of stormwater was evaluated per the TxDOT Hydraulic Design Manual (HDM), September 2019. The storm drain system and ditches were evaluated for the 2, 5, 10, 25, 50, and 100-year storm events respectively. See Existing/Proposed Internal Drainage Area Map sheets. (Sheet No. 126-129 in the included construction plans).

The proposed improvements will convert approximately 1.45-acres of pervious area to impervious area. This will change the pre-construction weighted runoff C factor of 0.62 to a post-construction value of 0.63. The resulting impervious area will generate approximately 3.72-cfs of additional flow for the 5-year design storm.

Stormwater runoff will be conveyed via roadside ditches and culverts. An engineered vegetative filter strip system will be installed as a permanent BMP for the removal of contaminants from the roadway runoff.

ROADWAY APPLICATION SECTION
TCEQ-20872
ATTACHMENT A: ROAD MAP



0 5,000 10,000
FEET

LEGEND

- Stream Centerline
- Bridge Structure
- Counties
- USGS Stream Gage

DATA SOURCES: TxDOT, TNRIS, FEMA, USGS, ESRI

DISCLAIMER: Topographic map information was compiled from the best available sources. No warranty is made for the accuracy or completeness.

FM 3351
BRIDGE REPLACEMENT AT CIBOLO CREEK (CSJ 3212-05-013)

ROAD MAP

SEPTEMBER 2023 | ATTACHMENT A

PATH: P:\3284_TXDOT\10329784\07_GIS_MODELS\MAP_DOCS\DRAFT\EXHIBITS\WPAP_PROJECTLOCATION.MXD - USER: DCOBURN - DATE: 7/21/2022

ROADWAY APPLICATION SECTION
TCEQ-20872
ATTACHMENT B: USGS QUADRANGLE

Van Raub

Boerne

FM3351

FM3351

Project Location

Bergheim

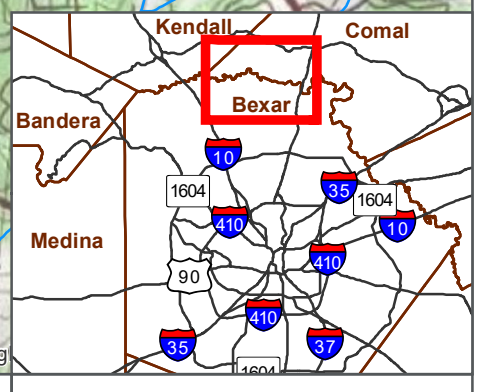
Camp Bullis

Cibolo Creek

Bulverde

Anhalt

USGS
08184000



0 5,000 10,000
FEET

LEGEND

- Stream Centerline
- Bridge Structure
- Counties
- Flow Arrow
- USGS Stream Gages
- USGS Quad

DATA SOURCES: TxDOT, TNRIS, FEMA, USGS, ESRI

DISCLAIMER: Topographic map information was compiled from the best available sources. No warranty is made for the accuracy or completeness.

FM 3351
BRIDGE REPLACEMENT
AT CIBOLO CREEK
(CSJ 3212-05-013)

USGS QUADRANGLE

SEPTEMBER 2023

ATTACHMENT B

PATH: P:\3284_TXDOT\10329784\07_GIS_MODELS\MAP_DOCS\DRAFT\EXHIBITS\WPAP_USGS_QUAD.MXD - USER: DCOBURN - DATE: 7/21/2022

ROADWAY APPLICATION SECTION

TCEQ-20872

ATTACHMENT G: CONSTRUCTION PLANS (FM 3351 AT CIBOLO CREEK PLAN SET)

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	STP 2024(729)MM		1
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	COMAL	
CONT.	SECT.	JOB	HIGHWAY NO.
3212	05	013	FM 3351

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
PROJECT NO. STP 2024(729)MM
CSJ: 3212-05-013

COMAL COUNTY
FM 3351

LIMITS AT CIBOLO CREEK

NET LENGTH OF ROADWAY = 1,625.00 FT = 0.308 MI
NET LENGTH OF BRIDGE = 950.00 FT = 0.180 MI
NET LENGTH OF PROJECT = 2,575.00 FT = 0.488 MI

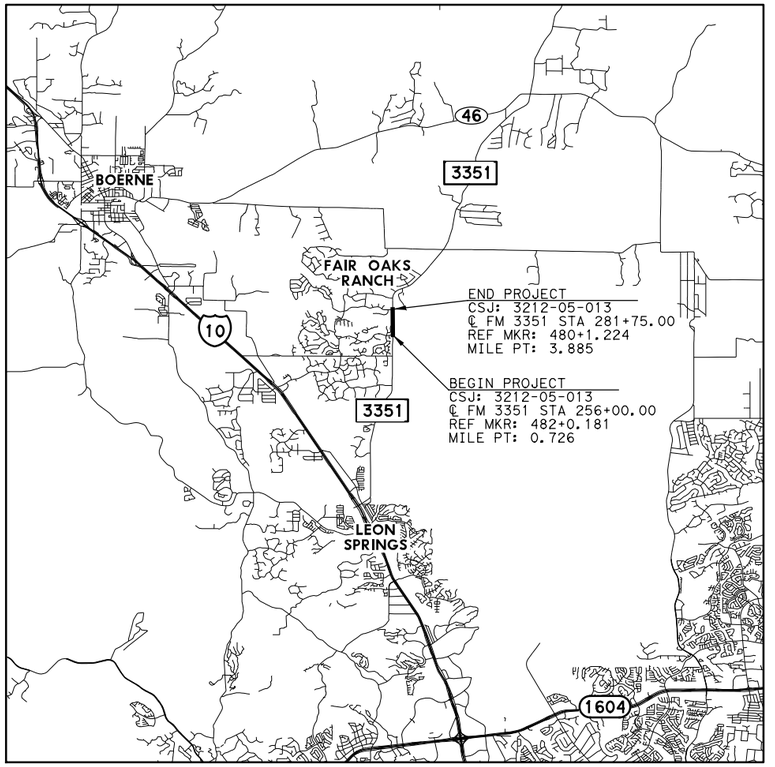
CONSISTING OF RECONSTRUCT EXISTING BRIDGE AT CIBOLO CREEK AND CONSTRUCT CENTER TWO WAY LEFT TURN LANE, SIDEWALKS, AND SHARED USE PATH

INDEX OF SHEETS

SEE SHEET 2-3 FOR INDEX OF SHEETS

FUNCTIONAL CLASS: SUBURBAN MINOR ARTERIAL
DESIGN SPEED = 50 MPH
BIKE PATH DESIGN SPEED = 15 MPH
AREA OF DISTURBED SOIL = 5.11 ACRES
A.D.T. (2024): 11,000
A.D.T. (2044): 16,300
A.D.T. (2054): 18,300
ACCESSIBILITY STANDARDS = PROWAG

REGISTERED ACCESSIBILITY SPECIALIST INSPECTION REQUIRED
TDLR NO.



NOT TO SCALE

EXCEPTIONS: NONE
RAILROAD: NONE
EQUATIONS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023)

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS.

_____ P.E. _____
AREA ENGINEER DATE

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING _____
TRANSPORTATION ENGINEER SUPERVISOR

RECOMMENDED FOR LETTING _____
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

REVIEWED FOR LETTING _____
TRANSPORTATION ENGINEER SUPERVISOR

APPROVED FOR LETTING _____
DISTRICT ENGINEER

LEVELS DISPLAYED
1

COUNTY COMAL PROJ. NO. STP 2024(729)MM
HWY. NO. FM 3351 LETTING DATE
DATE ACCEPTED

I. GENERAL

	1			TITLE SHEET
2	-	3		FM 3351 AT CIBOLO CREEK INDEX OF SHEETS
	4			FM 3351 AT CIBOLO CREEK PROJECT LAYOUT
	5			GENERAL NOTES
	6			ESTIMATE & QUANTITY
7	-	10		FM 3351 AT CIBOLO CREEK TYPICAL SECTIONS
11	-	13		FM 3351 AT CIBOLO CREEK QUANTITY SUMMARIES
14	-	15		SUMMARY OF SMALL SIGNS

II. TRAFFIC CONTROL PLAN ITEMS

	16			FM 3351 AT CIBOLO CREEK TCP NARRATIVE
	17			FM 3351 AT CIBOLO CREEK ADVANCE WARNING LAYOUT
	18			FM 3351 AT CIBOLO CREEK CHURCH SIGN DETAILS
	19			FM 3351 AT CIBOLO CREEK TCP PHASE 1 TYPICAL SECTIONS
19A	-	19B		FM 3351 AT CIBOLO CREEK TCP PHASE 1
	20			FM 3351 AT CIBOLO CREEK TCP PHASE 2 TYPICAL SECTIONS
21	-	22		FM 3351 AT CIBOLO CREEK TCP PHASE 2
23	-	26		FM 3351 AT CIBOLO CREEK TCP PHASE 2 DRIVEWAY DETOUR PLAN AND PROFILE
	27			FM 3351 AT CIBOLO CREEK TCP PHASE 3 TYPICAL SECTIONS
28	-	29		FM 3351 AT CIBOLO CREEK TCP PHASE 3
30	-	31		FM 3351 AT CIBOLO CREEK TCP PHASE 3 TEMPORARY RETAINING WALL PLAN AND PROFILE RW01
32	-	33		FM 3351 AT CIBOLO CREEK TCP PHASE 3 TEMPORARY RETAINING WALL PLAN AND PROFILE RW02
	34			FM 3351 AT CIBOLO CREEK TCP PHASE 3 TEMPORARY RETAINING WALL PLAN AND PROFILE RW03
	35			FM 3351 AT CIBOLO CREEK TCP PHASE 3 TEMPORARY RETAINING WALL PLAN AND PROFILE RW04
	36			FM 3351 AT CIBOLO CREEK TCP PHASE 4 TYPICAL SECTIONS
37	-	38		FM 3351 AT CIBOLO CREEK TCP PHASE 4
	39			FM 3351 AT CIBOLO CREEK TCP PHASE 4 CHURCH PARKING DETOUR LAYOUT
	40			FM 3351 AT CIBOLO CREEK TCP PHASE 5 TYPICAL SECTIONS
41	-	42		FM 3351 AT CIBOLO CREEK TCP PHASE 5
				TXDOT STANDARDS
	43			RW(TEW)(MOD)
44	-	55	#	BC(1)-21 THRU BC(12)-21
	56		#	TCP(2-1)-18
	57		#	TCP(2-3)-23
	58		#	TCP(2-5)-18
	59		#	TCP(3-1)-13
	60		#	TCP(3-3)-14
	61		#	TCP(7-1)-13
	62		#	WZ(TD)-17
	63		#	WZ(STPM)-23
	64		#	WZ(UL)-13
	65		#	WZ(RCD)-13
66	-	67	#	CSB(1)-10
	68		#	CSB(7)-10
69	-	70	#	LPCB-13
	71		#	ABSORB(M)-19
	72		#	SLED-19
	73			CRASH CUSHION SUMMARY SHEET
	74			TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA) SUMMARY SHEET

III. ROADWAY DETAILS

75	-	76		FM 3351 HORIZONTAL & VERTICAL CONTROL INDEX SHEET
	77			FM 3351 HORIZONTAL & VERTICAL CONTROL DETAIL SHEET
78	-	79		FM 3351 AT CIBOLO CREEK HORIZONTAL ALIGNMENT DATA & LAYOUT
80	-	81		FM 3351 AT CIBOLO CREEK REMOVAL LAYOUT
82	-	84		FM 3351 AT CIBOLO CREEK PLAN & PROFILE
85	-	86		FM 3351 AT CIBOLO CREEK GRADING PLAN
87	-	90		FM 3351 AT CIBOLO CREEK DRIVEWAY PLAN & PROFILE
91	-	94		FM 3351 AT CIBOLO CREEK SIDEWALK PLAN & PROFILE
				TXDOT STANDARDS
	95			MBTURNOUT (MOD)
	96		#	DRIVEWAY DETAILS (SAN ANTONIO DISTRICT STANDARD)
	97		#	GF(31)-19
	98		#	GF(31)-DAT-19
99	-	100	#	GF(31)TRT L3-20
	101		#	GF(31)MS-19
	102		#	BED-14
103	-	106	#	MB(1)-21 THRU MB(4)-21
107	-	110	#	PED-18
111	-	113	#	PRD-13
	114		#	TRF
	115		#	SGT(10S)31-16
	116		#	SGT(11S)31-18
	117		#	SGT(12S)31-18
	118		#	SGT(15)31-20
	119			OMITTED
120	-	121	#	SD-EBR

IV. RETAINING WALL DETAILS

OMITTED

V. DRAINAGE DETAILS

	122			FM 3351 AT CIBOLO CREEK DRAINAGE OVERALL DRAINAGE AREA MAP
	123			FM 3351 AT CIBOLO CREEK HYDROLOGIC DATA SHEET
	124			FM 3351 AT CIBOLO CREEK HYDRAULIC CALCULATION DATA SHEET 1 STRUCTURE
	125			FM 3351 AT CIBOLO CREEK HYDRAULIC CALCULATION DATA SHEET 2 STRUCTURE
126	-	127		FM 3351 AT CIBOLO CREEK EXISTING INTERNAL DRAINAGE AREA MAP
128	-	129		FM 3351 AT CIBOLO CREEK PROPOSED INTERNAL DRAINAGE AREA MAP
	130			FM 3351 AT CIBOLO CREEK INTERNAL HYDRAULIC SUMMARIES
131	-	132		FM 3351 AT CIBOLO CREEK DRAINAGE PLAN AND PROFILE
133	-	136		FM 3351 AT CIBOLO CREEK DITCH HORIZONTAL ALIGNMENT DATA
137	-	152		FM 3351 AT CIBOLO CREEK DITCH PLAN AND PROFILE
	153			FM 3351 AT CIBOLO CREEK MISCELLANEOUS DETAILS
				TXDOT STANDARDS
	154		###	PAZD
	155		###	PJB
	156		###	PDD
	157		###	SETP-PD

VI. UTILITIES

158	-	159		FM 3351 AT CIBOLO CREEK UTILITY LAYOUT
	160			FAIR OAKS RANCH WATER WELL REPLACEMENT PROJECT COVER
	161			GENERAL NOTES
162	-	164		FM 3351 PLAN WATER WELL LINE
	165			WATER DETAILS

VII. BRIDGES

166	-	168		FM 3351 AT CIBOLO CREEK BRIDGE LAYOUT
	169			FM 3351 AT CIBOLO CREEK TRANSVERSE SECTIONS
	170			FM 3351 AT CIBOLO CREEK BORE LOGS
	171			FM 3351 AT CIBOLO CREEK ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS
172	-	173		FM 3351 AT CIBOLO CREEK ABUTMENT NOS. 1 & 9
174	-	175		FM 3351 AT CIBOLO CREEK INTERIOR BENT NOS. 2-8
176	-	178		FM 3351 AT CIBOLO CREEK FRAMING PLAN
	179			FM 3351 AT CIBOLO CREEK 225.00' PRESTRESSED CONCRETE GIRDER UNIT
	180			FM 3351 AT CIBOLO CREEK 375.00' PRESTRESSED CONCRETE GIRDER UNIT
	181			FM 3351 AT CIBOLO CREEK 350.00' PRESTRESSED CONCRETE GIRDER UNIT
	182			FM 3351 AT CIBOLO CREEK AESTHETIC DETAILS
				TXDOT STANDARDS
	183		##	IGND
	184		##	BAS-A (MOD)
185	-	189	##	TYPE C223 (MOD)
190	-	191	##	TYPE PR11 (MOD)
	192		##	BRIDGE NBI NUMBER STENCIL (SAN ANTONIO DISTRICT STANDARD)
	193		##	BS-EJCP
194	-	195	##	CSAB
196	-	197	##	FD
198	-	199	##	IGD
200	-	202	##	IGEB
203	-	204	##	IGFRP
205	-	206	##	IGMS
	207		##	IGSK
	208		##	IGTS
209	-	210	##	MEBR(C)
211	-	214	##	PCP
	215		##	PCP-FAB
216	-	217	##	PMDF
	218		##	SEJ-M
219	-	220	##	SRR

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Cassie Wallof , P.E. 11/14/2023

SIGNATURE OF LICENSED DATE

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

, P.E. 11/14/2023

SIGNATURE OF LICENSED DATE

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

, P.E. 11/14/2023

SIGNATURE OF LICENSED DATE

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
INDEX OF SHEETS

N. T. S. SHEET 1 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	2

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User Name: CWALLOF

VIII. TRAFFIC ITEMS -SIGNALS

OMITTED

IX. TRAFFIC ITEMS - ILLUMINATION

OMITTED

X. TRAFFIC ITEMS - SIGNING AND MARKING

221	-	222		FM 3351 AT CIBOLO CREEK SIGNING & STRIPING LAYOUT
	223			FM 3351 AT CIBOLO CREEK SIGN DETAILS
				TXDOT STANDARDS
	224		$$	TSR(3)-13
	225		$$	TSR(4)-13
226	-	230	$$	D & OM(1)-20 THRU D & OM(5)-20
	231		$$	D & OM(VIA)-20
232	-	236	$$	PM(1)-22 THRU PM(5)-22
237	-	238	$$	TWLTL(1)-22 THRU TWLTL(2)-22 (SAN ANTONIO DISTRICT STANDARD)
	239		$$	TWLTL(6)-22 (SAN ANTONIO DISTRICT STANDARD)
	240		$$	SMD(GEN)-08
241	-	243	$$	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
	244		$$	SMD(TWT)-08

XI. TRAFFIC ITEMS - ITS

OMITTED

XII. ENVIRONMENTAL ITEMS

245	-	246		TXDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)
247	-	248		FM 3351 AT CIBOLO CREEK SW3P LAYOUT
249	-	250		ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
	251			FM 3351 AT CIBOLO CREEK TCEQ WPAP GENERAL CONSTRUCTION NOTES
252	-	258		FM 3351 AT CIBOLO CREEK WATER POLLUTION ABATEMENT PLAN CALCULATIONS
	259			FM 3351 AT CIBOLO CREEK WPAP IMPERVIOUS AREAS EXISTING/PROPOSED
				TXDOT STANDARDS
260	-	262	###	EC(1)-16 THRU EC(3)-16
263	-	265	###	EC(9)-16

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

SIGNATURE OF LICENSED , P.E. DATE 12/14/2023

STATE OF TEXAS
MANUEL ZUVIA III
105231
LICENSED
PROFESSIONAL ENGINEER

$$ THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

SIGNATURE OF LICENSED , P.E. DATE 12/14/2023

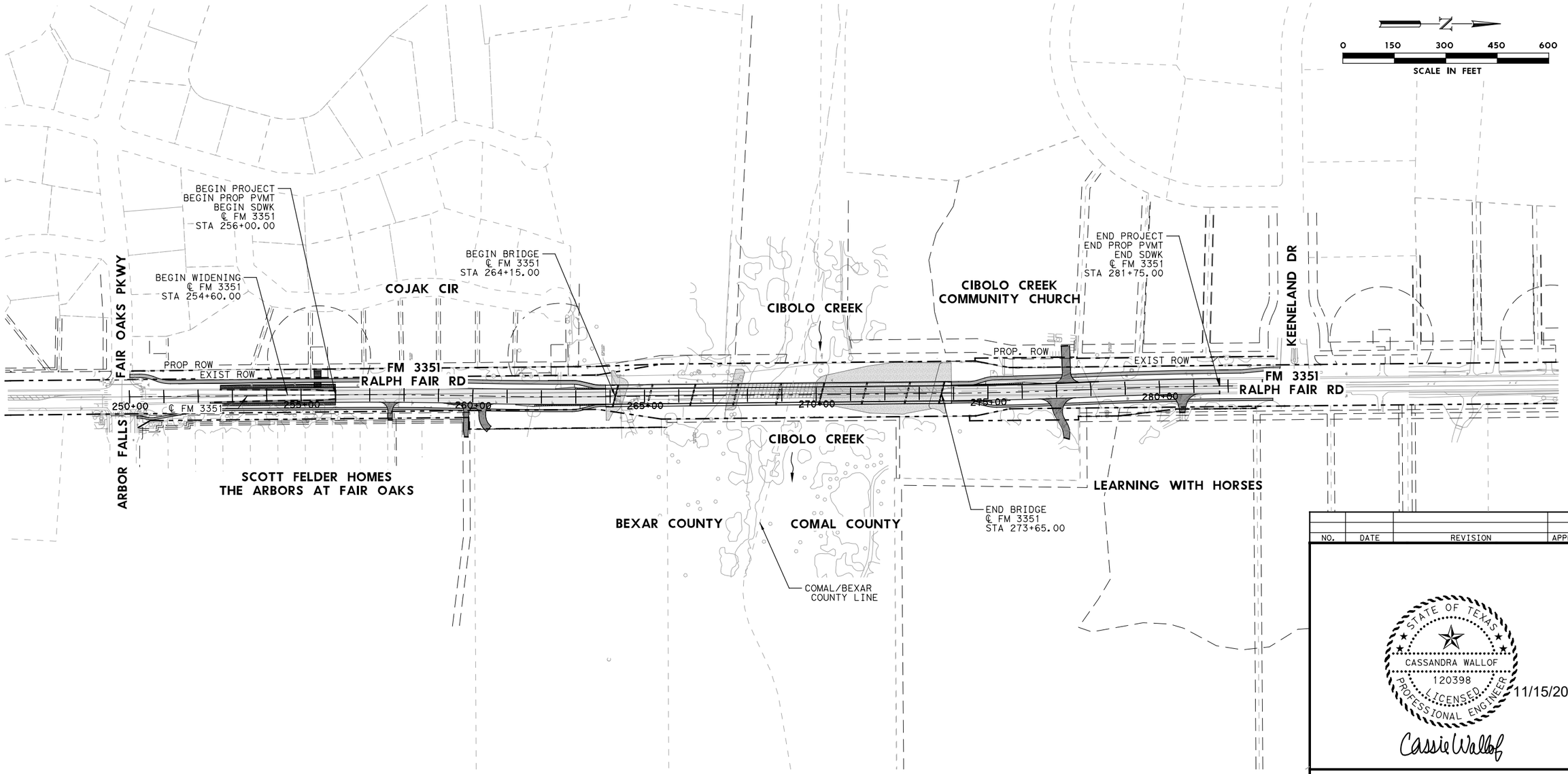
HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
INDEX OF SHEETS

N. T. S. SHEET 2 OF 2

DSN: CJW	STATE	FED RD. DIV. NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	3



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
PROJECT LAYOUT

SCALE: 1"=300'

SHEET 1 OF 1

DSN: CW	STATE	FED RD. DIV. NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	4

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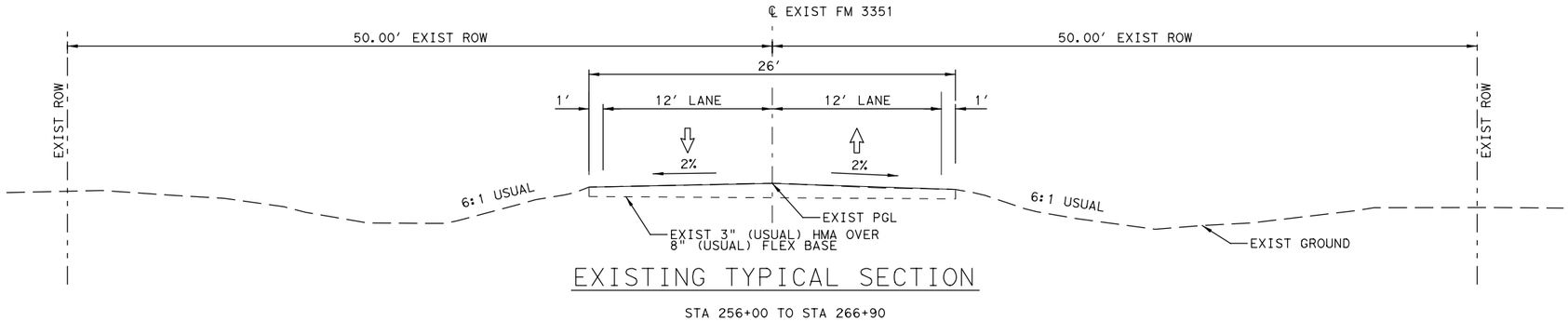
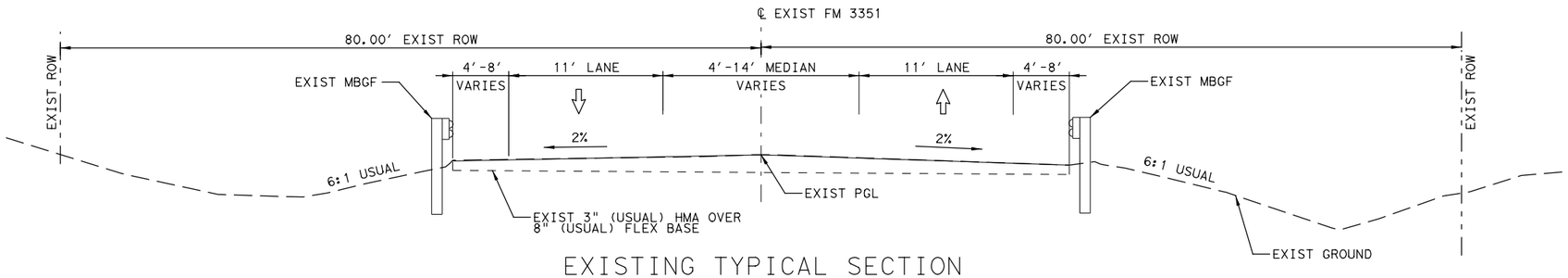
GENERAL NOTES

QUANTITY AND ESTIMATE



EXISTING TYPICAL SECTION

STA 256+00 TO STA 266+90



EXISTING TYPICAL SECTION

STA 266+90 TO STA 267+75
STA 269+96 TO STA 272+00

LEGEND

➡ PROP TRAFFIC LANE

⇨ EXIST TRAFFIC LANE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TYPICAL SECTIONS

SHEET 1 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	7

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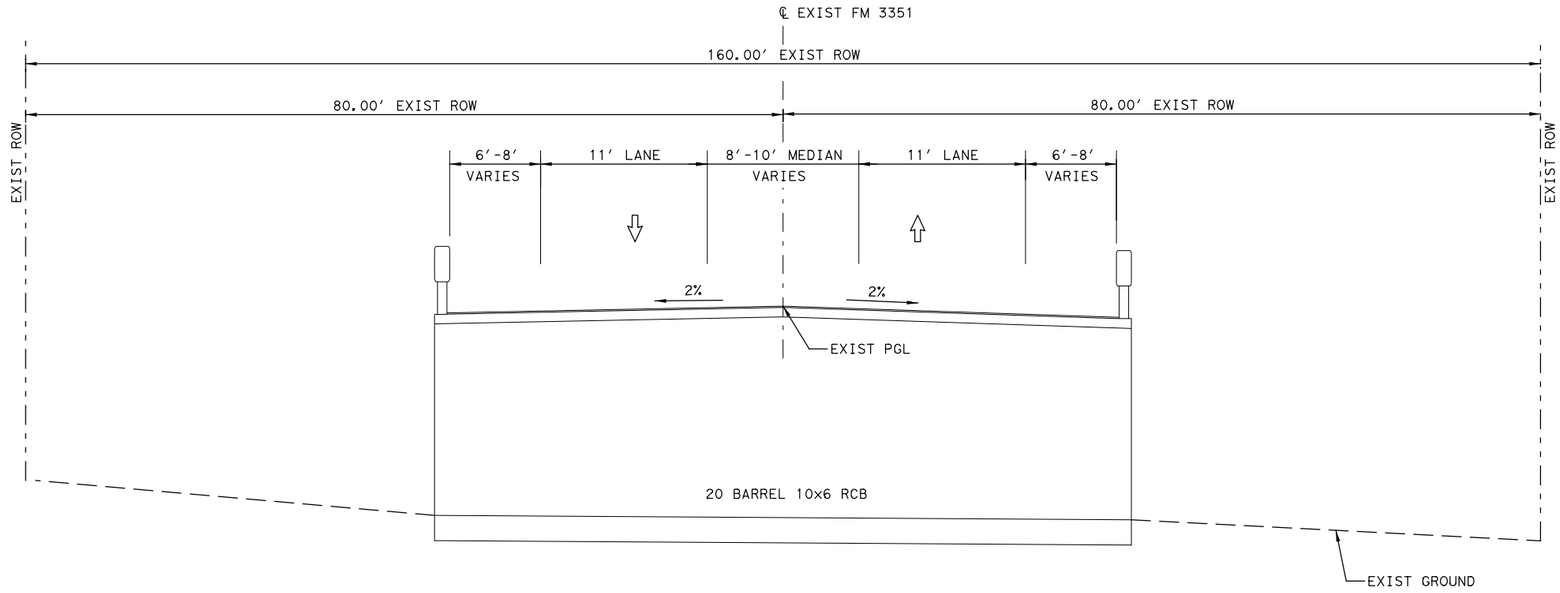
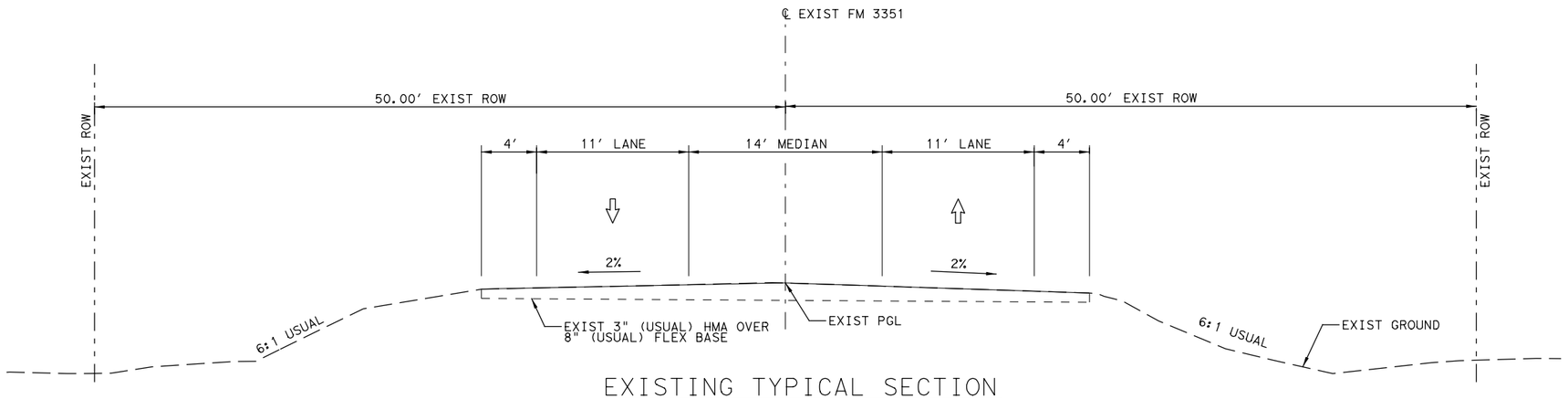


EXISTING TYPICAL SECTION

STA 267+75 TO STA 269+96
BRIDGE CLASS STRUCTURE
AT CIBOLO CREEK



EXISTING TYPICAL SECTION

STA 272+00 TO STA 281+75

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TYPICAL SECTIONS

SHEET 2 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	8

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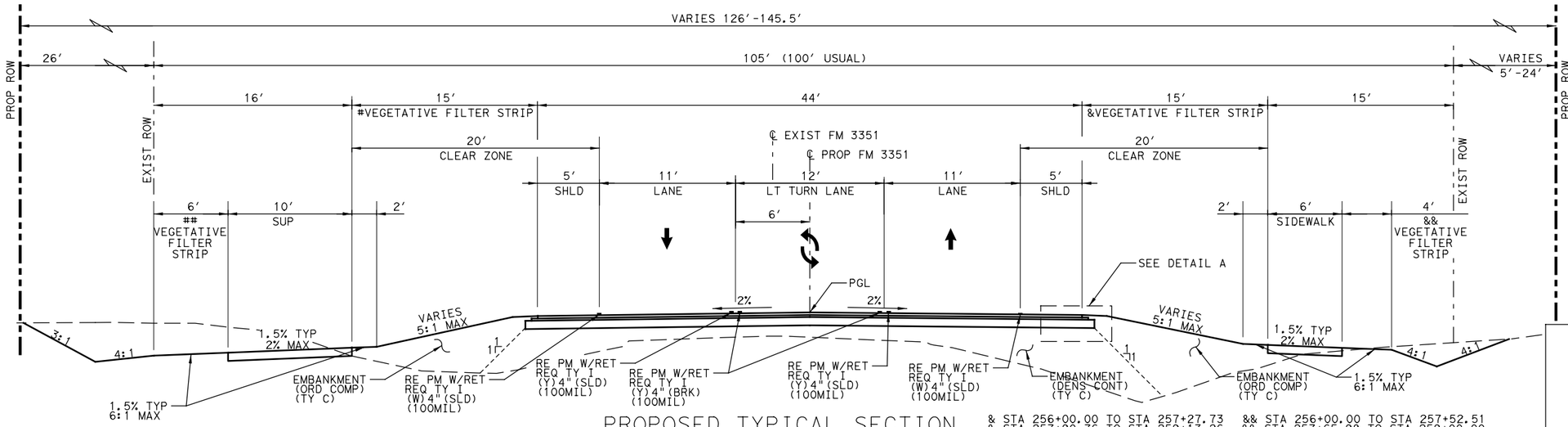


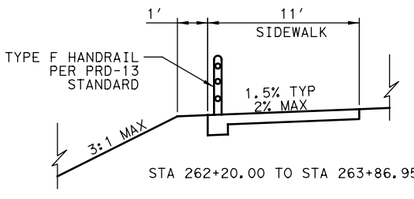
PROPOSED TYPICAL SECTION

STA 256+00.00 TO STA 261+50.00
STA 250+45.67 TO STA 261+25.50
STA 276+00.35 TO STA 277+00.00
STA 256+00.00 TO STA 262+41.35
STA 276+56.64 TO STA 276+88.90
STA 279+50.00 TO STA 281+75.00

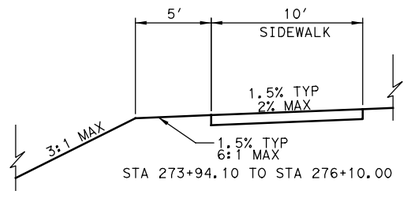
STA 256+00.00 TO STA 262+55.70
STA 276+00.35 TO STA 281+75.00

& STA 256+00.00 TO STA 257+27.73
& STA 257+90.76 TO STA 259+13.26
& STA 260+63.34 TO STA 261+25.50
& STA 275+64.41 TO STA 276+47.92
& STA 277+55.01 TO STA 279+82.67
& STA 281+16.49 TO STA 281+75.00

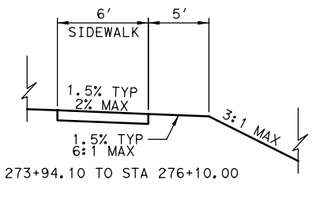
&& STA 256+00.00 TO STA 257+52.51
&& STA 257+65.98 TO STA 259+00.00
&& STA 260+50.00 TO STA 262+55.70
&& STA 276+00.35 TO STA 276+82.35
&& STA 277+19.98 TO STA 280+50.35
&& STA 280+81.12 TO STA 281+00.00



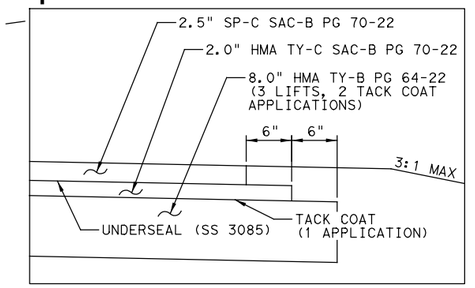
STA 262+20.00 TO STA 263+86.95



STA 273+94.10 TO STA 276+10.00



STA 273+94.10 TO STA 276+10.00



DETAIL A

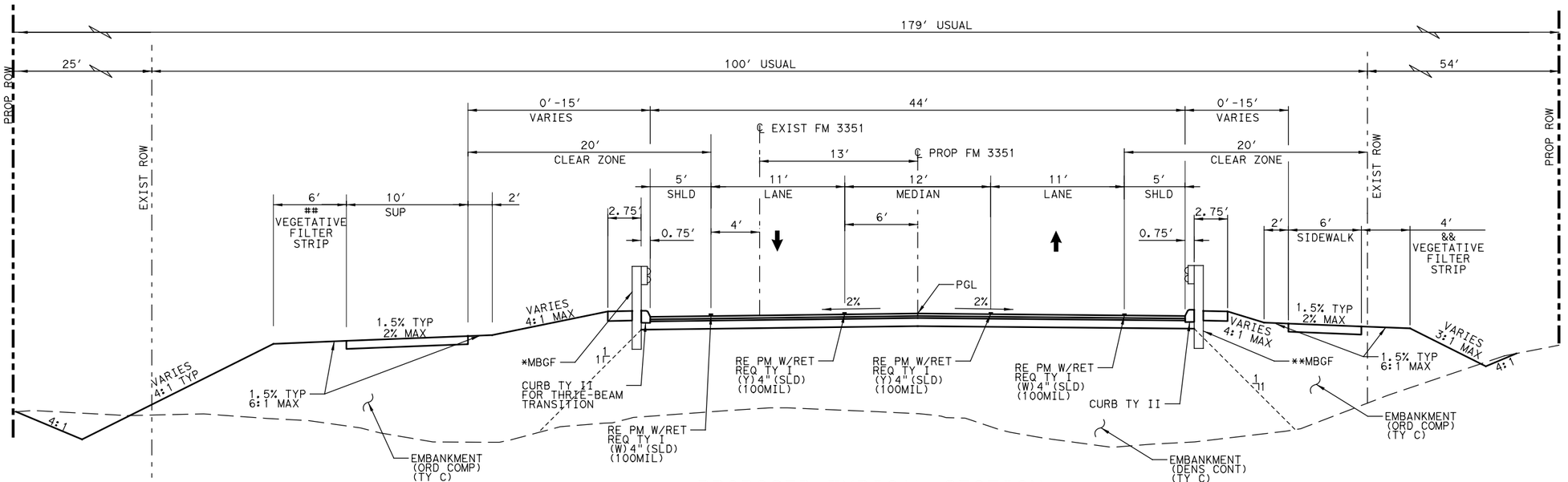
N.T.S.

NOTE: PROOF ROLL EXPOSED SUBGRADE, TACK COAT BETWEEN LIFTS OF HMA

LEGEND

PROP TRAFFIC LANE

EXIST TRAFFIC LANE



PROPOSED TYPICAL SECTION

STA 274+44.10 TO STA 276+00.35

* STA 262+55.70 TO STA 263+36.95
STA 274+44.10 TO STA 276+00.35

STA 262+55.70 TO STA 263+36.95
STA 274+44.10 TO STA 276+00.35

** STA 261+80.70 TO STA 263+36.95
** STA 274+44.10 TO STA 275+25.35

&& STA 262+55.70 TO STA 263+36.95
&& STA 274+44.10 TO STA 276+00.35

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

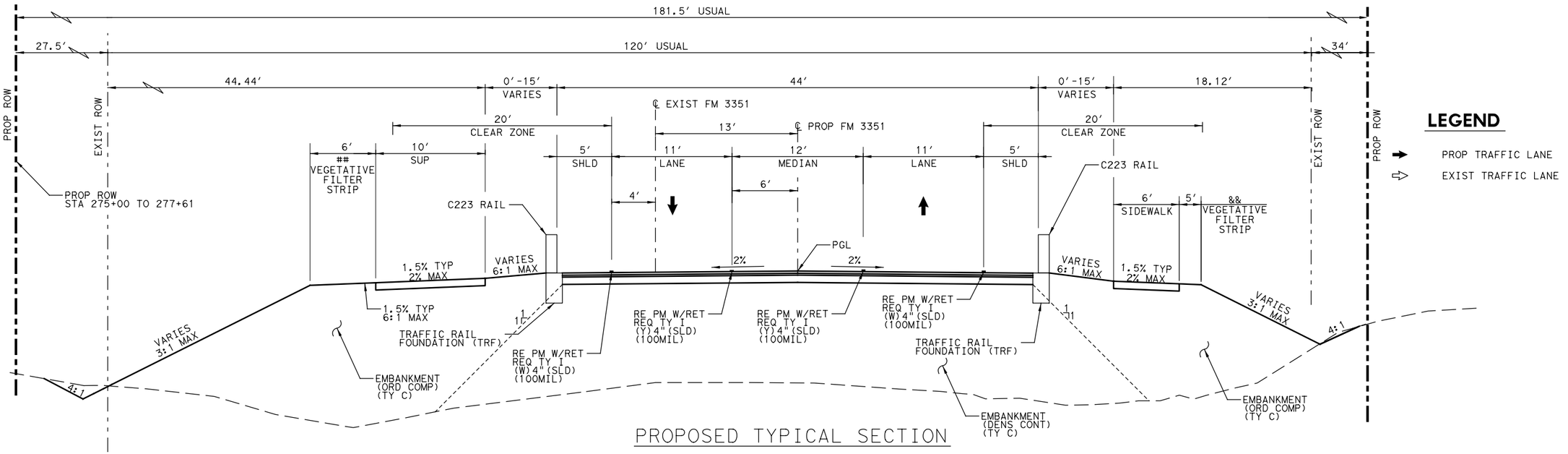
Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TYPICAL SECTIONS

SHEET 3 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	9

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 2:57:47 PM
File Name: FM3351PS03.DGN
User Name: CWALLOF

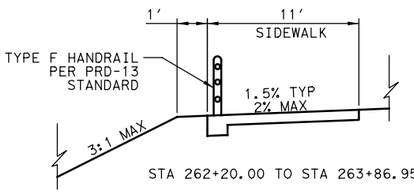


PROPOSED TYPICAL SECTION

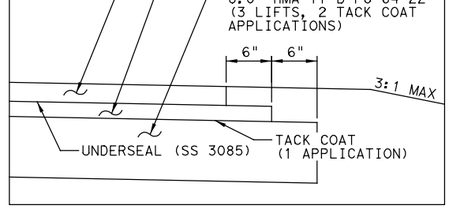
STA 274+00.00 TO STA 274+44.10

STA 263+36.95 TO STA 263+86.95
STA 273+94.10 TO STA 274+44.10
(APPROACH SLAB STA 263+86.95 TO STA 264+15.00)
(PROP BRIDGE STA 264+15.00 TO STA 273+65.00)
(APPROACH SLAB STA 273+65.00 TO STA 273+94.10)

&& STA 263+36.95 TO STA 263+50.00
&& STA 274+00.00 TO STA 274+44.10



STA 262+20.00 TO STA 263+86.95



DETAIL A

N.T.S.
NOTE: PROOF ROLL EXPOSED SUBGRADE, TACK COAT BETWEEN LIFTS OF HMA

LEGEND

PROP TRAFFIC LANE
EXIST TRAFFIC LANE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

HDR Engineering Inc.
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Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TYPICAL SECTIONS

SHEET 4 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	10

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 2:57:49 PM
File Name: FM3351PS04.DGN
User Name: CWALLOF

	SUMMARY OF TRAFFIC CONTROL ITEMS														
STATION LIMITS	ITEM 106 6001	ITEM 354 6021	ITEM 423 6003	ITEM 502 6001	ITEM 508 6001	ITEM 512 6005	ITEM 512 6029	ITEM 512 6041	ITEM 512 6053	ITEM 512 6009	ITEM 512 6010	ITEM 512 6057	ITEM 512 6058	ITEM 545 6003	ITEM 545 6004
	OBLITERATING ABANDONED ROAD	PLANE ASPH CONC PAV(0" TO 2")	RETAINING WALL (TEMP WALL)	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	PORT CTB (MOVE)(F-SHAPE)(TY 1)	PORT CTB (STKPL)(F-SHAPE)(TY 1)	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	PORT CTB (REMOVE)(LOW PROF)(TY 1)	PORT CTB (REMOVE)(LOW PROF)(TY 2)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (STKPL)
	STA	SY	SF	MO	SY	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA
PHASE 1															
BEGIN TO STA 268+00				3		1250									
STA 268+00 TO END						850									
PHASE 2															
BEGIN TO STA 268+00		142		1	3256		1050	200						2	
STA 268+00 TO END		232			1988			850							2
PHASE 3															
BEGIN TO STA 268+00		93	5060	9	859		1260			80	40	80	40	1	
STA 268+00 TO END		86	6715		1344	360	840			260	40	260	40	1	
PHASE 4															
BEGIN TO STA 268+00	12			13		750	1260							1	
STA 268+00 TO END	13.75					990	1200							3	
PHASE 5															
BEGIN TO STA 268+00				7			600		2010					1	
STA 268+00 TO END							720		2190					1	
PROJECT TOTALS	25.75	553	11775	33	7447	4200	6930	1050	4200	340	80	340	80	10	2

	SUMMARY OF TRAFFIC CONTROL ITEMS (CONT.)												
STATION LIMITS	ITEM 545 6005	ITEM 545 6019	ITEM 662 6002	ITEM 662 6004	ITEM 662 6033	ITEM 662 6034	ITEM 662 6038	ITEM 662 6109	ITEM 662 6110	ITEM 677 6001	ITEM 6001 6002	ITEM 6185 6002	ITEM 6185 6003
	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (Y)4"(DOT)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK NON-REMOV (Y)8"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY W	WK ZN PAV MRK SHT TERM (TAB)TY Y	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	EA	LF	LF	LF	LF	LF	EA	EA	LF	EA	DAY	HR
PHASE 1													
BEGIN TO STA 268+00		1		985		1910		50	96	2895			20
STA 268+00 TO END		3											
PHASE 2													
BEGIN TO STA 268+00				3170		3026		160	153	6196		10	20
STA 268+00 TO END			146	3167	143	3125		213	209	6581		10	
PHASE 3													
BEGIN TO STA 268+00			194	3617	194	3537	150	251	255	7542		210	20
STA 268+00 TO END			146	3504	288	3363		229	270	6867		210	
PHASE 4													
BEGIN TO STA 268+00		1		3586		3536	150	181	186	7122		266	20
STA 268+00 TO END		1	140	3826	296	3903		243	288	7934		266	
PHASE 5													
BEGIN TO STA 268+00	2			2400		2400		121	121	7122		126	40
STA 268+00 TO END	4			2750		2750		139	139	7934		126	
PROJECT TOTALS	6	6	626	27005	921	27550	300	1587	1717	60193	2	1224	120

		SUMMARY OF SW3P ITEMS									
SHEET NO.	STATION LIMITS	ITEM 160 6003	ITEM 164 6003	ITEM 164 6009	ITEM 164 6011	ITEM 168 6001	ITEM 169 6001	ITEM 506 6002	ITEM 506 6011	ITEM 506 6020	ITEM 506 6021
		FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM)(RURAL)(CLAY)	BROADCAST SEED (TEMP)(WARM)	BROADCAST SEED (TEMP)(COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1)(TY A)	ROCK FILTER DAMS (INSTALL)(TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL)(TY 1)	CONSTRUCTION EXITS (INSTALL)(TY 2)
		SY	SY	SY	SY	MG	SY	LF	LF	SY	SY
SHEET 1 OF 2	250+00.00 TO 269+00.00	13856	13856	6928	6928	648	13856	234	234	78	78
SHEET 2 OF 2	269+00.00 TO 284+00.00	8492	8492	4246	4246	396	8492	215	215	78	78
PROJECT TOTALS		22348	22348	11174	11174	1044	22348	449	449	156	156

		SUMMARY OF SW3P ITEMS				
SHEET NO.	STATION LIMITS	ITEM 506 6024	ITEM 506 6038	ITEM 506 6039	ITEM 506 6040	ITEM 506 6043
		CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL)(8")	BIODEG EROSN CONT LOGS (REMOVE)
		SY	LF	LF	LF	LF
SHEET 1 OF 2	250+00.00 TO 269+00.00	156	3139	3139	32	32
SHEET 2 OF 2	269+00.00 TO 284+00.00	156	3186	3186		
PROJECT TOTALS		312	6325	6325	32	32

SUMMARY OF MAINTENANCE ITEMS		
ITEM 730 6107	ITEM 734 6002	ITEM 735 6002
FULL - WIDTH MOWING	LITTER REMOVAL	DEBRIS REMOVAL (CNTR MEDIANS/MAINLANES)
CYC	CYC	MI
10	30	30

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FM 3351
AT CIBOLO CREEK
QUANTITY SUMMARIES

SHEET 1 OF 3

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	11

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:23:15 AM
File Name: FM3351QTY*DT-01.dgn
User Name: GARODRIGUE

SUMMARY OF REMOVAL ITEMS

SHEET NO.	STATION LIMITS	ITEM 104 6009	ITEM 104 6015	ITEM 104 6017	ITEM 104 6022	ITEM 104 6054	ITEM 105 6037	ITEM 105 6050	ITEM 496 6016	ITEM 542 6001	ITEM 542 6002	ITEM 544 6003	ITEM 690 6001
		REMOVING CONC (RIPRAP)	REMOVING CONC (SIDEWALKS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB AND GUTTER)	REMOVING CONCRETE (MOW STRIP)	REMOVING STAB BASE AND ASPH PAV (0"-16")	REMOV STAB BASE AND ASPH PAV (24")	REMOV STR (PIPE)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (REMOVE)	REMOVAL OF CONDUIT
		SY	SY	SY	LF	LF	SY	SY	EA	LF	EA	EA	LF
SHEET 1 OF 2	256+00.00 TO 276+00.00	75	27	69	95	490	618	6971	3	400	3	1	31
SHEET 2 OF 2	276+00.00 TO 281+75.00	40		54			343	2897	2				
PROJECT TOTALS		115	27	123	95	490	961	9868	5	400	3	1	31

SUMMARY OF ROADWAY ITEMS

SHEET NO.	STATION LIMITS	ITEM 100 6002	ITEM 105 6022	ITEM 110 6001	ITEM 110 6002	ITEM 132 6005	ITEM 132 6006	ITEM 132 6056	ITEM 216 6001	ITEM 354 6022	ITEM 420 6066	ITEM 432 6001	ITEM 432 6008
		PREPARING ROW	REMOVING STAB BASE AND ASPH PAV (13")	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	EMBANKMENT (FINAL) (ORD COMP) (TY C2) (DS) #	PROOF ROLLING	PLANE ASPH CONC PAV (0" TO 3")	CL C CONC (RAIL FOUNDATION)	RIPRAP (CONC) (4 IN)	RIPRAP (CONC) (CL B) (RR8&RR9)
		STA	SY	CY	CY	CY	CY	CY	HR	SY	CY	CY	CY
SHEET 1 OF 3	256+00.00 TO 261+50.00	6	639	1409		3078	2830	107	96	932			
SHEET 2 OF 3	261+50.00 TO 272+50.00	11		146	2717	5396	5292	126	31		16	6	5
SHEET 3 OF 3	272+50.00 TO 281+75.00	10		1347	669	11653	9992	406	100		23	5	4
PROJECT TOTALS		27	639	2902	3386	20127	18114	639	227	932	39	11	9

SEE RW(TEW)(MOD) FOR PLACEMENT

SUMMARY OF ROADWAY ITEMS (CONT.)

SHEET NO.	STATION LIMITS	ITEM 432 6045	ITEM 450 6067	ITEM 450 6052	ITEM 531 6002	ITEM 540 6002	ITEM 540 6006	ITEM 540 6016	ITEM 544 6001	ITEM 3076 6001	ITEM 3076 6025	ITEM 3076 6066	ITEM 3077 6023	ITEM 3085 6001
		RIPRAP (MOW STRIP) (4 IN)	RAIL (TY C223) (MOD)	RAIL (HANDRAIL) (TY F)	CONC SIDEWALKS (5")	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	D-GR HMA TY-B PG64-22	D-GR HMA TY-C SAC-B PG70-22	TACK COAT	SP MIXES SP-C SAC-B PG70-22	UNDERSEAL COURSE
		CY	LF	LF	SY	LF	EA	EA	EA	TON	TON	GAL	TON	GAL
SHEET 1 OF 3	256+00.00 TO 261+50.00	1		134	1995					1764	430	1152	546	759
SHEET 2 OF 3	261+50.00 TO 272+50.00	15	100	168	431	100	2	1	1	558	137	366	167	232
SHEET 3 OF 3	272+50.00 TO 281+75.00	14	150		1603	75	2	1	1	1836	450	1200	549	764
PROJECT TOTALS		30	250	302	4029	175	4	2	2	4158	1017	2718	1262	1755

SUMMARY OF DRIVEWAY ITEMS

SHEET NO.	ITEM 464 6003	ITEM 464 6005	ITEM 464 6018	ITEM 465 6158	ITEM 467 6358	ITEM 467 6389	ITEM 467 6391	ITEM 530 6008	ITEM 530 6021	ITEM 560 6004
	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL IV) (24 IN)	INLET (COMPL) (PAZD) (FG) (3FTX3FT-3FTX3FT)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (3: 1) (P)	SET (TY II) (24 IN) (RCP) (4: 1) (P)	TURNOUTS (ACP)	DRIVEWAYS (ACP) (TYPE 2)	MAILBOX INSTALL-S (TWG-POST) TY 2
	LF	LF	LF	EA	EA	EA	EA	SY	SY	EA
SHEET 1 OF 4		81	27	1		2	2	17	292	1
SHEET 2 OF 4									219	
SHEET 3 OF 4		53					2		383	
SHEET 4 OF 4	41	45			2	1	1	16	525	1
PROJECT TOTALS	41	179	27	1	2	3	5	33	1419	2

SUMMARY OF DRAINAGE ITEMS

SHEET NO.	ITEM 464 6003	ITEM 464 6005	ITEM 465 6006	ITEM 467 6357	ITEM 467 6395	ITEM 462 6212
	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	JCTBOX (COMPL) (PJB) (4FTX4FT)	SET (TY II) (18 IN) (RCP) (3: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	CONC BOX CULV (5FT X 0.5FT) (CIP)
	LF	LF	EA	EA	EA	LF
DRAINAGE PLAN AND PROFILE (1 OF 2)		185	1		1	
DRAINAGE PLAN AND PROFILE (2 OF 2)	236			2		
DITCH PLAN & PROFILE (3 OF 13)						10
DITCH PLAN & PROFILE (5 OF 13)						10
DITCH PLAN & PROFILE (9 OF 13)						6
DITCH PLAN & PROFILE (11 OF 13)						6
PROJECT TOTALS	236	185	1	2	1	32

ROADWAY APPLICATION RATES

ITEM	RATE	UNIT
D-GR HMA TY-B PG64-22	115	LB/SY/IN
D-GR HMA TY-C SAC-B PG70-22	115	LB/SY/IN
SP MIXES SP-C SAC-B PG70-22	115	LB/SY/IN
UNDERSEAL COURSE	0.2	GAL/SY
PROOF ROLLING	0.025	HR/SY
TACK COAT	0.1	GAL/SY

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FM 3351
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QUANTITY SUMMARIES

SHEET 2 OF 3

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	12

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:23:16 AM
File Name: FM3351QTY*DT-02.dgn
User Name: GARODRIGUE

SUMMARY OF SIGNING

LOCATION	644 6004 IN SM RD SN SUP&AM TY10BWG(1)SA(T) EA	644 6030 IN SM RD SN SUP&AM TYS80(1)SA(T) EA	644 6060 IN SM RD SN SUP&AM TYTWT(1)WS(P) EA	644 6061 IN SM RD SN SUP&AM TYTWT(1)WS(T) EA	644 6076 REMOVE SM RD SN SUP&AM EA	658 6014 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI) EA	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI) EA	658 6099 INSTL OM ASSM (OM-2Z)(WFLX)GND EA
FM 3351								
BEGIN PROJECT TO STA. 269+00.00	1	1	3	5	10	12	6	4
STA. 269+00.00 TO END PROJECT		1	1	4	8	12	6	
CSJ: 3212-05-013 TOTALS	1	2	4	9	18	24	12	12

SUMMARY OF STRIPING QUANTITIES

LOCATION	666 6036 REFL PAV MRK TY I (W)8"(SLD)(100MIL) LF	666 6156 REFL PAV MRK TY I(Y)(MED NOSE)(100MIL) EA	666 6225 PAVEMENT SEALER 6" LF	666 6226 PAVEMENT SEALER 8" LF	666 6230 PAVEMENT SEALER 24" LF	666 6231 PAVEMENT SEALER (ARROW) EA	666 6232 PAVEMENT SEALER (WORD) EA	666 6233 PAVEMENT SEALER (MED NOSE) EA	666 6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL) LF
FM 3351									
BEGIN PROJECT TO STA. 269+00.00	70	1	9745	70	96	1	1		3722
STA. 269+00.00 TO END PROJECT	324	5	11288	324		5	3	2	3952
CSJ: 3212-05-013 TOTALS	394	6	21033	394	96	6	4	2	7674

SUMMARY OF STRIPING QUANTITIES (CONT.)

LOCATION	666 6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL) LF	666 6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL) LF	668 6018 PREFAB PAV MRK TY B (W)(24")(SLD) LF	668 6077 PREFAB PAV MRK TY C (W) (ARROW) EA	668 6085 PREFAB PAV MRK TY C (W) (WORD) EA	672 6007 REFL PAV MRKR TY I-C EA	672 6009 REFL PAV MRKR TY II-A-A EA
FM 3351							
BEGIN PROJECT TO STA. 269+00.00	483	5540	96	1	1	4	151
STA. 269+00.00 TO END PROJECT	400	6936		5	3	17	327
CSJ: 3212-05-013 TOTALS	883	12476	96	6	4	21	478

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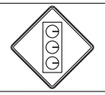
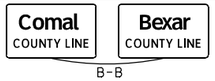
AT CIBOLO CREEK
QUANTITY SUMMARIES

DSN: IGA	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MZ	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: IGA	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: MZ	COMAL	SAT	3212	05	013	13

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (WXH)	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SHEET 10F2												
	①	R3-8 LK		36x36	X		TWT	1	WS	T		
	②	D1-1		VARX18	X		TWT	1	WS	T		
	③	W3-3		36X36	X		TWT	1	WS	T		
	④	R2-1		30X36	X		TWT	1	WS	P		
	⑤	W11-1		36X36	X		TWT	1	WS	T		
	⑥	D14-4T CW21-1aT	TOP BANK BOTTOM BANK   FOLDABLE SIGN	48X48 48X48	X		SCH 80	1	SA	T		
	⑦	W8-13aT		36x36	X		TWT	1	WS	T		
	⑧	M3-1 M1-6F		24X12 24x24	X		TWT	1	WS	P		
	⑨	I-2dT	 B-B	VARX36 VARX36	X		SCH 80	1	SA	T		
	⑩	I-3		VARX30	X		TWT	1	WS	P		
SHEET 20F2	⑪	I-3		VARX30	X		TWT	1	WS	P		
	⑫	D14-4T CW21-1aT	  FOLDABLE SIGN	48X48 48X48	X		SCH 80	1	SA	T		
	⑬	W2-2L	TOP BANK 	36x36	X		TWT	1	WS	T		
	⑭	W8-13aT	BOTTOM BANK 	36x36	X		TWT	1	WS	T		
	⑮	W2-2R		36x36	X		TWT	1	WS	T		

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.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE: 11/3/2023 3:26:15 PM
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SHEET 1 OF 2

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
4-16	DIST	COUNTY		SHEET NO.
8-16	SAT	COMAL		14

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SHEET 20F2	(16)	D1-1	← Keeneland Dr	VARX18	X		TWT	1	WS	T		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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FILE: $FILE$

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
4-16 8-16	DIST	COUNTY		SHEET NO.
	SAT	COMAL		15

TB

TRAFFIC CONTROL PLAN SEQUENCE OF WORK

(1) THIS PROJECT WILL BE CONSTRUCTED IN 5 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY 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.

(2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.

(3) 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.

(4) THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC" AND ITEM 502, "BARRICADES, SIGNS, AND TRAFFIC HANDLING", OF THE STANDARD SPECIFICATIONS, AND TO THE GENERAL NOTES

(5) CONTRACTOR IS NOT PERMITTED TO WORK IN AREAS WITH ONGOING UTILITY RELOCATION OR ROW ACQUISITION.

(6) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE 1

THE INTENT OF THIS PHASE IS TO RELOCATE THE JOINT BID UTILITIES. PHASES MAY PROCEED CONCURRENTLY WITH THIS PHASE.

1. MOBILIZATION
2. RELOCATE JOINT-BID UTILITIES. See UTILITY JOINT BID PLANS FOR LOCATIONS. USE TCP (2-1)-18 AS APPROVED BY THE ENGINEER.

PHASE 2

THE INTENT OF THIS PHASE IS TO CONSTRUCT TEMPORARY PAVEMENT WIDENING.

1. PLACE ADVANCE WARNING SIGNS, TEMPORARY SIGNS, BARRICADES, AND PAVEMENT MARKINGS AS SHOWN IN
2. THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
3. PREPARE ROW FOR ENTIRE PROJECT
   PLACE STORM WATER POLLUTION PREVENTION MEASURES ALONG CONSTRUCTION ZONE AS SHOWN ON SW3P LAYOUT SHEETS
4. UNDER MOBILE OPERATIONS, PLANE EXISTING PAVEMENT AS SHOWN ON PHASE 1 TYPICAL SECTION
5. INSTALL TEMPORARY BARRIER AS SHOWN ON PHASE 1 LAYOUT
6. CONSTRUCT CONSTRUCTION DETOUR PAVEMENT WIDENING
7. UNDER MOBILE OPERATIONS, OVERLAY EXISTING PAVEMENT AS SHOWN ON PHASE 1 TYPICAL SECTIONS
8. CONSTRUCT CONSTRUCTION DETOURS FOR DRIVEWAYS

PHASE 3

THE INTENT OF THIS PHASE IS TO MOVE TEMPORARY BARRIER AND SHIFT TRAFFIC AS SHOWN ON PHASE 2 LAYOUT ON EXISTING ROADWAY WHILE CONSTRUCTING PARTIAL PROPOSED PAVEMENT AND BRIDGE.

1. PLACE ADVANCE WARNING SIGNS, TEMPORARY SIGNS, BARRICADES, AND PAVEMENT MARKINGS AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
2. PLACE STORM WATER POLLUTION PREVENTION MEASURES ALONG CONSTRUCTION ZONE AS SHOWN ON SW3P LAYOUT SHEETS
3. INSTALL TEMPORARY BARRIER AS SHOWN ON PHASE 2 LAYOUT AND SHIFT TRAFFIC TO LEFT SIDE OF PROJECT
4 CONSTRUCT TEMPORARY RETAINING WALL
5. CONSTRUCT EAST SIDE OF PROPOSED BRIDGE DECK AND APPROACHES
6. INSTALL PERMANENT ASPHALT BASE AND TEMPORARY PAVEMENT
7. CONSTRUCT DRIVEWAYS NBDRV01 THROUGH NBDRV05
8. INSTALL TEMPORARY PAVEMENT MARKINGS FOR PHASE 3 TRAFFIC

PHASE 4

THE INTENT OF THIS PHASE IS TO SHIFT TRAFFIC ONTO PARTIALLY CONSTRUCTED PAVEMENT AND BRIDGE WHILE CONSTRUCTING REMAINING PAVEMENT AND BRIDGE.

1. PLACE DETOUR SIGNS, ADVANCE WARNING SIGNS, TEMPORARY SIGNS, BARRICADES, AND PAVEMENT MARKINGS AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
2. INSTALL TEMPORARY BARRIER AS SHOWN ON PHASE 3 LAYOUT AND SHIFT TRAFFIC TO LEFT SIDE OF PROJECT
3. SHIFT FM 3351 TRAFFIC ONTO CONSTRUCTED BRIDGE FROM PHASE 2
4. REMOVE EXISTING BRIDGE. MINIMUM OF 25 DAYS ADVANCE NOTICE IS REQUIRED BEFORE DEMOLITION OF STRUCTURE
5. CONSTRUCT REMAINING WEST SIDE OF BRIDGE DECK AND APPROACHES
6. INSTALL PROP BRIDGE RAILS
7. INSTALL PROP MBGF
8. REMOVE TEMPORARY PAVEMENT AND CONSTRUCT PERMANENT WIDENING
9. INSTALL REMAINING PERMANENT ASPHALT BASE
10. CONSTRUCT DRIVEWAY SBDRV01
11. INSTALL TEMPORARY PAVEMENT MARKINGS FOR PHASE 4 UNDER MOBILE OPERATIONS

PHASE 5

THE INTENT OF THIS PHASE IS TO SHIFT TRAFFIC ONTO CONSTRUCTED PAVEMENT AND BRIDGE WHILE CONSTRUCTING RAILS ON EAST SIDE OF BRIDGE, MBGF ON EAST APPROACH PAVEMENT, SIDEWALK AND FINAL GRADING. TRAFFIC WILL THEN BE SHIFTED ONTO PROPOSED ROADWAY WHILE CONSTRUCTING SURFACE COURSE AND INSTALLING PERMANENT STRIPING AND SIGNING UNDER TRAFFIC.

PHASE 5 STEP 1

1. PLACE ADVANCE WARNING SIGNS, TEMPORARY SIGNS, BARRICADES, AND PAVEMENT MARKINGS AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
2. MOVE BARRIER AND SHIFT TRAFFIC AS SHOWN ON PHASE 4 LAYOUT
3. REMOVE TEMPORARY PAVEMENT AND CONSTRUCT PERMANENT WIDENING
4. CONSTRUCT BRIDGE RAILS, TRAFFIC RAIL FOUNDATION, MBGF, MOW STRIP, SIDEWALK AND FINAL GRADING ON EAST SIDE
5. CONSTRUCT SIDEWALK AND FINAL GRADING ON WEST SIDE

PHASE 5 STEP 2

1. PLACE PERMANENT SIGNS & EROSION CONTROL MEASURES AS SHOWN IN PLANS
2. PERFORM SURFACE COURSE OVERLAY AND INSTALL PERMANENT PAVEMENT MARKINGS UNDER TRAFFIC. FLAGGERS WILL BE REQUIRED TO MAINTAIN TRAFFIC THROUGH THE SITE DURING THIS PHASE
3. REROUTE FM 3351 TRAFFIC ONTO PERMANENT LANES
4. REMOVE SW3P DEVICES
5. REMOVE BARRICADES AND ADVANCE WARNING SIGNS
6. PERFORM FINAL CLEANUP
7. PERFORM PUNCH LIST AND REMOVE ALL CONSTRUCTION DEVICES AND ITEMS

NOTES:

1. PROVIDE THE CIBOLO CREEK COMMUNITY CHURCH 60 DAYS NOTICE BEFORE TO DETOURING CHURCH TRAFFIC IN PHASE 4.
   CONTACT MS. JANINE SMITHIES AT JSMITHIES@CIBOLOCREEK.COM
2. COORDINATE WITH THE CIBOLO CREEK COMMUNITY CHURCH FOR WATER LINE INSTALLATION AT THE CHURCH'S DRIVEWAY. PROVIDE 14 DAYS NOTICE PRIOR TO CLOSURE. THE CHURCH'S DRIVEWAY MAY BE CLOSED MONDAY STARTING AT 9:00 AM AND SHALL BE RESTORED BY 9:00 PM ON FRIDAY.
3. PROVIDE NOTICE TO THE CITY OF FAIR OAKS RANCH 72 HOURS BEFORE MAJOR TRAFFIC SHIFTS.
   CONTACT MR. JULIO COLUNGA
   210-698-0900 EXT. 401
   JCOLUNGA@FAIROAKSRANCHTX.ORG

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP NARRATIVE

N. T. S. SHEET 1 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	16

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 15:13:15 PM
File Name: FM3351CU01.dgn
User Name: CWALLOF

TRAFFIC CONTROL DEVICES

LOCATION	G20-2 36" X 18"	G20-6T 48" X 30"	G20-1T 48" X 18"	G20-1aT 72" X 36"	G20-1bTR 72" X 24"	G20-1bTL 72" X 24"	G20-2bT 36" X 18"	CW3-5 36" X 36"	R2-1 24" X 30"	R20-3T 48" X 42"	G20-9TP 24" X 24"	R20-5T 24" X 30" R20-5aTP 24" X 12"	G20-5T 48" X 24"	G20-10T 60" X 48"	CW20-1D 36" X 36"	CW20-1A 36" X 36"	CW20-1B 36" X 36"	CW20-1C 36" X 36"	CW8-11 36" X 36"	CW3-4 36" X 36"
1		X			X	X		X	X	X	X	X	X	X	X					
2				X	X	X									X					
3	X						X													
4	X																			
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

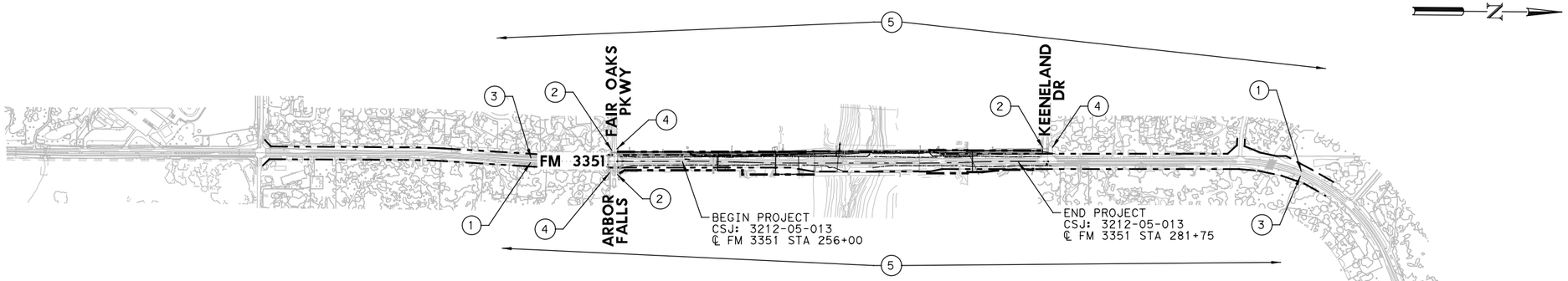
TRAFFIC CONTROL DEVICES CONT.

LOCATION	CW8-7 36" X 36"	CW21-4 36" X 36"	CW21-1T 48" X 48"	DIST PLAQUE	CW13-1P 24" X 24"	CW8-1 36" X 36"	CW28-1T 36" X 36"	CW21-5aR,L 36" X 36"	CW7-3aP 24" X 18"	CW20-8T 36" X 36"	CW5-2 36" X 36"	CW6-4 12" X 18"	ARROW BOARD	P.C.M.S.	BARRELS	PCTB	TYPE III	VP(F) IR,L	R1-2 36"X36"X36"	CW1-8(F)
1			X																	
2																				
3																				
4																				
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TRAFFIC CONTROL DEVICES CONT.

LOCATION	42" X 36"	CW16-6pR 24" X 18"	CW16-6pL 24" X 18"	CW21-10 36" X 36"
1				
2				
3				
4				
5	X	X	X	X

NOTES:
1. CERTAIN SIGNS MUST BE USED IN CONJUNCTION WITH OTHER SIGNS. EXAMPLE: "FLAGGER AHEAD" MUST HAVE A "BE PREPARED TO STOP".
2. BARRICADES AND WARNING SIGNS ON THIS SHEET ARE THE MINIMUM CONSTRUCTION ZONE, SIGNING, ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC. REQUIRED IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.
3. A DISTANCE PLAQUE IN FEET OR MILES MAY BE REQUIRED FOR USE IN CONJUNCTION WITH WARNING SIGNS.
4. IMPLEMENT DETOURS IN ACCORDANCE WITH THE TEXAS MUTCD. USE CHANGEABLE MESSAGE BOARDS TO GUIDE MOTORISTS THROUGH THE DETOUR.
5. UTILIZE EXPERIENCED FLAGGERS AT ALL TIMES.
6. TRUCK MOUNTED ATTENUATORS (TMA) WILL BE REQUIRED FOR THIS PROJECT.
7. MESSAGE BOARDS WILL BE REUIRE FOR THIS PROJECT. MESSAGE BOARDS WILL BE USED TO INFORM MOTORISTS OF CIBOLO COMMUNITY CHURCH DRIVEWAY CLOSURE AS WORK PROGRESSES IN ACCORDANCE WITH TCP SHEETS.
8. ALL ITEMS SHOWN ON THIS SHEET ARE SUBSIDIARY TO ITEM 502 UNLESS STATED ELSEWHERE IN THE PLANS.



GENERAL NOTES - BARRICADES:
LOCATION NO. 1 TRAFFIC CONTROL DEVICES TO BE USED AT BEGINNING OF THE PROJECT
LOCATION NO. 2 TRAFFIC CONTROL DEVICES TO BE USED AT ENTERING SIDE STREETS
LOCATION NO. 3 TRAFFIC CONTROL DEVICES TO BE USED AT THE END OF THE PROJECT
LOCATION NO. 4 TRAFFIC CONTROL DEVICES TO BE USED AT EXITING SIDE STREETS
LOCATION NO. 5 TRAFFIC CONTROL DEVICES TO BE USED THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK ADVANCE WARNING LAYOUT

SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	17

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PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:18 PM
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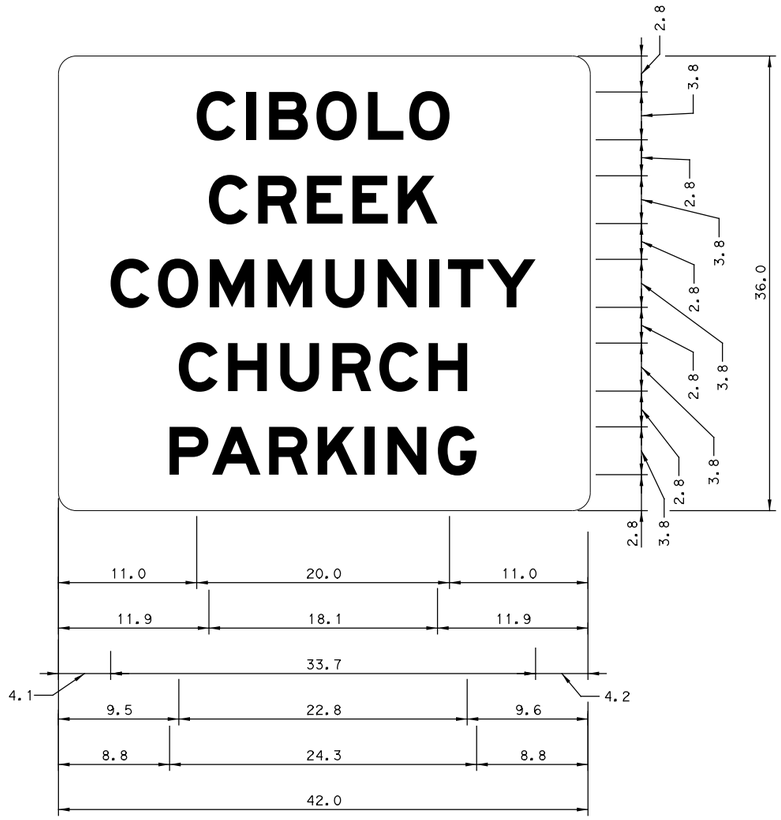
User Name:CWALLOF



1.2" Radius, 0.5" Border, Black on Orange;
"CIBOLO", C; "CREEK", C; "COMMUNITY", C;
"CHURCH" C; "PARKING", C;

NO.	DATE	REVISION	APPR BY

CASSANDRA WALLOF
120398
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PROFESSIONAL ENGINEER
STATE OF TEXAS
11/15/2023

HDR Engineering Inc.
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK TEMPORARY SIGN DETAILS

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: NSL	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: NSL	COMAL	SAT	3212	05	013	18

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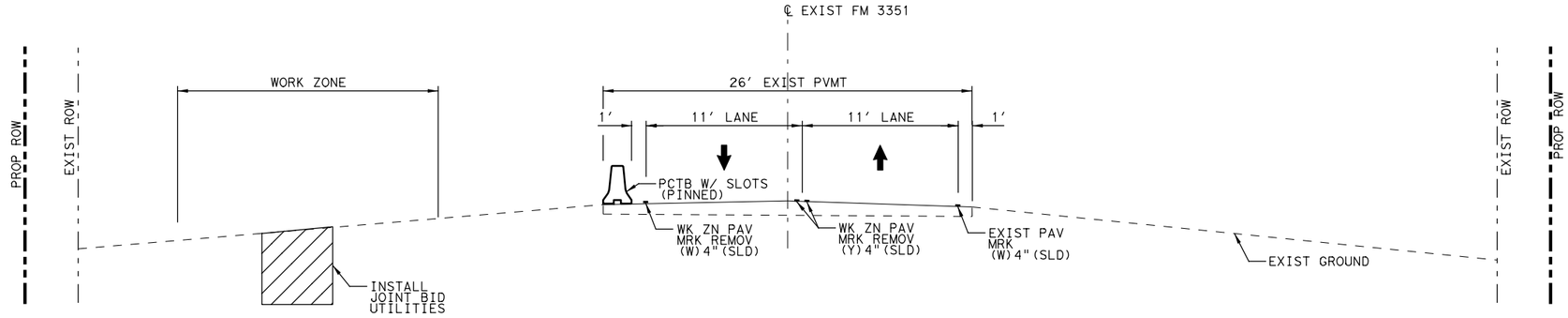
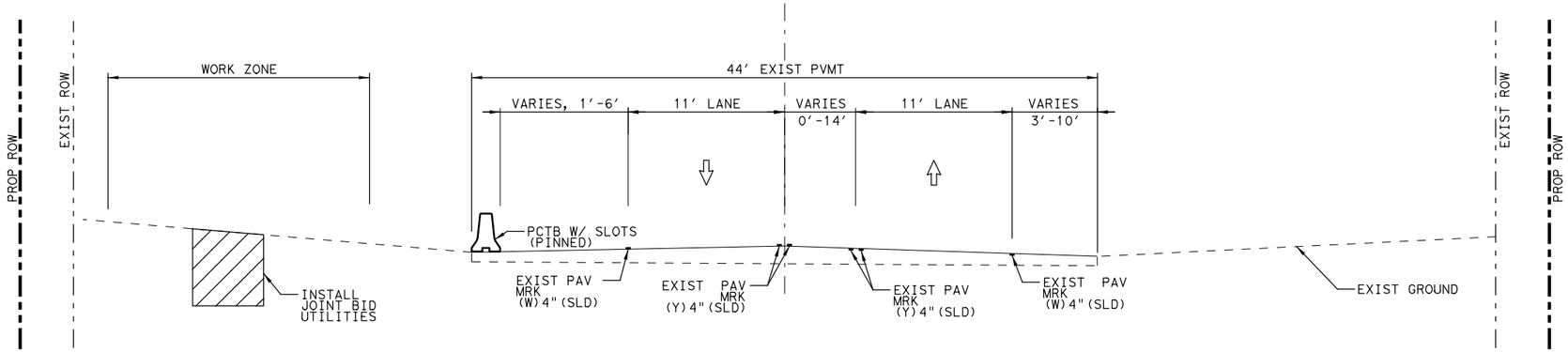


PHASE 1 TYPICAL SECTION

STA 255+37 TO STA 265+45



PHASE 1 TYPICAL SECTION

STA 265+45 TO STA 278+90

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP RETAINING WALL
- TEMP PAVEMENT
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE BRIDGE TRANSVERSE TYPICAL SECTIONS FOR PHASED TYPICAL SECTION ON THE BRIDGE.
2. SEE TCP LAYOUT SHEETS FOR LIMITS OF TEMPORARY PAVEMENT MARKINGS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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120398
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PROFESSIONAL ENGINEER
11/15/2023

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FM 3351
AT CIBOLO CREEK
TCP PHASE 1
TYPICAL SECTIONS

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	19

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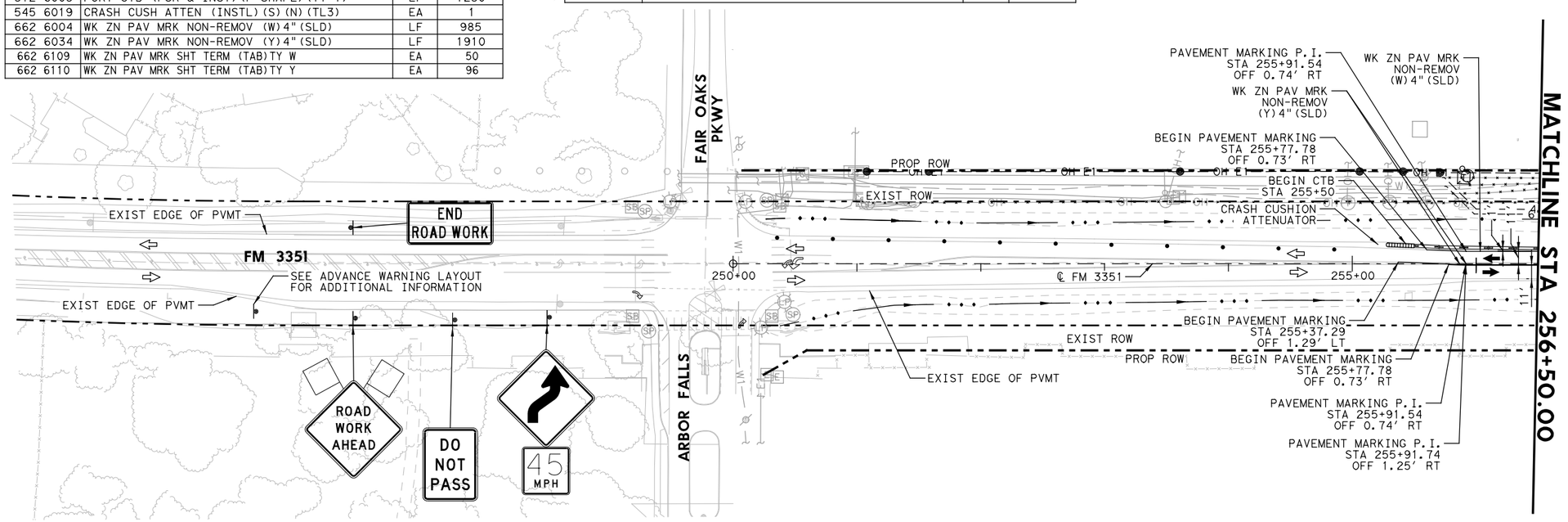
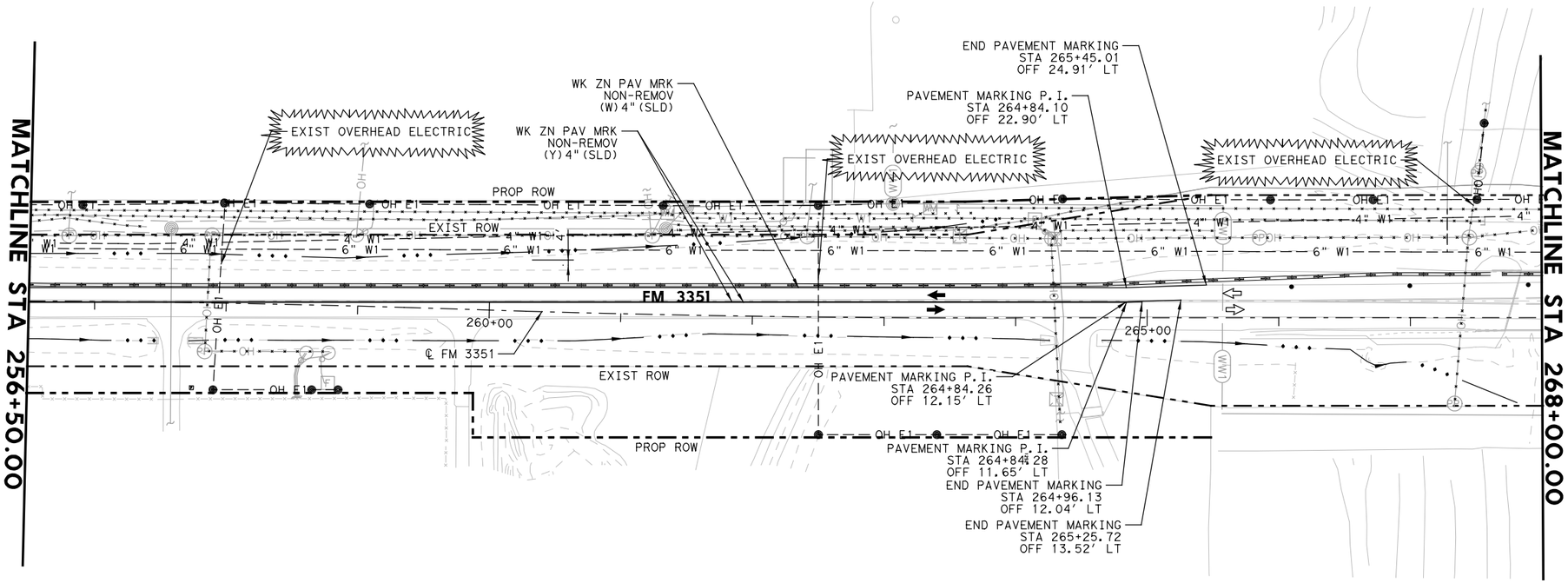
DATE: 11/15/2023
PLOTTING TIME: 5:13:22 PM
File Name:FM3351CS00.DGN
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3
512 6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	1250
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	985
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	1910
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	50
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	96

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	2895
6185 6003	TMA (MOBILE OPERATION)	HR	20





0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

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Dallas, TX 75248
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Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 1

BEGIN TO STA 268+00.00

SCALE: 1"=100' SHEET 1 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	19A

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PLOTTING TIME: 5:13:25 PM
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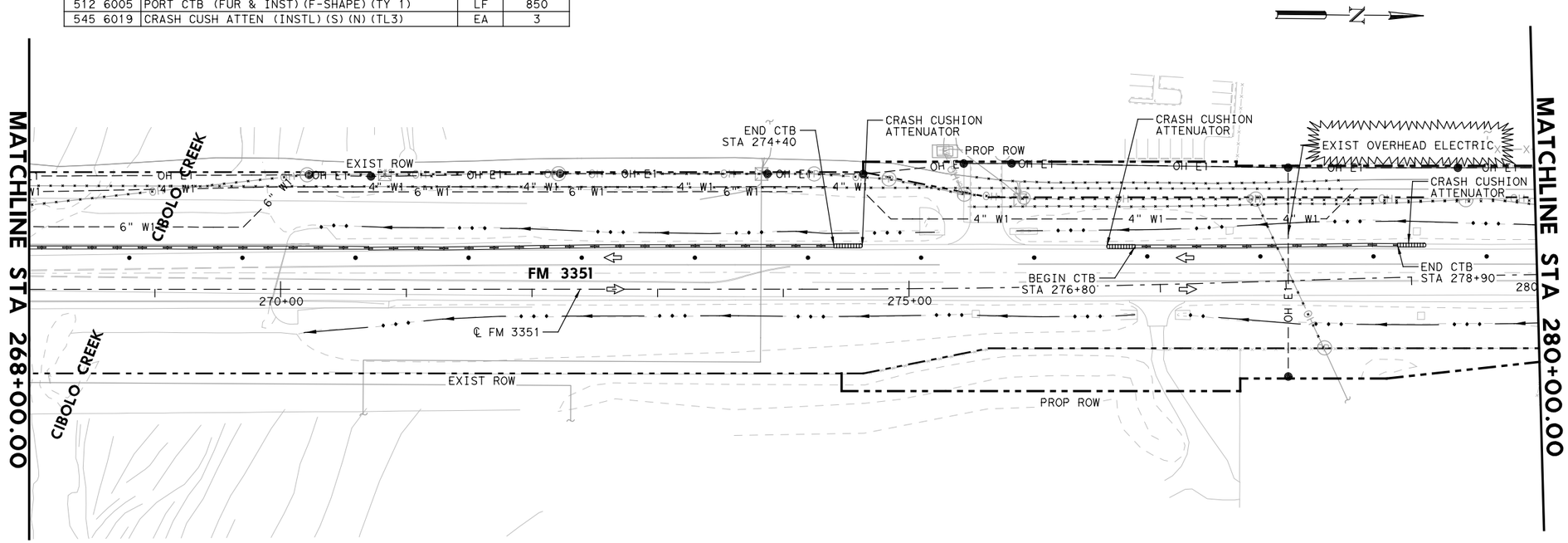
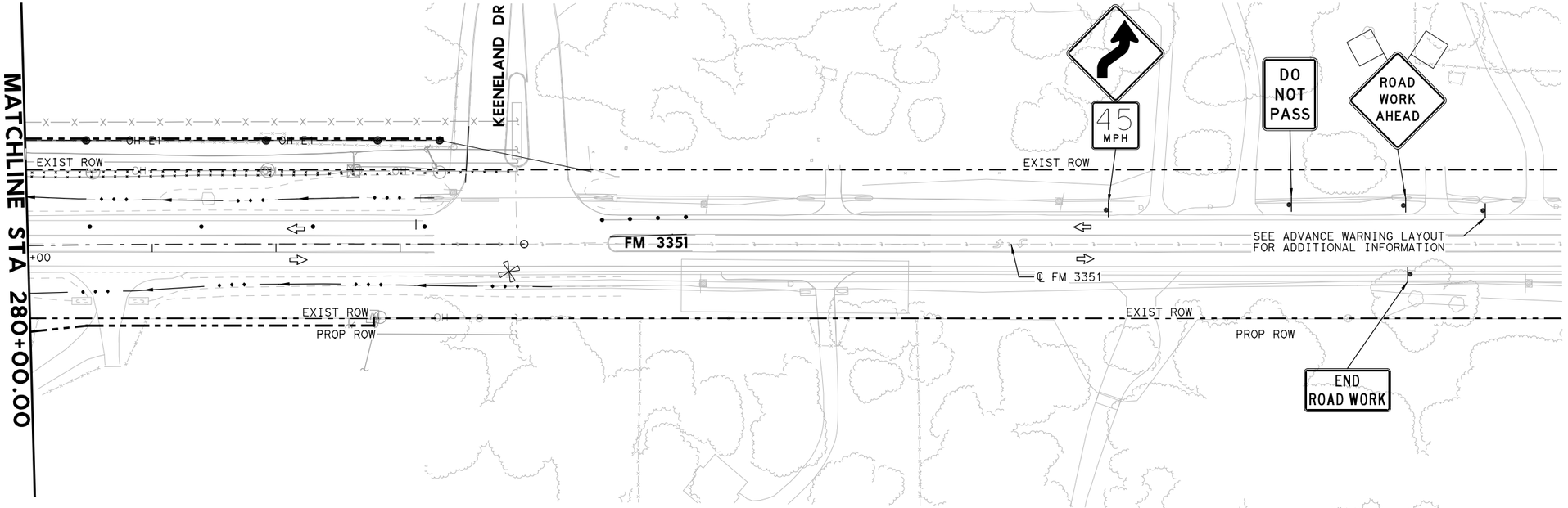
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
512 6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	850
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	3





0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

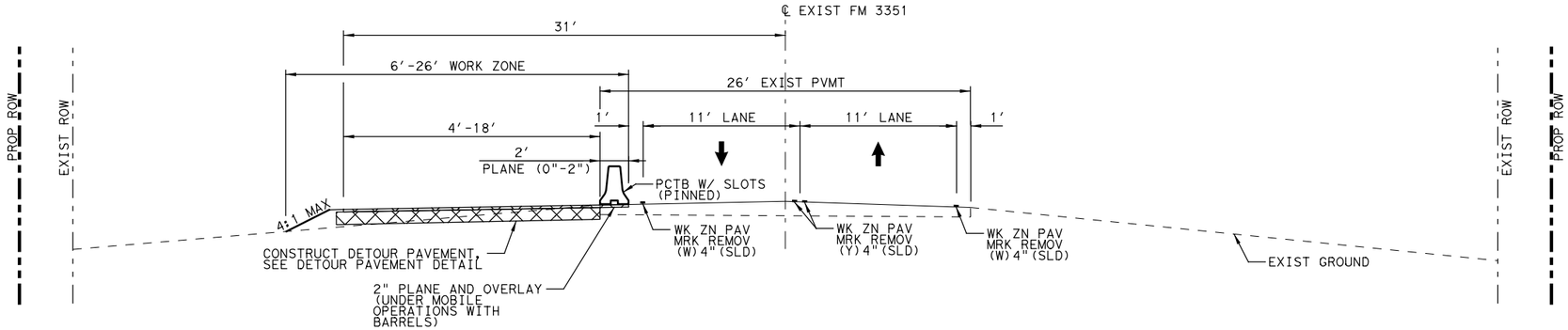
FM 3351
AT CIBOLO CREEK
TCP PHASE 1

STA 268+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	19B

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:28 PM
File Name:FM3351CL02.dgn
User Name:CWALLOF



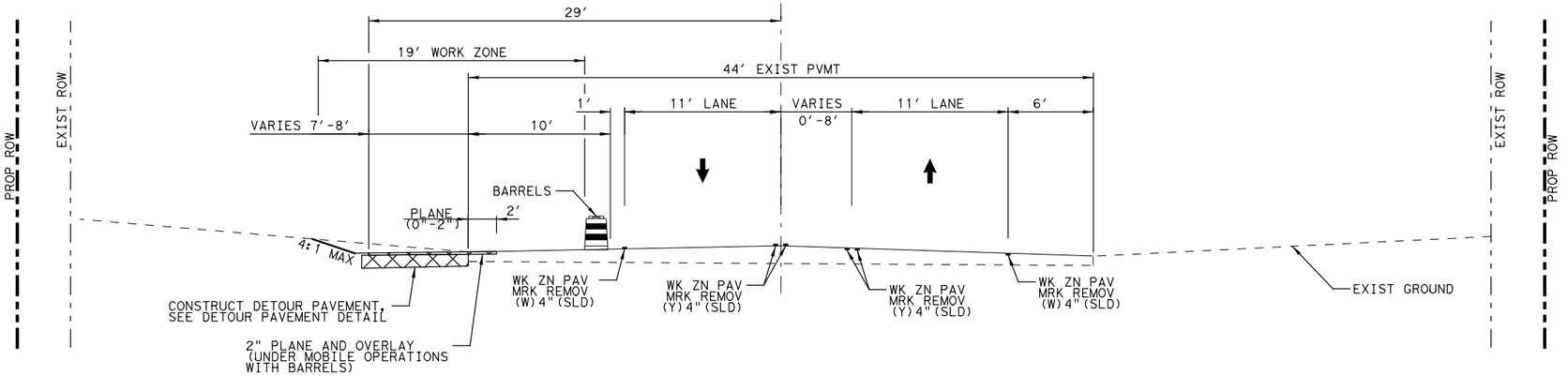
PHASE 2 TYPICAL SECTION

STA 250+15.46 TO STA 266+89

LEGEND

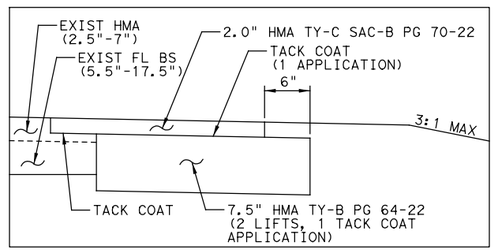
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP RETAINING WALL
- TEMP PAVEMENT
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE BRIDGE TRANSVERSE TYPICAL SECTIONS FOR PHASED TYPICAL SECTION ON THE BRIDGE.
2. SEE TCP LAYOUT SHEETS FOR LIMITS OF TEMPORARY PAVEMENT MARKINGS.



PHASE 2 TYPICAL SECTION

STA 272+00 TO STA 283+85



DETOUR PAVEMENT DETAIL

N.T.S.
NOTE: PROOF ROLL EXPOSED SUBGRADE, TACK COAT BETWEEN LIFTS OF HMA SEE ITEM 508, "CONSTRUCTING DETOURS" FOR PAYMENT

NO.	DATE	REVISION	APPR BY

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120398
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11/15/2023
Cassie Wallof

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17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 2
TYPICAL SECTIONS

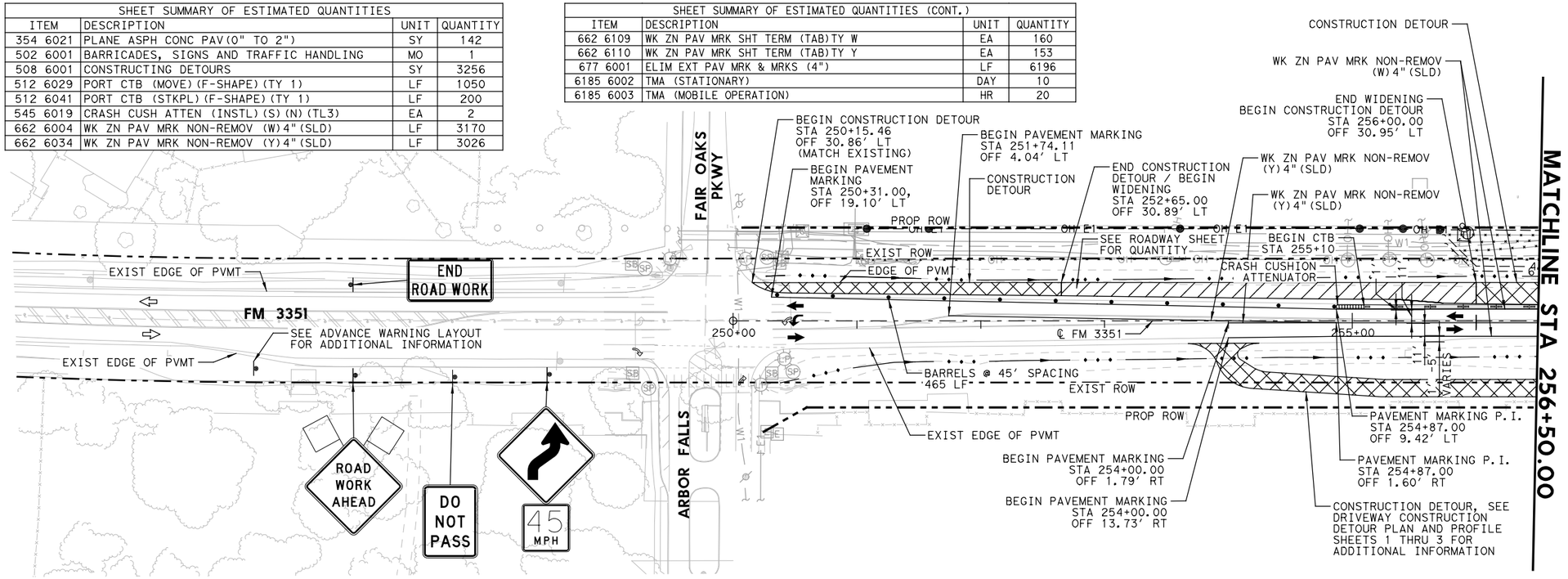
SHEET 1 OF 1

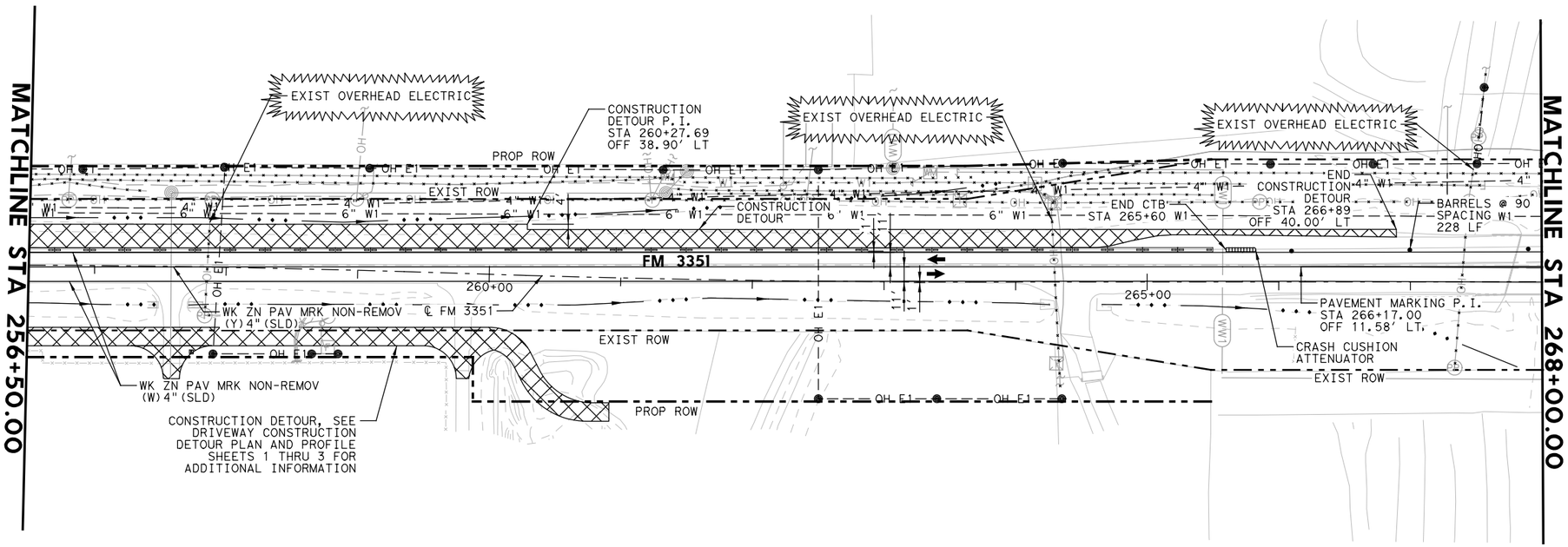
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	20

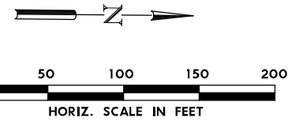
PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:30 PM
File Name:FM3351CS01.DGN
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
354 6021	PLANE ASPH CONC PAV(0" TO 2")	SY	142
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1
508 6001	CONSTRUCTING DETOURS	SY	3256
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1050
512 6041	PORT CTB (STKPL)(F-SHAPE)(TY 1)	LF	200
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3170
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3026

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	160
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	153
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6196
6185 6002	TMA (STATIONARY)	DAY	10
6185 6003	TMA (MOBILE OPERATION)	HR	20







LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

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120398
LICENSED
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11/15/2023
Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK
TCP PHASE 2

BEGIN TO STA 268+00.00

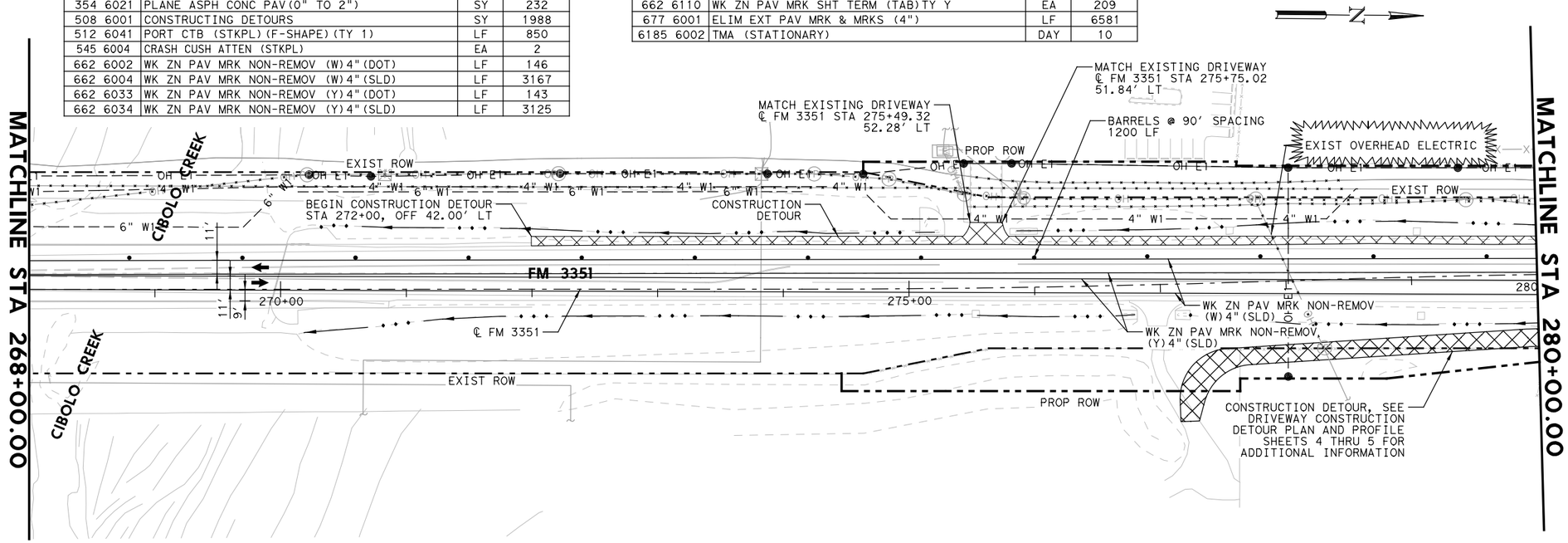
SCALE: 1"=100' SHEET 1 OF 2

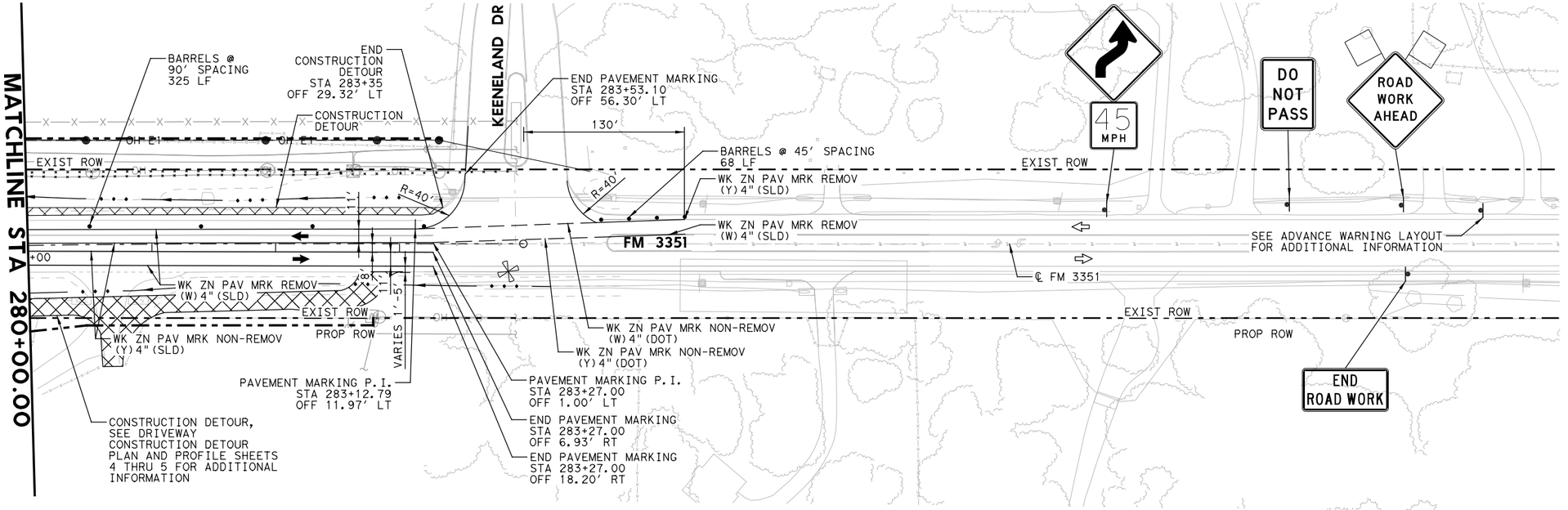
DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	21

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:32 PM
File Name:FM3351CL11.dgn
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
354 6021	PLANE ASPH CONC PAV(0" TO 2")	SY	232
508 6001	CONSTRUCTING DETOURS	SY	1988
512 6041	PORT CTB (STKPL)(F-SHAPE)(TY 1)	LF	850
545 6004	CRASH CUSH ATTEN (STKPL)	EA	2
662 6002	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	LF	146
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3167
662 6033	WK ZN PAV MRK NON-REMOV (Y)4"(DOT)	LF	143
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3125

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	213
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	209
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6581
6185 6002	TMA (STATIONARY)	DAY	10





0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

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11/15/2023

Cassie Wallof

HDR Engineering Inc.
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

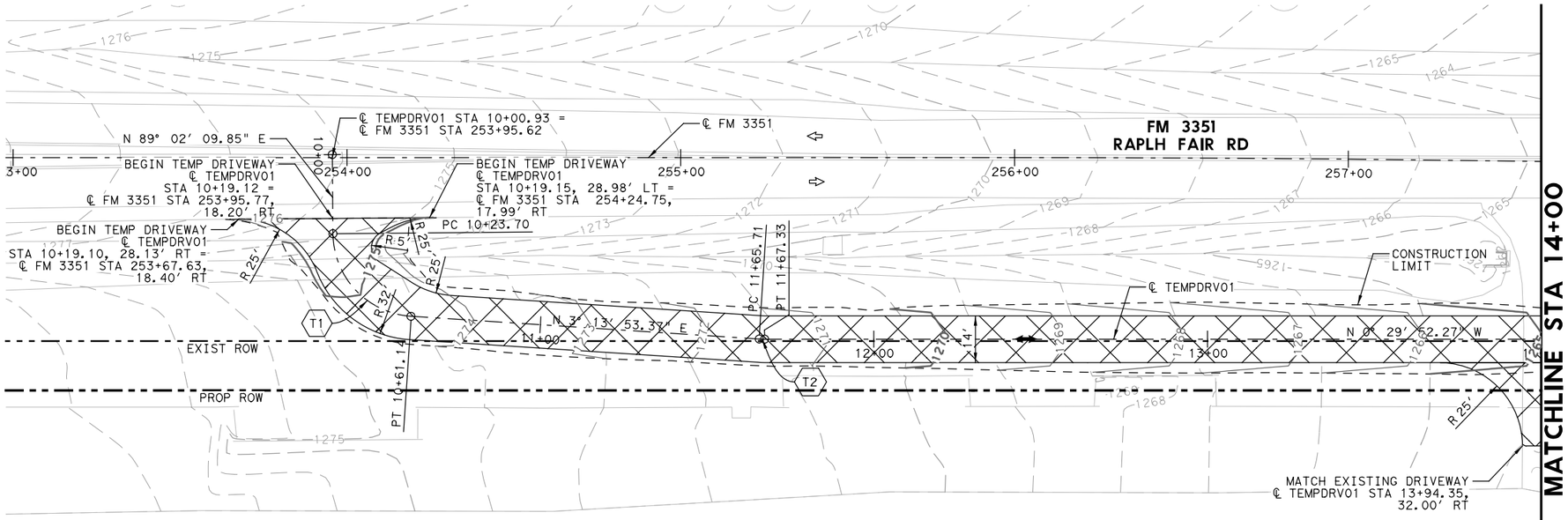
FM 3351
AT CIBOLO CREEK
TCP PHASE 2

STA 268+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	22

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:35 PM
File Name: FM3351CL12.dgn
User Name: CWALLOF



TEMPDRV01 CURVE DATA

T1

PI STATION	= 10+46.93
DELTA	= 85° 48' 16.49" (LT)
DEGREE OF CURVE	= 229° 10' 59.22"
TANGENT	= 23.23
LENGTH	= 37.44
RADIUS	= 25.00
PC STATION	= 10+23.70
PT STATION	= 10+61.14

T2

PI STATION	= 11+66.52
DELTA	= 3° 43' 45.64" (LT)
DEGREE OF CURVE	= 229° 10' 59.22"
TANGENT	= 0.81
LENGTH	= 1.63
RADIUS	= 25.00
PC STATION	= 11+65.71
PT STATION	= 11+67.33

0 20 40 60 80
HORIZ. SCALE IN FEET

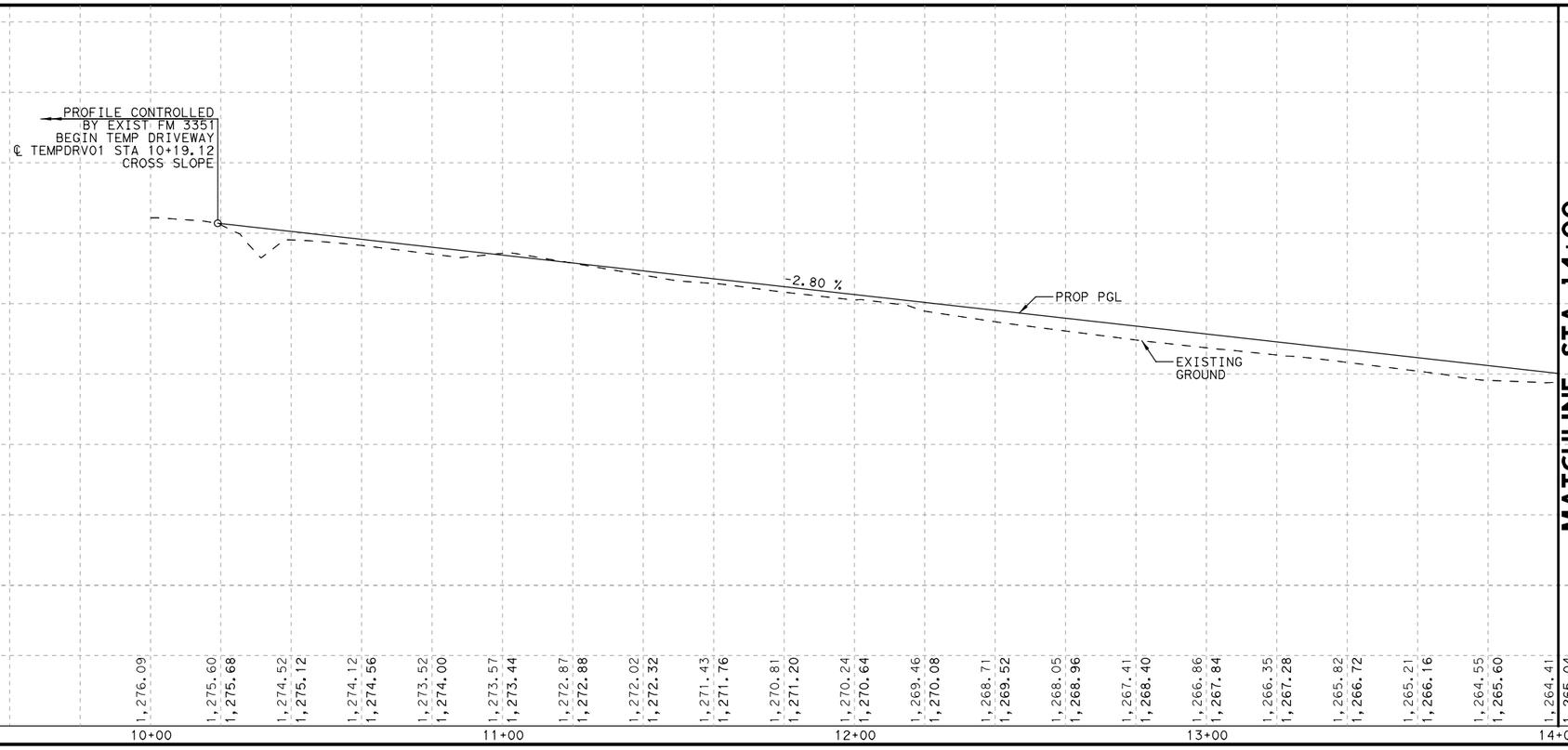
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- CONSTRUCTING DETOURS
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- MAJOR CONTOUR (5')
- MINOR CONTOUR (1')
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

1. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
2. SEE TCP PLAN SHEETS FOR MORE INFORMATION.
3. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY SECTIONS FOR TEMPORARY DRIVEWAY DETOUR.
4. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.



NO.	DATE	REVISION	APPR BY

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CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

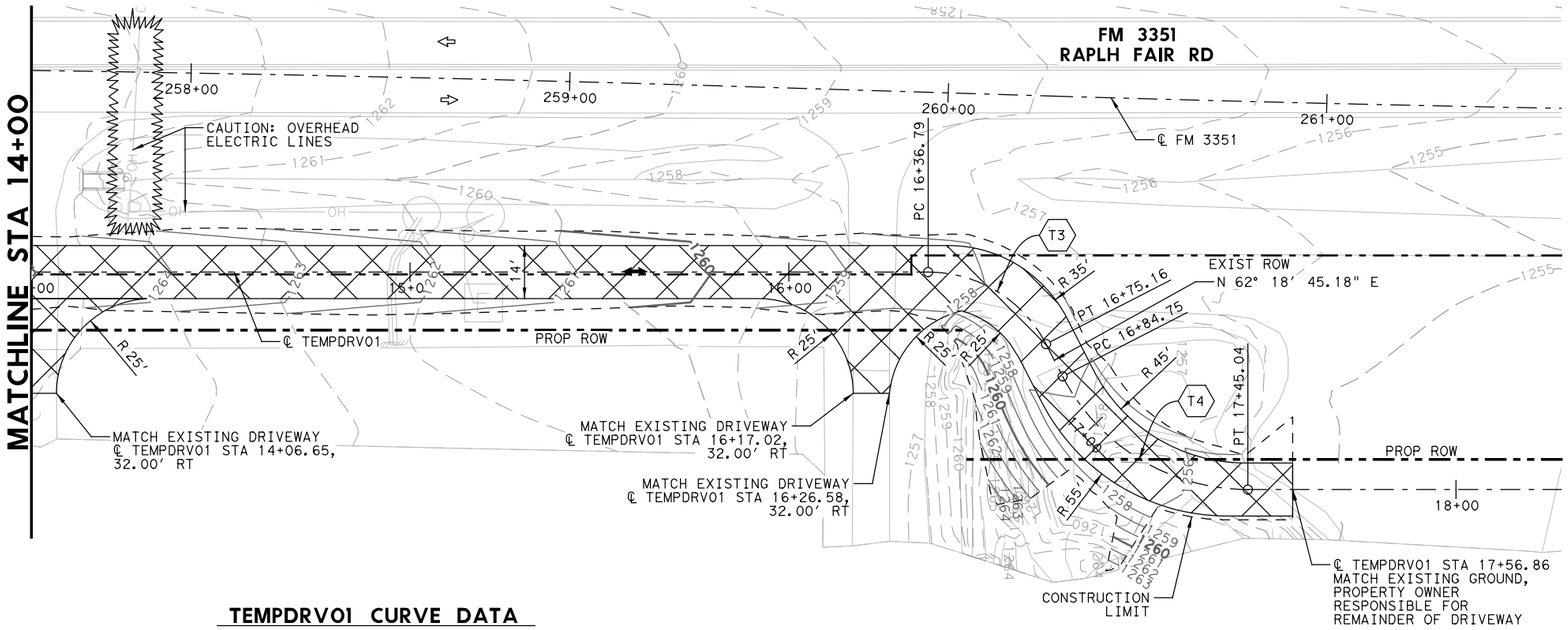
FM 3351 AT CIBOLO CREEK
TCP PHASE 2
DRIVEWAY CONSTRUCTION
DETOUR PLAN AND PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	23

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:39 PM
File Name: FM3351CP01.dgn
User Name: CWALLOF



TEMPDRV01 CURVE DATA

T3

PI STATION	= 16+58.16
DELTA	= 62° 48′ 37.44" (RT)
DEGREE OF CURVE	= 163° 42′ 08.02"
TANGENT	= 21.37
LENGTH	= 38.37
RADIUS	= 35.00
PC STATION	= 16+36.79
PT STATION	= 16+75.16

T4

PI STATION	= 17+18.33
DELTA	= 62° 48′ 27.97" (LT)
DEGREE OF CURVE	= 104° 10′ 26.92"
TANGENT	= 33.58
LENGTH	= 60.29
RADIUS	= 55.00
PC STATION	= 16+84.75
PT STATION	= 17+45.04

0 20 40 60 80
HORIZ. SCALE IN FEET

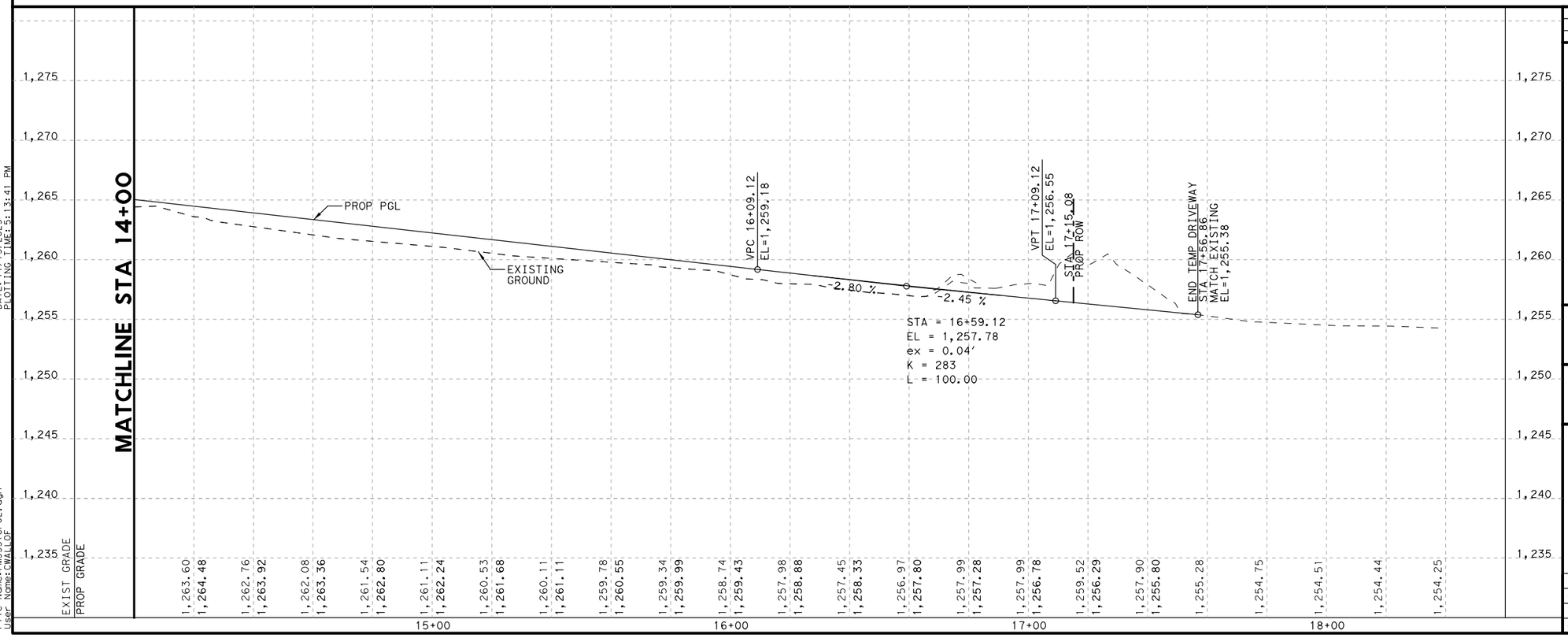
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- CONSTRUCTING DETOURS
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- MAJOR CONTOUR (5′)
- MINOR CONTOUR (1′)
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

1. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
2. SEE TCP PLAN SHEETS FOR MORE INFORMATION.
3. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY SECTIONS FOR TEMPORARY DRIVEWAY DETOUR.
4. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.



NO.	DATE	REVISION	APPR BY

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LICENSED
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11/15/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
TCP PHASE 2
DRIVEWAY CONSTRUCTION
DETOUR PLAN AND PROFILE

SCALE: 1"=40′-H
1"=10′-V

SHEET 2 OF 4

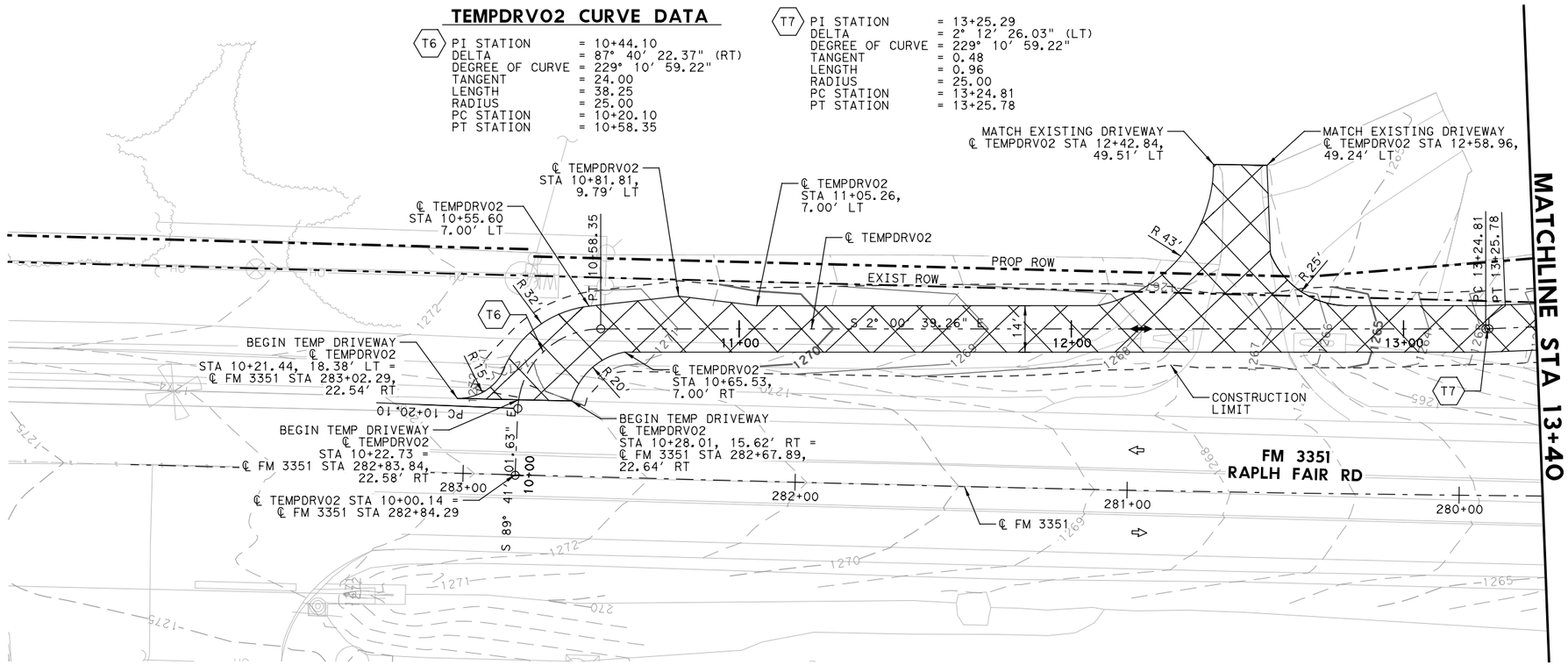
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	24

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:41 PM
File Name: FM3351CP02.dgn
User Name: CWALLOF

TEMPDRV02 CURVE DATA

T6
- PI STATION = 10+44.10
- DELTA = 87° 40′ 22.37" (RT)
- DEGREE OF CURVE = 229° 10′ 59.22"
- TANGENT = 24.00
- LENGTH = 38.25
- RADIUS = 25.00
- PC STATION = 10+20.10
- PT STATION = 10+58.35

T7
- PI STATION = 13+25.29
- DELTA = 2° 12′ 26.03" (LT)
- DEGREE OF CURVE = 229° 10′ 59.22"
- TANGENT = 0.48
- LENGTH = 0.96
- RADIUS = 25.00
- PC STATION = 13+24.81
- PT STATION = 13+25.78



LEGEND

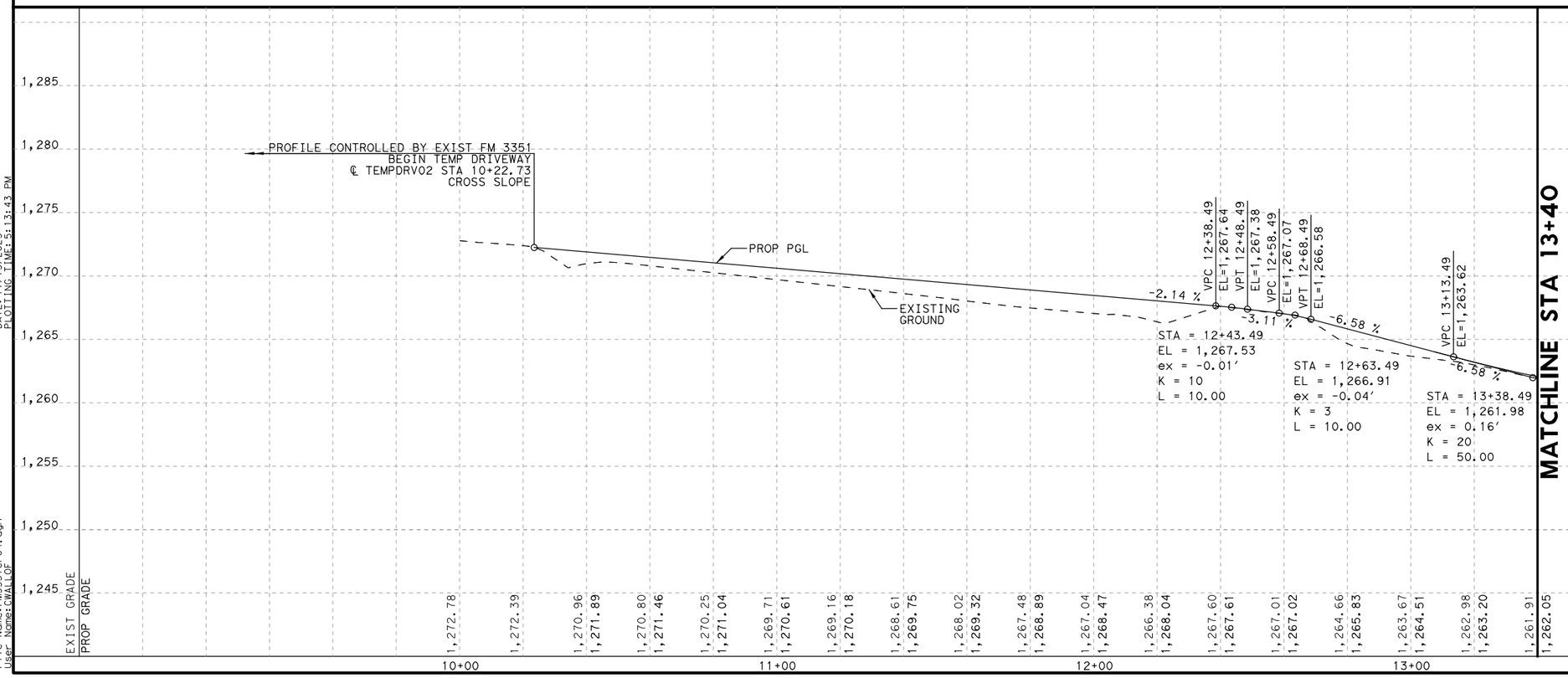
- CONSTRUCTING DETOURS
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- MAJOR CONTOUR (5′)
- MINOR CONTOUR (1′)
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

NOTES:

1. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
2. SEE TCP PLAN SHEETS FOR MORE INFORMATION.
3. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY SECTIONS FOR TEMPORARY DRIVEWAY DETOUR.
4. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.



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11/15/2023
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Texas Department of Transportation

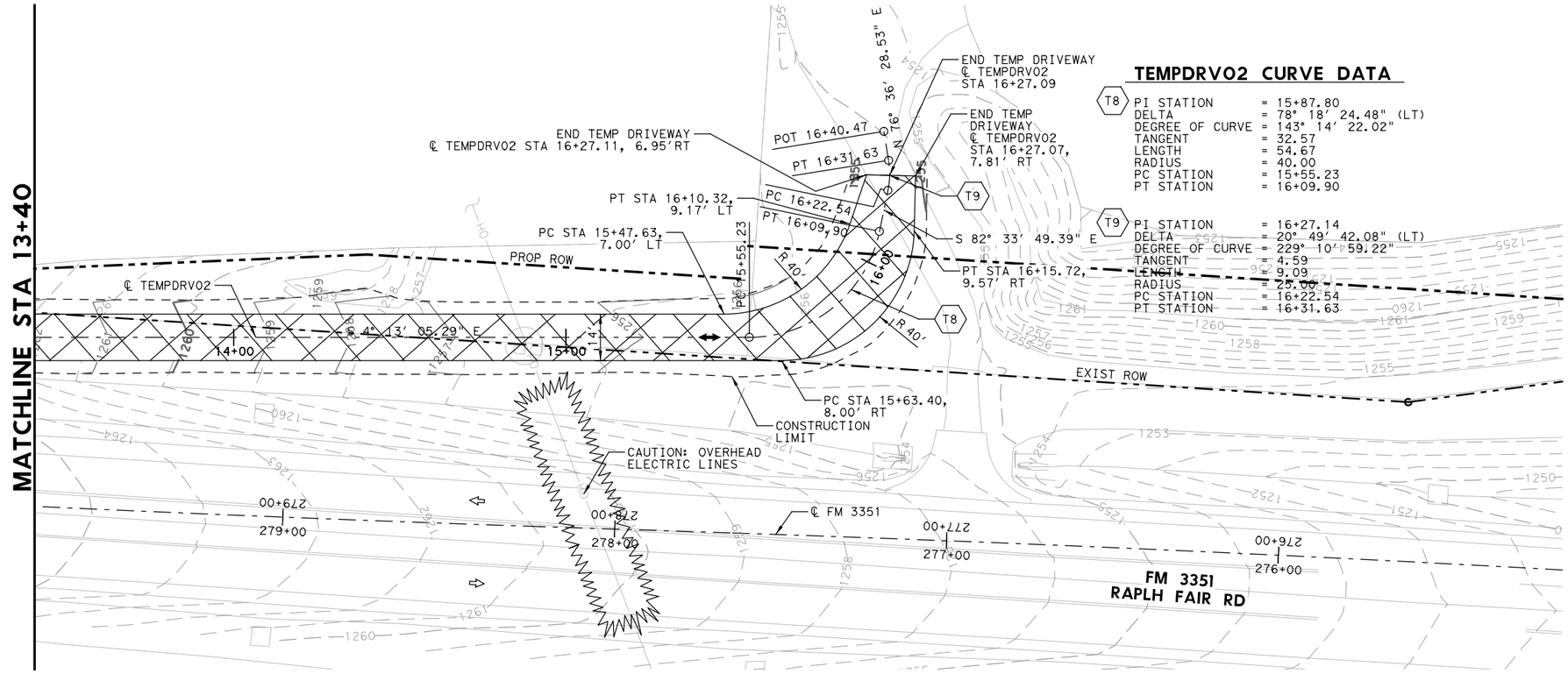
FM 3351 AT CIBOLO CREEK
TCP PHASE 2
DRIVEWAY CONSTRUCTION
DETOUR PLAN AND PROFILE

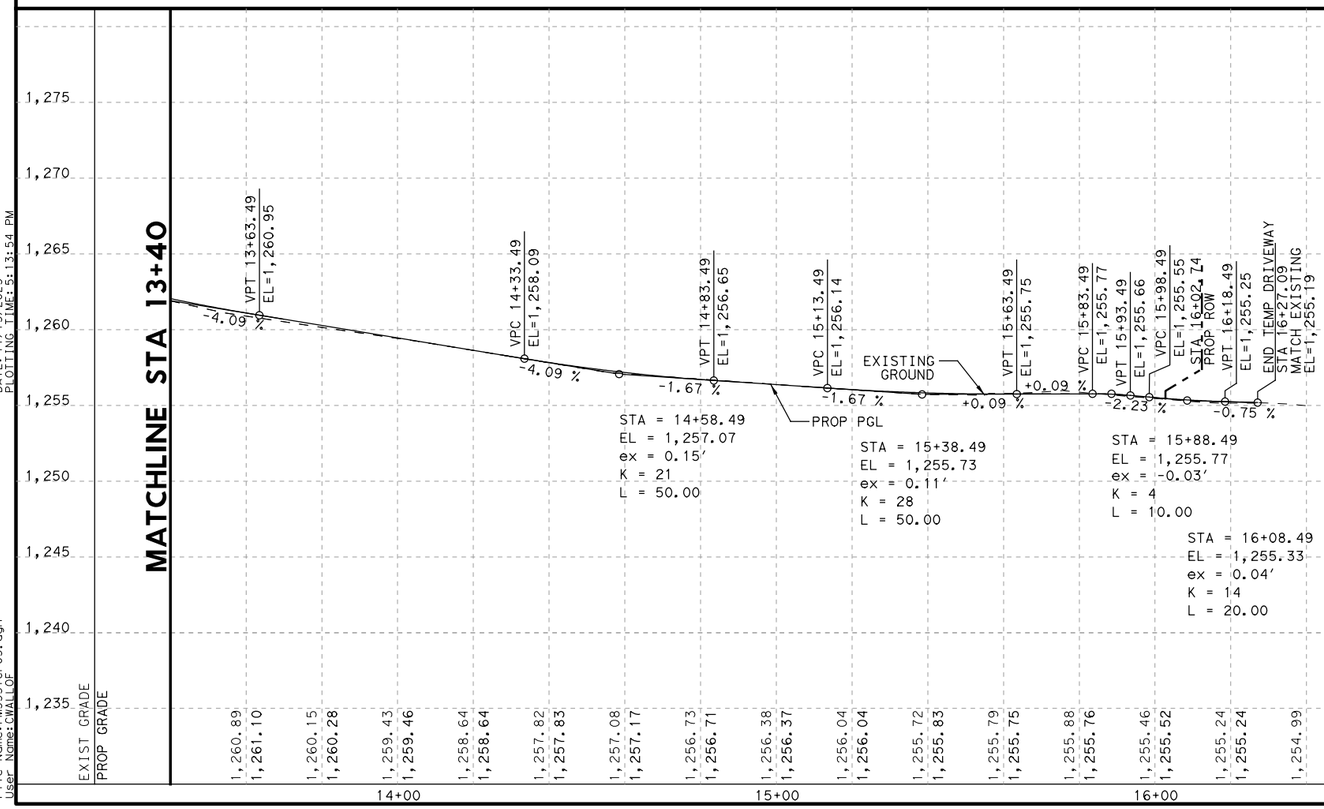
SCALE: 1"=40′-H
1"=10′-V

SHEET 3 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	25

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:43 PM
File Name: FM3351CP04.dgn
User Name: CWALLOF





NO.	DATE	REVISION	APPR BY

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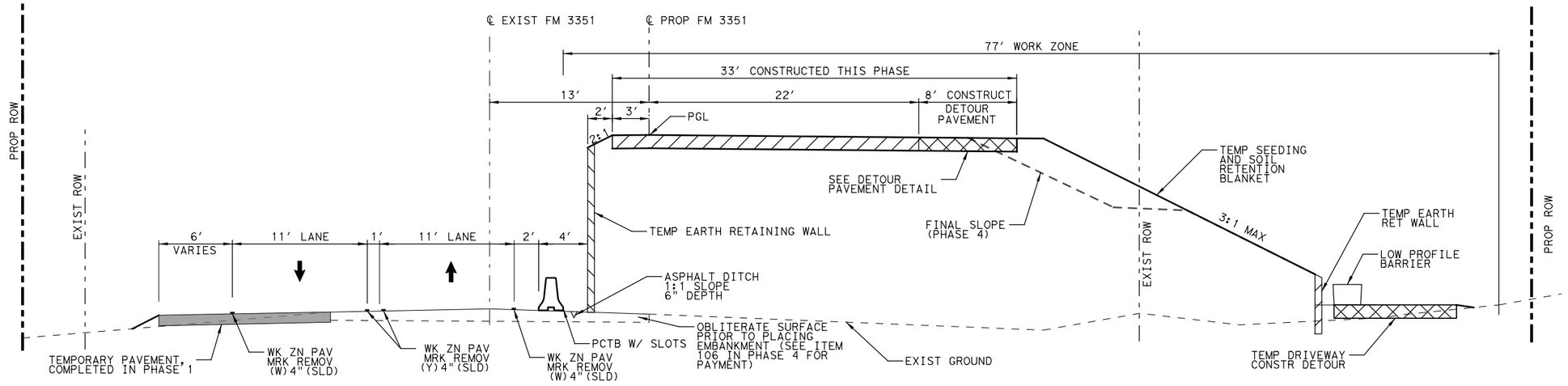
FM 3351 AT CIBOLO CREEK
TCP PHASE 2
DRIVEWAY CONSTRUCTION
DETOUR PLAN AND PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 4 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	26

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:54 PM
File Name: FM3351CP05.dgn
User Name: CWALLOF



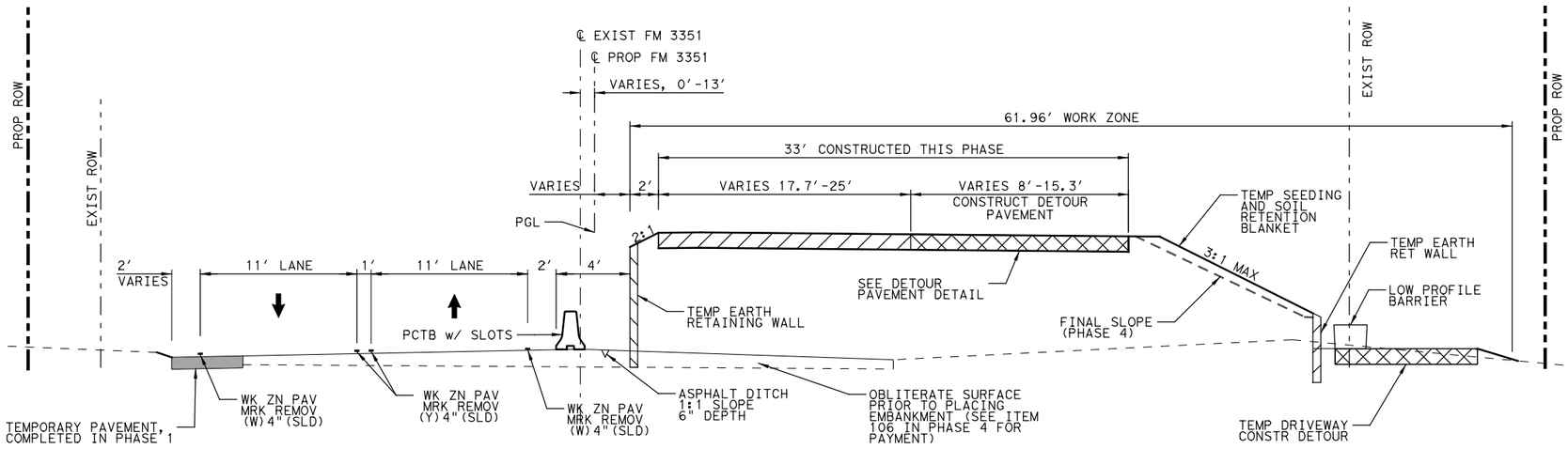
PHASE 3 TYPICAL SECTION

STA 256+00 TO STA 264+15
STA 273+65 TO STA 277+65

LEGEND

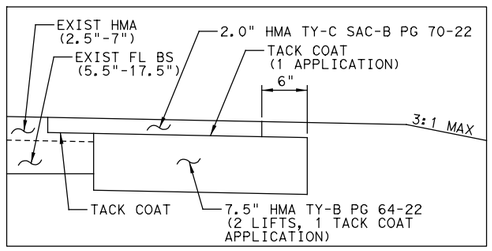
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP RETAINING WALL
- TEMP PAVEMENT
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE BRIDGE TRANSVERSE TYPICAL SECTIONS FOR PHASED TYPICAL SECTION ON THE BRIDGE.
2. SEE TCP LAYOUT SHEETS FOR LIMITS OF TEMPORARY PAVEMENT MARKINGS.



PHASE 3 TYPICAL SECTION

STA 277+65 TO STA 281+75



DETOUR PAVEMENT DETAIL

N.T.S.
NOTE: PROOF ROLL EXPOSED SUBGRADE, TACK COAT BETWEEN LIFTS OF HMA
SEE ITEM 508, "CONSTRUCTING DETOURS" FOR PAYMENT

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

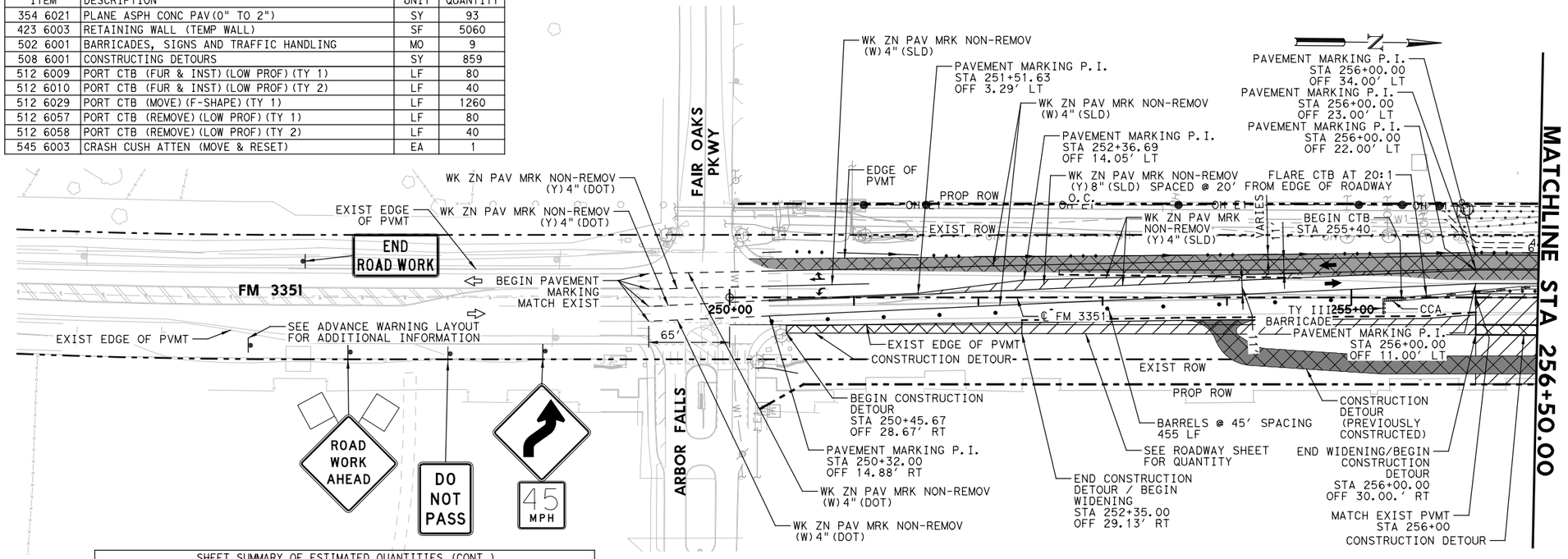
FM 3351
AT CIBOLO CREEK
TCP PHASE 3
TYPICAL SECTIONS

SHEET 1 OF 1

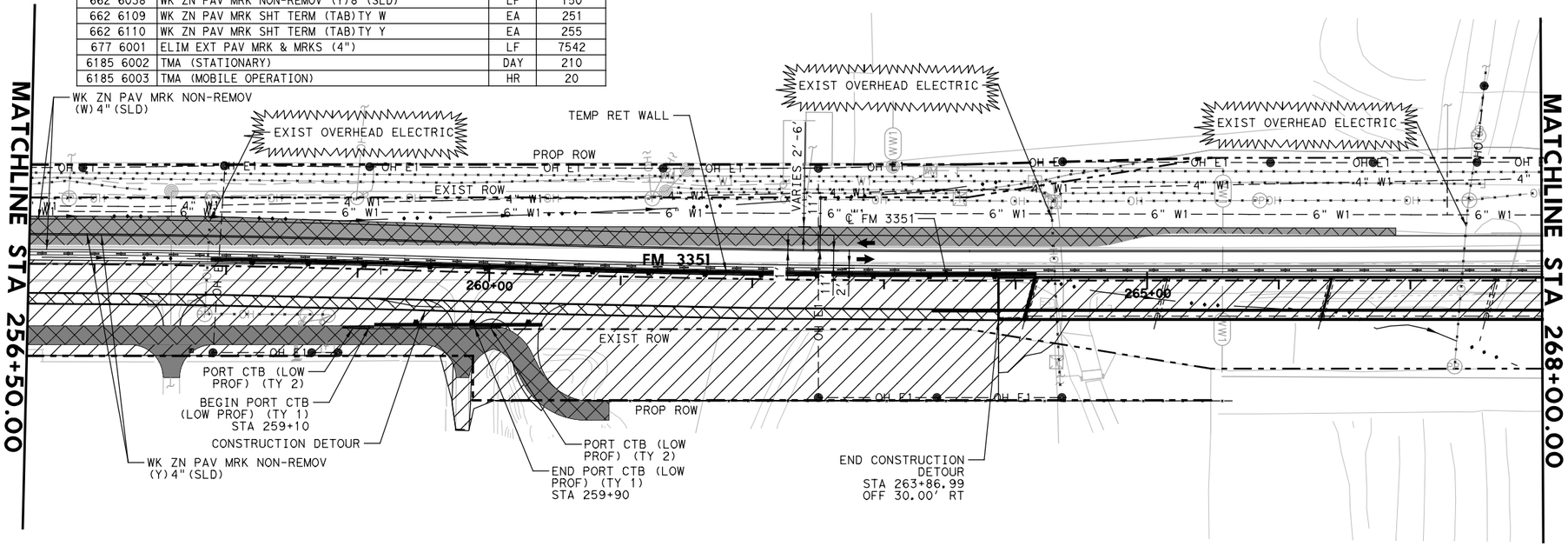
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	27

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:56 PM
File Name: FM3351CS02.DGN
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
354 6021	PLANE ASPH CONC PAV(0" TO 2")	SY	93
423 6003	RETAINING WALL (TEMP WALL)	SF	5060
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9
508 6001	CONSTRUCTING DETOURS	SY	859
512 6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	80
512 6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	40
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1260
512 6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	80
512 6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	40
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1



SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6002	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	LF	194
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3617
662 6033	WK ZN PAV MRK NON-REMOV (Y)4"(DOT)	LF	194
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3537
662 6038	WK ZN PAV MRK NON-REMOV (Y)8"(SLD)	LF	150
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	251
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	255
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	7542
6185 6002	TMA (STATIONARY)	DAY	210
6185 6003	TMA (MOBILE OPERATION)	HR	20



0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 3

BEGIN TO STA 268+00.00

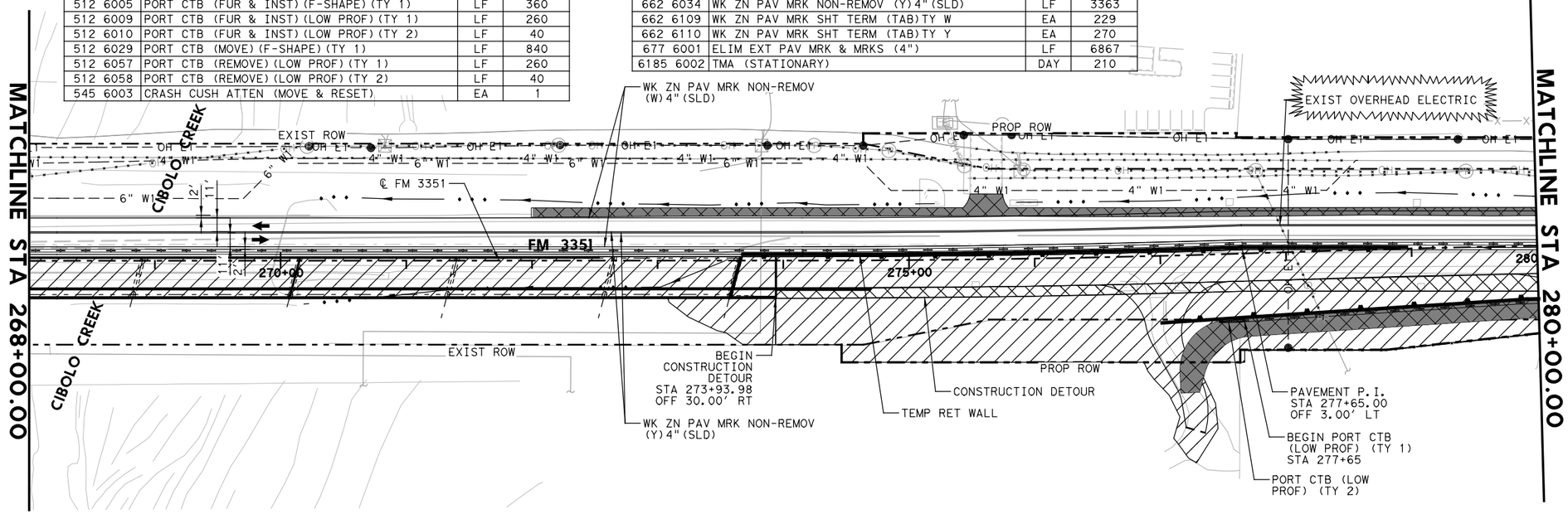
SCALE: 1"=100' SHEET 1 OF 2

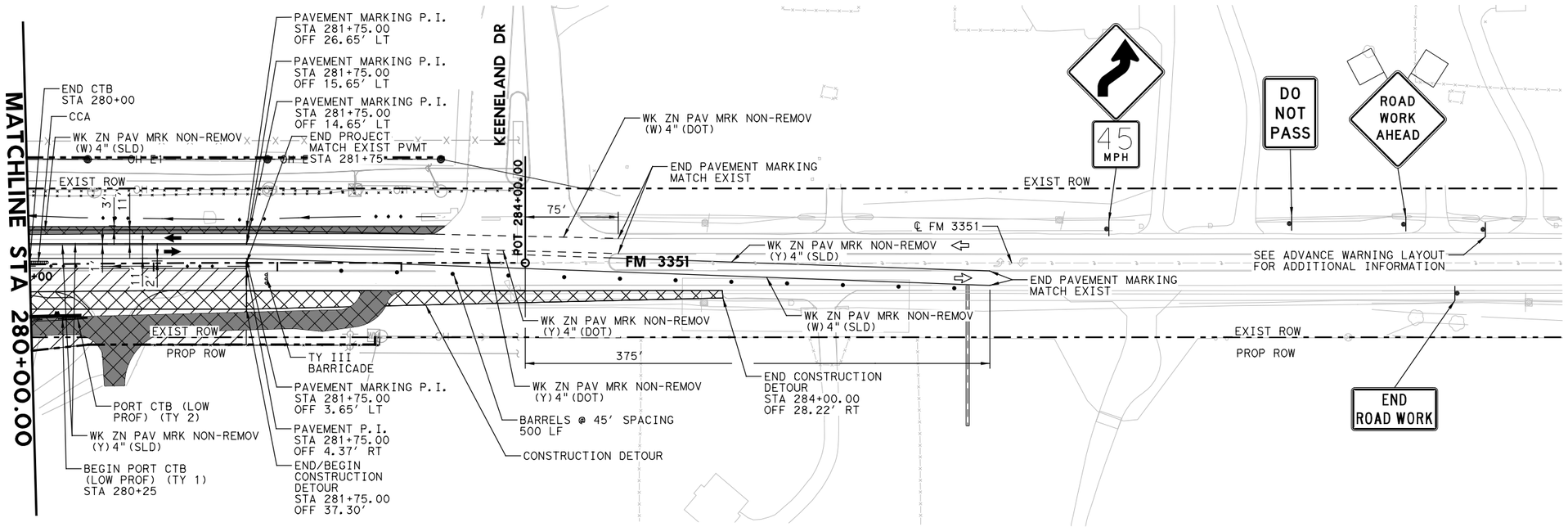
DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	28

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:13:59 PM
File Name: FM3351CL21.dgn
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
354 6021	PLANE ASPH CONC PAV(0" TO 2")	SY	86
423 6003	RETAINING WALL (TEMP WALL)	SF	6715
508 6001	CONSTRUCTING DETOURS	SY	1344
512 6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	360
512 6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	260
512 6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	40
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	840
512 6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	260
512 6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	40
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6002	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	LF	146
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3504
662 6033	WK ZN PAV MRK NON-REMOV (Y)4"(DOT)	LF	288
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3363
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	229
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	270
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6867
6185 6002	TMA (STATIONARY)	DAY	210





0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

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17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 3

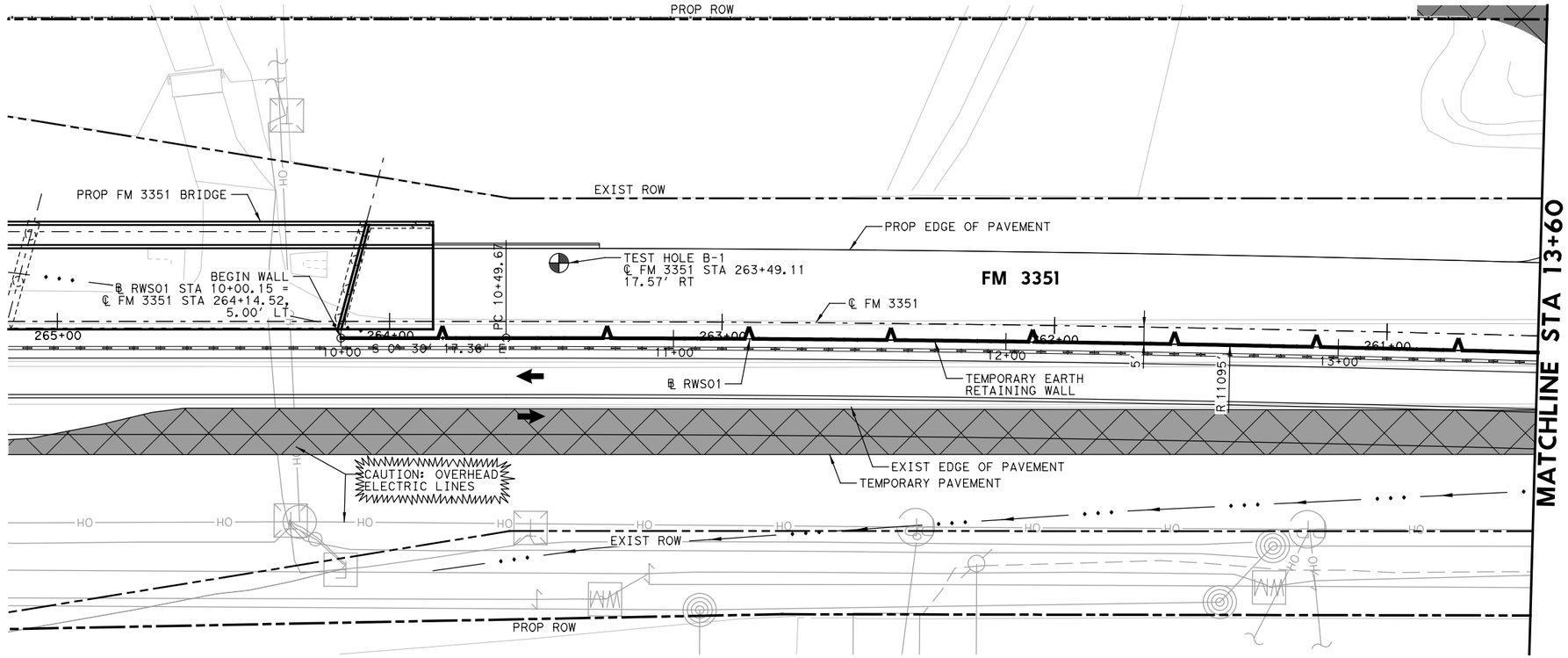
STA 268+00.00 TO END

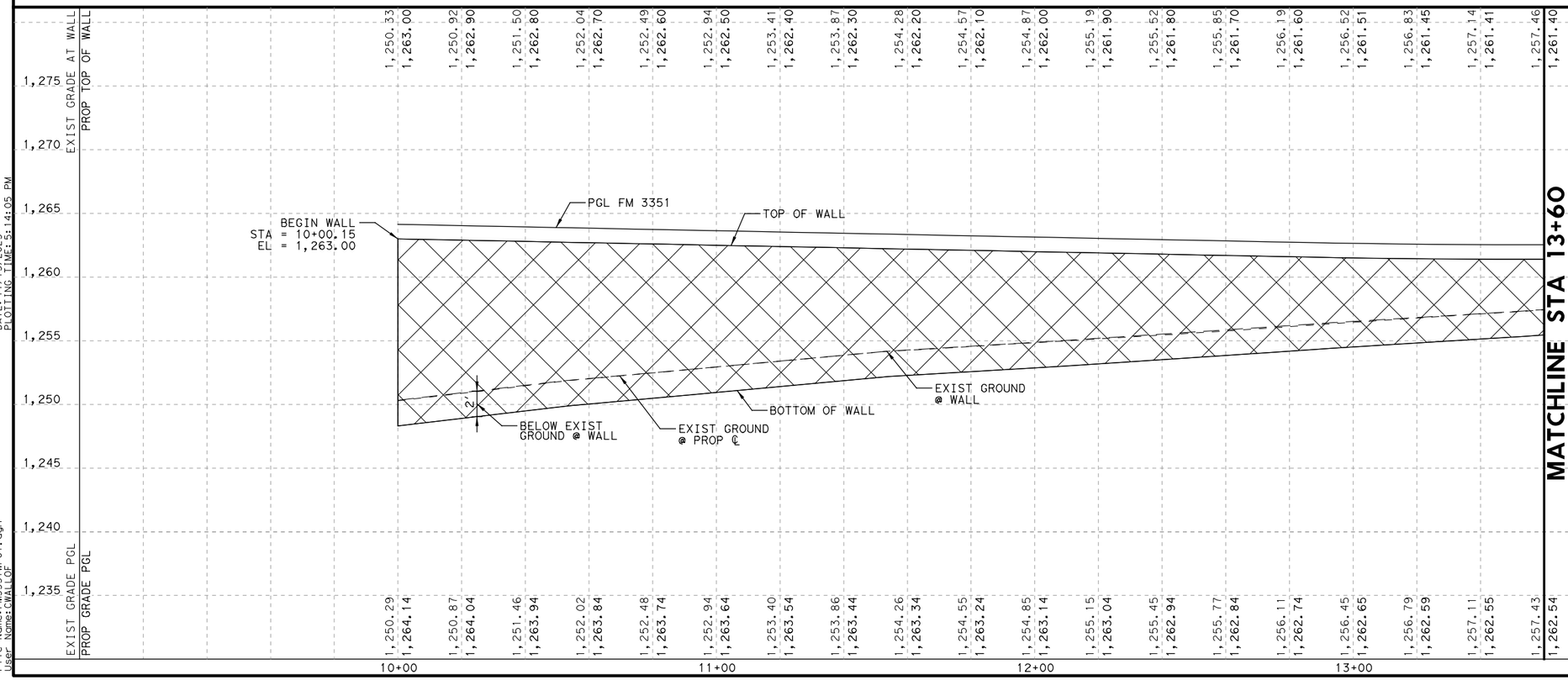
SCALE: 1"=100'

SHEET 2 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JR	COMAL	SAT	3212	05	013	29

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:02 PM
File Name: FM3351CL22.dgn
User Name: CWALLOF





0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.

NO.	DATE	REVISION	APPR BY

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CASSANDRA WALLOF
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11/15/2023
Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

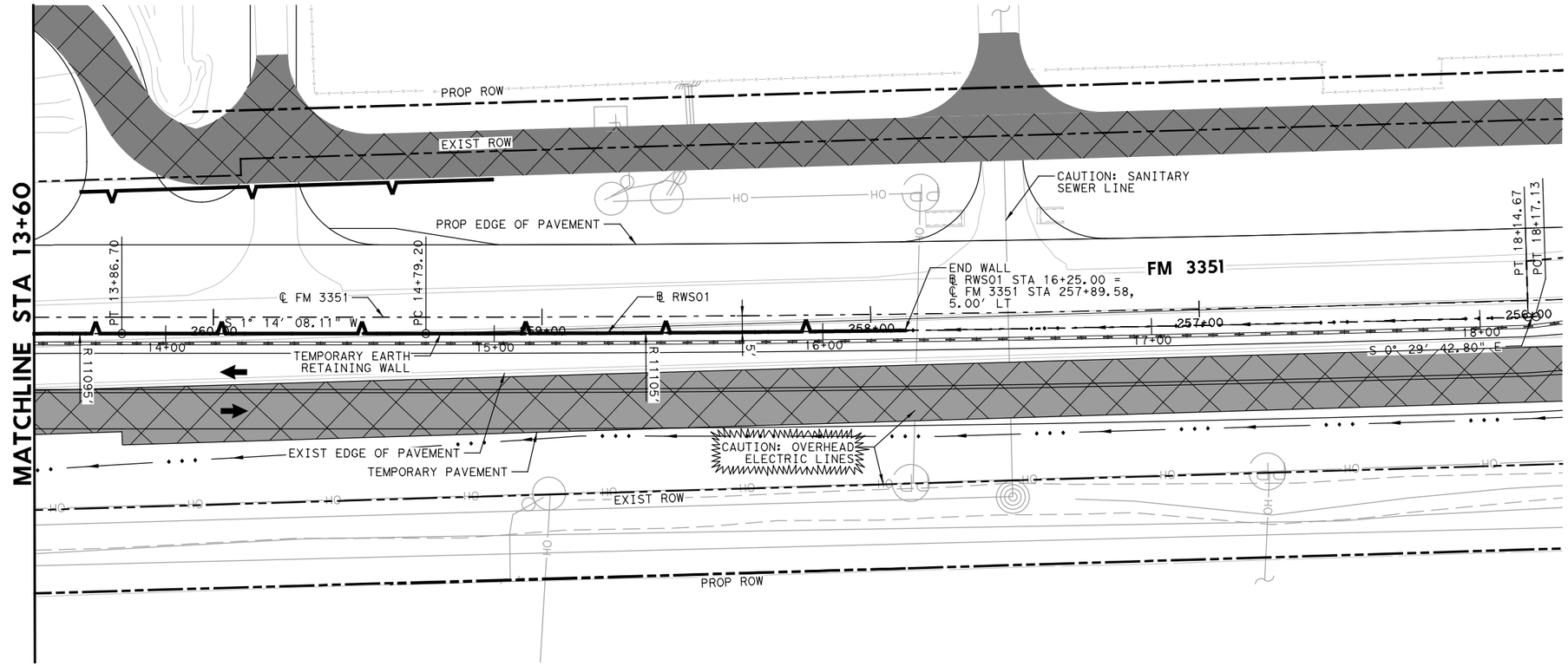
FM 3351 AT CIBOLO CREEK
TCP PHASE 3
TEMPORARY RETAINING WALL PLAN AND PROFILE
RWS01

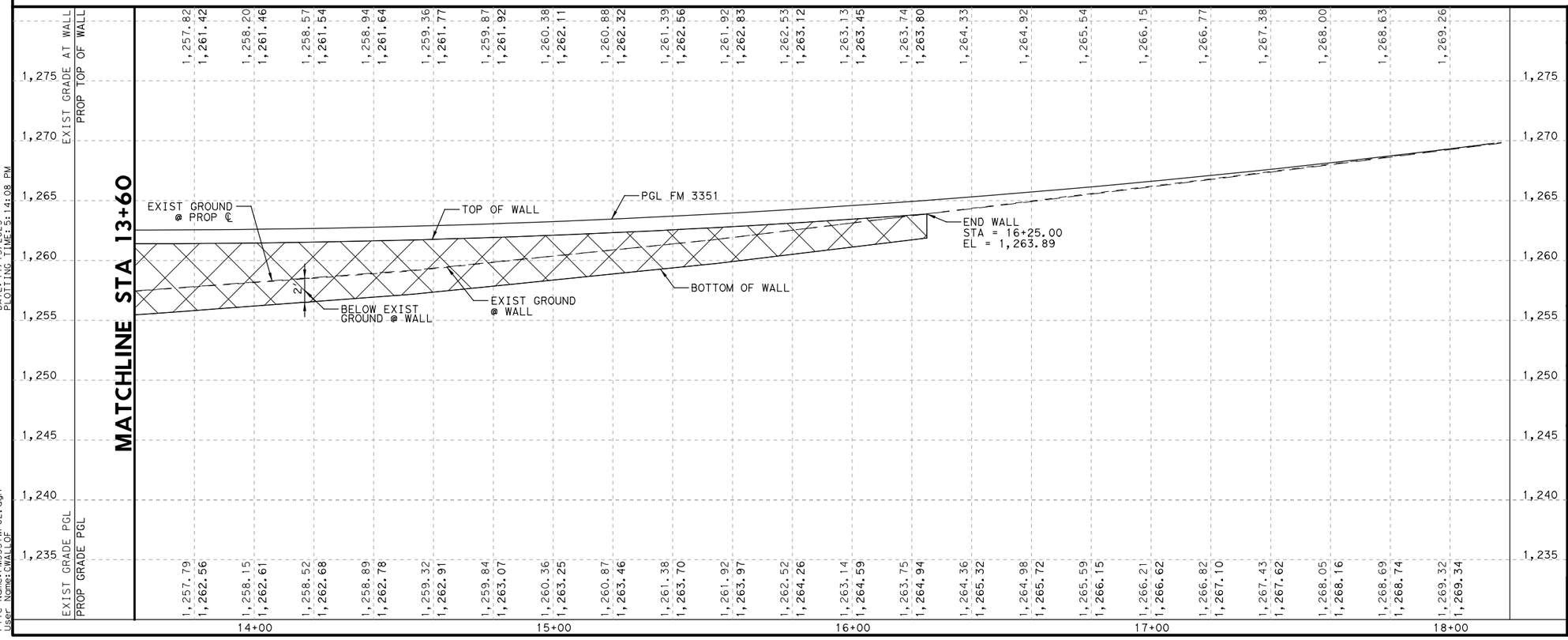
SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	30

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:05 PM
File Name: FM3351WP01.dgn
User Name: CWALLOF





0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.

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Texas Department of Transportation

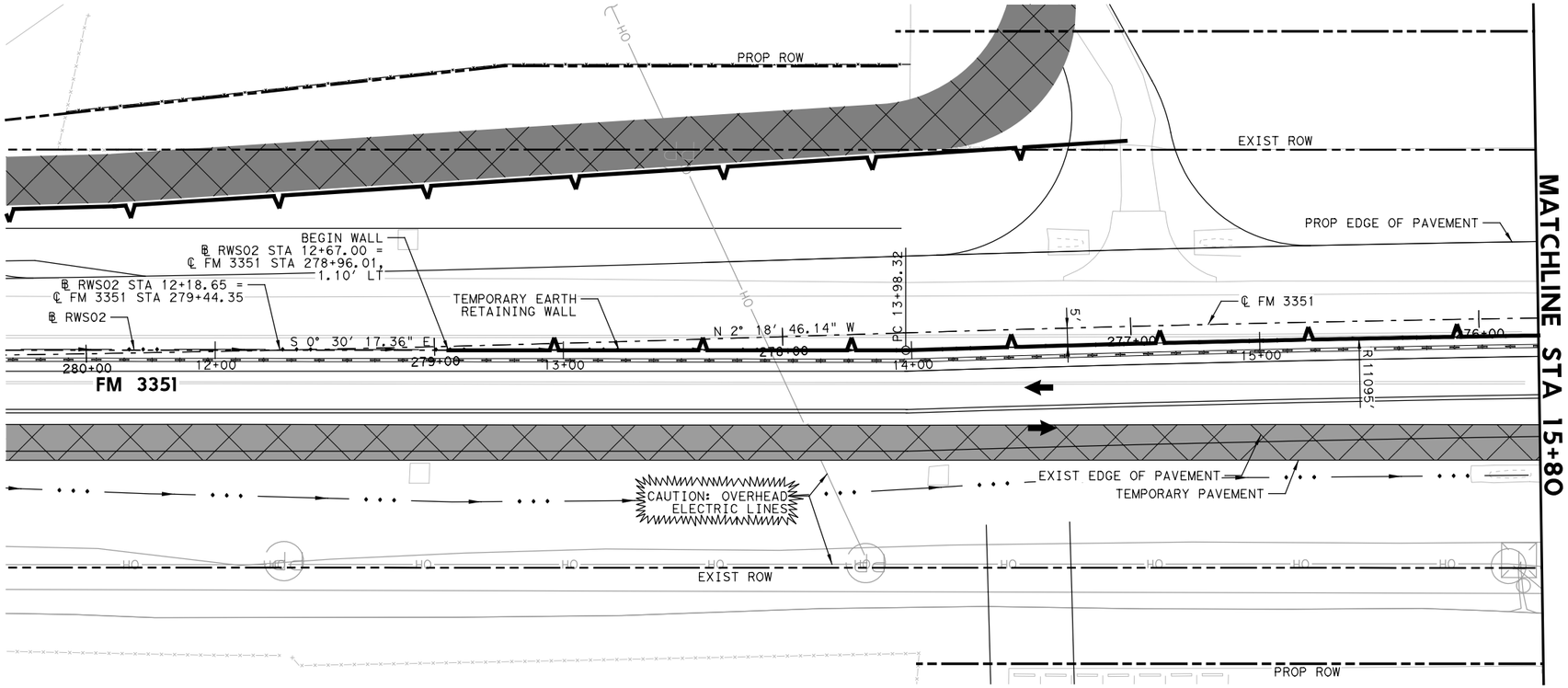
FM 3351 AT CIBOLO CREEK
TCP PHASE 3
TEMPORARY RETAINING WALL PLAN AND PROFILE
RWS01

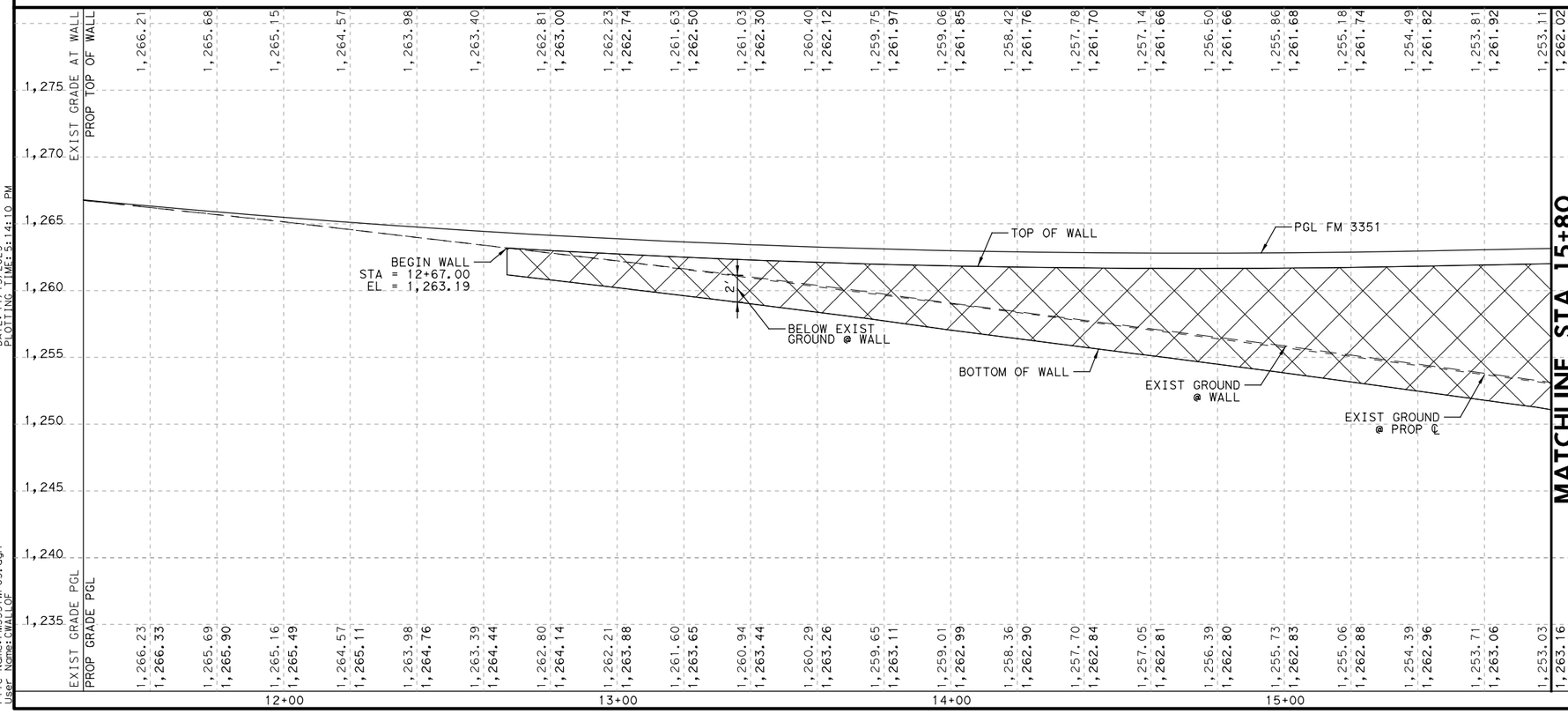
SCALE: 1"=40'-H
1"=10'-V

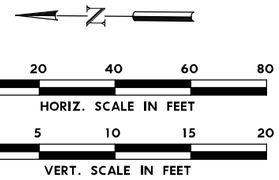
SHEET 2 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	31

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:08 PM
File Name: FM3351WP02.dgn
User Name: CWALLOF







LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.

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11/15/2023

Cassie Wallof

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Texas Department of Transportation

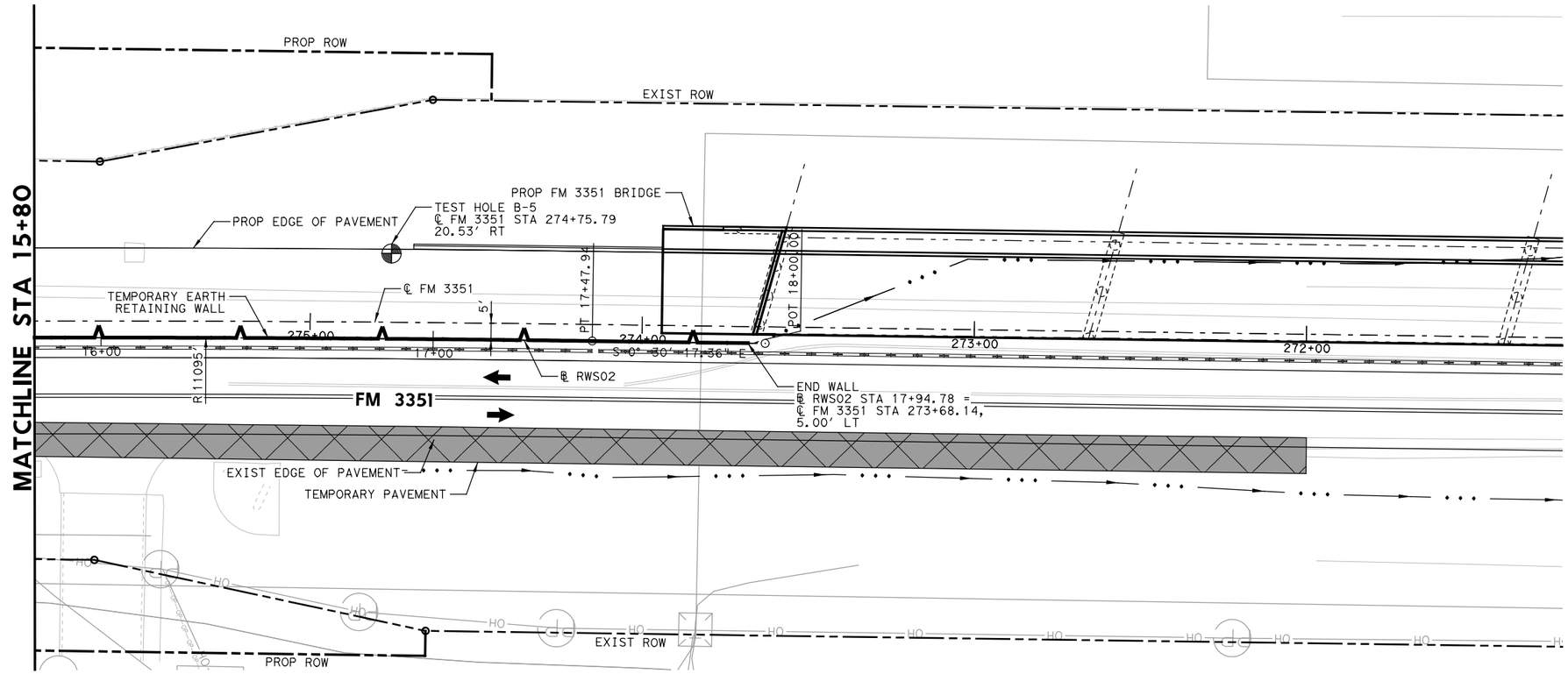
FM 3351 AT CIBOLO CREEK
TCP PHASE 3
TEMPORARY RETAINING WALL PLAN AND PROFILE
RWS02

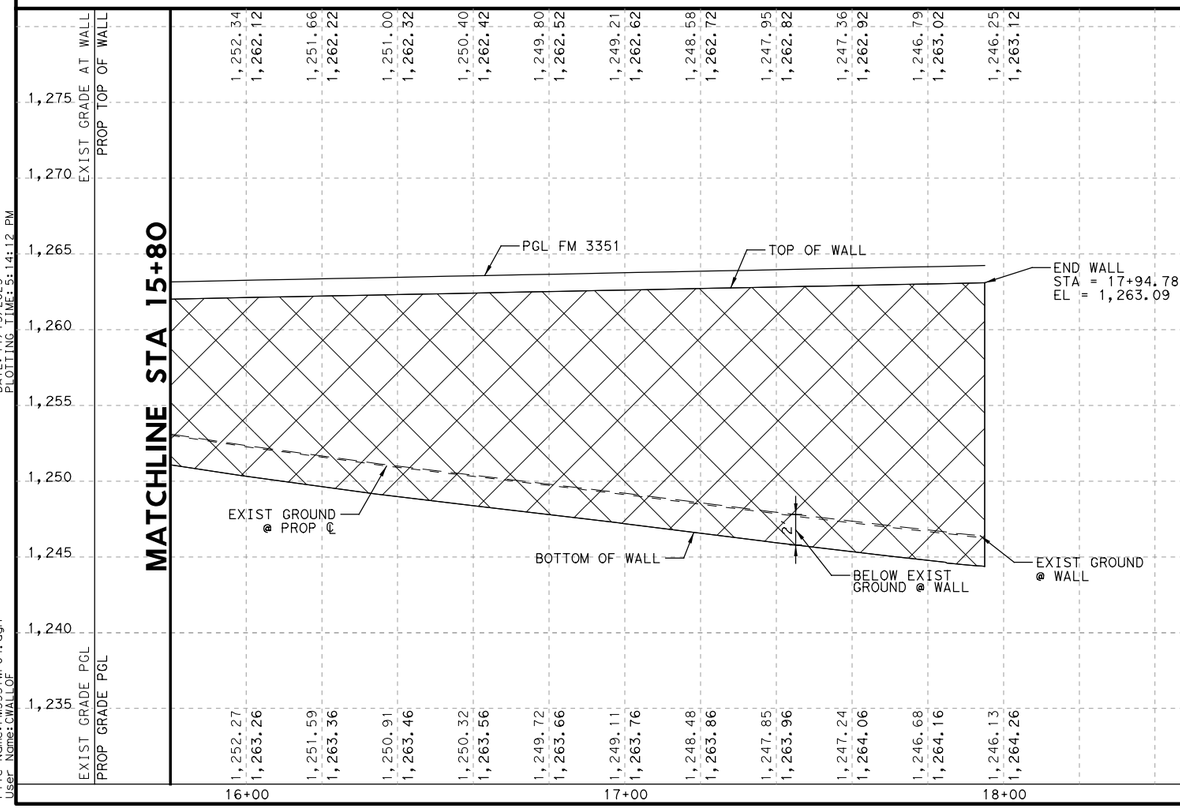
SCALE: 1"=40'-H
1"=10'-V

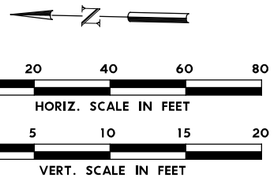
SHEET 1 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	32

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:10 PM
File Name: FM3351WP03.dgn
User Name: CWALLOF







LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.

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11/15/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

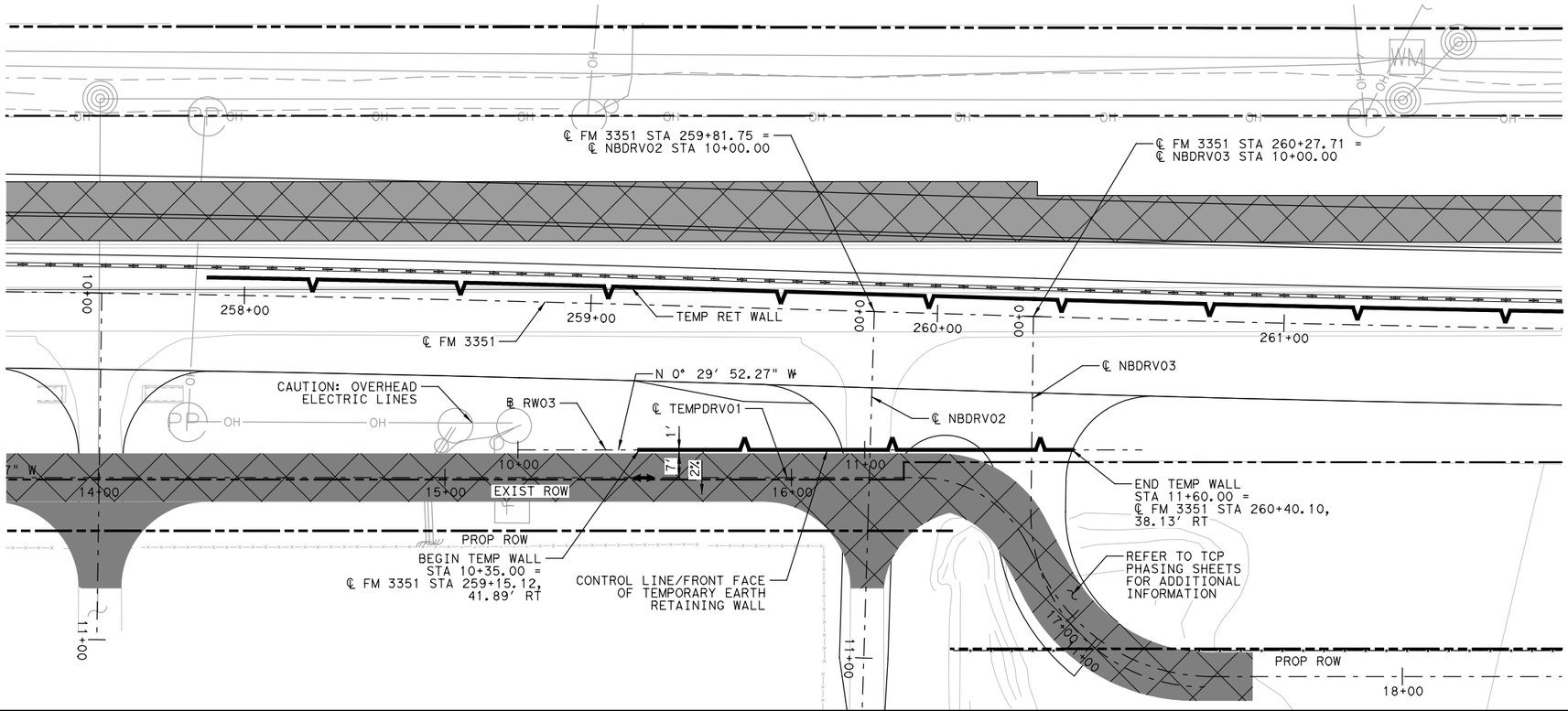
FM 3351 AT CIBOLO CREEK
TCP PHASE 3
TEMPORARY RETAINING WALL PLAN AND PROFILE
RWS02

SCALE: 1"=40'-H
1"=10'-V

SHEET 2 OF 2

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: NAS	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	33

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:12 PM
File Name: FM3351WP04.dgn
User Name: CWALLOF



0 20 40 60 80
HORIZ. SCALE IN FEET

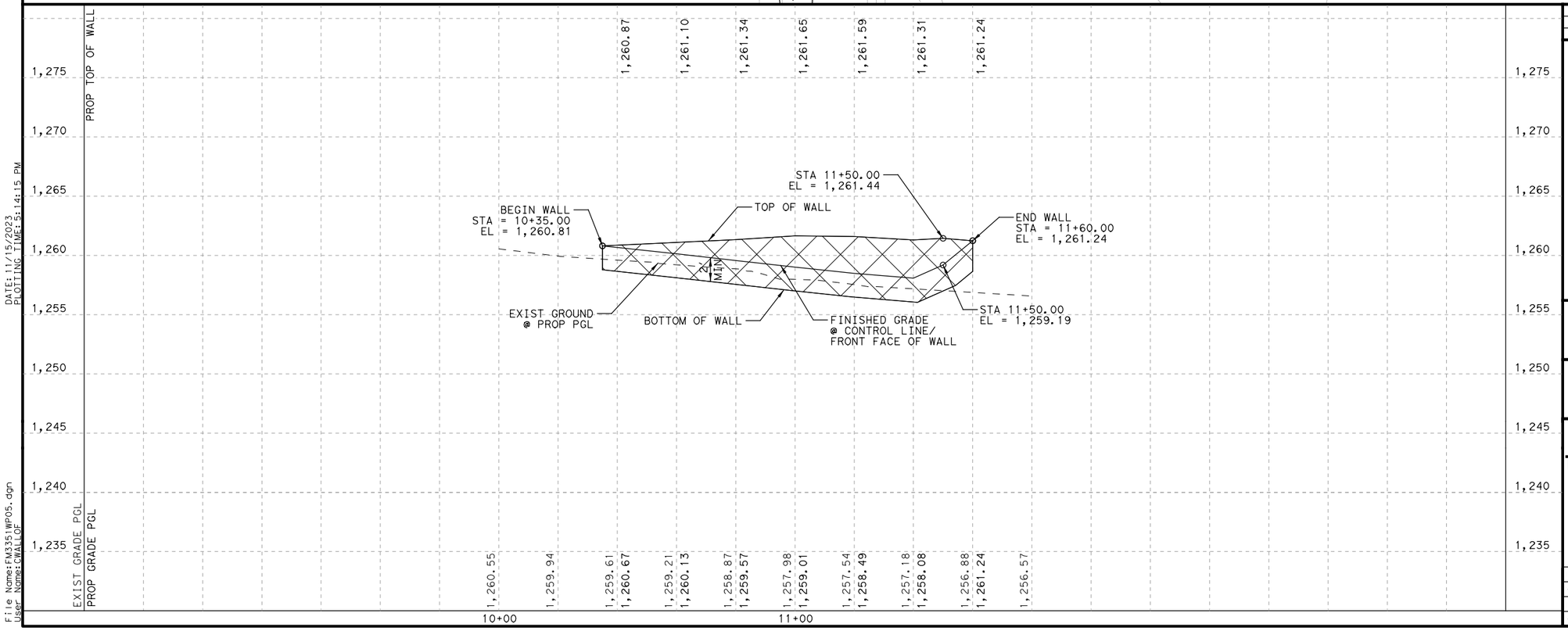
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.



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Cassie Wallof

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Texas Department of Transportation

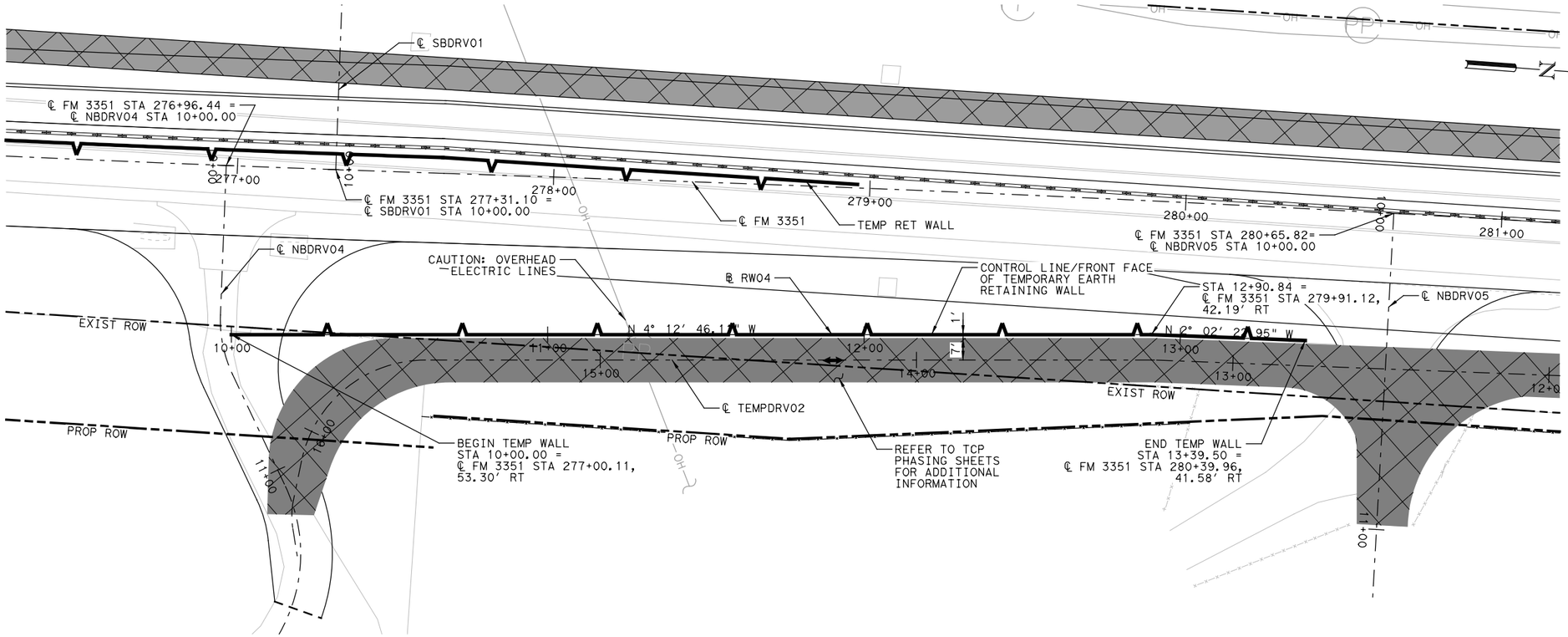
FM 3351 AT CIBOLO CREEK
TEMPORARY RETAINING WALL
PLAN & PROFILE
RW03

SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	34

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:15 PM
File Name: FM3351WP05.dgn
User Name: CWALLOF



0 20 40 60 80
HORIZ. SCALE IN FEET

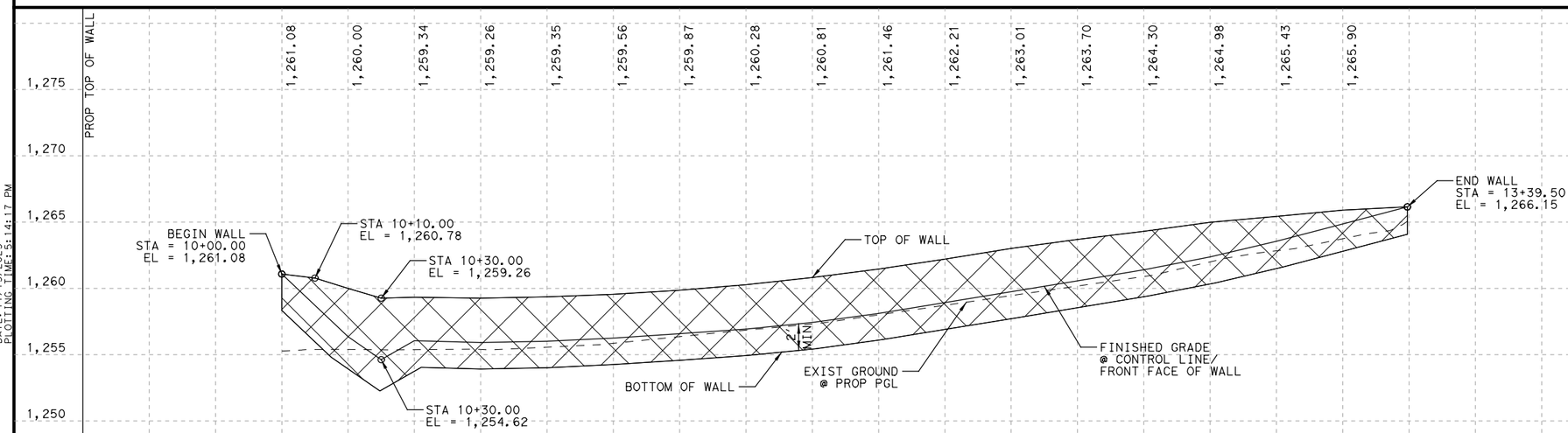
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- TEMP PAVEMENT (TCP PHASE 1)
- TEMPORARY EARTH RETAINING WALL
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE TCP PHASE 3 SHEETS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE MEASURED TO THE FACE OF WALL UNLESS OTHERWISE NOTED.
3. SEE RW(TEW)(MOD) FOR ADDITIONAL DETAILS.
4. SEE TCP PHASE 3 TYPICAL SECTIONS FOR TYPICAL SECTION.



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

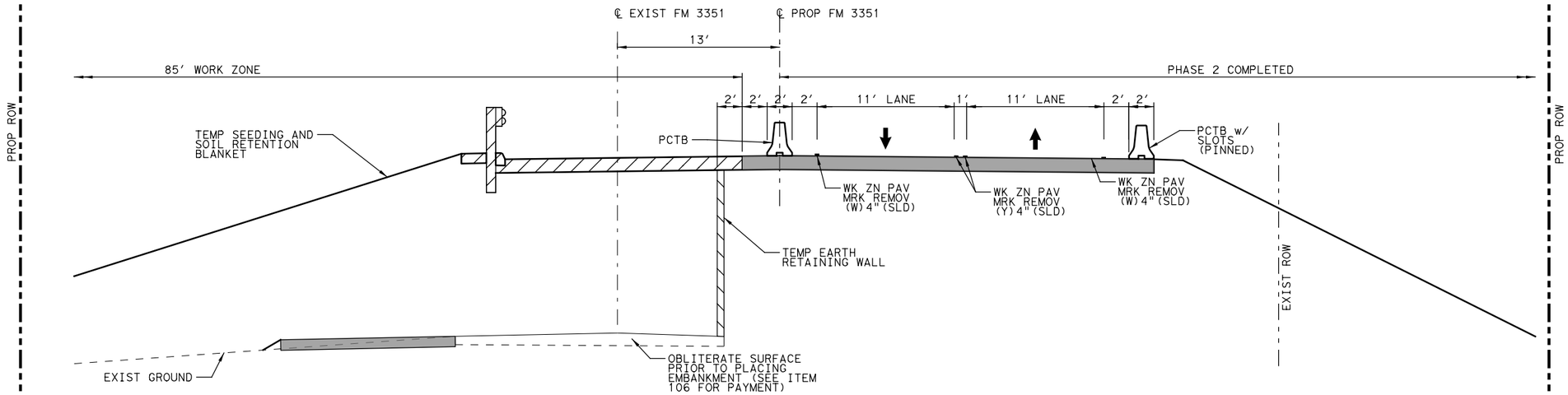
FM 3351 AT CIBOLO CREEK
TEMPORARY RETAINING WALL
PLAN & PROFILE
RW04

SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 1

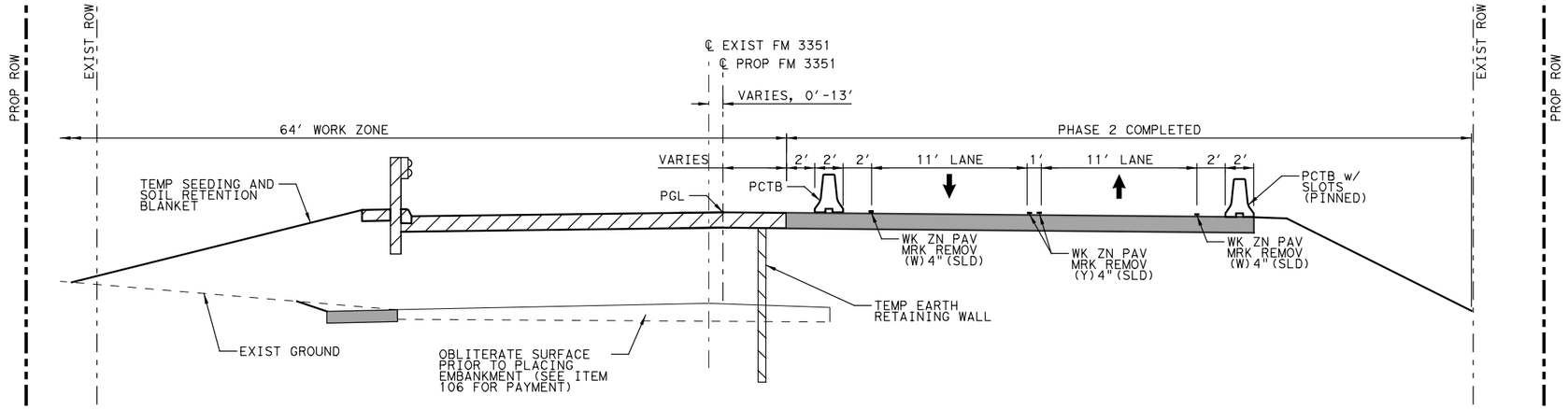
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	35

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:17 PM
File Name: FM3351WP06.dgn
User Name: CWALLOF



PHASE 4 TYPICAL SECTION

STA 256+00 TO STA 264+15
STA 273+65 TO STA 277+65



PHASE 4 TYPICAL SECTION

STA 277+65 TO STA 281+75

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP RETAINING WALL
- TEMP PAVEMENT
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE BRIDGE TRANSVERSE TYPICAL SECTIONS FOR PHASED TYPICAL SECTION ON THE BRIDGE.
2. SEE TCP LAYOUT SHEETS FOR LIMITS OF TEMPORARY PAVEMENT MARKINGS.

NO.	DATE	REVISION	APPR BY

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PROFESSIONAL ENGINEER
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 4
TYPICAL SECTIONS

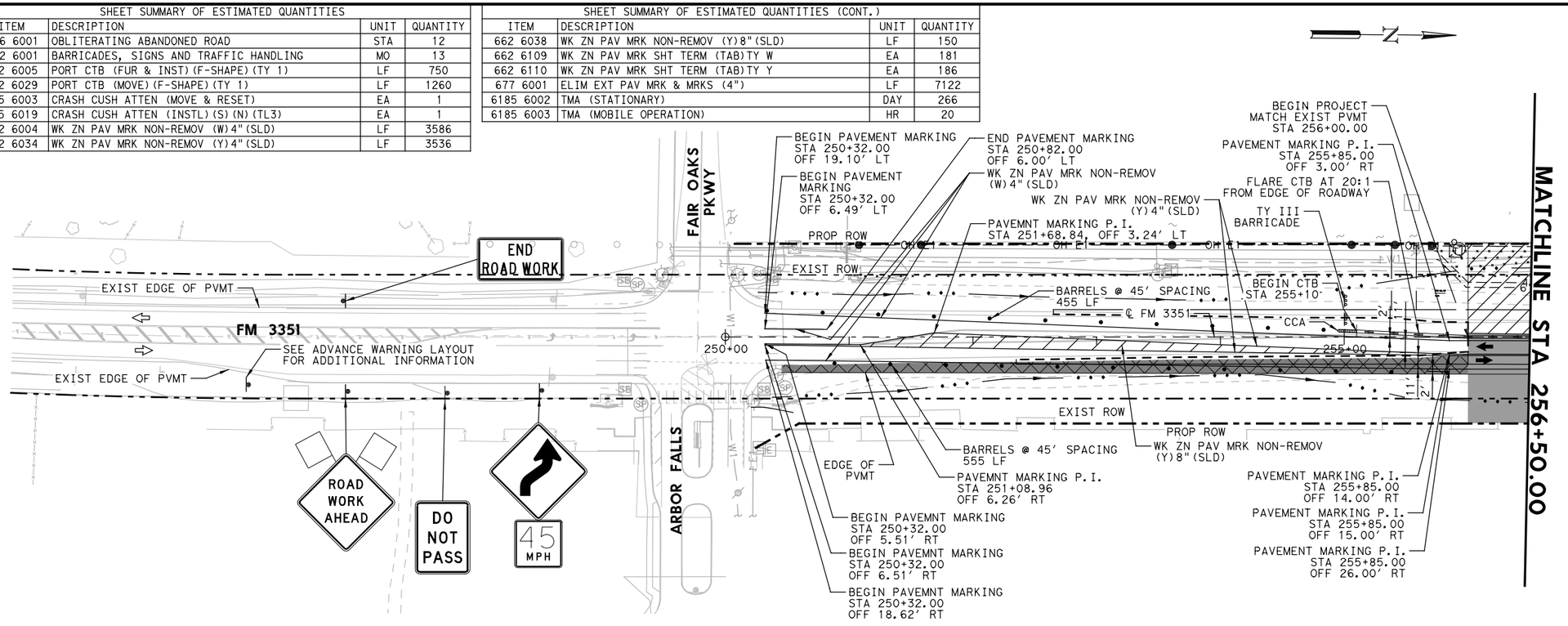
SHEET 1 OF 1

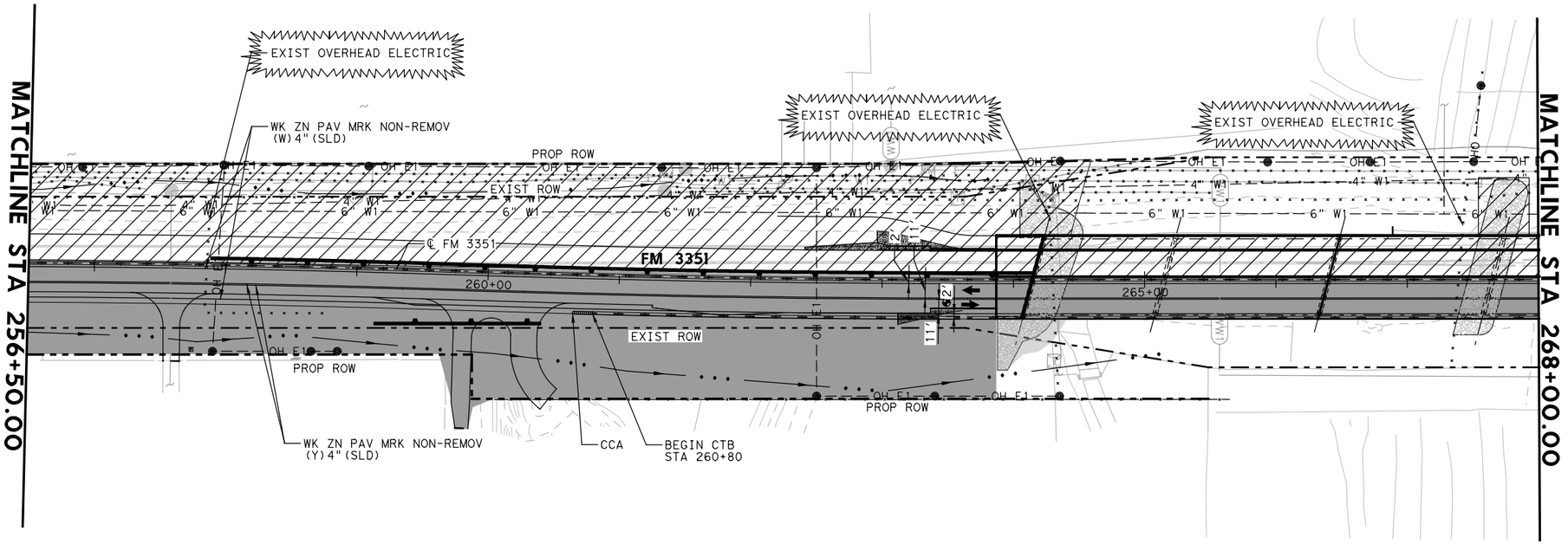
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	36

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1033784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:19 PM
File Name: FM3351CS03.DGN
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
106 6001	OBLITERATING ABANDONED ROAD	STA	12
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13
512 6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	750
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1260
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3586
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3536

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6038	WK ZN PAV MRK NON-REMOV (Y)8"(SLD)	LF	150
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	181
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	186
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	7122
6185 6002	TMA (STATIONARY)	DAY	266
6185 6003	TMA (MOBILE OPERATION)	HR	20





0 50 100 150 200
HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

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120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023
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HDR Engineering Inc.
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Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 4

BEGIN TO STA 268+00.00

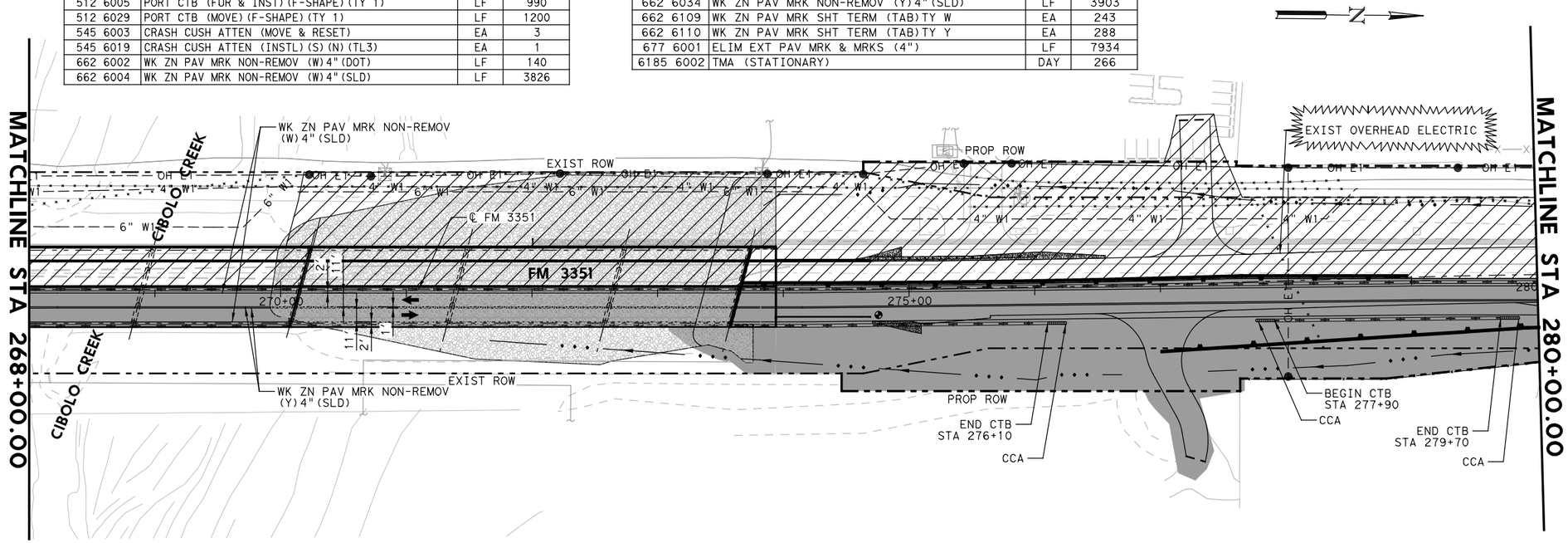
SCALE: 1"=100' SHEET 1 OF 2

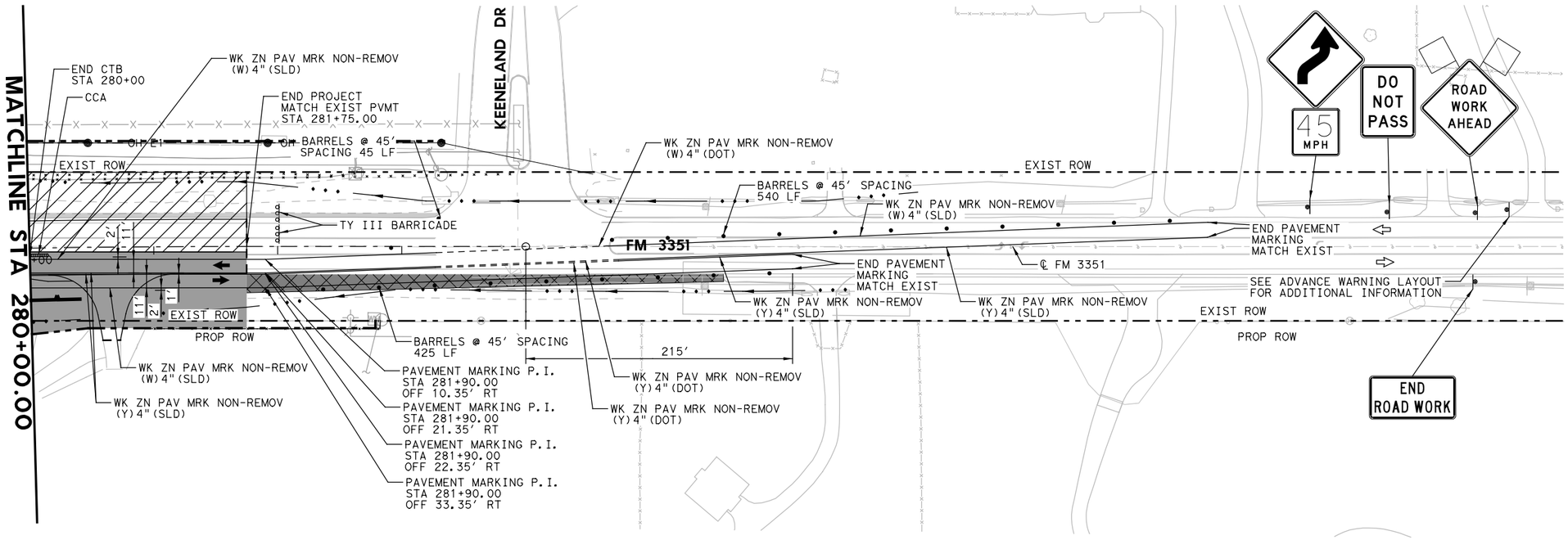
DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	37

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:21 PM
File Name: FM3351CL31.dgn
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
106 6001	OBLITERATING ABANDONED ROAD	STA	13.75
512 6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	990
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1200
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	3
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1
662 6002	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	LF	140
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	3826

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6033	WK ZN PAV MRK NON-REMOV (Y)4"(DOT)	LF	296
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3903
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	243
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	288
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	7934
6185 6002	TMA (STATIONARY)	DAY	266





0 50 100 150 200
HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023
Cassie Wallof

HDR Engineering Inc.
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Texas Department of Transportation

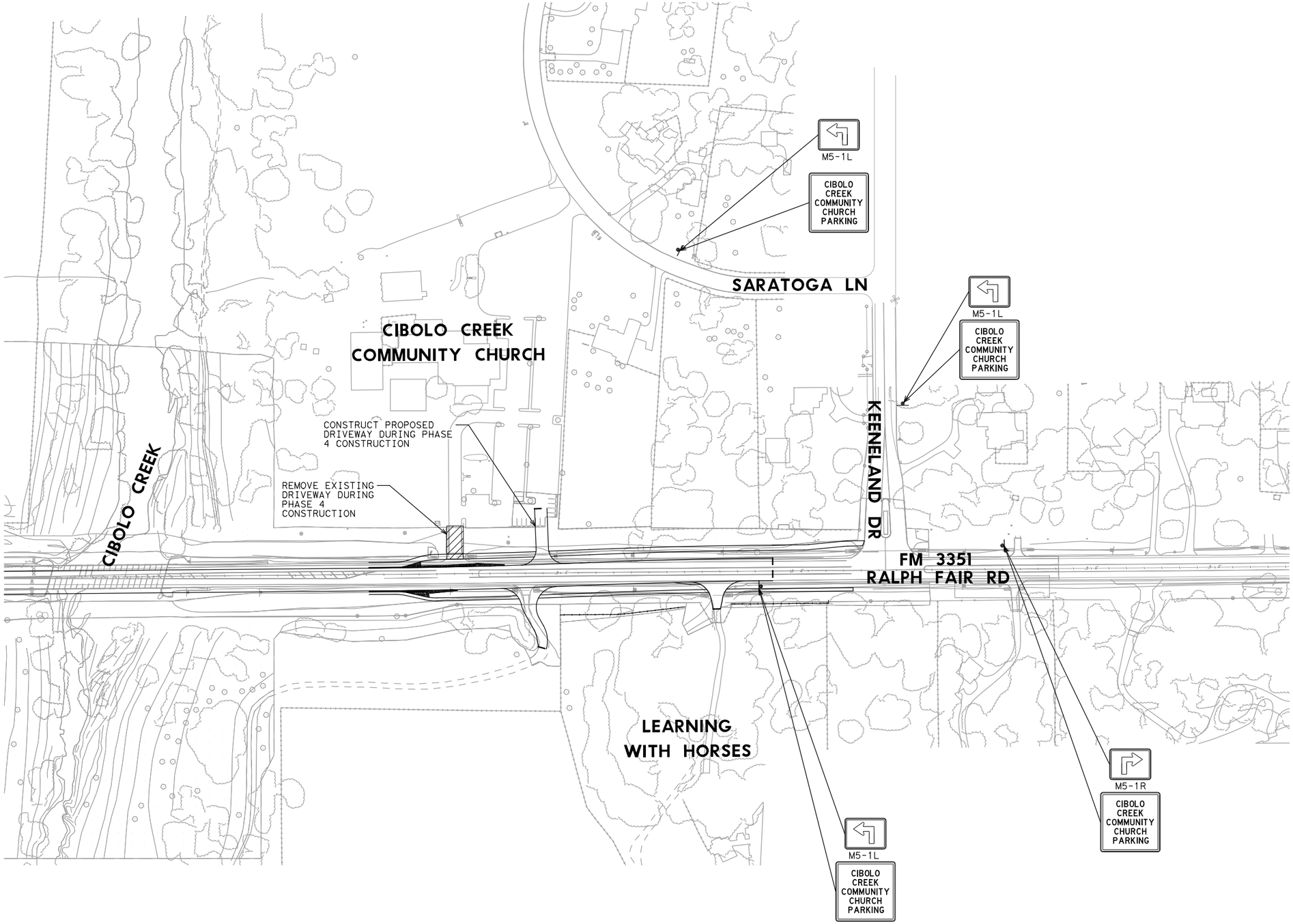
FM 3351
AT CIBOLO CREEK
TCP PHASE 4

STA 268+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	38

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:23 PM
File Name: FM3351CL32.dgn
User Name: CWALLOF



NOTES:
1. DURING PHASE 4 CONSTRUCTION, DETOUR CIBOLO CREEK COMMUNITY CHURCH PARKING ACCESS FROM TO KEENELAND DRIVE.
2. CONTRACTOR SHALL PROVIDE SIGNS AS SHOWN OR AS DIRECTED BY THE ENGINEER.

NO.	DATE	REVISION	APPR BY

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11/15/2023
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Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

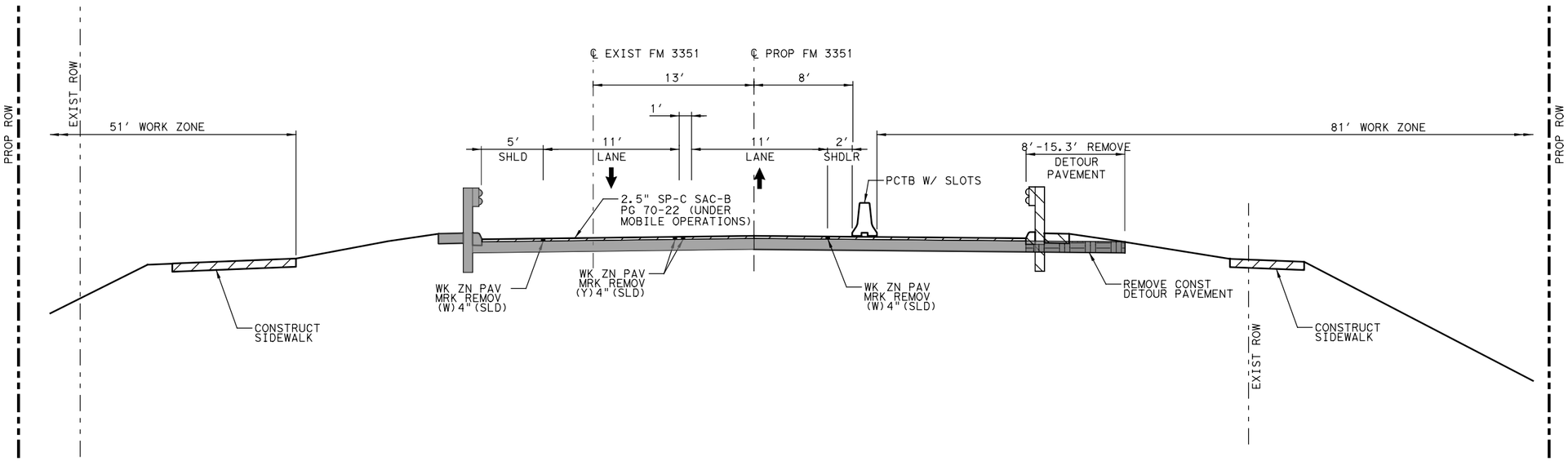
Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
PHASE 4 CHURCH PARKING
DETOUR LAYOUT

SCALE: 1"=200' SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: NSL	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: NSL	COMAL	SAT	3212	05	013	39

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:25 PM
File Name: FM3351CL33.dgn
User Name: CWALLOF



LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP RETAINING WALL
- TEMP PAVEMENT
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE BRIDGE TRANSVERSE TYPICAL SECTIONS FOR PHASED TYPICAL SECTION ON THE BRIDGE.
2. SEE TCP LAYOUT SHEETS FOR LIMITS OF TEMPORARY PAVEMENT MARKINGS.

PHASE 5 STEP 1 TYPICAL SECTION

STA 256+00 TO 264+15
STA 273+65 TO 281+75

NO.	DATE	REVISION	APPR BY

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120398
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11/15/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TCP PHASE 5
TYPICAL SECTIONS

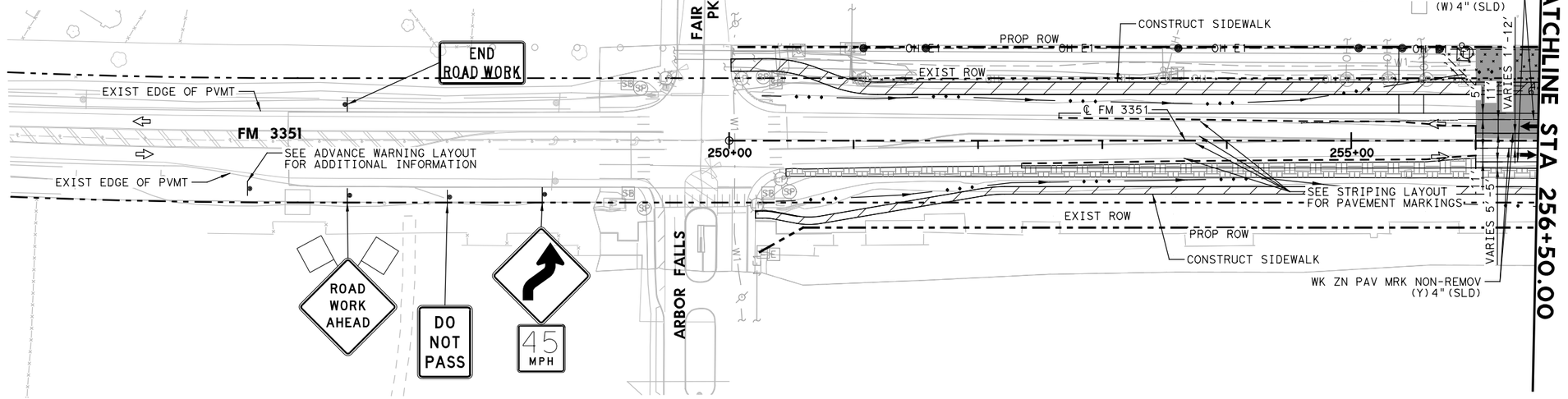
SHEET 1 OF 1

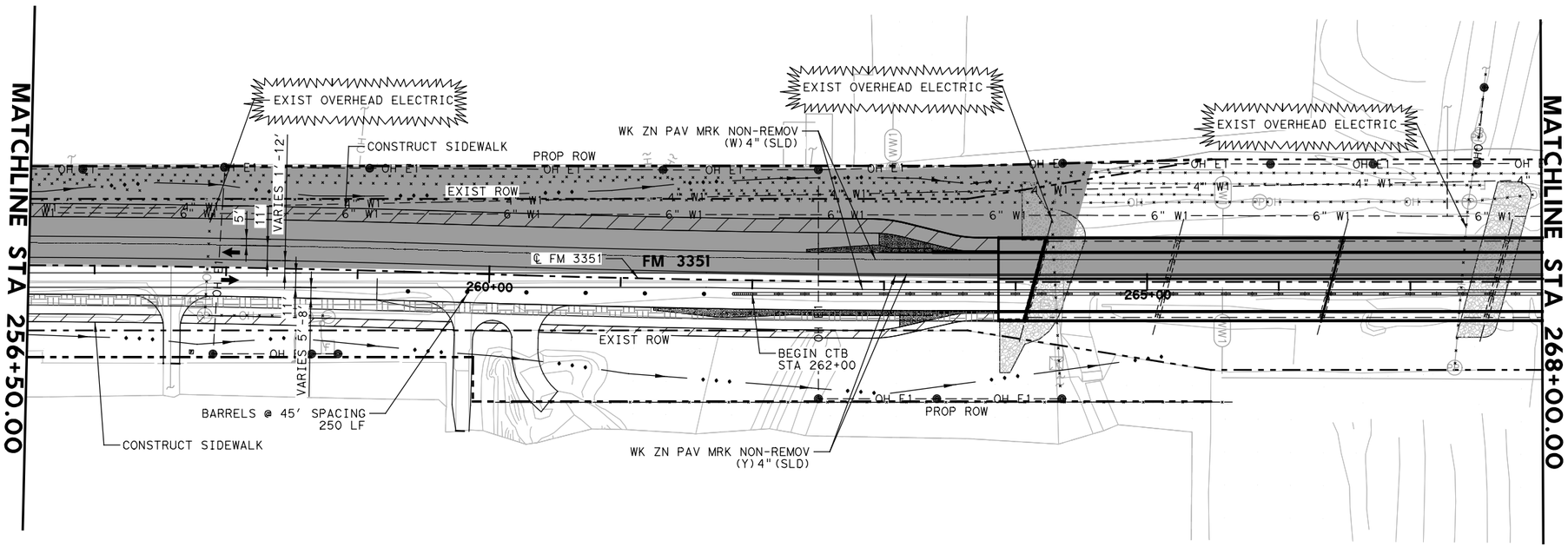
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: JTF	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	40

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:27 PM
File Name: FM3351CS04.DGN
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	600
512 6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	2010
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545 6005	CRASH CUSH ATTEN (REMOVE)	EA	2
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	2400
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	2400

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	121
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	121
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	7122
6185 6002	TMA (STATIONARY)	DAY	126
6185 6003	TMA (MOBILE OPERATION)	HR	40





0 50 100 150 200
HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

NO.	DATE	REVISION	APPR BY

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FM 3351
AT CIBOLO CREEK
TCP PHASE 5

BEGIN TO STA 268+00.00

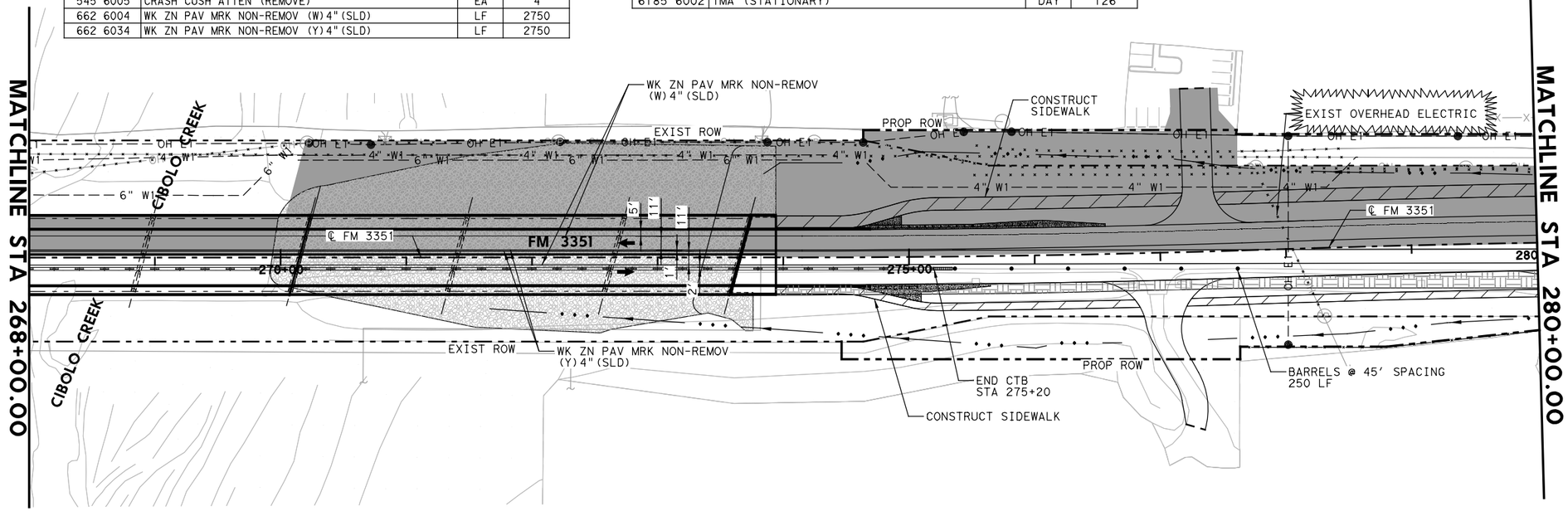
SCALE: 1"=100' SHEET 1 OF 2

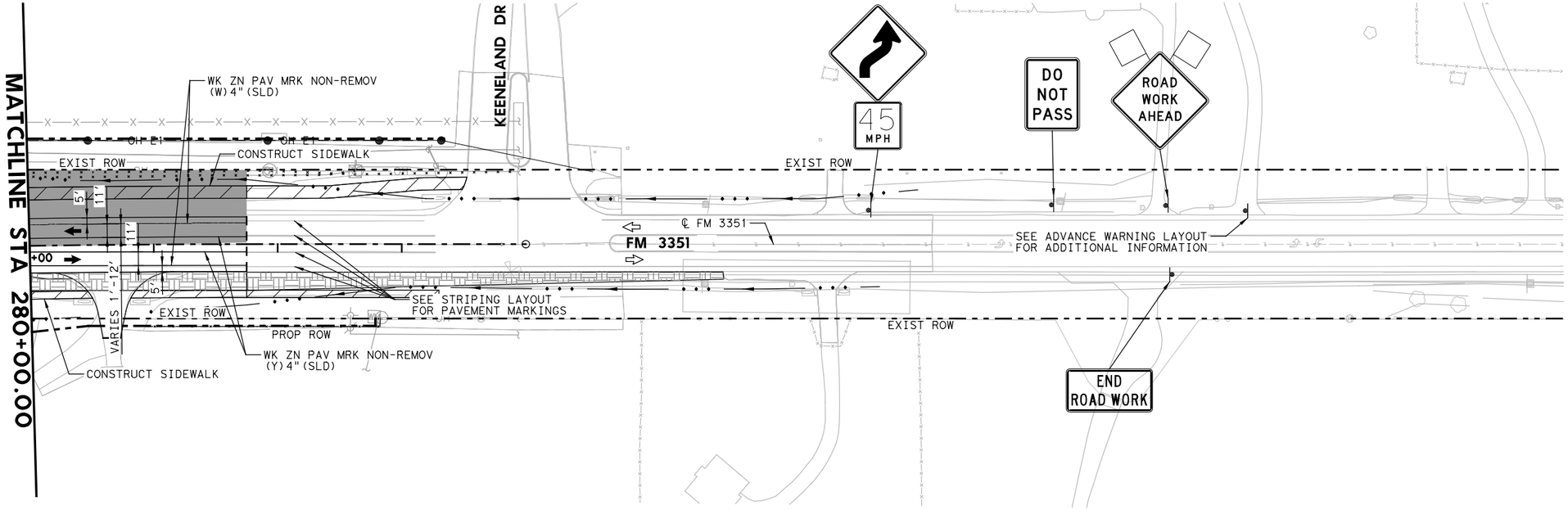
DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	41

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:29 PM
File Name: FM3351CL41.dgn
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
512 6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	720
512 6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	2190
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545 6005	CRASH CUSH ATTEN (REMOVE)	EA	4
662 6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	2750
662 6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	2750

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	139
662 6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	139
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	7934
6185 6002	TMA (STATIONARY)	DAY	126





0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- TEMP DETOUR PVMT CONST THIS PHASE
- TEMP DETOUR PVMT CONST PREVIOUS PHASE
- STONE PROTECTION RIPRAP
- REMOVE TEMP PAVEMENT

NOTES:
1. SEE TCP (2-1)-18 AND TCP (2-3)-18 FOR SIGN SPACING.
2. WHEN BARRIER IS LESS THAN 2 FT AWAY FROM TRAVEL LANE AND SPACE PERMITS, OFFSET CRASH CUSHION BY PROVIDING 20:1 TAPER AT END OF BARRIER.

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Texas Department of Transportation

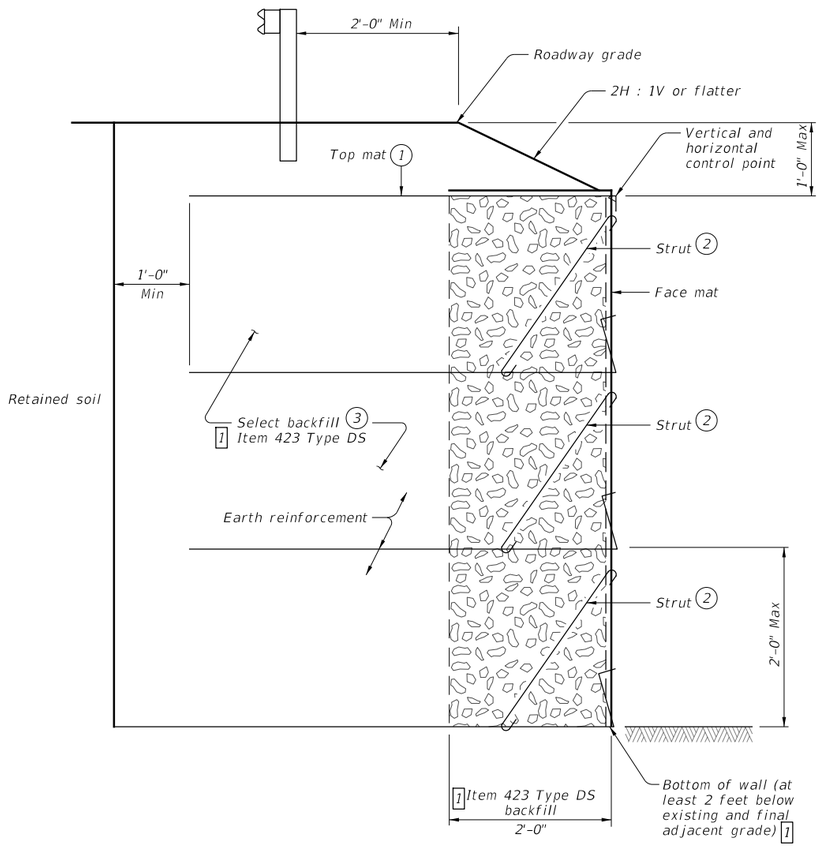
FM 3351
AT CIBOLO CREEK
TCP PHASE 5

STA 268+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

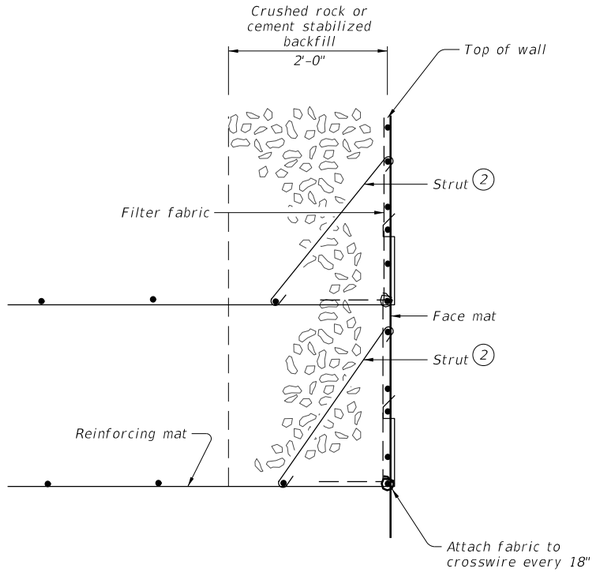
DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	42

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 5:14:31 PM
File Name: FM3351CL42.dgn
User Name: CWALLOF



TYPICAL SECTION

(Showing top mat option.)



DETAIL OF WALL FACE

(Showing strut option.)

(1) Provide top mat to stabilize top of wall. Contractor may propose alternate method to stabilize top of wall for review.

(2) Provide intermediate struts to stabilize face. Wall supplier may propose alternate methods of face stabilization for review.

(3) Shop drawings must include drainage provisions and details for backfill composed of:
[1] Item 423 Type DS

SPECIAL NOTE - FACE CONSTRUCTION

When constructing wire faced walls, it is critical that the area immediately behind the face mat be completely filled. Failure to fill and compact this area will result in bulging of the face mats and settlement of the top of wall. The filter fabric shall closely follow the contours of the face unit, with particular attention paid to the lower corner of the basket. Pull the fabric into the corner and attach to the basket with hog rings or tie wire. Extend the coarse rock or cement stabilized backfill in the 2-foot zone behind the face completely to the top of the face mat. Take particular care not to leave a gap or void below the next layer of earth reinforcement.

[1] Contractor is responsible for internal wall stability and shall submit signed and sealed calculations and construction drawings.

DESIGN CRITERIA NOTES:

Design Parameters:
Base design of retaining walls on the following design parameters unless stated elsewhere in the plans:

[1] Retained Soil – Type C as defined in the General Notes	Unit Weight = 120 pcf ϕ = 30° C = 0 psf
[1] Select Backfill – Item 423 Type DS	Unit Weight = 105 pcf for sliding, overturning and eccentricity Unit Weight = 125 pcf for bearing ϕ = 34° C = 0 psf

Limit allowable stresses and pullout of earth reinforcement in accordance with current AASHTO Standard Specifications for Highway Bridges and Interim Specifications.

Stability Criteria:
Base design on the following factors of safety:

Sliding along the base of the structure	Factor of Safety ≥ 1.5
Overturning	Factor of Safety ≥ 2.0
Pullout of Earth Reinforcement	Factor of Safety ≥ 1.5

Design the wall such that the base pressure resultant falls within the middle third of the retaining wall.

EARTH REINFORCEMENT:

Space vertical earth reinforcement at 24 inch maximum.
Provide earth reinforcement lengths adhering to the following:
[1] Greater of 1.0H or 10 feet, with H defined as the wall height from the roadway grade to the bottom of the wall.
Utilize a minimum W4.5 wire size for welded wire earth reinforcement. Space longitudinal wire at maximum of 12 inches and transverse wire at a maximum of 24 inches.
Geogrid earth reinforcement is permissible. If geogrid is to be used, provide a detail showing the connection between the welded wire face basket and the geogrid earth reinforcement.
Provide non-metallic or galvanized reinforcement for any temporary earth wall reinforcement that will be placed in the reinforced volume of a permanent MSE wall.

WALL FACE:

Provide welded wire in facing with a minimum W4.5 wire size. Space wire at 6 inches maximum in both the horizontal and vertical directions. Design the facing to maintain a vertical position during wall backfilling. Utilize wire struts, external bracing, or other means which provide acceptable performance. Stop construction if the face does not remain vertical during wall backfilling until the system is modified to meet this requirement.
Provide angled struts or a top mat to stabilize the top basket face. Space struts at 24 inch maximum.

GENERAL NOTES:

Sections shown are for informational purposes only. Determine specific geometry based on wall layouts and other plan information.
Extend the select backfill specified for use within the temporary earth wall select volume a minimum of 1 foot horizontally beyond the end of the earth reinforcement.
[1] Prior to temporary earth retaining wall construction, within the reinforced and retained fill zones, remove all organics, delterious materials, loose rock fragments, brown to dark brown clay soil, and any existing fill, thereby exposing tan granular alluvial soil and/or weathered limestone. This excavation is considered subsidiary to Item 423.

Texas P.E. Firm Registration No. F-754

For External Stability Only, which includes global stability, sliding, overturning, bearing and eccentricity.

STATE OF TEXAS
THOMAS C. WESLING
81589
LICENSED
PROFESSIONAL ENGINEER

August 24, 2023

Texas Department of Transportation

Bridge Division Standard

TEMPORARY EARTH RETAINING WALL

RW(TEW)(MOD)

FILE: RW-TEW-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE
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REVISIONS	3212	05	013	FM 3351
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	SAT	COMAL		43

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone 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), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

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

1. 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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	3212	05	013	FM 3351
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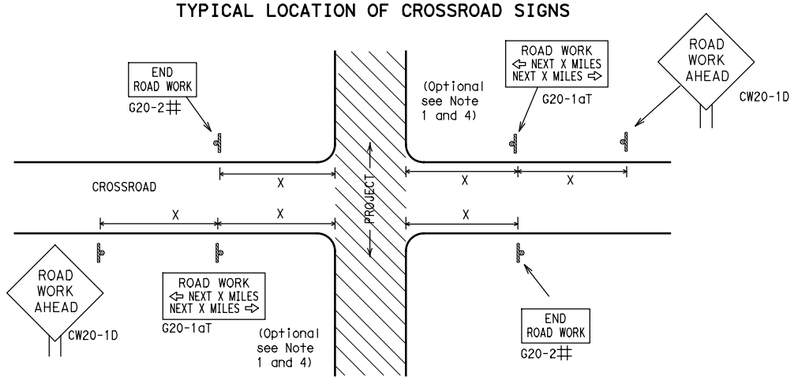
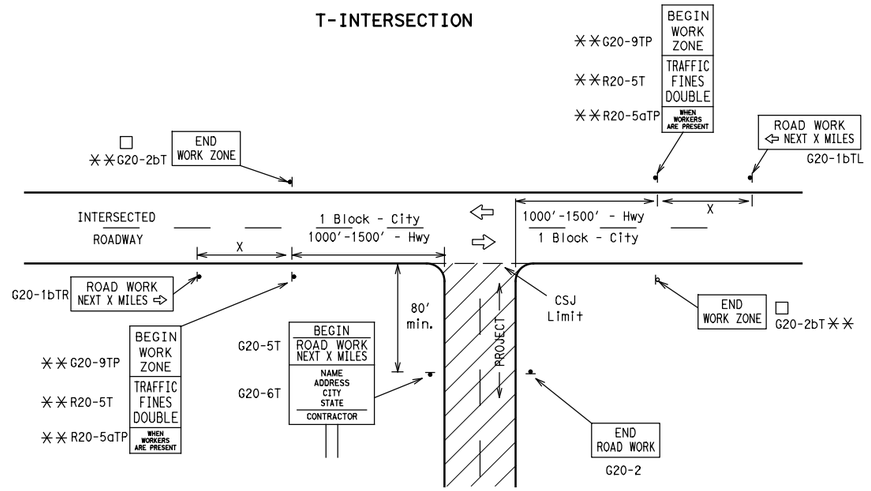
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. 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.
3. 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.
4. 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.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. 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.

T-INTERSECTION



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

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✳	✳[3]

✳ 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.

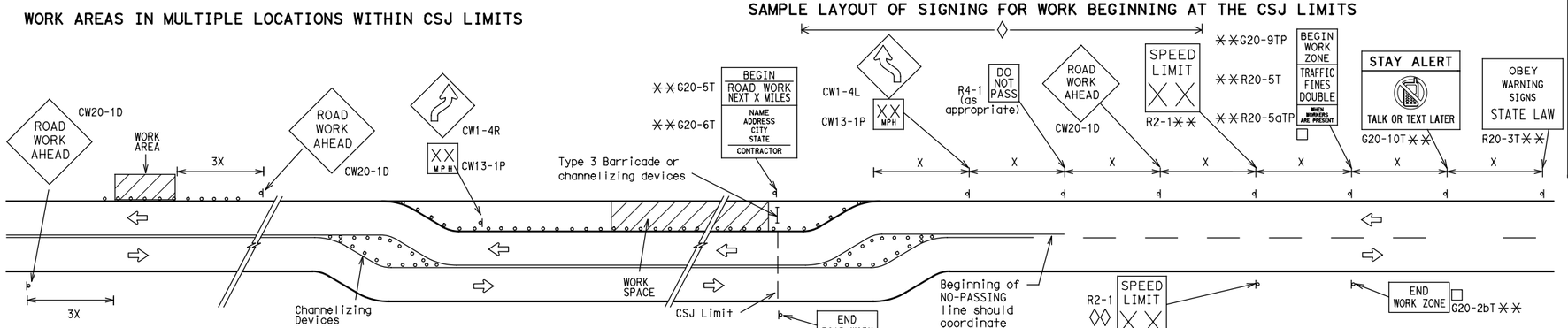
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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 sizes.

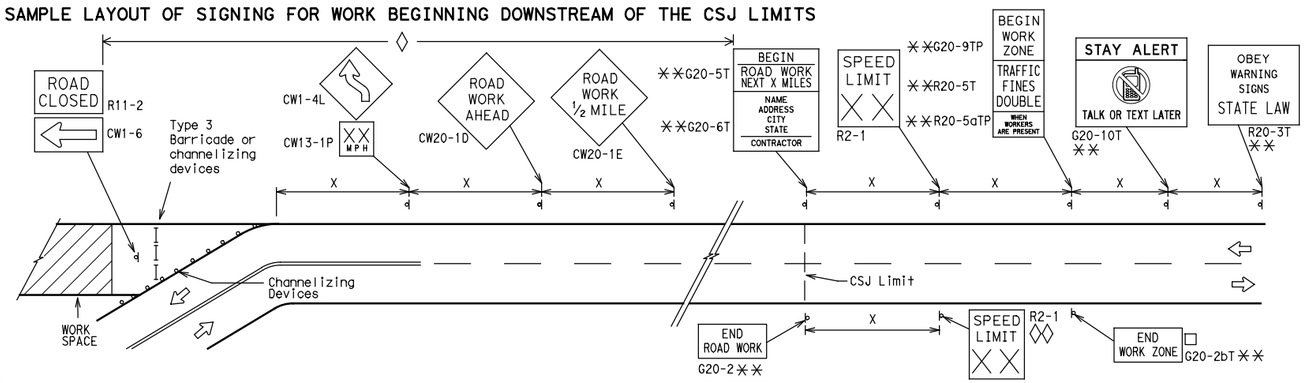
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

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



NOTES

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. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) 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 Control Plan.

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

LEGEND

⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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7-13 5-21	SAT	COMAL		45

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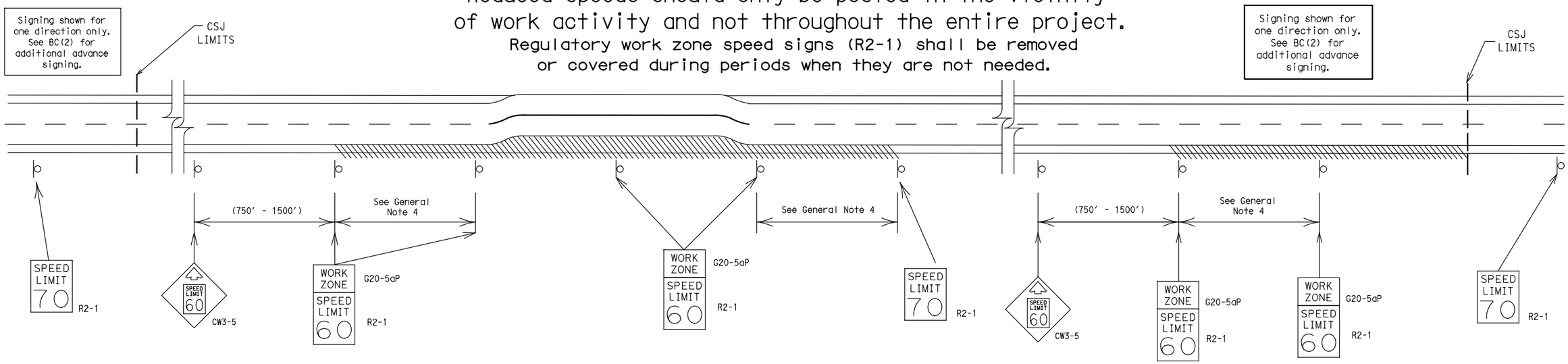
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



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

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. 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
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. 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.
9. 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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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	DIST	COUNTY		SHEET NO.
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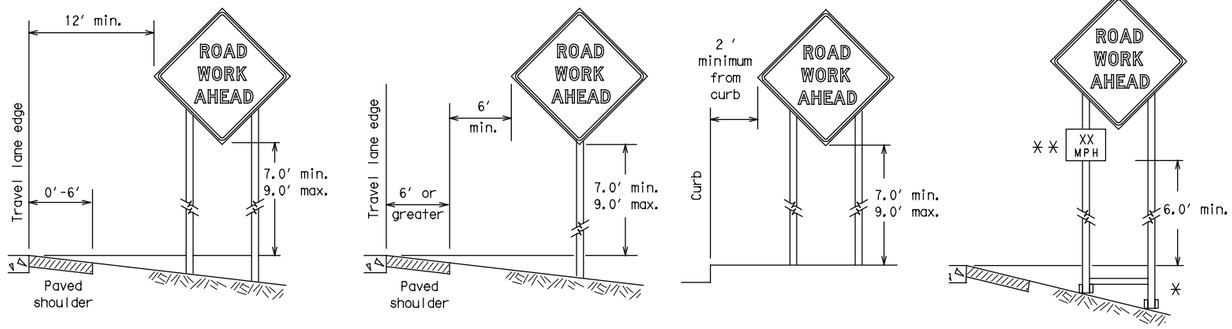
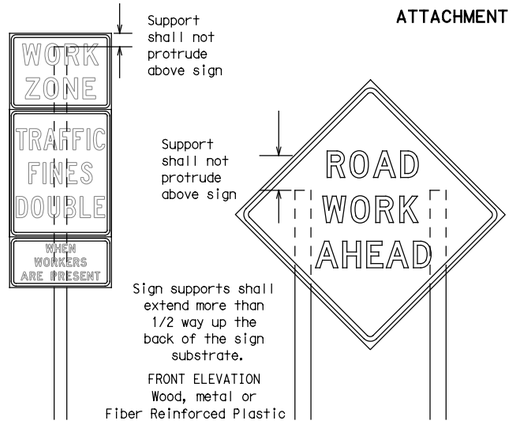
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

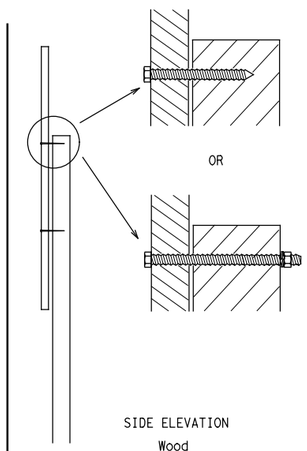


⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⚹⚹ 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.

ATTACHMENT FOR SIGN SUPPORTS





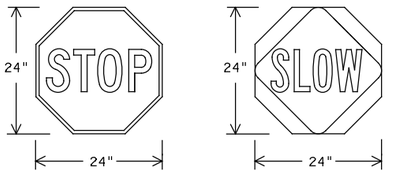
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two 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.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. 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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} 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

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, 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.
2. 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.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. 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.
5. 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 CWZTCD 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.
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 to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. 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.
5. 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.
6. 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 regarding 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.
7. 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.
8. 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.
9. 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 6)

1. 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.
   b. 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.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. 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 plaques mounted below other signs.
2. 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.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. 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.
5. 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

1. 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

1. 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.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. 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).
2. 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

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. 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.
3. 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.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. 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.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. 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.
7. 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.
8. 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	COMAL		47

DATE: 11/15/2023 5:47:04 PM
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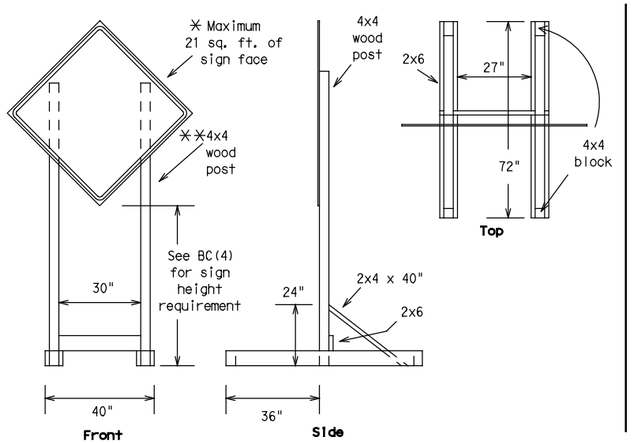
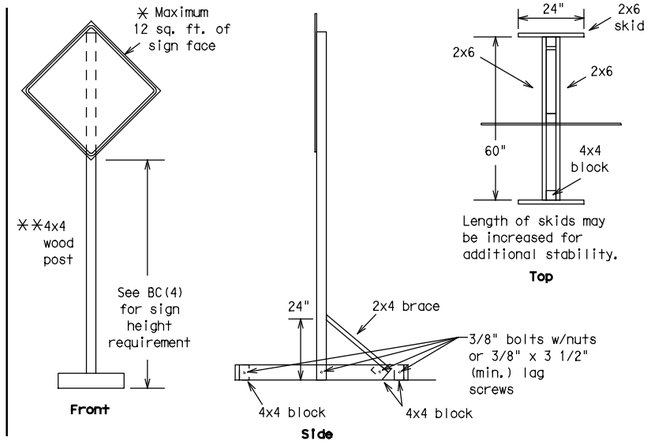
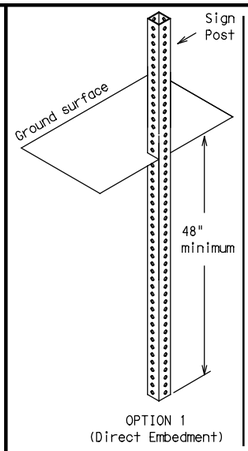
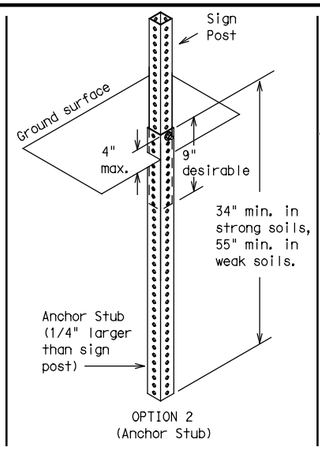


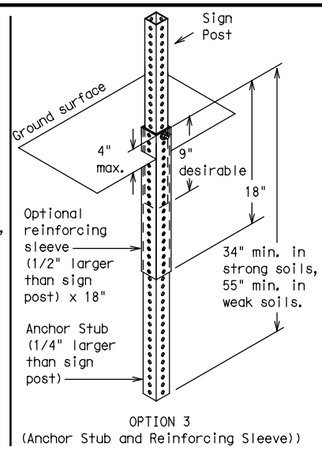


SKID MOUNTED WOOD SIGN SUPPORTS

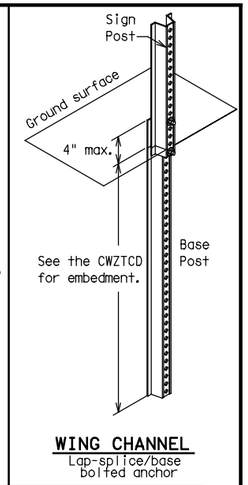
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







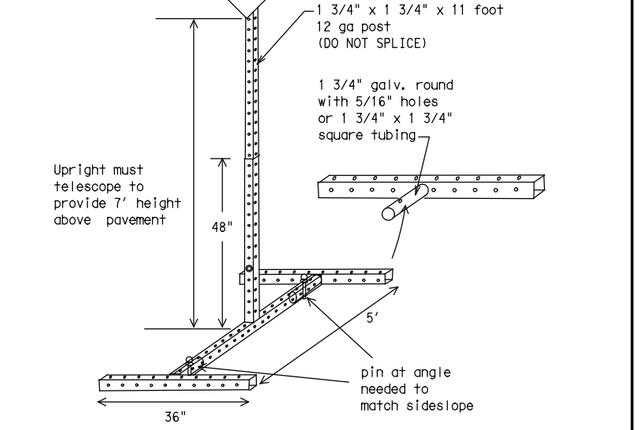
PERFORATED SQUARE METAL TUBING

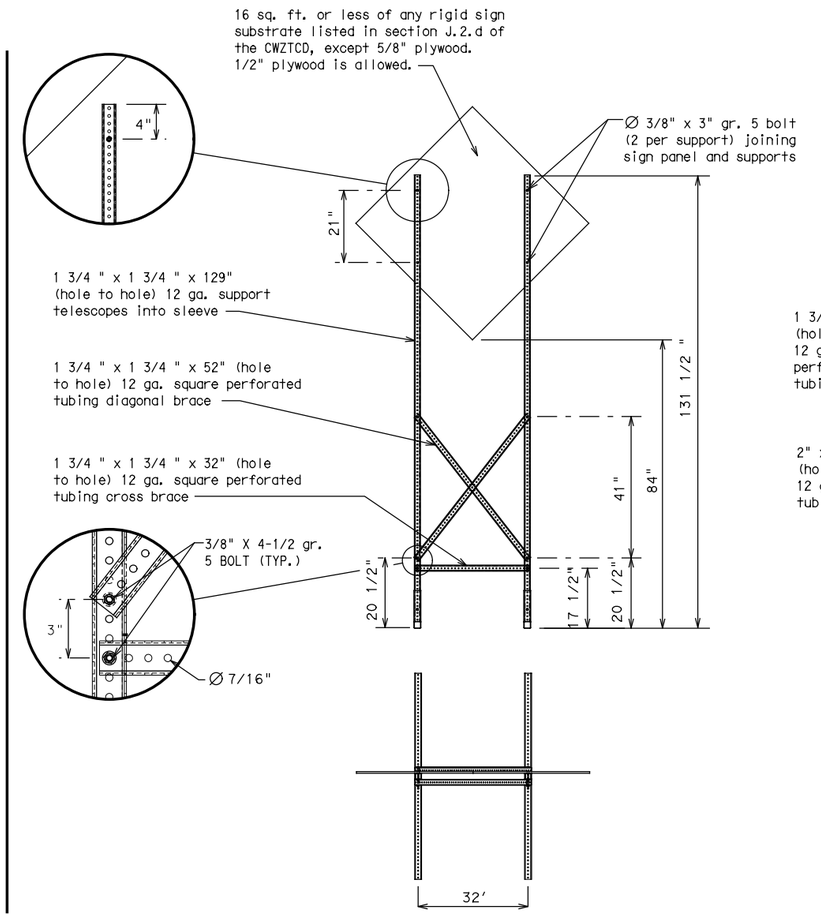


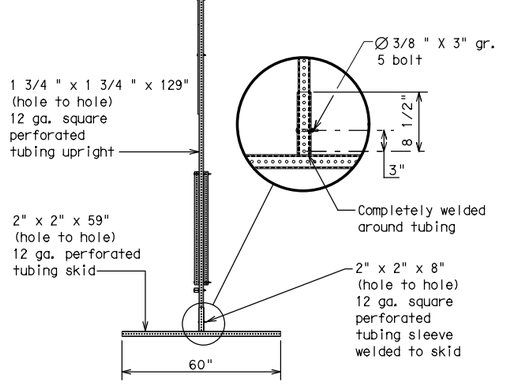
WING CHANNEL
Lap-splice/base bolted anchor

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.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

1. 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 connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	COMAL		48

DATE: 11/15/2023 5:47:05 PM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. 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.
3. 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 itself.
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.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. 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
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway 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

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT ✳

✳ LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE ✳

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

✳✳ Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

✳✳ See Application Guidelines Note 6.

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

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.
3. 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.
6. AHEAD may be used instead of distances if necessary.
7. FT 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 location phase is used.

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

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.
3. 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.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	COMAL		49

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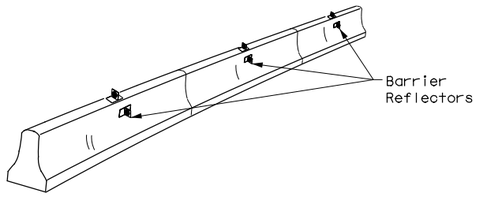
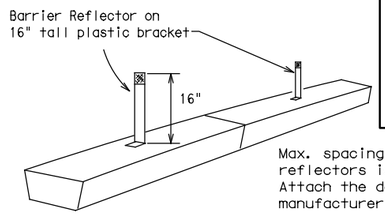
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



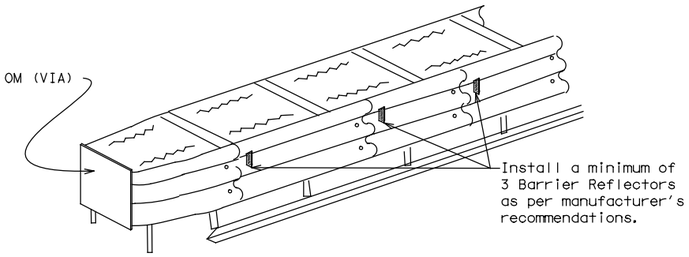
CONCRETE TRAFFIC BARRIER (CTB)

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 recommendations.
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.



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

LOW PROFILE CONCRETE BARRIER (LPCB) USED 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.

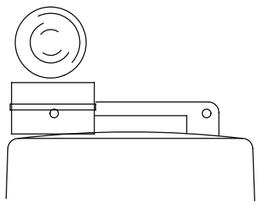
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

WARNING LIGHTS

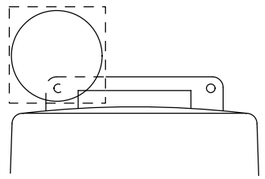
1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this 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.



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

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.



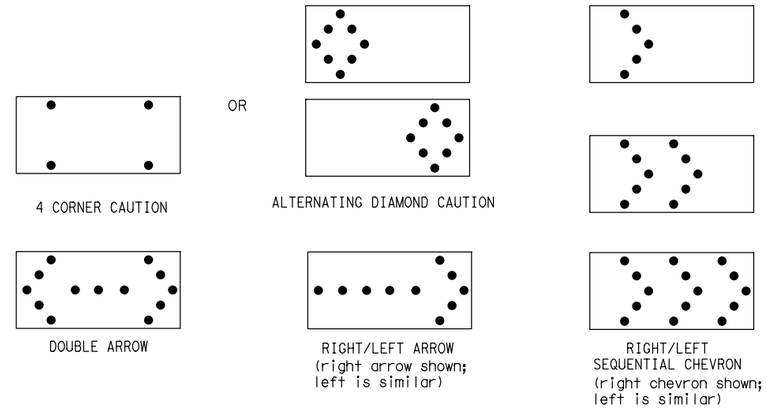
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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 on the CWZTCD.
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.
3. 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.
6. The straight line caution display is NOT ALLOWED.
7. 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.
8. 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 SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 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

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. 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.
6. 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.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	COMAL		50

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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:

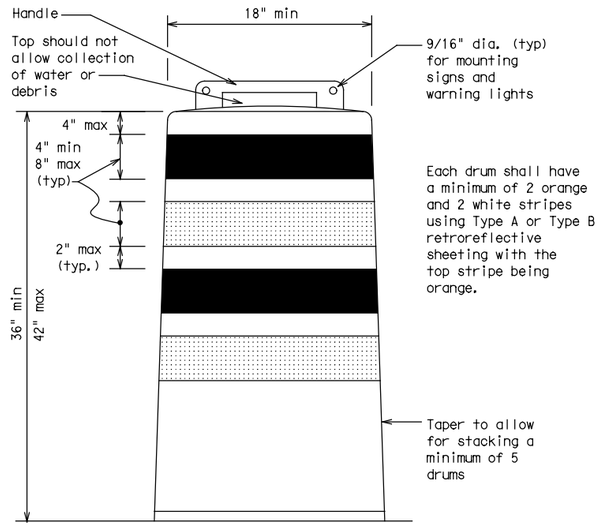
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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 compliant sign.
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 width.
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.

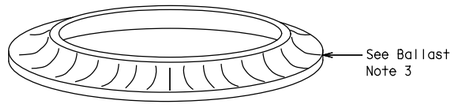
RETROREFLECTIVE SHEETING

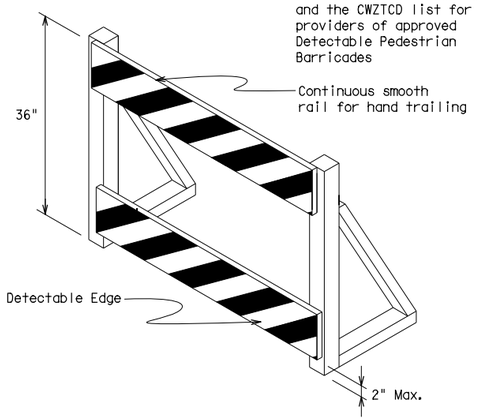
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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 surface.

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.
3. 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.

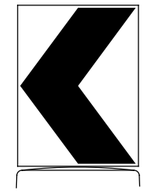




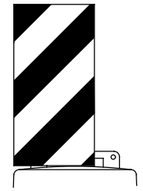


DETECTABLE PEDESTRIAN BARRICADES

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 path.
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 movements.
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



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

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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_{FL} or Type C_{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 connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3212	05	013	FM 3351
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SAT	COMAL		51
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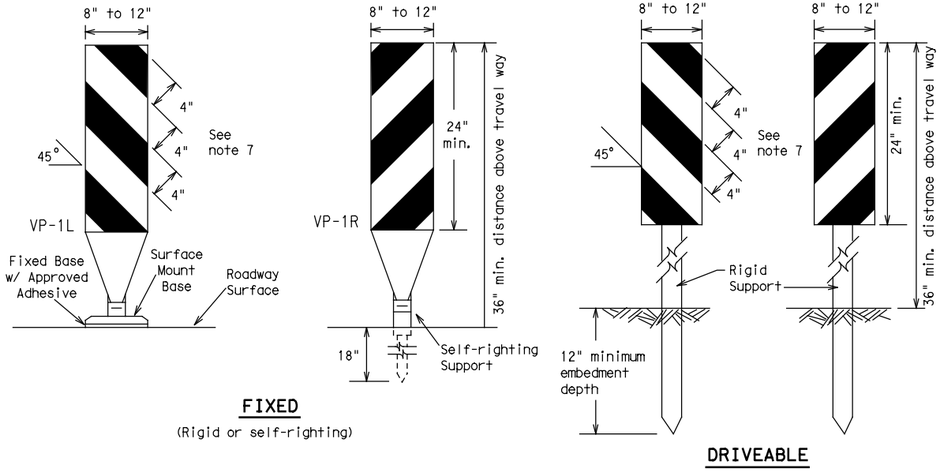
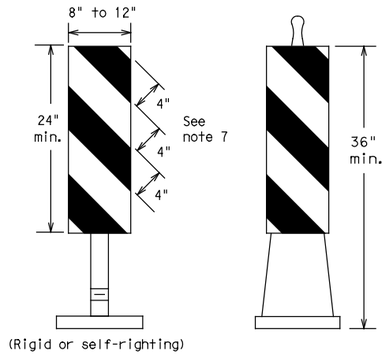


FIXED
(Rigid or self-righting)

DRIVEABLE

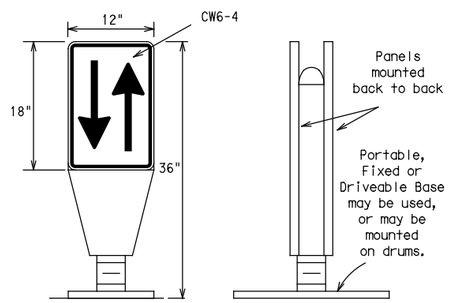


(Rigid or self-righting)

PORTABLE

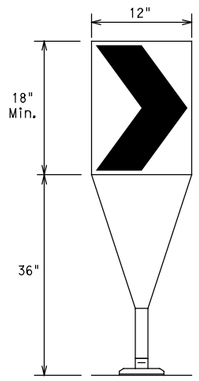
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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" (CWZTCD).
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" cones or VPs.
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 non-reflective 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)



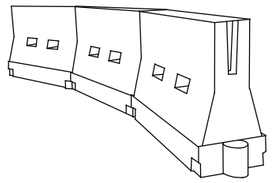
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 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.
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.
6. 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

1. 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.
4. 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.
5. 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 Speed	Formula	Minimum Desirable Taper Lengths ✻✻			Suggested Maximum Spacing of Channelizing Devices	
		10′ Offset	11′ Offset	12′ Offset	On a Taper	On a Tangent
30	$L=\frac{WS^2}{60}$	150′	165′	180′	30′	60′
35		205′	225′	245′	35′	70′
40		265′	295′	320′	40′	80′
45	L = WS	450′	495′	540′	45′	90′
50		500′	550′	600′	50′	100′
55		550′	605′	660′	55′	110′
60		600′	660′	720′	60′	120′
65		650′	715′	780′	65′	130′
70		700′	770′	840′	70′	140′
75		750′	825′	900′	75′	150′
80		800′	880′	960′	80′	160′

✻✻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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3212	05	013	FM 3351
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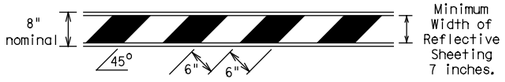
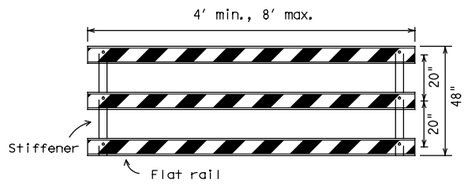
TYPE 3 BARRICADES

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.
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.
4. 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.
5. 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.
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. 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.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



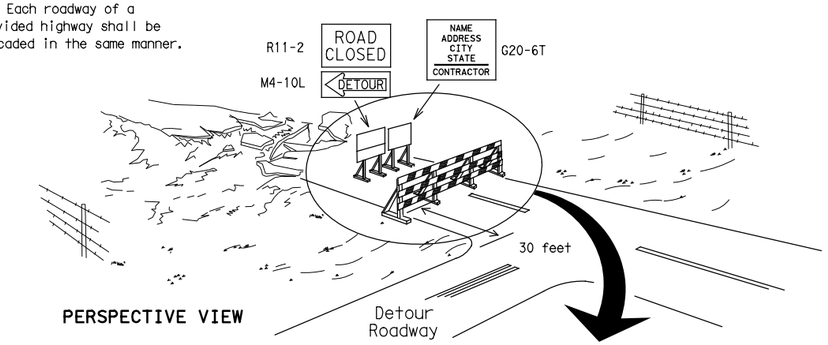
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

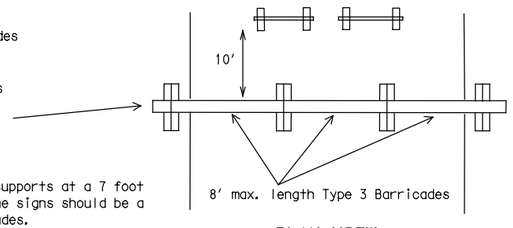
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

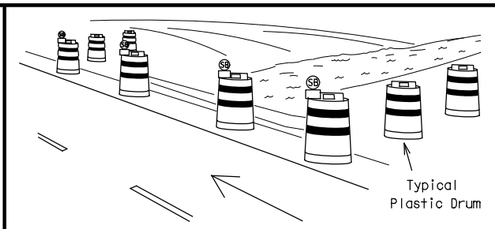
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

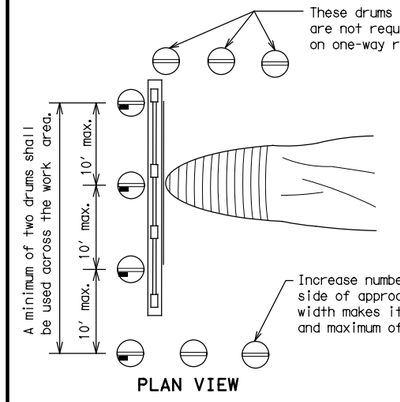
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

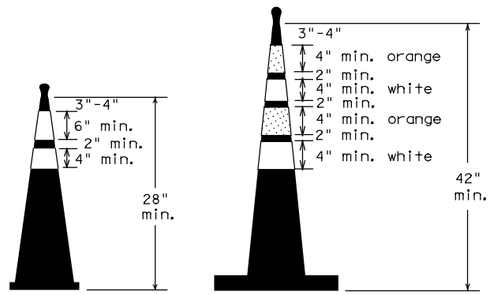
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

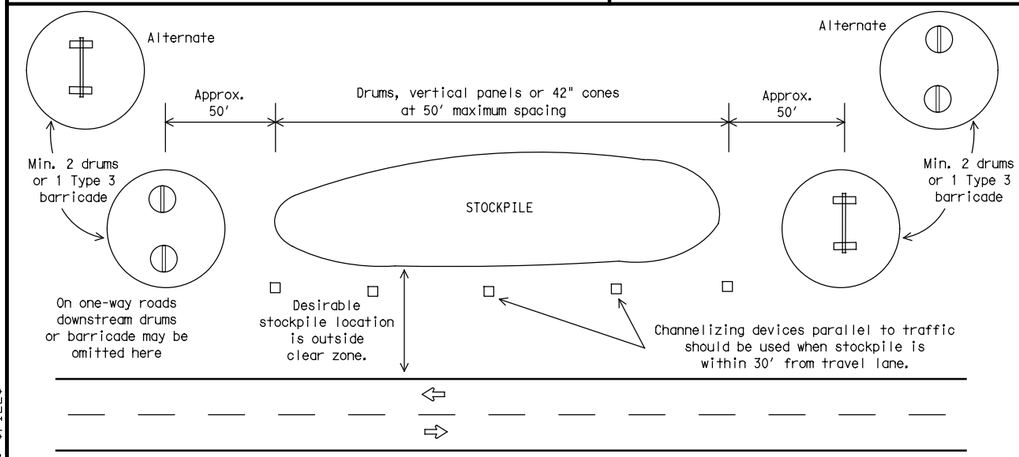
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	COMAL		53

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. 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.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. 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.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. 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

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

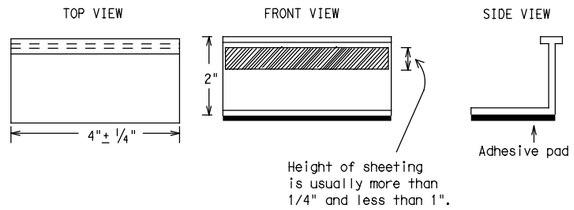
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. 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 Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. 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.
2. 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.
3. 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".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. 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.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. 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

1. 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 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

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. 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)	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).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	SAT	COMAL		54
11-02 8-14				

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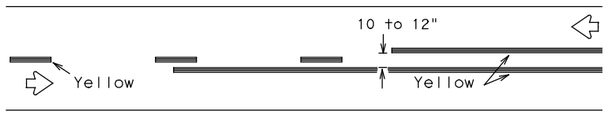
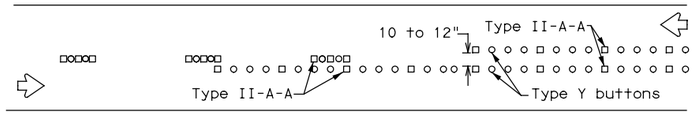
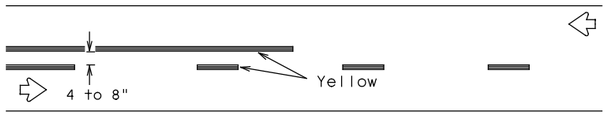
PAVEMENT MARKING PATTERNS



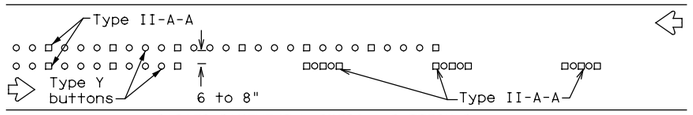
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



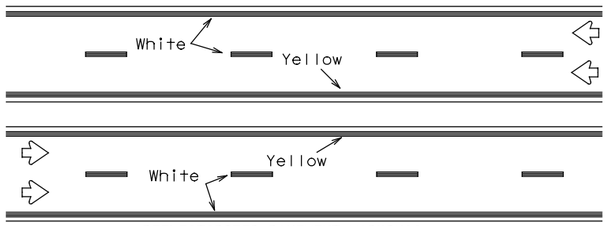
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



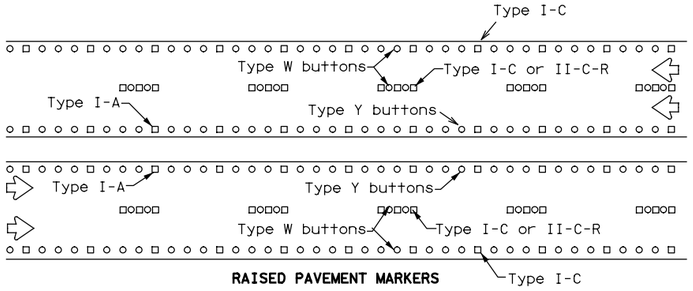
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



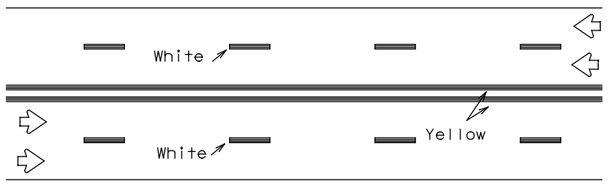
REFLECTORIZED PAVEMENT MARKINGS



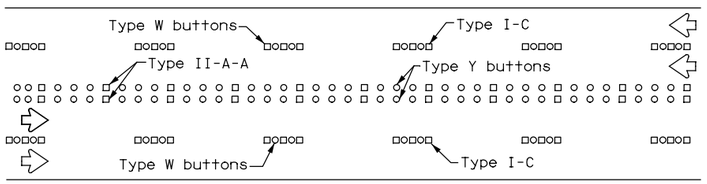
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



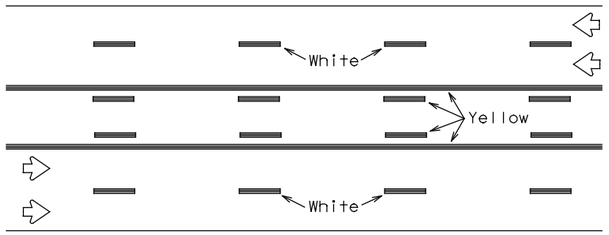
REFLECTORIZED PAVEMENT MARKINGS



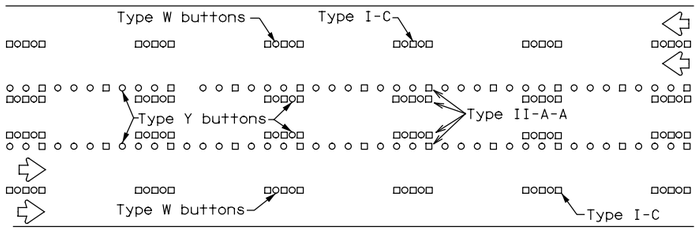
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

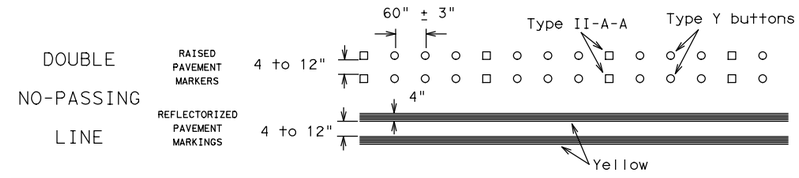
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

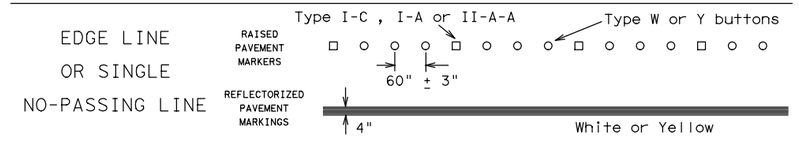
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

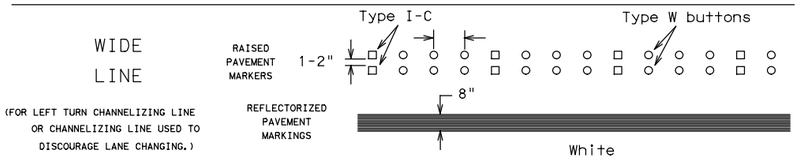


EDGE LINE OR SINGLE NO-PASSING LINE



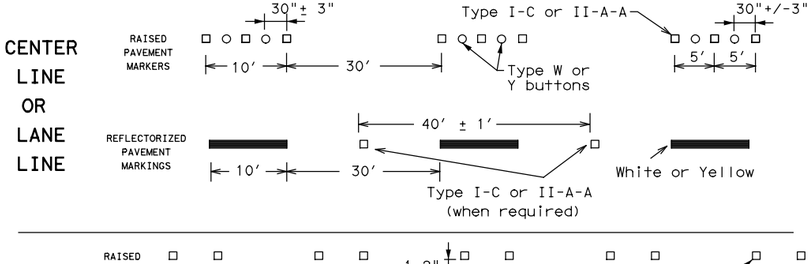
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

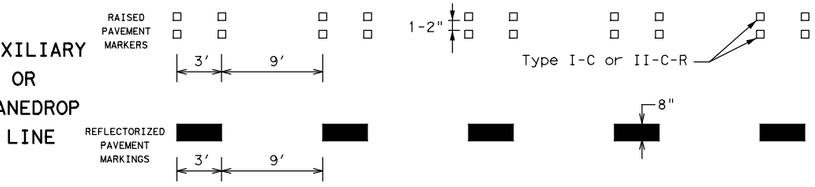


BROKEN LINES

CENTER LINE OR LANE LINE

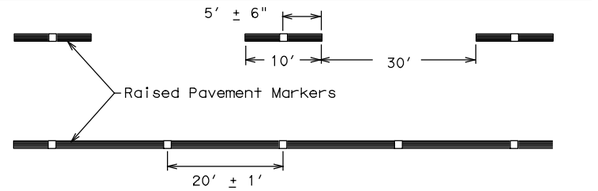


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate 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.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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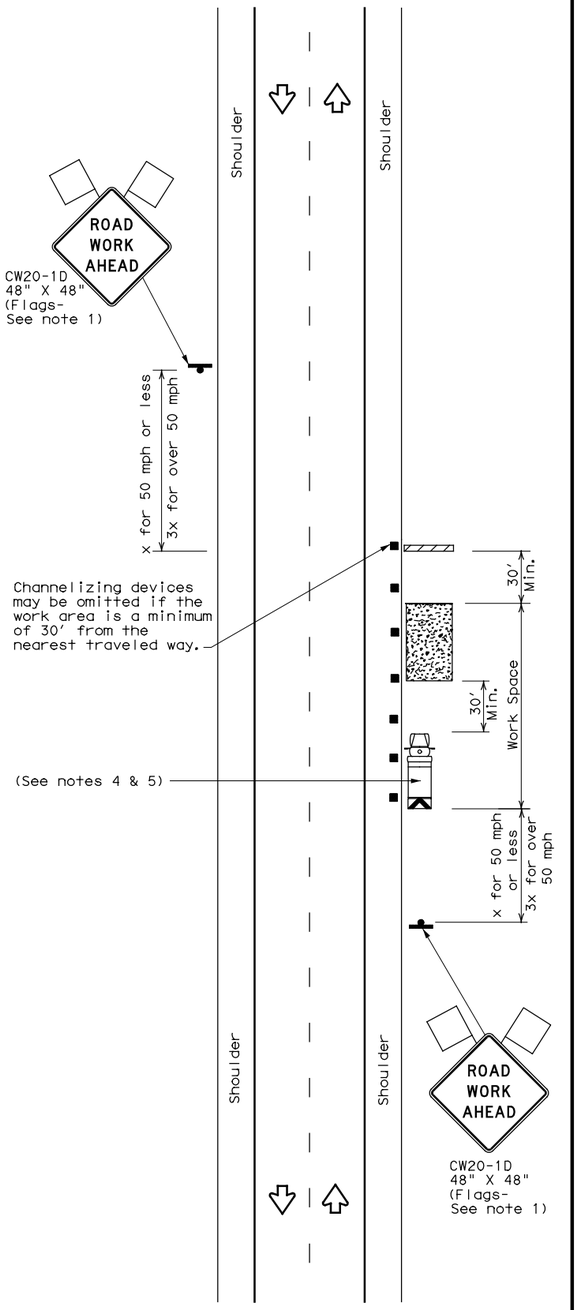
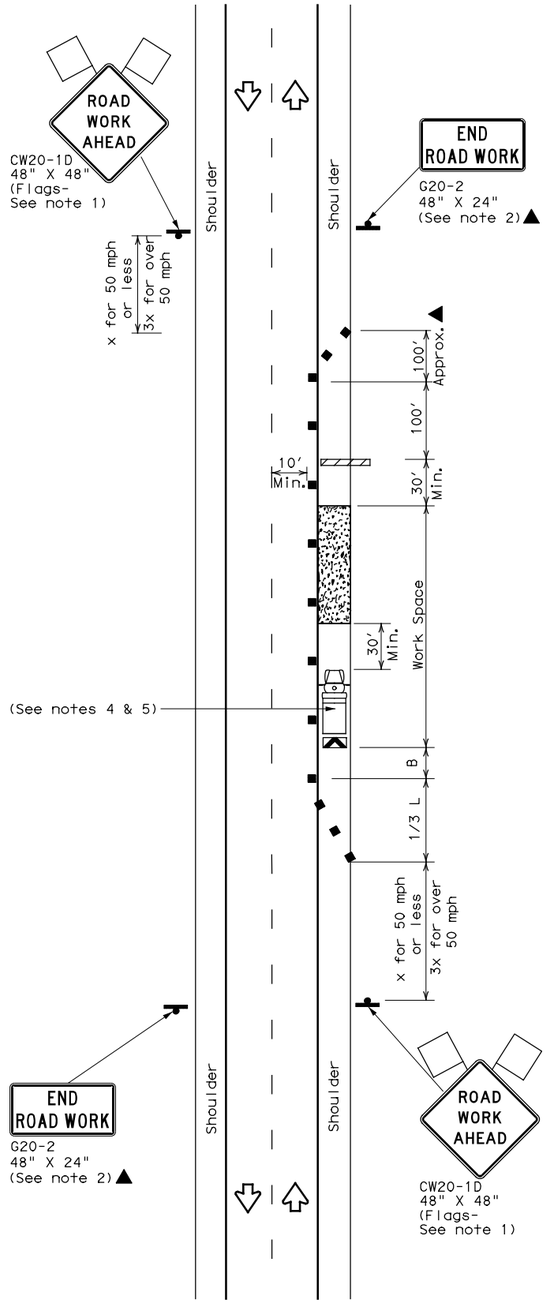


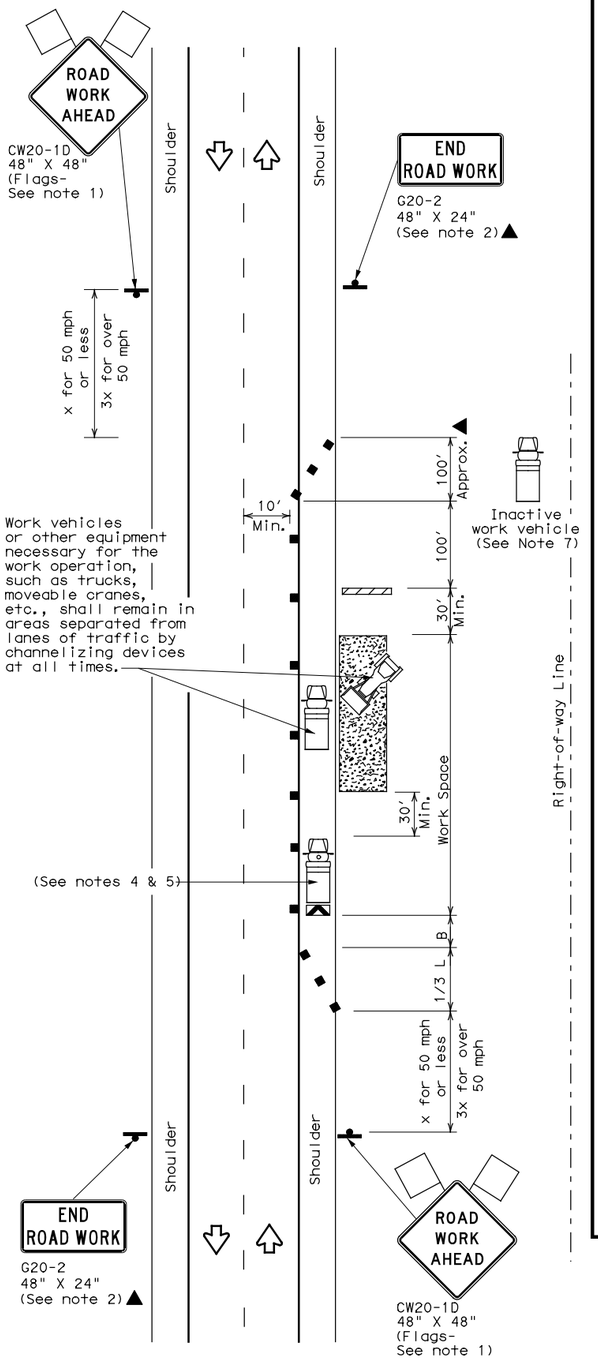
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		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 DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

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 in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS	3212	05	013	FM 3351
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8-95 2-12	SAT	COMAL		56
1-97 2-18				

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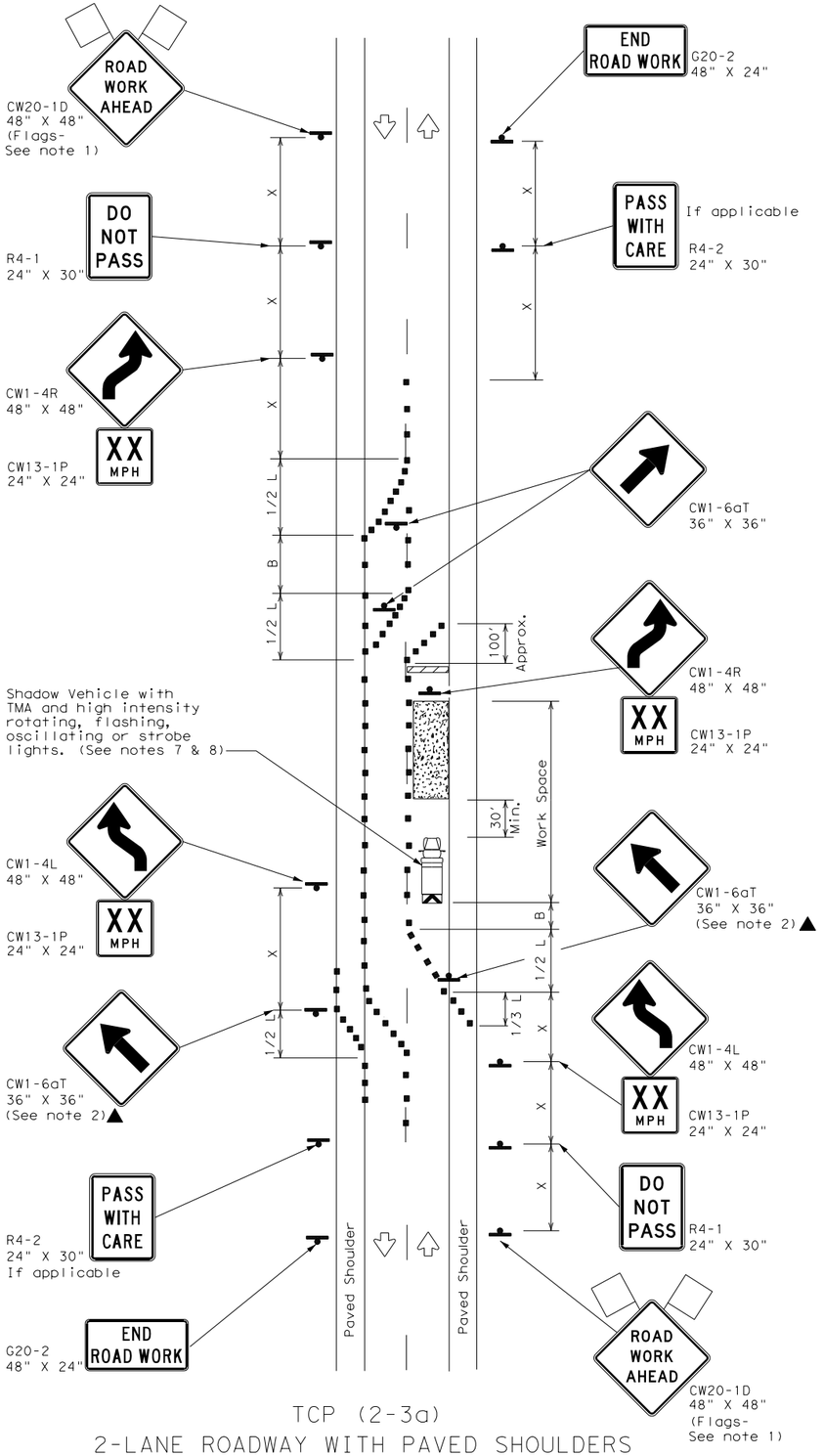
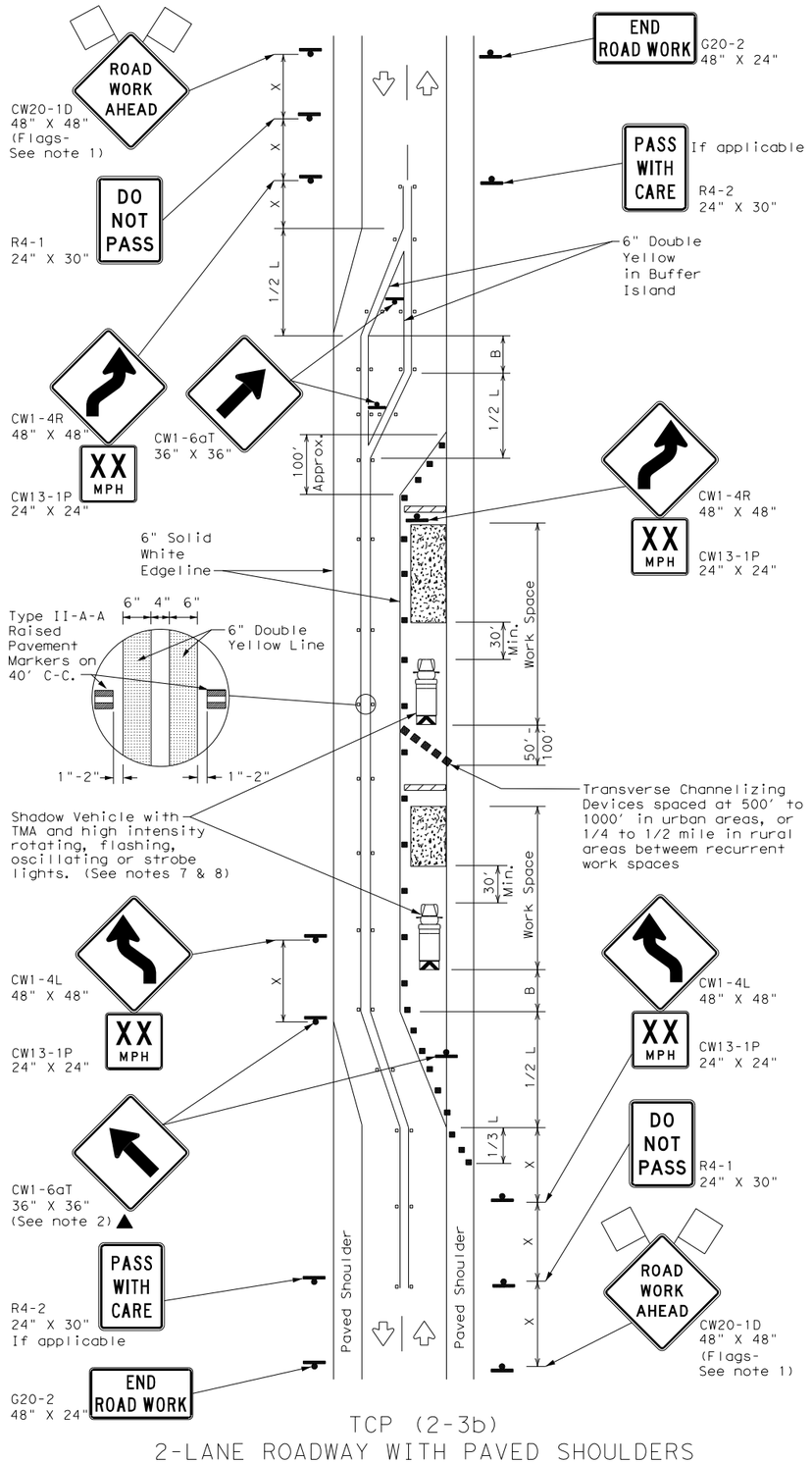


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		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 DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

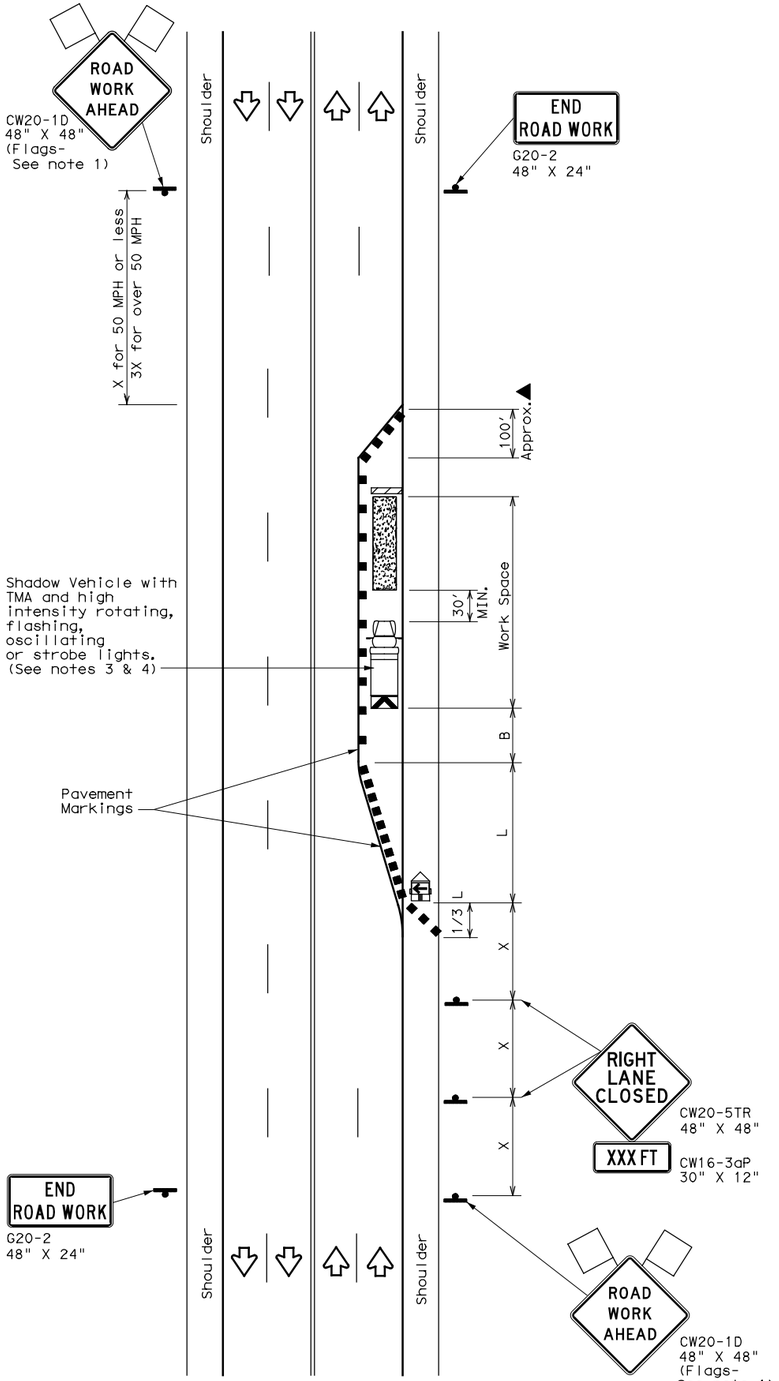
9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections,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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO-LANE ROADS

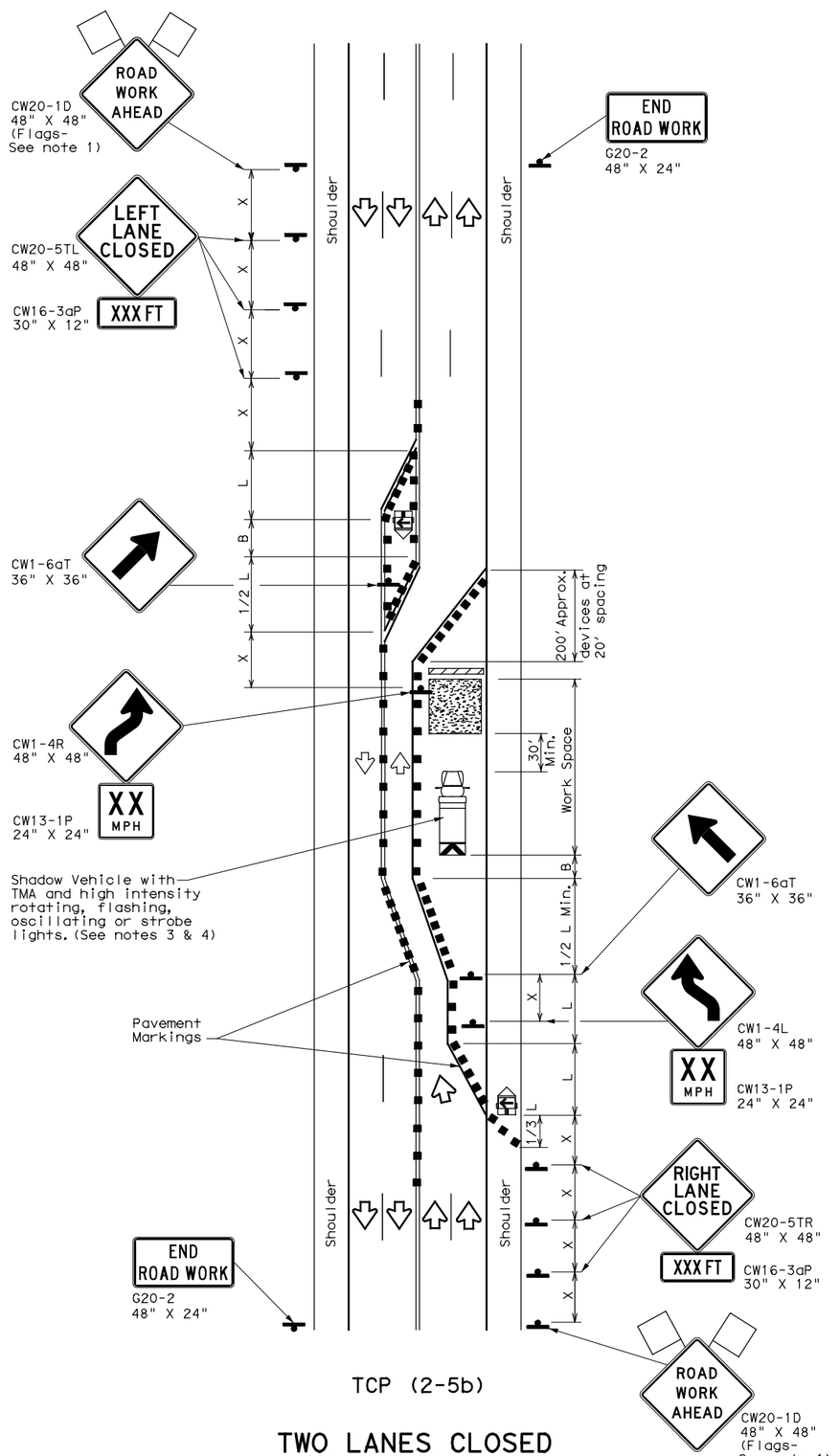
TCP (2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18	3212	05	013	FM 3351
8-95 3-03 4-23	DIST	COUNTY		SHEET NO.
1-97 2-12	SAT	COMAL		57



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		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 DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

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)

6. 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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	3212	05	013	FM 3351
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	SAT	COMAL		58

165

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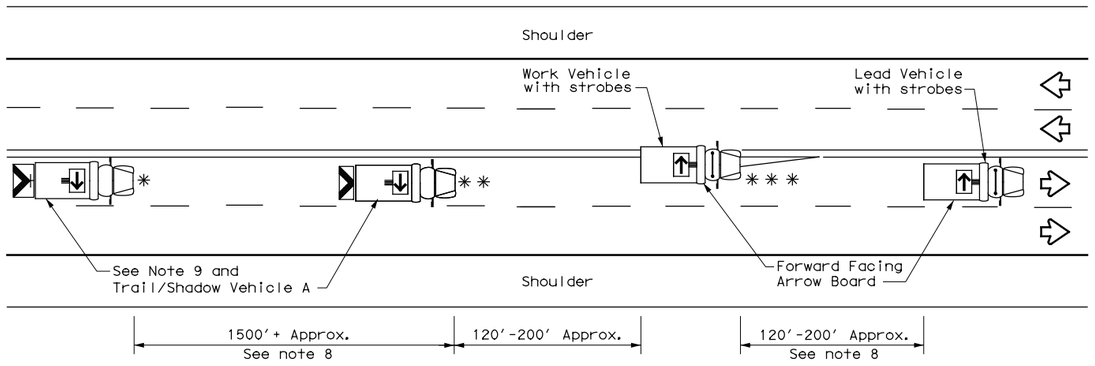
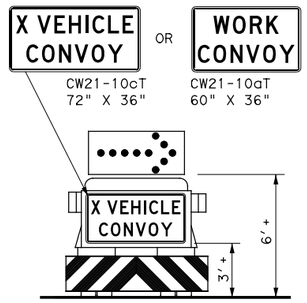


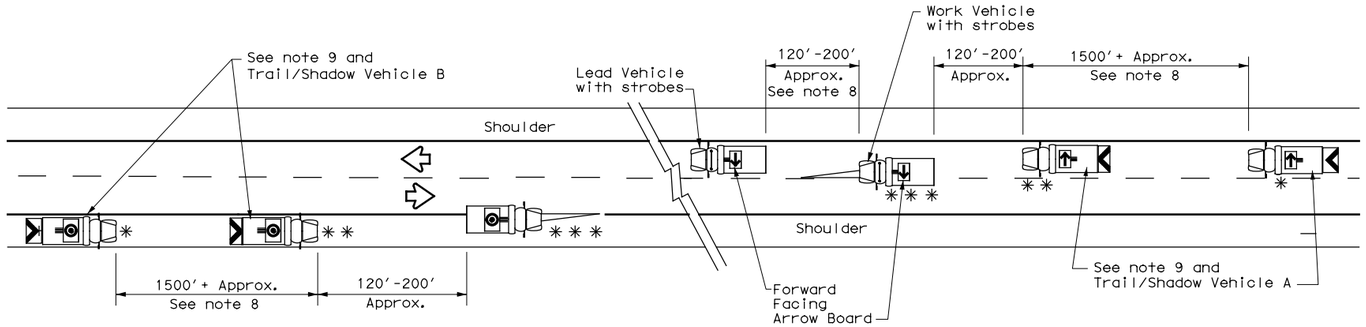
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

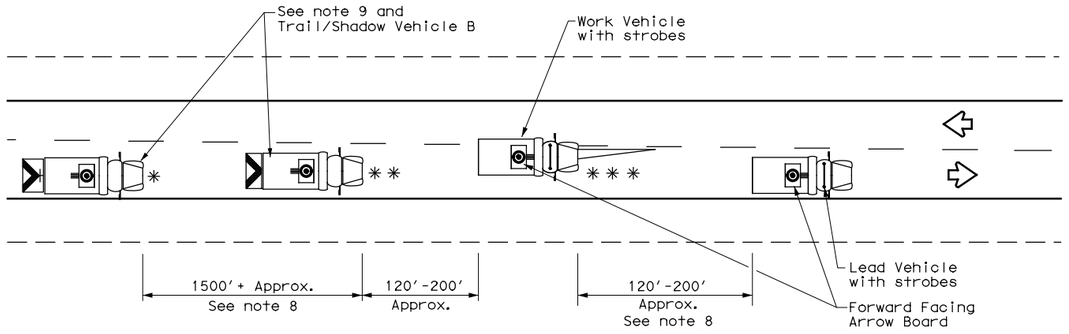


WORK ON SHOULDER

WORK ON TRAVEL LANE

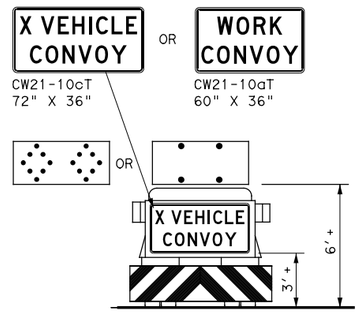
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

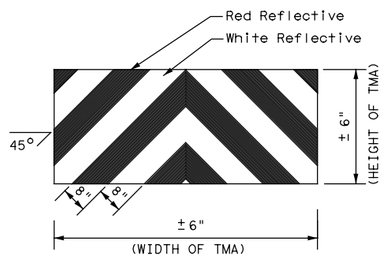
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

1. 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.
4. 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.
5. 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.
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.
8. 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.
9. "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.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	3212	05	013	FM 3351
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	SAT	COMAL		59

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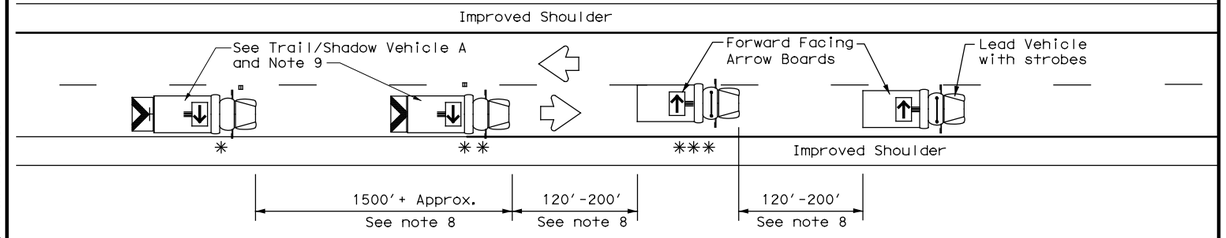
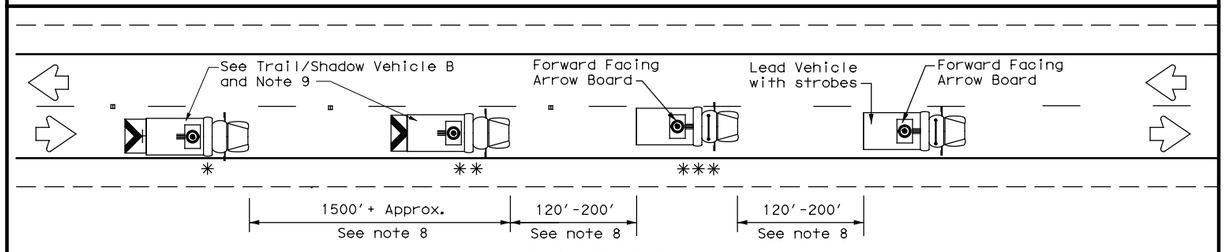


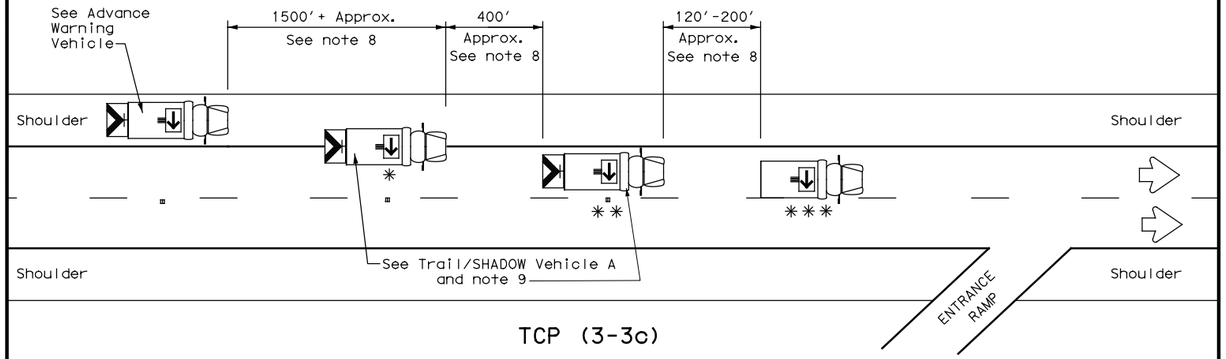
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



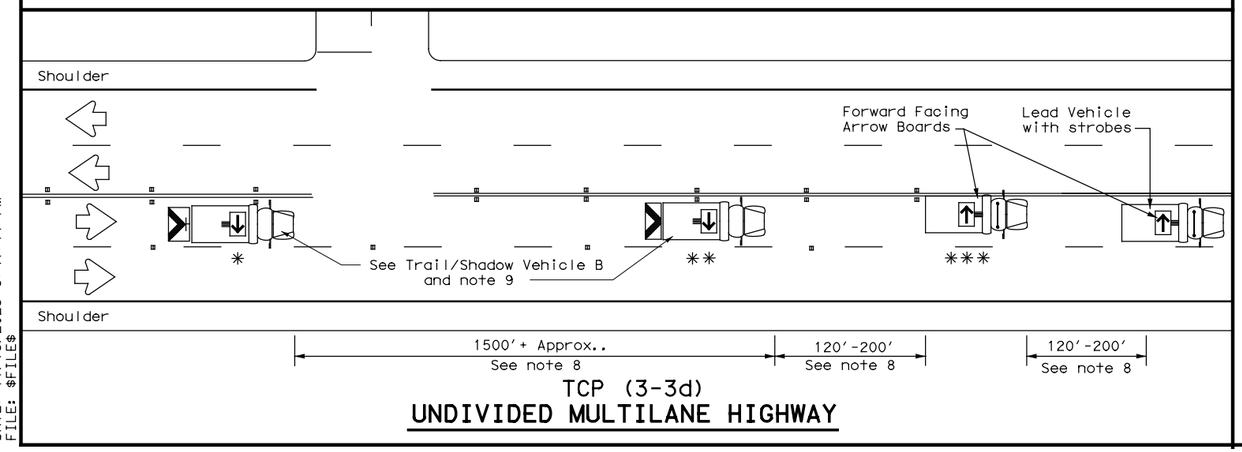
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



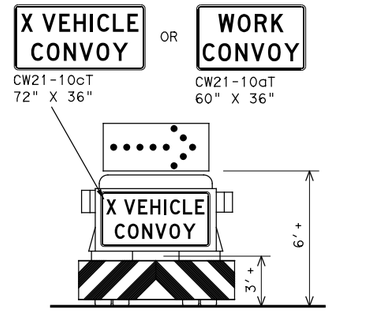
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



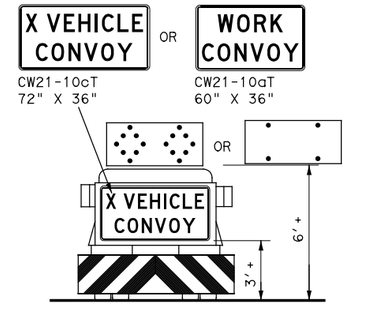
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



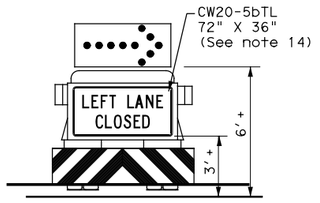
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

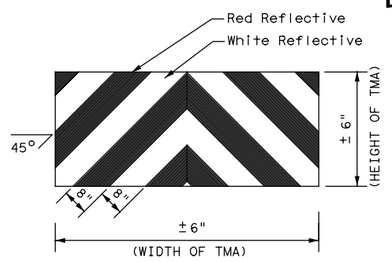


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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.
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, ADVANCE WARNING and TRAIL VEHICLE are required.
4. 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.
5. 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.
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.
8. 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.
9. 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. 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 Vehicle.
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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	SAT	COMAL		60
1-97 7-14				

177

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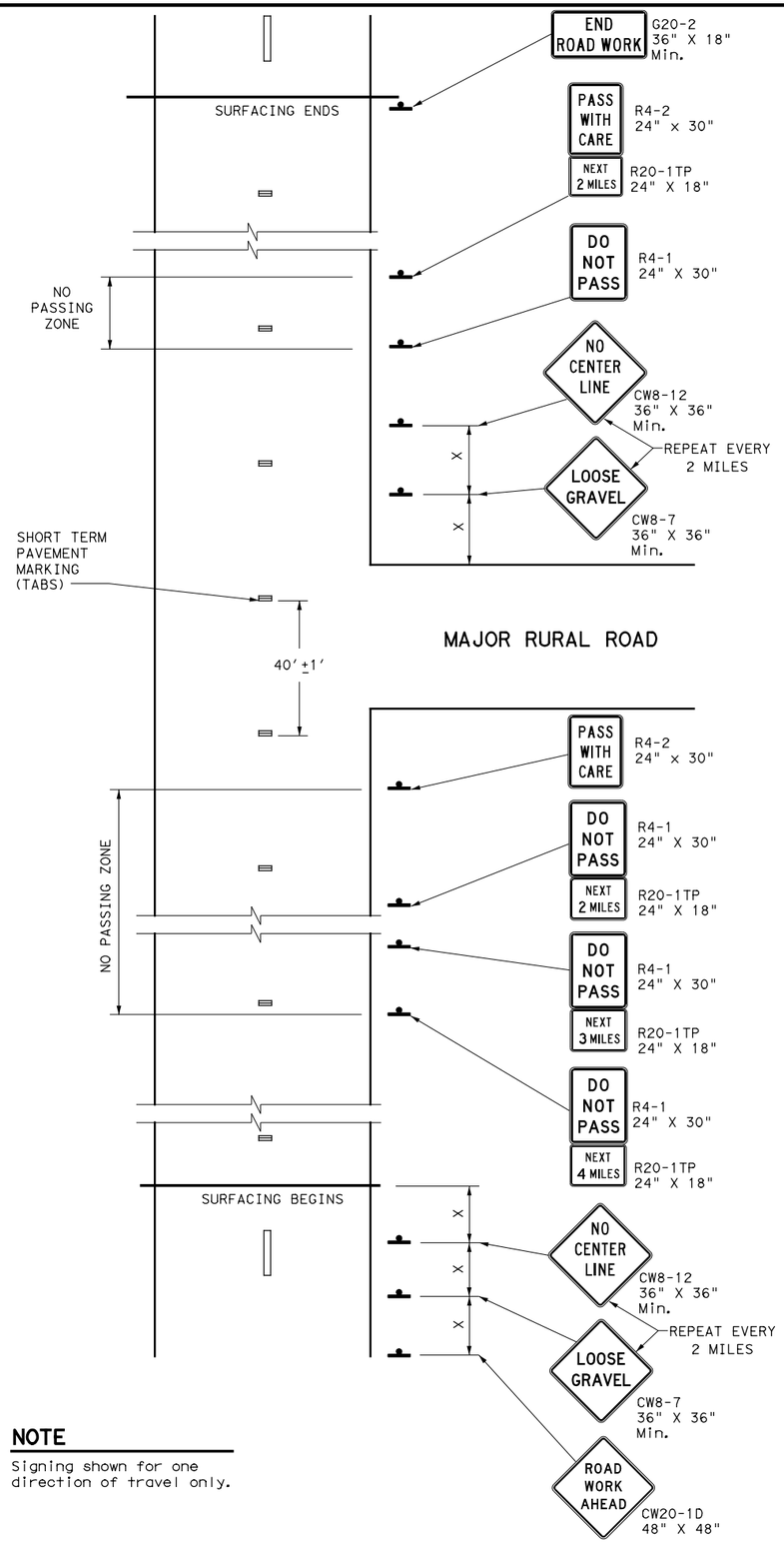
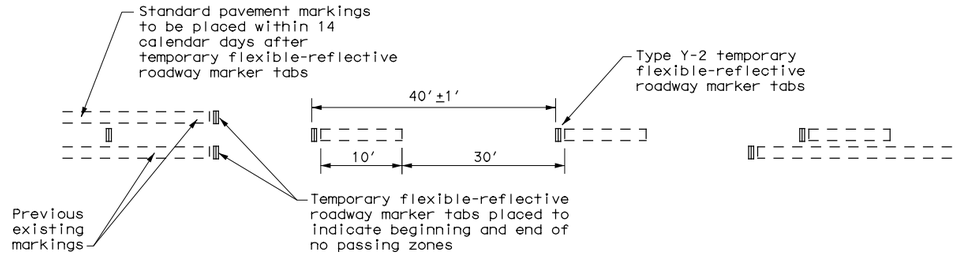


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs 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 pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined 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 (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque 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 the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque 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 the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
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.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

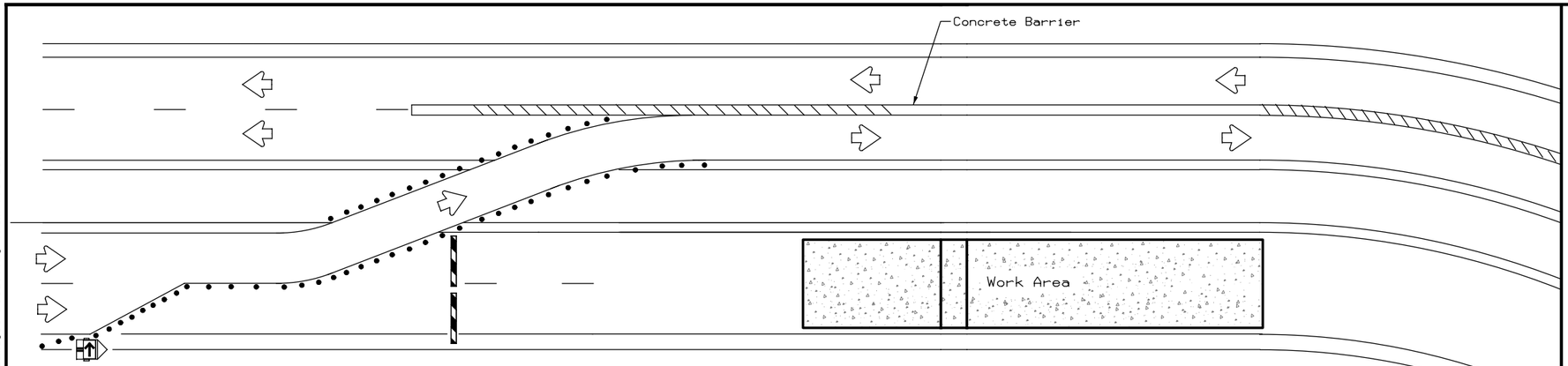
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	SAT	COMAL		61



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
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.
3. 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 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 are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. 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.

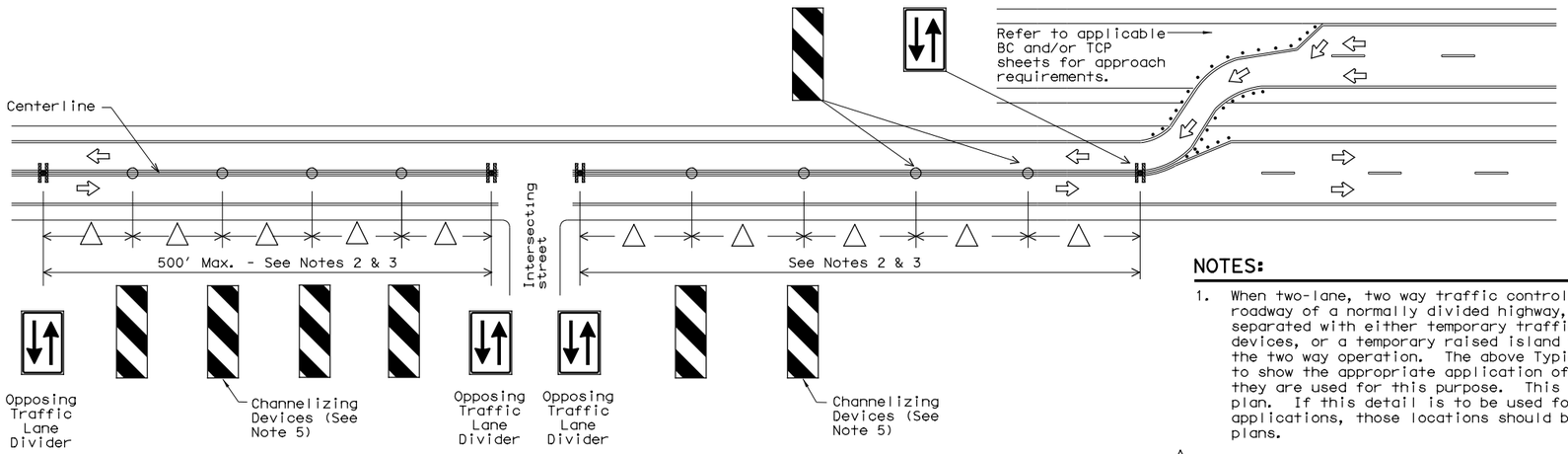
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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



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

NOTES:

1. 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 plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100′.

3. 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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		62

110

DATE: 11/15/2023 5:47:20 PM
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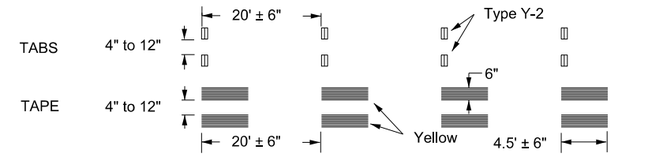
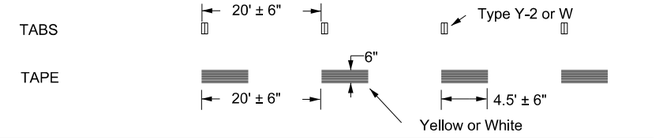
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

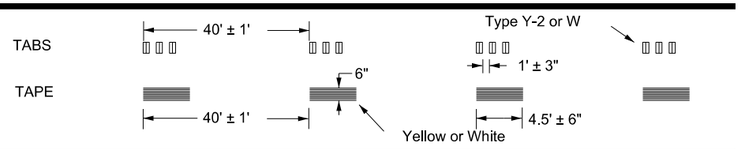


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



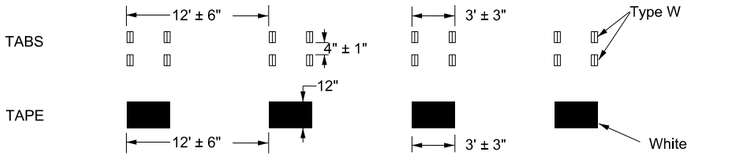
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

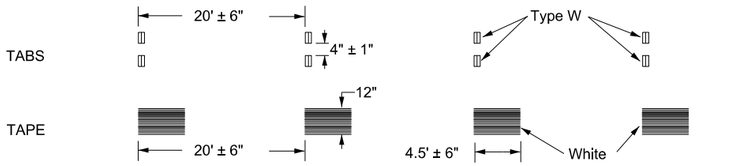


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



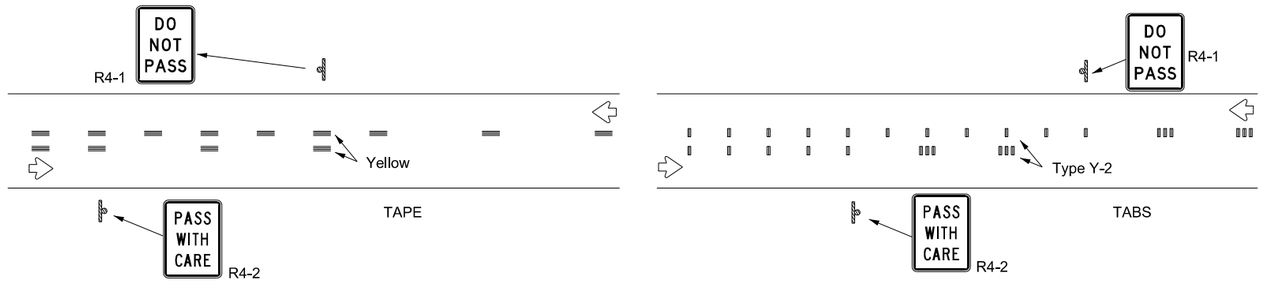
NOTES:

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 pavement 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.

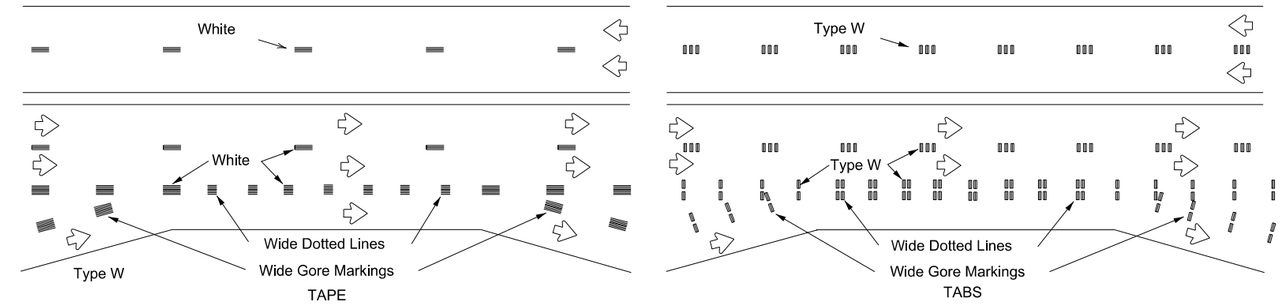
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.
4. 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.

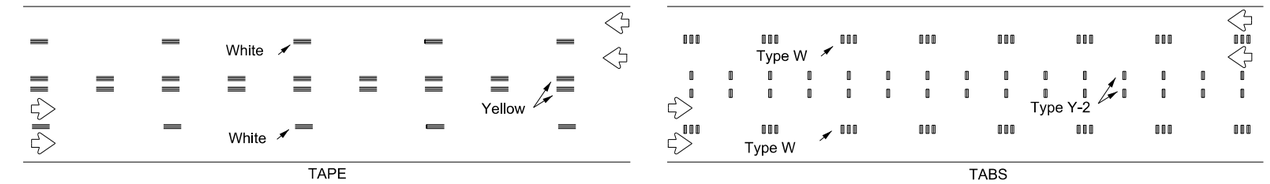
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



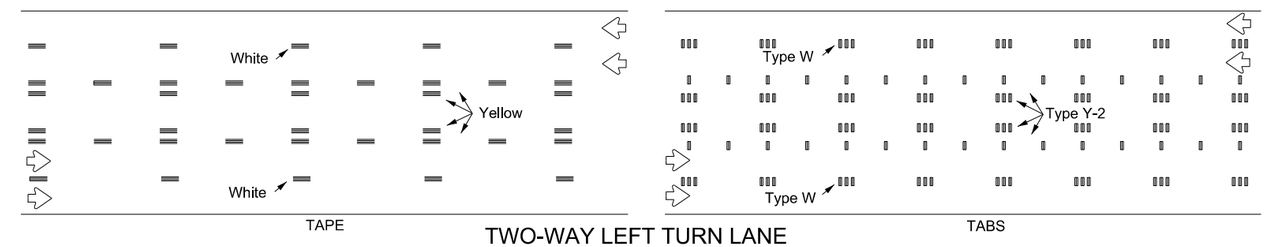
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



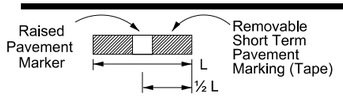
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. 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

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 7-13 1-97 2-23 3-03	3212	05	013	FM 3351
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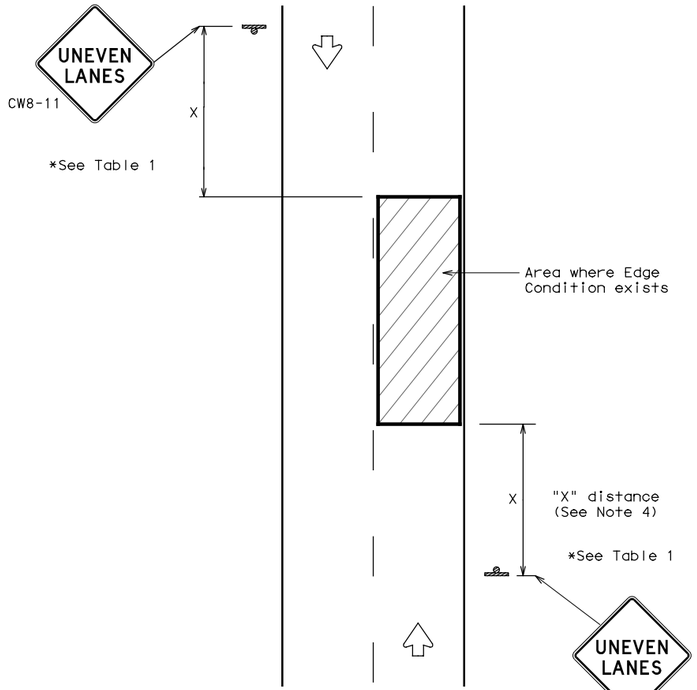
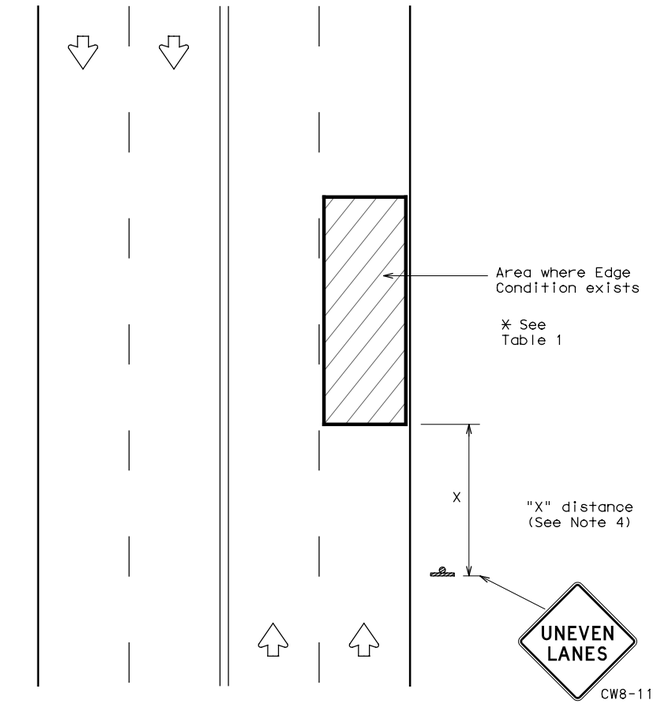
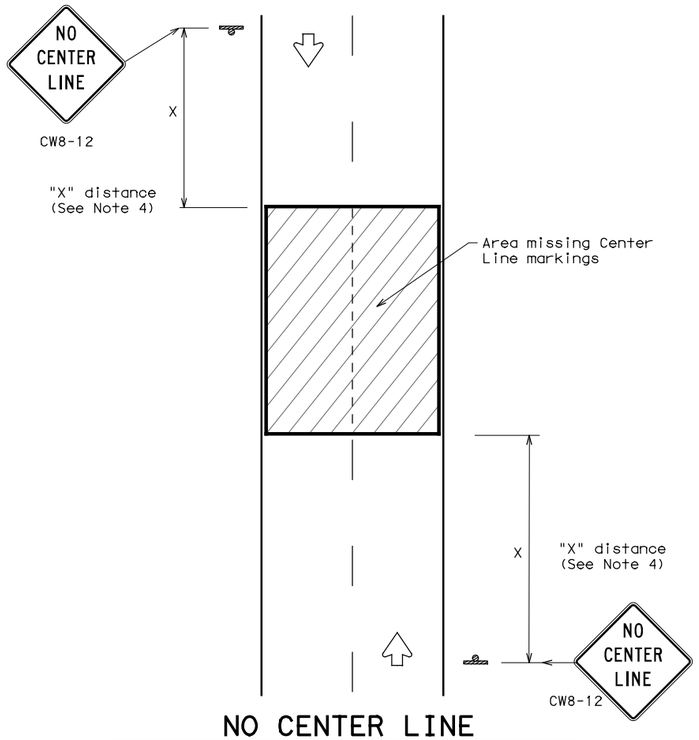


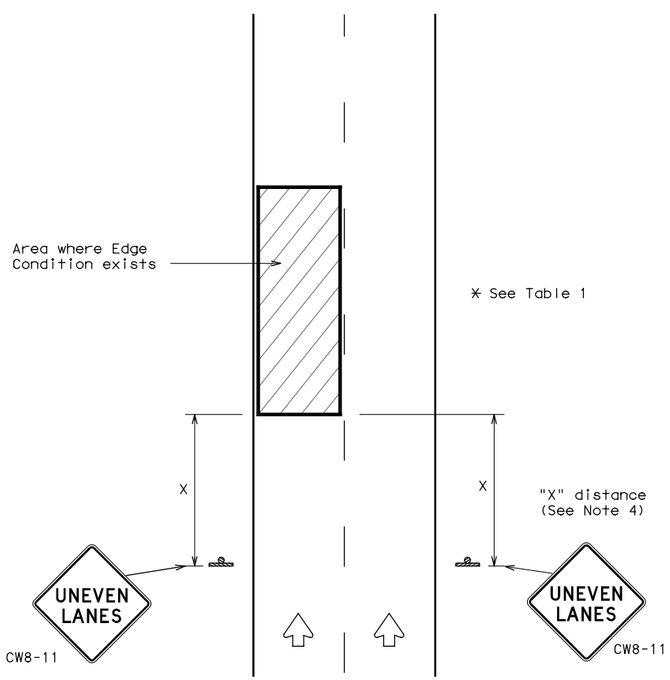
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

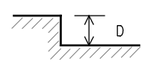
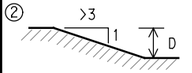
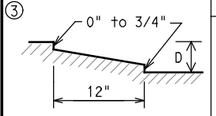
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} 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.
2. 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 installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. 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" list.
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
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (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 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	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".	

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

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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1-97 3-03	SAT	COMAL		64

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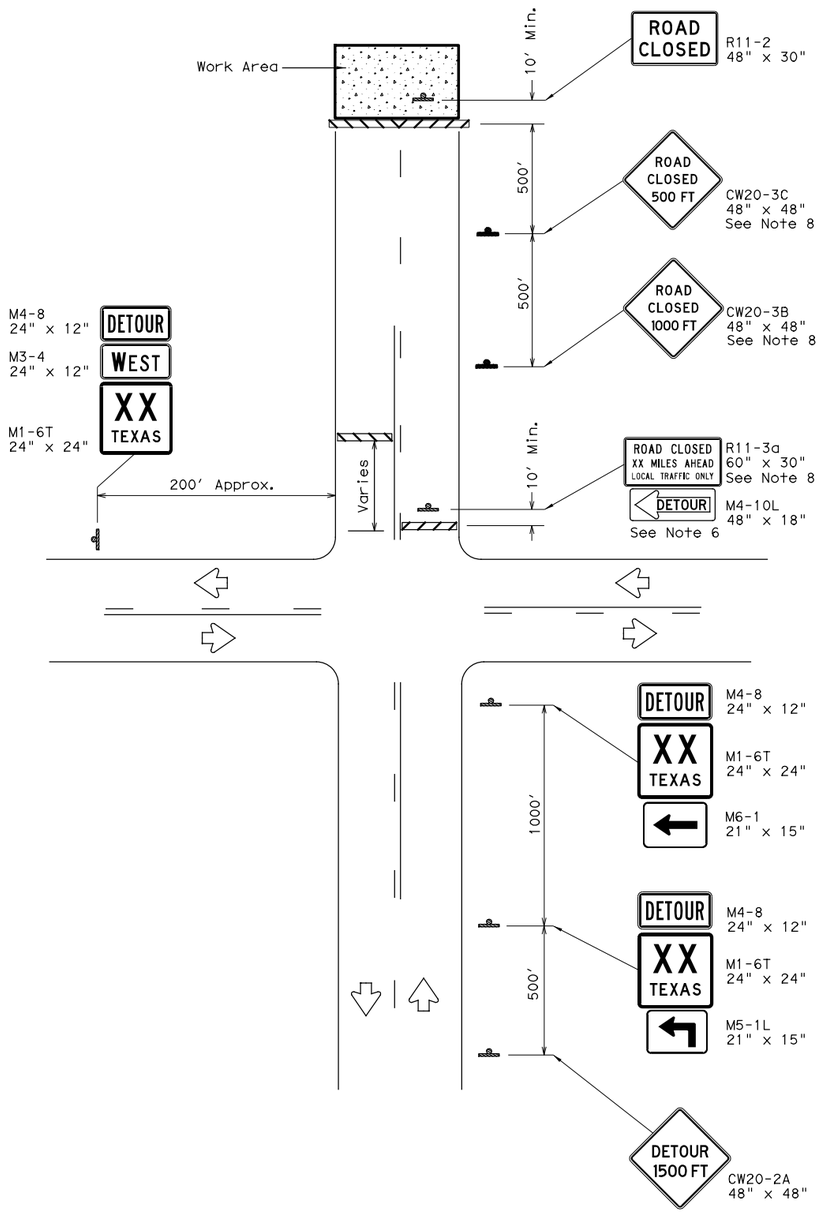
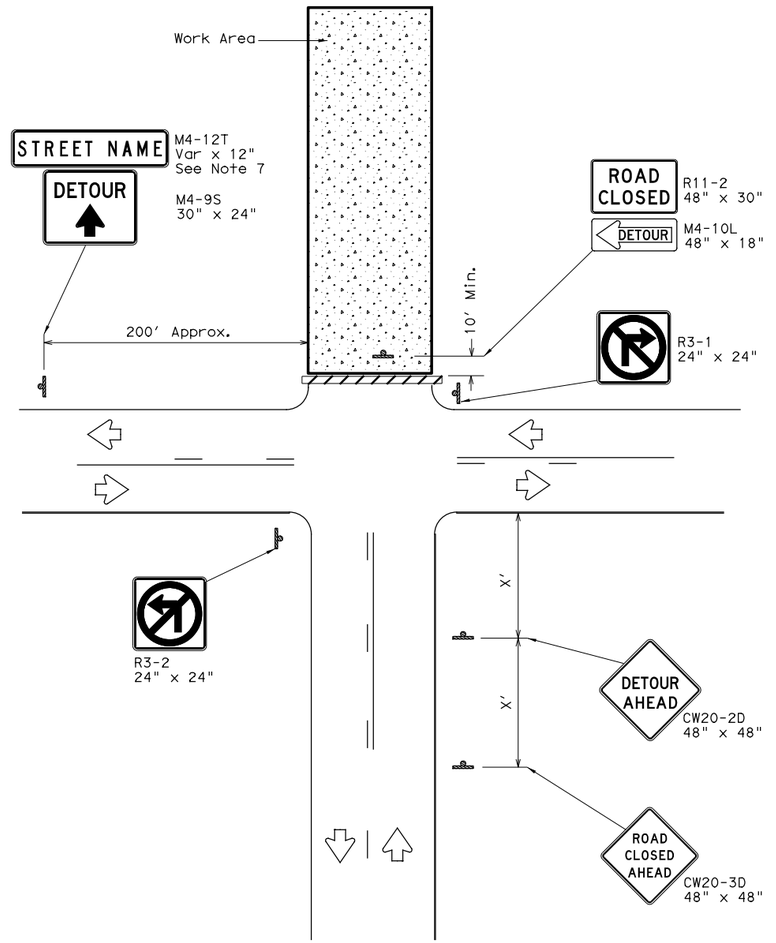


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" 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

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. 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).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. 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 (R11-3a) 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.
9. 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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

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© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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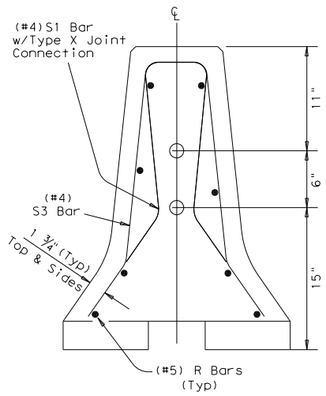
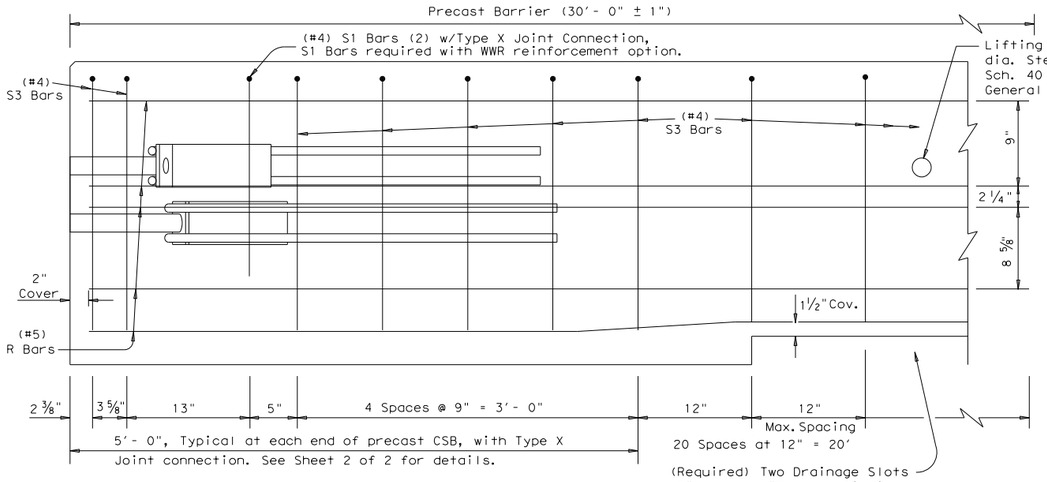


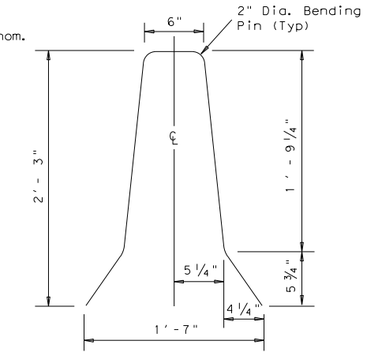
End View
Precast Barrier

See sheet 2 of 3 for Joint connection Type X

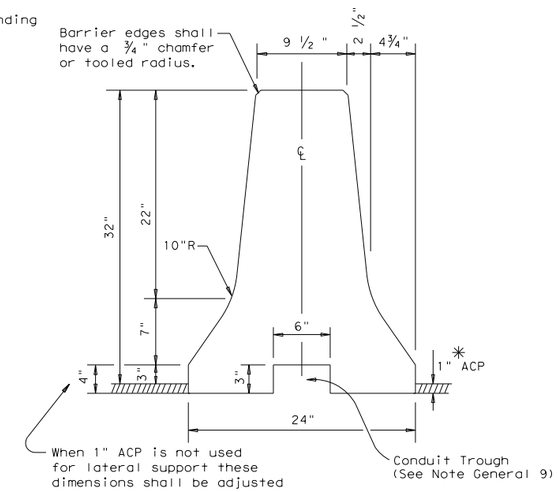


Reinforcement for Precast (CSB)
Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X

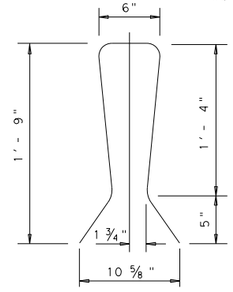


S3 Bar
#4 Bar

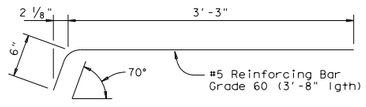


Concrete Safety Barrier

✳ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

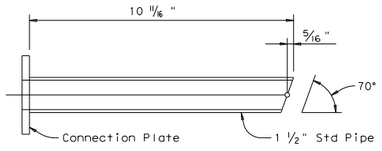


S1 Bar
#4 Bar (2)
(Joint Type X)



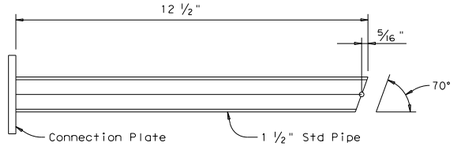
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



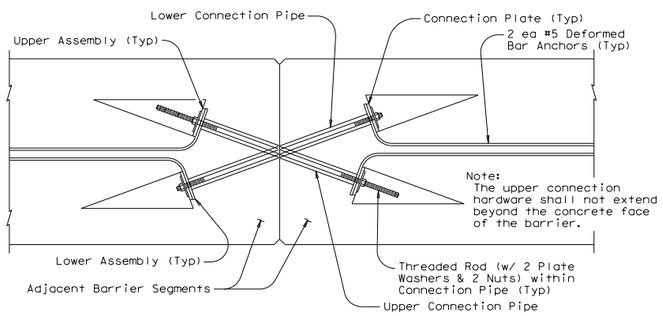
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

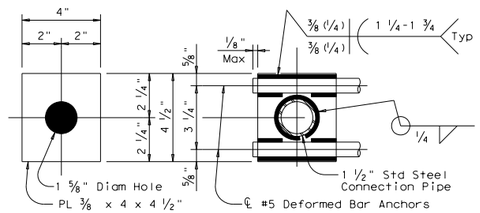
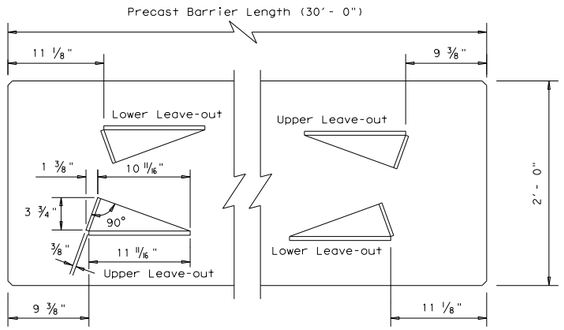


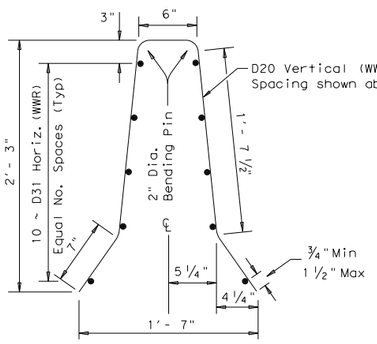
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



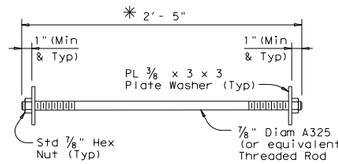
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

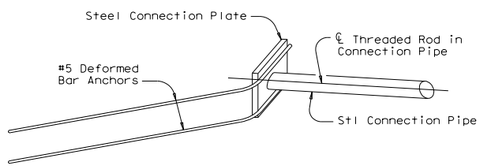
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL 3/8 x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a 3/4" chamfer or tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	SAT	COMAL		66

DATE: 11/15/2023 5:47:25 PM
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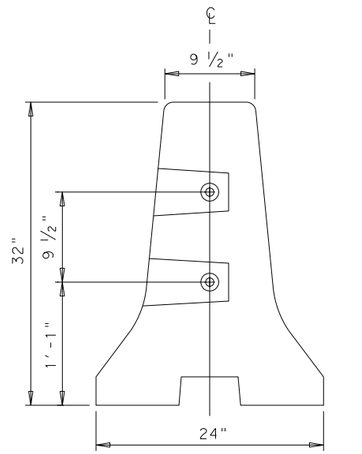
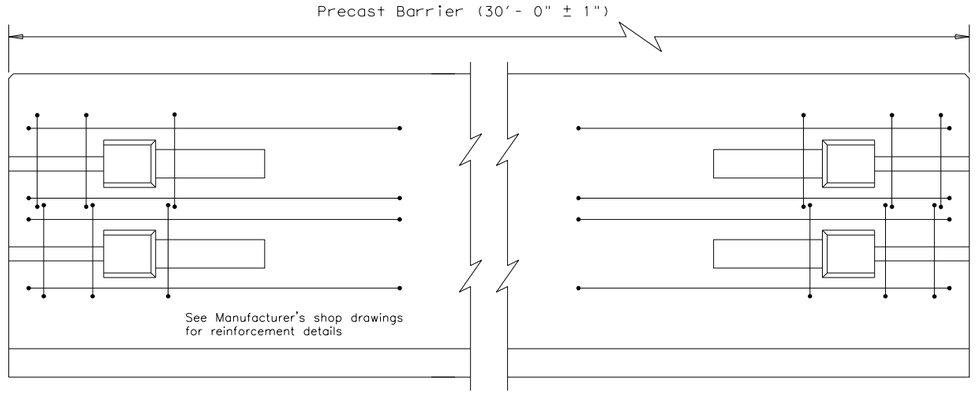
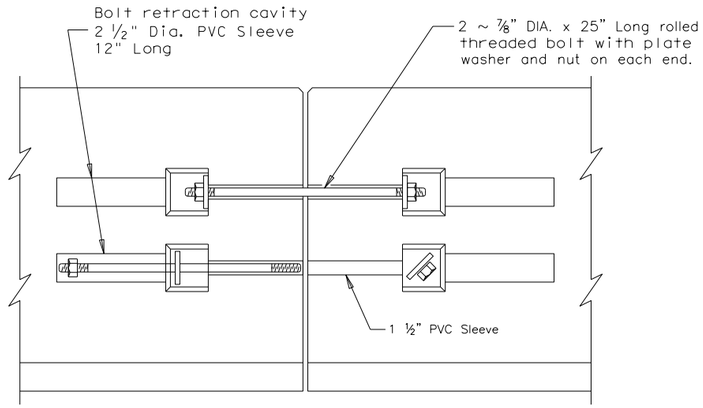


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

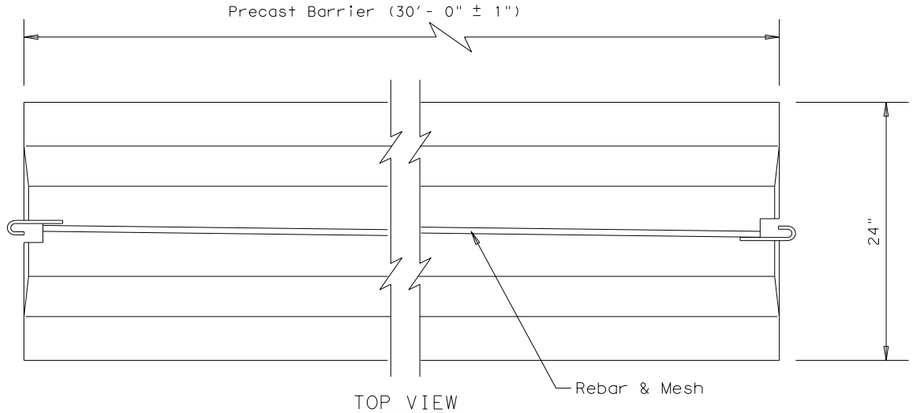


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

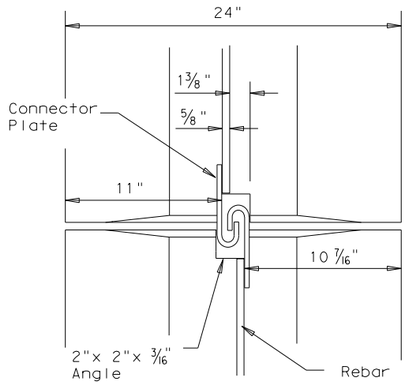


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

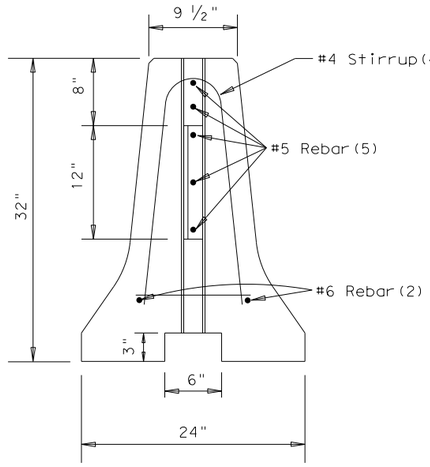
Joint Connection (Type Q)



TOP VIEW
PRECAST (CSB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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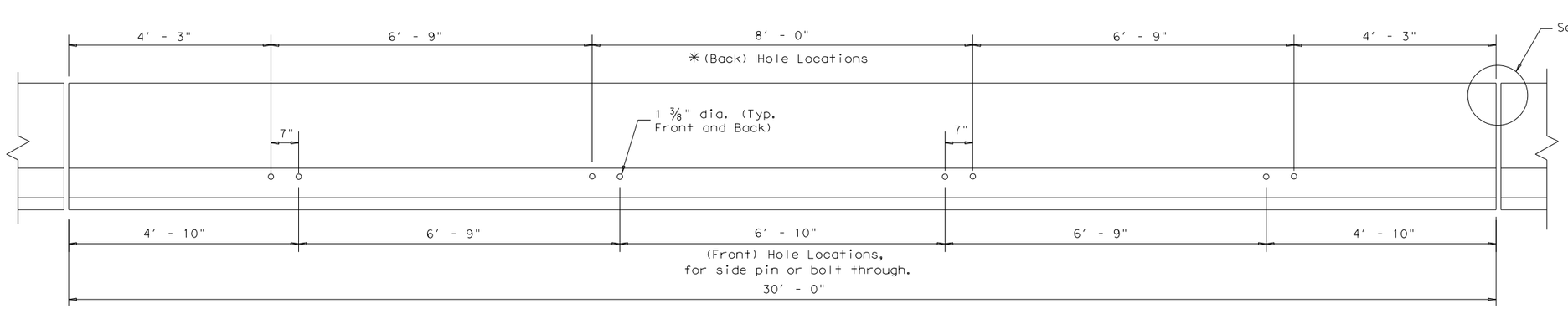
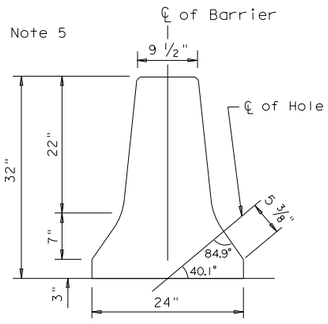
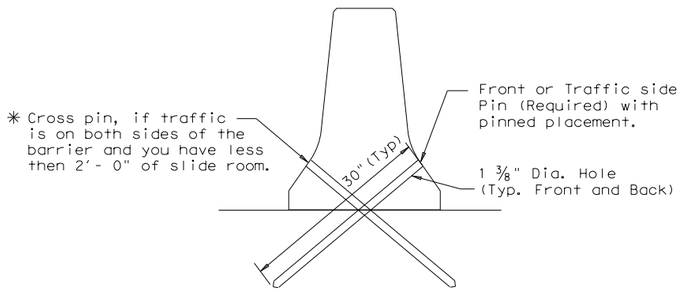


DETAIL 1

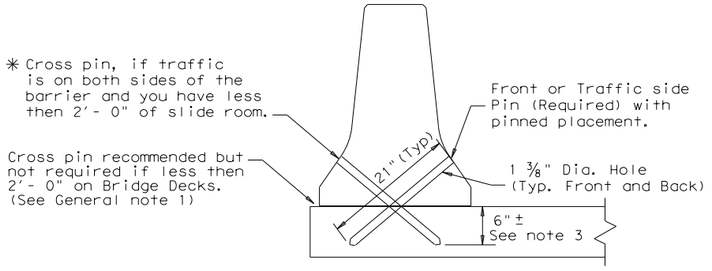


HOLE LOCATION DETAIL



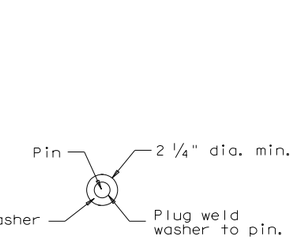
DETAIL 2

Placement on (ACP)
Asphalt Concete Pavement
or Treated Base Material
(30" Pin required)

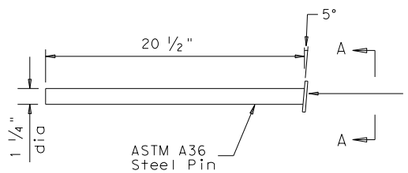


DETAIL 3

Bridge Deck or CRCP
(21" pin required)



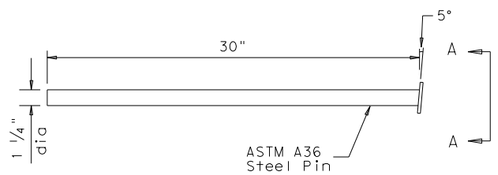
VIEW A-A



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

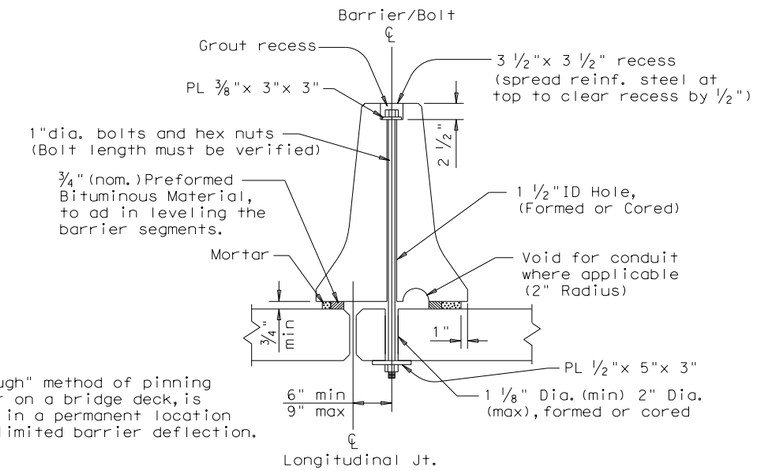
(21") PIN DETAIL

See Detail 3



(30") PIN DETAIL

See Detail 2



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.

Texas Department of Transportation

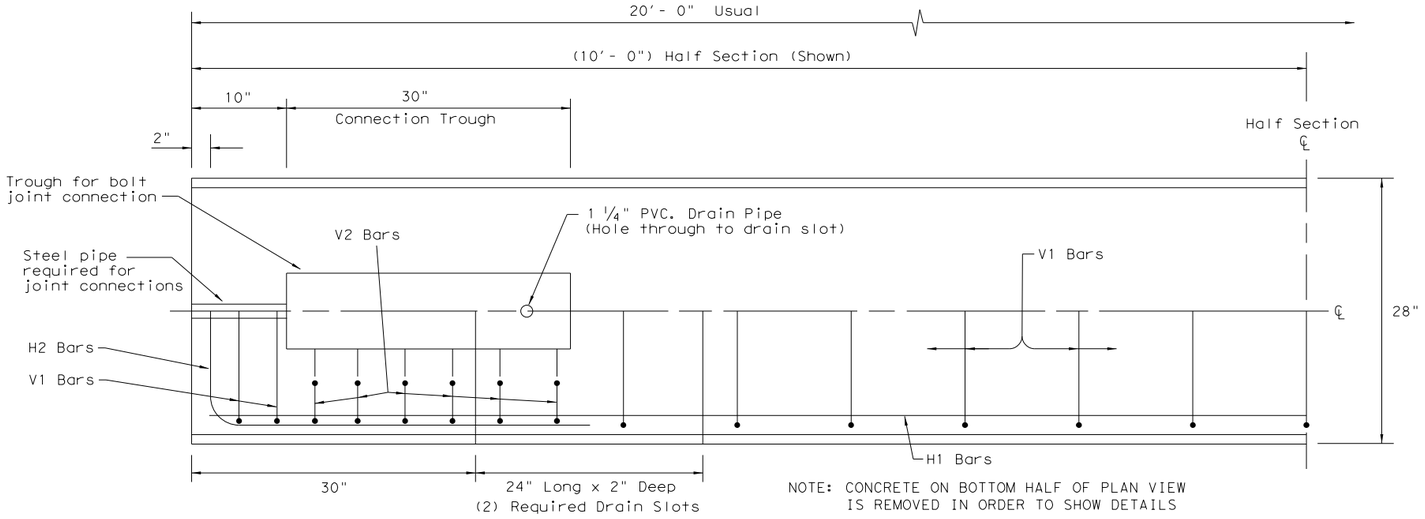
Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

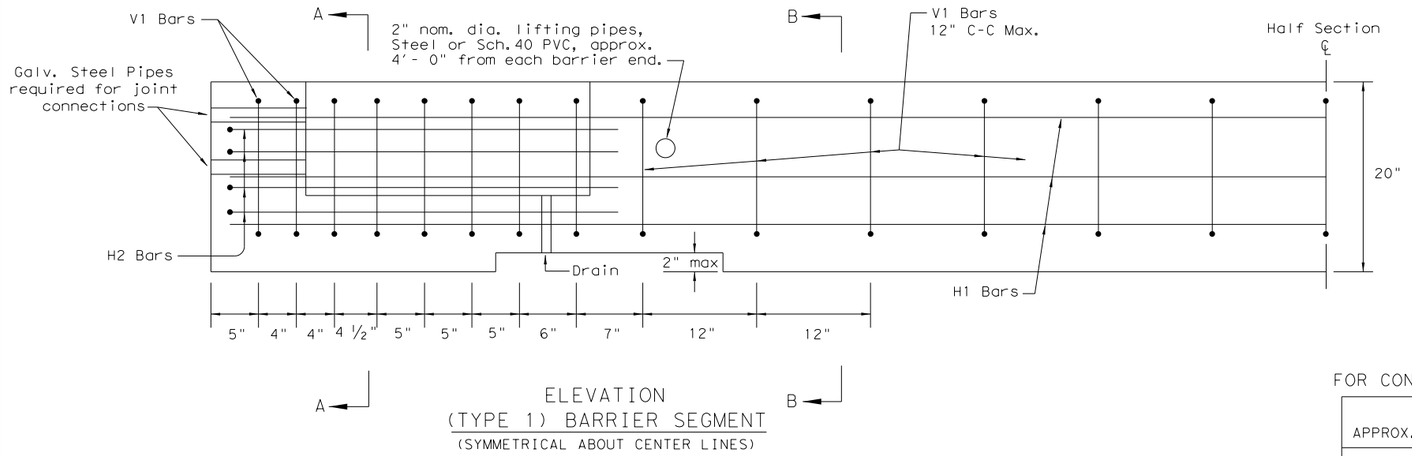
PRECAST BARRIER (TYPE 1) PINNED PLACEMENT

CSB(7)-10

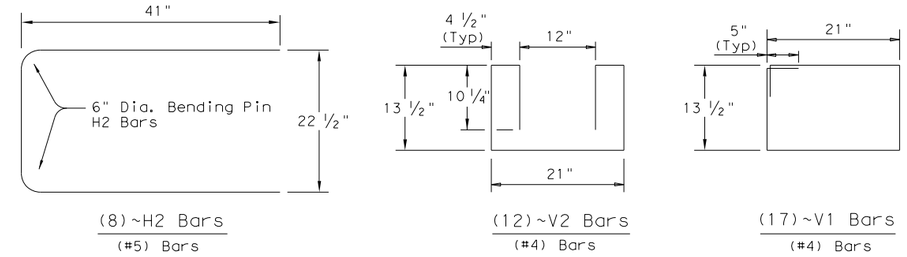
FILE: csb710.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		68



PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



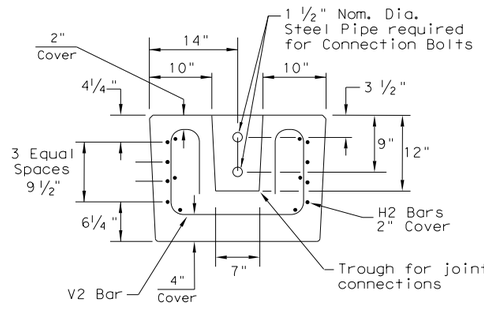
(8)~H2 Bars
(#5) Bars

(12)~V2 Bars
(#4) Bars

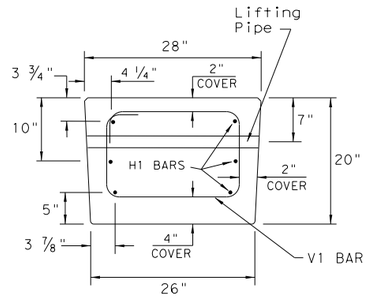
(17)~V1 Bars
(#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



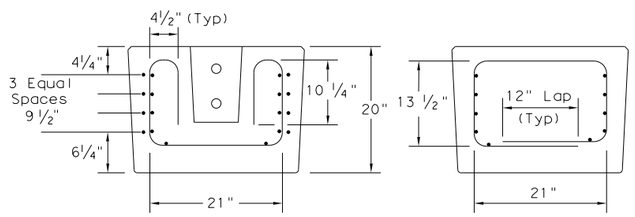
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A SECTION B-B

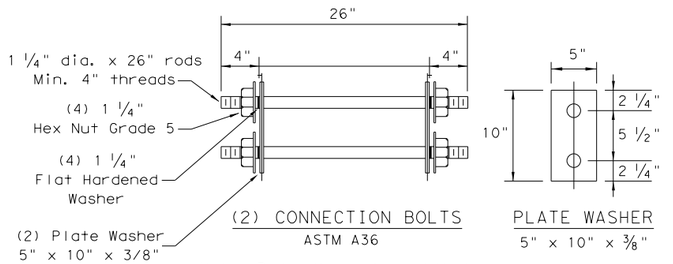
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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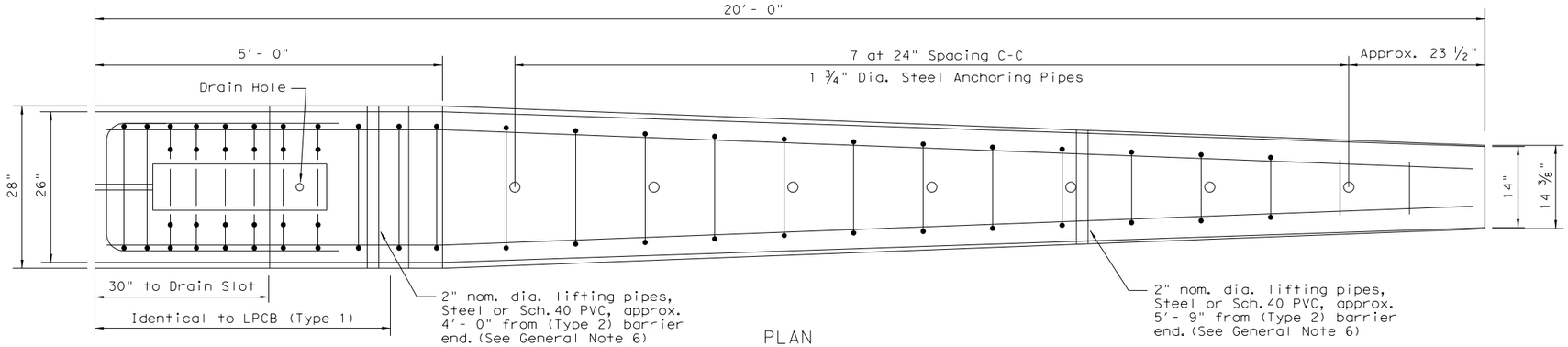
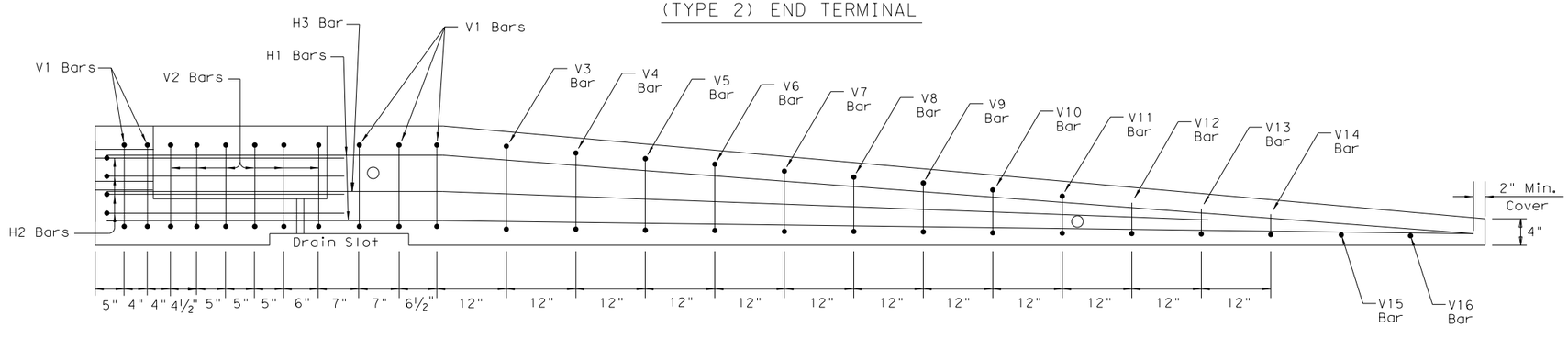
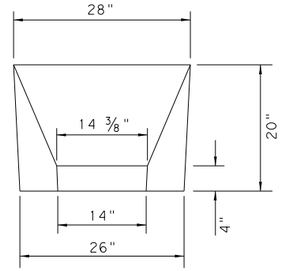


PLAN
(TYPE 2) END TERMINAL



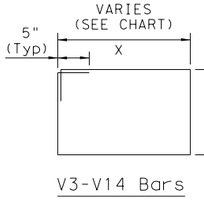
ELEVATION
(TYPE 2) END TERMINAL



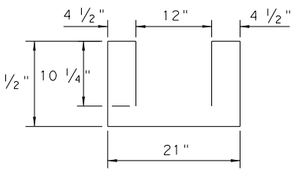
APPROACH VIEW

TYPE 2 - NOTES

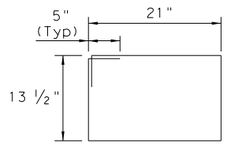
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



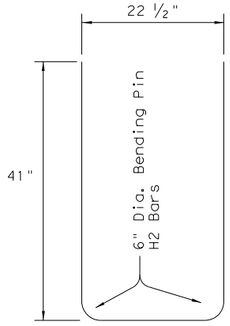
V3-V14 Bars



(6)~V2 Bars



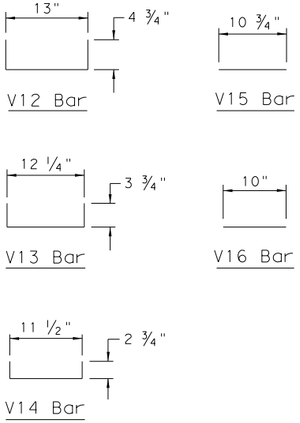
(5)~V1 Bars



(4)~H2 Bars
(#5) Bars

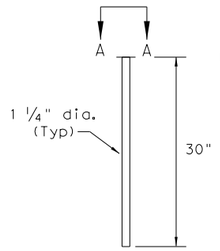
BAR(#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL

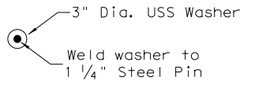


Note: All V Bars are (#4)

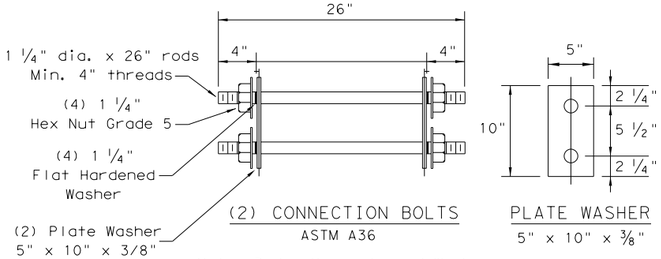
Note:
Anchoring pipes not shown in Elevation View



(7) Anchor Pins
ASTM A36 Steel
(See Note 3)



Section A-A
(Head of Anchoring Pin)

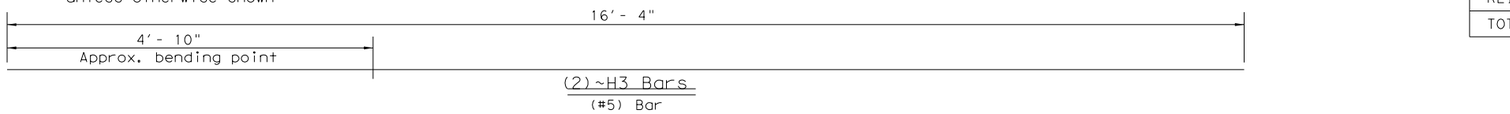


(2) CONNECTION BOLTS
ASTM A36

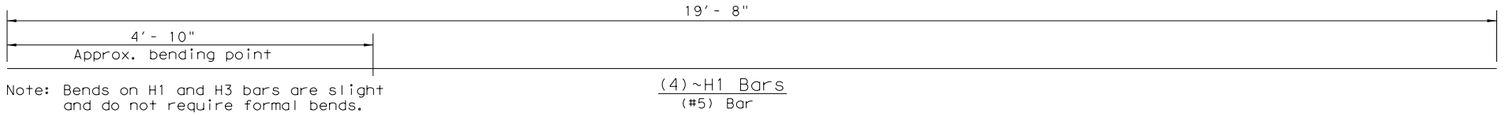
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

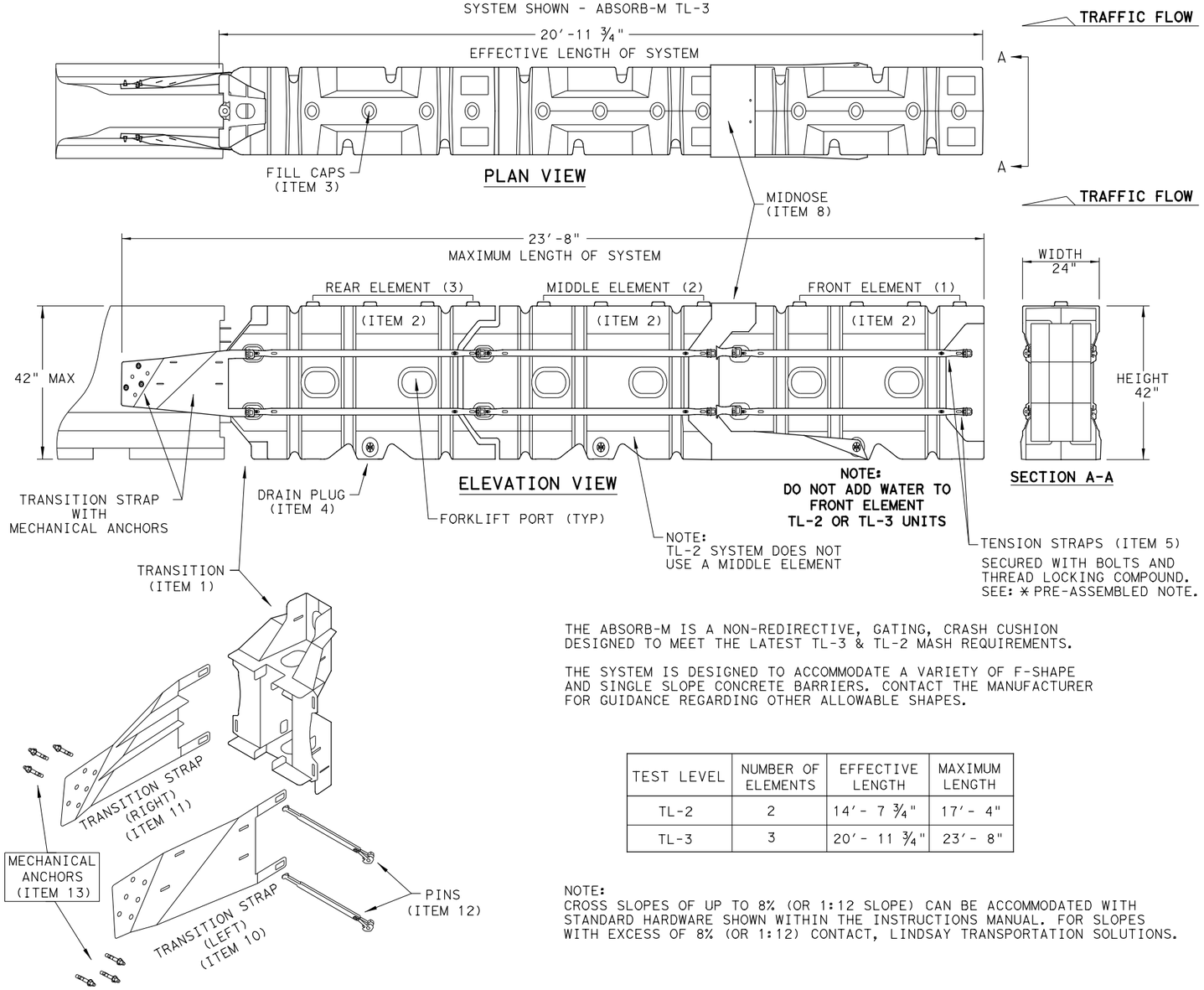
(TYPE 2) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

Texas Department of Transportation
Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		70

SYSTEM SHOWN - ABSORB-M TL-3



THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

THE SYSTEM IS DESIGNED TO ACCOMMODATE A VARIETY OF F-SHAPE AND SINGLE SLOPE CONCRETE BARRIERS. CONTACT THE MANUFACTURER FOR GUIDANCE REGARDING OTHER ALLOWABLE SHAPES.

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

NOTE:
CROSS SLOPES OF UP TO 8% (OR 1:12 SLOPE) CAN BE ACCOMMODATED WITH STANDARD HARDWARE SHOWN WITHIN THE INSTRUCTIONS MANUAL. FOR SLOPES WITH EXCESS OF 8% (OR 1:12) CONTACT, LINDSAY TRANSPORTATION SOLUTIONS.

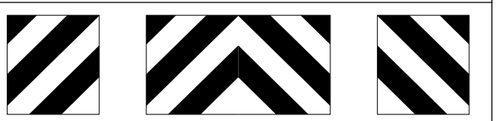
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

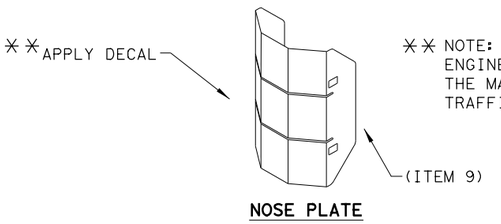
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE



TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER



NOSE PLATE

** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

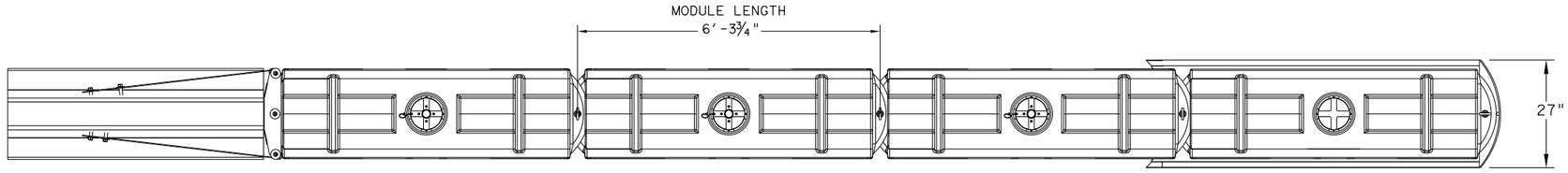
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

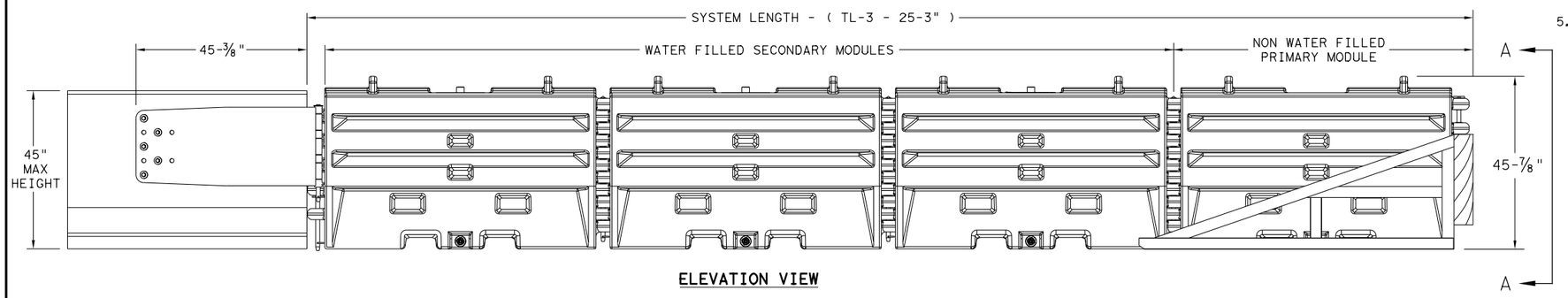
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		71

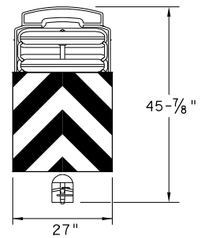
DATE: 11/15/2023
FILE: $FILE$



PLAN VIEW



ELEVATION VIEW



SECTION A-A

NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"

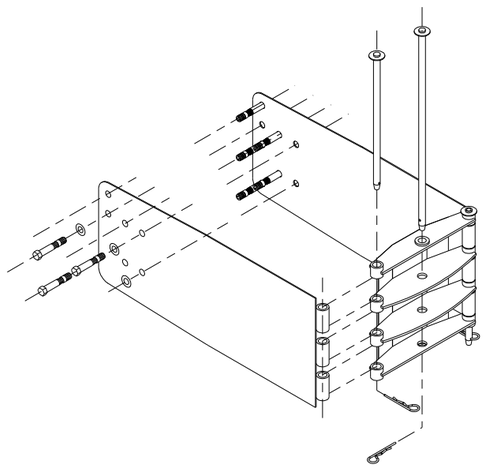
GENERAL NOTES

1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

BILL OF MATERIAL

PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		72

DATE: 11/15/2023
FILE: $FILE$

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	PHASE 1	19A	FM 3351	255+50	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
2	PHASE 1	19B	FM 3351	274+40	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
3	PHASE 1	19B	FM 3351	276+80	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
4	PHASE 1	19B	FM 3351	278+90	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
5	PHASE 2	21	FM 3351	255+10	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	1					X	
6	PHASE 2	22	FM 3351	265+50	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	2					X	
7	PHASE 3	28	FM 3351	255+40	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	3					X	
8	PHASE 3	29	FM 3351	280+00	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	4					X	
9	PHASE 4	37	FM 3351	255+10	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	5					X	
10	PHASE 4	38	FM 3351	280+00	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	6					X	
11	PHASE 4	37	FM 3351	260+80	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	7					X	
12	PHASE 4	38	FM 3351	276+10	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"				1	8					X	
13	PHASE 4	38	FM 3351	277+90	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
14	PHASE 4	38	FM 3351	279+70	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"		1								X	
15	PHASE 5	41	FM 3351	262+00	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"			2	1	9					X	
16	PHASE 5	42	FM 3351	275+20	3	BI	ASPHALT	2.5"	CONCRETE SAFETY BARRIER	24"	32"			4	1	10					X	
												TOTALS	6	6	10							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

CRASH CUSHION SUMMARY SHEET

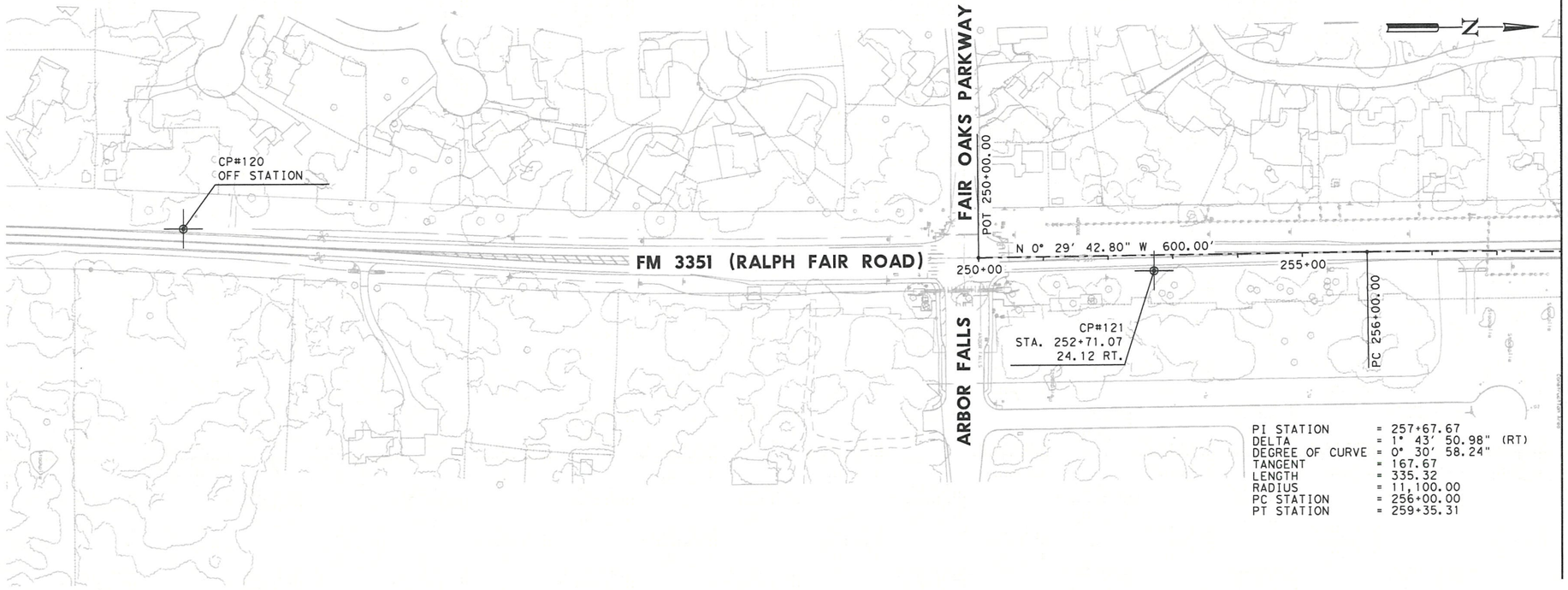
FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		
	SAT	COMAL		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			73

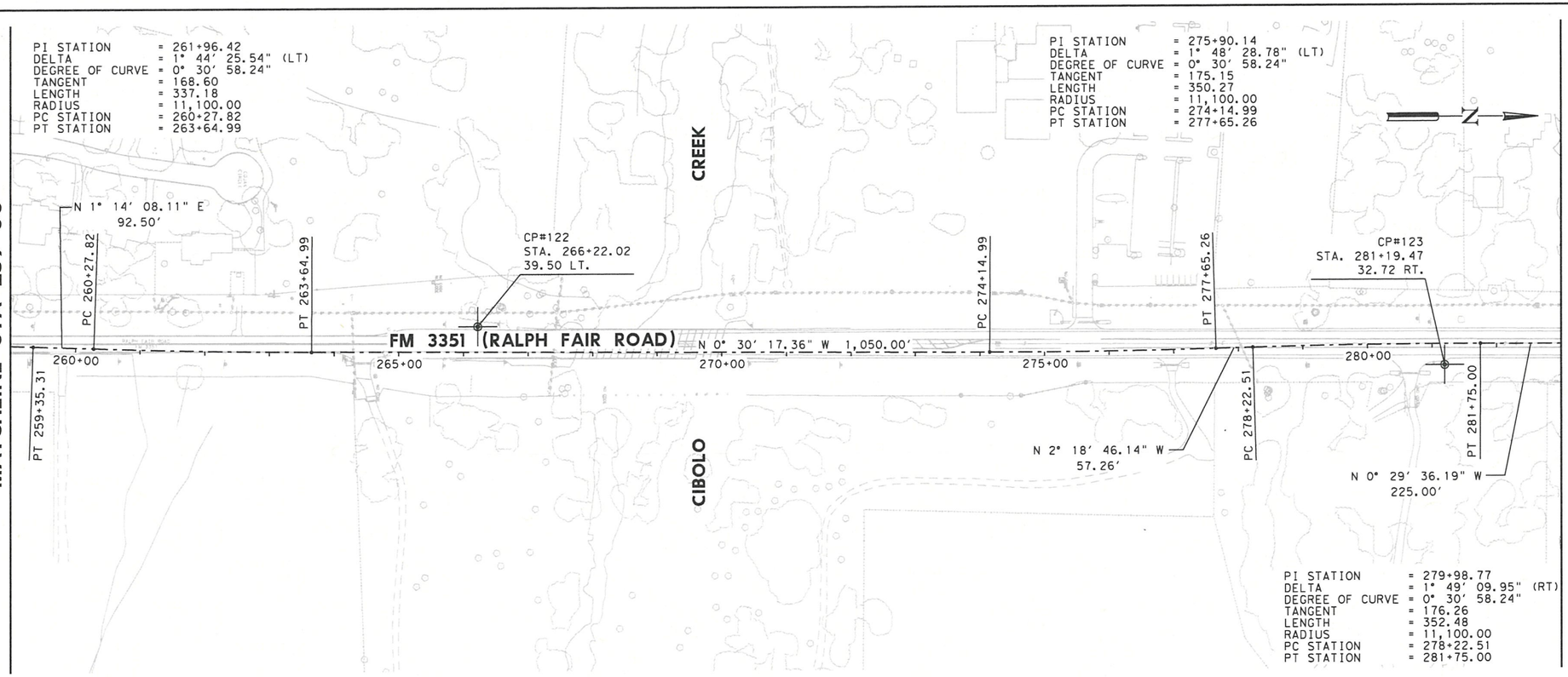
LOC NO.	TCP PHASE	SPECIFIC TCP PLAN SHEET OR TCP STANDARD SHEET	FURNISH TMA/TA	RELOCATE/REUSE TMA/TA	TOTAL TMA/TA PER SET UP	DURATION OF TMA/TA SET UP	6185 6002 TMA (STATIONARY)	6185 6003 TMA (MOBILE OPERATION)
		SHEET NUMBER	EA	EA	EA	DAYS PER TMA/TA USE	DAY	HR
1	PHASE 1	RESTRIPE LANE AND SET BARRIER						20
2	PHASE 2	RESTRIPE LANE AND SET BARRIER	2		2	10	20	20
3	PHASE 3	RESTRIPE LANE AND MOVE & SET BARRIER		2	2	210	420	20
4	PHASE 4	RESTRIPE LANE AND MOVE & SET BARRIER		2	2	266	532	20
5	PHASE 5, STEP 1	RESTRIPE LANE AND MOVE & SET BARRIER		2	2	126	252	
6	PHASE 5, STEP 2	FINAL SURFACE AND PAVEMENT MARKINGS						40
		TOTALS	2	6			1224	120

NOTE.
FURNISH TMA/TA - THE NUMBER OF ATTENUATORS BEING FURNISHED FOR THE SPECIFIC TCP.
RELOCATE/REUSE TMA/TA - THE NUMBER OF ATTENUATORS BEING REUSED FROM A PREVIOUS TCP FOR THE SPECIFIC TCP.
TOTAL TMA/TA PER SET UP = (FURNISH TMA/TA) + (RELOCATE/REUSE TMA/TA)
DURATION OF TMA/TA SET UP - THE NUMBER OF DAYS THE ATTENTUATORS WILL BE USED FOR THE SPECIFIC TCP.
TMA/TA (STATIONARY) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)
TMA/TA (MOBILE OPERATION) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)

TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA) SUMMARY SHEET

FILE: tma.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS 3/2018	3212	05	013	FM 3351
	DIST	COUNTY		
	SAT	COMAL		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			74





1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00017.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM NAD83(2011)(EPOCH2010.00) SOUTH CENTRAL ZONE (4204).
3. ALL CONTROL WAS HORIZONTALLY AND VERTICALLY VERIFIED AND FOUND TO REQUIRE NO CHANGES. ALL PUBLISHED VALUES WERE UTILIZED AND DISPLAYED HEREON. PUBLISHED VALUES PROVIDED BY POZNECKI CAMARILLO, INC. BY CONTROL SHEETS DATED 9/12/2016.

0 100 200 300 400
SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
REGISTERED
CURTIS SMITH
5494
PROFESSIONAL
LAND SURVEYOR
8/21/23

CURTIS SMITH
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5494 TEXAS FIRM No. 10106900

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

GORRONDONA & ASSOCIATES, INC.
2800 NE LOOP 820, SUITE 660
FORT WORTH, TEXAS 76137
TEXAS REGISTERED SURVEYING FIRM 10106900

Texas Department of Transportation

FM 3351
HORIZONTAL CONTROL INDEX SHEET

SHEET 1 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	75

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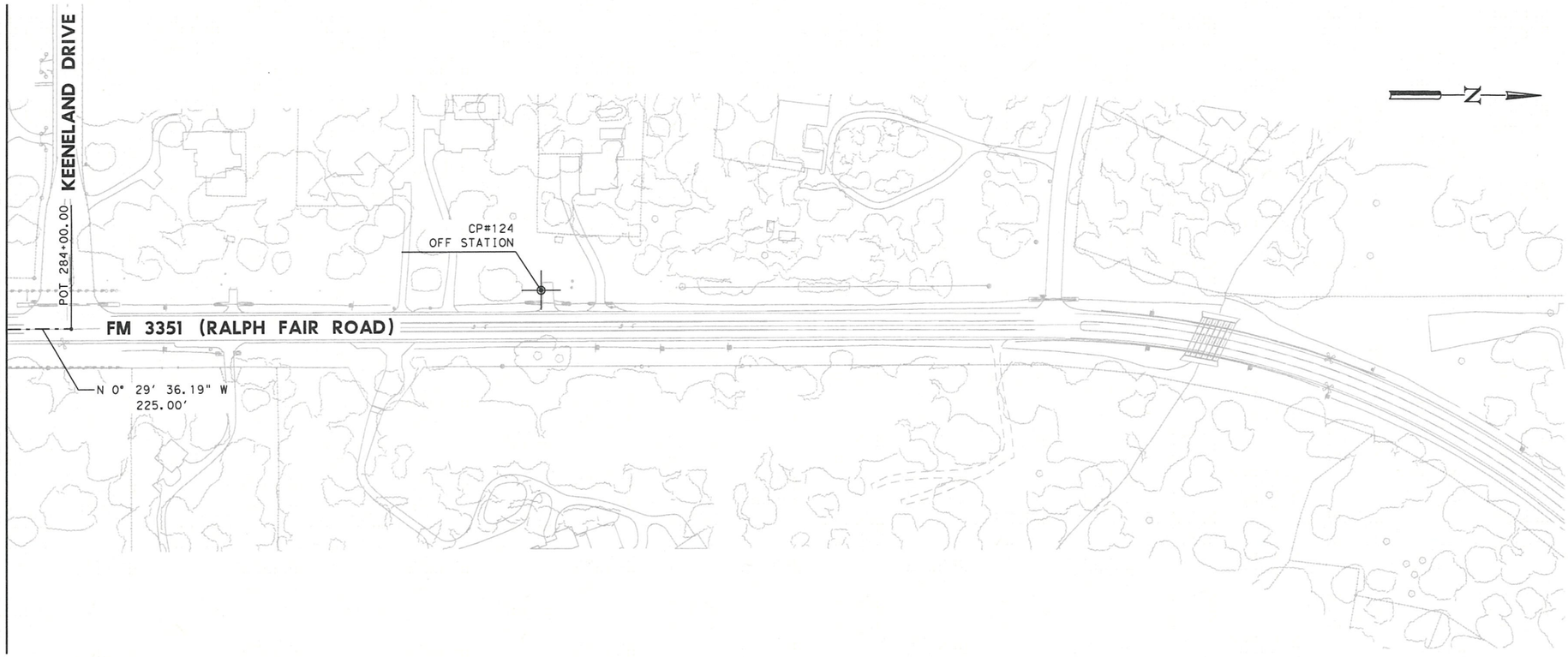

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00017.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM NAD83(2011)(EPOCH2010.00) SOUTH CENTRAL ZONE (4204).
3. ALL CONTROL WAS HORIZONTALLY AND VERTICALLY VERIFIED AND FOUND TO REQUIRE NO CHANGES. ALL PUBLISHED VALUES WERE UTILIZED AND DISPLAYED HEREON. PUBLISHED VALUES PROVIDED BY POZNECKI CAMARILLO, INC. BY CONTROL SHEETS DATED 9/12/2016.

0 100 200 300 400
SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
REGISTERED
CURTIS SMITH
5494
PROFESSIONAL
LAND SURVEYOR

8/21/23

CURTIS SMITH
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5494 TEXAS FIRM No. 10106900

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

CORRONDONA & ASSOCIATES, INC.
2800 NE LOOP 820, SUITE 660
FORT WORTH, TEXAS 76137
TEXAS REGISTERED SURVEYING FIRM 10106900

Texas Department of Transportation

FM 3351
HORIZONTAL CONTROL INDEX SHEET

SHEET 2 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	76

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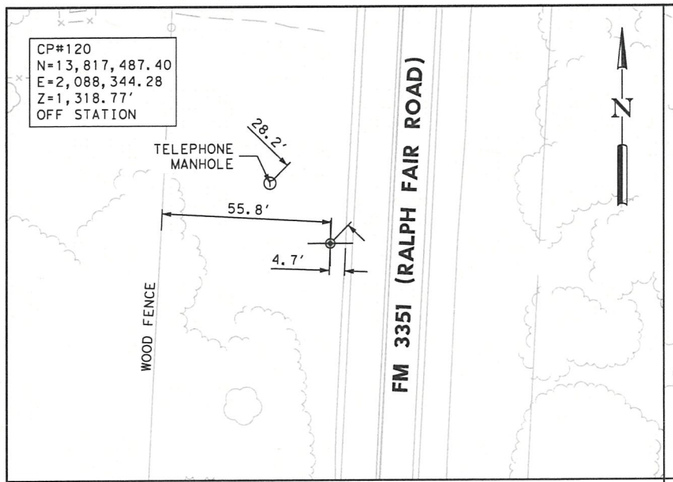
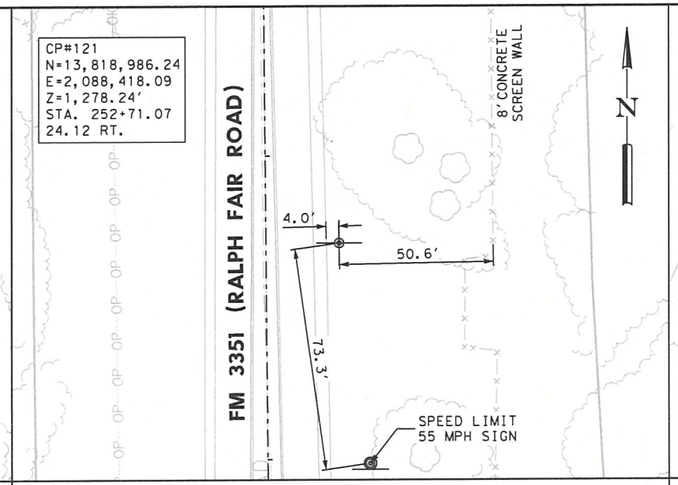
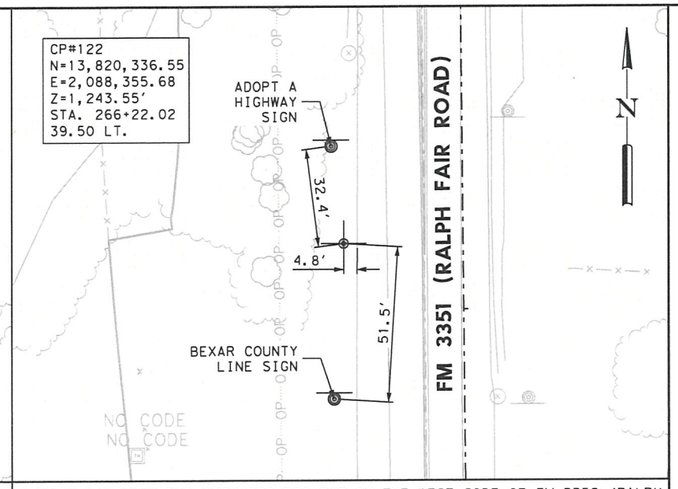


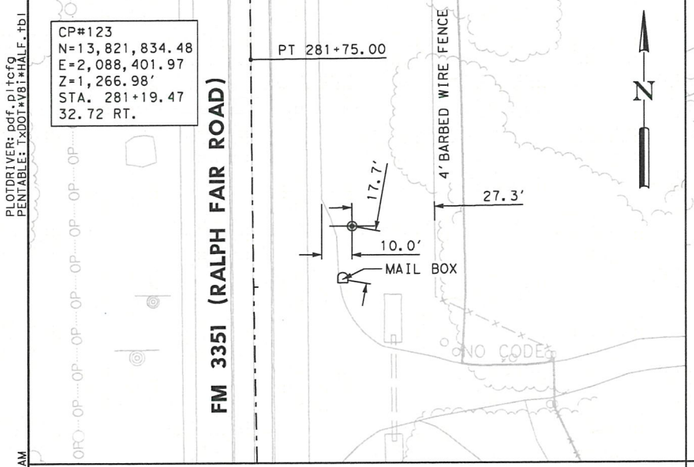
1/2" X 24" IRON ROD WITH RED PCI CAP ON THE WEST SIDE OF FM 3351 (RALPH FAIR RD.) +/-0.23 MILES SOUTH OF FAIR OAKS PARKWAY.



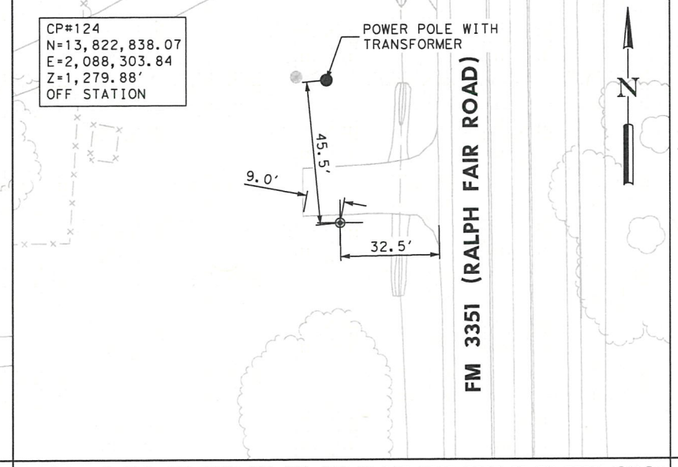
1/2" X 24" IRON ROD WITH RED PCI CAP ON THE EAST SIDE OF FM 3351 (RALPH FAIR RD.) +/-300' NORTH OF THE FAR OAKS PKWY. INTERSECTION.



1/2" X 24" IRON ROD WITH RED PCI CAP ON THE WEST SIDE OF FM 3352 (RALPH FAIR RD.) +/-0.31 MILES NORTH OF FAIR OAKS PARKWAY.



1/2" X 24" IRON ROD WITH RED PCI CAP ON THE EAST SIDE OF FM 3351 (RALPH FAIR RD.) +/-250' SOUTH OF THE KEENELAND ROAD INTERSECTION.



1/2" X 24" IRON ROD WITH RED PCI CAP ON THE WEST SIDE OF FM 3351 (RALPH FAIR RD.) +/-775' NORTH OF THE KEENELAND ROAD INTERSECTION.

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00017.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM NAD83(2011)(EPOCH2010.00) SOUTH CENTRAL ZONE (4204).
3. ALL CONTROL WAS HORIZONTALLY AND VERTICALLY VERIFIED AND FOUND TO REQUIRE NO CHANGES. ALL PUBLISHED VALUES WERE UTILIZED AND DISPLAYED HEREON. PUBLISHED VALUES PROVIDED BY POZNECKI CAMARILLO, INC. BY CONTROL SHEETS DATED 9/12/2016.

0 25 50 75 100
SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
REGISTERED
CURTIS SMITH
5494
PROFESSIONAL
LAND SURVEYOR

8/21/23

CURTIS SMITH
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5494 TEXAS FIRM No. 10106900

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

GORRONDONA & ASSOCIATES, INC.
2800 NE LOOP 820, SUITE 660
FORT WORTH, TEXAS 76137
TEXAS REGISTERED SURVEYING FIRM 10106900

Texas Department of Transportation

FM 3351
HORIZONTAL AND VERTICAL CONTROL DETAIL SHEET

SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	77

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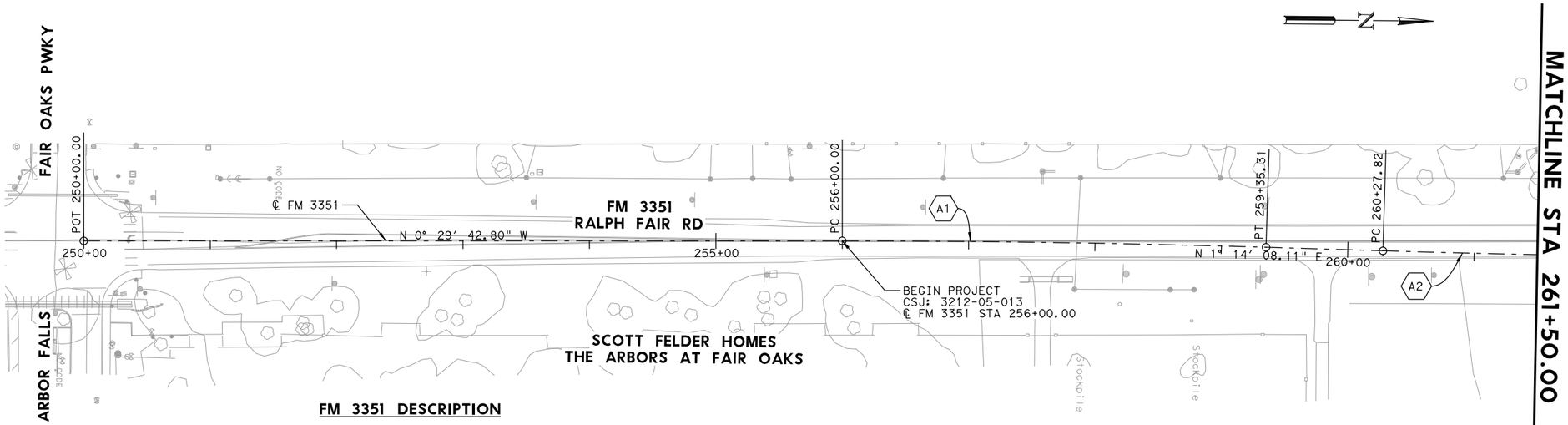
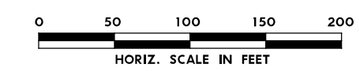




LEGEND

XX CURVE NO.

NOTES:

1. SEE ROADWAY PLAN SHEETS FOR ADDITIONAL INFORMATION.
2. SEE DRIVEWAY PLAN SHEETS FOR ADDITIONAL INFORMATION.
2. SEE SURVEY CONTROL SHEETS FOR ADDITIONAL INFORMATION.

FM 3351 DESCRIPTION

CHAIN FM3351 CONTAINS:
FM33511 CUR FM3351_3 CUR FM3351_6 CUR FM3351_9 CUR FM3351_12 FM335114

BEGINNING CHAIN FM3351 DESCRIPTION
FEATURE: PROFILE_ROAD

POINT FM33511 N 13,818,714.97 E 2,088,396.32 STA 250+00.00

COURSE FROM FM33511 TO PC FM3351_3 N 0° 29' 42.80" W DIST 600.00

A1

CURVE FM3351_3		CURVE DATA				
P.I. STATION	=	257+67.67	N	13,819,482.61	E	2,088,389.68
DELTA	=	1° 43' 50.98" (RT)				
DEGREE	=	0° 30' 58.24"				
TANGENT	=	167.67				
LENGTH	=	335.32				
RADIUS	=	11,100.00				
EXTERNAL	=	1.27				
LONG CHORD	=	335.30				
MID. ORD.	=	1.27				
P.C. STATION		256+00.00	N	13,819,314.95	E	2,088,391.13
P.T. STATION		259+35.31	N	13,819,650.24	E	2,088,393.30
C.C.			N	13,819,410.88	E	2,099,490.72

BACK = N 0° 29' 42.80" W
AHEAD = N 1° 14' 08.18" E
CHORD BEAR = N 0° 22' 12.69" E

COURSE FROM PT FM3351_3 TO PC FM3351_6 N 1° 14' 08.11" E DIST 92.50

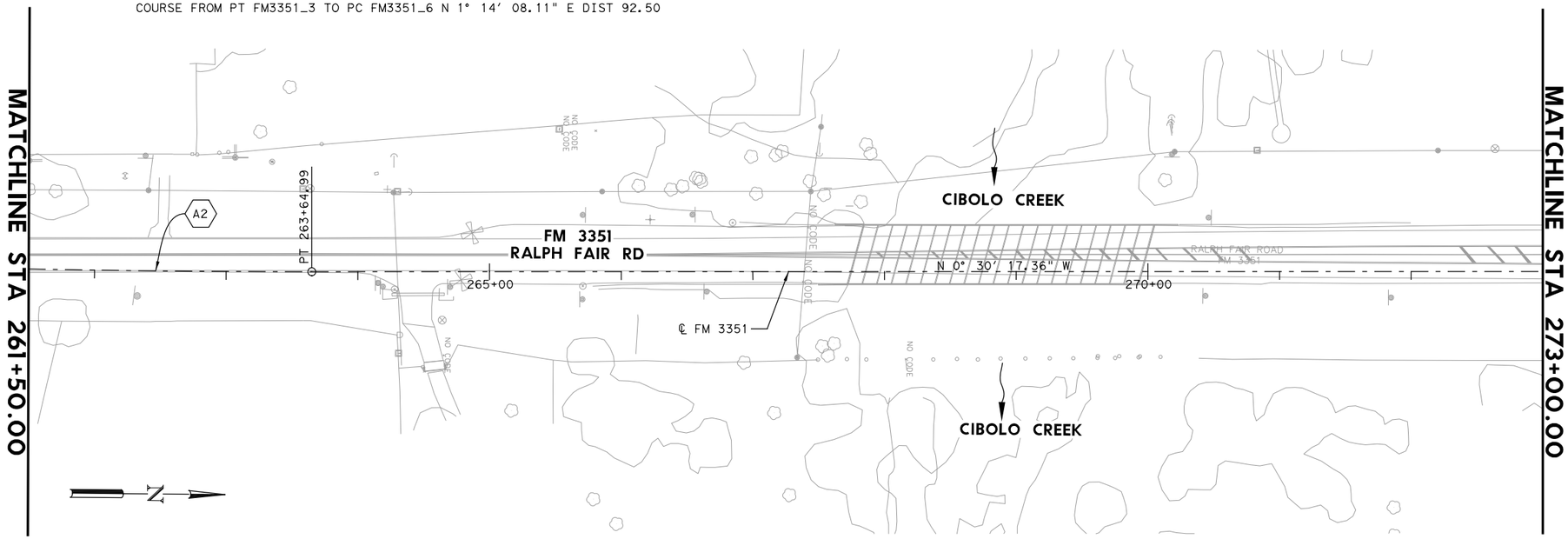
FM 3351 DESCRIPTION (CONT.)

A2

CURVE FM3351_6		CURVE DATA				
P.I. STATION	=	261+96.42	N	13,819,911.29	E	2,088,398.93
DELTA	=	1° 44' 25.54" (LT)				
DEGREE	=	0° 30' 58.24"				
TANGENT	=	168.60				
LENGTH	=	337.18				
RADIUS	=	11,100.00				
EXTERNAL	=	1.28				
LONG CHORD	=	337.16				
MID. ORD.	=	1.28				
P.C. STATION		260+27.82	N	13,819,742.72	E	2,088,395.29
P.T. STATION		263+64.99	N	13,820,079.88	E	2,088,397.44
C.C.			N	13,819,982.08	E	2,077,297.88

BACK = N 1° 14' 08.18" E
AHEAD = N 0° 30' 17.36" W
CHORD BEAR = N 0° 21' 55.41" E

COURSE FROM PT FM3351_6 TO PC FM3351_9 N 0° 30' 17.36" W DIST 1,050.00



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023
Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
HORIZONTAL ALIGNMENT DATA & LAYOUT
BEGIN PROJECT TO STA 273+00

SCALE: 1"=100' SHEET 1 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	78

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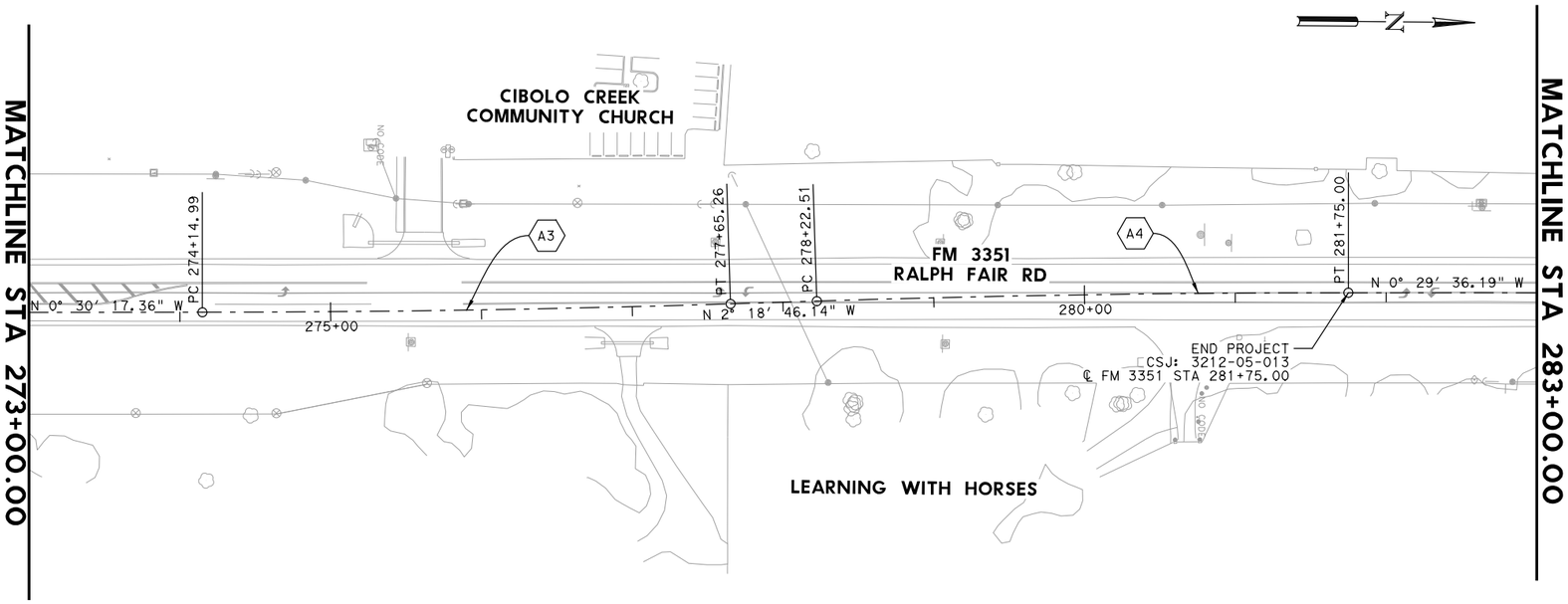

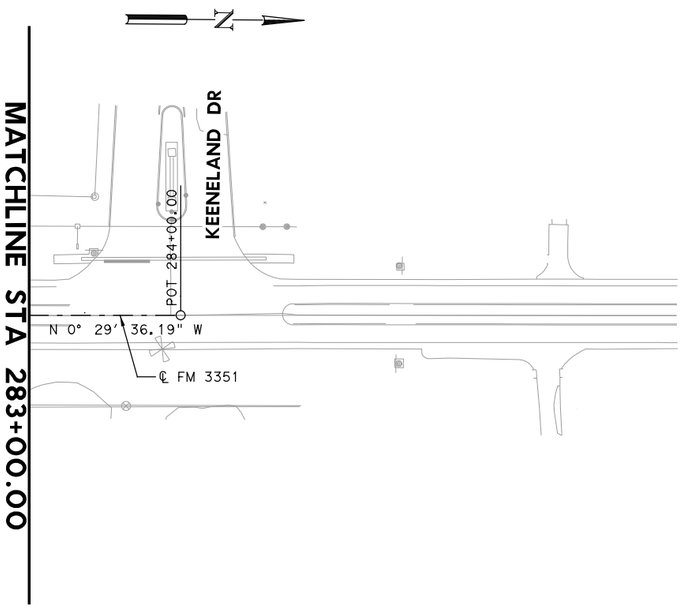

0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

(XX) CURVE NO.

NOTES:

1. SEE ROADWAY PLAN SHEETS FOR ADDITIONAL INFORMATION.
2. SEE DRIVEWAY PLAN SHEETS FOR ADDITIONAL INFORMATION.
2. SEE SURVEY CONTROL SHEETS FOR ADDITIONAL INFORMATION.

FM 3351 DESCRIPTION (CONT.)

A3

CURVE DATA

```
CURVE FM3351_9
P.I.  STATION          275+90.14   N      13,821,304.98  E      2,088,386.65
DELTA          =     1° 48' 28.78" (LT)
DEGREE         =     0° 30' 58.24"
TANGENT        =           175.15
LENGTH         =           350.27
RADIUS         =       11,100.00
EXTERNAL       =             1.38
LONG CHORD     =           350.25
MID. ORD.      =             1.38
P.C.  STATION          274+14.99   N      13,821,129.84  E      2,088,388.19
P.T.  STATION          277+65.26   N      13,821,479.98  E      2,088,379.58
C.C.                               N      13,821,032.04  E      2,077,288.62
BACK          = N   0° 30' 17.36" W
AHEAD         = N   2° 18' 46.14" W
CHORD BEAR    = N   1° 24' 31.75" W

COURSE FROM PT FM3351_9 TO PC FM3351_12 N 2° 18' 46.14" W DIST 57.26
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A4

CURVE DATA

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CURVE FM3351_12
P.I.  STATION          279+98.77   N      13,821,713.31  E      2,088,370.16
DELTA          =     1° 49' 09.95" (RT)
DEGREE         =     0° 30' 58.24"
TANGENT        =           176.26
LENGTH         =           352.48
RADIUS         =       11,100.00
EXTERNAL       =             1.40
LONG CHORD     =           352.47
MID. ORD.      =             1.40
P.C.  STATION          278+22.51   N      13,821,537.19  E      2,088,377.27
P.T.  STATION          281+75.00   N      13,821,889.56  E      2,088,368.64
C.C.                               N      13,821,985.14  E      2,099,468.23
BACK          = N   2° 18' 46.14" W
AHEAD         = N   0° 29' 36.19" W
CHORD BEAR    = N   1° 24' 11.16" W

COURSE FROM PT FM3351_12 TO FM335114 N 0° 29' 36.19" W DIST 225.00

POINT FM335114         N    13,822,114.55 E     2,088,366.70 STA     284+00.00

================================================================================
ENDING CHAIN FM3351 DESCRIPTION
```

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
HORIZONTAL ALIGNMENT DATA & LAYOUT
STA 273+00 TO END PROJECT

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	79

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DATE: 11/15/2023
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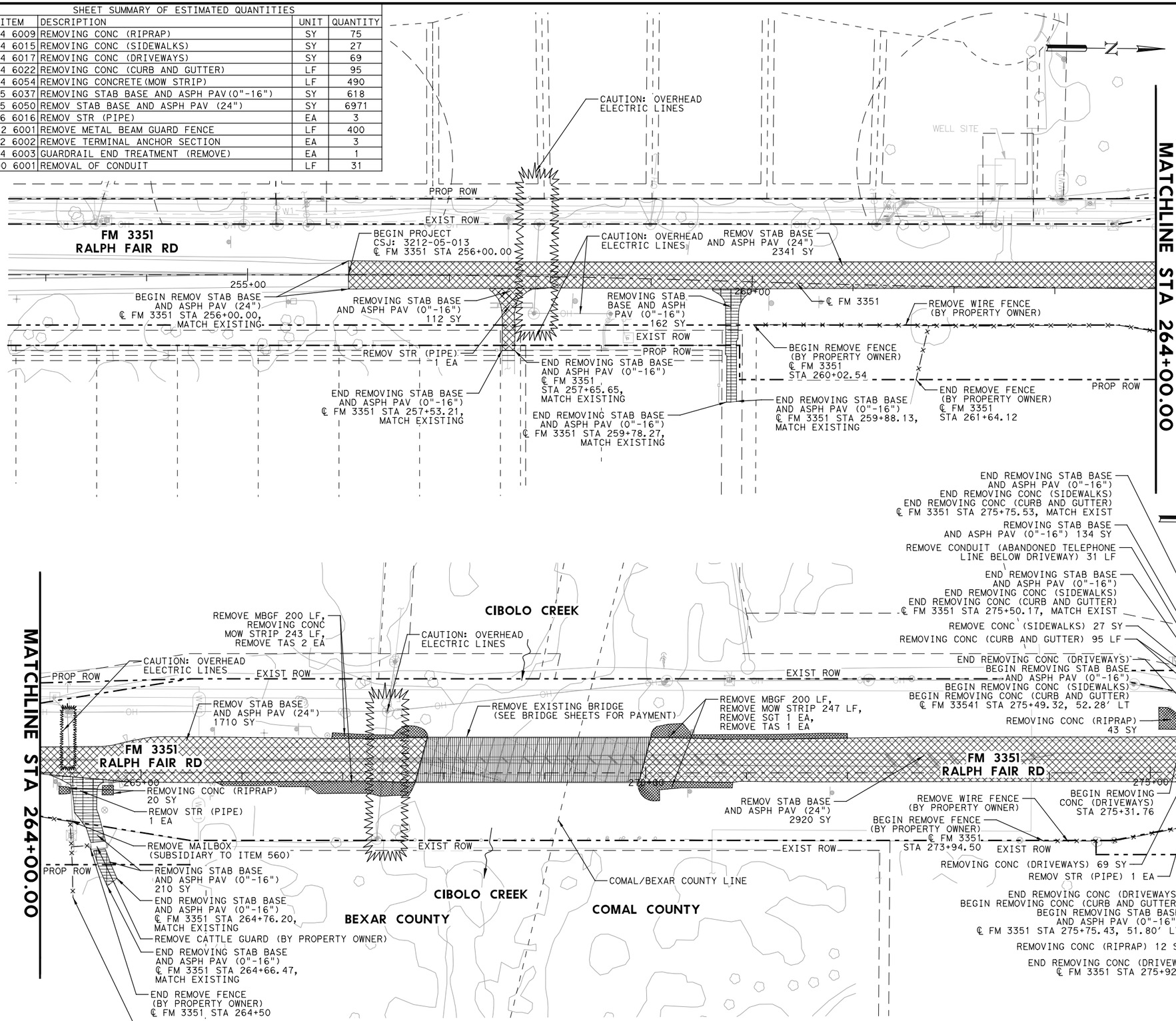
File Name: FM3351PL02.dgn
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
104 6009	REMOVING CONC (RIPRAP)	SY	75
104 6015	REMOVING CONC (SIDEWALKS)	SY	27
104 6017	REMOVING CONC (DRIVEWAYS)	SY	69
104 6022	REMOVING CONC (CURB AND GUTTER)	LF	95
104 6054	REMOVING CONCRETE(MOW STRIP)	LF	490
105 6037	REMOVING STAB BASE AND ASPH PAV(0"-16")	SY	618
105 6050	REMOV STAB BASE AND ASPH PAV (24")	SY	6971
496 6016	REMOV STR (PIPE)	EA	3
542 6001	REMOVE METAL BEAM GUARD FENCE	LF	400
542 6002	REMOVE TERMINAL ANCHOR SECTION	EA	3
544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
690 6001	REMOVAL OF CONDUIT	LF	31



0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PAVEMENT REMOVAL
- CONC RIPRAP REMOVAL
- ASPHALT DRIVEWAY REMOVAL
- CONCRETE DRIVEWAY REMOVAL
- REMOV STR (BRIDGE 100 - 499 FT LENGTH)
- -x—x— FENCE REMOVAL
- — - - EXIST ROW
- — - - PROP ROW
- — — EASEMENT LINES
- - - - PARCEL LINES

NOTES:

1. CONTRACTOR SHALL SEQUENCE REMOVALS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS, WHERE PRACTICAL, EXISTING PROTECTIVE MEASURES AND MBGF SHALL REMAIN IN PLACE UNTIL REPLACEMENT IS IMMINENT.
2. CONTRACTOR SHALL SEQUENCE REMOVAL OF EXISTING PAVEMENT MARKINGS AND DELINEATORS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS.
3. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
4. SEE SIGNING PLANS FOR ROADSIDE SIGNS REMOVALS.
5. SEE DRAINAGE PLANS FOR DRAINAGE REMOVALS.
6. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
7. FOR EXACT LOCATIONS AND LAYOUT OF SAWCUT LINE, REFER TO ROADWAY PLAN SHEETS.
8. REMOVE ABANDONED UTILITIES AS DIRECTED BY THE ENGINEER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK REMOVAL LAYOUT

BEGIN TO STA 276+00.00

SCALE: 1"=100' SHEET 1 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	80

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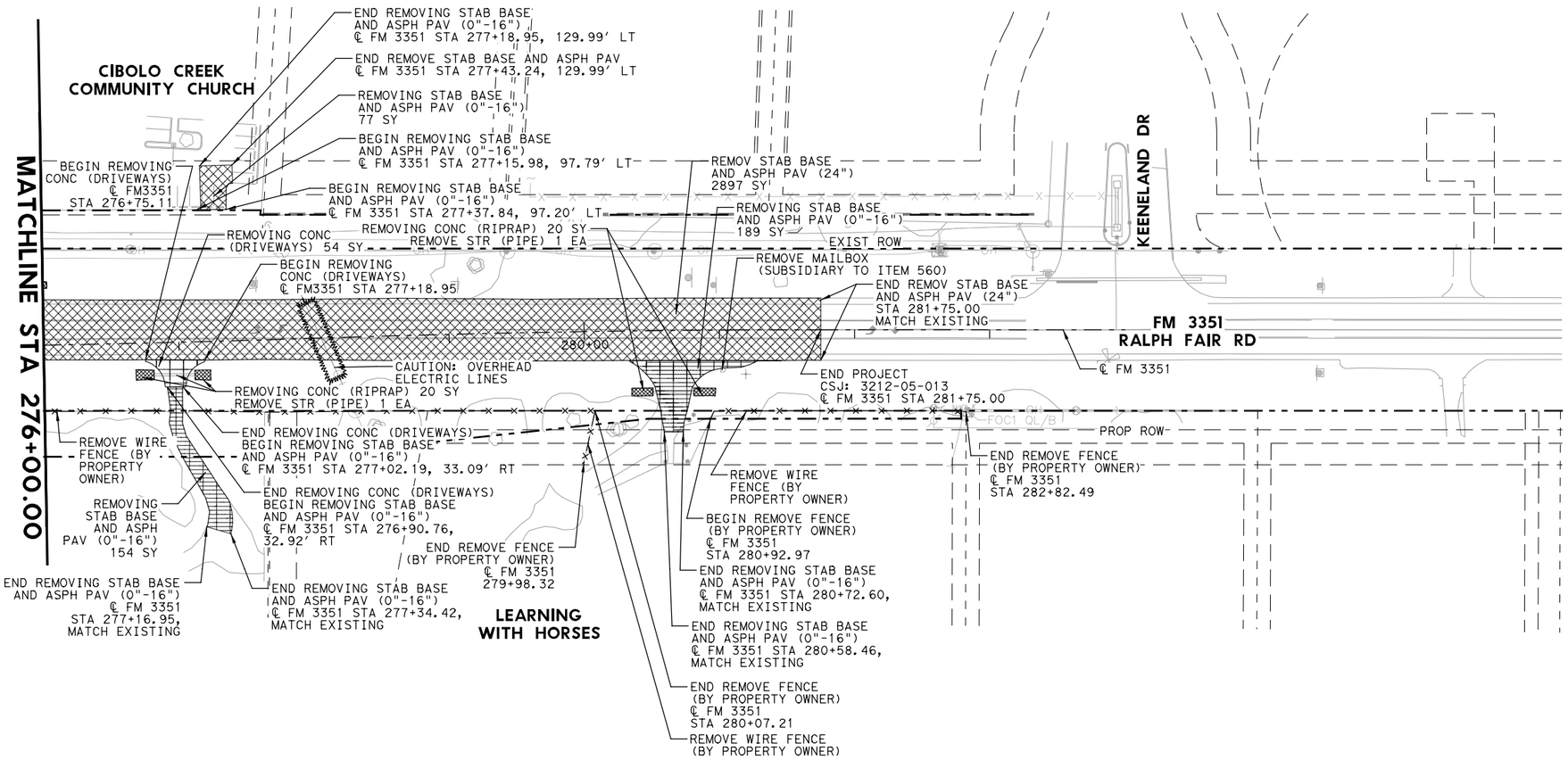
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
104 6009	REMOVING CONC (RIPRAP)	SY	40
104 6017	REMOVING CONC (DRIVEWAYS)	SY	54
105 6037	REMOVING STAB BASE AND ASPH PAV(0"-16")	SY	420
105 6050	REMOV STAB BASE AND ASPH PAV (24")	SY	2897
496 6016	REMOV STR (PIPE)	EA	2



0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- PAVEMENT REMOVAL
- CONC RIPRAP REMOVAL
- ASPHALT DRIVEWAY REMOVAL
- CONCRETE DRIVEWAY REMOVAL
- REMOV STR (BRIDGE 100 - 499 FT LENGTH)
- -x—x— FENCE REMOVAL
- — - - EXIST ROW
- — - - PROP ROW
- — — EASEMENT LINES
- — - — PARCEL LINES

NOTES:

1. CONTRACTOR SHALL SEQUENCE REMOVALS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS, WHERE PRACTICAL, EXISTING PROTECTIVE MEASURES AND MBGF SHALL REMAIN IN PLACE UNTIL REPLACEMENT IS IMMINENT.
2. CONTRACTOR SHALL SEQUENCE REMOVAL OF EXISTING PAVEMENT MARKINGS AND DELINEATORS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS.
3. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
4. SEE SIGNING PLANS FOR ROADSIDE SIGNS REMOVALS.
5. SEE DRAINAGE PLANS FOR DRAINAGE REMOVALS.
6. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
7. FOR EXACT LOCATIONS AND LAYOUT OF SAWCUT LINE, REFER TO ROADWAY PLAN SHEETS.
8. REMOVE ABANDONED UTILITIES AS DIRECTED BY THE ENGINEER.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
REMOVAL LAYOUT

STA 276+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	81

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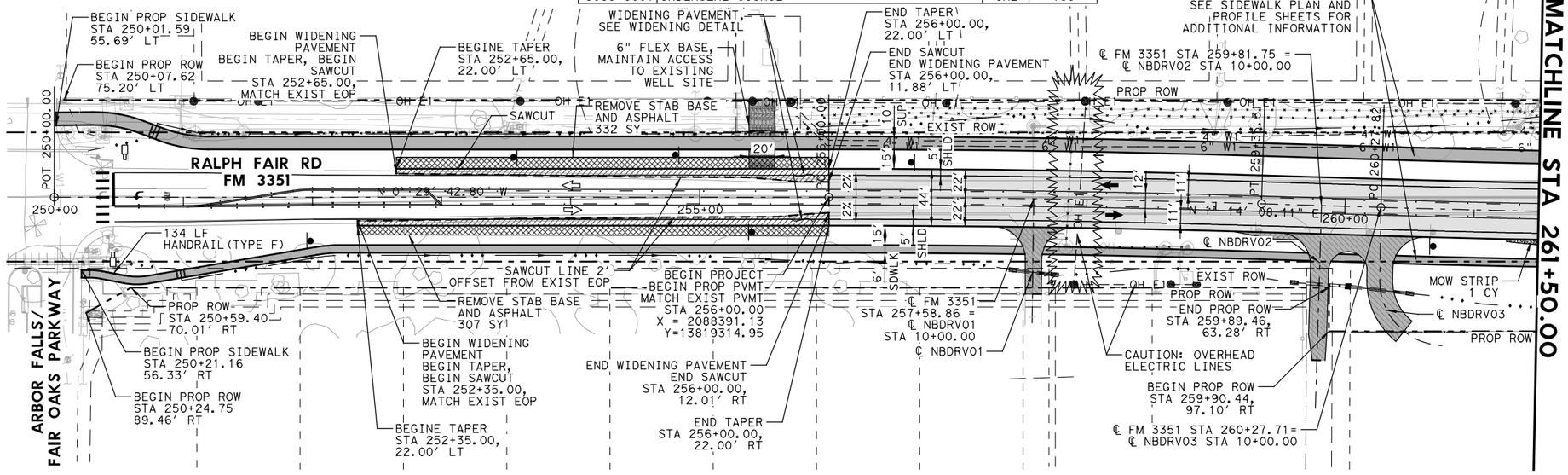
User Name: CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
100 6002	PREPARING ROW	STA	6
105 6022	REMOVING STAB BASE AND ASPH PAV (13")	SY	639
110 6001	EXCAVATION (ROADWAY)	CY	1409
132 6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	3078
132 6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	2830
132 6056	EMBANKMENT (FINAL)(ORD COMP)(TY C2)(DS)	CY	107
216 6001	PROOF ROLLING	HR	96

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
354 6022	PLANE ASPH CONC PAV(0" TO 3")	SY	932
432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	1
450 6052	RAIL (HANDRAIL)(TY F)	LF	134
531 6002	CONC SIDEWALKS (5")	SY	1995
3076 6001	D-GR HMA TY-B PG64-22	TON	1764
3076 6025	D-GR HMA TY-C SAC-B PG70-22	TON	430
3076 6066	TACK COAT	GAL	1152
3077 6023	SP MIXES SP-C SAC-B PG70-22	TON	546
3085 6001	UNDERSEAL COURSE	GAL	759



0 50 100 150 200
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- PROPOSED STONE RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

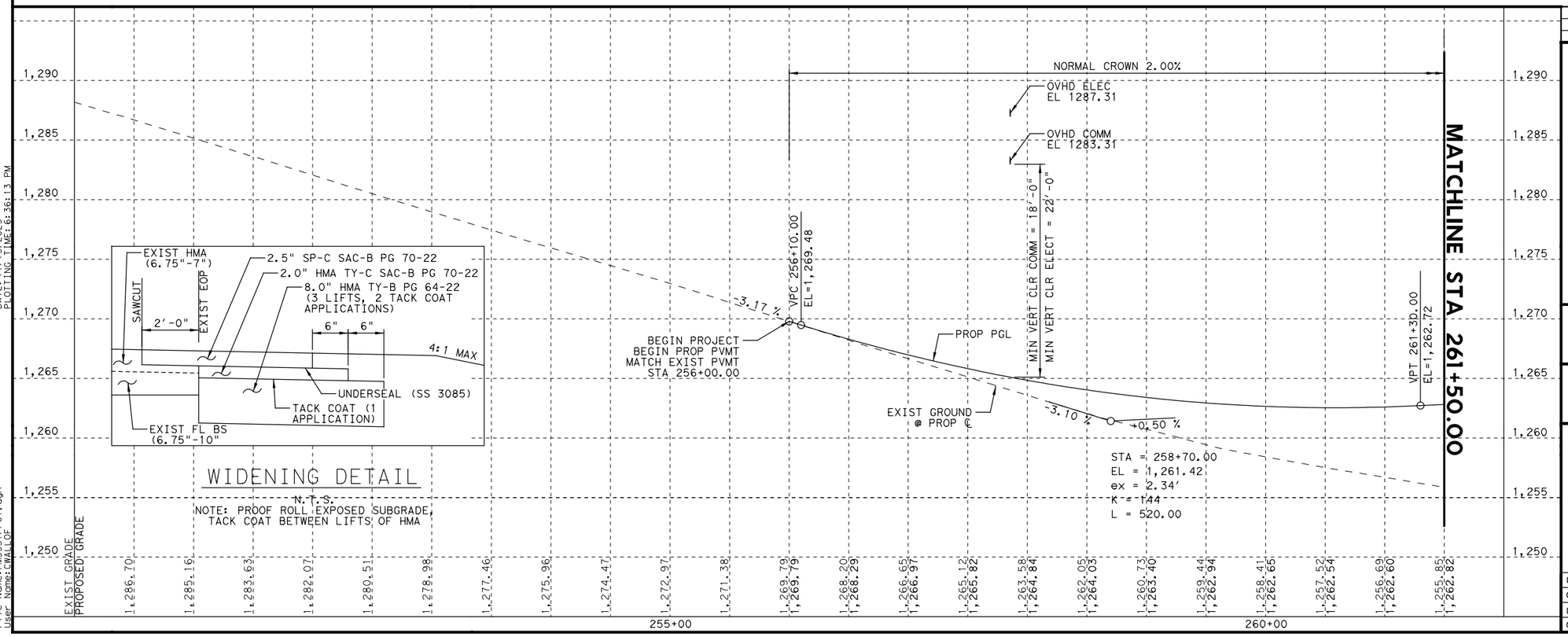
NOTES:

1. SEE HORIZONTAL DATA & LAYOUT SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
4. OFFSET FOR C223 RAIL IS TO THE NOMINAL FACE OF RAIL.
5. SEE DRAINAGE AND REMOVAL SHEETS FOR ADDITIONAL INFORMATION.

WIDENING DETAIL

N.T.S.

NOTE: PROOF ROLL EXPOSED SUBGRADE, TACK COAT BETWEEN LIFTS OF HMA



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
PLAN & PROFILE

BEGIN TO STA 261+50.00

SCALE: 1"=100'-H
1"=10'-V

SHEET 1 OF 3

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	82

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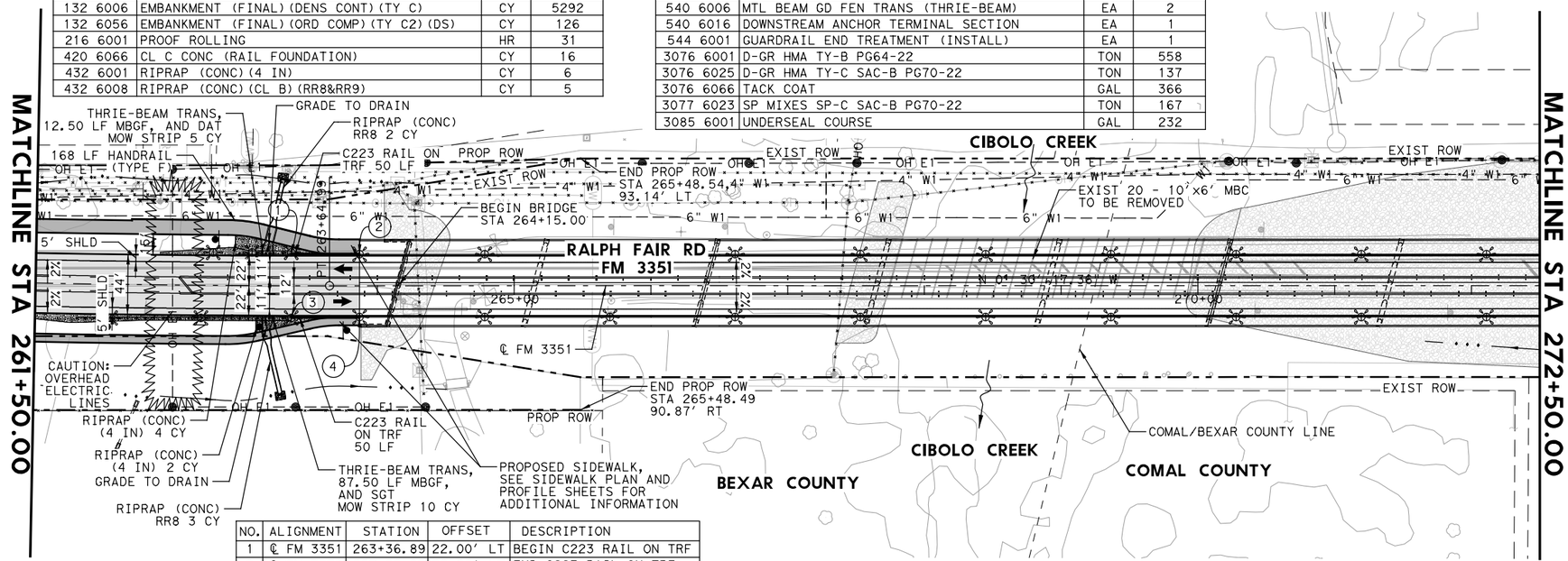
DATE: 11/15/2023
PLOTTING TIME: 6:36:13 PM
File Name:FM3351PP01.dgn
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
100 6002	PREPARING ROW	STA	11
110 6001	EXCAVATION (ROADWAY)	CY	146
110 6002	EXCAVATION (CHANNEL)	CY	2717
132 6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	5396
132 6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	5292
132 6056	EMBANKMENT (FINAL)(ORD COMP)(TY C2)(DS)	CY	126
216 6001	PROOF ROLLING	HR	31
420 6066	CL C CONC (RAIL FOUNDATION)	CY	16
432 6001	RIPRAP (CONC)(4 IN)	CY	6
432 6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	5

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	15
450 6067	RAIL (TY C223)(MOD)	LF	100
450 6052	RAIL (HANDRAIL)(TY F)	LF	168
531 6002	CONC SIDEWALKS (5")	SY	431
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
3076 6001	D-GR HMA TY-B PG64-22	TON	558
3076 6025	D-GR HMA TY-C SAC-B PG70-22	TON	137
3076 6066	TACK COAT	GAL	366
3077 6023	SP MIXES SP-C SAC-B PG70-22	TON	167
3085 6001	UNDERSEAL COURSE	GAL	232



NO.	ALIGNMENT	STATION	OFFSET	DESCRIPTION
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2	℄ FM 3351	263+86.95	22.00' LT	END C223 RAIL ON TRF
3	℄ FM 3351	263+37.00	22.00' RT	BEGIN C223 RAIL ON TRF
4	℄ FM 3351	263+86.95	22.00' RT	END C223 RAIL ON TRF

0 50 100 150 200
HORIZ. SCALE IN FEET

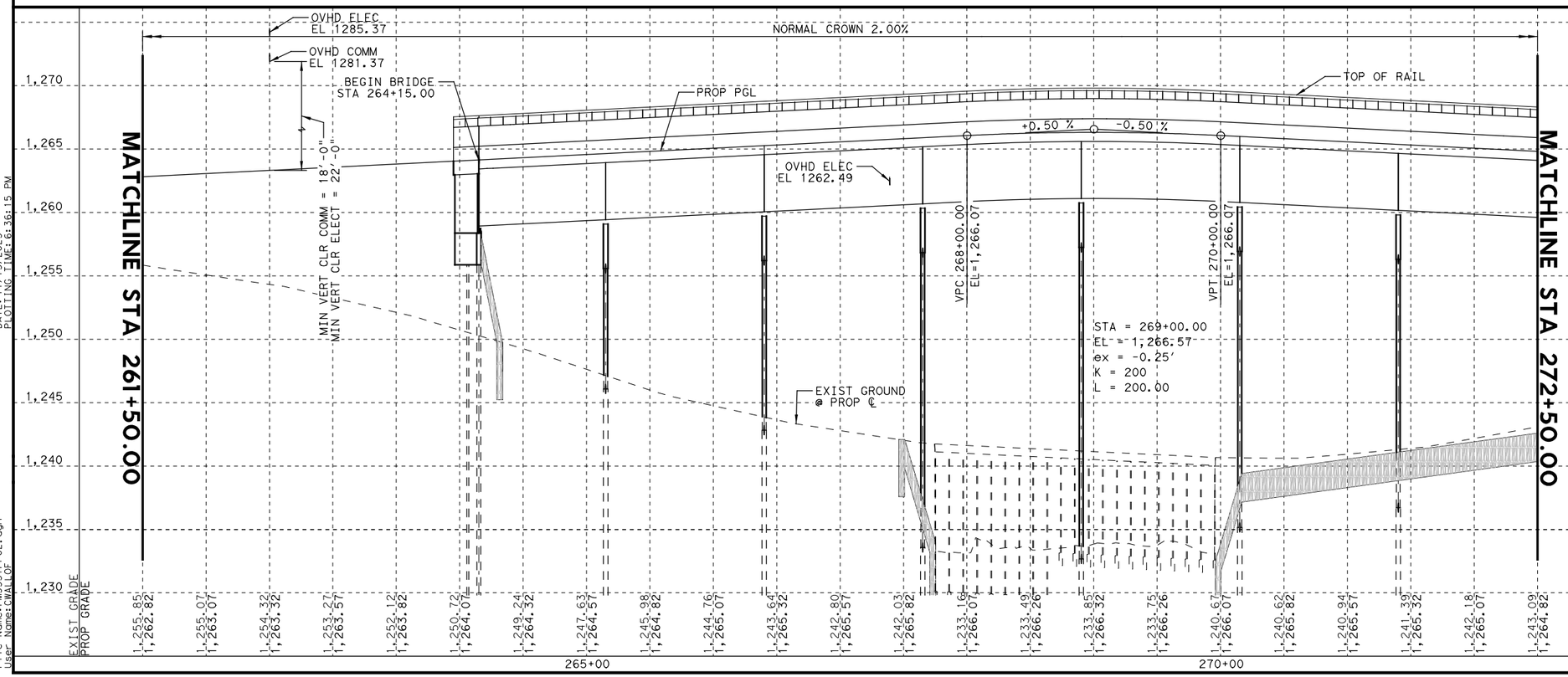
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- PROPOSED STONE RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE HORIZONTAL DATA & LAYOUT SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
4. OFFSET FOR C223 RAIL IS TO THE NOMINAL FACE OF RAIL.
5. SEE DRAINAGE AND REMOVAL SHEETS FOR ADDITIONAL INFORMATION.



NO.	DATE	REVISION	APPR BY

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PROFESSIONAL ENGINEER
11/15/2023
Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
PLAN & PROFILE

STA 261+50.00 TO STA 272+50.00

SCALE: 1"=100'-H
1"=10'-V

SHEET 2 OF 3

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	83

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
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DATE: 11/15/2023
PLOTTING TIME: 6:36:15 PM
File Name:FM3351PP02.dgn
User Name:CWALLOF

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
100 6002	PREPARING ROW	STA	10
110 6001	EXCAVATION (ROADWAY)	CY	1347
110 6002	EXCAVATION (CHANNEL)	CY	669
132 6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	11653
132 6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	9992
132 6056	EMBANKMENT (FINAL)(ORD COMP)(TY C2)(DS)	CY	406
216 6001	PROOF ROLLING	HR	100
420 6066	CL C CONC (RAIL FOUNDATION)	CY	23
432 6001	RIPRAP (CONC)(4 IN)	CY	5
432 6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	4

SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	14
450 6067	RAIL (TY C223)(MOD)	LF	150
531 6002	CONC SIDEWALKS (5")	SY	1603
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	75
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
3076 6001	D-GR HMA TY-B PG64-22	TON	1836
3076 6025	D-GR HMA TY-C SAC-B PG70-22	TON	450
3076 6066	TACK COAT	GAL	1200
3077 6023	SP MIXES SP-C SAC-B PG70-22	TON	549
3085 6001	UNDERSEAL COURSE	GAL	764

MATCHLINE STA 272+50.00

CIBOLO CREEK COMMUNITY CHURCH

END PROP ROW STA 277+63.69 95.87' LT

BEGIN PROP ROW STA 274+63.97, 92.91' LT

BEGIN PROP ROW STA 274+64.01, 101.19' LT

EXIST ROW

PROP ROW

℄ SBDRV01

RIPRAP (CONC) RR8 2 CY

GRADE TO DRAIN

THRIE-BEAM TRANS, 62.50 LF MBGF, AND SGT

9 CY MOW STIP

C223 RAIL ON TRF 75 LF

POT 274+14.00

RIPRAP (CONC) (4 IN) 2 CY

N 00° 30' 38" W

275+00

℄ NBDRV04

END BRIDGE STA 273+65.00

C223 RAIL ON TRF 75 LF

EXIST ROW

BEGIN PROP ROW STA 274+46.14, 67.02' RT

BEGIN PROP ROW STA 274+46.10, 81.05' RT

GRADE TO DRAIN

RIPRAP (CONC) RR8 2 CY

RIPRAP (CONC) (4 IN) 3 CY

THRIE-BEAM TRANS, 12.50 LF MBGF, AND DAT

5 CY MOW STRIP

PROP ROW

℄ FM 3351 STA 277+31.10 = ℄ SBDRV01 STA 10+00.00

END PROP ROW STA 277+60.85 86.46' RT

BEGIN PROP WIRE FENCE (TY A), STA 277+60.93, TIE INTO EXIST FENCE (TO BE CONSTRUCTED BY PROPERTY OWNER)

BEGIN PROP ROW STA 277+61.19 76.45' RT

℄ FM 3351 STA 276+96.44 = ℄ NBDRV04 STA 10+00.00

CAUTION: OVERHEAD ELECTRIC LINES

BEGIN PROP ROW STA 278+78.08 80.01' RT

END PROP WIRE FENCE (TY A) STA 280+04.61, TIE INTO EXIST FENCE (TO BE CONSTRUCTED BY PROPERTY OWNER)

LEARNING WITH HORSES

PROPOSED SIDEWALK, SEE SIDEWALK PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION

EXIST ROW

℄ FM 3351 STA 280+65.82= ℄ NBDRV05 STA 10+00.00

℄ FM 3351

280+00

5' SHLD ℄ NBDRV05

BEGIN SAWCUT STA 281+75.00, 22.00' LT

POT 281+75.00

RALPH FAIR RD

FM 3351

N 0° 29' 36.19" W

END PROJECT END PROP PVMT MATCH EXIST PVMT STA 281+75.00 X=2088368.64 Y=13821889.56

END SAWCUT STA 281+75.00, 22.00' RT

BEGIN PROP WIRE FENCE (TY A) STA 280+92.96, TIE INTO EXIST FENCE (TO BE CONSTRUCTED BY PROPERTY OWNER)

END SIDEWALK STA 283+48.72, 44.10' LT

POT 284+00.00

KEENELAND DR

END PROP ROW STA 282+78.76 65.82' RT

END SIDEWALK STA 283+30.00, 37.00' LT

PROP ROW

END PROP WIRE FENCE (TY A) STA 282+82.49, TIE INTO EXIST FENCE (TO BE CONSTRUCTED BY PROPERTY OWNER)

NO.	ALIGNMENT	STATION	OFFSET	DESCRIPTION
1	℄ FM 3351	273+94.10	22.00' LT	BEGIN C223 RAIL ON TRF
2	℄ FM 3351	274+69.22	22.00' LT	END C223 RAIL ON TRF
3	℄ FM 3351	273+94.10	22.00' RT	BEGIN C223 RAIL ON TRF
4	℄ FM 3351	274+68.99	22.00' RT	END C223 RAIL ON TRF

0 50 100 150 200
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- PROPOSED STONE RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE HORIZONTAL DATA & LAYOUT SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
4. OFFSET FOR C223 RAIL IS TO THE NOMINAL FACE OF RAIL.
5. SEE DRAINAGE AND REMOVAL SHEETS FOR ADDITIONAL INFORMATION.

MATCHLINE STA 272+50.00

OVHD ELEC EL 1285.74

MIN VERT CLR ELECT = 22'-0"

NORMAL CROWN 2.00%

TOP OF RAIL

END BRIDGE STA 273+65.00

PROP PGL

VPC 276+20.00 EL=1,262.97

VPT 280+50.00 EL=1,267.48

-0.50 %

+2.60 %

+2.11 %

2" OVERLAY CONSTRUCTED DURING CSJ 3212-05-015

EXIST GROUND AS SURVEYED DECEMBER 2021

END PROJECT END PROP PVMT MATCH EXIST PVMT* STA 281+75.00

STA = 278+35.00
EL = 1,261.90
ex = 1.66'
K = 139
L = 430.00

* THE EXIST ROADWAY WILL BE OVERLAYED DURING CSJ 3212-05-015. ADJUST PROFILE AS REQUIRED TO MATCH EXIST ROADWAY ELEVATION, WHILE MAINTAINING CURVE LENGTHS. OR AS DIRECTED BY THE ENGINEER

EXIST GROUND @ PROP ℄

1,280 1,275 1,270 1,265 1,260 1,255 1,250 1,245 1,240

1,243.09 1,264.82 | 1,244.37 1,264.57 | 1,245.74 1,264.32 | 1,247.16 1,264.07 | 1,248.70 1,263.82 | 1,250.23 1,263.57 | 1,251.83 1,263.32 | 1,253.61 1,263.07 | 1,255.30 1,262.85 | 1,256.95 1,262.80 | 1,258.58 1,262.93 | 1,260.19 1,263.24 | 1,261.83 1,263.72 | 1,263.30 1,264.39 | 1,264.77 1,265.24 | 1,266.14 1,266.27 | 1,267.50 1,267.48 | 1,268.76 1,268.77 | 1,269.98 1,270.07 | 1,271.07 | 1,272.12 | 1,273.06 | 1,273.91 | 1,274.72

275+00 280+00

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Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
PLAN & PROFILE

STA 272+50.00 TO END

SCALE: 1"=100'-H
1"=10'-V

SHEET 3 OF 3

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	84

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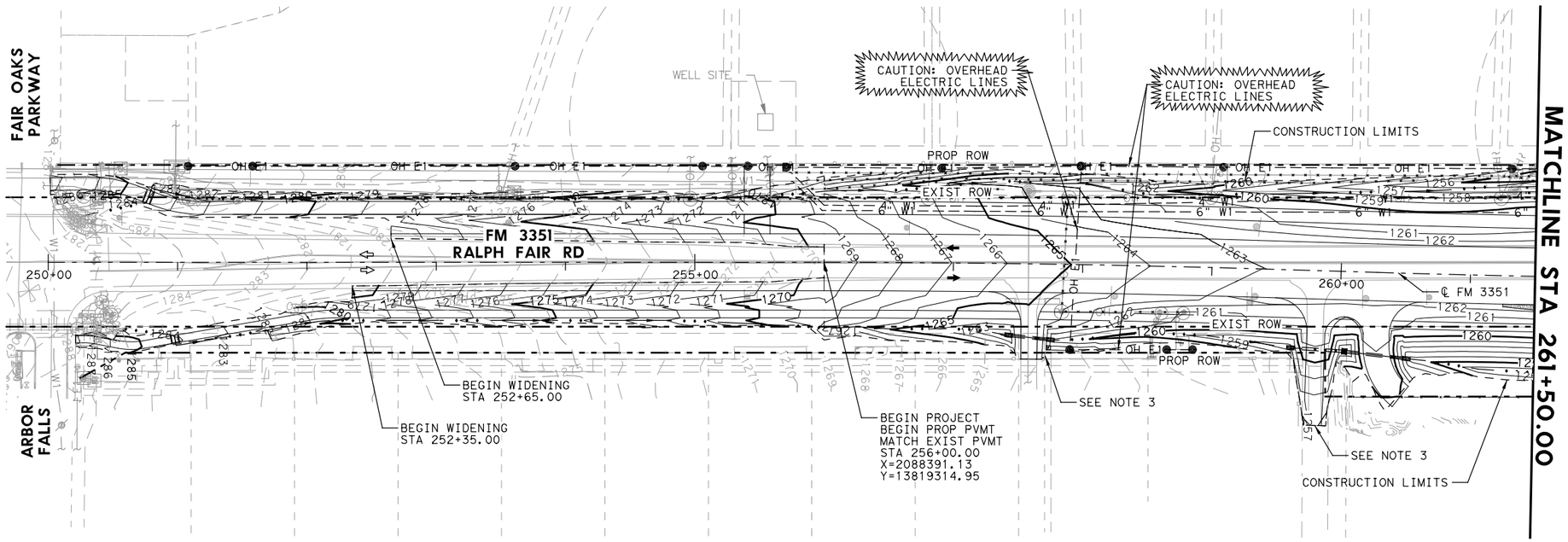

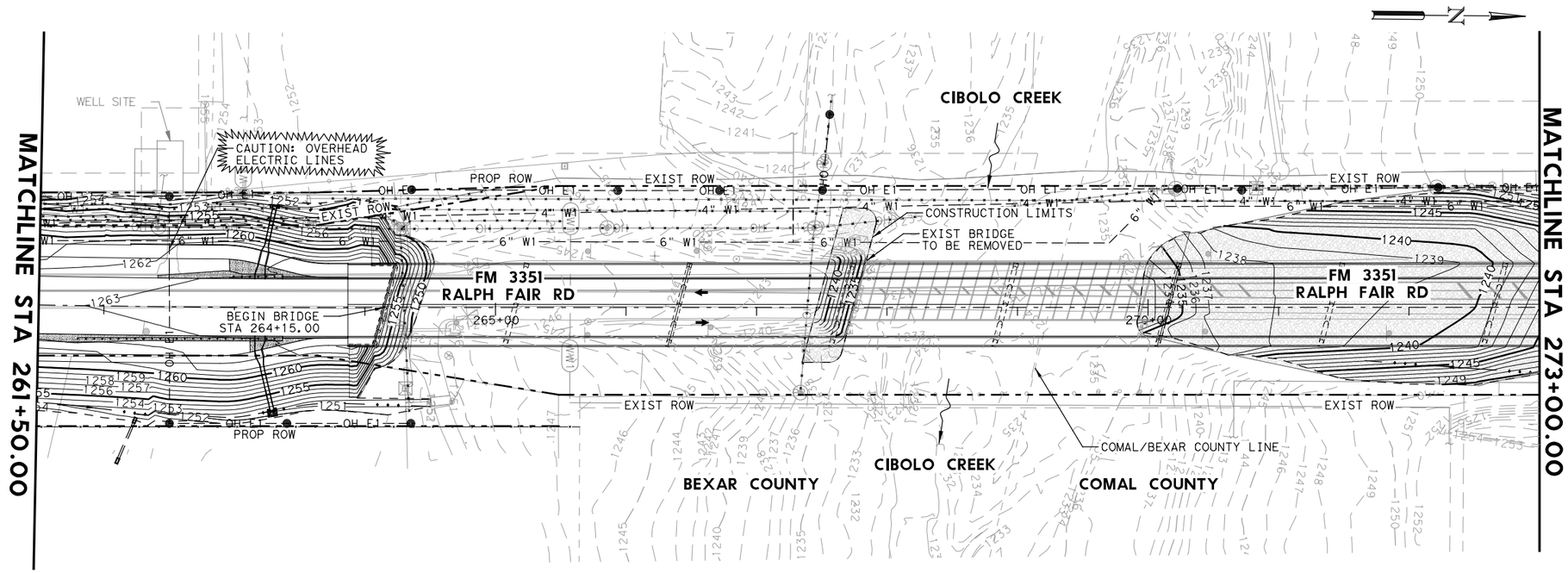

0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- MAJOR CONTOUR (5')
- MINOR CONTOUR (1')
- STONE PROTECTION RIPRAP

NOTES:
1. PROTECT IN PLACE EXISTING UTILITIES, UNLESS OTHERWISE NOTED.
2. SEE DRAINAGE PLANS FOR DITCH DRAINAGE.
3. COORDINATE GRADING OUTSIDE OF ROW WITH ENGINEER AND ADJACENT PROPERTY OWNERS. ADJUST GRADING AS DIRECTED BY ENGINEER. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

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120398
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12/15/2023
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FM 3351
AT CIBOLO CREEK
GRADING PLAN

BEGIN TO STA 276+00.00

SCALE: 1"=100' SHEET 1 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	85

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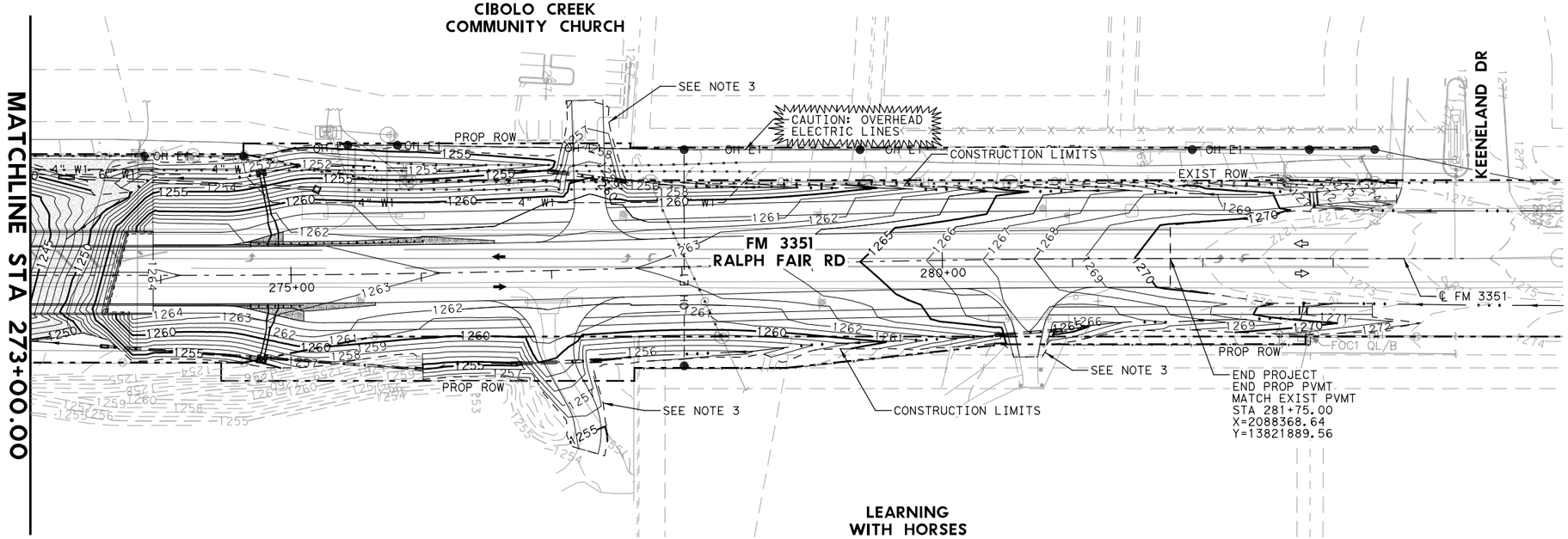

0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND

- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- MAJOR CONTOUR (5')
- MINOR CONTOUR (1')
- STONE PROTECTION RIPRAP

NOTES:
1. PROTECT IN PLACE EXISTING UTILITIES, UNLESS OTHERWISE NOTED.
2. SEE DRAINAGE PLANS FOR DITCH DRAINAGE.
3. COORDINATE GRADING OUTSIDE OF ROW WITH ENGINEER AND ADJACENT PROPERTY OWNERS. ADJUST GRADING AS DIRECTED BY ENGINEER. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

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FM 3351
AT CIBOLO CREEK
GRADING PLAN

STA 276+00.00 TO END

SCALE: 1"=100' SHEET 2 OF 2

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	86

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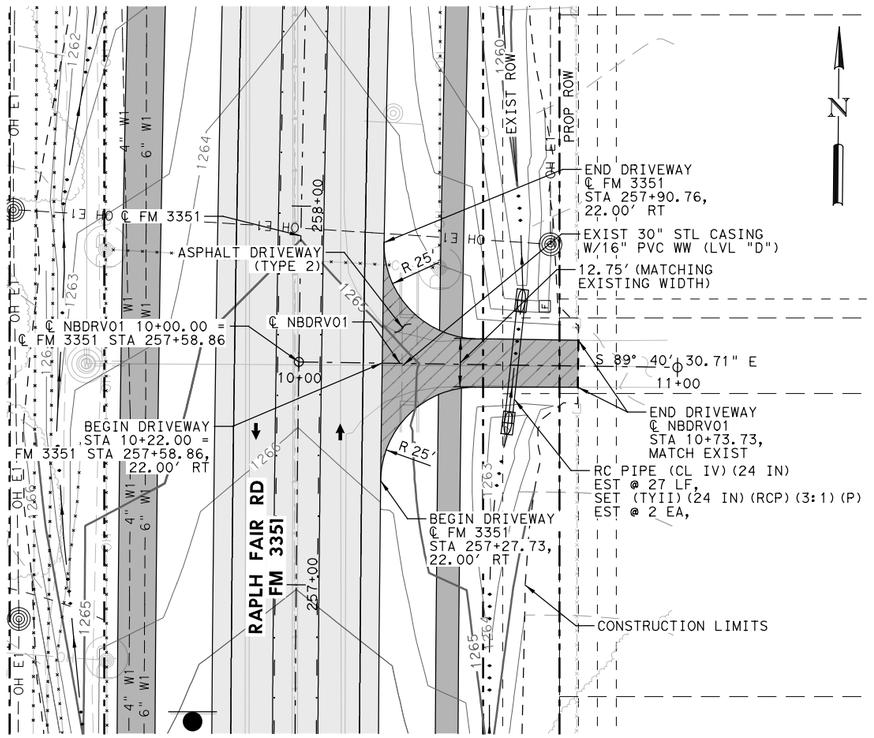
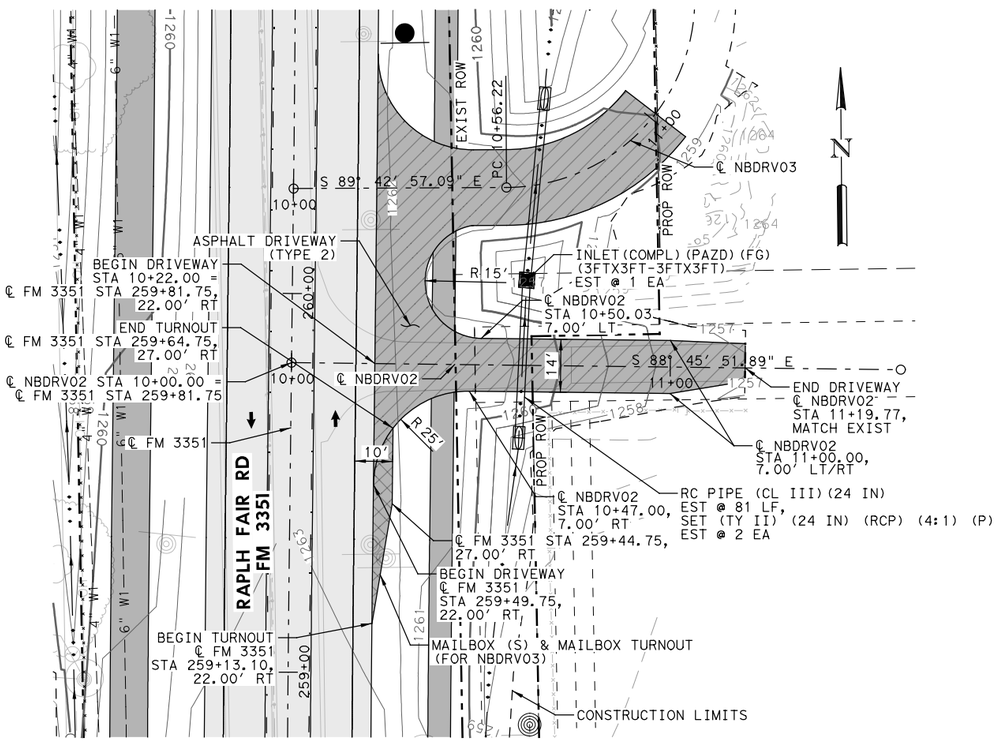
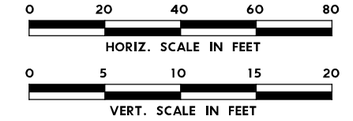






LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

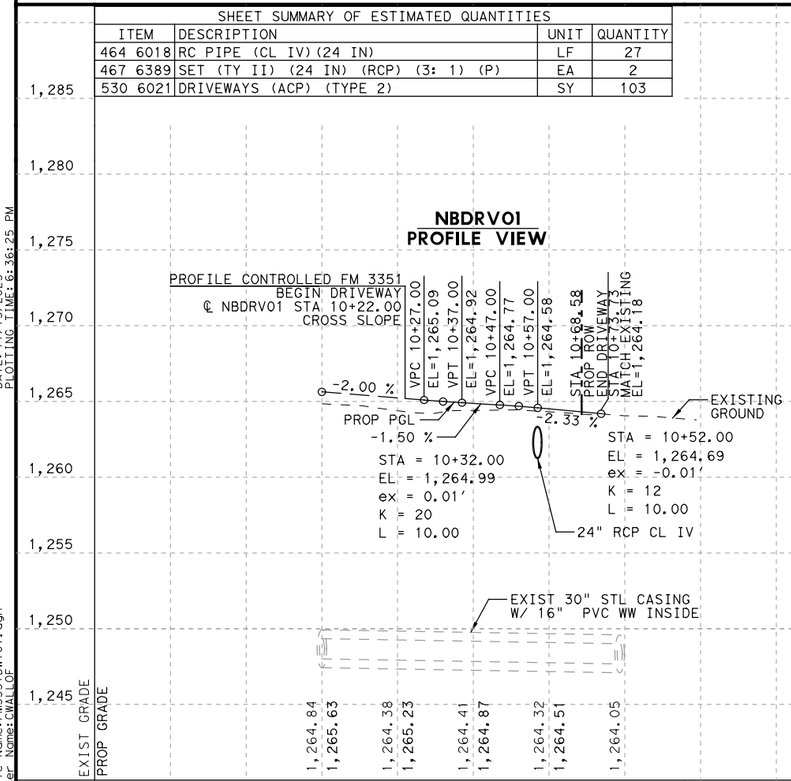
1. EXISTING DRIVEWAY PIPES TO BE REPLACED ONLY AT LOCATIONS PROVIDED IN THE PLAN AND PROFILE SHEETS.
2. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
3. SEE ROADWAY PLAN SHEETS FOR MORE INFORMATION.
4. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY PAVEMENT SECTIONS.
5. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

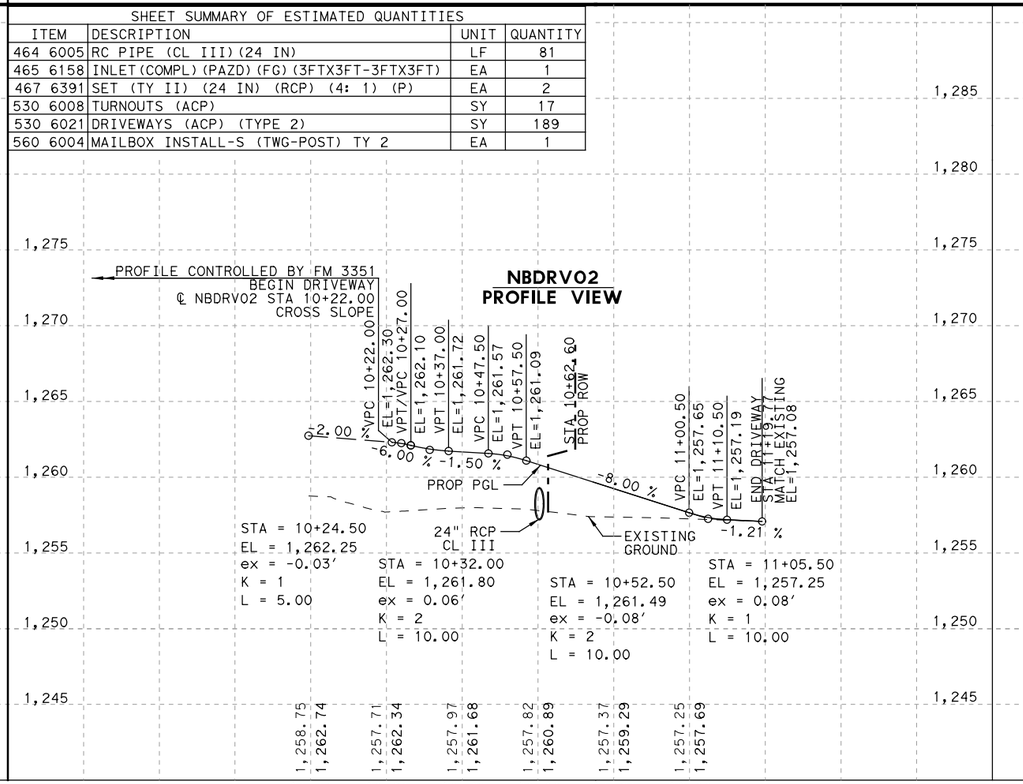
SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
464 6018	RC PIPE (CL IV) (24 IN)	LF	27
467 6389	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	2
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	103

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
464 6005	RC PIPE (CL III) (24 IN)	LF	81
465 6158	INLET (COMPL) (PAZD) (FG) (3FTX3FT-3FTX3FT)	EA	1
467 6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	2
530 6008	TURNOUTS (ACP)	SY	17
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	189
560 6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	1





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FM 3351
AT CIBOLO CREEK
DRIVEWAY
PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	87

PLOTDRIVER: TXDOT-PDF-BW.plt cfg
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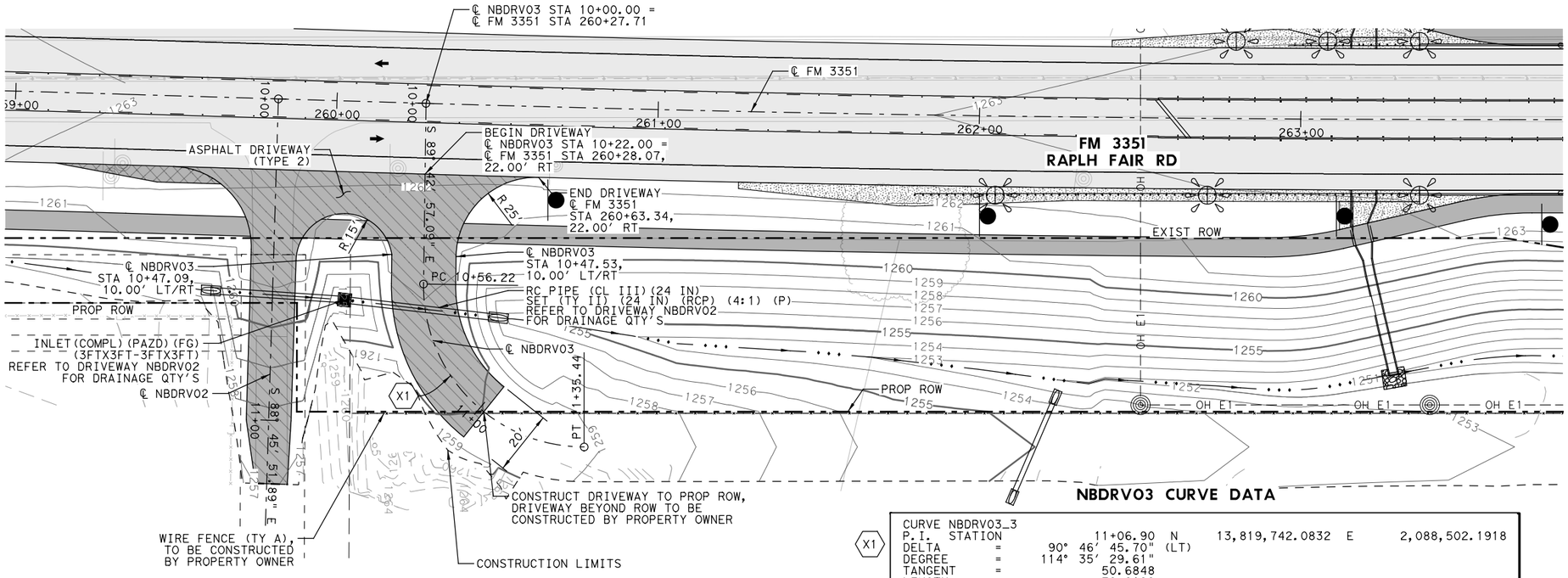
User Name: CWALLOF



0 20 40 60 80
HORZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

1. EXISTING DRIVEWAY PIPES TO BE REPLACED ONLY AT LOCATIONS PROVIDED IN THE PLAN AND PROFILE SHEETS.
2. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
3. SEE ROADWAY PLAN SHEETS FOR MORE INFORMATION.
4. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY PAVEMENT SECTIONS.
5. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

NBDRV03 CURVE DATA

X1

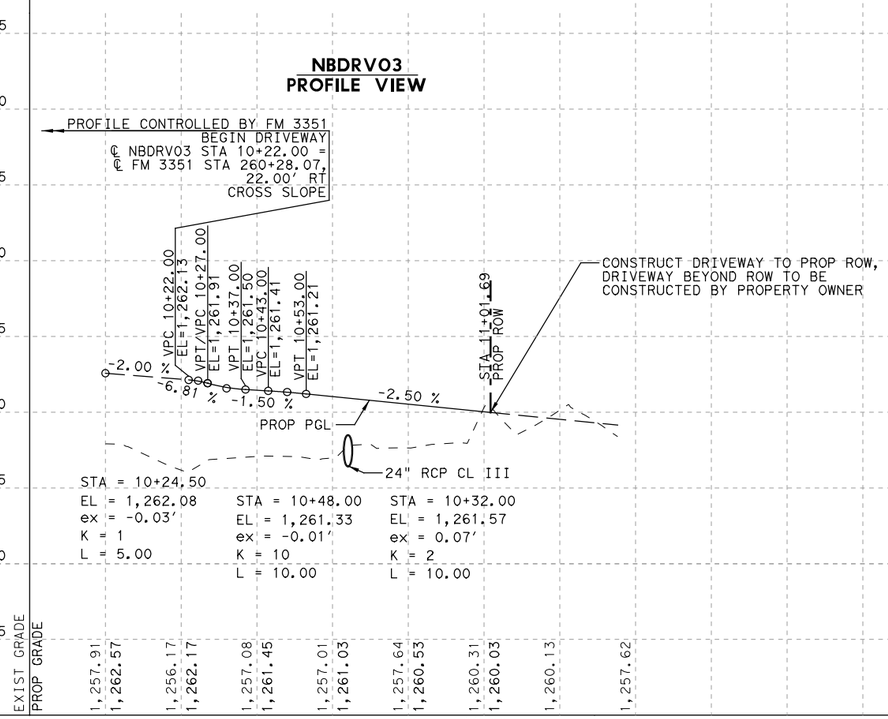
CURVE NBDRV03_3						
P.I. STATION		11+06.90	N	13,819,742.0832	E	2,088,502.1918
DELTA	=	90° 46' 45.70" (LT)				
DEGREE	=	114° 35' 29.61"				
TANGENT	=	50.6848				
LENGTH	=	79.2199				
RADIUS	=	50.0000				
EXTERNAL	=	21.1965				
LONG CHORD	=	71.1900				
MID. ORD.	=	14.8859				
P.C. STATION		10+56.22	N	13,819,742.3345	E	2,088,451.5077
P.T. STATION		11+35.44	N	13,819,792.7660	E	2,088,501.7537
C.C.			N	13,819,792.3339	E	2,088,451.7556
BACK	= S 89° 42' 57.09" E					
AHEAD	= N 0° 29' 42.80" W					
CHORD BEAR	= N 44° 53' 40.05" E					

COURSE FROM PT NBDRV03_3 TO PC NBDRV03_6 N 0° 29' 42.80" W DIST 372.3978

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	219

NBDRV03 PROFILE VIEW



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

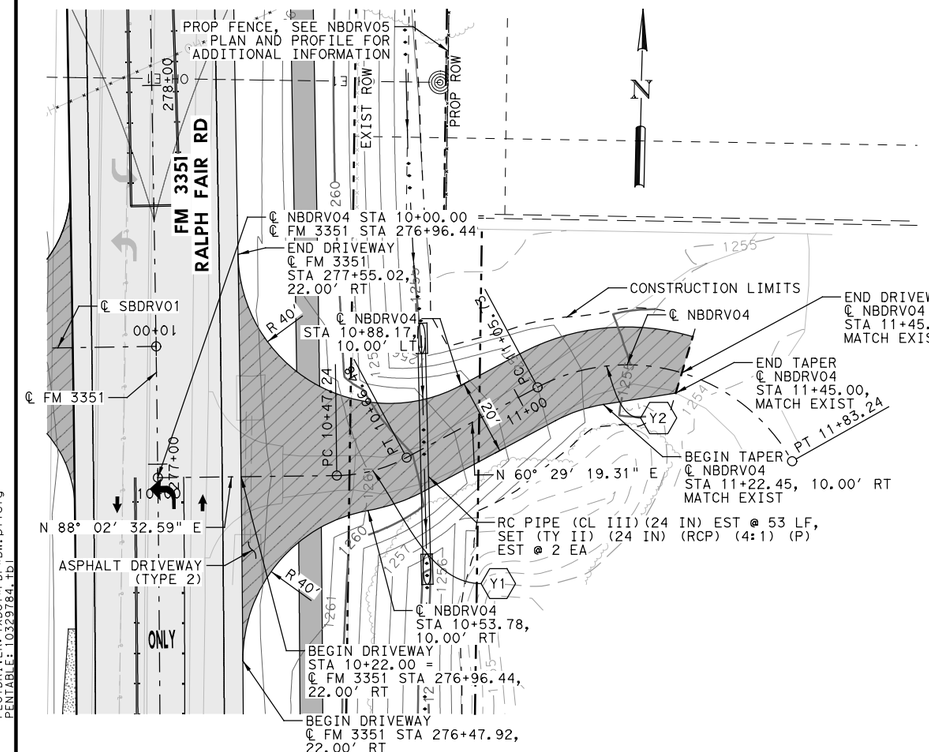
FM 3351
AT CIBOLO CREEK
DRIVEWAY
PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 2 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	88

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 6:36:28 PM
File Name: FM3351DWY02.dgn
User Name: CWALLOF



NBDRV04 CURVE DATA

CURVE NBDRV04_3			
P.I. STATION			10+57.05 N
13,821,413.1675	E		2,088,439.1637
DELTA	=		27° 33' 13.27" (LT)
DEGREE	=		143° 14' 22.02"
TANGENT	=		9.8078
LENGTH	=		19.2361
RADIUS	=		40.0000
EXTERNAL	=		1.1849
LONG CHORD	=		19.0513
MID. ORD.	=		1.1508
P.C. STATION			10+47.24 N
13,821,412.8325	E		2,088,429.3616
P.T. STATION			10+66.48 N
13,821,417.9988	E		2,088,447.6990
C.C.			N
13,821,452.8091	E		2,088,427.9952
BACK	= N		88° 02' 32.59" E
AHEAD	= N		60° 29' 19.31" E
CHORD BEAR	= N		74° 15' 55.95" E

NBDRV04 CURVE DATA (CONT.)

CURVE NBDRV04_6			
P.I. STATION			11+54.71 N
13,821,461.4628	E		2,088,524.4859
DELTA	=		88° 49' 32.42" (RT)
DEGREE	=		114° 35' 29.61"
TANGENT	=		48.9856
LENGTH	=		77.5150
RADIUS	=		50.0000
EXTERNAL	=		19.9970
LONG CHORD	=		69.9823
MID. ORD.	=		14.2842
P.C. STATION			11+05.73 N
13,821,437.3327	E		2,088,481.8558
P.T. STATION			11+83.24 N
13,821,419.3361	E		2,088,549.4846
C.C.			N
13,821,393.8198	E		2,088,506.4856
BACK	= N		60° 29' 19.31" E
AHEAD	= S		30° 41' 08.27" E
CHORD BEAR	= S		75° 05' 54.48" E

HORZ. SCALE IN FEET: 0 20 40 60 80

VERT. SCALE IN FEET: 0 5 10 15 20

LEGEND

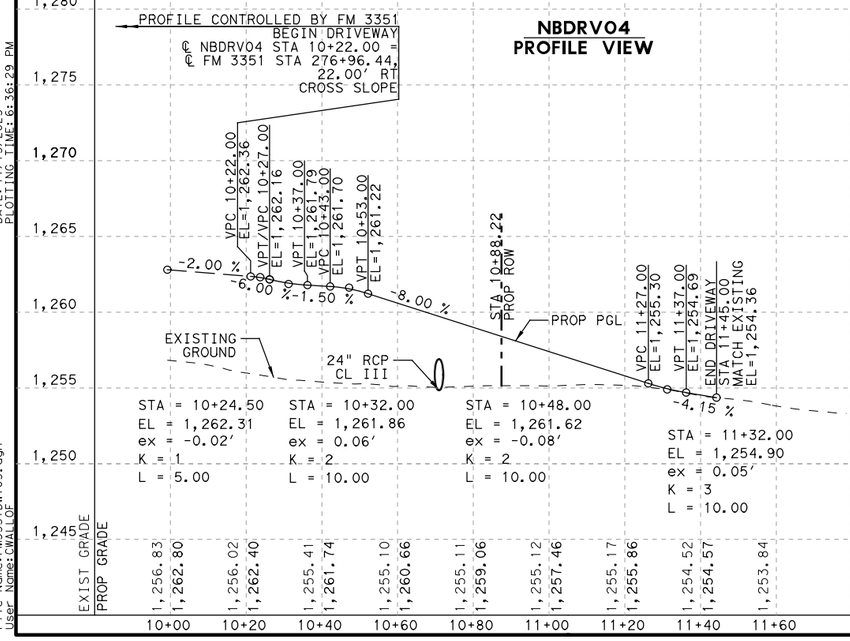
- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

1. EXISTING DRIVEWAY PIPES TO BE REPLACED ONLY AT LOCATIONS PROVIDED IN THE PLAN AND PROFILE SHEETS.
2. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
3. SEE ROADWAY PLAN SHEETS FOR MORE INFORMATION.
4. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY PAVEMENT SECTIONS.
5. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
464 6005	RC PIPE (CL III)(24 IN)	LF	53
467 6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	2
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	383



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

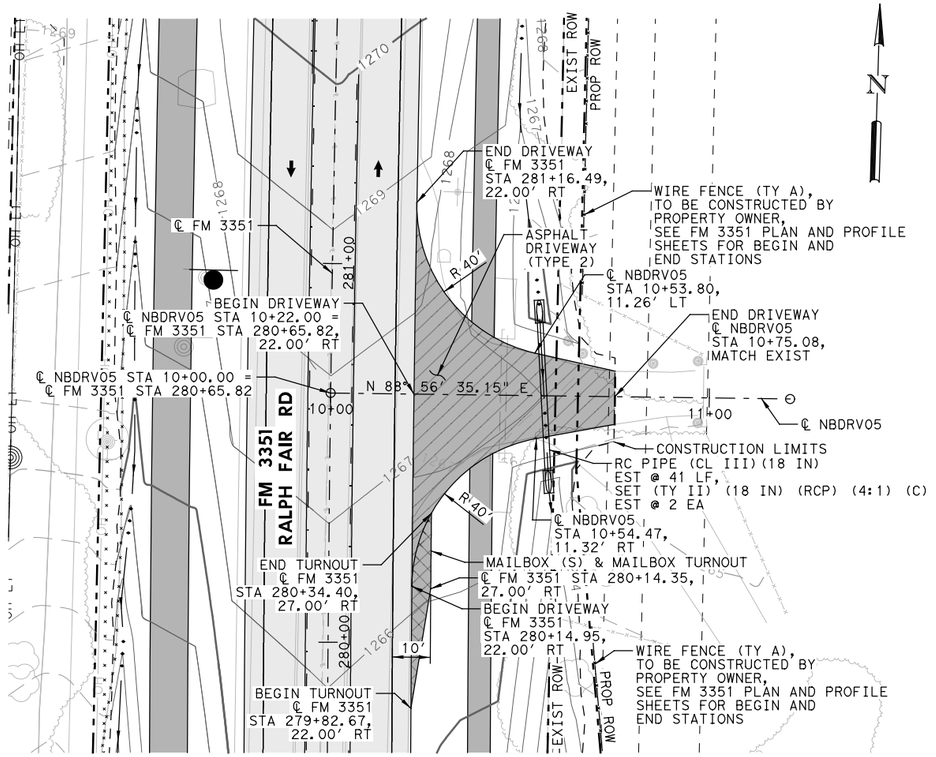
FM 3351
AT CIBOLO CREEK DRIVEWAY
PLAN & PROFILE

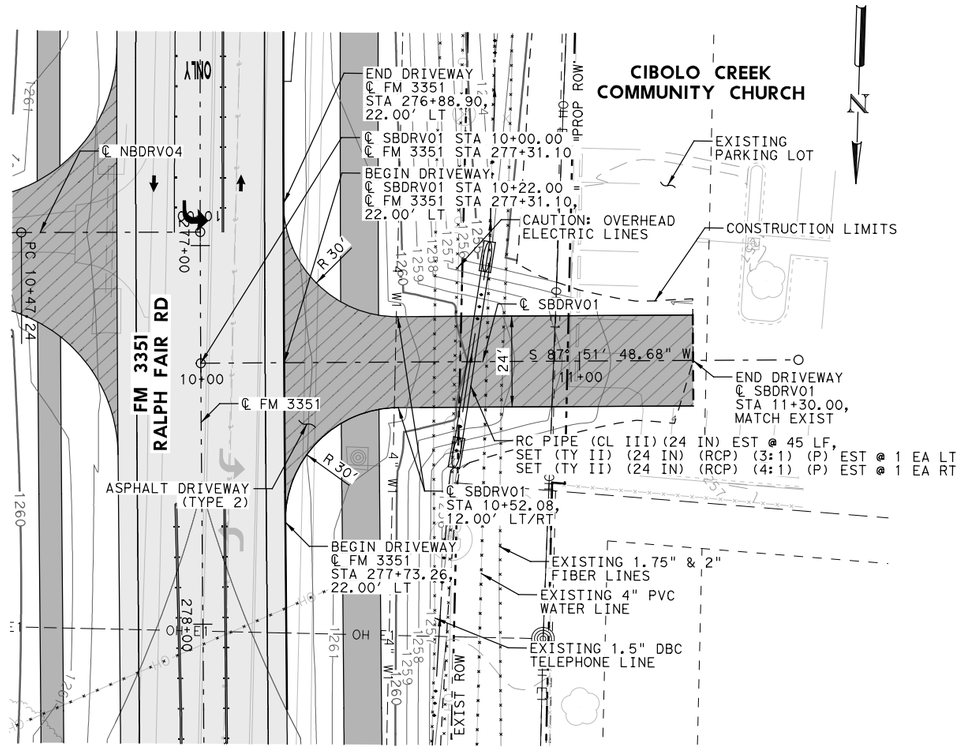
SCALE: 1"=40'-H
1"=10'-V

SHEET 3 OF 4

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	89

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 6:36:29 PM
File Name: FM3351DWY03.dgn
User Name: CWALLOF





0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- (X) CURVE NO.

NOTES:

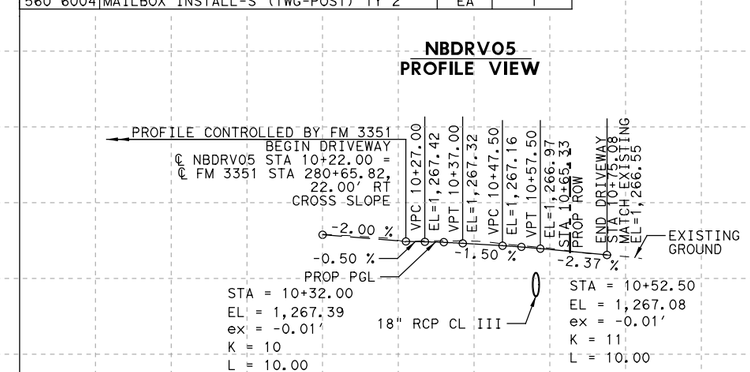
1. EXISTING DRIVEWAY PIPES TO BE REPLACED ONLY AT LOCATIONS PROVIDED IN THE PLAN AND PROFILE SHEETS.
2. CONTRACTOR TO FIELD VERIFY UTILITIES AND COORDINATE WITH THE ENGINEER.
3. SEE ROADWAY PLAN SHEETS FOR MORE INFORMATION.
4. SEE DRIVEWAY DETAILS (SAT) STANDARD FOR TYPE 2 DRIVEWAY PAVEMENT SECTIONS.
5. DRIVEWAY PENETRATION LETTERS HAVE BEEN SENT TO PROPERTY OWNERS.

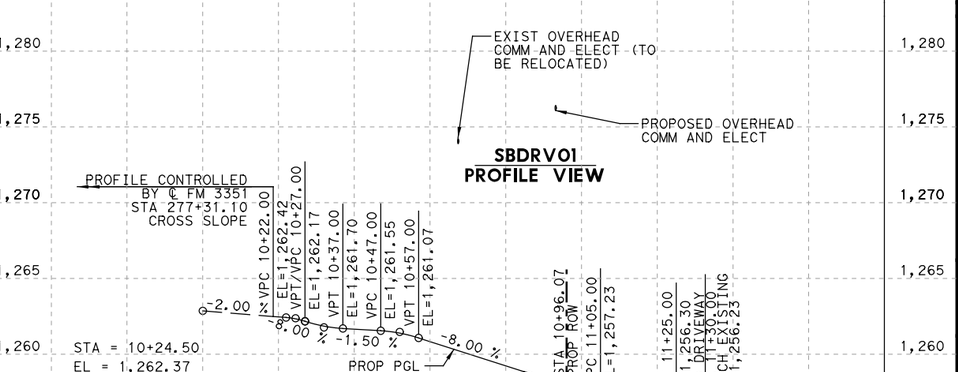
SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
464 6003	RC PIPE (CL III)(18 IN)	LF	41
467 6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	2
530 6008	TURNOUTS (ACP)	SY	16
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	194
560 6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	1

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
464 6005	RC PIPE (CL III)(24 IN)	LF	45
467 6389	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	1
467 6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	1
530 6021	DRIVEWAYS (ACP) (TYPE 2)	SY	331





NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK DRIVEWAY
PLAN & PROFILE

SCALE: 1"=40′-H
1"=10′-V

SHEET 4 OF 4

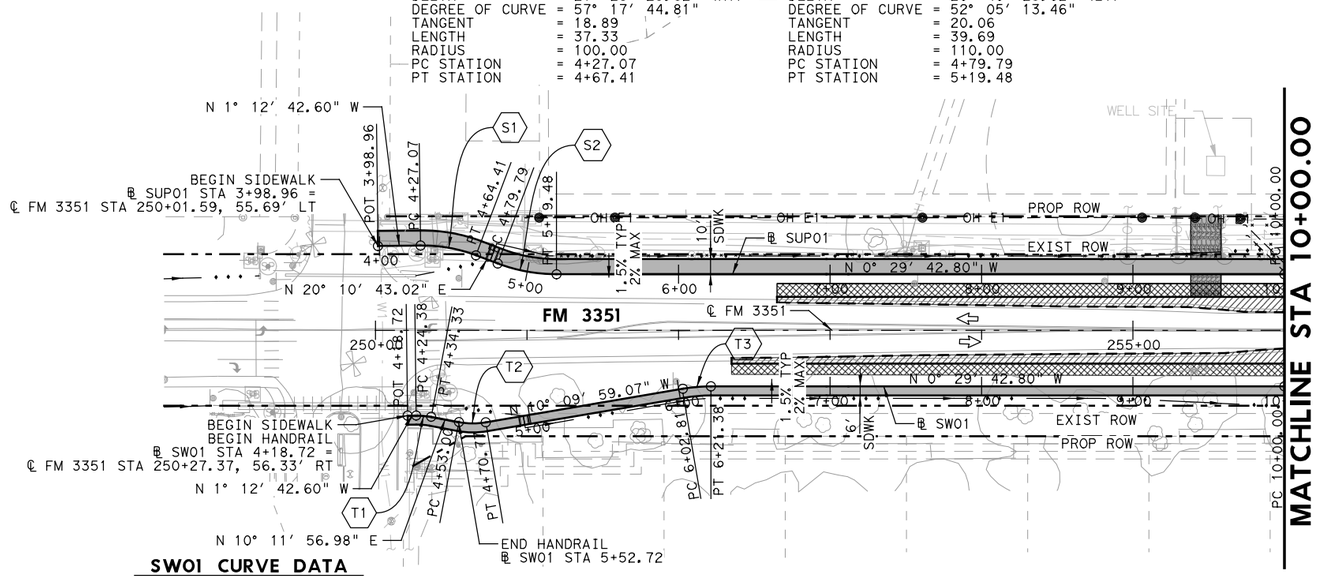
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	90

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 6:36:32 PM
File Name: FM3351DWY04.dgn
User Name: CWALLOF

SUP01 CURVE DATA

S1
PI STATION = 4+45.96
DELTA = 21° 23′ 25.62" (RT)
DEGREE OF CURVE = 57° 17′ 44.81"
TANGENT = 18.89
LENGTH = 37.33
RADIUS = 100.00
PC STATION = 4+27.07
PT STATION = 4+67.41

S2
PI STATION = 4+99.85
DELTA = 20° 40′ 25.82" (LT)
DEGREE OF CURVE = 52° 05′ 13.46"
TANGENT = 20.06
LENGTH = 39.69
RADIUS = 110.00
PC STATION = 4+79.79
PT STATION = 5+19.48



SW01 CURVE DATA

T1
PI STATION = 4+29.37
DELTA = 11° 24′ 39.58" (RT)
DEGREE OF CURVE = 114° 35′ 29.61"
TANGENT = 5.00
LENGTH = 9.96
RADIUS = 50.00
PC STATION = 4+24.38
PT STATION = 4+34.33

T2
PI STATION = 4+61.98
DELTA = 20° 21′ 56.05" (RT)
DEGREE OF CURVE = 114° 35′ 29.61"
TANGENT = 8.98
LENGTH = 17.77
RADIUS = 50.00
PC STATION = 4+53.00
PT STATION = 4+70.77

T3
PI STATION = 6+12.11
DELTA = 9° 40′ 16.27" (RT)
DEGREE OF CURVE = 52° 05′ 13.46"
TANGENT = 9.31
LENGTH = 18.57
RADIUS = 110.00
PC STATION = 6+02.81
PT STATION = 6+21.38

0 50 100 150 200
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

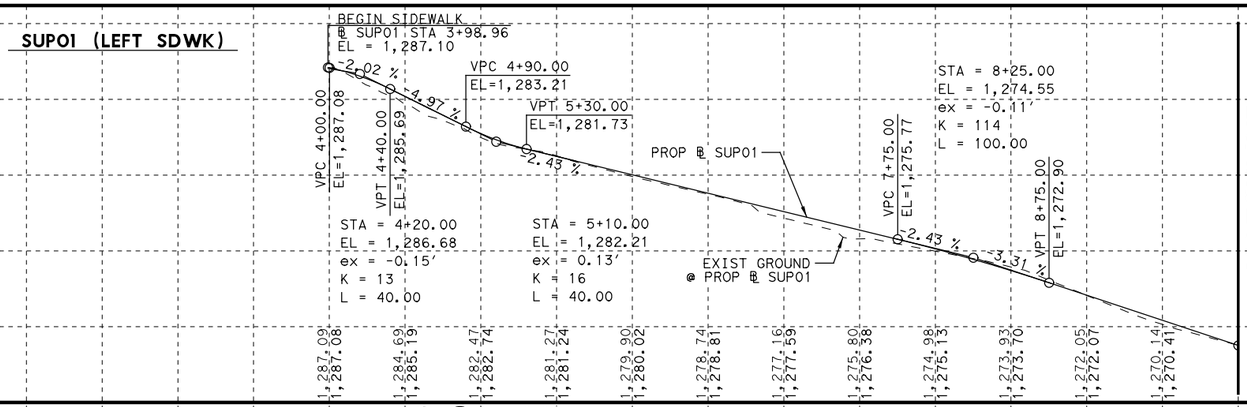
LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- RIPRAP (CONC) (4 IN)
- STONE PROTECTION RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

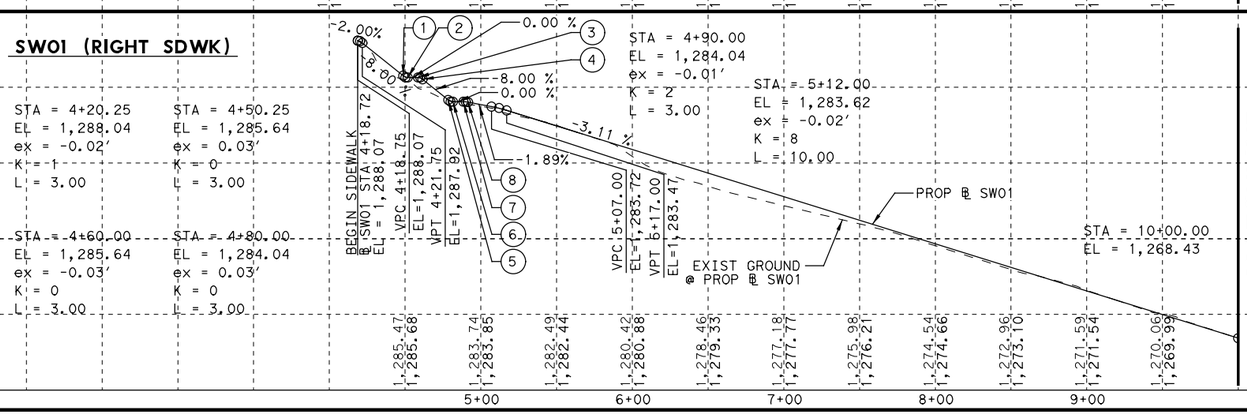
NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR QUANTITIES AND ADDITIONAL INFORMAION.
2. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
3. PROVIDE TYPE F HANDRAIL WHERE SHOWN. SEE PRD-13 FOR DETAILS.

SUP01 (LEFT SDWK)



SW01 (RIGHT SDWK)



①	VPC 4+48.75 EL=1,285.76	⑤	VPC 4+78.50 EL=1,284.16
②	VPT 4+51.75 EL=1,285.64	⑥	VPT 4+81.50 EL=1,284.04
③	VPC 4+58.50 EL=1,285.64	⑦	VPC 4+88.50 EL=1,284.04
④	VPT 4+61.50 EL=1,285.52	⑧	VPT 4+91.50 EL=1,284.01

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
SIDEWALK
PLAN & PROFILE

SCALE: 1"=100′-H
1"=10′-V

SHEET 1 OF 4

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	91

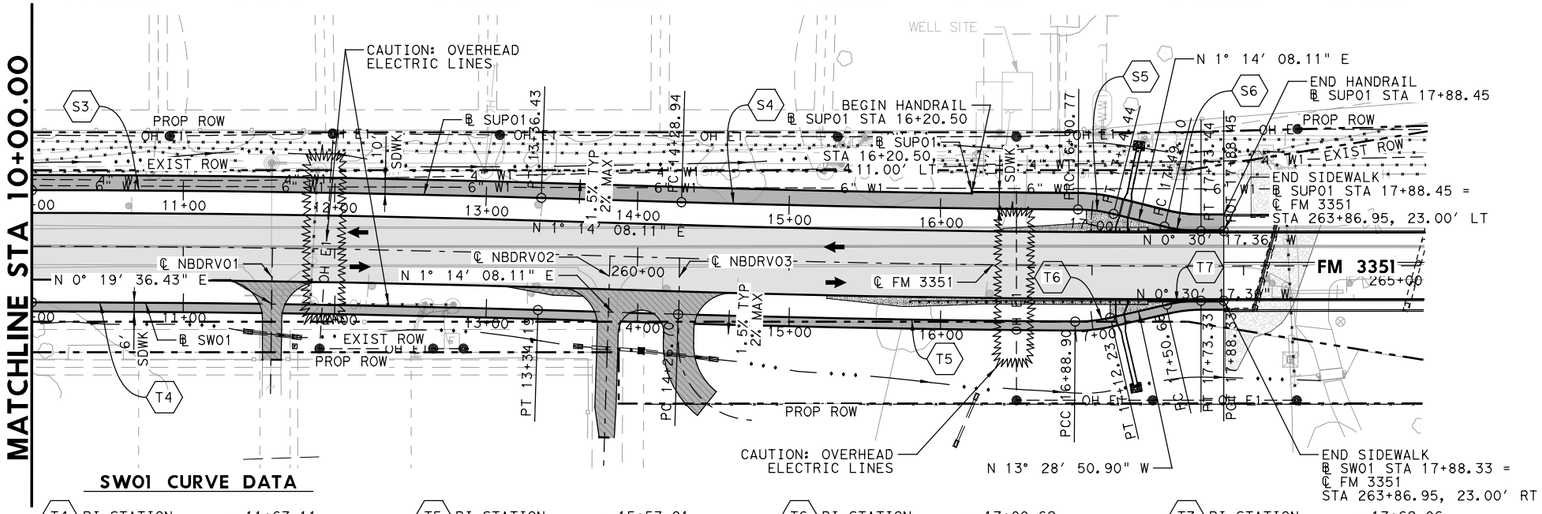
PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 6:36:34 PM
File Name:FM3351PP04A.dgn
User Name:CWALLOF

SUP01 CURVE DATA

	S3	S4	S5	S6
PI STATION	11+68.23	15+59.86	17+02.66	17+61.33
DELTA	1° 43′ 50.98" (RT)	1° 21′ 21.68" (LT)	13° 33′ 51.38" (RT)	13° 56′ 55.17" (LT)
DEGREE OF CURVE	0° 30′ 52.07"	0° 31′ 04.46"	57° 17′ 44.81"	57° 17′ 44.81"
TANGENT	168.23	130.92	11.89	12.23
LENGTH	336.43	261.83	23.67	24.34
RADIUS	11,137.00	11,063.00	100.00	100.00
PC STATION	10+00.00	14+28.94	16+90.77	17+49.10
PT STATION	13+36.43	16+90.77	17+14.44	17+73.44

0 50 100 150 200
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET



SW01 CURVE DATA

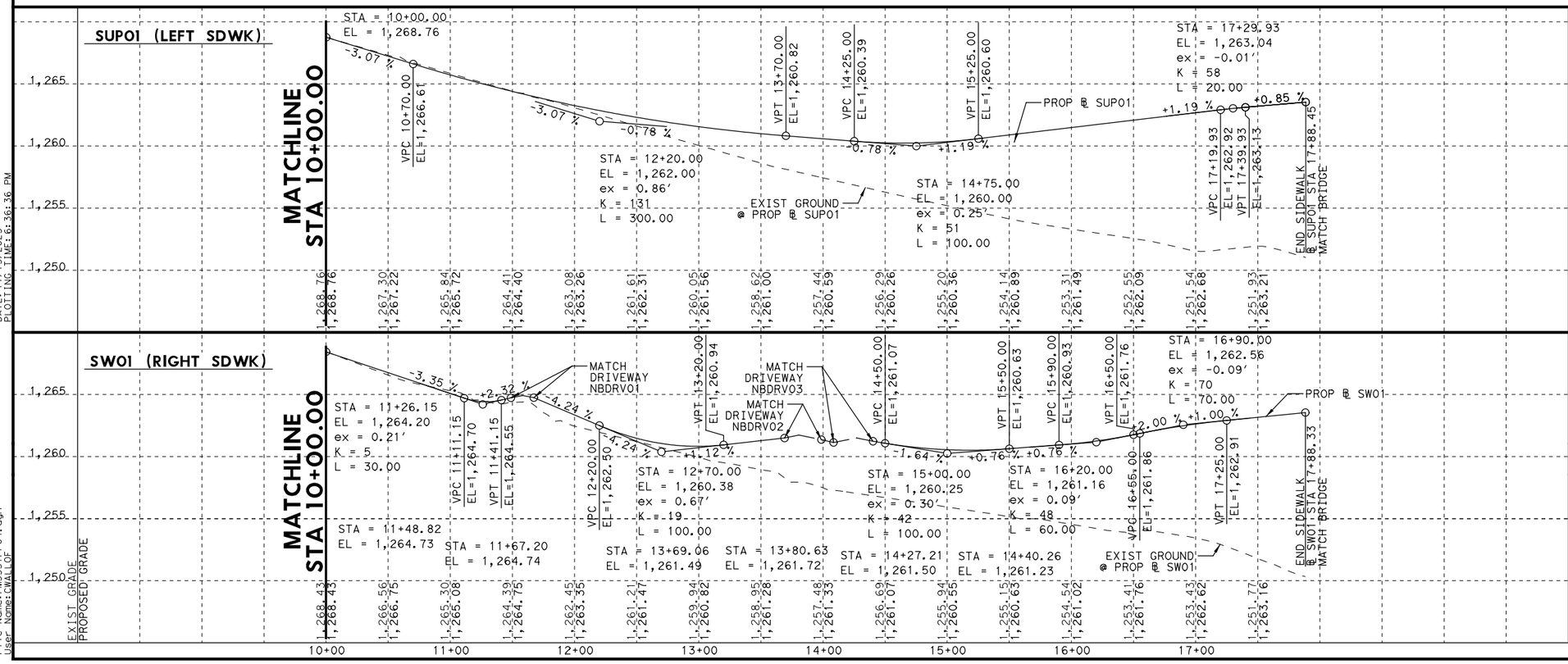
	T4	T5	T6	T7
PI STATION	11+67.11	15+57.81	17+00.62	17+62.06
DELTA	1° 43′ 50.91" (RT)	1° 20′ 56.02" (LT)	13° 22′ 02.99" (LT)	12° 58′ 33.54" (RT)
DEGREE OF CURVE	0° 31′ 04.46"	0° 30′ 52.07"	57° 17′ 44.81"	57° 17′ 44.81"
TANGENT	167.11	131.10	11.72	11.37
LENGTH	334.18	262.19	23.33	22.65
RADIUS	11,063.00	11,137.00	100.00	100.00
PC STATION	10+00.00	14+26.70	16+88.90	17+50.68
PT STATION	13+34.19	16+88.90	17+12.23	17+73.33

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- RIPRAP (CONC) (4 IN)
- STONE PROTECTION RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR QUANTITIES AND ADDITIONAL INFORMAION.
2. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
3. PROVIDE TYPE F HANDRAIL WHERE SHOWN. SEE PRD-13 FOR DETAILS.



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11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
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Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK
SIDEWALK
PLAN & PROFILE

SCALE: 1"=100′-H
1"=10′-V

SHEET 2 OF 4

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	92

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 11/15/2023
PLOTTING TIME: 6:36:36 PM
File Name:FM3351PP04.dgn
User Name:CWALLOF

SUP02 CURVE DATA

U1
PI STATION = 10+35.39
DELTA = 0° 08′ 59.95" (LT)
DEGREE OF CURVE = 0° 31′ 02.10"
TANGENT = 14.50
LENGTH = 29.00
RADIUS = 11,077.00
PC STATION = 10+20.89
PT STATION = 10+49.89

U2
PI STATION = 10+64.09
DELTA = 16° 10′ 22.10" (LT)
DEGREE OF CURVE = 57° 17′ 44.81"
TANGENT = 14.21
LENGTH = 28.23
RADIUS = 100.00
PC STATION = 10+49.89
PT STATION = 10+78.11

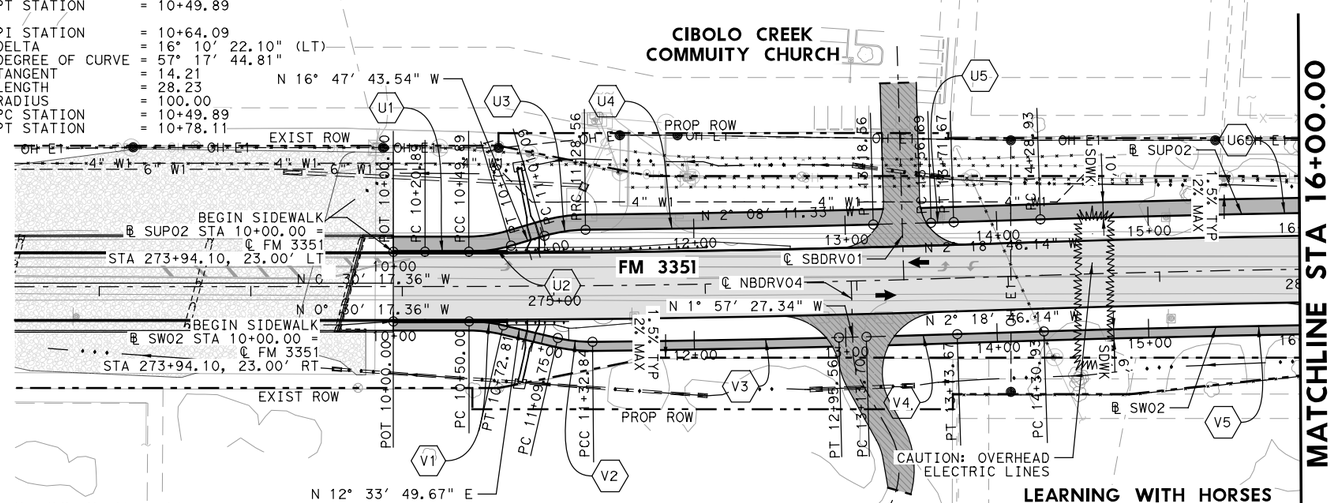
U3
PI STATION = 11+14.91
DELTA = 15° 44′ 30.04" (RT)
DEGREE OF CURVE = 57° 17′ 44.81"
TANGENT = 13.82
LENGTH = 27.47
RADIUS = 100.00
PC STATION = 11+01.09
PT STATION = 11+28.56

U4
PI STATION = 12+23.56
DELTA = 0° 59′ 02.41" (LT)
DEGREE OF CURVE = 0° 31′ 04.46"
TANGENT = 95.00
LENGTH = 190.00
RADIUS = 11,063.00
PC STATION = 11+28.56
PT STATION = 13+18.56

U5
PI STATION = 13+64.18
DELTA = 0° 04′ 39.40" (LT)
DEGREE OF CURVE = 0° 31′ 04.46"
TANGENT = 7.49
LENGTH = 14.99
RADIUS = 11,063.00
PC STATION = 13+56.69
PT STATION = 13+71.67

U6
PI STATION = 16+05.77
DELTA = 1° 49′ 09.95" (RT)
DEGREE OF CURVE = 0° 30′ 52.07"
TANGENT = 176.84
LENGTH = 353.66
RADIUS = 11,137.00
PC STATION = 14+28.93
PT STATION = 17+82.58

V5
PI STATION = 15+44.52
DELTA = 1° 10′ 35.45" (RT)
DEGREE OF CURVE = 0° 31′ 04.46"
TANGENT = 113.59
LENGTH = 227.17
RADIUS = 11,063.00
PC STATION = 14+30.93
PT STATION = 16+58.10



SW02 CURVE DATA

V1
PI STATION = 10+61.45
DELTA = 13° 04′ 07.04" (RT)
DEGREE OF CURVE = 57° 17′ 44.81"
TANGENT = 11.45
LENGTH = 22.81
RADIUS = 100.00
PC STATION = 10+50.00
PT STATION = 10+72.81

V2
PI STATION = 11+21.35
DELTA = 13° 38′ 15.39" (LT)
DEGREE OF CURVE = 59° 04′ 04.13"
TANGENT = 11.60
LENGTH = 23.09
RADIUS = 97.00
PC STATION = 11+09.75
PT STATION = 11+32.84

V3
PI STATION = 12+14.20
DELTA = 0° 50′ 13.66" (LT)
DEGREE OF CURVE = 0° 30′ 52.07"
TANGENT = 81.36
LENGTH = 162.72
RADIUS = 11,137.00
PC STATION = 11+32.84
PT STATION = 12+95.56

V4
PI STATION = 13+43.69
DELTA = 0° 18′ 30.84" (LT)
DEGREE OF CURVE = 0° 30′ 52.07"
TANGENT = 29.99
LENGTH = 59.98
RADIUS = 11,137.00
PC STATION = 13+13.70
PT STATION = 13+73.67

0 50 100 150 200
HORIZ. SCALE IN FEET

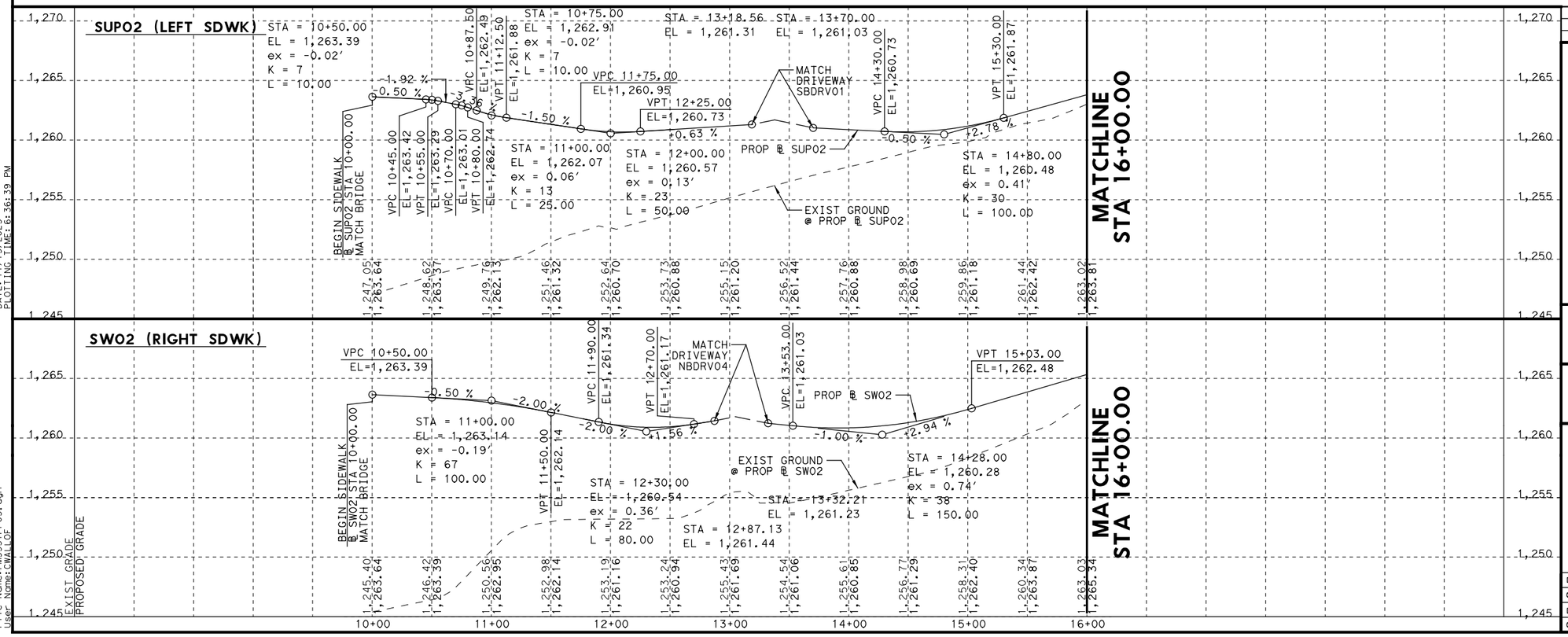
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- RIPRAP (CONC) (4 IN)
- STONE PROTECTION RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR QUANTITIES AND ADDITIONAL INFORMAION.
2. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
3. PROVIDE TYPE F HANDRAIL WHERE SHOWN. SEE PRD-13 FOR DETAILS.



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK SIDEWALK PLAN & PROFILE

SCALE: 1"=100′-H
1"=10′-V

SHEET 3 OF 4

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	93

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DATE: 11/15/2023
PLOTTING TIME: 6:36:39 PM
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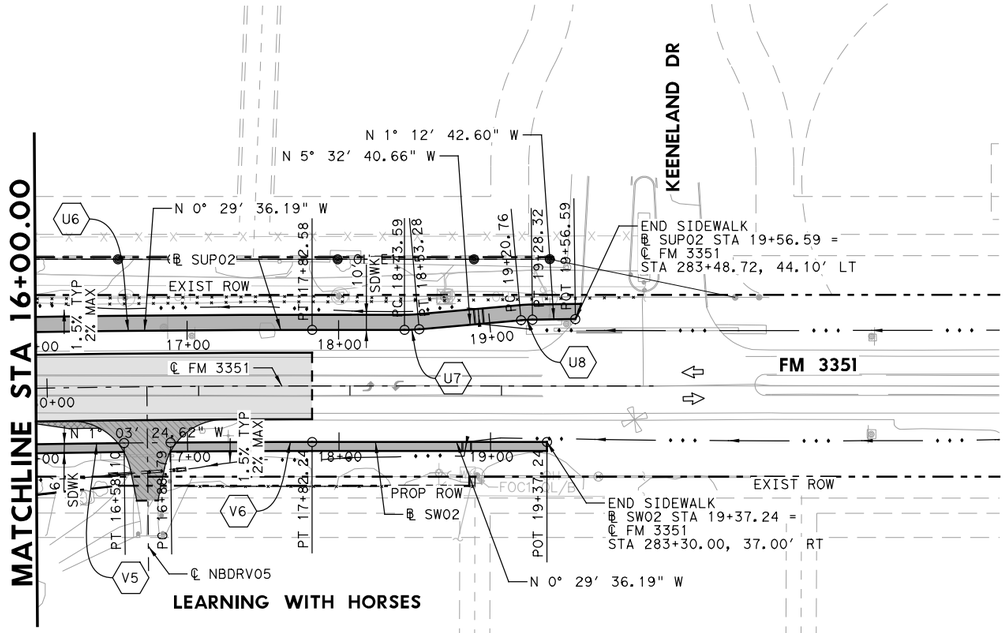
User Name: CWALLOF

SUP02 CURVE DATA

U6
PI STATION = 16+05.77
DELTA = 1° 49′ 09.95" (RT)
DEGREE OF CURVE = 0° 30′ 52.07"
TANGENT = 176.84
LENGTH = 353.66
RADIUS = 11,137.00
PC STATION = 14+28.93
PT STATION = 17+82.58

U7
PI STATION = 18+48.44
DELTA = 5° 03′ 04.47" (LT)
DEGREE OF CURVE = 52° 05′ 13.46"
TANGENT = 4.85
LENGTH = 9.70
RADIUS = 110.00
PC STATION = 18+43.59
PT STATION = 18+53.28

U8
PI STATION = 19+24.54
DELTA = 4° 19′ 58.06" (RT)
DEGREE OF CURVE = 57° 17′ 44.81"
TANGENT = 3.78
LENGTH = 7.56
RADIUS = 100.00
PC STATION = 19+20.76
PT STATION = 19+28.32



SW02 CURVE DATA

V5
PI STATION = 15+44.52
DELTA = 1° 10′ 35.45" (RT)
DEGREE OF CURVE = 0° 31′ 04.46"
TANGENT = 113.59
LENGTH = 227.17
RADIUS = 11,063.00
PC STATION = 14+30.93
PT STATION = 16+58.10

V6
PI STATION = 17+35.51
DELTA = 0° 29′ 02.36" (RT)
DEGREE OF CURVE = 0° 31′ 04.46"
TANGENT = 46.73
LENGTH = 93.45
RADIUS = 11,063.00
PC STATION = 16+88.79
PT STATION = 17+82.24

0 50 100 150 200
HORIZ. SCALE IN FEET

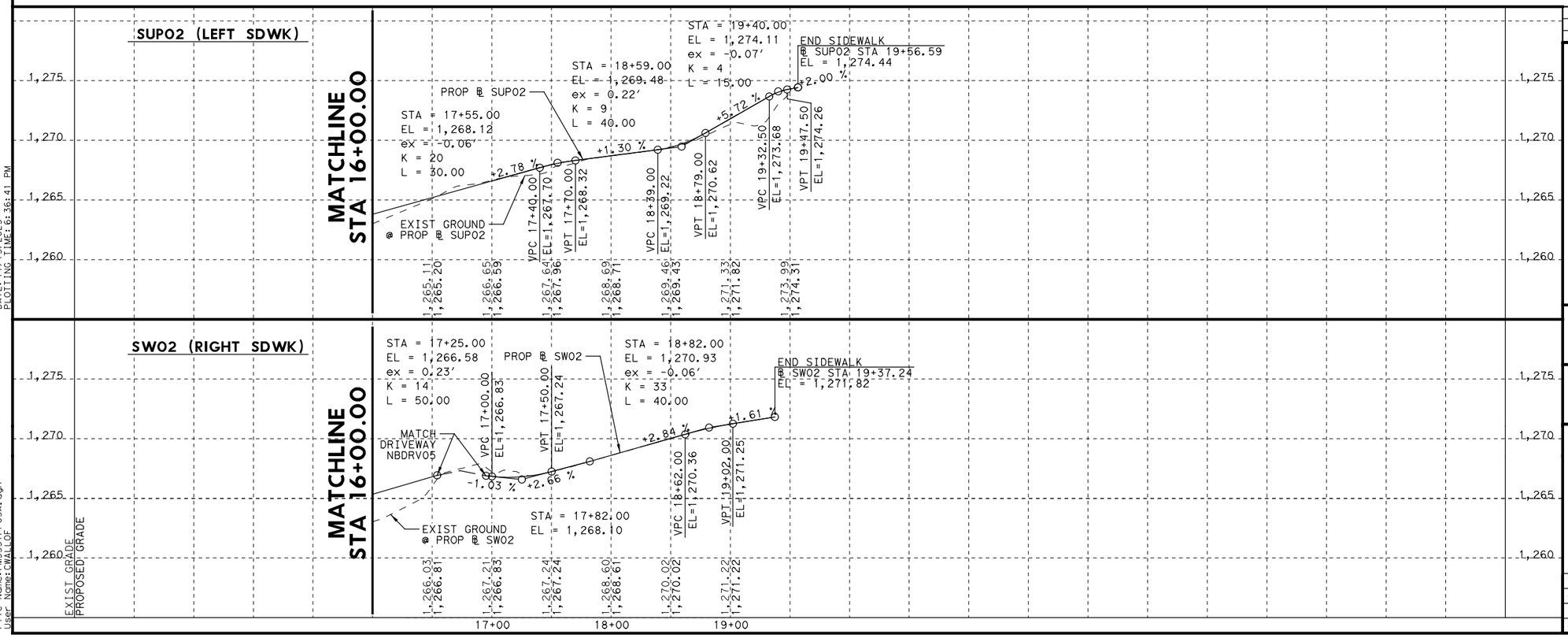
0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- PROPOSED PAVEMENT
- PROPOSED DRIVEWAY
- PROPOSED DRIVEWAY BY PROPERTY OWNER
- PROPOSED MAILBOX TURNOUT
- PROPOSED SIDEWALK
- RIPRAP (CONC) (4 IN)
- STONE PROTECTION RIPRAP
- EXIST ROW
- PROP ROW
- EASEMENT LINES
- PARCEL LINES
- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP DITCH ℄
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR QUANTITIES AND ADDITIONAL INFORMAION.
2. SEE DRIVEWAY LAYOUTS FOR ADDITIONAL INFORMATION.
3. PROVIDE TYPE F HANDRAIL WHERE SHOWN. SEE PRD-13 FOR DETAILS.



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
11/15/2023

Cassie Wallof

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
SIDEWALK
PLAN & PROFILE

SCALE: 1"=100′-H
1"=10′-V

SHEET 4 OF 4

DSN: CW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: CW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JTF	COMAL	SAT	3212	05	013	94

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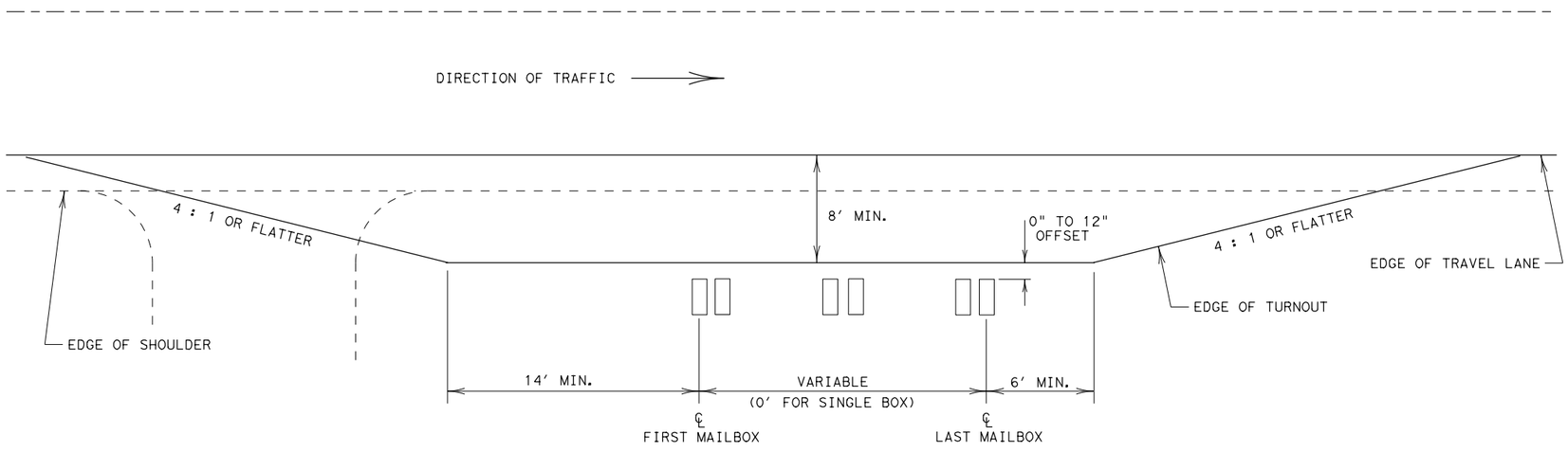
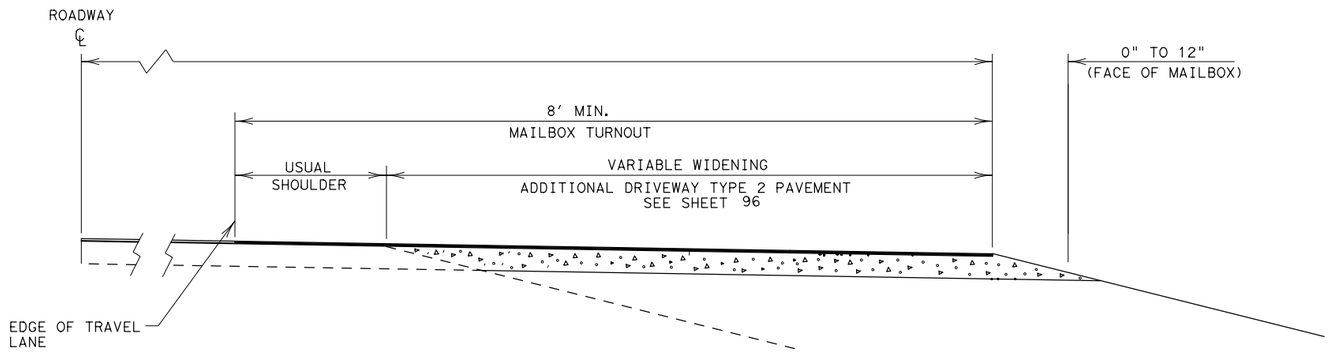


PLAN



TYPICAL SECTION

PAYMENT FOR MAILBOX TURNOUT IS PER
BID ITEM 530 "TURNOUTS ACP"

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

11/15/2023

FIRM NO. F-754

DESIGN DETAILS FOR TYPICAL MAILBOX TURNOUTS

MBTRNOUT (MOD)

FILE: mbtrnout.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		95

DATE: 11/15/2023
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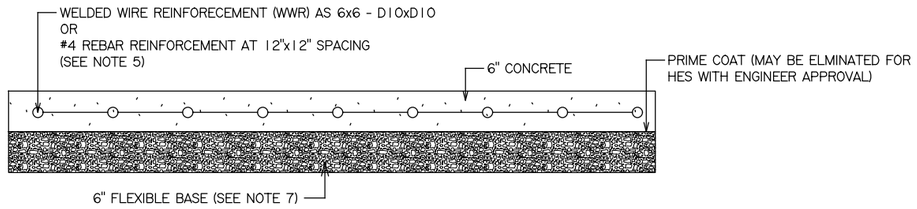
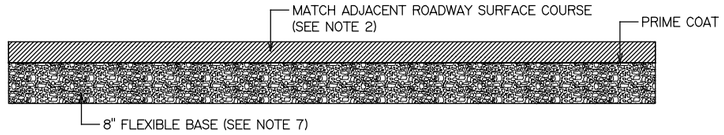


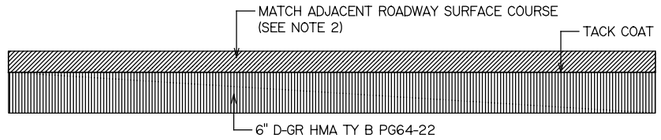
TYPICAL CONCRETE DRIVEWAY

* NOTE: STEEL SHALL BE CENTERED VERTICALLY IN CONCRETE.
PAID AS 'DRIVEWAYS CONC (HES)' OR 'DRIVEWAYS (CONC)'



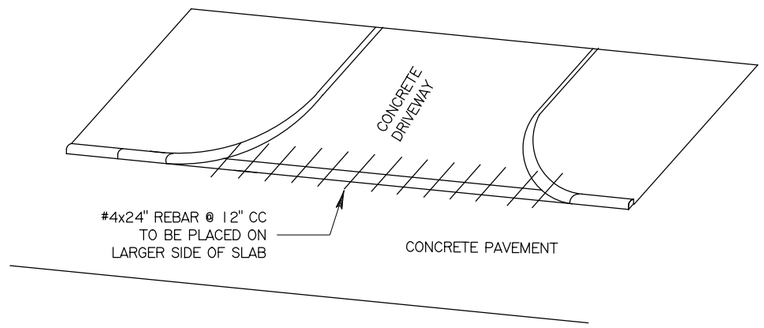
TYPICAL ROADWAY DRIVEWAY (TYPE 1)

PAID AS DRIVEWAYS ACP (TYPE 1)

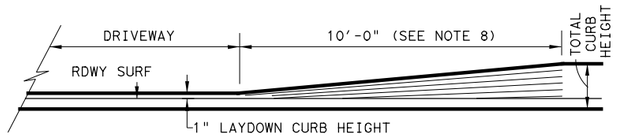


TYPICAL ROADWAY DRIVEWAY (TYPE 2)

PAID AS DRIVEWAYS ACP (TYPE 2)



TIE BAR PLACEMENT WITH CRCP



LAYDOWN CURB AT DRIVEWAYS DETAIL

NOTES:

1. USE CLASS A CONCRETE UNLESS OTHERWISE NOTED.
2. DENSE GRADED HMA MAY BE USED WHEN APPROVED BY THE ENGINEER IF THE ROADWAY SURFACE COURSE IS A PERFORMANCE MIX.
3. REFER TO PLAN SHEETS FOR GEOMETRIC DESIGN DETAILS.
4. FOR CONCRETE DRIVEWAYS, PROVIDE EXPANSION JOINT 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT.
5. FIBER REINFORCEMNT IS NOT ALLOWED.
6. MACHINE LAID HMA IS REQUIRED UNLESS OTHERWISE APPROVED BY THE ENGINEER.
7. FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OF GRADE IN ACCORDANCE WITH ITEM 247. FLEXIBLE BASE COMPRESSIVE STRENGTHS ARE WAIVED. BASE IS SUBSIDIARY TO THE ITEM.
8. WHERE SIDEWALK IS PRESENT, SLOPE AND LENGTH OF CURB TRANSITION SHOULD MATCH THE SIDEWALK AND MEET ADA REQUIREMENTS.
9. IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE THE IMPACT TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

Texas Department of Transportation
San Antonio District

DRIVEWAY DETAILS

San Antonio District Standard
Sheet (1 of 1)

I:Engdata/Standards/Drivewaydetails.dgn	PREPARED BY AND FOR USE OF TxDoT.					
ORIGINAL DRAWING DATE: 8/1/2020	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
REVISIONS	SAT	6	SEE TITLE SHEET			96
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	COMAL		3212	05	013	FM3351

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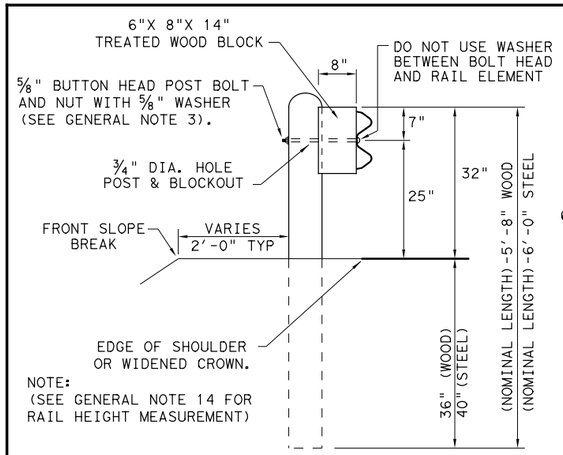
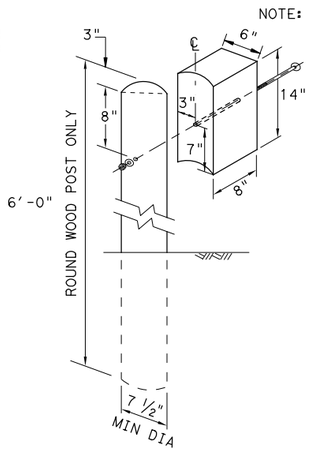
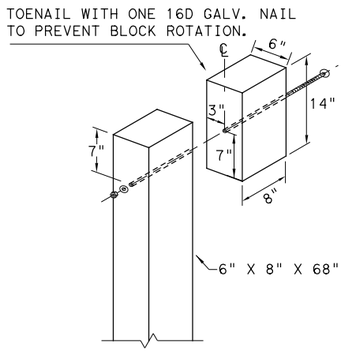
DATE: 11/15/2023
FILE: $FILE$



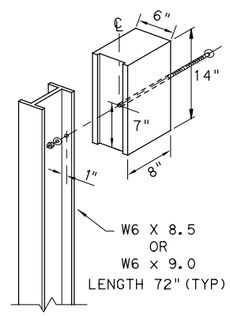
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

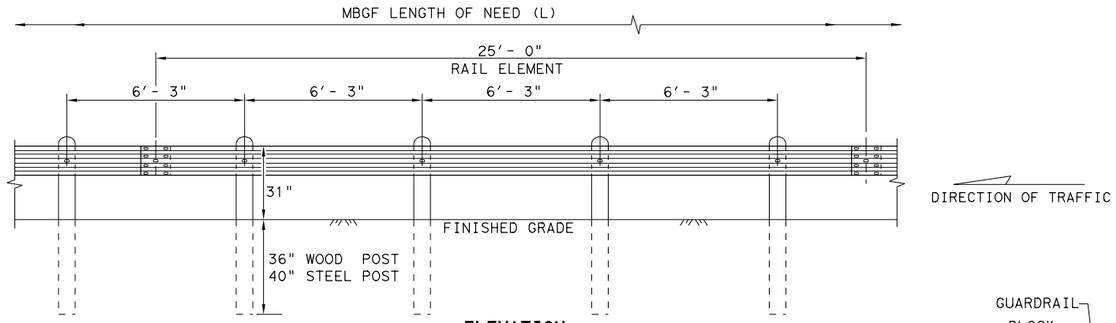


WOOD BLOCK TO RECTANGULAR WOOD POST



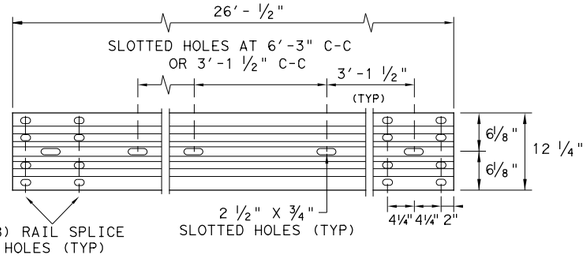
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



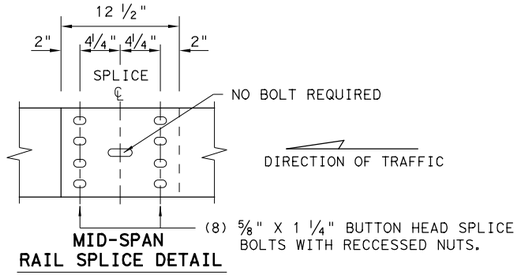
ELEVATION
MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

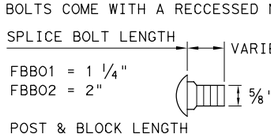
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



MID-SPAN
RAIL SPLICE DETAIL

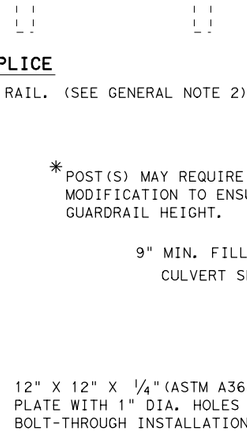
NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL
BOLTS COME WITH A RECCESSED NUT.

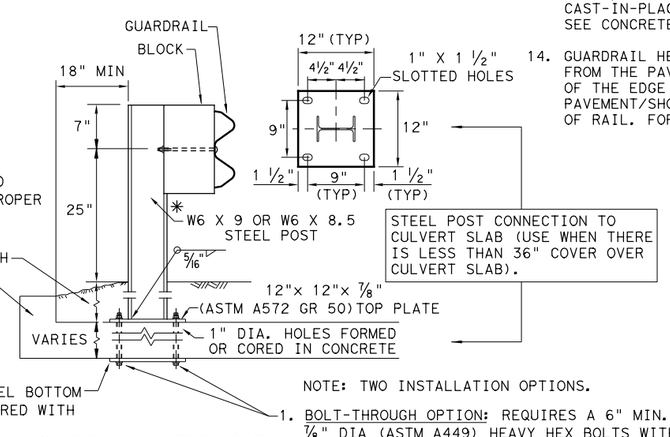


BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



✳ POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		97

DATE: 11/15/2023
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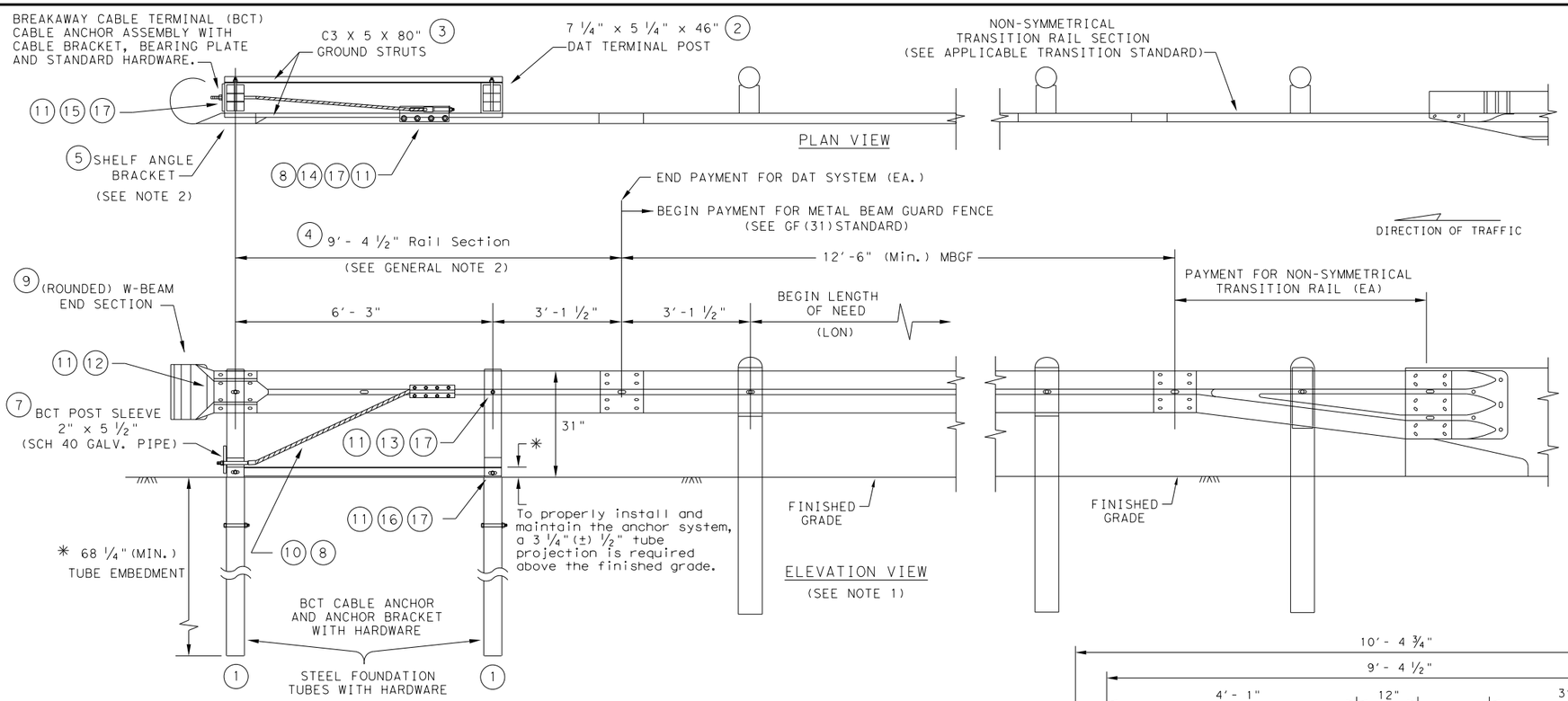


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

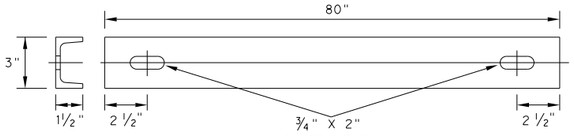
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

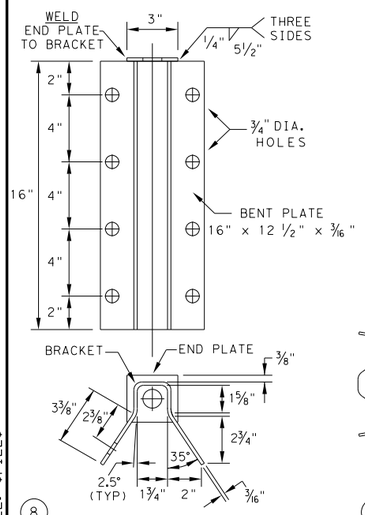
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

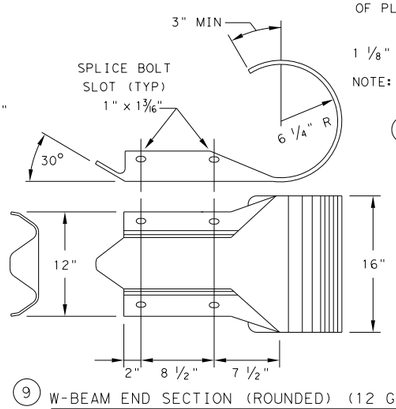
(4) TERMINAL RAIL ELEMENT FOR DAT



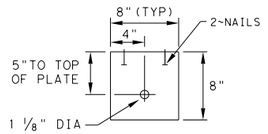
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

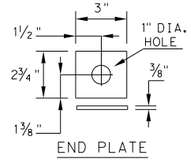


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

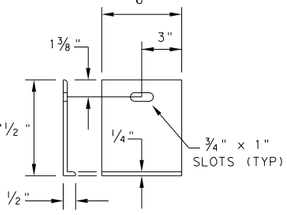


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

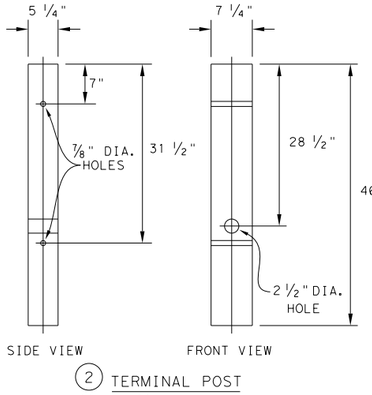
(6) BEARING PLATE
8"x 8"x 5/8" R



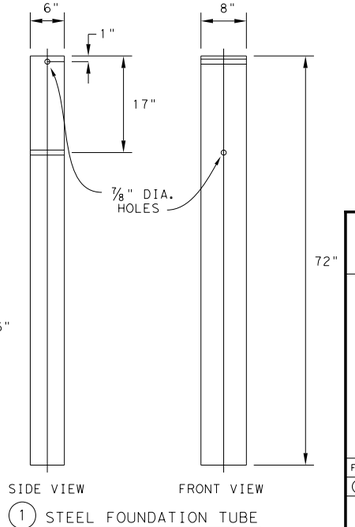
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		98

DATE: 11/15/2023
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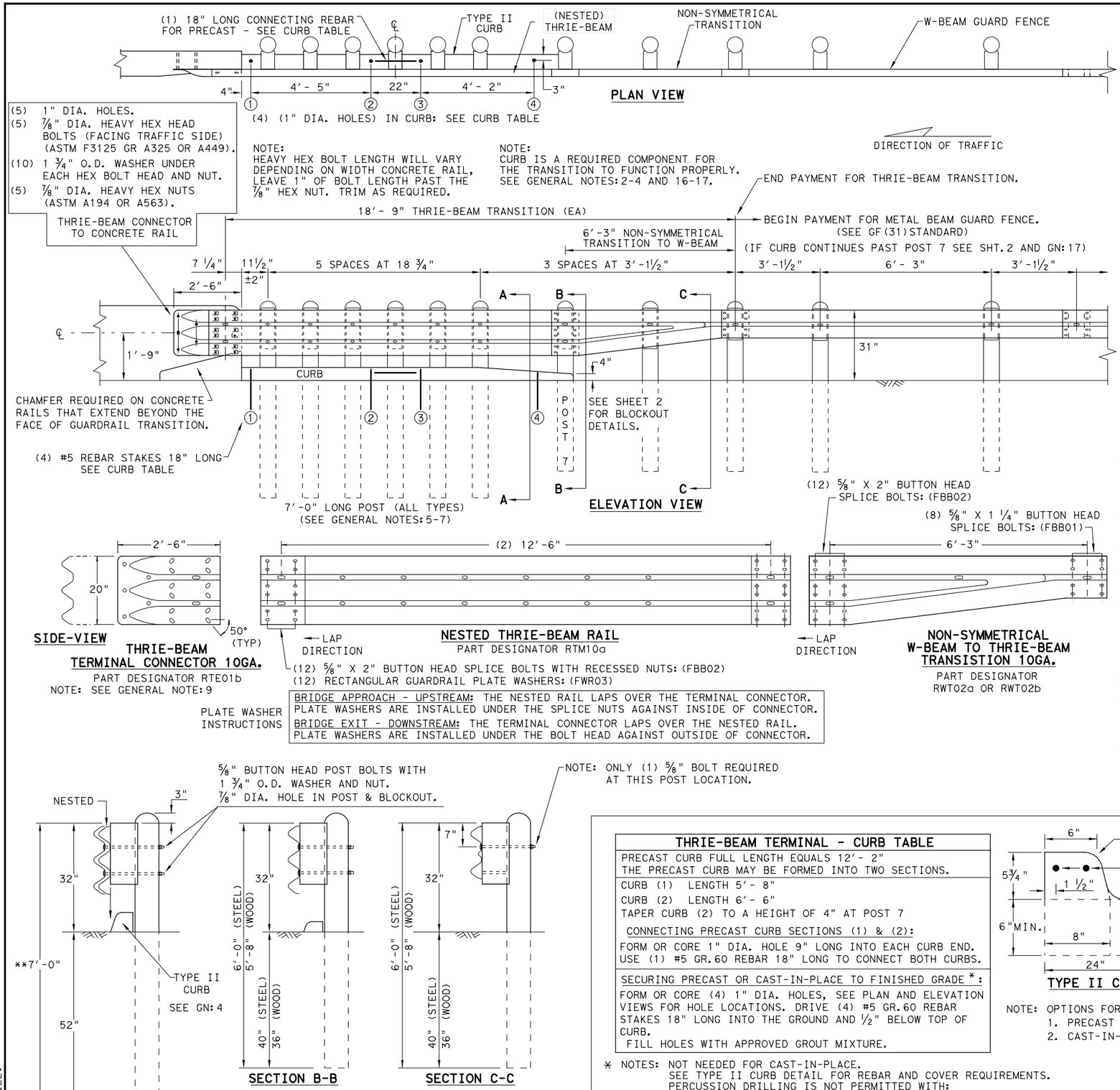


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM 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 THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

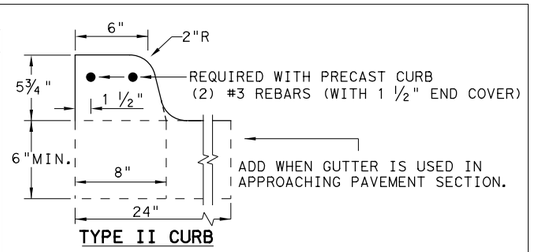
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31tr-tl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3212	05	013	FM 3351	
	DIST	COUNTY		SHEET NO.	
	SAT	COMAL		99	

DATE: 11/15/2023
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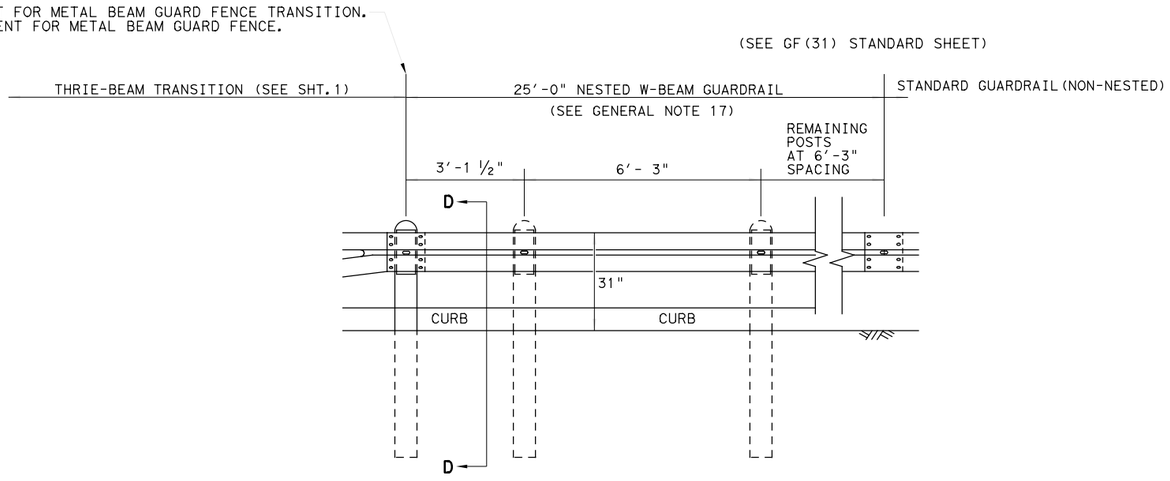
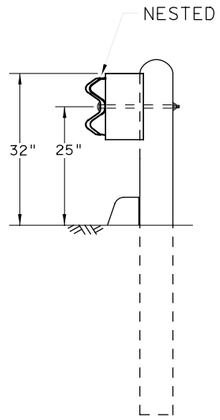
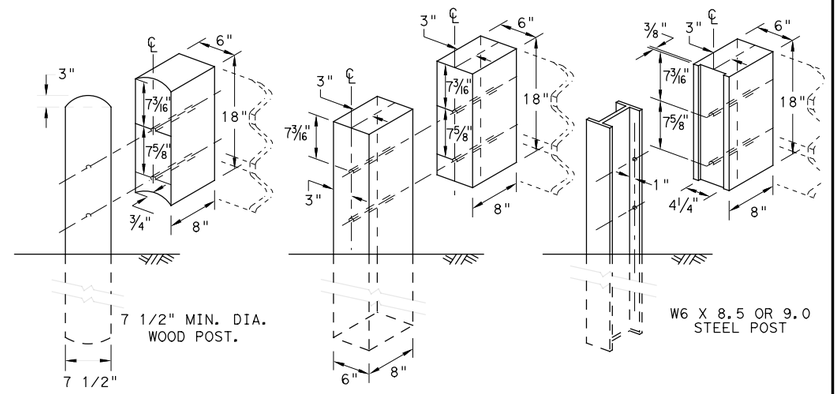
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY		
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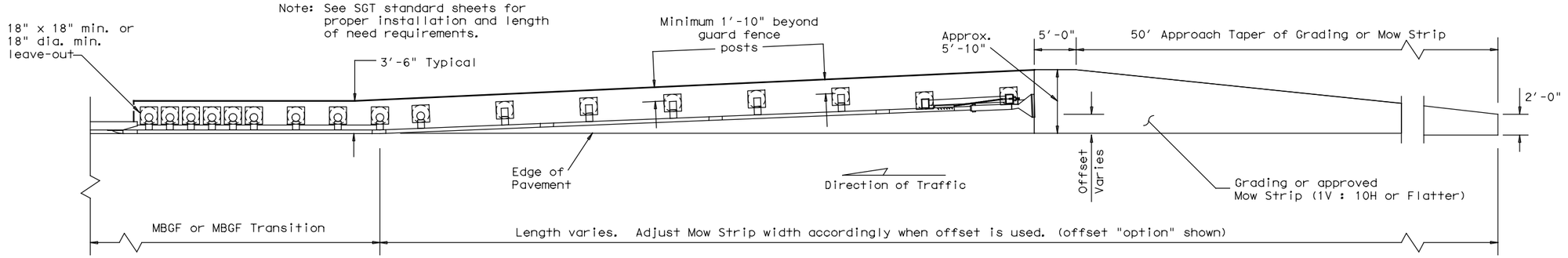
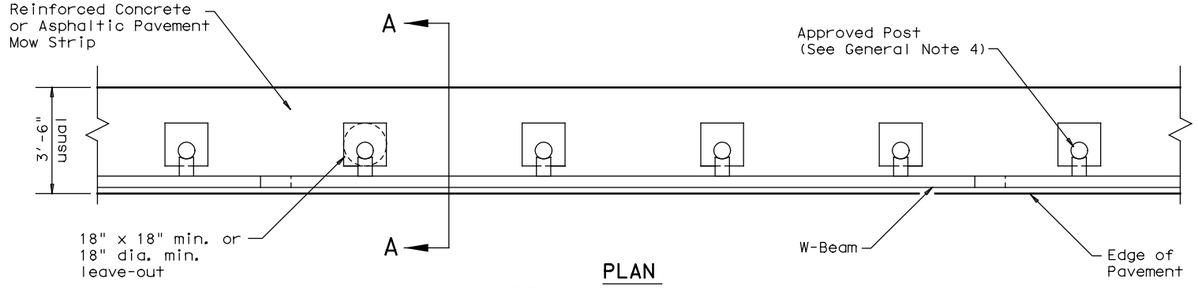
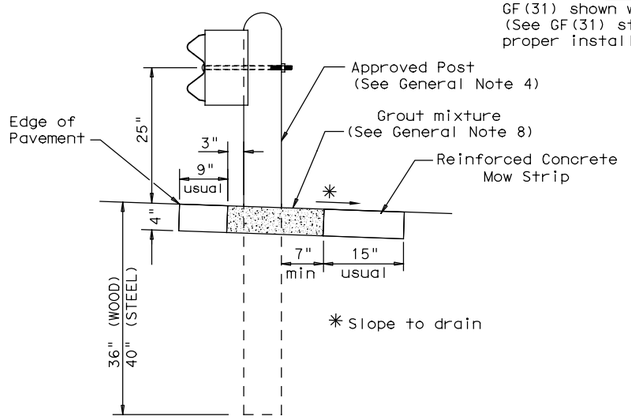


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



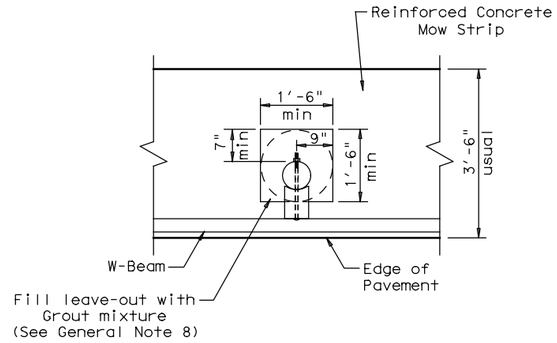
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



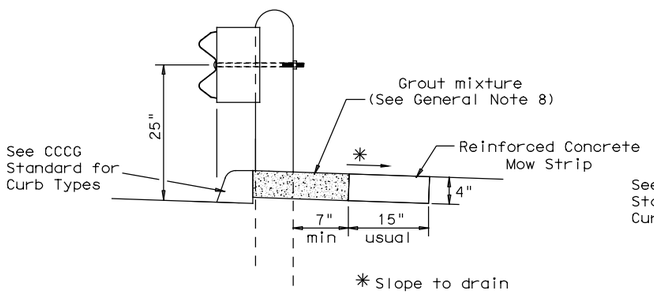
SECTION A-A

Typical



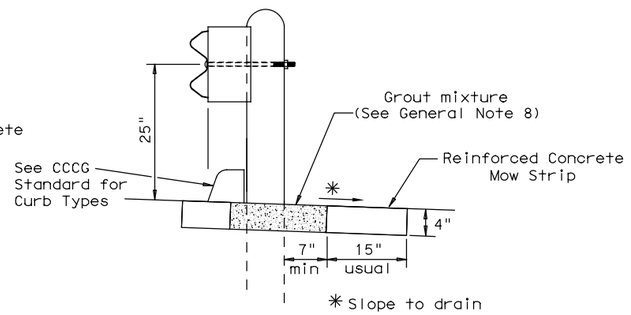
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



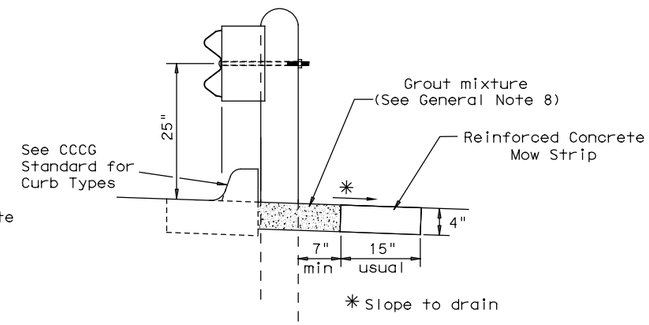
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	SAT	COMAL		101

DATE: 11/15/2023
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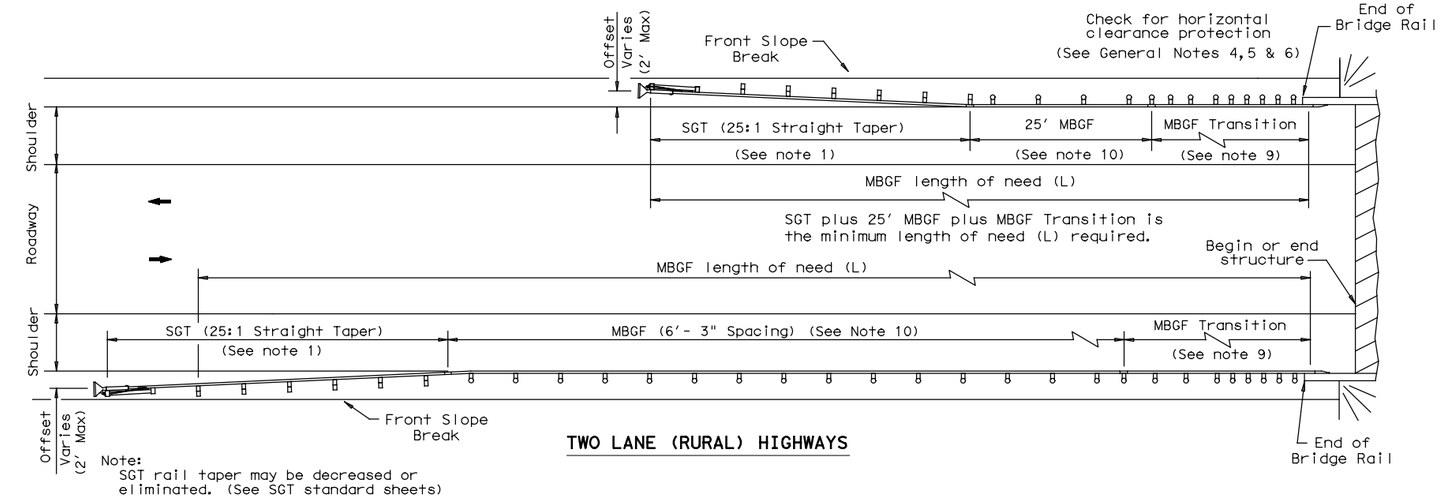
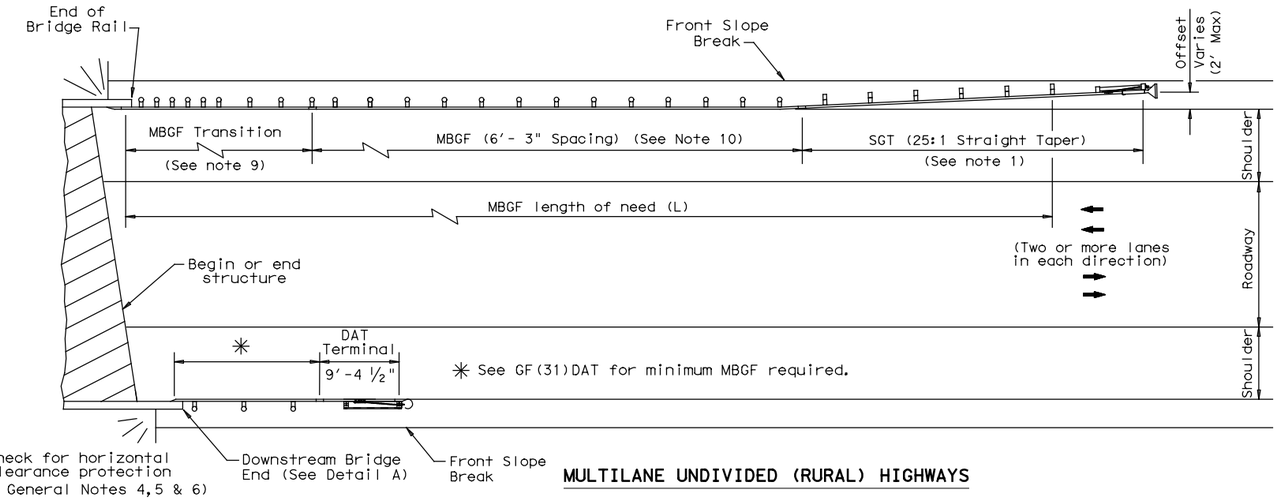
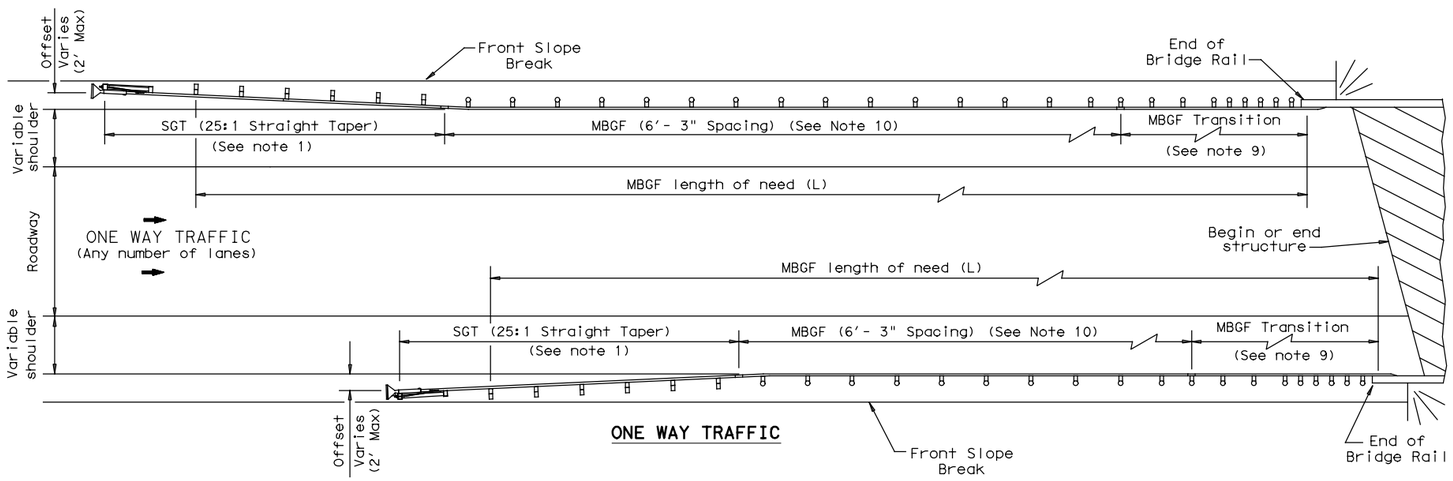


Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)

TWO LANE (RURAL) HIGHWAYS



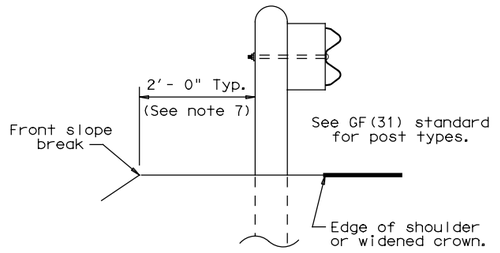
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



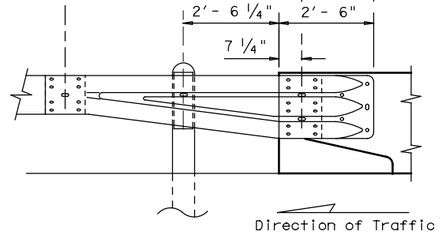
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

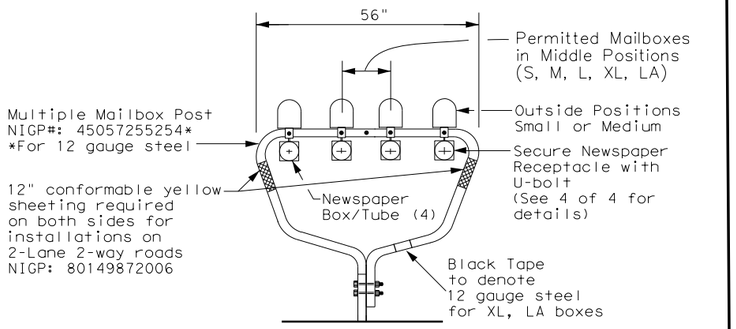
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

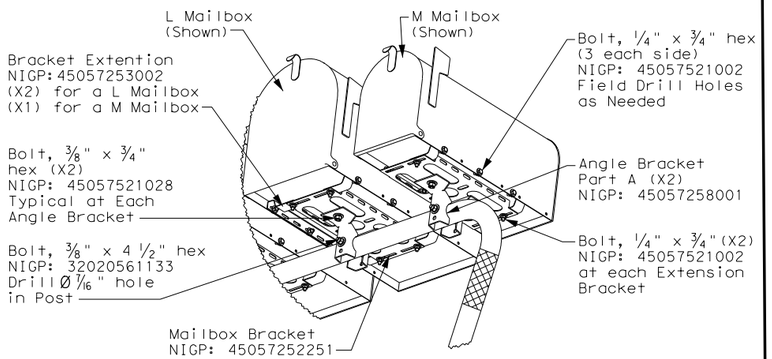
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		102

DATE: 11/15/2023 5:58:55 PM
FILE: $FILE$

TYPE 1 - MULTIPLE





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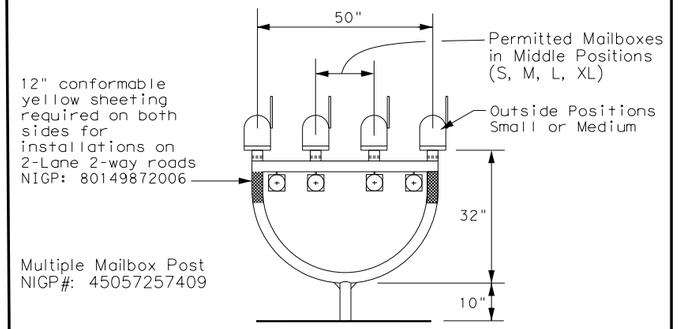
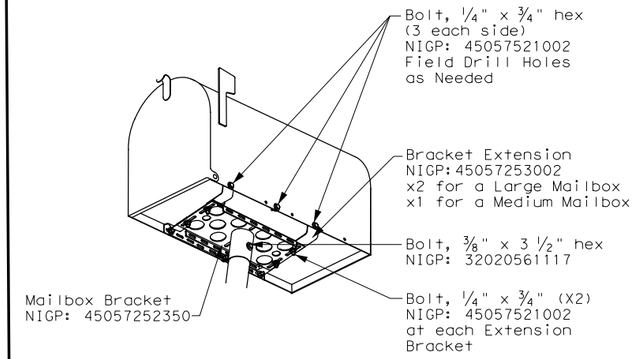




MAILBOX SIZES

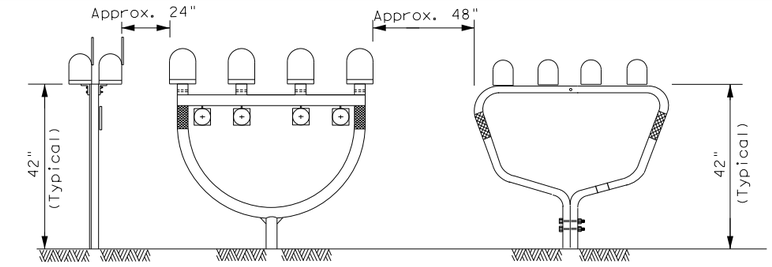
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX ** WEIGHT
	LENGTH	WIDTH	HEIGHT	
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

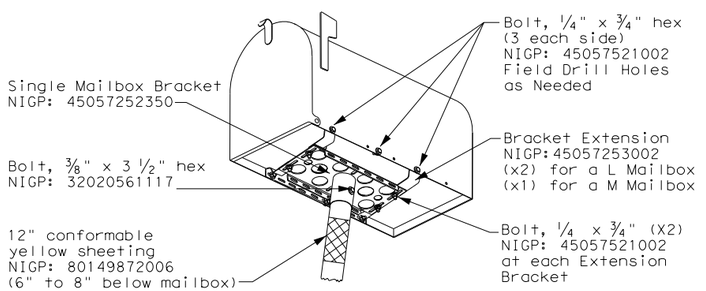
1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

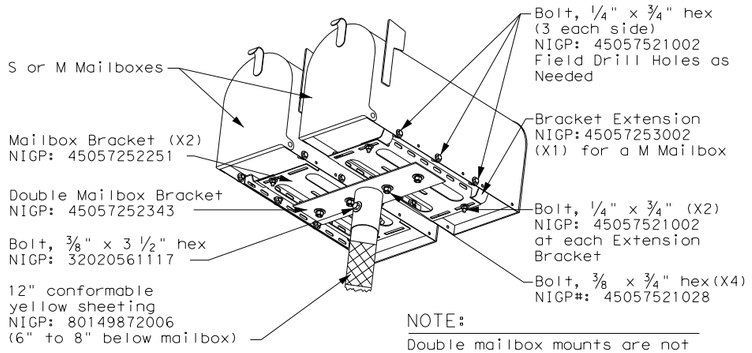
TYPICAL INSTALLATION MEASUREMENTS



NOTE:
Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

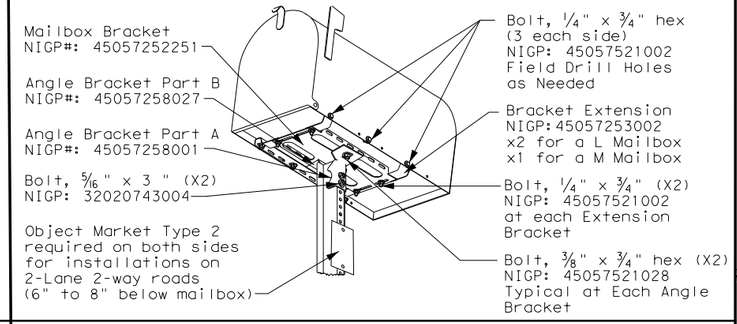
TYPE 2 and 4 - SINGLE/DOUBLE

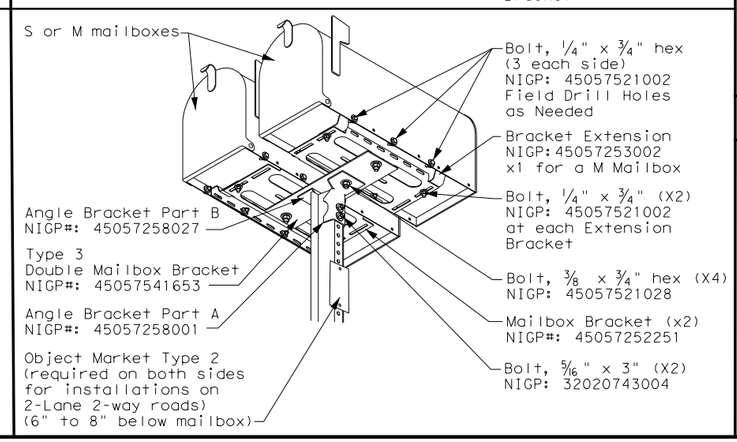




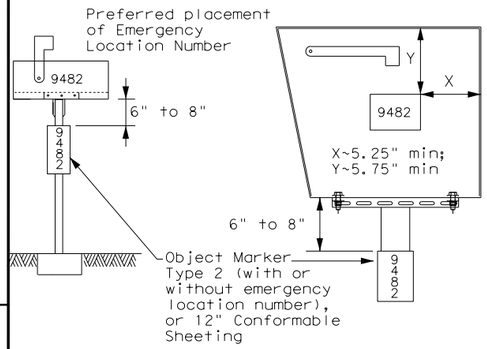
NOTE:
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

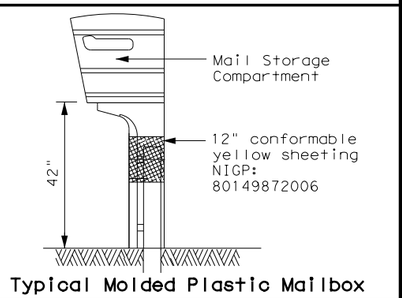


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		103

DATE: 11/15/2023 5:59:03 PM
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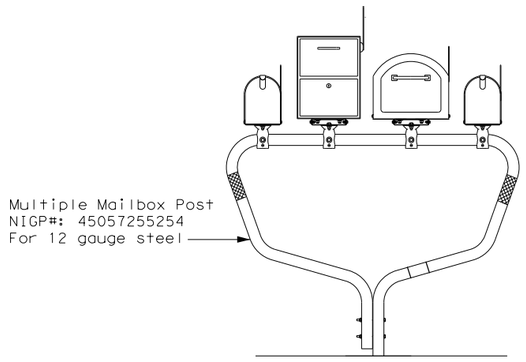
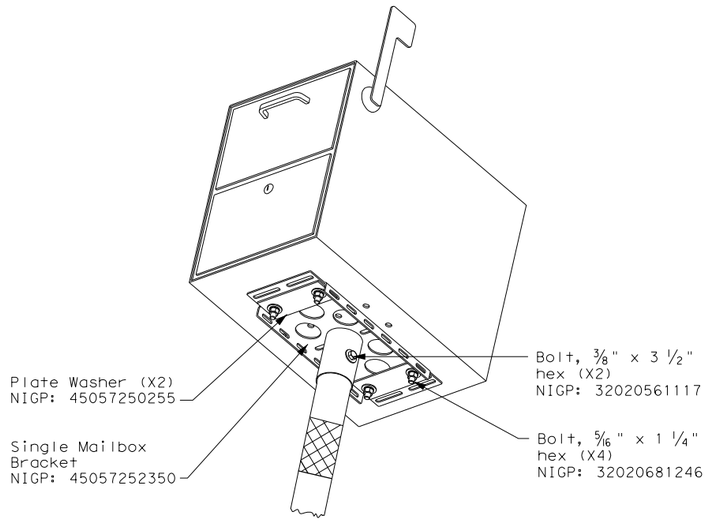
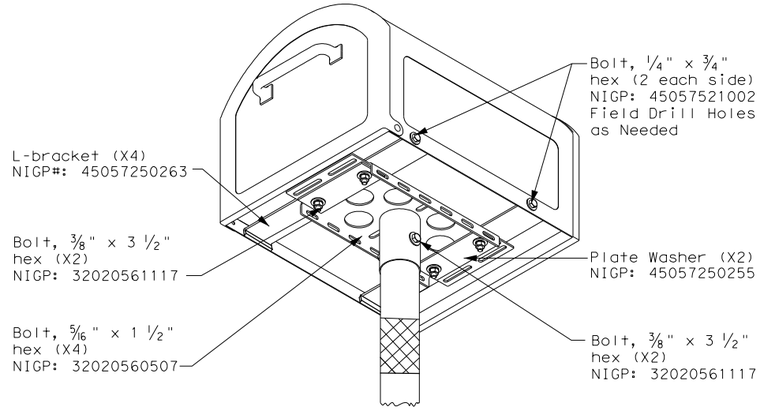
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

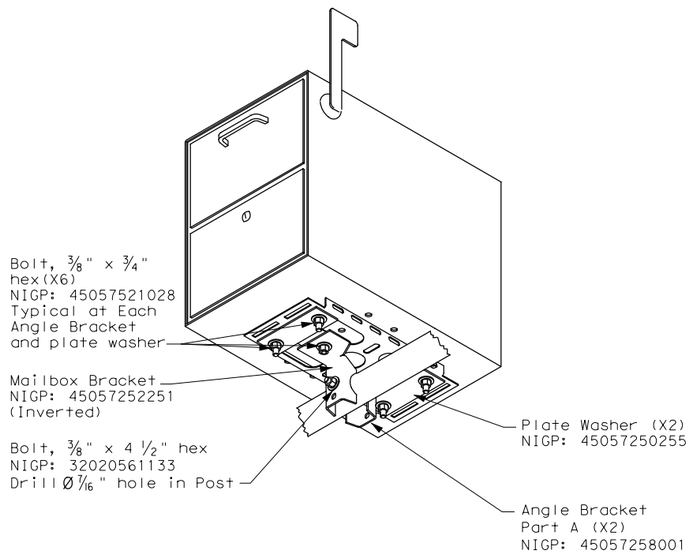


TYPE 2/4 - SINGLE XL MAILBOX

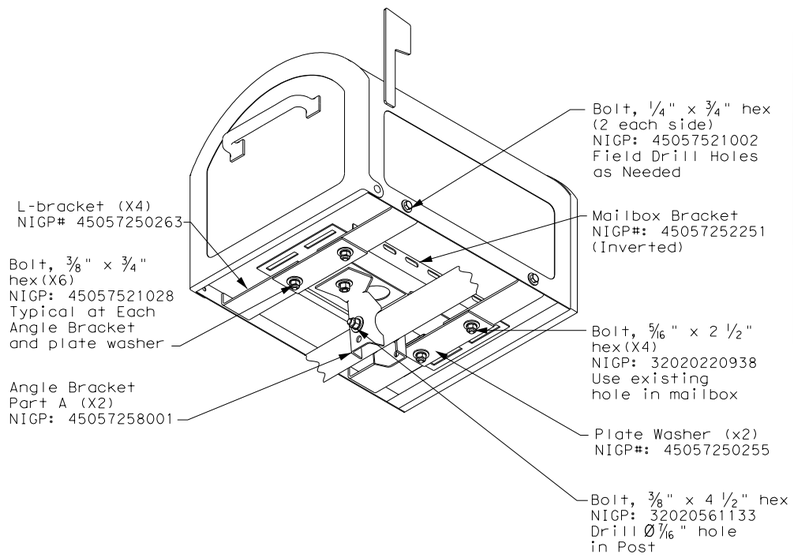


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

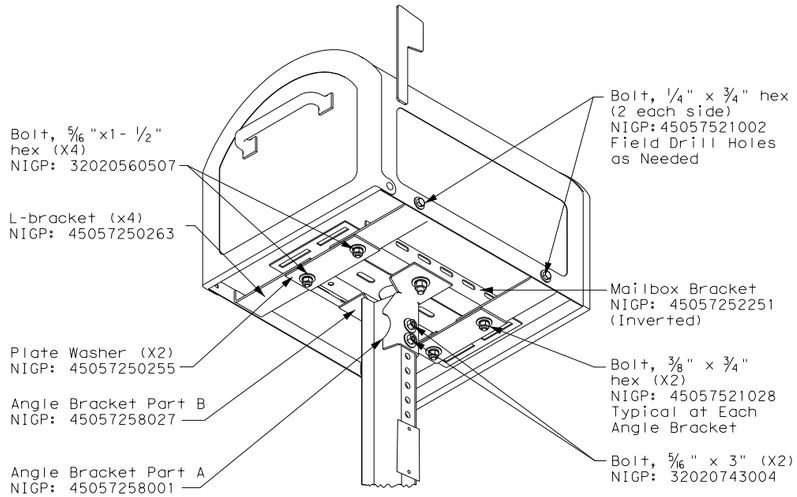
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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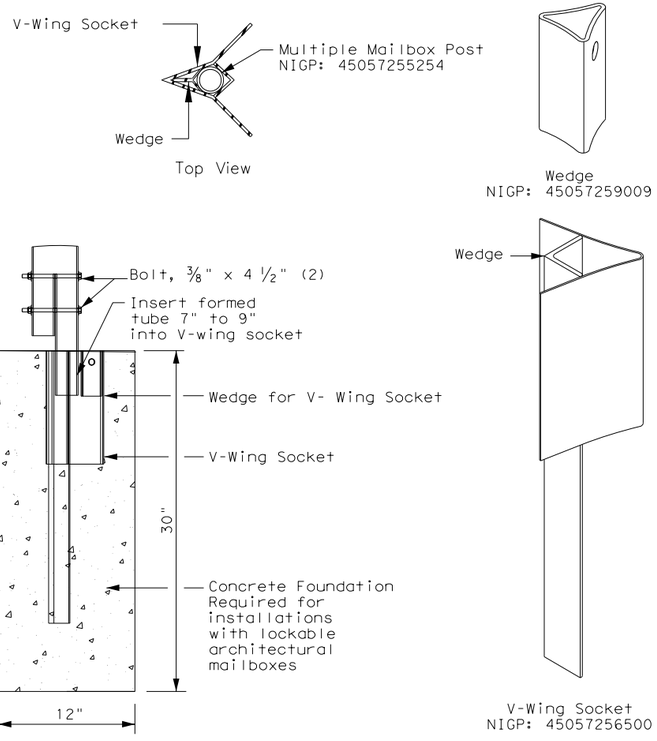
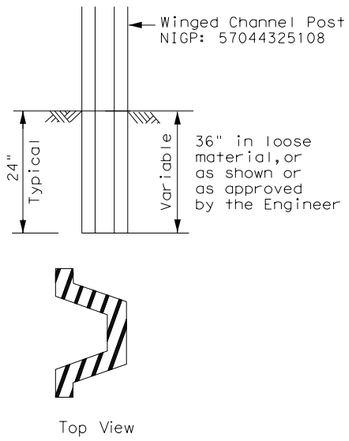
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		104

DATE: 11/15/2023 5:59:04 PM
FILE: $FILE$

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

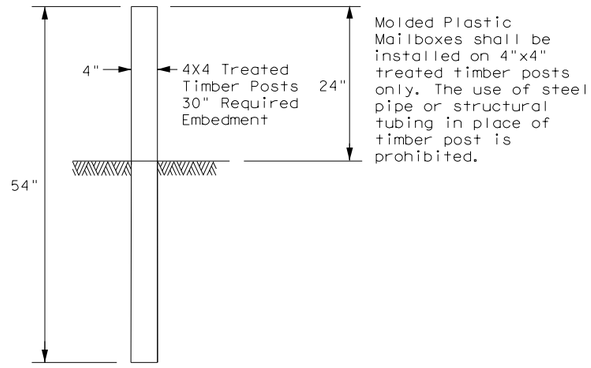


TYPE 3 - SUPPORT/FOUNDATION

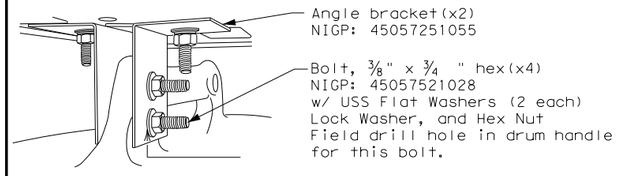


NOTES:
1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

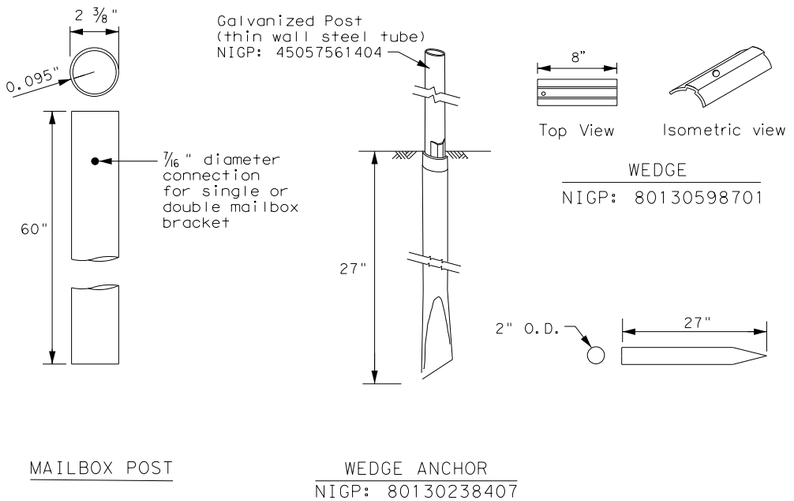


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

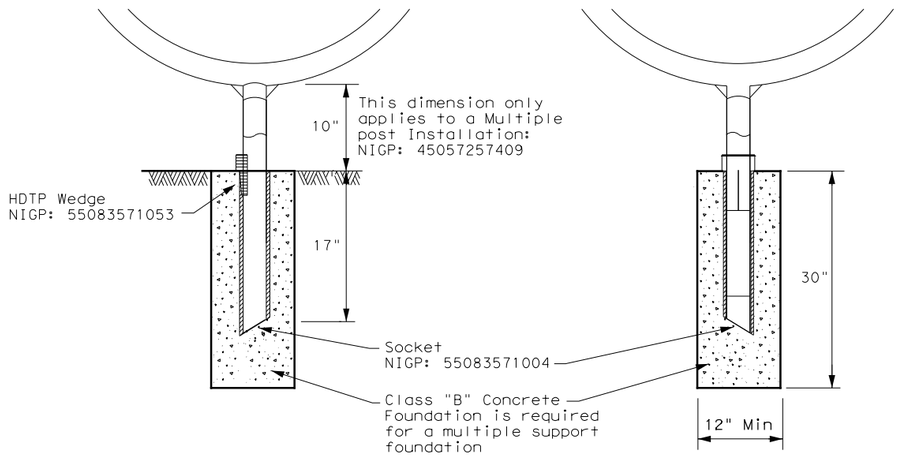
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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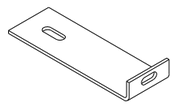
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		105

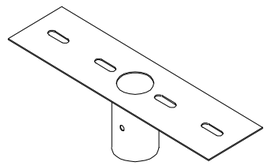
DATE: 11/15/2023 5:59:05 PM
FILE: $FILE$

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



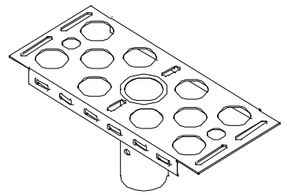
NIGP: 45057250263

L-Bracket x4 for
XL sized mailboxes



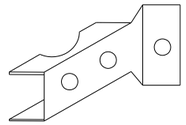
NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4
double mount



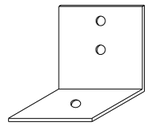
NIGP: 45057252350

Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



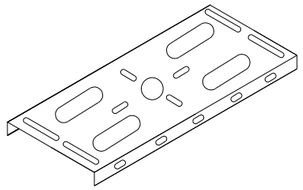
NIGP: 45057258001

Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



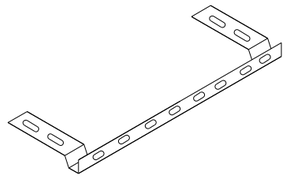
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



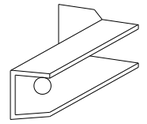
NIGP: 45057252251

Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



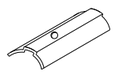
NIGP: 45057253002

Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



NIGP: 45057258027

Part "B" Angle Bracket
For Type 3 single
and double



NIGP: 80130598701

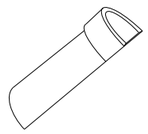
Wedge for Type 2

NIGP: 45057250255

Plate Washer for Architecural
and XL Mailboxes

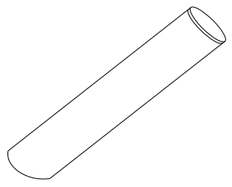
NIGP: 45057541653

Type 3 double mailbox bracket



NIGP: 55083571053

Type 4 Mailbox Wedge

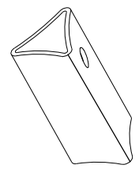


NIGP: 55083571004

Type 4 Mailbox Socket

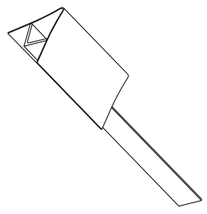
NIGP: 80130238407

Type 2 Wedge Anchor



NIGP: 45057259009

Wedge for Type 1 V-wing Socket



NIGP: 45057256500

V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

DATE: 11/15/2023 5:59:05 PM
FILE: $FILE$

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

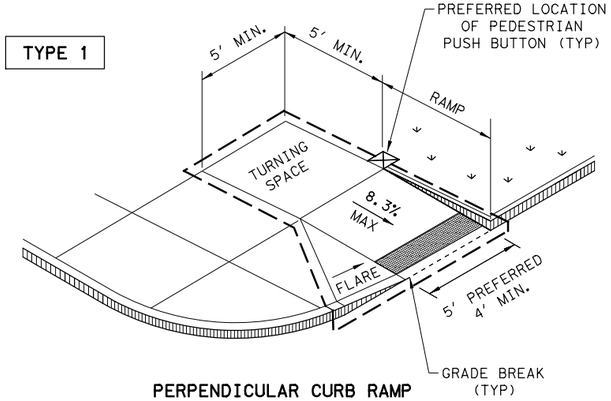
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	DIST	COUNTY		SHEET NO.
	SAT	COMAL		106

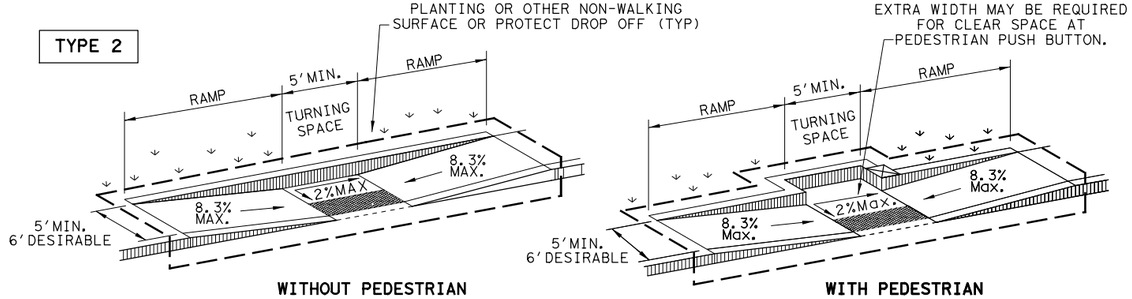
DATE: 11/15/2023
FILE: $FILE$

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

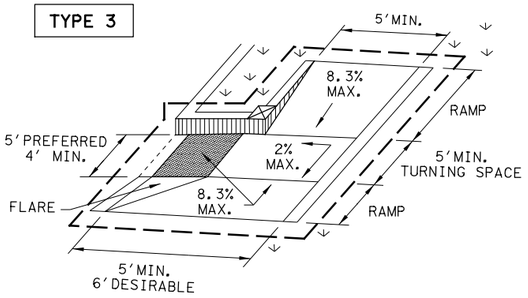


WITHOUT PEDESTRIAN PUSH BUTTON

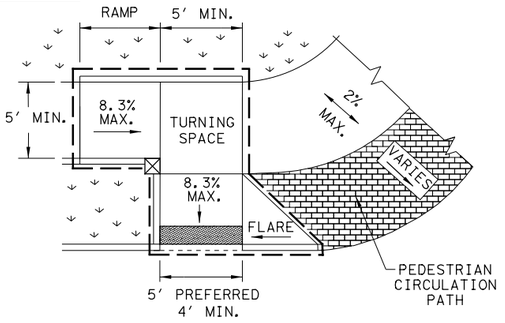
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

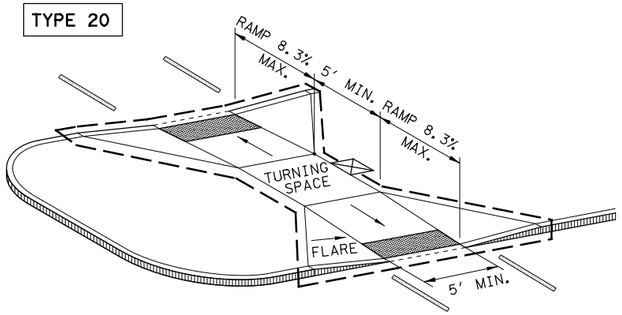


TYPE 6



COMBINATION CURB RAMPS

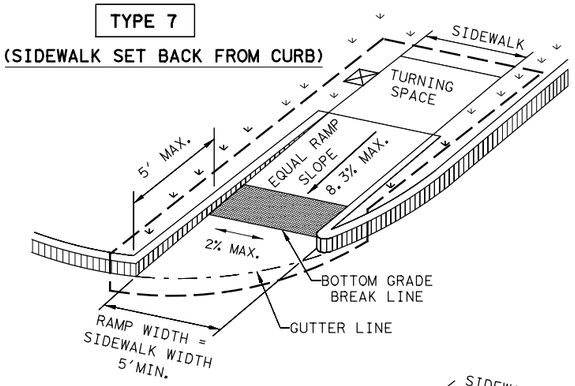
TYPE 20



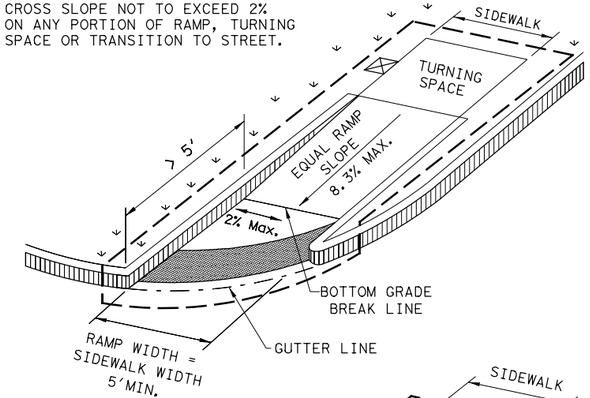
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

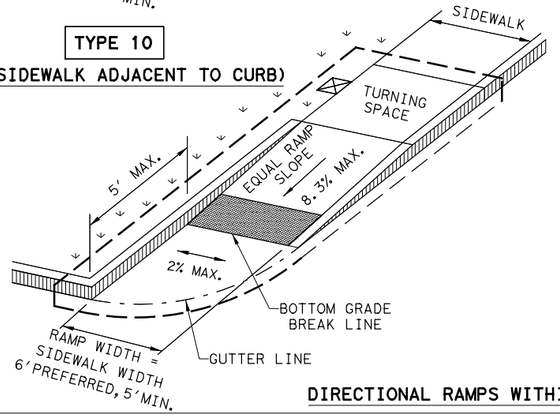


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

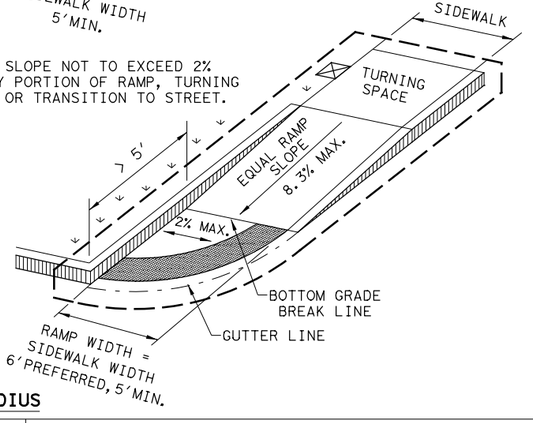


TYPE 10

(SIDEWALK ADJACENT TO CURB)

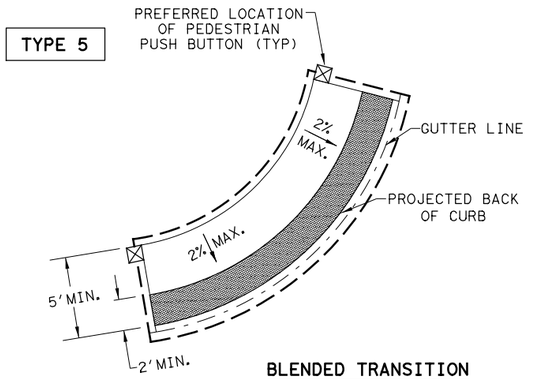


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

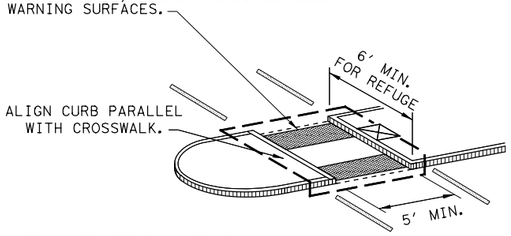
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

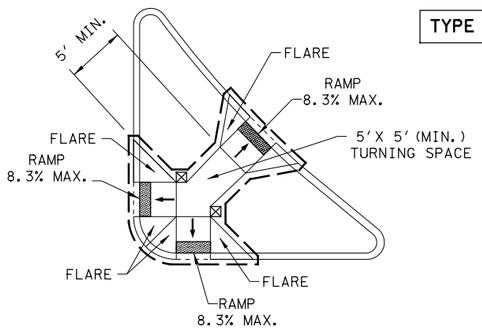
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



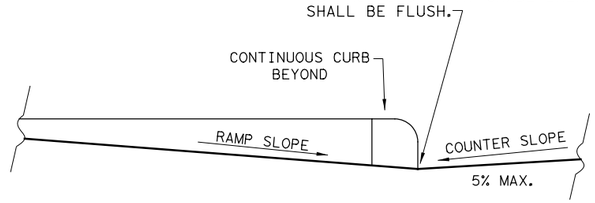
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	SAT	COMAL		107

DATE: 11/15/2023
FILE: $FILE$

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 areas 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).
9. 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′x 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 "Sidewalks".
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 applicaible standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

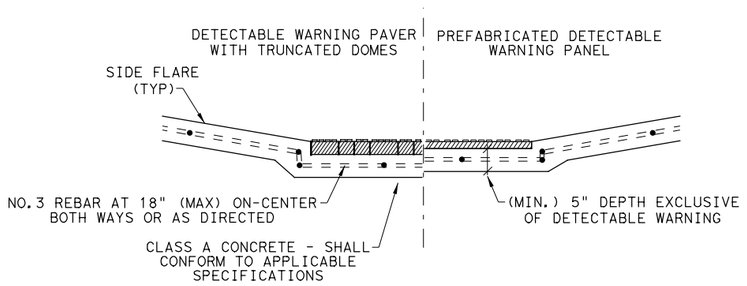
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

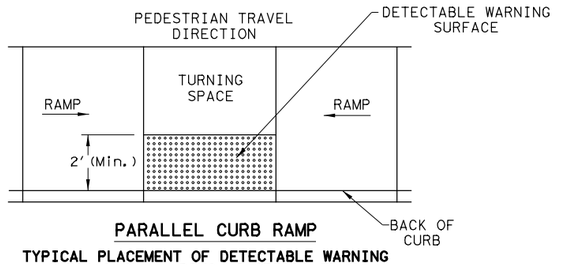
SIDEWALKS

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.

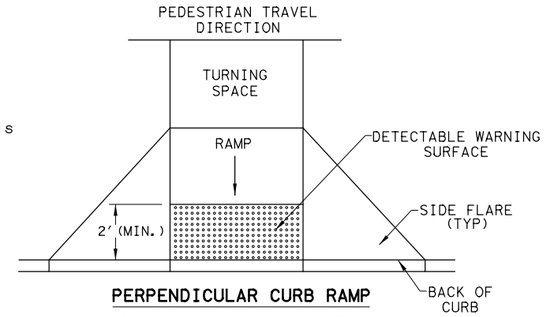


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

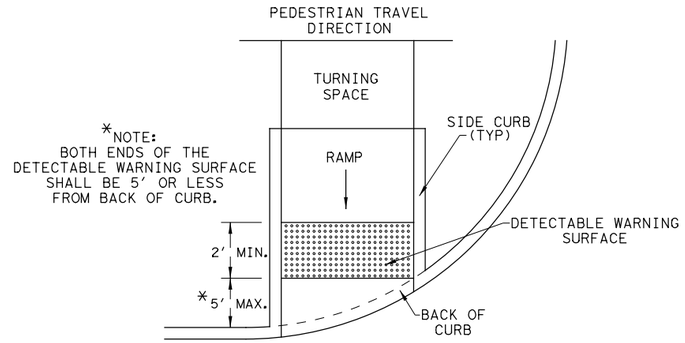
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

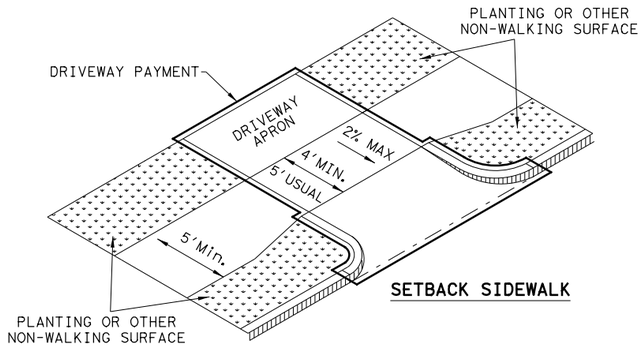
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

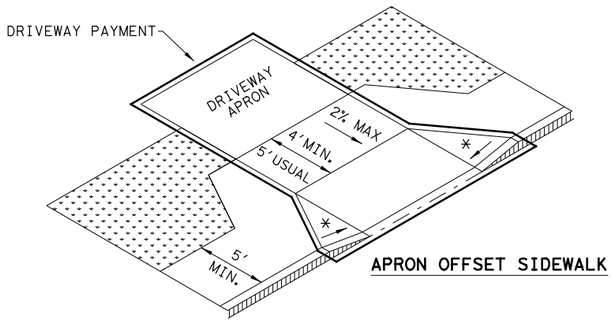
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3212	05	013	FM 3351	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	SAT	COMAL		108	

DATE: 11/15/2023
FILE: $FILE$

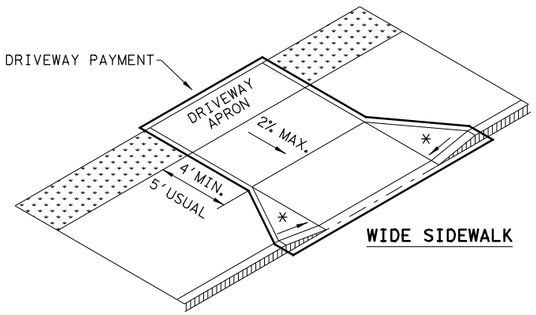
SIDEWALK TREATMENT AT DRIVEWAYS



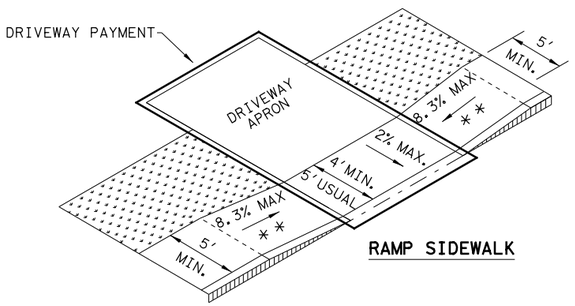
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

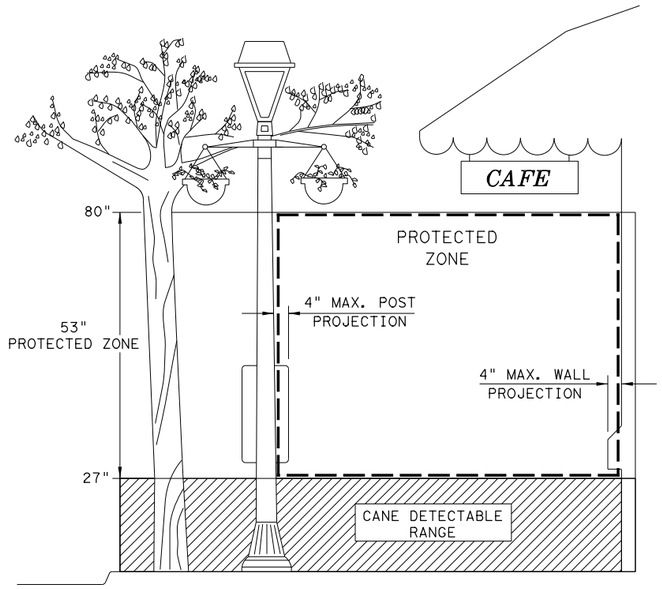


RAMP SIDEWALK

NOTES:

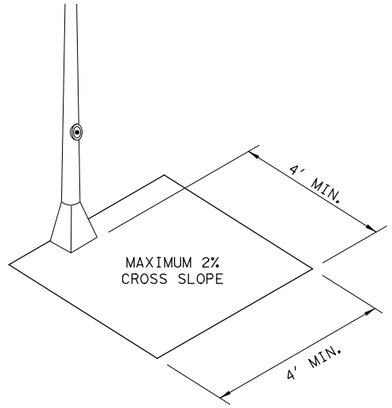
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

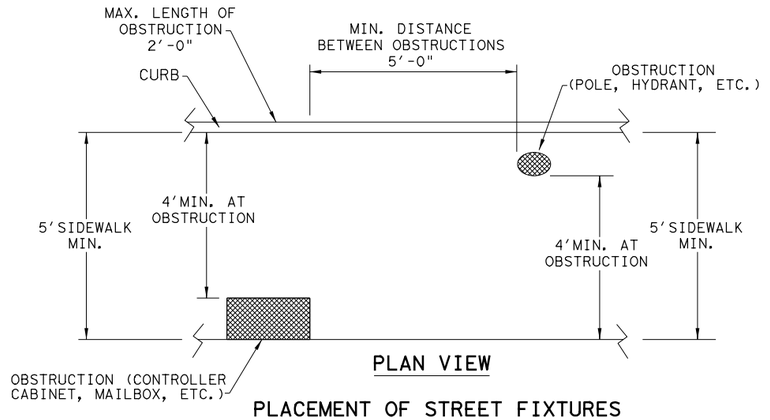


PROTECTED ZONE

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



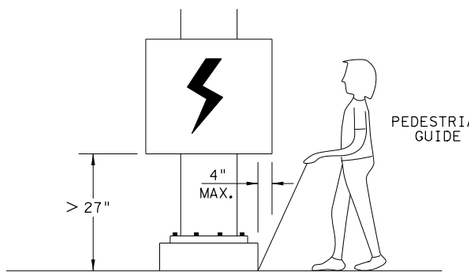
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



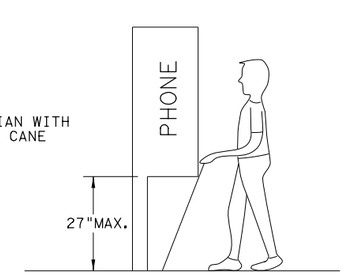
PLAN VIEW

PLACEMENT OF STREET FIXTURES

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



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 ≤27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

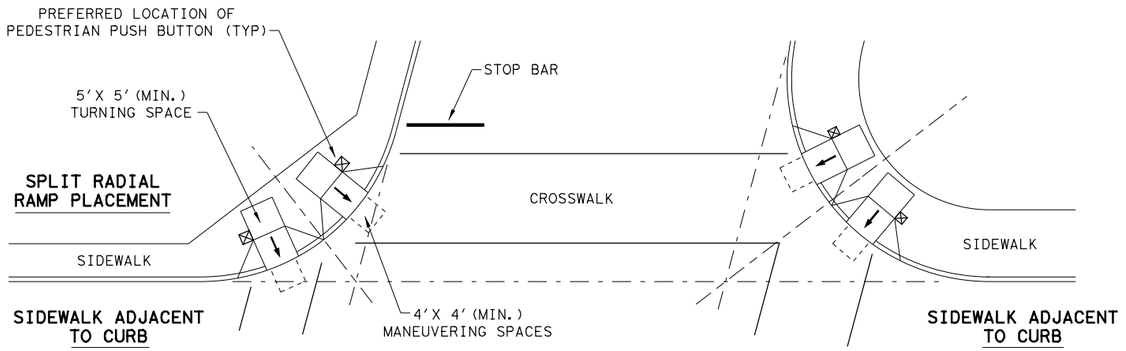
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	SAT	COMAL		109

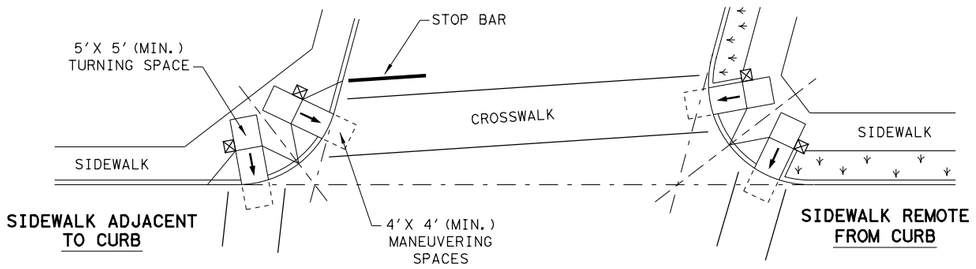
DATE: 11/15/2023
FILE: $FILE$

TYPICAL CROSSING LAYOUTS

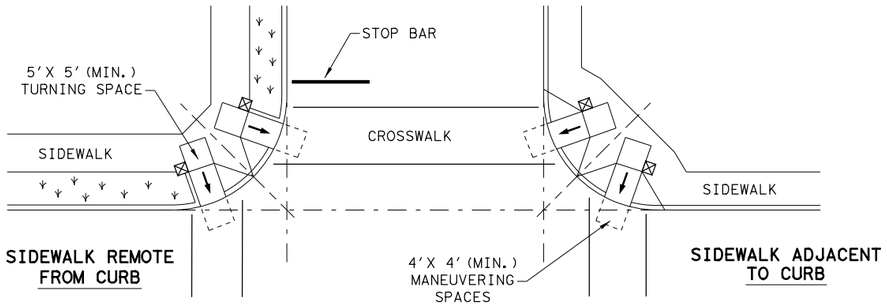
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



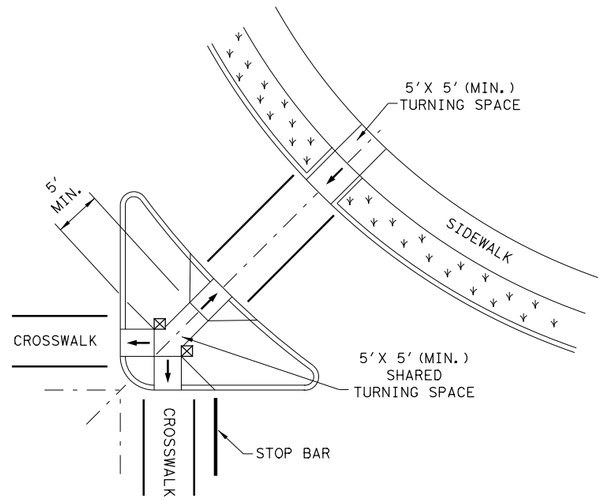
SKEWED INTERSECTION WITH "LARGE" RADIUS



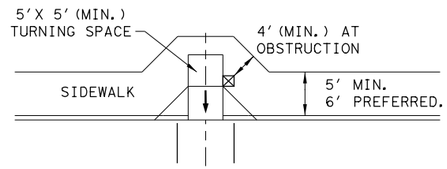
SKEWED INTERSECTION WITH "SMALL" RADIUS

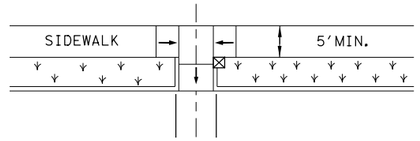


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

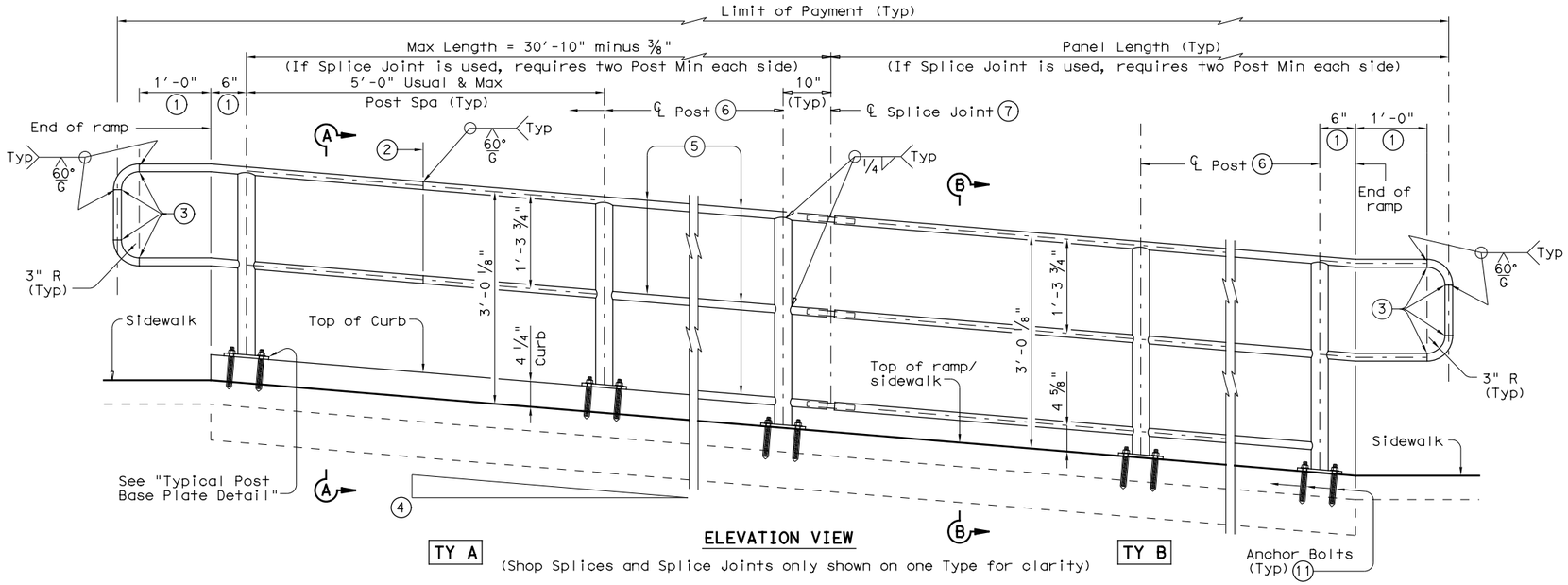
Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

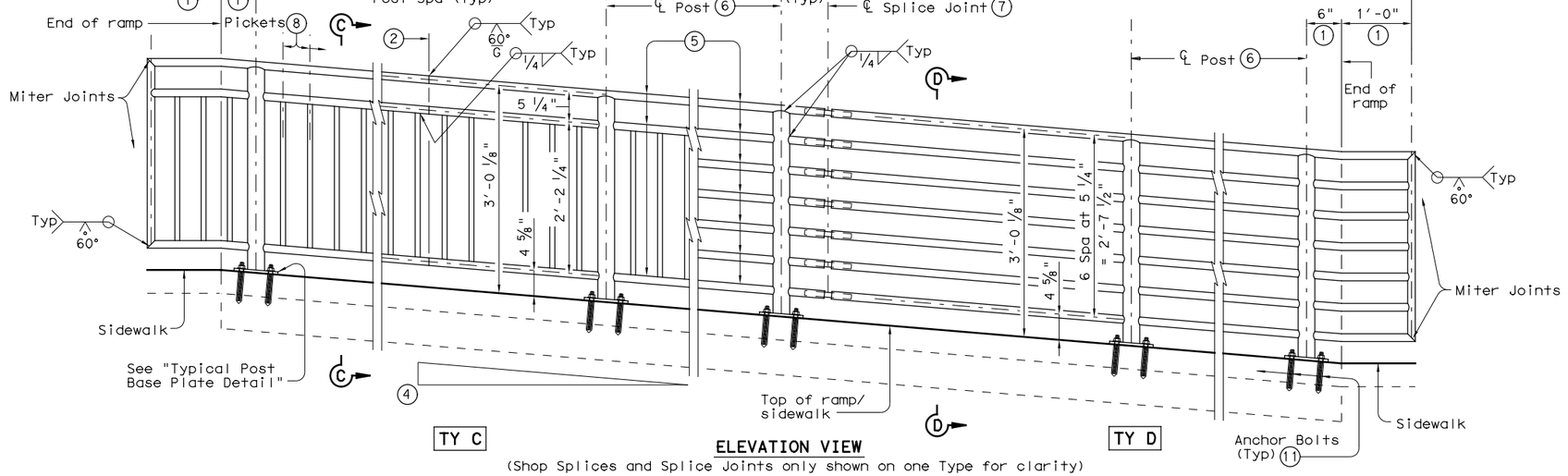
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	SAT	COMAL		110



ELEVATION VIEW

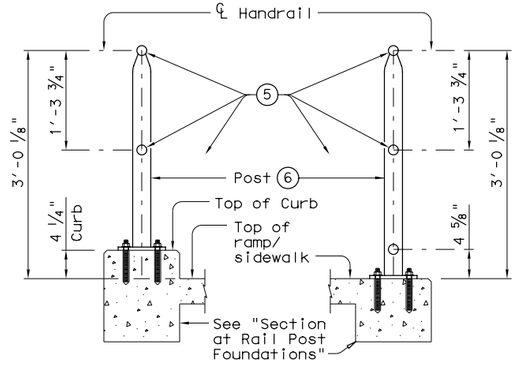
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE ⑨⑩	
Dropoff Height/ Condition	Recommended Rail Options
<30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F

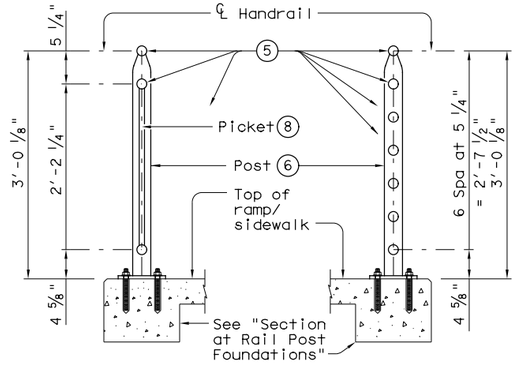


SECTION A-A

(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**)

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.

⑤ 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" 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 ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.

⑨ When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.

⑩ Not to be used on bridges.

⑪ See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

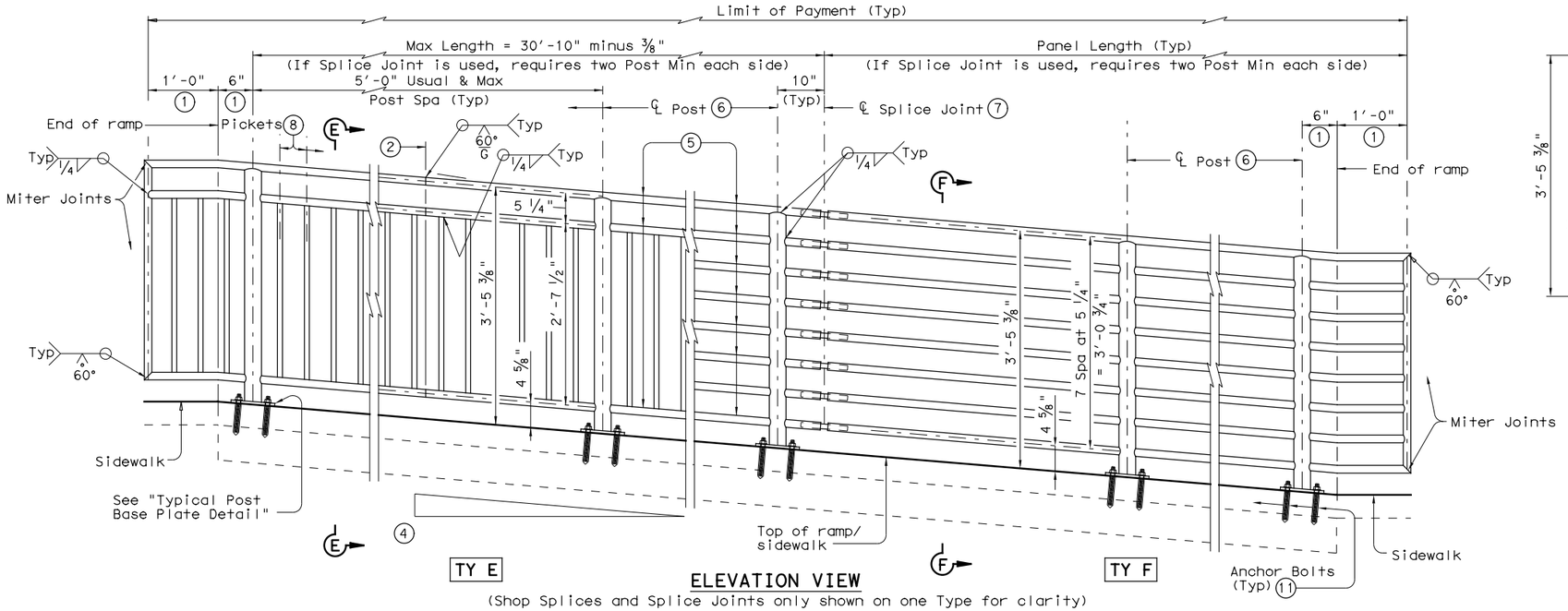
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

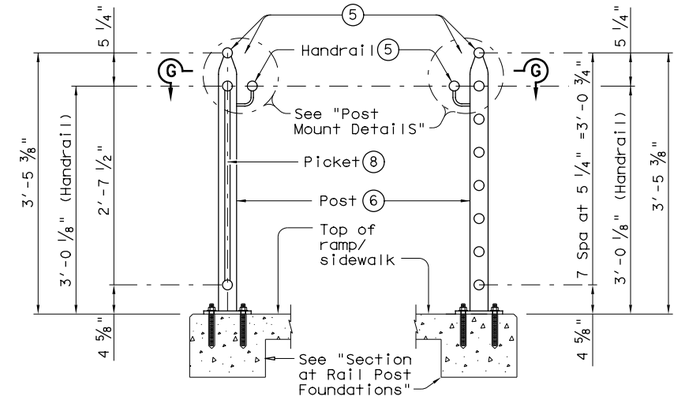
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		111

DATE: 11/15/2023
FILE: $FILE$



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

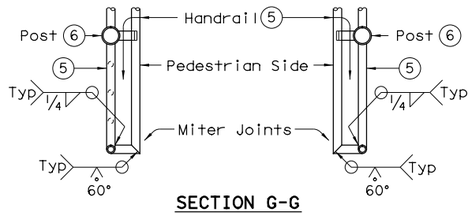


SECTION E-E

(Showing Handrail **TY E**)

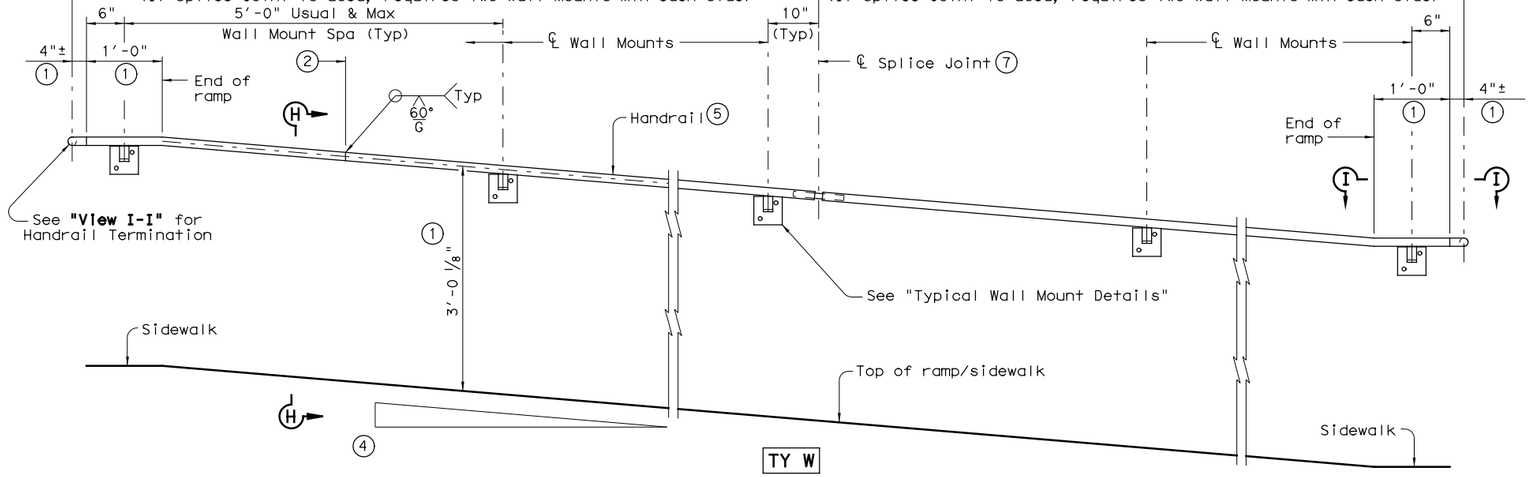
SECTION F-F

(Showing Handrail **TY F**)

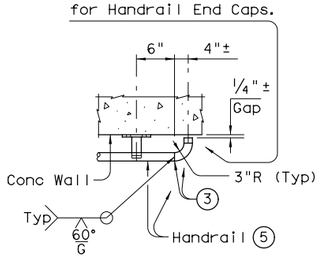


SECTION G-G

(Showing Handrail Termination)

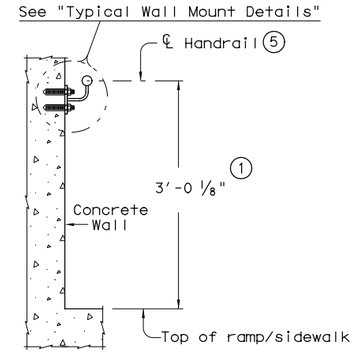


ELEVATION VIEW



VIEW I-I

(Showing Handrail Termination)



SECTION H-H

(Showing Handrail **TY W**)

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.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" 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. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

DATE: 11/15/2023
FILE: $FILE$

Texas Department of Transportation

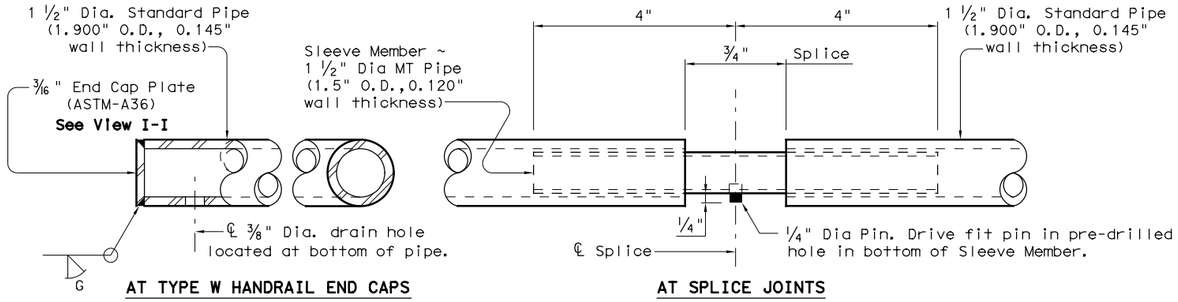
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		112

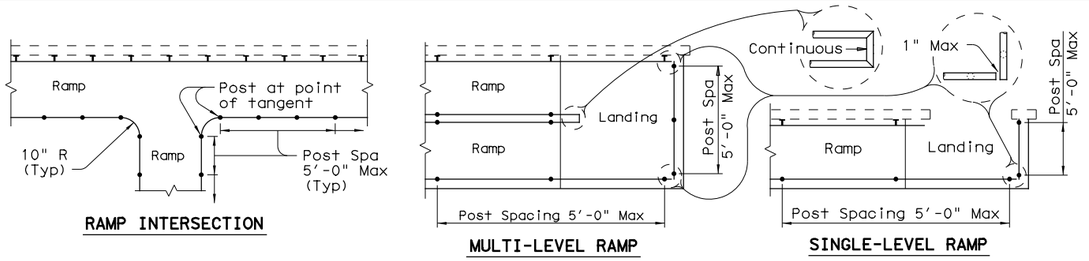
DATE: 11/15/2023
FILE: $FILE$



AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS

HANDRAIL FABRICATION DETAILS

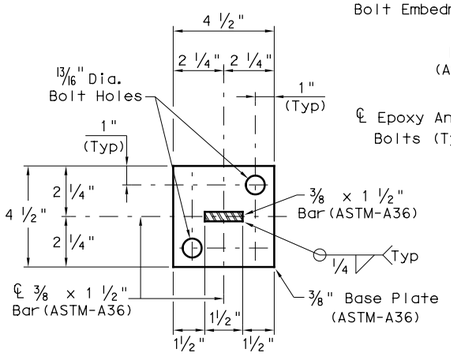


RAMP INTERSECTION

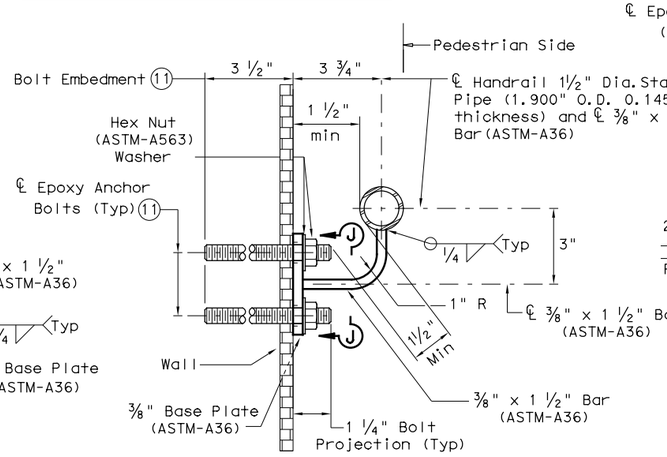
MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

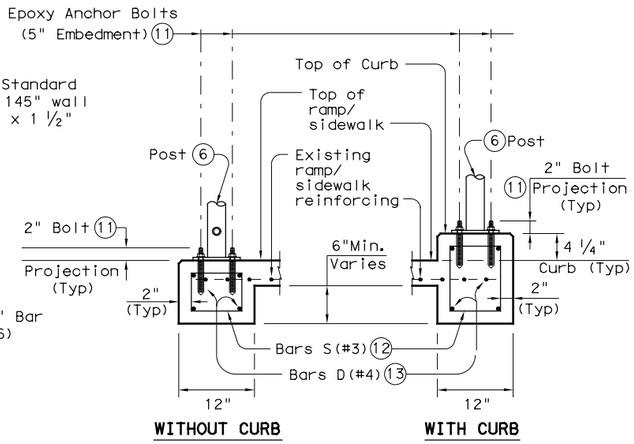
PLAN SHOWING RAIL AT RAMP CONDITIONS



SECTION J-J
(Anchor Bolts not shown for clarity)



SECTION AT WALL MOUNT



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS

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 ~ #4 = 1'-5" Epoxy coated ~ #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 ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" 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 ⅝" 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 ⅛" by grinding.

TYPICAL WALL MOUNT DETAILS

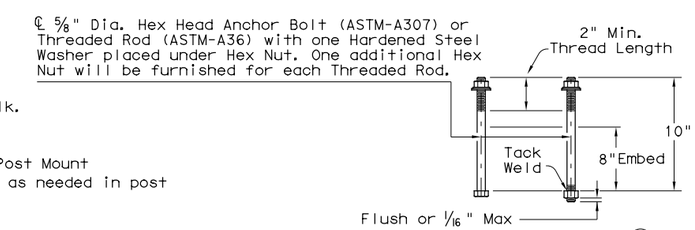
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

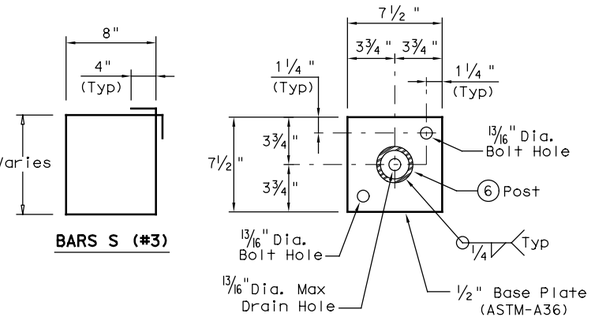
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

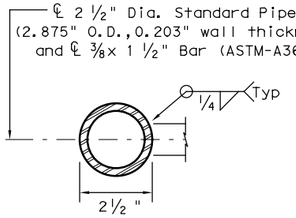
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



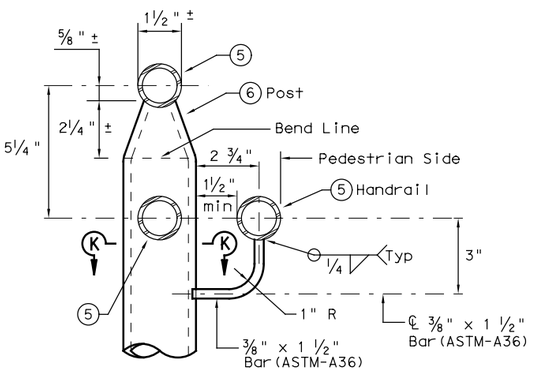
CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)



TYPICAL POST BASE PLATE DETAIL



SECTION K-K



ELEVATION

POST MOUNT DETAILS

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	SAT	COMAL		113

DATE: 11/15/2023 5:59:13 PM
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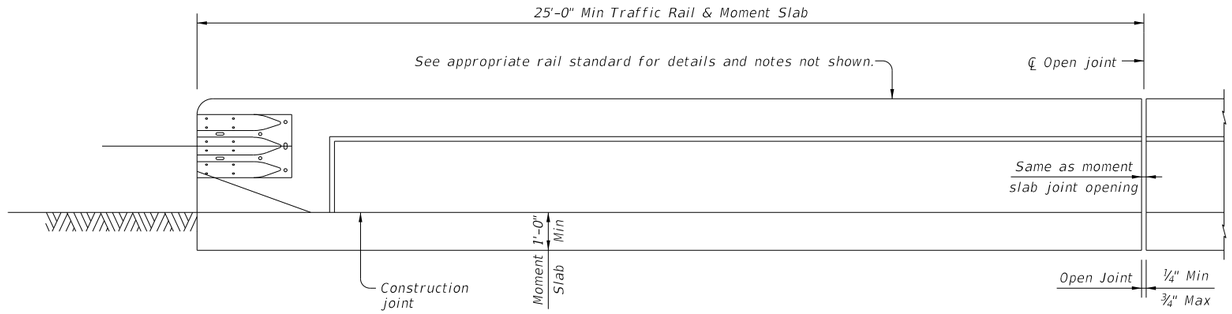
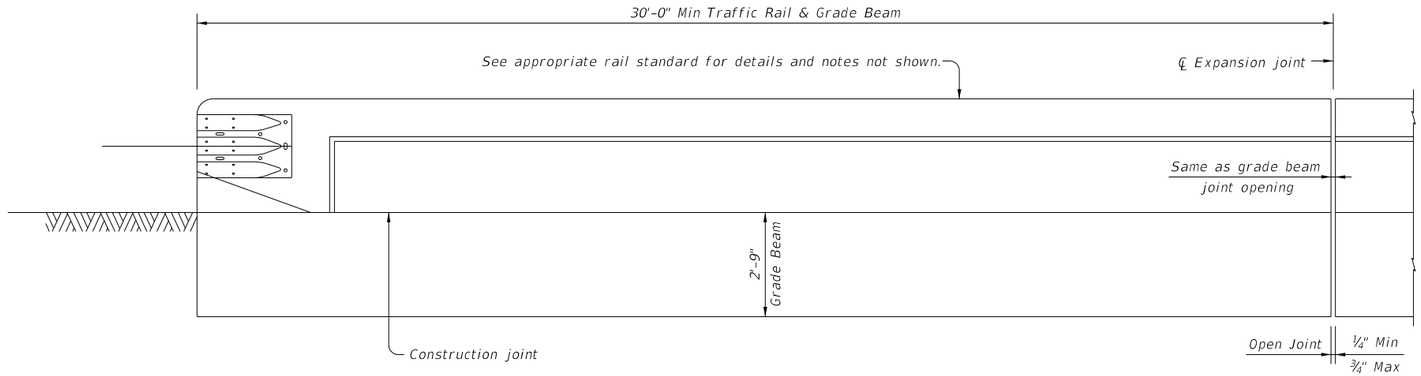


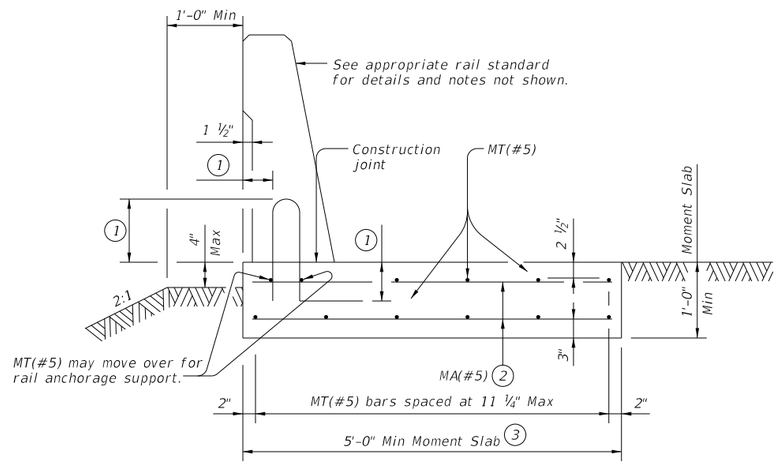
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



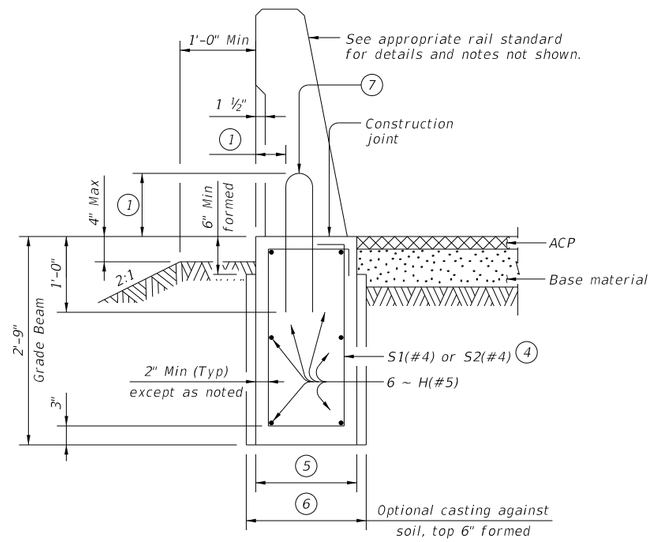
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



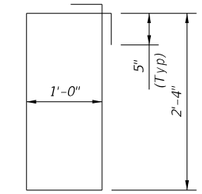
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

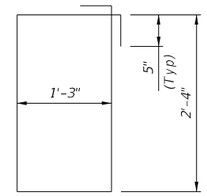
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS. Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66. Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into traffic rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for traffic rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS

FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

TRF

FILE: rlstd027-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Added moment slab with rail foundation lengths.	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		114

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT
(1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT
(2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

B B A A

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'- 1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15)
I-BEAM POST PN: 15205A

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED 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.

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4)AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅞" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		115

DATE: 11/15/2023
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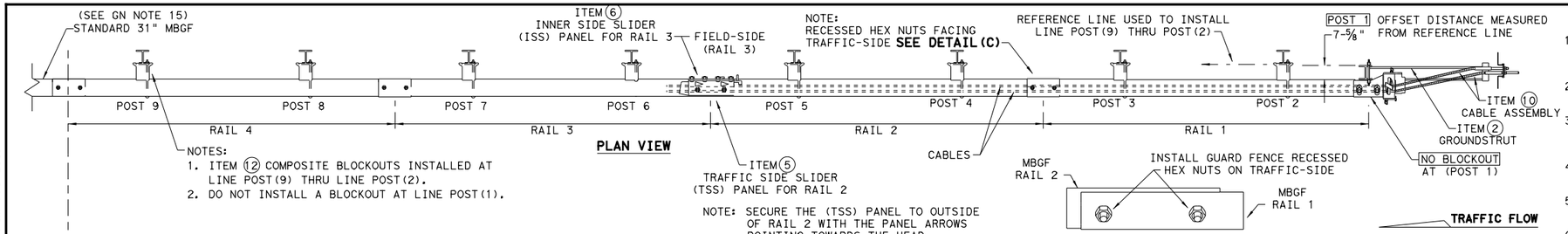
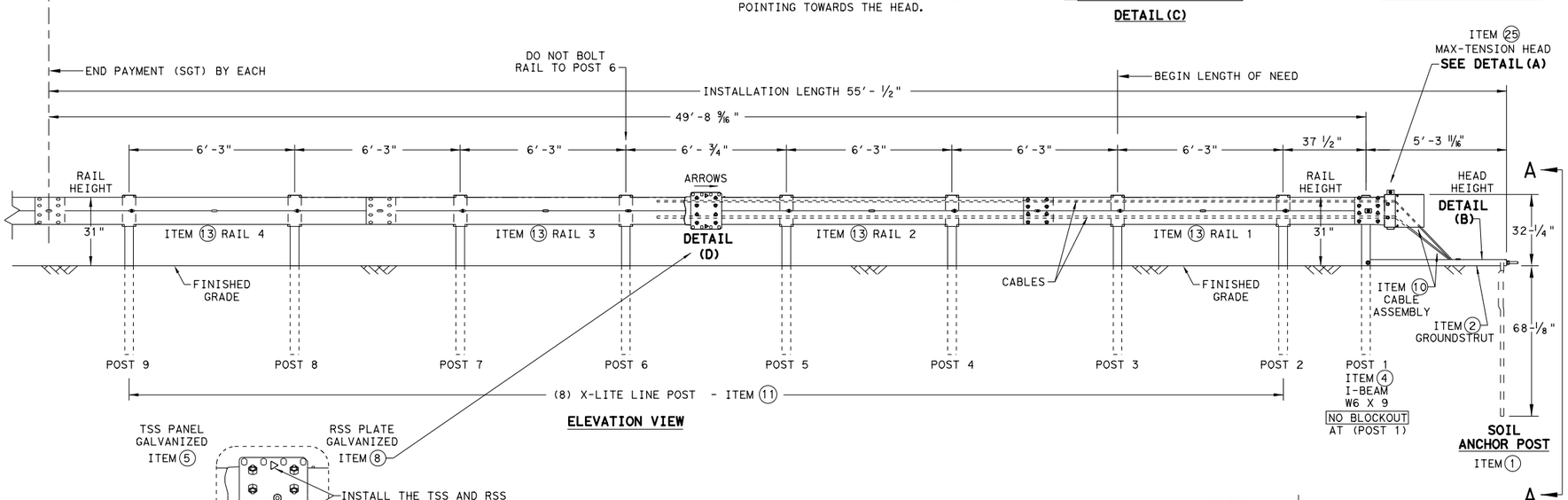
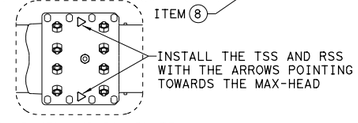
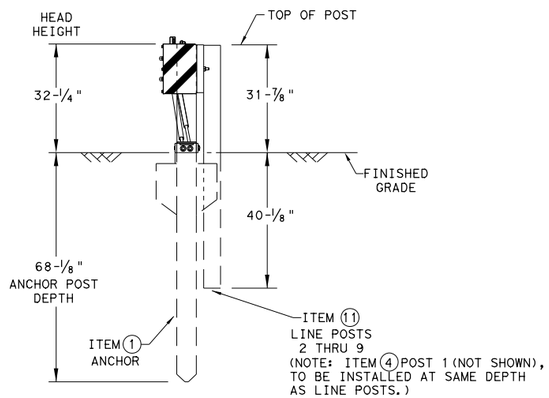
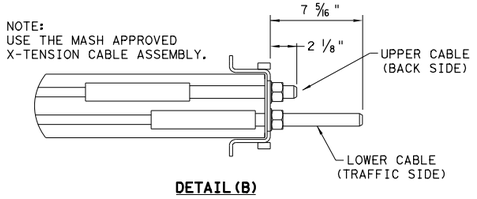
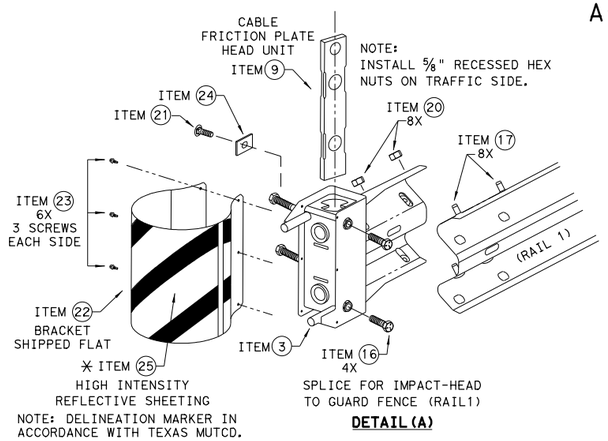












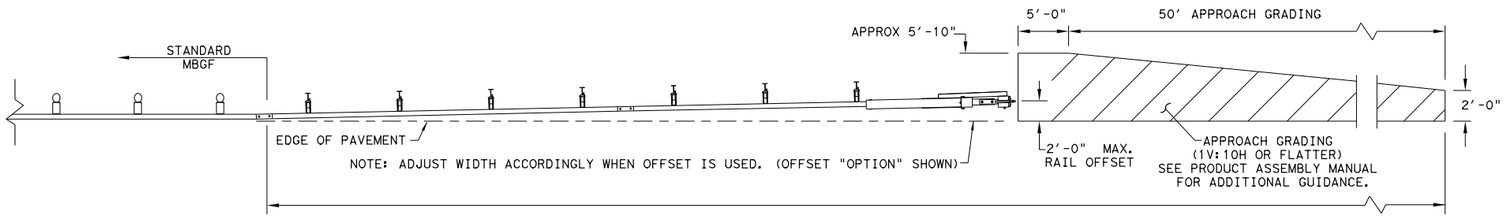
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS



TRAFFIC FLOW

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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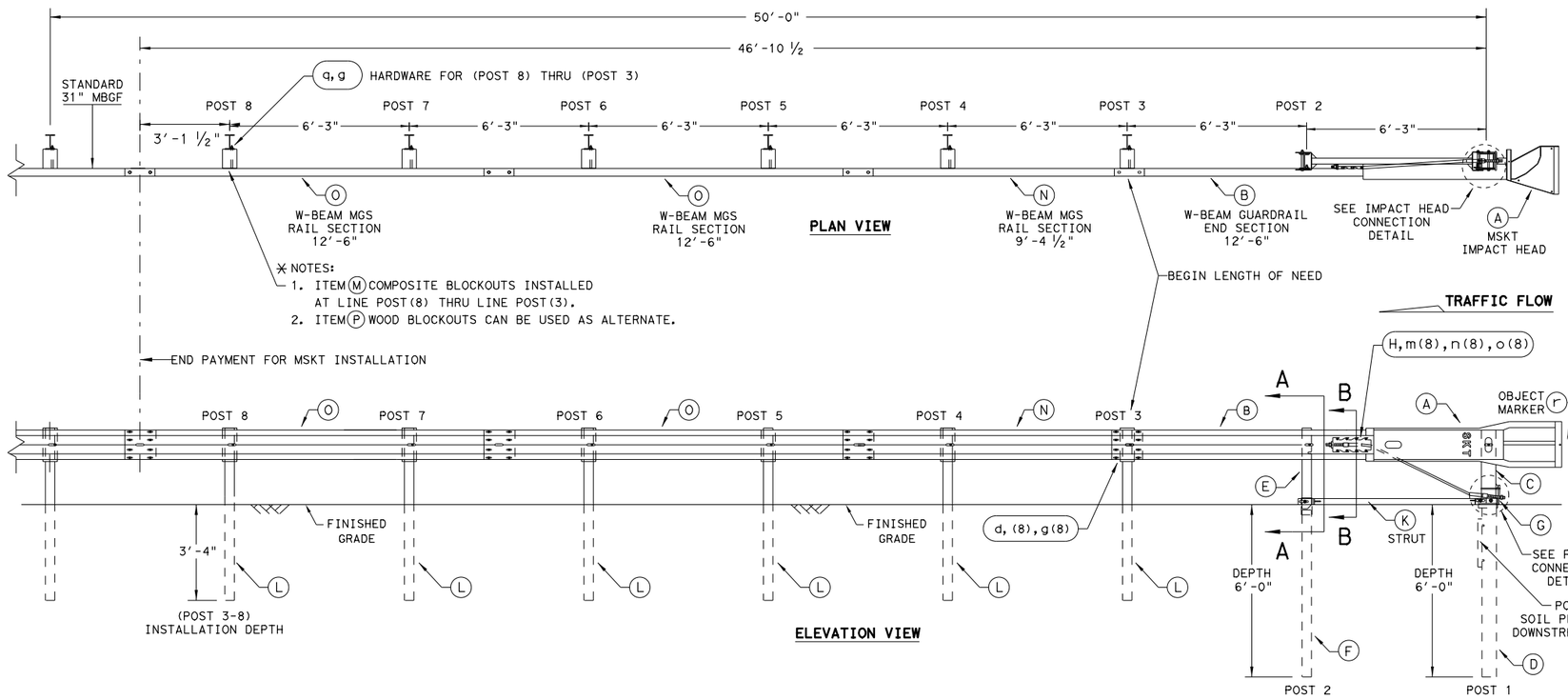


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

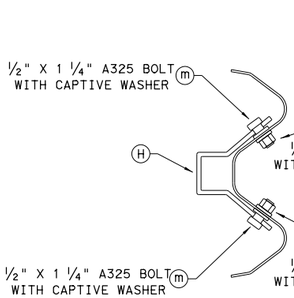
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED 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.
13. THE SYSTEM IS SHOWN WITH TWO 12′-6" MBGF PANELS, ONE 25′-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

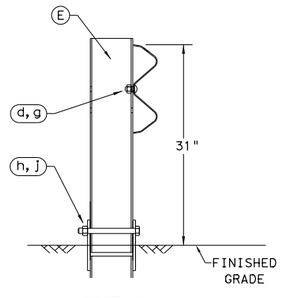
SEE NOTES: ✳

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6′ W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6′ W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9′-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12′-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25′-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25′GUARD FENCE PANEL



SECTION B-B
ANCHOR BRACKET



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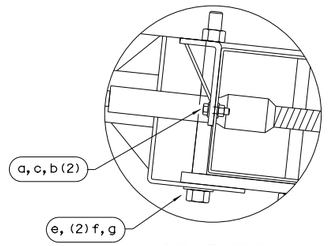
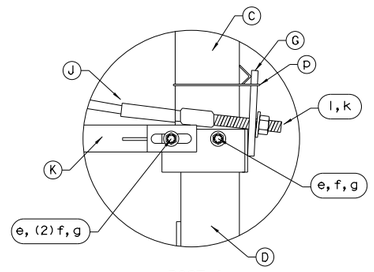
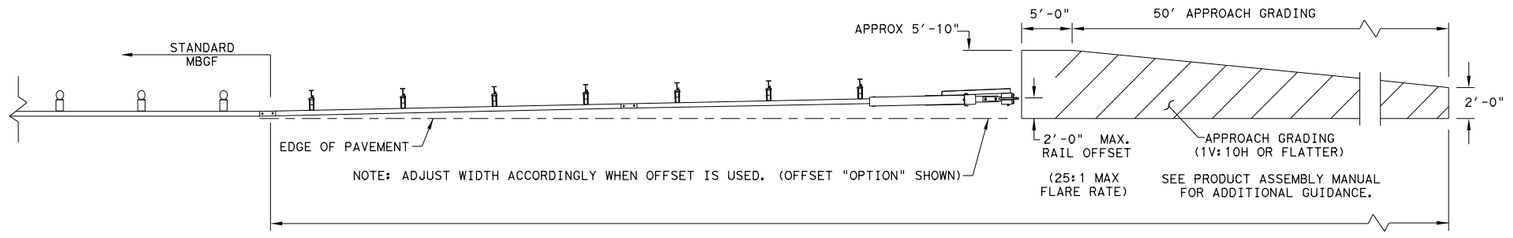
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

TRAFFIC FLOW

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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	DIST	COUNTY		SHEET NO.	
	SAT	COMAL		117	

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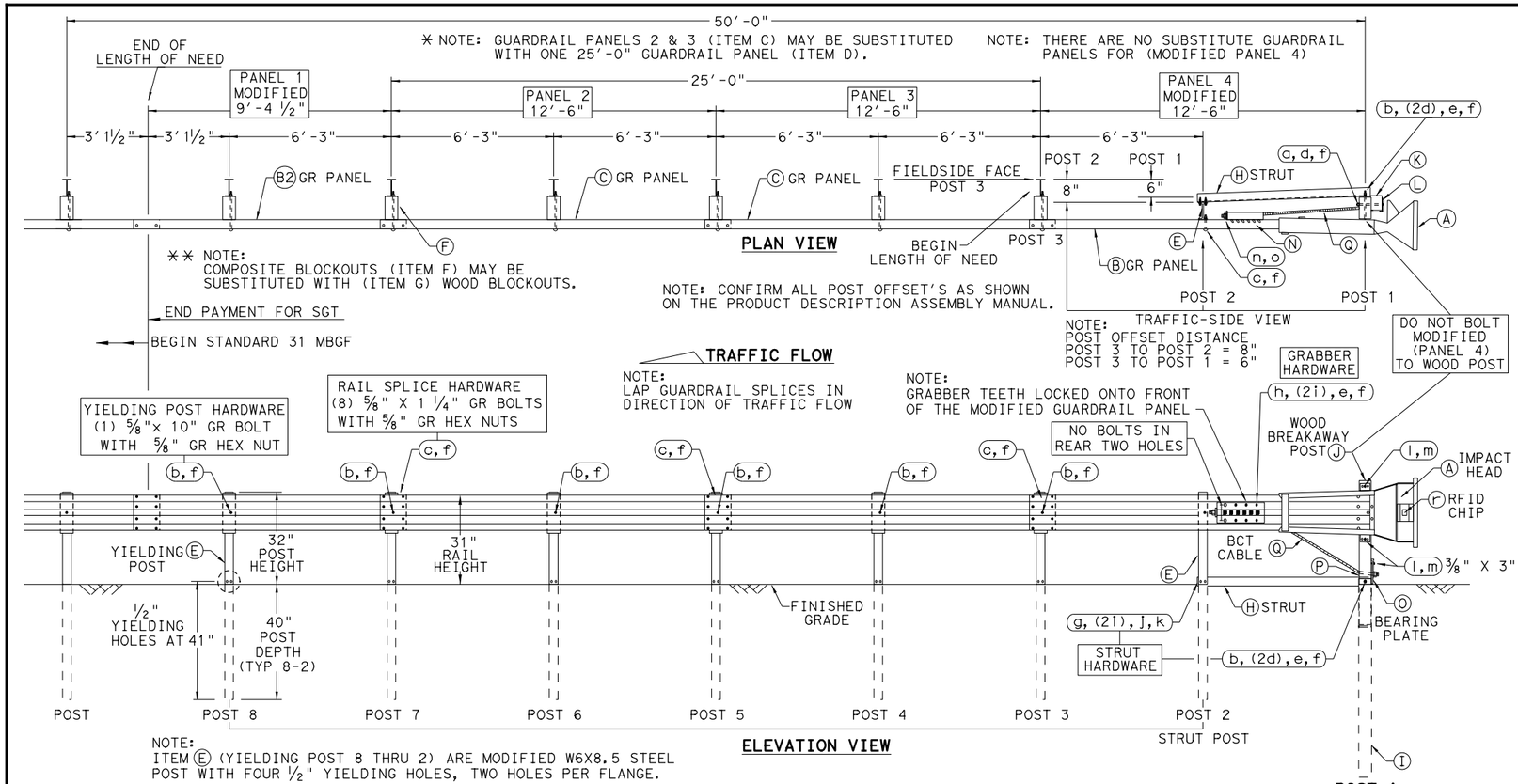
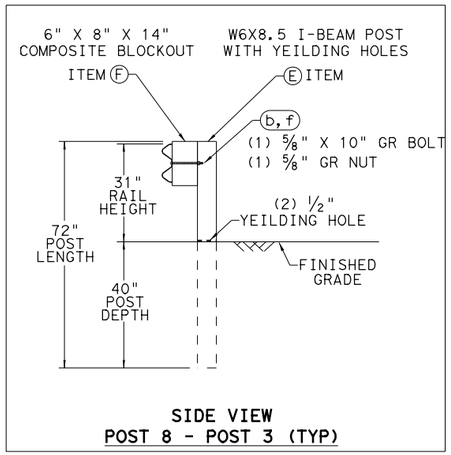


GENERAL NOTES

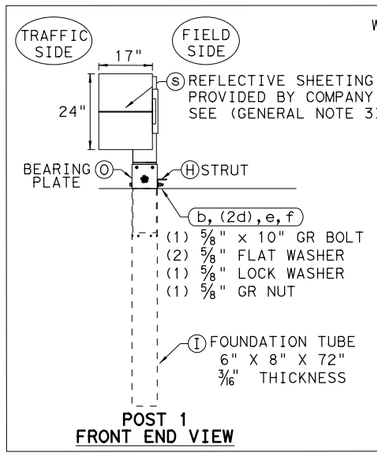
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW
* D E
** G



SIDE VIEW
POST 8 - POST 3 (TYP)



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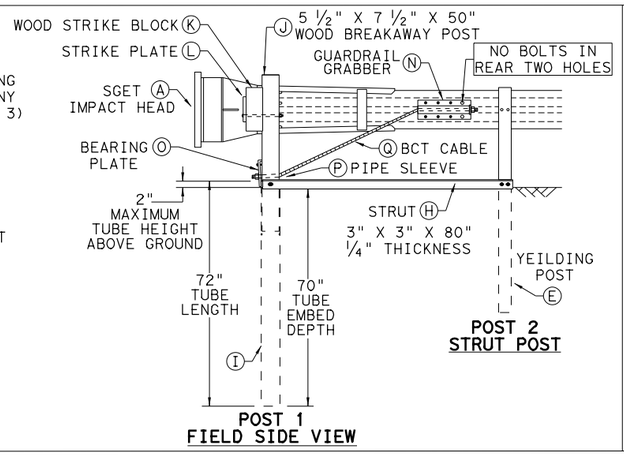
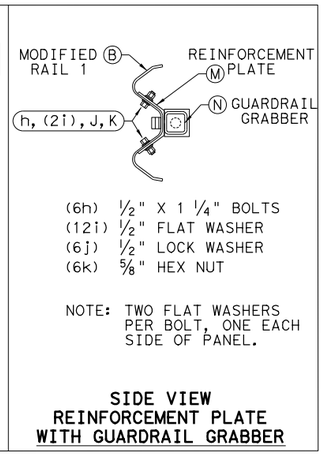
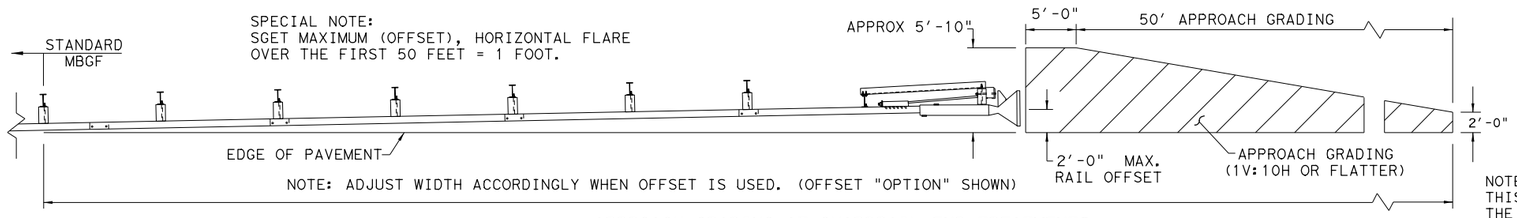
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation — Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt15320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
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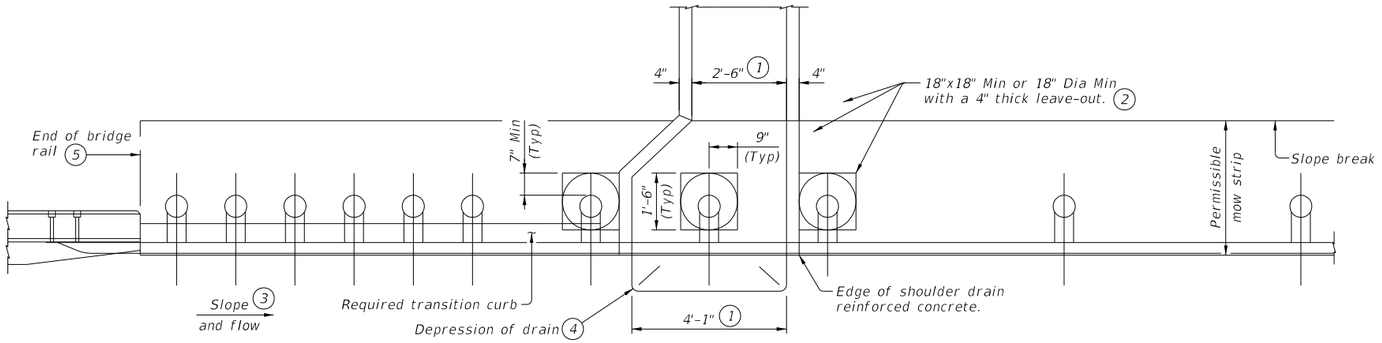
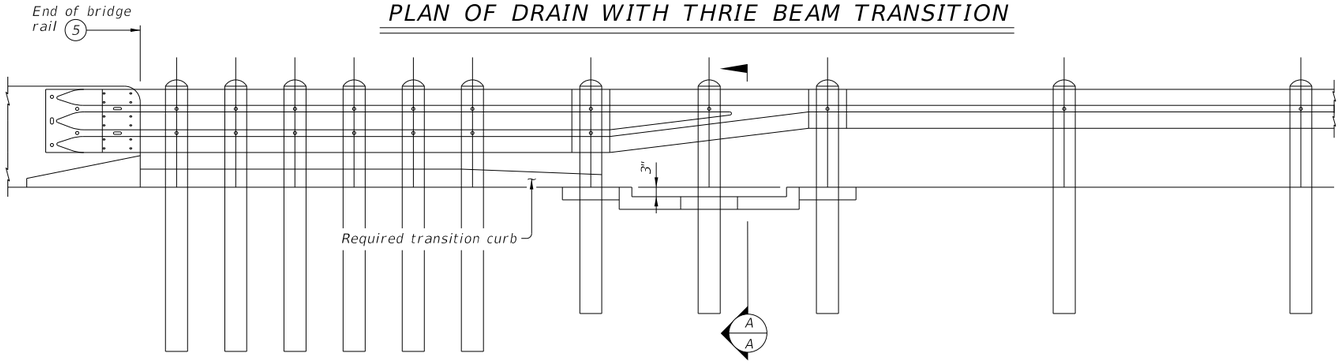
	SAT	COMAL		118		

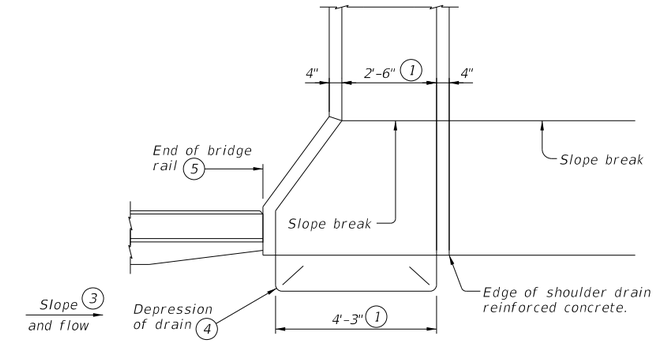
DATE: 11/15/2023
FILE: $FILE$



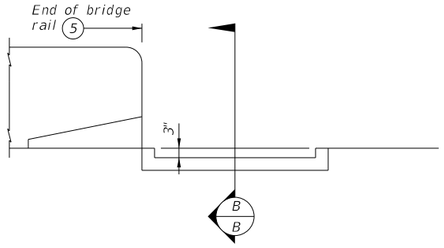
PLAN OF DRAIN WITH THRIE BEAM TRANSITION



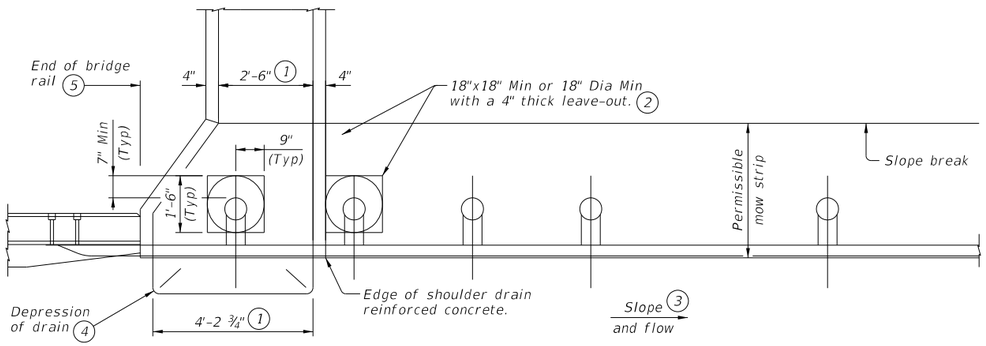
ROADWAY ELEVATION OF DRAIN WITH THRIE BEAM TRANSITION



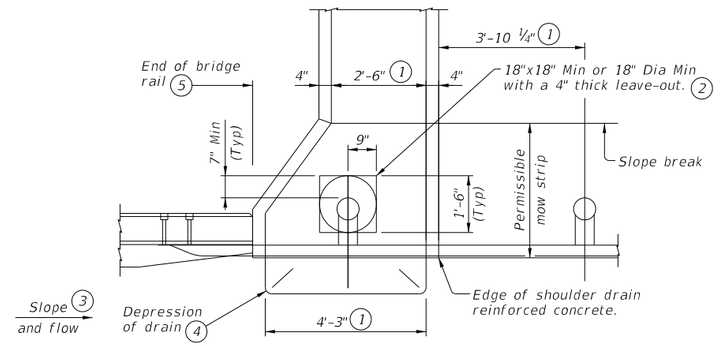
PLAN OF DRAIN WITHOUT MBGF TRANSITION



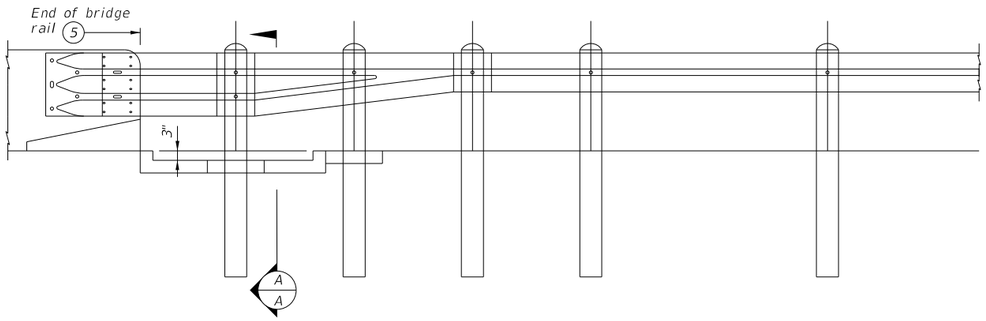
ROADWAY ELEVATION OF DRAIN WITHOUT MBGF TRANSITION



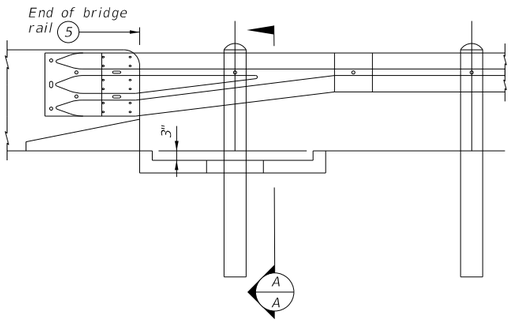
PLAN OF DRAIN WITH TL-2 (LOW SPEED) TRANSITION



PLAN OF DRAIN WITH DOWNSTREAM ANCHOR TERMINAL



ROADWAY ELEVATION OF DRAIN WITH TL-2 (LOW SPEED) TRANSITION



ROADWAY ELEVATION OF DRAIN WITH DOWNSTREAM ANCHOR TERMINAL

(1) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer. Location of shoulder drain must consider limitation imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(2) Fill leave-outs with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (20" Max leave-out).

(3) For other slope and flow directions drain configuration may be mirrored wider or tapered wider if shown elsewhere in the plans or directed by the Engineer.

(4) Form depression into concrete, asphalt pavement, or approach slab.

(5) See Bridge Layout for rail type.

Texas Department of Transportation

Bridge Division Standard

SHOULDER DRAIN AT END OF BRIDGE RAIL

SD-EBR

FILE: sdebr001-19.dgn		DN: TxDOT	CK: TAR	DW: JTR	CK: TAR		
©TxDOT April 2019		CONT	SECT	JOB		HIGHWAY	
REVISIONS		3212	05	013		FM 3351	
		DIST	COUNTY			SHEET NO.	
		SAT	COMAL			120	

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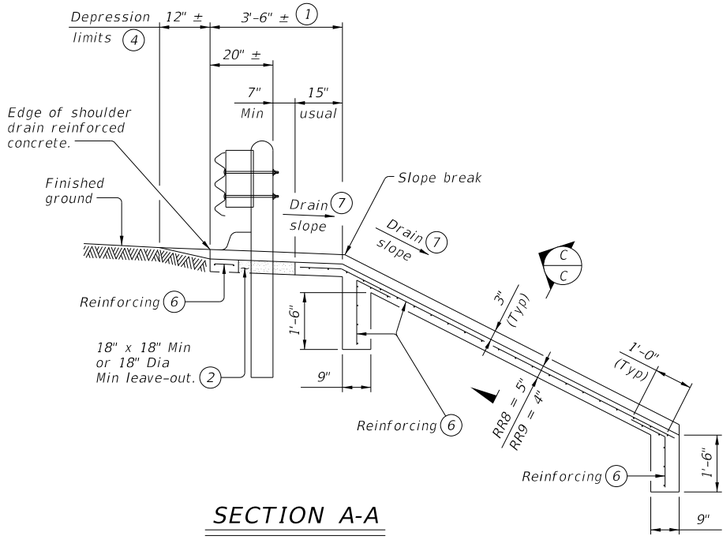
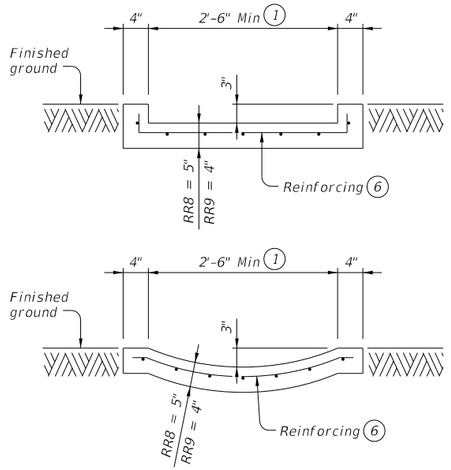
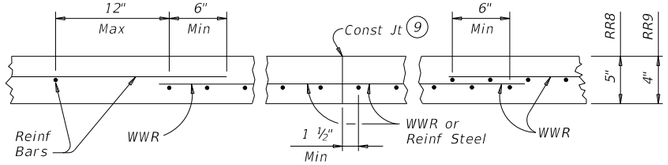


SECTION A-A



SECTION C-C

Sections shown without integrated riprap.



REINFORCEMENT DETAILS (6)

See General Notes for optional synthetic fiber reinforcement.

(1) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer. Location of shoulder drain must consider limitation imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(2) Fill leave-outs with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (20" Max leave-out).

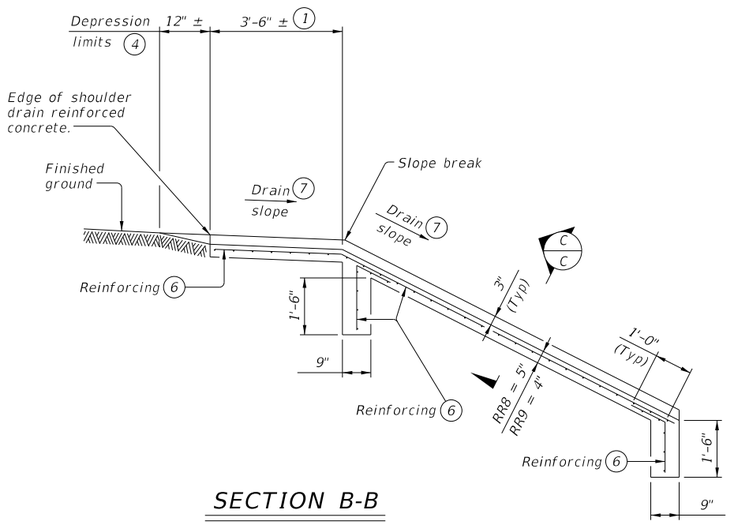
(4) Form depression into concrete, asphalt pavement, or approach slab.

(6) Provide (#3) reinforcing bar at 18" spacing c-c or welded wire reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars, unless shown otherwise.

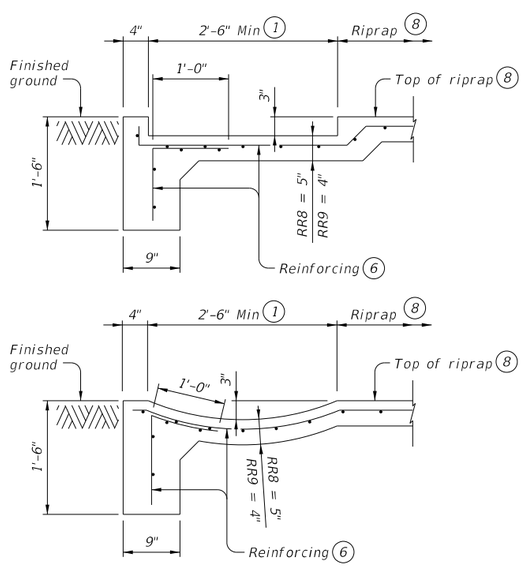
(7) See elsewhere in plans or as directed by the Engineer.

(8) See CRR standard for details and notes not shown.

(9) WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic fiber is utilized.



SECTION B-B



SECTION C-C

Sections shown with integrated riprap.

GENERAL NOTES:

Provide Class "B" concrete with a minimum compressive strength of 2,000 psi unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

See Metal Beam Guard Fence (Mow Strip) standard for details and notes not shown.

Payment for furnishing and placing 2-sack grout mixture will be subsidiary to shoulder drain.

Payment for shoulder drain will be as per Item 420, "Cl B Conc (Flume)". All details shown herein are subsidiary to shoulder drain.

See Layout for limits of shoulder drain.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

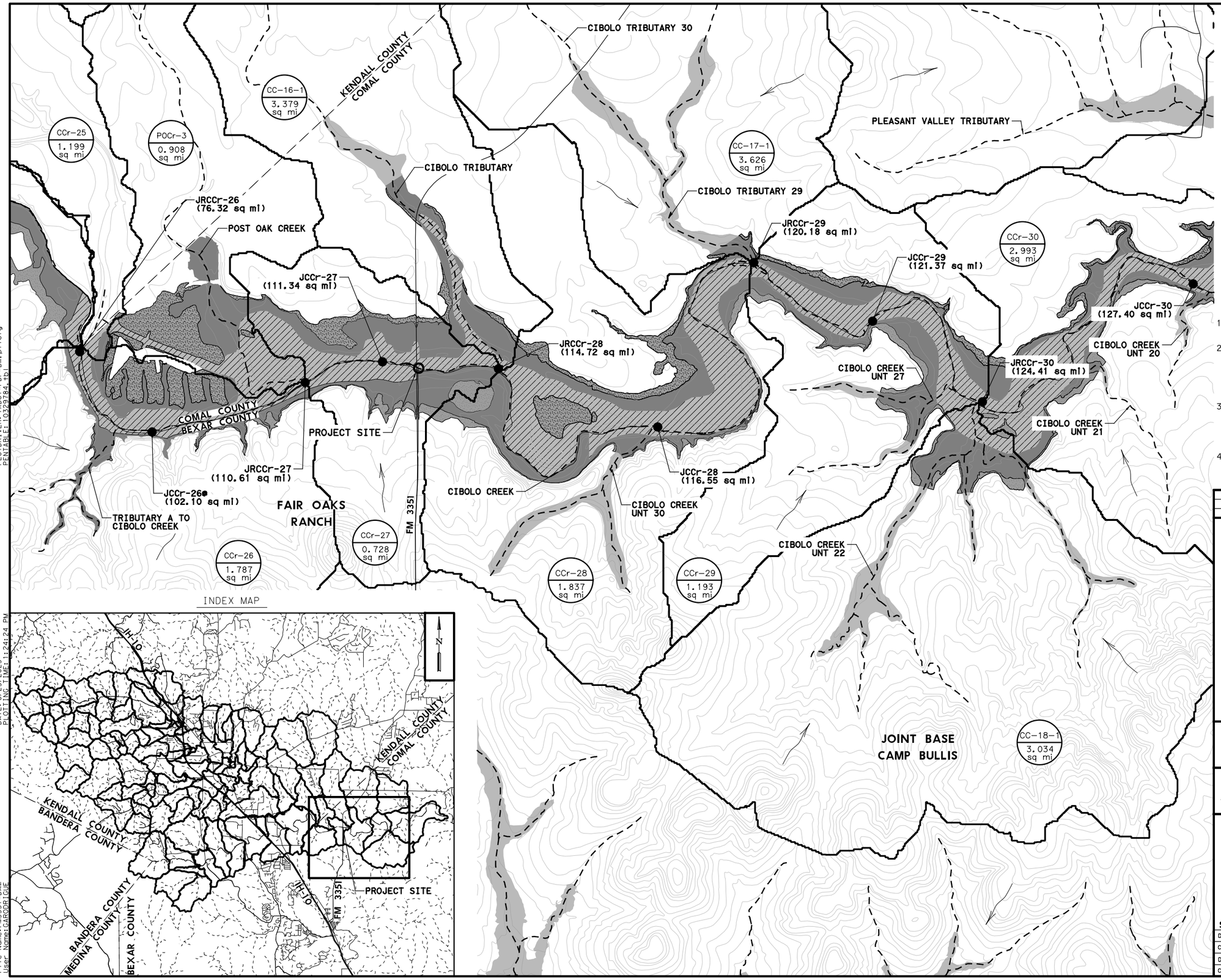
Texas Department of Transportation

Bridge Division Standard

SHOULDER DRAIN AT END OF BRIDGE RAIL

SD-EBR

FILE: sdebr001-19.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		121



INDEX MAP

1. FOR PEAK FLOW CALCULATIONS REFER TO THE HYDROLOGIC DATA SHEET.
2. WATERSHED DELINEATIONS UPSTREAM OF JUNCTION JRCCr-26 (76.32 sqmi) NOT INCLUDED FOR DISPLAY PURPOSES. REFER TO THE H&H ANALYSIS TECHNICAL MEMORANDUM (OCTOBER 2022) FOR ADDITIONAL WATERSHED INFORMATION BEYOND THE PROJECT LIMITS.
3. EFFECTIVE ZONE AE FLOODPLAIN SOURCE COMAL COUNTY FEMA FIRM PANEL 48091C0355F EFFECTIVE SEPTEMBER 3, 2009 AND BEXAR COUNTY FEMA FIRM PANEL 48029C0105F EFFECTIVE SEPTEMBER 29, 2010.
4. COORDINATION TO INFORM THE BEXAR COUNTY AND COMAL COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED ON DECEMBER 16, 2021.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
8/23/23

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM3351 AT CIBOLO CREEK DRAINAGE
OVERALL DRAINAGE AREA MAP

SCALE: 1"=2000' SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	122

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HYDROLOGIC BASINS

HYDROLOGIC ELEMENT	AREA	INITIAL LOSS	CONSTANT RATE	IMP	LAG	EXISTING CONDITIONS (NOAA ATLAS 14) PEAK FLOWS		
						25-Year*	100-Year	500-Year
	(SQ MI)	(IN)	(IN/HR)	%	(HR)	(CFS)	(CFS)	(CFS)
CC-16-1	3.379	0.417	0.0087	22.99	1.436	3,008	4,299	5,914
CC-17-1	3.626	0.4245	0.009	24.5	1.063	3,500	4,952	6,758
CC-18-1	3.034	0.4305	0.0092	10.21	1.047	3,230	4,504	6,089
CCr-25	1.199	0.4088	0.0084	21.13	1.144	1,288	1,781	2,407
CCr-26	1.787	0.4425	0.0097	31.32	1.055	2,077	2,824	3,788
CCr-27	0.728	0.4245	0.009	60	0.52	1,129	1,465	1,913
CCr-28	1.837	0.4268	0.0091	14.59	1.119	1,855	2,608	3,545
CCr-29	1.193	0.4223	0.0089	12.09	0.616	1,534	2,077	2,753
CCr-30	2.993	0.423	0.0089	10.17	1.682	2,477	3,411	4,970
POCr-3	0.908	0.4358	0.0094	25	1.267	971	1,339	1,810

NOTES:
BASIN HYDROLOGIC PARAMETERS REFLECT EFFECTIVE HYDROLOGY CONDITIONS.

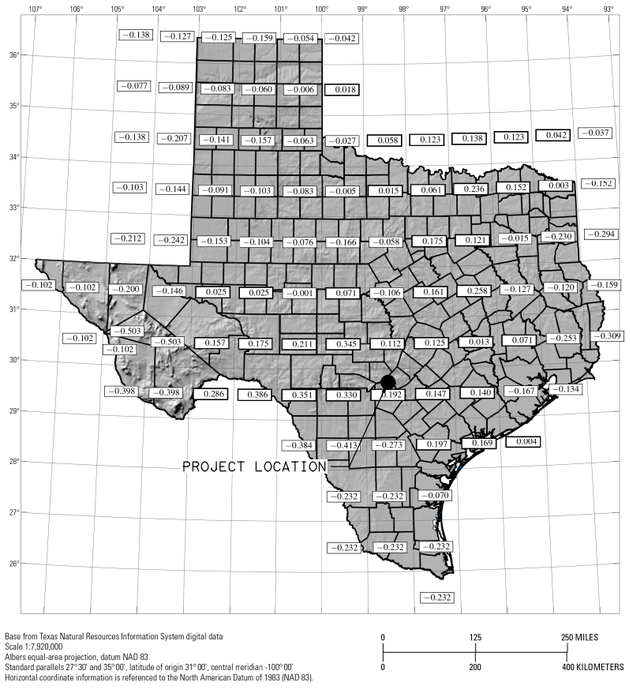
HYDROLOGIC JUNCTIONS

HYDROLOGIC ELEMENT	APPROXIMATE LOCATION	CONTRIBUTING AREA	EXISTING CONDITIONS (NOAA ATLAS 14) PEAK FLOWS		
			25-Year*	100-Year	500-Year
		(SQ MI)	(CFS)	(CFS)	(CFS)
JRCCr-26	BATTLE INTENSE RD	76.32	35,124	50,169	95,813
JCCr-26@	CIBOLO CREEK BELOW BALCONES CREEK	102.10	50,858	75,182	130,518
JRCCr-27	CIBOLO CREEK BELOW POST OAK CREEK	110.61	56,037	81,587	138,505
JCCr-27	RALPH FAIR RD FM3351	111.34	55,753	81,513	138,402
JRCCr-28	CIBOLO CREEK BELOW TRIBUTARY	114.72	57,368	83,660	141,188
JCCr-28	JUST INSIDE CAMP BULLIS	116.55	58,043	84,621	142,390
JRCCr-29	CIBOLO CREEK BELOW TRIBUTARY 29	120.18	58,395	85,735	143,439
JCCr-29	INSIDE CAMP BULLIS	121.37	58,114	85,897	143,409
JRCCr-30	INSIDE CAMP BULLIS	124.41	58,637	86,881	144,727
JCCr-30	UPSTREAM OF PLEASANT VALLEY CREEK	127.40	58,081	87,204	145,123

NOTES:
* DESIGN STORM EVENT
REFER TO DRAINAGE TECHNICAL MEMORANDUM FOR STORM EVENT COMPUTATIONS UNDER ULTIMATE DEVELOPMENT CONDITIONS.

REGIONAL REGRESSION COMPUTATIONS

CONTRIBUTING SUBBASIN / JUNCTION(S)	AREA (ACRE)	AREA (SQ. MI)	MEAN ANNUAL PRECIP. (IN)	MAIN CHANNEL SLOPE (FT/FT)	OmegaEm PARAMETER	DESIGN YEAR	a	b	c	d	e	f	Q (CFS)
JCCr-27	71255	111.34	33	0.00555	0.192	5-YR	16.62	-15.32	1.308	0.372	0.885	-0.0215	12391
						10-YR	13.62	-11.97	1.203	0.403	0.918	-0.0289	18534
						*25-YR	11.79	-9.819	1.14	0.446	0.945	-0.0374	29112
						50-YR	11.17	-8.997	1.105	0.476	0.961	-0.0424	39007
						100-YR	10.82	-8.448	1.071	0.507	0.969	-0.0467	51222
						500-YR	10.4	-7.605	0.988	0.569	0.976	-0.0554	88413



HILL-SHADE RELIEF IN TEXAS WITH SUPERIMPOSED VALUES OF OmegaEM PARAMETER THAT REPRESENTS A GENERALIZED TERRAIN AND CLIMATE INDEX FOR REGIONALIZATION OF PEAK-STREAMFLOW FREQUENCY

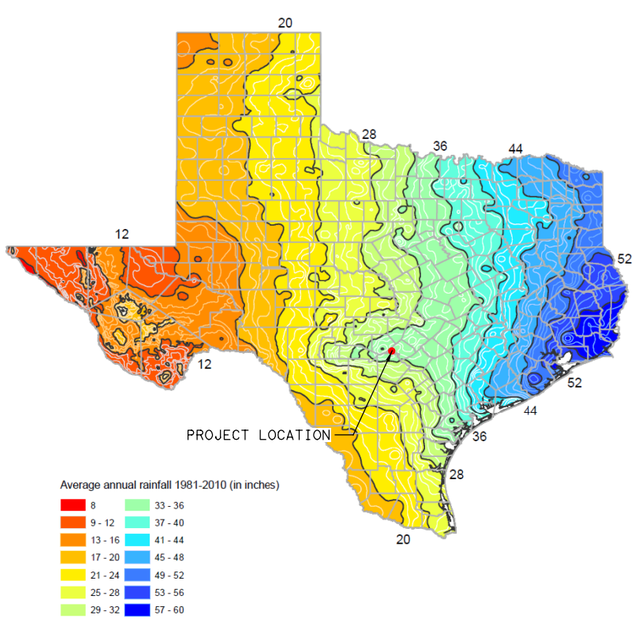


Figure 4-6. Mean annual precipitation, in inches (Source: Texas Water Development Board 2017)

MEAN ANNUAL PRECIPITATION (P) MAP OF TEXAS

DESIGN REQUIREMENTS:

1. MINIMUM 25-YEAR DESIGN STORM EVENT CAPACITY.
2. NO ADVERSE IMPACT TO THE EFFECTIVE 100-YEAR FLOODPLAIN OUTSIDE TXDOT ROW PER FEMA GUIDELINES.

HYDROLOGIC ANALYSIS DESIGN METHOD:

1. PER COORDINATION WITH THE LOCAL BEXAR COUNTY FLOODPLAIN ADMINISTRATORS (DECEMBER 16, 2021), THE EFFECTIVE CIBOLO CREEK EFFECTIVE HYDROLOGY MODEL DATED MARCH 2005 WITH NOAA ATLAS 14 PRECIPITATION SHALL BE USED FOR FLOODPLAIN ANALYSIS WITHIN THE PROJECT AREA. PRELIMINARY REVISED CIBOLO CREEK HYDROLOGY DEVELOPED BY THE SAN ANTONIO RIVER AUTHORITY (DEC. 2021) HAS NOT BEEN ACCEPTED DATA FOR USE.
2. INITIAL AND CONSTANT LOSS AND SNYDER LAG TIME PARAMETERS IN EFFECTIVE HYDROLOGY MODEL UNCHANGED FOR THIS PROJECT.
3. DESIGN APPROACH TO USE CURRENT EFFECTIVE HYDROLOGY SELECTED BASED ON COORDINATION AND DIRECTION FROM BEXAR COUNTY FLOODPLAIN ADMINISTRATOR.

NOTES:

1. TXDOT HYDRAULIC DESIGN MANUAL (HDM), SEPTEMBER 2019, AND EFFECTIVE CIBOLO CREEK HYDROLOGY MODEL WERE USED TO DETERMINE HYDROLOGIC DATA.
2. EFFECTIVE CIBOLO CREEK HYDROLOGY MODEL TRUNCATED TO A DISTANCE 36,000 FEET DOWNSTREAM OF THE PROJECT AREA (HEC-HMS NODE JCCr-30).
3. PEAK FLOWS (HEC-HMS V 3.5) DEVELOPED USING NOAA ATLAS 14 PRECIPITATION DATA FOR PRECIPITATION AREA 1 (PA-1) PER THE TXDOT HDM AND SAN ANTONIO RIVER BASIN REGIONAL MODELING STANDARDS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
8/23/23

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

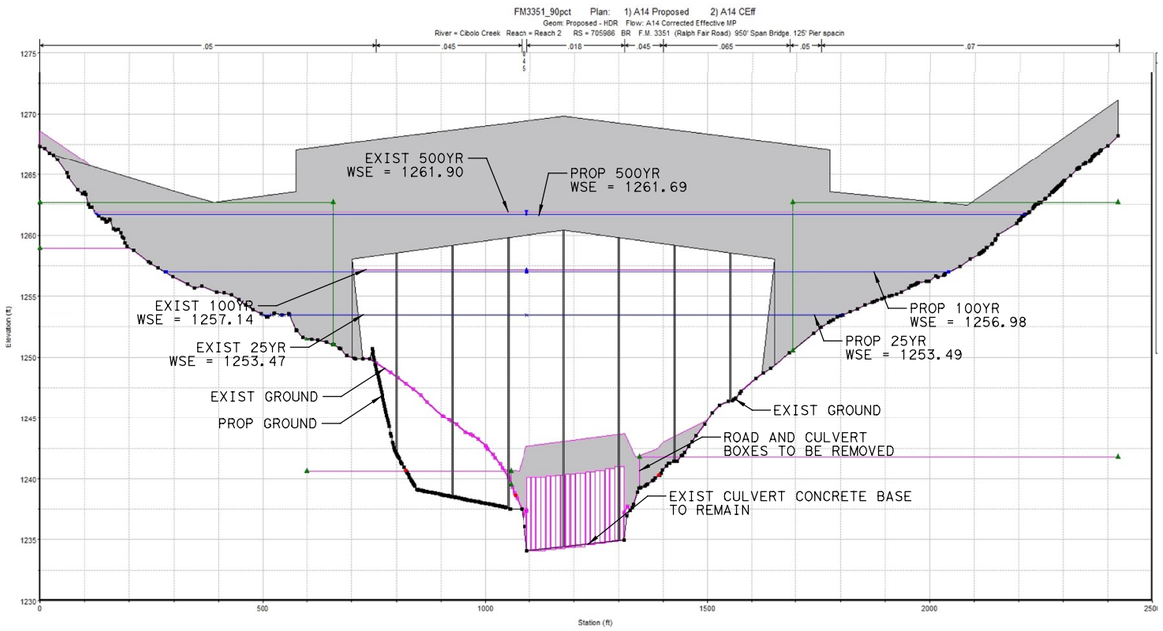
Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
DRAINAGE HYDROLOGIC DATA SHEET

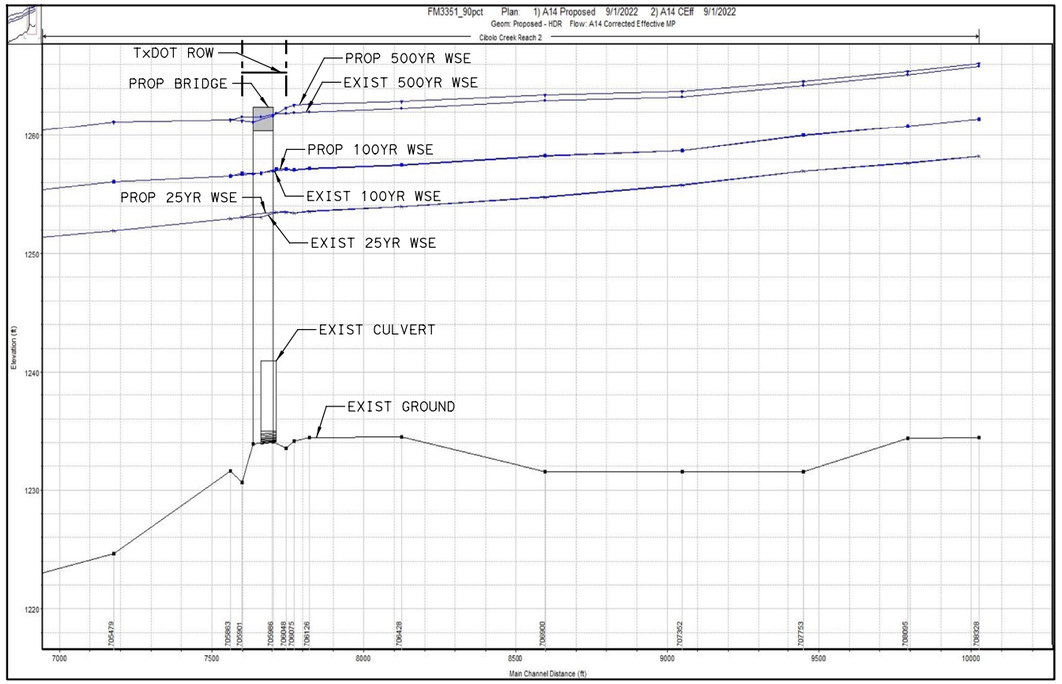
N. T. S. SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	123

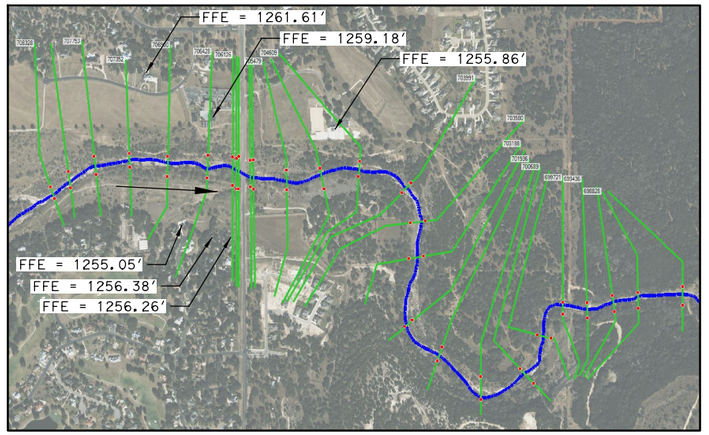
HEC-RAS STRUCTURE UPSTREAM SECTION



HEC-RAS PROFILE



HEC-RAS CROSS SECTION LAYOUT



NOTES:

1. FINISHED FLOOR ELEVATION (FFE) SURVEY PROVIDED TO EVALUATE NO ADVERSE IMPACT FOR STRUCTURES CURRENTLY LOCATED WITHIN THE EFFECTIVE 100-YEAR FLOODPLAIN. FFE SURVEY PROVIDED BY GORRONDONA & ASSOCIATES, INC. REFER TO HORIZONTAL AND VERTICAL CONTROL FOR VERTICAL DATUM DATA.
2. PROJECT TO PROVIDE NO ADVERSE IMPACT TO ADJACENT PROPERTIES.
3. HEC-RAS 6.1.0 USED FOR HYDRAULIC ANALYSIS.
4. A NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION WITH A SLOPE OF 0.0018 FT/FT TO DETERMINE THE STARTING WATER SURFACE ELEVATION (WSE) SLOPE DERIVED FROM LIDAR (2017).
5. HYDRAULIC GEOMETRIES CROSS SECTION DATA BASED ON LIDAR (2017) AND TOPOGRAPHIC SURVEY WITHIN TXDOT ROW.
6. VERTICAL DATUM IS NAVD 88.
7. STRUCTURE WITHIN COMAL COUNTY FEMA FIRM PANEL 48091C0355F EFFECTIVE SEPTEMBER 3, 2009 AND BEXAR COUNTY FEMA FIRM PANEL 48029C0105F EFFECTIVE SEPTEMBER 29, 2010.
8. COORDINATION TO INFORM THE BEXAR COUNTY AND COMAL COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED ON DECEMBER 16, 2021.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
8/23/23

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
HYDRAULIC CALCULATION DATA SHEET 1
STRUCTURE

N. T. S.

SHEET 1 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	124

SUMMARY TABLE

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 2	706900	A14 25-Year	Existing	56037	1231.53	1254.77	1248.36	1255.81	0.002389	9.41	8243.25	1325.29	0.38
Reach 2	706900	A14 25-Year	Proposed	56037	1231.53	1254.78	1248.36	1255.81	0.002385	9.4	8249.26	1326.13	0.38
Reach 2	706900	A14 100-Year	Existing	81587	1231.53	1258.26	1251.82	1259	0.0016	8.6	13963.51	1666.42	0.32
Reach 2	706900	A14 100-Year	Proposed	81587	1231.53	1258.22	1251.52	1258.97	0.001619	8.64	13897.1	1665.36	0.32
Reach 2	706900	A14 500-Year	Existing	138505	1231.53	1262.94	1256.21	1263.67	0.001308	8.81	22199.37	1847.94	0.3
Reach 2	706900	A14 500-Year	Proposed	138505	1231.53	1263.50	1256.21	1264.16	0.001154	8.38	23235.5	1872.78	0.28
Reach 2	706428	A14 25-Year	Existing	55753	1234.47	1253.96	1248.21	1254.72	0.001959	8.17	9079.64	1040.24	0.34
Reach 2	706428	A14 25-Year	Proposed	55753	1234.47	1253.96	1248.23	1254.72	0.001954	8.16	9087.94	1040.48	0.34
Reach 2	706428	A14 100-Year	Existing	81513	1234.47	1257.51	1250.8	1258.26	0.001597	8.32	13192.66	1577.16	0.32
Reach 2	706428	A14 100-Year	Proposed	81513	1234.47	1257.47	1250.81	1258.22	0.001617	8.36	13127.06	1566.86	0.32
Reach 2	706428	A14 500-Year	Existing	138402	1234.47	1262.31	1254.44	1263.05	0.001372	8.82	22345.66	2136.46	0.3
Reach 2	706428	A14 500-Year	Proposed	138402	1234.47	1262.97	1254.44	1263.62	0.001176	8.3	23762.21	2174.86	0.28
Reach 2	706126	A14 25-Year	Existing	55753	1234.39	1253.57	1246.01	1254.16	0.001461	6.94	9827.41	985.27	0.29
Reach 2	706126	A14 25-Year	Proposed	55753	1234.39	1253.58	1246.03	1254.17	0.001458	6.94	9836.04	985.93	0.29
Reach 2	706126	A14 100-Year	Existing	81513	1234.39	1257.20	1248.32	1257.79	0.00122	7.19	14505.95	1685.67	0.28
Reach 2	706126	A14 100-Year	Proposed	81513	1234.39	1257.15	1248.25	1257.75	0.001237	7.23	14415.43	1683.06	0.28
Reach 2	706126	A14 500-Year	Existing	138402	1234.39	1262.02	1252.59	1262.65	0.00109	7.8	23742.28	2078.73	0.27
Reach 2	706126	A14 500-Year	Proposed	138402	1234.39	1262.72	1252.58	1263.27	0.000937	7.36	25212.18	2130.07	0.25
Reach 2	706075	A14 25-Year	Existing	55753	1234.1	1253.43	1246.3	1254.08	0.001636	7.23	9541.94	1017.66	0.31
Reach 2	706075	A14 25-Year	Proposed	55753	1234.1	1253.44	1246.3	1254.09	0.001632	7.23	9551.56	1018.64	0.31
Reach 2	706075	A14 100-Year	Existing	81513	1234.1	1257.11	1248.76	1257.73	0.001326	7.42	14585.43	1724.87	0.29
Reach 2	706075	A14 100-Year	Proposed	81513	1234.1	1257.05	1248.75	1257.68	0.001346	7.46	14489.63	1719.45	0.29
Reach 2	706075	A14 500-Year	Existing	138402	1234.1	1261.96	1252.91	1262.6	0.001149	7.94	24001.38	2086.71	0.28
Reach 2	706075	A14 500-Year	Proposed	138402	1234.1	1262.67	1252.93	1263.23	0.000982	7.48	25493.47	2121.92	0.26
Reach 2	706048	A14 25-Year	Existing	55753	1233.53	1253.47	1245.82	1253.96	0.00129	6.49	11172.04	1262.89	0.27
Reach 2	706048	A14 25-Year	Proposed	55753	1233.53	1253.52	1245.63	1253.94	0.001019	5.74	11530.54	1285.41	0.24
Reach 2	706048	A14 100-Year	Existing	81513	1233.53	1257.14	1248.19	1257.64	0.001055	6.66	16047.02	1775.99	0.26
Reach 2	706048	A14 100-Year	Proposed	81513	1233.53	1257.09	1247.55	1257.58	0.000928	6.21	15222.37	1769.51	0.24
Reach 2	706048	A14 500-Year	Existing	138402	1233.53	1261.90	1252.41	1262.56	0.001197	8.13	24670.55	2098.88	0.28
Reach 2	706048	A14 500-Year	Proposed	138402	1233.53	1262.40	1251.25	1263.15	0.001004	7.5	20710.32	2120.02	0.26
Reach 2	705986			FM 3351									
Reach 2	705901	A14 25-Year	Existing	55753	1230.63	1253.08	1244.4	1253.77	0.001486	7.49	9334.72	980.31	0.3
Reach 2	705901	A14 25-Year	Proposed	55753	1230.63	1253.08	1244.38	1253.77	0.001486	7.49	9313.83	979.91	0.3
Reach 2	705901	A14 100-Year	Existing	81513	1230.63	1256.77	1247.08	1257.44	0.001221	7.63	13515.55	1382	0.28
Reach 2	705901	A14 100-Year	Proposed	81513	1230.63	1256.68	1247.08	1257.42	0.001315	7.9	12653.61	1378.35	0.29
Reach 2	705901	A14 500-Year	Existing	138402	1230.63	1261.56	1252.97	1262.32	0.001185	8.53	22068	2104.81	0.28
Reach 2	705901	A14 500-Year	Proposed	138402	1230.63	1261.28	1252.89	1262.43	0.001641	9.96	17323.18	2086.96	0.33
Reach 2	705863	A14 25-Year	Existing	55753	1231.62	1252.97	1244.18	1253.7	0.001562	7.52	9126.33	957.91	0.31
Reach 2	705863	A14 25-Year	Proposed	55753	1231.62	1252.97	1244.18	1253.7	0.001562	7.52	9126.24	957.9	0.31
Reach 2	705863	A14 100-Year	Existing	81513	1231.62	1256.57	1247.45	1257.36	0.001426	8.08	13067.28	1562.57	0.3
Reach 2	705863	A14 100-Year	Proposed	81513	1231.62	1256.57	1247.46	1257.36	0.001426	8.08	13067.45	1562.58	0.3
Reach 2	705863	A14 500-Year	Existing	138402	1231.62	1261.36	1252.64	1262.23	0.001355	8.96	21679.39	2106.96	0.3
Reach 2	705863	A14 500-Year	Proposed	138402	1231.62	1261.36	1252.65	1262.23	0.001355	8.96	21679.41	2106.96	0.3

EXISTING 25-YEAR DETAILED BRIDGE SUMMARY *

Plan: A14 CEff Cibolo Creek Reach 2 RS: 705986
Culv Group: Culvert #1 Profile: A14 25-Year

Q Culv Group (cfs)	509.95	Culv Full Len (ft)	50
# Barrels	2	Culv Vel US (ft/s)	4.25
Q Barrel (cfs)	254.98	Culv Vel DS (ft/s)	4.25
E.G. US. (ft)	1253.96	Culv Inv El Up (ft)	1234.08
W.S. US. (ft)	1253.47	Culv Inv El Dn (ft)	1233.89
E.G. DS (ft)	1253.77	Culv Frctn Ls (ft)	0.05
W.S. DS (ft)	1253.08	Culv Exit Loss (ft)	0
Delta EG (ft)	0.19	Culv Entr Loss (ft)	0.14
Delta WS (ft)	0.39	Q Weir (cfs)	50718.01
E.G. IC (ft)	1238.37	Weir Sta Lft (ft)	600
E.G. OC (ft)	1253.97	Weir Sta Rgt (ft)	1836.78
Culvert Control	Outlet	Weir Submerg	0.94
Culv WS Inlet (ft)	1240.08	Weir Max Depth (ft)	13.39
Culv WS Outlet (ft)	1239.89	Weir Avg Depth (ft)	7.6
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	9400.21
Culv Crt Depth (ft)	2.72	Min El Weir Flow (ft)	1240.59

EXISTING 100-YEAR DETAILED BRIDGE SUMMARY *

Plan: A14 CEff Cibolo Creek Reach 2 RS: 705986
Culv Group: Culvert #1 Profile: A14 100-Year

Q Culv Group (cfs)	510.43	Culv Full Len (ft)	50
# Barrels	2	Culv Vel US (ft/s)	4.25
Q Barrel (cfs)	255.21	Culv Vel DS (ft/s)	4.25
E.G. US. (ft)	1257.64	Culv Inv El Up (ft)	1234.08
W.S. US. (ft)	1257.14	Culv Inv El Dn (ft)	1233.89
E.G. DS (ft)	1257.44	Culv Frctn Ls (ft)	0.05
W.S. DS (ft)	1256.77	Culv Exit Loss (ft)	0
Delta EG (ft)	0.19	Culv Entr Loss (ft)	0.14
Delta WS (ft)	0.37	Q Weir (cfs)	76460.35
E.G. IC (ft)	1238.37	Weir Sta Lft (ft)	600
E.G. OC (ft)	1257.64	Weir Sta Rgt (ft)	2063.31
Culvert Control	Outlet	Weir Submerg	0.96
Culv WS Inlet (ft)	1240.08	Weir Max Depth (ft)	17.06
Culv WS Outlet (ft)	1239.89	Weir Avg Depth (ft)	9.81
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	14350
Culv Crt Depth (ft)	2.73	Min El Weir Flow (ft)	1240.59

EXISTING 500-YEAR DETAILED BRIDGE SUMMARY *

Plan: A14 CEff Cibolo Creek Reach 2 RS: 705986
Culv Group: Culvert #1 Profile: A14 500-Year

Q Culv Group (cfs)	568.73	Culv Full Len (ft)	50
# Barrels	2	Culv Vel US (ft/s)	4.74
Q Barrel (cfs)	284.36	Culv Vel DS (ft/s)	4.74
E.G. US. (ft)	1262.56	Culv Inv El Up (ft)	1234.08
W.S. US. (ft)	1261.9	Culv Inv El Dn (ft)	1233.89
E.G. DS (ft)	1262.32	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	1261.56	Culv Exit Loss (ft)	0
Delta EG (ft)	0.24	Culv Entr Loss (ft)	0.17
Delta WS (ft)	0.34	Q Weir (cfs)	132760.10
E.G. IC (ft)	1238.69	Weir Sta Lft (ft)	220.08
E.G. OC (ft)	1262.56	Weir Sta Rgt (ft)	2240.79
Culvert Control	Outlet	Weir Submerg	0.95
Culv WS Inlet (ft)	1240.08	Weir Max Depth (ft)	21.97
Culv WS Outlet (ft)	1239.89	Weir Avg Depth (ft)	11.47
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	23181
Culv Crt Depth (ft)	2.93	Min El Weir Flow (ft)	1240.59

*NOTE: DETAILED SUMMARY REFERS TO SINGLE GROUP OF CULVERTS (2-10'X 6' MBC). A TOTAL OF TEN CULVERT GROUPS IN HYDRAULIC MODEL (20-10'X 6' MBC) ARE INCLUDED IN EFFECTIVE HYDRAULIC MODEL. REFER TO PROVIDED HYDRAULIC MODELS FOR ADDITIONAL CULVERT GROUP INFORMATION.

PROPOSED 25-YEAR DETAILED BRIDGE SUMMARY

Plan: A14 Proposed Cibolo Creek
Reach 2 RS: 705986 Profile: A14 25-Year

E.G. US. (ft)	1253.94	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1253.52	E.G. Elev (ft)	1253.91	1253.84
Q Total (cfs)	55753	W.S. Elev (ft)	1253.49	1253.3
Q Bridge (cfs)	55753	Crit W.S. (ft)	1243.75	1243.99
Q Weir (cfs)		Max Chl Dpth (ft)	19.41	19.41
Weir Sta Lft (ft)		Vel Total (ft/s)	4.66	5.18
Weir Sta Rgt (ft)		Flow Area (sq ft)	11967.53	10753.53
Weir Submerg		Froude # Chl	0.21	0.24
Weir Max Depth (ft)		Specif Force (cu ft)	99102.61	91635.66
Min El Weir Flow (ft)	1262.67	Hydr Depth (ft)	13.27	13.18
Min El Prs (ft)	1260.41	W.P. Total (ft)	1111.86	1015.11
Delta EG (ft)	0.17	Conv. Total (cfs)	2454104	3127584
Delta WS (ft)	0.44	Top Width (ft)	901.86	815.93
BR Open Area (sq ft)	15729.19	Frctn Loss (ft)	0.03	0.02
BR Open Vel (ft/s)	5.18	C & E Loss (ft)	0.04	0.05
BR Sluice Coef		Shear Total (lb/sq ft)	0.35	0.21
BR Sel Method	Energy only	Power Total (lb/ft s)	1.62	1.09

PROPOSED 100-YEAR DETAILED BRIDGE SUMMARY

Plan: A14 Proposed Cibolo Creek
Reach 2 RS: 705986 Profile: A14 100-Year

E.G. US. (ft)	1257.58	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1257.09	E.G. Elev (ft)	1257.53	1257.45
Q Total (cfs)	81513	W.S. Elev (ft)	1256.98	1256.71
Q Bridge (cfs)	81513	Crit W.S. (ft)	1245.66	1246.19
Q Weir (cfs)		Max Chl Dpth (ft)	22.9	22.82
Weir Sta Lft (ft)		Vel Total (ft/s)	5.38	6.01
Weir Sta Rgt (ft)		Flow Area (sq ft)	15147.42	13553.03
Weir Submerg		Froude # Chl	0.22	0.25
Weir Max Depth (ft)		Specif Force (cu ft)	152412.7	140110
Min El Weir Flow (ft)	1262.67	Hydr Depth (ft)	16.42	16.41
Min El Prs (ft)	1260.41	W.P. Total (ft)	1189.68	1083.87
Delta EG (ft)	0.16	Conv. Total (cfs)	3391282	4217752
Delta WS (ft)	0.41	Top Width (ft)	922.67	826.05
BR Open Area (sq ft)	15729.19	Frctn Loss (ft)	0.03	0.02
BR Open Vel (ft/s)	6.01	C & E Loss (ft)	0.06	0
BR Sluice Coef		Shear Total (lb/sq ft)	0.46	0.29
BR Sel Method	Energy only	Power Total (lb/ft s)	2.47	1.75

PROPOSED 500-YEAR DETAILED BRIDGE SUMMARY

Plan: A14 Proposed Cibolo Creek
Reach 2 RS: 705986 Profile: A14 500-Year

E.G. US. (ft)	1263.15	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1262.4	E.G. Elev (ft)	1262.93	1262.71
Q Total (cfs)	138402	W.S. Elev (ft)	1261.69	1261.12
Q Bridge (cfs)	138402	Crit W.S. (ft)	1249.24	1250.06
Q Weir (cfs)		Max Chl Dpth (ft)	27.61	27.23
Weir Sta Lft (ft)		Vel Total (ft/s)	8.03	8.8
Weir Sta Rgt (ft)		Flow Area (sq ft)	17228.3	15729.19
Weir Submerg		Froude # Chl	0.3	0.34
Weir Max Depth (ft)		Specif Force (cu ft)	253845.5	231777.8
Min El Weir Flow (ft)	1262.67	Hydr Depth (ft)		
Min El Prs (ft)	1260.41	W.P. Total (ft)	2160.58	1959.05
Delta EG (ft)	0.72	Conv. Total (cfs)	2828622	3574041
Delta WS (ft)	1.12	Top Width (ft)		
BR Open Area (sq ft)	15729.19	Frctn Loss (ft)	0.13	0.06
BR Open Vel (ft/s)	8.8	C & E Loss (ft)	0.1	0.22
BR Sluice Coef		Shear Total (lb/sq ft)	1.19	0.75
BR Sel Method	Energy only	Power Total (lb/ft s)	9.57	6.61

NOTES:

1. PROJECT TO PROVIDE NO ADVERSE IMPACT TO ADJACENT PROPERTIES.
2. HEC-RAS 6.1.0 USED FOR HYDRAULIC ANALYSIS.
3. A NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION WITH A SLOPE OF 0.0018 FT/FT TO DETERMINE THE STARTING WATER SURFACE ELEVATION (WSE) SLOPE DERIVED FROM LIDAR (2017).
4. HYDRAULIC GEOMETRIES CROSS SECTION DATA BASED ON LIDAR (2017) AND TOPOGRAPHIC SURVEY WITHIN TXDOT ROW.
5. VERTICAL DATUM IS NAVD 88.
6. STRUCTURE WITHIN COMAL COUNTY FEMA FIRM PANEL 48091C0355F EFFECTIVE SEPTEMBER 3, 2009 AND BEXAR COUNTY FEMA FIRM PANEL 48029C0105F EFFECTIVE SEPTEMBER 29, 2010.
7. COORDINATION TO INFORM THE BEXAR COUNTY AND COMAL COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED ON DECEMBER 16, 2021.
8. REFER TO THE DRAINAGE TECHNICAL MEMORANDUM FOR ADDITIONAL INFORMATION ON THE ULTIMATE BRIDGE DESIGN AND HYDRAULIC ANALYSIS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
8/23/23

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
HYDRAULIC CALCULATION DATA SHEET 2
STRUCTURE

SHEET 2 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	125

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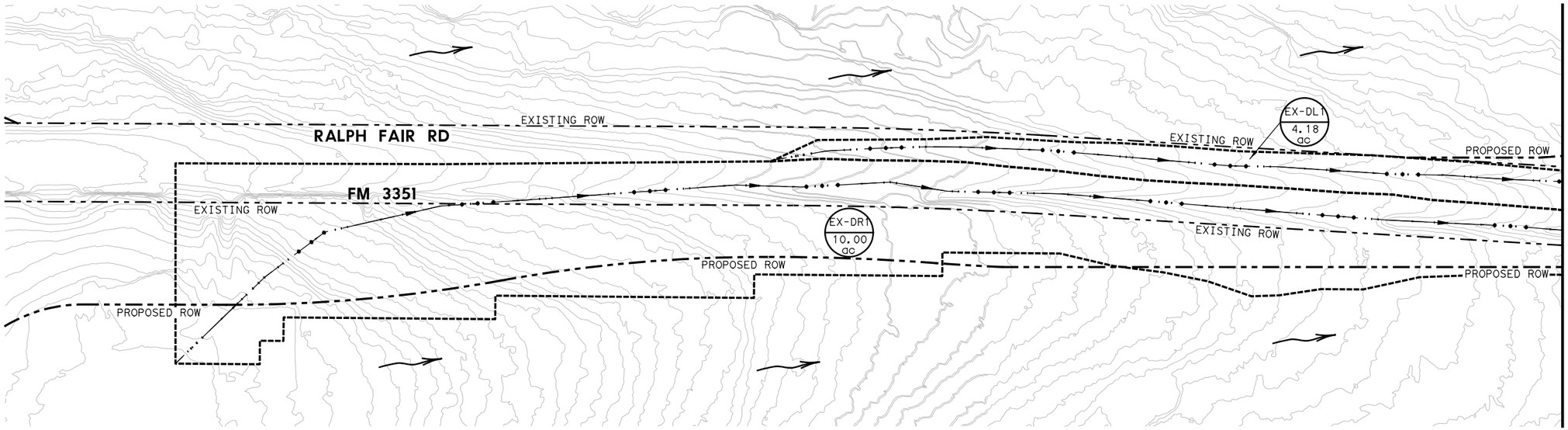
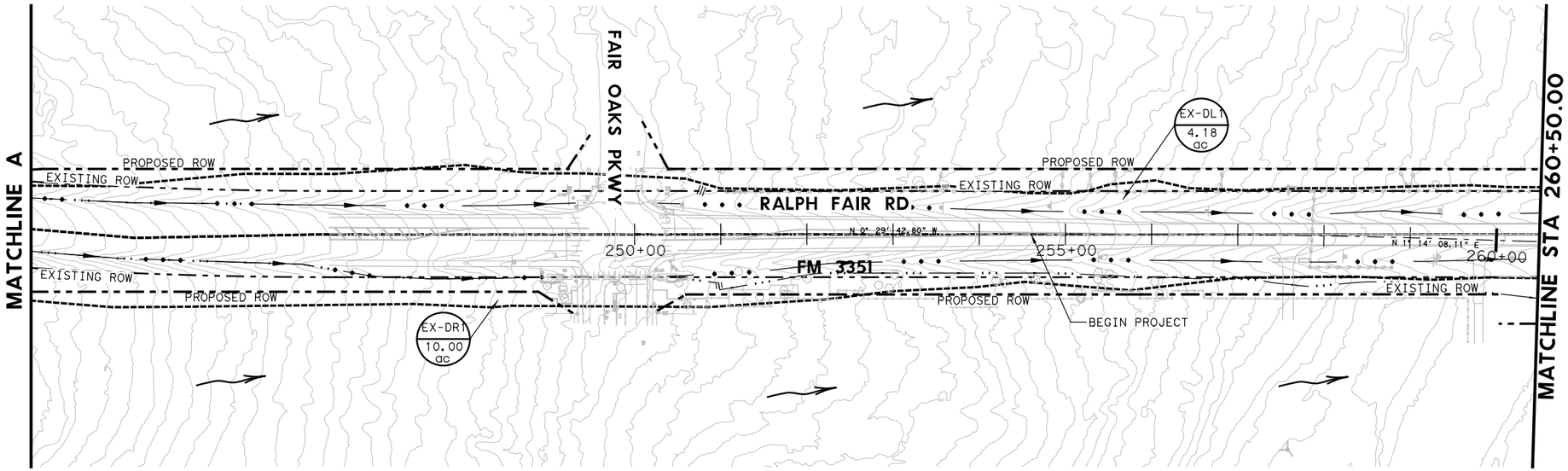
DATE: 8/23/2023
PLOTTING TIME: 1:24:41 PM
File Name: FM3351*HYDRA*02.dgn
User Name: GARODRIGUE

Existing Rational Method Peak Flow Calculations

Subbasin ID	Area	Weighted Runoff C-Value	Time of Concentration	I2	Q2	I5	*Q5	I10	Q10	I25	Q25	I50	Q50	I100	Q100
	(AC)		(MIN)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)
EX-DR1	10.00	0.64	28.70	2.83	18.25	3.78	24.32	4.50	28.98	5.47	35.24	6.23	40.12	6.99	45.03
EX-DR2	2.79	0.63	11.40	4.48	8.00	5.86	10.47	6.91	12.35	8.30	14.84	9.38	16.78	10.42	18.63
EX-DL1	4.18	0.64	23.10	3.20	8.70	4.25	11.55	5.05	13.72	6.12	16.64	6.96	18.91	7.79	21.17

*DITCH DESIGN YEAR





0 75 150 225 300

SCALE IN FEET

DRAINAGE LEGEND

- XX / X.X ac — DRAINAGE AREA
- FLOW PATH
- DITCH DRAINAGE AREA
- INTERNAL DRAINAGE AREA
- FLOW
- EXISTING ROW
- PROPOSED ROW
- LIDAR 2017 1-FT INTERVAL

NOTES

1. DRAINAGE ANALYSIS PER TXDOT HYDRAULIC DEISGN MANUAL (HDM).
2. RATIONAL METHOD WAS USED FOR DRAINAGE AREA CALCULATIONS.
3. C-VALUES ARE BASED ON HDM TABLE 4-11: RUNOFF COEFFICENTS FOR RURAL WATERSHEDS.
4. PEAK FLOWS DEVELOPED USING ATLAS 14 IDF INFORMATION.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

EXISTING INTERNAL DRAINAGE AREA MAP

SCALE: 1"=150' SHEET 1 OF 2

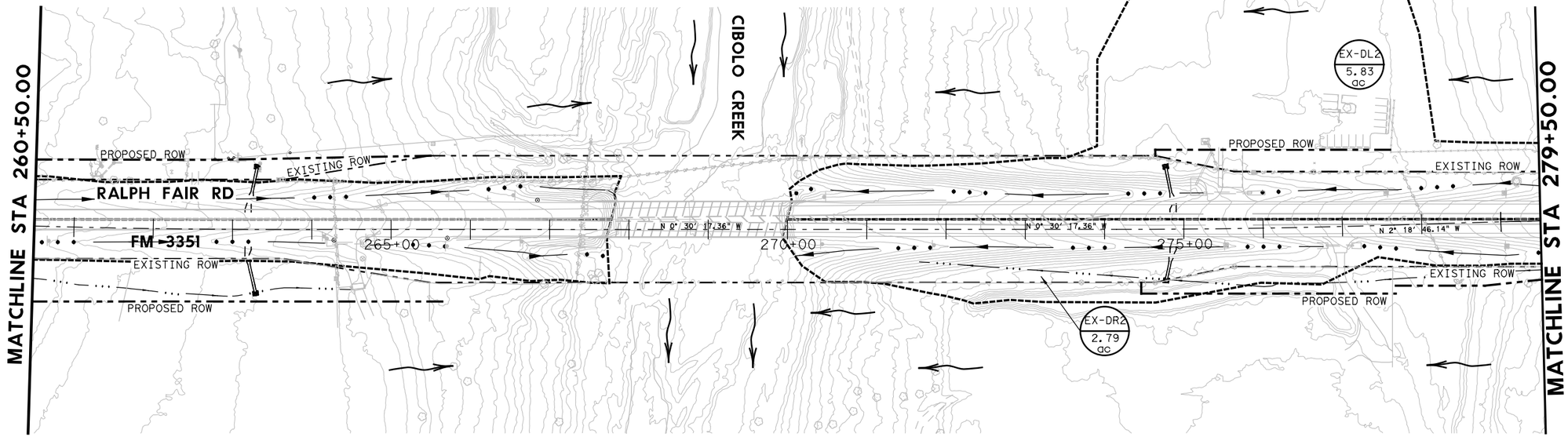
DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	126

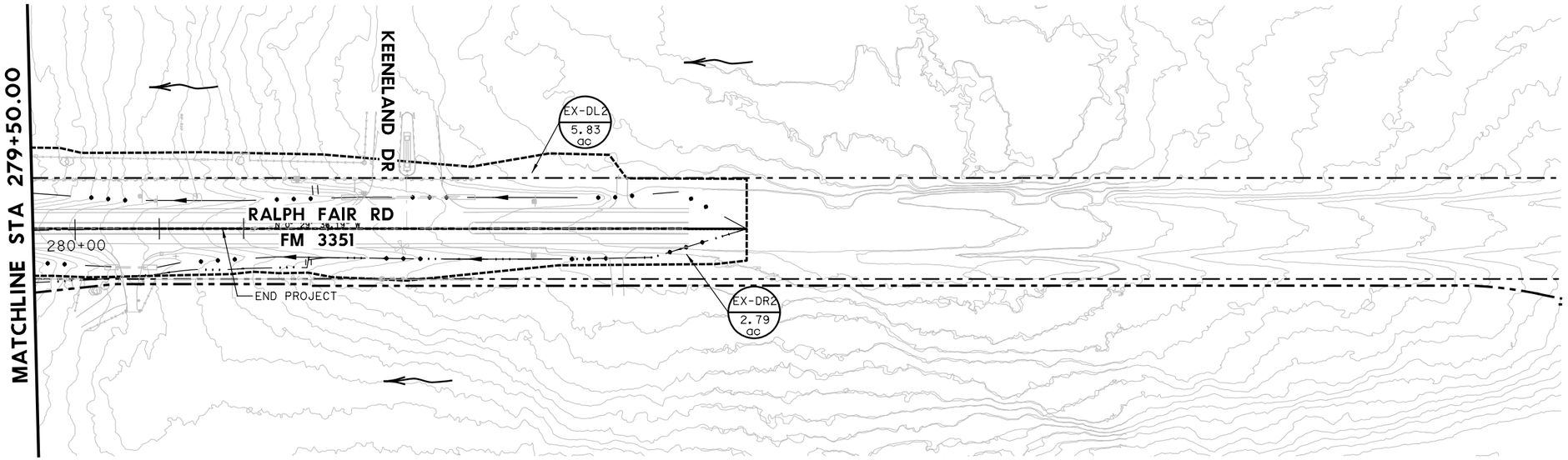
PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1032784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:13:37 AM
File Name: FM3351-EX-DAM-01.dgn
User Name: GARODRIGUE

Existing Rational Method Peak Flow Calculations

Subbasin ID	Area (AC)	Weighted Runoff C-Value	Time of Concentration (MIN)	I2 (IN/HR)	Q2 (CFS)	I5 (IN/HR)	*Q5 (CFS)	I10 (IN/HR)	Q10 (CFS)	I25 (IN/HR)	Q25 (CFS)	I50 (IN/HR)	Q50 (CFS)	I100 (IN/HR)	Q100 (CFS)
EX-DR1	10.00	0.64	28.70	2.83	18.25	3.78	24.32	4.50	28.98	5.47	35.24	6.23	40.12	6.99	45.03
EX-DR2	2.79	0.63	11.40	4.48	8.00	5.86	10.47	6.91	12.35	8.30	14.84	9.38	16.78	10.42	18.63
EX-DL1	4.18	0.64	23.10	3.20	8.70	4.25	11.55	5.05	13.72	6.12	16.64	6.96	18.91	7.79	21.17
EX-DL2	5.83	0.57	12.50	4.31	14.47	5.65	18.97	6.67	22.38	8.02	26.92	9.08	30.46	10.09	33.87

*DITCH DESIGN YEAR





0 75 150 225 300
SCALE IN FEET

DRAINAGE LEGEND

- XX / X.X ac — DRAINAGE AREA
- FLOW PATH
- DITCH DRAINAGE AREA
- INTERNAL DRAINAGE AREA
- FLOW
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- PROPOSED ROW
- LIDAR 2017 1-FT INTERVAL

NOTES

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

EXISTING INTERNAL DRAINAGE AREA MAP

SCALE: 1"=150'

SHEET 2 OF 2

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	127

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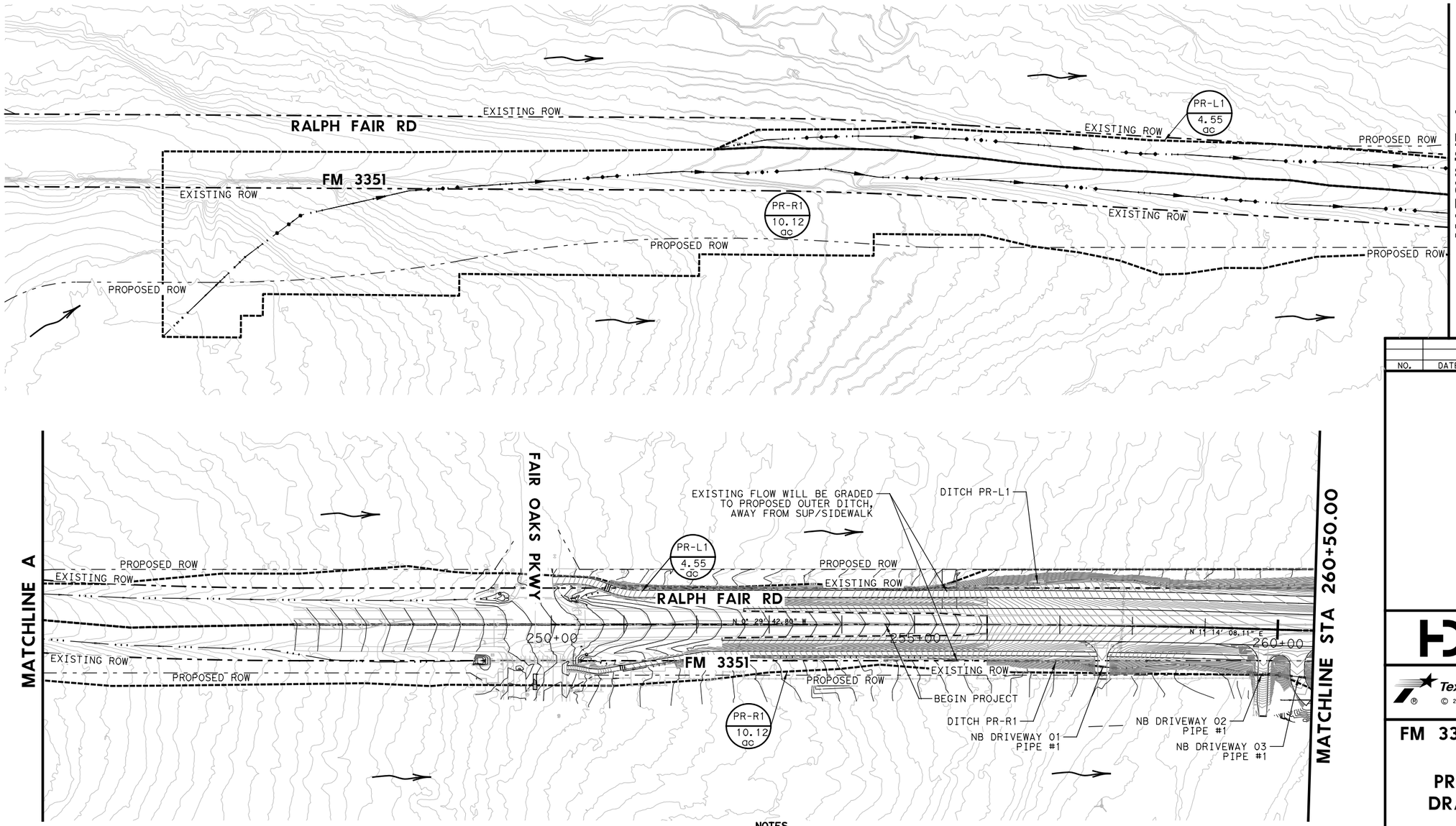
PENTABLE: 1032784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:13:46 AM
File Name: FM3351-EX-DAM-02.dgn
User Name: GARODRIGUE

Proposed Rational Method Peak Flow Calculations

Subbasin ID	Area (AC)	Weighted Runoff C-Value	Time of Concentration (MIN)	I2 (IN/HR)	Q2 (CFS)	I5 (IN/HR)	*Q5 (CFS)	I10 (IN/HR)	Q10 (CFS)	I25 (IN/HR)	**Q25 (CFS)	I50 (IN/HR)	Q50 (CFS)	I100 (IN/HR)	Q100 (CFS)
PR-R1	10.12	0.57	26.10	2.99	17.34	3.98	23.07	4.74	27.45	5.75	33.34	6.55	37.93	7.34	42.53
PR-R2	2.35	0.68	10.00	4.71	7.52	6.15	9.82	7.24	11.56	8.68	13.87	9.81	15.68	10.88	17.39
PR-L1	4.55	0.67	20.40	3.42	10.51	4.53	13.91	5.37	16.50	6.51	19.98	7.39	22.68	8.26	25.36
PR-L2	5.58	0.67	11.20	4.51	17.00	5.90	22.23	6.95	26.21	8.35	31.49	9.44	35.60	10.49	39.53

*DITCH DESIGN YEAR
**INLET DESIGN YEAR

0 75 150 225 300
SCALE IN FEET



DRAINAGE LEGEND

- XX / X.X ac — DRAINAGE AREA
- FLOW PATH
- DITCH DRAINAGE AREA
- INTERNAL DRAINAGE AREA
- FLOW
- EXISTING ROW
- PROPOSED ROW
- LIDAR 2017 1-FT INTERVAL
- STONE RIP RAP

NOTES
1. DRAINAGE ANALYSIS PER TXDOT HYDRAULIC DESIGN MANUAL (HDM).
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4. PEAK FLOWS DEVELOPED USING ATLAS 14 IDF INFORMATION.

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12/14/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

PROPOSED INTERNAL DRAINAGE AREA MAP

SCALE: 1"=150' SHEET 1 OF 2

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	128

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PENTABLE: 1033784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:16:18 AM
File Name: FM3351-PR-DAM-01.dgn
User Name: GARODRIGUE

NOTES

1. DRAINAGE ANALYSIS PER TXDOT HYDRAULIC DEISGN MANUAL (HDM).
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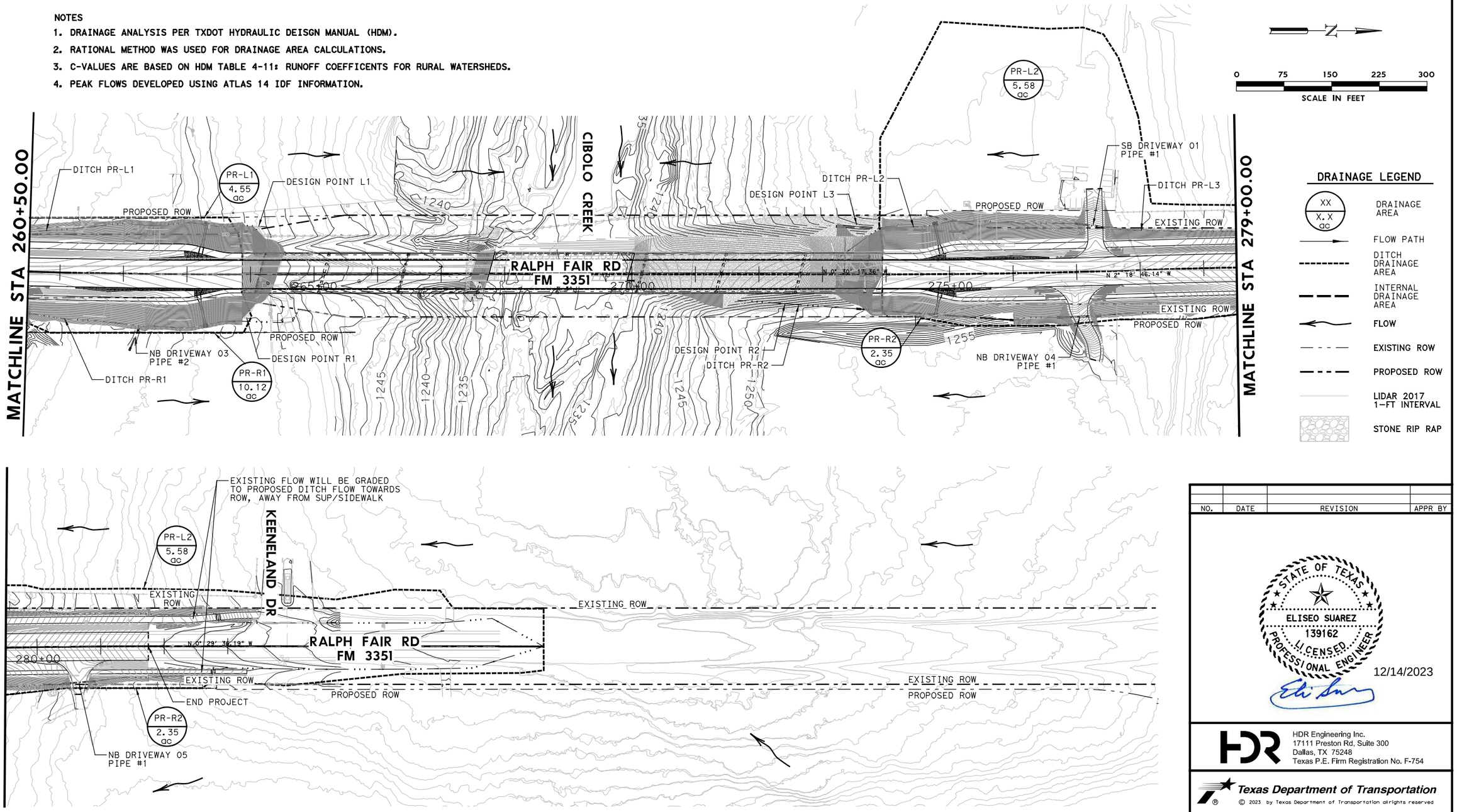

DRAINAGE LEGEND

- XX / X.X ac — DRAINAGE AREA
- FLOW PATH
- DITCH DRAINAGE AREA
- INTERNAL DRAINAGE AREA
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- EXISTING ROW
- PROPOSED ROW
- LIDAR 2017 1-FT INTERVAL
- STONE RIP RAP

Proposed Rational Method Peak Flow Calculations

Subbasin ID	Area (AC)	Weighted Runoff C-Value	Time of Concentration (MIN)	I2 (IN/HR)	Q2 (CFS)	I5 (IN/HR)	*Q5 (CFS)	I10 (IN/HR)	Q10 (CFS)	I25 (IN/HR)	**Q25 (CFS)	I50 (IN/HR)	Q50 (CFS)	I100 (IN/HR)	Q100 (CFS)
PR-R1	10.12	0.57	26.10	2.99	17.34	3.98	23.07	4.74	27.45	5.75	33.34	6.55	37.93	7.34	42.53
PR-R2	2.35	0.68	10.00	4.71	7.52	6.15	9.82	7.24	11.56	8.68	13.87	9.81	15.68	10.88	17.39
PR-L1	4.55	0.67	20.40	3.42	10.51	4.53	13.91	5.37	16.50	6.51	19.98	7.39	22.68	8.26	25.36
PR-L2	5.58	0.67	11.20	4.51	17.00	5.90	22.23	6.95	26.21	8.35	31.49	9.44	35.60	10.49	39.53

*DITCH DESIGN YEAR
**INLET DESIGN YEAR

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

PROPOSED INTERNAL DRAINAGE AREA MAP

SCALE: 1"=150' SHEET 2 OF 2

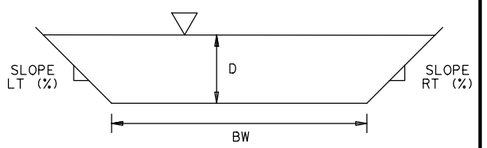
DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	129

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:18:37 AM
File Name:FM3351*PR*DAM-02.dgn
User Name:GARODRIGUE

DITCH FLOW CALCULATIONS

STATION RANGE	DRAINAGE AREA ID & POINT OF DESIGN	DESCRIPTION **	SLOPE (%)	n	BOTTOM WIDTH (FT)	SLOPE LT (%)	SLOPE RT (%)	MAX DEPTH (FT)	CAPACITY (CFS)	Q5* (CFS)	Q100 (CFS)	D5 (FT)	D100 (FT)	V5 (FT/S)	V100 (FT/S)	MAX SHEAR 2-YR (LB/SF)	MAX SHEAR 5-YR (LB/SF)	MAX SHEAR 100-YR (LB/SF)	FREE BOARD (FT)
10+00 - 10+23	PR-L1	Grass w/ TY A	1.54%	0.035	-	25.00%	25.00%	2.64	173.9	13.9	25.4	1.02	1.28	3.3	3.9	0.89	0.99	1.24	1.62
10+23 - 10+51	PR-L1	Grass w/ TY A	2.38%	0.035	-	33.00%	17.00%	1.45	48.7	13.9	25.4	0.91	1.14	3.8	4.4	1.21	1.34	1.68	0.54
10+51 - 10+61	PR-L1	Grass w/ TY A	0.80%	0.035	-	25.00%	25.00%	3.97	371.7	13.9	25.4	1.16	1.45	2.6	3.0	0.52	0.58	0.72	2.81
10+61 - 10+98	PR-L1	Grass w/ TY A	2.18%	0.035	-	33.00%	50.00%	2.52	111.3	13.9	25.4	1.15	1.45	4.1	4.8	1.41	1.57	1.97	1.37
10+98 - 14+33	PR-L1	Grass w/ TY A	2.46%	0.035	-	25.00%	31.00%	1.26	27.5	13.9	25.4	0.98	1.22	4.0	4.7	1.35	1.50	1.88	0.28
14+33 - 14+84	PR-L1	Grass w/ TY A	3.15%	0.035	-	25.00%	16.67%	1.34	51.3	13.9	25.4	0.82	1.03	4.1	4.8	1.46	1.62	2.03	0.52
14+84 - 15+85	PR-L1	Grass w/ TY A	4.85%	0.035	-	25.00%	16.67%	2.09	208.0	13.9	25.4	0.76	0.95	4.8	5.6	2.06	2.29	2.87	1.33
15+85 - 16+84	PR-L1	Grass w/ TY A	3.14%	0.035	-	33.00%	25.00%	2.85	265.5	13.9	25.4	0.94	1.18	4.4	5.2	1.66	1.85	2.31	1.91
16+84 - 17+60	PR-L1	Grass w/ TY A	1.81%	0.035	-	33.00%	25.00%	2.00	78.4	13.9	25.4	1.05	1.31	3.6	4.2	1.06	1.18	1.48	0.95
17+60 - 19+26	PR-L1	Grass w/ TY A	2.59%	0.035	-	33.00%	25.00%	2.39	150.9	13.9	25.4	0.98	1.23	4.1	4.8	1.42	1.58	1.98	1.41
19+26 - 20+56	PR-L1	Grass w/ TY A	2.19%	0.035	-	25.00%	25.00%	1.64	58.2	13.9	25.4	0.96	1.20	3.8	4.4	1.18	1.31	1.64	0.68
20+56 - 20+94	PR-L1	Grass w/ TY A	1.65%	0.035	-	25.00%	25.00%	1.60	47.3	22.2	39.5	1.21	1.50	3.8	4.4	1.12	1.24	1.54	0.39
20+94 - 23+88	PR-L1	Grass w/ TY A	1.34%	0.035	-	33.00%	33.00%	1.96	54.8	22.2	39.5	1.40	1.73	3.8	4.3	1.06	1.17	1.46	0.56
40+65 - 42+87	PR-L2	Grass w/ TY A	0.81%	0.035	-	33.00%	33.00%	3.80	248.7	22.2	39.5	1.54	1.91	3.1	3.6	0.70	0.78	0.97	2.26
42+87 - 43+87	PR-L2	Grass w/ TY A	2.84%	0.035	-	25.00%	29.00%	2.76	246.7	22.2	39.5	1.12	1.39	4.8	5.5	1.80	1.99	2.47	1.64
43+87 - 44+47	PR-L2	Grass w/ TY A	0.29%	0.035	-	36.00%	33.00%	2.25	35.3	22.2	39.5	1.89	2.35	2.1	2.5	0.31	0.35	0.43	0.36
44+47 - 45+85	PR-L2	Grass w/ TY A	2.04%	0.035	-	36.00%	33.00%	1.50	31.6	22.2	39.5	1.31	1.63	4.4	5.1	1.51	1.67	2.08	0.19
45+85 - 47+40	PR-L2	Grass w/ TY A	3.60%	0.035	-	33.00%	33.00%	1.25	27.0	22.2	39.5	1.16	1.44	5.4	6.3	2.36	2.61	3.24	0.09
47+40 - 48+07	PR-L2	Grass w/ TY A	3.10%	0.035	-	25.00%	25.00%	1.50	54.6	23.1	42.5	1.09	1.37	4.9	5.7	1.89	2.10	2.64	0.41
48+07 - 48+83	PR-L2	Grass w/ TY A	2.06%	0.035	-	25.00%	16.00%	1.80	93.4	23.1	42.5	1.07	1.34	4.0	4.6	1.23	1.37	1.73	0.73
48+83 - 48+93	PR-L2	Grass w/ TY A	0.60%	0.035	-	25.00%	16.00%	1.90	58.2	23.1	42.5	1.34	1.69	2.5	2.9	0.45	0.50	0.63	0.56
48+93 - 49+48	PR-L2	Grass w/ TY A	3.21%	0.035	-	25.00%	17.00%	1.98	144.8	23.1	42.5	0.99	1.25	4.7	5.5	1.79	1.99	2.51	0.99
49+48 - 49+79	PR-L3	Grass w/ TY A	2.97%	0.035	-	16.00%	25.00%	1.00	23.4	23.1	42.5	1.00	1.25	4.5	5.3	1.65	1.84	2.32	0.00
49+79 - 49+92	PR-L2	Grass w/ TY A	2.97%	0.035	-	16.00%	25.00%	1.00	23.4	23.1	42.5	1.00	1.25	4.5	5.3	1.65	1.84	2.32	0.00
25+00 - 25+68	PR-R1	Grass w/ TY A	1.51%	0.035	-	25.00%	17.00%	0.30	0.6	23.1	42.5	1.15	1.44	3.6	4.1	0.97	1.08	1.36	-0.85
25+68 - 26+34	PR-R1	Grass w/ TY A	1.64%	0.035	-	25.00%	17.00%	0.30	0.7	23.1	42.5	1.13	1.42	3.7	4.3	1.04	1.16	1.45	-0.83
26+34 - 26+40	PR-R1	Grass w/ TY A	0.83%	0.035	-	25.00%	17.00%	0.20	0.2	23.1	42.5	1.28		2.8		0.60	0.67		-1.08
26+40 - 26+85	PR-R1	Grass w/ TY A	1.46%	0.035	-	25.00%	17.00%	1.33	33.8	23.1	42.5	1.15	1.45	3.5	4.1	0.94	1.05	1.32	0.18
26+85 - 27+24	PR-R1	Grass w/ TY A	1.81%	0.035	-	25.00%	17.00%	1.00	17.6	23.1	42.5	1.11	1.39	3.8	4.4	1.12	1.25	1.57	-0.11
27+24 - 30+58	PR-R1	Grass w/ TY A	3.08%	0.035	-	25.00%	17.00%	1.80	110.0	23.1	42.5	1.00	1.26	4.7	5.4	1.73	1.93	2.43	0.80
30+58 - 31+28	PR-R1	Grass w/ TY A	5.73%	0.035	-	25.00%	25.00%	2.10	182.0	9.8	17.4	0.70	0.87	5.0	5.7	2.27	2.51	3.11	1.40
31+28 - 32+19	PR-R1	Grass w/ TY A	3.30%	0.035	-	25.00%	33.00%	2.63	219.9	9.8	17.4	0.82	1.02	4.2	4.8	1.53	1.69	2.09	1.81
32+19 - 32+56	PR-R1	Grass w/ TY A	3.31%	0.035	-	25.00%	33.00%	2.25	145.3	9.8	17.4	0.82	1.01	4.2	4.8	1.53	1.69	2.10	1.43
32+56 - 34+38	PR-R1	Grass w/ TY A	1.72%	0.035	-	25.00%	25.00%	3.00	258.2	9.8	17.4	0.88	1.09	3.2	3.7	0.86	0.95	1.17	2.12
34+38 - 35+33	PR-R1	Grass w/ TY A	2.16%	0.035	-	25.00%	25.00%	5.50	1455.3	9.8	17.4	0.84	1.05	3.4	4.0	1.03	1.14	1.41	4.66
35+33 - 35+93	PR-R1	Grass w/ TY A	1.21%	0.035	-	25.00%	25.00%	2.45	126.4	9.8	17.4	0.94	1.16	2.8	3.2	0.64	0.71	0.88	1.51
35+93 - 37+06	PR-R1	Grass w/ TY A	1.18%	0.035	-	25.00%	25.00%	1.89	62.4	9.8	17.4	0.94	1.17	2.8	3.2	0.63	0.70	0.86	0.95
61+36 - 61+94	PR-R2	Grass w/ TY A	4.67%	0.035	-	25.00%	33.00%	6.52	2941.5	9.8	17.4	0.77	0.95	4.7	5.5	2.03	2.24	2.77	5.75
61+94 - 64+45	PR-R2	Grass w/ TY A	1.02%	0.035	-	33.00%	33.00%	2.93	139.7	9.8	17.4	1.08	1.34	2.8	3.2	0.63	0.69	0.86	1.85
64+45 - 65+07	PR-R2	Grass w/ TY A	0.52%	0.035	-	25.00%	33.00%	3.35	166.4	9.8	17.4	1.16	1.44	2.1	2.4	0.34	0.38	0.47	2.19
65+07 - 65+67	PR-R2	Grass w/ TY A	0.19%	0.035	-	25.00%	33.00%	1.25	7.3	9.8	17.4	1.40	1.73	1.4	1.6	0.15	0.17	0.21	-0.15
65+67 - 66+72	PR-R2	Grass w/ TY A	0.68%	0.035	-	25.00%	25.00%	0.80	4.8	9.8	17.4	1.05	1.30	2.2	2.6	0.40	0.44	0.55	-0.25
66+72 - 67+35	PR-R2	Grass w/ TY A	4.00%	0.035	-	25.00%	25.00%	2.50	242.1	9.8	17.4	0.75	0.93	4.3	5.0	1.70	1.88	2.32	1.75
67+35 - 68+21	PR-R2	Grass w/ TY A	3.34%	0.035	-	25.00%	25.00%	1.75	85.5	9.8	17.4	0.78	0.96	4.1	4.7	1.47	1.62	2.01	0.97
68+21 - 68+79	PR-R2	Grass w/ TY A	4.30%	0.035	-	25.00%	33.00%	1.95	113.0	9.8	17.4	0.78	0.97	4.6	5.3	1.90	2.09	2.60	1.17
68+79 - 69+24	PR-R2	Grass w/ TY A	1.89%	0.035	-	25.00%	33.00%	2.35	123.1	9.8	17.4	0.91	1.13	3.4	3.9	0.97	1.07	1.33	1.44
69+24 - 69+49	PR-R2	Grass w/ TY A	2.60%	0.035	-	25.00%	33.00%	2.45	161.4	9.8	17.4	0.86	1.06	3.8	4.4	1.26	1.39	1.72	1.59
69+49 - 70+06	PR-R2	Grass w/ TY A	3.24%	0.035	-	25.00%	25.00%	2.00	120.2	9.8	17.4	0.78	0.97	4.0	4.6	1.43	1.58	1.96	1.22
70+06 - 70+57	PR-R2	Grass w/ TY A	2.40%	0.035	-	25.00%	25.00%	1.50	48.0	9.8	17.4	0.83	1.03	3.6	4.1	1.12	1.24	1.53	0.67
70+57 - 71+66	PR-R2	Grass w/ TY A	2.36%	0.035	-	25.00%	25.00%	2.00	102.5	9.8	17.4	0.83	1.03	3.6	4.1	1.11	1.22	1.51	1.17
71+66 - 73+15	PR-R2	Grass w/ TY A	2.12%	0.035	-	25.00%	25.00%	2.47	170.5	9.8	17.4	0.85	1.05	3.4	3.9	1.01	1.12	1.39	1.62

CHANNEL DEPTH (D) FROM GIVEN FLOW (Q)



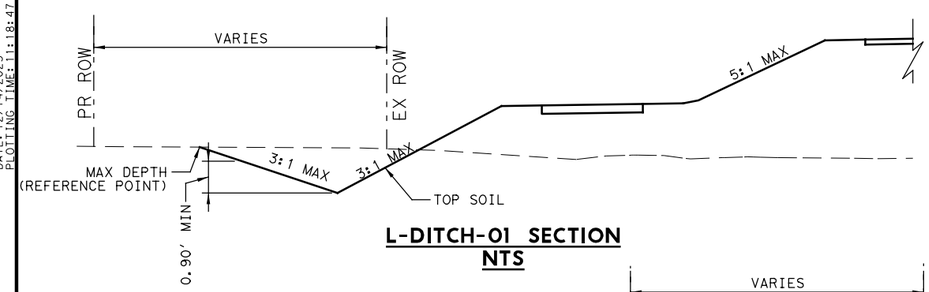
MANNING'S EQUATION COMBINED WITH THE CONTINUITY EQUATION UTILIZED TO DETERMINE THE CHANNEL CAPACITY:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

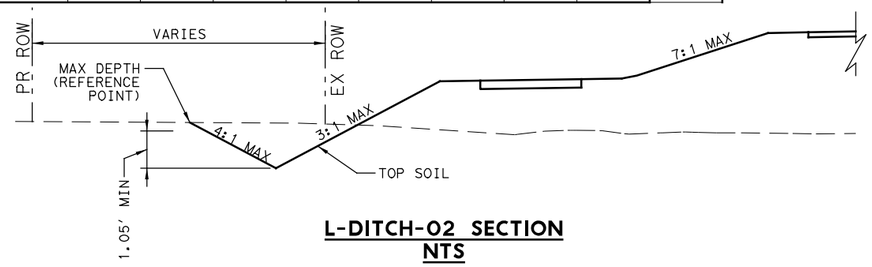
NOTE:

1. THE CALCULATIONS USED ON THIS WORKSHEET TO DETERMINE DEPTH ASSUMES STEADY AND UNIFORM FLOW. SEE TXDOT'S HYDRAULIC MANUAL, CHAPTER 6. OPEN CHANNEL FLOW FOR ADDITIONAL DETAILS.
2. REFER TO FM 3351 AT CIBOLO CREEK DITCH PLAN AND PROFILE SHEETS FOR DITCH LOCATIONS AND ELEVATIONS.
3. DESIGNED PER LATEST TXDOT HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019), A MINIMUM TIME OF CONCENTRATION OF 10 MIN. WAS USED FOR THE RATIONAL METHOD.
4. CHANNEL LINING USED WAS PERMISSABLE FOR THE SHEAR STRESS REQUIRED FOR DITCHES.

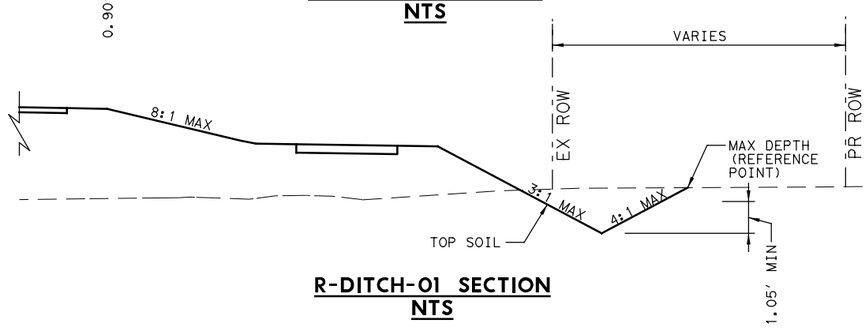
* DITCH DESIGN YEAR
** SOIL RETENTION BLANKETS USED FOR GRASS LINING



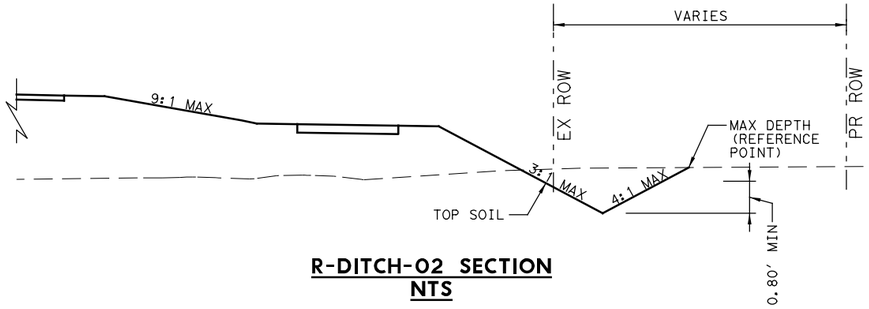
L-DITCH-01 SECTION
NTS



L-DITCH-02 SECTION
NTS



R-DITCH-01 SECTION
NTS



R-DITCH-02 SECTION
NTS

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

INTERNAL HYDRAULIC SUMMARIES

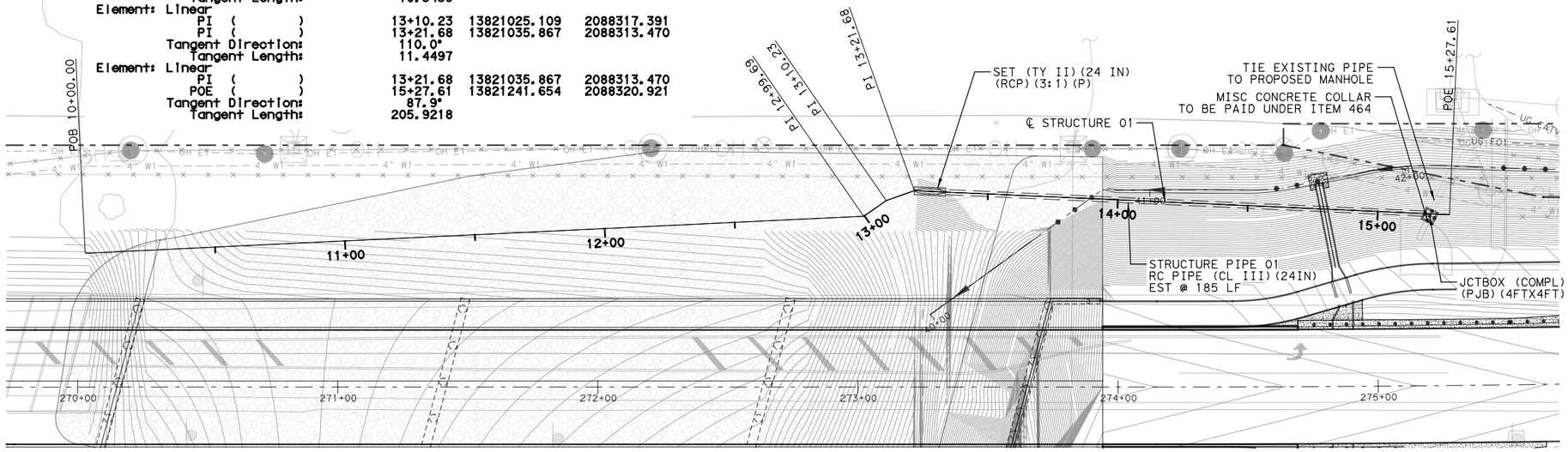
SHEET 1 OF 1

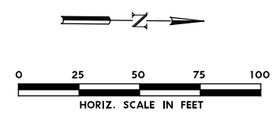
DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	130

DRAINAGE
HORIZONTAL DATA

Project Name: FM 3351
Description:
Horizontal Alignment Name: DRN*01

		STATION	NORTHING	EASTING
Element: Linear				
POB	( )	10+00.00	13820717.283	2088340.344
PI	( )	12+99.69	13821016.496	2088323.476
Tangent Direction:		93.2°		
Tangent Length:		299.6883		
Element: Linear				
PI	( )	12+99.69	13821016.496	2088323.476
PI	( )	13+10.23	13821025.109	2088317.391
Tangent Direction:		125.2°		
Tangent Length:		10.5459		
Element: Linear				
PI	( )	13+10.23	13821025.109	2088317.391
PI	( )	13+21.68	13821035.867	2088313.470
Tangent Direction:		110.0°		
Tangent Length:		11.4497		
Element: Linear				
PI	( )	13+21.68	13821035.867	2088313.470
POE	( )	15+27.61	13821241.654	2088320.921
Tangent Direction:		87.9°		
Tangent Length:		205.9218		





DRAINAGE LEGEND

FLOW ARROW

PROPOSED RCP PIPE

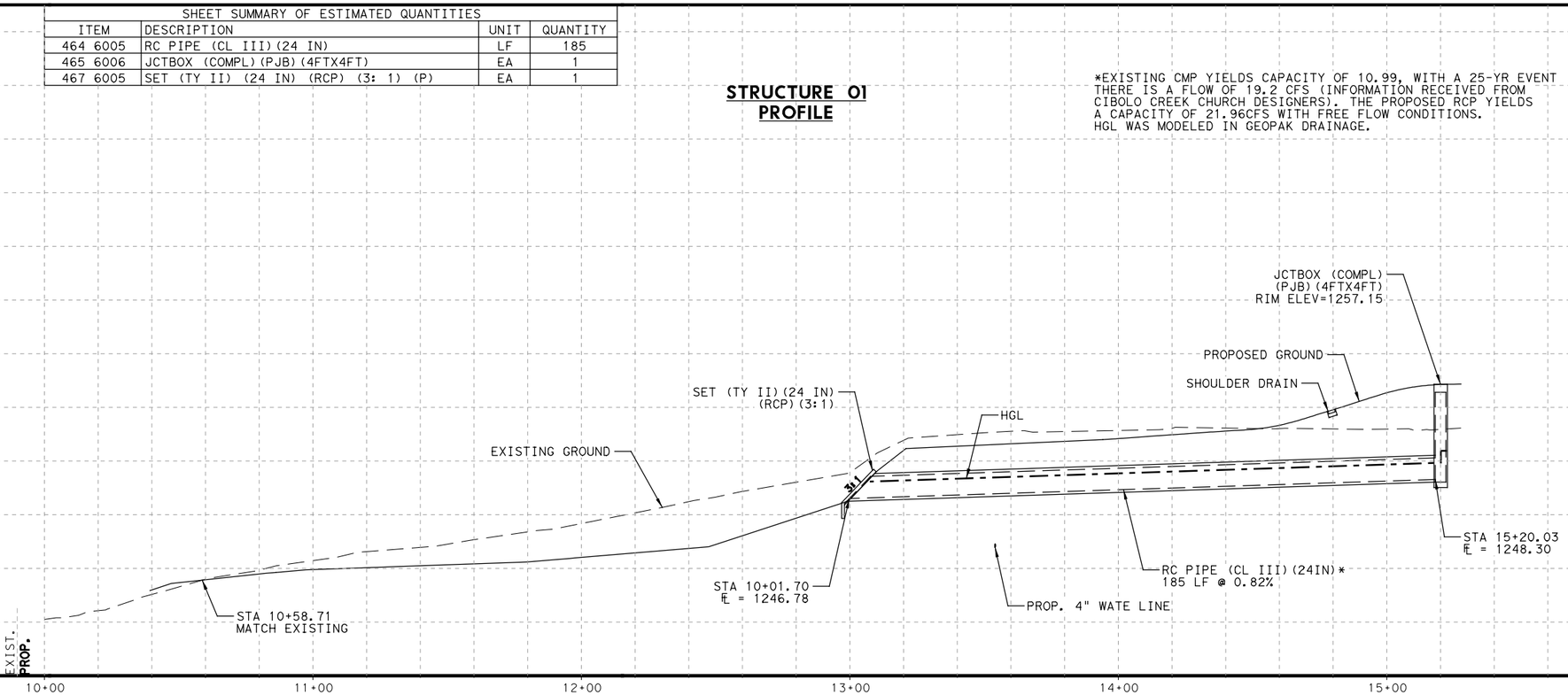
NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
5. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR F.O. LOCATES.

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
464 6005	RC PIPE (CL III)(24 IN)	LF	185
465 6006	JCTBOX (COMPL)(PJB)(4FTX4FT)	EA	1
467 6005	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	1

STRUCTURE 01
PROFILE

*EXISTING CMP YIELDS CAPACITY OF 10.99, WITH A 25-YR EVENT THERE IS A FLOW OF 19.2 CFS (INFORMATION RECEIVED FROM CIBOLO CREEK CHURCH DESIGNERS). THE PROPOSED RCP YIELDS A CAPACITY OF 21.96CFS WITH FREE FLOW CONDITIONS. HGL WAS MODELED IN GEOPAK DRAINAGE.



NO.	DATE	REVISION	APPR BY

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139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

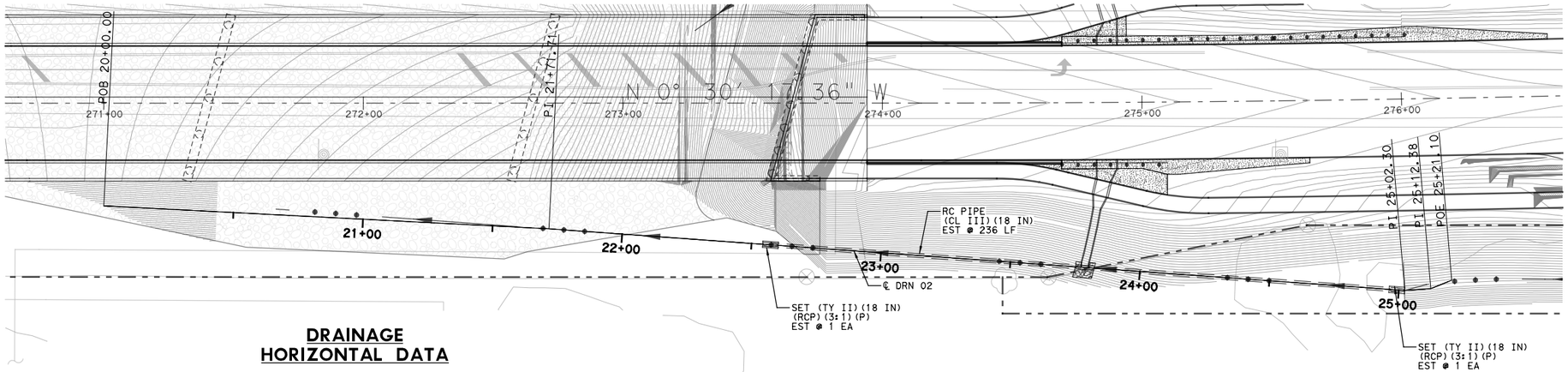
FM 3351 AT CIBOLO CREEK

DRAINAGE
PLAN & PROFILE

SCALE: 1"=50'-H
1"=10'-V

SHEET 1 OF 2

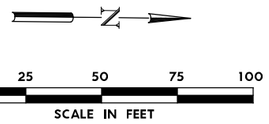
DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	131



DRAINAGE
HORIZONTAL DATA

Project Name: FM 3351
Description: Horizontal Alignment Name: DRN*02

		STATION	NORTHING	EASTING
Element:	Linear			
	POB ( )	20+00.00	13820815.208	2088430.543
	PI ( )	21+71.71	13820986.759	2088437.849
	Tangent Direction:	87.6°		
	Tangent Length:	171.7067		
Element:	Linear			
	PI ( )	21+71.71	13820986.759	2088437.849
	PI ( )	25+02.30	13821316.695	2088458.687
	Tangent Direction:	86.4°		
	Tangent Length:	330.5933		
Element:	Linear			
	PI ( )	25+02.30	13821316.695	2088458.687
	PI ( )	25+12.38	13821326.744	2088457.899
	Tangent Direction:	94.5°		
	Tangent Length:	10.0800		
Element:	Linear			
	PI ( )	25+12.38	13821326.744	2088457.899
	POE ( )	25+21.10	13821334.806	2088454.568
	Tangent Direction:	112.4°		
	Tangent Length:	8.7230		



DRAINAGE LEGEND

FLOW ARROW

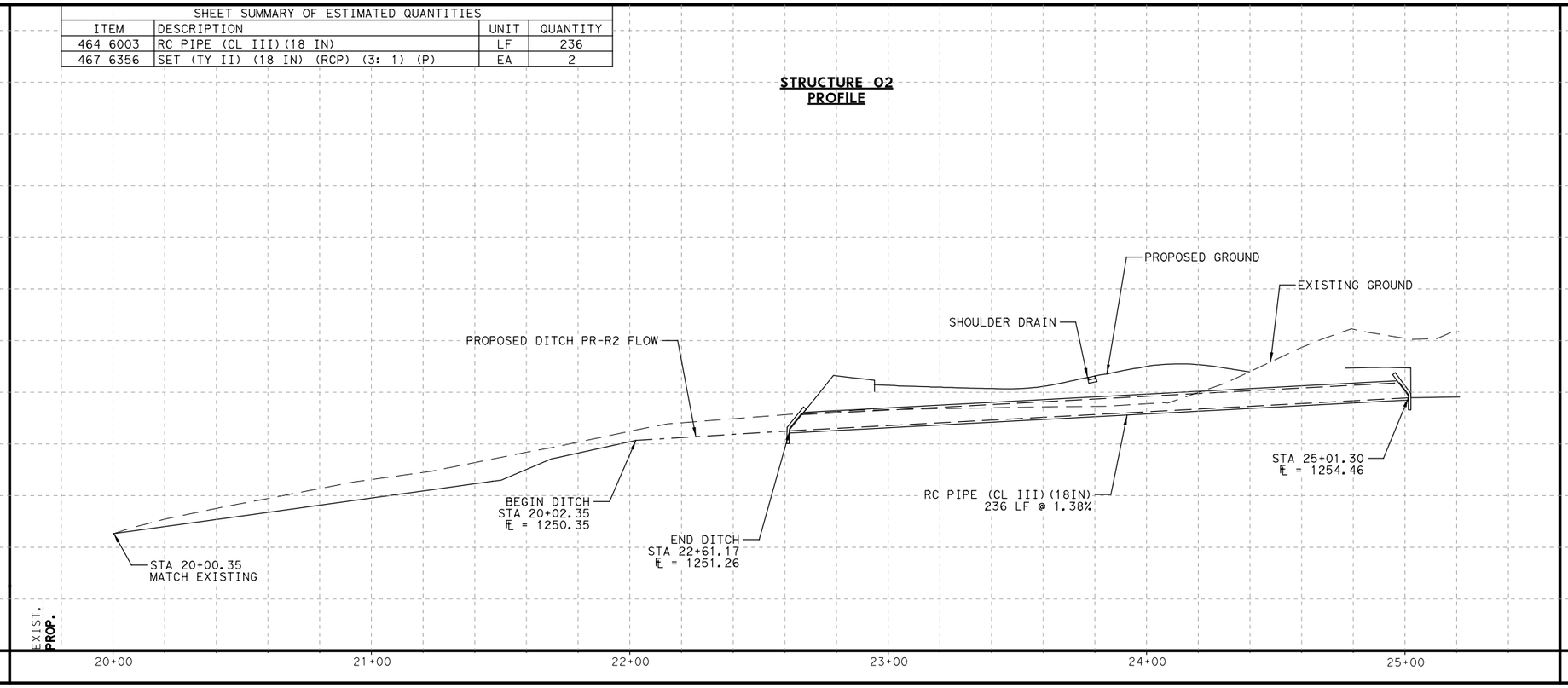
PROPOSED RCP PIPE

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
5. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR F.O. LOCATES.

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
464 6003	RC PIPE (CL III)(18 IN)	LF	236
467 6356	SET (TY II) (18 IN) (RCP) (3: 1) (P)	EA	2

STRUCTURE 02
PROFILE



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DRAINAGE
PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 2 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	132

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:19:02 AM
File Name:FM3351*DRN*02.dgn
User Name:GARODRIGUE

<* 1 Describe Chain PR-LD-01

Beginning chain PR-LD-01 description
Feature: Geom_Centerline

Point 74376 N 13,818,741.2640 E 2,088,360.0680 Sta 10+00.00
Course from 74376 to 74377 N 9° 56' 11.44" W Dist 49.0673
Point 74377 N 13,818,789.5953 E 2,088,351.6011 Sta 10+49.07
Course from 74377 to 74378 N 69° 49' 16.98" W Dist 14.0000
Point 74378 N 13,818,794.4246 E 2,088,338.4604 Sta 10+63.07
Course from 74378 to 74379 N 11° 43' 59.28" E Dist 24.9266
Point 74379 N 13,818,818.8303 E 2,088,343.5293 Sta 10+87.99
Course from 74379 to 74380 N 3° 31' 33.65" E Dist 10.5820
Point 74380 N 13,818,829.3922 E 2,088,344.1801 Sta 10+98.58
Course from 74380 to 74381 N 2° 19' 22.37" E Dist 30.4431
Point 74381 N 13,818,859.8103 E 2,088,345.4140 Sta 11+29.02
Course from 74381 to 74382 N 0° 31' 15.66" W Dist 40.5901
Point 74382 N 13,818,900.3988 E 2,088,345.0449 Sta 11+69.61
Course from 74382 to 74383 N 0° 33' 34.37" W Dist 40.5908
Point 74383 N 13,818,940.9876 E 2,088,344.6485 Sta 12+10.20
Course from 74383 to 74384 N 0° 33' 34.37" W Dist 40.5908
Point 74384 N 13,818,981.5765 E 2,088,344.2521 Sta 12+50.79
Course from 74384 to 74385 N 0° 33' 34.30" W Dist 40.5908
Point 74385 N 13,819,022.1654 E 2,088,343.8557 Sta 12+91.38
Course from 74385 to 74386 N 0° 33' 34.34" W Dist 40.5908
Point 74386 N 13,819,062.7542 E 2,088,343.4593 Sta 13+31.97
Course from 74386 to 74387 N 0° 30' 58.59" W Dist 10.1477
Point 74387 N 13,819,072.9015 E 2,088,343.3679 Sta 13+42.12
Course from 74387 to 74388 N 0° 30' 48.01" W Dist 30.4431
Point 74388 N 13,819,103.3434 E 2,088,343.0951 Sta 13+72.56
Course from 74388 to 74389 N 0° 06' 25.85" E Dist 40.5908
Point 74389 N 13,819,143.9341 E 2,088,343.1711 Sta 14+13.15
Course from 74389 to 74390 N 0° 10' 24.52" E Dist 10.1477
Point 74390 N 13,819,154.0817 E 2,088,343.2018 Sta 14+23.30
Course from 74390 to 74391 N 0° 10' 39.19" E Dist 25.9129
Point 74391 N 13,819,179.9945 E 2,088,343.2821 Sta 14+49.21
Course from 74391 to 74392 N 0° 28' 03.93" W Dist 31.0359
Point 74392 N 13,819,211.0293 E 2,088,343.0287 Sta 14+80.25
Course from 74392 to 74393 N 0° 42' 24.83" W Dist 6.9355
Point 74393 N 13,819,217.9643 E 2,088,342.9431 Sta 14+87.19
Course from 74393 to 74394 N 2° 56' 57.12" W Dist 15.4653
Point 74394 N 13,819,233.4092 E 2,088,342.1474 Sta 15+02.65
Course from 74394 to 74395 N 3° 17' 47.76" W Dist 5.1551
Point 74395 N 13,819,238.5557 E 2,088,341.8510 Sta 15+07.81
Course from 74395 to 74396 N 3° 21' 03.71" W Dist 15.4653
Point 74396 N 13,819,253.9946 E 2,088,340.9470 Sta 15+23.27
Course from 74396 to 74397 N 3° 21' 03.71" W Dist 20.6204
Point 74397 N 13,819,274.5797 E 2,088,339.7417 Sta 15+43.89
Course from 74397 to 74398 N 3° 21' 09.34" W Dist 20.6204
Point 74398 N 13,819,295.1648 E 2,088,338.5358 Sta 15+64.51
Course from 74398 to 74399 N 6° 41' 48.10" W Dist 15.4641
Point 74399 N 13,819,310.5234 E 2,088,336.7325 Sta 15+79.98
Course from 74399 to 74400 N 22° 35' 36.83" W Dist 6.3021
Point 74400 N 13,819,316.3418 E 2,088,334.3113 Sta 15+86.28
Course from 74400 to 74401 N 2° 53' 24.91" W Dist 6.0667
Point 74401 N 13,819,322.4008 E 2,088,334.0054 Sta 15+92.35
Course from 74401 to 74402 N 1° 33' 53.83" W Dist 14.0215
Point 74402 N 13,819,336.4171 E 2,088,333.6224 Sta 16+06.37
Course from 74402 to 74403 N 0° 51' 36.00" W Dist 7.5997
Point 74403 N 13,819,344.0160 E 2,088,333.5084 Sta 16+13.97
Course from 74403 to 74404 N 0° 50' 10.44" W Dist 7.6004
Point 74404 N 13,819,351.6156 E 2,088,333.3974 Sta 16+21.57
Course from 74404 to 74405 N 0° 47' 56.54" W Dist 7.6000
Point 74405 N 13,819,359.2149 E 2,088,333.2914 Sta 16+29.17
Course from 74405 to 74406 N 0° 45' 36.01" W Dist 7.6012
Point 74406 N 13,819,366.8154 E 2,088,333.1906 Sta 16+36.77
Course from 74406 to 74407 N 14° 30' 42.55" W Dist 7.8491
Point 74407 N 13,819,374.4141 E 2,088,331.2238 Sta 16+44.62
Course from 74407 to 74408 N 4° 24' 14.97" W Dist 9.0530

<* 1 Describe Chain PR-LD-01

Beginning chain PR-LD-01 description
Feature: Geom_Centerline

Point 74408 N 13,819,383.4403 E 2,088,330.5286 Sta 16+53.67
Course from 74408 to 74409 N 3° 21' 10.91" W Dist 9.2850
Point 74409 N 13,819,392.7094 E 2,088,329.9855 Sta 16+62.96
Course from 74409 to 74410 N 3° 30' 52.25" W Dist 9.2879
Point 74410 N 13,819,401.9799 E 2,088,329.4162 Sta 16+72.24
Course from 74410 to 74411 N 3° 32' 58.67" W Dist 9.2885
Point 74411 N 13,819,411.2506 E 2,088,328.8411 Sta 16+81.53
Course from 74411 to 74412 N 3° 43' 19.70" W Dist 18.5831
Point 74412 N 13,819,429.7945 E 2,088,327.6347 Sta 17+00.11
Course from 74412 to 74413 N 1° 27' 35.92" W Dist 15.6443
Point 74413 N 13,819,445.4337 E 2,088,327.2361 Sta 17+15.76
Course from 74413 to 74414 N 0° 06' 24.98" W Dist 15.6377
Point 74414 N 13,819,461.0714 E 2,088,327.2069 Sta 17+31.40
Course from 74414 to 74415 N 2° 11' 28.99" E Dist 15.6446
Point 74415 N 13,819,476.7046 E 2,088,327.8052 Sta 17+47.04
Course from 74415 to 74416 N 1° 07' 45.98" E Dist 25.6942
Point 74416 N 13,819,502.3937 E 2,088,328.3116 Sta 17+72.74
Course from 74416 to 74417 N 1° 41' 19.38" W Dist 8.0867
Point 74417 N 13,819,510.4770 E 2,088,328.0733 Sta 17+80.82
Course from 74417 to 74418 N 0° 37' 44.32" E Dist 8.0782
Point 74418 N 13,819,518.5546 E 2,088,328.1620 Sta 17+88.90
Course from 74418 to 74419 N 4° 32' 00.04" E Dist 8.0928
Point 74419 N 13,819,526.6221 E 2,088,328.8016 Sta 17+96.99
Course from 74419 to 74420 N 4° 40' 00.30" E Dist 8.3851
Point 74420 N 13,819,534.9794 E 2,088,329.4838 Sta 18+05.38
Course from 74420 to 74421 N 4° 39' 08.07" E Dist 17.1534
Point 74421 N 13,819,552.0763 E 2,088,330.8751 Sta 18+22.53
Course from 74421 to 74422 N 4° 31' 14.62" E Dist 8.5731
Point 74422 N 13,819,560.6227 E 2,088,331.5508 Sta 18+31.10
Course from 74422 to 74423 N 14° 19' 46.61" E Dist 9.6212
Point 74423 N 13,819,569.9446 E 2,088,333.9321 Sta 18+40.73
Course from 74423 to 74424 N 0° 52' 55.23" W Dist 10.5733
Point 74424 N 13,819,580.5166 E 2,088,333.7693 Sta 18+51.30
Course from 74424 to 74425 N 0° 58' 18.55" W Dist 10.5739
Point 74425 N 13,819,591.0890 E 2,088,333.5900 Sta 18+61.87
Course from 74425 to 74426 N 1° 10' 26.26" W Dist 10.5747
Point 74426 N 13,819,601.6615 E 2,088,333.3733 Sta 18+72.45
Course from 74426 to 74427 N 1° 14' 29.79" W Dist 10.5753
Point 74427 N 13,819,612.2344 E 2,088,333.1442 Sta 18+83.02
Course from 74427 to 74428 N 1° 24' 34.27" W Dist 10.5778
Point 74428 N 13,819,622.8090 E 2,088,332.8840 Sta 18+93.60
Course from 74428 to 74429 N 1° 29' 36.96" W Dist 10.5792
Point 74429 N 13,819,633.3847 E 2,088,332.6082 Sta 19+04.18
Course from 74429 to 74430 N 1° 37' 48.42" W Dist 10.5806
Point 74430 N 13,819,643.9610 E 2,088,332.3073 Sta 19+14.76
Course from 74430 to 74431 N 1° 46' 14.19" W Dist 10.5802
Point 74431 N 13,819,654.5361 E 2,088,331.9804 Sta 19+25.34
Course from 74431 to 74432 N 1° 56' 35.56" W Dist 10.5794
Point 74432 N 13,819,665.1095 E 2,088,331.6216 Sta 19+35.92
Course from 74432 to 74433 N 2° 07' 48.70" W Dist 10.5759
Point 74433 N 13,819,675.6780 E 2,088,331.2285 Sta 19+46.50
Course from 74433 to 74434 N 2° 18' 54.29" W Dist 10.5770
Point 74434 N 13,819,686.2464 E 2,088,330.8013 Sta 19+57.07
Course from 74434 to 74435 N 2° 23' 22.78" W Dist 10.5775
Point 74435 N 13,819,696.8148 E 2,088,330.3602 Sta 19+67.65
Course from 74435 to 74436 N 2° 23' 23.51" W Dist 10.5771
Point 74436 N 13,819,707.3827 E 2,088,329.9192 Sta 19+78.23
Course from 74436 to 74437 N 2° 23' 24.06" W Dist 10.5768
Point 74437 N 13,819,717.9503 E 2,088,329.4781 Sta 19+88.80
Course from 74437 to 74438 N 2° 23' 28.06" W Dist 10.5747
Point 74438 N 13,819,728.5158 E 2,088,329.0369 Sta 19+99.38
Course from 74438 to 74439 N 2° 23' 28.06" W Dist 10.5747
Point 74439 N 13,819,739.0813 E 2,088,328.5957 Sta 20+09.95
Course from 74439 to 74440 N 2° 36' 28.44" W Dist 2.8487

<* 1 Describe Chain PR-LD-01

Beginning chain PR-LD-01 description
Feature: Geom_Centerline

Point 74440 N 13,819,741.9270 E 2,088,328.4661 Sta 20+12.80
Course from 74440 to 74441 N 2° 36' 28.44" W Dist 7.7131
Point 74441 N 13,819,749.6321 E 2,088,328.1152 Sta 20+20.52
Course from 74441 to 74442 N 2° 06' 13.10" W Dist 13.1997
Point 74442 N 13,819,762.8229 E 2,088,327.6306 Sta 20+33.72
Course from 74442 to 74443 N 2° 17' 49.45" W Dist 14.9561
Point 74443 N 13,819,777.7671 E 2,088,327.0312 Sta 20+48.67
Course from 74443 to 74444 N 3° 02' 46.48" W Dist 14.9621
Point 74444 N 13,819,792.7080 E 2,088,326.2361 Sta 20+63.63
Course from 74444 to 74445 N 3° 49' 52.58" W Dist 14.9410
Point 74445 N 13,819,807.6156 E 2,088,325.2377 Sta 20+78.58
Course from 74445 to 74446 N 4° 32' 56.04" W Dist 14.9980
Point 74446 N 13,819,822.5664 E 2,088,324.0482 Sta 20+93.57
Course from 74446 to 74447 N 5° 17' 29.66" W Dist 15.0709
Point 74447 N 13,819,837.5730 E 2,088,322.6583 Sta 21+08.64
Course from 74447 to 74448 N 5° 48' 58.83" W Dist 15.0814
Point 74448 N 13,819,852.5768 E 2,088,321.1300 Sta 21+23.73
Course from 74448 to 74449 N 5° 03' 13.97" W Dist 15.0497
Point 74449 N 13,819,867.5679 E 2,088,319.8042 Sta 21+38.77
Course from 74449 to 74450 N 1° 01' 06.02" E Dist 15.4081
Point 74450 N 13,819,882.9736 E 2,088,320.0781 Sta 21+54.18
Course from 74450 to 74451 N 4° 31' 48.23" W Dist 17.4207
Point 74451 N 13,819,900.3399 E 2,088,318.7021 Sta 21+71.60
Course from 74451 to 74452 N 6° 18' 02.95" W Dist 17.4740
Point 74452 N 13,819,917.7083 E 2,088,316.7844 Sta 21+89.08
Course from 74452 to 74453 N 5° 48' 26.51" E Dist 17.6130
Point 74453 N 13,819,935.2309 E 2,088,318.5665 Sta 22+06.69
Course from 74453 to 74454 N 4° 40' 15.57" E Dist 17.2451
Point 74454 N 13,819,952.4187 E 2,088,319.9709 Sta 22+23.94
Course from 74454 to 74455 N 1° 37' 19.79" E Dist 17.3732
Point 74455 N 13,819,969.7850 E 2,088,320.4627 Sta 22+41.31
Course from 74455 to 74456 N 4° 42' 04.97" W Dist 16.1129
Point 74456 N 13,819,985.8437 E 2,088,319.1420 Sta 22+57.42
Course from 74456 to 74457 N 6° 02' 06.19" W Dist 10.9391
Point 74457 N 13,819,996.7222 E 2,088,317.9919 Sta 22+68.36
Course from 74457 to 74458 N 5° 48' 36.42" W Dist 10.9416
Point 74458 N 13,820,007.6076 E 2,088,316.8843 Sta 22+79.30
Course from 74458 to 74459 N 1° 37' 36.86" W Dist 10.8860
Point 74459 N 13,820,018.4892 E 2,088,316.5752 Sta 22+90.19
Course from 74459 to 74460 N 4° 42' 19.44" E Dist 10.9113
Point 74460 N 13,820,029.3637 E 2,088,317.4703 Sta 23+01.10
Course from 74460 to 74461 N 7° 42' 51.68" E Dist 10.9684
Point 74461 N 13,820,040.2329 E 2,088,318.9426 Sta 23+12.07
Course from 74461 to 74462 N 7° 58' 49.83" E Dist 10.9134
Point 74462 N 13,820,051.0406 E 2,088,320.4578 Sta 23+22.98
Course from 74462 to 74463 N 8° 12' 46.33" E Dist 10.9200
Point 74463 N 13,820,061.8486 E 2,088,322.0178 Sta 23+33.90
Course from 74463 to 74464 N 5° 01' 37.20" E Dist 10.3428
Point 74464 N 13,820,072.1516 E 2,088,322.9240 Sta 23+44.24
Course from 74464 to 74465 N 1° 28' 20.41" W Dist 7.9420
Point 74465 N 13,820,080.0910 E 2,088,322.7200 Sta 23+52.19
Course from 74465 to 74466 N 6° 01' 27.59" W Dist 7.9772
Point 74466 N 13,820,088.0241 E 2,088,321.8828 Sta 23+60.16
Course from 74466 to 74467 N 7° 10' 15.35" W Dist 8.2640
Point 74467 N 13,820,096.2234 E 2,088,320.8512 Sta 23+68.43
Course from 74467 to 74468 N 2° 46' 54.43" W Dist 6.9517
Point 74468 N 13,820,103.1669 E 2,088,320.5138 Sta 23+75.38
Course from 74468 to 74469 N 7° 57' 31.02" E Dist 0.7806
Point 74469 N 13,820,103.9400 E 2,088,320.6219 Sta 23+76.16
Course from 74469 to 74470 N 7° 57' 31.06" E Dist 0.7806
Point 74470 N 13,820,104.7131 E 2,088,320.7300 Sta 23+76.94
Course from 74470 to 74471 N 7° 57' 31.06" E Dist 0.7806
Point 74471 N 13,820,105.4862 E 2,088,320.8381 Sta 23+77.72
Course from 74471 to 74472 N 0° 24' 25.89" W Dist 12.0708

<* 1 Describe Chain PR-LD-01

Beginning chain PR-LD-01 description
Feature: Geom_Centerline

Point 74472 N 13,820,117.5567 E 2,088,320.7523
Sta 23+89.79
Course from 74472 to 74473 N 3° 08' 54.06" E Dist 22.1142
Point 74473 N 13,820,139.6375 E 2,088,321.9668
Sta 24+11.91

Ending chain PR-LD-01 description

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 4

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	133

<* 1 Describe Chain PR-LD-02

Chain PR-LD-02 contains:
74474 74475 74476 74477 74478 74479 74480 74481 74482 74483 74484 74485 74486 - 74487 74488 74489 74490 74491 74492 74493 74494 74495 74496 74497 74498 74499 7- 4500 74501 74502 74503 74504 74505 74506 74507 74508 74509 74510 74511 74512 74- 513 74514 74515 74516 74517 74518 74519 74520 74521 74522 74523 74524 74525 745- 26 74527 74528 74529 74530 74531 74532 74533 74534 74535 74536 74537 74538 7453- 9 74540 74541 74542 74543 74544 74545 74546 74547 74548 74549

Beginning chain PR-LD-02 description
Feature: Geom_Centerline

Point 74474	N 13,821,042.4528	E 2,088,361.0479	Sta	40+00.00
Course from 74474 to 74475 N 36° 29′ 09.00" W Dist 81.8840				
Point 74475	N 13,821,108.2878	E 2,088,312.3577	Sta	40+81.88
Course from 74475 to 74476 N 4° 19′ 08.54" W Dist 3.1756				
Point 74476	N 13,821,111.4544	E 2,088,312.1185	Sta	40+85.06
Course from 74476 to 74477 N 11° 16′ 58.02" E Dist 2.1086				
Point 74477	N 13,821,113.5223	E 2,088,312.5311	Sta	40+87.17
Course from 74477 to 74478 N 0° 37′ 49.90" W Dist 37.3378				
Point 74478	N 13,821,150.8578	E 2,088,312.1202	Sta	41+24.51
Course from 74478 to 74479 N 0° 34′ 42.39" W Dist 17.5587				
Point 74479	N 13,821,168.4156	E 2,088,311.9429	Sta	41+42.06
Course from 74479 to 74480 N 3° 04′ 33.62" W Dist 3.7760				
Point 74480	N 13,821,172.1862	E 2,088,311.7403	Sta	41+45.84
Course from 74480 to 74481 N 5° 58′ 46.54" W Dist 5.8532				
Point 74481	N 13,821,178.0075	E 2,088,311.1306	Sta	41+51.69
Course from 74481 to 74482 N 11° 27′ 33.21" W Dist 7.4165				
Point 74482	N 13,821,185.2762	E 2,088,309.6571	Sta	41+59.11
Course from 74482 to 74483 N 11° 23′ 47.12" W Dist 20.8947				
Point 74483	N 13,821,205.7589	E 2,088,305.5284	Sta	41+80.01
Course from 74483 to 74484 N 12° 18′ 55.51" W Dist 6.3829				
Point 74484	N 13,821,211.9949	E 2,088,304.1670	Sta	41+86.39
Course from 74484 to 74485 N 7° 21′ 47.16" W Dist 14.6962				
Point 74485	N 13,821,226.5699	E 2,088,302.2836	Sta	42+01.08
Course from 74485 to 74486 N 1° 51′ 08.63" W Dist 8.9989				
Point 74486	N 13,821,235.5642	E 2,088,301.9927	Sta	42+10.08
Course from 74486 to 74487 N 1° 40′ 31.48" E Dist 8.9780				
Point 74487	N 13,821,244.5383	E 2,088,302.2552	Sta	42+19.06
Course from 74487 to 74488 N 1° 32′ 01.18" E Dist 31.1538				
Point 74488	N 13,821,275.6810	E 2,088,303.0890	Sta	42+50.21
Course from 74488 to 74489 N 0° 04′ 34.96" E Dist 40.7588				
Point 74489	N 13,821,316.4397	E 2,088,303.1433	Sta	42+90.97
Course from 74489 to 74490 N 1° 39′ 22.75" W Dist 33.6039				
Point 74490	N 13,821,350.0295	E 2,088,302.1720	Sta	43+24.58
Course from 74490 to 74491 N 0° 57′ 11.80" W Dist 12.4302				
Point 74491	N 13,821,362.4580	E 2,088,301.9652	Sta	43+37.01
Course from 74491 to 74492 N 4° 18′ 54.96" E Dist 49.0307				
Point 74492	N 13,821,411.3497	E 2,088,305.6545	Sta	43+86.04
Course from 74492 to 74493 N 7° 13′ 23.80" E Dist 52.3841				
Point 74493	N 13,821,463.3181	E 2,088,312.2411	Sta	44+38.42
Course from 74493 to 74494 N 7° 51′ 01.78" E Dist 16.8782				
Point 74494	N 13,821,480.0381	E 2,088,314.5464	Sta	44+55.30
Course from 74494 to 74495 N 2° 12′ 49.17" E Dist 11.7249				
Point 74495	N 13,821,491.7542	E 2,088,314.9993	Sta	44+67.03
Course from 74495 to 74496 N 2° 07′ 43.16" E Dist 12.0028				
Point 74496	N 13,821,503.7487	E 2,088,315.4452	Sta	44+79.03
Course from 74496 to 74497 N 1° 51′ 15.01" E Dist 12.9976				
Point 74497	N 13,821,516.7395	E 2,088,315.8657	Sta	44+92.03
Course from 74497 to 74498 N 1° 33′ 27.97" E Dist 14.2756				
Point 74498	N 13,821,531.0098	E 2,088,316.2538	Sta	45+06.30
Course from 74498 to 74499 N 1° 23′ 17.82" E Dist 14.2758				
Point 74499	N 13,821,545.2814	E 2,088,316.5997	Sta	45+20.58
Course from 74499 to 74500 N 0° 06′ 07.60" E Dist 17.4011				
Point 74500	N 13,821,562.6825	E 2,088,316.6307	Sta	45+37.98
Course from 74500 to 74501 N 0° 55′ 57.04" E Dist 10.6622				
Point 74501	N 13,821,573.3433	E 2,088,316.8042	Sta	45+48.64
Course from 74501 to 74502 N 0° 33′ 03.53" E Dist 19.5334				
Point 74502	N 13,821,592.8757	E 2,088,316.9920	Sta	45+68.17
Course from 74502 to 74503 N 0° 39′ 09.53" W Dist 10.7773				

<* 1 Describe Chain PR-LD-02

Chain PR-LD-02 contains:
74474 74475 74476 74477 74478 74479 74480 74481 74482 74483 74484 74485 74486 - 74487 74488 74489 74490 74491 74492 74493 74494 74495 74496 74497 74498 74499 7- 4500 74501 74502 74503 74504 74505 74506 74507 74508 74509 74510 74511 74512 74- 513 74514 74515 74516 74517 74518 74519 74520 74521 74522 74523 74524 74525 745- 26 74527 74528 74529 74530 74531 74532 74533 74534 74535 74536 74537 74538 7453- 9 74540 74541 74542 74543 74544 74545 74546 74547 74548 74549

Beginning chain PR-LD-02 description
Feature: Geom_Centerline

Point 74503	N 13,821,603.6523	E 2,088,316.8693	Sta	45+78.95
Course from 74503 to 74504 N 0° 45′ 22.56" W Dist 9.7621				
Point 74504	N 13,821,613.4136	E 2,088,316.7404	Sta	45+88.71
Course from 74504 to 74505 N 0° 18′ 01.91" E Dist 7.2497				
Point 74505	N 13,821,620.6633	E 2,088,316.7784	Sta	45+95.96
Course from 74505 to 74506 N 0° 06′ 24.42" E Dist 7.1151				
Point 74506	N 13,821,627.7783	E 2,088,316.7917	Sta	46+03.08
Course from 74506 to 74507 N 0° 01′ 45.40" E Dist 6.8112				
Point 74507	N 13,821,634.5896	E 2,088,316.7952	Sta	46+09.89
Course from 74507 to 74508 N 1° 04′ 18.52" W Dist 7.8706				
Point 74508	N 13,821,642.4588	E 2,088,316.6480	Sta	46+17.76
Course from 74508 to 74509 N 1° 13′ 33.47" W Dist 8.1361				
Point 74509	N 13,821,650.5930	E 2,088,316.4739	Sta	46+25.90
Course from 74509 to 74510 N 0° 26′ 11.83" W Dist 7.1259				
Point 74510	N 13,821,657.7187	E 2,088,316.4196	Sta	46+33.02
Course from 74510 to 74511 N 0° 37′ 26.16" E Dist 6.0917				
Point 74511	N 13,821,663.8099	E 2,088,316.4859	Sta	46+39.11
Course from 74511 to 74512 N 1° 45′ 09.66" E Dist 5.2752				
Point 74512	N 13,821,669.0826	E 2,088,316.6473	Sta	46+44.39
Course from 74512 to 74513 N 1° 01′ 27.89" E Dist 5.8115				
Point 74513	N 13,821,674.8932	E 2,088,316.7512	Sta	46+50.20
Course from 74513 to 74514 N 0° 43′ 09.08" E Dist 6.0854				
Point 74514	N 13,821,680.9781	E 2,088,316.8275	Sta	46+56.29
Course from 74514 to 74515 N 0° 51′ 01.28" E Dist 5.9946				
Point 74515	N 13,821,686.9721	E 2,088,316.9165	Sta	46+62.28
Course from 74515 to 74516 N 1° 04′ 17.74" E Dist 5.8448				
Point 74516	N 13,821,692.8158	E 2,088,317.0258	Sta	46+68.13
Course from 74516 to 74517 N 1° 06′ 43.39" E Dist 5.8446				
Point 74517	N 13,821,698.6594	E 2,088,317.1392	Sta	46+73.97
Course from 74517 to 74518 N 1° 07′ 18.47" E Dist 5.8447				
Point 74518	N 13,821,704.5030	E 2,088,317.2537	Sta	46+79.81
Course from 74518 to 74519 N 1° 09′ 34.75" E Dist 5.8451				
Point 74519	N 13,821,710.3469	E 2,088,317.3720	Sta	46+85.66
Course from 74519 to 74520 N 0° 30′ 29.80" W Dist 4.8307				
Point 74520	N 13,821,715.1774	E 2,088,317.3291	Sta	46+90.49
Course from 74520 to 74521 N 5° 25′ 47.95" W Dist 4.8439				
Point 74521	N 13,821,719.9996	E 2,088,316.8707	Sta	46+95.33
Course from 74521 to 74522 N 2° 23′ 47.03" W Dist 4.8326				
Point 74522	N 13,821,724.8279	E 2,088,316.6687	Sta	47+00.17
Course from 74522 to 74523 N 4° 09′ 39.13" E Dist 4.8545				
Point 74523	N 13,821,729.6696	E 2,088,317.0209	Sta	47+05.02
Course from 74523 to 74524 N 4° 10′ 11.08" E Dist 4.8545				
Point 74524	N 13,821,734.5112	E 2,088,317.3739	Sta	47+09.88
Course from 74524 to 74525 N 4° 12′ 15.78" E Dist 4.8544				
Point 74525	N 13,821,739.3526	E 2,088,317.7298	Sta	47+14.73
Course from 74525 to 74526 N 4° 14′ 38.36" E Dist 9.7083				
Point 74526	N 13,821,749.0342	E 2,088,318.4482	Sta	47+24.44
Course from 74526 to 74527 N 2° 28′ 45.04" E Dist 5.7152				
Point 74527	N 13,821,754.7441	E 2,088,318.6954	Sta	47+30.15
Course from 74527 to 74528 N 1° 35′ 03.76" E Dist 6.2918				
Point 74528	N 13,821,761.0335	E 2,088,318.8694	Sta	47+36.45
Course from 74528 to 74529 N 0° 58′ 23.81" W Dist 8.7934				
Point 74529	N 13,821,769.8256	E 2,088,318.7200	Sta	47+45.24
Course from 74529 to 74530 N 1° 58′ 02.63" W Dist 10.4671				
Point 74530	N 13,821,780.2865	E 2,088,318.3607	Sta	47+55.71
Course from 74530 to 74531 N 1° 54′ 43.88" W Dist 10.4677				
Point 74531	N 13,821,790.7483	E 2,088,318.0114	Sta	47+66.17
Course from 74531 to 74532 N 1° 51′ 37.19" W Dist 10.4682				

<* 1 Describe Chain PR-LD-02

Chain PR-LD-02 contains:
74474 74475 74476 74477 74478 74479 74480 74481 74482 74483 74484 74485 74486 - 74487 74488 74489 74490 74491 74492 74493 74494 74495 74496 74497 74498 74499 7- 4500 74501 74502 74503 74504 74505 74506 74507 74508 74509 74510 74511 74512 74- 513 74514 74515 74516 74517 74518 74519 74520 74521 74522 74523 74524 74525 745- 26 74527 74528 74529 74530 74531 74532 74533 74534 74535 74536 74537 74538 7453- 9 74540 74541 74542 74543 74544 74545 74546 74547 74548 74549

Beginning chain PR-LD-02 description
Feature: Geom_Centerline

Point 74532	N 13,821,801.2110	E 2,088,317.6716	Sta	47+76.64
Course from 74532 to 74533 N 1° 15′ 39.31" W Dist 9.5223				
Point 74533	N 13,821,810.7309	E 2,088,317.4620	Sta	47+86.16
Course from 74533 to 74534 N 1° 13′ 07.06" W Dist 9.5233				
Point 74534	N 13,821,820.2521	E 2,088,317.2595	Sta	47+95.69
Course from 74534 to 74535 N 1° 10′ 07.01" W Dist 9.5239				
Point 74535	N 13,821,829.7740	E 2,088,317.0653	Sta	48+05.21
Course from 74535 to 74536 N 1° 07′ 08.88" W Dist 9.5241				
Point 74536	N 13,821,839.2963	E 2,088,316.8793	Sta	48+14.74
Course from 74536 to 74537 N 0° 52′ 12.93" W Dist 9.5240				
Point 74537	N 13,821,848.8192	E 2,088,316.7346	Sta	48+24.26
Course from 74537 to 74538 N 0° 10′ 40.06" W Dist 9.5244				
Point 74538	N 13,821,858.3436	E 2,088,316.7050	Sta	48+33.78
Course from 74538 to 74539 N 1° 47′ 48.54" E Dist 8.5796				
Point 74539	N 13,821,866.9190	E 2,088,316.9741	Sta	48+42.36
Course from 74539 to 74540 N 2° 42′ 08.89" E Dist 8.3475				
Point 74540	N 13,821,875.2572	E 2,088,317.3676	Sta	48+50.71
Course from 74540 to 74541 N 2° 59′ 25.08" E Dist 17.6812				
Point 74541	N 13,821,892.9143	E 2,088,318.2900	Sta	48+68.39
Course from 74541 to 74542 N 1° 44′ 37.84" E Dist 11.4173				
Point 74542	N 13,821,904.3264	E 2,088,318.6375	Sta	48+79.81
Course from 74542 to 74543 N 89° 30′ 23.81" E Dist 16.5956				
Point 74543	N 13,821,904.4693	E 2,088,335.2325	Sta	48+96.41
Course from 74543 to 74544 N 0° 24′ 40.91" W Dist 6.7222				
Point 74544	N 13,821,911.1913	E 2,088,335.1842	Sta	49+03.13
Course from 74544 to 74545 N 2° 07′ 40.69" W Dist 7.6812				
Point 74545	N 13,821,918.8672	E 2,088,334.8990	Sta	49+10.81
Course from 74545 to 74546 N 2° 07′ 40.69" W Dist 130.1212				
Point 74546	N 13,822,048.8987	E 2,088,330.0674	Sta	50+40.93
Course from 74546 to 74547 N 0° 24′ 40.82" W Dist 300.9960				
Point 74547	N 13,822,349.8869	E 2,088,327.9065	Sta	53+41.93
Course from 74547 to 74548 N 5° 29′ 10.89" W Dist 80.5586				
Point 74548	N 13,822,430.0764	E 2,088,320.2044	Sta	54+22.48
Course from 74548 to 74549 N 28° 00′ 10.67" E Dist 92.4392				
Point 74549	N 13,822,511.6931	E 2,088,363.6062	Sta	55+14.92

Ending chain PR-LD-02 description

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 4

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	134

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:19:24 AM
File Name: FM3351DITCH-ALN-002.dgn
User Name: GARODRIGUE

<* 1 Describe Chain PR-RD-01

Chain PR-RD-01 contains:

Beginning chain PR-RD-01 description
Feature: Geom_Centerline

Point 74550 N 13,818,753.2000 E 2,088,444.8540 Sta 25+00.00
Course from 74550 to 74551 N 3° 24′ 54.62" W Dist 102.7561
Point 74551 N 13,818,855.7736 E 2,088,438.7327 Sta 26+02.76
Course from 74551 to 74552 N 6° 55′ 58.00" W Dist 27.3755
Point 74552 N 13,818,882.9490 E 2,088,435.4284 Sta 26+30.13
Course from 74552 to 74553 N 79° 50′ 00.93" E Dist 15.1234
Point 74553 N 13,818,885.6184 E 2,088,450.3144 Sta 26+45.26
Course from 74553 to 74554 N 11° 41′ 02.42" W Dist 1.5268
Point 74554 N 13,818,887.1135 E 2,088,450.0052 Sta 26+46.78
Course from 74554 to 74555 N 11° 41′ 02.42" W Dist 7.4886
Point 74555 N 13,818,894.4469 E 2,088,448.4886 Sta 26+54.27
Course from 74555 to 74556 N 11° 38′ 54.95" W Dist 31.7297
Point 74556 N 13,818,925.5231 E 2,088,442.0821 Sta 26+86.00
Course from 74556 to 74557 N 5° 46′ 39.17" W Dist 13.5914
Point 74557 N 13,818,939.0454 E 2,088,440.7139 Sta 26+99.59
Course from 74557 to 74558 N 2° 43′ 01.72" W Dist 13.6014
Point 74558 N 13,818,952.6316 E 2,088,440.0691 Sta 27+13.19
Course from 74558 to 74559 N 5° 35′ 33.33" W Dist 9.0338
Point 74559 N 13,818,961.6223 E 2,088,439.1888 Sta 27+22.23
Course from 74559 to 74560 N 0° 29′ 42.80" W Dist 7.9932
Point 74560 N 13,818,969.6152 E 2,088,439.1197 Sta 27+30.22
Course from 74560 to 74561 N 0° 29′ 42.80" W Dist 31.9728
Point 74561 N 13,819,001.5868 E 2,088,438.8433 Sta 27+62.19
Course from 74561 to 74562 N 0° 29′ 42.80" W Dist 31.9728
Point 74562 N 13,819,033.5583 E 2,088,438.5670 Sta 27+94.17
Course from 74562 to 74563 N 0° 29′ 42.80" W Dist 31.9728
Point 74563 N 13,819,065.5299 E 2,088,438.2906 Sta 28+26.14
Course from 74563 to 74564 N 0° 29′ 42.80" W Dist 31.9728
Point 74564 N 13,819,097.5015 E 2,088,438.0143 Sta 28+58.11
Course from 74564 to 74565 N 0° 29′ 42.80" W Dist 31.9728
Point 74565 N 13,819,129.4730 E 2,088,437.7380 Sta 28+90.08
Course from 74565 to 74566 N 0° 29′ 42.80" W Dist 31.9728
Point 74566 N 13,819,161.4446 E 2,088,437.4616 Sta 29+22.06
Course from 74566 to 74567 N 0° 29′ 42.80" W Dist 31.9728
Point 74567 N 13,819,193.4162 E 2,088,437.1853 Sta 29+54.03
Course from 74567 to 74568 N 0° 29′ 42.80" W Dist 31.4258
Point 74568 N 13,819,224.8408 E 2,088,436.9137 Sta 29+85.45
Course from 74568 to 74569 N 0° 29′ 42.80" W Dist 30.2328
Point 74569 N 13,819,255.0725 E 2,088,436.6523 Sta 30+15.69
Course from 74569 to 74570 N 0° 29′ 42.80" W Dist 30.2328
Point 74570 N 13,819,285.3042 E 2,088,436.3910 Sta 30+45.92
Course from 74570 to 74571 N 18° 02′ 06.96" E Dist 12.5554
Point 74571 N 13,819,297.2428 E 2,088,440.2782 Sta 30+58.48
Course from 74571 to 74572 N 10° 52′ 54.46" E Dist 7.4883
Point 74572 N 13,819,304.5964 E 2,088,441.6919 Sta 30+65.96
Course from 74572 to 74573 N 10° 52′ 54.46" E Dist 7.4883
Point 74573 N 13,819,311.9501 E 2,088,443.1056 Sta 30+73.45
Course from 74573 to 74574 N 3° 20′ 37.03" W Dist 15.2099
Point 74574 N 13,819,327.1341 E 2,088,442.2185 Sta 30+88.66
Course from 74574 to 74575 N 3° 53′ 44.85" W Dist 13.6907
Point 74575 N 13,819,340.7932 E 2,088,441.2883 Sta 31+02.35
Course from 74575 to 74576 N 3° 15′ 47.31" E Dist 5.0854
Point 74576 N 13,819,345.8703 E 2,088,441.5778 Sta 31+07.44
Course from 74576 to 74577 N 3° 15′ 47.31" E Dist 5.0854
Point 74577 N 13,819,350.9474 E 2,088,441.8672 Sta 31+12.52
Course from 74577 to 74578 N 3° 16′ 23.49" E Dist 5.0853
Point 74578 N 13,819,356.0245 E 2,088,442.1576 Sta 31+17.61
Course from 74578 to 74579 N 3° 19′ 31.69" E Dist 5.0853
Point 74579 N 13,819,361.1012 E 2,088,442.4526 Sta 31+22.69
Course from 74579 to 74580 N 2° 15′ 59.98" E Dist 5.6149
Point 74580 N 13,819,366.7117 E 2,088,442.6746 Sta 31+28.31
Course from 74580 to 74581 N 0° 29′ 10.03" W Dist 15.4936

<* 1 Describe Chain PR-RD-01

Chain PR-RD-01 contains:

Beginning chain PR-RD-01 description
Feature: Geom_Centerline

Point 74581 N 13,819,382.2048 E 2,088,442.5432 Sta 31+43.80
Course from 74581 to 74582 N 0° 25′ 57.64" W Dist 7.7463
Point 74582 N 13,819,389.9508 E 2,088,442.4847 Sta 31+51.55
Course from 74582 to 74583 N 0° 22′ 13.33" W Dist 7.7449
Point 74583 N 13,819,397.6956 E 2,088,442.4346 Sta 31+59.29
Course from 74583 to 74584 N 0° 19′ 40.10" W Dist 7.7444
Point 74584 N 13,819,405.4399 E 2,088,442.3903 Sta 31+67.04
Course from 74584 to 74585 N 0° 19′ 40.10" W Dist 7.7444
Point 74585 N 13,819,413.1842 E 2,088,442.3460 Sta 31+74.78
Course from 74585 to 74586 N 0° 57′ 58.29" E Dist 6.6392
Point 74586 N 13,819,419.8225 E 2,088,442.4580 Sta 31+81.42
Course from 74586 to 74587 N 1° 21′ 42.52" E Dist 6.3635
Point 74587 N 13,819,426.1842 E 2,088,442.6092 Sta 31+87.79
Course from 74587 to 74588 N 2° 56′ 07.35" E Dist 6.3688
Point 74588 N 13,819,432.5447 E 2,088,442.9353 Sta 31+94.15
Course from 74588 to 74589 N 5° 19′ 32.97" E Dist 6.3866
Point 74589 N 13,819,438.9037 E 2,088,443.5281 Sta 32+00.54
Course from 74589 to 74590 N 9° 53′ 49.84" E Dist 6.4543
Point 74590 N 13,819,445.2619 E 2,088,444.6375 Sta 32+07.00
Course from 74590 to 74591 N 10° 31′ 29.44" E Dist 6.4668
Point 74591 N 13,819,451.6199 E 2,088,445.8187 Sta 32+13.46
Course from 74591 to 74592 N 1° 37′ 54.47" E Dist 3.0982
Point 74592 N 13,819,454.7169 E 2,088,445.9070 Sta 32+16.56
Course from 74592 to 74593 N 3° 46′ 08.89" E Dist 0.4631
Point 74593 N 13,819,455.1790 E 2,088,445.9374 Sta 32+17.02
Course from 74593 to 74594 N 6° 22′ 30.79" E Dist 6.0000
Point 74594 N 13,819,461.1419 E 2,088,446.6036 Sta 32+23.02
Course from 74594 to 74595 N 5° 37′ 33.21" E Dist 26.4722
Point 74595 N 13,819,487.4866 E 2,088,449.1988 Sta 32+49.50
Course from 74595 to 74596 N 6° 22′ 30.79" E Dist 6.0000
Point 74596 N 13,819,493.4495 E 2,088,449.8650 Sta 32+55.50
Course from 74596 to 74597 N 2° 37′ 58.92" E Dist 6.1167
Point 74597 N 13,819,499.5598 E 2,088,450.1460 Sta 32+61.61
Course from 74597 to 74598 N 2° 36′ 38.90" W Dist 8.6452
Point 74598 N 13,819,508.1960 E 2,088,449.7522 Sta 32+70.26
Course from 74598 to 74599 N 4° 36′ 27.75" W Dist 12.5396
Point 74599 N 13,819,520.6950 E 2,088,448.7449 Sta 32+82.80
Course from 74599 to 74600 N 5° 54′ 41.62" W Dist 17.8960
Point 74600 N 13,819,538.4958 E 2,088,446.9017 Sta 33+00.69
Course from 74600 to 74601 N 4° 42′ 12.63" W Dist 26.7805
Point 74601 N 13,819,565.1861 E 2,088,444.7057 Sta 33+27.47
Course from 74601 to 74602 N 0° 15′ 29.14" W Dist 15.0226
Point 74602 N 13,819,580.2086 E 2,088,444.6380 Sta 33+42.50
Course from 74602 to 74603 N 1° 21′ 41.07" E Dist 15.0086
Point 74603 N 13,819,595.2129 E 2,088,444.9946 Sta 33+57.51
Course from 74603 to 74604 N 3° 34′ 27.87" E Dist 27.9059
Point 74604 N 13,819,623.0645 E 2,088,446.7344 Sta 33+85.41
Course from 74604 to 74605 N 4° 07′ 38.18" E Dist 12.3731
Point 74605 N 13,819,635.4054 E 2,088,447.6249 Sta 33+97.78
Course from 74605 to 74606 N 8° 22′ 24.35" E Dist 12.4459
Point 74606 N 13,819,647.7186 E 2,088,449.4374 Sta 34+10.23
Course from 74606 to 74607 N 8° 24′ 13.12" E Dist 12.4457
Point 74607 N 13,819,660.0307 E 2,088,451.2562 Sta 34+22.68
Course from 74607 to 74608 N 11° 23′ 24.51" E Dist 13.4403
Point 74608 N 13,819,673.2063 E 2,088,453.9105 Sta 34+36.12
Course from 74608 to 74609 N 3° 26′ 15.77" E Dist 6.0000
Point 74609 N 13,819,679.1955 E 2,088,454.2703 Sta 34+42.12
Course from 74609 to 74610 N 3° 26′ 38.47" E Dist 37.1668
Point 74610 N 13,819,716.2952 E 2,088,456.5031 Sta 34+79.28
Course from 74610 to 74611 N 6° 05′ 31.95" E Dist 52.7050

<* 1 Describe Chain PR-RD-01

Chain PR-RD-01 contains:

Beginning chain PR-RD-01 description
Feature: Geom_Centerline

Point 74611 N 13,819,768.7026 E 2,088,462.0966 Sta 35+31.99
Course from 74611 to 74612 N 8° 10′ 15.71" E Dist 9.9873
Point 74612 N 13,819,778.5885 E 2,088,463.5161 Sta 35+41.98
Course from 74612 to 74613 N 7° 10′ 51.98" E Dist 6.4213
Point 74613 N 13,819,784.9593 E 2,088,464.3188 Sta 35+48.40
Course from 74613 to 74614 N 7° 53′ 20.37" E Dist 6.1318
Point 74614 N 13,819,791.0331 E 2,088,465.1604 Sta 35+54.53
Course from 74614 to 74615 N 8° 12′ 33.21" E Dist 6.1313
Point 74615 N 13,819,797.1016 E 2,088,466.0359 Sta 35+60.66
Course from 74615 to 74616 N 8° 35′ 13.35" E Dist 6.1366
Point 74616 N 13,819,803.1695 E 2,088,466.9521 Sta 35+66.80
Course from 74616 to 74617 N 8° 45′ 24.03" E Dist 6.1391
Point 74617 N 13,819,809.2370 E 2,088,467.8867 Sta 35+72.94
Course from 74617 to 74618 N 9° 04′ 29.10" E Dist 6.1627
Point 74618 N 13,819,815.3226 E 2,088,468.8587 Sta 35+79.10
Course from 74618 to 74619 N 9° 18′ 04.37" E Dist 6.1954
Point 74619 N 13,819,821.4366 E 2,088,469.8601 Sta 35+85.29
Course from 74619 to 74620 N 3° 05′ 17.93" E Dist 25.5056
Point 74620 N 13,819,846.9051 E 2,088,471.2342 Sta 36+10.80
Course from 74620 to 74621 N 3° 48′ 02.21" E Dist 32.8840
Point 74621 N 13,819,879.7169 E 2,088,473.4139 Sta 36+43.68
Course from 74621 to 74622 N 5° 44′ 55.64" E Dist 16.2141
Point 74622 N 13,819,895.8494 E 2,088,475.0380 Sta 36+59.90
Course from 74622 to 74623 N 5° 52′ 57.16" E Dist 15.5532
Point 74623 N 13,819,911.3207 E 2,088,476.6321 Sta 36+75.45
Course from 74623 to 74624 N 6° 48′ 57.78" E Dist 14.3771
Point 74624 N 13,819,925.5962 E 2,088,478.3384 Sta 36+89.83
Course from 74624 to 74625 N 7° 12′ 23.99" E Dist 14.0912
Point 74625 N 13,819,939.5761 E 2,088,480.1061 Sta 37+03.92
Course from 74625 to 74626 N 3° 33′ 12.33" W Dist 15.1427
Point 74626 N 13,819,954.6896 E 2,088,479.1675 Sta 37+19.06
Course from 74626 to 74627 N 3° 20′ 28.48" E Dist 15.8410
Point 74627 N 13,819,970.5037 E 2,088,480.0908 Sta 37+34.90
Course from 74627 to 74628 N 3° 00′ 40.35" E Dist 13.2078
Point 74628 N 13,819,983.6933 E 2,088,480.7846 Sta 37+48.11
Course from 74628 to 74629 N 2° 39′ 03.26" E Dist 5.3649
Point 74629 N 13,819,989.0524 E 2,088,481.0328 Sta 37+53.47
Course from 74629 to 74630 N 4° 05′ 22.46" E Dist 5.9480
Point 74630 N 13,819,994.9853 E 2,088,481.4569 Sta 37+59.42
Course from 74630 to 74631 N 3° 26′ 32.31" E Dist 9.2270
Point 74631 N 13,820,004.1957 E 2,088,482.0110 Sta 37+68.65
Course from 74631 to 74632 N 2° 58′ 30.31" E Dist 1.3971
Point 74632 N 13,820,005.5909 E 2,088,482.0835 Sta 37+70.05
Course from 74632 to 74633 N 1° 12′ 54.37" E Dist 4.4604
Point 74633 N 13,820,010.0502 E 2,088,482.1781 Sta 37+74.51
Course from 74633 to 74634 N 0° 35′ 13.36" W Dist 1.5208
Point 74634 N 13,820,011.5709 E 2,088,482.1625 Sta 37+76.03
Course from 74634 to 74635 N 2° 01′ 50.16" W Dist 1.5727
Point 74635 N 13,820,013.1426 E 2,088,482.1068 Sta 37+77.60
Course from 74635 to 74636 N 2° 01′ 50.16" W Dist 1.6821
Point 74636 N 13,820,014.8237 E 2,088,482.0472 Sta 37+79.28
Course from 74636 to 74637 N 3° 43′ 42.46" W Dist 1.0631
Point 74637 N 13,820,015.8845 E 2,088,481.9780 Sta 37+80.35
Course from 74637 to 74638 N 4° 43′ 11.45" W Dist 1.6493
Point 74638 N 13,820,017.5283 E 2,088,481.8423 Sta 37+82.00
Course from 74638 to 74639 N 7° 11′ 38.55" W Dist 6.5205
Point 74639 N 13,820,023.9975 E 2,088,481.0257 Sta 37+88.52
Course from 74639 to 74640 N 10° 13′ 30.86" W Dist 3.4701
Point 74640 N 13,820,027.4125 E 2,088,480.4097 Sta 37+91.99
Course from 74640 to 74641 N 11° 23′ 08.78" W Dist 6.1430
Point 74641 N 13,820,033.4346 E 2,088,479.1970 Sta 37+98.13
Course from 74641 to 74642 N 11° 12′ 55.60" W Dist 30.3845

<* 1 Describe Chain PR-RD-01

Chain PR-RD-01 contains:

Beginning chain PR-RD-01 description
Feature: Geom_Centerline

Point 74642 N 13,820,063.2388 E 2,088,473.2873 Sta 38+28.51
Course from 74642 to 74643 N 10° 11′ 27.74" W Dist 6.0915
Point 74643 N 13,820,069.2343 E 2,088,472.2095 Sta 38+34.61
Course from 74643 to 74644 N 6° 53′ 11.12" W Dist 5.7211
Point 74644 N 13,820,074.9141 E 2,088,471.5235 Sta 38+40.33
Course from 74644 to 74645 N 5° 16′ 06.74" W Dist 5.6382
Point 74645 N 13,820,080.5285 E 2,088,471.0058 Sta 38+45.96
Course from 74645 to 74646 N 3° 19′ 21.94" W Dist 1.3043
Point 74646 N 13,820,081.8306 E 2,088,470.9302 Sta 38+47.27
Course from 74646 to 74647 N 1° 19′ 57.81" W Dist 5.6594
Point 74647 N 13,820,087.4885 E 2,088,470.7986 Sta 38+52.93
Course from 74647 to 74648 N 0° 16′ 48.50" E Dist 4.2234
Point 74648 N 13,820,091.7118 E 2,088,470.8192 Sta 38+57.15
Course from 74648 to 74649 N 0° 18′ 31.82" E Dist 10.7738
Point 74649 N 13,820,102.4854 E 2,088,470.8773 Sta 38+67.93
Course from 74649 to 74650 N 1° 26′ 52.33" E Dist 63.6461
Point 74650 N 13,820,166.1112 E 2,088,472.4855 Sta 39+31.57

Ending chain PR-RD-01 description

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 4

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	135

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:19:33 AM
File Name:FM3351DITCH-ALN-003.dgn
User Name:GARODRIGUE

<* 1 Describe Chain PR-RD-02

Chain PR-RD-02 contains:
74651 74652 74653 74654 74655 74656 74657 74658 74659 74660 74661 74662 74663 - 74664 74665 74666 74667 74668 74669 74670 74671 74672 74673 74674 74675 74676 7- 4677 74678 74679 74680 74681 74682 74683 74684 74685 74686 74687 74688 74689 74- 690 74691 74692 74693 74694 74695 74696 74697 74698 74699 74700 74701 74702 747- 03 74704 74705 74706 74707 74708 74709 74710 74711 74712 74713 74714 74715 7471- 6 74717 74718 74719 74720 74721 74722 74723 74724 74725 74726

Beginning chain PR-RD-02 description
Feature: Geom_Centerline

Point 74651 N 13,820,881.5617 E 2,088,431.2047 Sta 60+00.00
Course from 74651 to 74652 N 3° 36′ 49.54" E Dist 100.0000
Point 74652 N 13,820,981.3629 E 2,088,437.5078 Sta 61+00.00
Course from 74652 to 74653 N 3° 37′ 05.05" E Dist 88.0001
Point 74653 N 13,821,069.1876 E 2,088,443.0610 Sta 61+88.00
Course from 74653 to 74654 N 3° 36′ 44.65" E Dist 247.9999
Point 74654 N 13,821,316.6948 E 2,088,458.6867 Sta 64+36.00
Course from 74654 to 74655 N 15° 44′ 52.75" W Dist 8.7561
Point 74655 N 13,821,325.1222 E 2,088,456.3102 Sta 64+44.76
Course from 74655 to 74656 N 7° 09′ 09.93" W Dist 9.8738
Point 74656 N 13,821,334.9191 E 2,088,455.0808 Sta 64+54.63
Course from 74656 to 74657 N 4° 13′ 40.09" W Dist 11.9860
Point 74657 N 13,821,346.8725 E 2,088,454.1971 Sta 64+66.62
Course from 74657 to 74658 N 1° 25′ 34.64" W Dist 13.4652
Point 74658 N 13,821,360.3335 E 2,088,453.8620 Sta 64+80.08
Course from 74658 to 74659 N 0° 01′ 21.97" W Dist 10.3713
Point 74659 N 13,821,370.7048 E 2,088,453.8578 Sta 64+90.45
Course from 74659 to 74660 N 0° 20′ 33.43" W Dist 10.2240
Point 74660 N 13,821,380.9287 E 2,088,453.7967 Sta 65+00.68
Course from 74660 to 74661 N 0° 16′ 18.46" E Dist 5.1399
Point 74661 N 13,821,386.0685 E 2,088,453.8211 Sta 65+05.82
Course from 74661 to 74662 N 2° 14′ 41.46" W Dist 2.2324
Point 74662 N 13,821,388.2991 E 2,088,453.7337 Sta 65+08.05
Course from 74662 to 74663 N 2° 39′ 51.15" W Dist 4.3385
Point 74663 N 13,821,392.6329 E 2,088,453.5320 Sta 65+12.39
Course from 74663 to 74664 N 2° 36′ 27.76" W Dist 52.9762
Point 74664 N 13,821,445.5543 E 2,088,451.1217 Sta 65+65.36
Course from 74664 to 74665 N 2° 36′ 54.55" W Dist 7.9994
Point 74665 N 13,821,453.5453 E 2,088,450.7567 Sta 65+73.36
Course from 74665 to 74666 N 6° 39′ 53.42" W Dist 15.1358
Point 74666 N 13,821,468.5788 E 2,088,449.0000 Sta 65+88.50
Course from 74666 to 74667 N 3° 51′ 29.28" W Dist 49.6753
Point 74667 N 13,821,518.1415 E 2,088,445.6576 Sta 66+38.17
Course from 74667 to 74668 N 3° 02′ 17.92" W Dist 22.9360
Point 74668 N 13,821,541.0453 E 2,088,444.4419 Sta 66+61.11
Course from 74668 to 74669 N 1° 34′ 25.45" W Dist 22.9254
Point 74669 N 13,821,563.9620 E 2,088,443.8123 Sta 66+84.04
Course from 74669 to 74670 N 7° 33′ 43.44" W Dist 6.0440
Point 74670 N 13,821,569.9535 E 2,088,443.0169 Sta 66+90.08
Course from 74670 to 74671 N 7° 18′ 53.48" W Dist 6.0316
Point 74671 N 13,821,575.9360 E 2,088,442.2489 Sta 66+96.11
Course from 74671 to 74672 N 6° 46′ 45.48" W Dist 6.0268
Point 74672 N 13,821,581.9207 E 2,088,441.5375 Sta 67+02.14
Course from 74672 to 74673 N 6° 24′ 31.19" W Dist 11.9228
Point 74673 N 13,821,593.7689 E 2,088,440.2067 Sta 67+14.06
Course from 74673 to 74674 N 6° 33′ 07.99" W Dist 10.8830
Point 74674 N 13,821,604.5808 E 2,088,438.9648 Sta 67+24.94
Course from 74674 to 74675 N 6° 00′ 07.41" W Dist 5.4384
Point 74675 N 13,821,609.9894 E 2,088,438.3962 Sta 67+30.38
Course from 74675 to 74676 N 5° 46′ 24.03" W Dist 5.4374
Point 74676 N 13,821,615.3992 E 2,088,437.8492 Sta 67+35.82
Course from 74676 to 74677 N 3° 40′ 07.32" W Dist 6.7143
Point 74677 N 13,821,622.0997 E 2,088,437.4196 Sta 67+42.53
Course from 74677 to 74678 N 3° 07′ 13.17" W Dist 14.2738
Point 74678 N 13,821,636.3523 E 2,088,436.6426 Sta 67+56.81
Course from 74678 to 74679 N 3° 03′ 30.92" W Dist 7.1378
Point 74679 N 13,821,643.4799 E 2,088,436.2618 Sta 67+63.94
Course from 74679 to 74680 N 3° 01′ 14.19" W Dist 7.1405
Point 74680 N 13,821,650.6105 E 2,088,435.8855 Sta 67+71.09
Course from 74680 to 74681 N 2° 59′ 01.04" W Dist 7.1404

<* 1 Describe Chain PR-RD-02

Chain PR-RD-02 contains:
74651 74652 74653 74654 74655 74656 74657 74658 74659 74660 74661 74662 74663 - 74664 74665 74666 74667 74668 74669 74670 74671 74672 74673 74674 74675 74676 7- 4677 74678 74679 74680 74681 74682 74683 74684 74685 74686 74687 74688 74689 74- 690 74691 74692 74693 74694 74695 74696 74697 74698 74699 74700 74701 74702 747- 03 74704 74705 74706 74707 74708 74709 74710 74711 74712 74713 74714 74715 7471- 6 74717 74718 74719 74720 74721 74722 74723 74724 74725 74726

Beginning chain PR-RD-02 description
Feature: Geom_Centerline

Point 74681 N 13,821,657.7412 E 2,088,435.5138 Sta 67+78.23
Course from 74681 to 74682 N 2° 56′ 47.44" W Dist 7.1403
Point 74682 N 13,821,664.8721 E 2,088,435.1468 Sta 67+85.37
Course from 74682 to 74683 N 2° 54′ 15.81" W Dist 7.1410
Point 74683 N 13,821,672.0039 E 2,088,434.7850 Sta 67+92.51
Course from 74683 to 74684 N 2° 52′ 06.72" W Dist 7.1411
Point 74684 N 13,821,679.1361 E 2,088,434.4276 Sta 67+99.65
Course from 74684 to 74685 N 2° 50′ 30.16" W Dist 7.1411
Point 74685 N 13,821,686.2684 E 2,088,434.0736 Sta 68+06.79
Course from 74685 to 74686 N 2° 49′ 19.80" W Dist 7.1173
Point 74686 N 13,821,693.3771 E 2,088,433.7231 Sta 68+13.91
Course from 74686 to 74687 N 2° 50′ 35.15" W Dist 7.0631
Point 74687 N 13,821,700.4315 E 2,088,433.3728 Sta 68+20.97
Course from 74687 to 74688 N 2° 49′ 15.86" W Dist 7.0630
Point 74688 N 13,821,707.4859 E 2,088,433.0252 Sta 68+28.03
Course from 74688 to 74689 N 2° 46′ 39.74" W Dist 7.0629
Point 74689 N 13,821,714.5405 E 2,088,432.6829 Sta 68+35.10
Course from 74689 to 74690 N 4° 01′ 09.99" W Dist 6.0999
Point 74690 N 13,821,720.6254 E 2,088,432.2553 Sta 68+41.20
Course from 74690 to 74691 N 4° 20′ 15.11" W Dist 5.8942
Point 74691 N 13,821,726.5027 E 2,088,431.8095 Sta 68+47.09
Course from 74691 to 74692 N 4° 17′ 27.45" W Dist 5.8940
Point 74692 N 13,821,732.3801 E 2,088,431.3686 Sta 68+52.98
Course from 74692 to 74693 N 4° 16′ 33.96" W Dist 5.8939
Point 74693 N 13,821,738.2576 E 2,088,430.9291 Sta 68+58.88
Course from 74693 to 74694 N 4° 14′ 16.67" W Dist 5.8941
Point 74694 N 13,821,744.1356 E 2,088,430.4935 Sta 68+64.77
Course from 74694 to 74695 N 4° 12′ 14.01" W Dist 5.8942
Point 74695 N 13,821,750.0139 E 2,088,430.0614 Sta 68+70.67
Course from 74695 to 74696 N 13° 58′ 38.35" W Dist 5.9533
Point 74696 N 13,821,755.7909 E 2,088,428.6235 Sta 68+76.62
Course from 74696 to 74697 N 5° 12′ 07.52" W Dist 6.0000
Point 74697 N 13,821,761.7662 E 2,088,428.0795 Sta 68+82.62
Course from 74697 to 74698 N 4° 43′ 37.34" W Dist 39.0160
Point 74698 N 13,821,800.6494 E 2,088,424.8642 Sta 69+21.63
Course from 74698 to 74699 N 5° 04′ 21.71" W Dist 6.0000
Point 74699 N 13,821,806.6259 E 2,088,424.3337 Sta 69+27.64
Course from 74699 to 74700 N 4° 13′ 27.21" W Dist 8.7940
Point 74700 N 13,821,815.3960 E 2,088,423.6859 Sta 69+36.43
Course from 74700 to 74701 N 10° 29′ 00.45" W Dist 6.3070
Point 74701 N 13,821,821.5977 E 2,088,422.5384 Sta 69+42.74
Course from 74701 to 74702 N 9° 25′ 57.58" W Dist 6.2810
Point 74702 N 13,821,827.7937 E 2,088,421.5090 Sta 69+49.02
Course from 74702 to 74703 N 8° 32′ 30.93" W Dist 6.2673
Point 74703 N 13,821,833.9915 E 2,088,420.5781 Sta 69+55.28
Course from 74703 to 74704 N 7° 23′ 05.46" W Dist 6.2523
Point 74704 N 13,821,840.1919 E 2,088,419.7745 Sta 69+61.54
Course from 74704 to 74705 N 6° 14′ 42.30" W Dist 6.2664
Point 74705 N 13,821,846.4210 E 2,088,419.0928 Sta 69+67.80
Course from 74705 to 74706 N 4° 57′ 22.46" W Dist 6.2549
Point 74706 N 13,821,852.6525 E 2,088,418.5524 Sta 69+74.06
Course from 74706 to 74707 N 4° 19′ 09.46" W Dist 6.2503
Point 74707 N 13,821,858.8850 E 2,088,418.0817 Sta 69+80.31
Course from 74707 to 74708 N 0° 05′ 44.51" E Dist 10.6274
Point 74708 N 13,821,869.5125 E 2,088,418.0994 Sta 69+90.94
Course from 74708 to 74709 N 0° 08′ 36.83" E Dist 10.6269
Point 74709 N 13,821,880.1393 E 2,088,418.1261 Sta 70+01.56
Course from 74709 to 74710 N 0° 00′ 54.45" W Dist 6.0082

<* 1 Describe Chain PR-RD-02

Chain PR-RD-02 contains:
74651 74652 74653 74654 74655 74656 74657 74658 74659 74660 74661 74662 74663 - 74664 74665 74666 74667 74668 74669 74670 74671 74672 74673 74674 74675 74676 7- 4677 74678 74679 74680 74681 74682 74683 74684 74685 74686 74687 74688 74689 74- 690 74691 74692 74693 74694 74695 74696 74697 74698 74699 74700 74701 74702 747- 03 74704 74705 74706 74707 74708 74709 74710 74711 74712 74713 74714 74715 7471- 6 74717 74718 74719 74720 74721 74722 74723 74724 74725 74726

Beginning chain PR-RD-02 description
Feature: Geom_Centerline

Point 74710 N 13,821,886.1475 E 2,088,418.1245 Sta 70+07.57
Course from 74710 to 74711 N 0° 49′ 27.81" W Dist 2.1038
Point 74711 N 13,821,888.2511 E 2,088,418.0942 Sta 70+09.67
Course from 74711 to 74712 N 3° 00′ 43.99" W Dist 23.0792
Point 74712 N 13,821,911.2984 E 2,088,416.8814 Sta 70+32.75
Course from 74712 to 74713 N 1° 25′ 28.95" E Dist 21.3909
Point 74713 N 13,821,932.6826 E 2,088,417.4133 Sta 70+54.14
Course from 74713 to 74714 N 1° 22′ 41.62" E Dist 10.6940
Point 74714 N 13,821,943.3736 E 2,088,417.6705 Sta 70+64.84
Course from 74714 to 74715 N 0° 38′ 52.99" E Dist 12.2719
Point 74715 N 13,821,955.6447 E 2,088,417.8093 Sta 70+77.11
Course from 74715 to 74716 N 0° 29′ 04.15" E Dist 19.8115
Point 74716 N 13,821,975.4555 E 2,088,417.9768 Sta 70+96.92
Course from 74716 to 74717 N 0° 01′ 40.49" E Dist 10.6954
Point 74717 N 13,821,986.1509 E 2,088,417.9820 Sta 71+07.62
Course from 74717 to 74718 N 1° 06′ 16.44" W Dist 10.6964
Point 74718 N 13,821,996.8454 E 2,088,417.7758 Sta 71+18.31
Course from 74718 to 74719 N 1° 18′ 11.24" W Dist 10.6970
Point 74719 N 13,822,007.5396 E 2,088,417.5326 Sta 71+29.01
Course from 74719 to 74720 N 2° 08′ 40.36" W Dist 10.6915
Point 74720 N 13,822,018.2237 E 2,088,417.1325 Sta 71+39.70
Course from 74720 to 74721 N 2° 11′ 42.22" W Dist 10.7072
Point 74721 N 13,822,028.9230 E 2,088,416.7224 Sta 71+50.41
Course from 74721 to 74722 N 2° 11′ 19.55" W Dist 10.6987
Point 74722 N 13,822,039.6139 E 2,088,416.3138 Sta 71+61.11
Course from 74722 to 74723 N 1° 47′ 42.38" W Dist 50.7956
Point 74723 N 13,822,090.3846 E 2,088,414.7226 Sta 72+11.90
Course from 74723 to 74724 N 6° 46′ 11.57" W Dist 103.1072
Point 74724 N 13,822,192.7728 E 2,088,402.5681 Sta 73+15.01
Course from 74724 to 74725 N 1° 07′ 04.08" W Dist 207.1735
Point 74725 N 13,822,399.9069 E 2,088,398.5266 Sta 75+22.18
Course from 74725 to 74726 N 17° 20′ 52.97" W Dist 117.1136
Point 74726 N 13,822,511.6931 E 2,088,363.6062 Sta 76+39.30

Ending chain PR-RD-02 description

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH HORIZONTAL ALIGNMENT DATA

SHEET 4 OF 4

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	136

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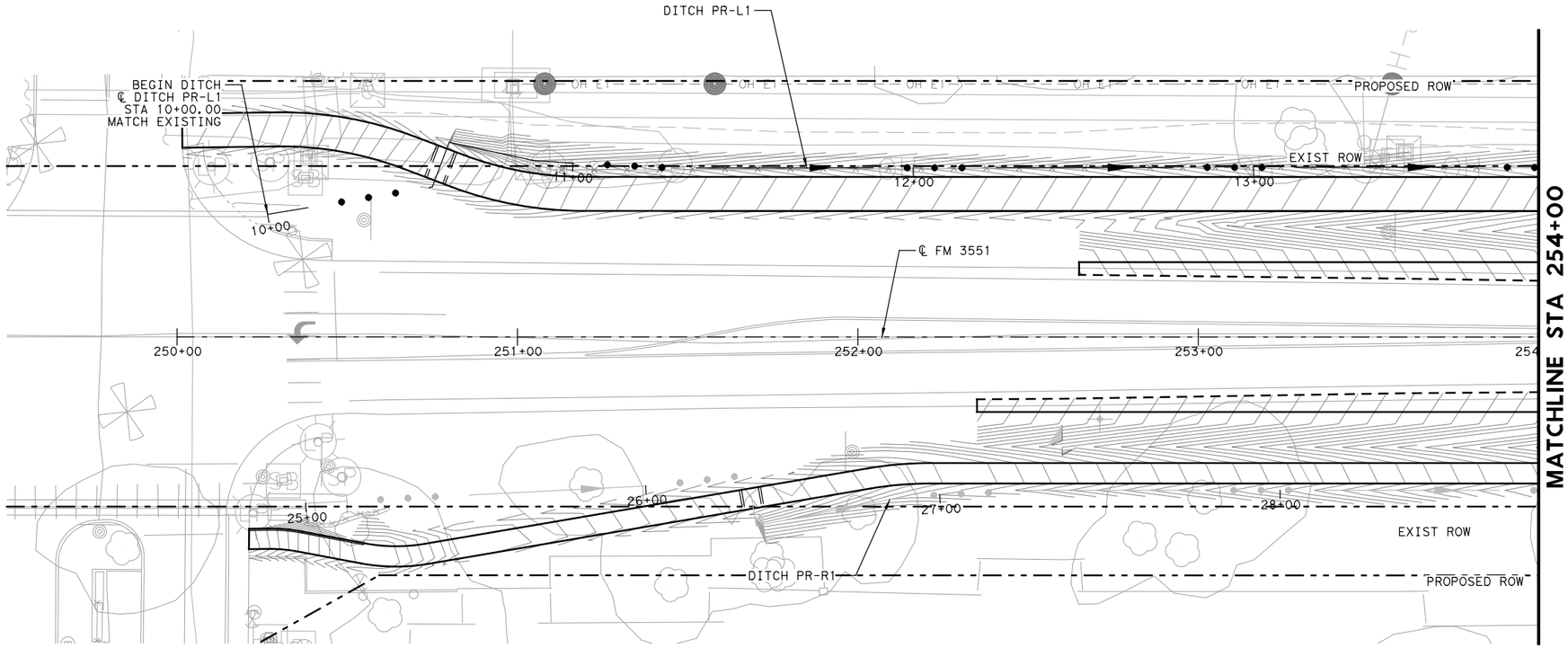
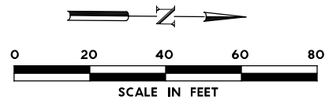
User Name: GARODRIGUE



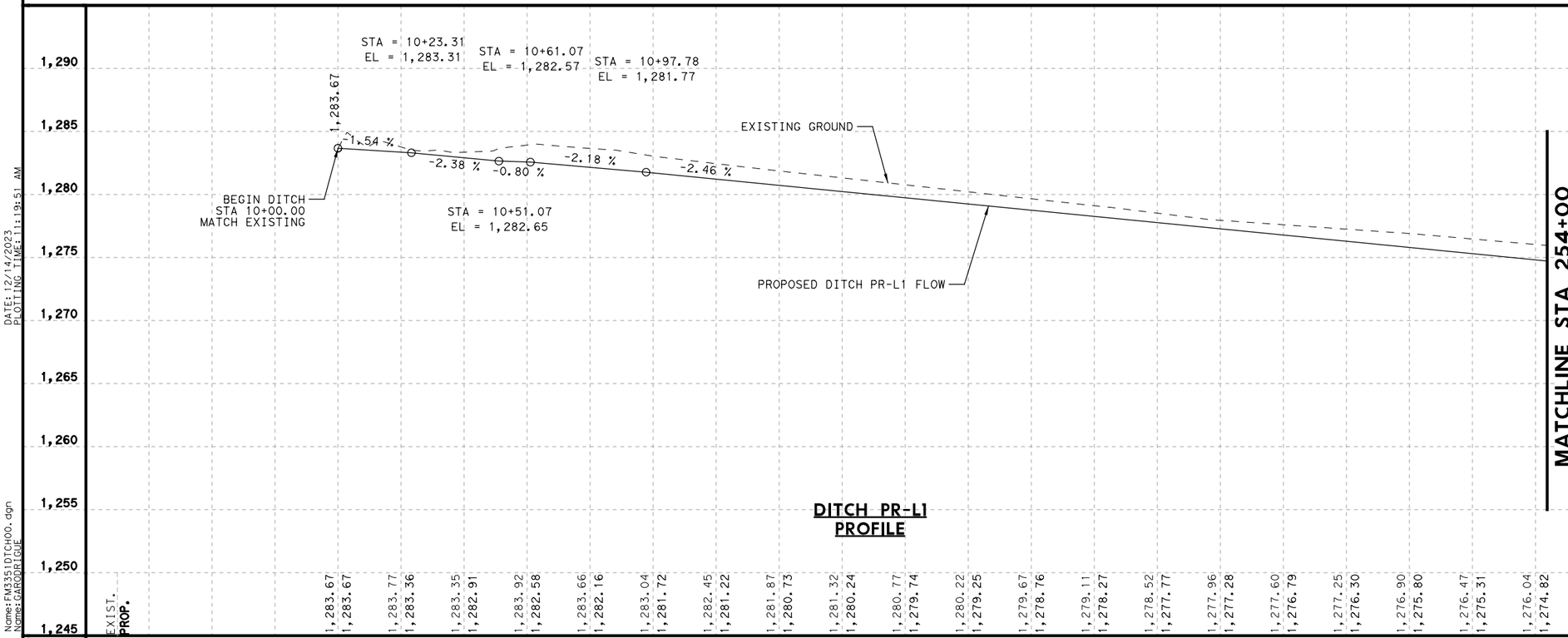


DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. SEE HORIZONTAL DITCH ALIGNMENT DATA SHEETS FOR DITCH ALIGNMENT.
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.



DITCH PR-L1
PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 1 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	137

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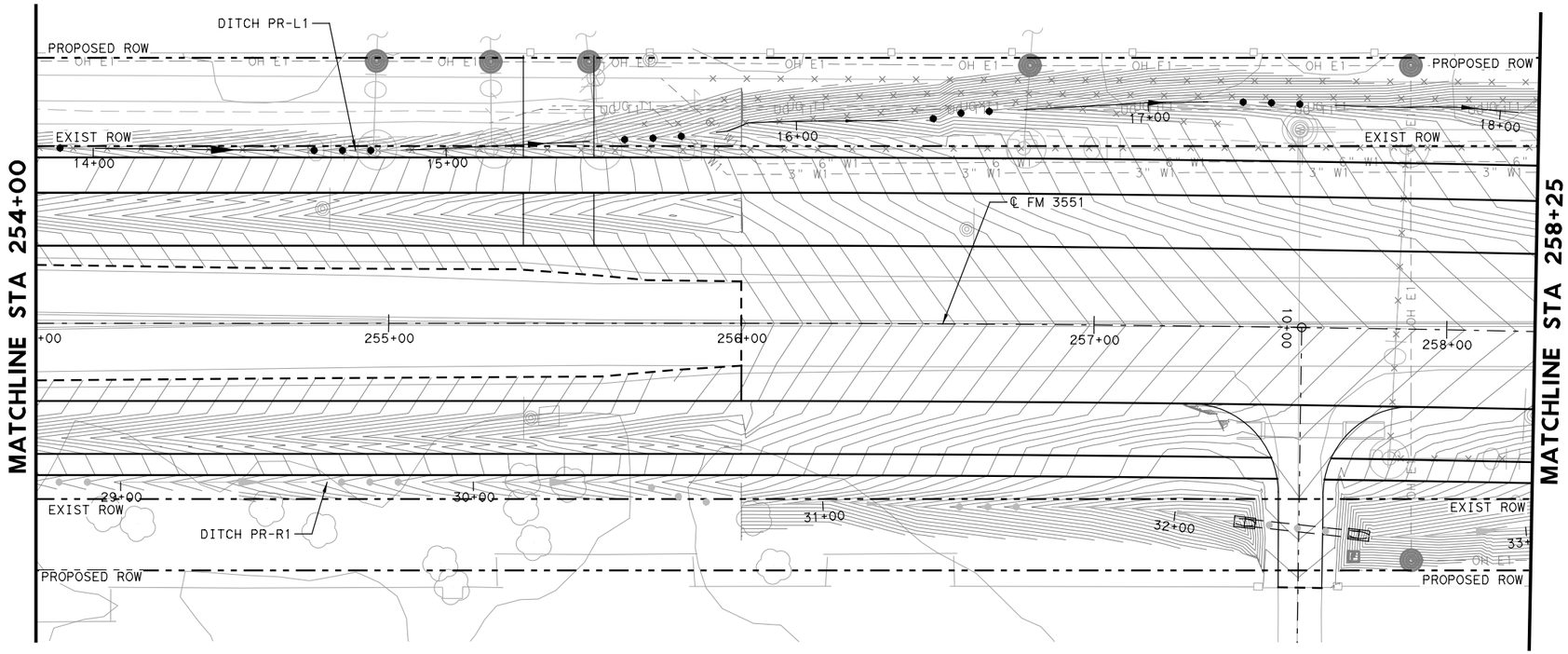
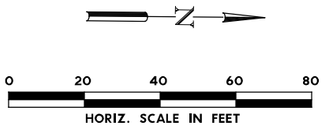
User Name:GARODRIGUE



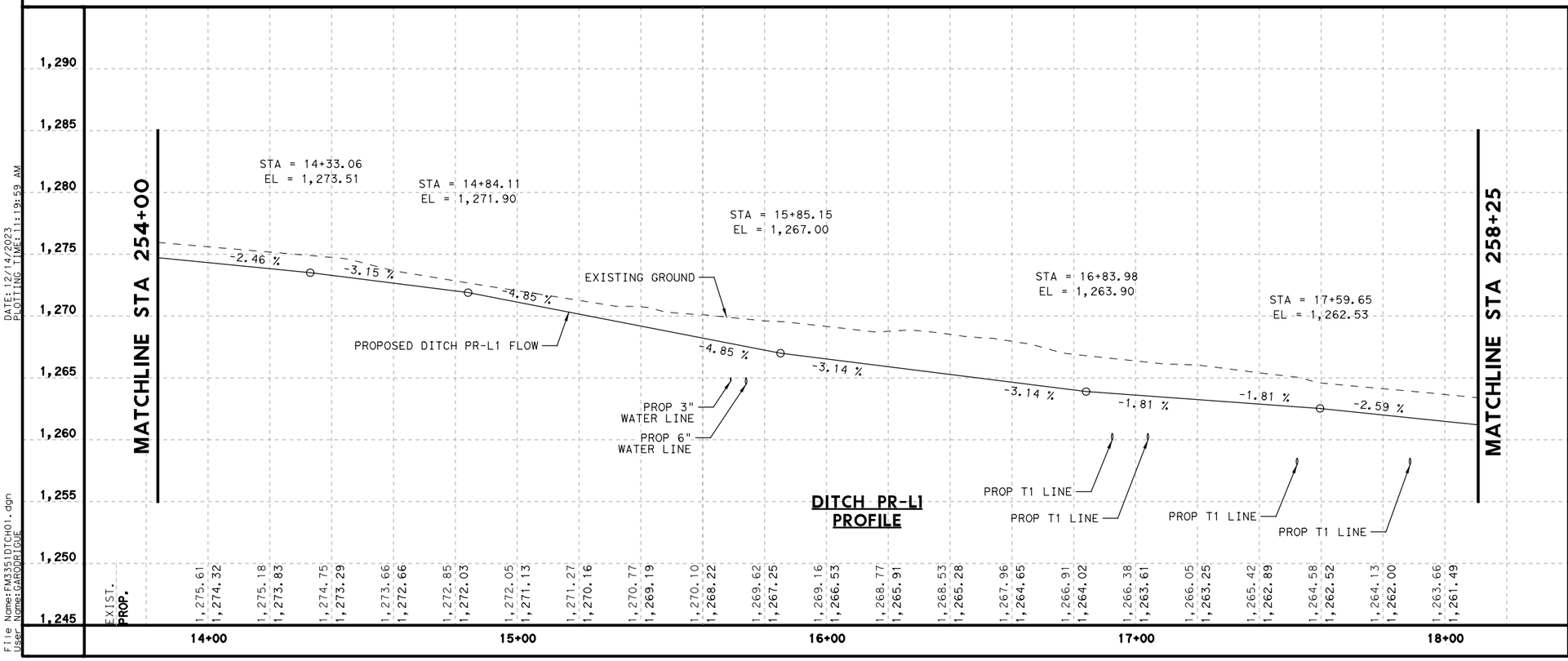


DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. SEE HORIZONTAL DITCH ALIGNMENT DATA SHEETS FOR DITCH ALIGNMENT.
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.



DITCH PR-L1 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 2 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	138

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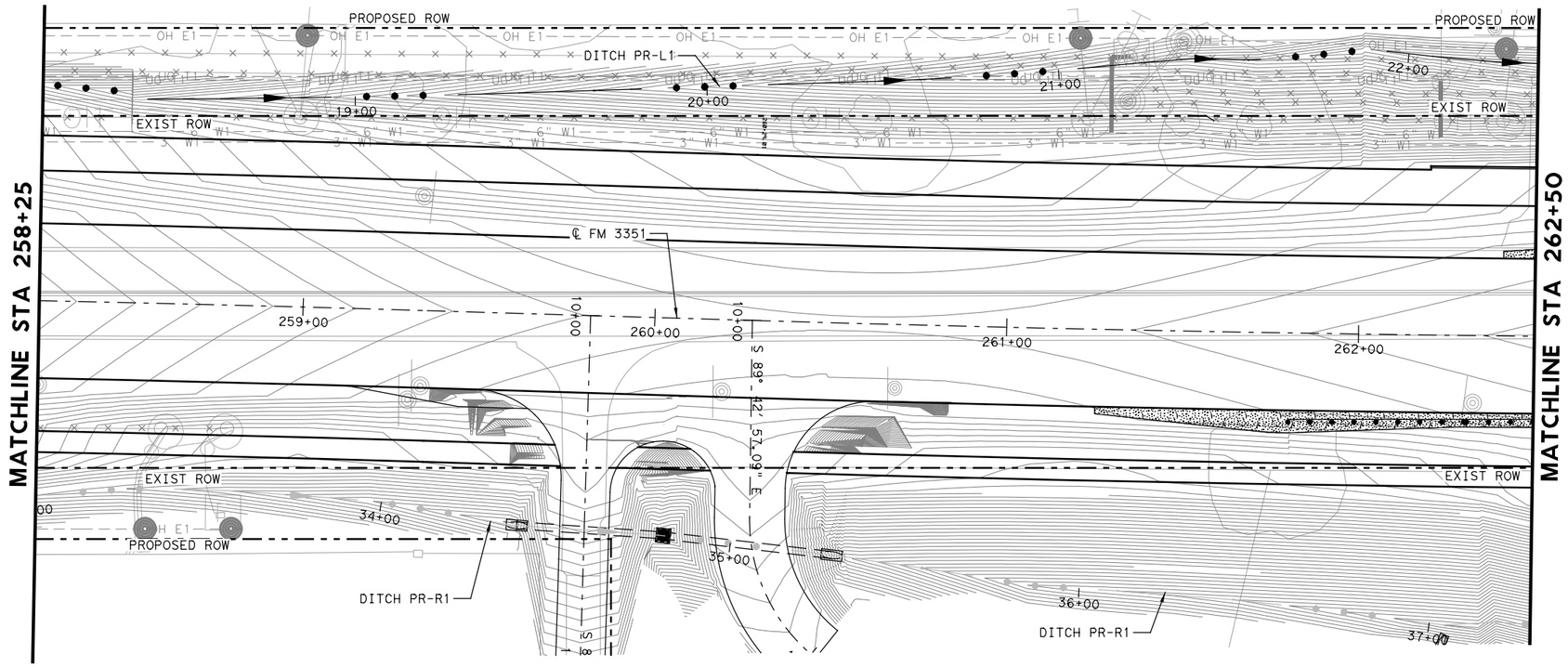
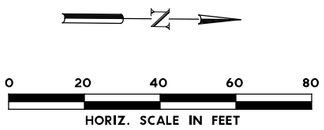




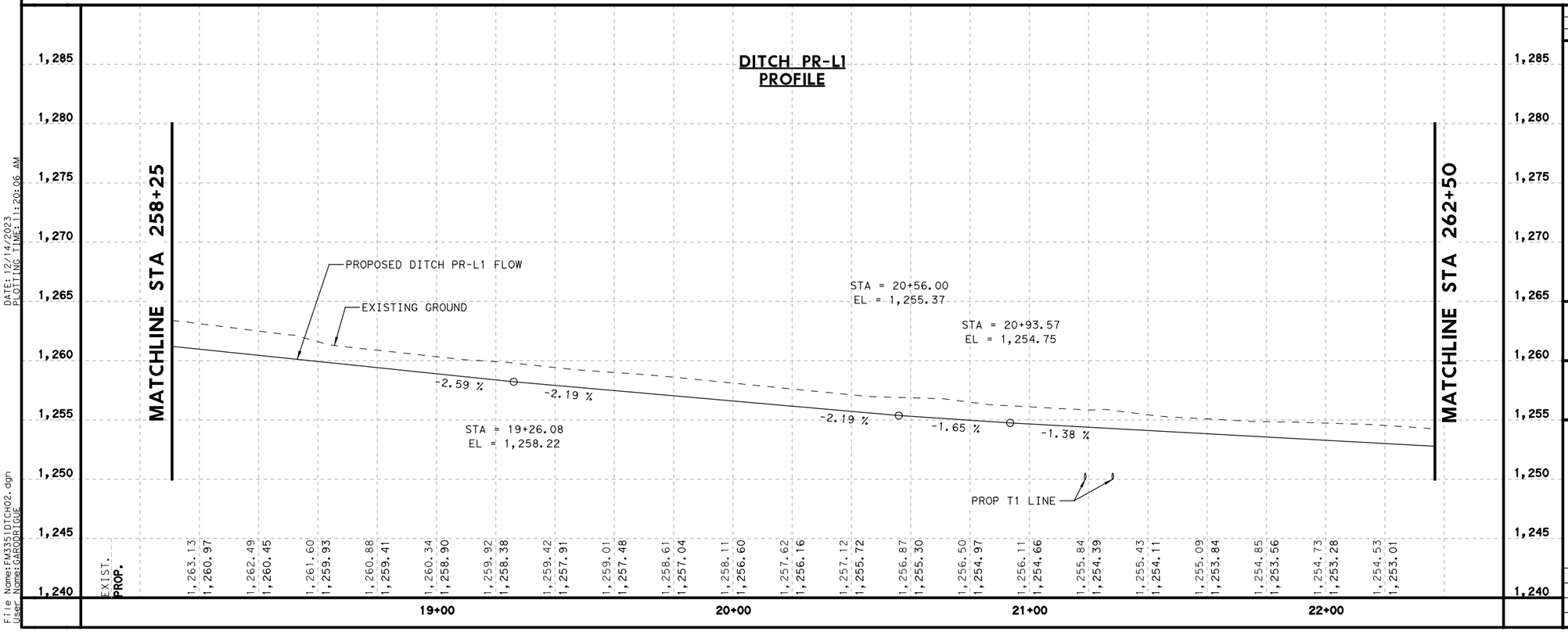
DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. SEE HORIZONTAL DITCH ALIGNMENT DATA SHEETS FOR DITCH ALIGNMENT.
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.

DITCH PR-L1 PROFILE



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 3 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	139

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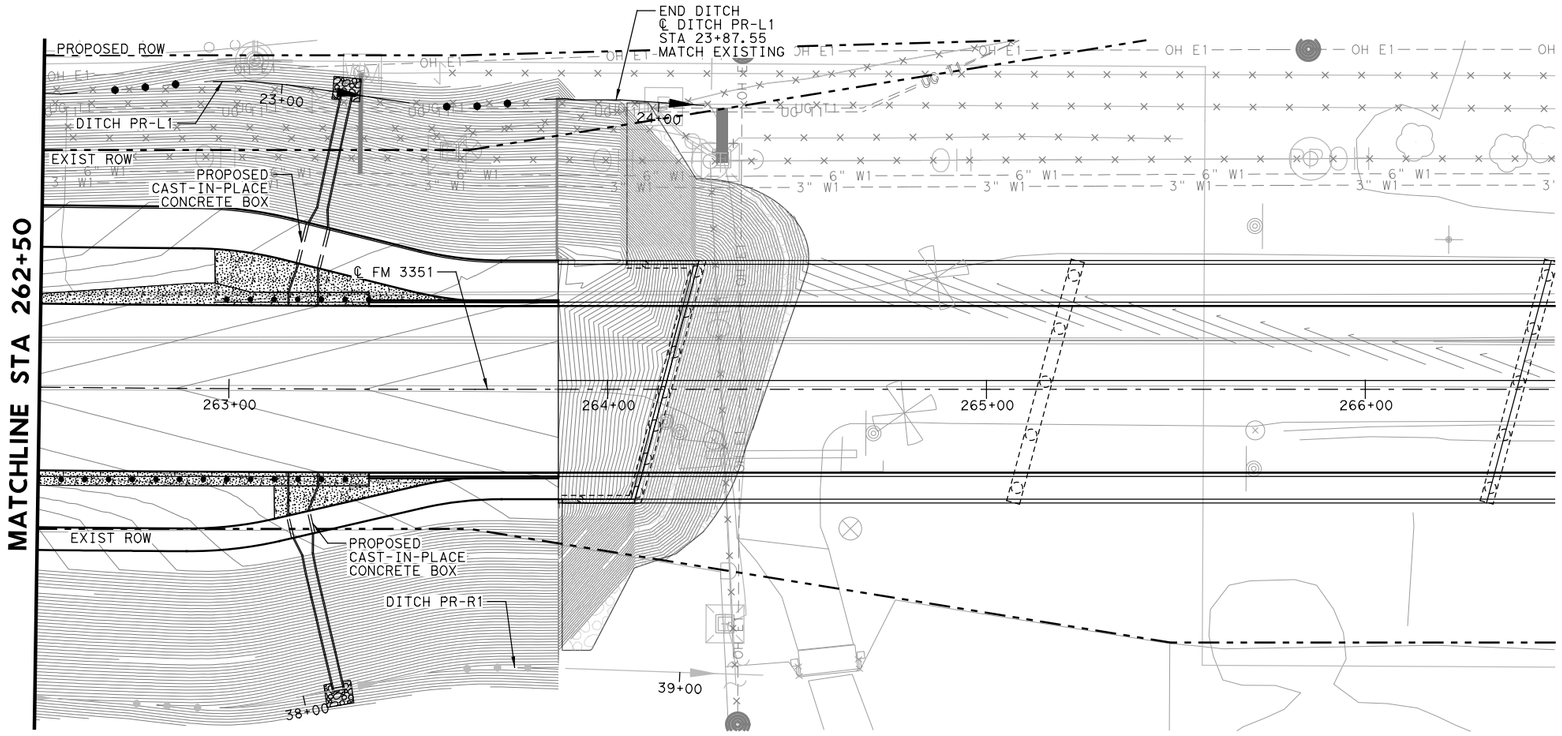

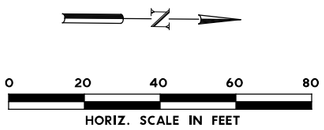

DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
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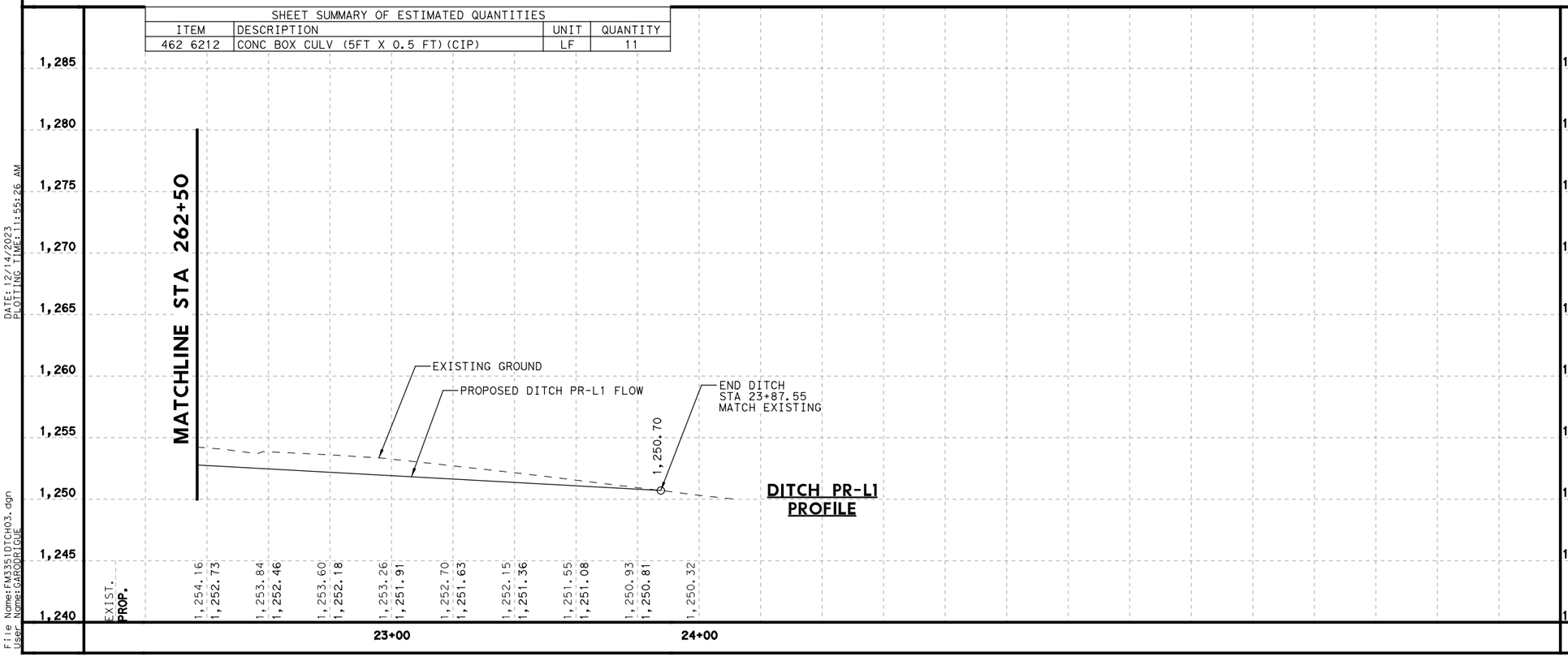
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
462 6212	CONC BOX CULV (5FT X 0.5 FT)(CIP)	LF	11



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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139162
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12/14/2023

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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 4 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	140

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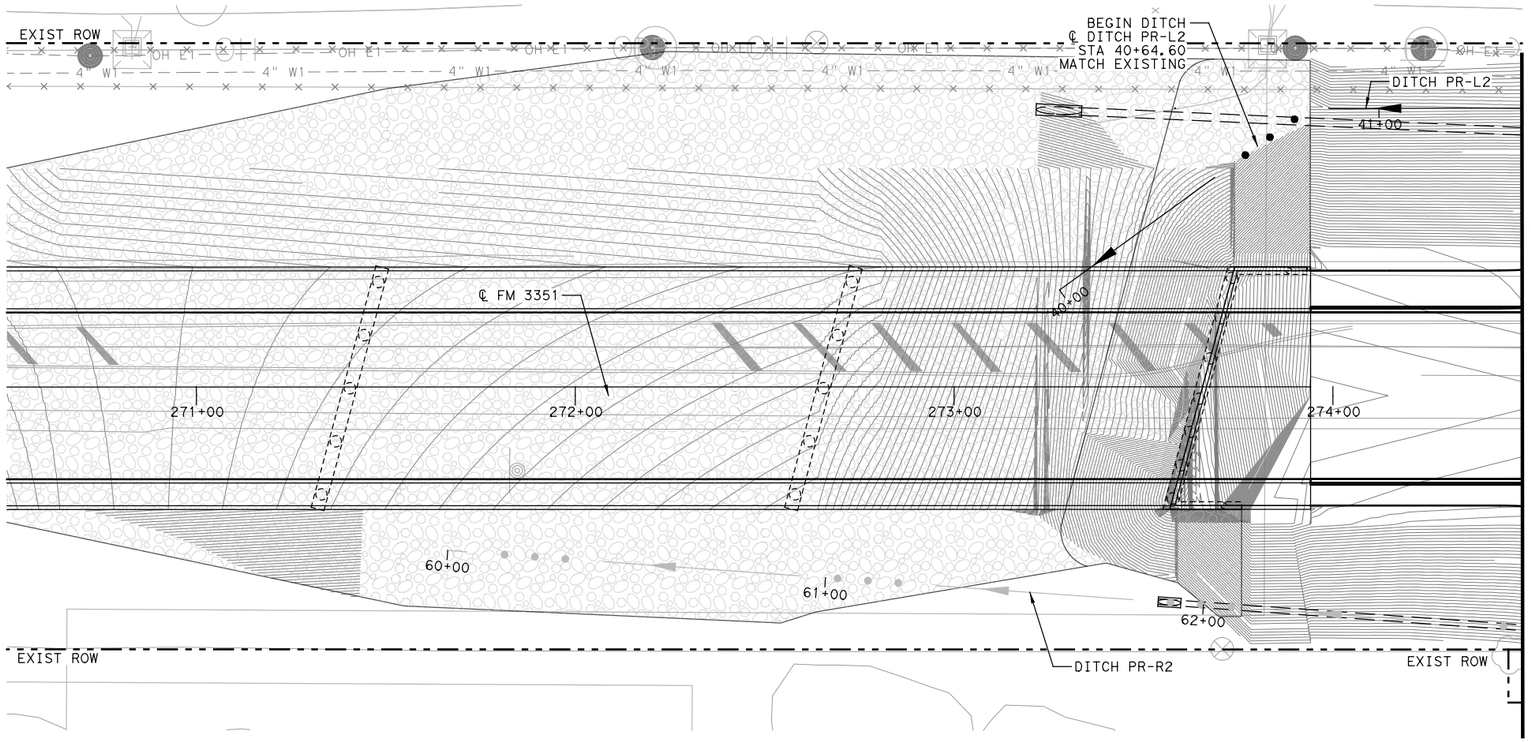

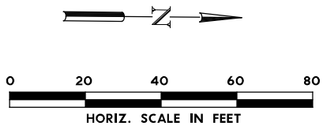

DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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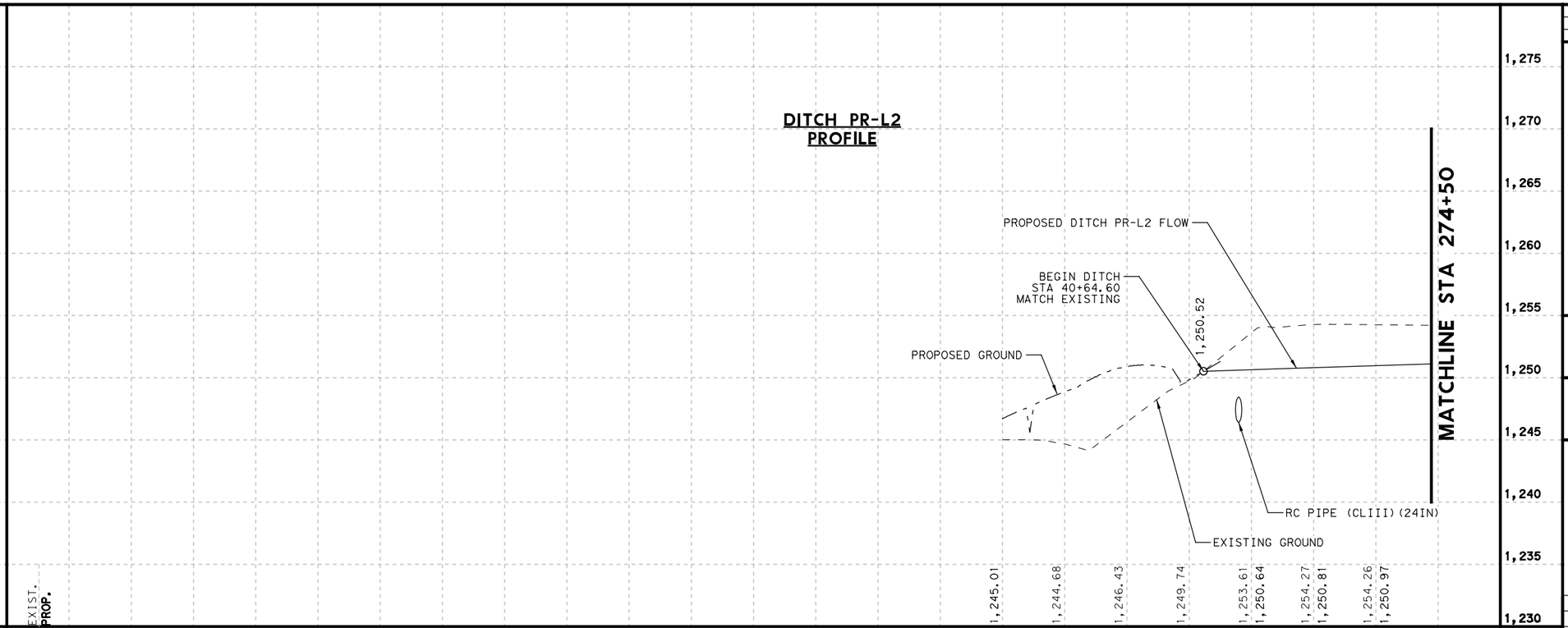
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.

DITCH PR-L2 PROFILE



NO.	DATE	REVISION	APPR BY

ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

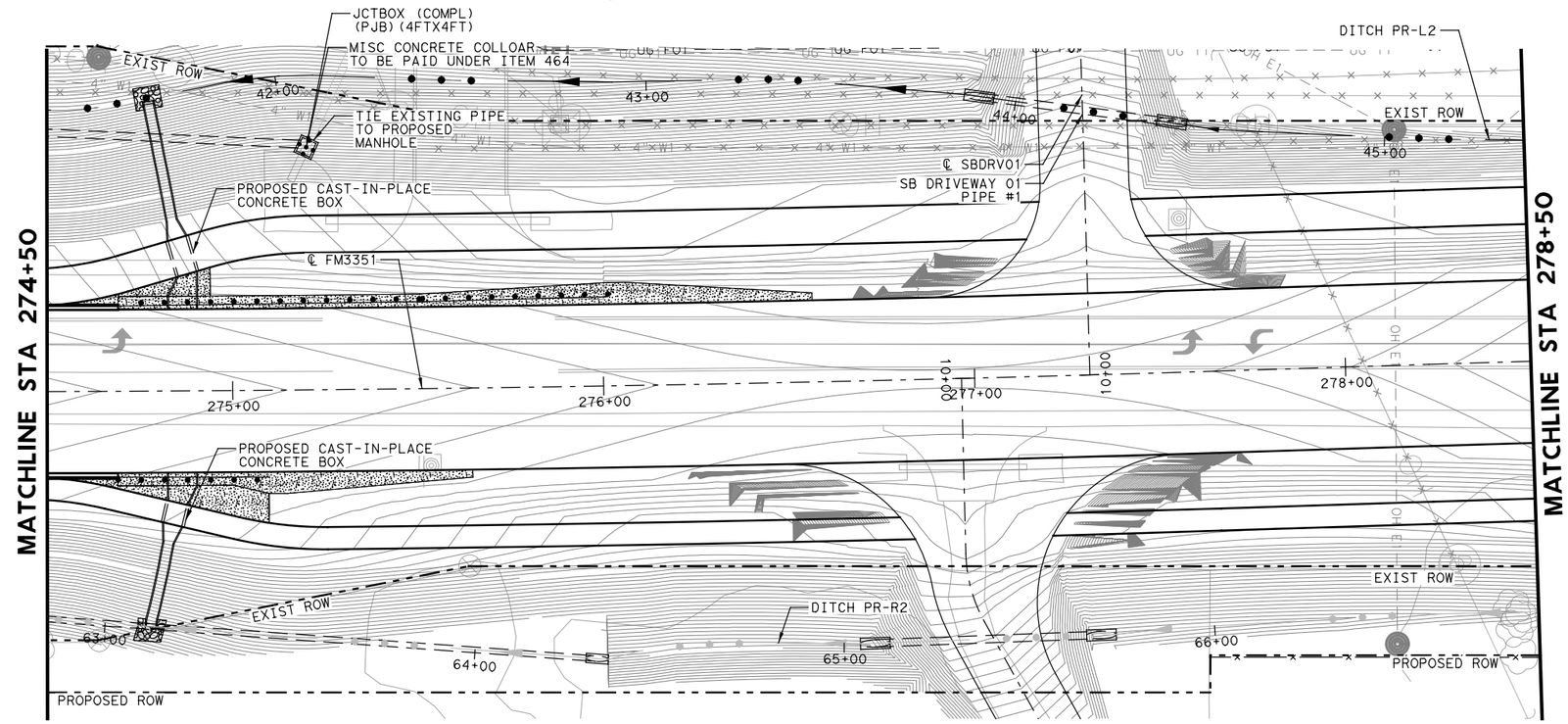
DITCH PLAN & PROFILE

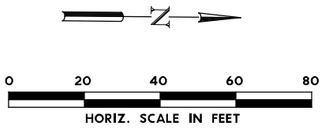
SCALE: 1"=40'-H
1"=10'-V

SHEET 5 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	141

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1033784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:20:15 AM
File Name:FM3351DITCH04.dgn
User Name:GARODRIGUE





DRAINAGE LEGEND

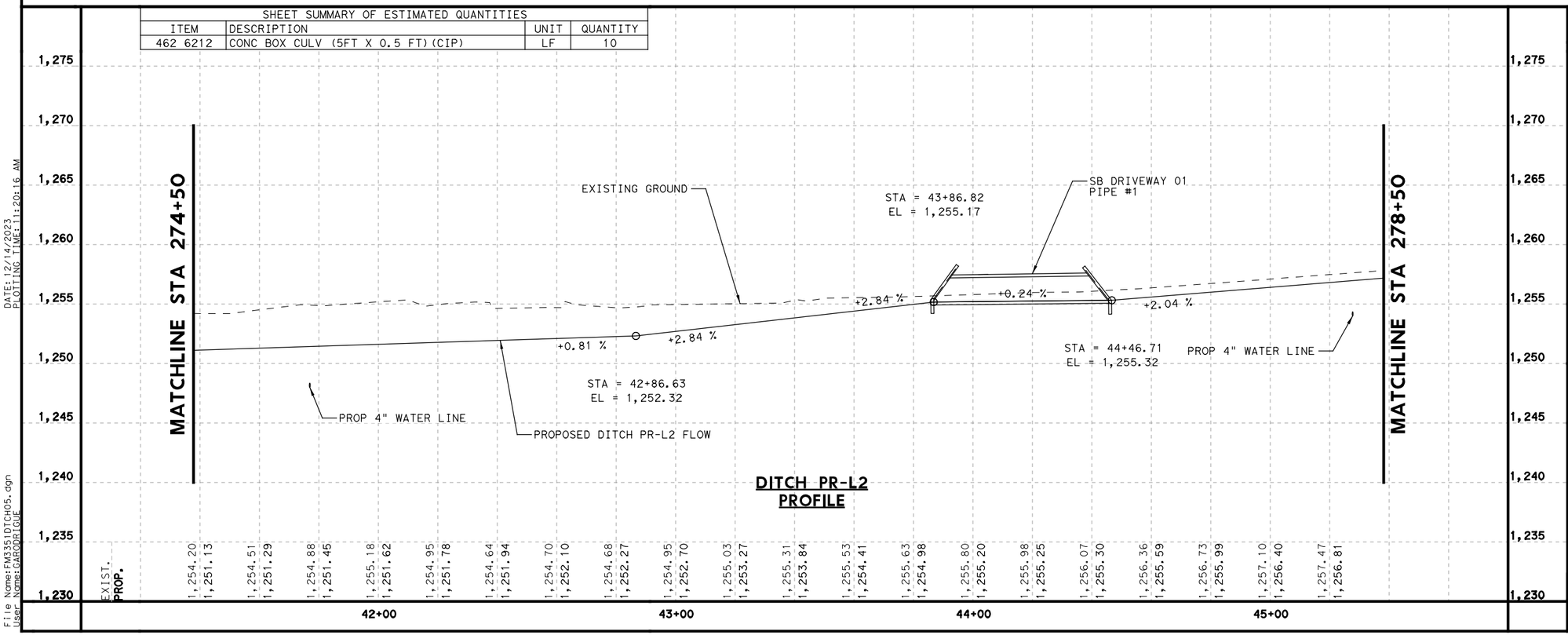
- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. SEE HORIZONTAL DITCH ALIGNMENT DATA SHEETS FOR DITCH ALIGNMENT.
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
462 6212	CONC BOX CULV (5FT X 0.5 FT) (CIP)	LF	10



DITCH PR-L2 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

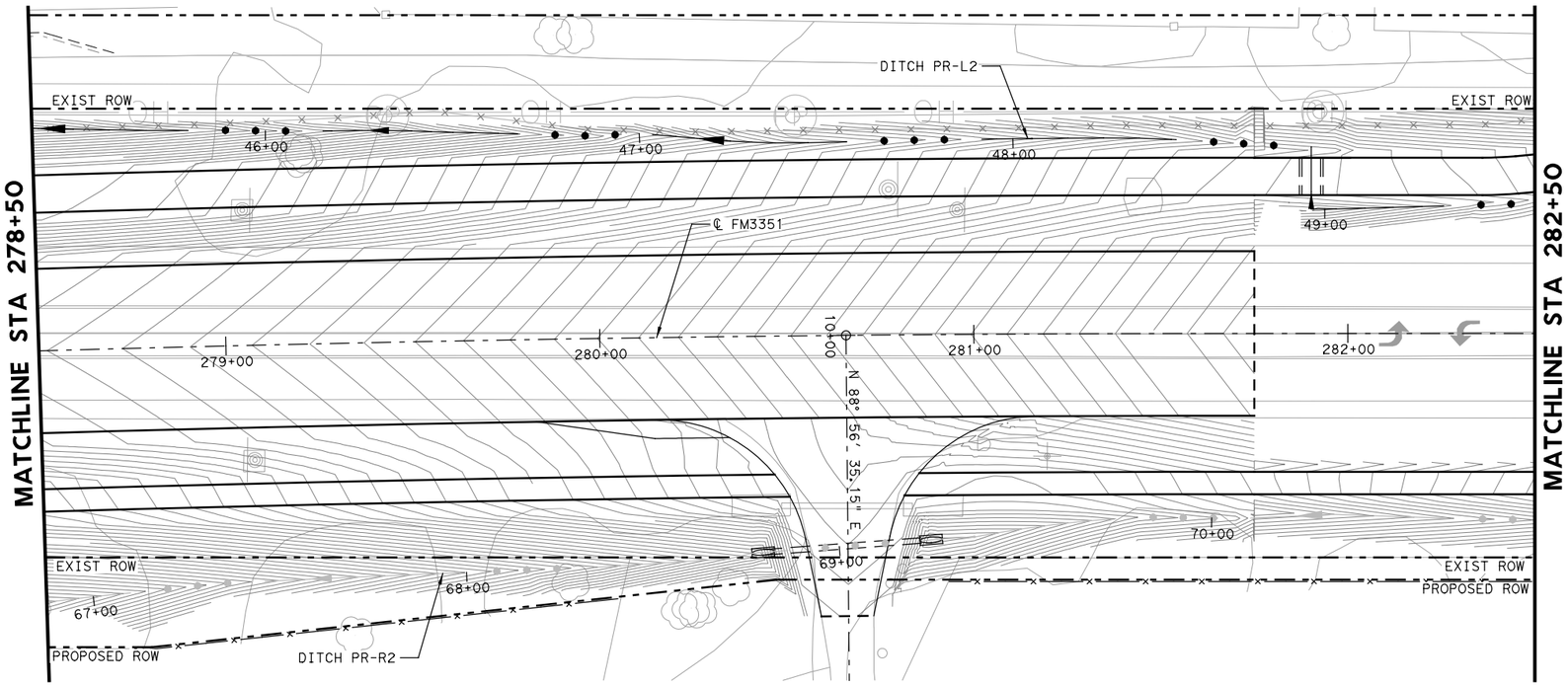
DITCH PLAN & PROFILE

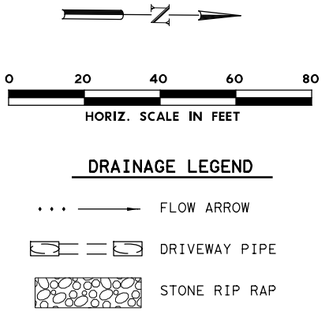
SCALE: 1"=40'-H
1"=10'-V

SHEET 6 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	142

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:20:16 AM
File Name: FM3351DITCH05.dgn
User Name: GARODRIGUE





NOTES:

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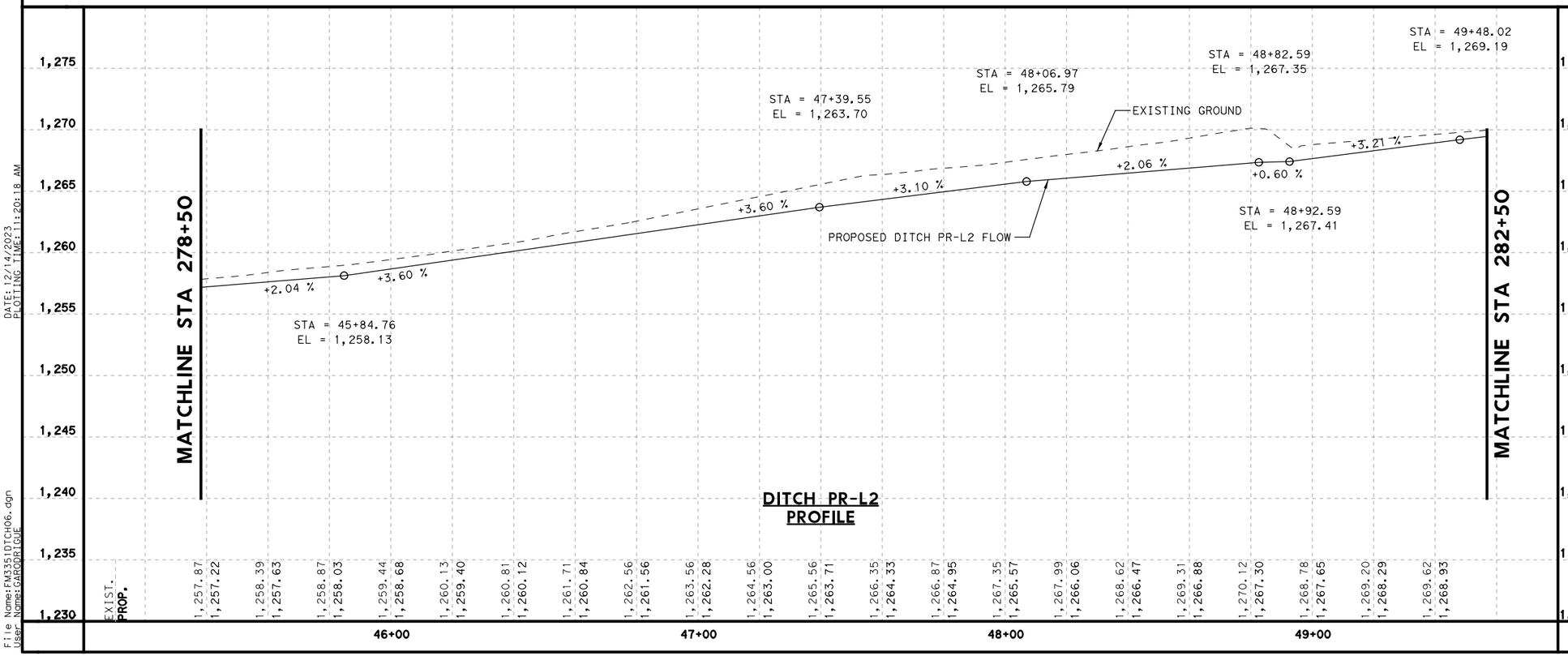

DITCH PR-L2 PROFILE

NO.	DATE	REVISION	APPR BY

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 7 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	143

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
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DATE: 12/14/2023
PLOTTING TIME: 11:20:18 AM
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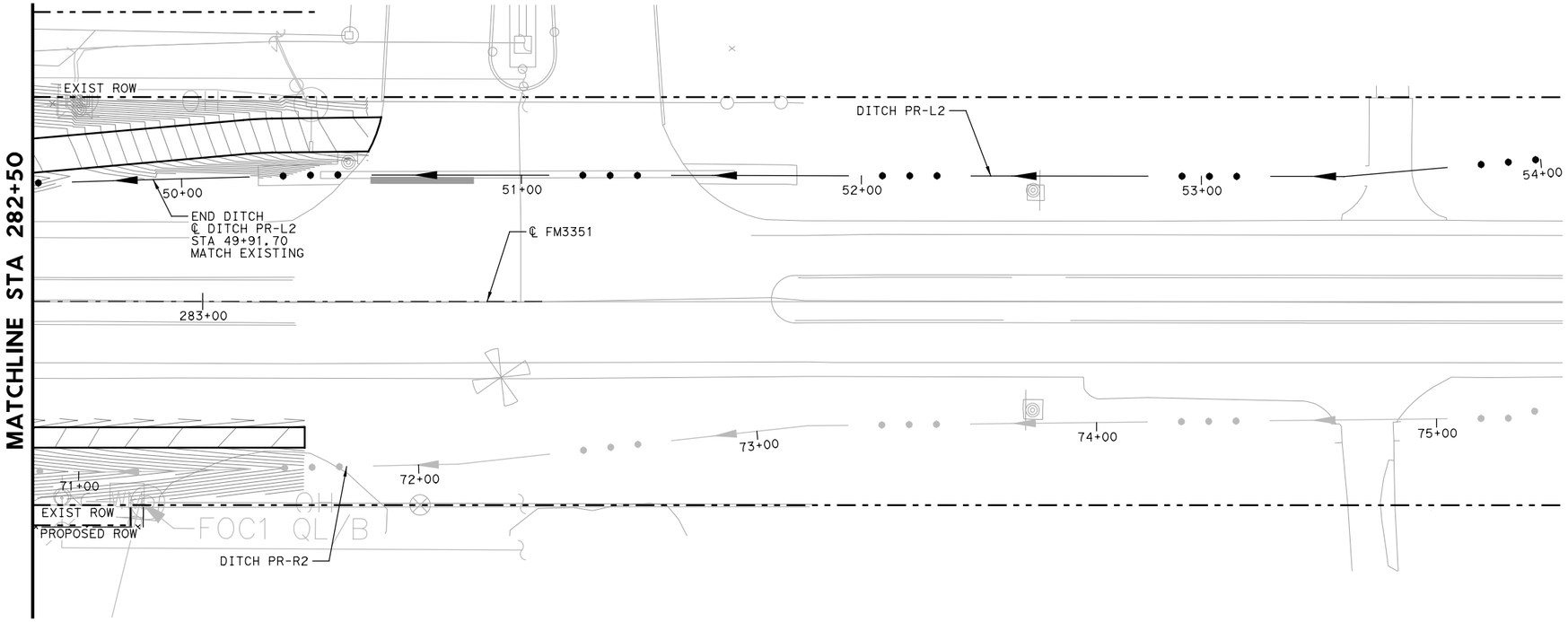
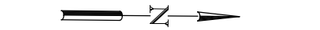
User Name=GARODRIGUE





DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
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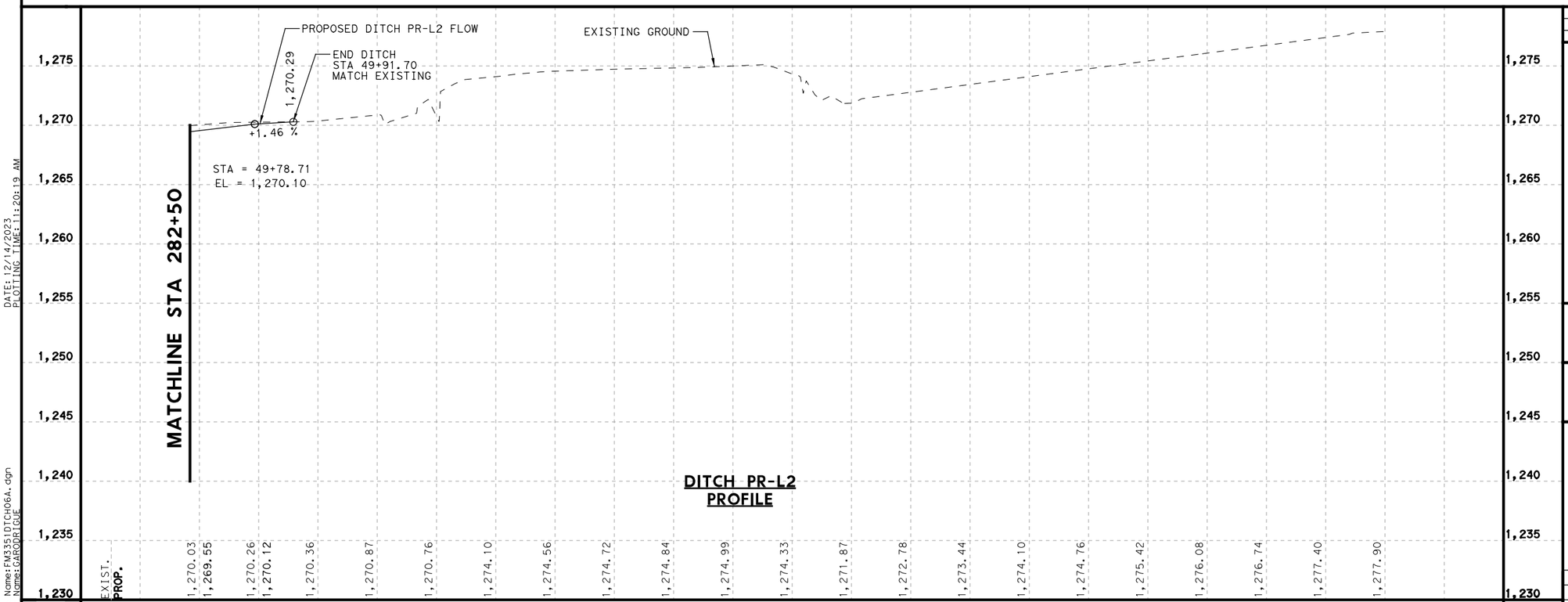

DITCH PR-L2 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 8 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	144

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
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DATE: 12/14/2023
PLOTTING TIME: 11:20:19 AM
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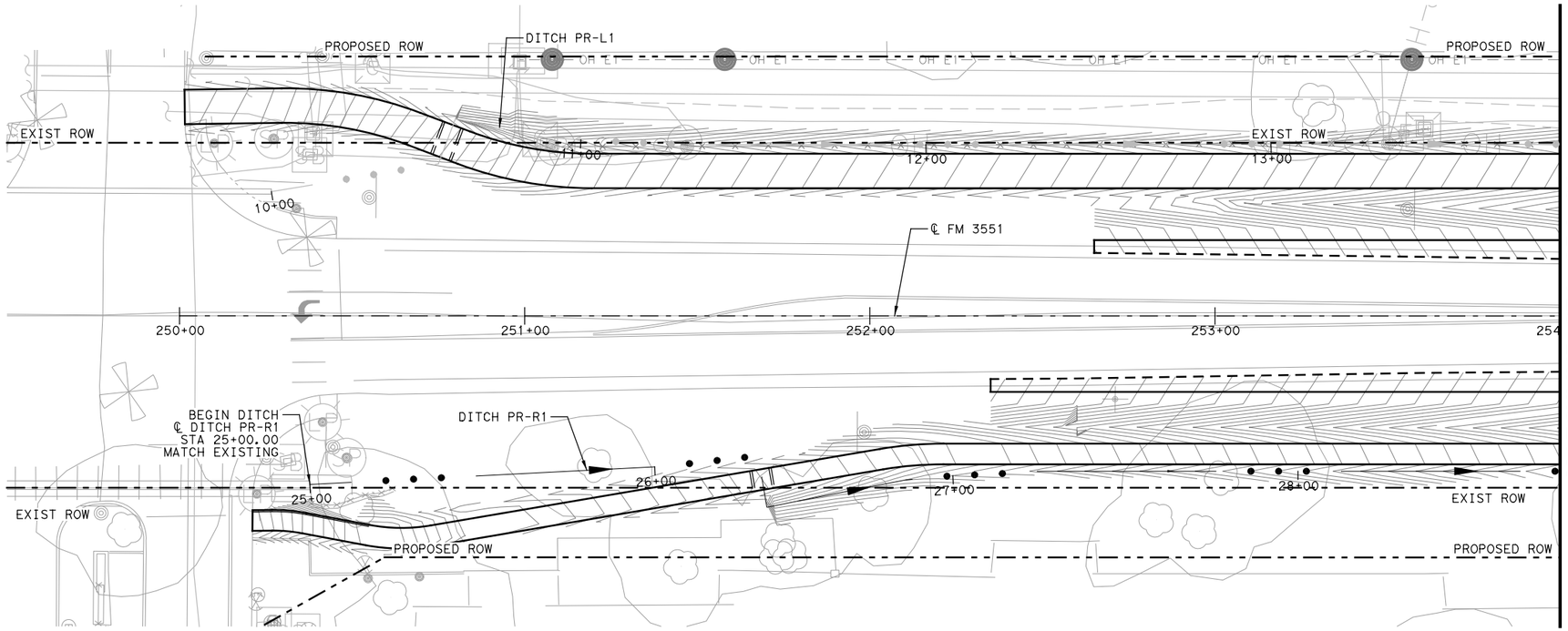
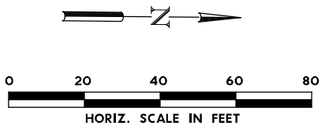
User Name:GARODRIGUE





DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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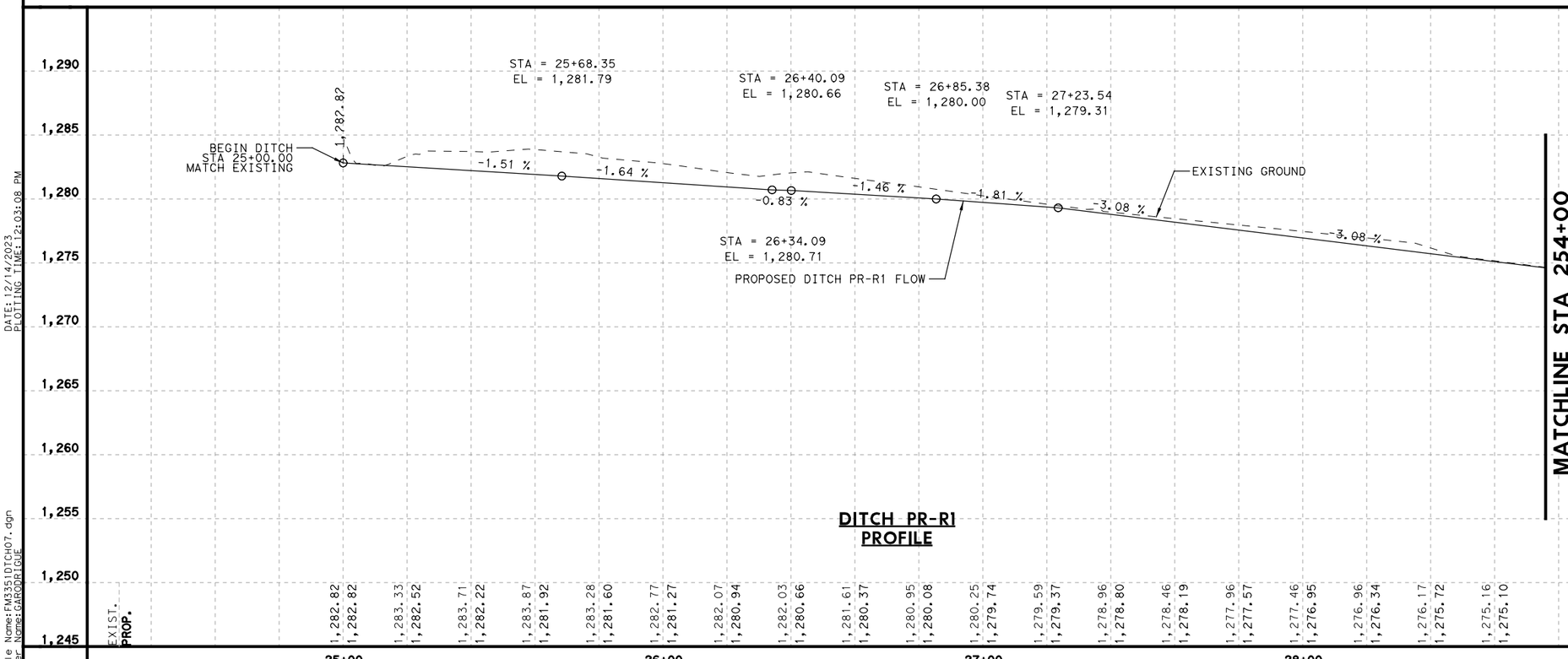

DITCH PR-R1 PROFILE

NO.	DATE	REVISION	APPR BY

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 9 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	145

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
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DATE: 12/14/2023
PLOTTING TIME: 12:03:08 PM
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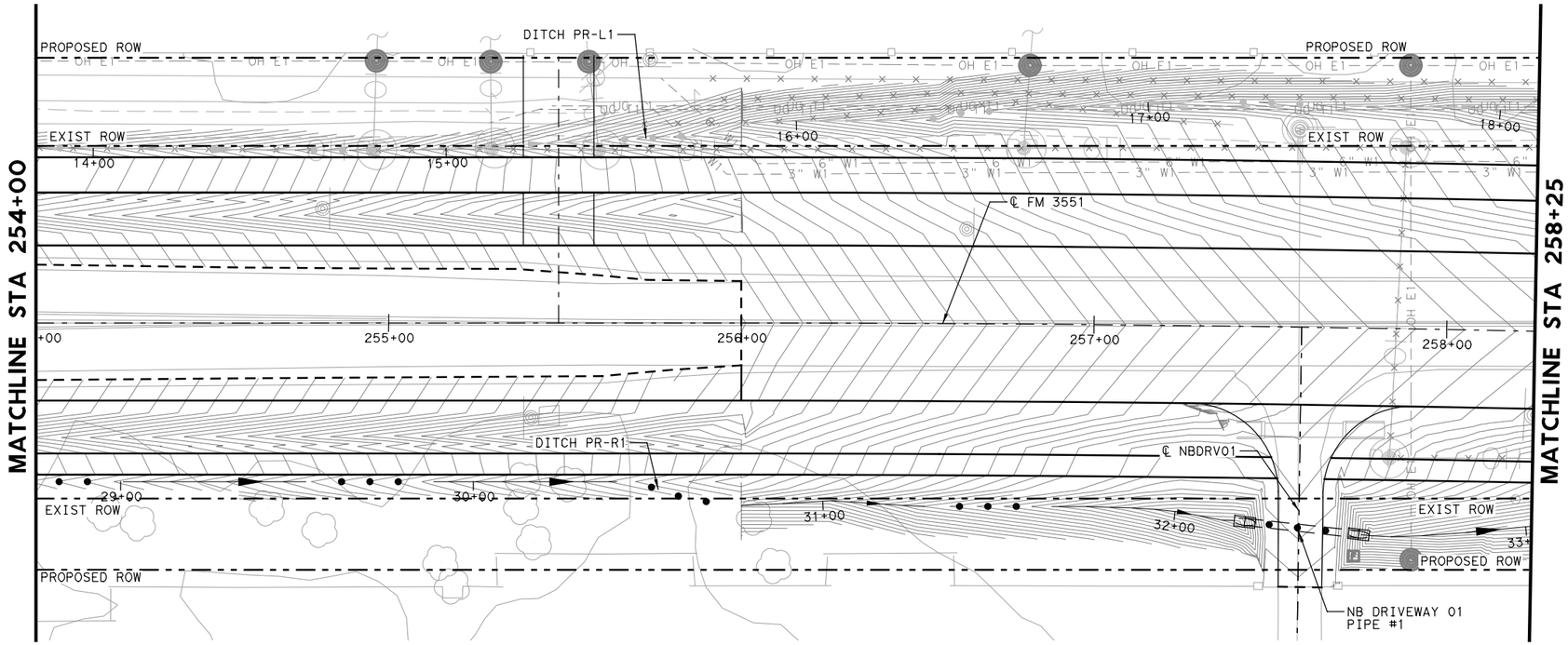
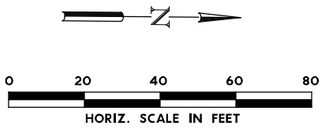
User Name=GARODRIGUE





DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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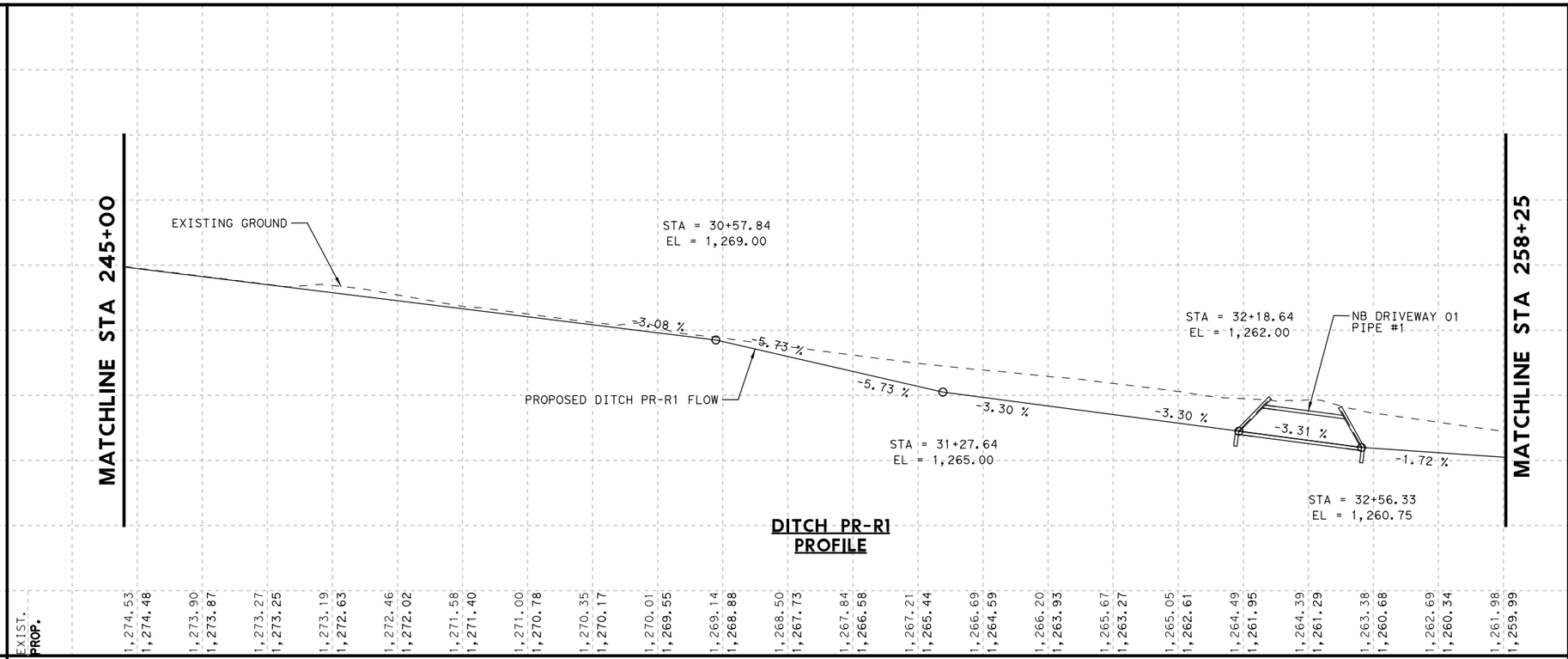

DITCH PR-R1 PROFILE

NO.	DATE	REVISION	APPR BY

ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 10 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	146

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
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DATE: 12/14/2023
PLOTTING TIME: 12:00:01 PM
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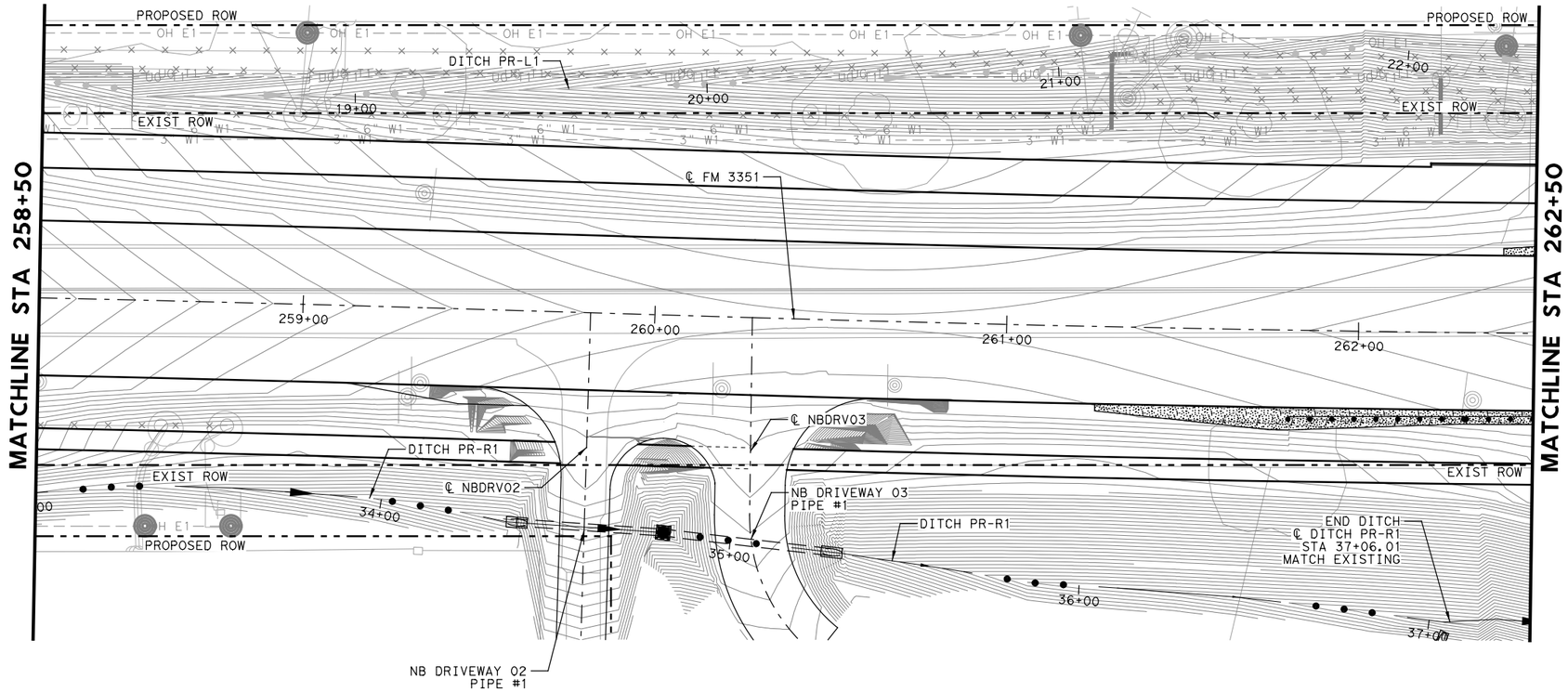
User Name=GARODRIGUE



0 20 40 60 80

HORIZ. SCALE IN FEET

DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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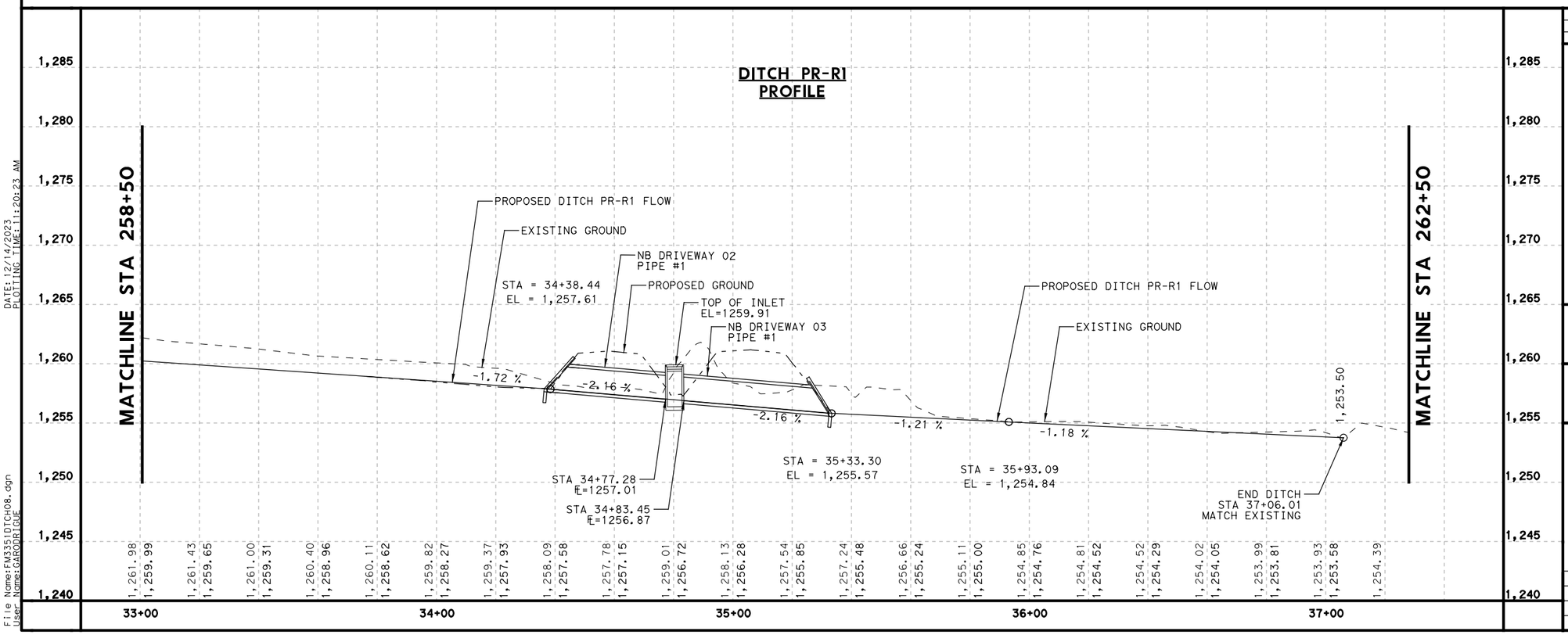
DITCH PR-R1 PROFILE



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 11 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	147

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl

DATE: 12/14/2023
PLOTTING TIME: 11:20:23 AM

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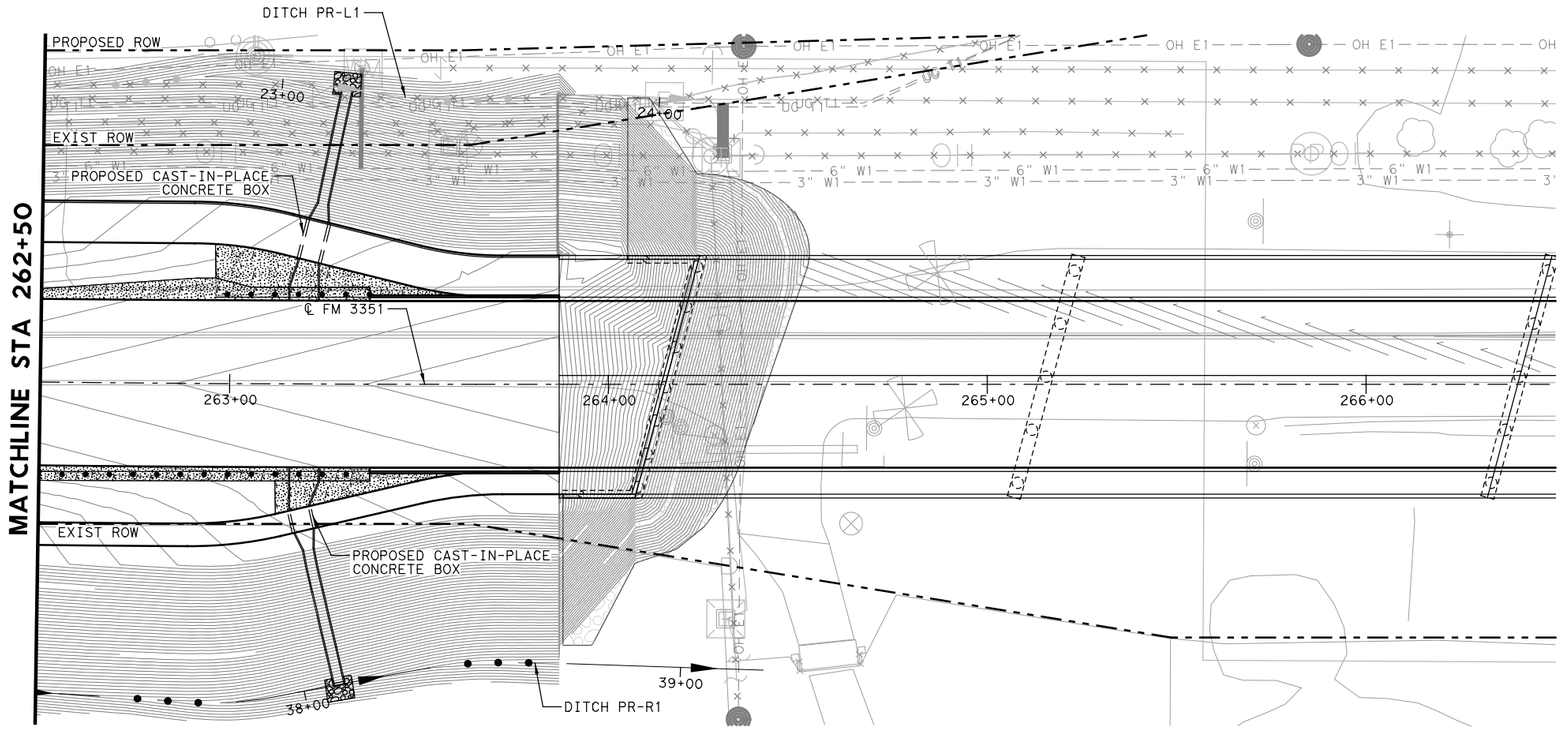

0 20 40 60 80

HORIZ. SCALE IN FEET

DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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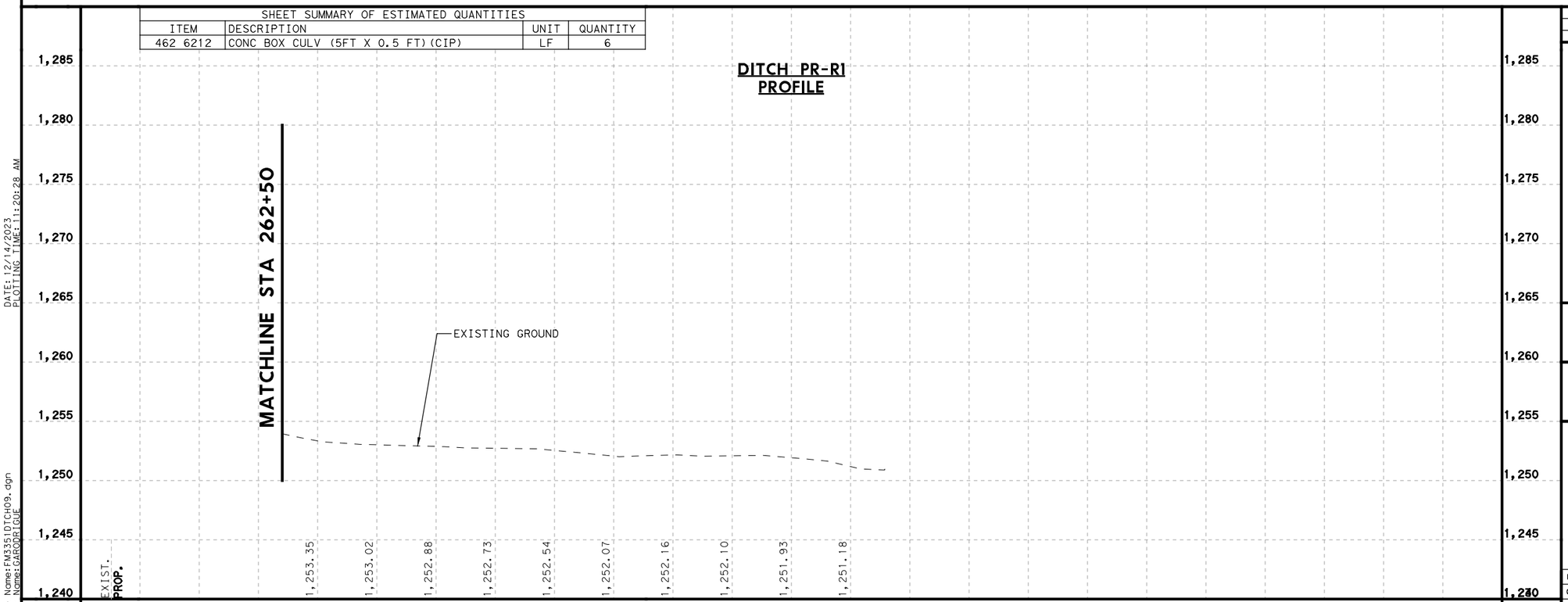
SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
462 6212	CONC BOX CULV (5FT X 0.5 FT)(CIP)	LF	6

DITCH PR-R1 PROFILE



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

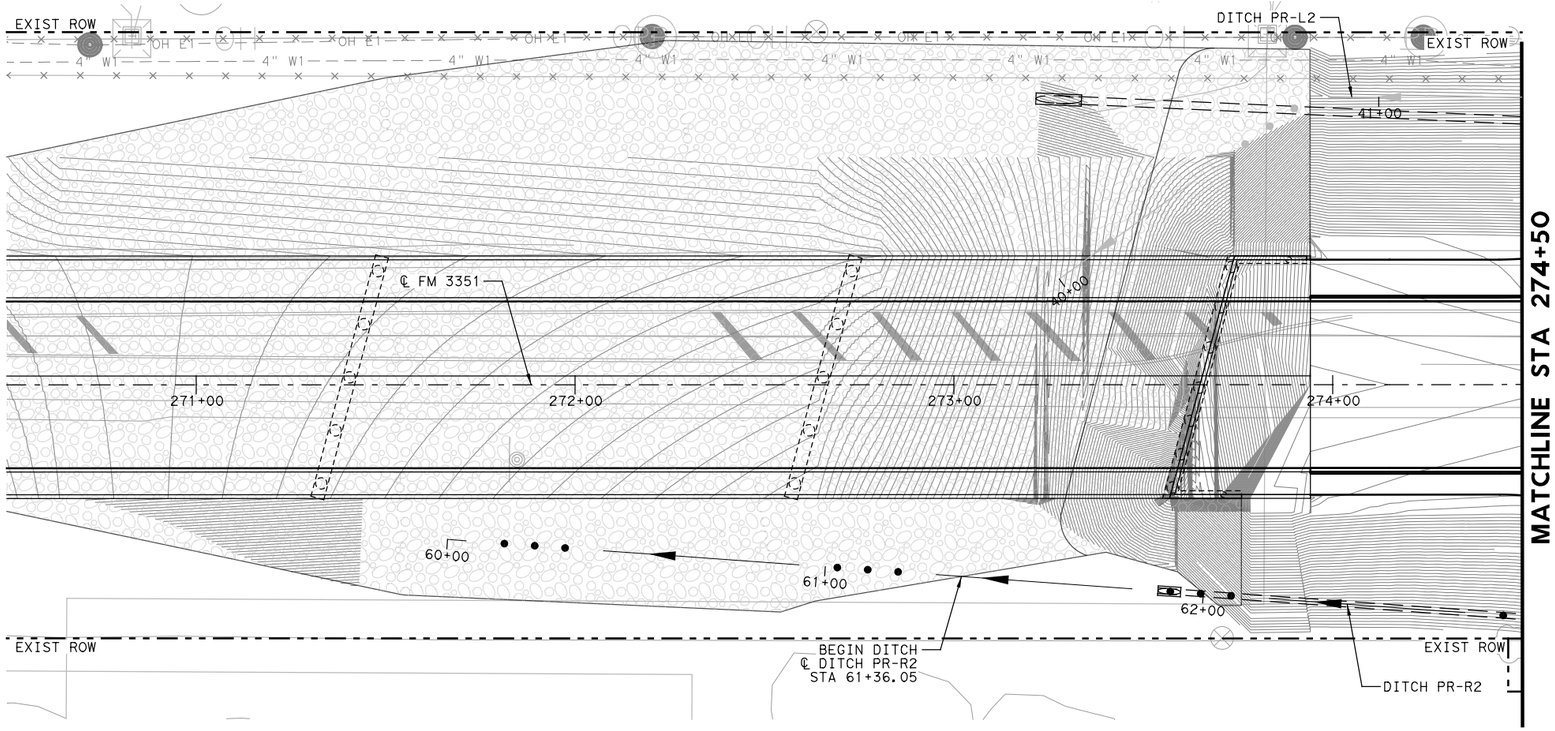
DITCH PLAN & PROFILE

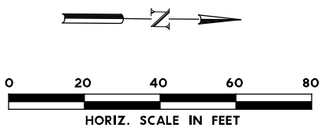
SCALE: 1"=40'-H
1"=10'-V

SHEET 12 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	148

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:20:28 AM
File Name:FM3351DITCH09.dgn
User Name:GARODRIGUE





DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
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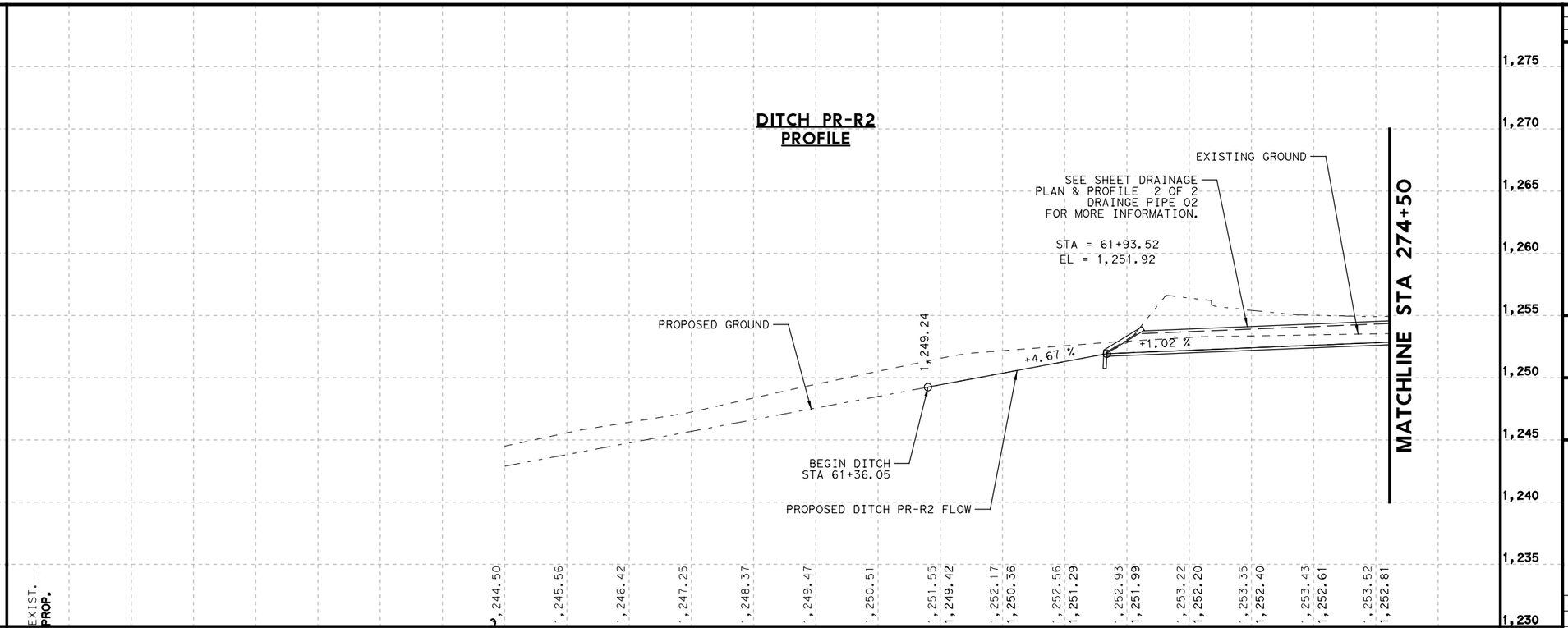
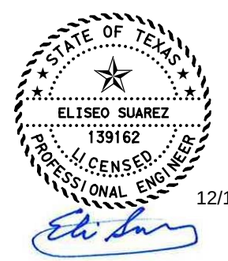
DITCH PR-R2 PROFILE



NO.	DATE	REVISION	APPR BY



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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 13 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	149

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1032978d.tbl
DATE: 12/14/2023
PLOTTING TIME: 11:20:33 AM
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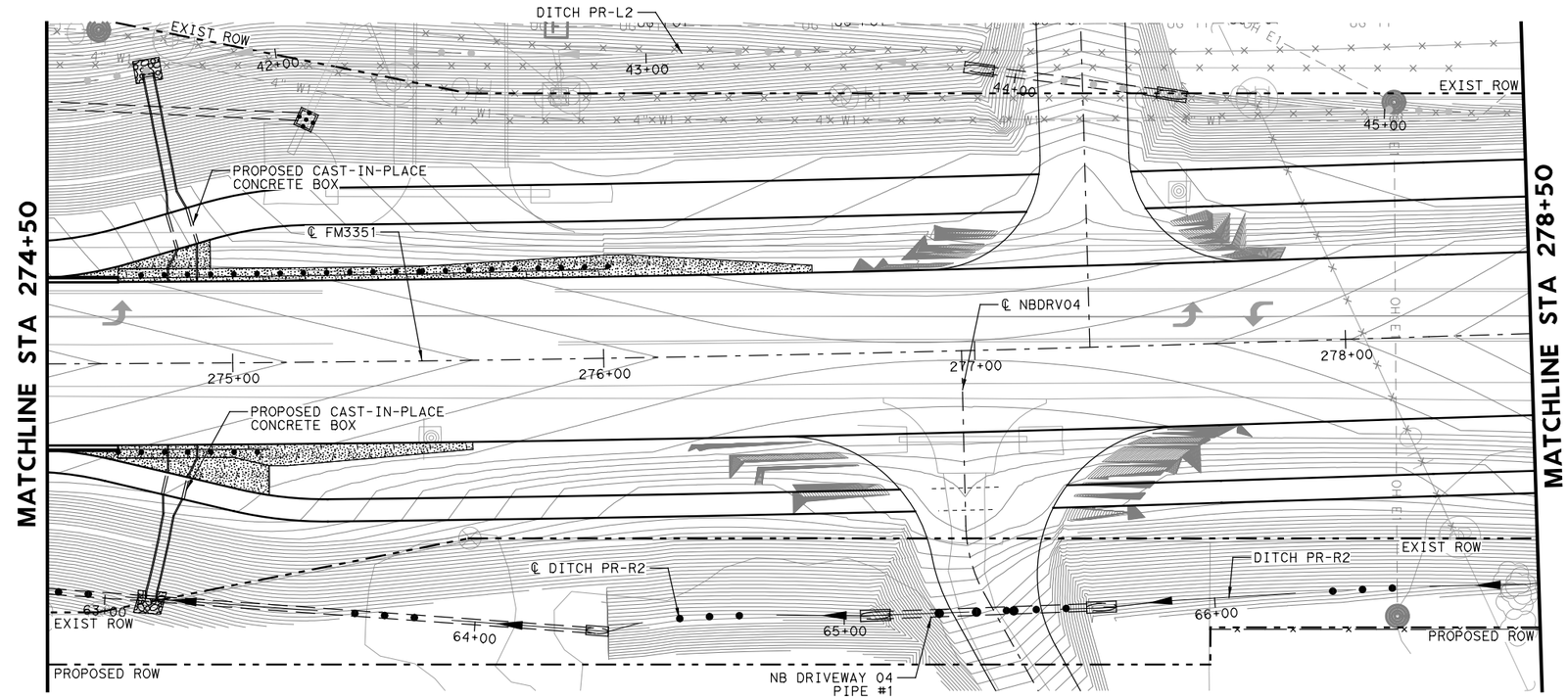
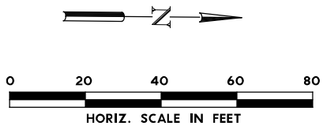
User Name:GARODRIGUE





DRAINAGE LEGEND

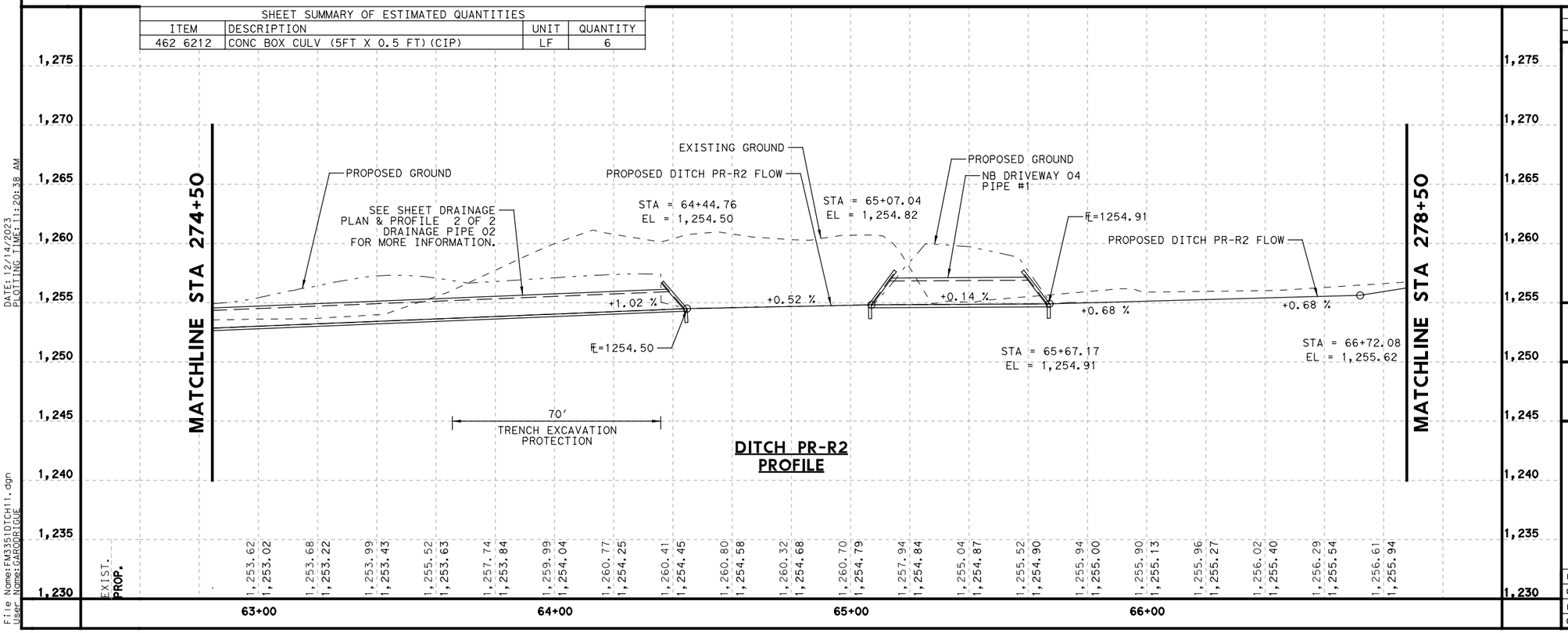
- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
2. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN AND DITCHES.
3. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN AND DITCHES.
4. SEE HORIZONTAL DITCH ALIGNMENT DATA SHEETS FOR DITCH ALIGNMENT.
5. REFER TO INTERNAL HYDRAULIC SUMMARIES SHEET FOR DITCH CONFIGURATION AND HYDRAULIC CALCULATIONS.
6. CONTACT UTILITY PROVIDERS 48 HOURS PRIOR TO EXCAVATION. CALL 817-392-9296 FOR FIBER OPTIC LOCATES.

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
462 6212	CONC BOX CULV (5FT X 0.5 FT)(CIP)	LF	6



DITCH PR-R2 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

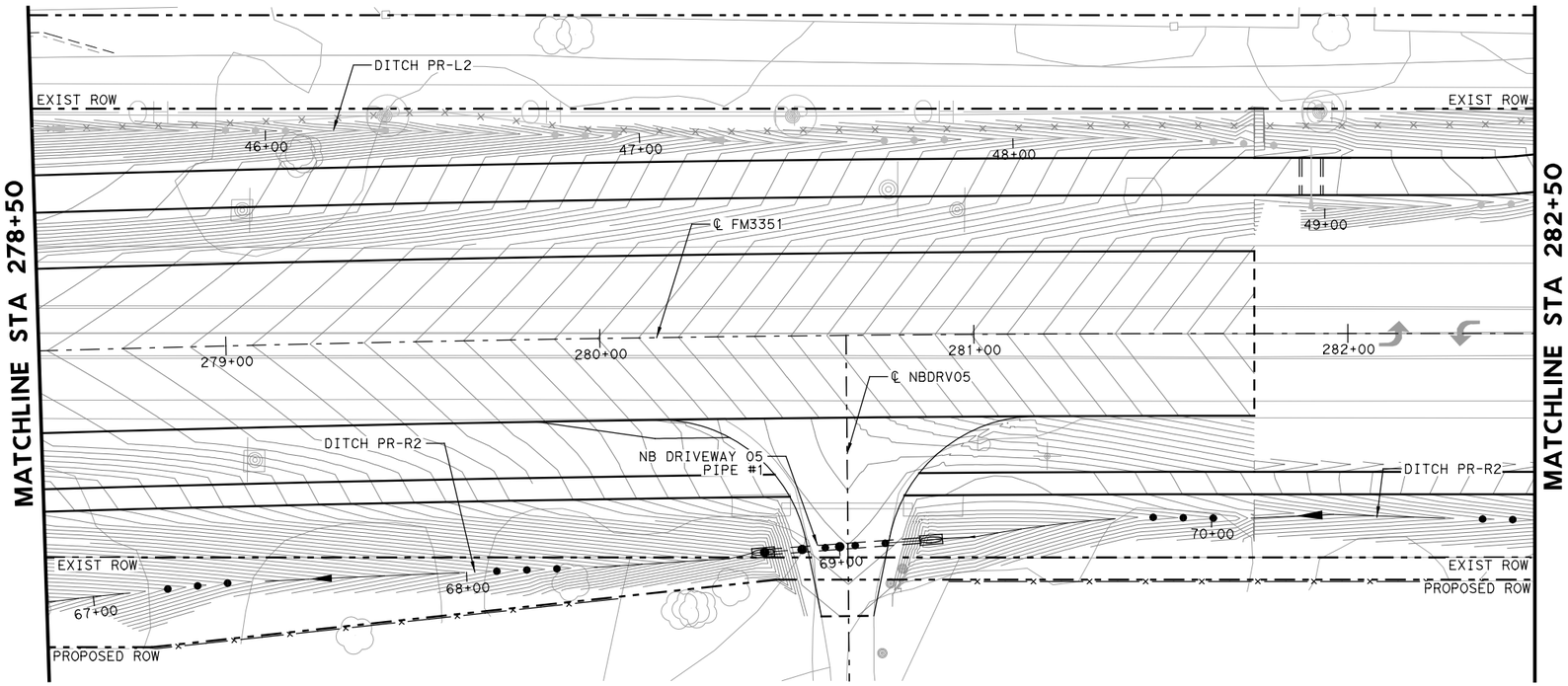
FM 3351 AT CIBOLO CREEK

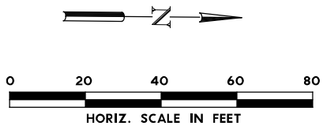
DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 14 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	150





DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

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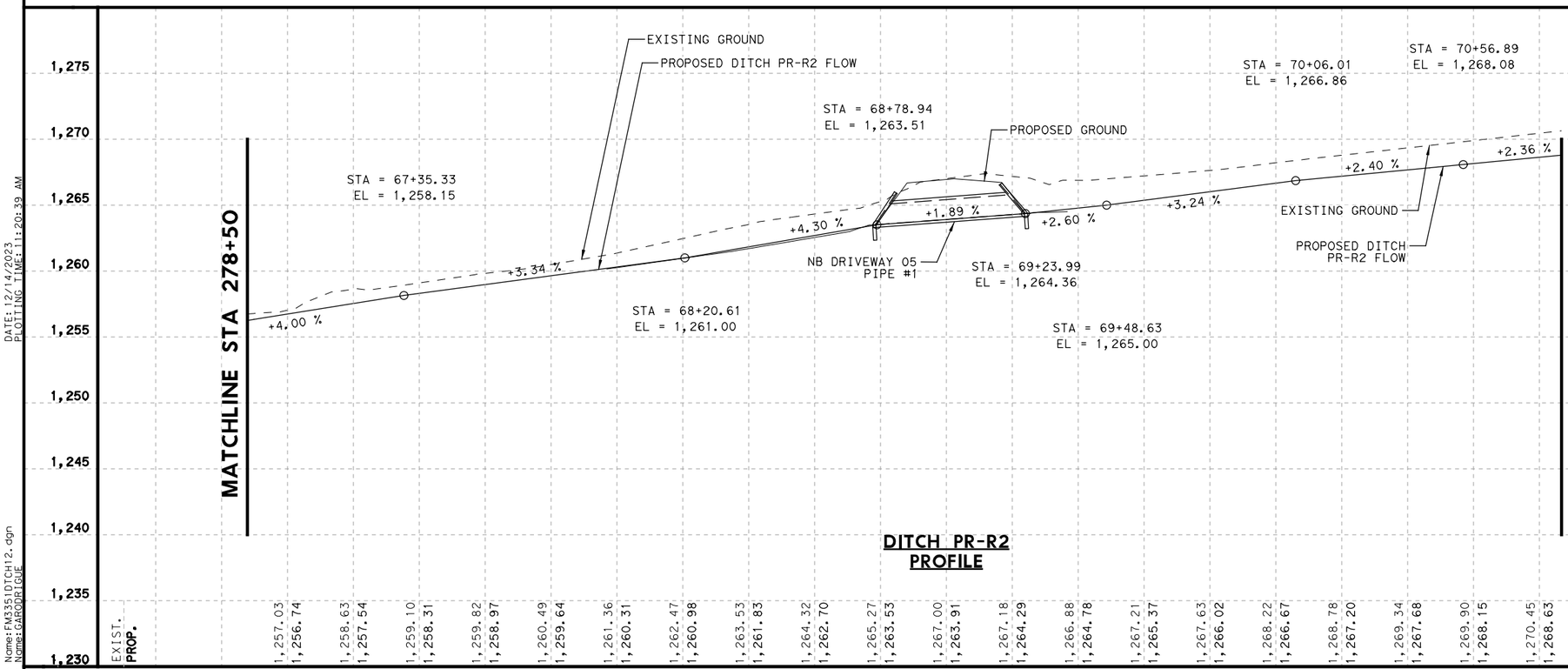

DITCH PR-R2 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
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LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AY CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 15 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	151

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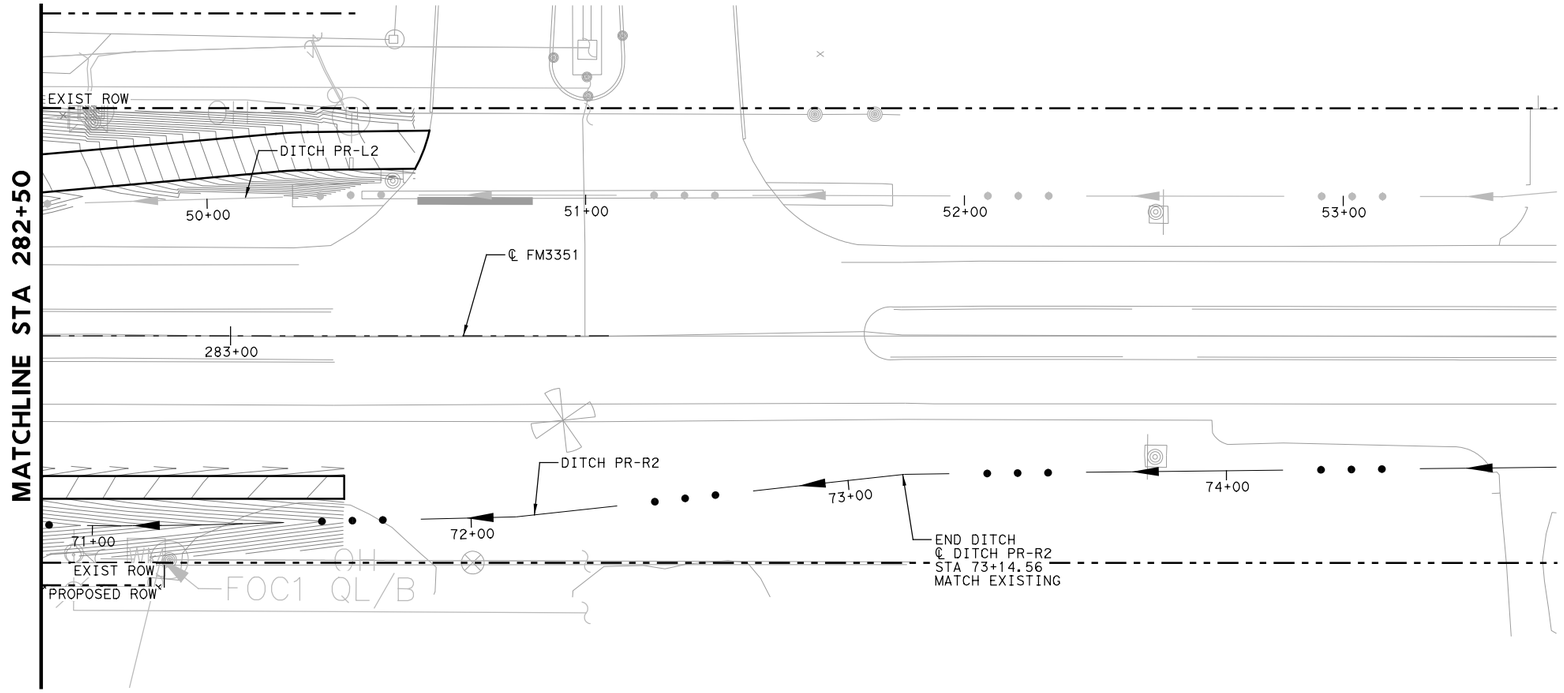

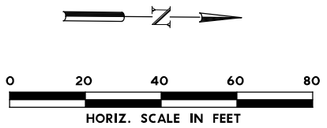

DRAINAGE LEGEND

- FLOW ARROW
- DRIVEWAY PIPE
- STONE RIP RAP

NOTES:

1. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
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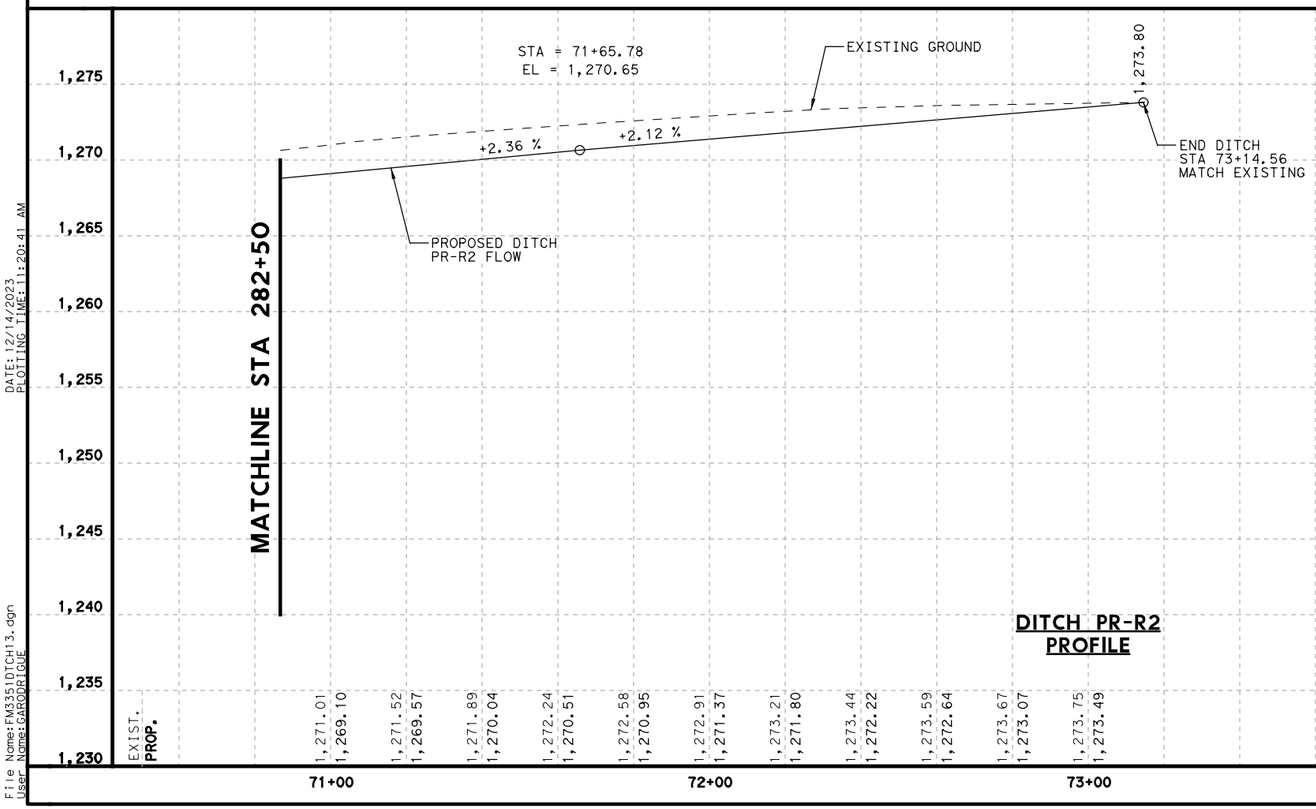

DITCH PR-R2 PROFILE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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12/14/2023

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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

DITCH PLAN & PROFILE

SCALE: 1"=40'-H
1"=10'-V

SHEET 16 OF 16

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	152

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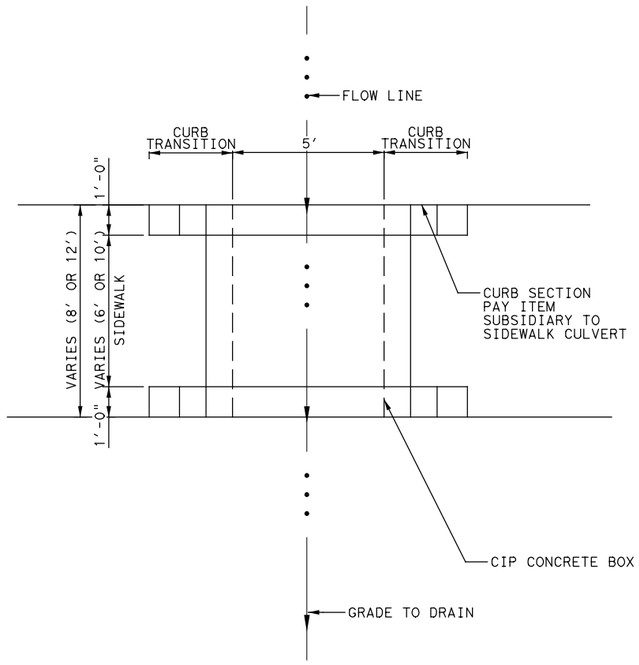
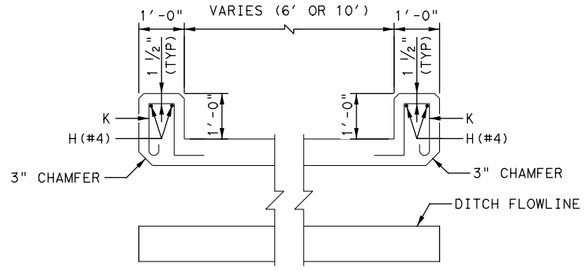
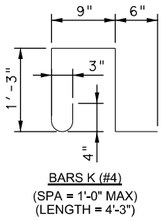


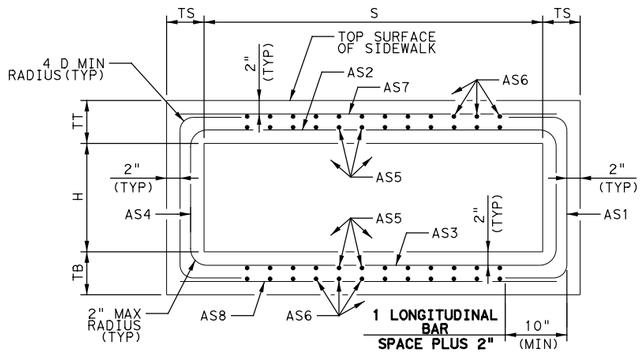


SECTION THRU CURB



BARS K (#4)
(SPA = 1'-0" MAX)
(LENGTH = 4'-3")

BOX DATA											
SECTION DIMENSIONS					REINFORCING (IN^2/FT)						
S (FT)	H (FT)	TT (IN)	TB (IN)	TS (IN)	AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8
5	0.5	9	9	8	0.19	0.31	0.21	0.14	0.19	0.19	0.19	0.17



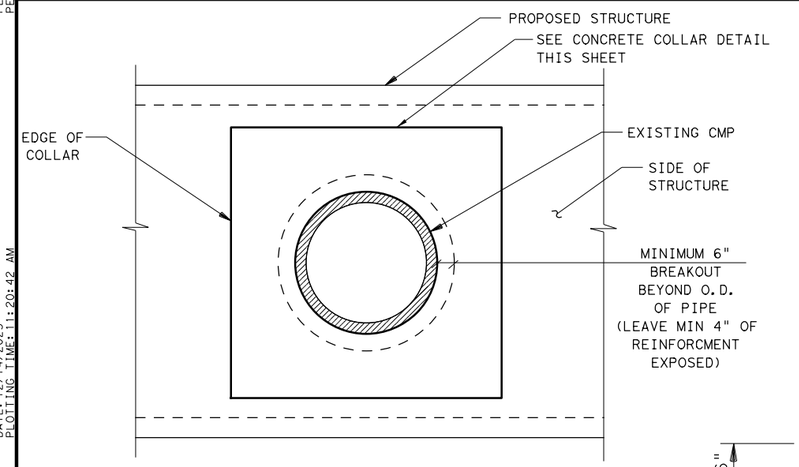
CAST IN PLACE CONCRETE BOX

GENERAL NOTES FOR CIP CONCRETE BOX:

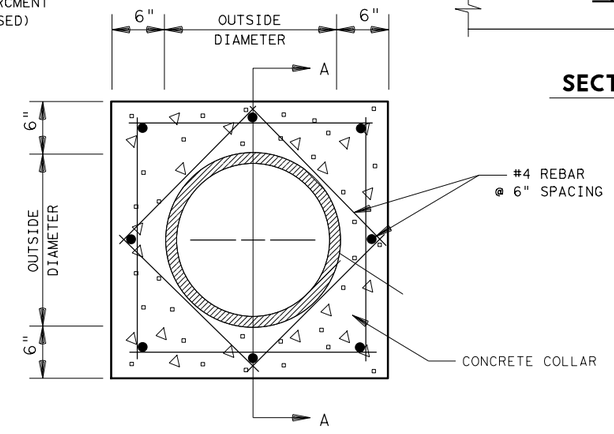
1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATION 8TH EDITION(2017).
2. DESIGNED FOR HL93 LOADING.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
5. VERIFY FORM WORK AND REINFORCING WITH ENGINEER PRIOR TO PLACING CONCRETE. TOP OF CONCRETE BOX/SIDEWALK SURFACE SHALL MEET ADA.
6. CONTRACTOR TO VERIFY FLOW LINE ELEVATION WITH ENGINEER.

MATERIAL NOTES FOR CIP CONCRETE BOX:

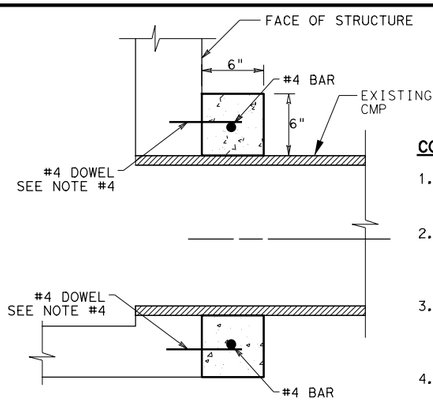
1. PROVIDE 0.03 SQ. IN./FT. MINIMUM LONGITUDINAL REINFORCEMENT AT EACH FACE IN THE SLAB AND WALLS. THIS MINIMUM REQUIREMENT MAY BE MET BY THE TRANSVERSE WIRES WHEN WIRE MESH REINFORCEMENT IS USED.
2. PROVIDE CLASS H CONCRETE (f'c=5,000 PSI).
3. PROVIDE GRADE 60 REINFORCING STEEL.



COLLAR TIE-IN-DETAIL
FOR RC PIPES TO BOXES & INLETS



CONCRETE COLLAR DETAIL
N.T.S.



SECTION A-A

CONCRET COLLOR NOTES:

1. ALL CONCRETE COLLARS SHALL BE CLASS 'A' CONCRETE.
2. DETAILS SHALL BE USED AT ALL PIPE CONNECTIONS WITH BOX CULVERTS, MANHOLES, INLETS AND EXISTING PIPES.
3. CONCRETE COLLAR SHALL BE DOWELED INTO CONNECTIONS WITH BOX CULVERTS, MANHOLES AND INLETS.
4. DOWEL SHALL BE EMBEDDED 1/2 THE WALL OF THE STRUCTURE WALL (INLET, CULVERT, MANHOLE) @ 18' O.C. AND COMPLY WITH ACCORDANCE TO ITEM 420.
5. VOID SPACE BETWEEN CMP AND STRUCTURE SHALL BE FILLED WITH NON-SHRINK GROUT AS APPROVED BY THE ENGINEER.
6. ALL WORK AND INCIDENTALS ASSOCIATED WITH CONCRETE COLLARS ARE NOT PAID FOR DIRECTLY BUT ARE SUBSIDIARY TO ITEM 464.
7. IN AREAS THAT THE BACKFILL WILL NOT SUPPORT ANY PORTION OF THE COMPLETED ROAD BED, THE FLOWABLE BACKFILL WILL BE REPLACED WITH COMPACTED BACKFILL.
8. COMPACTED BACKFILL SHALL BE IN ACCORDANCE TO ITEM 400 "EXCAVATION AND BACKFILL FOR STRUCTURES". THE CONTRACTOR HAS THE OPTION OF PLACING FLOWABLE BACKFILL IN PLACE OF COMPACTED BACKFILL, BUT THE ADDITIONAL FLOWABLE BACKFILL WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEM.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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139162
LICENSED
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12/14/2023

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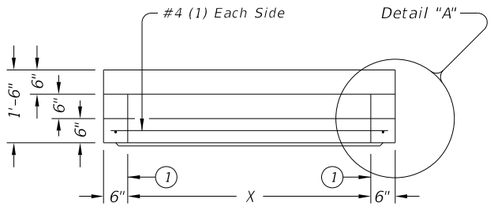
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351 AT CIBOLO CREEK

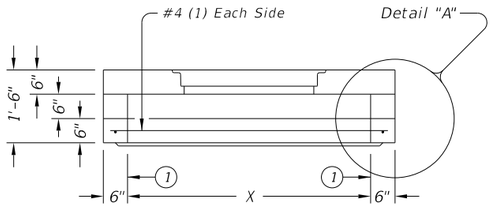
MISCELLANEOUS DETAILS

SHEET 1 OF 1

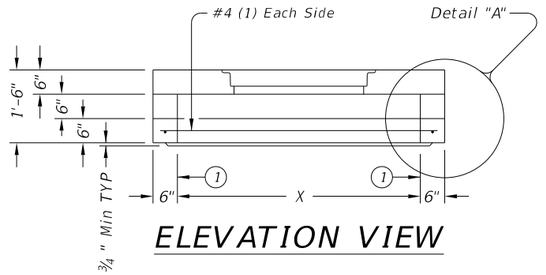
DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	153



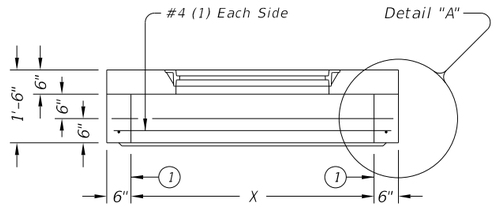
ELEVATION VIEW



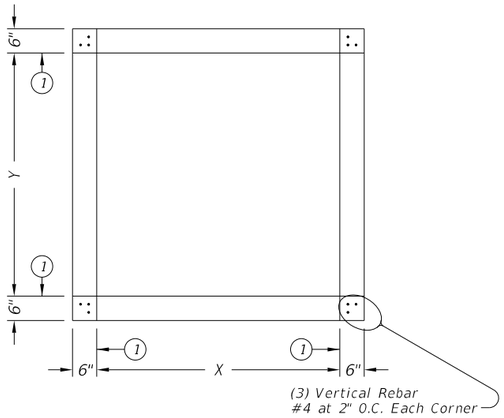
ELEVATION VIEW



ELEVATION VIEW



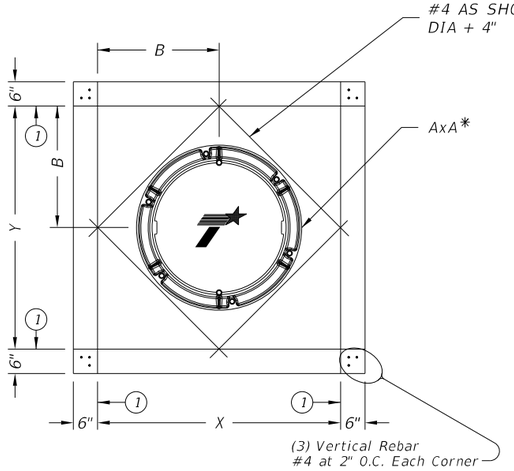
ELEVATION VIEW



PLAN VIEW

NO OPENINGS

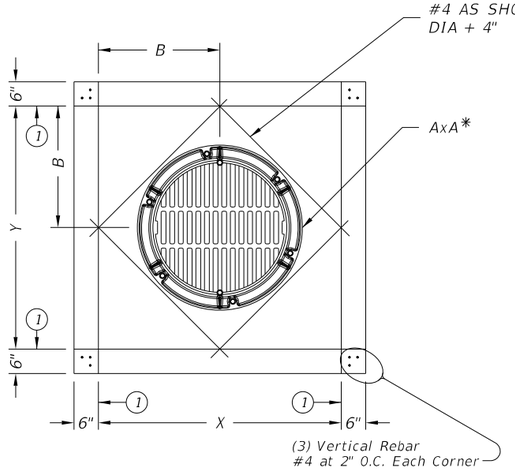
STYLE 'SL'



PLAN VIEW

32" DIA CAST-IN RING & COVER

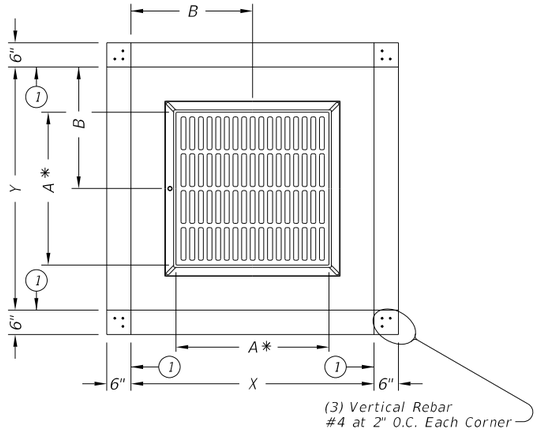
STYLE 'RC'



PLAN VIEW

32" DIA CAST-IN RING & GRATE

STYLE 'RG'



PLAN VIEW

CAST-IN FRAME & GRATE

STYLE 'FG'

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

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. Provide clear cover of ¾" to reinforcing from bottom of slab for structural reinforcement. Place short span reinforcing closest to surface.
4. No substitution is allowed for diagonal #4 bars around openings.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
6. Provide lifting devices in conformance with Manufacturer's recommendations.

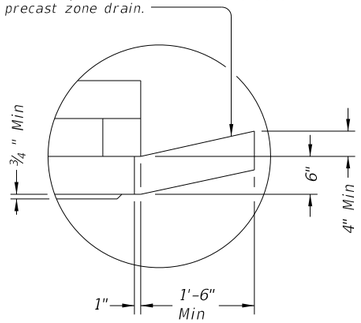
INSTALLATION NOTES:

1. PAZD is for use in ditches and medians outside of the horizontal clearance (clear zone). Precast Area Zone Drain is not intended for direct traffic and may not be placed in roadway.
2. 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.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Construct cast-in-place reinforced concrete apron when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PAZD. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PAZD, use detail above to create an apron ledge on all 4 sides.

Style	Size (X x Y)	A x A*	B x B	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	n/a	n/a	0.37 in²/ft	0.37 in²/ft
RC,RG	3'x3'	32" Dia	1.5'x1.5'	0.37 in²/ft	0.37 in²/ft
FG	3'x3'	3'x3'	1.5'x1.5'	0.37 in²/ft	0.37 in²/ft
SL	4'x4'	n/a	n/a	0.34 in²/ft	0.34 in²/ft
RC,RG	4'x4'	32" Dia	2'x2'	0.34 in²/ft	0.34 in²/ft
FG	4'x4'	3'x3'	2'x2'	0.34 in²/ft	0.34 in²/ft
FG	4'x4'	4'x4'	2'x2'	0.34 in²/ft	0.34 in²/ft
SL	5'x5'	n/a	n/a	0.43 in²/ft	0.43 in²/ft
RC,RG	5'x5'	32" Dia	2.5'x2.5'	0.68 in²/ft	0.68 in²/ft
FG	5'x5'	3'x3'	2.5'x2.5'	0.43 in²/ft	0.43 in²/ft
FG	5'x5'	4'x4'	2.5'x2.5'	0.43 in²/ft	0.43 in²/ft

* Nominal frame/grate or ring/cover size.

Texas Department of Transportation

Bridge Division Standard

PRECAST AREA ZONE DRAIN

PAZD

FILE: prestd08-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		154

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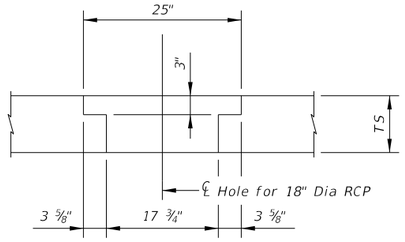
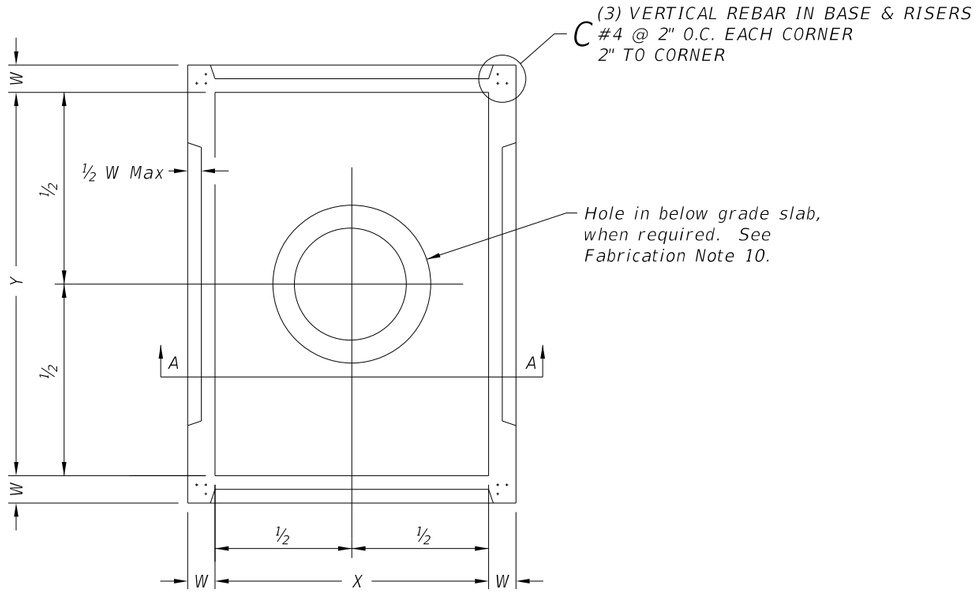
FILE: $FILE$

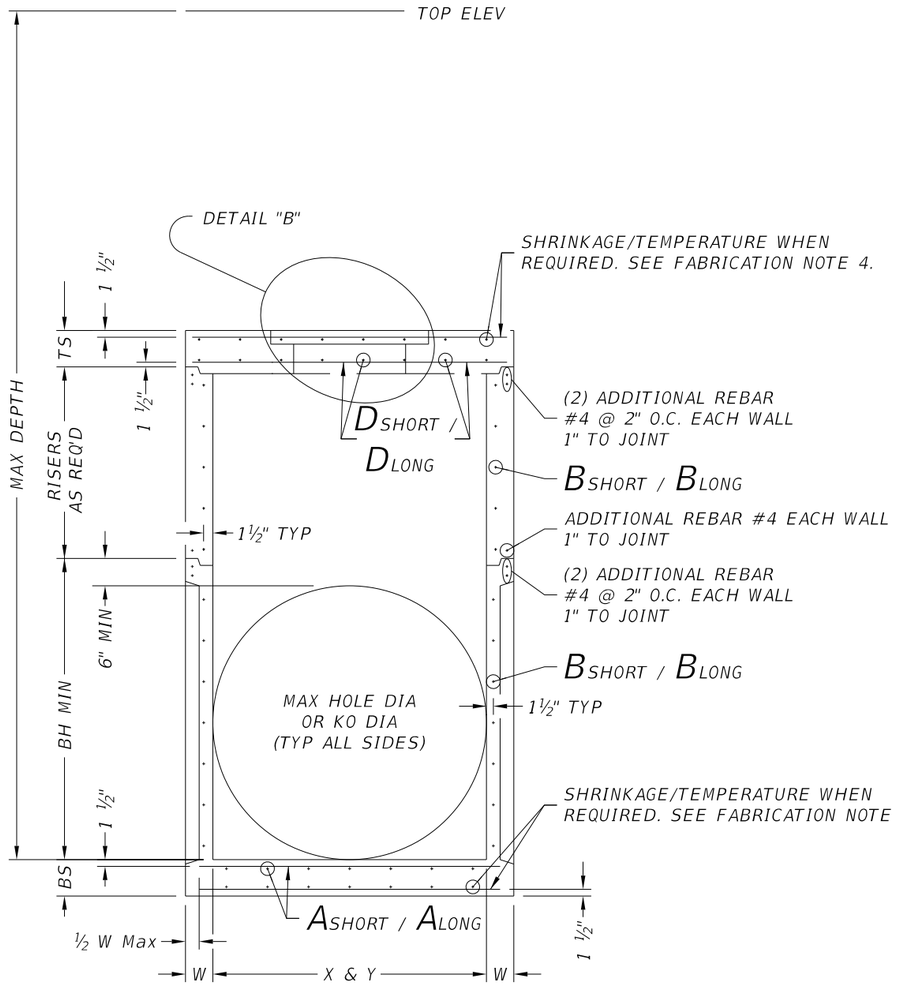
DATE: 12/14/2023 11:20:45 AM
FILE: $FILE$



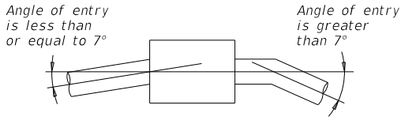
DETAIL "B"



PLAN VIEW



SECTION A-A



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:

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. 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 ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. 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 to junction box.
2. 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.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. 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.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE: prestd09-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		155

	Size	MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB										Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)						
		Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	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
	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
	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
	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
	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
	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
	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
Precast Base (PB)	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
	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
	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
	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
	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
	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:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. 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

Texas Department of Transportation | Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

PDD

FILE: prestd10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	COMAL		156

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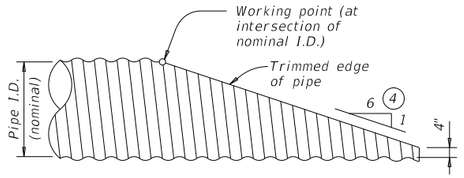
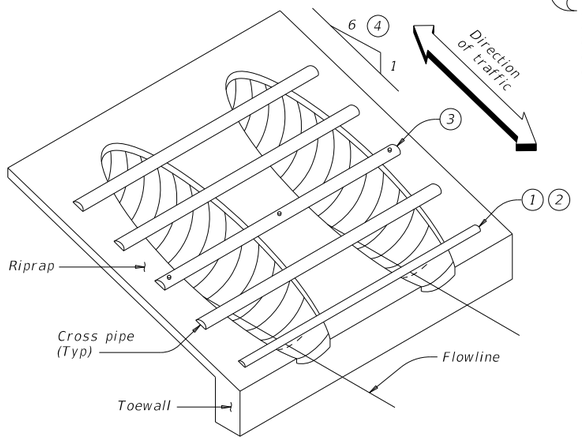


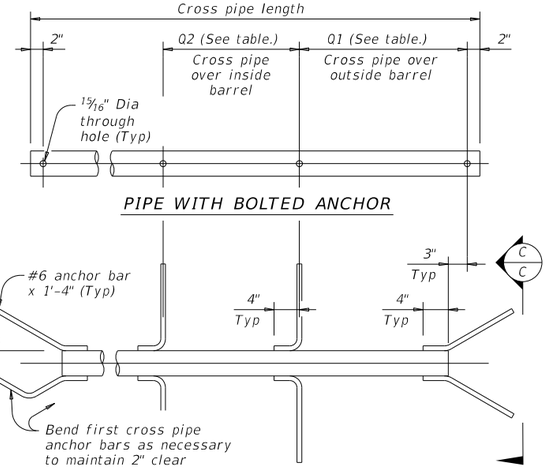
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

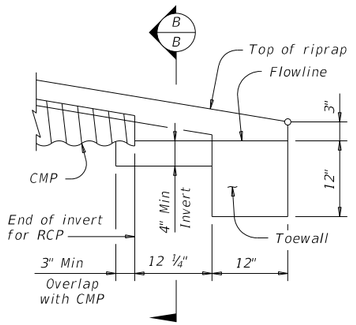
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

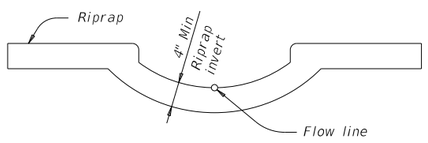


CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. 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, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

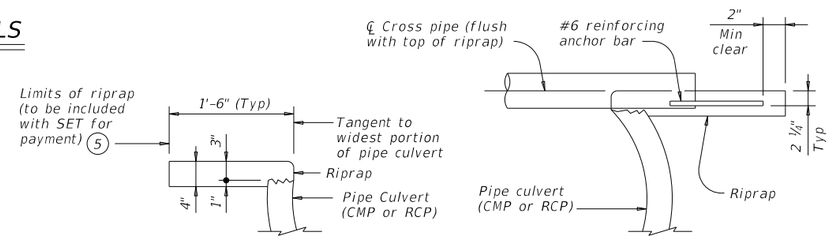
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

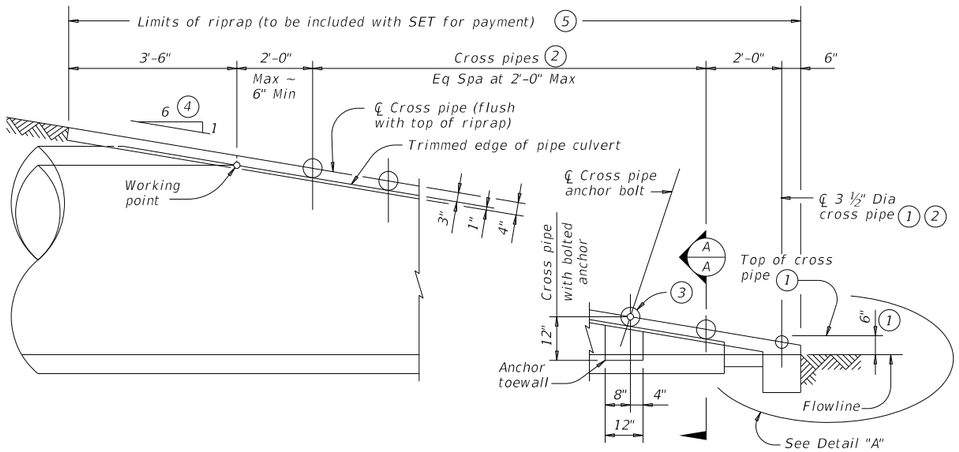
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



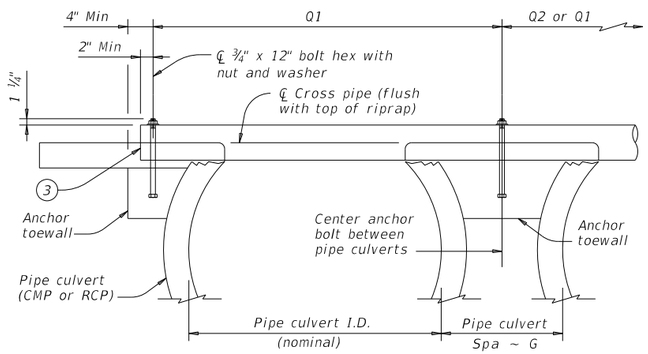
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

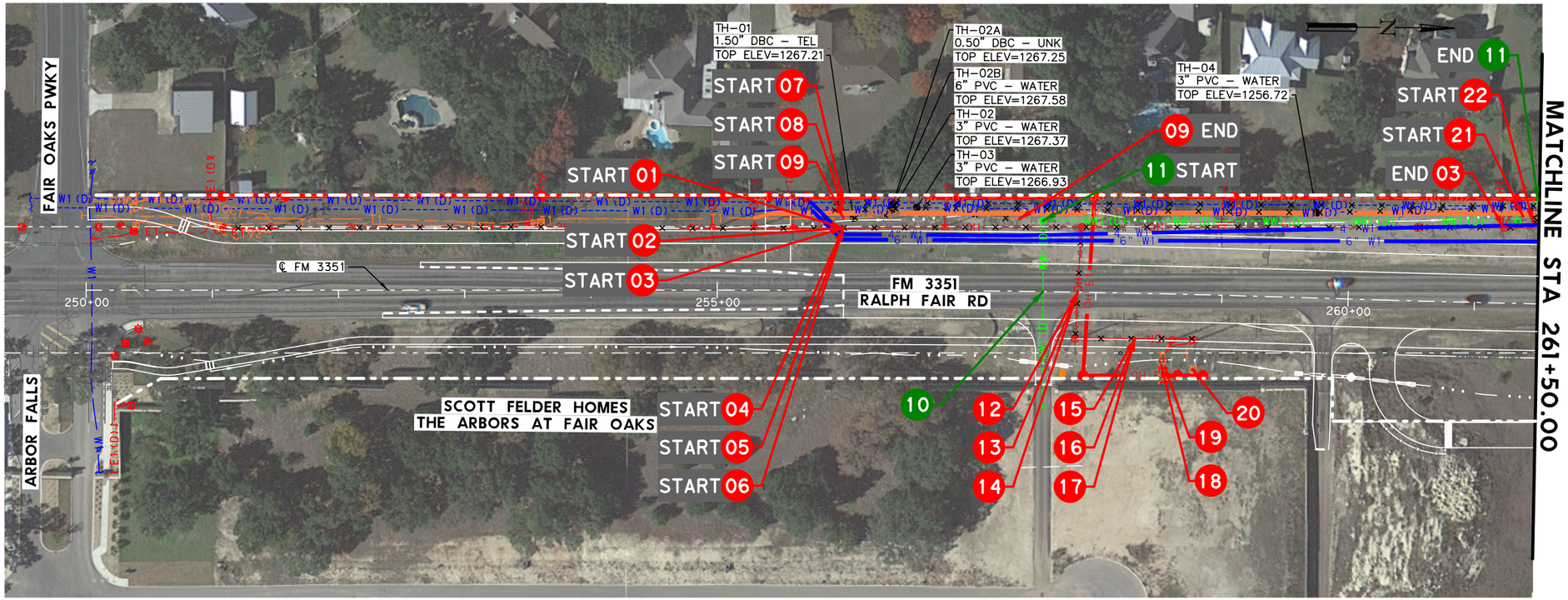
Bridge Division Standard

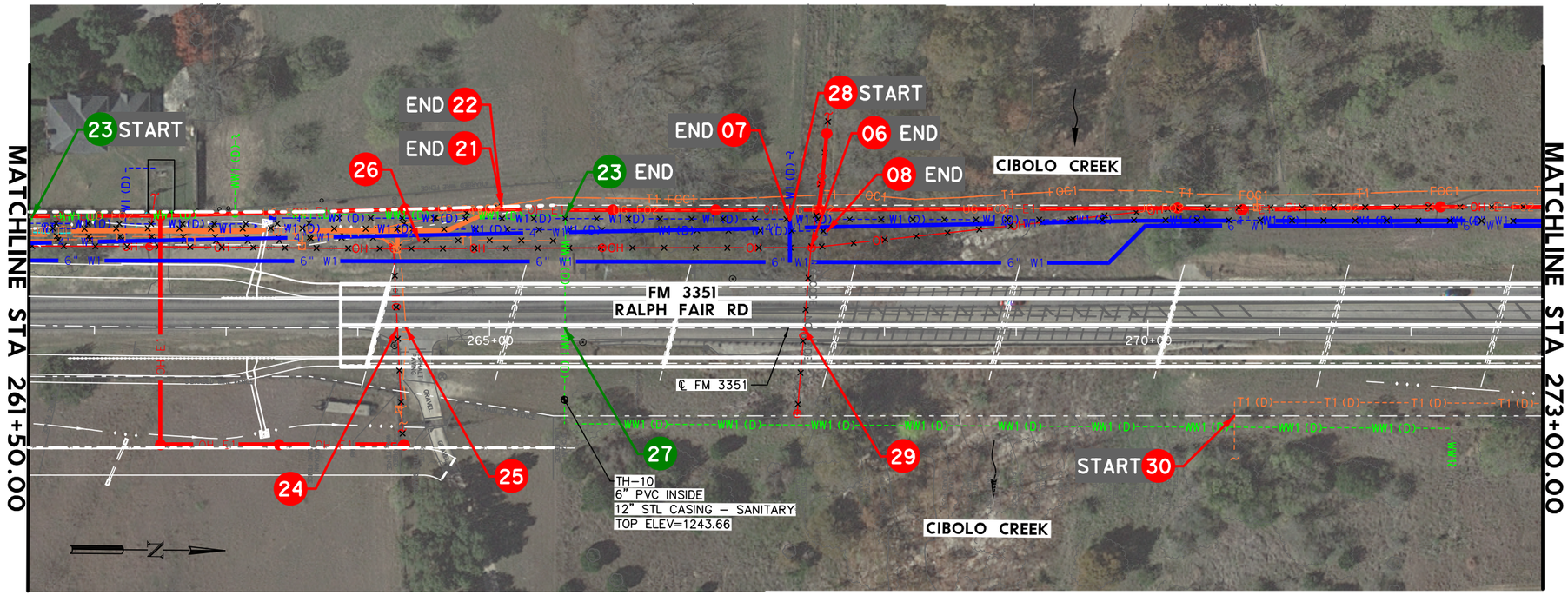
SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		157





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THE LOCATIONS OF THE UTILITIES SHOWN IN THESE PLANS DOES NOT RELIEVE THE CONTRACTOR FROM THE DUTY TO COMPLY WITH THE APPLICABLE UTILITY DAMAGE PREVENTION LAWS AND REGULATIONS, INCLUDING, BUT NOT LIMITED TO, GIVING NOTIFICATION TO UTILITY OWNER'S "ONE-CALL" CENTERS BEFORE EXCAVATION.

0 50 100 150 200
HORIZ. SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS

	QL "B"	QL "D"
GVTC (TELE)	T1	T1 (D)
GVTC (FO/DUCT)	FOC1	FOC1 (D)
GVTC (CABLE)	CTV2	CTV2 (D)
SPECTRUM (CABLE)	CTV1	CTV1 (D)
SPECTRUM (FO/DUCT)	FOC2	FOC2 (D)

ELECTRIC / POWER

	QL "B"	QL "D"
CPS ENERGY	E1	E1 (D)

SANITARY SEWER

	QL "B"	QL "D"
CITY OF FAIR OAKS	WW1	WW1 (D)

POTABLE WATER

	QL "B"	QL "D"
CITY OF FAIR OAKS	W1	W1 (D)

TRAFFIC SIGNALS

	QL "B"	QL "D"
TXDOT	TS1	TS1 (D)

OVERHEAD UTILITY — QL "C"/QL "D": OH

OH1 - CPS ELECTRIC
OH2 - SPECTRUM FIBER
OH3 - SPECTRUM COAX
OH4 - GVTC FIBER
OH5 - GVTC COAX
OH6 - GVTC TELE

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER
8/29/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
UTILITY LAYOUT

SCALE: 1"=100' SHEET 1 OF 2

DSN: BE	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CW	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: BE	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CW	COMAL	SAT	3212	05	013	158

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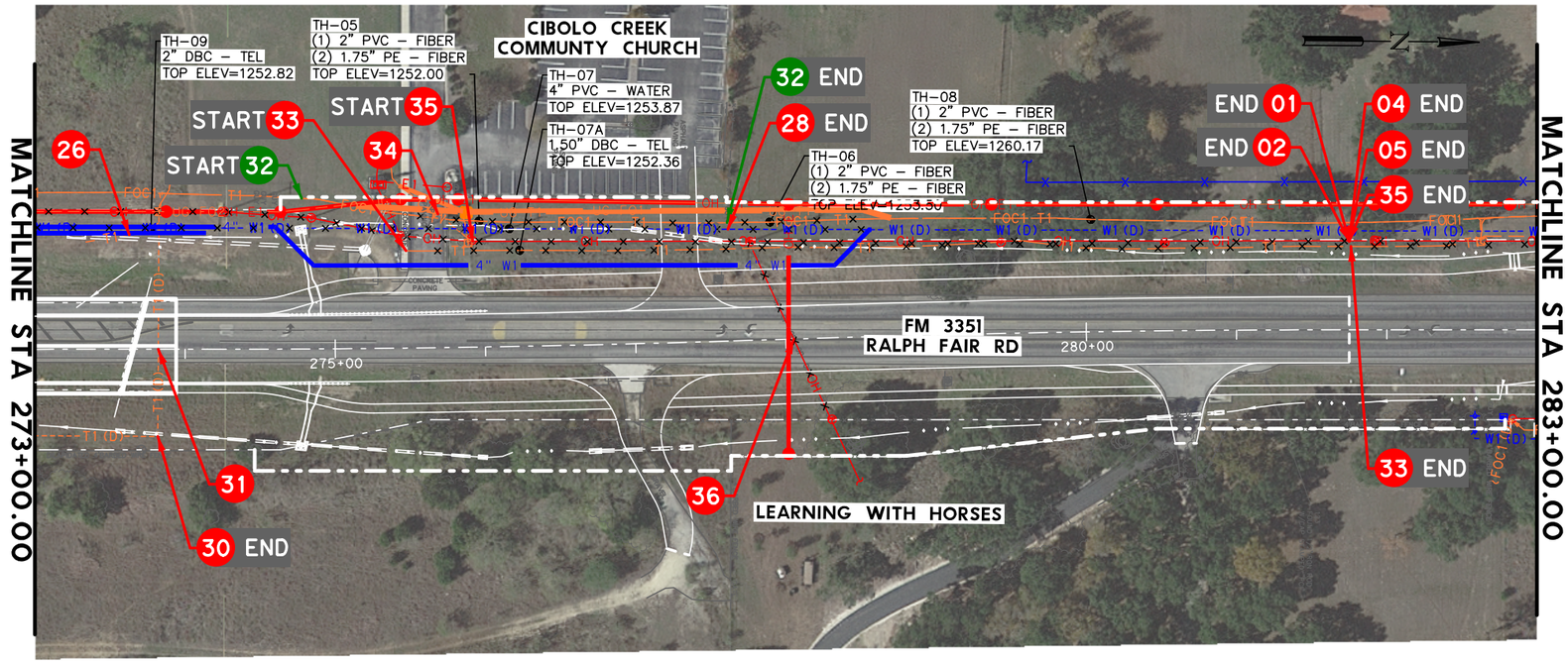

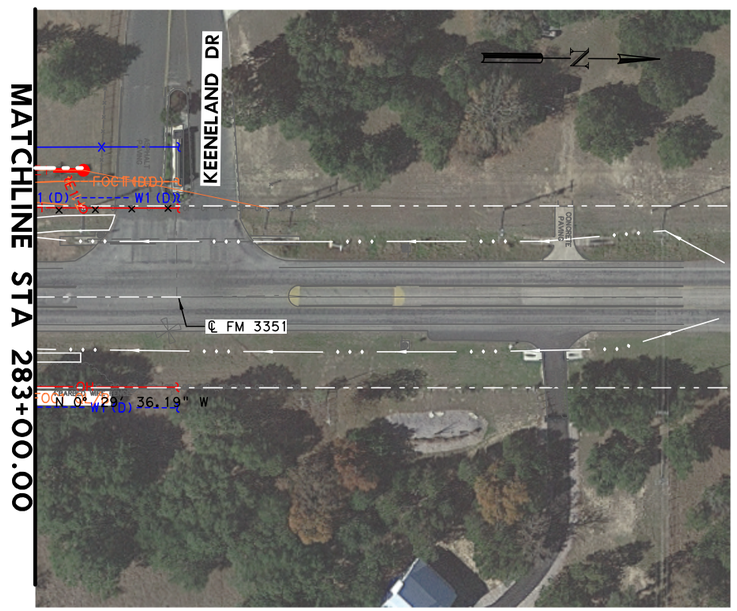

0 50 100 150 200

HORIZ. SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS

	QL "B"	QL "D"
GVTC (TELE)	T1	T1 (D)
GVTC (FO/DUCT)	FOC1	FOC1 (D)
GVTC (CABLE)	CTV2	CTV2 (D)
SPECTRUM (CABLE)	CTV1	CTV1 (D)
SPECTRUM (FO/DUCT)	FOC2	FOC2 (D)

ELECTRIC / POWER

	QL "B"	QL "D"
CPS ENERGY	E1	E1 (D)

SANITARY SEWER

	QL "B"	QL "D"
CITY OF FAIR OAKS	WW1	WW1 (D)

POTABLE WATER

	QL "B"	QL "D"
CITY OF FAIR OAKS	W1	W1 (D)

TRAFFIC SIGNALS

	QL "B"	QL "D"
TXDOT	TS1	TS1 (D)

OVERHEAD UTILITY — QL "C"/QL "D": OH

OH1 - CPS ELECTRIC
OH2 - SPECTRUM FIBER
OH3 - SPECTRUM COAX
OH4 - GVTC FIBER
OH5 - GVTC COAX
OH6 - GVTC TELE

NO.	DATE	REVISION	APPR BY

UTILITY INFORMATION IS DERIVED FROM FURNISHED RECORDS. SUCH INFORMATION MAY NOT BE ACCURATE OR RELIABLE. HDR, INC, EXPRESSLY DISCLAIMS RESPONSIBILITY FOR THE ACCURACY OR RELIABILITY OF UTILITY INFORMATION DEPICTED IN OUR RECORDS.

THE LOCATIONS OF THE UTILITIES SHOWN IN THESE PLANS DOES NOT RELIEVE THE CONTRACTOR FROM THE DUTY TO COMPLY WITH THE APPLICABLE UTILITY DAMAGE PREVENTION LAWS AND REGULATIONS, INCLUDING, BUT NOT LIMITED TO, GIVING NOTIFICATION TO UTILITY OWNER'S "ONE-CALL" CENTERS BEFORE EXCAVATION.

STATE OF TEXAS
BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER

8/29/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
UTILITY LAYOUT

SCALE: 1"=100' SHEET 2 OF 2

DSN: BE	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CW	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: BE	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CW	COMAL	SAT	3212	05	013	159

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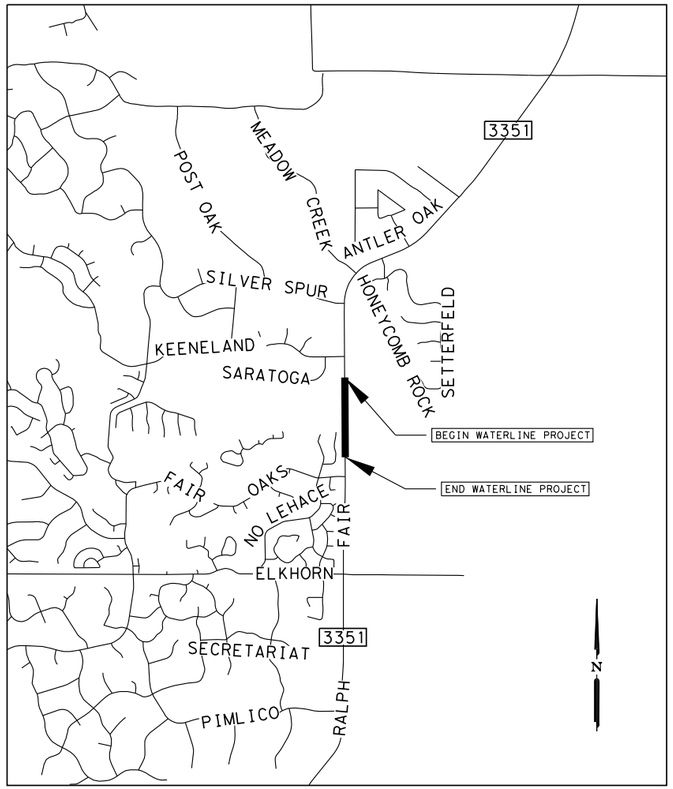
CITY OF FAIR OAKS RANCH

WATER WELL REPLACEMENT PROJECT
RALPH FAIR ROAD (FM 3351)

SHEET INDEX:



NOT TO SCALE

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
101306
REGISTERED
PROFESSIONAL ENGINEER

PREPARED BY:

K FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING

40 NE INTERSTATE 410 LOOP, SUITE 545
SAN ANTONIO, TX 78216
210.491.2391

TBPE FIRM REGISTRATION NO:6535

EMILY STROUP	PLACE 1
ROY ELIZONDO	PLACE 2
MICHELLE BLISS	PLACE 3
LAURA KOERNER	PLACE 4
SCOTT PARKER	PLACE 5
CHELSEY MUENCHOW	PLACE 6

DATE:_____

GENERAL NOTES

1. THIS WATER DISTRIBUTION SYSTEM MUST BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS 30 TEXAS ADMINISTRATIVE CODE (TAC) CHAPTER 290 SUBCHAPTER D. WHEN CONFLICTS ARE NOTED WITH LOCAL STANDARDS, THE MORE STRINGENT REQUIREMENT SHALL BE APPLIED. AT A MINIMUM, CONSTRUCTION FOR PUBLIC WATER SYSTEMS MUST ALWAYS MEET TCEQ'S "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS.

2. ALL NEWLY INSTALLED PIPES AND RELATED PRODUCTS MUST CONFORM TO AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)/NSF INTERNATIONAL STANDARD 61 AND MUST BE CERTIFIED BY AN ORGANIZATION ACCREDITED BY ANSI [§290.44(A)(1)].

3. PLASTIC PIPE FOR USE IN PUBLIC WATER SYSTEMS MUST BEAR THE NSF INTERNATIONAL SEAL OF APPROVAL (NSF-PW) AND HAVE AN ASTM DESIGN PRESSURE RATING OF AT LEAST 150 PSI OR A STANDARD DIMENSION RATIO OF 26 OR LESS [§290.44(A)(2)].

4. NO PIPE WHICH HAS BEEN USED FOR ANY PURPOSE OTHER THAN THE CONVEYANCE OF DRINKING WATER SHALL BE ACCEPTED OR RELOCATED FOR USE IN ANY PUBLIC DRINKING WATER SUPPLY [§290.44(A)(3)].

5. ALL WATER LINE CROSSINGS OF WASTEWATER MAINS SHALL BE PERPENDICULAR [§290.44(E)(4)(B)].

6. WATER TRANSMISSION AND DISTRIBUTION LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. HOWEVER, THE TOP OF THE WATER LINE MUST BE LOCATED BELOW THE FROST LINE AND IN NO CASE SHALL THE TOP OF THE WATER LINE BE LESS THAN 24 INCHES BELOW GROUND SURFACE [§290.44(A)(4)].

7. THE MAXIMUM ALLOWABLE LEAD CONTENT OF PIPES, PIPE FITTINGS, PLUMBING FITTINGS, AND FIXTURES IS 0.25 PERCENT [§290.44(B)].

8. THE CONTRACTOR SHALL INSTALL APPROPRIATE AIR RELEASE DEVICES WITH VENT OPENINGS TO THE ATMOSPHERE COVERED WITH 16-MESH OR FINER, CORROSION RESISTANT SCREENING MATERIAL OR AN ACCEPTABLE EQUIVALENT [§290.44(D)(1)].

9. THE CONTRACTOR SHALL NOT PLACE THE PIPE IN WATER OR WHERE IT CAN BE FLOODED WITH WATER OR SEWAGE DURING ITS STORAGE OR INSTALLATION [§290.44(F)(1)].

10. WHEN WATERLINES ARE LAID UNDER ANY FLOWING OR INTERMITTENT STREAM OR SEMI-PERMANENT BODY OF WATER THE WATERLINE SHALL BE INSTALLED IN A SEPARATE WATERTIGHT PIPE ENCASEMENT. VALVES MUST BE PROVIDED ON EACH SIDE OF THE CROSSING WITH FACILITIES TO ALLOW THE UNDERWATER PORTION OF THE SYSTEM TO BE ISOLATED AND TESTED [§290.44(F)(2)].

11. PURSUANT TO 30 TAC §290.44(A)(5), THE HYDROSTATIC LEAKAGE RATE SHALL NOT EXCEED THE AMOUNT ALLOWED OR RECOMMENDED BY THE MOST CURRENT AWWA FORMULAS FOR PVC PIPE, CAST IRON AND DUCTILE IRON PIPE. INCLUDE THE FORMULAS IN THE NOTES ON THE PLANS.

- THE HYDROSTATIC LEAKAGE RATE FOR POLYVINYL CHLORIDE (PVC) PIPE AND APPURTENANCES SHALL NOT EXCEED THE AMOUNT ALLOWED OR RECOMMENDED BY FORMULAS IN AMERICA WATER WORKS ASSOCIATION (AWWA) C-605 AS REQUIRED IN 30 TAC §290.44(A)(5). PLEASE ENSURE THAT THE FORMULA FOR THIS CALCULATION IS CORRECT AND MOST CURRENT FORMULA IS IN USE;

$$Q = \frac{LD\sqrt{P}}{148{,}000}$$

WHERE:

Q = THE QUANTITY OF MAKEUP WATER IN GALLONS PER HOUR,
L = THE LENGTH OF THE PIPE SECTION BEING TESTED, IN FEET,
D = THE NOMINAL DIAMETER OF THE PIPE IN INCHES, AND
P = THE AVERAGE TEST PRESSURE DURING THE HYDROSTATIC TEST IN POUNDS PER SQUARE INCH (PSI).

- THE HYDROSTATIC LEAKAGE RATE FOR DUCTILE IRON (DI) PIPE AND APPURTENANCES SHALL NOT EXCEED THE AMOUNT ALLOWED OR RECOMMENDED BY FORMULAS IN AMERICA WATER WORKS ASSOCIATION (AWWA) C-600 AS REQUIRED IN 30 TAC §290.44(A)(5). PLEASE ENSURE THAT THE FORMULA FOR THIS CALCULATION IS CORRECT AND MOST CURRENT FORMULA IS IN USE;

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

WHERE:

L = THE QUANTITY OF MAKEUP WATER IN GALLONS PER HOUR,
S = THE LENGTH OF THE PIPE SECTION BEING TESTED, IN FEET,
D = THE NOMINAL DIAMETER OF THE PIPE IN INCHES, AND
P = THE AVERAGE TEST PRESSURE DURING THE HYDROSTATIC TEST IN POUNDS PER SQUARE INCH (PSI).

12. THE CONTRACTOR SHALL MAINTAIN A MINIMUM SEPARATION DISTANCE IN ALL DIRECTIONS OF NINE FEET BETWEEN THE PROPOSED WATERLINE AND WASTEWATER COLLECTION FACILITIES INCLUDING MANHOLES. IF THIS DISTANCE CANNOT BE MAINTAINED, THE CONTRACTOR MUST IMMEDIATELY NOTIFY THE PROJECT ENGINEER FOR FURTHER DIRECTION. SEPARATION DISTANCES, INSTALLATION METHODS, AND MATERIALS UTILIZED MUST MEET §290.44(E)(1)-(4).

13. THE SEPARATION DISTANCE FROM A POTABLE WATERLINE TO A WASTEWATER MAIN OR LATERAL MANHOLE OR CLEANOUT SHALL BE A MINIMUM OF NINE FEET. WHERE THE NINE-FOOT SEPARATION DISTANCE CANNOT BE ACHIEVED, THE POTABLE WATERLINE SHALL BE ENCASED IN A JOINT OF AT LEAST 150 PSI PRESSURE CLASS PIPE AT LEAST 18 FEET LONG AND TWO NOMINAL SIZES LARGER THAN THE NEW CONVEYANCE. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT FIVE-FOOT INTERVALS WITH SPACERS OR BE FILLED TO THE SPRINGLINE WITH WASHED SAND. THE ENCASEMENT PIPE SHALL BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH CEMENT GROUT OR MANUFACTURED SEALANT [§290.44(E)(5)].

14. FIRE HYDRANTS SHALL NOT BE INSTALLED WITHIN NINE FEET VERTICALLY OR HORIZONTALLY OF ANY WASTEWATER LINE, WASTEWATER LATERAL, OR WASTEWATER SERVICE LINE REGARDLESS OF CONSTRUCTION [§290.44(E)(6)].

15. SUCTION MAINS TO PUMPING EQUIPMENT SHALL NOT CROSS WASTEWATER MAINS, WASTEWATER LATERALS, OR WASTEWATER SERVICE LINES. RAW WATER SUPPLY LINES SHALL NOT BE INSTALLED WITHIN FIVE FEET OF ANY TILE OR CONCRETE WASTEWATER MAIN, WASTEWATER LATERAL, OR WASTEWATER SERVICE LINE [§290.44(E)(7)].

16. WATERLINES SHALL NOT BE INSTALLED CLOSER THAN TEN FEET TO SEPTIC TANK DRAINFIELDS [§290.44(E)(8)].

17. THE CONTRACTOR SHALL DISINFECT THE NEW WATERLINES IN ACCORDANCE WITH AWWA STANDARD C- 651-14 OR MOST RECENT, THEN FLUSH AND SAMPLE THE LINES BEFORE BEING PLACED INTO SERVICE. SAMPLES SHALL BE COLLECTED FOR MICROBIOLOGICAL ANALYSIS TO CHECK THE EFFECTIVENESS OF THE DISINFECTION PROCEDURE WHICH SHALL BE REPEATED IF CONTAMINATION PERSISTS. A MINIMUM OF ONE SAMPLE FOR EACH 1,000 FEET OF COMPLETED WATERLINE WILL BE REQUIRED OR AT THE NEXT AVAILABLE SAMPLING POINT BEYOND 1,000 FEET AS DESIGNATED BY THE DESIGN ENGINEER [§290.44(F)(3)].

18. DECHLORINATION OF DISINFECTING WATER SHALL BE IN STRICT ACCORDANCE WITH CURRENT AWWA STANDARD C655-09 OR MOST RECENT.

19. CONTRACTOR TO REMOVE ALL EXISTING WATERLINES AS DIRECTED BY TXDOT. ABANDONMENT OF EXISTING WATERLINES IN PLACE IS NOT PERMITTED BY TXDOT.

CONTRACTOR SHALL INSTALL ALL WATER LINES A MINIMUM OF 4-FT DEEP BELOW FINISH GRADE UNLESS OTHERWISE NOTED IN THE PLANS. CONTRACTOR TO REVIEW ROADWAY/BRIDGE LAYOUTS FOR ELEVATIONS.

ITEM NO.	1	2	3	4	5	6	7	8	9	10	11
DESCRIPTION	PIPE WATER MAIN (PVC)(4")	PIPE WATER MAIN (PVC)(6")	TRENCH EXCAVATION PROTECTION	GATE VALVE AND BOX (COMPLETE) (4")	GATE VALVE AND BOX (COMPLETE) (6")	DUCTILE IRON FITTINGS	PERMANENT BLOW-OFF (COMPLETE) (2")	CONCRETE ENCASEMENT	TIE IN (COMPLETE) (4")	TIE IN (COMPLETE) (6")	HYDROSTATIC PRESSURE TEST
SPEC NO.	7196 6161	7196 6129	7196 6001	7196 6132	7196 6029	7196 6002	7196 6043	7196 6162	7196 6163	7196 6033	7196 6003
PAGE	LF	LF	LF	EA	EA	TON	EA	CY	EA	EA	EA
PLAN 01	637	634	1271	1	1	0.3		1.3	1	1	2
PLAN 02	952	932	1884			0.2		4.2		1	
PLAN 03	759	295	1054	1	1	0.4	1	0.75	1		
TOTAL	**2348**	**1861**	**4209**	**2**	**2**	**0.9**	**1**	**6.25**	**2**	**2**	**2**

NO.	DATE	REVISION	APPR BY

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
101306
REGISTERED PROFESSIONAL ENGINEER

K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
40 NE Interstate Loop 410
Suite 545
San Antonio, Texas 78216
P 210.491.2391 F 512.338.1784
TBPE Firm Number 6535
www.kfriese.com

Texas Department of Transportation

GENERAL NOTES

SHEET 1 OF 1

DSN: JV	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: XX	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: LB	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: XX	COMAL	SAT	3212	05	013	161

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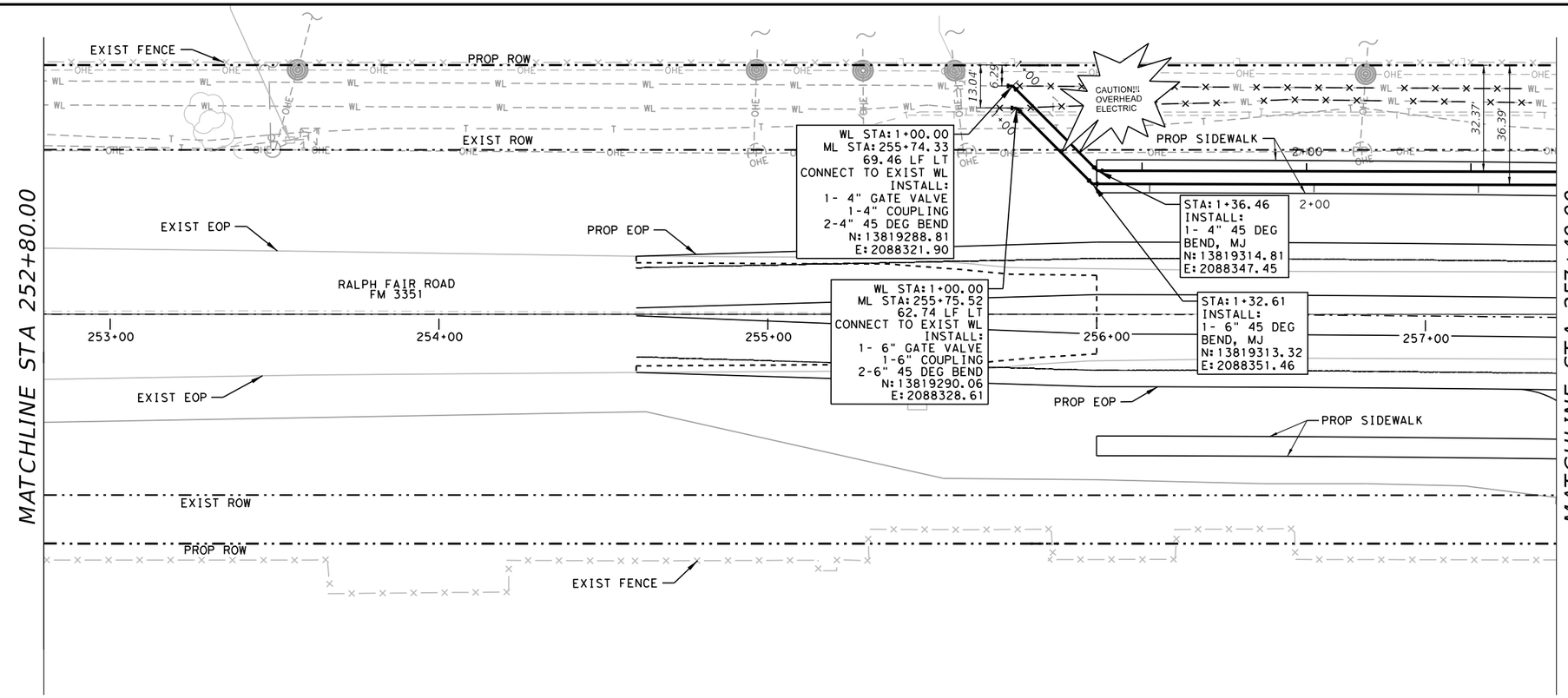

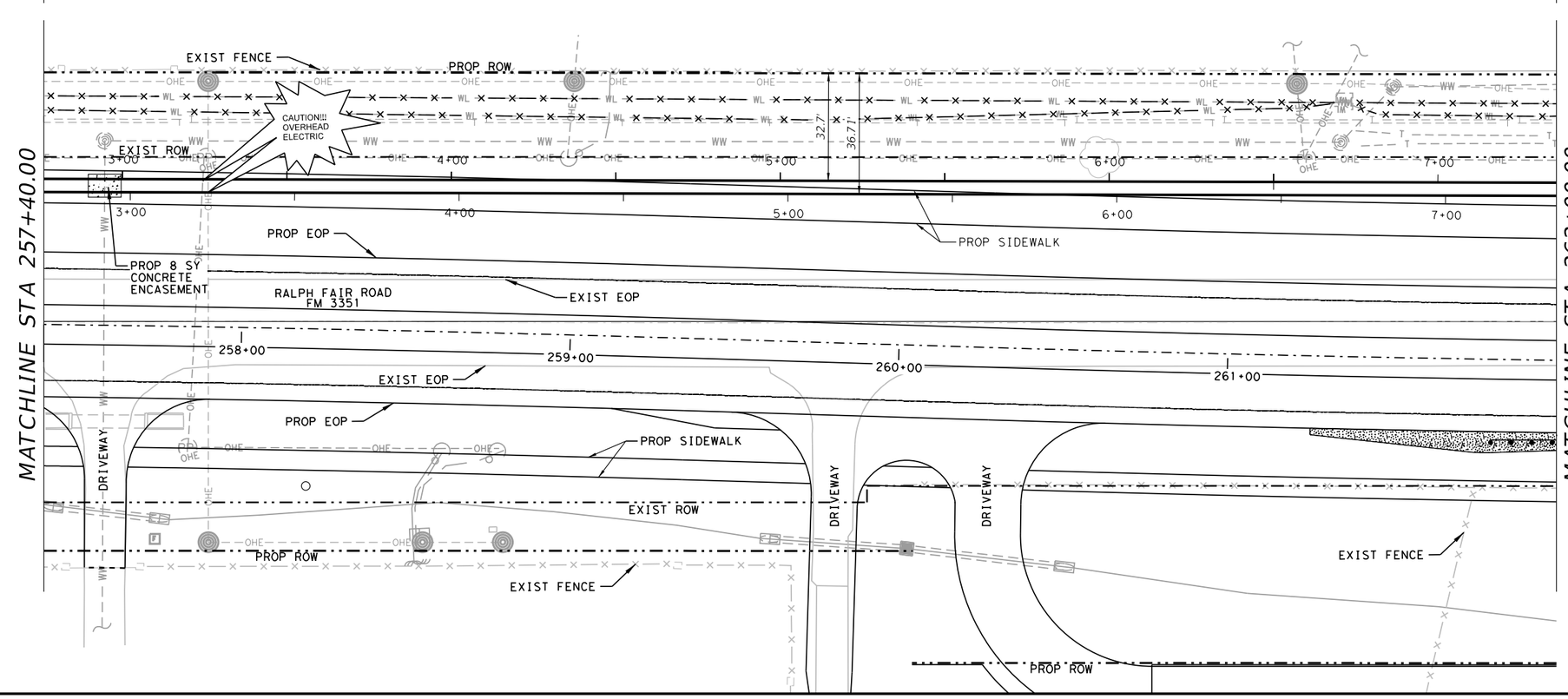

LEGEND

- PROP WATER MAIN
- EXIST WATER MAIN — 6"C.I.W.M.
- GAS MAIN — 2"G
- SANITARY SEWER — 8"SS
- STORM SEWER — 24"ST
- UTILITY POLE LINE
- ELECTRIC CABLE — E
- TELEPHONE CABLE — T

NOTES:

1. CONTRACTOR TO LOCATE ALL EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION.
2. UTILITY CROSSINGS TO BE CONDUCTED PER WATER DETAIL A ON SHEET 6.
3. CULVERT CROSSINGS TO BE CONDUCTED PER WATER DETAIL B ON SHEET 6.
4. ALL PIPE SHALL BE C900 UNLESS OTHERWISE NOTED ON THE CONSTRUCTION PLANS.
5. CONTRACTOR TO REFER TO GENERAL NOTES FOR ABANDONING AND REMOVAL OF EXISTING 6" WATERLINE.

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPR BY

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
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PROFESSIONAL ENGINEER

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40 NE Interstate Loop 410
Suite 545
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TBPE Firm Number 6535
www.kfriese.com

Texas Department of Transportation

FM 3351
PLAN
WATER WELL LINE
STA 252+80 TO STA 262+00

SCALE:1"=40' SHEET 1 OF 3

DSN: JV	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: XX	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: LB	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: XX	COMAL	SAT	3212	05	013	162

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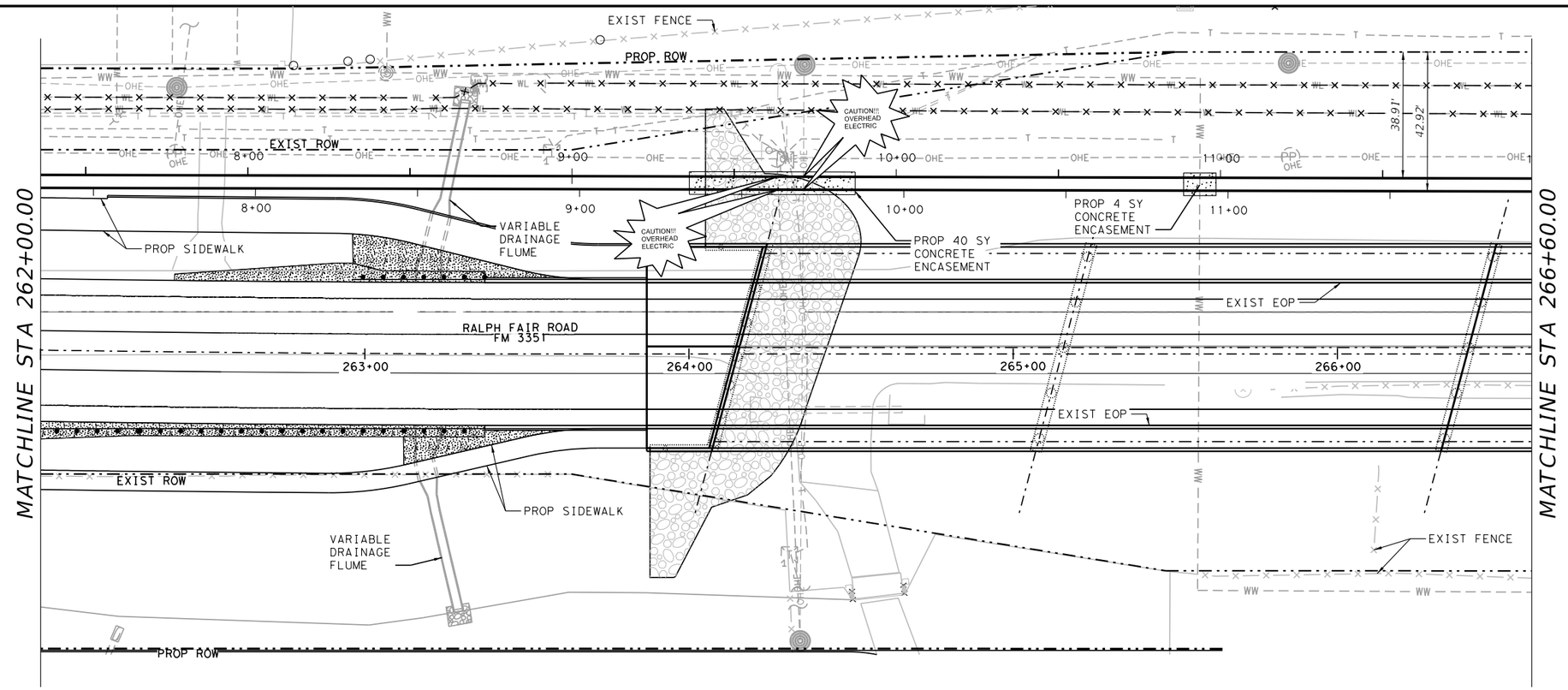

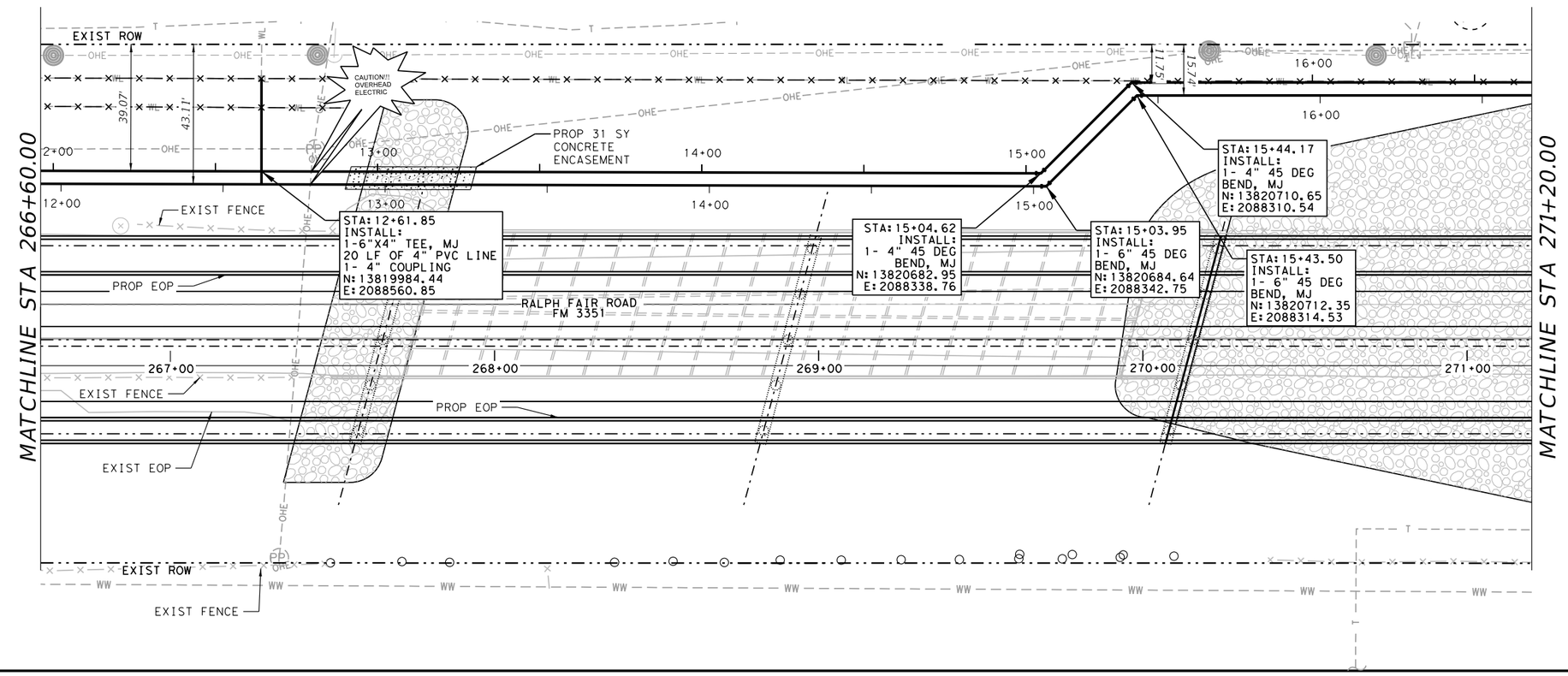

LEGEND

PROP WATER MAIN	
EXIST WATER MAIN	6"C.I.W.L.
GAS MAIN	2"G
SANITARY SEWER	8"SS
STORM SEWER	24"ST
UTILITY POLE LINE	
ELECTRIC CABLE	E
TELEPHONE CABLE	T

NOTES:

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3. CULVERT CROSSINGS TO BE CONDUCTED PER WATER DETAIL B ON SHEET 6.
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5. CONTRACTOR TO REFER TO GENERAL NOTES FOR ABANDONING AND REMOVAL OF EXISTING 6" WATERLINE.

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPR BY

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
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Texas Department of Transportation

FM 3351
PLAN
WATER WELL LINE
STA 262+00 TO STA 271+20

SCALE:1"=40' SHEET 2 OF 3

DSN: JV	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: XX	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: LB	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: XX	COMAL	SAT	3212	05	013	163

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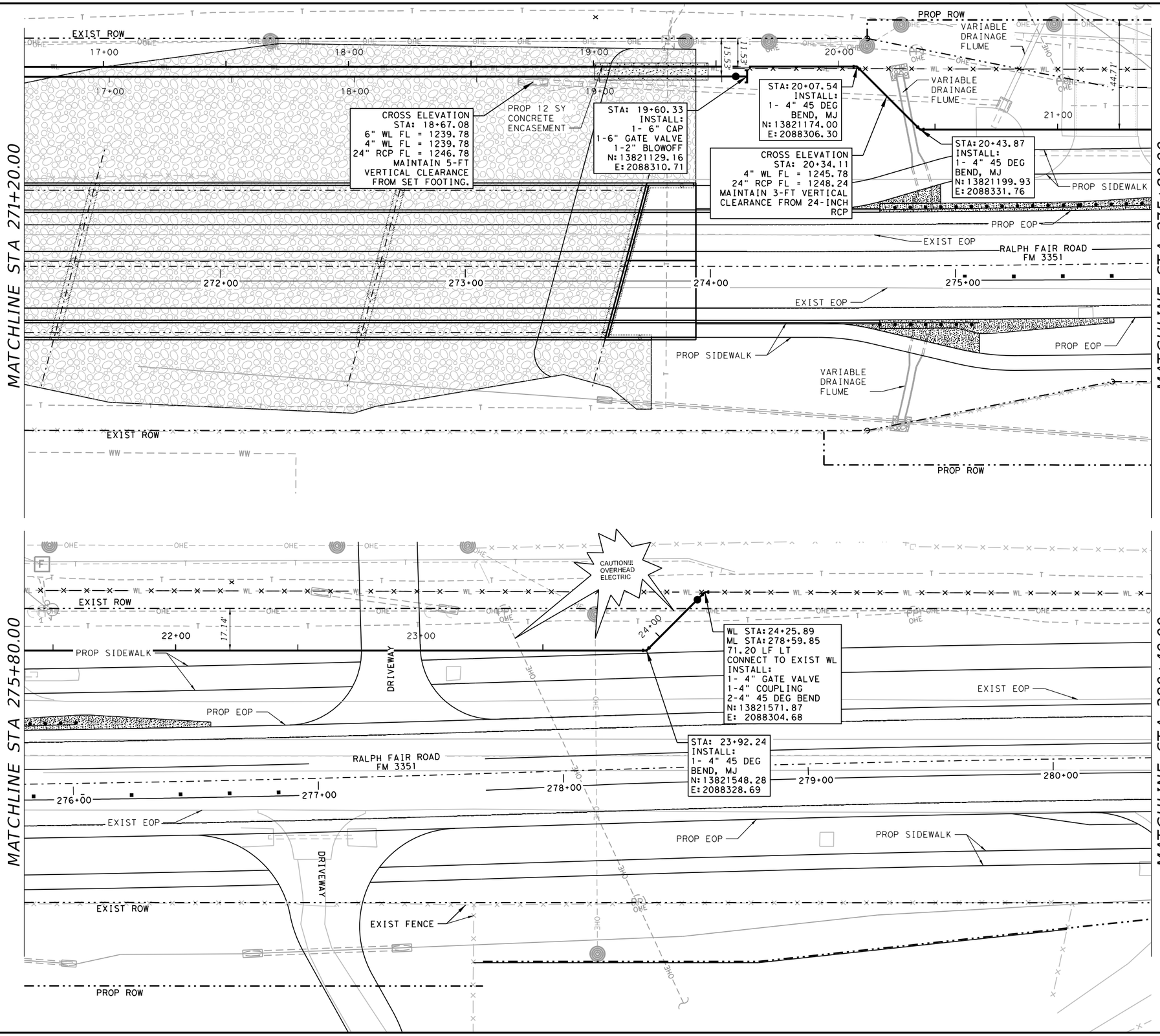

LEGEND

- PROP WATER MAIN
- EXIST WATER MAIN — 6"C.I.W.L.
- GAS MAIN — 2"G
- SANITARY SEWER — 8"SS
- STORM SEWER — 24"ST
- UTILITY POLE LINE
- ELECTRIC CABLE — E
- TELEPHONE CABLE — T

NOTES:

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4. ALL PIPE SHALL BE C900 UNLESS OTHERWISE NOTED ON THE CONSTRUCTION PLANS.
5. CONTRACTOR TO REFER TO GENERAL NOTES FOR ABANDONING AND REMOVAL OF EXISTING 6" WATERLINE.

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPR BY

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
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Texas Department of Transportation

FM 3351
PLAN
WATER WELL LINE
STA 271+20 TO STA 280+40

SCALE:1"=40' SHEET 3 OF 3

DSN: JV	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: XX	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: LB	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
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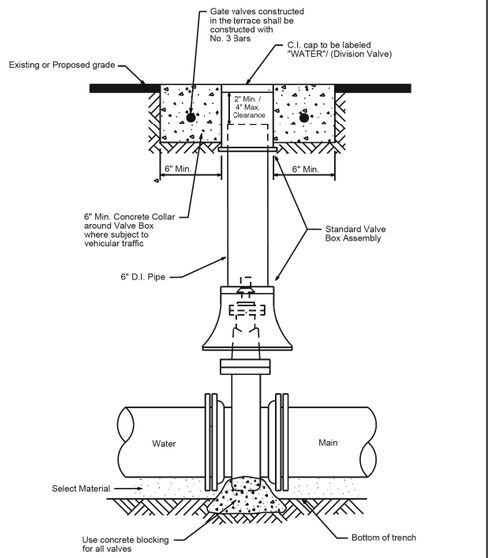
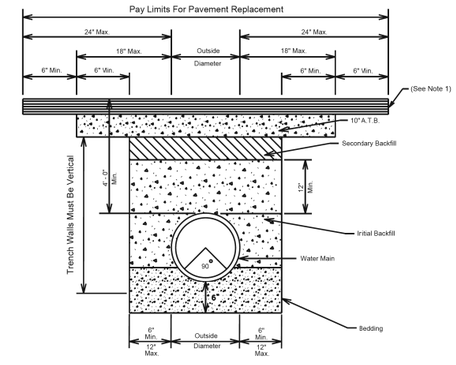


NOTES:
1. All concrete to be 3,000 psi
2. All gate valves shall open left (counter-clockwise)

PROPERTY OF		APPROVED	REVISED
THE CITY OF FAIR OAKS RANCH	INSTALLATION OF NON-GEARED GATE VALVE WITH VALVE BOX AND EXTENSION	JANUARY 2019	
		DD-828-01	SHEET 1 OF 1

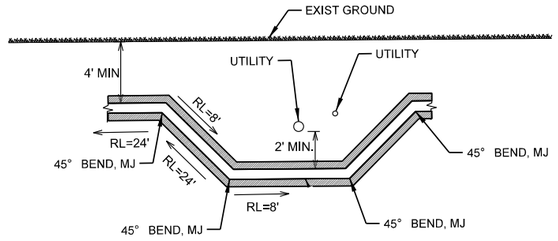


1) REPLACEMENT AC SURFACE LAYER SHALL BE OF THE TYPE AND THICKNESS BASED ON FUNCTIONAL CLASSIFICATION.

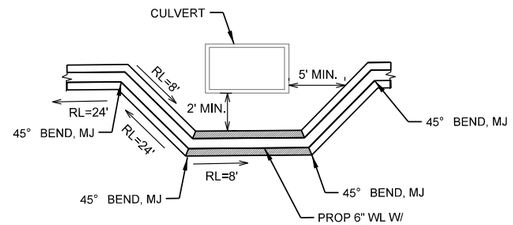
a. Min 2" HMAC Type "D" for trench repair in Local / Residential streets.

b. Min 3" HMAC Type "C" for trench repair in Collector / Arterial streets.

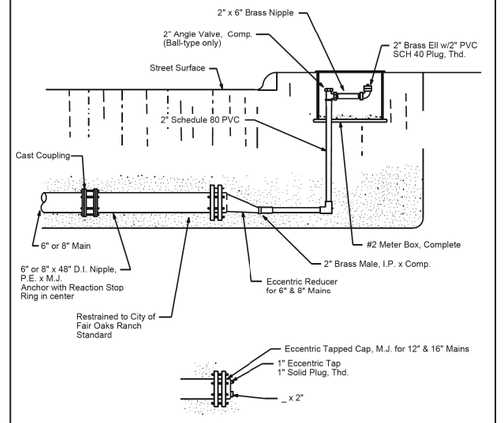
PROPERTY OF		APPROVED	REVISED
THE CITY OF FAIR OAKS RANCH	POTABLE AND RECYCLED WATER MAIN DETAIL	JANUARY 2019	
		DD-812-01	SHEET 1 OF 1



DETAIL A
SCALE: NTS

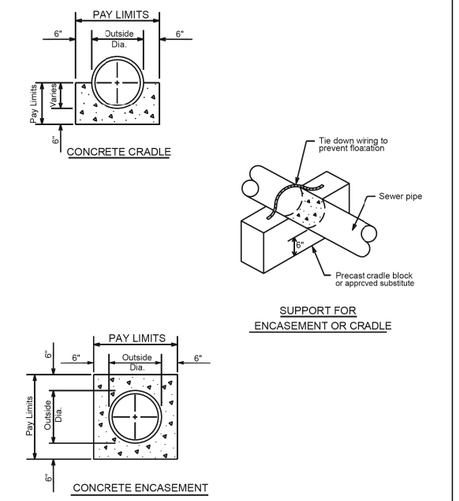


DETAIL B
SCALE: NTS



Note:
1. All ferrous metal surfaces in accordance with 814.3 Specification.

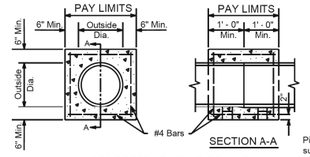
PROPERTY OF		APPROVED	REVISED
THE CITY OF FAIR OAKS RANCH	2" PERMANENT BLOW-OFF ASSEMBLY	JANUARY 2019	
		DD-824-04	SHEET 5 OF 5



Notes:
1) All concrete encasement shall be poured at a plane 6" above the pipe between excavated trench walls.
2) All sewer pipe with less than 3' of cover to subgrade shall be concrete encased.
3) All Force mains shall be provided with thrust blocks, where changes in direction occur, at Tees, Bends, Crosses, changes in size, stops, or as directed by the City of Fair Oaks Ranch.

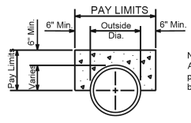
PROPERTY OF		APPROVED	REVISED
THE CITY OF FAIR OAKS RANCH	TYPICAL CONCRETE ENCASEMENT DETAILS	JANUARY 2019	
		DD-858-01	SHEET 1 OF 1

After centering pipe ends, wrap joints with 3" wide polyvinyl tape or rubber adapter, Can-Tex.1-70A or equal



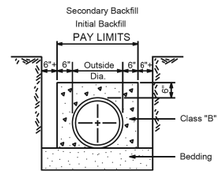
CONCRETE JOINTING COLLAR

Pipe sections to be blocked and supported similar to the encasement detail shown below, (subject to approval)



TYPICAL CONCRETE SADDLE

Note:
All concrete encasement shall be poured at a plane 6" above the pipe between excavated trench walls



CONCRETE COVER FOR FLEXIBLE PIPE

To be used wherever trench width is greater than two feet (2') plus O.D.

PROPERTY OF		APPROVED	REVISED
THE CITY OF FAIR OAKS RANCH	TYPICAL CONCRETE DETAILS	JANUARY 2019	
		DD-858-02	SHEET 1 OF 1

NO.	DATE	REVISION	APPR BY

03/22/2023

STATE OF TEXAS
JOEL DORIAN VALDEZ
101306
REGISTERED
PROFESSIONAL ENGINEER

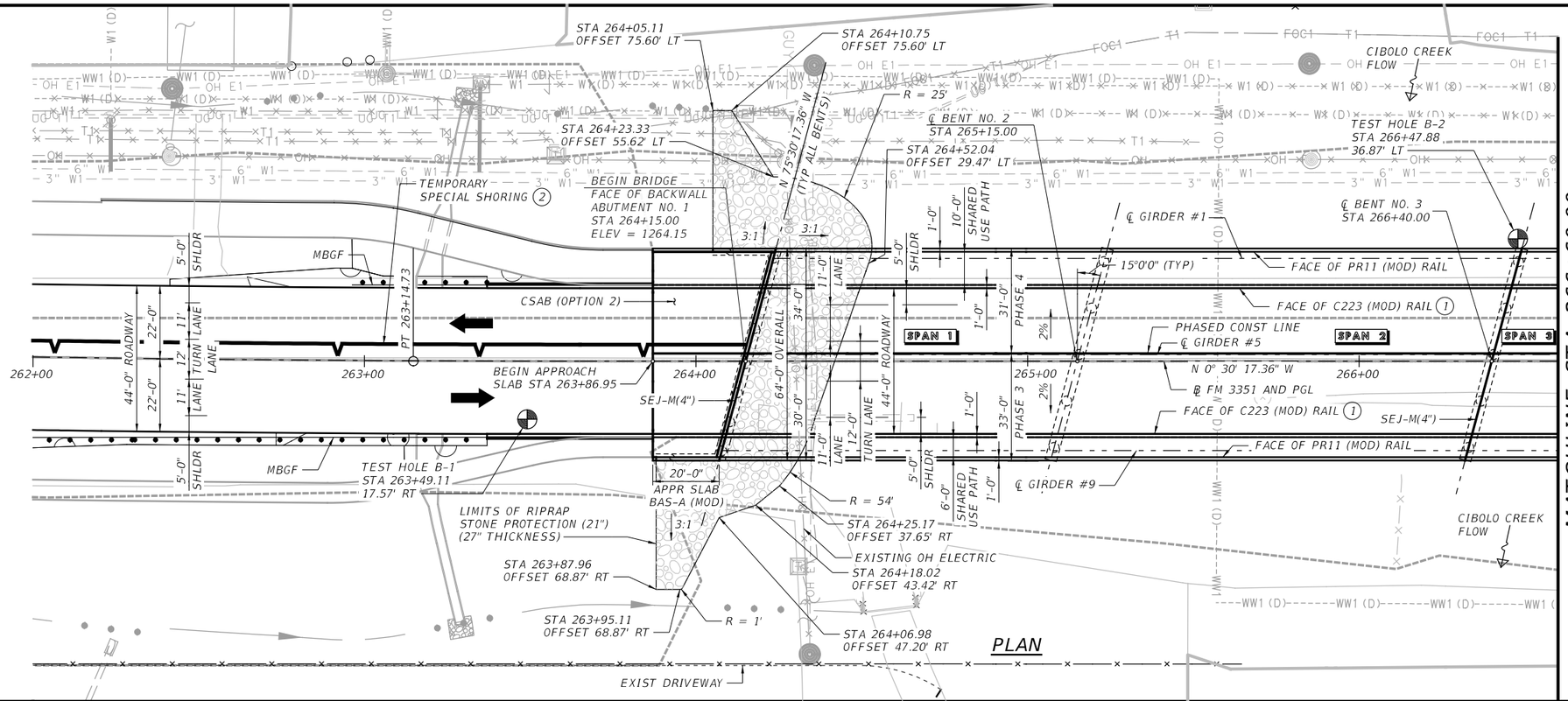
K·FRIESE + ASSOCIATES
PUBLIC PROJECT ENGINEERING
40 NE Interstate Loop 410
Suite 545
San Antonio, Texas 78216
P 210.491.2391 F 512.338.1784
TBPE Firm Number 6535
www.kfriese.com

Texas Department of Transportation

WATER DETAILS

SHEET 1 OF 1

DSN: JV	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: XX	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: LB	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: XX	COMAL	SAT	3212	05	013	165



PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl

MATCHLINE STA 266+60.00

PLAN

DESIGN SPEED = 50 MPH
ADT: 5618 (2016)
5700 (2035)
FUNC CLASS: ARTERIAL
EXIST NBI: 15-046-0-3212-05-007
PROP NBI: 15-046-0-3212-05-113

0 20 40 60 80
SCALE IN FEET

(1) WATER BARRIER TO BE PROVIDED FULL LENGTH OF C223. SEE TYPE C223 (MOD) STANDARD FOR DETAILS.

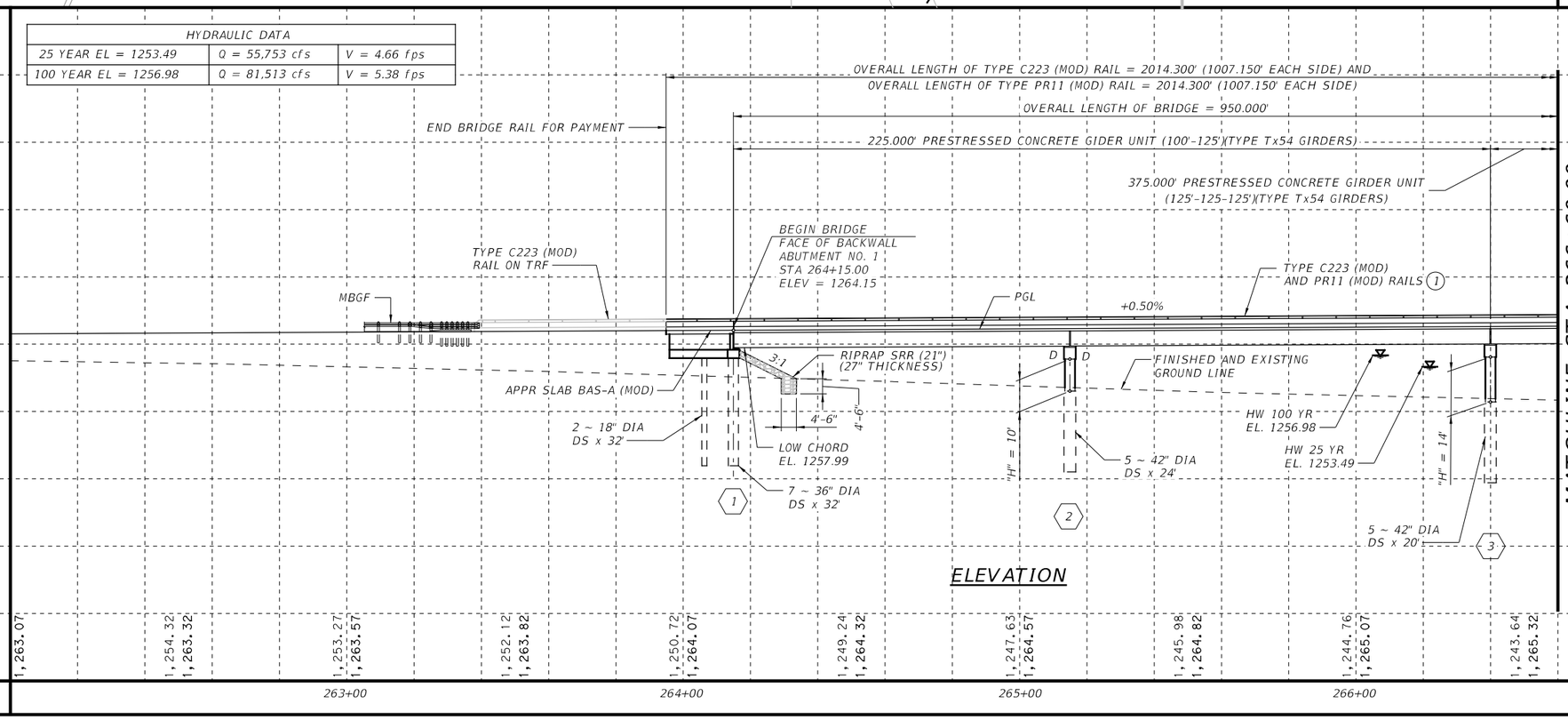
(2) SEE TRAFFIC CONTROL SHEETS FOR LIMITS AND PAYMENT OF TEMPORARY SPECIAL SHORING.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2020, 9TH EDITION.
2. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.
3. "D" DENOTES DOWELED END CONDITION. SEE BENT DETAILS FOR DOWEL LOCATION.
4. SEE "TYPICAL SECTIONS" SHEET FOR TYPICAL SECTIONS AND PHASED CONSTRUCTION.
5. FOUND DRILLED SHAFTS AT THE LENGTHS SHOWN ON PLANS OR LONGER TO OBTAIN A MINIMUM PENETRATION OF THREE DIAMETERS INTO LIMESTONE.
6. SEE BORE LOGS SHEET FOR BORE LOG DETAILS NOT SHOWN.
7. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBILE FOR CALCULATION OF FINAL COLUMN HEIGHTS BASED ON FINAL GRADING AND FIELD CONDITIONS.
8. SEE GRADING DETAILS FOR GRADING LIMITS.

HL 93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.09/2.07

HYDRAULIC DATA		
25 YEAR EL = 1253.49	Q = 55,753 cfs	V = 4.66 fps
100 YEAR EL = 1256.98	Q = 81,513 cfs	V = 5.38 fps



ELEVATION

MATCHLINE STA 266+60.00

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK
BRIDGE LAYOUT

SCALE:1"=40' SHEET 1 OF 3

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	166

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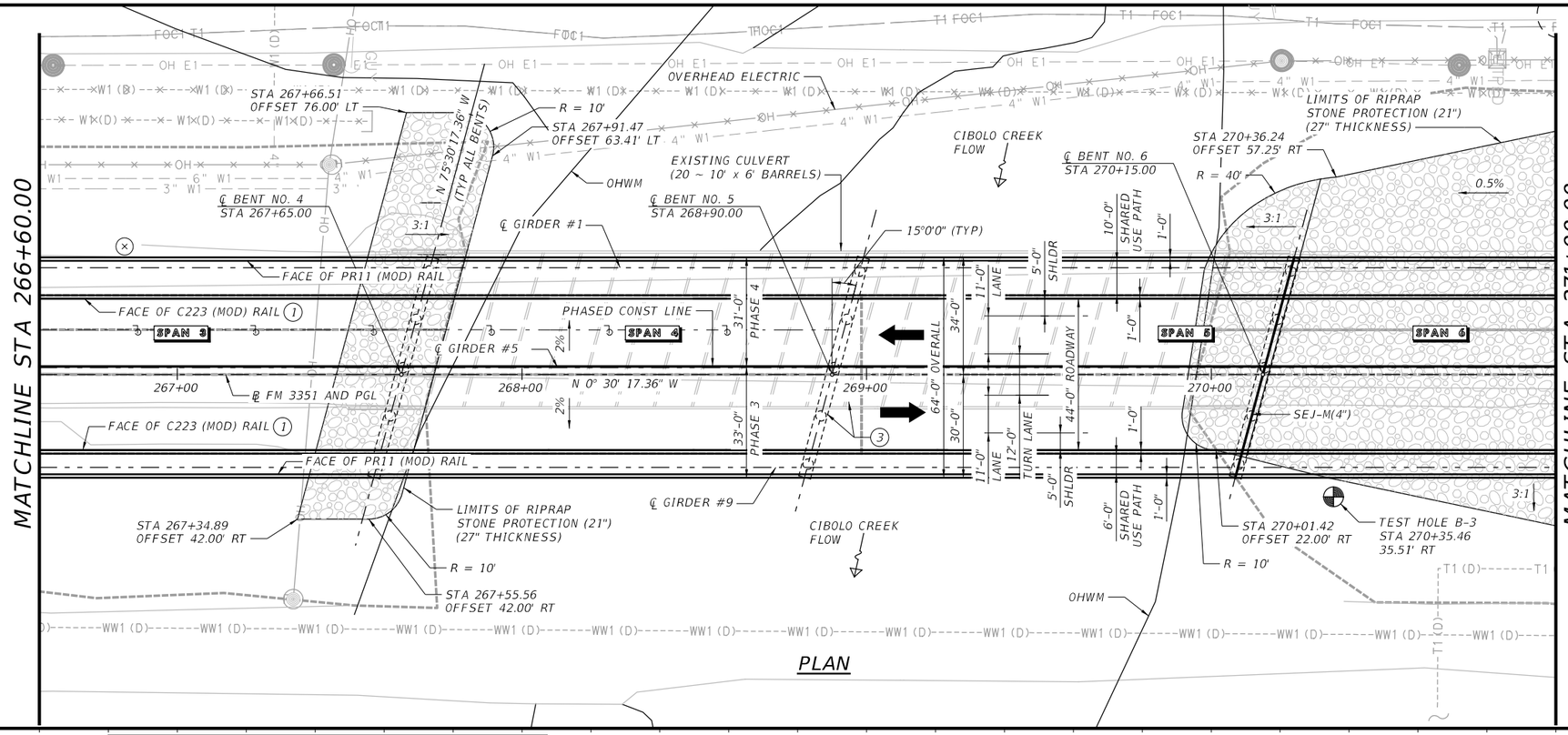


0 20 40 60 80
SCALE IN FEET

(1) WATER BARRIER TO BE PROVIDED FULL LENGTH OF C223. SEE TYPE C223 (MOD) STANDARD FOR DETAILS.

(3) CONTRACTOR TO PARTIALLY SAWCUT EXISTING SLAB FOR DRILLED SHAFT AND BENT CONSTRUCTION. PROVIDE CLEARANCE FOR FUTURE REMOVAL OF CULVERT WITHOUT IMPACT TO PROPOSED COLUMNS.

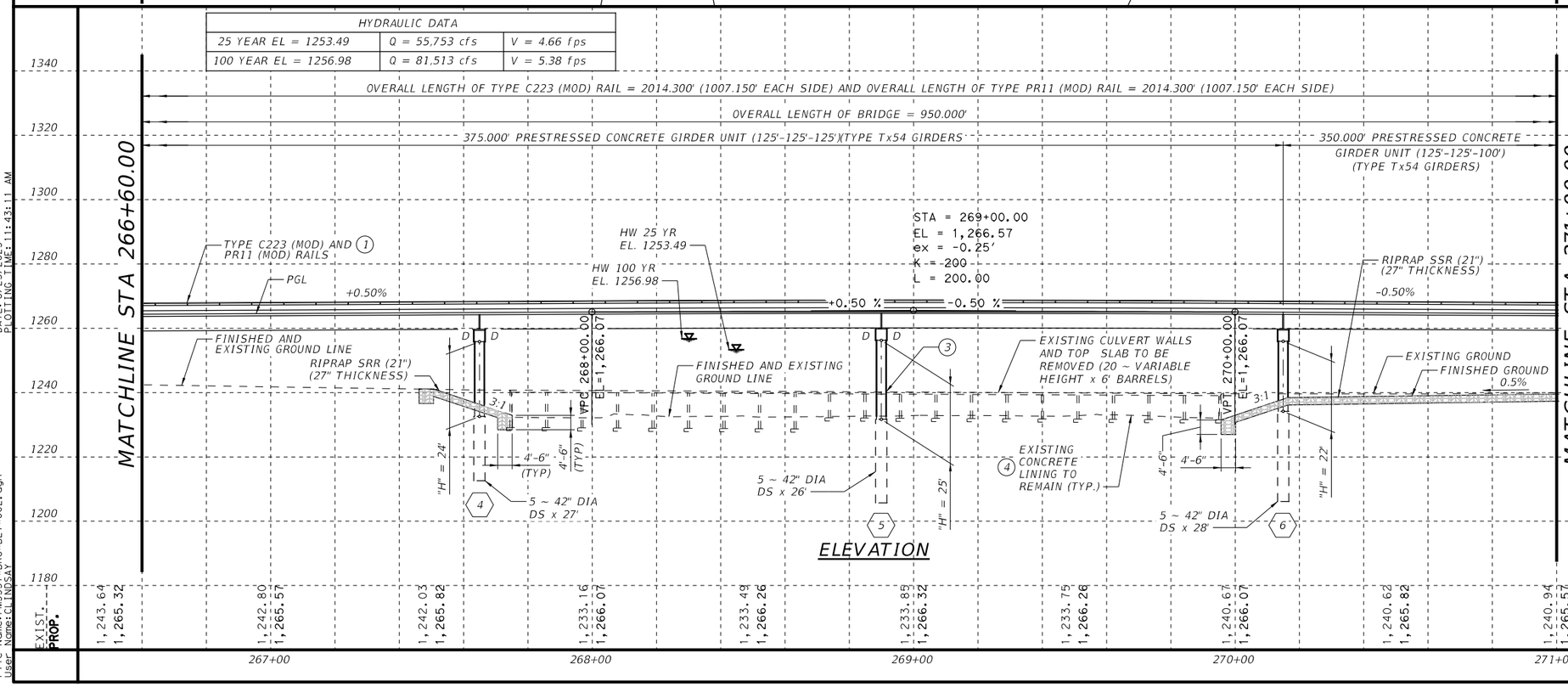
(4) SAW CUT EXISTING CULVERT WALLS FLUSH WITH EXISTING GROUND. DO NOT MODIFY EXISTING CONCRETE LINING IN CULVERT BOTTOMS.

GENERAL NOTES:

1. FOR NOTES, SEE SHEET 1 OF 3.

HL 93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.09/2.07

HYDRAULIC DATA		
25 YEAR EL = 1253.49	Q = 55,753 cfs	V = 4.66 fps
100 YEAR EL = 1256.98	Q = 81,513 cfs	V = 5.38 fps



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351
AT CIBOLO CREEK
BRIDGE LAYOUT

SCALE:1"=40' SHEET 2 OF 3

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	167

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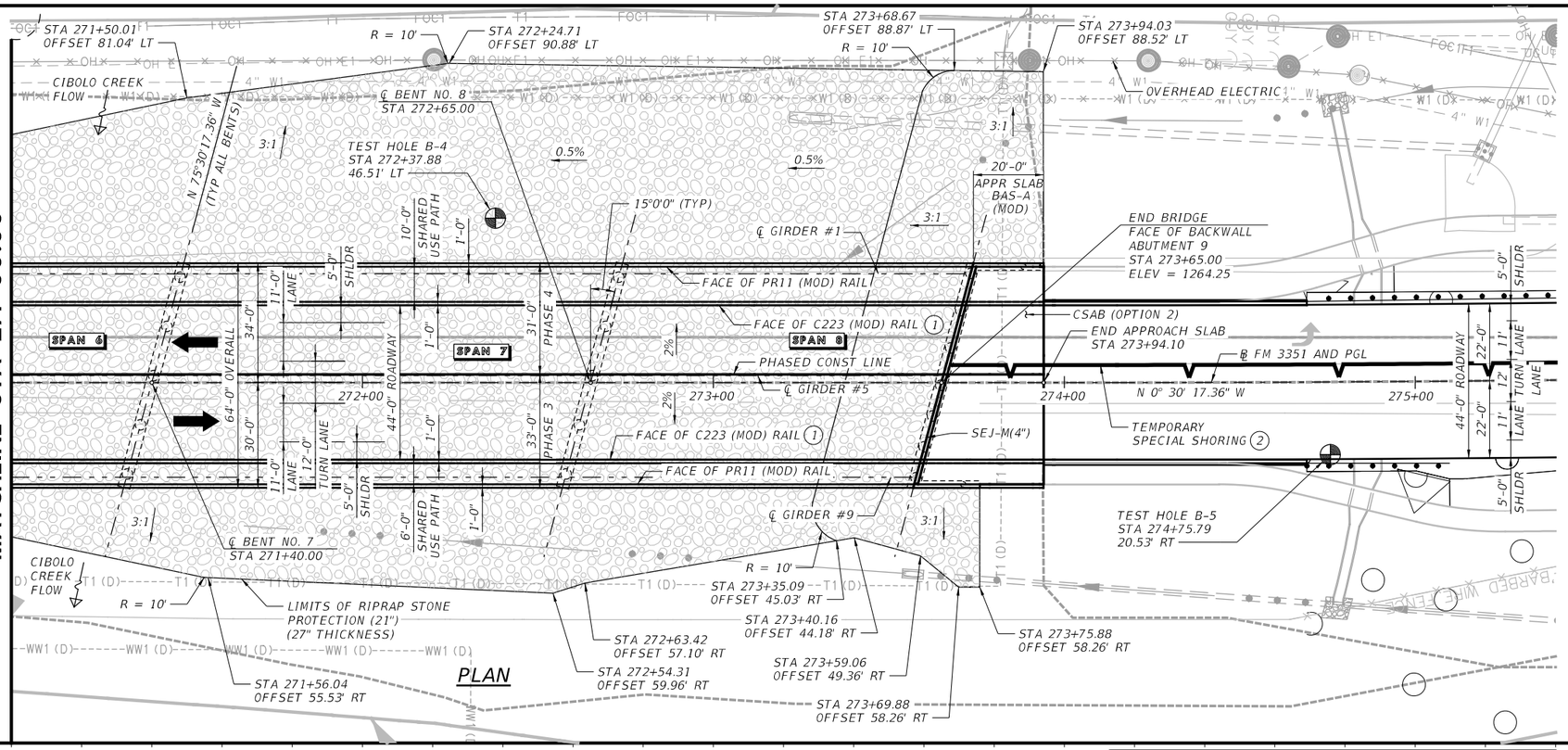


(1) WATER BARRIER TO BE PROVIDED FULL LENGTH OF C223. SEE TYPE C223 (MOD) STANDARD FOR DETAILS.

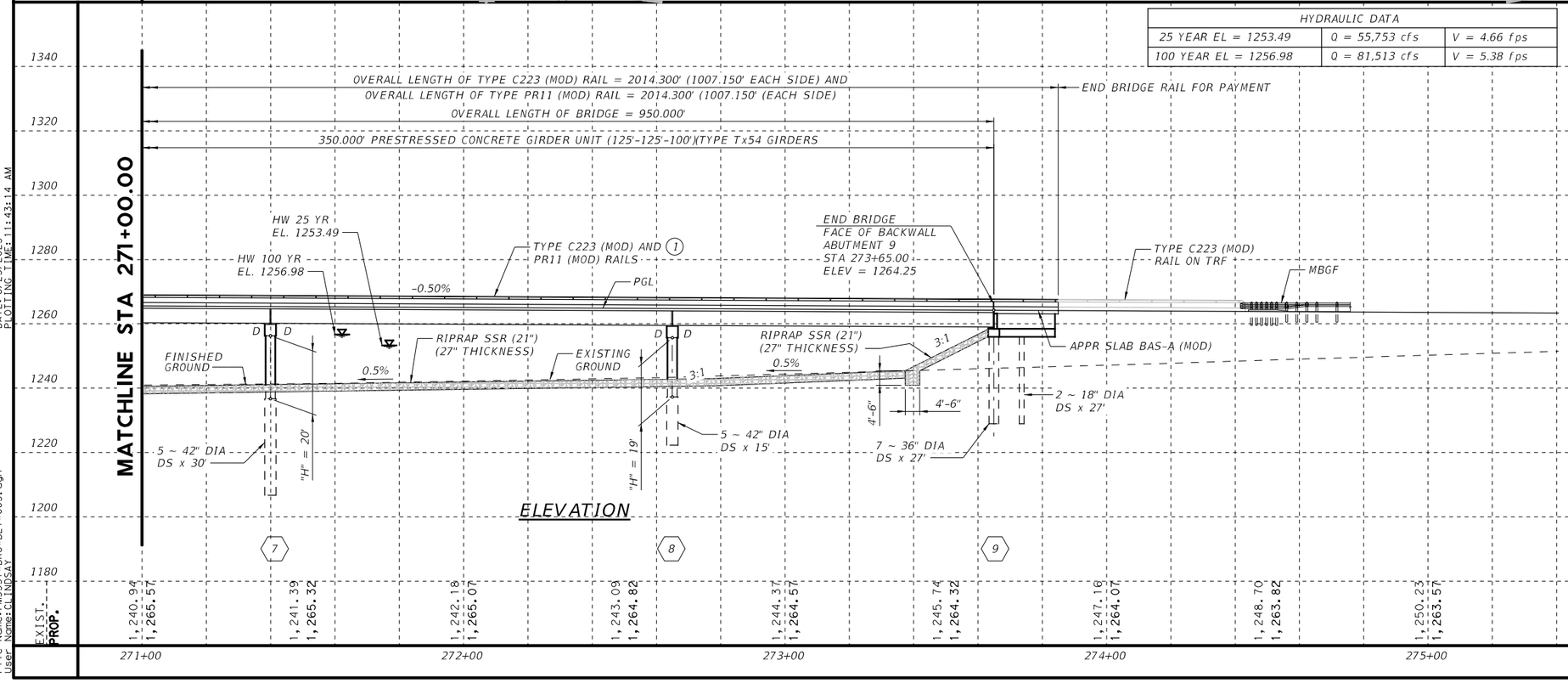
(2) SEE TRAFFIC CONTROL SHEETS FOR LIMITS AND PAYMENT OF TEMPORARY SPECIAL SHORING.

GENERAL NOTES:

1. FOR NOTES, SEE SHEET 1 OF 3.

HL 93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.09/2.07

HYDRAULIC DATA		
25 YEAR EL = 1253.49	Q = 55,753 cfs	V = 4.66 fps
100 YEAR EL = 1256.98	Q = 81,513 cfs	V = 5.38 fps



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
BRIDGE LAYOUT

SCALE:1"=40' SHEET 3 OF 3

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	168

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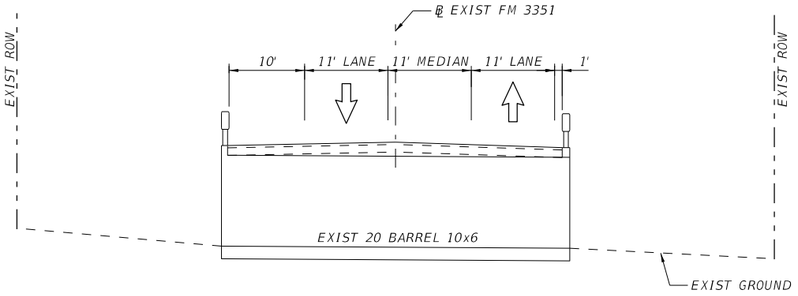
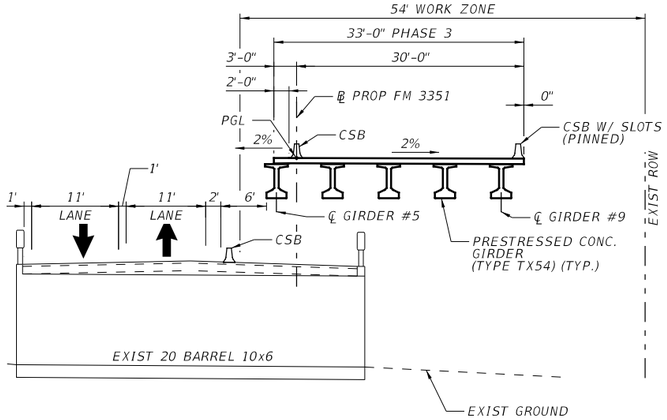


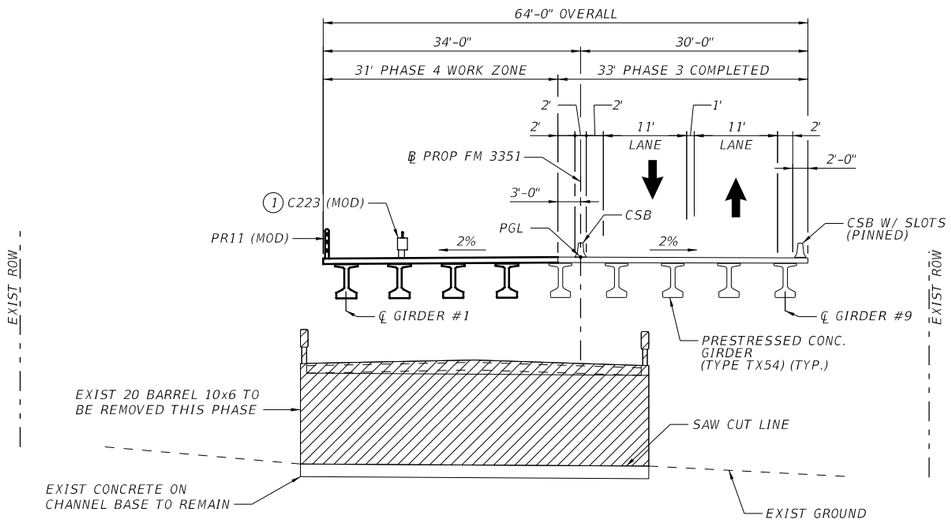
PHASE 2 TYPICAL SECTION

BRIDGE CLASS STRUCTURE
AT CIBOLO CREEK



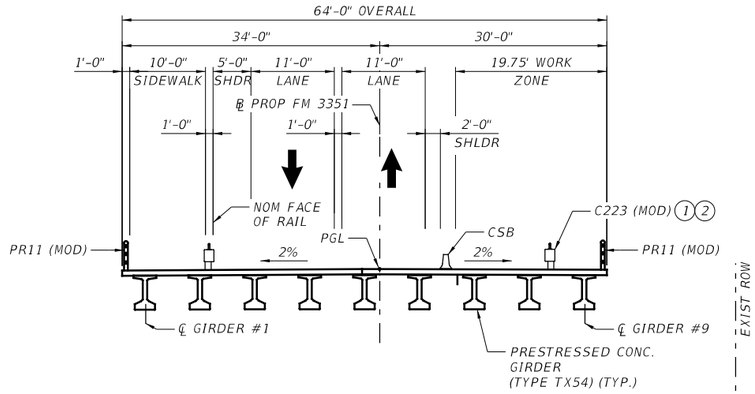
PHASE 3 TYPICAL SECTION

STA 264+15.00 TO 273+65.00
AT CIBOLO CREEK



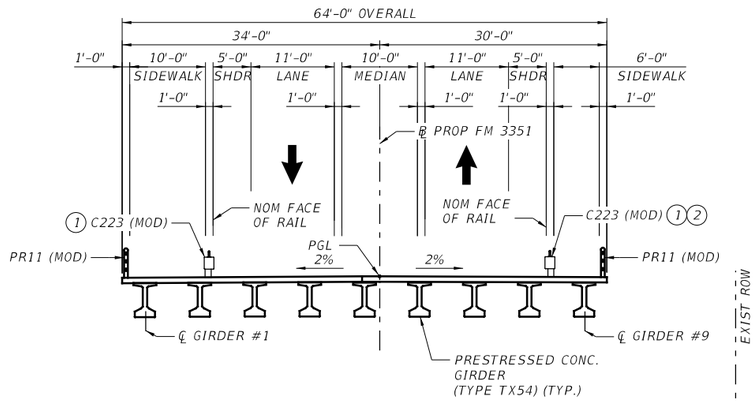
PHASE 4 TYPICAL SECTION

STA 264+15.00 TO 273+65.00
AT CIBOLO CREEK



PHASE 5 TYPICAL SECTION

STA 264+15.00 TO 273+65.00
AT CIBOLO CREEK



FINAL TYPICAL SECTION

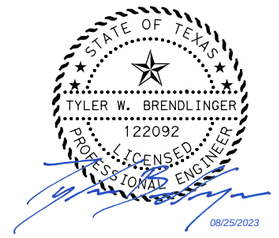
STA 264+15.00 TO 273+65.00
AT CIBOLO CREEK

(1) WATER BARRIER TO BE PROVIDED FULL LENGTH OF C223. SEE TYPE C223 (MOD) STANDARD FOR DETAILS.

(2) BARRIER TO BE POST INSTALLED. SEE TYPE C223 (MOD) STANDARD FOR DETAILS.

HL 93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.09/2.07

NO.	DATE	REVISION	APPR BY



HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
TRANSVERSE SECTIONS

SCALE:1"=20' SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	169

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DATE: 8/25/2023
PLOTTING TIME: 11:43:16 AM
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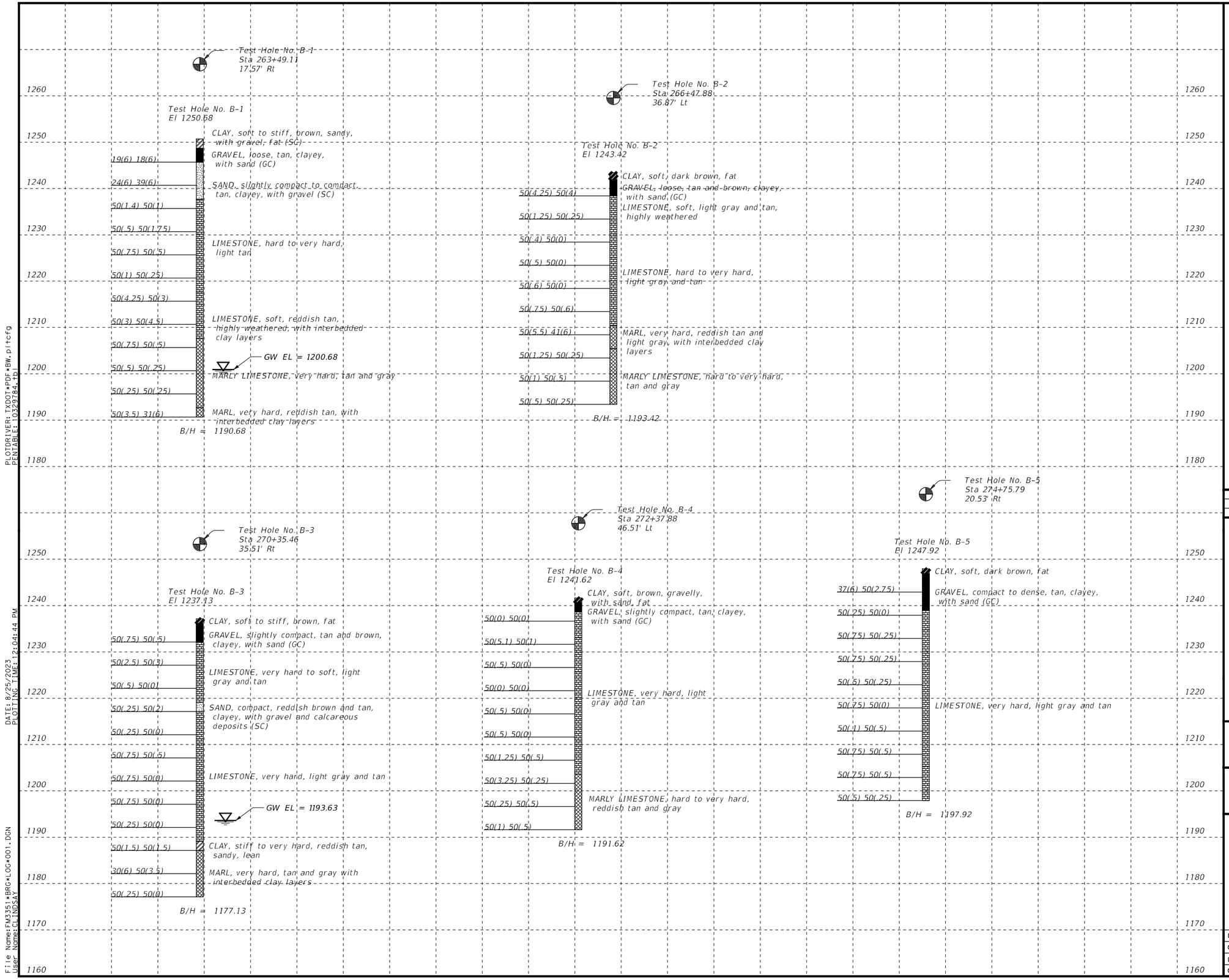
PENTABLE: 10329784.tbl



NO.	DATE	REVISION	APPR BY

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM3351
AT CIBOLO CREEK
BORE LOGS

SCALE:1"=10' SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	170

SUMMARY OF ESTIMATED QUANTITIES

BID ITEM DESCRIPTION / BRIDGE ELEMENT	0400 6005	0416 6001	0416 6004	416 6005	0420 6013	0420 6029	0420 6037	0422 6001	0422 6015	0425 6039	0432 6034	0442 6007	0450 6067	0450 6113	0454 6018	0496 6010	4171 6001
	CEM STABIL BKFL	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT) (2)	CL C CONC (CAP) (2)	CL C CONC (COL) (2)	REINF CONC SLAB (2)	APPROACH SLAB (2)	PRESTR CONC GIRDER (TX54) (2)	RIPRAP (STONE PROTECTION) (21 IN)	STR STEEL (MISC NON-BRIDGE) (1)	RAIL (TY C223) (MOD) (2)	RAIL (TY PR11) (MOD) (2)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	REMOV STR (BRIDGE 100-499 FT LENGTH)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	CY	LF	LF	LF	CY	CY	CY	SF	CY	LF	CY	LB	LF	LF	LF	EA	EA
CSJ 3212-05-113 Phase 3																0.5	
2 - Abutments	149	59	236		50.6				76.0		685				135		
7 - Interior Bents				510		114.8	104.5				2108						
1 - 225.00' PRESTR CONC GIRDER UNIT								7425		1119.95		109.7					
1 - 375.00' PRESTR CONC GIRDER UNIT								12375		1867.50		109.7					
1 - 350.00' PRESTR CONC GIRDER UNIT								11550		1742.45		109.7					
CSJ 3212-05-113 Phase 4																0.5	
2 - Abutments	149	59	177		45.0				71.4		748		57.2	57.2	127		
7 - Interior Bents				340		99.4	69.7				3044						
1 - 225.00' PRESTR CONC GIRDER UNIT								6975		895.96		184.9	225.0	225.0			
1 - 375.00' PRESTR CONC GIRDER UNIT								11625		1494.00		184.9	375.0	375.0			
1 - 350.00' PRESTR CONC GIRDER UNIT								10850		1393.96		184.9	350.0	350.0			
CSJ 3212-05-113 Phase 5																	
2 - Abutments													57.2	57.2			
7 - Interior Bents																	
1 - 225.00' PRESTR CONC GIRDER UNIT													225.0	225.0			2
1 - 375.00' PRESTR CONC GIRDER UNIT													375.0	375.0			
1 - 350.00' PRESTR CONC GIRDER UNIT													350.0	350.0			2
Phase 3 Total	149	59	236	510	50.6	114.8	104.5	31350	76.0	4729.9	2793	329.1			135	0.5	
Phase 4 Total	149	59	177	340	45.0	99.4	69.7	29450	71.4	3783.9	3792	554.7	1007.2	1007.2	127	0.5	
Phase 5 Total													1007.2	1007.2			4
TOTAL	298	118	413	850	95.6	214.2	174.2	60800	147.4	8513.82	6584	883.8	2014.4	2014.4	262	1.0	4

(1) FOR SIDEWALK EXPANSION JOINT COVER.

(2) PAINTING IS SUBSIDIARY TO ITEM. SEE AESTHETIC DETAILS FOR LIMITS OF PAINTING.

BEARING SEAT ELEVATIONS

		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7	BEAM 8	BEAM 9
BENT	1 (FWD)	1257.884	1258.017	1258.151	1258.285	1258.419	1258.355	1258.199	1258.042	1257.886
BENT	2 (BK)	1258.374	1258.507	1258.641	1258.775	1258.908	1258.845	1258.689	1258.532	1258.376
	(FWD)	1258.301	1258.434	1258.568	1258.702	1258.835	1258.772	1258.616	1258.459	1258.303
BENT	3 (BK)	1258.916	1259.049	1259.183	1259.317	1259.450	1259.387	1259.231	1259.074	1258.918
	(FWD)	1258.926	1259.059	1259.193	1259.327	1259.460	1259.397	1259.241	1259.084	1258.928
BENT	4 (BK)	1259.541	1259.674	1259.808	1259.942	1260.075	1260.012	1259.856	1259.699	1259.543
	(FWD)	1259.614	1259.747	1259.881	1260.015	1260.148	1260.085	1259.929	1259.772	1259.616
BENT	5 (BK)	1259.992	1260.135	1260.278	1260.420	1260.563	1260.508	1260.360	1260.212	1260.064
	(FWD)	1259.992	1260.135	1260.278	1260.421	1260.563	1260.509	1260.361	1260.214	1260.065
BENT	6 (BK)	1259.630	1259.783	1259.936	1260.089	1260.242	1260.199	1260.062	1259.925	1259.788
	(FWD)	1259.557	1259.710	1259.863	1260.016	1260.169	1260.126	1259.989	1259.852	1259.715
BENT	7 (BK)	1258.942	1259.095	1259.248	1259.401	1259.554	1259.511	1259.374	1259.237	1259.100
	(FWD)	1258.932	1259.085	1259.238	1259.391	1259.544	1259.501	1259.364	1259.227	1259.090
BENT	8 (BK)	1258.317	1258.470	1258.623	1258.776	1258.929	1258.886	1258.749	1258.612	1258.475
	(FWD)	1258.390	1258.543	1258.696	1258.849	1259.002	1258.959	1258.822	1258.685	1258.548
BENT	9 (BK)	1257.901	1258.054	1258.206	1258.359	1258.512	1258.469	1258.332	1258.195	1258.058

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
11/16/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS

SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV. NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	171

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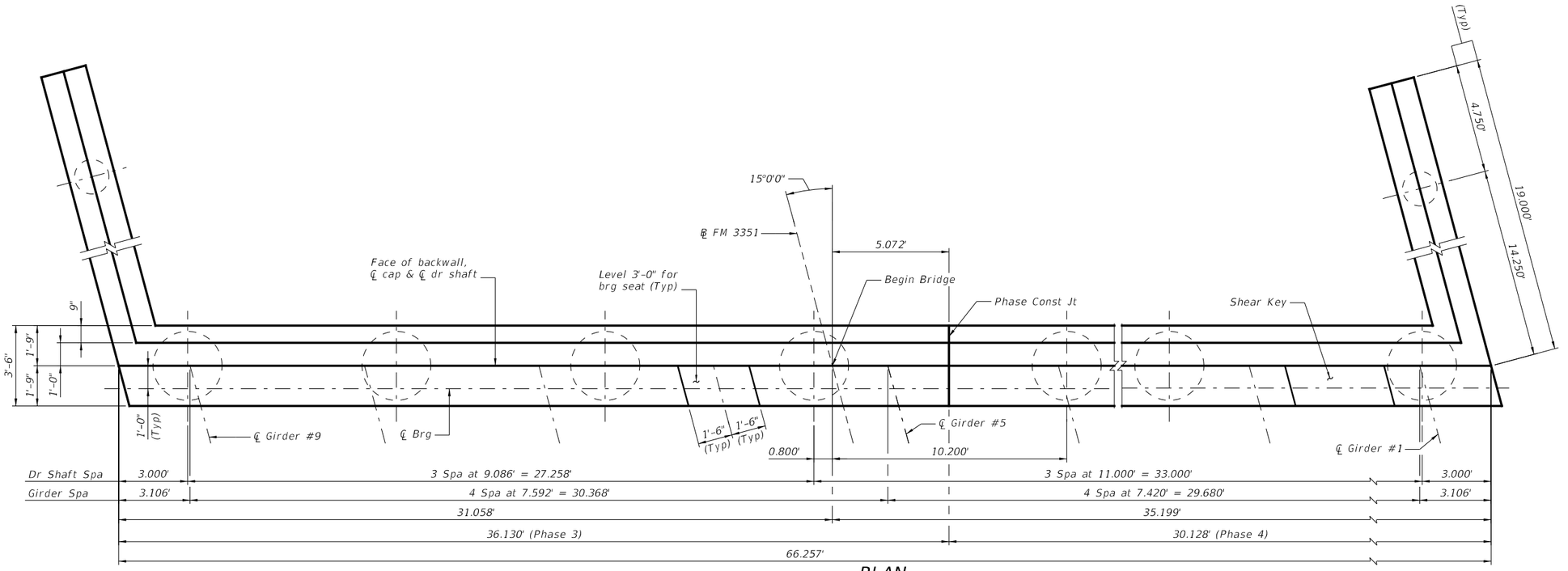
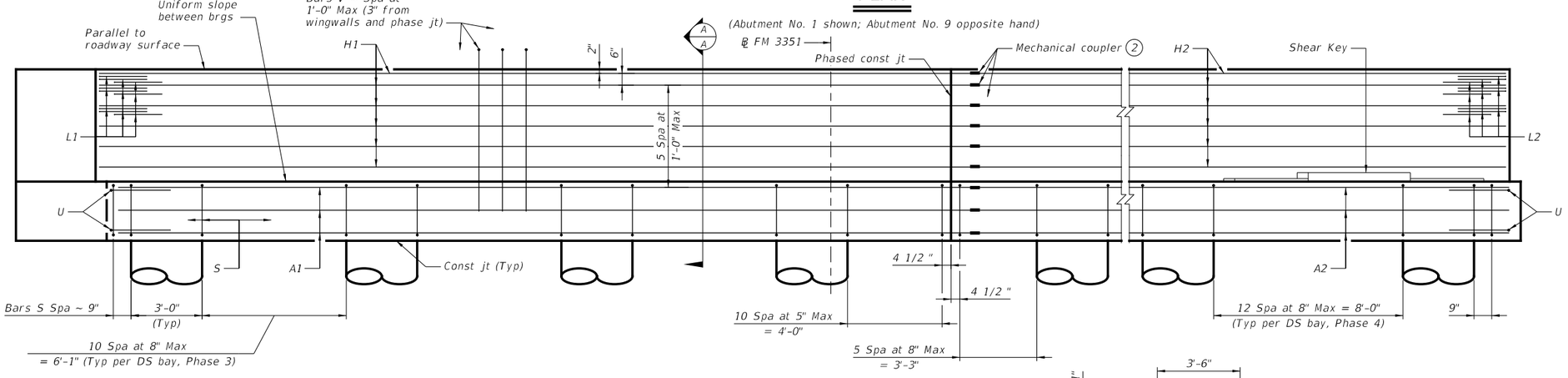
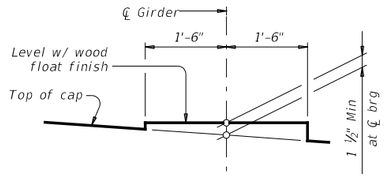


PLAN



ELEVATION

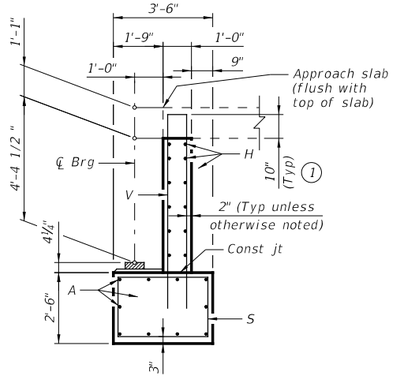


BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

(1) Increase as required to maintain 3" from finished grade.

(2) Extend Bars 1'-0" into Phase 4 construction. Splice bars A by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 400, "Reinforcing Steel".



SECTION A-A

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Brdige Design Specifications, 9th Edition (2020).

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Stone Riprap (SRR) standard sheet for all riprap attachment details.

See Shear Key (IGSK) standard sheet for all shear key details and notes.

See Sealed Expansion Joint (SEJ-M) standard sheet for details.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.

Calculated foundation loads:

97 tons/Abutment DS

20 tons/Wingwall DS

MATERIAL NOTES:

All concrete shall be Class C, f'c 3600 psi.

All reinforcing steel shall be Grade 60.

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
ABUTMENT NOS. 1 & 9

SCALE:3/16"=1'-0" SHEET 1 OF 2

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	172

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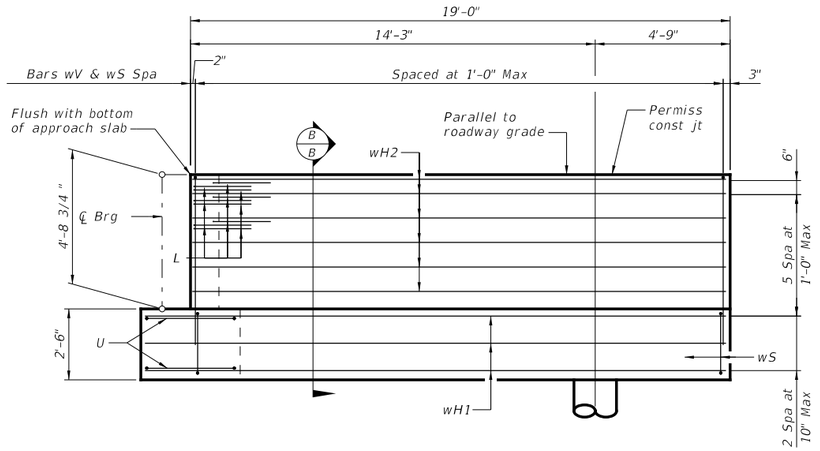
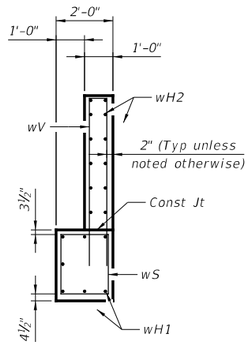
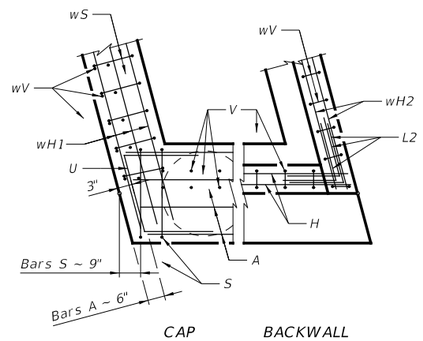


WINGWALL ELEVATION



SECTION B-B



CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES ~ PHASE 3 (3)

	Bar	No.	Size	Length	Weight
(4)	A1	10	#11	36'-8"	1948
(4)	H1	12	#6	37'-0"	667
	L1	9	#6	4'-0"	54
	S	47	#5	11'-6"	564
	U	2	#6	8'-2"	25
	V	36	#5	15'-8"	588
	wH1	7	#6	20'-5"	215
	wH2	14	#6	18'-8"	393
	wS	20	#4	7'-10"	105
	wV	20	#5	14'-5½"	303
	Reinforcing Steel		Lb		4862
	Class C Conc (Abut)		CY		25.3

TABLE OF ESTIMATED QUANTITIES ~ PHASE 4 (3)

	Bar	No.	Size	Length	Weight
(4)	A2	10	#11	28'-8"	1523
(4)	H2	12	#6	29'-0"	523
	L2	9	#6	4'-0"	54
	S	34	#5	11'-6"	408
	U	2	#6	8'-2"	25
	V	29	#5	15'-8"	474
	wH1	7	#6	20'-5"	215
	wH2	14	#6	18'-8"	393
	wS	20	#4	7'-10"	105
	wV	20	#5	14'-5½"	303
	Reinforcing Steel		Lb		4022
	Class C Conc (Abut) (5)		CY		22.5

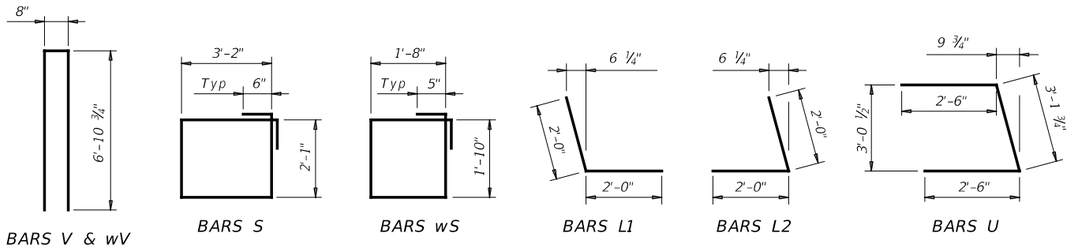
(3) Quantities shown are for one abutment only

(4) Bar lengths terminate at 1'-0" from phase joint. Contractor shall adjust bar lengths based on mechanical coupler requirements.

(5) Shear Key quantity included in Phase 4.

GENERAL NOTES:

See Abutment Nos. 1 & 9, Sheet 1 of 2 for notes.



HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
ABUTMENT NOS. 1 & 9

SCALE:3/16"=1'-0" SHEET 2 OF 2

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	173

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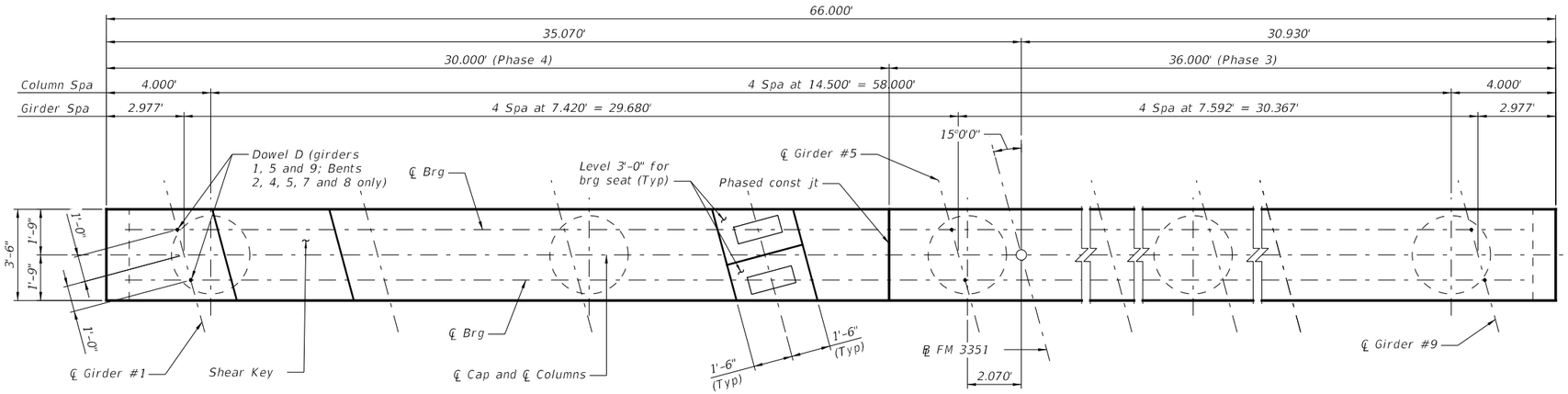
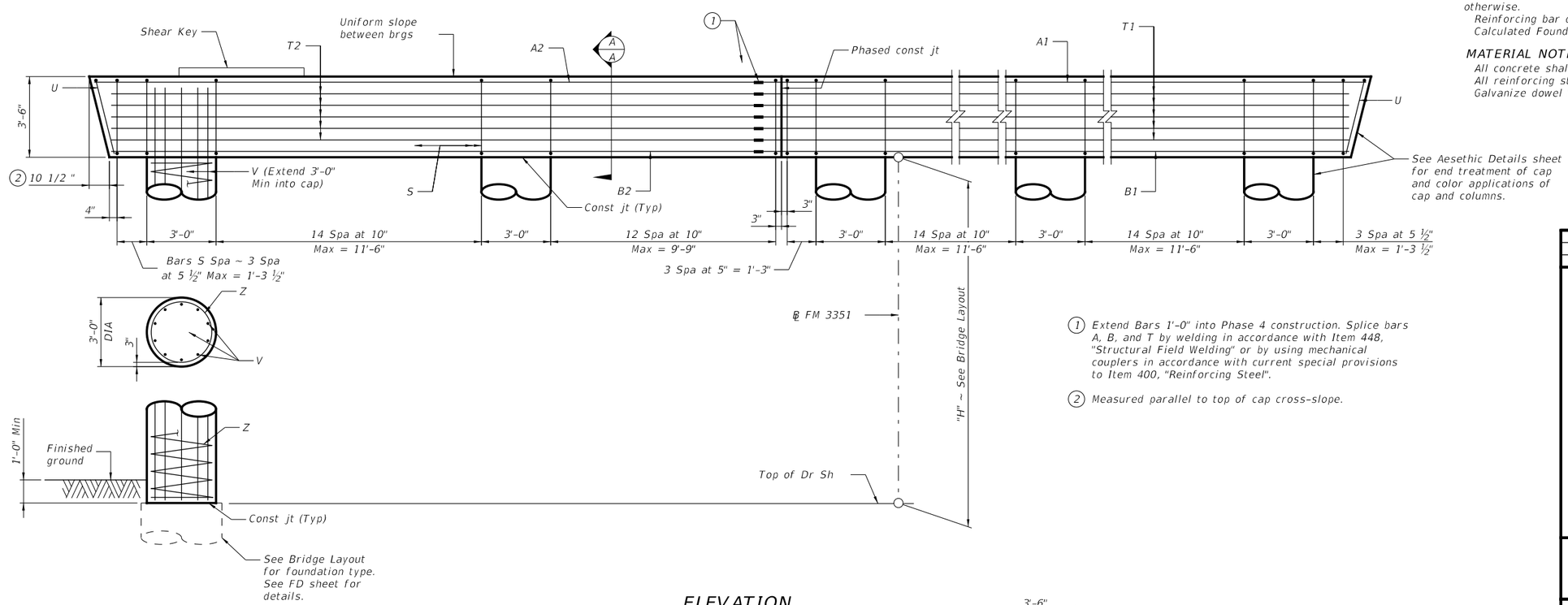
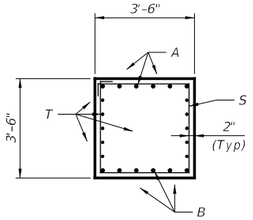


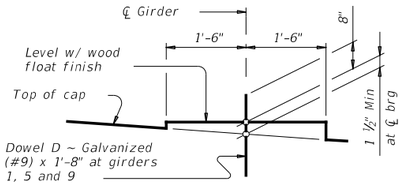
PLAN



ELEVATION



SECTION A-A



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 9th Edition (2020).
See Framing Plan for girder angles.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.
Calculated Foundation Loads = 297 tons/ Dr Sh.

MATERIAL NOTES:

All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
Galvanize dowel bars D.

(1) Extend Bars 1'-0" into Phase 4 construction. Splice bars A, B, and T by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 400, "Reinforcing Steel".

(2) Measured parallel to top of cap cross-slope.

HL 93 LOADING

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08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
INTERIOR BENT NOS. 2-8

SCALE:3/16"=1'-0" SHEET 1 OF 2

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	174

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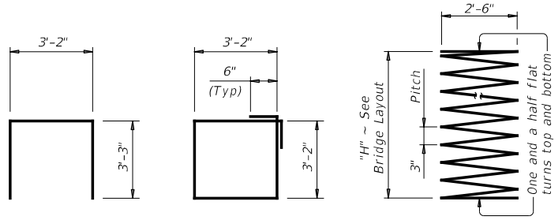

TABLE OF CAP ④ QUANTITIES ~ PHASE 3

	Bar	No.	Size	Length	Weight
③	A1	6	#11	35'-9"	1140
③	B1	6	#11	35'-0"	1116
	D	4	#9	1'-8"	23
	S	38	#5	13'-8"	541
③	T1	10	#5	35'-0"	365
	U	1	#5	9'-8"	10

Reinforcing Steel	Lb	3195
Class C Conc (Cap)	CY	16.4

TABLE OF CAP ④ QUANTITIES ~ PHASE 4

Bar	No.	Size	Length	Weight
A2	6	#11	29'-9"	948
B2	6	#11	29'-0"	924
D	2	#9	1'-8"	12
S	32	#5	13'-8"	456
T2	10	#5	29'-0"	302
U	1	#5	9'-8"	10

Reinforcing Steel	Lb	2652
Class C Conc (Cap)	CY	14.2

TABLE OF COLUMN QUANTITIES ~ PHASE 3 ⑤

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4 Spiral		Reinf Steel	Class "C" Conc (Col)
	Height	Length	Weight	Length	Weight	LB	CY
2	10'	13'-0"	1301	337'-9"	677	2107	7.8
3	14'	17'-0"	1709	463'-5"	929	2808	10.9
4	24'	27'-0"	2729	777'-7"	1558	4559	18.7
5	25'	28'-0"	2831	809'-0"	1621	4734	19.5
6	22'	25'-0"	2525	714'-9"	1432	4209	17.2
7	20'	23'-0"	2321	651'-11"	1306	3858	15.6
8	19'	22'-0"	2219	620'-6"	1243	3683	14.8

TABLE OF COLUMN QUANTITIES ~ PHASE 4 ⑤

Bent	"H"	Bars V 20 ~ #9		Bars Z 2 ~ #4 Spiral		Reinf Steel	Class "C" Conc (Col)
	Height	Length	Weight	Length	Weight	LB	CY
2	10'	13'-0"	954	337'-9"	451	1405	5.2
3	14'	17'-0"	1253	463'-5"	619	1872	7.3
4	24'	27'-0"	2001	777'-7"	1038	3039	12.5
5	25'	28'-0"	2076	809'-0"	1081	3157	13.0
6	22'	25'-0"	1851	714'-9"	955	2806	11.4
7	20'	23'-0"	1701	651'-11"	871	2572	10.4
8	19'	22'-0"	1627	620'-6"	829	2456	9.9

③ Bar lengths terminate 1'-0" beyond phase joint. Contractor shall adjust bar lengths based on mechanical coupler requirements.

④ Quantities shown are for one bent only.

⑤ For each 1'-0" in variation in "H" value, make the following adjustments:
Bars V length by 1'-0"
Bars Z length by 31'-5"
Reinforcing Steel, 176 LB
Class C Conc (Column), 0.79 CY per bent

HL 93 LOADING

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08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
INTERIOR BENT NOS. 2-8

NTS2 SHEET 2 OF 2

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	175

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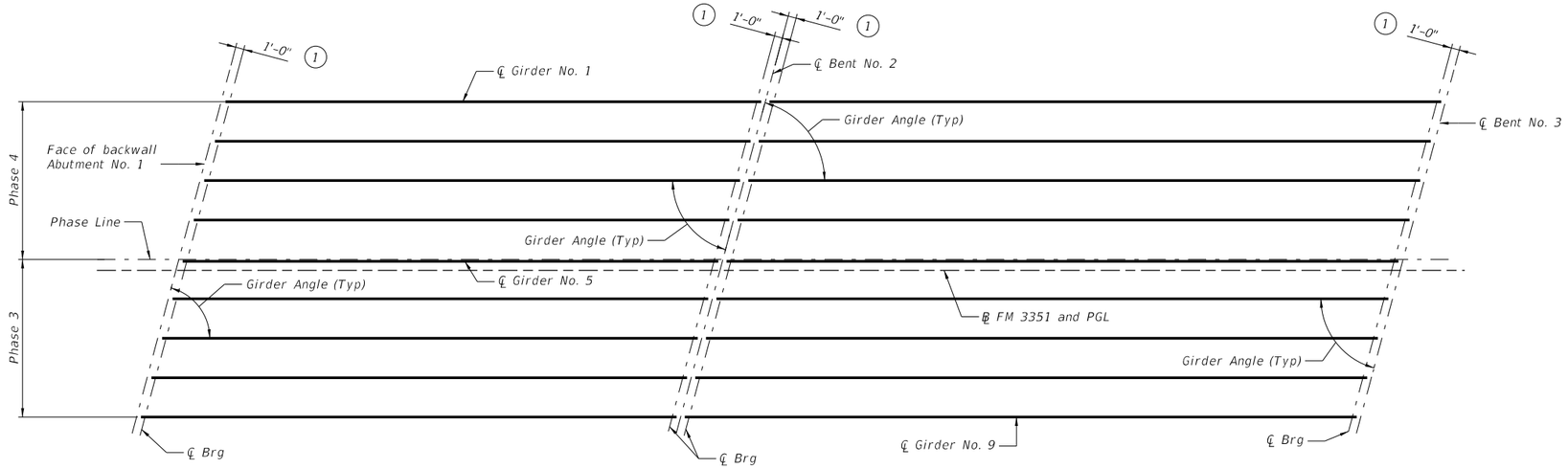

SPAN 1
(TYPE Tx54 GIRDERS)

SPAN 2
(TYPE Tx54 GIRDERS)

1. See Elastomeric Bearing & Girder End Details (IGEB) standard sheet for orientation of dimensions.
2. Girder lengths shown are bottom girder flange lengths with adjustments made for girder slope.
3. Distance between Station Line and Beam #5 = 2.415' L along ℄ Bent.

BENT REPORT

BENT NO. 1 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 2 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 2 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 3 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	BEAM BOT. BM. FLG.	SLOPE (2)
BEAM 1	100.000	97.965	99.49	0.0050
BEAM 2	100.000	97.965	99.49	0.0050
BEAM 3	100.000	97.965	99.49	0.0050
BEAM 4	100.000	97.965	99.49	0.0050
BEAM 5	100.000	97.965	99.49	0.0050
BEAM 6	100.000	97.965	99.49	0.0050
BEAM 7	100.000	97.965	99.49	0.0050
BEAM 8	100.000	97.965	99.49	0.0050
BEAM 9	100.000	97.965	99.49	0.0050

BEAM REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	BEAM BOT. BM. FLG.	SLOPE (2)
BEAM 1	125.000	123.000	124.50	0.0050
BEAM 2	125.000	123.000	124.50	0.0050
BEAM 3	125.000	123.000	124.50	0.0050
BEAM 4	125.000	123.000	124.50	0.0050
BEAM 5	125.000	123.000	124.50	0.0050
BEAM 6	125.000	123.000	124.50	0.0050
BEAM 7	125.000	123.000	124.50	0.0050
BEAM 8	125.000	123.000	124.50	0.0050
BEAM 9	125.000	123.000	124.50	0.0050

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
FRAMING PLAN
(SPANS 1-2)

NTS SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	176

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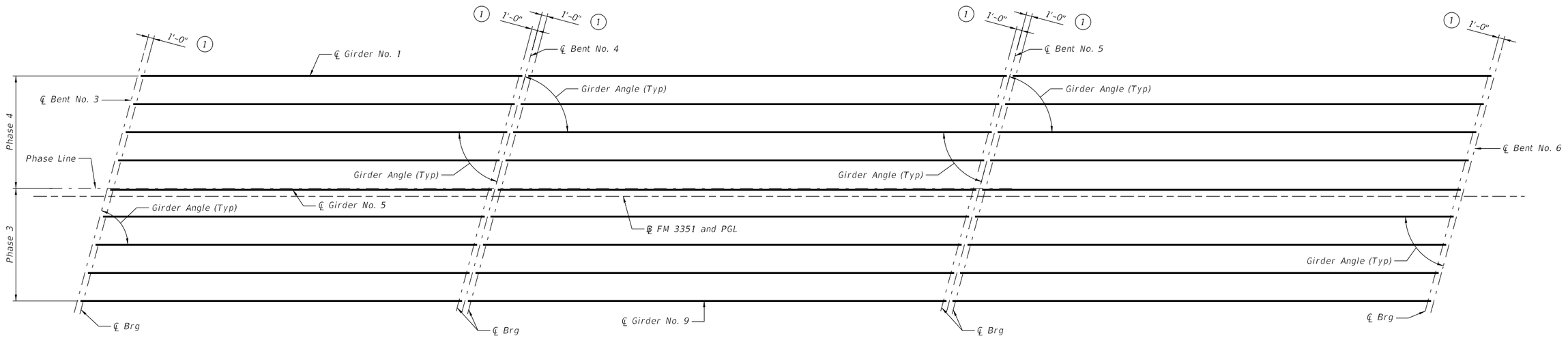

1. See Elastomeric Bearing & Girder End Details (IGEB) standard sheet for orientation of dimensions.
2. Girder lengths shown are bottom girder flange lengths with adjustments made for girder slope.
3. Distance between Station Line and Beam #5 = 2.415' L along ℄ Bent.

BENT REPORT

BENT NO. 3 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 5 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 4	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 4 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 5 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 5	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 4 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 4	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 6 (N 75 30 17.36 W)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 5	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.420	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BEAM REPORT

BEAM REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	125.000	123.000	124.50	0.0050
BEAM 2	125.000	123.000	124.50	0.0050
BEAM 3	125.000	123.000	124.50	0.0050
BEAM 4	125.000	123.000	124.50	0.0050
BEAM 5	125.000	123.000	124.50	0.0050
BEAM 6	125.000	123.000	124.50	0.0050
BEAM 7	125.000	123.000	124.50	0.0050
BEAM 8	125.000	123.000	124.50	0.0050
BEAM 9	125.000	123.000	124.50	0.0050

BEAM REPORT, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	125.000	123.000	124.50	0.0031
BEAM 2	125.000	123.000	124.50	0.0032
BEAM 3	125.000	123.000	124.50	0.0032
BEAM 4	125.000	123.000	124.50	0.0033
BEAM 5	125.000	123.000	124.50	0.0034
BEAM 6	125.000	123.000	124.50	0.0034
BEAM 7	125.000	123.000	124.50	0.0035
BEAM 8	125.000	123.000	124.50	0.0036
BEAM 9	125.000	123.000	124.50	0.0036

BEAM REPORT, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	125.000	123.000	124.50	-0.0029
BEAM 2	125.000	123.000	124.50	-0.0029
BEAM 3	125.000	123.000	124.50	-0.0028
BEAM 4	125.000	123.000	124.50	-0.0027
BEAM 5	125.000	123.000	124.50	-0.0026
BEAM 6	125.000	123.000	124.50	-0.0025
BEAM 7	125.000	123.000	124.50	-0.0024
BEAM 8	125.000	123.000	124.50	-0.0023
BEAM 9	125.000	123.000	124.50	-0.0023

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
FRAMING PLAN
(SPANS 3-5)

NTS SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	177

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 8/25/2023
PLOTTING TIME: 11:43:38 AM
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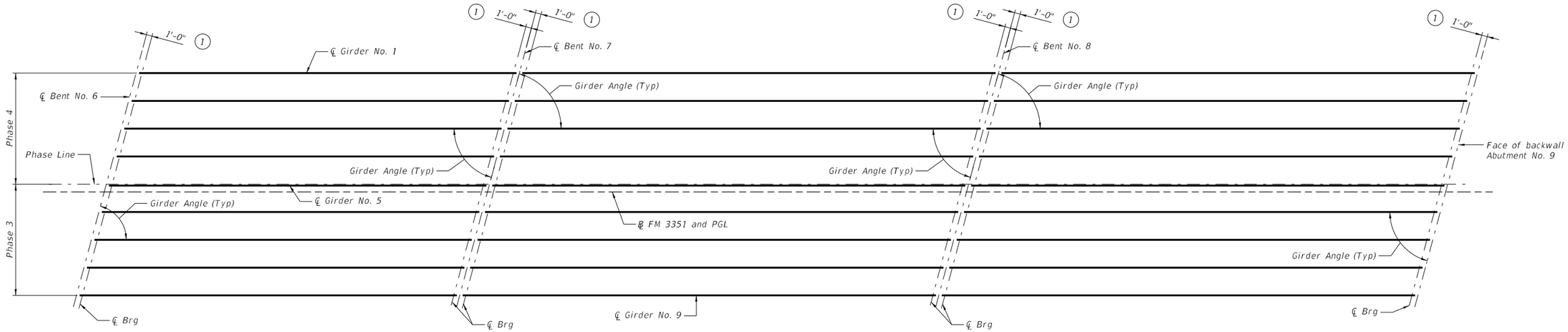


1. See Elastomeric Bearing & Girder End Details (IGEB) standard sheet for orientation of dimensions.
2. Girder lengths shown are bottom girder flange lengths with adjustments made for girder slope.
3. Distance between Station Line and Beam #5 = 2.415' L along ℄ Bent.

BENT REPORT

BENT NO. 6 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 6	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 7 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 6	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 7 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 7	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 8 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 7	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 8 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 8	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BENT NO. 9 (S 75 30 17.36 E)
(3) DISTANCE BETWEEN STATION LINE AND BEAM 1, 32.094 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 8	BEAM 1	0.000	75	0	0
	BEAM 2	7.420	75	0	0
	BEAM 3	7.419	75	0	0
	BEAM 4	7.420	75	0	0
	BEAM 5	7.420	75	0	0
	BEAM 6	7.592	75	0	0
	BEAM 7	7.592	75	0	0
	BEAM 8	7.592	75	0	0
	BEAM 9	7.592	75	0	0
	TOTAL	60.046			

BEAM REPORT

BEAM REPORT, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	125.000	123.000	124.50	-0.0050
BEAM 2	125.000	123.000	124.50	-0.0050
BEAM 3	125.000	123.000	124.50	-0.0050
BEAM 4	125.000	123.000	124.50	-0.0050
BEAM 5	125.000	123.000	124.50	-0.0050
BEAM 6	125.000	123.000	124.50	-0.0050
BEAM 7	125.000	123.000	124.50	-0.0050
BEAM 8	125.000	123.000	124.50	-0.0050
BEAM 9	125.000	123.000	124.50	-0.0050

BEAM REPORT, SPAN 7

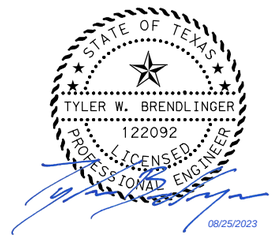
	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	125.000	123.000	124.50	-0.0050
BEAM 2	125.000	123.000	124.50	-0.0050
BEAM 3	125.000	123.000	124.50	-0.0050
BEAM 4	125.000	123.000	124.50	-0.0050
BEAM 5	125.000	123.000	124.50	-0.0050
BEAM 6	125.000	123.000	124.50	-0.0050
BEAM 7	125.000	123.000	124.50	-0.0050
BEAM 8	125.000	123.000	124.50	-0.0050
BEAM 9	125.000	123.000	124.50	-0.0050

BEAM REPORT, SPAN 8

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE (2)
BEAM 1	100.000	97.965	99.49	-0.0050
BEAM 2	100.000	97.965	99.49	-0.0050
BEAM 3	100.000	97.965	99.49	-0.0050
BEAM 4	100.000	97.965	99.49	-0.0050
BEAM 5	100.000	97.965	99.49	-0.0050
BEAM 6	100.000	97.965	99.49	-0.0050
BEAM 7	100.000	97.965	99.49	-0.0050
BEAM 8	100.000	97.965	99.49	-0.0050
BEAM 9	100.000	97.965	99.49	-0.0050

HL 93 LOADING

NO.	DATE	REVISION	APPR BY



HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
FRAMING PLAN
(SPANS 6-8)

NTS SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	178

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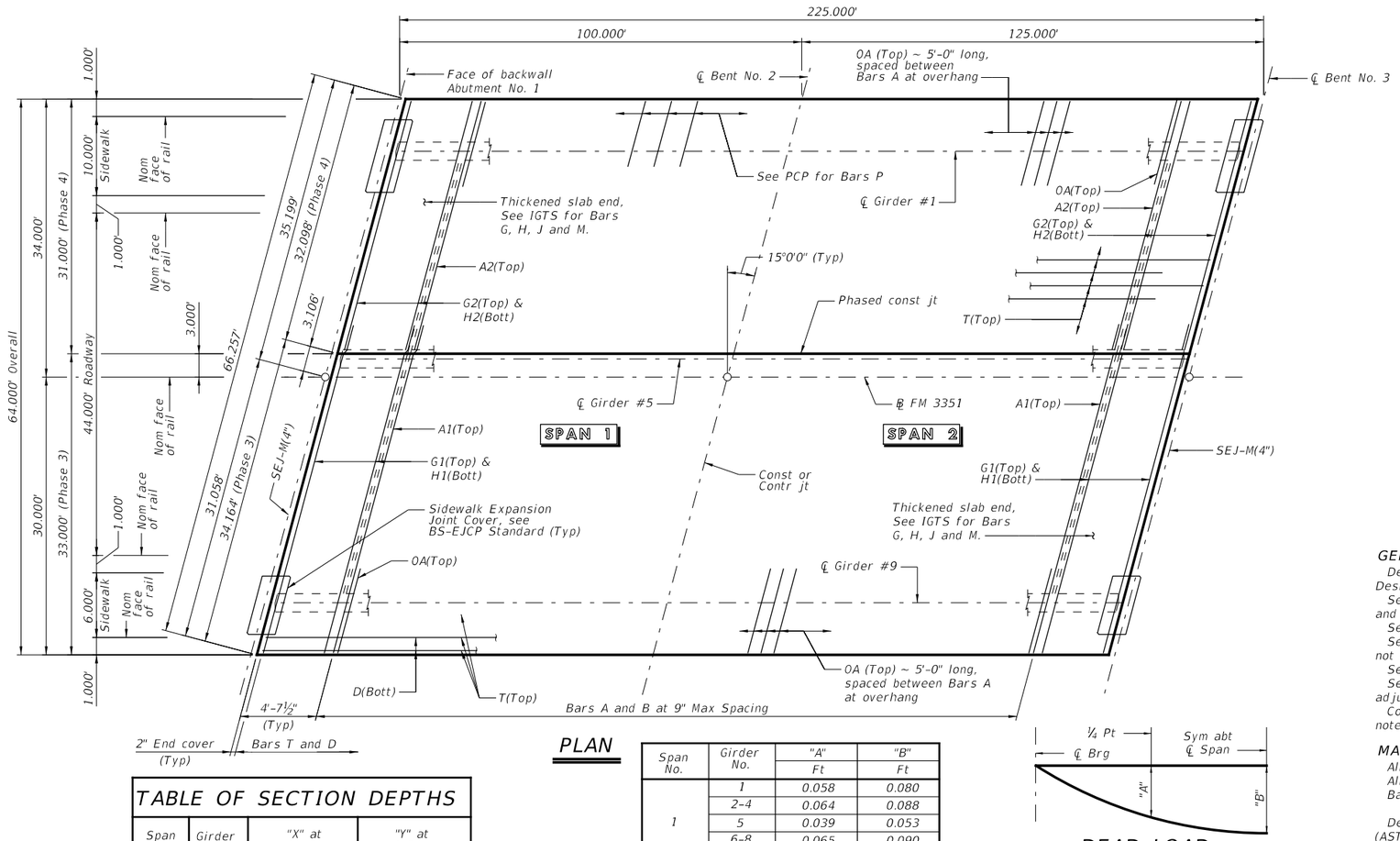


PLAN

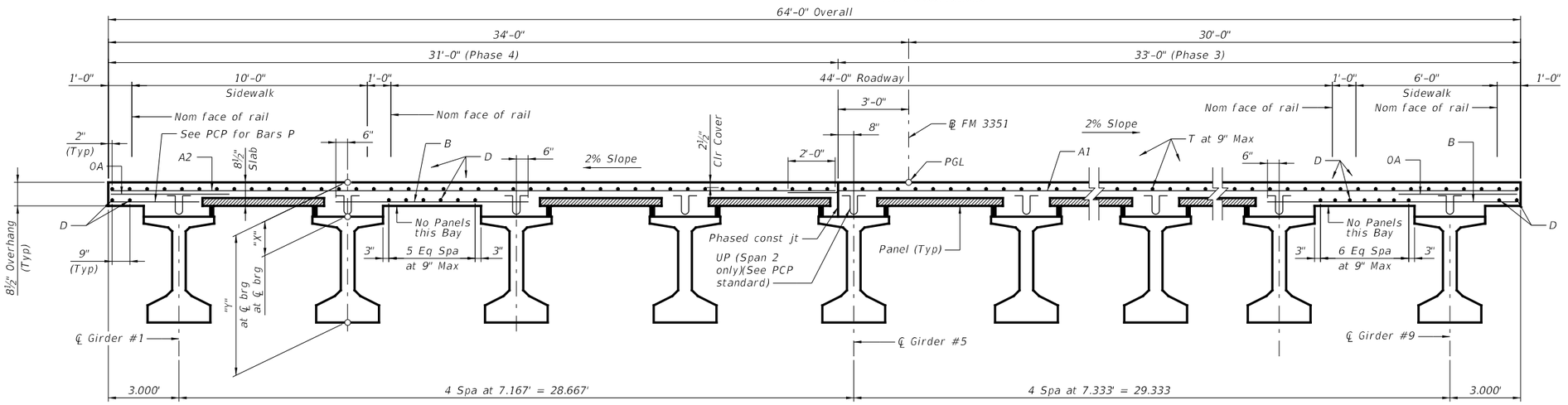
Span No.	Girder No.	"A" Ft	"B" Ft
1	1	0.058	0.080
	2-4	0.064	0.088
	5	0.039	0.053
	6-8	0.065	0.090
	9	0.060	0.082
2	1	0.146	0.201
	2-4	0.159	0.218
	5	0.096	0.132
	6-8	0.162	0.223
	9	0.148	0.203

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.
1	All	11½"	5'-5½"
2	All	1'-0½"	5'-6½"

DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec = 5000 ksi) Calculated deflections shown are theoretical and actual deflections may be less. Deflections shall be adjusted based on field observations



TYPICAL TRANSVERSE SECTION

BAR TABLE

BAR	SIZE
A1	#4
A2	#4
B	#4
D	#4
G1	#4
G2	#4
H1	#4
H2	#4
J	#4
M	#4
OA	#5
P	#4
T	#4
UP	#4

TABLE OF ESTIMATED QUANTITIES ~ PHASE 3

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
1	3300	497.45	11220
2	4125	622.50	14025
Total	7425	1119.95	25245

TABLE OF ESTIMATED QUANTITIES ~ PHASE 4

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
1	3100	397.96	10540
2	3875	498.00	13175
Total	6975	895.96	25245

(1) Reinforcing steel weight is calculated using an approximate factor of 3.4 Lbs/SF.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 9th Edition (2020).
See IGTS standard for Thickened Slab End details and quantity adjustments.
See rail standard for anchorage in slab.
See PCP and PCP-FAB standards for panel details not shown.
See IGMS standard for miscellaneous details.
See PMDF standard for details and quantity adjustments if this option is used.
Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

All concrete shall be Class S, f'c = 4000 psi.
All reinforcing steel shall be Grade 60.
Bar laps, where required shall be as follows:
#4 = 1'-7"
Deformed Welded Wire Reinforcement (WRR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P or T unless noted otherwise.

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
225.00' PRESTRESSED CONCRETE GIRDER UNIT

SCALE:3/16"=1'-0" SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	179

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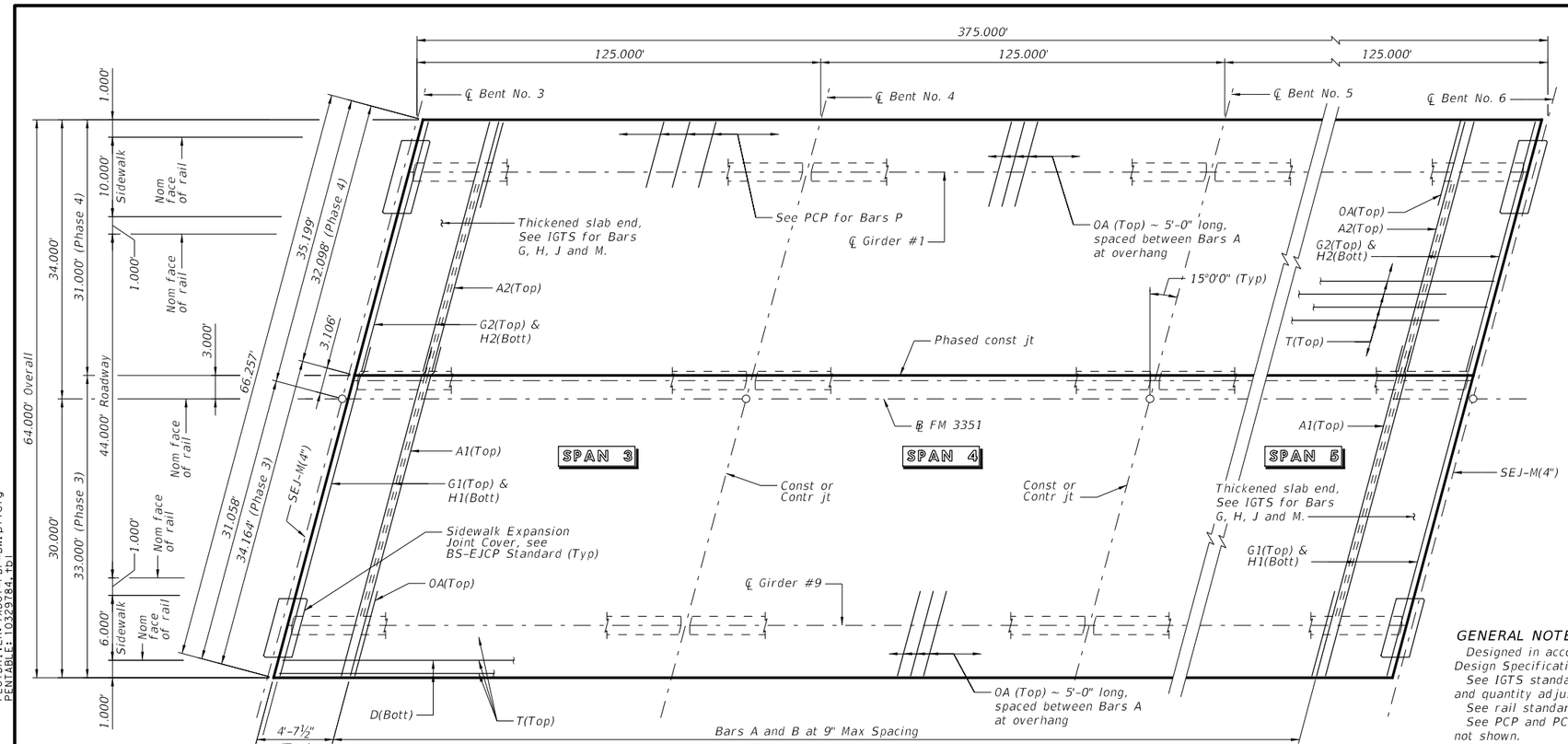


PLAN

Span No.	Girder No.	"A" Ft	"B" Ft
3-5	1	0.146	0.201
	2-4	0.159	0.218
	5	0.096	0.132
	6-8	0.162	0.223
	9	0.148	0.203

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.
3	All	1'-0½"	5'-6½"
4-5	All	11¾"	5'-5¾"

DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec = 5000 ksi) Calculated deflections shown are theoretical and actual deflections may be less. Deflections shall be adjusted based on field observations

BAR TABLE

BAR	SIZE
A1	#4
A2	#4
B	#4
D	#4
G1	#4
G2	#4
H1	#4
H2	#4
J	#4
M	#4
0A	#5
P	#4
T	#4
UP	#4

TABLE OF ESTIMATED QUANTITIES ~ PHASE 3

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
3	4125	622.50	14025
4	4125	622.50	14025
5	4125	622.50	14025
Total	12375	1867.50	42075

TABLE OF ESTIMATED QUANTITIES ~ PHASE 4

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
3	3875	498.00	13175
4	3875	498.00	13175
5	3875	498.00	13175
Total	11625	1494.00	39525

(1) Reinforcing steel weight is calculated using an approximate factor of 3.4 Lbs/SF.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 9th Edition (2020).

See IGTS standard for Thickened Slab End details and quantity adjustments.

See rail standard for anchorage in slab.

See PCP and PCP-FAB standards for panel details not shown.

See IGMS standard for miscellaneous details.

See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

All concrete shall be Class S, f'c = 4000 psi.

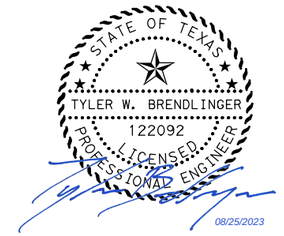
All reinforcing steel shall be Grade 60.

Bar laps, where required shall be as follows:
#4 = 1'-7"

Deformed Welded Wire Reinforcement (WRR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, 0A, P or T unless noted otherwise.

HL 93 LOADING

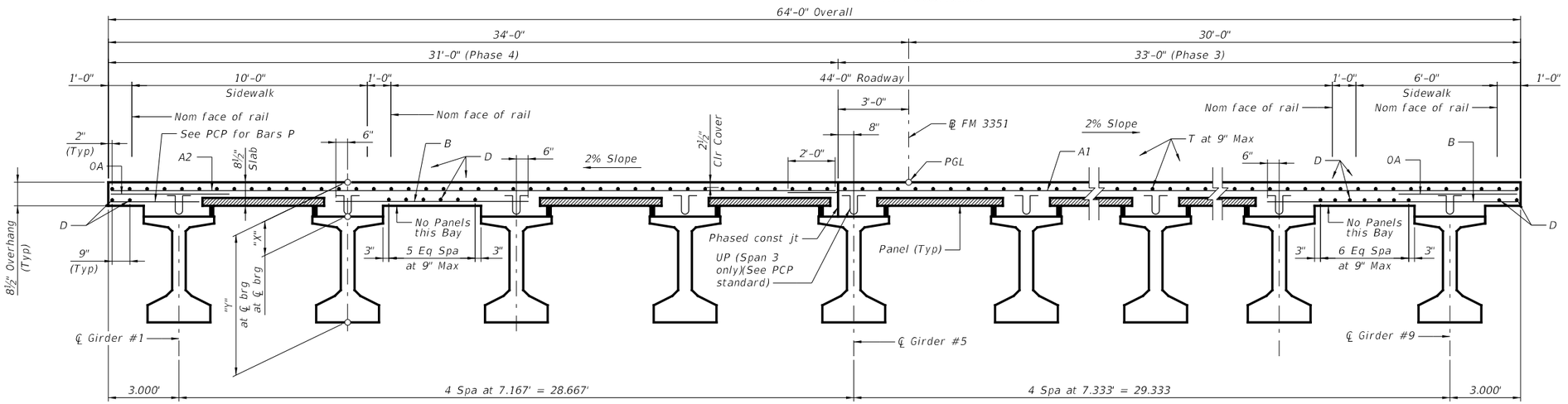
NO.	DATE	REVISION	APPR BY



HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
375.00' PRESTRESSED CONCRETE GIRDER UNIT



TYPICAL TRANSVERSE SECTION

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	180

SCALE: 3/16"=1'-0" SHEET 1 OF 1

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 10329784.tbl
DATE: 8/25/2023
PLOTTING TIME: 11:43:47 AM
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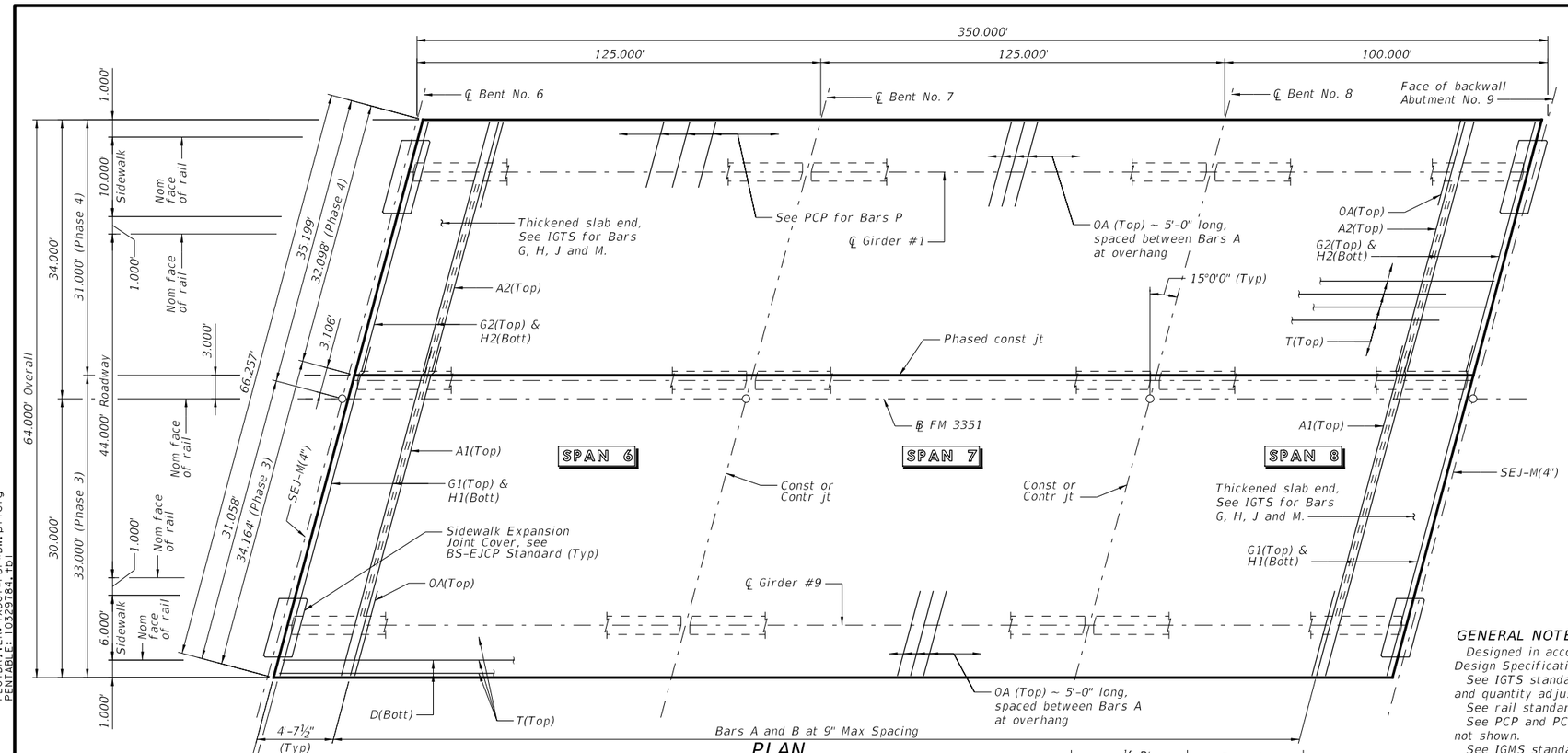
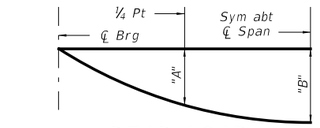


PLAN

Span No.	Girder No.	"A" Ft	"B" Ft
6-7	1	0.146	0.201
	2-4	0.159	0.218
	5	0.096	0.132
	6-8	0.162	0.223
	9	0.148	0.203
8	1	0.058	0.080
	2-4	0.064	0.088
	5	0.039	0.053
	6-8	0.065	0.090
	9	0.060	0.082

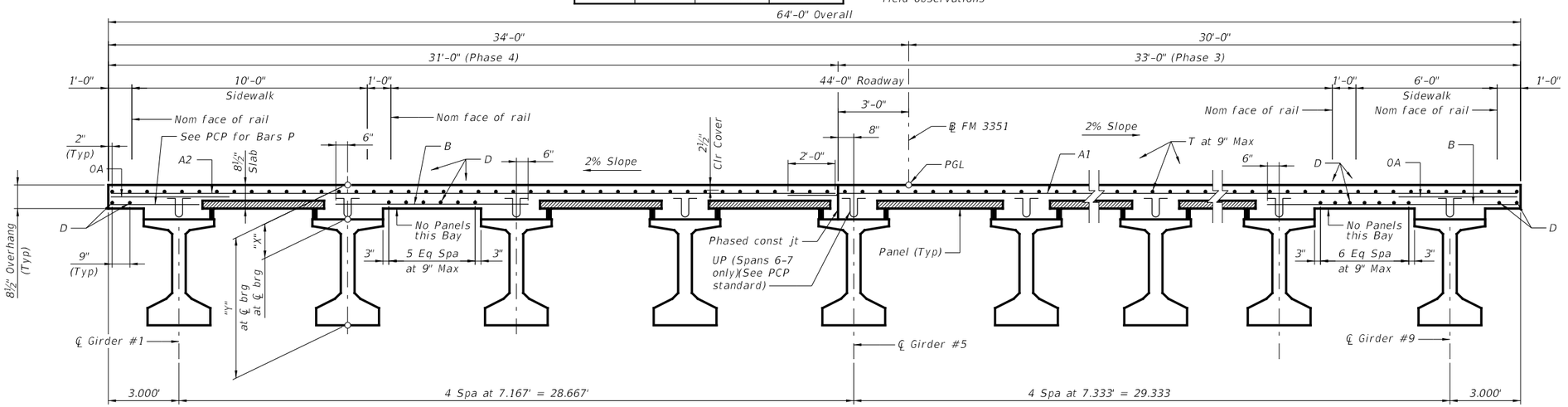
TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.
6-7	All	1'-0½"	5'-6½"
8	All	11½"	5'-5½"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec = 5000 ksi) Calculated deflections shown are theoretical and actual deflections may be less. Deflections shall be adjusted based on field observations



TYPICAL TRANSVERSE SECTION

BAR TABLE

BAR	SIZE
A1	#4
A2	#4
B	#4
D	#4
G1	#4
G2	#4
H1	#4
H2	#4
J	#4
M	#4
0A	#5
P	#4
T	#4
UP	#4

TABLE OF ESTIMATED QUANTITIES ~ PHASE 3

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
6	4125	622.50	14025
7	4125	622.50	14025
8	3300	497.45	11220
Total	11550	1742.45	39270

TABLE OF ESTIMATED QUANTITIES ~ PHASE 4

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 54)	Reinforcing Steel (1)
No.	SF	LF	Lb
6	3875	498.00	13175
7	3875	498.00	13175
8	3100	397.96	10540
Total	10850	1393.96	36890

(1) Reinforcing steel weight is calculated using an approximate factor of 3.4 Lbs/SF.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 9th Edition (2020).

See IGTS standard for Thickened Slab End details and quantity adjustments.

See rail standard for anchorage in slab.

See PCP and PCP-FAB standards for panel details not shown.

See IGMS standard for miscellaneous details.

See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

All concrete shall be Class S, f'c = 4000 psi.

All reinforcing steel shall be Grade 60.

Bar laps, where required shall be as follows:
#4 = 1'-7"

Deformed Welded Wire Reinforcement (WRR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, 0A, P or T unless noted otherwise.

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
350.00' PRESTRESSED CONCRETE GIRDER UNIT

SCALE:3/16"=1'-0" SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	181

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PENTABLE: 10329784.tbl
DATE: 8/25/2023
PLOTTING TIME: 11:43:51 AM
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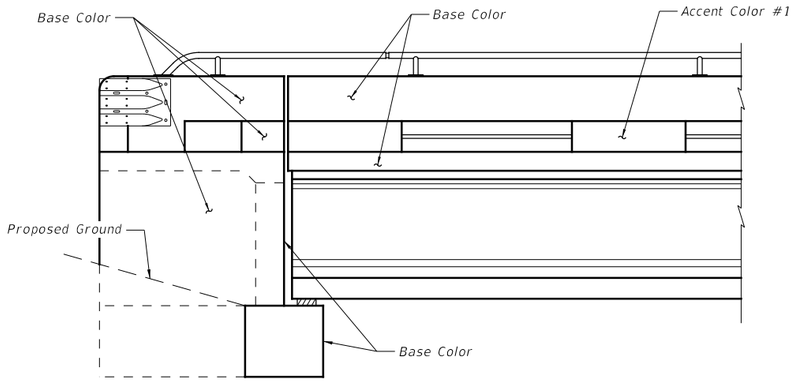
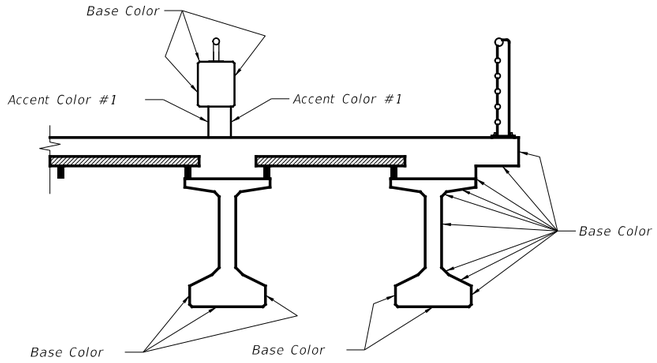
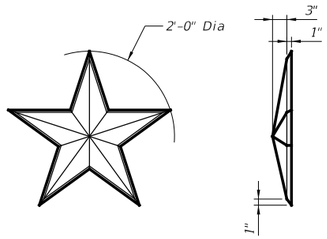
User Name: CLINDSAY



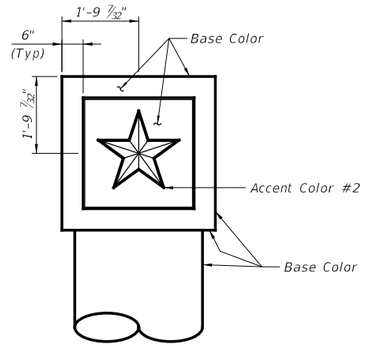
ABUTMENT, WINGWALL AND C223 RAIL DETAILS



GIRDER DETAILS



TEXAS LONE STAR DETAIL



STAR LOCATION AND BENT DETAILS

Colored Textured Concrete
Random Slate Pattern
(Regular Slate Texture)(Tools A-D)
By Bomanite (559-673-2411 or approved equal)

Lithochrome R Color Hardener 5758
Weathered Sage (25%)
Lithochrome R Color Hardener 3611
Oyster White (75%)

Lithochrome R Antquing Release A-50
Slate Gray
(800-800-9900)(By Scofield or
approved equal)

Base Color
Sherwin Williams
SW 6142 'Macadamia' or approved equal

Accent Color #1
Sherwin Williams
SW 6179 'Artichoke' or approved equal

Accent Color #2
Sherwin Williams
SW 6152 'Superior Bronze' or approved equal

NOTES:
1. All painting is subsidiary to various bridge items.

HL 93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351
AT CIBOLO CREEK
AESETHIC DETAILS

NTS

SHEET 1 OF 1

DSN: TWB	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CMR	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CMR	COMAL	SAT	3212	05	013	182

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DATE: 8/25/2023
PLOTTING TIME: 11:45:38 AM
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User Name: CLINDSAY

DATE: 11/3/2023 3:00:25 PM
FILE: $FILE$

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
FM 3351 at Cibolo Creek	1,8	All	Tx54		28	0.6	270	20.01	14.29	4	44.5	4.500	5.000	2.938	-2.998	6229	0.727	0.802	1.62	2.10	1.15
	2-7	All	Tx54		46	0.6	270	18.66	11.36	8	50.5	5.800	7.500	4.613	-4.542	9152	0.727	0.804	1.60	2.07	1.09

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

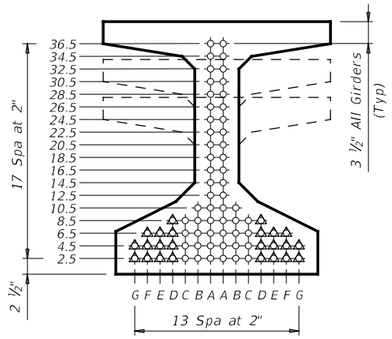
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

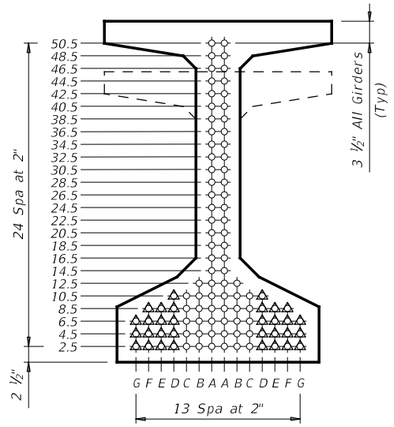
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

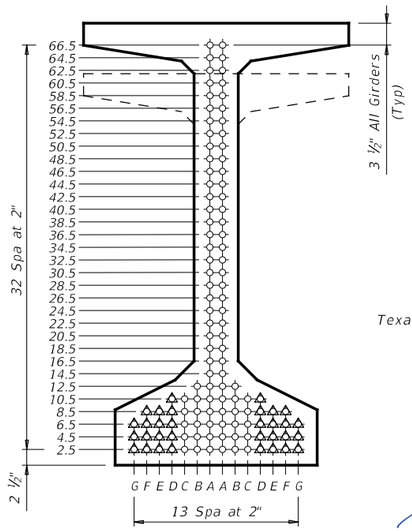
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



TYPE Tx28, Tx34 & Tx40



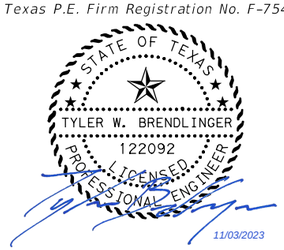
TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

Texas P.E. Firm Registration No. F-754



Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: IG-IGND-22.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only. 3-22: Added Load Rating.	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		183

DATE: 8/25/2023 12:04:47 PM
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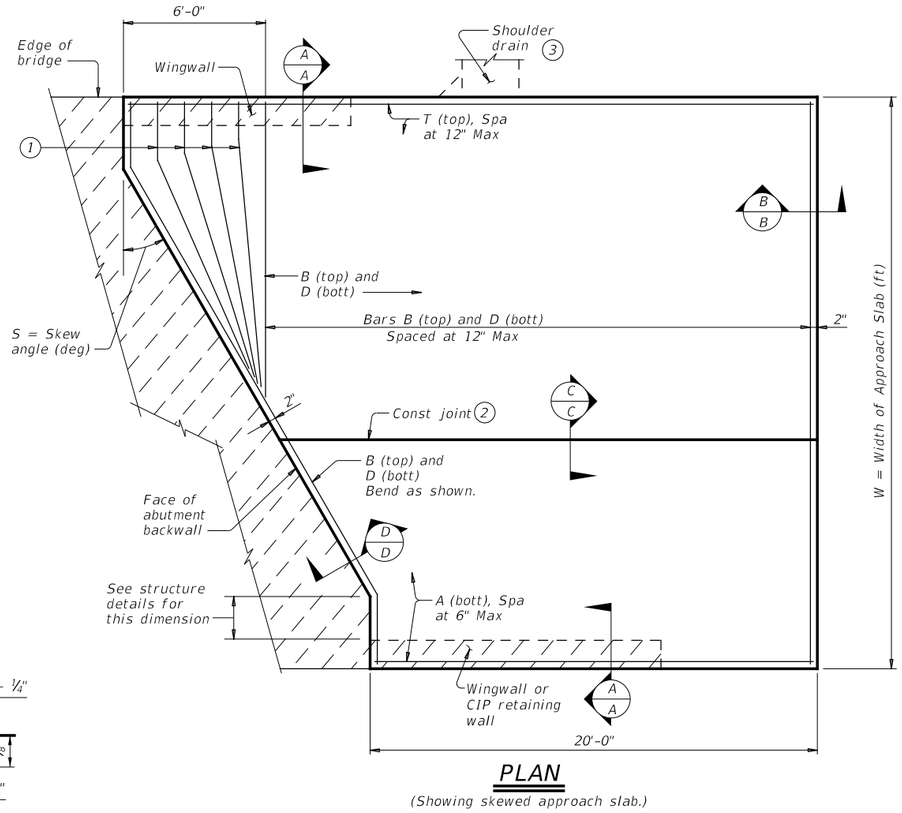
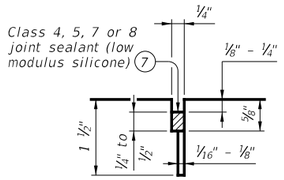


PLAN

(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

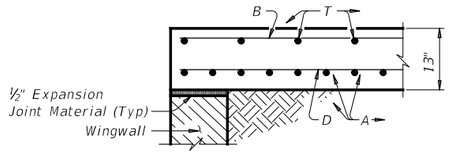
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

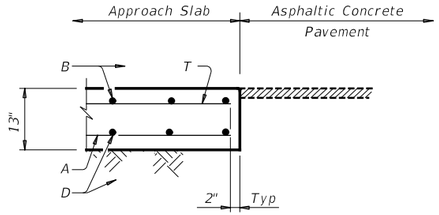
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.

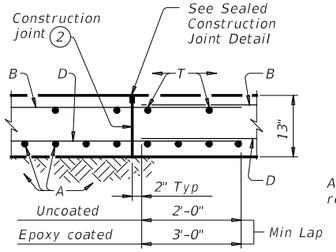


SHOWING WINGWALL

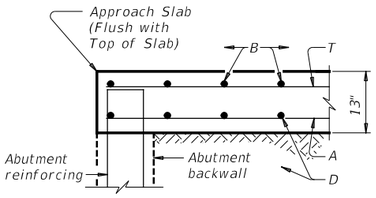


SECTION A-A

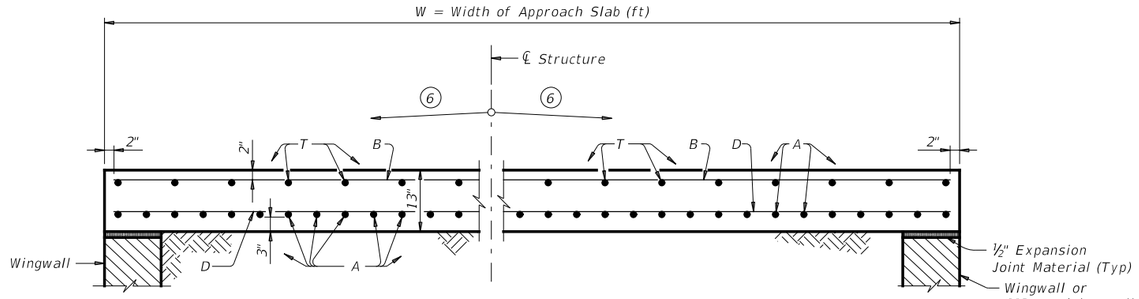
SECTION B-B



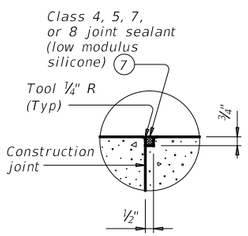
SECTION C-C (5)



SECTION D-D



TYPICAL TRANSVERSE SECTION



SEALED CONSTRUCTION JOINT DETAIL

Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

Bridge Division Standard

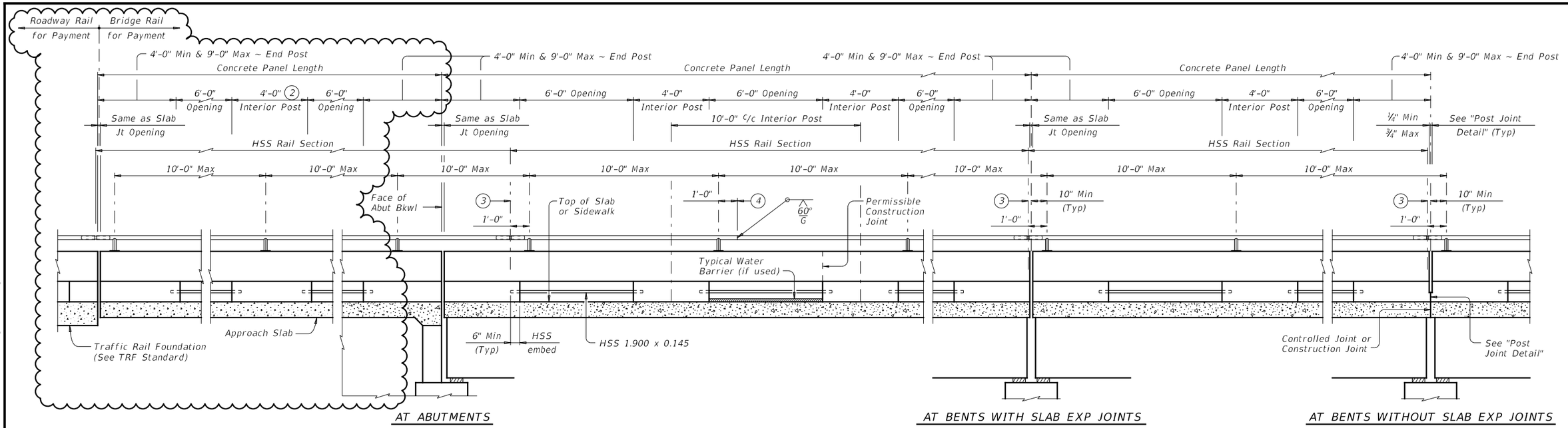
BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A(MOD)

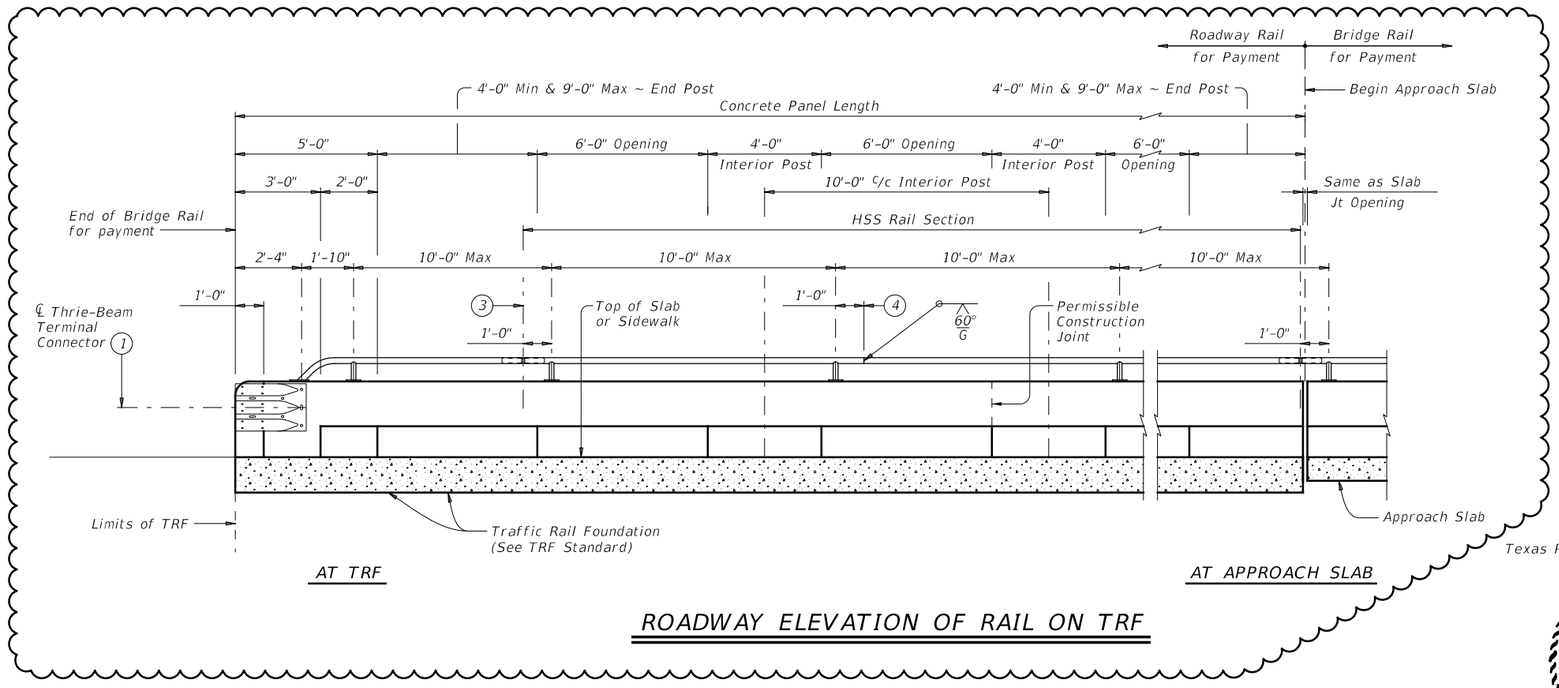
FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
02-20: Removed stress relieving pad. Mod - Appr Slab on Wingwall	DIST	COUNTY		SHEET NO.
	SAT	COMAL		184

DATE: 8/25/2023 12:04:49 PM
FILE: $FILE$



ROADWAY ELEVATION OF RAIL ON BRIDGE

(Showing without raised sidewalk)



ROADWAY ELEVATION OF RAIL ON TRF

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Omit Interior Post if not required.

(3) ℄ Splice Jt or Exp Jt

(4) One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

Texas P.E. Firm Registration No. F-754

SHEET 1 OF 5

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223 (MOD)

FILE:	rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		3212	05	013	FM 3351
Addition of post install option using epoxy anchors and adjust length to limits of approach slab		DIST	COUNTY		SHEET NO.
		SAT	COMAL		185

DATE: 8/25/2023 12:04:49 PM
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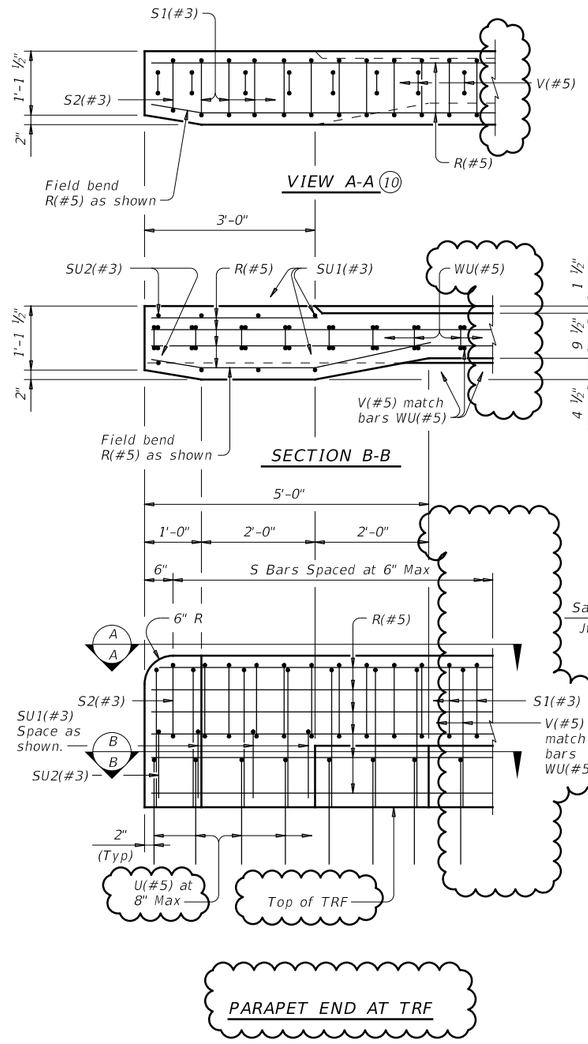
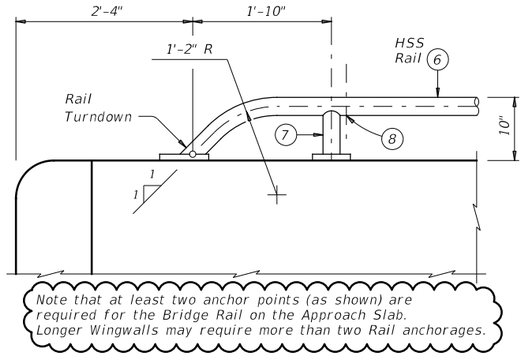
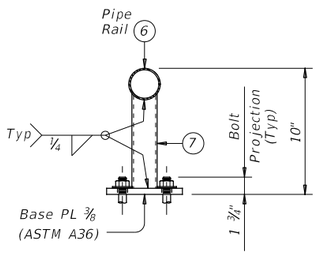
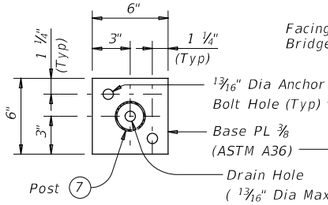




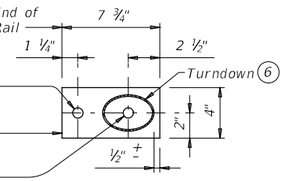
HSS RAIL TERMINAL DETAIL



TRANSVERSE SECTION

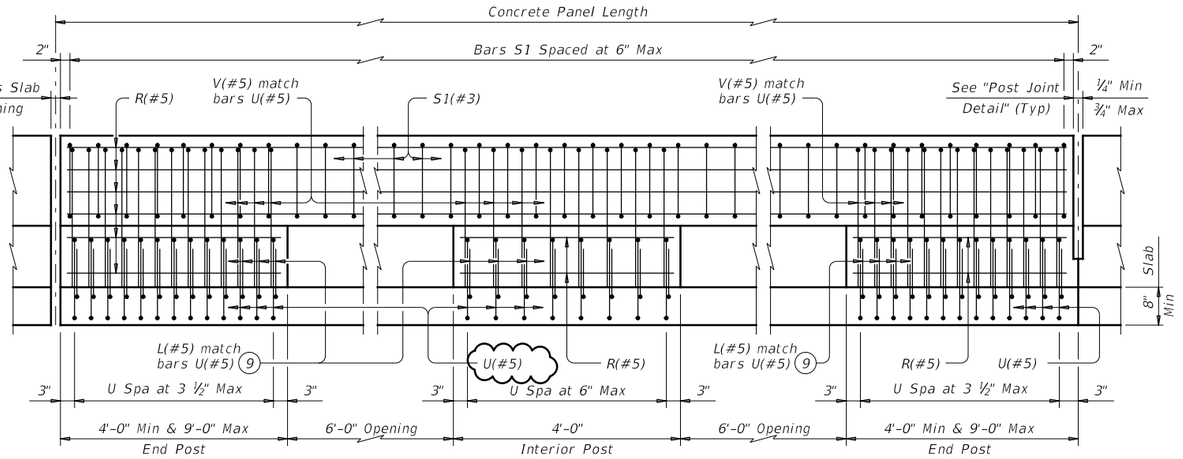


POST BASE PLATE PLAN



RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL DETAILS



AT BENTS WITH SLAB EXP JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab and without raised sidewalk. Rail on box culvert similar. HSS not shown for clarity.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(5) Increase 2" for structures with overlay.

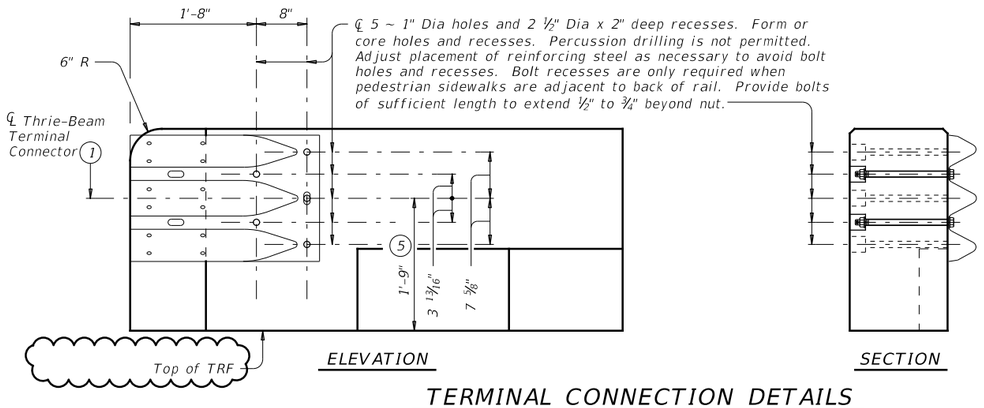
(6) HSS 2.875 x 0.203

(7) HSS 2.375 x 0.154

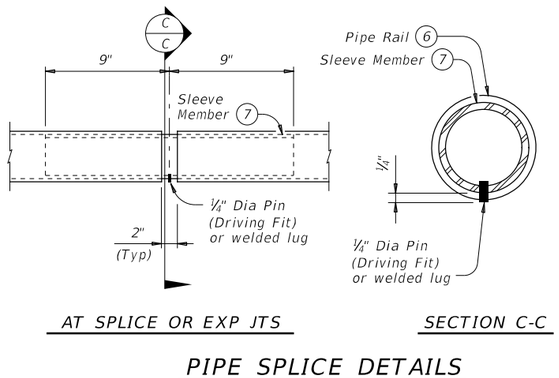
(8) ⅜" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(10) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.



TERMINAL CONNECTION DETAILS

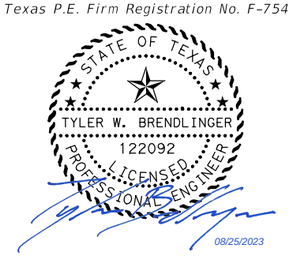


AT SPLICE OR EXP JTS

SECTION C-C

PIPE SPLICE DETAILS

Texas P.E. Firm Registration No. F-754



SHEET 2 OF 5

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C223 (MOD)

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
Addition of post install option using epoxy anchors and adjust length to limits of approach slab	DIST	COUNTY		SHEET NO.
	SAT	COMAL		186

DATE: 8/25/2023 12:04:49 PM
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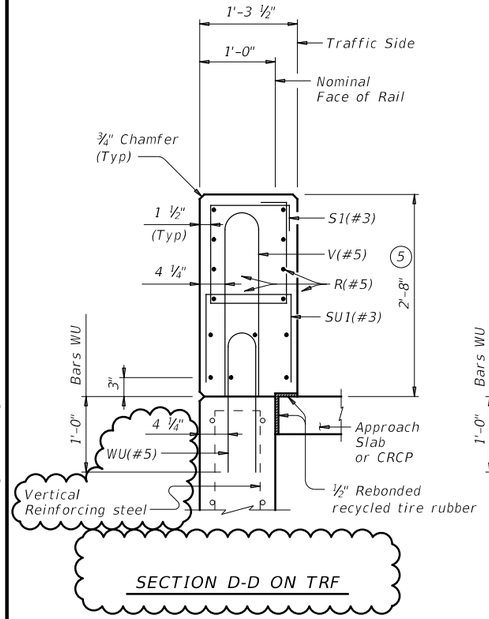
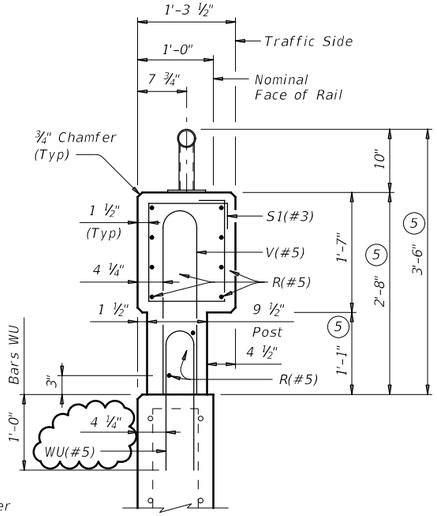
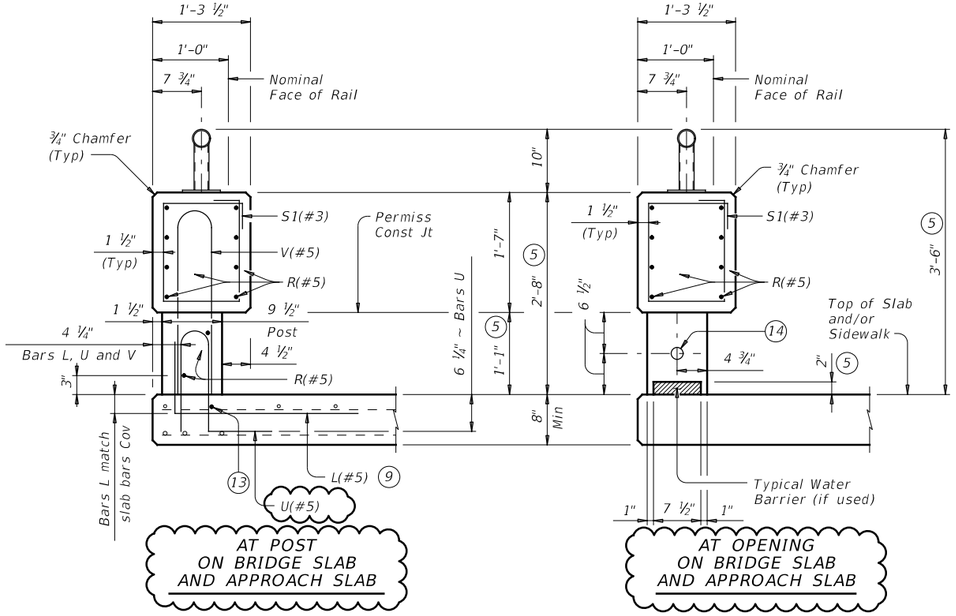


SECTION D-D ON TRF

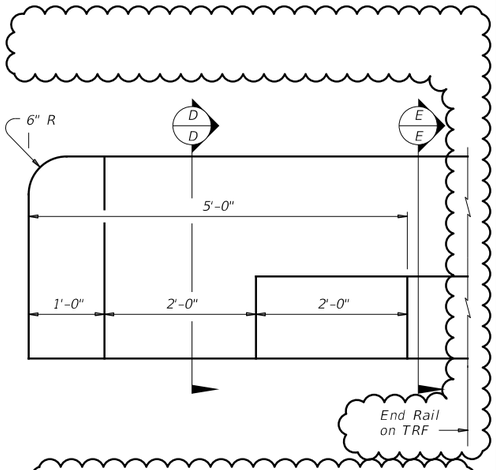


SECTION E-E ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



AT POST ON BRIDGE SLAB AND APPROACH SLAB

AT OPENING ON BRIDGE SLAB AND APPROACH SLAB



ELEVATION AT TRF

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

Sections on box culvert similar.

SECTION D-D ON TRF

SECTION E-E ON TRF

AT POST ON BRIDGE SLAB

AT OPENING ON BRIDGE SLAB

SECTIONS THRU RAIL WITH RAISED SIDEWALK

Sections on box culvert similar.

(2) Wingwall Length minus 5'-0" (Varies)

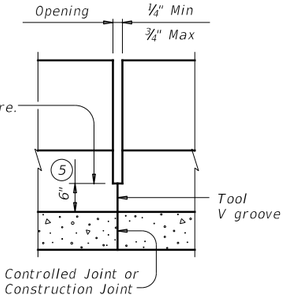
(5) Increase 2" for structures with overlay.

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(13) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(14) HSS 1.900 x 0.145

(15) Raised Sidewalk.



POST JOINT DETAIL

(Showing without raised sidewalk)
Provide at all interior bents without slab expansion joints.

Texas P.E. Firm Registration No. F-754

SHEET 3 OF 5

Texas Department of Transportation

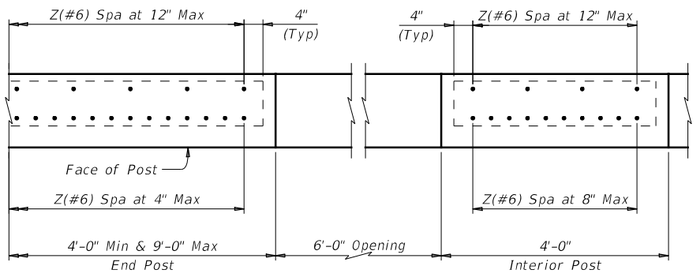
Bridge Division Standard

COMBINATION RAIL

TYPE C223 (MOD)

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
Addition of post install option using epoxy anchors and adjust length to limits of approach slab	DIST	COUNTY		SHEET NO.
	SAT	COMAL		187

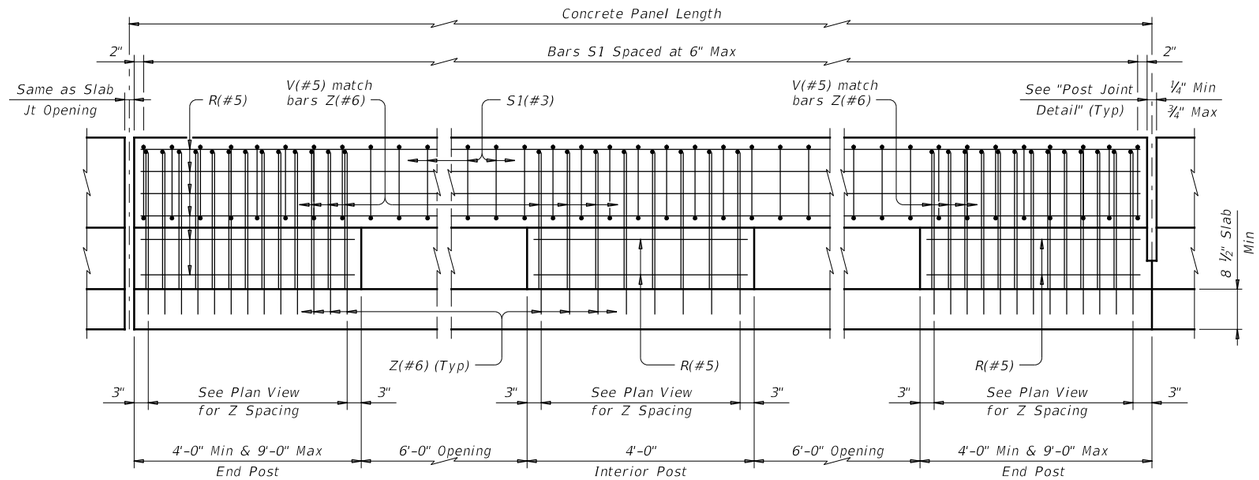
DATE: 8/25/2023 12:04:50 PM
FILE: $FILE$



AT END POST AT 4' INTERIOR POST

PLAN SHOWING TYPICAL EPOXY ANCHOR REINFORCING PLACEMENT

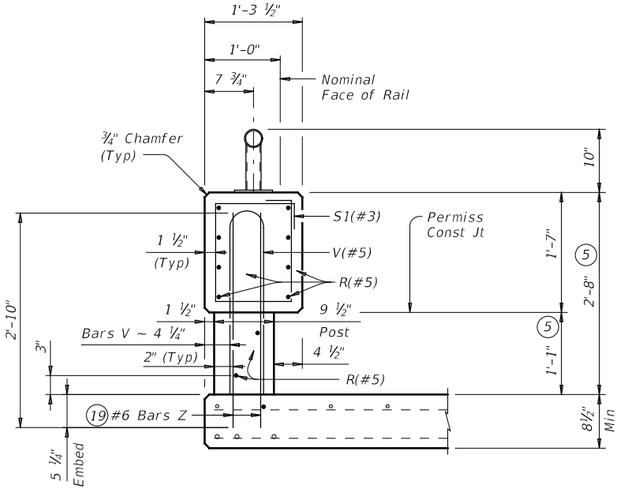
Showing rail on slab. Approach slab similar. HSS not shown for clarity.



AT BENTS WITH SLAB EXP JOINTS AT 4' INTERIOR POST AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL EPOXY ANCHOR REINFORCING PLACEMENT

Showing rail on slab. Approach slab similar. HSS not shown for clarity.



AT POST ON BRIDGE SLAB AND APPROACH SLAB

SECTIONS THRU RAIL USING POST INSTALLED ANCHORS

(19) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Texas P.E. Firm Registration No. F-754

STATE OF TEXAS
TYLER W. BRENDLINGER
122092
LICENSED
PROFESSIONAL ENGINEER
08/25/2023

SHEET 4 OF 5

Texas Department of Transportation — Bridge Division Standard

COMBINATION RAIL

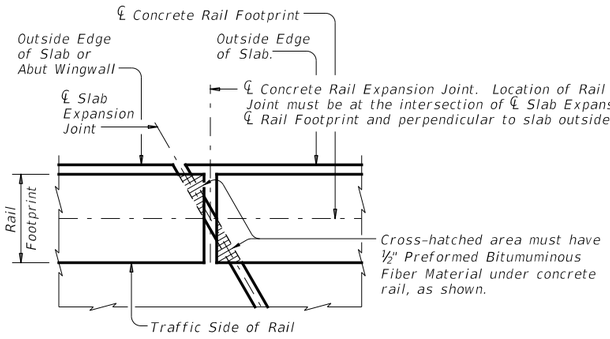
TYPE C223 (MOD)

FILE:	rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019		CONT	SECT	JOB	HIGHWAY
REVISIONS		3212	05	013	FM 3351
Addition of post install option using epoxy anchors and adjust length to limits of approach slab		DIST	COUNTY		SHEET NO.
		SAT	COMAL		188

DATE: 8/25/2023 12:04:50 PM
FILE: $FILE$

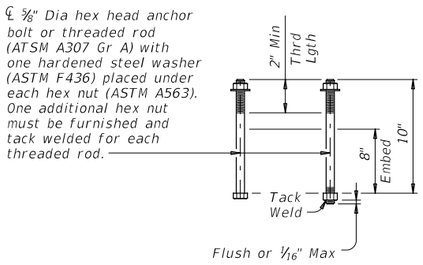
RAIL DATA FOR HORIZONTAL CURVES

	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.



CAST-IN-PLACE ANCHOR BOLT OPTIONS (16)

(5) Increase 2" for structures with overlay.

(16) See "Material Notes" for anchor bolt information.

(17) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

(18) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway/sidewalk surface without overlay.

CONSTRUCTION NOTES:

Face of rail, posts and parapet must be vertical transversely unless otherwise approved by the Engineer. HSS rail posts and opening end faces must be perpendicular to top of adjacent concrete parapet grade. Use epoxy mortar under HSS rail post base plates if gaps larger than 1/16" exist.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes".

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Provide ASTM A1085, A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over gavanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Optional cast-in-place anchor bolts must be ⅝" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows: Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

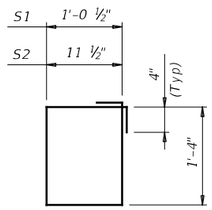
Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

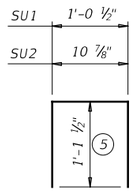
Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay:
370 plf total
358 plf (Conc)
12 plf (Steel)

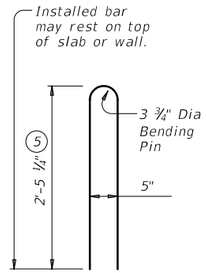
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



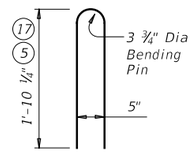
BARS S (#3)



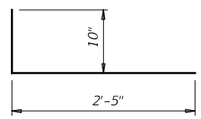
BARS SU (#3)



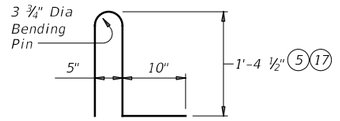
BARS V (#5) (18)



BARS WU (#5)

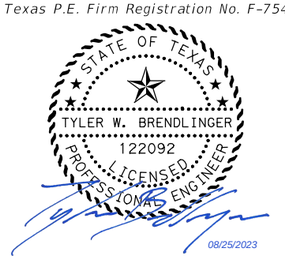


BARS L (#5)



BARS U (#5) (18)

Texas P.E. Firm Registration No. F-754



SHEET 5 OF 5

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223 (MOD)

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
Addition of post install option using epoxy anchors and adjust length to limits of approach slab	DIST	COUNTY		SHEET NO.
	SAT	COMAL		189

DATE: 8/25/2023 12:04:52 PM
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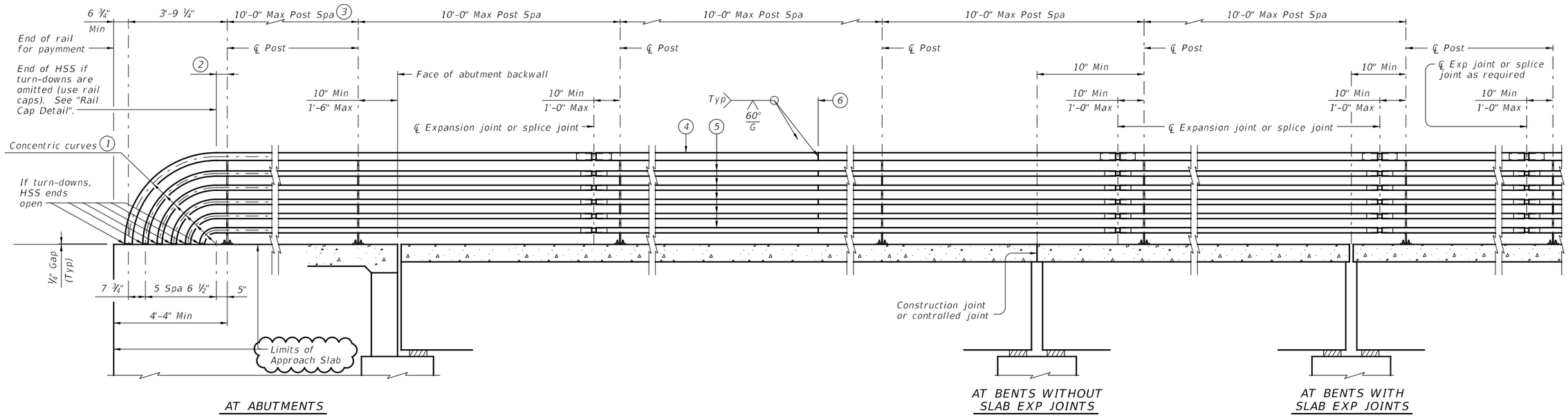


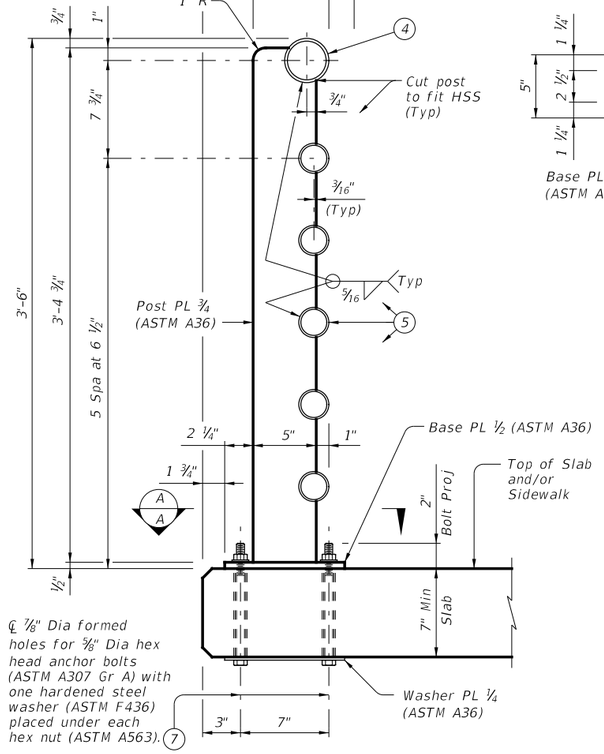
AT ABUTMENTS

AT BENTS WITHOUT SLAB EXP JOINTS

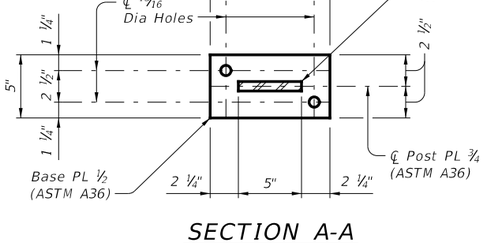
AT BENTS WITH SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

1. Portion of railing with turn-downs to be used or omitted as indicated on Bridge Layout.
2. 10" Min ~ 1'-6" Max if turn-downs are omitted.
3. Min of 2 posts required on approach slab.
4. HSS 3.500 x 0.216 (Rail Member)
5. HSS 2.375 x 0.154 (Rail Member)
6. One shop splice per panel is permitted (with minimum 85 percent penetration). The weld may be square groove or single vee groove. Grind smooth.
7. At Contractor's option, adhesive anchors may be used. Adhesive anchors must be ⅝" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 5" into slabs or culverts without curbs. See "Material Notes" for adhesive anchor requirements.
8. At Contractor's option, adhesive anchors may be used. Adhesive anchors must be ⅝" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 7" into wingwalls or culverts with curbs. See "Material Notes" for adhesive anchor requirements.

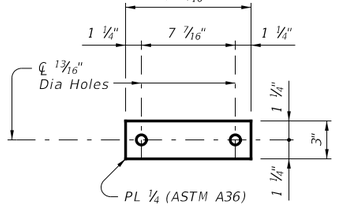


ON BRIDGE SLAB

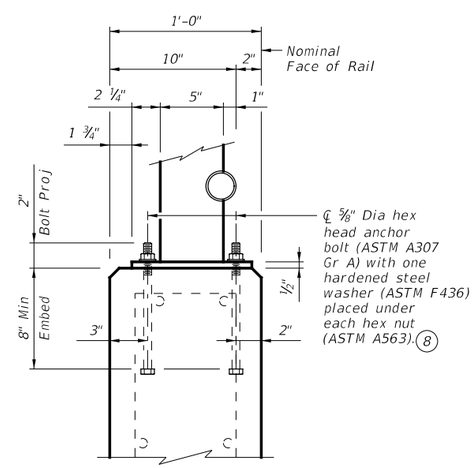


SECTION A-A

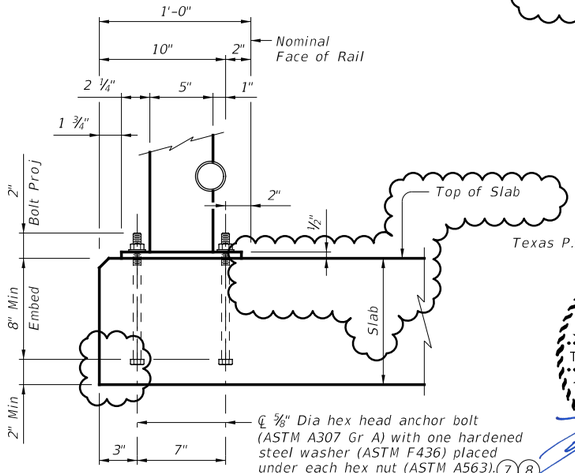
Showing base plate detail.



WASHER PLATE DETAIL



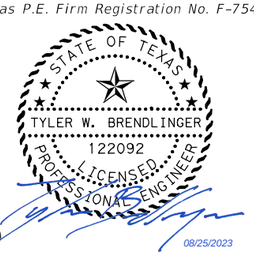
ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON APPROACH SLAB

SECTIONS THRU RAIL

Texas P.E. Firm Registration No. F-754



SHEET 1 OF 2

Texas Department of Transportation

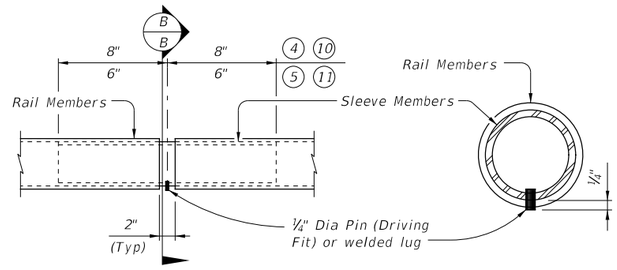
Bridge Division Standard

PEDESTRIAN RAIL

TYPE PR11(MOD)

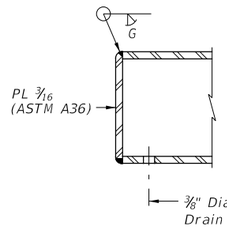
FILE: rlstd028-19.dgn	DN: TAR	CK: TBE	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
Revised for approach slab on wingwall	DIST	COUNTY		SHEET NO.
	SAT	COMAL		190

DATE: 8/25/2023 12:04:52 PM
FILE: $FILE$

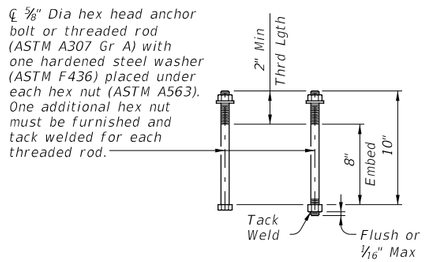


AT SPLICES OR EXP JTS — SECTION B-B

PIPE SPLICE DETAIL



RAIL CAP DETAIL



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

(4) HSS 3.500 x 0.216 (Rail Member)
(5) HSS 2.375 x 0.154 (Sleeve Member)
(10) HSS 2.875 x 0.203 (Sleeve Member)
(11) HSS 1.900 x 0.145 (Sleeve Member)

CONSTRUCTION NOTES:

Panel lengths of railing must be attached to a minimum of three posts except at abutment wingwalls.

At the Contractor's option anchor bolts may be an adhesive anchorage system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

Face of rail and posts must be vertical transversely unless otherwise approved. Posts must be perpendicular to adjacent roadway grade. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

For curved railing applications, fabricate the HSS rail to the radius when the radius is 600' or less. Submit shop drawings for approval when tubes are required to be fabricated to a radius. Shop drawings must be submitted to the Engineer for approval.

Round or chamfer all exposed edges of steel components 1/16" by grinding prior to galvanizing.

MATERIAL NOTES:

Provide ASTM A500 Gr B, A1085 or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A with one hardened steel washer (ASTM F436) placed under each hex nut or ASTM A307 Gr A threaded rods with one tack welded hex nut each and with one hex nut with one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436). Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into slab, wingwalls, or culvert curbs using a Type III, Class C, D, E, or F anchor adhesive. Anchor adhesive chosen must be able to achieve a nominal bond strength in tension, Na, of a single anchor of 10 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

For all rails, submit erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting for approval.

Average weight of railing is 30 plf.

Texas P.E. Firm Registration No. F-754

Texas Department of Transportation — Bridge Division Standard

PEDESTRIAN RAIL

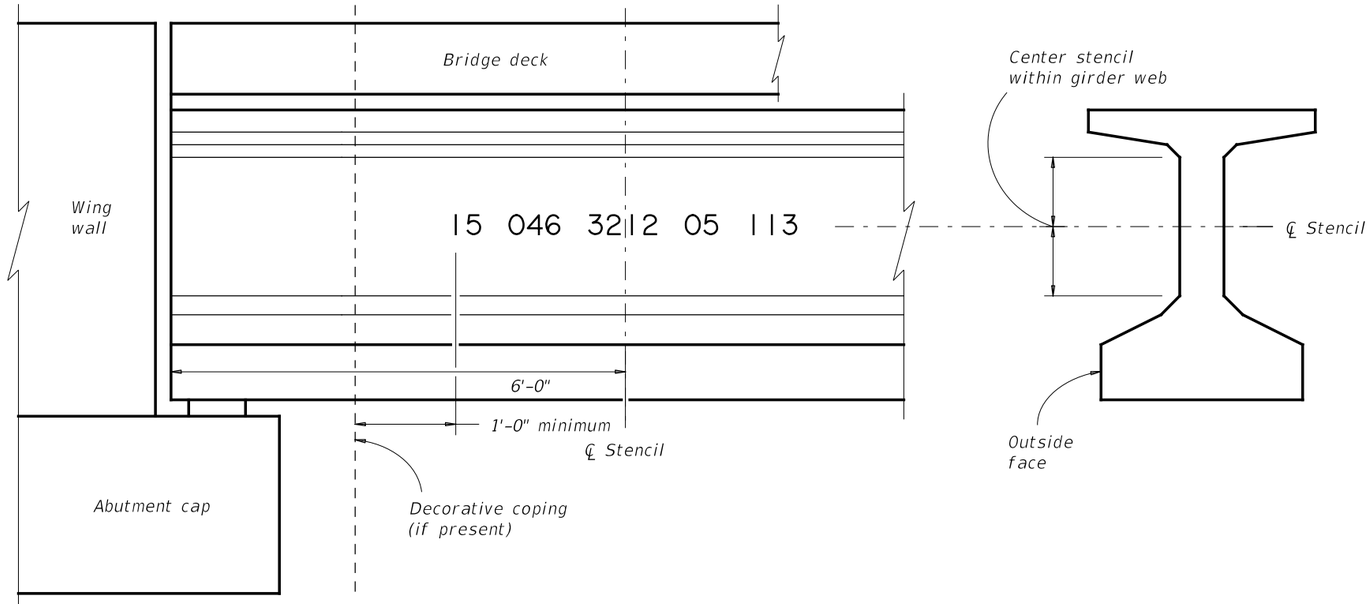
TYPE PR11(MOD)

FILE:	rlstd028-19.dgn	DN: TAR	CK: TBE	DN: JTR	CK: TAR
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		3212	05	013	FM 3351
		DIST	COUNTY		SHEET NO.
		SAT	COMAL		191

15 046 3212 05 113

San Antonio District designation	County designation	Control number	Section nunber	Structure number

PAINTED STRUCTURE NUMBER DETAIL



TYPICAL BRIDGE CORNER (ELEVATION)

SAN ANTONIO DISTRICT COUNTY DESIGNATIONS

Atascosa 007
Bandera 010
Bexar 015
Comal 046
Frio 083
Guadalupe 095
Kendall 131
Kerr 133
McMullen 162
Medina 163
Uvalde 232
Wilson 247

GENERAL NOTES:
Apply stucture number in accordance with Special Specification for Stenciling Permanent Structure Numbers.

SAN ANTONIO DISTRICT STANDARD

Texas Department of Transportation
San Antonio District (Structural Design)
Prepared by and for the use of TxDOT

BRIDGE NBI NUMBER STENCIL

DN: BCL	CK: XXX	FILENAME: 000000000 SA District Stencil.dgn		
DW: SRF	CK: XXX	ORIGINAL DRAWING DATE: August 2019		
DIST	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		COUNTY
SAT	6			COMAL
CONTROL	SECTION	JOB	SHEET NO.	ROUTE
3212	05	013	192	FM 3351

REVISIONS:

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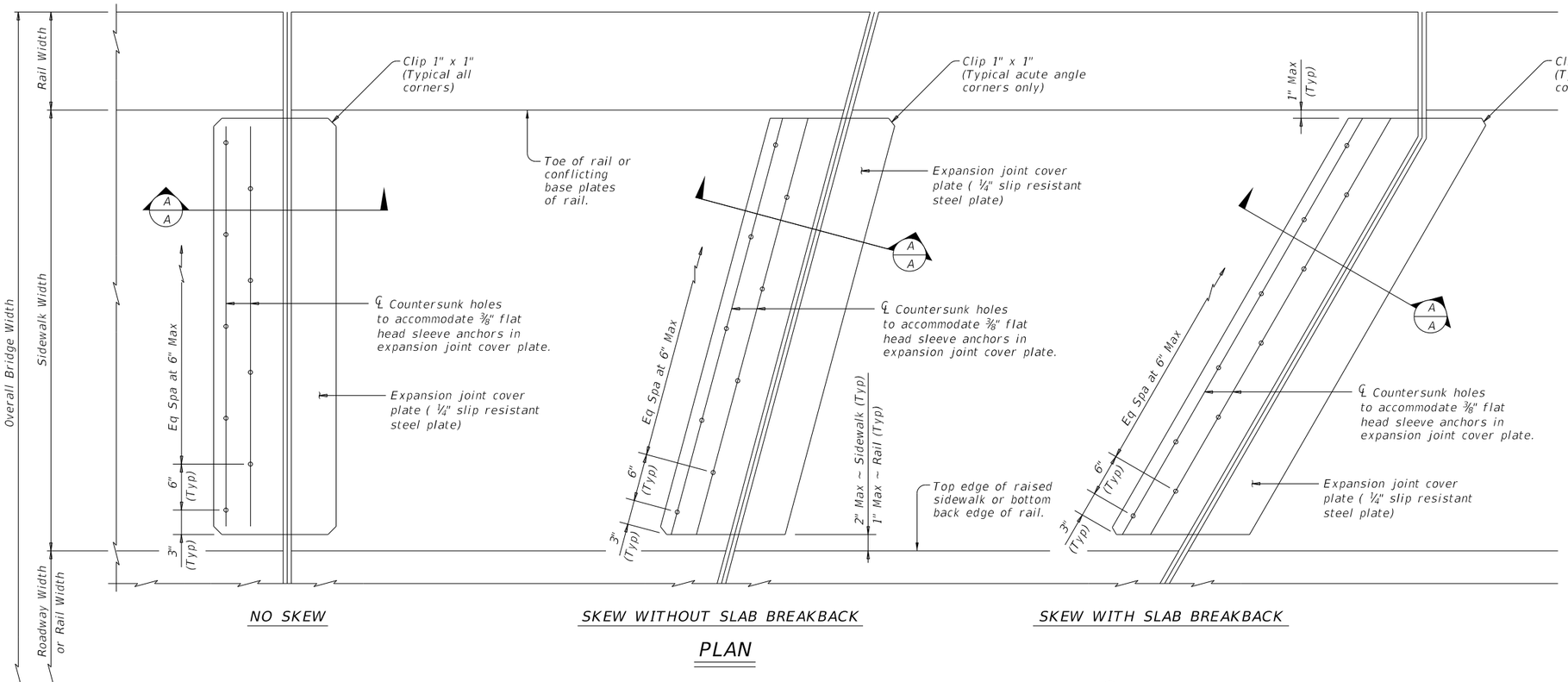
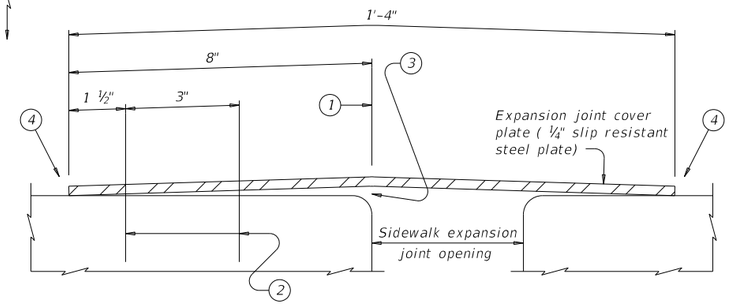
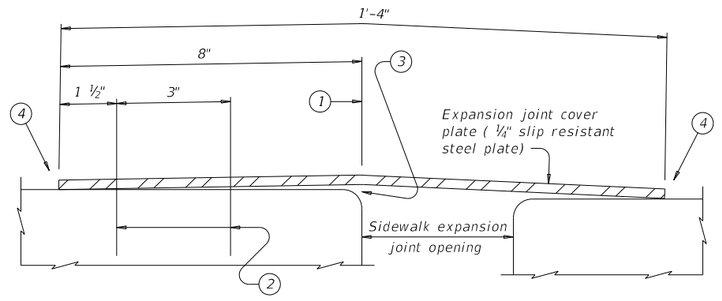


NO SKEW | SKEW WITHOUT SLAB BREAKBACK | SKEW WITH SLAB BREAKBACK

PLAN



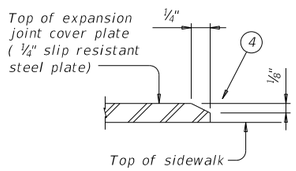
SHOWING LEVEL EXP JOINT



SHOWING UNLEVEL EXP JOINT
(Install sleeve anchors on high side of expansion joint)

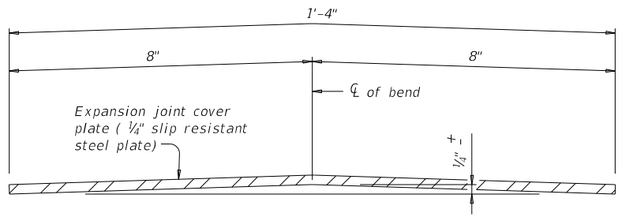
SECTION A-A

1. ℄ Expansion joint cover plate and edge of expansion joint.
2. ℄ ⅜" x 2 ½" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in ¼" Slip Resistant Steel Plate.
3. It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
4. Transverse edges must be in contact with sidewalk surface after installation.



EXP JOINT COVER PLATE BEVEL DETAIL

Bevel all plate edges as shown.



BENDING DIAGRAM OF EXP JOINT COVER PLATE

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide cover plates fabricated with a product from this list. No exceptions are permitted.

FABRICATION NOTES:

Shop drawings for the fabrication of Bridge Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.

Sidewalk expansion joint cover plates must be hot-dipped galvanized ¼" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and non-metallic coatings.

Minimum required yield strength of steel plate is 36 ksi.

Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Provide stainless steel flat head sleeve anchors meeting the requirements of ASTM F 593, Group I, Alloy 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

GENERAL NOTES:

Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint opening.

Details provided are applicable to concrete walkway surfaces only.

Payment for sidewalk expansion joint cover plates are by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures".

Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

Texas Department of Transportation

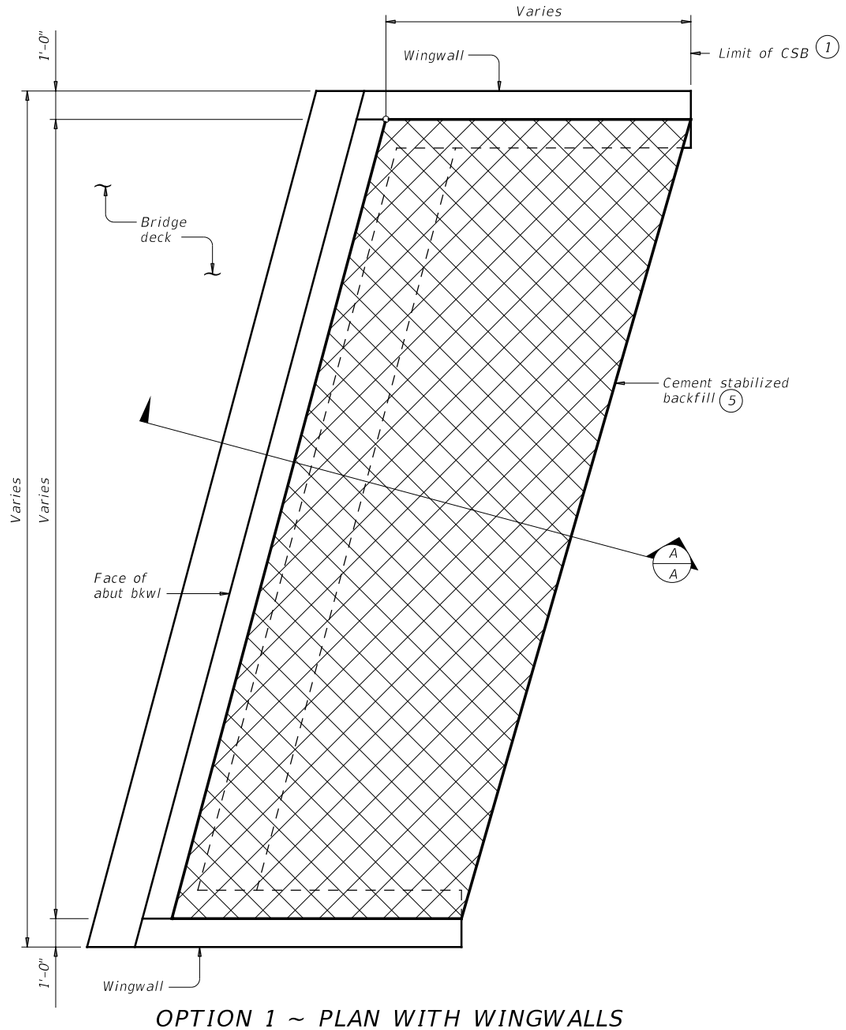
Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

BS-EJCP

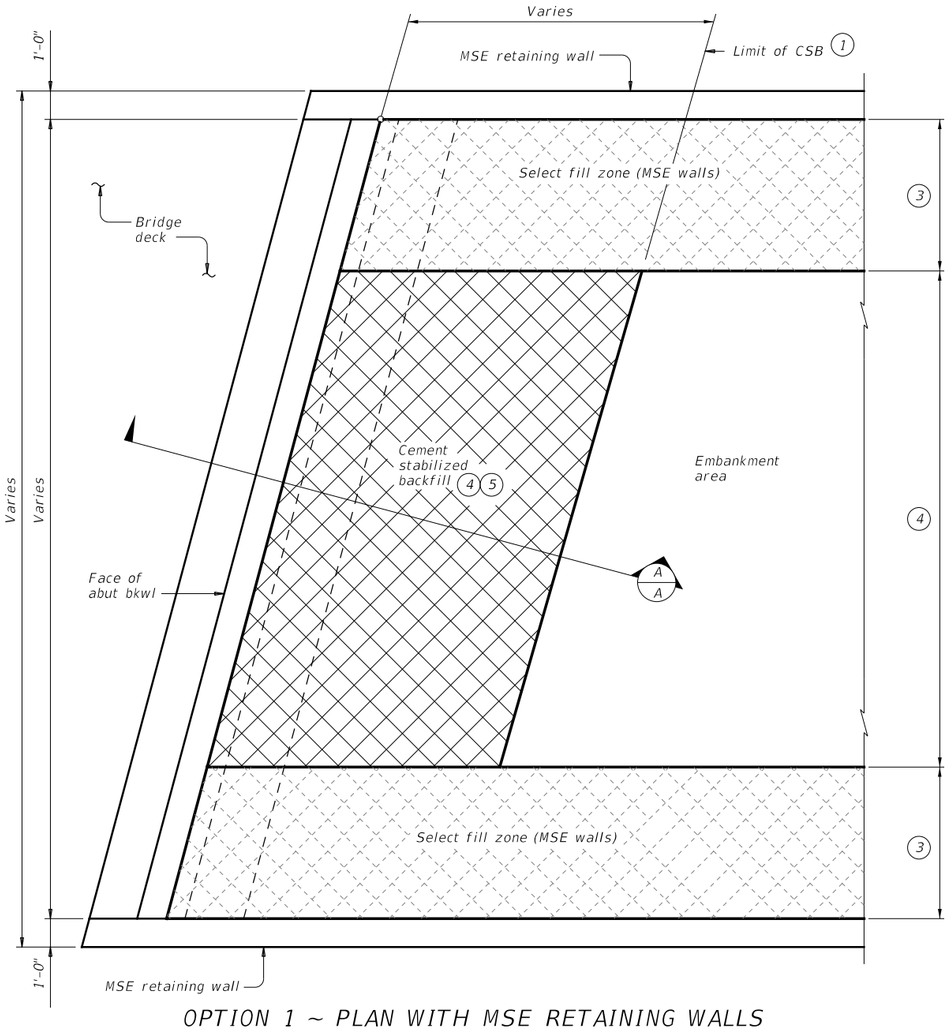
FILE: bsejste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
8-20: Closer tolerances on cover plate.	DIST	COUNTY		SHEET NO.
	SAT	COMAL		193

DATE: 11/3/2023 3:00:27 PM
FILE: $FILE$

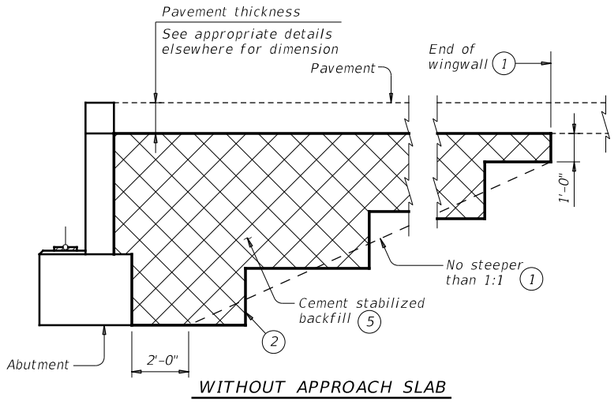


OPTION 1 ~ PLAN WITH WINGWALLS

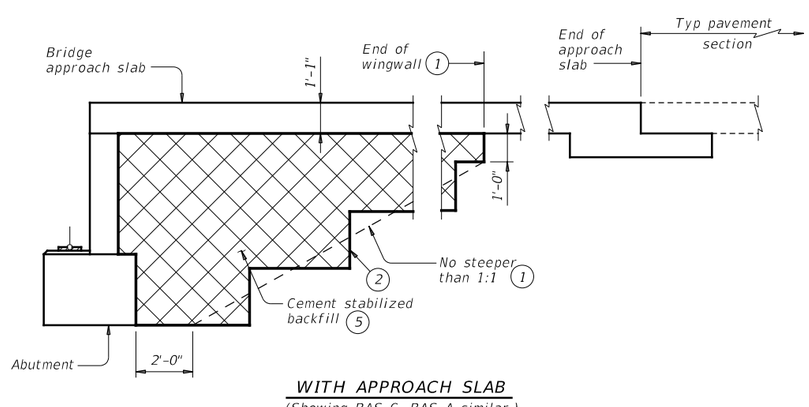
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

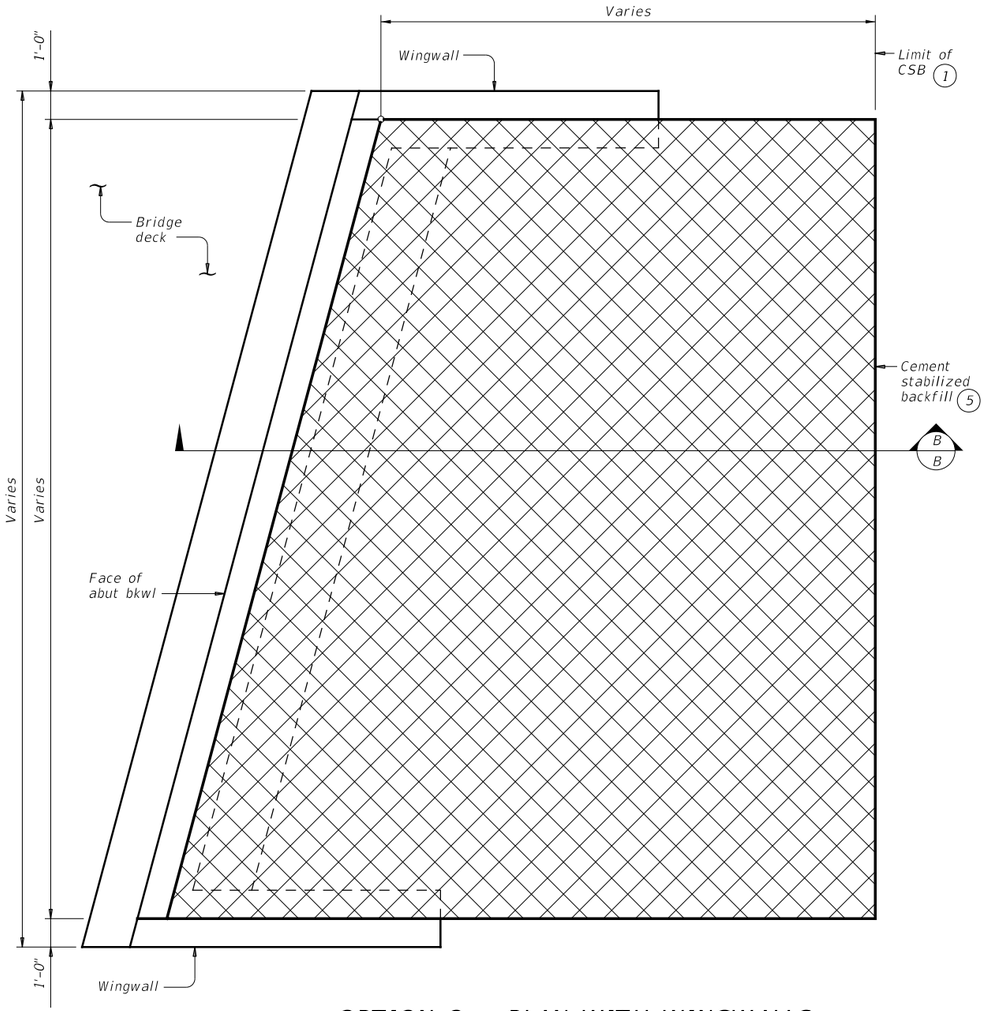
Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

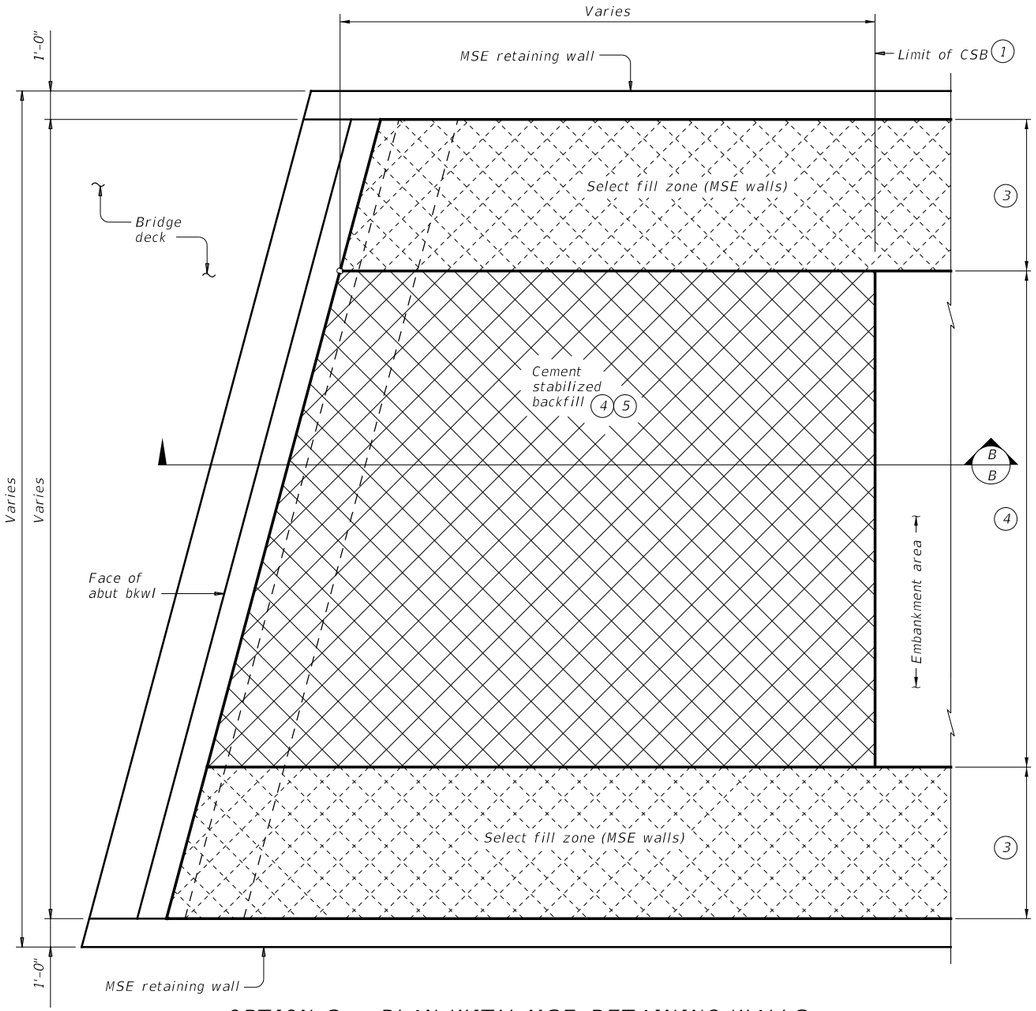
CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SAT	COMAL		194



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

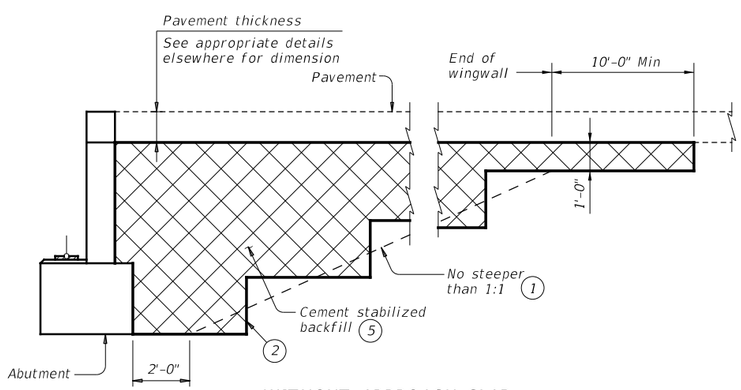
(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

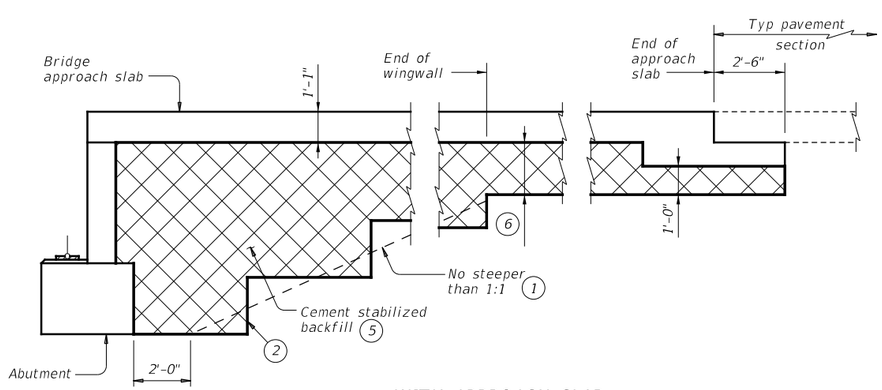
(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



WITHOUT APPROACH SLAB



WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SAT	COMAL		195

DATE: 11/3/2023 3:00:27 PM
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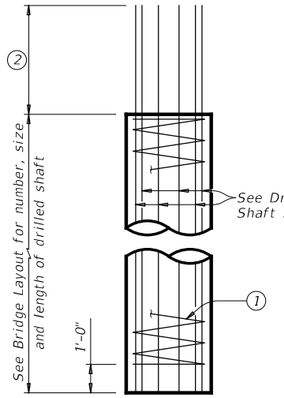
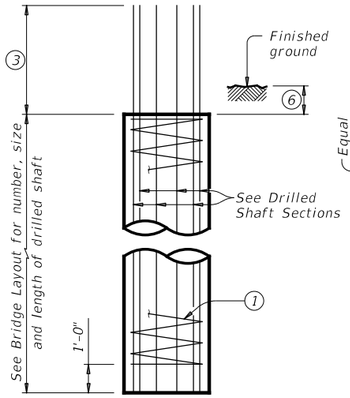
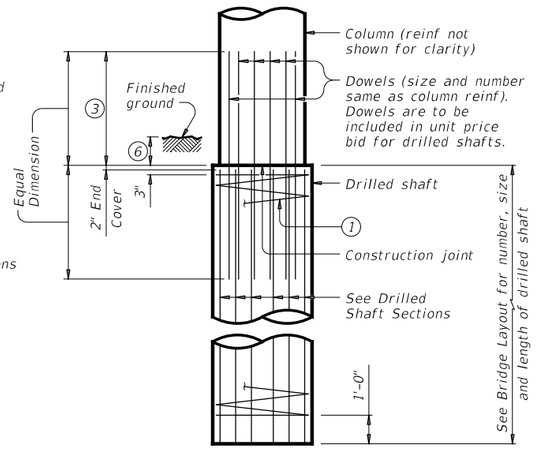
DATE: 8/25/2023 11:44:17 AM
FILE: $FILE$



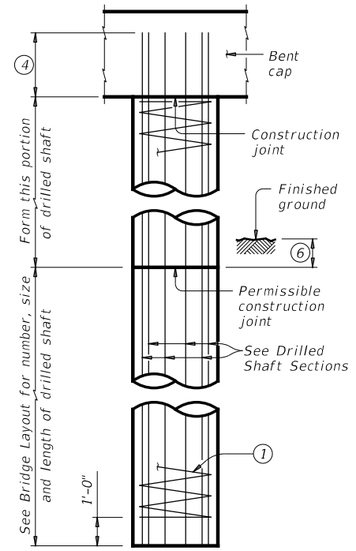
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



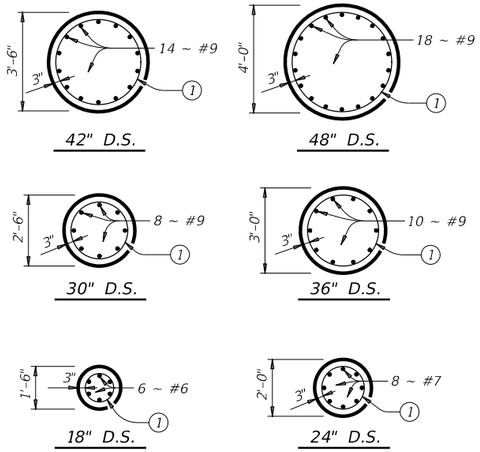
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

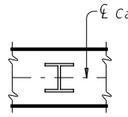


DRILLED SHAFT SECTIONS

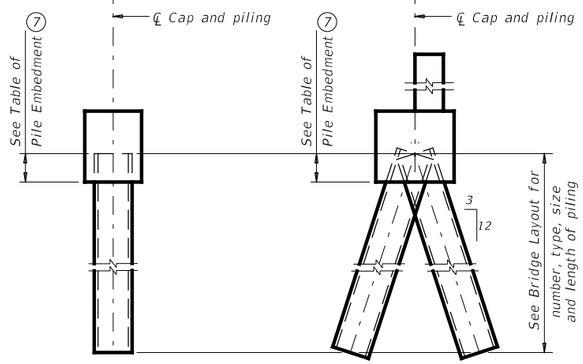
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

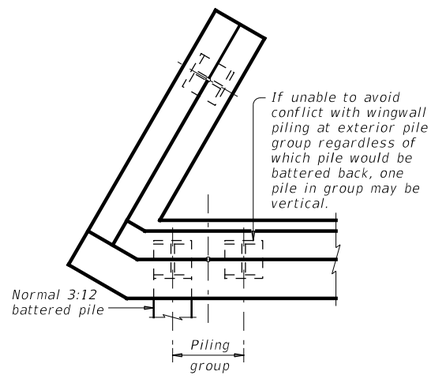


ORIENTATION OF STEEL H-PILING

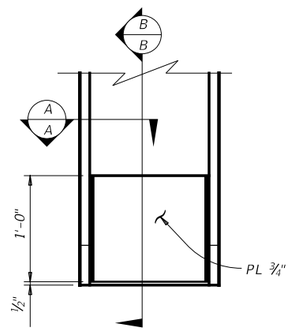


VERTICAL PILE BATTERED PILE

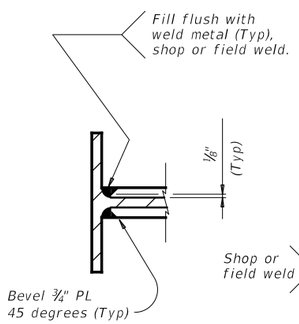
PILING DETAILS
(Concrete or steel H)



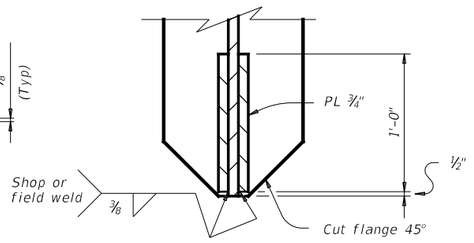
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



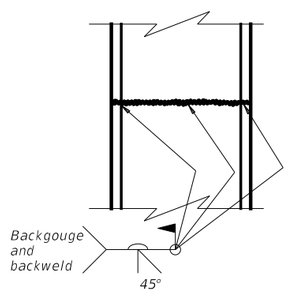
SECTION A-A

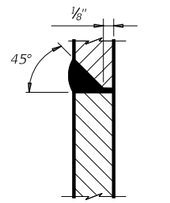


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SAT	COMAL		196

DATE: 8/25/2023 11:44:17 AM
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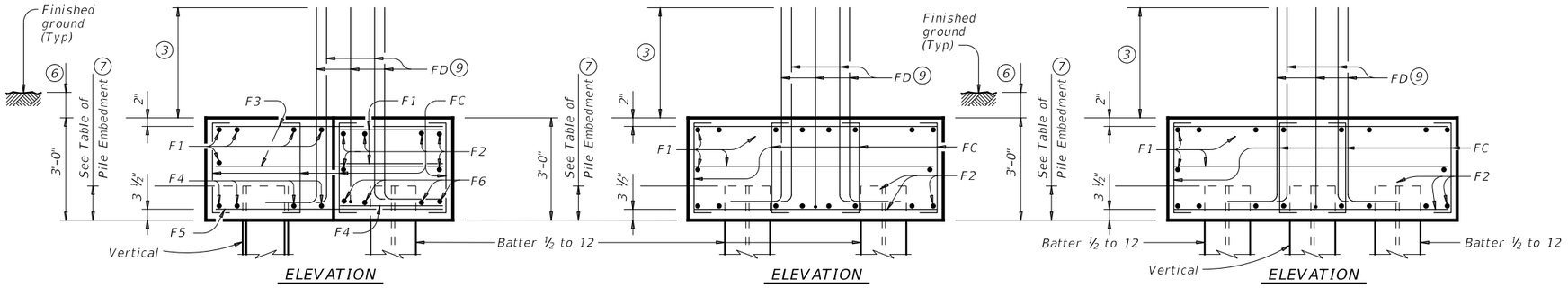
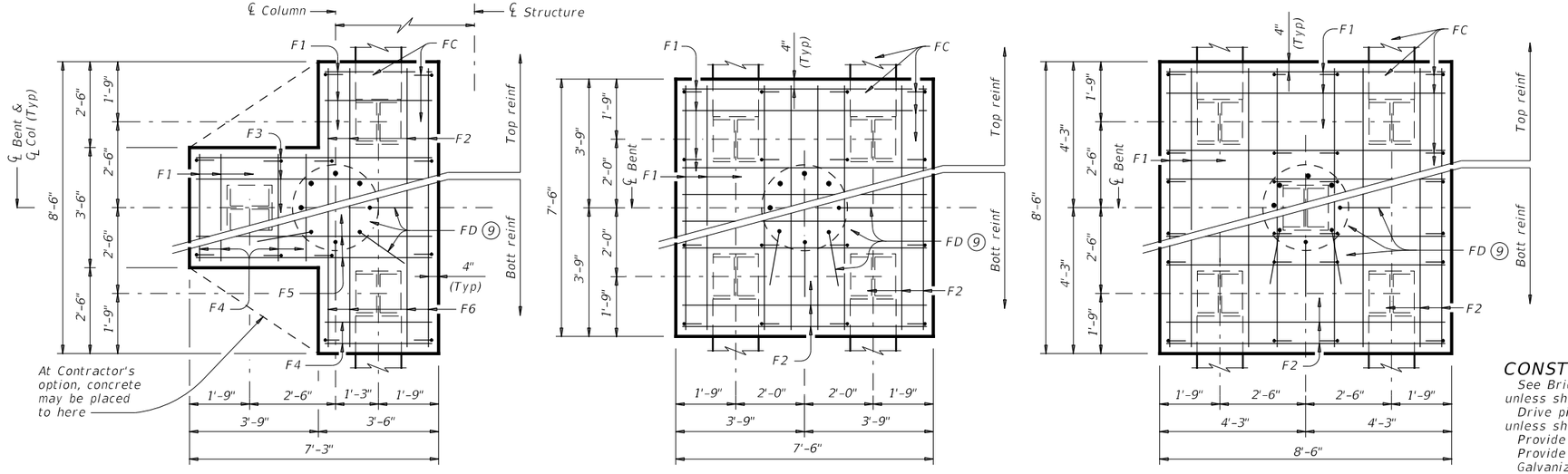




THREE PILE FOOTING (8)

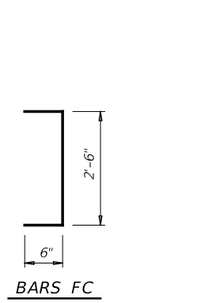
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

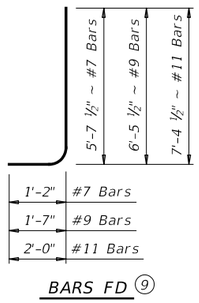
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SAT	COMAL		197

DATE: 7/26/2023 8:17:34 AM
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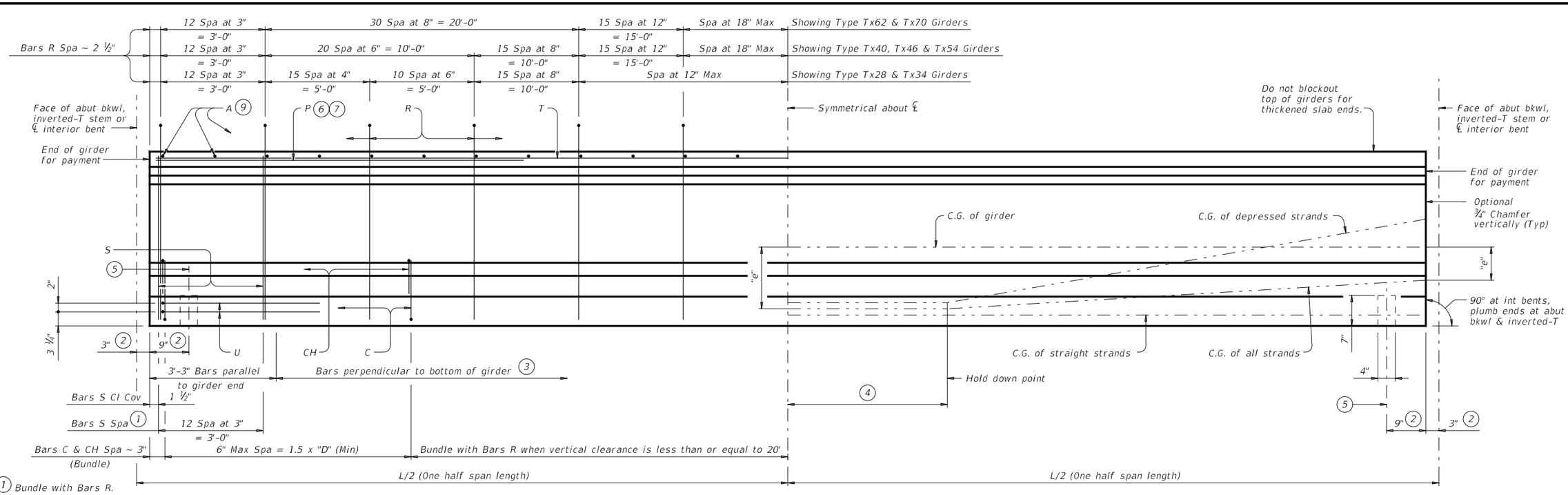


(1) Bundle with Bars R.

(2) Measured along ℄ Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.

(3) The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

(4) L/20, but not less than 5'-0" (-0,+2').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

GIRDER ELEVATION

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

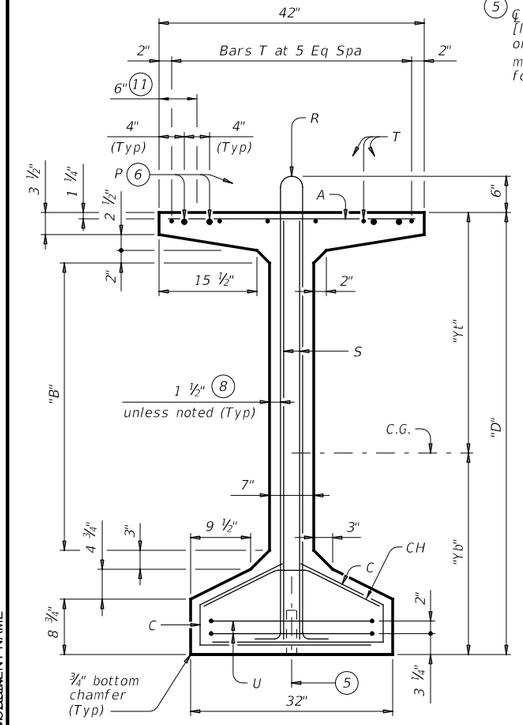
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

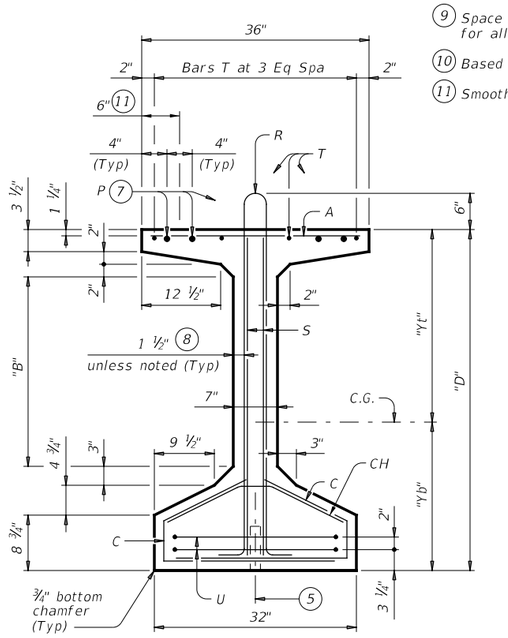
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

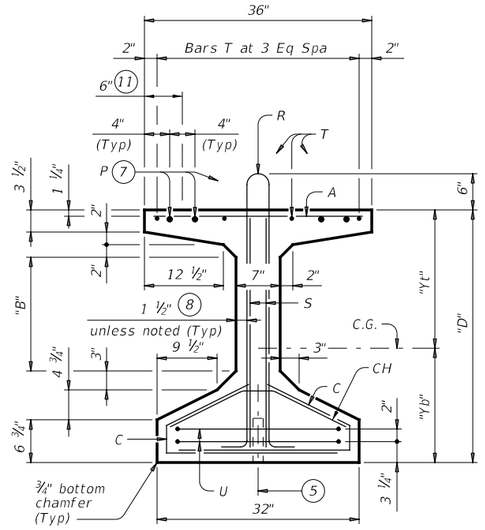
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	38.09	31.91	966	628,747	57,579	1,040

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.
When vertical clearance of the span is less than or equal to 20', provide additional Bars C and CH in every girder of that span.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: IG-IGD-23.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		198

DATE: 11/3/2023 7:05:00 PM
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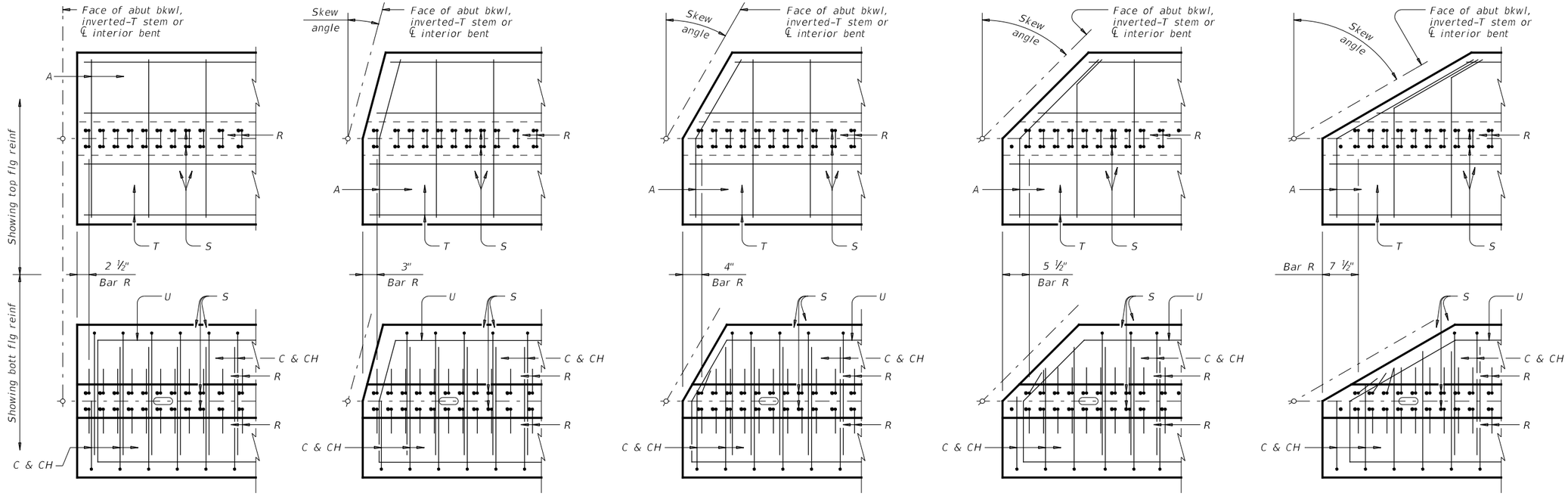
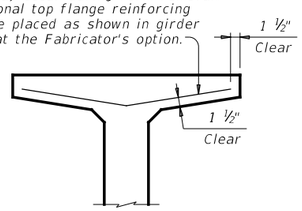
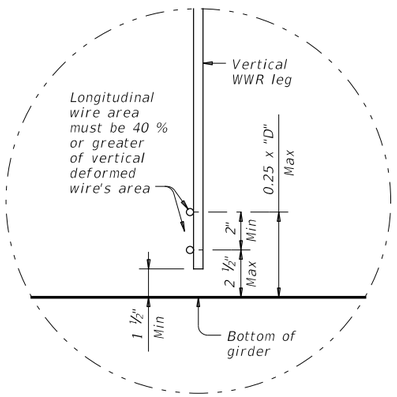


PLAN OF GIRDER ENDS (12)

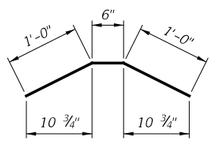
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



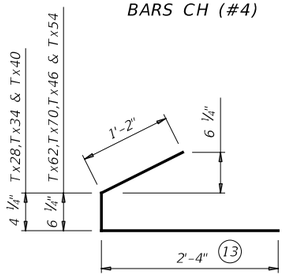
OPTIONAL TOP FLANGE REINFORCING DETAIL



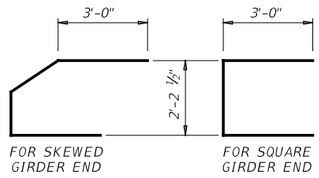
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



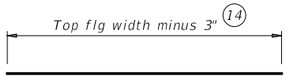
BARS CH (#4)



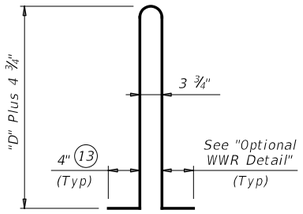
BARS C (#4)



BARS U (#5)

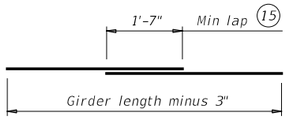


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

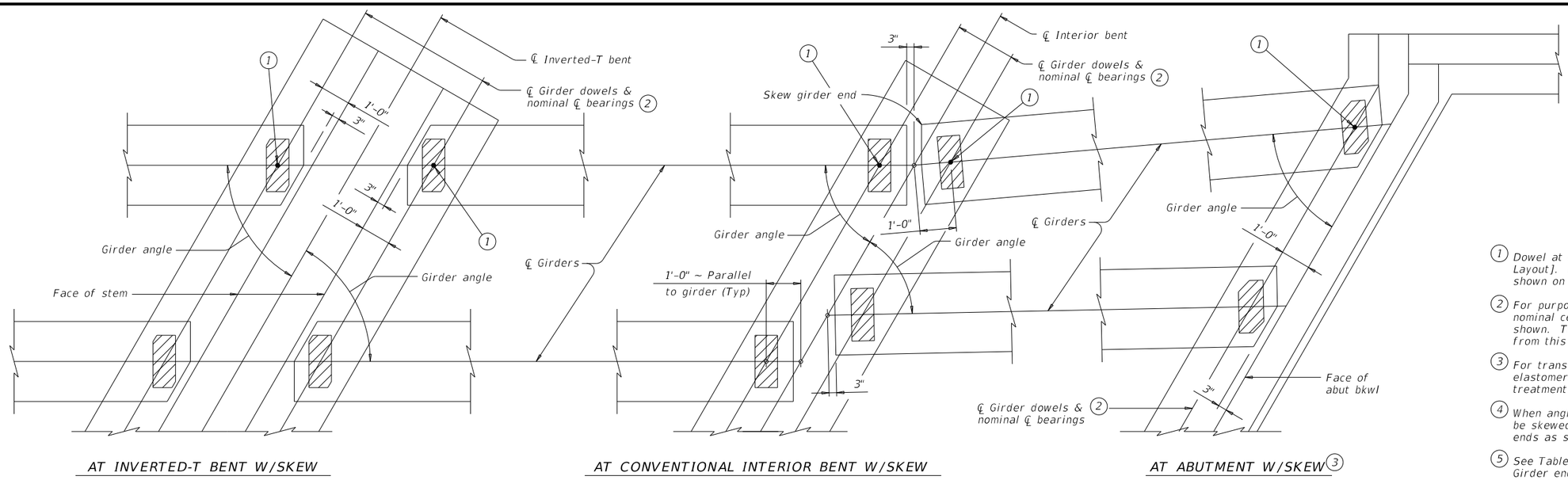
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: IG-IGD-23.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		199



AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

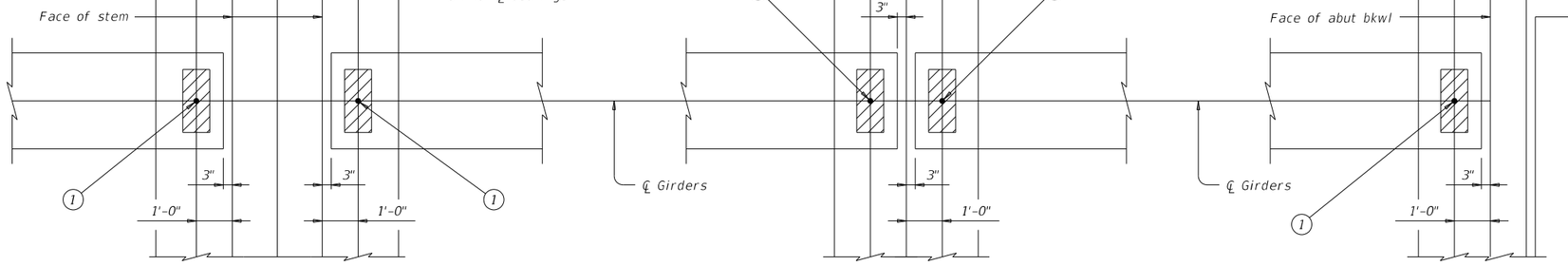
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.

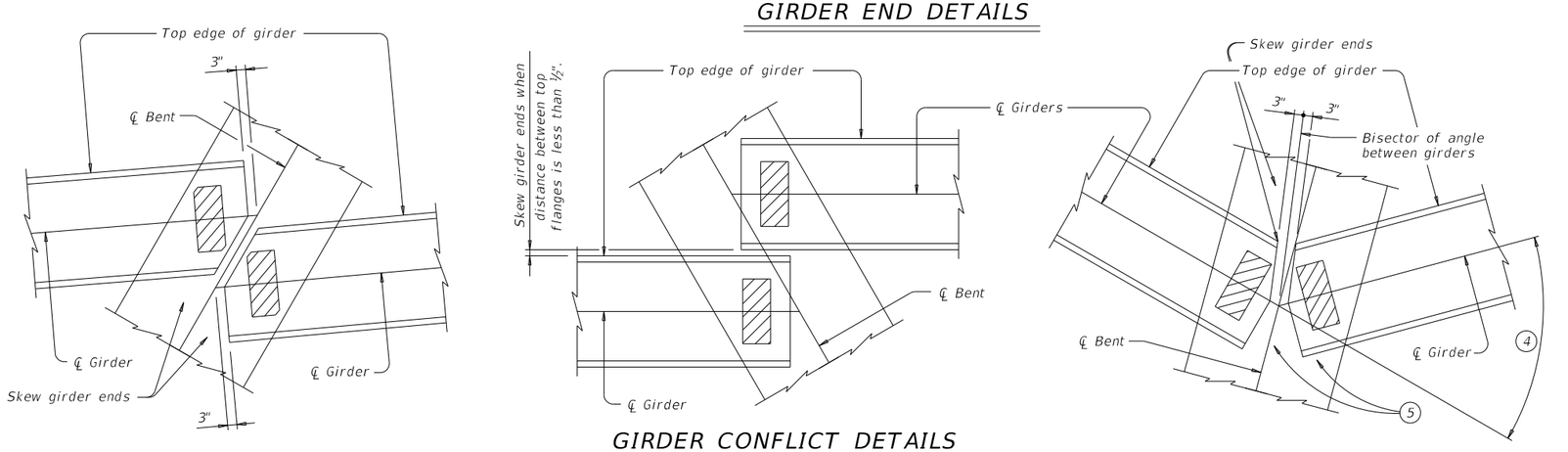


AT INVERTED-T BENT

AT CONVENTIONAL INTERIOR BENT

AT ABUTMENT (3)

GIRDER END DETAILS



GIRDER CONFLICT DETAILS

GENERAL NOTES:

These details accommodate skew angles up to 60°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
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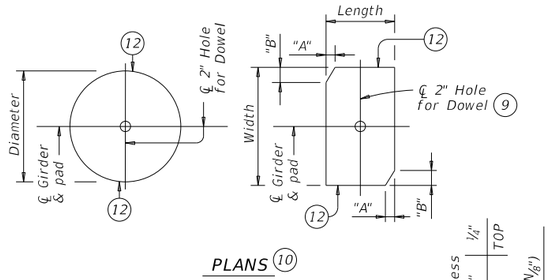
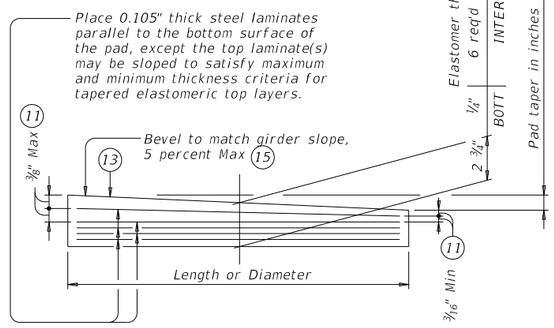


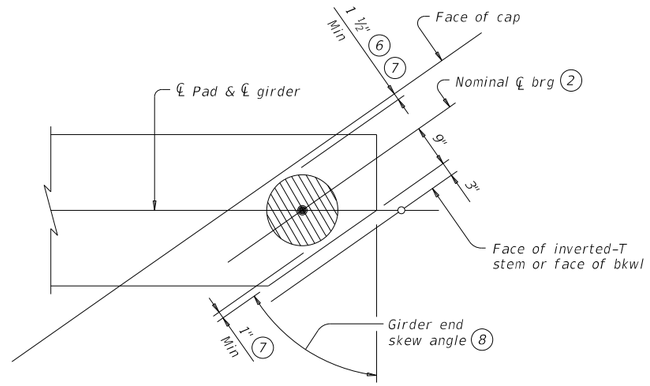
PLANS (10)



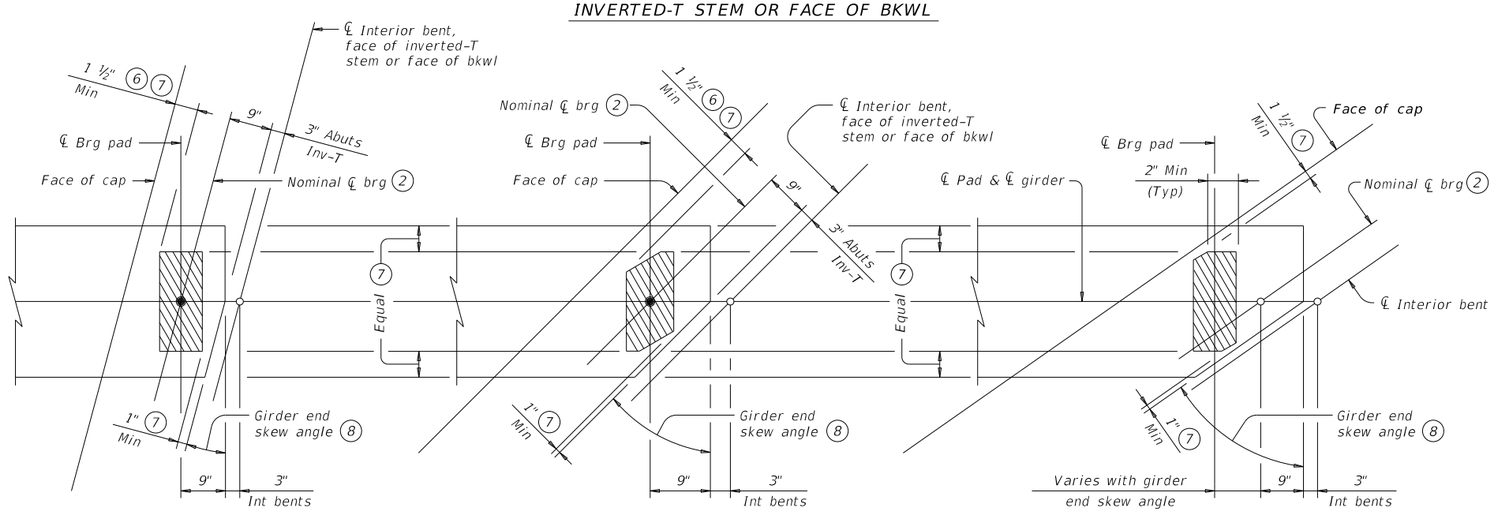
ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL



SKEWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

Girder Type	Abutments: Face of Bkwl to Face of Cap	Int Bents: Overall Cap Width	Inv-T Bents: Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

(11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(12) Locate Permanent Mark here.

(13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

(14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.

(15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.

(16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		201

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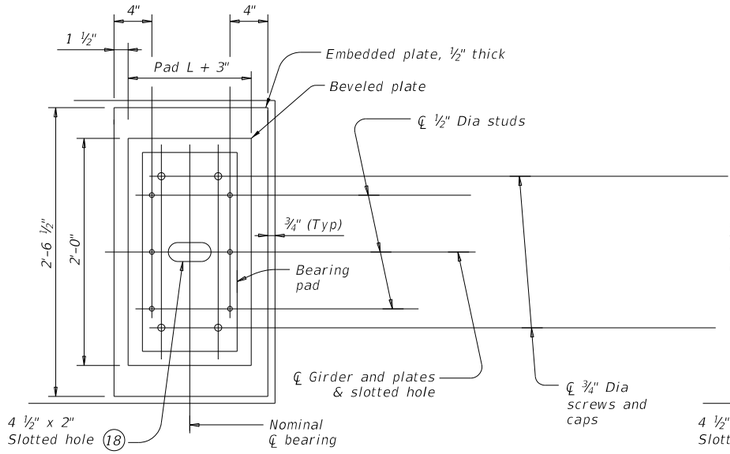
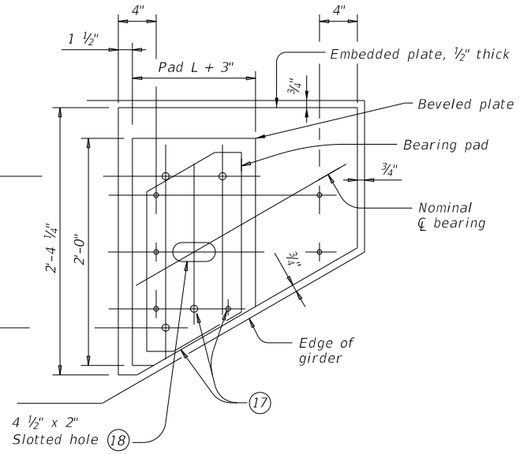
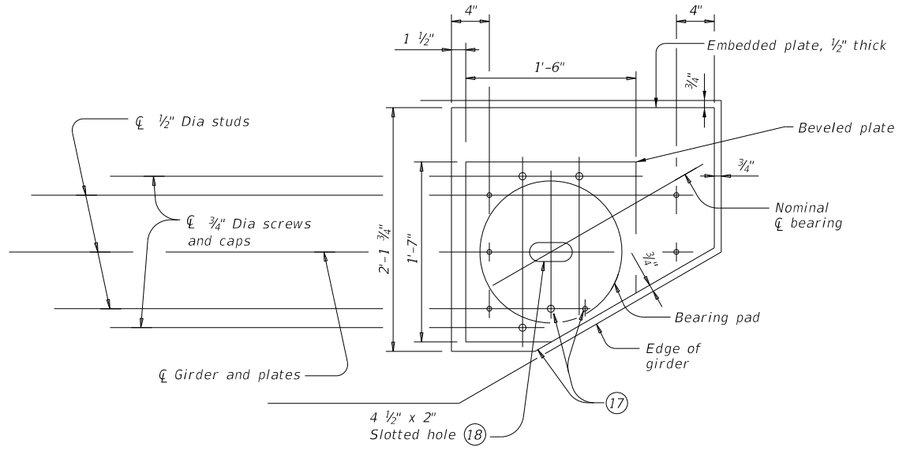


NORMAL GIRDER END
RECTANGULAR BEARING PAD

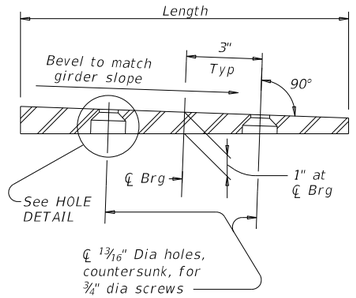


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

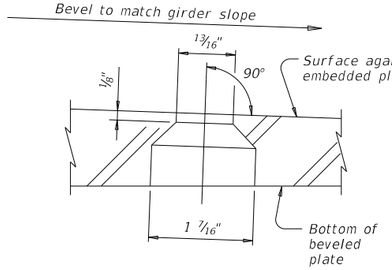


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS

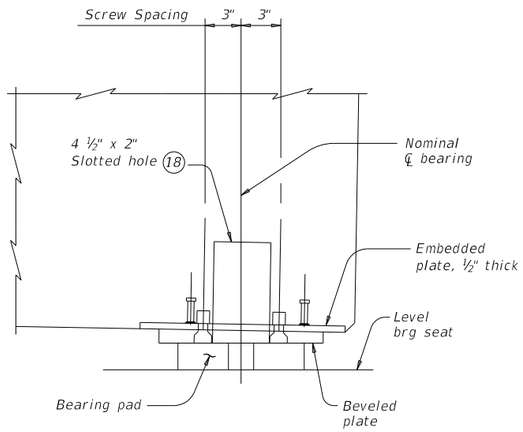


SECTION

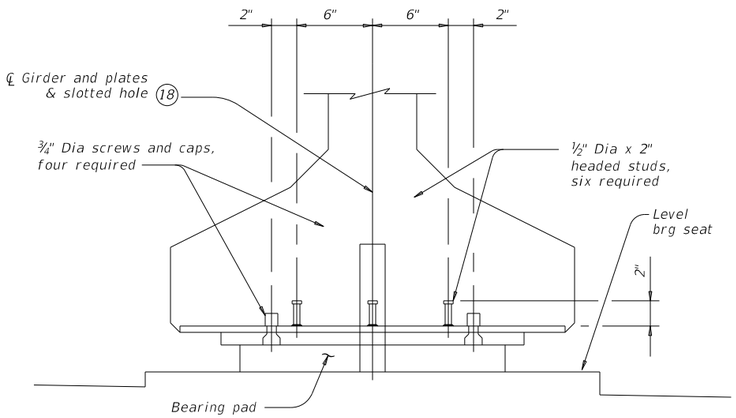


HOLE DETAIL

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

(17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.

(18) Slotted hole is required at doweled girder end locations.

SOLE PLATE NOTES:

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1⁄16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1⁄16"+/-, except variation from a plane parallel to the theoretical top surface can not exceed 1⁄16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

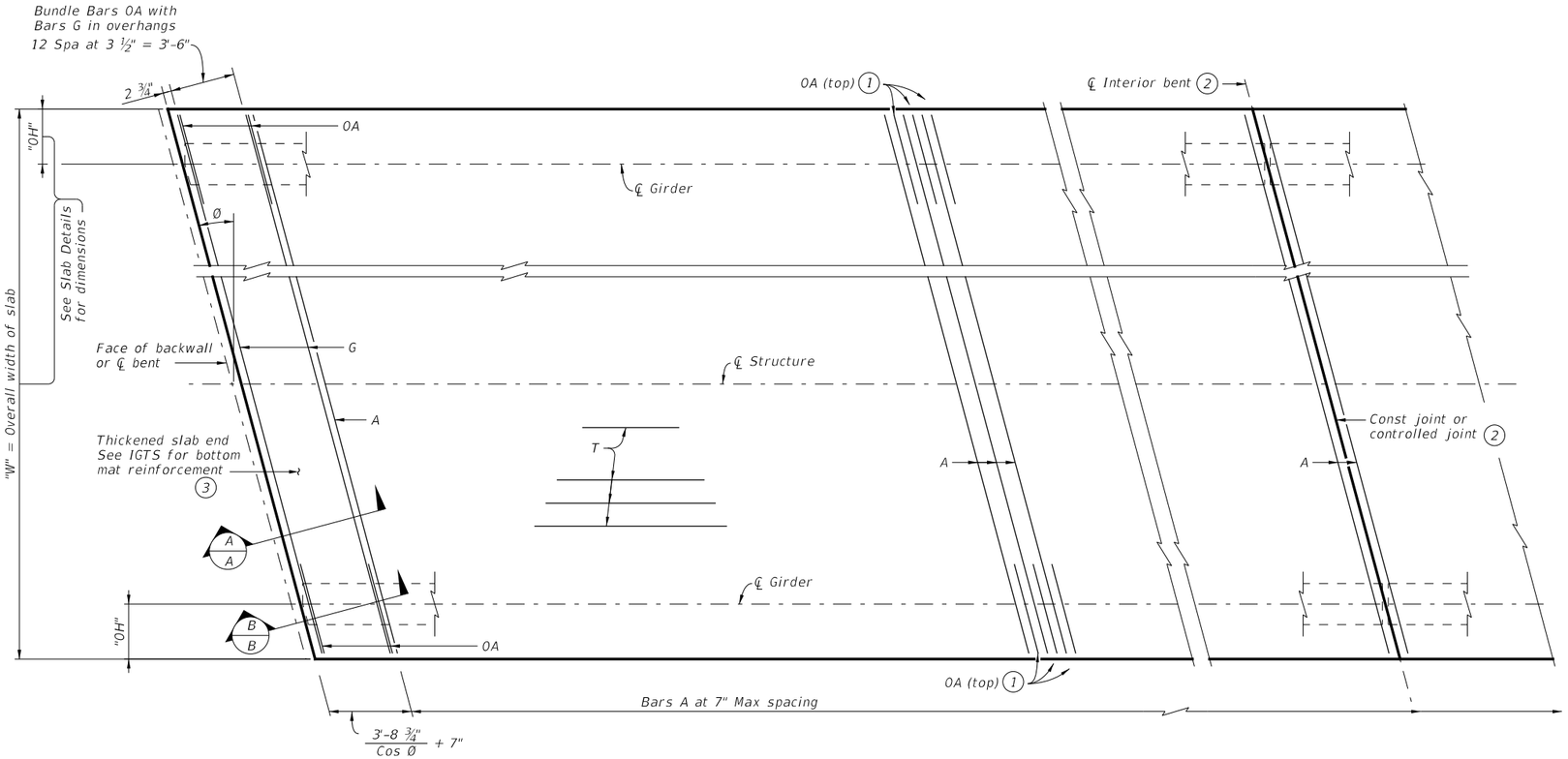
HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

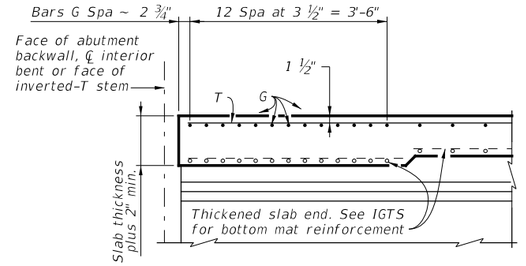
ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		202

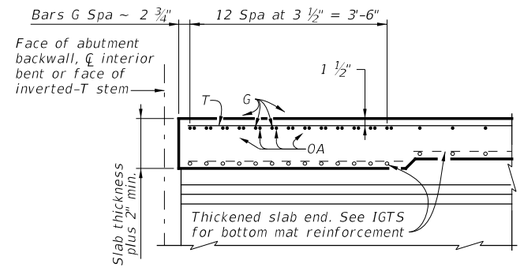


AT THICKENED SLAB END



SECTION A-A

Showing Thickened Slab End with PCP Option 1. Option 2 similar.



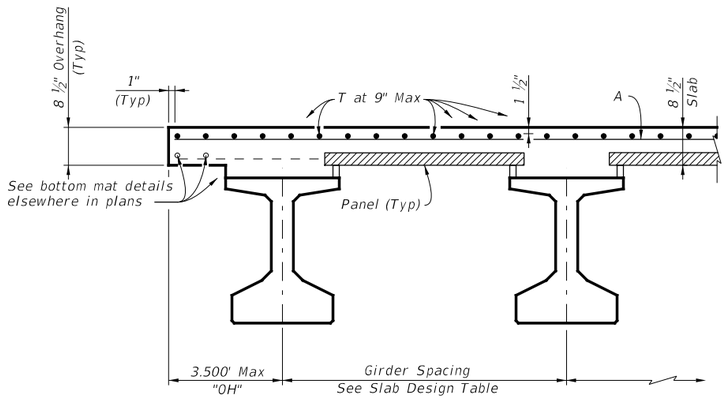
SECTION B-B

Showing Thickened Slab End with PCP Option 1. Option 2 similar.

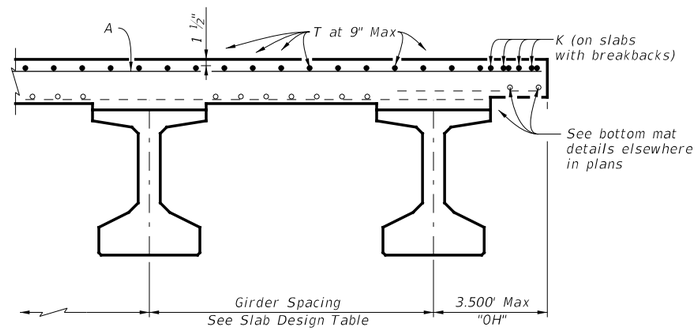
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.

AT SLAB CONTINUOUS OVER INTERIOR BENTS



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

1. Place Bars 0A midway between Bars A at overhang.
2. Bars are continuous through joint.
3. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT

PRESTRESSED CONC I-GIRDER SPANS

IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Updated to latest design specification.	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		203

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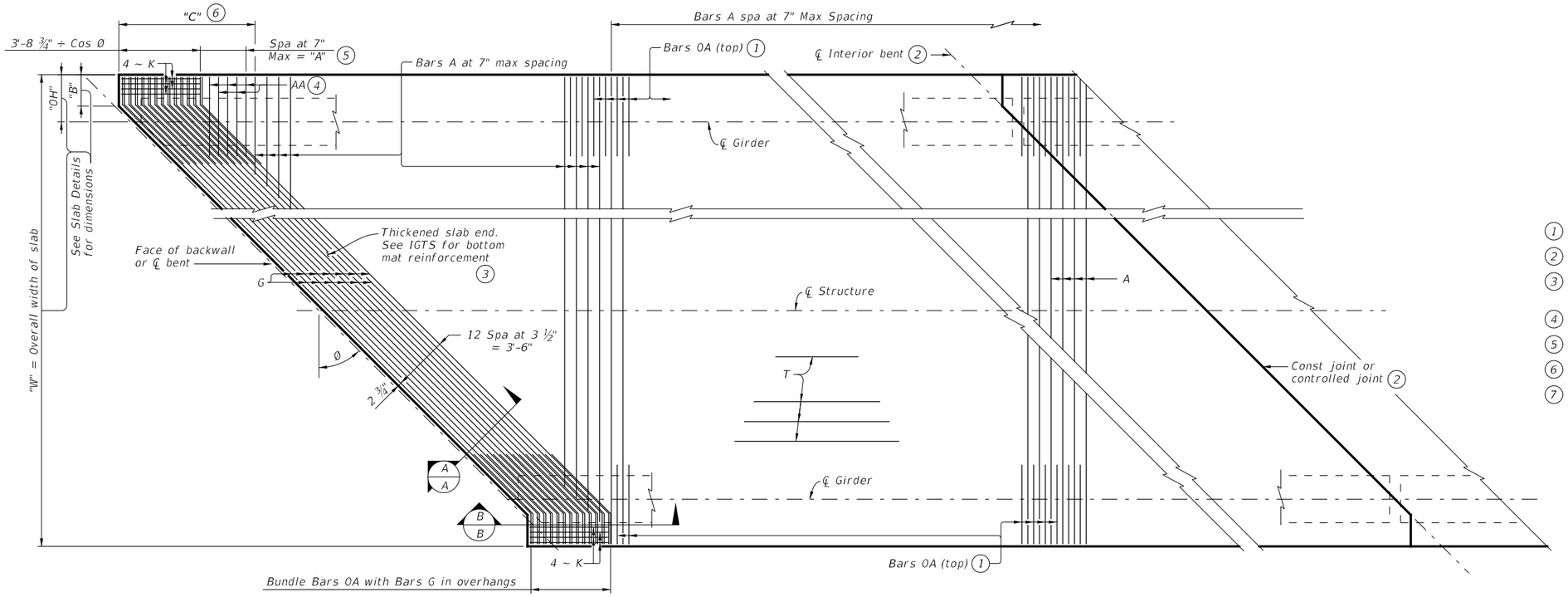


AT THICKENED SLAB END

PLAN FOR SLABS WITH BREAKBACKS

Showing top mat reinforcement only.

AT SLAB CONTINUOUS OVER INTERIOR BENTS

BAR TABLE	
BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
0A	#5
T	#5

(1) Place Bars 0A midway between Bars A at overhang.

(2) Bars are continuous through joint.

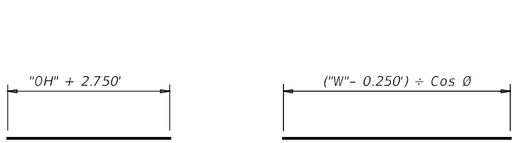
(3) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

(4) Tie Bars AA to bottom of Bars G in this location.

(5) A = ("0H" + 2.333' - "B") x Tan Ø

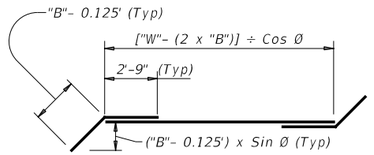
(6) $C = \frac{3.729'}{\cos Ø} + \text{"A"} + \text{Bar A spacing}$

(7) Only required on slabs with breakbacks.

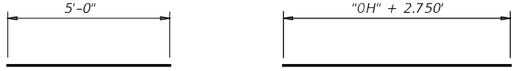


BARS AA (#5) (7)

BARS G (#5)
(For slabs without breakbacks)

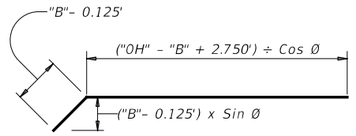


BARS G (#5)
(For slabs with breakbacks)



BARS K (#5) (7)

BARS OA (#5)



BARS OA (#5)
(For slabs with breakbacks)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

These details are restricted to Prestressed Concrete I-Girder spans with an 8 ½" slab and up to a 10'-0" girder spacing.

These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).

This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.

The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.

Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.

Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT
PRESTRESSED CONC I-GIRDER SPANS
IGFRP

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
10-19: Updated to latest design specification.	DIST	COUNTY		SHEET NO.
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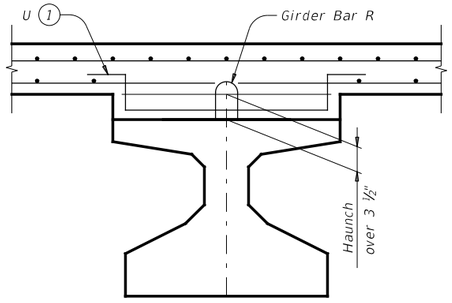
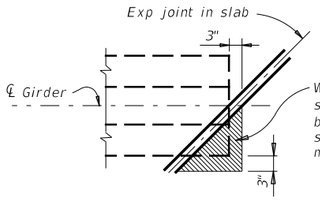
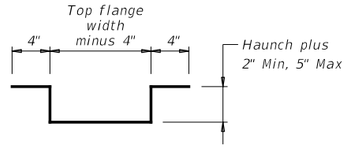


HAUNCH REINFORCING DETAIL

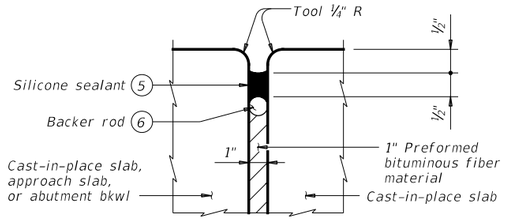


Where flanges project under slab of adjacent span, provide a minimum of ½" clearance between top of girder and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a filler.

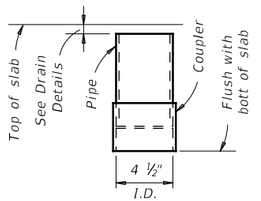
TREATMENT AT GIRDER END FOR SKEWED SPANS



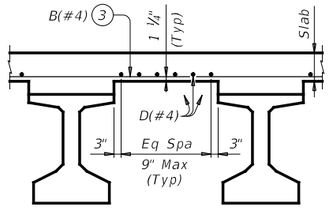
BARS U (#4)



TYPE A JOINT DETAIL (7)

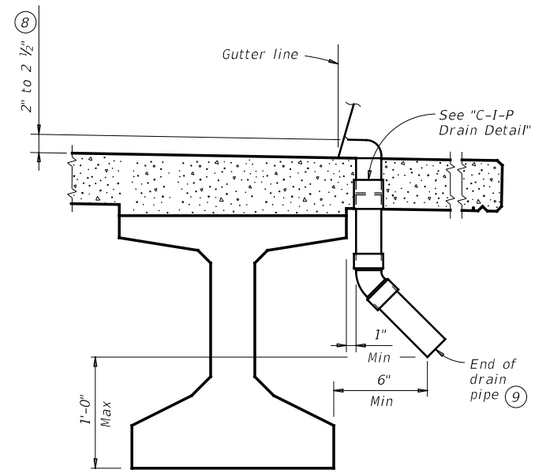


C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

(2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

(4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(5) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(6) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

(10) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

DECK FORMWORK NOTES:

Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
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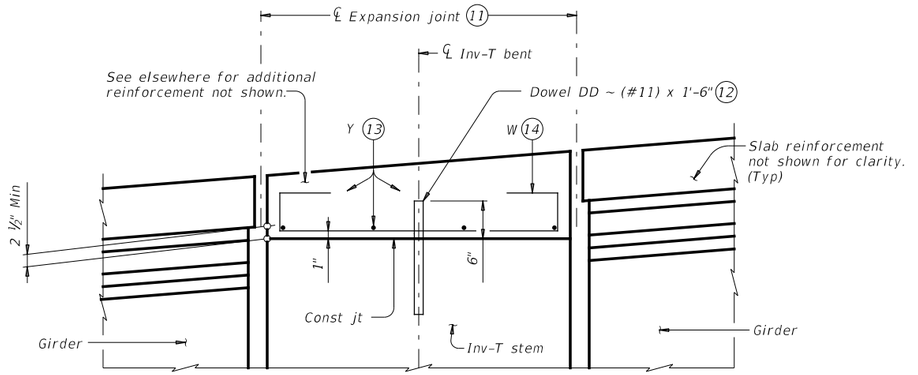
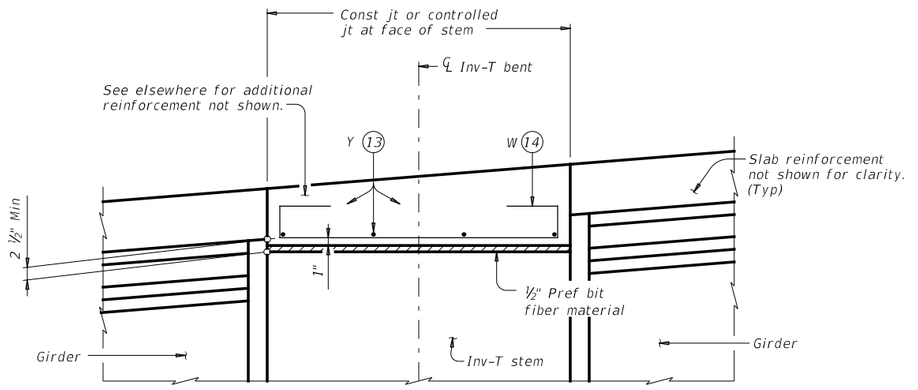
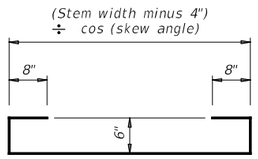


SHOWING EXPANSION JOINTS

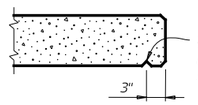


SHOWING CONST JTS OR CONTROLLED JTS

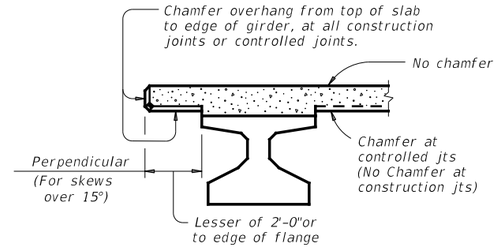
REINFORCEMENT OVER INV-T BENTS



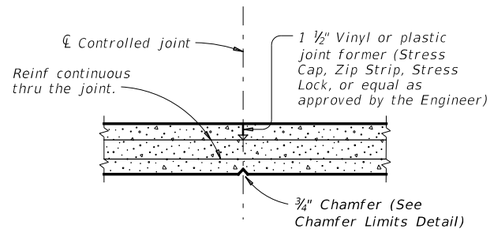
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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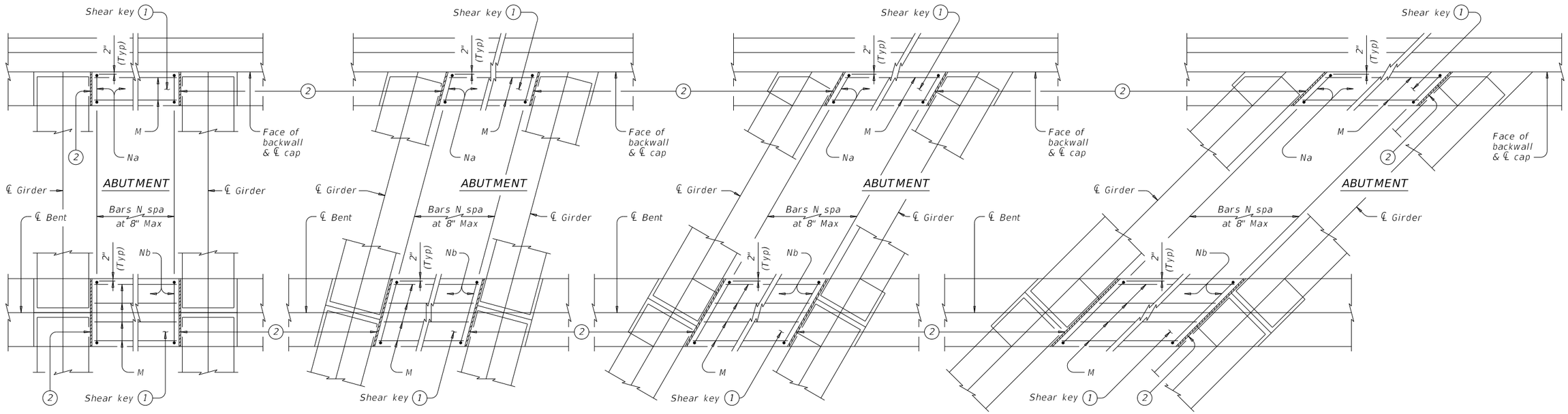


PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 30° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 45° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

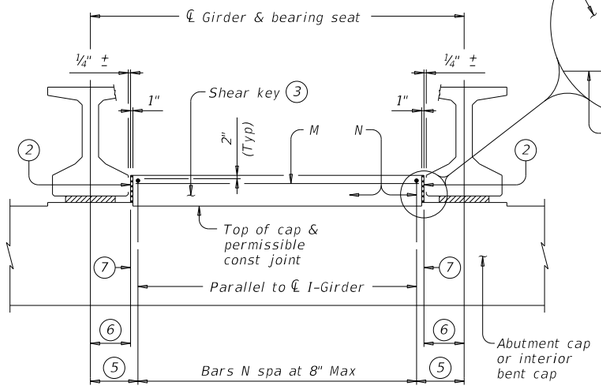
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

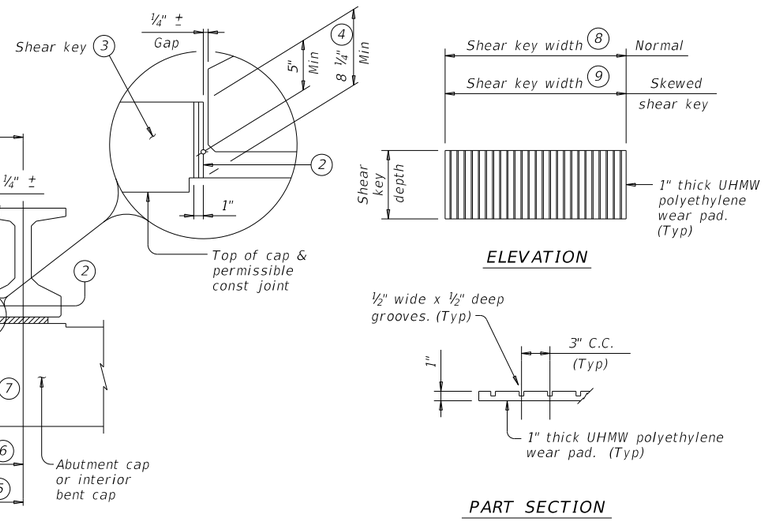
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

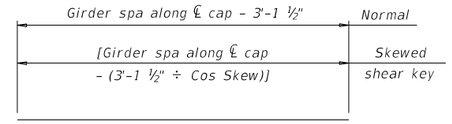


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

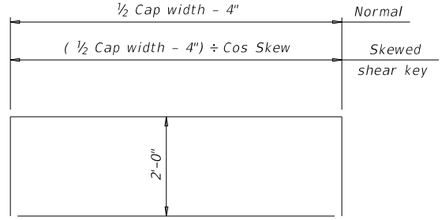
Showing shear key with girder Type Tx46. Other I-Girder types similar.



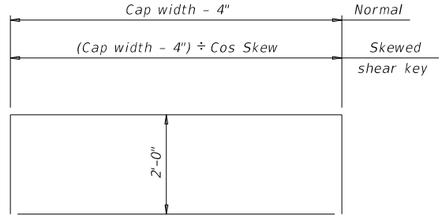
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

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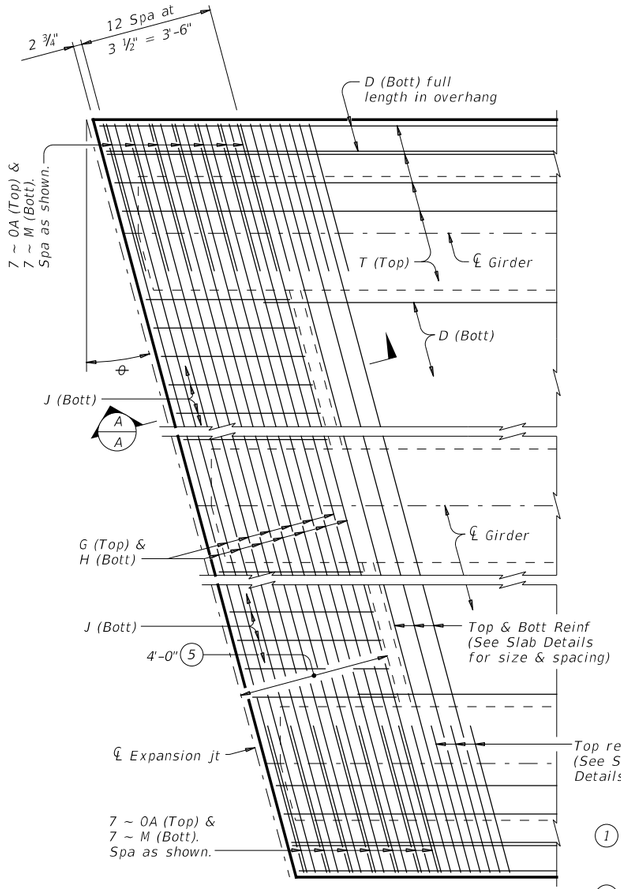
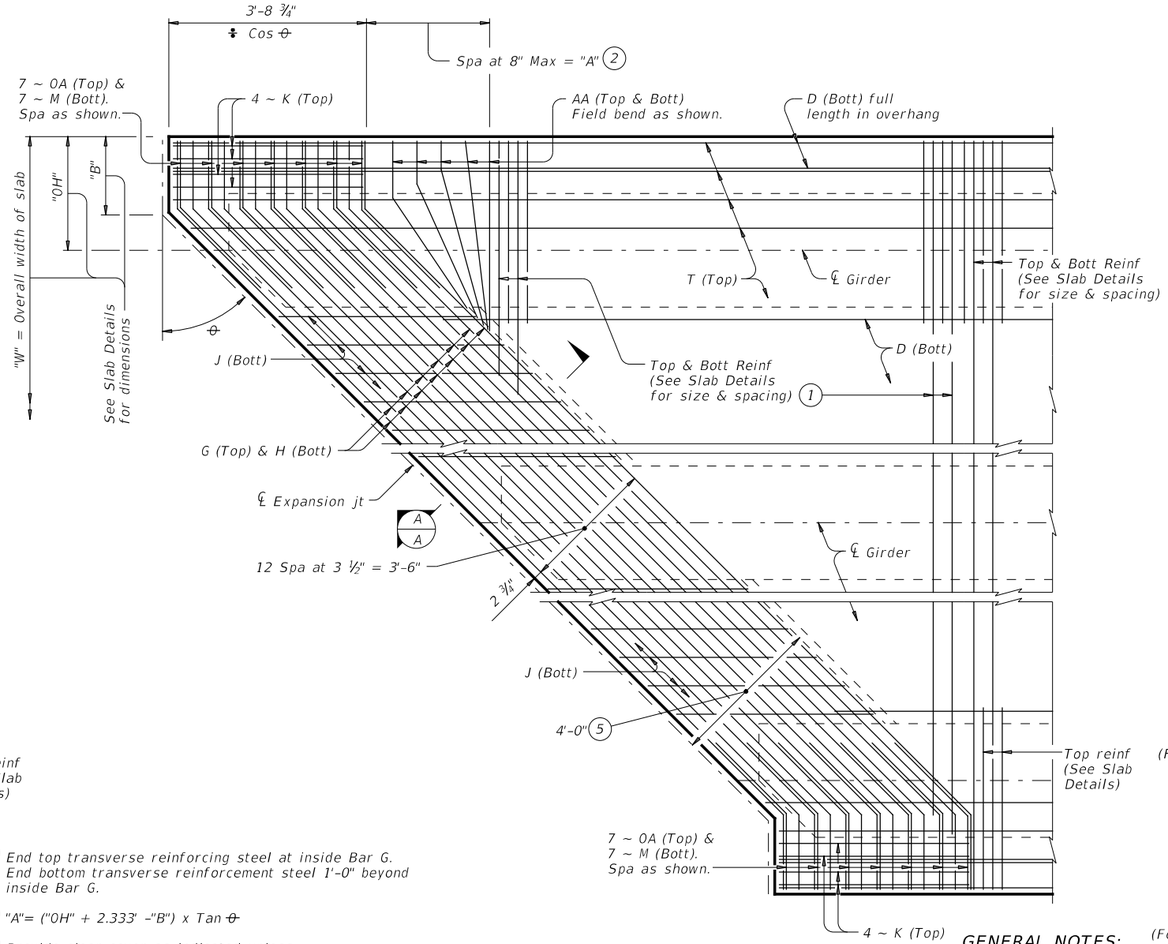


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

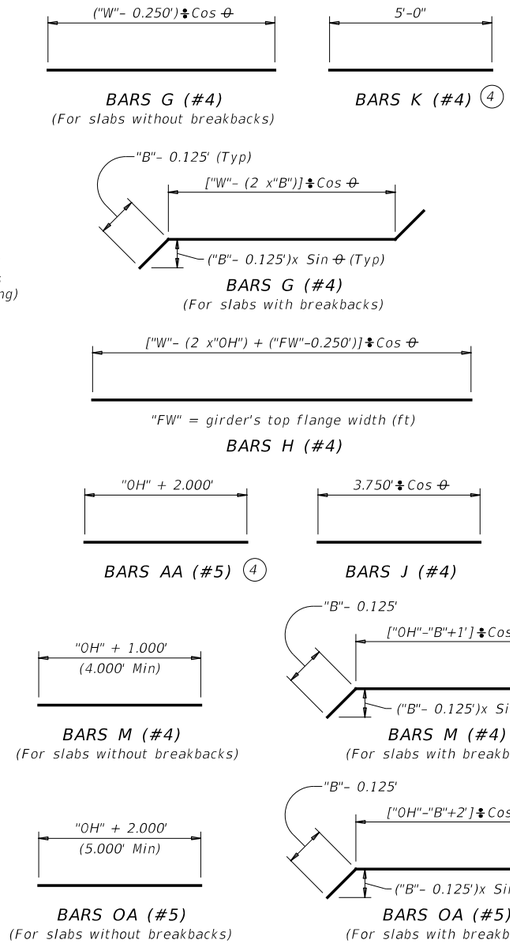
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 2.333' -"B") x Tan θ

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

(5) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



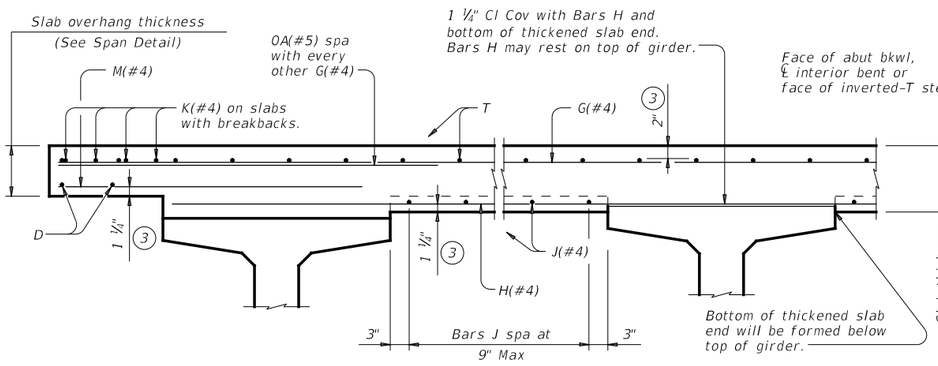
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

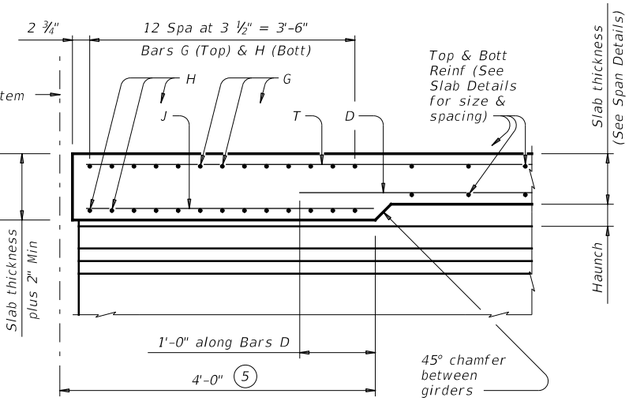
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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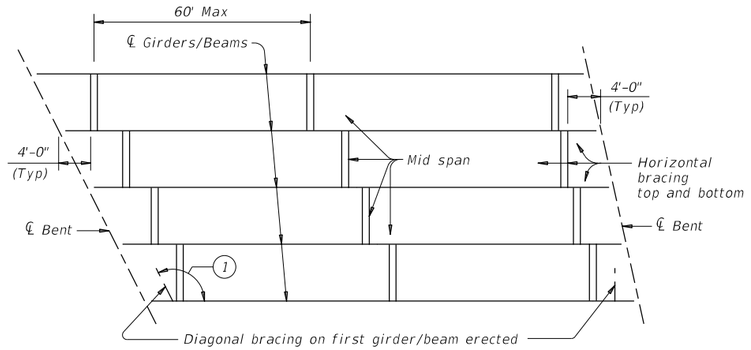
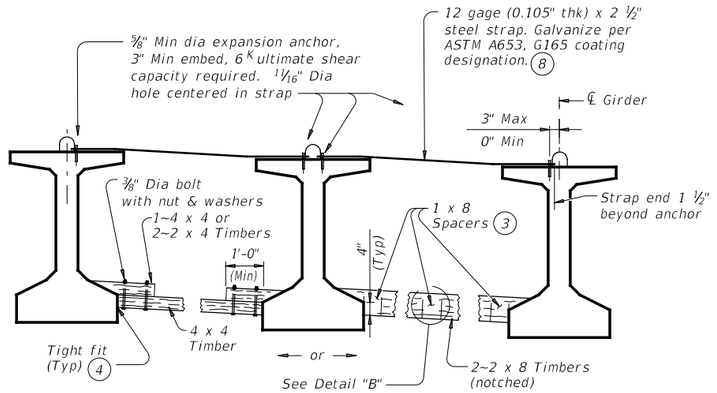
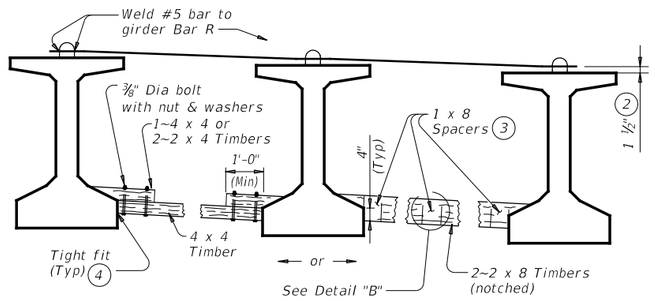


ERECTION BRACING



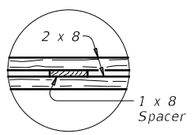
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



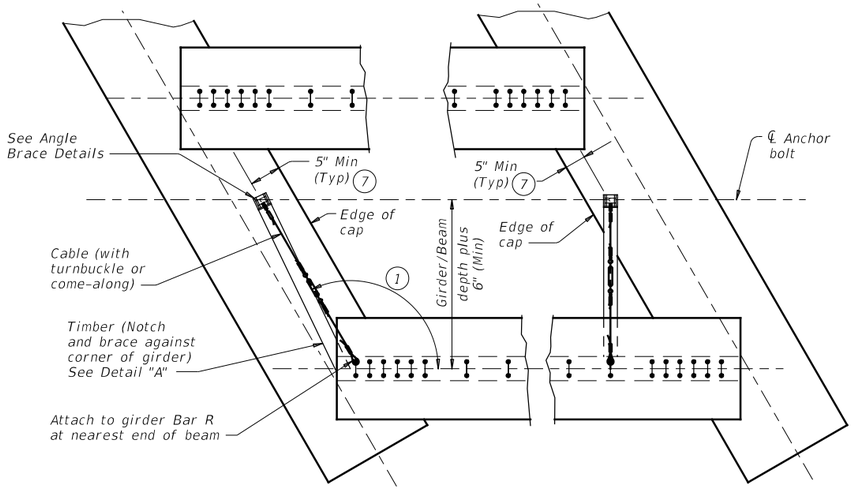
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

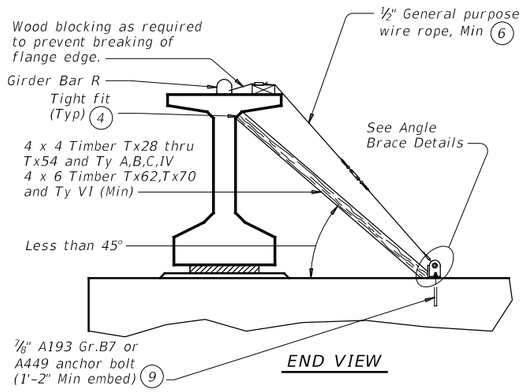


PLAN

DETAIL "B"



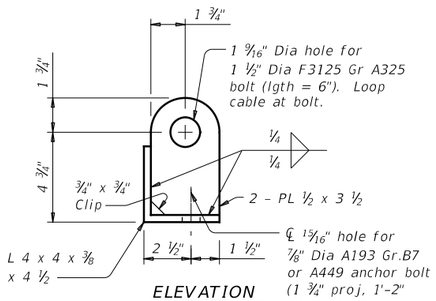
PLAN



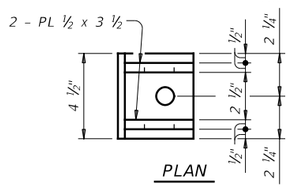
END VIEW

DIAGONAL BRACING DETAILS (5)

(To be used on both ends of the first girder/beam erected in the span in each phase.)



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

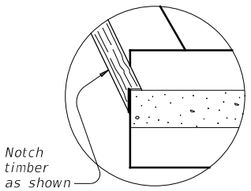
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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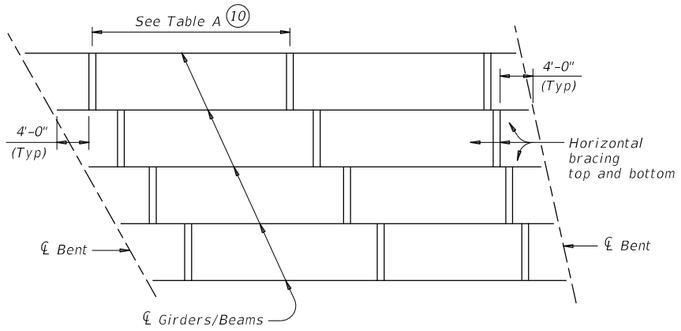
	SAT	COMAL		209



SLAB PLACEMENT BRACING

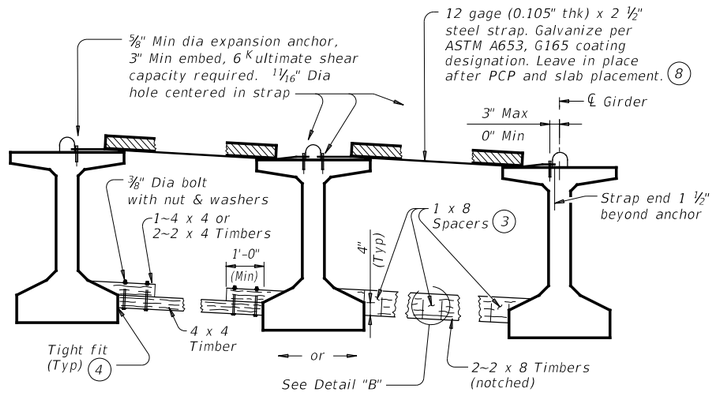
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

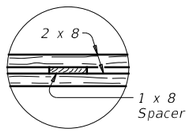
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



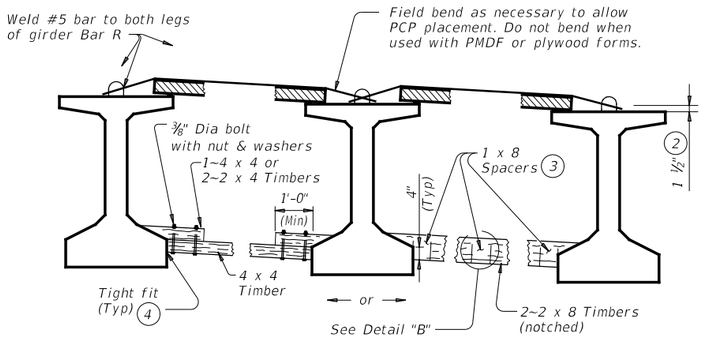
FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



PLAN

DETAIL "B"



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(10) Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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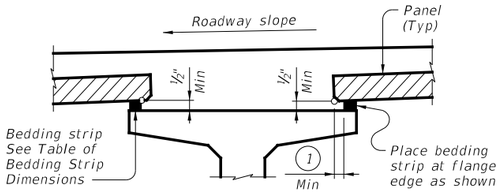
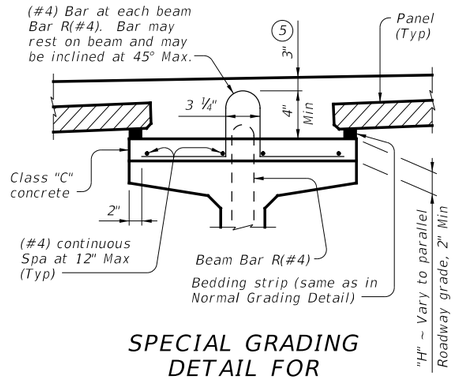


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders. (Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders. (Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

1. 2" Min for I-girders, 1 ½" Min for all other beam types.
2. Allowed for prestressed concrete I-girders, not allowed on other beam types.
3. To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.
4. Height must not exceed twice the width.
5. Provide clear cover as indicated unless otherwise shown on Span Details.
6. See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
7. Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.
8. Do not locate construction joints on top of a panel.
9. Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

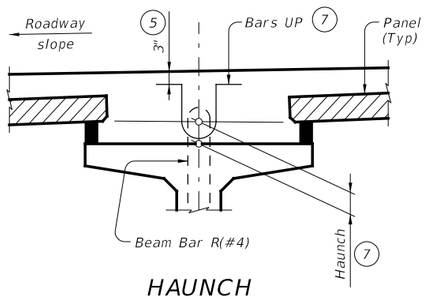
These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

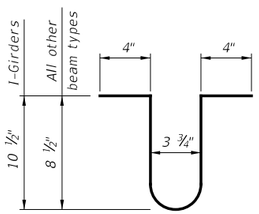
Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

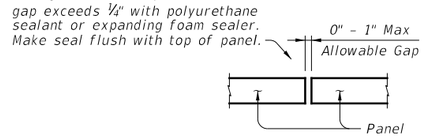


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders. (Other beam types similar)

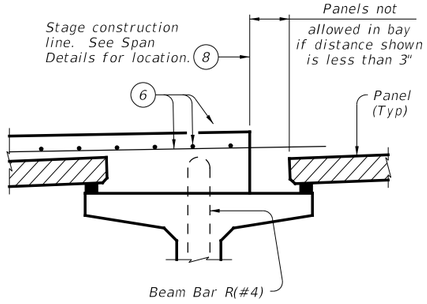


BARS UP (#4) (7)

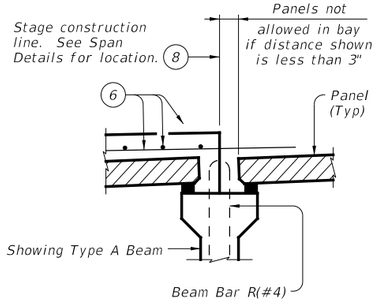


PANEL JOINTS

(Panel reinforcing not shown for clarity. The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



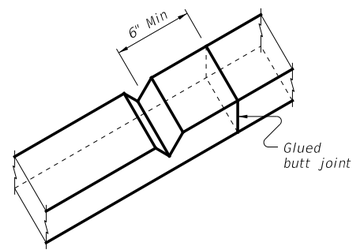
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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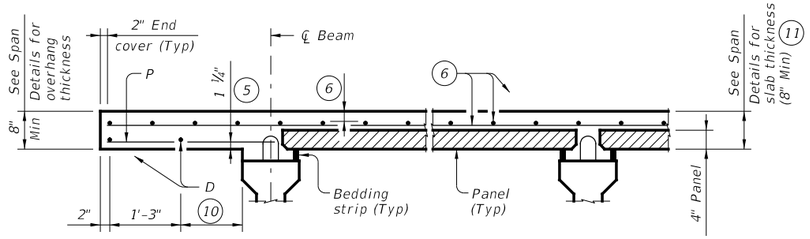

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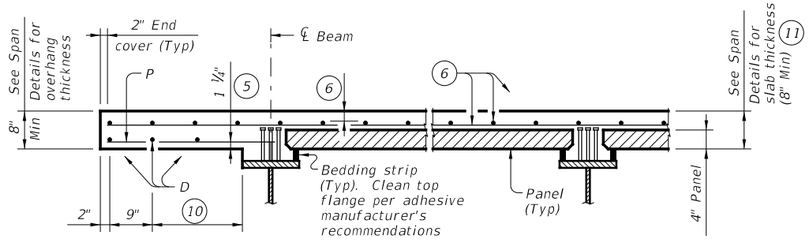
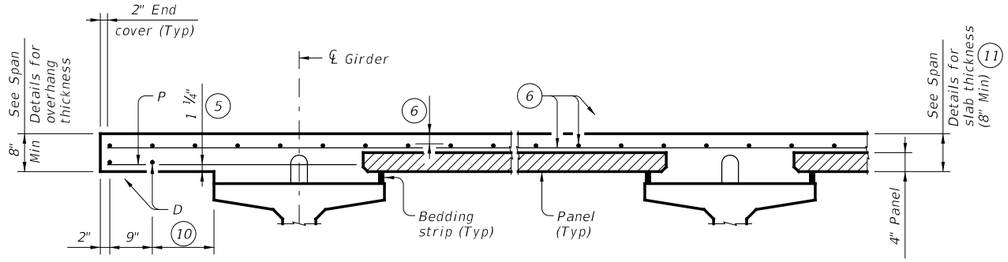
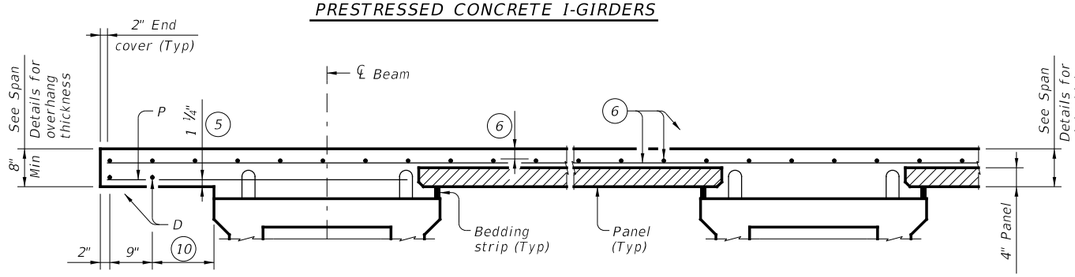


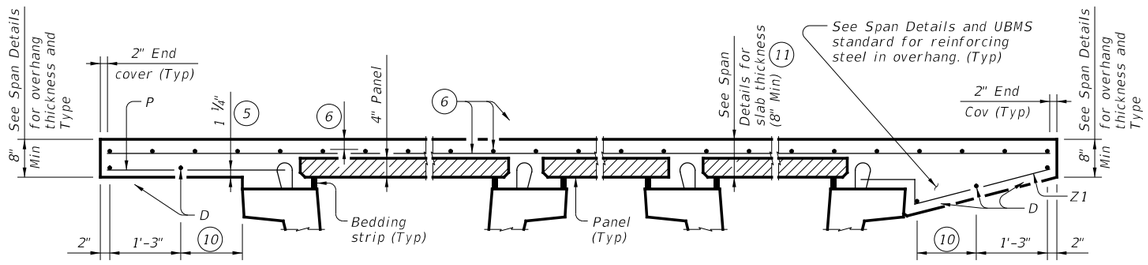
STEEL BEAMS (13)



PRESTRESSED CONCRETE I-GIRDERS



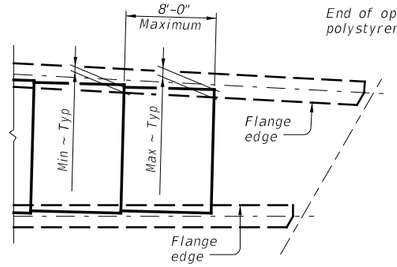
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

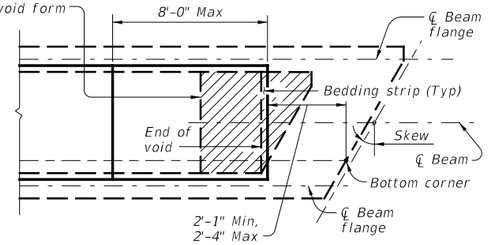
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



OVER CONC U-BEAMS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

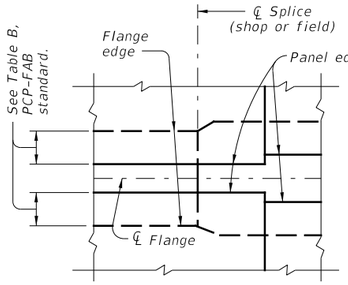
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

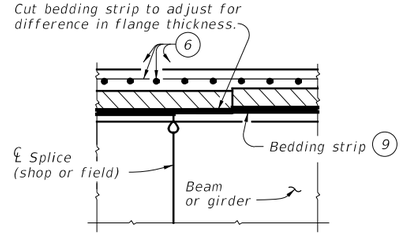
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Panels are allowed over top tension flanges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



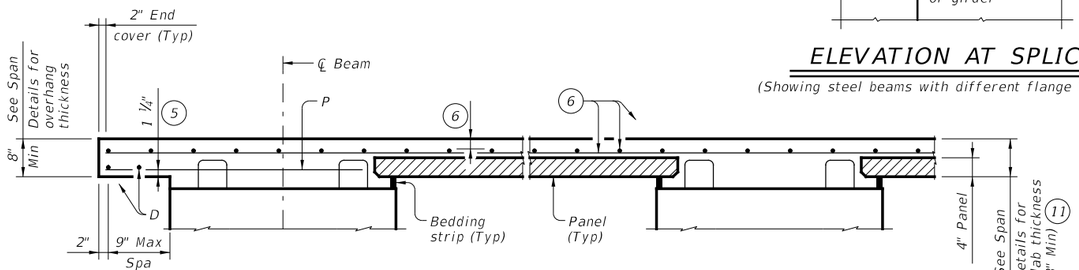
PLAN AT SPLICE

(Showing steel beams with flange width transition)



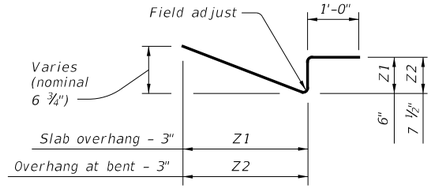
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4) (12)

HL93 LOADING SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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3/2023: Removed top flange tension limit.	DIST	COUNTY		SHEET NO.
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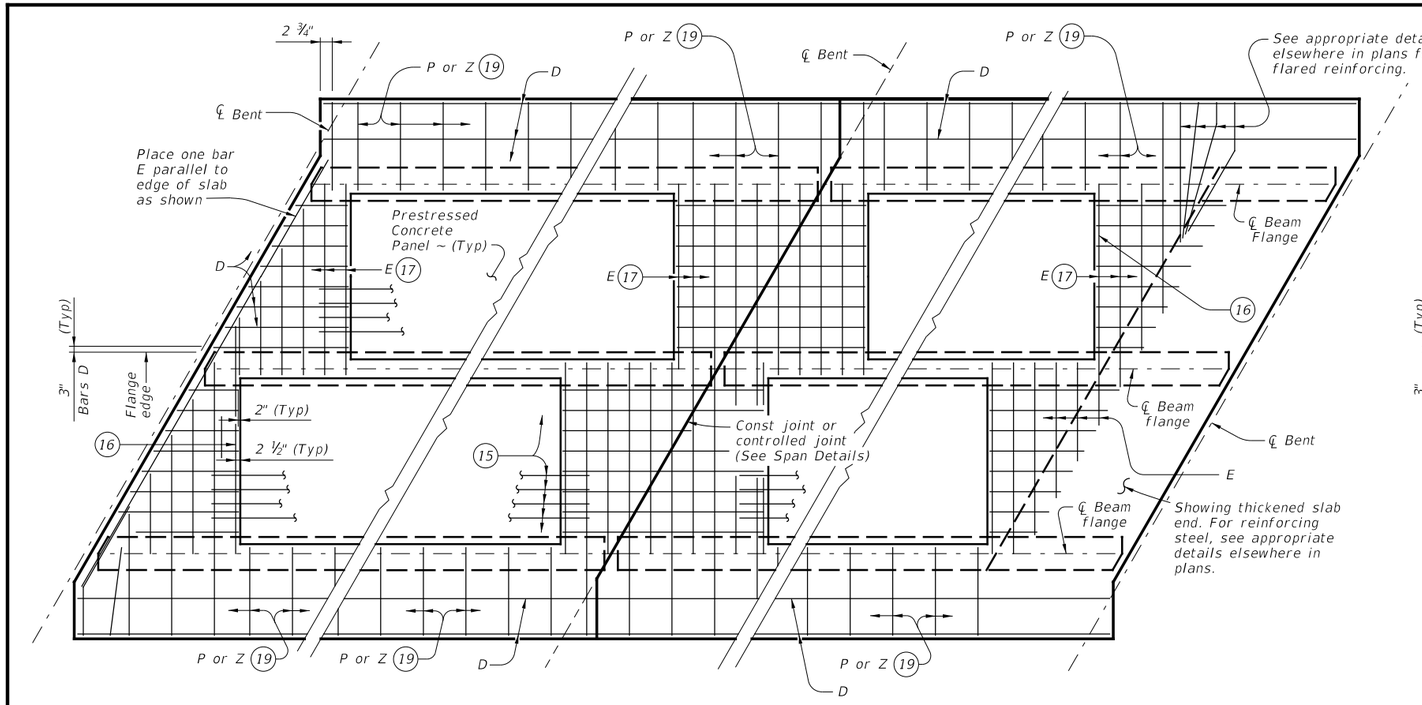
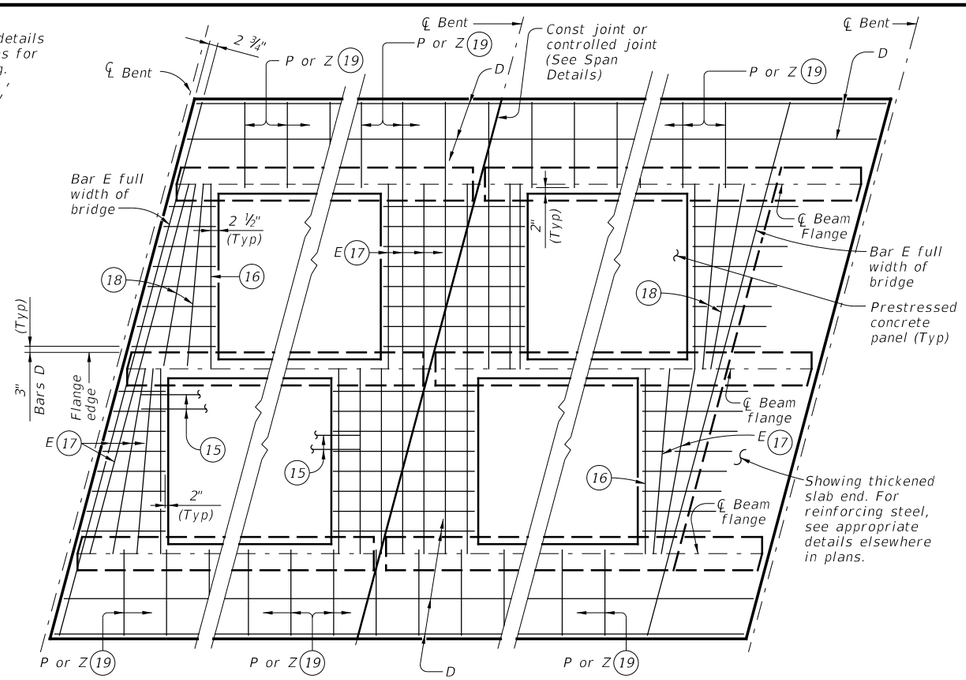


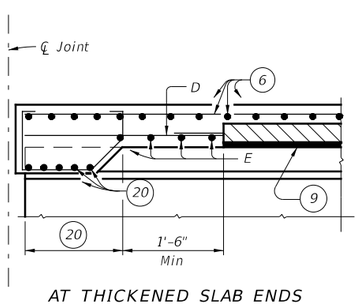
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

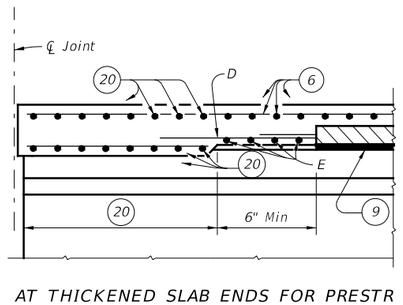


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

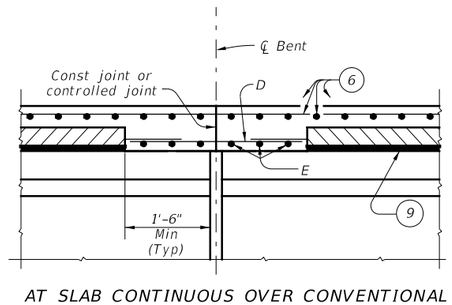
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



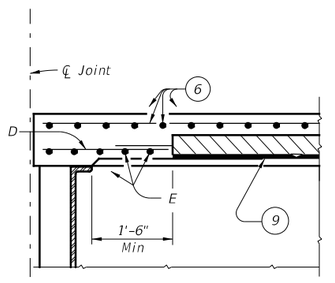
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE U-BEAMS



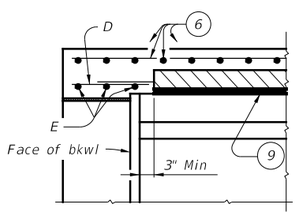
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE I-BEAMS AND STEEL BEAMS



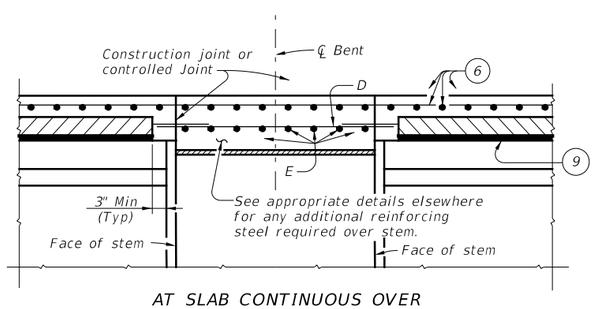
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BEAMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BEAMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BEAMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BEAMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

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Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: MS-PCP-23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
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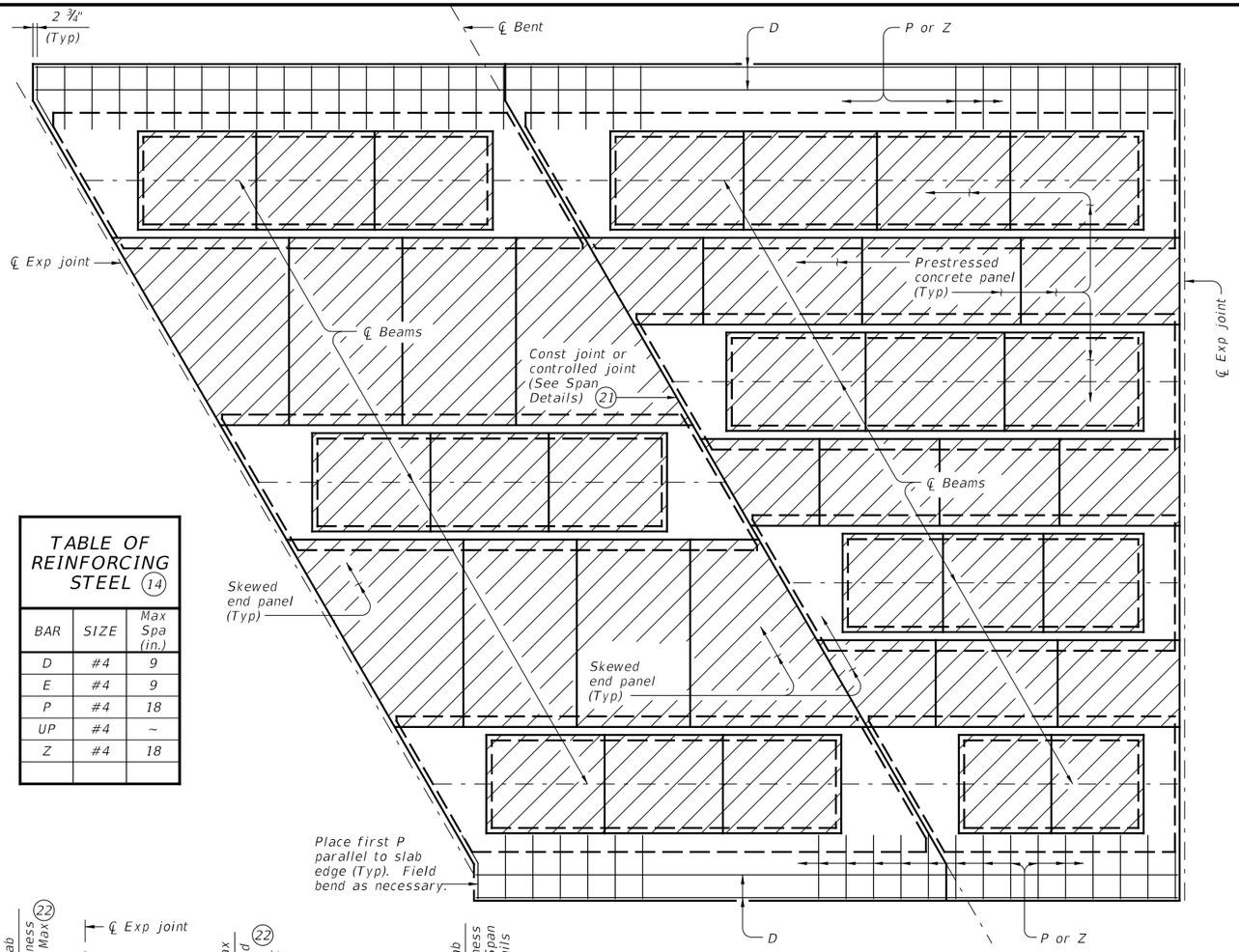
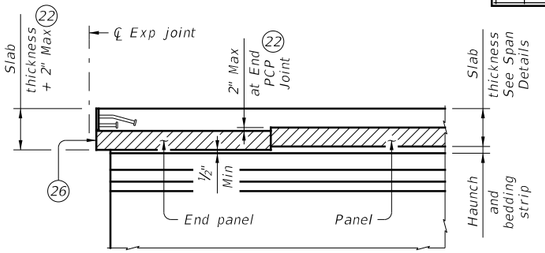


OPTION 2 ~ PLAN OF SLAB

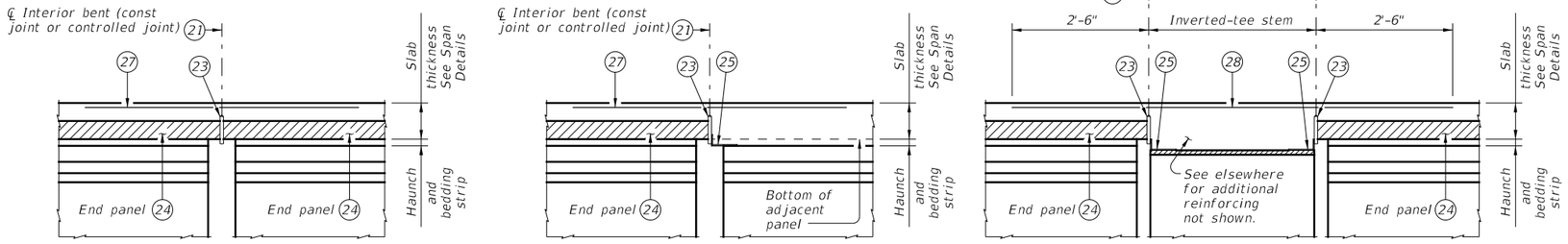
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.

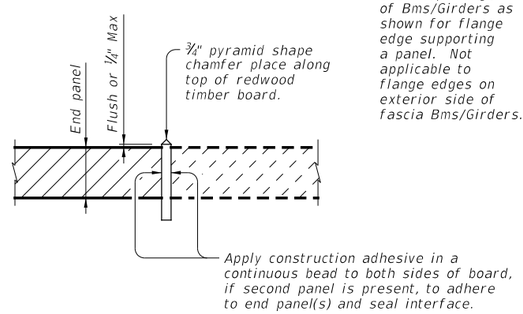
CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adjacent span.

INVERTED-T BENT

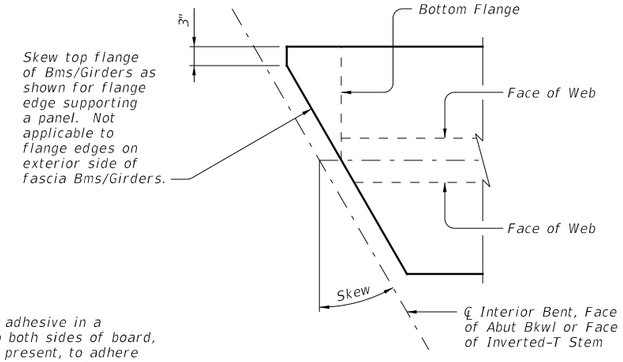
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Beam/I-Girder, U-Beams and Steel Beams similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab Bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and OA from standard IGTS in the slab.

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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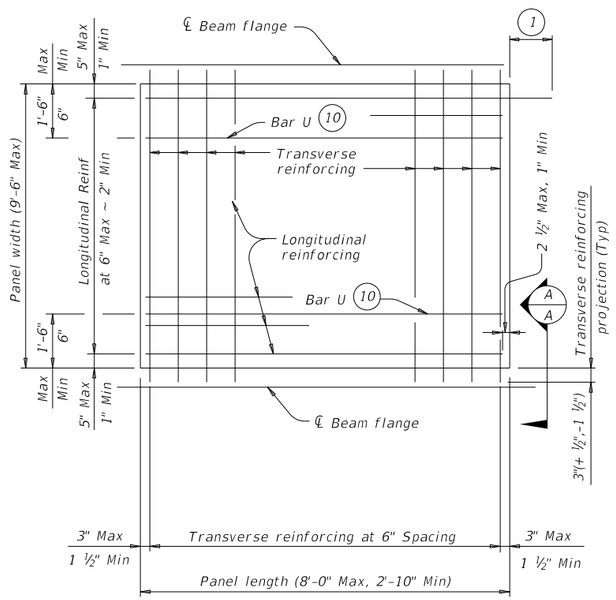
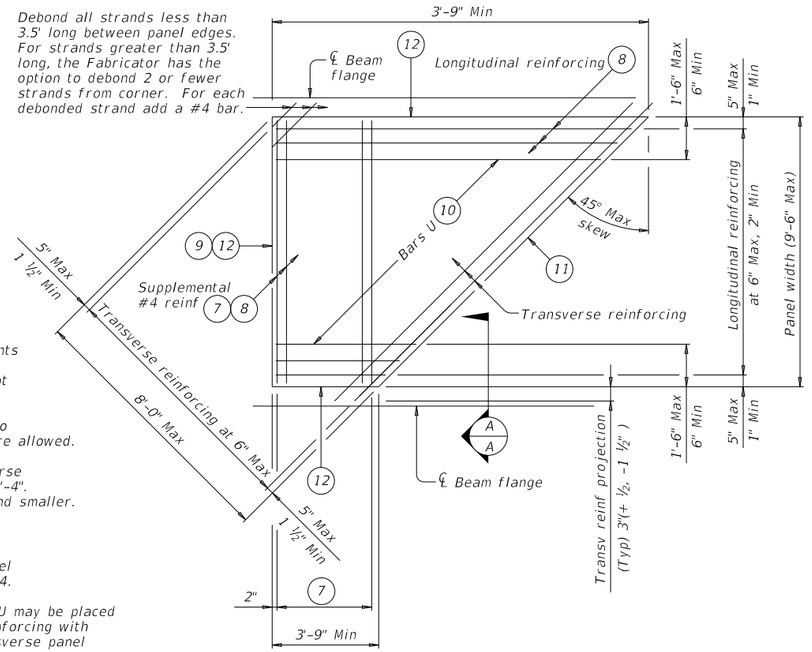


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

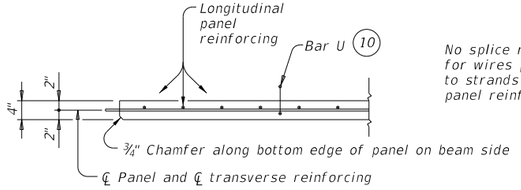
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

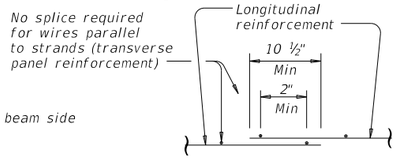
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

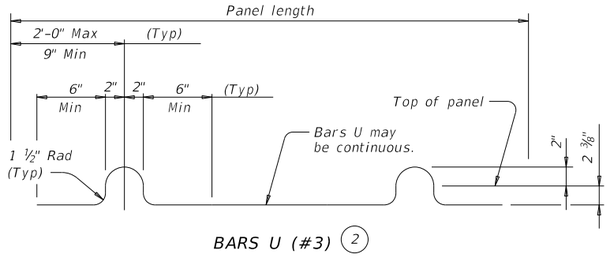


SECTION A-A

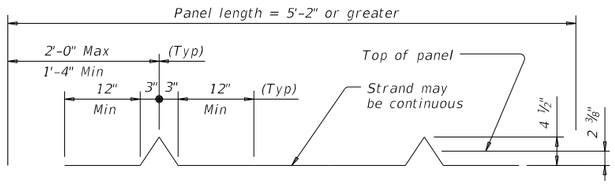
(Not showing supplemental #4 bars for skewed end panels.)



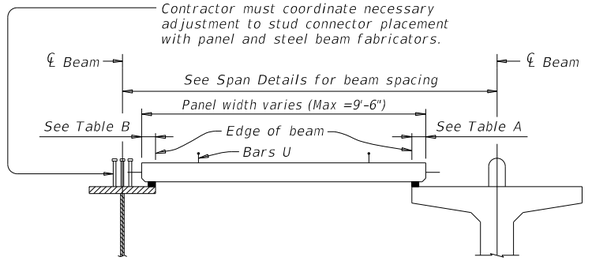
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



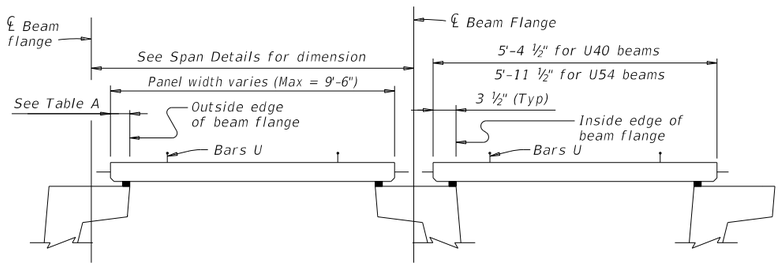
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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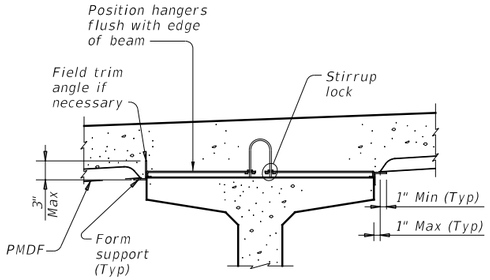
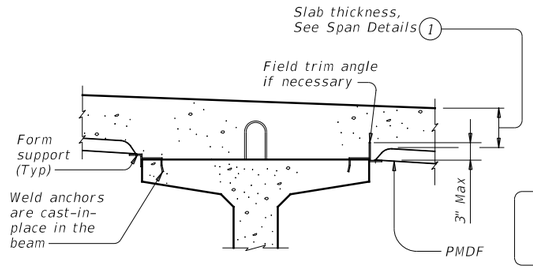
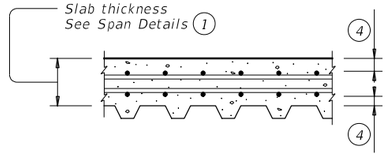


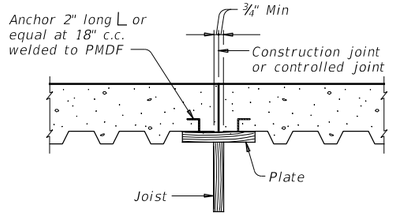
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

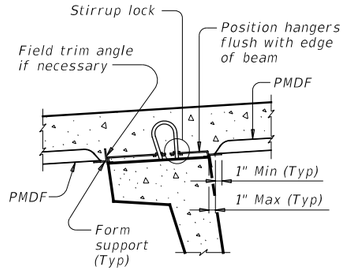


TYP LONGITUDINAL SLAB SECTION

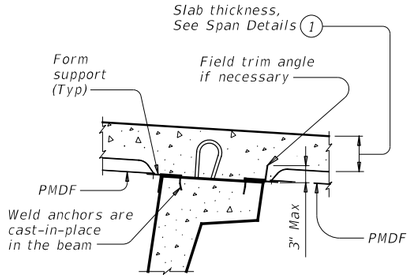


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

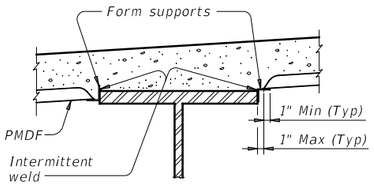
SECTION THRU CONSTRUCTION JOINT



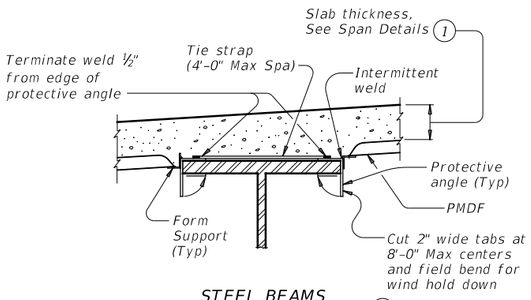
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

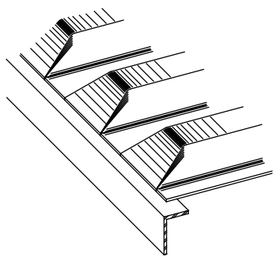


STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



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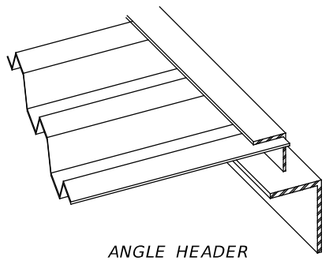
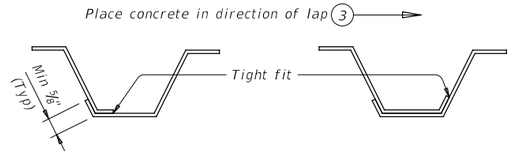


ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	SAT	COMAL		216

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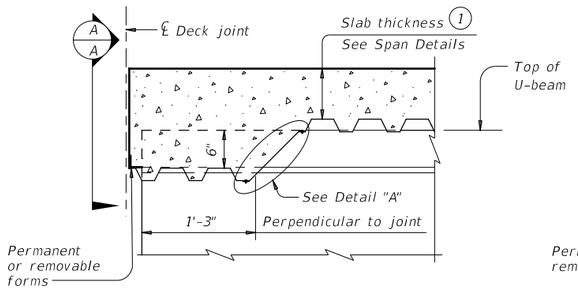
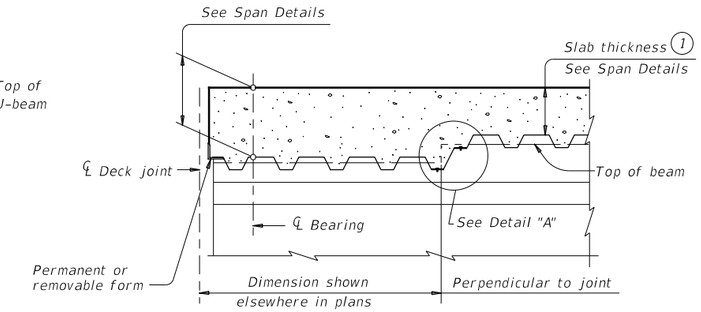
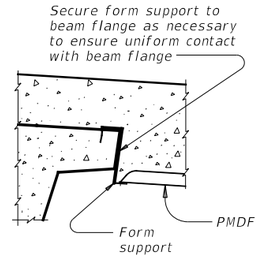


AT THICKENED SLAB END FOR U-BEAMS

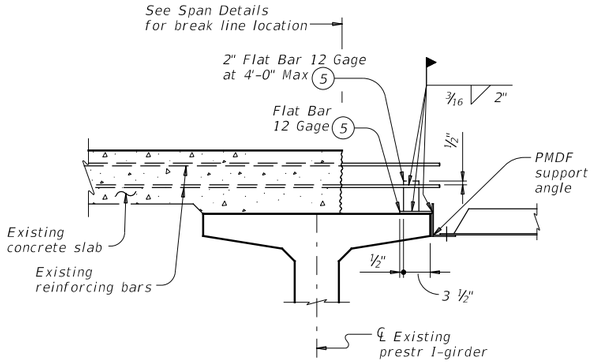


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

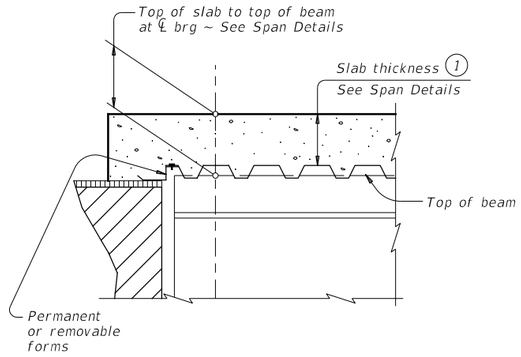
Showing I-beam block-out. No block-out for I-girders or steel beams.



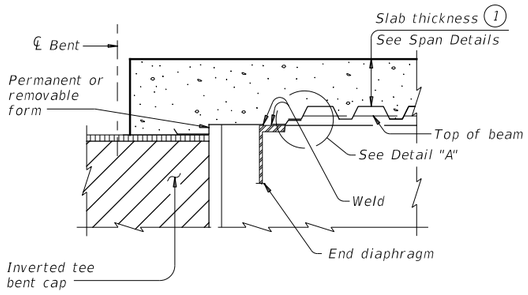
SECTION A-A



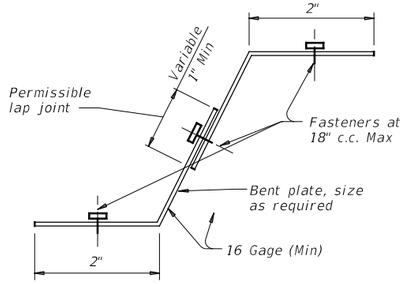
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



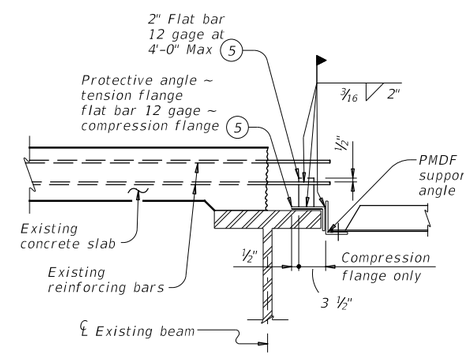
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

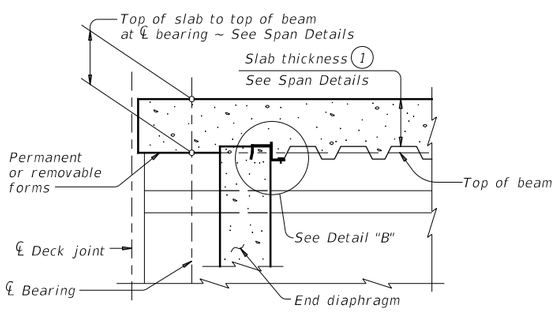


DETAIL "A"

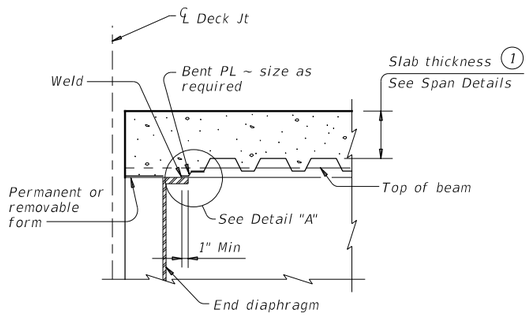


SHOWING STEEL BEAMS

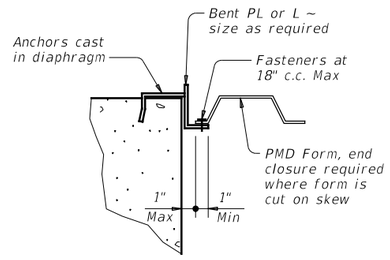
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 3/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	SAT	COMAL		217

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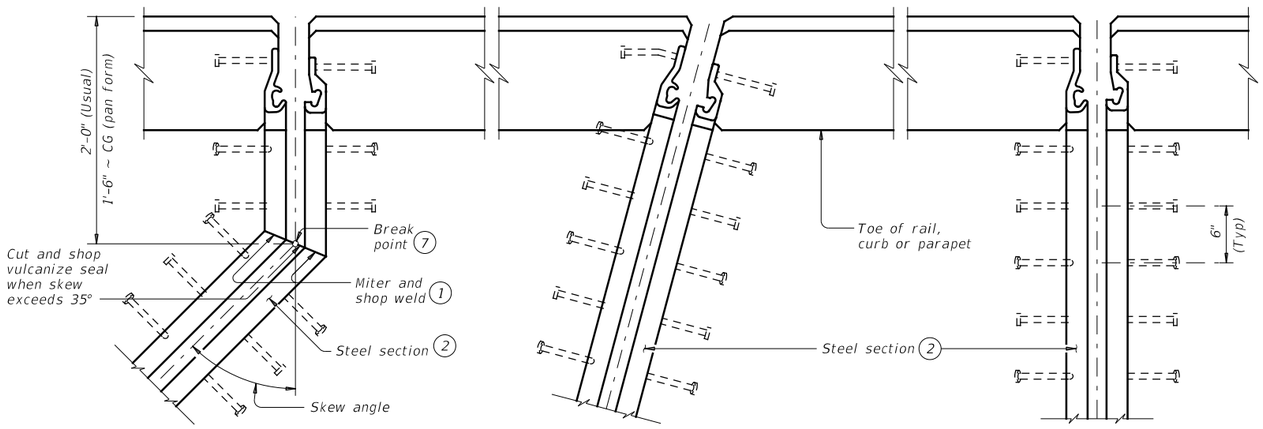
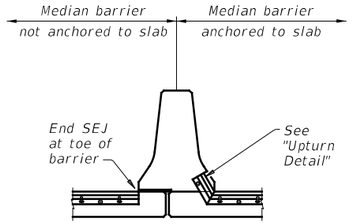
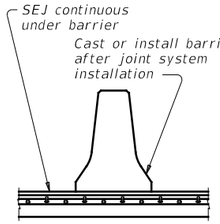


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

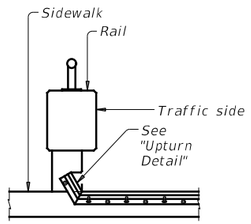
PLANS OF END CONDITIONS



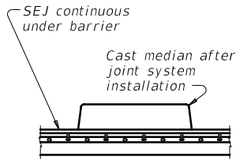
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



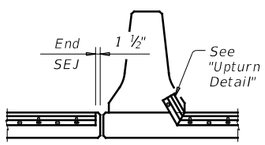
AT MEDIAN BARRIER



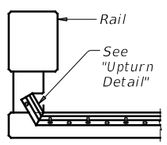
AT SIDEWALK BEHIND BRIDGE RAIL



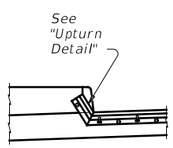
AT RAISED MEDIAN



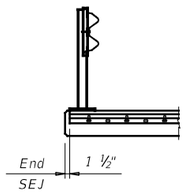
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

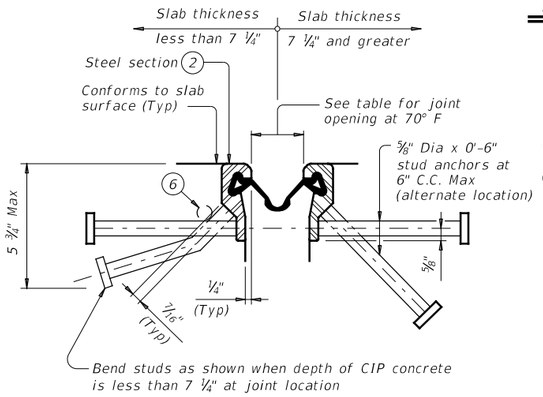


AT SIDEWALK

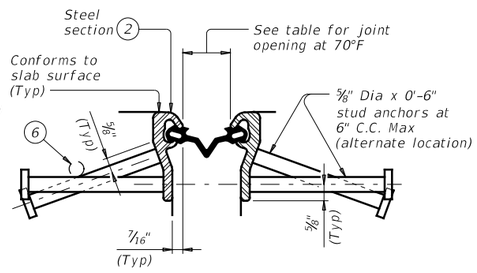


AT STEEL POST BRIDGE RAIL

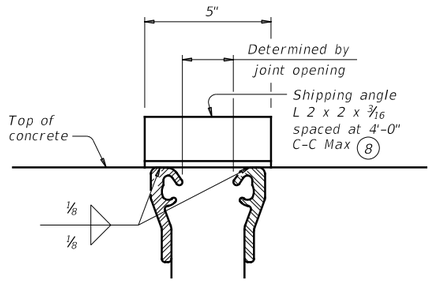
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

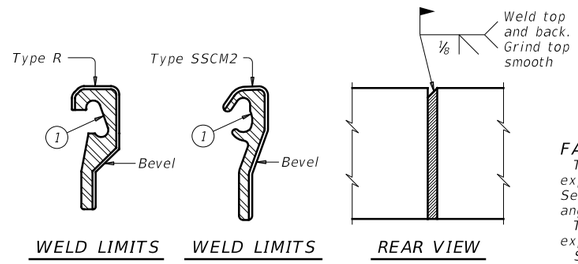
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

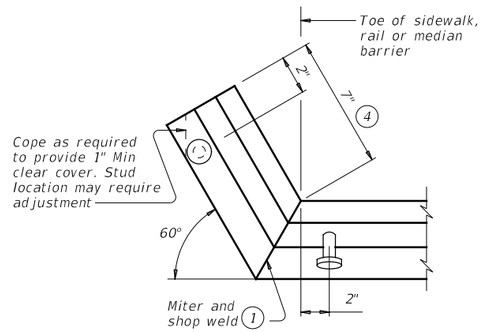
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	COMAL		218

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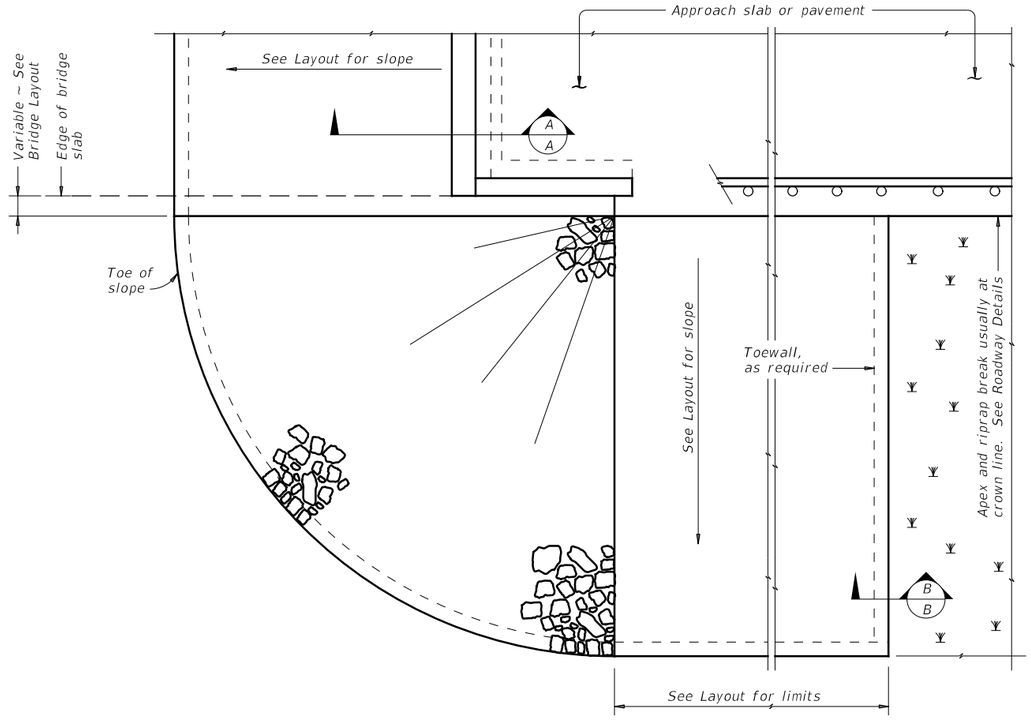
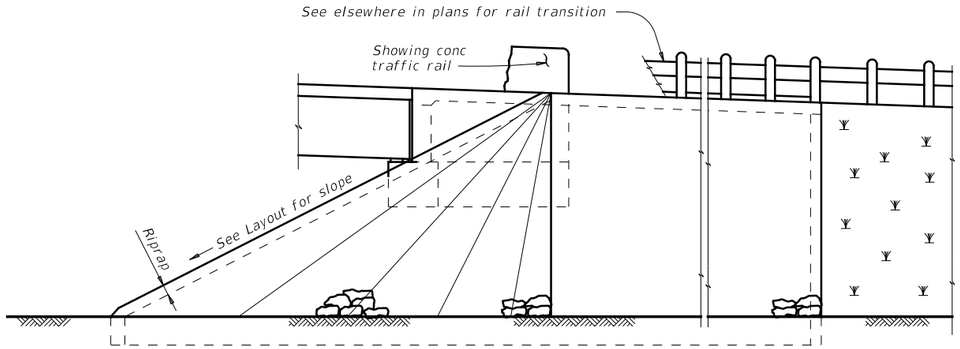
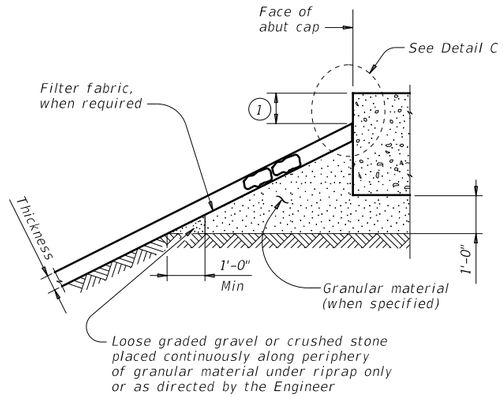


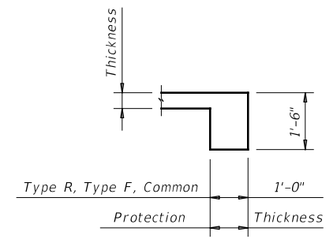
PLAN



ELEVATION

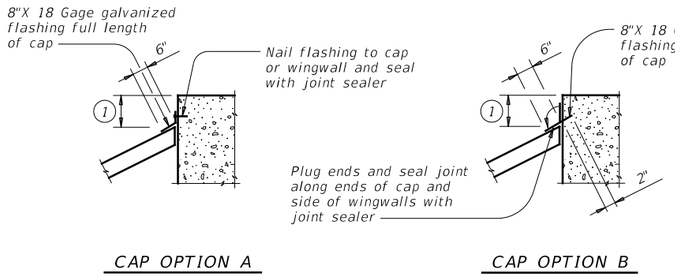


SECTION A-A AT CAP



SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	COMAL		219

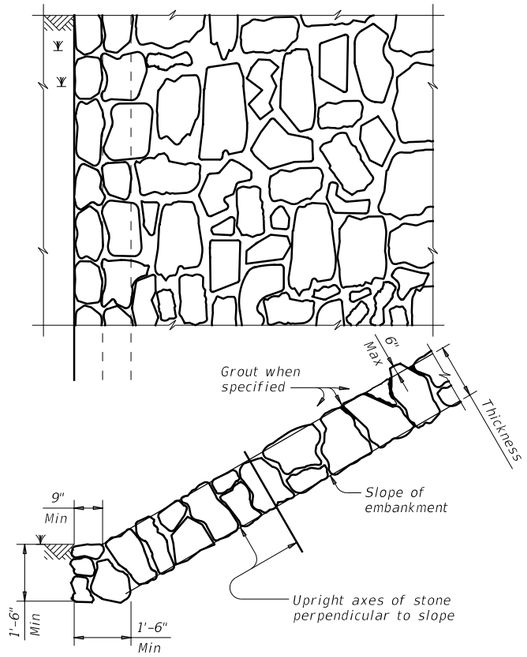


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

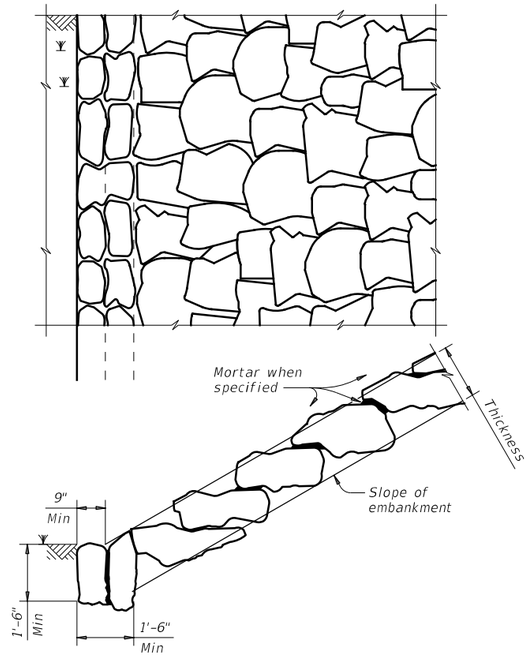


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

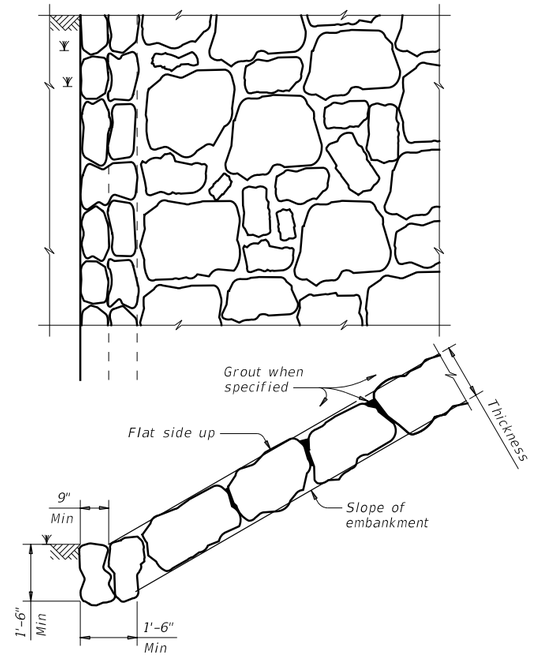


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

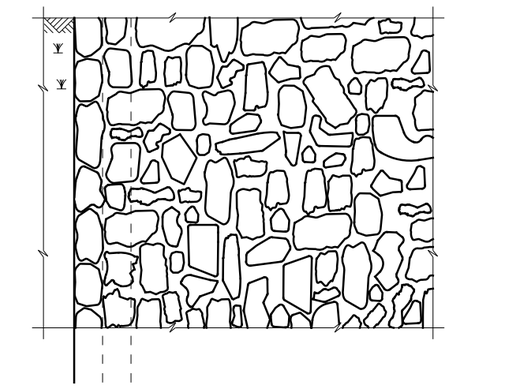


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

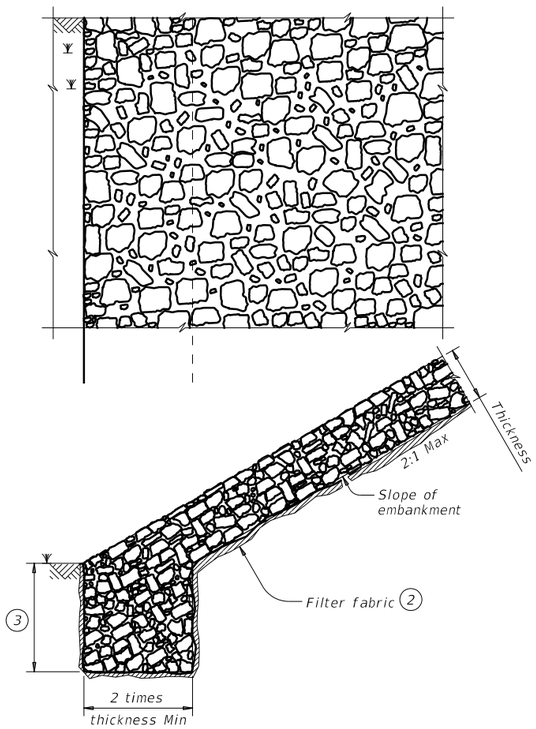


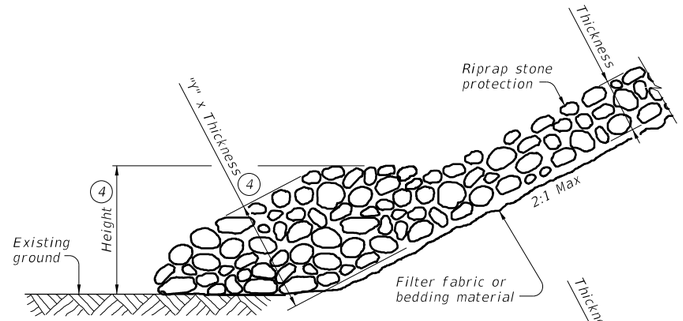
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

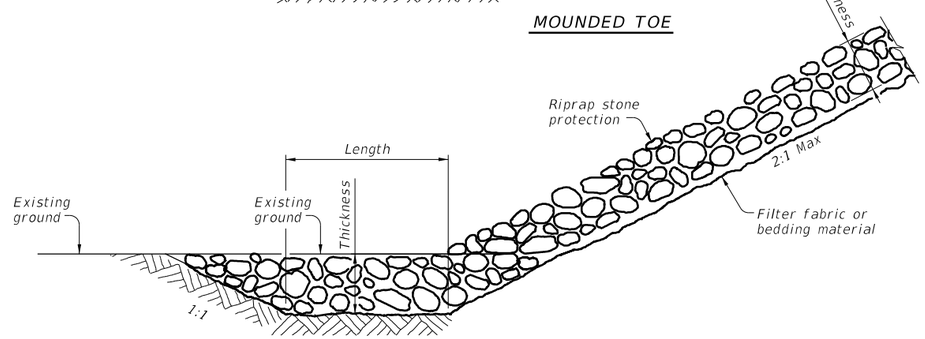
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

DATE: 8/25/2023 11:44:46 AM
FILE: $FILE$

SHEET 2 OF 2

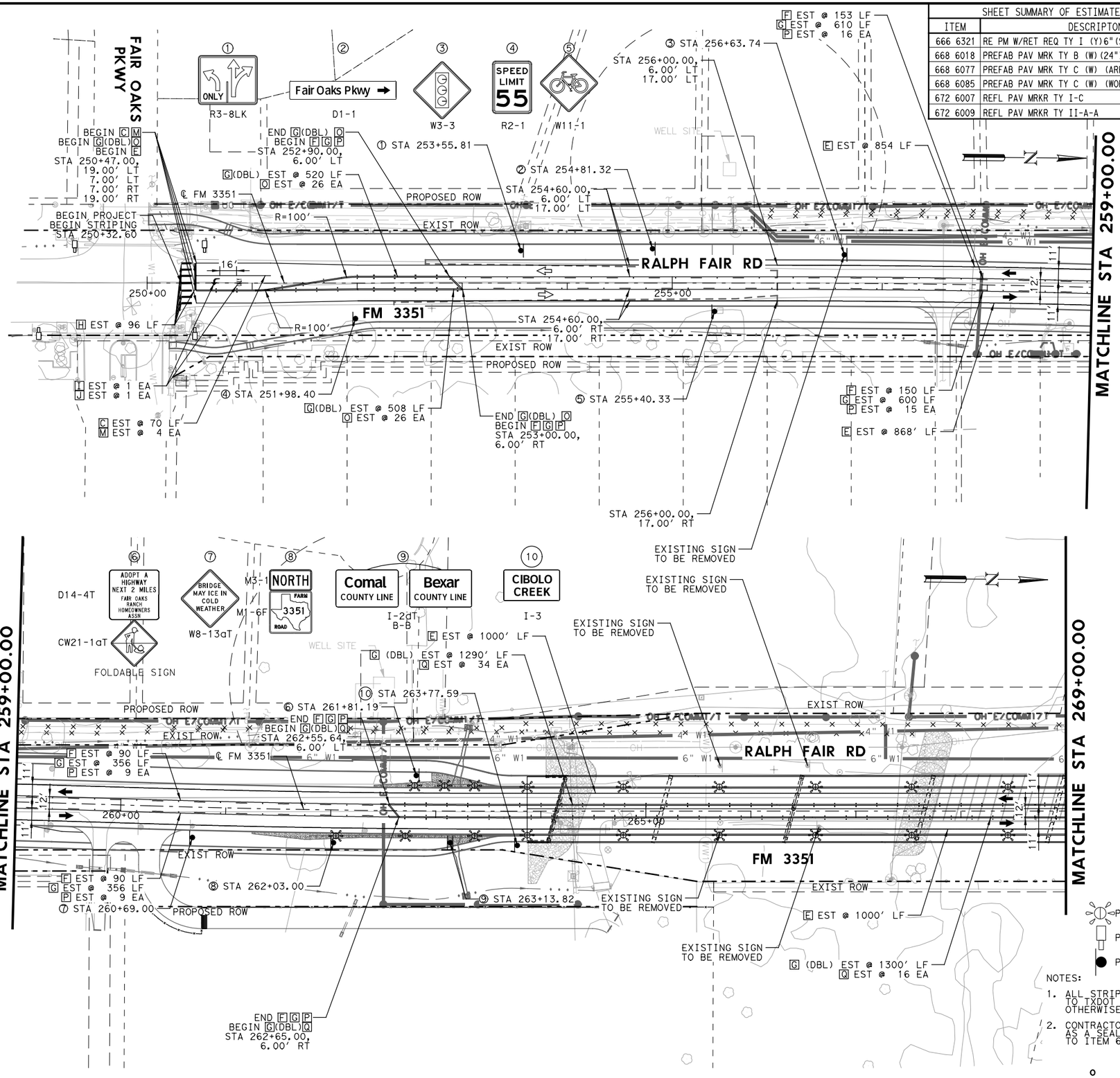
Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		220



NOTES:

1. ALL STRIPING MUST ADHERE TO TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. CONTRACTOR SHALL USE REFL PAV MRK TY II AS A SEALER AND THIS SHALL BE SUBSIDIARY TO ITEM 666.

SHEET SUMMARY OF ESTIMATED QUANTITIES Cont.

ITEM	DESCRIPTON	UNIT	QTY
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	5540
668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	96
668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	1
668 6085	PREFAB PAV MRK TY C (W) (WORD)	EA	1
672 6007	REFL PAV MRKR TY I-C	EA	4
672 6009	REFL PAV MRKR TY II-A-A	EA	151

SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM	DESCRIPTON	UNIT	QTY
644 6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644 6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1
644 6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	3
644 6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	5
644 6076	REMOVE SM RD SN SUP&AM	EA	10
658 6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	12
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	6
658 6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	4
666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	70
666 6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	1
666 6225	PAVEMENT SEALER 6"	LF	9745
666 6226	PAVEMENT SEALER 8"	LF	70
666 6230	PAVEMENT SEALER 24"	LF	96
666 6231	PAVEMENT SEALER (ARROW)	EA	1
666 6232	PAVEMENT SEALER (WORD)	EA	1
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	3722
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	483

LEGEND

- C REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- E RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- F RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- G RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- H PREFAB PAV MRK TY B (W)(24")(SLD)
- I PREFAB PAV MRK TY C(W)(ARROW)
- J PREFAB PAV MRK TY C(W)(WORD)
- M REFL PAV MRKR TY I-C @ 20 SPA
- O REFL PAV MRKR TY II-A-A @ 20 SPA
- P REFL PAV MRKR TY II-A-A @ 40 SPA
- Q REFL PAV MRKR TY II-A-A @ 80 SPA

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
MANUEL ZUVIA III
105231
LICENSED
PROFESSIONAL ENGINEER

11/06/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 3351 AT CIBOLO CREEK

SIGNING & STRIPING LAYOUT

SCALE: 1"=100' SHEET 1 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	221

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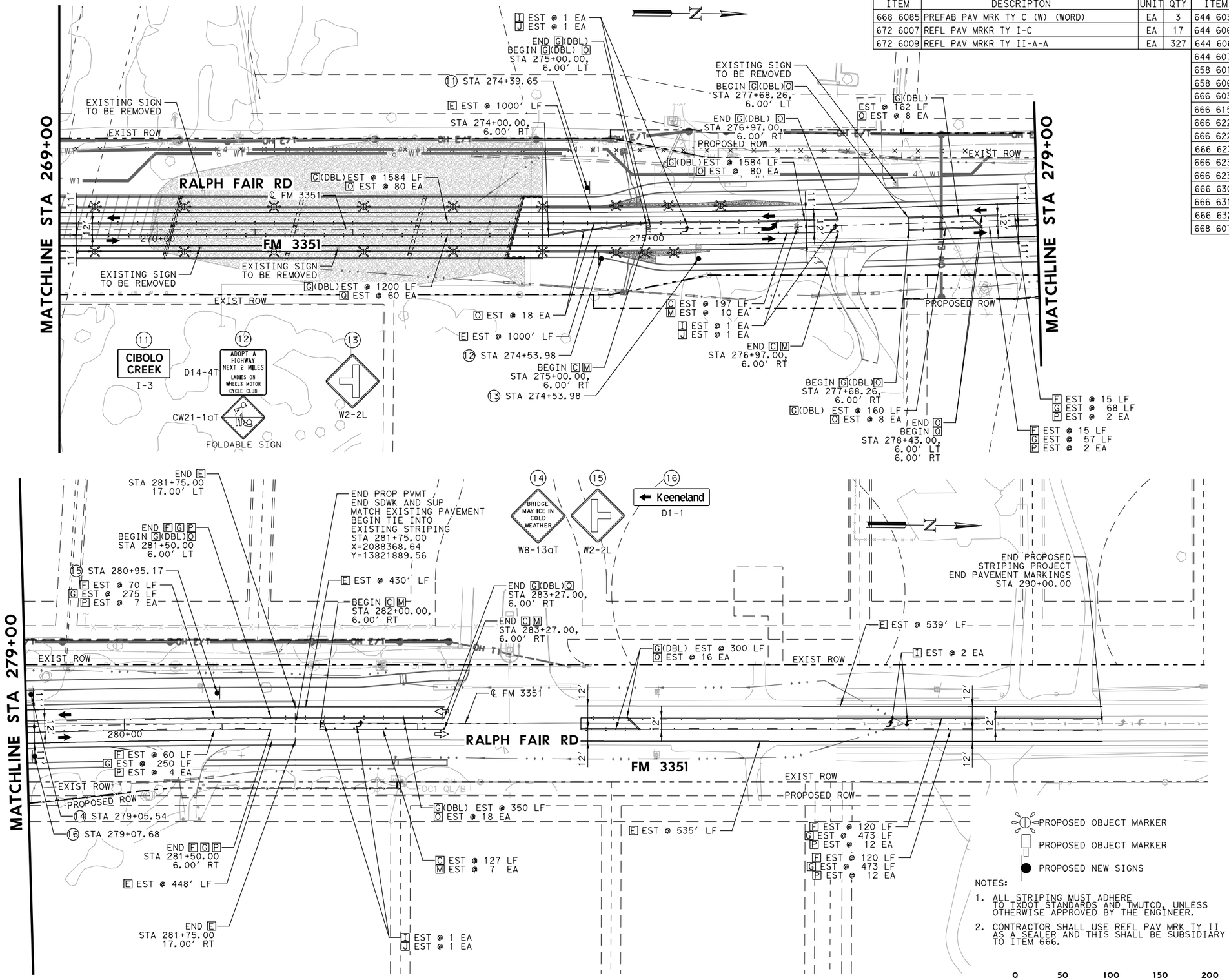
PENTABLE: 10329784.tbl
DATE: 11/3/2023
PLOTTING TIME: 1:45:12 PM
File Name:FM3351-PVMRK-01.dgn
User Name:OSANTOS

SHEET SUMMARY OF ESTIMATED QUANTITIES Cont.			
ITEM	DESCRIPTON	UNIT	QTY
668 6085	PREFAB PAV MRK TY C (W) (WORD)	EA	3
672 6007	REFL PAV MRKR TY I-C	EA	17
672 6009	REFL PAV MRKR TY II-A-A	EA	327

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTON	UNIT	QTY
644 6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1
644 6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	1
644 6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	4
644 6076	REMOVE SM RD SN SUP&AM	EA	8
658 6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	12
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	6
666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	324
666 6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	5
666 6225	PAVEMENT SEALER 6"	LF	11288
666 6226	PAVEMENT SEALER 8"	LF	324
666 6231	PAVEMENT SEALER (ARROW)	EA	5
666 6232	PAVEMENT SEALER (WORD)	EA	3
666 6233	PAVEMENT SEALER (MED NOSE)	EA	2
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	3952
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	400
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	6936
668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	5

LEGEND

- C REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- E RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- F RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- G RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- H PREFAB PAV MRK TY B (W)(24")(SLD)
- I PREFAB PAV MRK TY C(W)(ARROW)
- J PREFAB PAV MRK TY C(W)(WORD)
- M REFL PAV MRKR TY I-C @ 20 SPA
- O REFL PAV MRKR TY II-A-A @ 20 SPA
- P REFL PAV MRKR TY II-A-A @ 40 SPA
- Q REFL PAV MRKR TY II-A-A @ 80 SPA



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
MANUEL ZUVIA III
105231
LICENSED
PROFESSIONAL ENGINEER
11/06/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

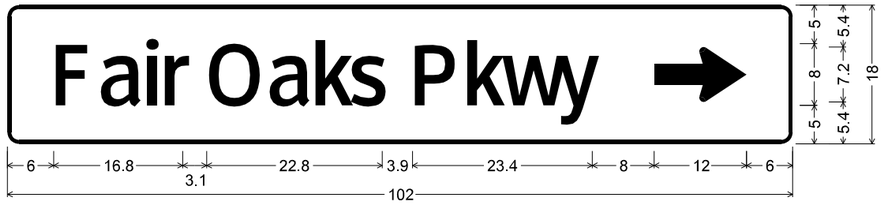
Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

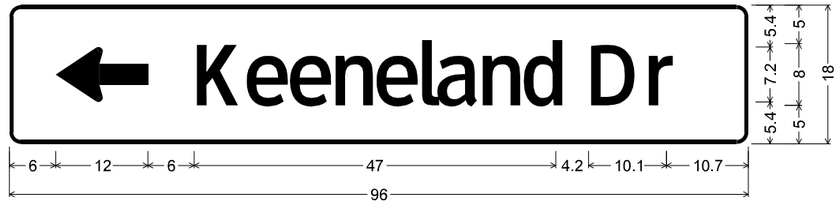
SIGNING & STRIPING LAYOUT

SCALE: 1"=100' SHEET 2 OF 2

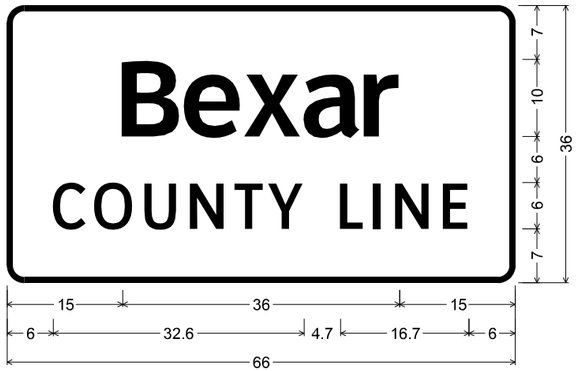
DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	222



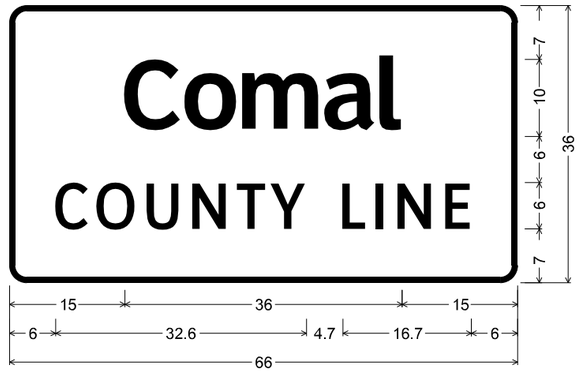
D1-1 8in RT;
1.5" Radius, 0.5" Border, White on Green;
"Fair Oaks Pkwy", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;



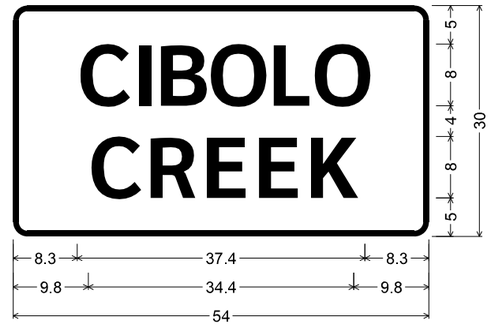
D1-1 8in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Keeneland Dr", ClearviewHwy-3-W;



I-2dT 10in;
2.3" Radius, 0.8" Border, White on Green;
"Bexar", ClearviewHwy-5-W-R;
"COUNTY LINE", ClearviewHwy-3-W;



I-2dT 10in;
2.3" Radius, 0.8" Border, White on Green;
"Comal", ClearviewHwy-5-W-R;
"COUNTY LINE", ClearviewHwy-3-W;

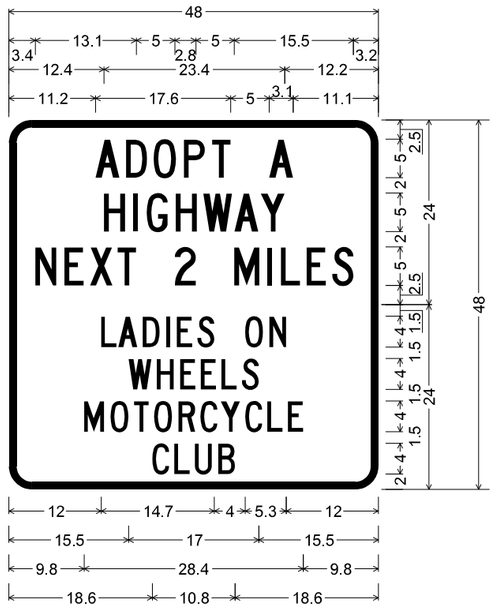


I-3 8in;
1.9" Radius, 0.8" Border, White on Green;
"CIBOLO", ClearviewHwy-5-W-R;
"CREEK", ClearviewHwy-5-W-R;

D14-4T-2_48x48;

3.0" Radius, 1.0" Border, White on Blue;
"ADOPT A", C; "HIGHWAY", C;
"NEXT 2 MILES", C;

3.0" Radius, 1.0" Border, White on Blue;
"FAIR OAKS", C; "RANCH", C;
"HOMEOWNERS", C; "ASSN", C;



D14-4T-2_48x48;

3.0" Radius, 1.0" Border, White on Blue;
"ADOPT A", C; "HIGHWAY", C;
"NEXT 2 MILES", C;

3.0" Radius, 1.0" Border, White on Blue;
"LADIES ON", C; "WHEELS", C;
"MOTORCYCLE", C; "CLUB", C;

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
MANUEL ZUVIA III
105231
LICENSED
PROFESSIONAL ENGINEER

11/06/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

SIGN DETAILS

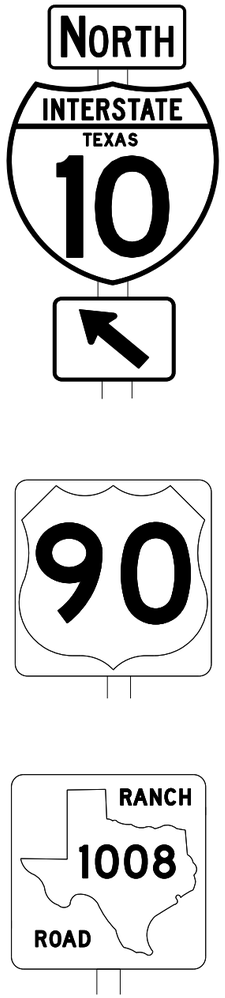
SCALE: N. T. S. SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	COMAL	SAT	3212	05	013	223

DATE: 11/3/2023 1:45:19 PM
FILE: $FILE$

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

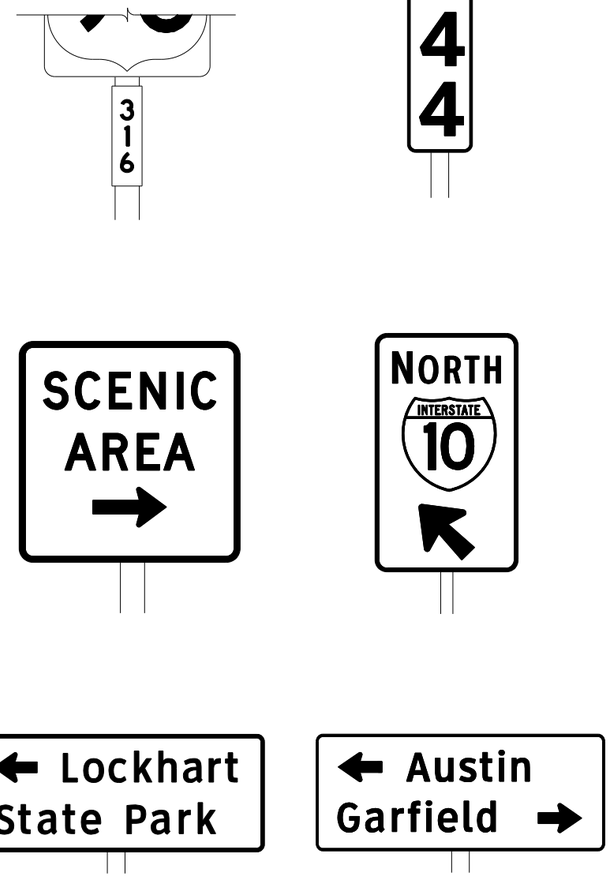
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall 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. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white 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

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described 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 width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

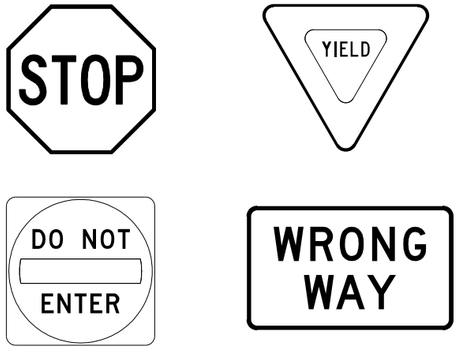
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	COMAL		224

3

DATE: 11/3/2023 1:45:20 PM
FILE: $FILE$

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

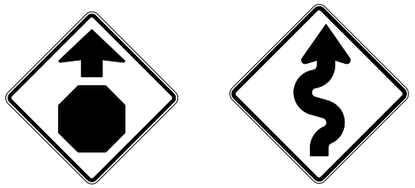
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall 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. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders 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. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

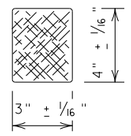
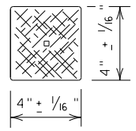
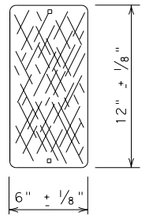
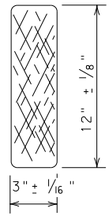
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	COMAL		225

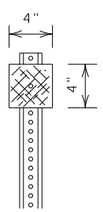
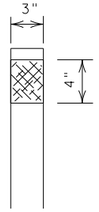
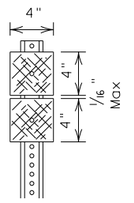
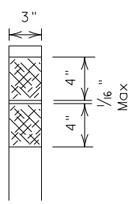
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/3/2023 1:45:22 PM
FILE: $FILE$

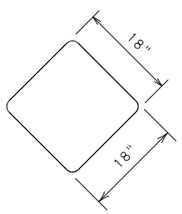
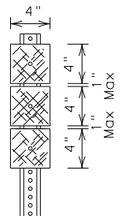
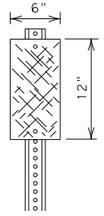
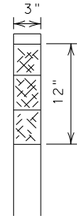
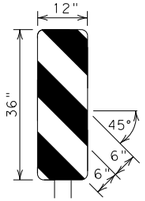
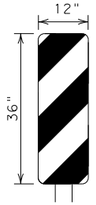
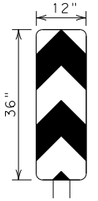
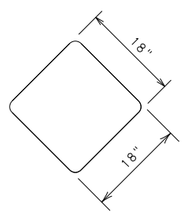
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

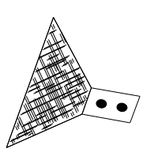
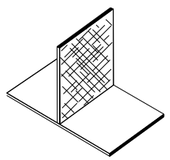
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

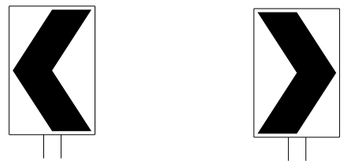
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

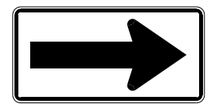
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

- NUMBER OF REFLECTORS
  - S = Single
  - D = Double
- COLOR OF REFLECTORS
  - W = White
  - Y = Yellow
  - R = Red
- REFLECTOR UNIT SIZE
  - 1 or 2
- TYPE OF POST OR DELINEATOR
  - WC = Wing Channel Post
  - YFLX = Yellow Flexible Post
  - WFLX = White Flexible Post
  - BRF = Barrier Reflector
- TYPE OF MOUNT
  - GND = Embedded (drivable or set in concrete)
  - CTB = Concrete Barrier Mount
  - GF1 or GF2 = Guard Fence Attachment
  - SRF = Surface Mount
- DIRECTION
  - If Required
  - BI = Bi-Directional
  - BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

- TYPE OF OBJECT MARKER
  - 1, 2, 3, or 4
- NUMBER OF REFLECTORS OR DIRECTION
  - X = 3-Size 2 reflector units (Type 2 only)
  - Y = 1-Size 3 reflector unit (Type 2 only)
  - Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
  - L = Left Side (Type 3 Object Marker only)
  - R = Right Side (Type 3 Object Marker only)
  - C = Center (Type 3 Object Marker only)
- TYPE OF POST
  - WC = Wing Channel Post
  - WFLX = White Flexible Post
  - TWT = Thin Walled Tubing
- TYPE OF MOUNT
  - GND = Embedded (drivable)
  - SRF = Surface Mount
  - WAS = Wedge Anchor Steel
  - WAP = Wedge Anchor Plastic
- DIRECTION
  - If Required
  - BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

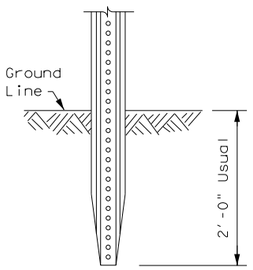
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	COMAL		226

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

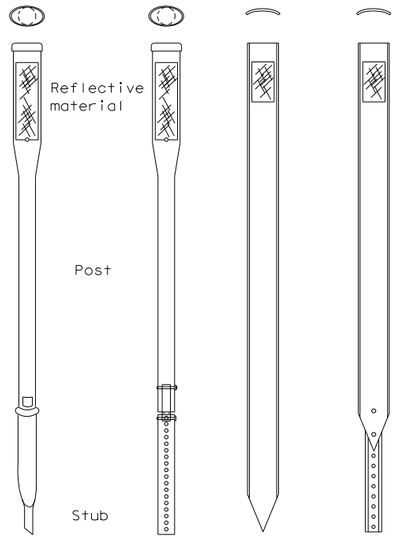


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

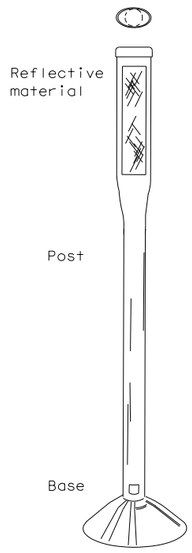
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



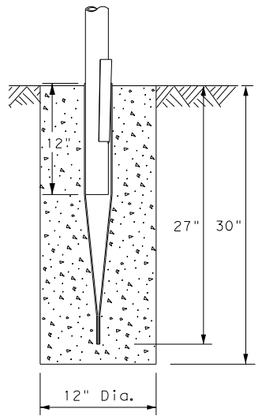
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

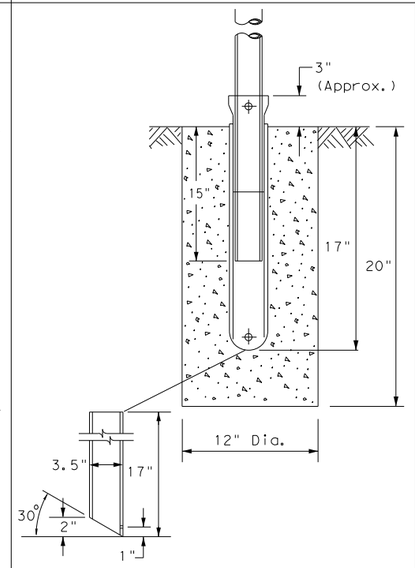
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

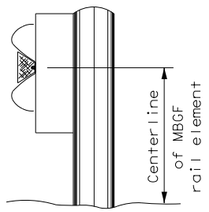
NOTE

1. Install per manufacturer's recommendations.

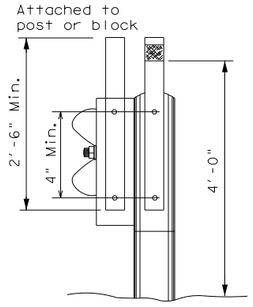
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

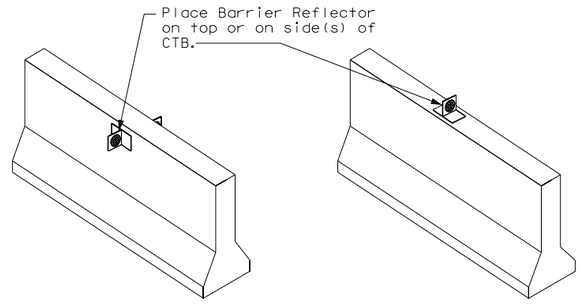
GF1



GF2



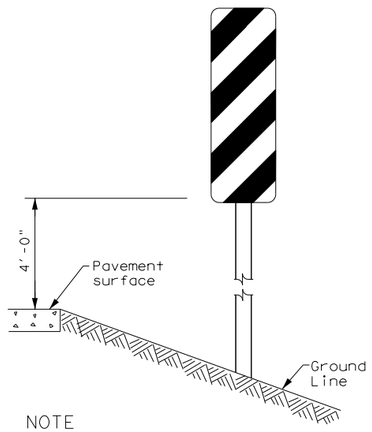
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

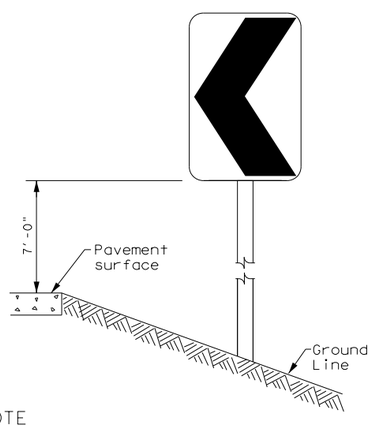
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

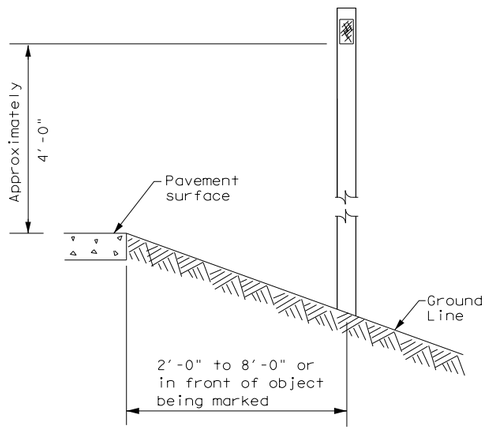
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	COMAL		227

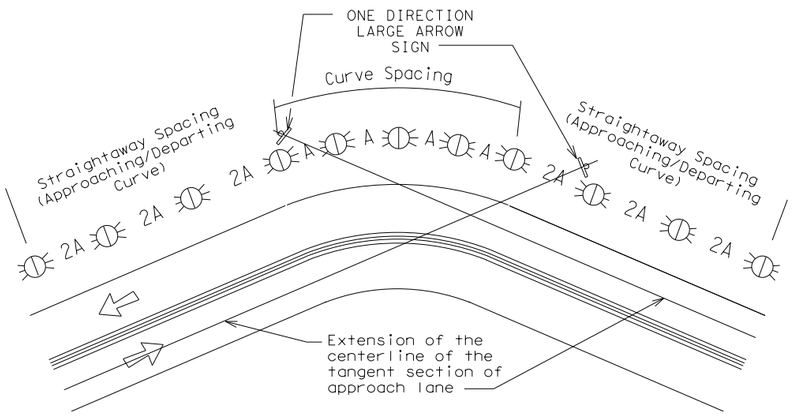
20B

DATE: 11/3/2023 1:45:39 PM
FILE: $FILE$

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

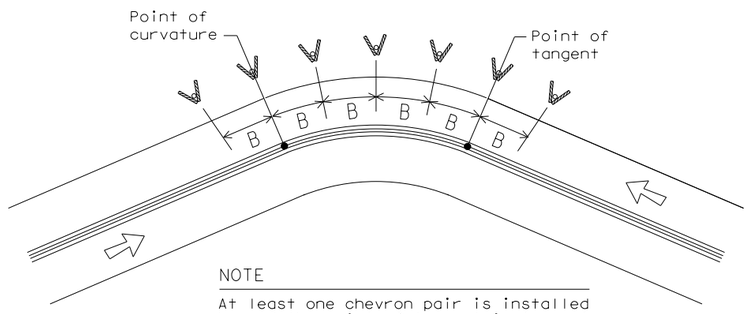
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	SAT	COMAL		228

20C

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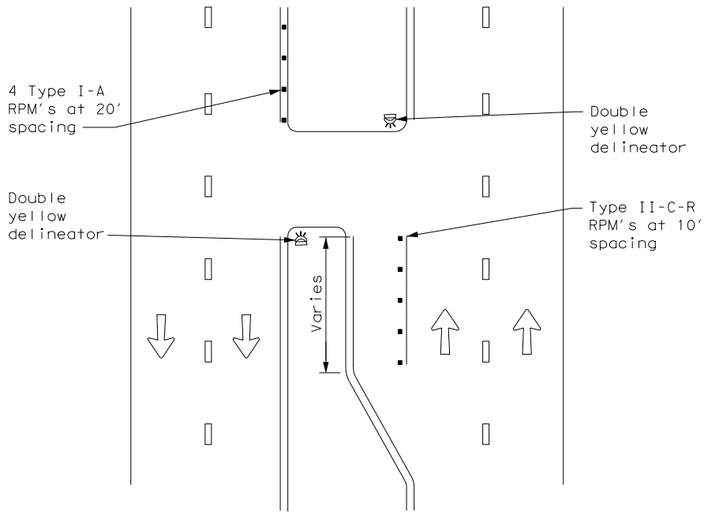
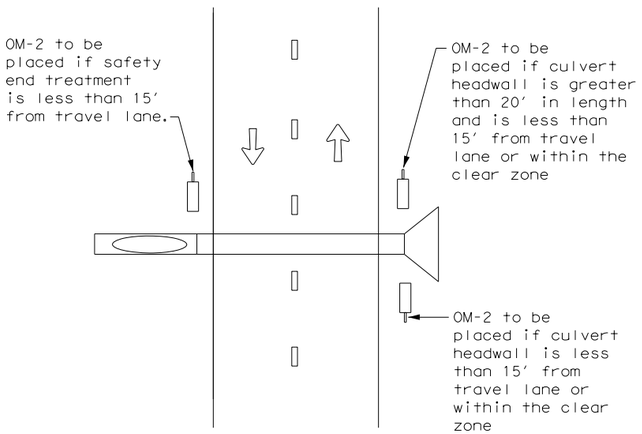
CROSSOVERS



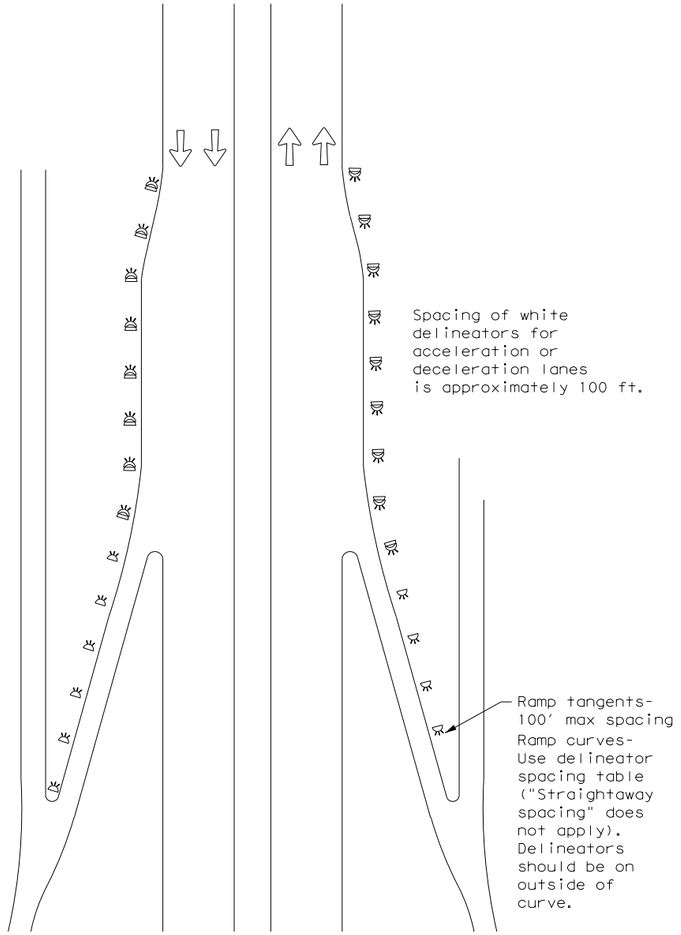
DETAIL 1

FOR CULVERTS WITHOUT MBGF



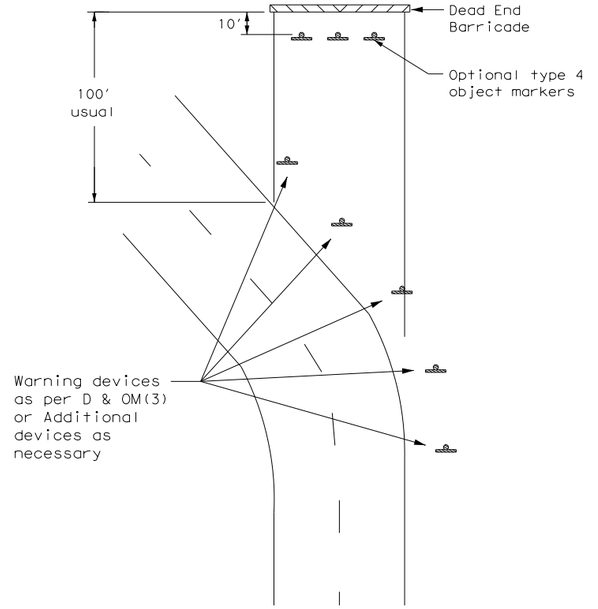
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



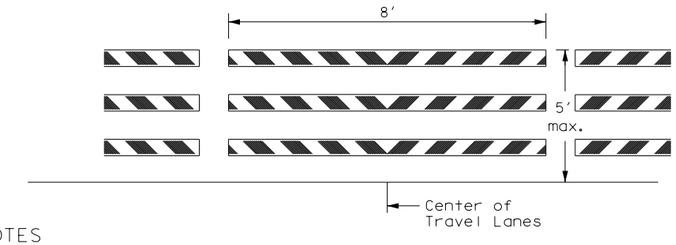
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

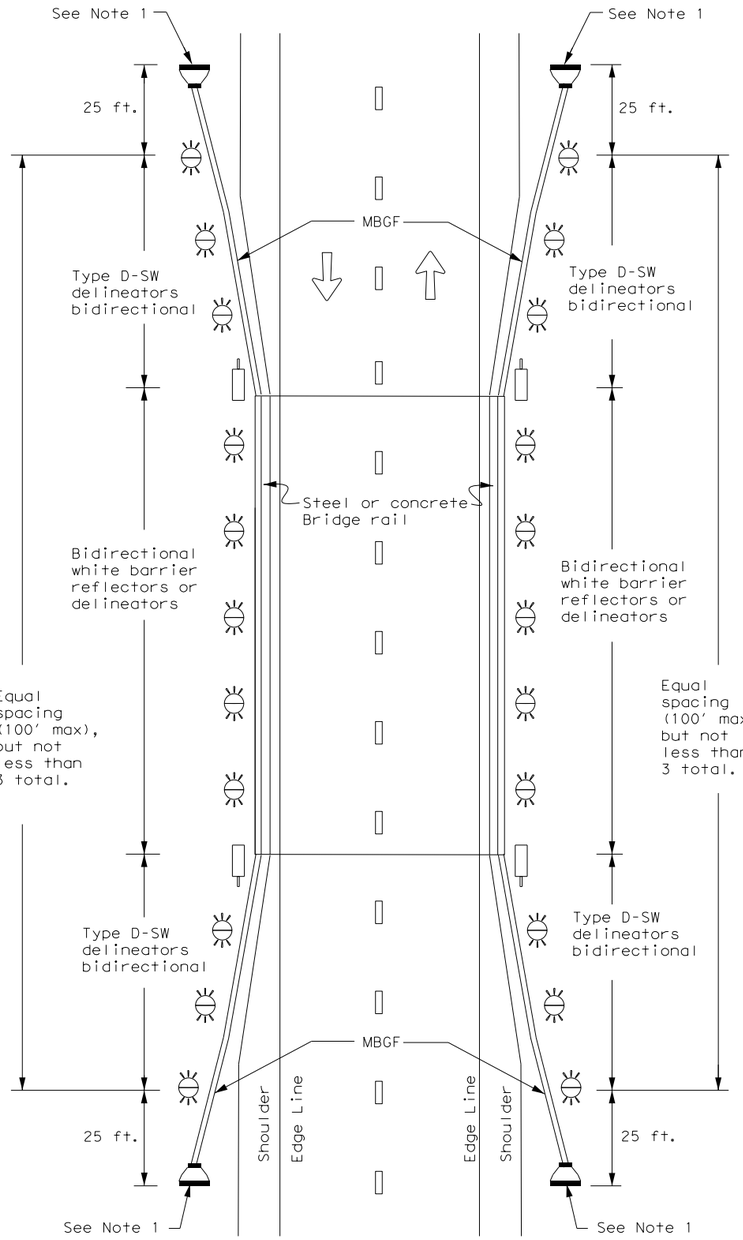
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
3-15	DIST	COUNTY		SHEET NO.
7-20	SAT	COMAL		229

20D

DATE: 11/3/2023 1:45:43 PM
FILE: $FILE$

DATE: 11/3/2023 1:45:44 PM
FILE: $FILE$

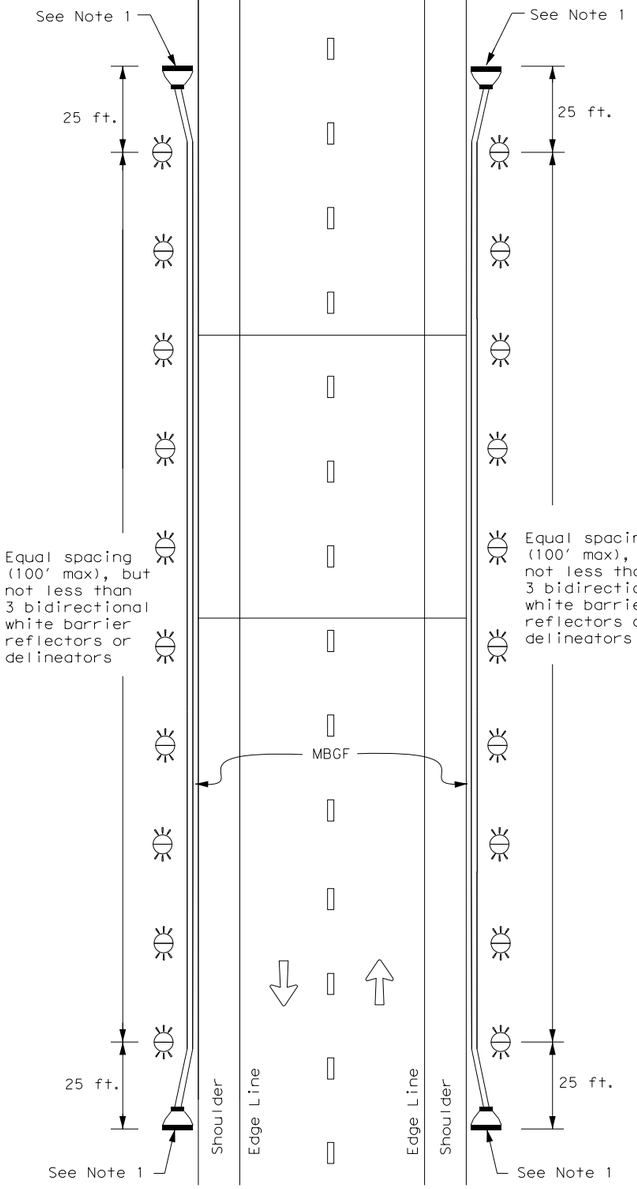
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

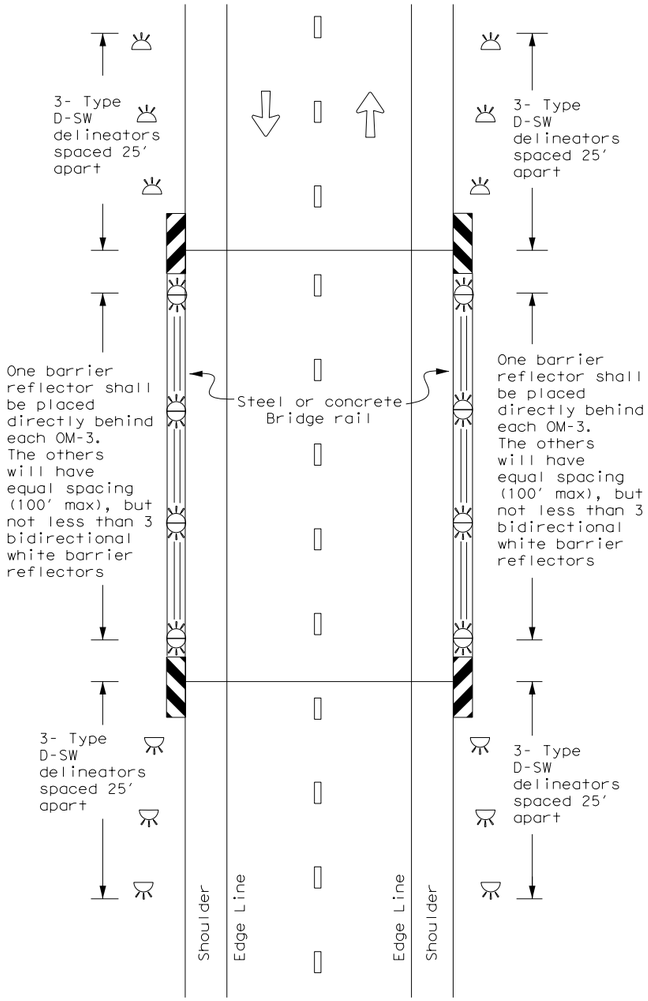
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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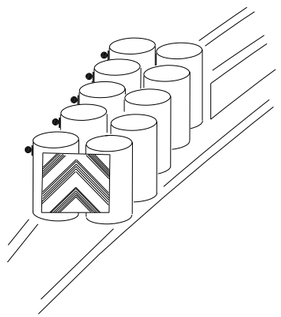
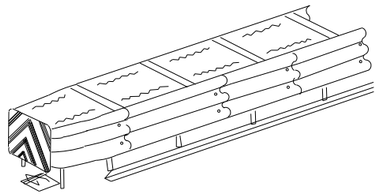
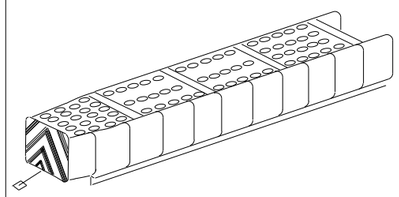
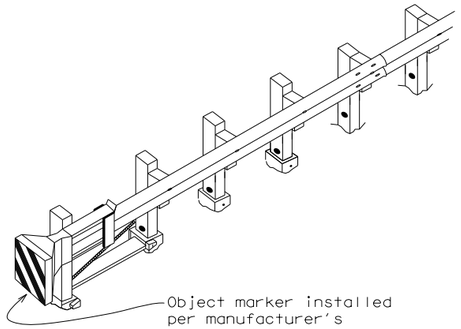
	SAT	COMAL		230

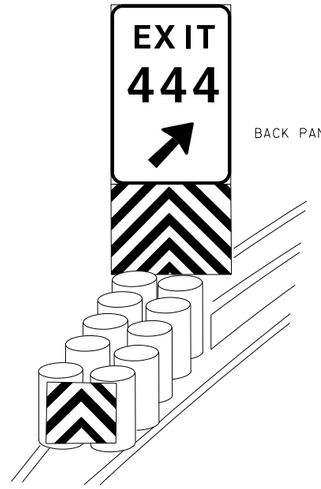
20E

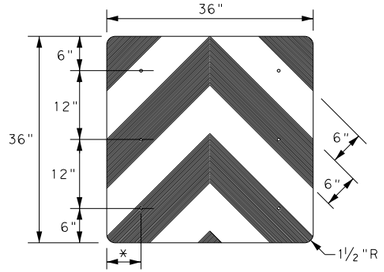


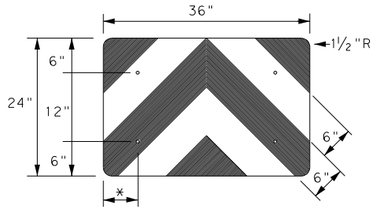




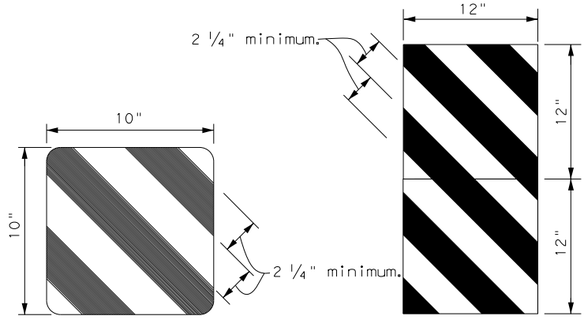




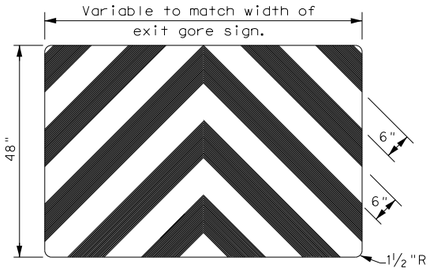


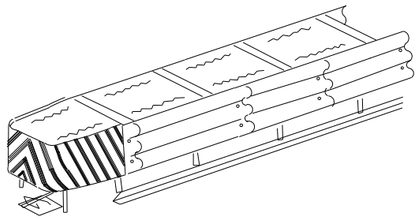


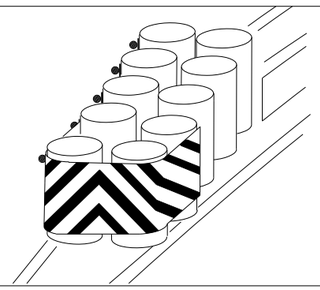
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

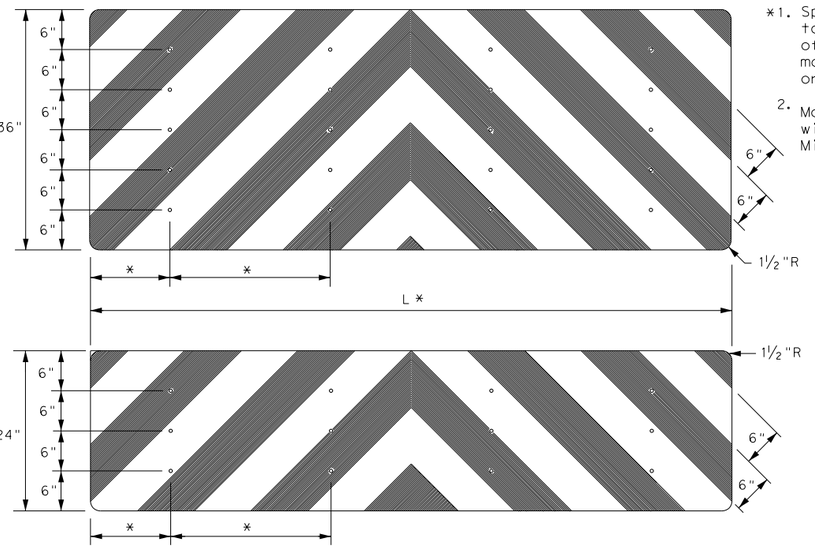


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers 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. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. 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.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
4-92 8-04	DIST	COUNTY		SHEET NO.
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20G

DATE: 11/3/2023 1:45:46 PM
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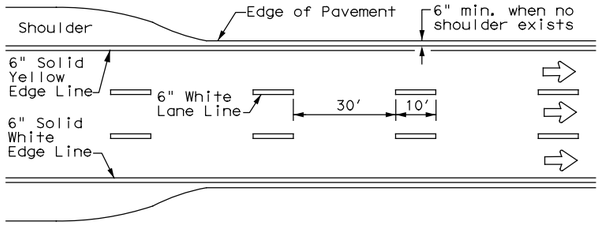
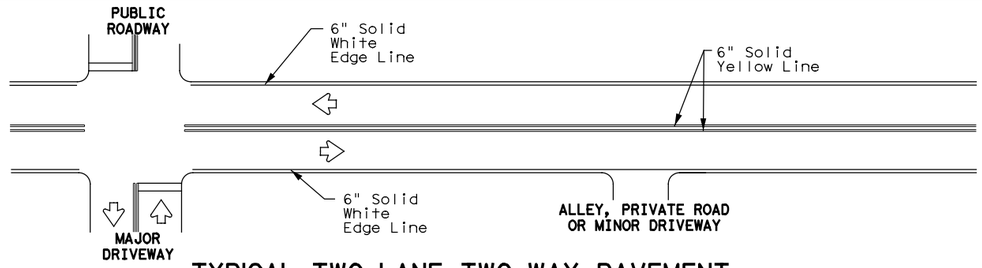
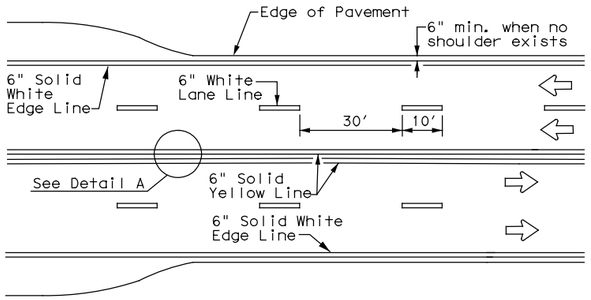
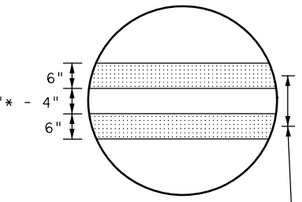


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





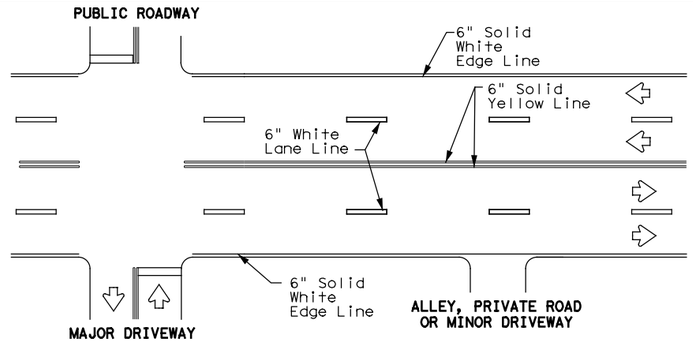
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

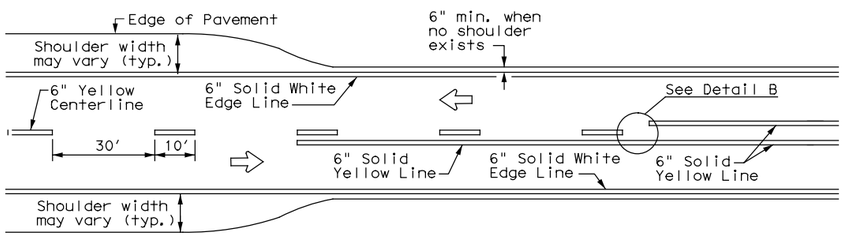
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

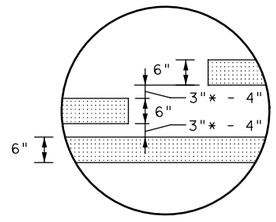
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



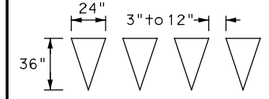
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

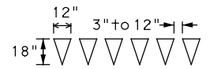
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

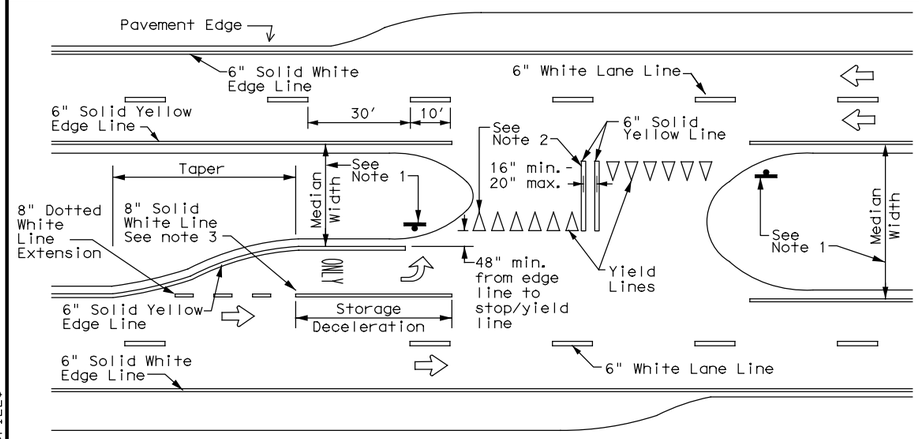


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

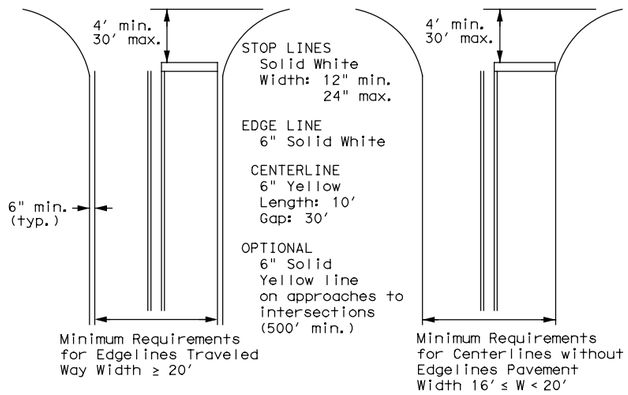
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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.
2. 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

1. 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

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	3212	05	013	FM 3351
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22A

DATE: 11/3/2023 3:02:12 PM
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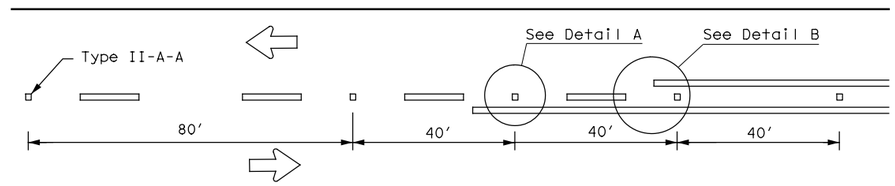
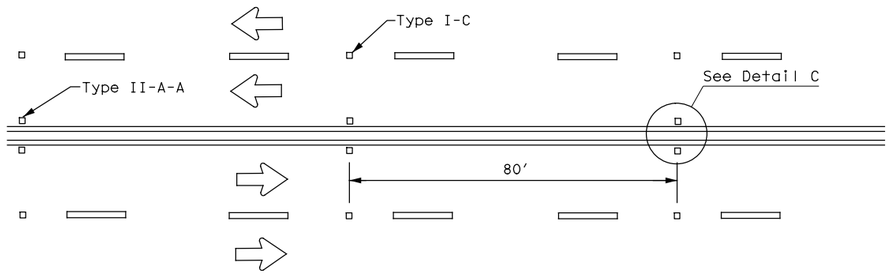
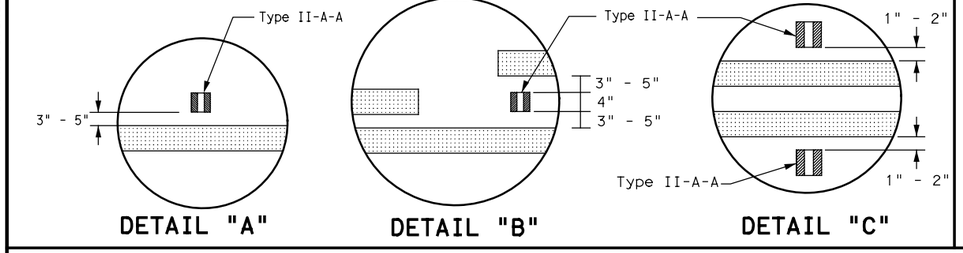
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

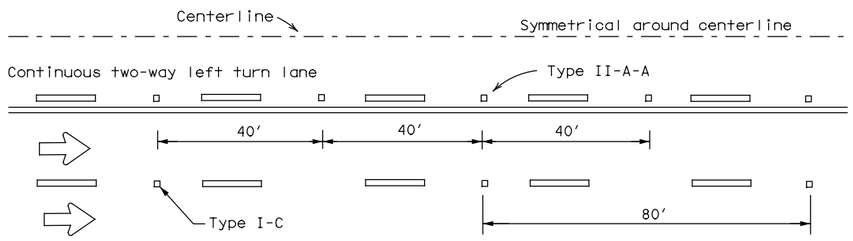


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

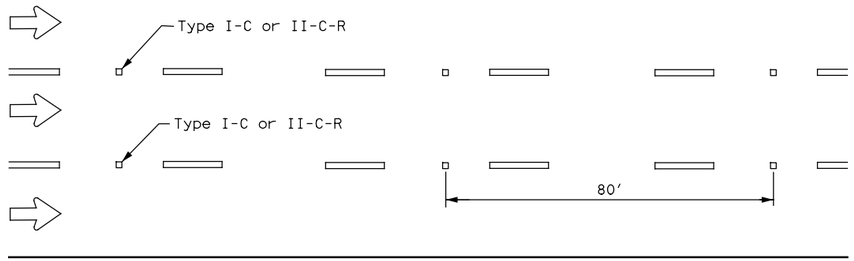


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



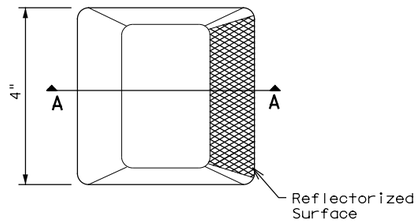
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

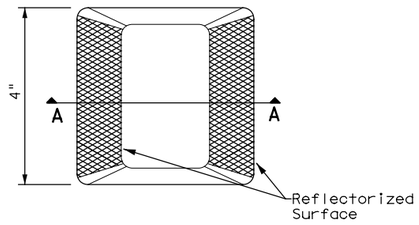
See Note 3.

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

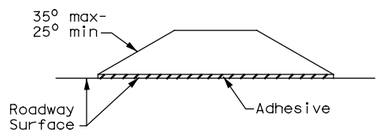
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

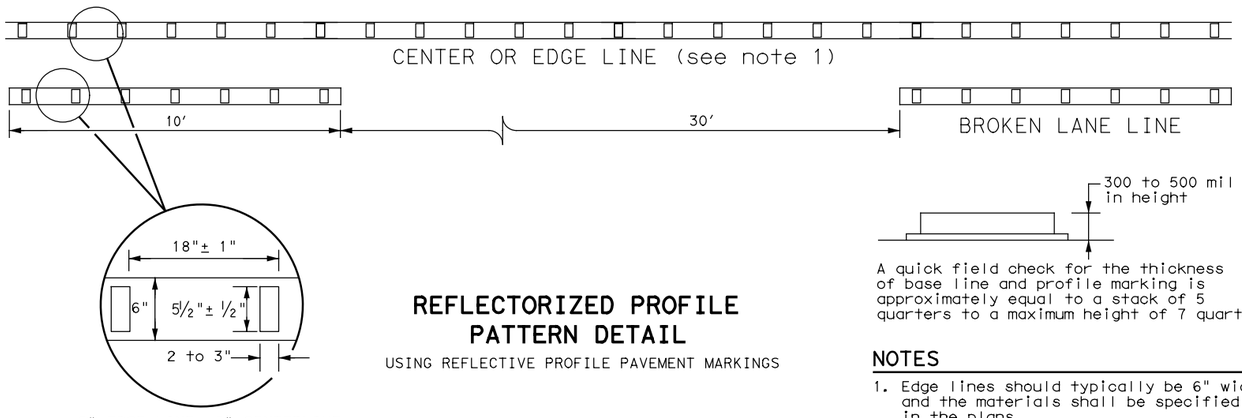


Type II (Top View)



SECTION A

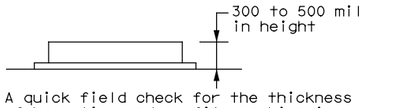
RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. 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.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		233

22B

DATE: 11/3/2023 3:02:14 PM
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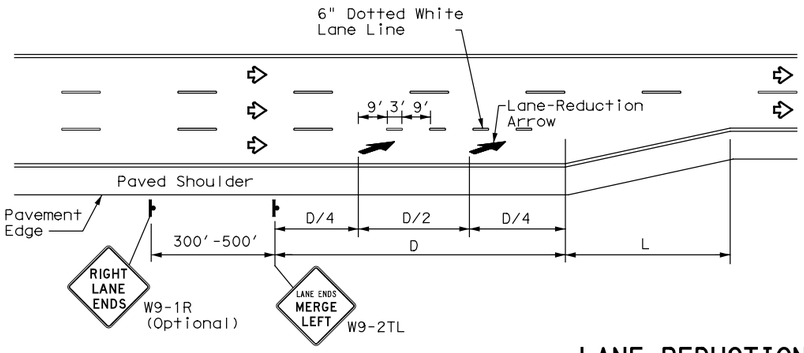
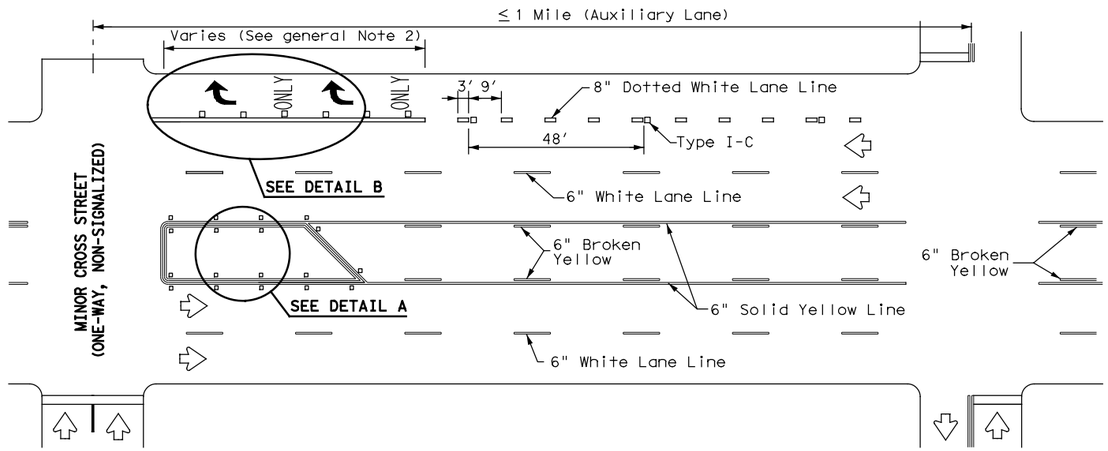


LANE REDUCTION

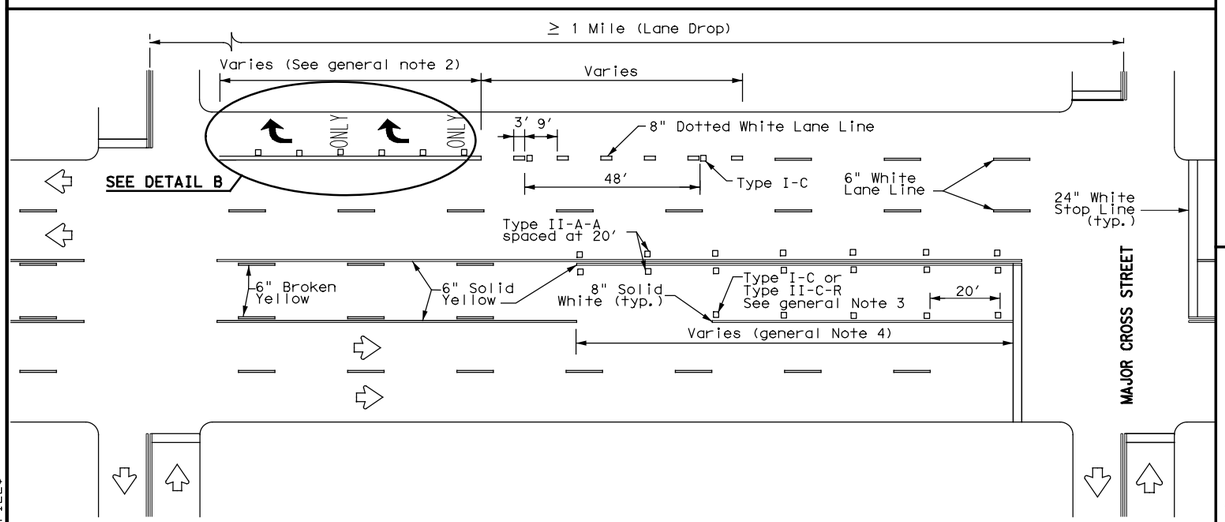
NOTES

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 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.

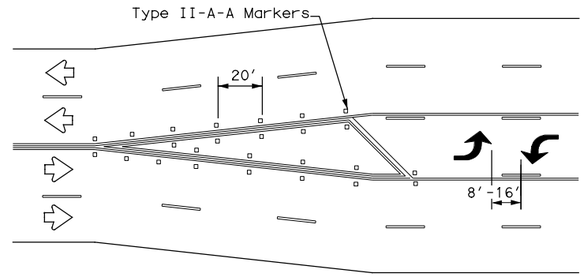
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



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.

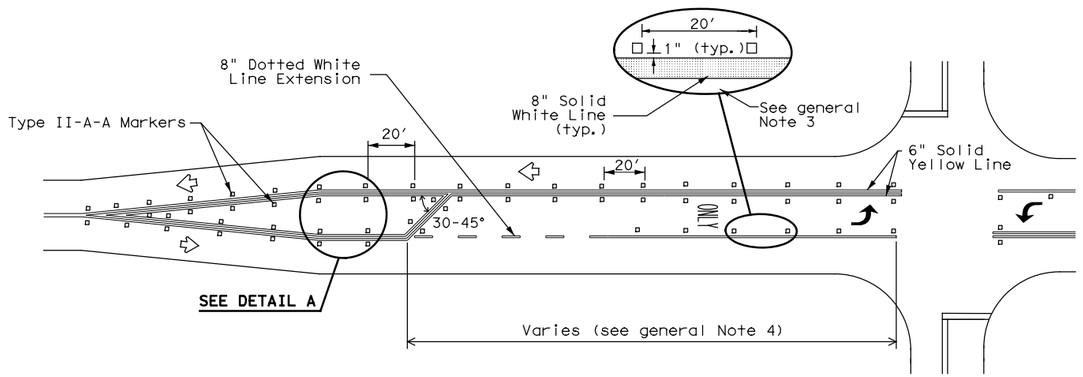
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

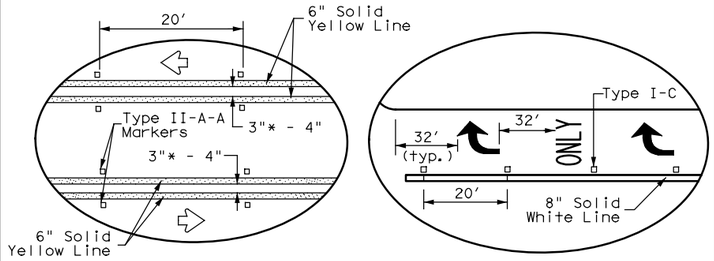
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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.
3. 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



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		234

22C

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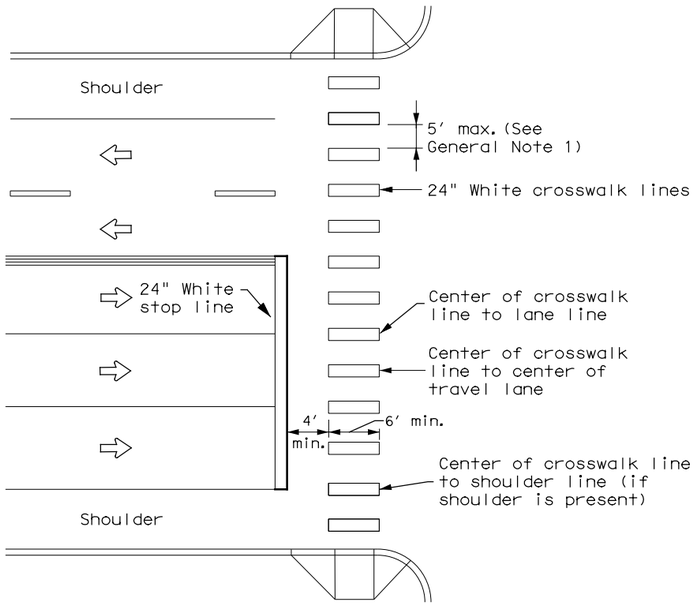


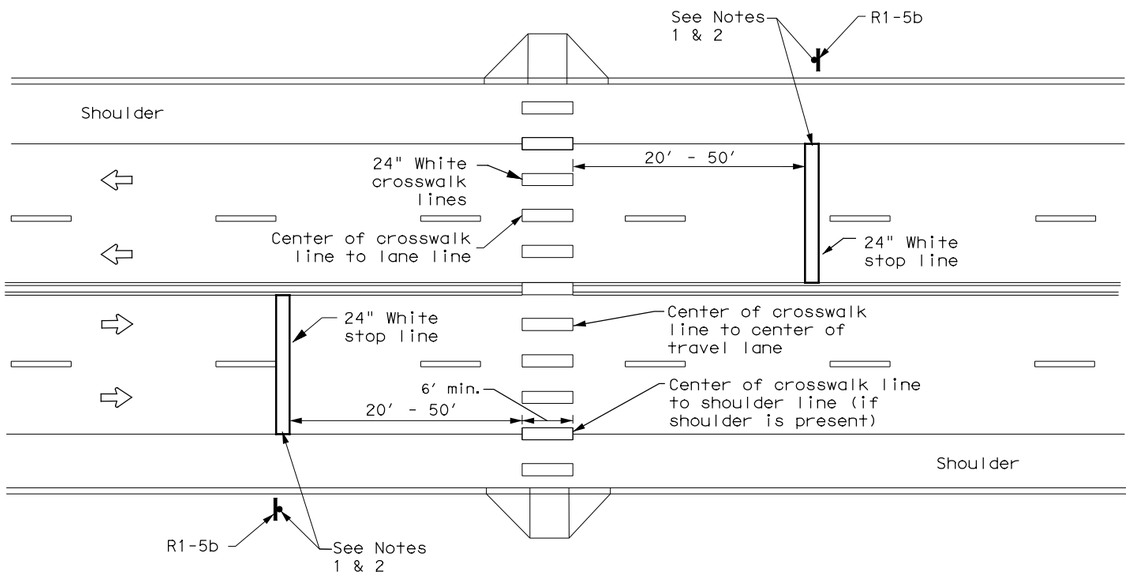
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. 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).
2. 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.
3. 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.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. 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.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
6-20	DIST	COUNTY		SHEET NO.
6-22	SAT	COMAL		235
12-22				
22D				

DATE: 11/3/2023 2:48:14 PM
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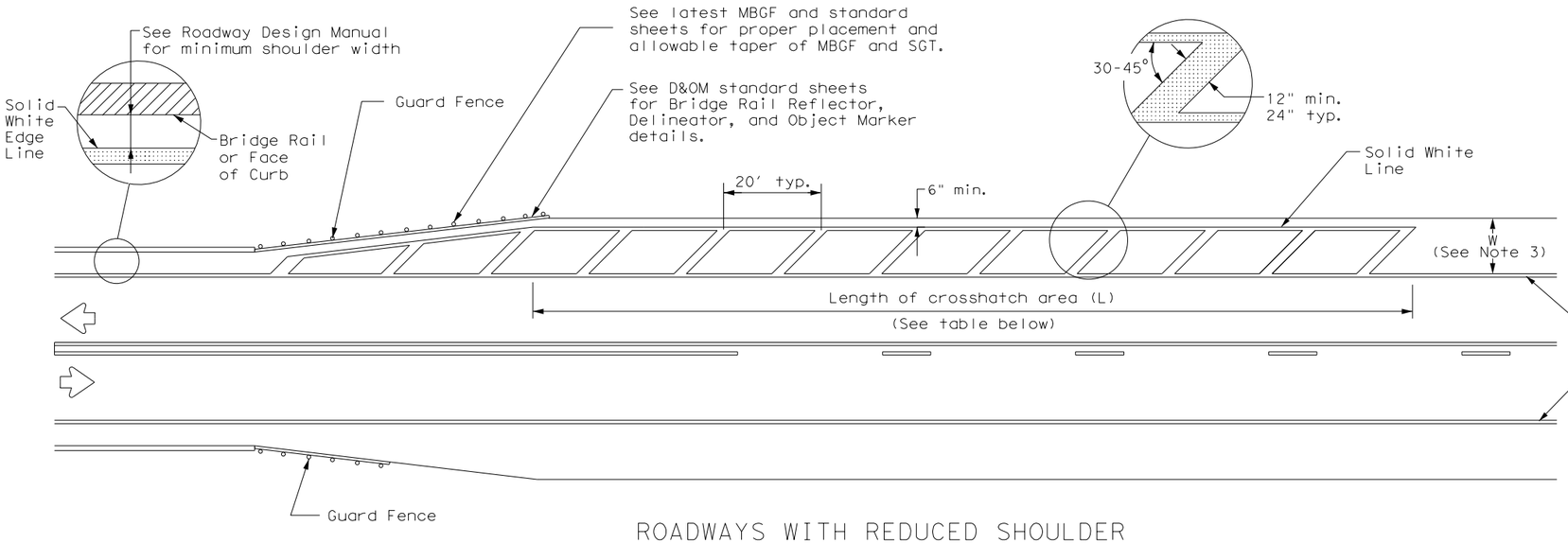

ROADWAYS WITH REDUCED SHOULDER
WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

NOTES

1. 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 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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.

Texas Department of Transportation

Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		236

22E

DATE: 11/3/2023 2:48:13 PM
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CHECKED BY: G.C./OMG
REVISED ON: 5-18
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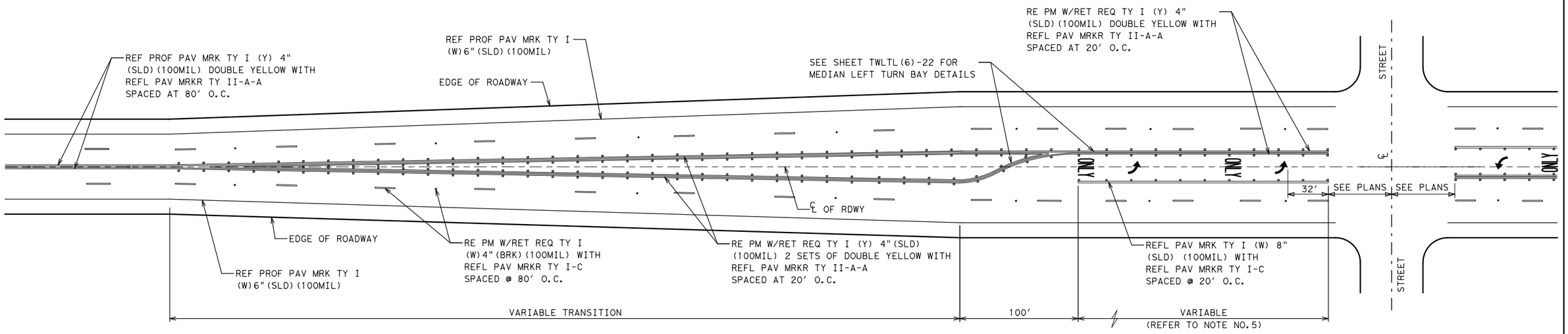
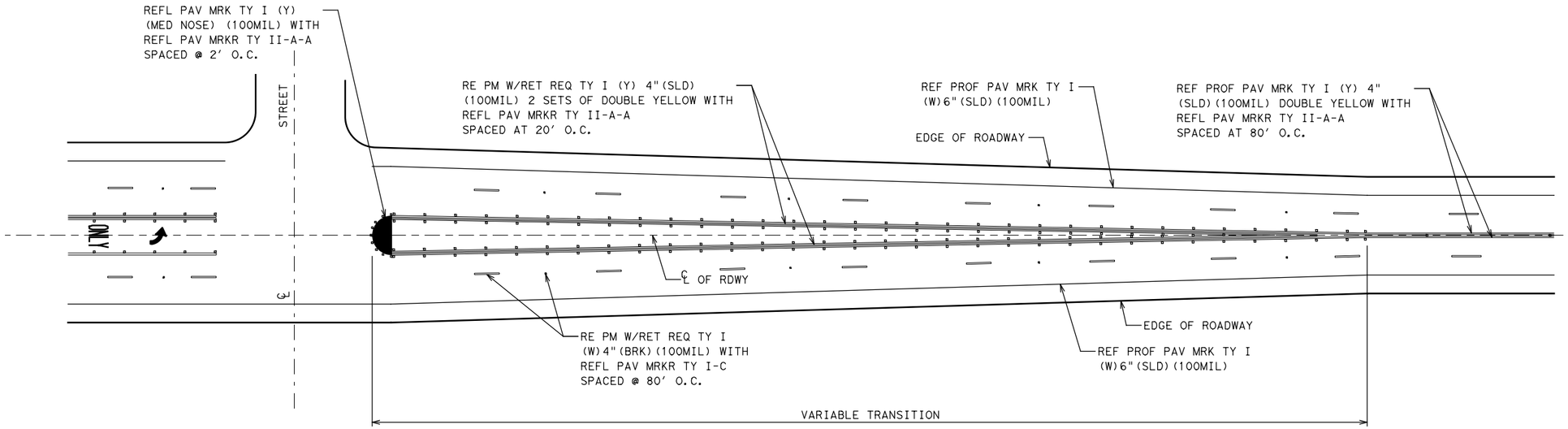
11/3/2023



TYPICAL MEDIAN LEFT TURN BAY (FOR USE ON RURAL ROADS)

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS
WITH LEFT TURN BAY

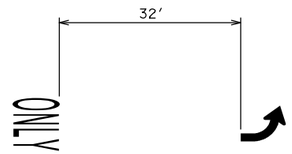


NOTES:

1. PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STATE STANDARDS PM(2)-20 (POSITIONING GUIDANCE).
2. PAVEMENT MARKING ARROWS SHALL COMPLY TO TEXAS MUTCD
3. LEFT TURN BAY LAYOUT, TWO SETS OF "WORDS" AND "ARROWS" SHALL BE USED IF THE LENGTH OF THE BAY IS EQUAL TO OR GREATER THAN 180 FEET. THE BOTTOM OF THE FIRST "ONLY" SHALL BE PLACED AT THE BEGINNING OF THE TURN BAY LANE LINE AS SHOWN ABOVE.
4. REFER TO TXDOT STANDARD PM(3)-20 FOR MORE TURN LANE DETAILS.
5. REFER TO TXDOT ROADWAY DESIGN MANUAL FOR DECELERATION AND STORAGE LENGTH.

TYPICAL TRANSITION

LEFT TURN BAY END CONDITION AND ROADWAY TRANSITION



LEGEND

TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO STATE STANDARD PM(3)-20)

San Antonio District Standard

TWO WAY LEFT TURN LANE AND LEFT TURN BAYS - RURAL ROADS

SCALE: NS

TWLTL(1)-22

REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
MAY 2010	6	$FAP-NUM$		237
MAY 2018	STATE	DIST.	COUNTY	
MAY 2022	TEXAS	SAT	COMAL	
	CONT.	SECT.	JOB	HIGHWAY NO.
	3212	05	013	FM 3351

$FILE$

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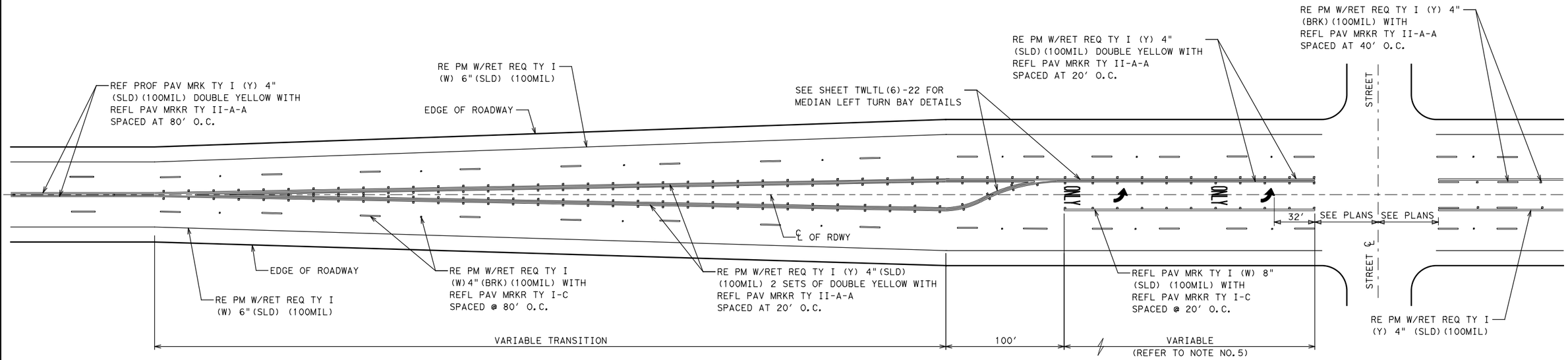
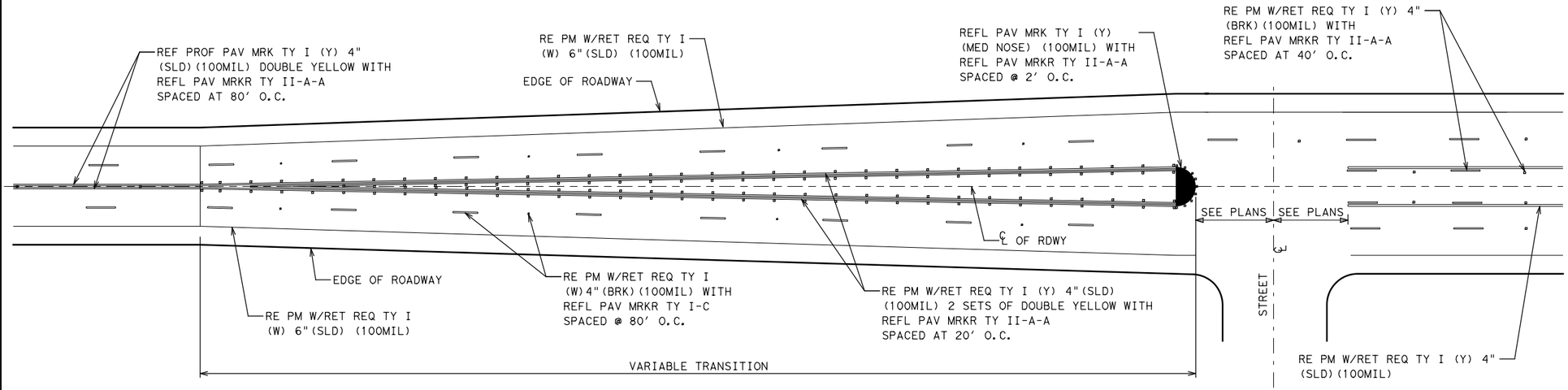
REVISED BY: JC03
CHECKED BY: OMG
REVISED ON: 5-18
3:21:59 PM
11/3/2023



TYPICAL MEDIAN LEFT TURN BAY

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS
AT BEGINNING AND END OF TWO WAY CENTER LEFT TURN LANE

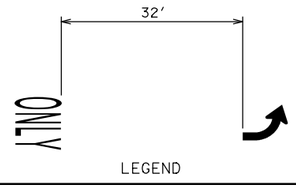


TYPICAL TRANSITION

AT BEGINNING AND END OF TWO WAY CENTER LEFT TURN LANE

NOTES:

1. PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STATE STANDARDS PM(2)-20 (POSITIONING GUIDANCE).
2. PAVEMENT MARKING ARROWS SHALL COMPLY TO TEXAS MUTCD
3. LEFT TURN BAY LAYOUT, TWO SETS OF "WORDS" AND "ARROWS" SHALL BE USED IF THE LENGTH OF THE BAY IS EQUAL TO OR GREATER THAN 180 FEET. THE BOTTOM OF THE FIRST "ONLY" SHALL BE PLACED AT THE BEGINNING OF THE TURN BAY LANE LINE AS SHOWN ABOVE.
4. REFER TO TXDOT STANDARD PM(3)-20 FOR MORE TURN LANE DETAILS.
5. REFER TO TXDOT ROADWAY DESIGN MANUAL FOR DECELERATION AND STORAGE LENGTH.



LEGEND

TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO STATE STANDARD PM(3)-20)

San Antonio District Standard

TWO WAY LEFT TURN LANE AND LEFT TURN BAYS - URBAN ROADS

SCALE: NS

TWLTL(2)-22

REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
MAY 2010 MAY 2018 MAY 2022	6	$FAP-NUM$		238
	STATE	DIST.	COUNTY	
	TEXAS	SAT	COMAL	
	CONT.	SECT.	JOB	HIGHWAY NO.
	3212	05	013	FM 3351

$FILE$

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REVISED ON: 5-18
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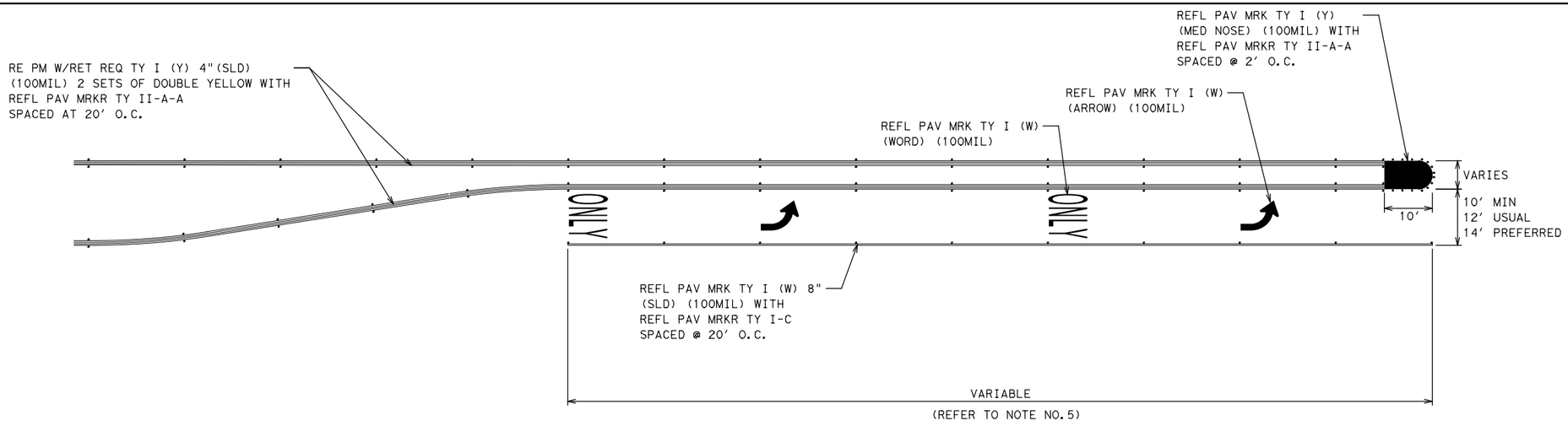
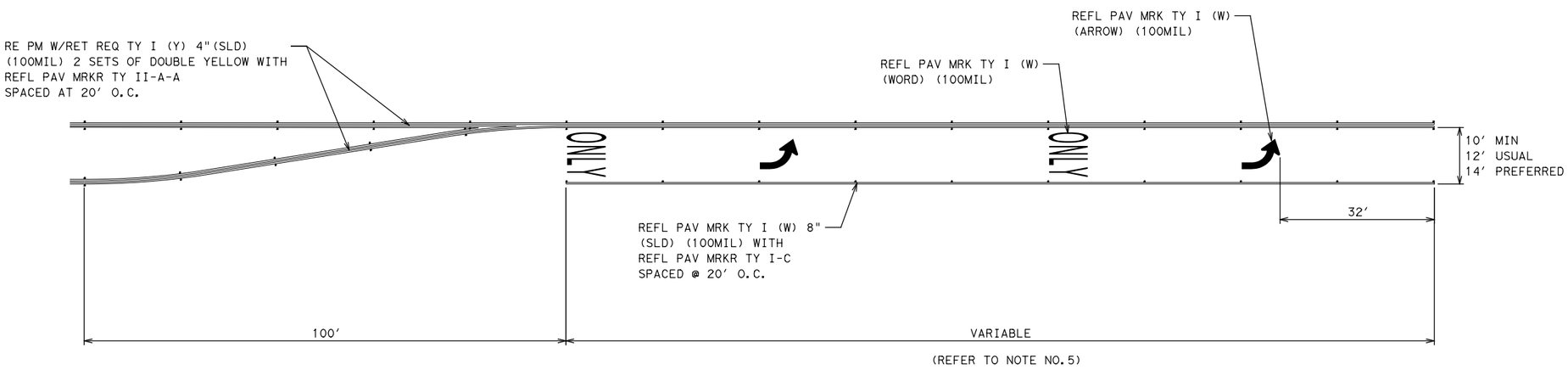
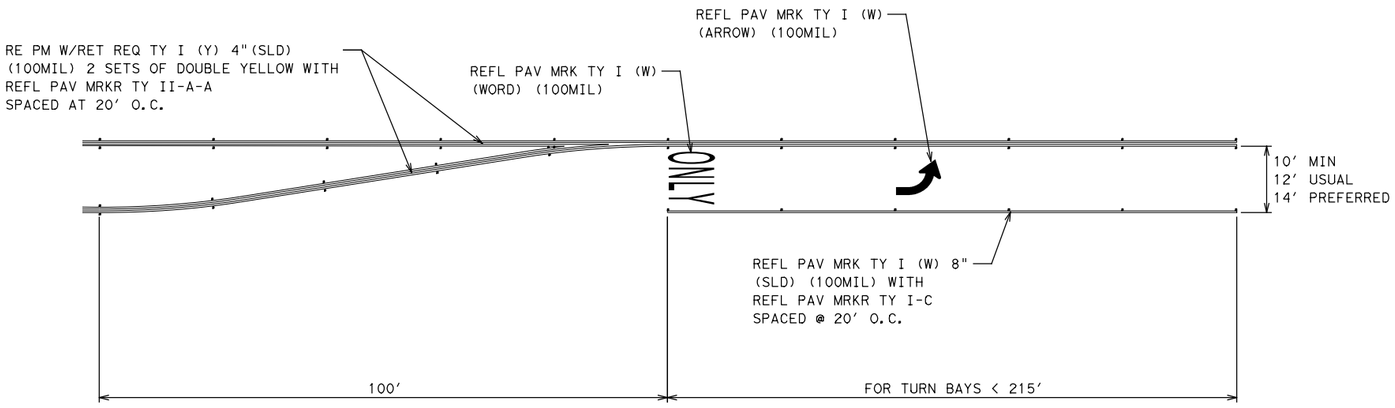
11/3/2023







MEDIAN LEFT TURN BAY DETAILS

NOTES:

1. PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STATE STANDARDS PM(2)-20 (POSITIONING GUIDANCE).
2. PAVEMENT MARKING ARROWS SHALL COMPLY TO TEXAS MUTCD
3. LEFT TURN BAY LAYOUT, TWO SETS OF "WORDS" AND "ARROWS" SHALL BE USED IF THE LENGTH OF THE BAY IS EQUAL TO OR GREATER THAN 180 FEET. THE BOTTOM OF THE FIRST "ONLY" SHALL BE PLACED AT THE BEGINNING OF THE TURN BAY LANE LINE AS SHOWN ABOVE.
4. REFER TO TXDOT STANDARD PM(3)-20 FOR MORE TURN LANE DETAILS.
5. REFER TO TXDOT ROADWAY DESIGN MANUAL FOR DECELERATION AND STORAGE LENGTH.

San Antonio District Standard

TWO WAY LEFT TURN LANE AND LEFT TURN BAYS - URBAN ROADS

SCALE: NS

TWLTL(6)-22

REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
MAY 2010 MAY 2018 MAY 2022	6	$FAP-NUM$		239
	STATE	DIST.	COUNTY	
	TEXAS	SAT	COMAL	
	CONT.	SECT.	JOB	HIGHWAY NO.
	3212	05	013	FM 3351

$FILE$

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)

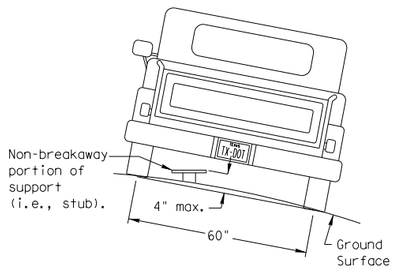
Anchor Type

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))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

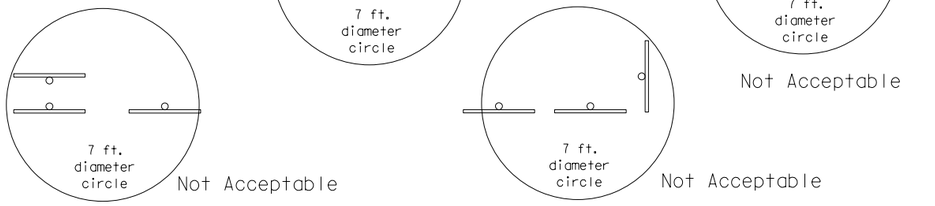
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



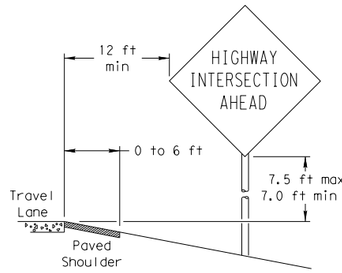
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



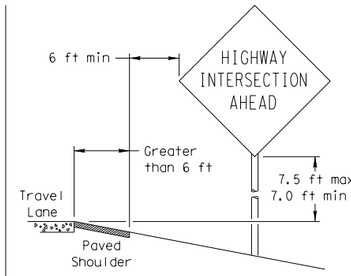
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

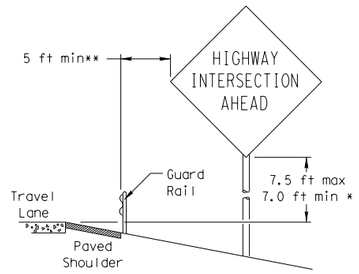
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



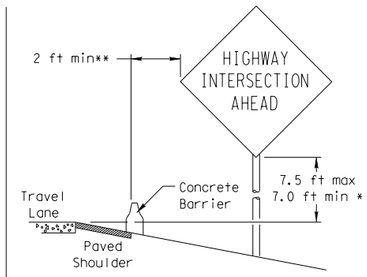
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



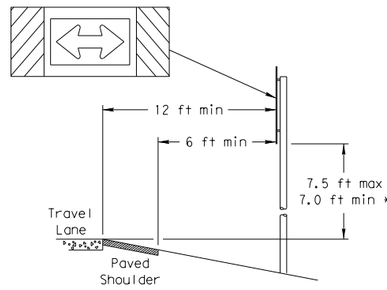
BEHIND GUARDRAIL



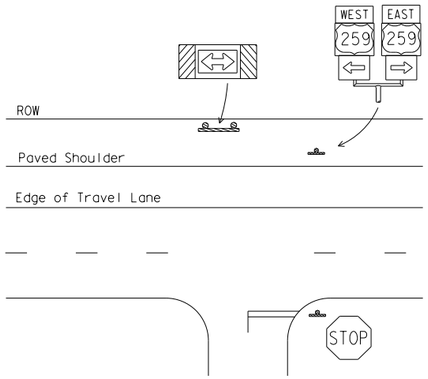
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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.



* 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

(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.

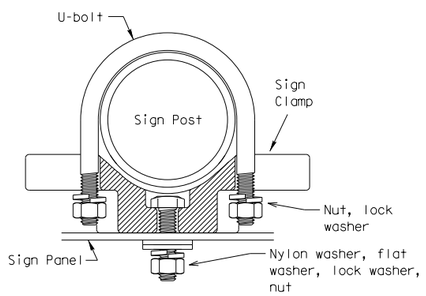
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

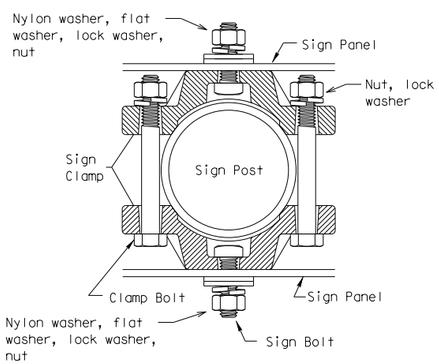


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

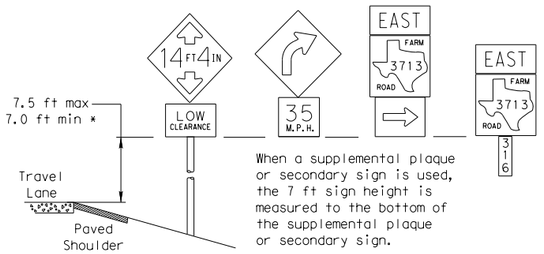
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



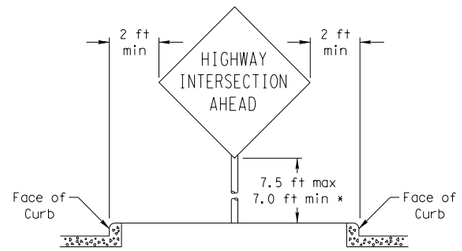
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



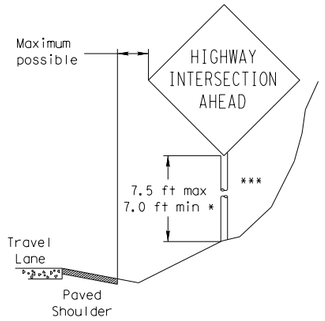
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



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 lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
3212	05	013	FM 3351

DIST	COUNTY	SHEET NO.
SAT	COMAL	240

26A

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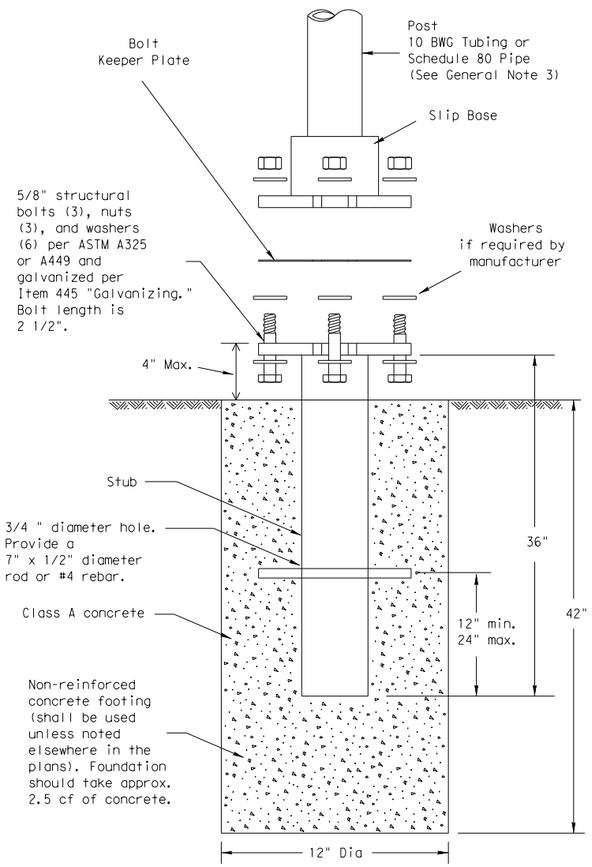
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

GENERAL NOTES:

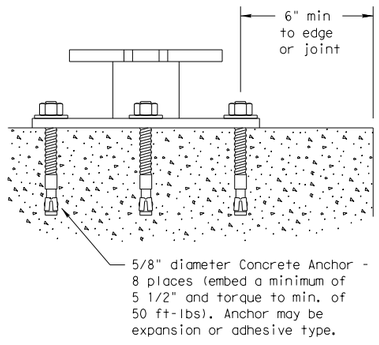
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   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.

Support
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 straight.
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.

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 normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

CONT	SECT	JOB	HIGHWAY
3212	05	013	FM 3351
DIST	COUNTY		SHEET NO.
SAT	COMAL		241

26B

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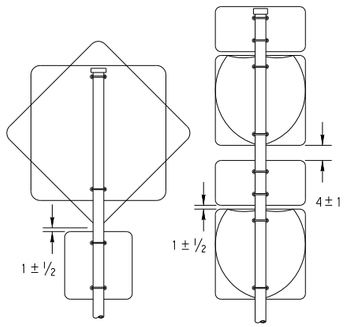
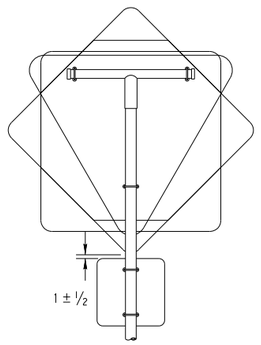


SM RD SGN ASSM TY XXXXX(1)XX(P)



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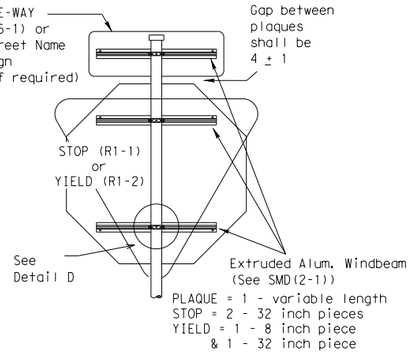
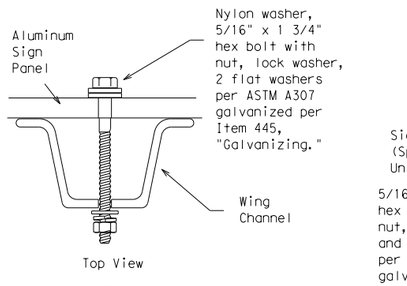
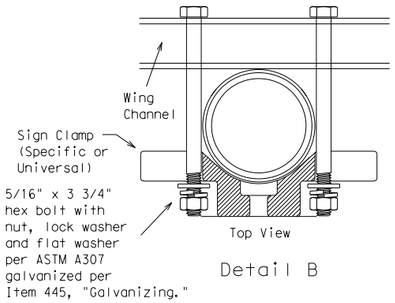


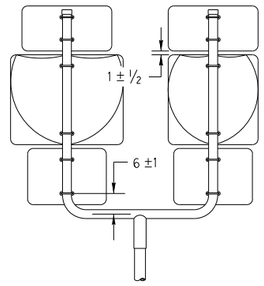
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



Detail B



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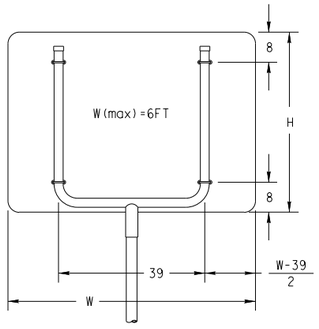

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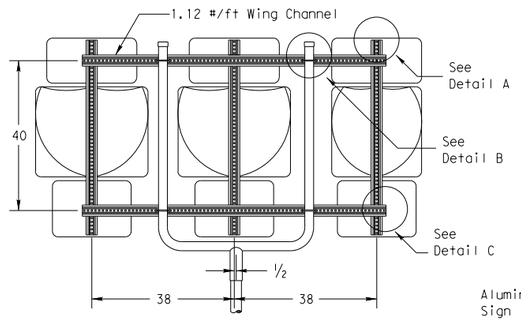
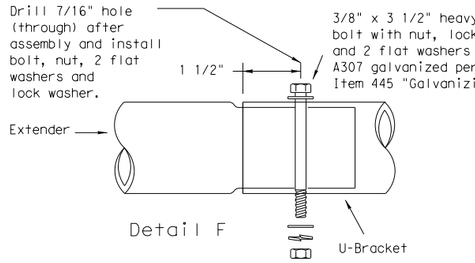
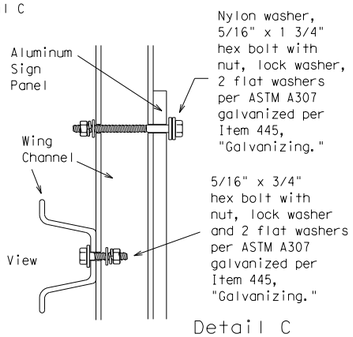


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

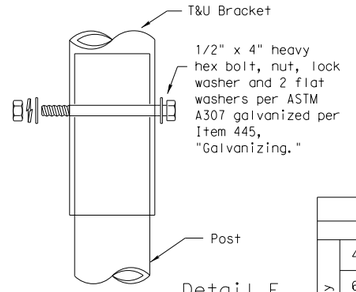


Detail F

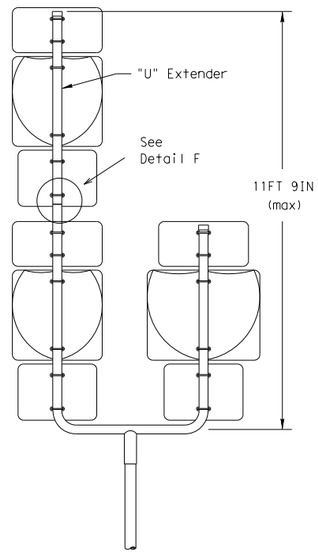
Splices shall only be allowed behind the sign substrate.



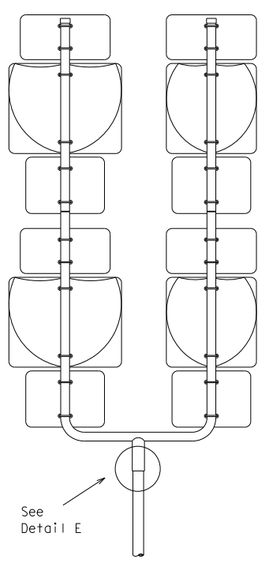
Detail C



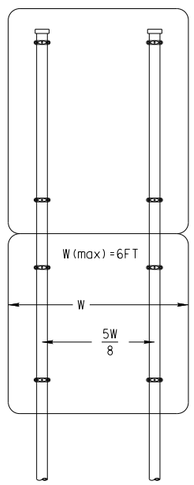
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

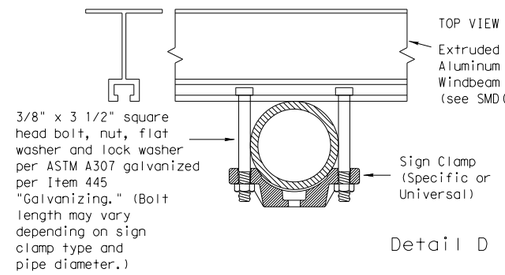


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

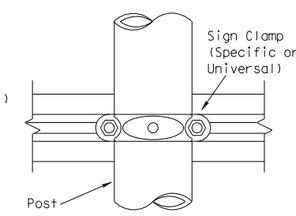


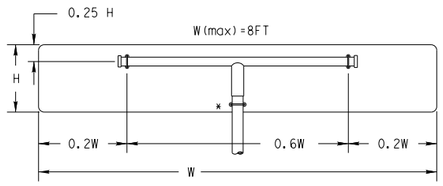
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

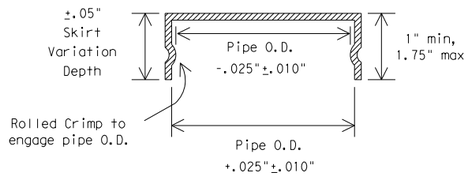




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



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.

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

2. 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. 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
Regulatory	48-inch STOP sign (R1-1)	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)
Warning	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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	3212	05	013	FM 3351
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	SAT	COMAL		242

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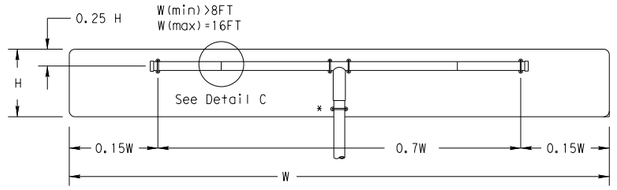
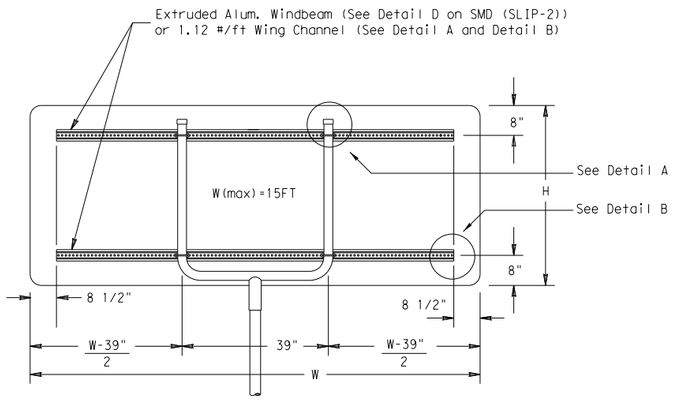


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)



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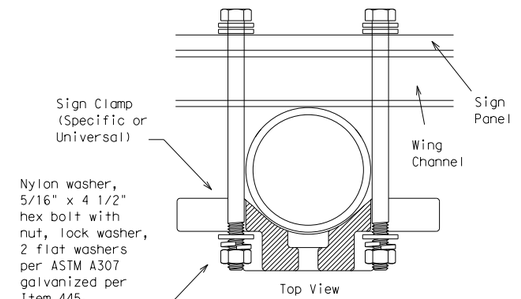
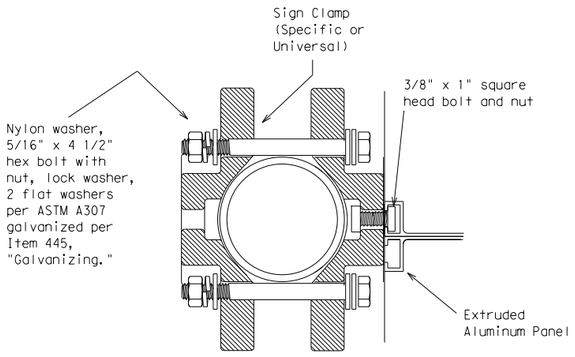
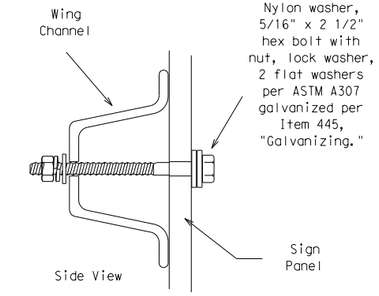


Detail A

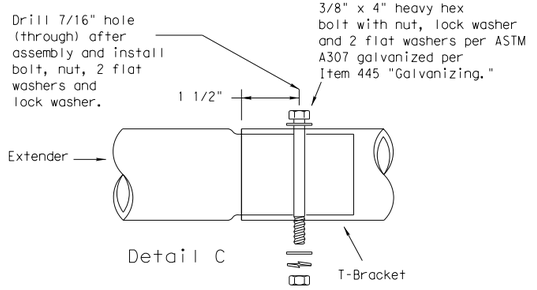


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

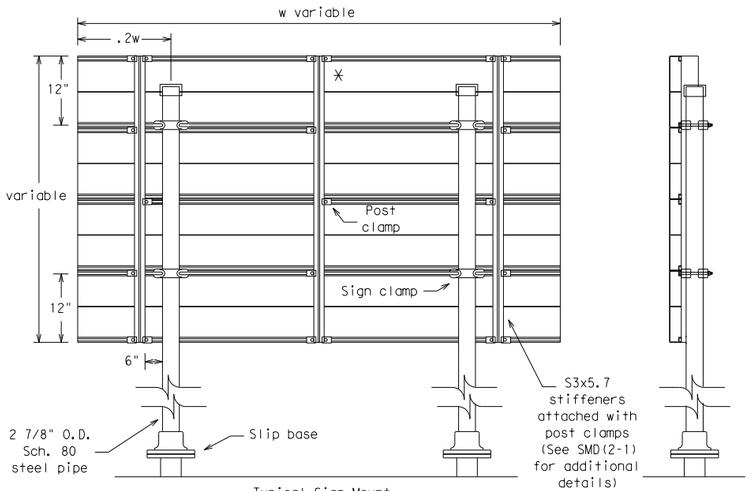


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

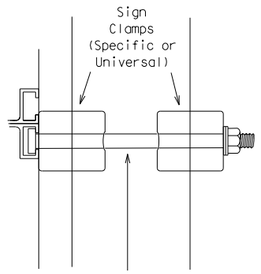


Typical Sign Mount

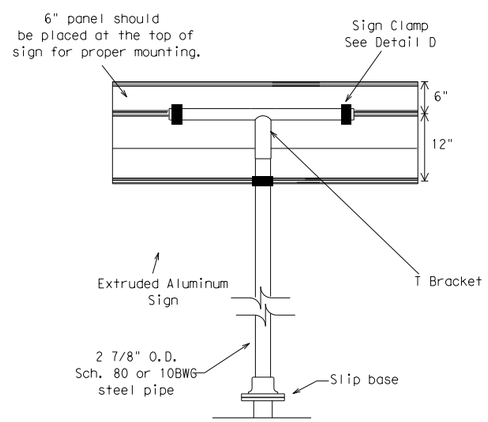
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

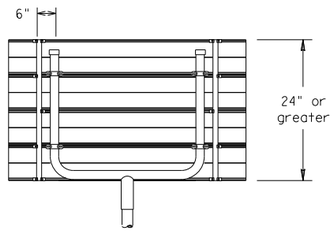
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

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

2. 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. 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. Sign blanks shall be the sizes and shapes shown on the plans.
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
Regulatory	48-inch STOP sign (R1-1)	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)
Warning	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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
3212	05	013	FM 3351

DIST	COUNTY	SHEET NO.
SAT	COMAL	243

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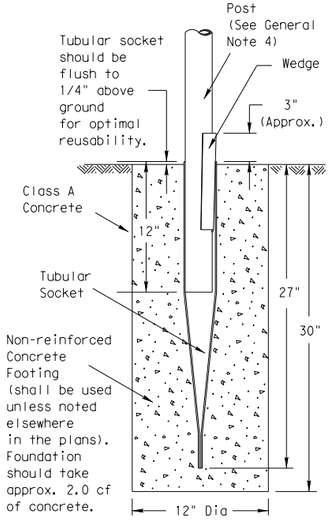
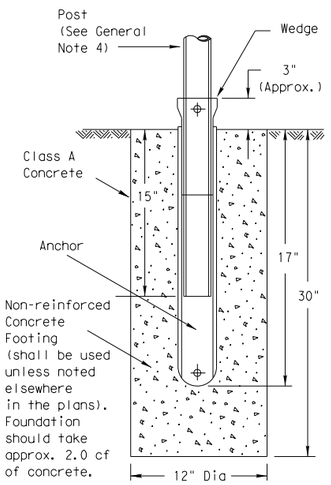
Wedge Anchor Steel System



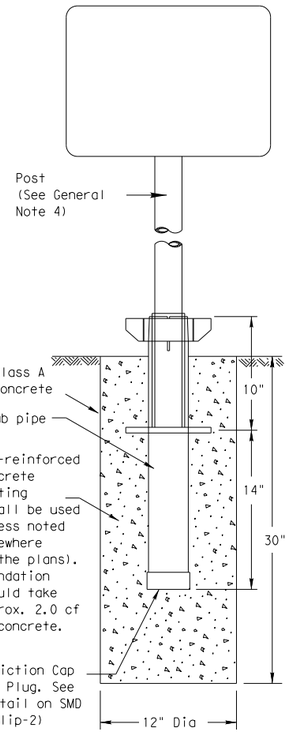
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

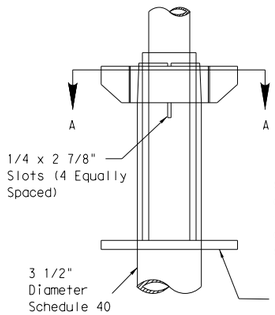


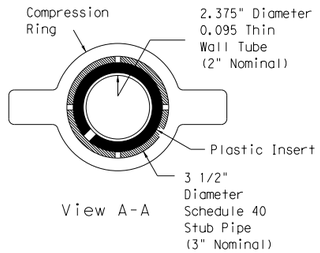
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



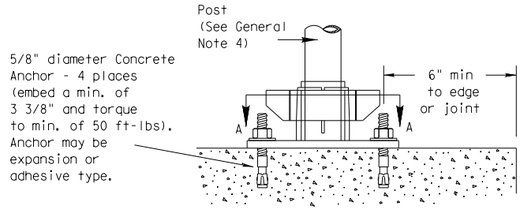
SM RD SGN ASSM TY TWT(X)UA(P)



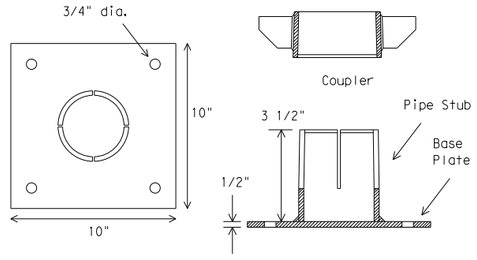


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

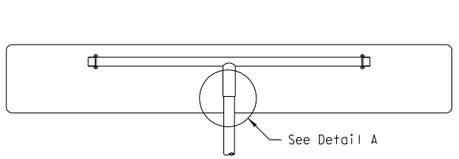


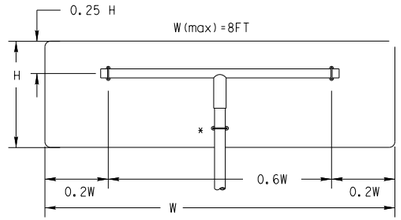
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.



SM RD SGN ASSM TY TWT(X)UB(P)

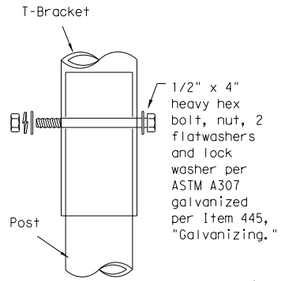
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

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 Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   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 per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
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: http://www.txdot.gov/publications/traffic.htm

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. 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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
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

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. Insert base post in hole to depths shown and backfill hole with concrete.
3. 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.
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.
7. 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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
3212	05	013	FM 3351
DIST	COUNTY		SHEET NO.
SAT	COMAL		244

26E

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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 any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

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):

CSJ: 3212-05-013

1.2 PROJECT LIMITS:

From: FM 3351 STA 256+00.00

To: FM 3351 STA 281+75.00

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29°44'25.61"N ,(Long) 98°37'23.94"W

END: (Lat) 29°44'51.11"N ,(Long) 98°37'24.09"W

1.4 TOTAL PROJECT AREA (Acres): 12.06 AC

1.5 TOTAL AREA TO BE DISTURBED (Acres): 5.08 AC

1.6 NATURE OF CONSTRUCTION ACTIVITY:

CONSISTING OF RECONSTRUCT EXISTING BRIDGE AT CIBOLO CREEK AND CONSTRUCT CENTER TWO WAY LEFT TURN LANE, SIDEWALK AND SHARED USE PATH.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
ANHALT CLAY (Ca)	WELL-DRAINED CLAY, 0 TO 5% SLOPES
LEWISVILLE SILTY CLAY (LvA/LvB/LeB)	WELL-DRAINED SILTY CLAY, 0 TO 5% SLOPES
ECKRANT COBBLY CLAY (TaB)	WELL-DRAINED COBBLY CLAY, 0 TO 5% SLOPES
ORIF SOILS (Or)	GRAVELLY LOAMY SAND TO COARSE SAND, 0 TO 5% SLOPES
GRUENE CLAY (GrC)	WELL-DRAINED UNIT THAT VARIES FROM CLAY TO GRAVELLY LOAM

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	Sheet #s

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.)

X Mobilization
X Install sediment and erosion controls
X Blade existing topsoil into windrows, prep ROW, clear and grub
X Remove existing pavement
X Grading operations, excavation, and embankment
X Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
X Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
X Install culverts, culvert extensions, SETs
X Install mow strip, MBGF, bridge rail
X Place flex base
X Rework slopes, grade ditches
X Blade windrowed material back across slopes
X Revegetation of unpaved areas
X Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ 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 activities
☐ Transported soils from offsite vehicle tracking
X Construction debris and waste from various construction activities
X Contaminated water from excavation or dewatering pump-out water
X Sanitary waste from onsite restroom facilities
X Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
UPPER CIBOLO CREEK	CIBOLO CREEK SEGMENT # 1908

* Add (*) for impaired waterbodies 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
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X 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 for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
No MS4s recieve stormwater discharge from the site

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		245
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	COMAL	
CONT.	SECT.	JOB	HIGHWAY NO.
3212	05	013	FM 3351

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.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ X Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ X Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ X Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- X ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ X Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 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:

Type	Stationing	
	From	To
Vegetated Filter Strips	256+00.00	262+41.06
Vegetated Filter Strips	256+00.00	261+50.00
Vegetated Filter Strips	256+00.00	261+25.50
Vegetated Filter Strips	256+00.00	263+50.00
Vegetated Filter Strips	276+56.65	281+75.00
Vegetated Filter Strips	274+00.00	277+00.00
Vegetated Filter Strips	275+64.41	281+75.00
Vegetated Filter Strips	274+00.00	281+75.00

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
- X Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ 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	
	From	To

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 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 .

2.9 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.

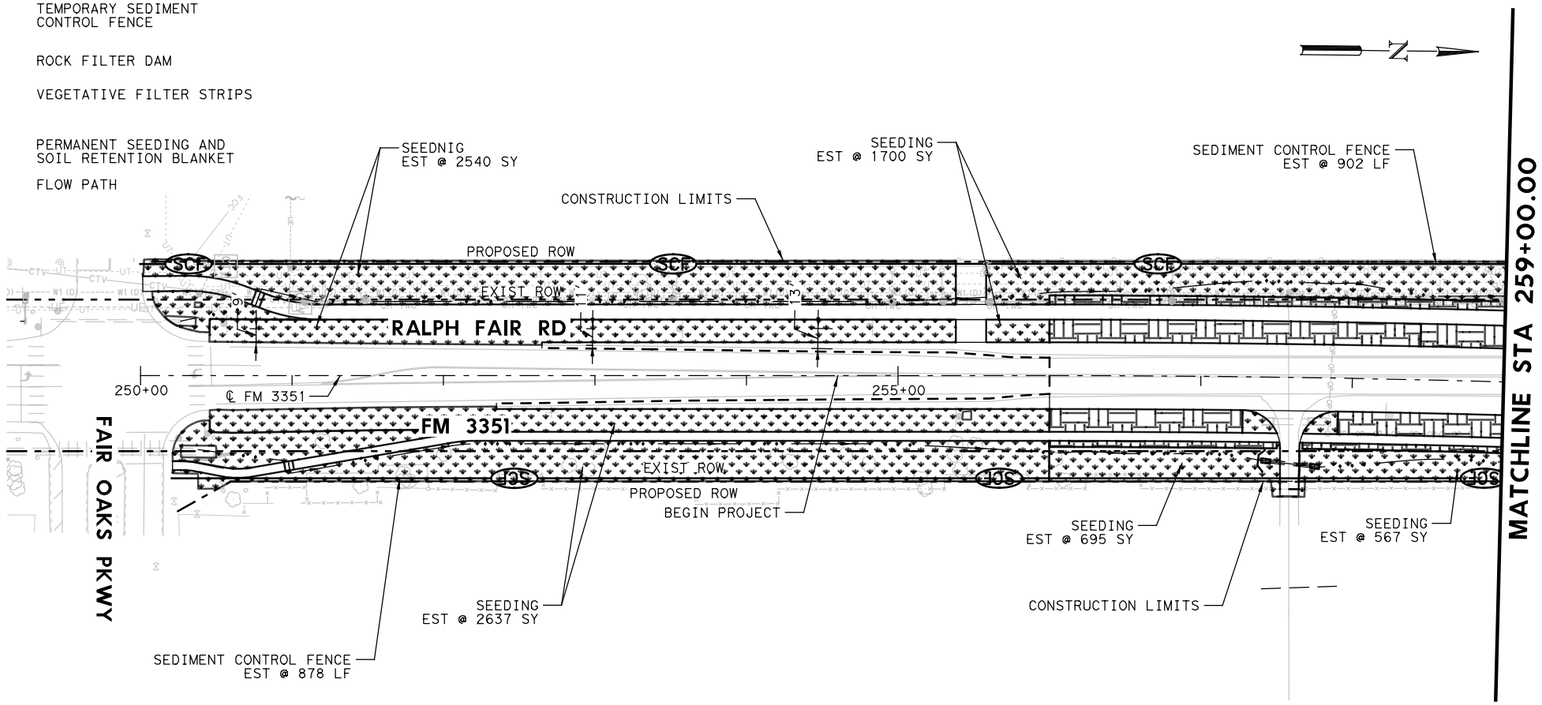
STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		246
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	COMAL	
CONT.	SECT.	JOB	HIGHWAY NO.
3212	05	013	FM 3351

ENVIRONMENTAL LEGEND

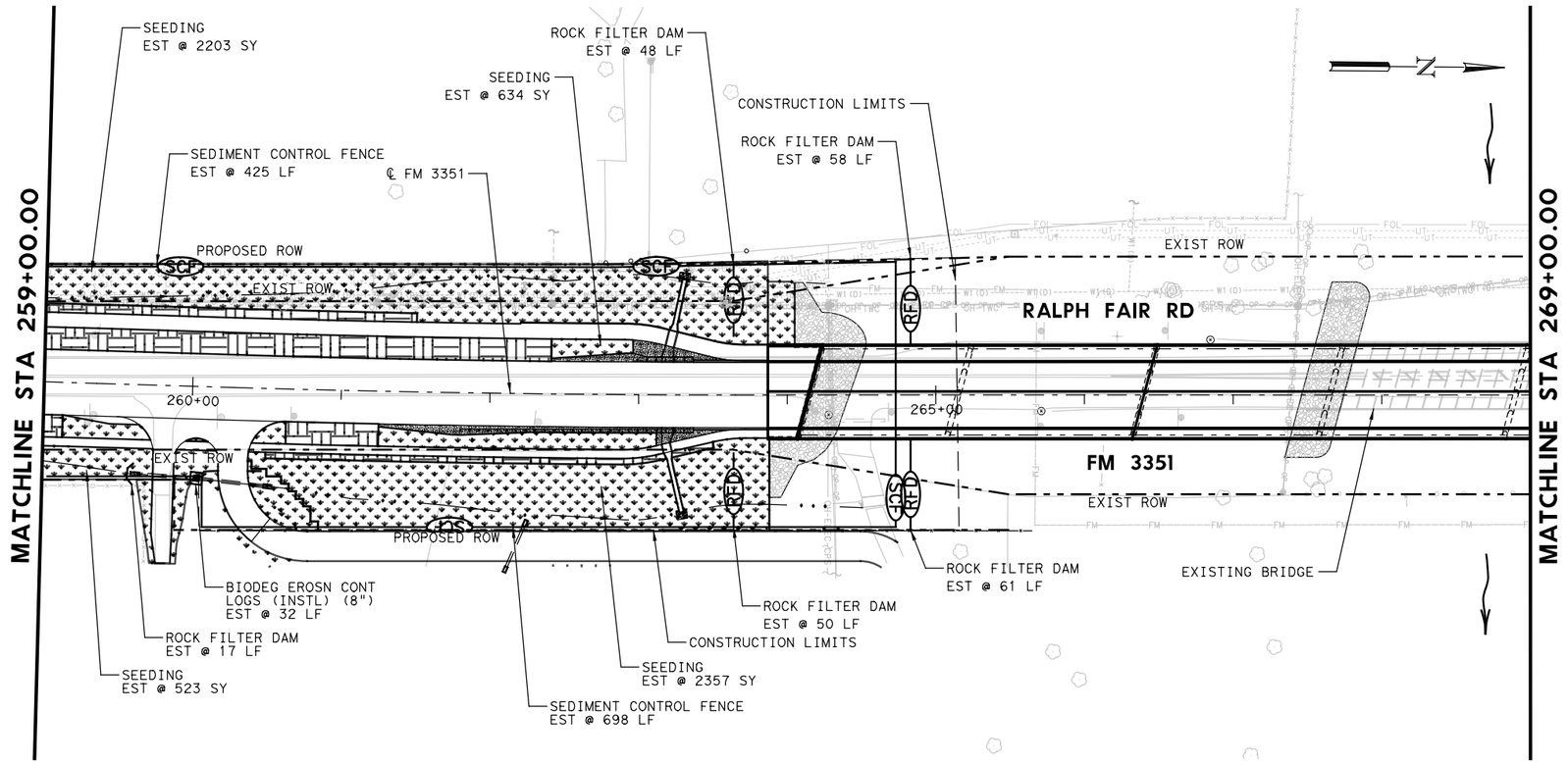
- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM
- VEGETATIVE FILTER STRIPS
- PERMANENT SEEDING AND SOIL RETENTION BLANKET
- FLOW PATH



SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	13856
164 6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	13856
164 6009	BROADCAST SEED (TEMP) (WARM)	SY	6928
164 6011	BROADCAST SEED (TEMP) (COOL)	SY	6928
168 6001	VEGETATIVE WATERING	MG	648
169 6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	13856
506 6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	234
506 6011	ROCK FILTER DAMS (REMOVE)	LF	234
506 6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	78
506 6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	78
506 6024	CONSTRUCTION EXITS (REMOVE)	SY	156
506 6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3139
506 6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3139
506 6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	32
506 6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	32

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMODATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3) FOR DETAILS.
5. QUANTITY FOR VEGETATIVE FILTER STRIPS ARE INCLUDED IN FURNISHING AND PLACING TOPSOIL, BROADCAST SEED, AND SOIL RETENTION BLANKETS QUANTITIES.



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

SW3P LAYOUT

SCALE: 1"=100' SHEET 1 OF 2

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	247

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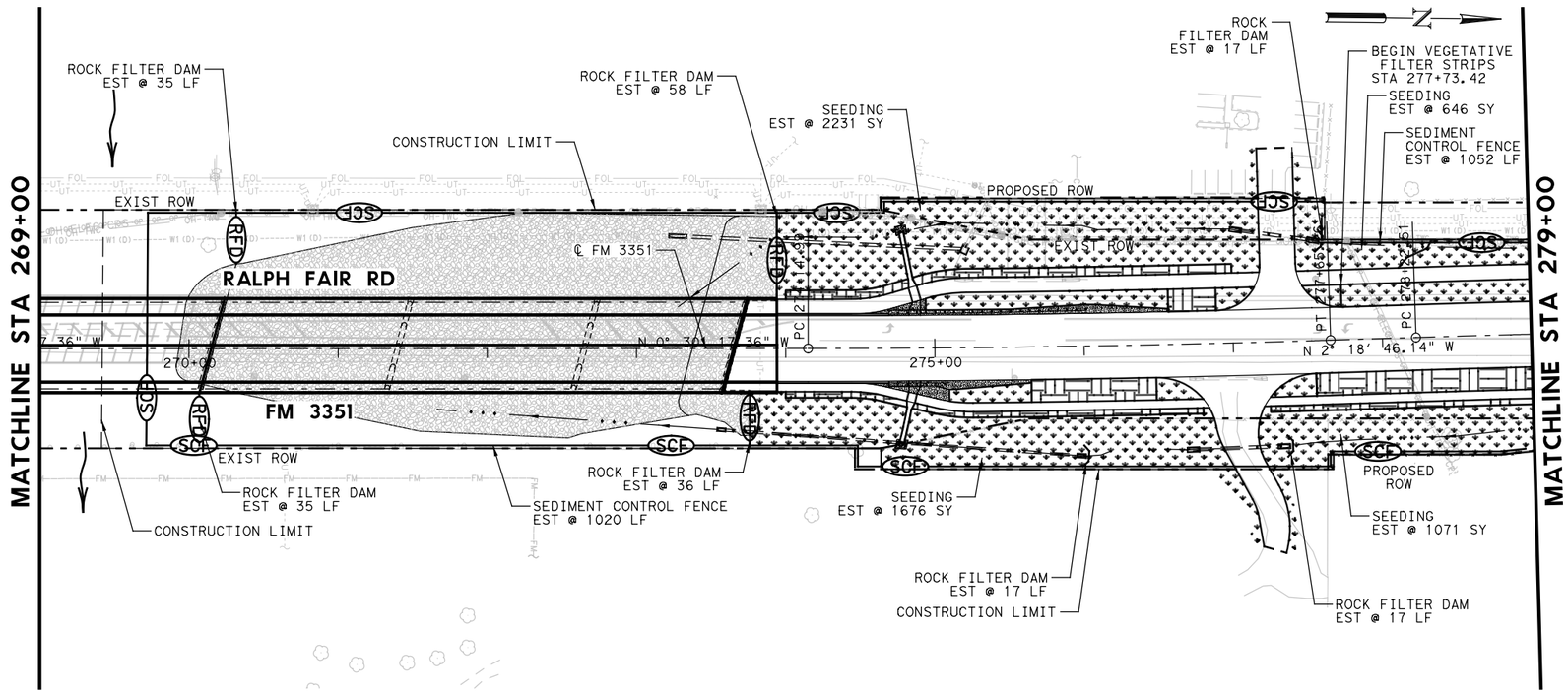
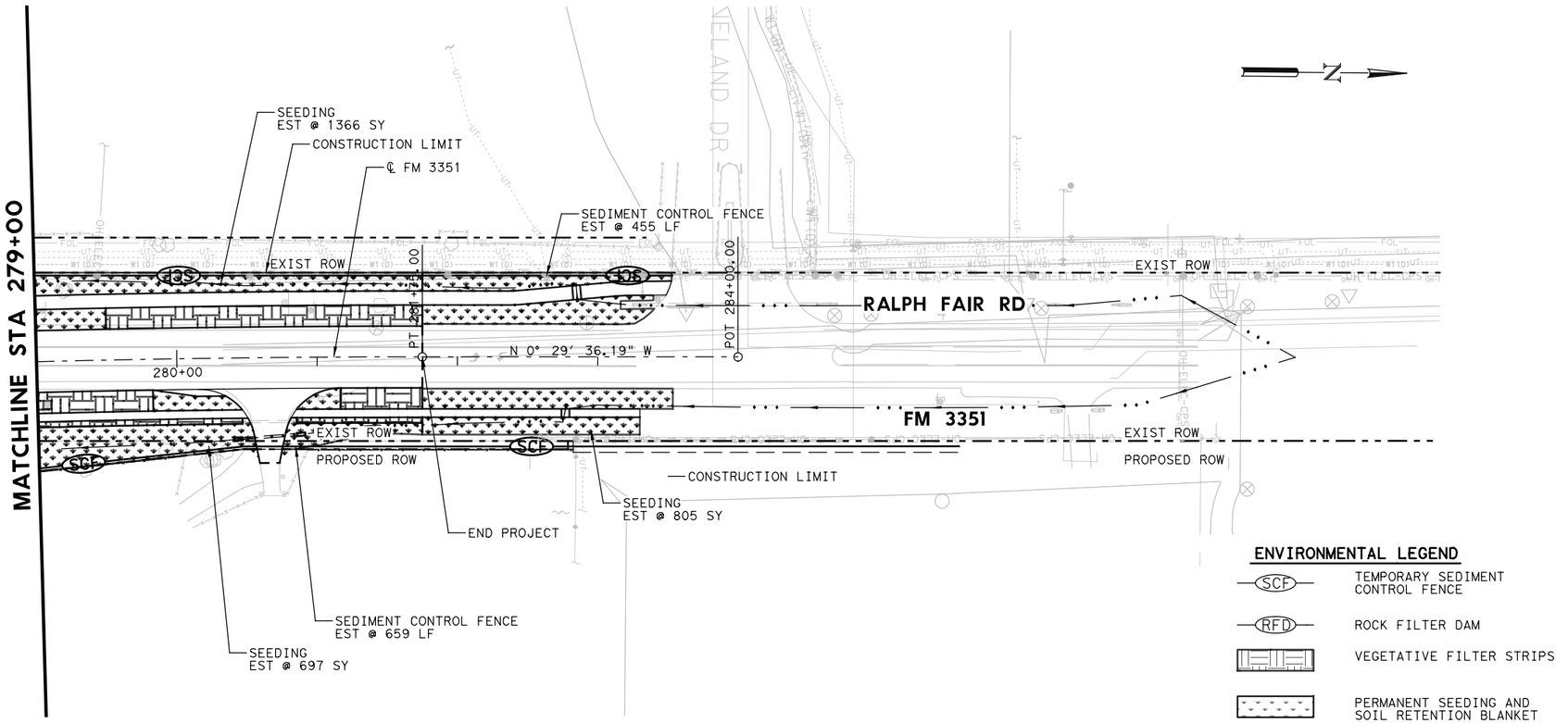
User Name: GARODRIGUE





SHEET SUMMARY OF ESTIMATED QUANTITIES (CONT.)			
ITEM	DESCRIPTION	UNIT	QUANTITY
160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	8492
164 6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	8492
164 6009	BROADCAST SEED (TEMP) (WARM)	SY	4246
164 6011	BROADCAST SEED (TEMP) (COOL)	SY	4246
168 6001	VEGETATIVE WATERING	MG	396
169 6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	8492
506 6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	215
506 6011	ROCK FILTER DAMS (REMOVE)	LF	215
506 6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	78
506 6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	78
506 6024	CONSTRUCTION EXITS (REMOVE)	SY	156
506 6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3186
506 6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3186

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMODATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3) FOR DETAILS.
5. QUANTITY FOR VEGETATIVE FILTER STRIPS ARE INCLUDED IN FURNISHING AND PLACING TOPSOIL, BROADCAST SEED, AND SOIL RETENTION BLANKETS QUANTITIES.

ENVIRONMENTAL LEGEND

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM
- VEGETATIVE FILTER STRIPS
- PERMANENT SEEDING AND SOIL RETENTION BLANKET
- FLOW PATH

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
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PROFESSIONAL ENGINEER
12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

SW3P LAYOUT

SCALE: 1"=100' SHEET 2 OF 2

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	248

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres distrubed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: ☒Yes ☐No

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required
☐ Nationwide Permit 14 - PCN Required
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

1. Cibolo Creek - NWP 14 w/ no PCN (lat/long: 29.74406528, -98.62332833)
2.
3.
4.

401 Best Management Practices: (Not applicable if no USACE permit)

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☒ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Sedimentation Chambers
		☐ Grassy Swales

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.

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.
4.

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.

1.
2.
3.
4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

   A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

   B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.
3. Implement Bird BMPs (western burrowing owl), including avoiding vegetation clearing activities in the nesting season; avoiding active nests; preventing the establishment of active nests in the nesting season; and minimizing impacts during the nesting season due to human presence, construction noise, and lighting. See Item 5 in General Notes.
4. Implement Water Quality and Stream Crossing BMPs (Neotrichia juani), including minimizing the use of equipment in streams and riparian areas; removing rubbish near bridges; and not disturbing riparian buffer zones. See Item 5 in General Notes.
5. Implement Bat BMPs (big brown bat, cave myotis bat), including retaining mature, large trees and avoiding harm or death to bats. See Item 5 in General Notes.
6. Implement Rare Plant BMPs (Correll's false dragon head, gravelbar brickellbush, narrowleaf brickelbush, Osage plains false foxglove, Texas almond, tree dodder, Wright's milkvetch), including avoiding and minimizing impacts to rare plants and conducting work during times of the year when plants are dormant. See Item 5 in General Notes.

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 immediated area, and contact the Engineer immediately.

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 immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the follwing 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

Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

Does the project involve the demolition of a span bridge?

☐ Yes ☒ No (No further action required)

If "Yes", a pre- demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG
©TxDOT OCTOBER 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		249

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Project is located on the TCEQ Edwards Aquifer Recharge Zone and the EPA Sole Source Aquifer Recharge Zone. The Contractor shall comply with the Texas Commission on Environmental Quality (TCEQ) approved Water Pollution Abatement Plan (WPAP) and conditions in the TCEQ authorization letter for this project. A copy of the project WPAP, TCEQ, and EPA approval letters shall be maintained on site. No Regulated Activities shall begin until approval of the WPAP has been received from the TCEQ and EPA.
2. The Contractor must immediately report spills (including sanitary sewer discharge) of reportable quantities to TxDOT and to the following:
   - State Emergency Response Center 800-832-8224
   - TCEQ Regional Office 210-490-3096
   - National Response Center 800-424-8802
   - Edwards Aquifer Authority 210-222-2204.
3. Hazardous substances (e.g., fuel, oil, asphalt emulsion, concrete curing compounds) shall not be stored on the State ROW or easements.
4. Intentional discharges of sediment laden storm water during construction are not allowed.
5. If any sensitive feature (e.g., cave, sinkhole, well) is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately and notify the Engineer. Construction near the sensitive feature may not proceed until the feature has been evaluated and approval to continue construction has been received.
6. Temporary Best Management Practices (BMPs) will be installed as necessary to manage discharges due to dewatering of drill shafts. The type and location of the BMPs will be at the discretion of the Engineer.

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

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	CONT	SECT	JOB		HIGHWAY		
REVISIONS	3212	05	013		FM 3351		
	DIST	COUNTY				SHEET NO.	
	SAT	COMAL				250	

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Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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, etc.

7. Sediment must be removed from the sediment traps or sedimentation basins not later than TCEQ-0592 (Rev. July 15, 2015) Page 2 of 2 when it occupies 50% of the basin's design capacity.

8. Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from being discharged offsite.

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. 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.

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 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.

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.

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 holderof 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

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

HDR Engineering Inc.
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Dallas, TX 75248
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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
TCEQ WPAP
GENERAL CONSTRUCTION NOTES

SHEET 1 OF 1

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	251

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DATE: 12/14/2023
PLOTTING TIME: 11:21:01 AM
File Name:FM3351-TCEQ-GN.dgn
User Name:GARODRIGUE

DRAINAGE BASIN VFS1-R

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS1-R**	
Total drainage basin/outfall area =	3.12	acres
Predevelopment impervious area within drainage basin/outfall area =	0.83	acres
Post-development impervious area within drainage basin/outfall area =	1.28	acres
Post-development impervious fraction within drainage basin/outfall area =	0.41	
$L_{M\ THIS\ BASIN}$ =	404	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.54	acres
A_I =	0.32	acres
A_P =	0.22	acres
L_R =	314	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 404 lbs.

F = 1.29

DRAINAGE BASIN VFS1-S

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

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Site Data: Determine Required Load Removal Based on the Entire Project

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Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS1-S**	
Total drainage basin/outfall area =	3.12	acres
Predevelopment impervious area within drainage basin/outfall area =	0.83	acres
Post-development impervious area within drainage basin/outfall area =	1.28	acres
Post-development impervious fraction within drainage basin/outfall area =	0.41	
$L_{M\ THIS\ BASIN}$ =	404	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.20	acres
A_I =	0.13	acres
A_P =	0.07	acres
L_R =	127	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 404 lbs.

F = 3.17

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 1 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	252

DRAINAGE BASIN VFS2-R

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**12.06**	acres
Predevelopment impervious area within the limits of the plan * =	**3.37**	acres
Total post-development impervious area within the limits of the plan* =	**5.08**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**1535**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **4**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS2-R**	
Total drainage basin/outfall area =	**2.92**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.56**	acres
Post-development impervious area within drainage basin/outfall area =	**1.21**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.41**	
$L_{M\ THIS\ BASIN}$ =	**583**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = **85** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**0.41**	acres
A_I =	**0.31**	acres
A_P =	**0.10**	acres
L_R =	**302**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **583** lbs.

F = **1.93**

DRAINAGE BASIN VFS2-S

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**12.06**	acres
Predevelopment impervious area within the limits of the plan * =	**3.37**	acres
Total post-development impervious area within the limits of the plan* =	**5.08**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**1535**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **4**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS2-S**	
Total drainage basin/outfall area =	**2.92**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.56**	acres
Post-development impervious area within drainage basin/outfall area =	**1.21**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.41**	
$L_{M\ THIS\ BASIN}$ =	**583**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = **85** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**0.13**	acres
A_I =	**0.08**	acres
A_P =	**0.05**	acres
L_R =	**78**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **583** lbs.

F = **7.44**

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 2 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	253

DRAINAGE BASIN VFS3-R

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS3-R**	
Total drainage basin/outfall area =	3.24	acres
Predevelopment impervious area within drainage basin/outfall area =	1.32	acres
Post-development impervious area within drainage basin/outfall area =	1.36	acres
Post-development impervious fraction within drainage basin/outfall area =	0.42	
$L_{M\ THIS\ BASIN}$ =	36	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.37	acres
A_I =	0.28	acres
A_P =	0.09	acres
L_R =	273	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 36 lbs.

F = 0.13

DRAINAGE BASIN VFS3-S

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS3-S**	
Total drainage basin/outfall area =	3.24	acres
Predevelopment impervious area within drainage basin/outfall area =	1.32	acres
Post-development impervious area within drainage basin/outfall area =	1.36	acres
Post-development impervious fraction within drainage basin/outfall area =	0.42	
$L_{M\ THIS\ BASIN}$ =	36	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.11	acres
A_I =	0.07	acres
A_P =	0.04	acres
L_R =	69	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 36 lbs.

F = 0.52

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
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PROFESSIONAL ENGINEER
12/14/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 3 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	254

DRAINAGE BASIN VFS4-R

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS4-R**	
Total drainage basin/outfall area =	2.78	acres
Predevelopment impervious area within drainage basin/outfall area =	0.64	acres
Post-development impervious area within drainage basin/outfall area =	1.22	acres
Post-development impervious fraction within drainage basin/outfall area =	0.44	
$L_{M\ THIS\ BASIN}$ =	521	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.48	acres
A_I =	0.35	acres
A_P =	0.13	acres
L_R =	342	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 521 lbs.

F = 1.52

DRAINAGE BASIN VFS4-S

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS4-S**	
Total drainage basin/outfall area =	2.78	acres
Predevelopment impervious area within drainage basin/outfall area =	0.64	acres
Post-development impervious area within drainage basin/outfall area =	1.22	acres
Post-development impervious fraction within drainage basin/outfall area =	0.44	
$L_{M\ THIS\ BASIN}$ =	521	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.16	acres
A_I =	0.10	acres
A_P =	0.06	acres
L_R =	98	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 521 lbs.

F = 5.31

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
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Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 4 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	255

DRAINAGE BASIN VFS1-SUM

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	VFS1-SUM	
Total drainage basin/outfall area =	3.12	acres
Predevelopment impervious area within drainage basin/outfall area =	0.83	acres
Post-development impervious area within drainage basin/outfall area =	1.28	acres
Post-development impervious fraction within drainage basin/outfall area =	0.41	
$L_{M\ THIS\ BASIN}$ =	404	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.74	acres
A_I =	0.45	acres
A_P =	0.29	acres
L_R =	441	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 404 lbs.

F = 0.92

DRAINAGE BASIN VFS2-SUM

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Comal	
Total project area included in plan * =	12.06	acres
Predevelopment impervious area within the limits of the plan * =	3.37	acres
Total post-development impervious area within the limits of the plan* =	5.08	acres
Total post-development impervious cover fraction * =	0.42	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	1535	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = 4

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	VFS2-SUM	
Total drainage basin/outfall area =	2.92	acres
Predevelopment impervious area within drainage basin/outfall area =	0.56	acres
Post-development impervious area within drainage basin/outfall area =	1.21	acres
Post-development impervious fraction within drainage basin/outfall area =	0.41	
$L_{M\ THIS\ BASIN}$ =	583	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.54	acres
A_I =	0.39	acres
A_P =	0.15	acres
L_R =	381	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 583 lbs.

F = 1.53

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
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PROFESSIONAL ENGINEER
12/14/2023

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 5 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	256

DRAINAGE BASIN VFS3-SUM

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**12.06**	acres
Predevelopment impervious area within the limits of the plan * =	**3.37**	acres
Total post-development impervious area within the limits of the plan* =	**5.08**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**1535**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **4**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS3-SUM**	
Total drainage basin/outfall area =	**3.24**	acres
Predevelopment impervious area within drainage basin/outfall area =	**1.32**	acres
Post-development impervious area within drainage basin/outfall area =	**1.36**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.42**	
$L_{M\ THIS\ BASIN}$ =	**36**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = **85** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**0.48**	acres
A_I =	**0.35**	acres
A_P =	**0.13**	acres
L_R =	**342**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **36** lbs.

F = **0.11**

DRAINAGE BASIN VFS4-SUM

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: FM 3351 at Cibolo Creek
Date Prepared: 6/14/2022

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**12.06**	acres
Predevelopment impervious area within the limits of the plan * =	**3.37**	acres
Total post-development impervious area within the limits of the plan* =	**5.08**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**1535**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **4**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS4-SUM**	
Total drainage basin/outfall area =	**2.78**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.64**	acres
Post-development impervious area within drainage basin/outfall area =	**1.22**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.44**	
$L_{M\ THIS\ BASIN}$ =	**521**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = **85** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**0.64**	acres
A_I =	**0.45**	acres
A_P =	**0.19**	acres
L_R =	**440**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **521** lbs.

F = **1.18**

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 6 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	257

DRAINAGE BASIN VFS-SUM

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: **FM 3351 at Cibolo Creek**
Date Prepared: **6/14/2022**

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Comal**	
Total project area included in plan * =	**12.06**	acres
Predevelopment impervious area within the limits of the plan * =	**3.37**	acres
Total post-development impervious area within the limits of the plan* =	**5.08**	acres
Total post-development impervious cover fraction * =	**0.42**	
P =	**33**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**1535**	lbs.

* **The values entered in these fields should be for the total project area.**

Number of drainage basins / outfalls areas leaving the plan area = **4**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = VFS-SUM

Total drainage basin/outfall area =	**12.06**	acres
Predevelopment impervious area within drainage basin/outfall area =	**3.37**	acres
Post-development impervious area within drainage basin/outfall area =	**5.08**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.42**	
$L_{M\ THIS\ BASIN}$ =	**1535**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = **85** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**2.40**	acres
A_I =	**1.64**	acres
A_P =	**0.76**	acres
L_R =	**1603**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **1535** lbs.

F = **0.96**

*THIS PROJECT BORDERS BEXAR AND COMAL COUNTY. TO BE CONSERVATIVE WE ARE USING THE AVERAGE ANNUAL PERCIPITATION (IN.) FROM COMAL COUNTY

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER

12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK
WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 7 OF 7

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	258

EXISTING IMPERVIOUS COVER = 3.37 AC

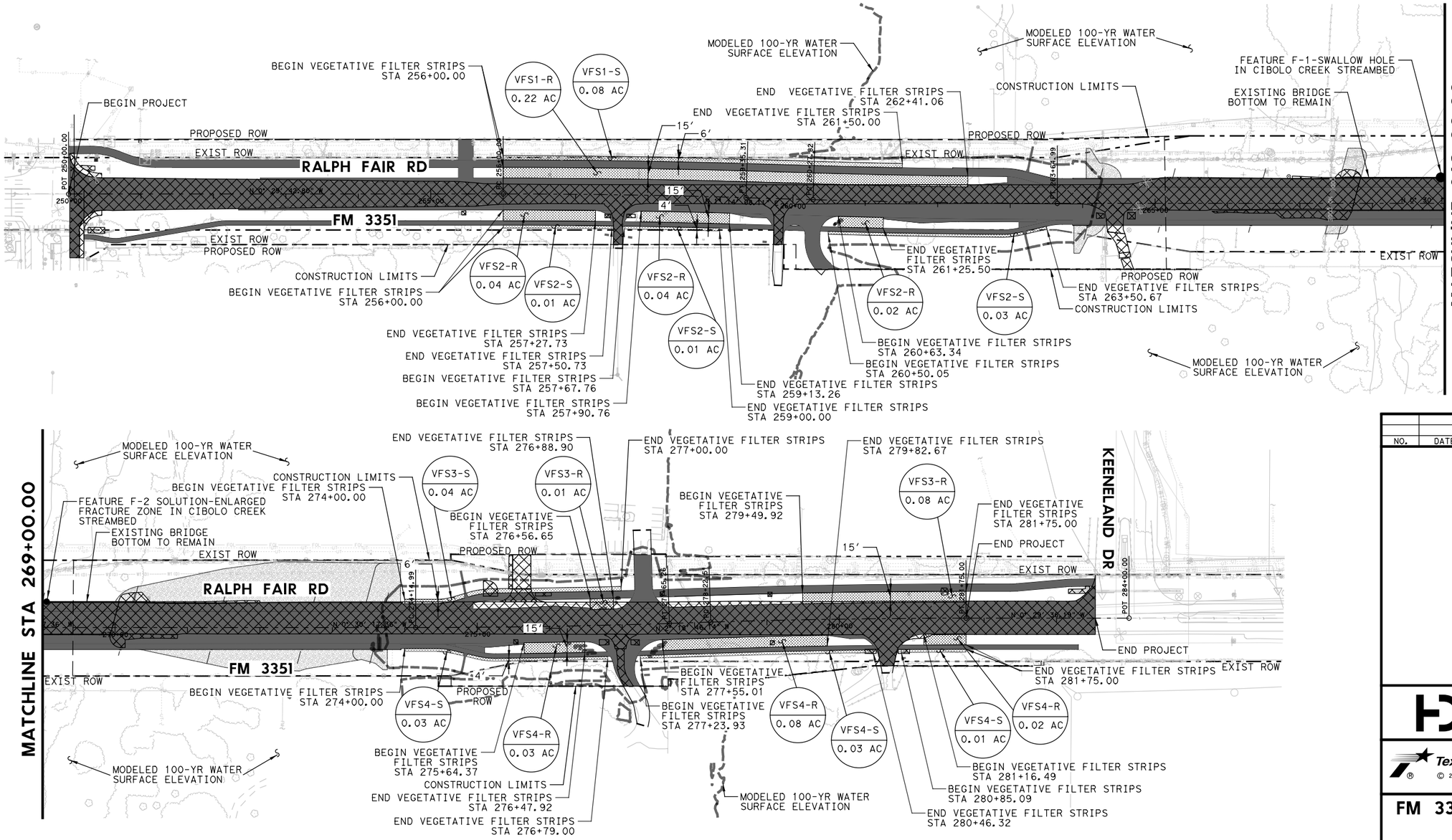
PROPOSED IMPERVIOUS COVER = 5.08 AC*
*ULTIMATE CONDITIONS

PROPOSED VEGETATIVE FILTER STRIPS = 0.78 AC

VFS#-X
X.XX AC

R - ROADWAY
S - SHARED USE PATH/SIDEWALK

0 75 150 225 300
SCALE IN FEET



NOTES:

1. ALL VEGETATIVE FILTER STRIPS ARE LOCATED ABOVE THE 100-YEAR WATER SURFACE ELEVATION.
2. THE MINIMUM VEGETATED COVER FOR ENGINEERED STRIPS IS 80%.
3. THE MAXIMUM SLOPE OF FILTERED STRIP SHOULD NOT EXCEED 20%. THE MINIMUM DIMENSION OF THE FILTER STRIP SHOULD BE NO LESS THAN 15 FEET WHEN BEHIND TO THE ROADWAY.
   THE MINIMUM DISTANCE OF THE FILTERED STRIP SHOUULD BE NO LESS THAN 3.1 FEET WHEN BEHIND THE SIDEWALK OR SHARED USE PATH WHOSE WIDTH IS 6 FEET.
   THE MINIMUM DISTANCE OF THE FILTERED STRIP SHOUULD BE NO LESS THAN 5.2 FEET WHEN BEHIND THE SIDEWALK OR SHARED USE PATH WHOSE WIDTH IS 10 FEET.
4. ALL DISTURBED AREAS NOT SHOWN AS VEGETATIVE FILTER STRIPS WILL HAVE SEEDING AND BLANKETS AS SHOWN ON THE SW3P SHEETS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
ELISEO SUAREZ
139162
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 3351 AT CIBOLO CREEK

WPAP IMPERVIOUS AREAS EXISTING/PROPOSED

SCALE: 1"=150′ SHEET 1 OF 1

DSN: GMR	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: ES	TEXAS	6	SEE TITLE SHEET			FM 3351
DRN: GMR	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: ES	COMAL	SAT	3212	05	013	259

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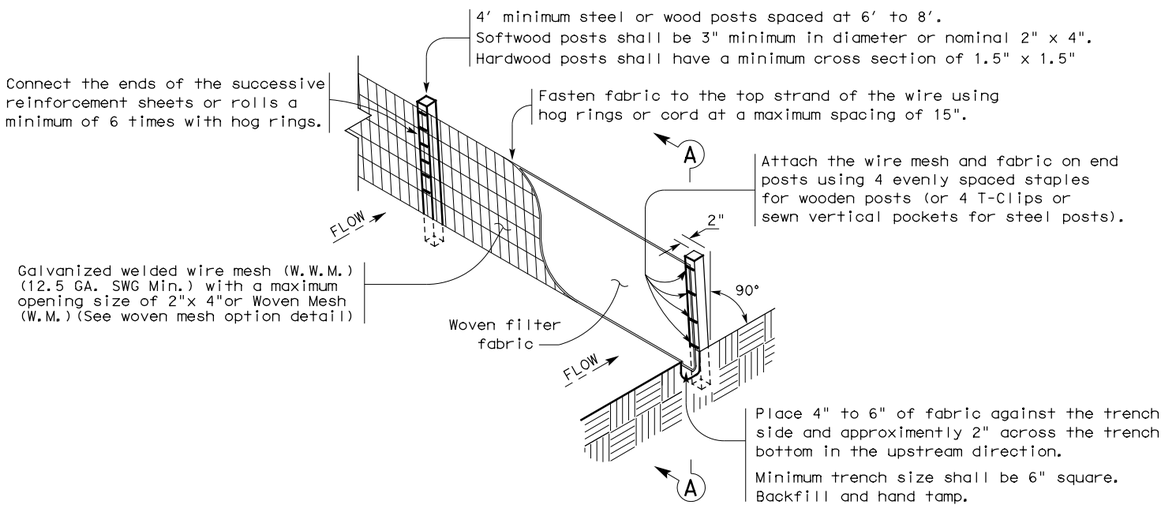
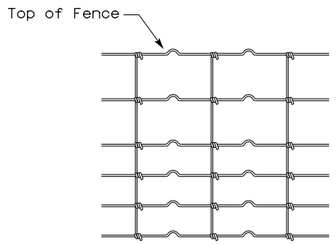
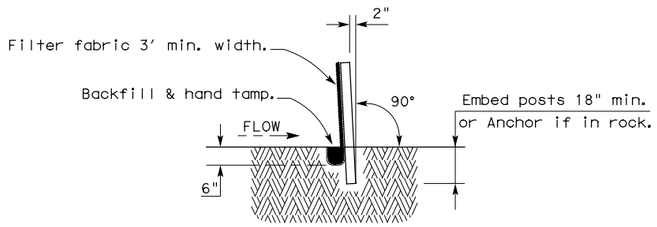


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

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 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

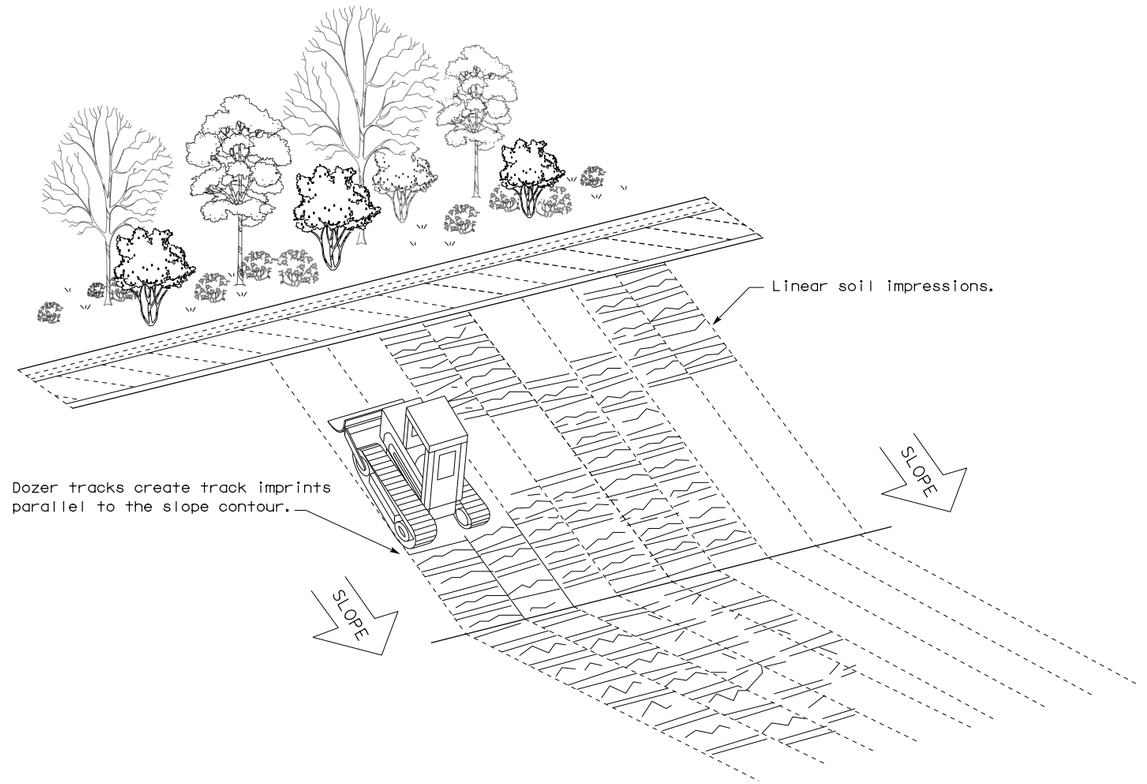
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. 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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	3212	05	013		FM 3351	
	DIST	COUNTY			SHEET NO.	
	SAT	COMAL			260	

12/18/2023
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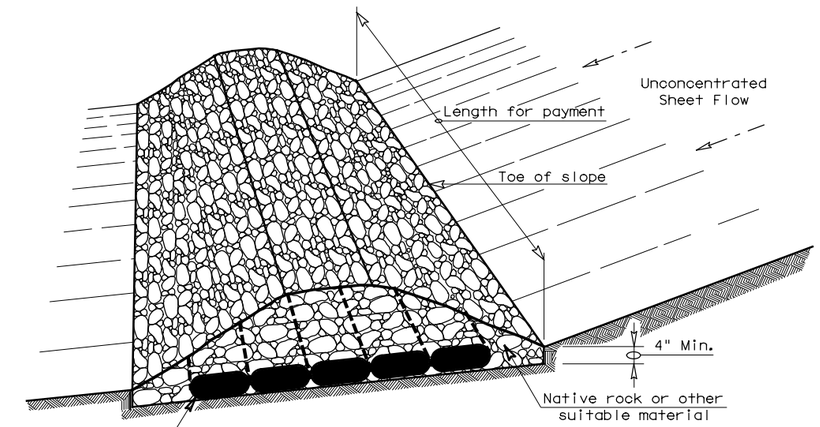
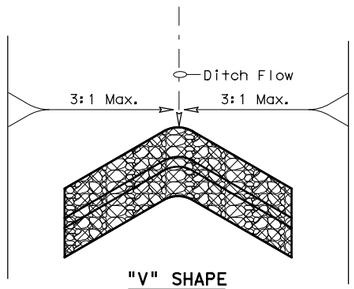
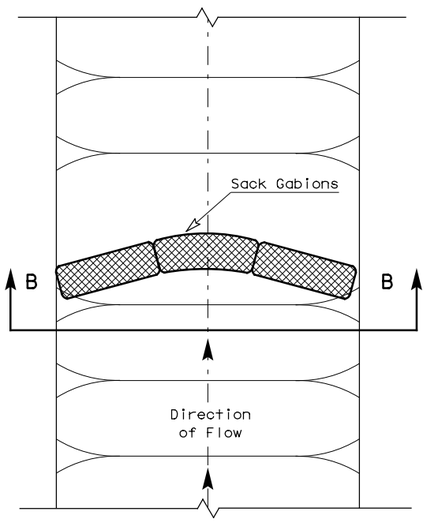


FILTER DAM AT TOE OF SLOPE

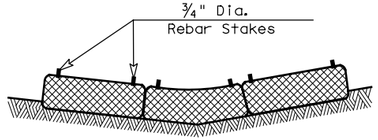
RFD1



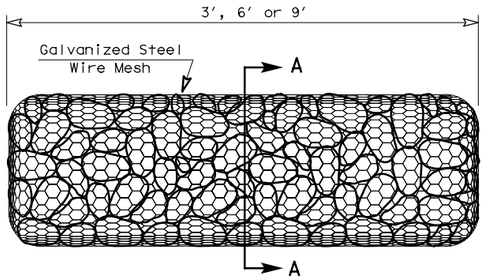
"V" SHAPE
PLAN VIEW



PLAN VIEW

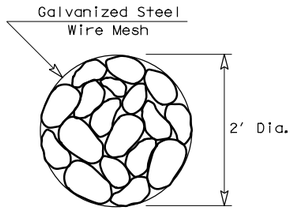


SECTION B-B

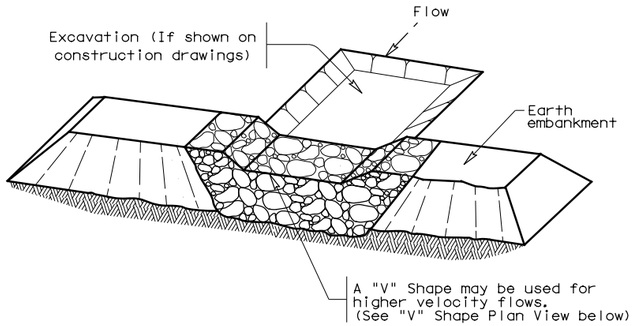


TYPE 4 (SACK GABIONS)

RFD4

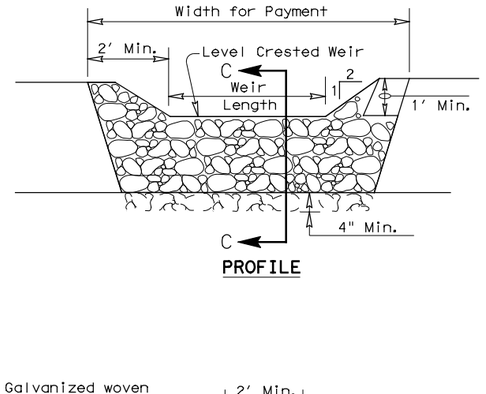


SECTION A-A

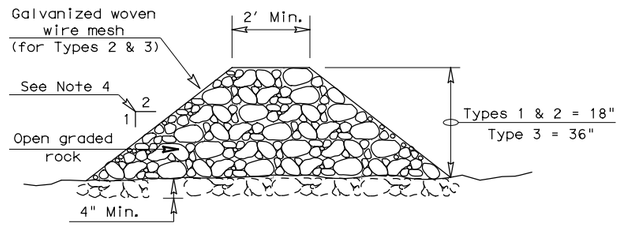


FILTER DAM AT SEDIMENT TRAP

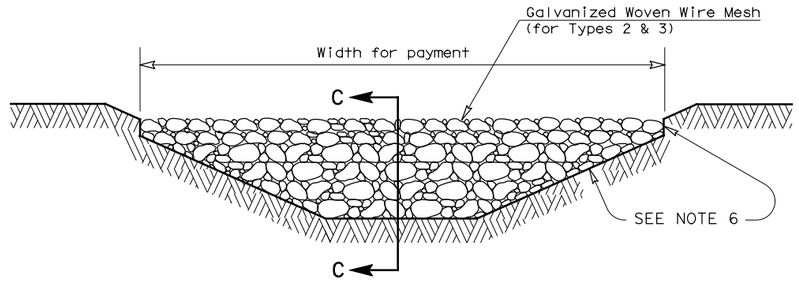
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

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.
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 SW3P plans.
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 ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. 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. For 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 ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

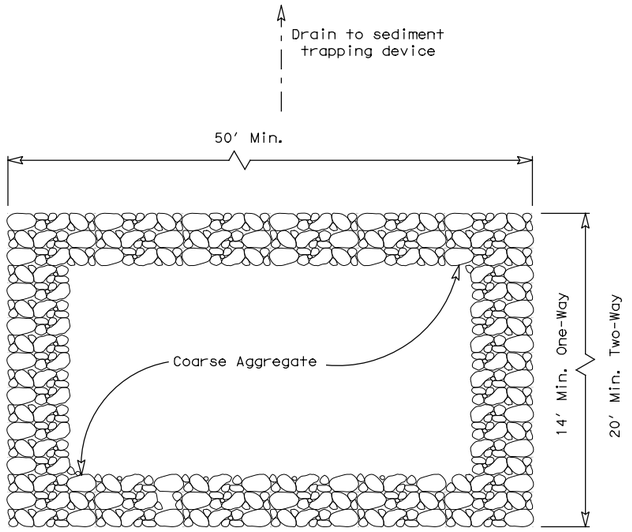
ROCK FILTER DAMS

EC(2)-16

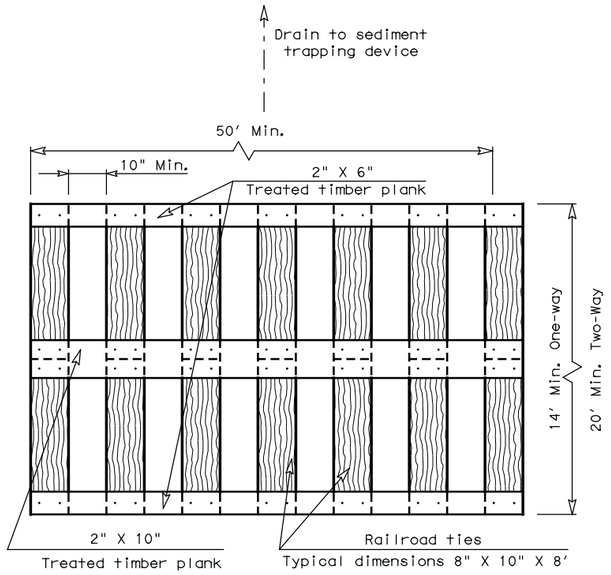
FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		261

DATE: 12/14/2023
FILE: $FILE$

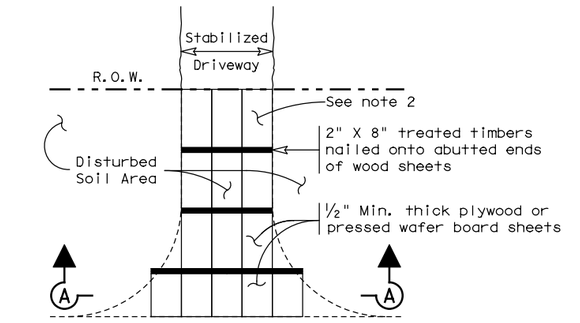
DATE: 12/14/2023
FILE: $FILE$



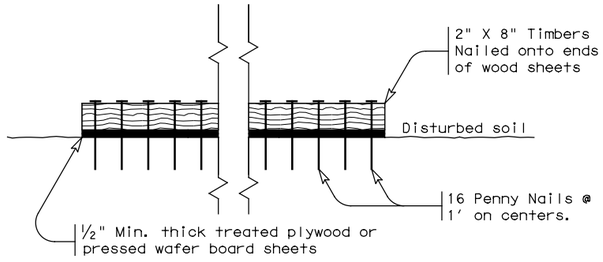
PLAN VIEW



PLAN VIEW



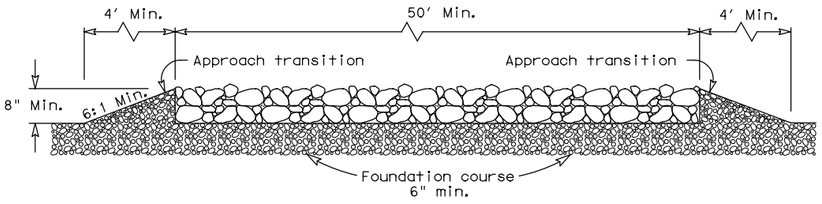
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

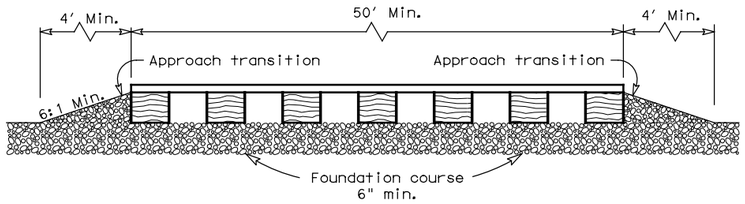
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER 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".
3. 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 by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
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.

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′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. 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.
8. 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.

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.

Texas Department of Transportation

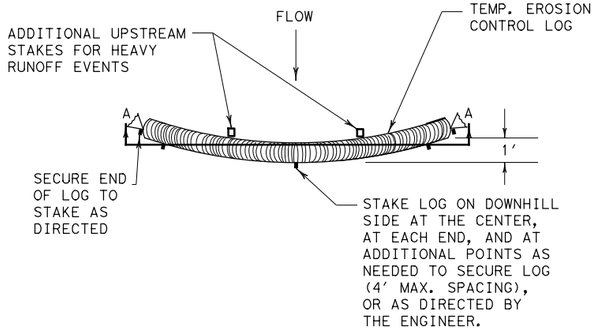
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

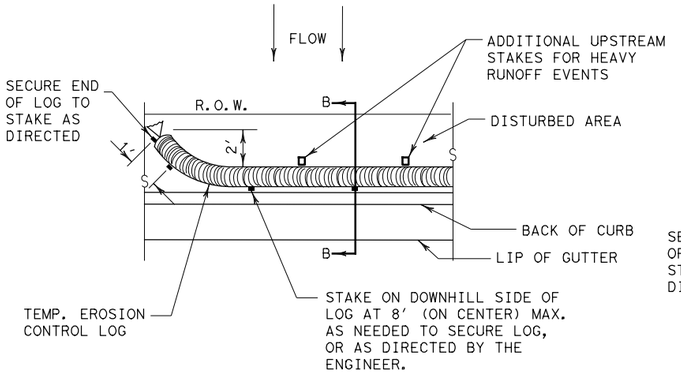
CONSTRUCTION EXITS

EC(3)-16

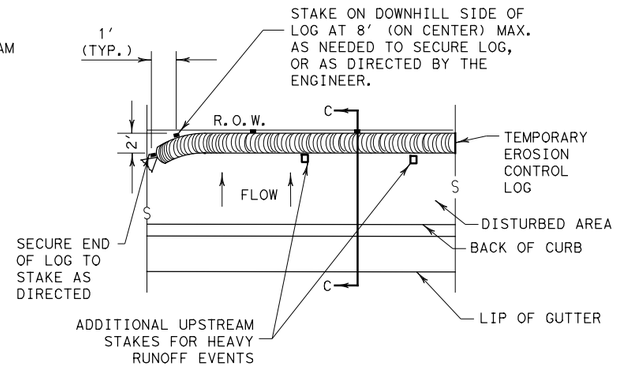
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		262



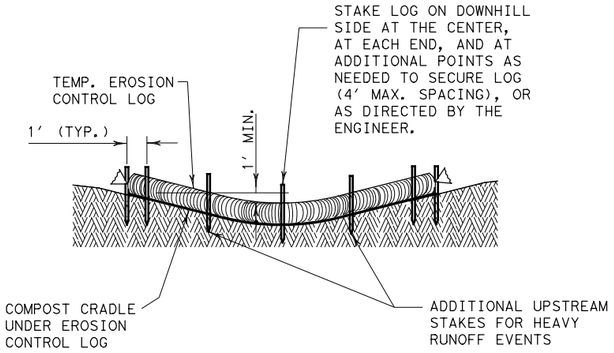
PLAN VIEW



PLAN VIEW



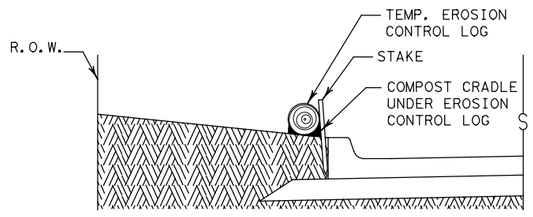
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

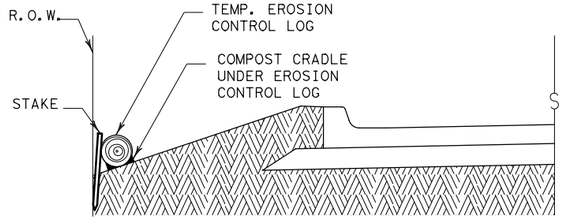
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



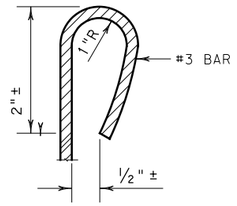
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED 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.
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.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. 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.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. 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.

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.

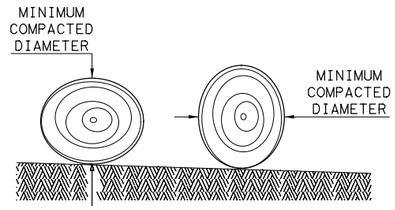
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

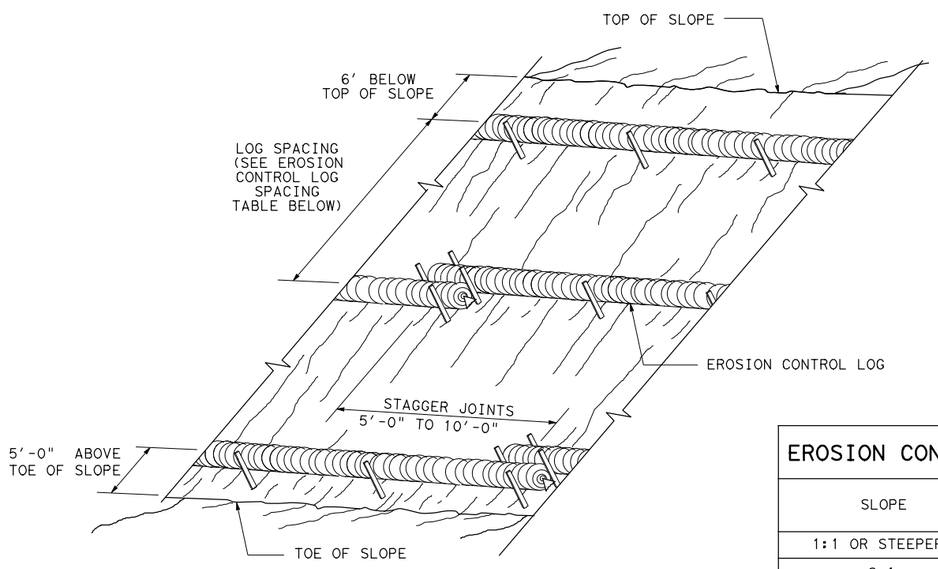
EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		3212	05	013		FM 3351	
		DIST		COUNTY			SHEET NO.
		SAT		COMAL			263

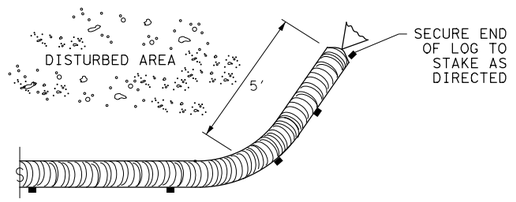
DATE: 12/14/2023
FILE: $FILE$

DATE: 12/14/2023
FILE: $FILE$



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

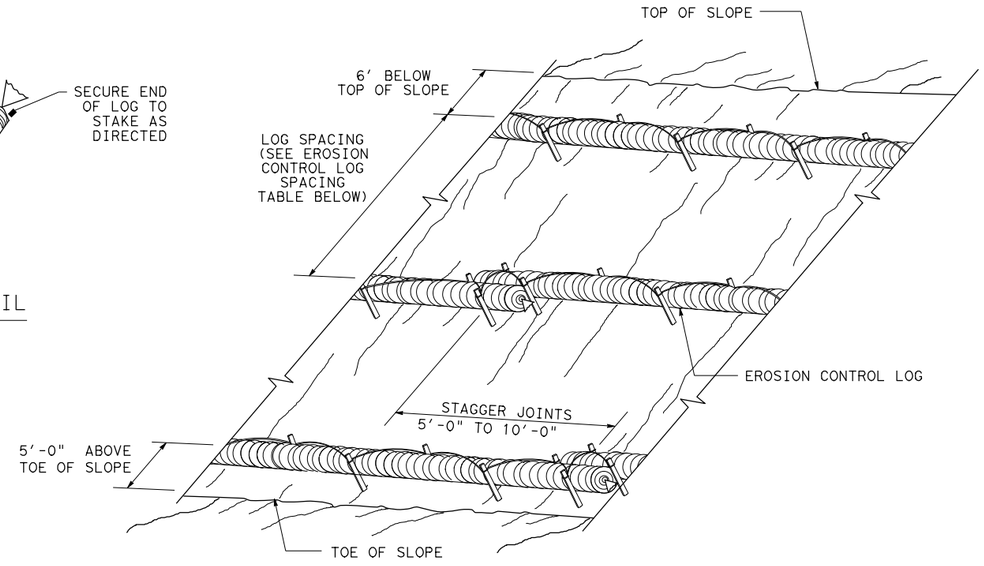
CL-SST



END SECTION RAP DETAIL

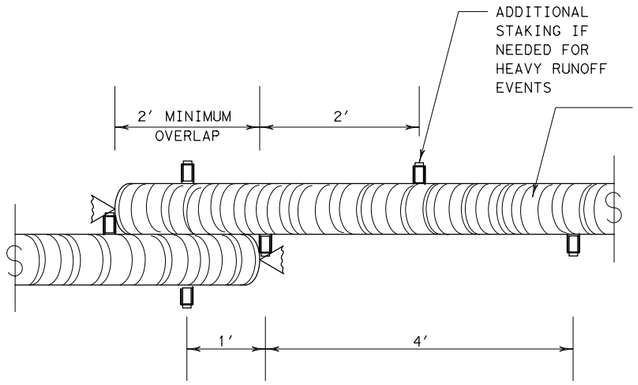
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

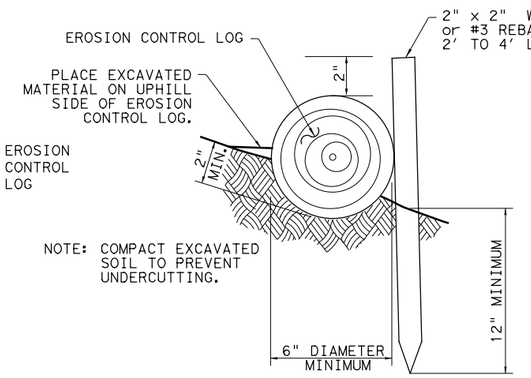
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

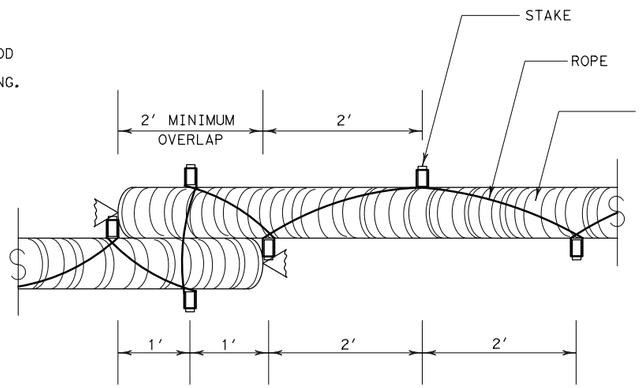


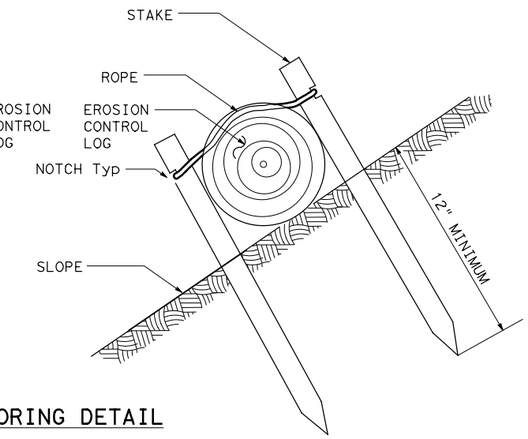


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

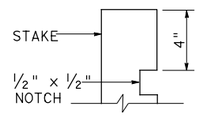
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

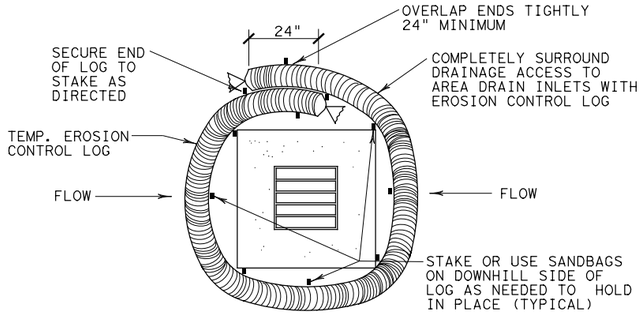
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

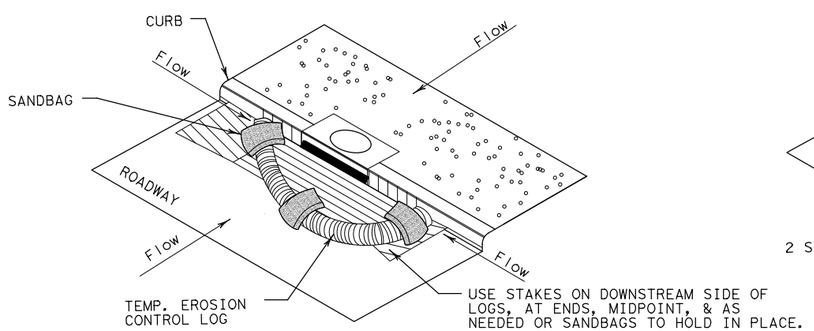
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3212	05	013	FM 3351	
	DIST	COUNTY		SHEET NO.	
	SAT	COMAL		264	



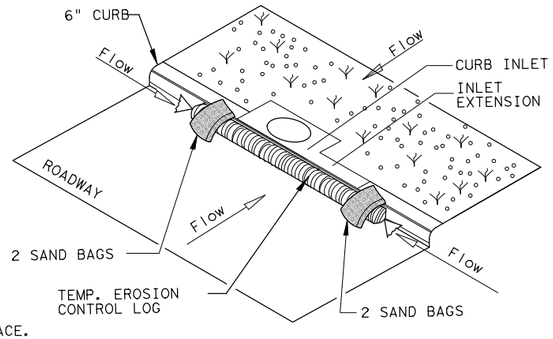
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

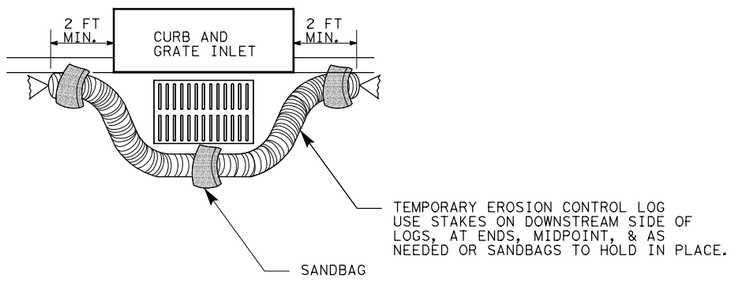
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

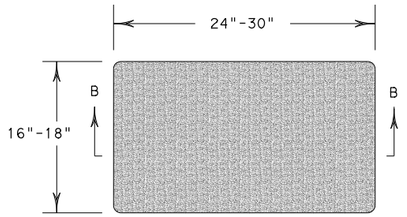
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3212	05	013	FM 3351
	DIST	COUNTY		SHEET NO.
	SAT	COMAL		265

DATE: 12/14/2023
FILE: $FILE$

ROADWAY APPLICATION SECTION

TCEQ-20872

ATTACHMENT H: INSPECTION, MAINTENANCE, REPAIR, AND RETROFIT PLAN

ATTACHMENT H
INSPECTION, MAINTENANCE, REPAIR AND RETROFIT PLAN
FM 3351 at Cibolo Creek
Bexar and Comal County, TX
CSJ: 3212-05-013

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 permanent storm water controls constructed for this project.

Pest management: Any vegetated areas that have noxious vegetation, insects, or other pests will be remedied with the minimum amount of selective pesticide necessary to control the pest. All chemicals are EPA labeled, registered, and approved. Personnel licensed and/or trained according to Texas Department of Agriculture (TDA) laws and regulations will apply pesticides. Records are kept for each application in accordance with TDA regulations.

Inspection cycles: Maintenance forces will review roadways and roadsides at least twice per year. Any problem areas are duly noted particularly if there is an absence of vegetation, any accumulation of brush, debris or litter, and/or any areas of significant erosion. These items will then he scheduled for repair on priority basis.

Debris and litter removal: Litter, debris and brush accumulation is assessed not only for aesthetic reasons but also for the tendency to clog drainage paths or impede the intended flow of a structure's hydraulic design. Areas are cleaned periodically by state forces or by outside contractor. Areas documented as trouble spots are scheduled on a priority basis.

Sediment removal: During inspections if sediment has accumulated to a depth that hinders original design characteristics it will be removed. Excessive sedimentation, or a significant load of silt, does not normally occur in filter strip areas or in permanent pond structures after project completion, but it may occur from other drainage areas or construction underway beyond State right-of-way.

Stormwater Treatment Unit (Engineered Vegetative Filter Strips):

1. Post-construction inspection is required prior to putting the unit into service.

2. It is recommended that stormwater treatment units be inspected on a quarterly basis for the first year of operation. The rate at which each system collects pollutants will often depend more on-site activities than the size or type of unit. For example, watershed construction activities, or heavy winter sanding will cause sediments to accumulate at a more rapid rate.

3. After the first year, maintenance personnel will have a better understanding of the operational characteristics of the unit and subsequent inspections can be reduced if warranted. At a minimum, maintenance should be performed twice annually during detailed inspections. Inspections and maintenance should be concurrent with other project BMP inspections when feasible. At least one of the inspections should occur following a rainfall event to observe system operations.

4. In the event of an oil, fuel, or other chemical spill, and inspection is required.

5. All exposed site areas should be stabilized to minimize sediment loads in unit and runoff from non-stabilized construction areas should be routed around the unit and treated separately.

6. With each inspection, any damage to the structural elements of the system (pipes, concrete drainage structures, filters, cartridges, etc.) must be identified and repaired immediately. Cracks, voids and undermining should be patched/filled to prevent growth in cracks and joints that can cause structural damage. Repair or replace any components that are inoperative.

7. Maintenance should be conducted by professional vacuum cleaning service providers with experience in confined space entry procedures and the maintenance of underground tanks, sewers, or catch basins.
   a. Every 12 months, filter cartridges should be tested for adequate flow rate and cleaned, recommissioned, or replaced as necessary.
   b. A manual backflush must be performed on one of the draindown cartridges using the unit's backflush pipe. If time required to drain 14 gallons exceeds 15 seconds, it is recommended to perform a manual backflush on each cartridge. If draindown time exceeds 15 seconds after manual backflush, then cartridge must be replaced.

8. Filters/Cartridges should be replaced once every three years. If inspection of the removed filters/cartridges indicates that their life expectancy exceeds three years, a modified maintenance plan should be provided to TCEQ specifying the new replacement schedule. Filters/Cartridges may initially require annual replacement due to sediment load from construction activities. Cartridge replacement also may be required in the event of a chemical or hazardous material spill or due to excessive sediment loading from site erosion or extreme storms.

9. Check and verify that the BMP facility site(s) are secure at least once per month. Any site found to be insecure should be made secure immediately.

10. Standing water within vaults may become a location of mosquito breeding. The facility should be evaluated at least twice a year to determine if mosquito control is needed.

Maintenance Contact: The Maintenance Supervisor may be contacted for questions or concerns pertaining to maintenance of the facility.

Mr. Henry J. Fojtik
TxDOT Department of Transportation
Transportation Engineer Supervisor
4615 NW Loop 410
San Antonio, Texas 78229
(210) 615-5935

DocuSigned by:
HJF P.E.
BC07365ECB8C4E4...
Signature

ATTACHMENT J

SAN ANTONIO DISTRICT SPILL RESPONSE PROCEDURES
(BEXAR COUNTY ONLY)

Texas Department of Transportation

Small < 25 gal
(not reportable to the TCEQ)

SPILLS
Gasoline, Diesel & Automotive fluids
(antifreeze, transmission fluids)
*all TxDOT spills and incidents must be reported to TxDOT - ENV Section using the attached form

Large > 25 gal
(reportable to TCEQ)

Is a **Responsible Party (RP) available?

Yes

TCEQ notification is not required
Responsible Party contracts for clean-up
TxDOT Maint. notifies Ronnie Lemmons
(210-844-8152 cell)
TxDOT Maint.completes & submits incident report
TxDOT Maint.oversees clean up

No

If no action by RP, TxDOT initiates initial spill response

TCEQ notification not required
TxDOT Maint.notifies Ronnie Lemmons
(210-844-8152 cell)
TxDOT Maint.completes & submits incident report
TxDOT Maint.may initiate initial spill procedures:
a) Sand
b) Absorb-all

Is a Responsible Party available?

Yes

Responsible Party & TxDOT Maint.notifies TCEQ
Responsible Party initiates clean up action
TxDOT Maint.notifies Ronnie Lemmons
(210-844-8152 cell)
TxDOT Maint.completes and submits incident report
TxDOT Maint.oversees clean up

No

TxDOT Maint.notifies TCEQ
TxDOT Maint. notifies SWS or Ronnie Lemmons
(210-844-8152 (cell)
TxDOT Maint.completes and submits incident report
TxDOT Maint.oversees clean up

IMPORTANT TELEPHONE NUMBERS

1. Texas Commission on Environmental Quality
   Monday - Friday 8 a.m. to 5 pm (210) 490-3096
   After Hours (210) 715-1989, 1-800-832-8224
2. TxDOT Hazardous-Materials Clean Up Contractor:
   SWS(ie-Eagle)Environmental Services Office:
   (210) 566-8366
   24-Hour Emergency 1-800-336-0909
3. *TxDOT Personnel Environmental Section
   Ronnie Lemmons (On Call)
   (210) 615-5872 (Ofc) - (210) 844-8152 (Cell)

* For non-emergency spills, TxDOT personnel should be notified between 8 a.m. and 5 p.m., Monday - Friday, or the next working day. For emergency spills after normal working hours,please contact Ronnie Lemmons at 210-844-8152
**Responsible Party is the person or company creating the incident or spill.

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN
FIELD INSPECTION AND MAINTENANCE REPORT

Project Information

Inspection Cycle (select only one):

☐ At least once every 7 calendar days.

☐ At least once every 14 calendar days and within 24 hours after 0.5 inches or more of rainfall.

☐ *Other _____

CSJ: _____ Inspection Date: _____

Project: _____ TCEQ Authorization No.: _____

Highway: _____ Date of Last Rainfall: _____

County: _____ Amount of Last Rainfall: _____ (inches)

***For "other" options, the Engineer must verify compliance with Part III.F.7(a) of the TPDES Construction General Permit (CGP) and approve revisions to the SWP3.**

Inspected Best Management Practice (BMP)/Areas

All of these BMPs/areas must be inspected when present on the right-of-way

☐ Disturbed areas
☐ Discharge locations
☐ Erosion control BMPs
☐ Sediment control BMPs
☐ Concrete truck washout areas
☐ Areas where litter/debris/trash collect
☐ Areas that generate dust
☐ Postings
☐ Material stockpiles
☐ Areas where vehicles enter/leave site
☐ Portable sanitary facilities
☐ Construction material storage areas
☐ Parking/equipment storage areas
☐ Chemical/fuel storage areas

Other _____

Corrective Actions, Maintenance, Upgrading or Additional Controls

Except the items listed below, all areas/BMPs indicated above have been inspected and do not require maintenance, upgrading or additional controls. If multiple highways or project locations are involved, identify the highway or project location of the BMPs/areas requiring maintenance or improvement. Document all changes to the SWP3.

Station(s) or Location	Left or Right of Centerline	Issue/BMP	Corrective Action	Priority*	Date of Corrective Action Completed
Other/Notes			Cause		
Other/Notes			Cause		
Other/Notes			Cause		
Other/Notes			Cause		
Other/Notes			Cause		

* **High** - must be addressed immediately; all other project work is stopped until issue is resolved.
Med - address as soon as practicable or as directed; other work can continue.
Low - address within 7 days or before the next rainfall event.

Erosion Control and Stabilization

When construction activities permanently cease, or temporarily cease and are not expected to resume for 14 or more days, on a disturbed portion of the site, erosion control and stabilization measures must be initiated immediately, unless excepted by Part III.F.2(b)(iii) of the CGP (page 28). Indicate the stabilization measure that have been initiated under these circumstances.

Station	Left or Right of Centerline	Stabilization Measure	Date Initiated	Other/Notes
to				
to				
to				
to				
to				

Compliance Certification

Check One and Complete Signature.

☐ With the corrective actions noted (if any), the site is in compliance with the CGP regulations and the SWP3.

☐ The site is in potential non-compliance with the CGP regulations and/or the SWP3. Potential non-compliance issues are described below.

TxDOT's Representative's Name (Print clearly):	Title:	Date:
TxDOT's Representative's Signature:		

Potential Non-Compliance Issues

Potential non-compliance issues may include the failure to address previously noted corrective actions, repeated failure of a control measure, off-site discharges of sediment, off-site discharges of other pollutants, or other potential non-compliance issues identified in the CGP. Notify the Engineer immediately of any potential non-compliance issues.

Station	Left or Right of Centerline	Describe Potential Non-Compliance Issue
to		
to		
to		
to		
to		

Contractor Notification

Furnish a copy of this inspection report to the Contractor within one calendar day of the inspection. Corrective actions must be taken 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. If corrective actions are not made within this timeframe and become potential noncompliance issues, other work on the project may be suspended by the Engineer. Time charges will continue until the project is brought into compliance and documentation of corrective action is provided. This in no way releases the contractor of liability for noncompliance.

Contractor's Representative's Name (Print clearly):	Title:	Date:
Contractor's Representative's Signature:		

Inspection Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

TxDOT's Certifying Representative's Name (Print clearly):	Title:	Date:
TxDOT's Certifying Representative's Signature:		

Geological Assessment

FM 3351

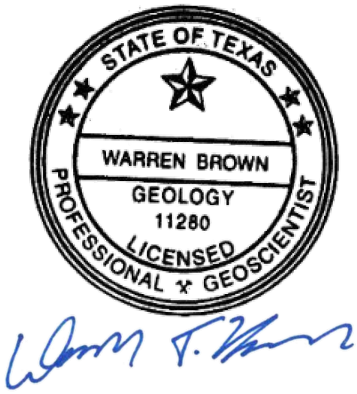
Project limits: From I-10 to SH 46

CSJs 3212-05-011, 3212-05-013, 3212-06-017

Bexar, Comal, and Kendall counties, Texas

February 2019

Texas Department of Transportation, San Antonio District



The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

Table of Contents

FIGURES

APPENDICES

ATTACHMENTS

Acronyms and Abbreviations

BFZ	Balcones Fault Zone
BMPs	Best Management Practices
EAA	Edwards Aquifer Authority
EARZ	Edwards Aquifer Recharge Zone
EPA	Environmental Protection Agency
ft/mi	feet per mile
GA	Geologic Assessment
GPS	Global Positioning System
in/hr	inches per hour
Kgr	Glen Rose Limestone
NRCS	Natural Resources Conservation Service
PCI	Poznecki-Camarillo, Inc.
Qt	Terrace deposits
ROW	Right-of-Way
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TxDOT	Texas Department of Transportation
TWDB	Texas Water Development Board
USDA	U.S. Department of Agriculture

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

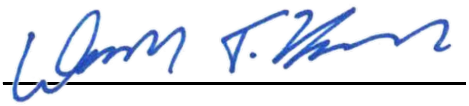
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Warren Brown Telephone: (210) 349-3273

Date: 21 February 2019 Fax: (210) 349-4395

Representing: Poznecki, Camarillo, Inc. -TBPE Firm No. F-483 (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:



Regulated Entity Name: FM 3351 - From I-10 to SH 46

(CSJ 3212-05-011 & CSJ 3212-05-013 & CSJ 3212-06-017)

Project Information

1. Date(s) Geologic Assessment was performed: December 17, 2018 and February 10, 2019
2. Type of Project:

   ☒ WPAP ☐ AST
   ☐ SCS ☐ UST
3. Location of Project:

   ☒ Recharge Zone
   ☐ Transition Zone

☐ Contributing Zone within the Transition 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 Characteristics and Thickness

Soil Name	Group*	Thickness(feet)
Anhalt Clay (Ca)	D	Approx. 0-2
Eckrant cobbly clay (TaB)	C	Approx. 0-1
Lewisville silty clay (LeB/LvA/LvB)	B	Approx. 0-5
Orif soils (Or)	B/A	Approx. 0-6
Gruene clay (GrC)	C	Approx. 0-6

** Soil Group Definitions (Abbreviated)*

A. Soils having a high infiltration rate when thoroughly wetted.

B. Soils having a moderate infiltration rate when thoroughly wetted.

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" = 220'
   Site Geologic Map Scale: 1" = 220'
   Site Soils Map Scale (if more than 1 soil type): 1" = 190'

9. Method of collecting positional data:

☒ Global 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 investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

    ☐ Geologic or manmade features were not discovered on the project site during the field 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.

    ☐ There are _____ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
    - ☐ The wells are not in use and have been properly abandoned.
    - ☐ The wells are not in use and will be properly abandoned.
    - ☐ The wells are in use and comply with 16 TAC Chapter 76.

    ☒ There are no wells or test holes of any kind known to exist on the project site.

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.

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: FM 3351 from IH 10 to SH 46 Boerne, Texas

LOCATION			FEATURE CHARACTERISTICS													EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3		4		5	5A	6	7	8A	8B		9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DIP	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE		TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10							<40	>40	<1.6	>1.6	
F-1	29.743999°	-98.623427°	SW	30	Qt	0.5	0.75	unknown	n/a	0	n/a	n/a	C	5		35	X			X	Streambed
F-2	29.744126°	-98.623380°	SF, Z	30	Qt	14	7.5	unknown	110°	0	2/7	0.15	C	7		37	X			X	Streambed

* DATUM: WGS 1984

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

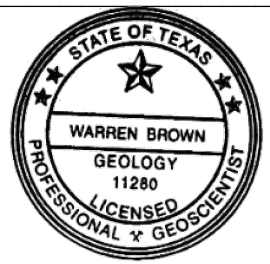
12 TOPOGRAPHY

Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

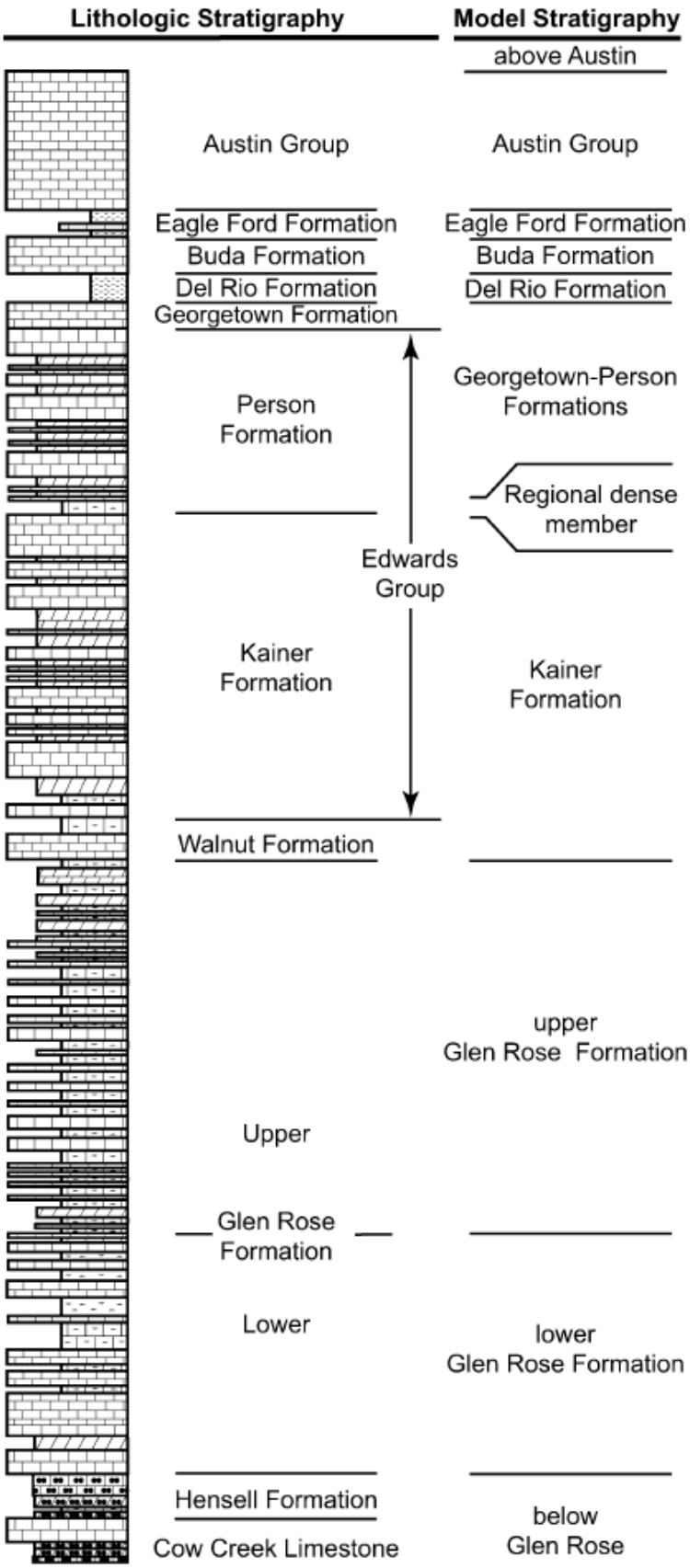
I have read, I understood, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Date 2/20/2019

Sheet 1 of 1



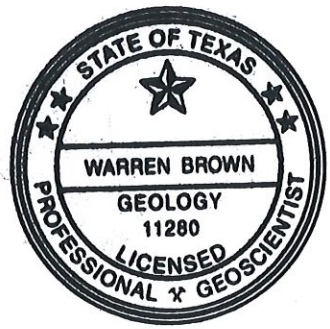
TCEQ-0585-Table (Rev. 10-01-04)



Stratigraphic Column: *Ferrill et al., 2004*

5835 Callaghan Road, Suite 200
San Antonio, TX 78228
www.pozcam.com

In accordance with the Texas Board of Professional Geoscientist rules at 22 Texas Administrative Code, Part 39, Chapter 851, Subchapter C, §851.156, this report is signed and sealed on the title page to assure the user that the work has been performed by or directly supervised by the following professional geologist who takes full responsibility for this work.



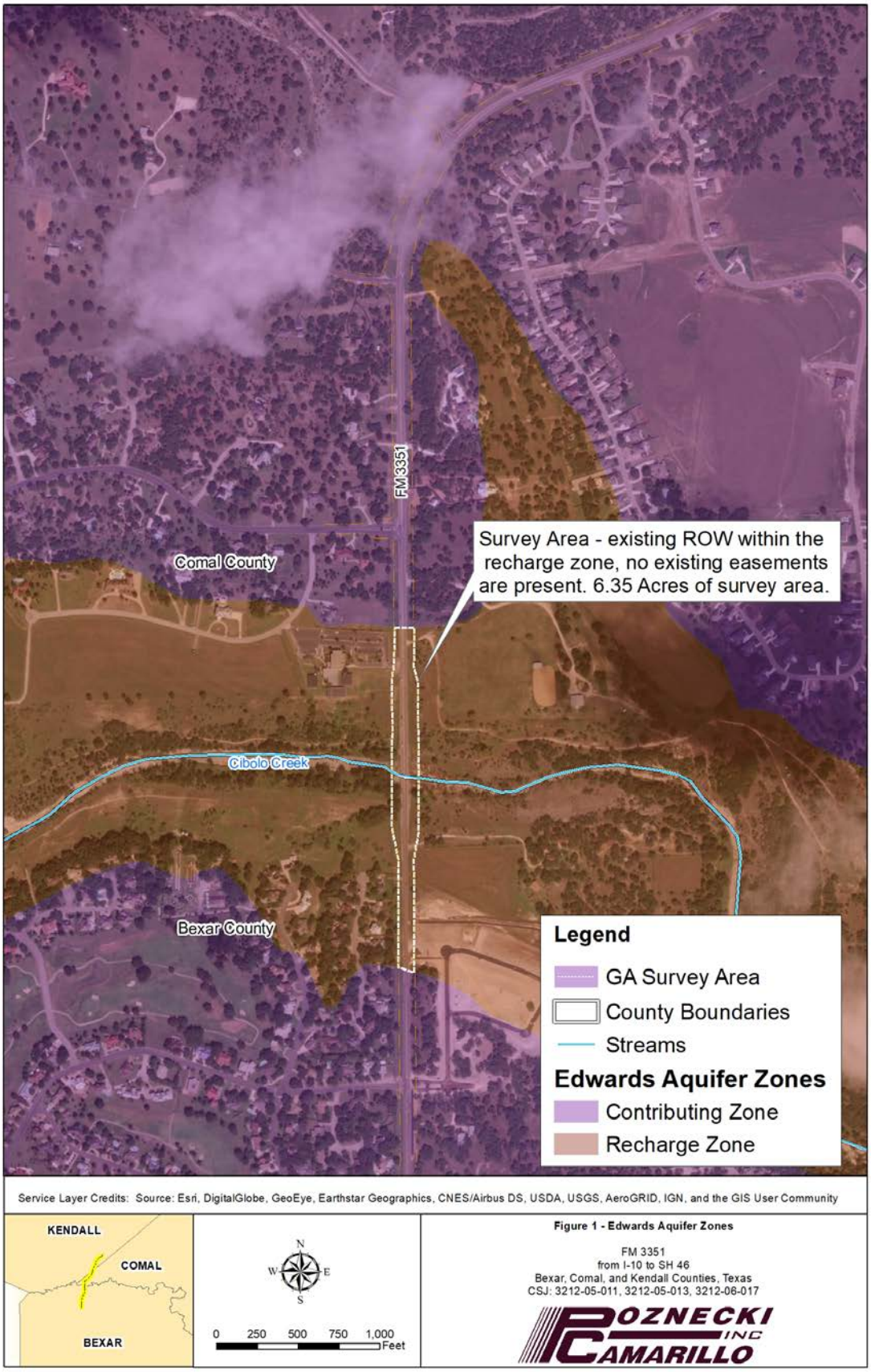
2/21/2019

21 February 2019
Warren Brown, Texas Professional Geoscientist No. 11280

1. Introduction

The Texas Department of Transportation (TxDOT) San Antonio District is proposing improvements to FM 3351 between I-10 and SH 46 in Bexar, Comal, and Kendall counties, Texas, a project length of approximately 11.7 miles. A geologic (karst) feature survey and geologic assessment (GA) were conducted within a 6.35-acre area ("GA Survey Area") of the project limits. The GA Survey Area includes the area within the existing FM 3351 right of way (ROW) that is within the Texas Commission on Environmental Quality (TCEQ) and the Edwards Aquifer Authority (EAA) limits of the Edwards Aquifer Recharge Zone (EARZ) (**Figure 1**).

A pedestrian survey was conducted on December 17, 2018 by a licensed geologist, which documented two geologic features. As directed by TCEQ in the *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones* (TCEQ, 2004), the pedestrian survey was completed by walking parallel transects spaced approximately 50 feet apart. Closer spacing was used where vegetation inhibited clear observation of the ground surface. The methodology used for this survey cannot preclude the presence of sub-grade karst features that lack surface expression. Prior to the field survey, the Poznecki-Camarillo, Inc. (PCI) geologist reviewed applicable references for regional geology, aerial photographs, and geologic, topographic, and soil maps for the property. A second pedestrian survey was conducted on February 10, 2019 to observe the identified features while Cibolo Creek was flowing following a rain event. These observations enabled a more informed characterization of recharge potential for each feature.


FM 3351
Comal County
Survey Area - existing ROW within the recharge zone, no existing easements are present. 6.35 Acres of survey area.
Cibolo Creek
Bexar County
Legend
GA Survey Area
County Boundaries
Streams
Edwards Aquifer Zones
Contributing Zone
Recharge Zone
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
KENDALL
COMAL
BEXAR
N
W
E
S
0 250 500 750 1,000 Feet
Figure 1 - Edwards Aquifer Zones
FM 3351
from I-10 to SH 46
Bexar, Comal, and Kendall Counties, Texas
CSJ: 3212-05-011, 3212-05-013, 3212-06-017
POZNECKI CAMARILLO INC

2. Background

2.1 Soils

Soil descriptions were compiled from the Web Soil Survey of the Natural Resources Conservation Service (NRCS). Five different soil types are identified in the survey area (**Figure 2**). A brief description of each soil type, taken from NRCS, is presented below. A detailed description of all soil types is presented in **Appendix A**.

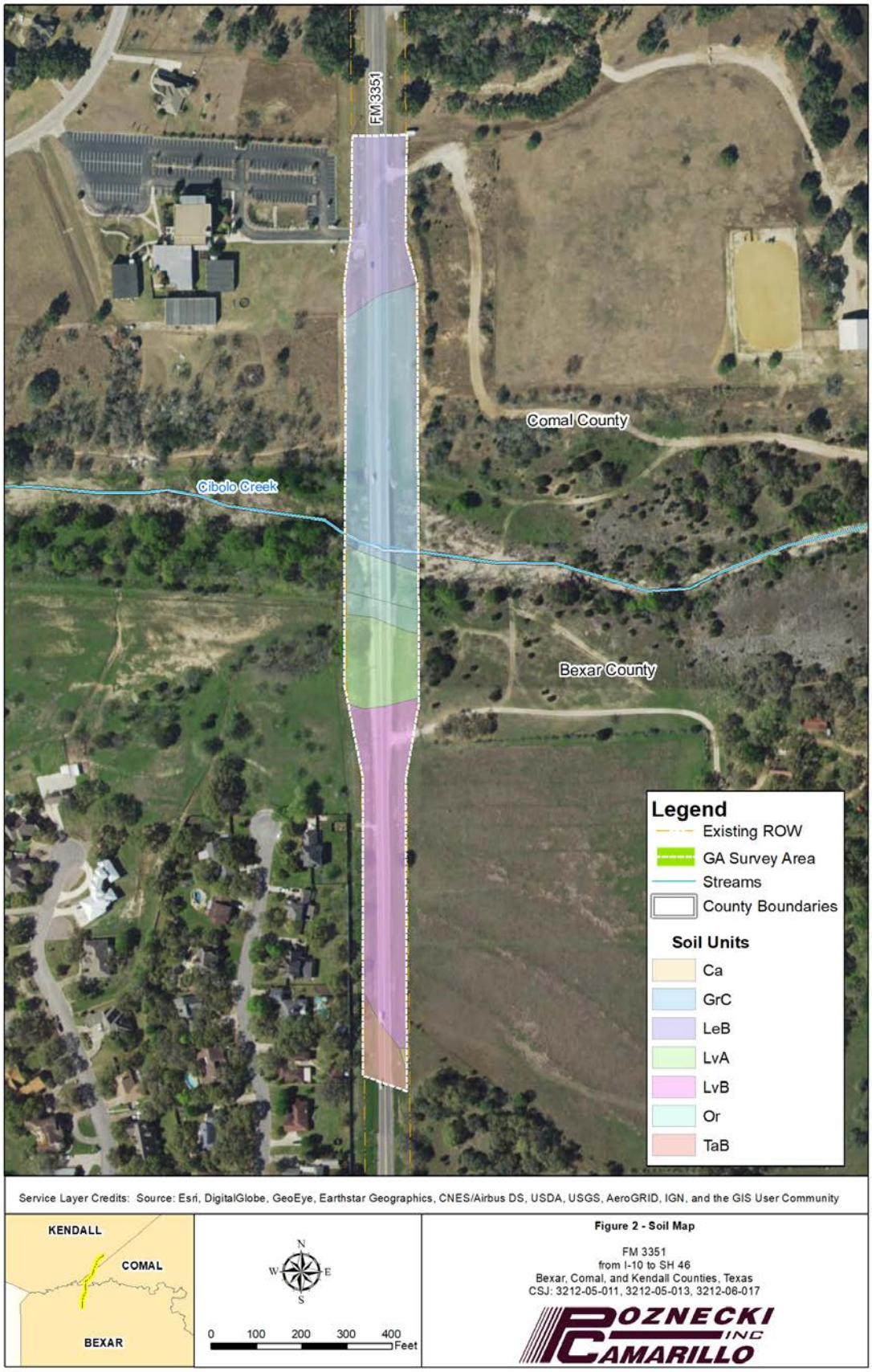
Anhalt Clay (Ca)
This is a well-drained clay unit that is capable of transmitting up to 0.06 inches per hour (in/hr) of precipitation by its limiting layer to the subsurface. This soil group comprises 0.5 percent of the survey area.

Lewisville silty clay (LvA/LvB/LeB)
This is a well-drained silty clay, and is capable of transmitting up to 1.98 in/hr of precipitation by its limiting layer to the subsurface. This soil group comprises 51 percent of the project area.

Eckrant cobbly clay (TaB)
This is a well-drained cobbly clay and is capable of transmitting up to 0.57 in/hr of precipitation by its limiting layer to the subsurface. This soil group comprises 5 percent of the project area.

Orif soils (Or)
This is a gravelly loamy sand to coarse sand that is capable of transmitting up to 19.98 in/hr of precipitation by its limiting layer to the subsurface. This soil group comprises 8.5 percent of the project area.

Gruene clay (GrC)
This is a well-drained unit that varies from clay to gravelly loam and is capable of transmitting up to 0.57 in/hr of precipitation by its limiting layer to the subsurface. This soil group comprises 35 percent of the project area.


FM 3351
Comal County
Cibolo Creek
Bexar County
Legend
Existing ROW
GA Survey Area
Streams
County Boundaries
Soil Units
Ca
GrC
LeB
LvA
LvB
Or
TaB
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
KENDALL
COMAL
BEXAR
N
W
E
S
0 100 200 300 400
Feet
Figure 2 - Soil Map
FM 3351
from I-10 to SH 46
Bexar, Comal, and Kendall Counties, Texas
CSJ: 3212-05-011, 3212-05-013, 3212-06-017
POZNECKI INC CAMARILLO

2.2 Regional Geology

Strata in the vicinity of the survey area are Cretaceous limestone, dolomitic limestone, dolomite, argillaceous limestone, marl and mudstone that represent more than 2,000 feet of shelf deposition on the southeast-trending San Marcos Platform. Northwest of the Balcones Escarpment, the outcrop belt consists mostly of cyclic, shallow, subtidal to tidal flat limestones, dolomitic limestones and dolomite of the Glen Rose Formation and the Kainer and Person Formations of the Edwards Group (Collins, 2000, p. 8). Quaternary alluvial deposits including the Pleistocene Leona Formation cover surface drainages in the area. A regional dip of 15 feet per mile (ft/mi) to the southeast for Cretaceous strata on the Edwards Plateau in Comal County was reported by George (1952, p. 33).

2.2.1 Stratigraphy

The survey area contains two geologic units: the Glen Rose Limestone (Kgr) and alluvial terrace deposits (Qt) as shown on **Figure 3**. The lower member of the Glen Rose Limestone can be as much as 395 feet thick in the San Antonio area. The formation consists mostly of hard limestone strata alternating with marl or marly limestone, but is replaced by sandy facies shoreward (to the northwest). Paleoenvironmentally diverse strata in the Trinity Group include blanket-like beach deposits, rudist reefs, wide-spread tidal-flat deposits, and shallow-water and shore deposits of caliche and alluvium. Many of the lower beds of the Glen Rose Limestone are very fossiliferous, with the most plentiful fossils represented by internal casts of pelecypods and gastropods. A particularly varied fauna occurs in nodular limestone and clay near the top of the lower member of the Glen Rose Limestone (Collins, 2000, p. 14). The Glen Rose Limestone, although considered the uppermost unit of the Trinity aquifer, could be viewed as a part of the Edwards aquifer in the Cibolo Creek area because of the hydraulic response and continuity of the formations (Lindgren et al., 2004).

The terrace deposits present in the survey area consist of sand, silt, clay, and gravel in various proportions, with calcium carbonate (caliche) in terraces along streams. In upland regions, the unit includes fluvial terrace deposits, light-brown, reddish-brown, grey, or yellowish-brown, gravelly quartz and lithic sand and silt to sandy gravel (Moore and Wermund, 1993).

In the Balcones fault zone, the displacement of fault blocks and the subsequent development and deformation of relay ramps in carbonate rocks, such as those confining the Edwards and Trinity aquifers, can produce increased fracture porosity and directional permeability within the aquifer-bearing strata. This style of faulting, in turn, can create potential flow barriers or allow communication between contiguous aquifers. Those faults with sufficiently large displacements may juxtapose the Edwards and Trinity aquifer-bearing

units and provide ground-water flow from the upper or lower Trinity to the Edwards aquifer or vice versa depending on hydraulic gradients between the two aquifers (Clark et al., 2009).

The geologic formations that comprise the Edwards Aquifer are, from top to bottom, the Georgetown, Person and Kainer (**Attachment B**, stratigraphic column). No units of the Edwards Aquifer strata outcrop within the survey area.

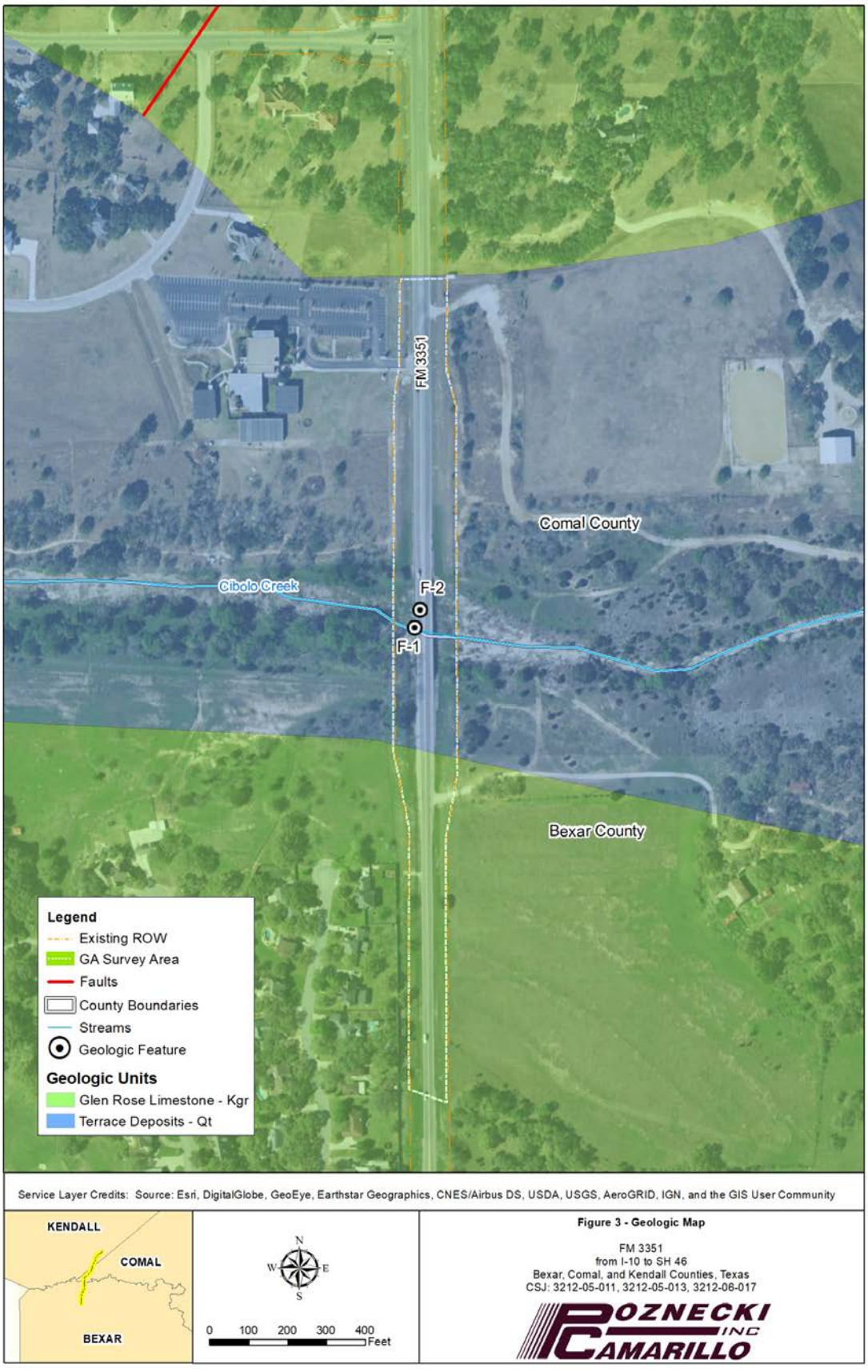


Figure 3 - Geologic Map

FM 3351
from I-10 to SH 46
Bexar, Comal, and Kendall Counties, Texas
CSJ: 3212-05-011, 3212-05-013, 3212-06-017

POZNECKI CAMARILLO INC

STATE OF TEXAS
WARREN BROWN
GEOLOGY
11280
LICENSED
PROFESSIONAL GEOSCIENTIST

2.2.2 Groundwater

The Texas Hill Country area is a semi-arid to humid subtropical environment with average annual rainfall of approximately 38 inches per year. Many of the rainfall events occur as thermal convection thunderstorms that can produce excessive amounts of precipitation in short periods of time. Some of this water makes its way into the aquifers, usually through concentrated areas along creeks and rivers in outcrop areas of the recharge zone.

Seven main faults that are a part of the Balcones fault zone in central Texas cross Comal County in a northeasterly direction. They are normal faults with the downthrow to the south or southeast, are roughly parallel, and have a combined displacement of about 1,500 feet. The direction of ground water movement is largely controlled by these faults. One of these normal faults is present approximately 900 feet northwest of the survey area. Studies of hydraulic gradients, chemical analyses, correlation among water levels, rainfall, and discharge measurements of Comal Springs, and relative run-off of streams within the county prove rather conclusively that more than half of the water discharged by Comal Springs is supplied by a large underground reservoir that also supplies many artesian wells in the San Antonio area. The data show that a relatively large proportion of the water comes from recharge areas west of Comal County (George, 1952).

3. Methods

Karst survey methods for this work followed protocols outlined in the TCEQ Instructions to Geologists for Geologic Assessments (TCEQ 2004). Pedestrian surveys, as defined by TCEQ (2004), were conducted throughout the entire survey area. The survey area is defined as the area inside the TxDOT ROW boundaries along FM 3351 from the limit of the TCEQ and EPA established recharge boundary (**Figure 1**). Positions of all features were documented using Global Positioning System (GPS) technology. All karst features identified were inspected by a licensed Professional Geoscientist and evaluated for potential impact to Edwards Aquifer recharge. The work was completed by ranking the recharge sensitivity of each feature using the point scheme defined by TCEQ (2004). Field work for the karst survey was conducted on December 17, 2018 and February 10, 2019 and was performed by a Texas licensed Professional Geoscientist. The second site visit was conducted to observe the identified features while Cibolo Creek was flowing (rain events occurred February 9th and 10th).

4. Results

4.1 Reported Water Wells

The Texas Water Development Board (TWDB) Groundwater Data viewer was utilized to identify water wells that may be affected by project activities within the survey area. **Figure 4**

identifies two wells that are located within 1,000 feet of the survey area; no wells were identified within the survey area. The complete listings are included in **Appendix B**.

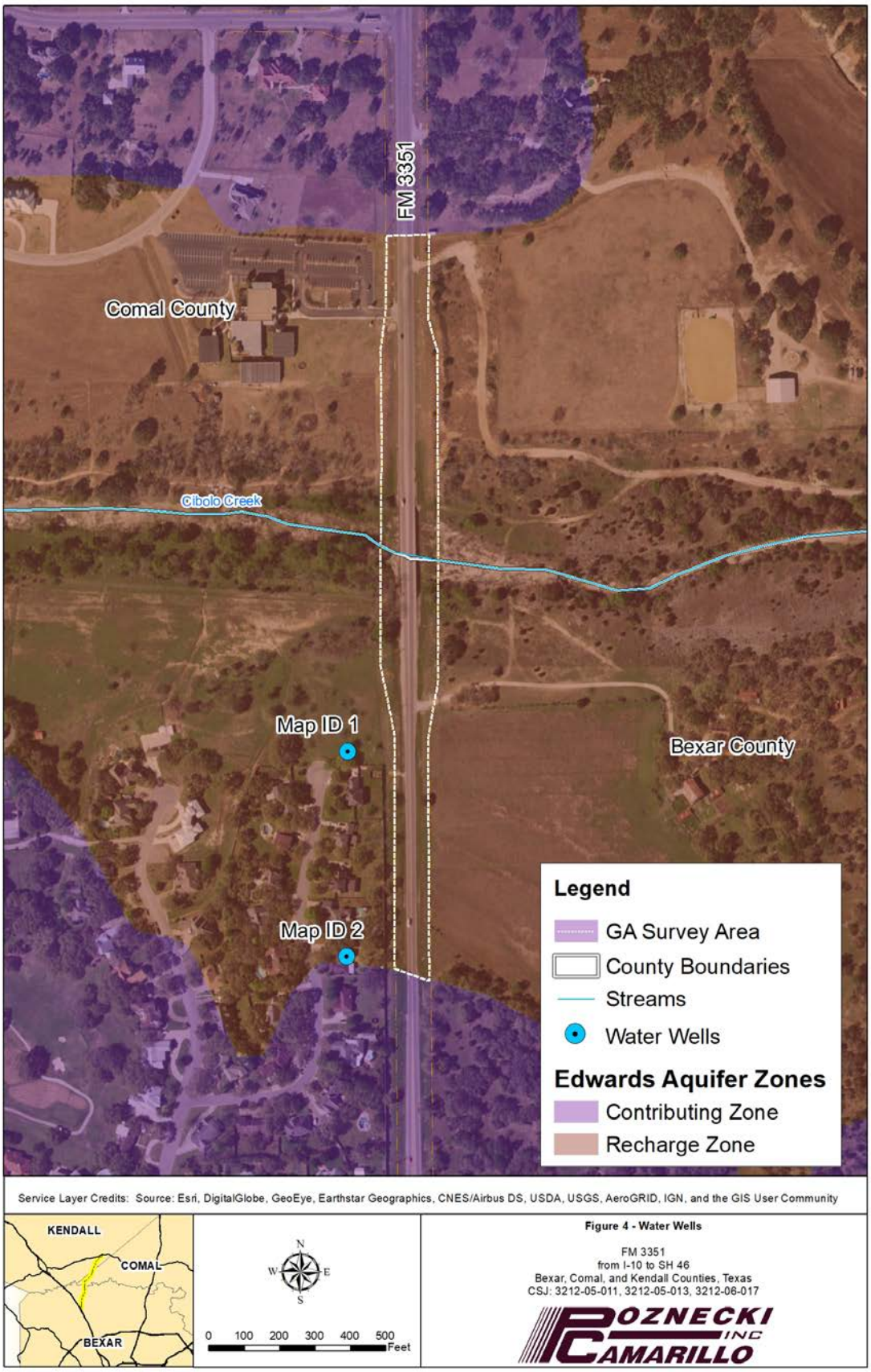
Map ID (1) Lat: 29.7425, Long: -98.623889; State Well ID 6820108

This location plots near the end of Cojak Circle, approximately 110 feet west of existing ROW. This well is owned by the City of Fair Oaks Ranch and is used for public water supply. According to the log, this well was drilled in 1979 and completed in the Cow Creek Limestone 435 feet below ground surface.

Map ID (2) Lat: 29.740834, Long: -98.623889; State Well ID 6820109

This location plots within a residential lot located at 29738 Cojak Circle and approximately 110 feet west of existing ROW. This well is owned by the Fairco Water Company in Fair Oaks Ranch and is not currently in use. According to the log, this well was drilled in 1980 and completed in the Cow Creek Limestone and Hosston Formation 877 feet below ground surface.

Conclusion: Neither of these listings were visually confirmed during the field reconnaissance. Specifically, none of these listings are located within TxDOT ROW. The construction storm water pollution prevention plan (SWPPP) that is implemented during actual construction will require reasonable best management practices (BMPs) to prevent runoff from the construction area and should prevent impacts to the recharge zone relative to either of these listings.


FM 3351
Comal County
Cibolo Creek
Map ID 1
Map ID 2
Bexar County
Legend
GA Survey Area
County Boundaries
Streams
Water Wells
Edwards Aquifer Zones
Contributing Zone
Recharge Zone
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
KENDALL
COMAL
BEXAR
N
W
E
S
0 100 200 300 400 500
Feet
Figure 4 - Water Wells
FM 3351
from I-10 to SH 46
Bexar, Comal, and Kendall Counties, Texas
CSJ: 3212-05-011, 3212-05-013, 3212-06-017
POZNECKI INC CAMARILLO

4.2 Description of Geologic (Karst) Features

Results of the surface karst feature survey are presented in the TCEQ Geologic Assessment Table at the beginning of this document, discussed below, and displayed on **Figure 3**. All features were ranked according to TCEQ standards and listed in TCEQ-0585-Table (Rev. 10-01-04).

Feature F-1 – Swallow hole in Cibolo Creek streambed

This swallow hole is located adjacent on the west side of the FM 3351 bridge over Cibolo Creek, directly in front of a box culvert. The feature is approximately 6 inches wide and 8 inches long with an unknown depth due to hardened infill (possibly infilled during previous bridge construction). This feature's location and surroundings suggest that the current conditions at this feature may be influenced by previous construction of the bridge and drainage structure. Surficial infill consisted of gravel and cobbles, with some underlying brown, organic material. This feature has a large catchment area (greater than 1.6 acres) within the Cibolo Creek streambed. When observed during flowing conditions, this feature held water and did not drain over a period of 24 hours.

Feature F-1 Overview, facing east

Feature F-2 – Solution-enlarged fracture zone in Cibolo Creek streambed

This fracture zone is in the Cibolo Creek streambed and measures 7.5 feet wide and 14 feet long, with no elevation change along the length of the feature. This feature is located underneath the FM 3351 bridge within a box culvert, with poured concrete bordering the feature on all four sides. This feature's location and surroundings suggest that it's current conditions may be influenced by previous construction of the bridge and drainage structure. The fractures are infilled with gravel and sand. This feature has a large catchment area (greater than 1.6 acres) within the Cibolo Creek streambed. When observed during flowing conditions, this feature held water and did not drain over a period of 24 hours.

Feature F-2 Overview, facing east

5. Conclusion

The overall potential for increased infiltration in the recharge zone due to planned roadway and bridge construction is low. Neither of the two features identified in this Geologic Assessment are classified as sensitive due to their holding of water as observed in the field. Runoff from construction activities that could reach one or both features

should be controllable by appropriate selection and application of stormwater BMPs, which will be outlined in TxDOT's SWPPP, provided under separate cover.

It is always possible that a hidden karst feature could become exposed during construction activity, but this is a constant possibility throughout the recharge zone. Only those karst features that exhibit some sort of surface expression were identified within the scope of this geologic assessment, which conforms to TCEQ Instructions to Geologists (document 0585). If a sensitive feature is encountered during construction activities, compliance with the Edwards Aquifer Rules (30 TAC 213.5) would be required, including halting construction activities until TCEQ has reviewed and approved methods proposed to protect the feature and the Edwards Aquifer.

6. References Cited

Clark, A.R., Blome, C.D., and Faith, J.R, 2009, Map showing the geology and hydrostratigraphy of the Edwards aquifer catchment area, northern Bexar County, Southcentral Texas: U.S. Geological Survey Open-File Report 2009-1008.

Collins, E.W. 2000. Geologic Map of the New Braunfels, Texas, 30 X 60 Minute Quadrangle: Geologic Framework of an Urban-Growth Corridor along the Edwards Aquifer, South Central Texas: Bureau of Economic Geology. Scale 1:24,000.

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FM 3351

Comal County

Cibolo Creek

F-2

F-1

Bexar County

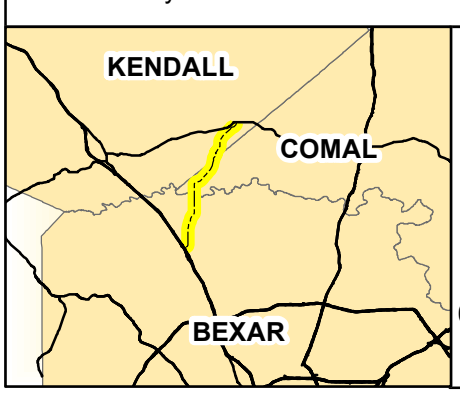
Legend

- Existing ROW
- GA Survey Area
- Faults
- County Boundaries
- Streams
- Geologic Feature
- Edwards Aquifer Recharge Zone

Geologic Units

- Glen Rose Limestone - Kgr
- Terrace Deposits - Qt

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



N W E S

STATE OF TEXAS
WARREN BROWN
GEOLOGY
11280
LICENSED
PROFESSIONAL GEOSCIENTIST

0 100 200 300 400 500 Feet

Attachment D - Geologic Map

FM 3351
from I-10 to SH 46
Bexar, Comal, and Kendall Counties, Texas
CSJ: 3212-05-011, 3212-05-013, 3212-06-017

POZNECKI INC CAMARILLO

Appendix A– Soil Description

Ca—Anhalt clay, 0 to 2 percent slopes

Map Unit Setting

- *National map unit symbol:* 2t2m8
- *Elevation:* 570 to 2,200 feet
- *Mean annual precipitation:* 31 to 36 inches
- *Mean annual air temperature:* 65 to 68 degrees F
- *Frost-free period:* 220 to 260 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Anhalt and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anhalt

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Clayey residuum weathered from limestone

Typical profile

- *Ap - 0 to 12 inches:* clay
- *Bss - 12 to 28 inches:* clay
- *Cr - 28 to 60 inches:* bedrock

Properties and qualities

- *Slope:* 0 to 2 percent
- *Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
- *Natural drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 15 percent
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile:* Low (about 3.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 3s
- *Hydrologic Soil Group:* D
- *Ecological site:* Deep Redland 29-35" PZ (R081CY358TX)
- *Hydric soil rating:* No

Minor Components

Krum

- *Percent of map unit:* 8 percent
- *Landform:* Stream terraces

- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Concave
- *Ecological site:* Clay Loam 29-35" PZ (R081CY357TX)
- *Hydric soil rating:* No

Tarrant

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex, linear
- *Ecological site:* Low Stony Hill 29-35" PZ (R081CY360TX)
- *Hydric soil rating:* No

Tarpley

- *Percent of map unit:* 2 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Footslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Redland 29-35" PZ (R081CY361TX)
- *Hydric soil rating:* No

LvA—Lewisville silty clay, 0 to 1 percent slopes

Map Unit Setting

- *National map unit symbol:* 2vtgz
- *Elevation:* 330 to 1,360 feet
- *Mean annual precipitation:* 32 to 40 inches
- *Mean annual air temperature:* 66 to 69 degrees F
- *Frost-free period:* 258 to 274 days
- *Farmland classification:* All areas are prime farmland

Map Unit Composition

- *Lewisville and similar soils:* 90 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Lewisville

Setting

- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Calcareous clayey alluvium derived from mudstone

Typical profile

- *Ap - 0 to 17 inches:* silty clay
- *Bk1 - 17 to 44 inches:* silty clay
- *Bk2 - 44 to 61 inches:* silty clay

Properties and qualities

- *Slope:* 0 to 1 percent

- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 40 percent
- *Salinity, maximum in profile:* Nonsaline (0.7 to 1.1 mmhos/cm)
- *Available water storage in profile:* High (about 9.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 2s
- *Hydrologic Soil Group:* B
- *Ecological site:* Southern Clay Loam (R086AY007TX)
- *Hydric soil rating:* No

Minor Components

Branyon

- *Percent of map unit:* 10 percent
- *Landform:* Stream terraces, stream terraces
- *Landform position (three-dimensional):* Tread
- *Microfeatures of landform position:* Circular gilgai, circular gilgai
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Ecological site:* Southern Blackland (R086AY011TX)
- *Hydric soil rating:* No

LvB—Lewisville silty clay, 1 to 3 percent slopes

Map Unit Setting

- *National map unit symbol:* 2vtgn
- *Elevation:* 240 to 1,470 feet
- *Mean annual precipitation:* 32 to 44 inches
- *Mean annual air temperature:* 63 to 68 degrees F
- *Frost-free period:* 240 to 270 days
- *Farmland classification:* All areas are prime farmland

Map Unit Composition

- *Lewisville and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Lewisville

Setting

- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Calcareous clayey alluvium derived from mudstone

Typical profile

- *Ap - 0 to 15 inches:* silty clay

- *Bk1 - 15 to 38 inches:* silty clay
- *Bk2 - 38 to 69 inches:* silty clay

Properties and qualities

- *Slope:* 1 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Low
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 40 percent
- *Salinity, maximum in profile:* Nonsaline (0.7 to 1.1 mmhos/cm)
- *Available water storage in profile:* High (about 9.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 2e
- *Hydrologic Soil Group:* B
- *Ecological site:* Southern Clay Loam (R086AY007TX)
- *Hydric soil rating:* No

Minor Components

Altoga

- *Percent of map unit:* 10 percent
- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Ecological site:* Southern Clay Loam (R086AY007TX)
- *Hydric soil rating:* No

Branyon

- *Percent of map unit:* 5 percent
- *Landform:* Stream terraces, stream terraces
- *Landform position (three-dimensional):* Tread
- *Microfeatures of landform position:* Circular gilgai, circular gilgai
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Ecological site:* Southern Blackland (R086AY011TX)
- *Hydric soil rating:* No

Or—Orif soils, moist, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

- *National map unit symbol:* 2t0sp
- *Elevation:* 500 to 1,270 feet
- *Mean annual precipitation:* 33 to 37 inches
- *Mean annual air temperature:* 66 to 69 degrees F
- *Frost-free period:* 230 to 265 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Orif, moist, and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Orif, Moist

Setting

- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear, concave
- *Parent material:* Calcareous sandy and gravelly alluvium derived from limestone

Typical profile

- *A - 0 to 20 inches:* gravelly loamy sand
- *2C1 - 20 to 60 inches:* extremely gravelly loamy sand
- *3C2 - 60 to 80 inches:* coarse sand

Properties and qualities

- *Slope:* 0 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* Frequent
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 95 percent
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile:* Very low (about 2.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 5w
- *Hydrologic Soil Group:* A
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Minor Components

Oakalla

- *Percent of map unit:* 8 percent
- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Riverwash

- *Percent of map unit:* 4 percent
- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear, concave
- *Hydric soil rating:* No

Frio

- *Percent of map unit:* 2 percent
- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Unnamed, hydric

- *Percent of map unit:* 1 percent
- *Landform:* Depressions on flood plains
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Concave, linear
- *Across-slope shape:* Concave, linear
- *Hydric soil rating:* Yes

TaB—Eckrant cobbly clay, 1 to 8 percent slopes

Map Unit Setting

- *National map unit symbol:* 2t0sg
- *Elevation:* 650 to 1,900 feet
- *Mean annual precipitation:* 30 to 35 inches
- *Mean annual air temperature:* 65 to 69 degrees F
- *Frost-free period:* 210 to 250 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Eckrant and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Eckrant

Setting

- *Landform:* Ridges
- *Landform position (two-dimensional):* Backslope, summit, shoulder
- *Landform position (three-dimensional):* Side slope, interfluve
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from limestone

Typical profile

- *A1 - 0 to 4 inches:* cobbly clay
- *A2 - 4 to 11 inches:* very cobbly clay
- *R - 11 to 80 inches:* bedrock

Properties and qualities

- *Slope:* 1 to 8 percent
- *Percent of area covered with surface fragments:* 2.3 percent
- *Depth to restrictive feature:* 4 to 20 inches to lithic bedrock
- *Natural drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches

- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 10 percent
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Sodium adsorption ratio, maximum in profile:* 1.0
- *Available water storage in profile:* Very low (about 1.0 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6s
- *Hydrologic Soil Group:* D
- *Ecological site:* Low Stony Hill 29-35" PZ (R081CY360TX)
- *Hydric soil rating:* No

Minor Components

Brackett

- *Percent of map unit:* 7 percent
- *Landform:* Ridges
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* Adobe 29-35" PZ (R081CY355TX)
- *Hydric soil rating:* No

Bexar

- *Percent of map unit:* 5 percent
- *Landform:* Ridges
- *Landform position (two-dimensional):* Footslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Redland 29-35" PZ (R081CY361TX)
- *Hydric soil rating:* No

Krum

- *Percent of map unit:* 3 percent
- *Landform:* Ridges
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Clay Loam 29-35" PZ (R081CY357TX)
- *Hydric soil rating:* No

Comal County, Texas

GrC—Gruene clay, 1 to 5 percent slopes

Map Unit Setting

- *National map unit symbol:* f3k5
- *Elevation:* 600 to 1,500 feet
- *Mean annual precipitation:* 33 to 34 inches
- *Mean annual air temperature:* 66 to 68 degrees F

- *Frost-free period:* 254 to 265 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Gruene and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Gruene

Setting

- *Landform:* Ridges
- *Landform position (two-dimensional):* Shoulder, backslope
- *Landform position (three-dimensional):* Interfluve, side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex, linear
- *Parent material:* Clayey alluvium of pliestocene age derived from mixed sources over gravelly alluvium of pliestocene age derived from mixed sources

Typical profile

- *H1 - 0 to 13 inches:* clay
- *H2 - 13 to 22 inches:* cemented material
- *H3 - 22 to 80 inches:* stratified very gravelly loam

Properties and qualities

- *Slope:* 1 to 5 percent
- *Depth to restrictive feature:* 7 to 16 inches to petrocalcic
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile:* Very low (about 1.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4s
- *Hydrologic Soil Group:* D
- *Ecological site:* Southern Chalky Ridge (R086AY002TX)
- *Hydric soil rating:* No

Minor Components

Unnamed

- *Percent of map unit:* 15 percent
- *Hydric soil rating:* No

LeB—Lewisville silty clay, 1 to 3 percent slopes

Map Unit Setting

- *National map unit symbol:* 2vtgn
- *Elevation:* 240 to 1,470 feet
- *Mean annual precipitation:* 32 to 44 inches
- *Mean annual air temperature:* 63 to 68 degrees F
- *Frost-free period:* 240 to 270 days
- *Farmland classification:* All areas are prime farmland

Map Unit Composition

- *Lewisville and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Lewisville

Setting

- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Calcareous clayey alluvium derived from mudstone

Typical profile

- *Ap - 0 to 15 inches:* silty clay
- *Bk1 - 15 to 38 inches:* silty clay
- *Bk2 - 38 to 69 inches:* silty clay

Properties and qualities

- *Slope:* 1 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Low
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 40 percent
- *Salinity, maximum in profile:* Nonsaline (0.7 to 1.1 mmhos/cm)
- *Available water storage in profile:* High (about 9.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 2e
- *Hydrologic Soil Group:* B
- *Ecological site:* Southern Clay Loam (R086AY007TX)
- *Hydric soil rating:* No

Minor Components

Altoga

- *Percent of map unit:* 10 percent
- *Landform:* Stream terraces
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Ecological site:* Southern Clay Loam (R086AY007TX)
- *Hydric soil rating:* No

Branyon

- *Percent of map unit:* 5 percent
- *Landform:* Stream terraces, stream terraces
- *Landform position (three-dimensional):* Tread
- *Microfeatures of landform position:* Circular gilgai, circular gilgai
- *Down-slope shape:* Linear

- *Across-slope shape:* Convex
- *Ecological site:* Southern Blackland (R086AY011TX)
- *Hydric soil rating:* No

Or—Orif soils, moist, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

- *National map unit symbol:* 2t0sp
- *Elevation:* 500 to 1,270 feet
- *Mean annual precipitation:* 33 to 37 inches
- *Mean annual air temperature:* 66 to 69 degrees F
- *Frost-free period:* 230 to 265 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Orif, moist, and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Orif, Moist

Setting

- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear, concave
- *Parent material:* Calcareous sandy and gravelly alluvium derived from limestone

Typical profile

- *A - 0 to 20 inches:* gravelly loamy sand
- *2C1 - 20 to 60 inches:* extremely gravelly loamy sand
- *3C2 - 60 to 80 inches:* coarse sand

Properties and qualities

- *Slope:* 0 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Well drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* Frequent
- *Frequency of ponding:* None
- *Calcium carbonate, maximum in profile:* 95 percent
- *Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile:* Very low (about 2.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 5w
- *Hydrologic Soil Group:* A
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Minor Components

Oakalla

- *Percent of map unit:* 8 percent

- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Riverwash

- *Percent of map unit:* 4 percent
- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear, concave
- *Hydric soil rating:* No

Frio

- *Percent of map unit:* 2 percent
- *Landform:* Flood plains on river valleys
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* Loamy Bottomland 29-35" PZ (R081CY561TX)
- *Hydric soil rating:* No

Unnamed, hydric

- *Percent of map unit:* 1 percent
- *Landform:* Depressions on flood plains
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Concave, linear
- *Across-slope shape:* Concave, linear
- *Hydric soil rating:* Yes

Texas Water Development Board (TWDB)
Groundwater Database (GWDB)
Well Information Report for State Well Number 68-20-108

GWDB Reports and Downloads

Well Basic Details

Scanned Documents

State Well Number	6820108
County	Bexar
River Basin	San Antonio
Groundwater Management Area	9
Regional Water Planning Area	L - South Central Texas
Groundwater Conservation District	Trinity Glen Rose GCD
Latitude (decimal degrees)	29.7425
Latitude (degrees minutes seconds)	29° 44' 33" N
Longitude (decimal degrees)	-98.623889
Longitude (degrees minutes seconds)	098° 37' 26" W
Coordinate Source	Global Positioning System - GPS
Aquifer Code	218CCRK - Cow Creek Limestone
Aquifer	Trinity
Aquifer Pick Method	
Land Surface Elevation (feet above sea level)	1254
Land Surface Elevation Method	Interpolated From Topo Map
Well Depth (feet below land surface)	435
Well Depth Source	Driller's Log
Drilling Start Date	
Drilling End Date	4/6/1979
Drilling Method	Air Rotary
Borehole Completion	Open Hole

Well Type	Withdrawal of Water
Well Use	Public Supply
Water Level Observation	Miscellaneous Measurements
Water Quality Available	No
Pump	Submersible
Pump Depth (feet below land surface)	378
Power Type	Electric Motor
Annular Seal Method	
Surface Completion	
Owner	City of Fair Oaks Ranch (#12-Ralph Fair)
Driller	Louis Bergmann & Sons
Other Data Available	Drillers Log
Well Report Tracking Number	
Plugging Report Tracking Number	
U.S. Geological Survey Site Number	
Texas Commission on Environmental Quality Source Id	
Groundwater Conservation District Well Number	
Owner Well Number	12
Other Well Number	
Previous State Well Number	
Reporting Agency	Texas Water Development Board
Created Date	8/12/1987
Last Update Date	7/20/2016

Remarks	Reported yield 88 GPM. Cemented from 0 to 224 feet.

Casing

Diameter (in.)	Casing Type	Casing Material	Schedule	Gauge	Top Depth (ft.)	Bottom Depth (ft.)
8	Blank	Steel			0	224
	Open Hole				224	435

Well Tests - No Data

Lithology - No Data

Annular Seal Range - No Data

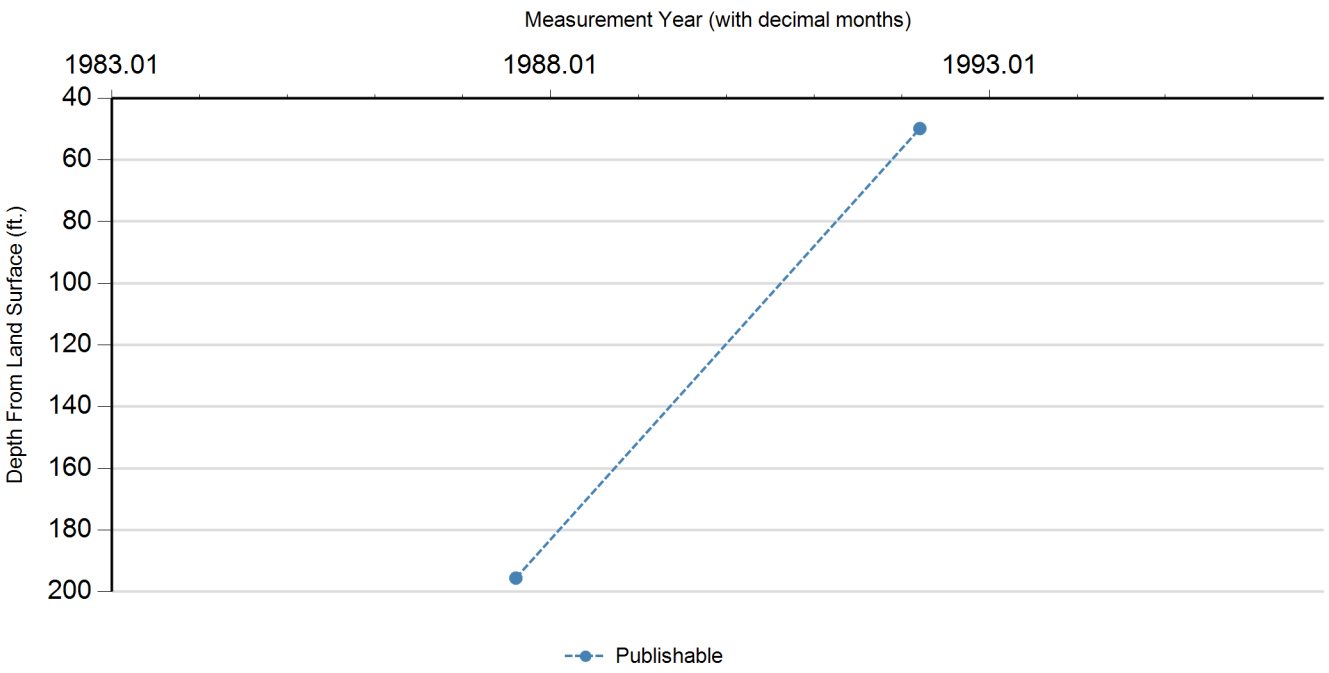
Borehole - No Data

Plugged Back - No Data

Filter Pack - No Data

Packers - No Data

Water Level Measurements



Status Code	Date	Time	Water Level (ft. below land surface)	Change value in ( ) indicates rise in level	Water Elevation (ft. above sea level)	Meas #	Measuring Agency	Method	Remark ID	Comments
P	8/13/1987		195.58		1058.42	1	Texas Water Development Board	Steel Tape		
P	3/18/1992		49.84	(145.74)	1204.16	1	Groundwater Consultant	Steel Tape		

Code Descriptions

Status Code	Status Description
P	Publishable

Water Quality Analysis - No Data Available

Texas Water Development Board (TWDB)
Groundwater Database (GWDB)
Well Information Report for State Well Number 68-20-109

GWDB Reports and Downloads

Well Basic Details

Scanned Documents

State Well Number	6820109
County	Bexar
River Basin	San Antonio
Groundwater Management Area	9
Regional Water Planning Area	L - South Central Texas
Groundwater Conservation District	Trinity Glen Rose GCD
Latitude (decimal degrees)	29.740834
Latitude (degrees minutes seconds)	29° 44' 27" N
Longitude (decimal degrees)	-98.623889
Longitude (degrees minutes seconds)	098° 37' 26" W
Coordinate Source	+/- 1 Second
Aquifer Code	217HSCC - Hosston Formation and Cow Creek Limestone
Aquifer	Trinity
Aquifer Pick Method	
Land Surface Elevation (feet above sea level)	1272
Land Surface Elevation Method	Interpolated From Topo Map
Well Depth (feet below land surface)	877
Well Depth Source	Driller's Log
Drilling Start Date	
Drilling End Date	8/1/1980
Drilling Method	Mud (Hydraulic) Rotary
Borehole Completion	Open Hole

Well Type	Withdrawal of Water
Well Use	Unused
Water Level Observation	Miscellaneous Measurements
Water Quality Available	No
Pump	None
Pump Depth (feet below land surface)	
Power Type	
Annular Seal Method	
Surface Completion	
Owner	Fairco Water Company Fair Oaks Ranch
Driller	Louis Bergmann & Sons
Other Data Available	Drillers Log
Well Report Tracking Number	
Plugging Report Tracking Number	
U.S. Geological Survey Site Number	
Texas Commission on Environmental Quality Source Id	
Groundwater Conservation District Well Number	
Owner Well Number	
Other Well Number	
Previous State Well Number	
Reporting Agency	Texas Water Development Board
Created Date	8/13/1987
Last Update Date	6/6/1997

Remarks	Owner's #14 well. Unused public supply well. Cemented from 0 to 690 feet. Poor water quality.

Casing

Diameter (in.)	Casing Type	Casing Material	Schedule	Gauge	Top Depth (ft.)	Bottom Depth (ft.)
8	Blank	Steel			0	690
	Open Hole				690	877

Well Tests - No Data

Lithology - No Data

Annular Seal Range - No Data

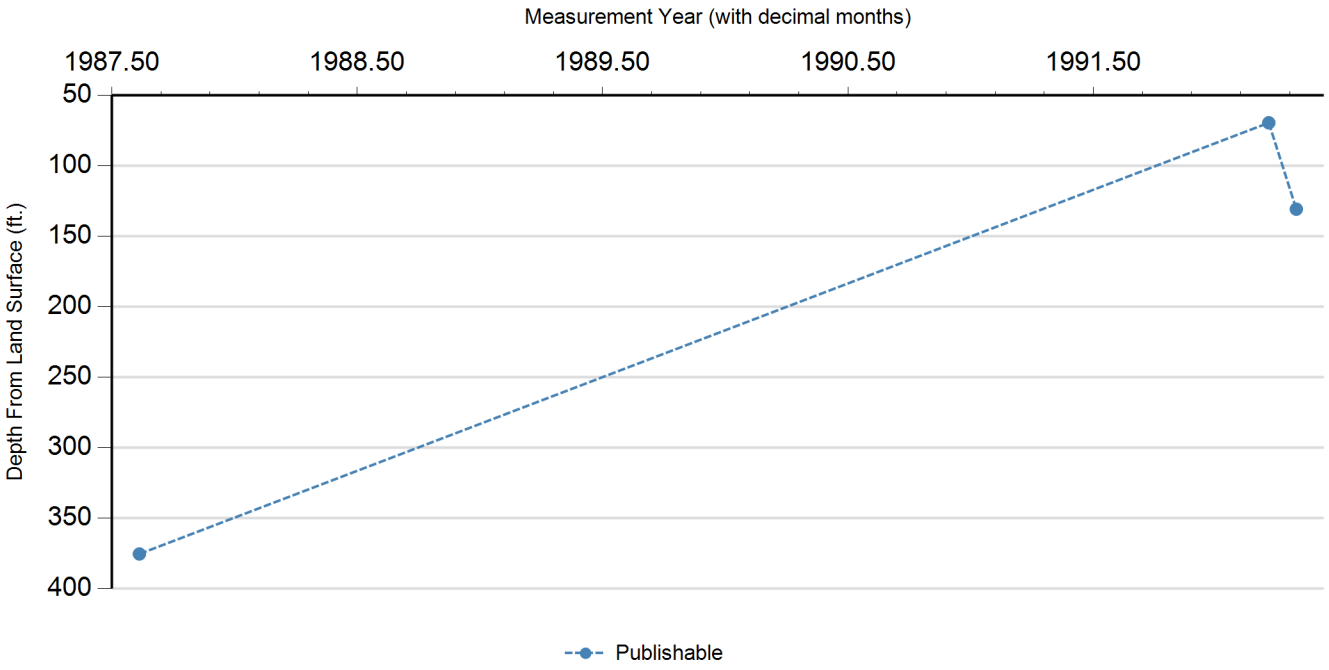
Borehole - No Data

Plugged Back - No Data

Filter Pack - No Data

Packers - No Data

Water Level Measurements



Status Code	Date	Time	Water Level (ft. below land surface)	Change value in ( ) indicates rise in level	Water Elevation (ft. above sea level)	Meas #	Measuring Agency	Method	Remark ID	Comments
P	8/13/1987		375.33		896.67	1	Texas Water Development Board	Steel Tape		
P	3/18/1992		69.58	(305.75)	1202.42	1	Groundwater Consultant	Steel Tape		
P	4/29/1992		130.84	61.26	1141.16	1	Groundwater Consultant	Steel Tape		

Code Descriptions

Status Code	Status Description
P	Publishable

Water Quality Analysis - No Data Available

Technical Memorandum

Date:	December 12, 2023
Project:	FM 3351 at Cibolo Creek Bridge Replacement
To:	TCEQ, Edwards Aquifer Protection Program
From:	Paula Jo Lemonds, PG, PE
Subject:	CSJ: 3212-05-013 FM 3351 at Cibolo Creek

December 12, 2023

1 Introduction

The Texas Department of Transportation (TxDOT) proposes to replace the existing bridge at FM 3351 at Cibolo Creek in Bexar and Comal counties, approximately 0.013 miles north of the Bexar County Line, (control-section-job number (CSJ): 3212-05-013.

The purpose of this site investigation and technical memorandum is to verify the findings of the Geologic Assessment (GA) completed in February 2019 by Poznecki, Camarillo, Inc., TBPE Firm No. F-483. The 2019 GA included a larger project area than the current project limits and is attached to the technical memorandum for reference. The technical memorandum summarizes the field verification of the 2019 findings. The site investigation includes the proposed right-of-way. This report complies with the requirements of Title 30, Texas Administrative Code (TAC) Chapter 213, related to the protection of the Edwards Aquifer Recharge Zone (TCEQ, 2001). The site investigation included a karst feature survey.

2 Scope

This technical memorandum is intended to aid in satisfying the requirements for a Geologic Assessment, which will be included as a component of a Water Pollution Abatement Plan (WPAP). The WPAP identifies measures that will be implemented to protect the water quality of the aquifer. The scope of the work consists of a site reconnaissance, field survey, and review of existing data and reports. The site investigation includes the proposed right-of-way. Features identified during the 2019 GA and field-verified in 2022 have been ranked utilizing the Texas Commission on Environmental Quality (TCEQ) matrix for Edwards Aquifer Recharge Zone Features as part of the WPAP upon completion of final design of the proposed project. The ranking of the features determines their viability for recharge potential.

3 Investigation Methods

The following investigation methods and activities were used to develop this technical memo.

- Review of existing files and literature to determine the regional geology and known caves and karst features associated with the proposed project and existing geological field reports and

correspondence regarding the existing geologic features on the proposed project, specifically the 2019 GA;

- Site reconnaissance by a registered professional geologist to identify and examine karst, caves, recharge features, and other significant geologic features; and

- Evaluation of collected field data.

Reconnaissance of all existing and proposed ROW included the methodology described in TCEQ (2004). The geologic assessment site visit was completed by Paula Jo Lemonds (Texas PG #10173) and geologist technician Caroline Nellis. The site reconnaissance was completed on November 18, 2022. The purpose of the visit was to verify previously identified karst features and complete a field survey for any additional features.

4 Findings

Results of the surface karst feature survey presented in the 2019 GA were verified and no additional karst features were identified. **Figure 1** and **Figure 2** include photos taken during the November 2022 site visit of the two features identified in the 2019 GA. In addition to the 2019 GA description, Feature 2, described as the solution-enlarged fracture zone in the Cibolo Creek streambed, could have placed rocks, similar to rip rap during bridge construction. **Figure 3** shows an overview of the FM 3351 bridge at Cibolo Creek from the downstream (east) side. **Figure 4** shows an overview of the FM 3351 bridge at Cibolo Creek from the upstream (west) side.

5 References

(TCEQ) Texas Commission on Environmental Quality, 2001. "Edwards Aquifer Protection Program, Chapter 213 Rules – Recharge Zone, Transition Zone, Contributing Zone, and Contributing Zone within the Transition Zone." Map. Digital Data. November 28, 2001. Austin, Texas.

TCEQ, 2004. Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge / Transition Zones. TCEQ Form 0585.

Figure 1. Swallow hole in Cibolo Creek streambed identified as Feature F-1 in the 2019 GA.

Figure 2. Solution-enlarged fracture zone in Cibolo Creek streambed identified as Feature F-2 in the 2019 GA.

Figure 3. Overview of the FM 3351 bridge at Cibolo Creek from the downstream (east) side

Figure 4. Overview of the FM 3351 bridge at Cibolo Creek from the upstream (west) side

TCEQ Use Only

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 Submission (*If other is checked please describe in space provided.*)

☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	**3. Regulated Entity Reference Number** *(if issued)*
CN 600803456		**RN**

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy)

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)* — *If new Customer, enter previous Customer below:*

Texas Department of Transportation

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID** (9 digits)	**10. DUNS Number** *(if applicable)*

11. Type of Customer: ☐ Corporation ☐ Individual Partnership: ☐ General ☐ Limited

Government: ☐ City ☐ County ☐ Federal ☐ Local ☒ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees

☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher

13. Independently Owned and Operated?

☒ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☐ Owner ☐ Operator ☒ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant ☐ Other:

15. Mailing Address:

4615 NW Loop 410

City	San Antonio	**State**	TX	**ZIP**	78229	**ZIP + 4**	0928

16. Country Mailing Information *(if outside USA)*	**17. E-Mail Address** *(if applicable)*
	brian.witherell@txdot.gov

18. Telephone Number	**19. Extension or Code**	**20. Fax Number** *(if applicable)*

(210) 615-5846		( ) -

SECTION III: Regulated Entity Information

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.)*

FM 3351 at Cibolo Creek

23. Street Address of the Regulated Entity: ***(No PO Boxes)***	4615 NW Loop 410							
	City	San Antonio	**State**	TX	**ZIP**	78229	**ZIP + 4**	0928
24. County	Bexar							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	FM 3351 at Cibolo Creek in Bexar and Comal County, approximately 0.013 miles north of the Bexar County Line.				
26. Nearest City			**State**	**Nearest ZIP Code**	
Fair Oaks Ranch			TX	78015	

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	29.743924		**28. Longitude (W) In Decimal:**	98.62333	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	44	38	98	37	24

29. Primary SIC Code (4 digits)	**30. Secondary SIC Code** (4 digits)	**31. Primary NAICS Code** (5 or 6 digits)	**32. Secondary NAICS Code** (5 or 6 digits)
1622	1611	237310	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

34. Mailing Address:	**4615 NW Loop 410**							
	City	**San Antonio**	**State**	**TX**	**ZIP**	**78229**	**ZIP + 4**	**0928**
35. E-Mail Address:	**brian.witherell@txdot.gov**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(210) 615-5846		( ) -

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.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Eliseo Suarez	**41. Title:**	Transportation Engineer

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(210 **)** 300-0221		**( )** -	eliseo.suarez@hdrinc.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:	Texas Dept of Transportation	**Job Title:**	Environmental Project Planner
Name *(In Print):*	Brian Witherell	**Phone:**	(210)615-5846
Signature:		**Date:**	2/14/2024