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: Cascade Subdivision						**2. Regulated Entity No.: RN111868394**			
3. Customer Name: LB Warren LLC						**4. Customer No.: CN606215515**			
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):**		219.293 Ac	
9. Application Fee:	$8,000.00		**10. Permanent BMP(s):**			Batch Detention Pond, Vegetative Filter Strips, Grassy Swale			
11. SCS (Linear Ft.):	N/A		**12. AST/UST (No. Tanks):**			N/A			
13. County:	Williamson		**14. Watershed:**			North Fork San Gabriel			

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.)	___	___	_X_
Region (1 req.)	___	___	_X_
County(ies)	___	___	_X_
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.)	___	___	___	___	___
Region (1 req.)	___	___	___	___	___
County(ies)	___	___	___	___	___
Groundwater Conservation District(s)	___ Edwards Aquifer Authority ___Trinity-Glen Rose	___Edwards Aquifer Authority	___Kinney	___EAA ___Medina	___EAA ___Uvalde
City(ies) Jurisdiction	___Castle Hills ___Fair Oaks Ranch ___Helotes ___Hill Country Village ___Hollywood Park ___San Antonio (SAWS) ___Shavano Park	___Bulverde ___Fair Oaks Ranch ___Garden Ridge ___New Braunfels ___Schertz	NA	___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. Nathan D. Kelly, P.E.
Print Name of Customer/Authorized Agent
Signature of Customer/Authorized Agent — Date: 7/1/2024

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):	

Contributing Zone Plan Application

Texas Commission on Environmental Quality

for Regulated Activities on the Contributing Zone to the Edwards Aquifer and Relating to 30 TAC §213.24(1), Effective June 1, 1999

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

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

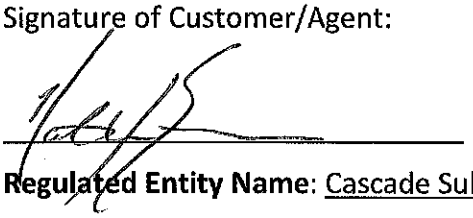
Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Contributing Zone Plan Application** is hereby submitted for TCEQ review and Executive Director approval. The application was prepared by:

Print Name of Customer/Agent: Nathan D. Kelly, P.E.

Date: 7/1/2024

Signature of Customer/Agent:



Regulated Entity Name: Cascade Subdivision

Project Information

1. County: Williamson
2. Stream Basin: North Fork San Gabriel
3. Groundwater Conservation District (if applicable): None
4. Customer (Applicant):

   Contact Person: Adam Boenig, President
   Entity: LB Warren LLC
   Mailing Address: 6720 Vaught Ranch Rd, Ste 200
   City, State: Austin, TX Zip: 78730
   Telephone: (512) 334-6775 Fax: _____
   Email Address: AdamB@brohnhomes.com

5. Agent/Representative (If any):

Contact Person: Nathan D. Kelly, P.E.
Entity: Gray Engineering, Inc.
Mailing Address: 8834 N. Capital of Texas Hwy, Ste 140
City, State: Austin, TX Zip: 78759
Telephone: (512) 452-0371 Fax: (512) 454-9933
Email Address: nkelly@grayengineeringinc.com

6. Project Location:

☐ The project site is located inside the city limits of _____.
☐ The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
☒ The project site is not located within any city's limits or ETJ.

7. ☒ The location of the project site is described below. Sufficient detail and clarity has been provided so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

Approximately 1 mile Southwest of the US HWY 183 and CR 207 intersection in Williamson County, TX.

8. ☒ **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.

9. ☒ **Attachment B - USGS Quadrangle Map**. 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).

10. ☒ **Attachment C - Project Narrative**. 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:

☒ Area of the site
☒ Offsite areas
☒ Impervious cover
☒ Permanent BMP(s)
☒ Proposed site use
☒ Site history
☒ Previous development
☒ Area(s) to be demolished

11. Existing project site conditions are noted below:

☐ Existing commercial site
☐ Existing industrial site

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

12. The type of project is:

☒ Residential: # of Lots: 113
☐ Residential: # of Living Unit Equivalents: _____
☐ Commercial
☐ Industrial
☒ Other: 2 - Landscape Lots; 1- Lift Station Lot; 1 - Drainage/WQ Lot

13. Total project area (size of site): 26.81 Acres

    Total disturbed area: 26.81 Acres

14. Estimated projected population: 396

15. The amount and type of impervious cover expected after construction is complete is shown below:

Table 1 - Impervious Cover

Impervious Cover of Proposed Project	***Sq. Ft.***	***Sq. Ft./Acre***	***Acres***
Structures/Rooftops	469,500	÷ 43,560 =	10.78
Parking	0	÷ 43,560 =	0.00
Other paved surfaces	270,874	÷ 43,560 =	6.22
Total Impervious Cover	740,374	÷ 43,560 =	17.00

Total Impervious Cover 17.00 **÷ Total Acreage** 26.81 **X 100 =** 63.39**% Impervious Cover**

16. ☒ **Attachment D - Factors Affecting Surface Water Quality**. A detailed description of all factors that could affect surface water quality is attached. If applicable, this includes the location and description of any discharge associated with industrial activity other than construction.

17. ☐ Only inert materials as defined by 30 TAC 330.2 will be used as fill material.

For Road Projects Only

Complete questions 18 - 23 if this application is exclusively for a road project.

☒ N/A

18. Type of project:

- ☐ TXDOT road project.
- ☐ County road or roads built to county specifications.
- ☐ City thoroughfare or roads to be dedicated to a municipality.
- ☐ Street or road providing access to private driveways.

19. Type of pavement or road surface to be used:

- ☐ Concrete
- ☐ Asphaltic concrete pavement
- ☐ Other: _____

20. Right of Way (R.O.W.):

Length of R.O.W.: _____ feet.
Width of R.O.W.: _____ feet.
L x W = _____Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.

21. Pavement Area:

Length of pavement area: _____ feet.
Width of pavement area: _____ feet.
L x W = _____Ft^2 ÷ 43,560 Ft^2/Acre = _____ acres.
Pavement area _____ acres ÷ R.O.W. area _____ acres x 100 = _____% impervious cover.

22. ☐ A rest stop will be included in this project.

☐ A rest stop will not be included in this project.

23. ☐ Maintenance and repair of existing roadways that do not require approval from the TCEQ Executive Director. Modifications to existing roadways such as widening roads/adding shoulders totaling more than one-half (1/2) the width of one (1) existing lane require prior approval from the TCEQ.

Stormwater to be generated by the Proposed Project

24. ☒ **Attachment E - Volume and Character of Stormwater**. A detailed description of the volume (quantity) and character (quality) of the stormwater runoff which is 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 runoff coefficient of the site for both pre-construction and post-construction conditions.

Wastewater to be generated by the Proposed Project

25. ☐ Wastewater is to be discharged in the contributing zone. Requirements under 30 TAC §213.6(c) relating to Wastewater Treatment and Disposal Systems have been satisfied.

☒ N/A

26. Wastewater will be disposed of by:

☐ On-Site Sewage Facility (OSSF/Septic Tank):

☐ **Attachment F - Suitability Letter from Authorized Agent**. An on-site sewage facility will be used to treat and dispose of the wastewater from this site. The appropriate licensing authority's (authorized agent) written approval is attached. It states that the land is suitable for the use of private sewage facilities and will meet or exceed the requirements for on-site sewage facilities as specified under 30 TAC Chapter 285 relating to On-site Sewage Facilities.

☐ Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.

☒ Sewage Collection System (Sewer Lines):

The sewage collection system will convey the wastewater to the Warren Tract Wastewater (name) Treatment Plant. The treatment facility is:

☐ Existing.

☒ Proposed.

☐ N/A

Permanent Aboveground Storage Tanks(ASTs) ≥ 500 Gallons

Complete questions 27 - 33 if this project includes the installation of AST(s) with volume(s) greater than or equal to 500 gallons.

☒N/A

27. Tanks and substance stored:

Table 2 - Tanks and Substance Storage

AST Number	*Size (Gallons)*	*Substance to be Stored*	*Tank Material*
1			
2			
3			
4			
5			

Total x 1.5 = _____ Gallons

28. ☐ The AST will be placed within a containment structure that is sized to capture one and one-half (1 1/2) times the storage capacity of the system. For facilities with more than

one tank system, the containment structure is sized to capture one and one-half (1 1/2) times the cumulative storage capacity of all systems.

☐ **Attachment G - Alternative Secondary Containment Methods**. Alternative methods for providing secondary containment are proposed. Specifications showing equivalent protection for the Edwards Aquifer are attached.

29. Inside dimensions and capacity of containment structure(s):

Table 3 - Secondary Containment

Length (L)(Ft.)	*Width(W)(Ft.)*	*Height (H)(Ft.)*	*L x W x H = (Ft3)*	*Gallons*

Total: _____ Gallons

30. Piping:

☐ All piping, hoses, and dispensers will be located inside the containment structure.
☐ Some of the piping to dispensers or equipment will extend outside the containment structure.
☐ The piping will be aboveground
☐ The piping will be underground

31. ☐ The containment area must be constructed of and in a material impervious to the substance(s) being stored. The proposed containment structure will be constructed of: _____.

32. ☐ **Attachment H - AST Containment Structure Drawings**. A scaled drawing of the containment structure is attached that shows the following:

☐ Interior dimensions (length, width, depth and wall and floor thickness).
☐ Internal drainage to a point convenient for the collection of any spillage.
☐ Tanks clearly labeled
☐ Piping clearly labeled
☐ Dispenser clearly labeled

33. ☐ Any spills must be directed to a point convenient for collection and recovery. Spills from storage tank facilities must be removed from the controlled drainage area for disposal within 24 hours of the spill.

☐ In the event of a spill, any spillage will be removed from the containment structure within 24 hours of the spill and disposed of properly.

☐ In the event of a spill, any spillage will be drained from the containment structure through a drain and valve within 24 hours of the spill and disposed of properly. The drain and valve system are shown in detail on the scaled drawing.

Site Plan Requirements

Items 34 - 46 must be included on the Site Plan.

34. ☒ The Site Plan must have a minimum scale of 1" = 400'.

    Site Plan Scale: 1" = _____'.

35. 100-year floodplain boundaries:

    ☐ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.

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

    The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s): _____.

36. ☒ The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Lots, recreation centers, buildings, roads, etc. are shown on the site plan.

    ☐ The layout of the development is shown with existing contours at appropriate, but not greater than ten-foot contour intervals. Finished topographic contours will not differ from the existing topographic configuration and are not shown. Lots, recreation centers, buildings, roads, etc. are shown on the site plan.

37. ☒ A drainage plan showing all paths of drainage from the site to surface streams.

38. ☒ The drainage patterns and approximate slopes anticipated after major grading activities.

39. ☒ Areas of soil disturbance and areas which will not be disturbed.

40. ☒ Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.

41. ☒ Locations where soil stabilization practices are expected to occur.

42. ☐ Surface waters (including wetlands).

    ☒ N/A

43. ☐ Locations where stormwater discharges to surface water.

    ☒ There will be no discharges to surface water.

44. ☐ Temporary aboveground storage tank facilities.

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

45. ☐ Permanent aboveground storage tank facilities.

☒ Permanent aboveground storage tank facilities will not be located on this site.

46. ☒ Legal boundaries of the site are shown.

Permanent Best Management Practices (BMPs)

Practices and measures that will be used during and after construction is completed.

47. ☒ Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.

☐ N/A

48. ☒ These practices and measures have been designed, and will be constructed, operated, and maintained to insure 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 prepared or 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 is: _____.

☐ N/A

49. ☒ Owners must insure that permanent BMPs and measures are constructed and function as designed. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the appropriate regional office within 30 days of site completion.

☐ N/A

50. Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

☐ The site will be used for low density single-family residential development and has 20% or less impervious cover.

☒ The site will be used for low density single-family residential development but has more than 20% impervious cover.

☐ The site will not be used for low density single-family residential development.

51. The executive director may waive the requirement for other permanent BMPs for multi-family residential developments, schools, or small business sites where 20% or less impervious cover is used at the site. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.

    ☐ **Attachment I - 20% or Less Impervious Cover Waiver**. The site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is attached.
    ☐ The site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.
    ☒ The site will not be used for multi-family residential developments, schools, or small business sites.

52. ☐ **Attachment J - BMPs for Upgradient 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.

53. ☐ **Attachment K - 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.

54. ☒ **Attachment L - BMPs for Surface Streams**. A description of the BMPs and measures that prevent pollutants from entering surface streams is attached.

    ☐ N/A

55. ☒ **Attachment M - 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: Design calculations, TCEQ Construction Notes, all proposed structural plans and specifications, and appropriate details.

☐ N/A

56. ☒ **Attachment N - 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 of 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 record keeping procedures

☐ N/A

57. ☐ **Attachment O - 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

58. ☒ **Attachment P - 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 velocities, and other in-stream effects caused by the regulated activity, which increase erosion that result in water quality degradation.

☐ N/A

Responsibility for Maintenance of Permanent BMPs and Measures after Construction is Complete.

59. ☒ 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 having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.

60. ☒ A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development,

or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.

Administrative Information

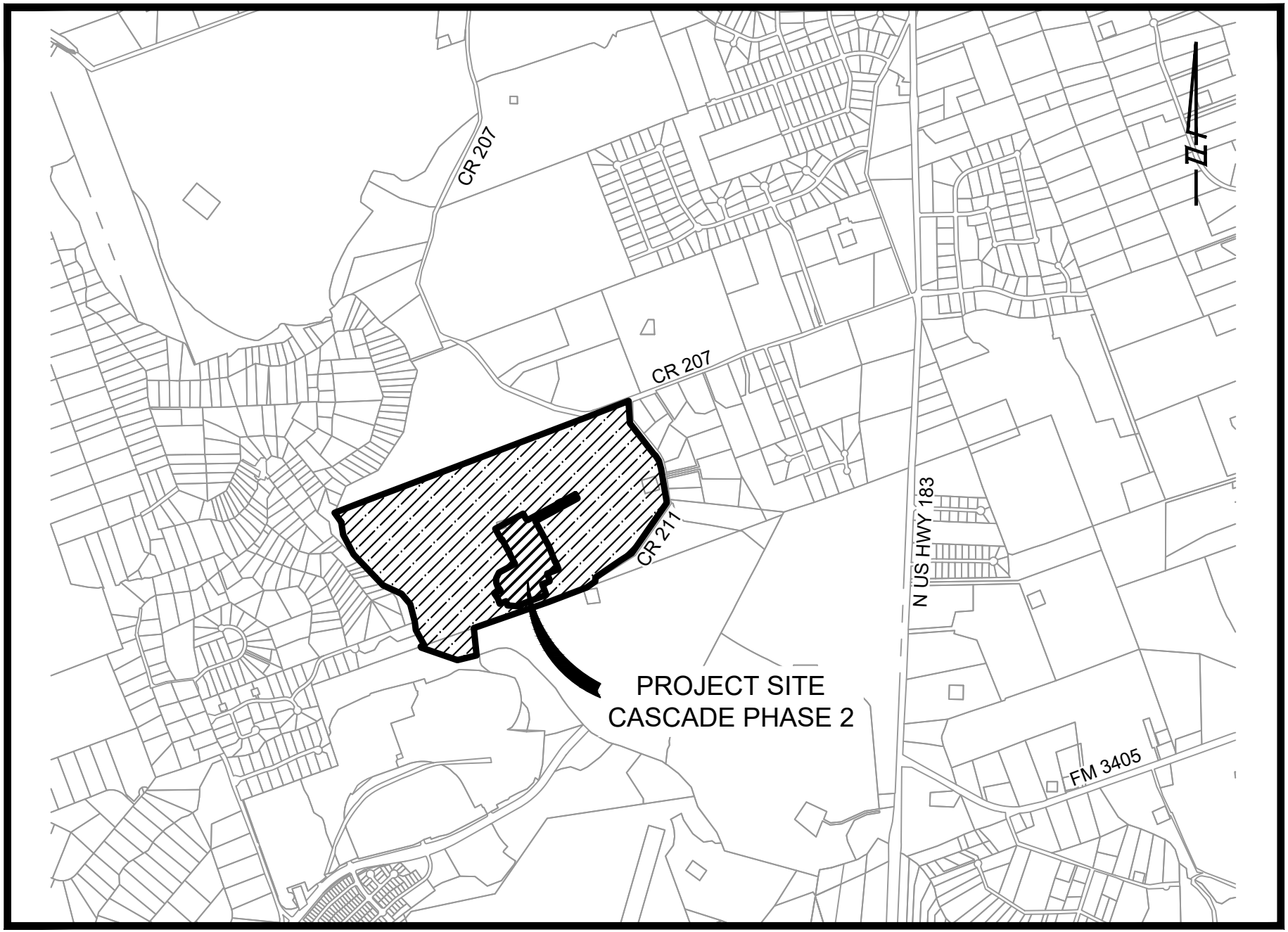
61. ☒ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions.

62. ☐ Any modification of this Contributing Zone Plan may require TCEQ review and Executive Director approval prior to construction, and may require submission of a revised application, with appropriate fees.

63. ☐ The site description, controls, maintenance, and inspection requirements for the storm water pollution prevention plan (SWPPP) developed under the EPA NPDES general permits for stormwater discharges have been submitted to fulfill paragraphs 30 TAC §213.24(1-5) of the technical report. All requirements of 30 TAC §213.24(1-5) have been met by the SWPPP document.

☒ The Temporary Stormwater Section (TCEQ-0602) is included with the application.

ATTACHMENT A: LOCATION MAP

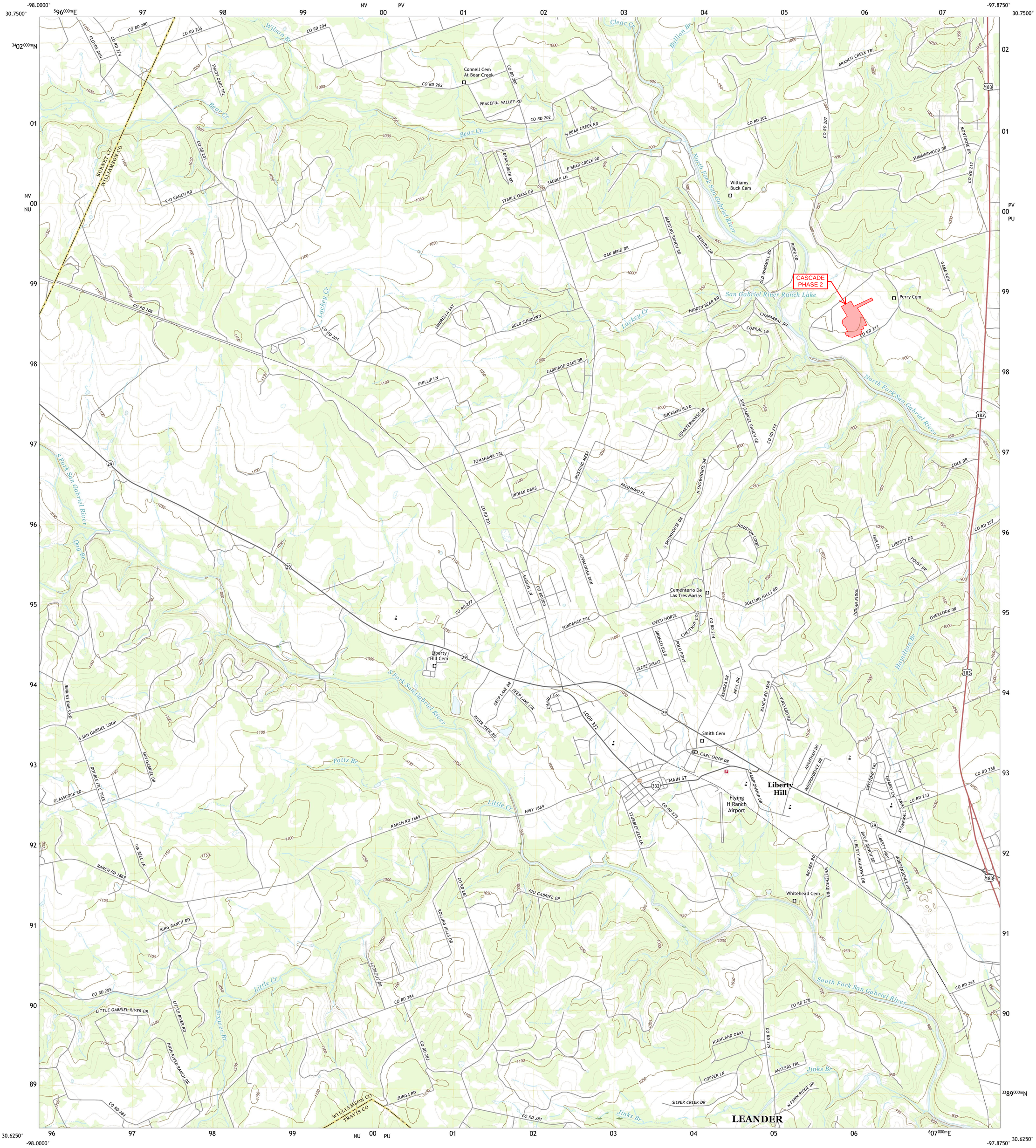


SCALE: 1" = 2000'

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

LIBERTY HILL QUADRANGLE
TEXAS
7.5-MINUTE SERIES

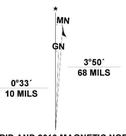


Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 14R

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, August 2016 - November 2016
Roads.....U.S. Census Bureau, 2015 - 2019
Names.....GNIS, 2008 - 2021
Hydrography.....National Hydrography Dataset, 2002 - 2020
Contours.....National Elevation Dataset, 2019
Boundaries.....Multiple sources; see metadata file 2019 - 2021

Wetlands.....FWS National Wetlands Inventory Not Available



UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
NV PV
NU PU
Grid Zone Designation
14R

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES

1 Joppa
2 Mahomet
3 Florence
4 Bertram
5 Leander NE
6 Travis Peak
7 Nameless
8 Leander

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

LIBERTY HILL, TX
2022

MSN 76430163970112
NGA REF NO. USGSX24K25631

Attachment C – Project Narrative

Area of Site

Cascade Phase 2 sits on 26.81 acres of land in Williamson County, Texas. The site is located immediately west of Cascade Phase 1, approximately 1 mile southwest of the North US Highway 183 and County Road 207 intersection.

Offsite Areas

Offsite areas impacting Phase 2 of the Cascade development include upstream areas located north of the project site. All runoff resulting from these areas is accounted for in the Drainage and TSS removal calculations.

Impervious Cover

There is no existing impervious cover present within the project site. In total, 23.869 acres will be disturbed by regulated activities (grading, utility installation, road construction, and home construction) and will be accounted for in proposed erosion controls. Of the disturbed area, Phase 2 contains 17.03 acres of proposed impervious cover. The proposed impervious cover is comprised of 113 single-family residential lots, 2 landscape lots, 1 lift station lot, 1 drainage/water quality lot, and the associated street/utility improvements needed to support these facilities.

Permanent BMPs

Three (3) total permanent BMPs are proposed for this project: one (1) Batch Detention Pond and two (2) Vegetative Filter Strips.

Batch Detention Pond B receives 18.37 acres of runoff with 11.40 acres of impervious cover. This results in a required TSS removal of 9,923 pounds. Pond B has been designed to treat future phases of the proposed development, as well as any on-site runoff that will flow offsite, untreated. To account for this additional runoff, Pond B is oversized such that 10,222 pounds of treatment is provided.

Vegetative Filter Strip 2 receives 1.10 acres of runoff, with 0.69 acres of proposed impervious cover. This results in a required TSS removal of 599 pounds. Vegetative Filter Strip 2 provides a total of 654 pounds of proposed treatment.

Vegetative Filter Strip 3 receives 0.82 acres of runoff, with 0.41 acres of proposed impervious cover. This results in a required TSS removal of 360 pounds. Vegetative Filter Strip 3 provides a total of 395 pounds of proposed treatment.

Proposed areas included in Phase 2 that will flow offsite untreated total 0.47 acres with 0.32 acres of proposed impervious cover. This results in a required TSS removal of 279 pounds. These areas load removal requirements area accounted for through the overtreatment provided in the other proposed on-site BMPs.

Upstream drainage areas contributing to Batch Detention Pond B, from future phases of the Cascade development, have been included in the sizing of the BMP. Table 1 below shows a summary of the TSS removal calculations. Details and calculations for the proposed BMPs can also be found in the attached construction plans.

Additionally, portions of Phase 2 are being treated by Phase 1's "Batch Detention Pond A." 4.29 acres of Phase 2 are being treated by Batch Detention Pond A, which has been approved with the Cascade Phase 1 Contributing Zone Plan. Please see Table 2 below, for TSS removal calculations.

Temporary BMPs

A temporary BMP is proposed for a portion of Phase 2 that will be treated by a subsequent phase of the Cascade Subdivision. The proposed temporary BMP is Grassy Swale F. Grassy Swale F receives 1.76 acres of runoff with 1.22 acres of impervious cover. This results in a required TSS removal of 1,063 pounds. The grassy swale provides 953 pounds of TSS removal. The excess TSS removal required is being accounted for with Batch Detention Pond B

Site History, Previous Development & Areas to be Demolished

No significant construction has occurred on site; in total, Phase 2 proposes to demolish approximately 612 linear feet of overhead electrical line.

Phase 2 of the Cascade Tract is located within the Edward's Aquifer Contributing Zone. It is not located within the FEMA 100-year Flood Plain in accordance with Flood Insurance Rate Map (FIRM) Panel No. 48491C0235F, effective date December 20, 2019.

Table 1: TSS Removal Calculations Summary

BASIN	RUNOFF AREA (AC)	IMPERVIOUS AREA (AC)	TSS REQ. (LB)	REQ. VOLUME (CF)	DES. VOLUME (CF)	TSS REMOVED (LB)
POND A (PH 2)	4.29	2.96	2,573	-	-	2,573
POND B	18.37	11.40	9,923	48,113	52,297	10,222
VFS 2	1.10	0.69	599	-	-	654
VFS 3	0.82	0.41	360	-	-	395
OS-3 & OS-4	0.47	0.32	279	-	-	-
SWALE F	1.76	1.22	1,063	-	-	953
TOTAL	**26.81**	**17.00**	**14,797**	**-**	**-**	**14,797**

Table 2: TSS Removal Calculations Summary - Cascade Phase 1

BASIN	RUNOFF AREA (AC)	IMPERVIOUS AREA (AC)	TSS REQ. (LB)	REQ. VOLUME (CF)
POND A (PERMITTED)	64.68	36.66	31,908	147,817
FROM APPROVED PH 1 CZP				

Attachment D – Factors Affecting Surface Water Quality

Multiple factors have the potential of affecting surface water quality during construction. These include: oil, grease, gas, transmission fluids, and/or other vehicular fluids, as well as shifts in sediment that will occur during excavation and fill operations. Upon completion of construction, normal traffic on the site could be responsible for many of these same pollutants, as well as everyday activities, such as car washing and lawn watering.

Attachment E – Volume and Character of Stormwater

A majority of the runoff from Phase 2 drains to on-site BMPs where it will be treated. The total drainage area accounted for by Phase 2 BMPs is 22.52 acres of runoff with 14.04 acres of impervious cover. Resultant runoff is conveyed to one (1) proposed batch detention pond via proposed storm system improvements, two (2) proposed vegetative filter strips, and one (1) temporary grassy swale. Small portions of runoff will bypass treatment and discharge to tributaries of the North Fork San Gabriel River. BMPs shown in the construction plans have been adequately sized to account for the untreated flows.

The overall proposed drainage area map and water quality calculations are shown in the construction plans included with this submittal. This project lies within the North Fork San Gabriel River Detention Exempt Stream Reach as defined by Williamson County and drains directly to the North Fork San Gabriel River.

Attachment F – Suitability Letter from Authorized Agent

Not applicable to this project.

Attachment G – Alternative Secondary Containment Methods

Not applicable to this project.

Attachment H – AST Containment Structure Drawings

Not applicable to this project.

Attachment I – 20% or Less Impervious Cover Declaration

Not applicable to this project.

Attachment J – BMPs for Upgradient Stormwater

Upgradient stormwater can be characterized as runoff flowing from adjacent properties which contain either no impervious cover or are being treated by existing BMPs. The upgradient stormwater is being captured by temporary inlets placed for the future Cascade development.

Attachment K – BMPs for On-Site Stormwater

On-site stormwater will be treated by three (3) permanent BMPs which account for all proposed impervious cover on the site, as well as additional impervious cover from the future Cascade Tract developments. A majority of the TSS removal will occur by way of one (1) Batch Detention Pond, which is oversized to account for untreated offsite runoff and future phase runoff inclusions. There will also be two (2) vegetative filter strip that accounts for additional pollutant treatment. Additionally, there will be one (1) temporary BMP to capture runoff that will be treated by permanent BMPs to be built in future phases. This flow will be conveyed to a grassy swale that will treat the runoff prior to the construction of the next phase. TSS removal calculations for each BMP are shown below. The locations and copies of these calculations for each individual BMP are also shown in the attached construction plans.

Batch Detention Pond B TSS Calculations (Final Conditions)

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 =	Williamson	
Total project area included in plan * =	26.81	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	17.00	acres
Total post-development impervious cover fraction * =	0.63	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	14797	lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = 6

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = POND B

Total drainage basin/outfall area =	18.37	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	11.40	acres
Post-development impervious fraction within drainage basin/outfall area =	0.62	
$L_{M\ THIS\ BASIN}$ =	9923	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Batch Detention
Removal efficiency = 91 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 =	18.37	acres
A_I =	11.40	acres
A_P =	6.97	acres
L_R =	11596	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area.

Desired $L_{M\ THIS\ BASIN}$ = 10222 lbs.

F = 0.88

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth =	1.50	Inches
Post Development Runoff Coefficient =	0.44	
On-site Water Quality Volume =	43581	cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

Off-site area draining to BMP =	0.00	acres
Off-site impervious cover draining to BMP =	0.00	acres
Impervious fraction of off-site area =	0	
Off-site Runoff Coefficient =	0.00	
Off-site Water Quality Volume =	0	cubic feet
Storage for Sediment =	8716	
Total Capture Volume (required water quality volume(s) x 1.20) =	52297	cubic feet

Vegetative Filter Strip 2 TSS Calculations

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 =	Williamson	
Total project area included in plan * =	26.81	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	17.00	acres
Total post-development impervious cover fraction * =	0.63	
P =	32	inches

$L_{M\ TOTAL\ PROJECT}$ = **14797** lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = **6**

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = VFS 2

Total drainage basin/outfall area =	1.10	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.69	acres
Post-development impervious fraction within drainage basin/outfall area =	0.63	
$L_{M\ THIS\ BASIN}$ =	599	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 =	1.10	acres
A_I =	0.69	acres
A_P =	0.41	acres
L_R =	654	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 654 lbs.

F = 1.00

Vegetative Filter Strip 3 TSS Calculations

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 =	Williamson	
Total project area included in plan * =	26.81	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	17.00	acres
Total post-development impervious cover fraction * =	0.63	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	14797	lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = 6

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = VFS 3

Total drainage basin/outfall area =	0.82	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.41	acres
Post-development impervious fraction within drainage basin/outfall area =	0.50	
$L_{M\ THIS\ BASIN}$ =	360	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:

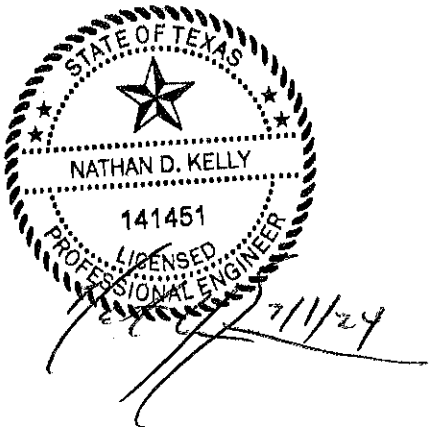
A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	0.82	acres
A_I =	0.41	acres
A_P =	0.41	acres
L_R =	395	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 395 lbs.

F = 1.00



Temporary Grassy Swale F TSS Calculations

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 =	Williamson	
Total project area included in plan * =	26.81	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	17.00	acres
Total post-development impervious cover fraction * =	0.63	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	14797	lbs.

* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = 6

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = SWALE F

Total drainage basin/outfall area =	1.76	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	1.22	acres
Post-development impervious fraction within drainage basin/outfall area =	0.69	
$L_{M\ THIS\ BASIN}$ =	1063	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Grassy Swale
Removal efficiency = 70 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:

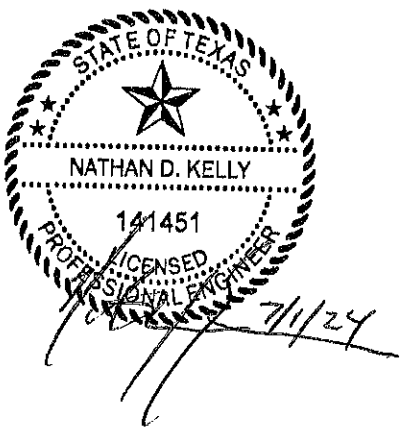
A_C = Total On-Site drainage area in the BMP catchment area
A_I = Impervious area proposed in the BMP catchment area
A_P = Pervious area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	1.76	acres
A_I =	1.22	acres
A_P =	0.54	acres
L_R =	953	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = 953 lbs.

F = 1.00



15. Grassy Swales Designed as Required in RG-348 Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A =	1.76 acres
Impervious Cover in Drainage Area =	1.22 acres
Rainfall intensity = i =	1.1 in/hr
Swale Slope =	0.01 ft/ft
Side Slope (z) =	3
Design Water Depth = y =	0.33 ft
Weighted Runoff Coefficient = C =	0.61
A_{CS} = cross-sectional area of flow in Swale =	3.33 sf
P_W = Wetted Perimeter =	11.09 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.30 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 8.98 feet

Q = CIA = 1.19 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CIA =	1.19 cfs		
Manning's Equation Q =	1.19 cfs	Error 1 =	0.00
Swale Width=	9.64 ft		

Instructions are provided to the right (green comments).

Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

Instructions are provided to the right (blue comments).

Design Width =	10 ft		
Design Discharge =	1.19 cfs	Error 2 =	0.00
Design Depth =	0.33 ft		
Flow Velocity =	0.33 cfs		
Minimum Length =	99.57 ft		

Untreated Offsite TSS Calculations

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 =	Williamson	
Total project area included in plan * =	26.81	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	17.00	acres
Total post-development impervious cover fraction * =	0.63	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	14797	lbs.

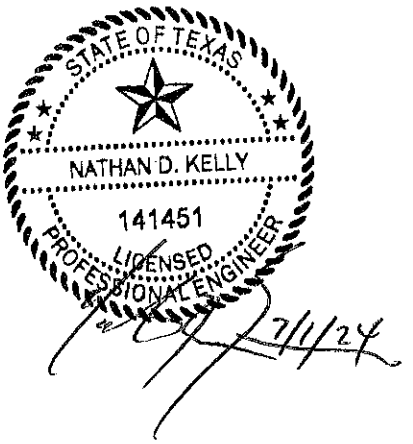
* The values entered in these fields should be for the total project area.

Number of drainage basins / outfalls areas leaving the plan area = 6

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = OFFSITE 3 &4

Total drainage basin/outfall area =	0.47	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.32	acres
Post-development impervious fraction within drainage basin/outfall area =	0.68	
$L_{M\ THIS\ BASIN}$ =	279	lbs.



Attachment L – BMPs for Surface Streams

No BMPs are proposed specifically for surface streams. Proposed on-site BMPs and drainage systems are designed to maintain existing flow patterns.

Attachment M – Construction Plans

Construction sheets for BMPs, proposed storm improvements, and erosion controls are attached with this submittal.

DEVELOPER:
CLAYTON PROPERTIES GROUP, INC.
DBA BROHN HOMES
6720 VAUGHT RANCH ROAD
SUITE 200
AUSTIN, TX 78730
(512) 320-8833

ENGINEER:
GRAY ENGINEERING INC.
8834 N. CAPITAL OF TEXAS HWY., SUITE 140
AUSTIN, TEXAS 78759
(512) 452-0371
FAX (512) 454-9933

GENERAL NOTES:

1. THIS PROJECT IS LOCATED WITHIN THE NORTH FORK SAN GABRIEL RIVER WATERSHED.
2. THIS PROJECT IS LOCATED WITHIN THE EDWARDS AQUIFER CONTRIBUTING ZONE.
3. NO PORTION OF THIS PLAN IS ENCROACHED BY SPECIAL FLOOD HAZARD AREAS INUNDATED BY THE 1% ANNUAL CHANCE FLOOD AS IDENTIFIED BY THE U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY BOUNDARY MAP (FLOOD INSURANCE RATE MAP) COMMUNITY PANEL NUMBER 48491C0235F, EFFECTIVE DATE DECEMBER 20,2019 FOR WILLIAMSON COUNTY TEXAS.
4. THE CONTRACTOR SHALL OBTAIN A "NOTICE OF PROPOSED INSTALLATION OF UTILITY LINE" PERMIT FROM WILLIAMSON COUNTY FOR ANY WORK PERFORMED IN THE EXISTING COUNTY RIGHT-OF-WAY (DRIVEWAY APRON, WATER MAIN TIE-IN, ETC.) THIS PERMIT APPLICATION WILL REQUIRE A LIABILITY AGREEMENT, A CONSTRUCTION COST ESTIMATE FOR WORK WITHIN THE RIGHT-OF-WAY INCLUDING PAVEMENT REPAIR (IF NEEDED), A PERFORMANCE BOND, CONSTRUCTION PLANS AND, IF NECESSARY, A TRAFFIC CONTROL PLAN. AN INSPECTION FEE, AND A PRE-CONSTRUCTION MEETING MAY ALSO BE REQUIRED, DEPENDING ON THE SCOPE OF WORK. THE PERMIT WILL BE REVIEWED AND APPROVED BY THE COUNTY ENGINEER, AND MUST ALSO BE APPROVED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT IF ANY ROAD CLOSURE IS INVOLVED."
5. OFFSITE WATER IMPROVEMENTS ALONG CR 207 SHALL BE IN PLACE AND OPERATIONAL AT THE COMPLETION OF PHASE 1 CONSTRUCTION. OFFSITE WATER IMPROVEMENTS TO THE SOUTH OF THIS DEVELOPMENT SHALL BE IN PLACE AND OPERATION AL AT THE COMPLETION OF PHASE 2 CONSTRUCTION.

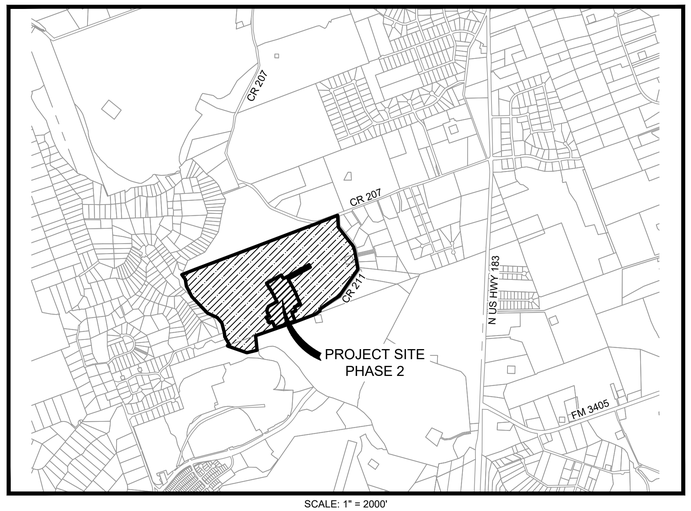
CONSTRUCTION PLANS FOR

CASCADE TRACT PHASE 2

"PAVING, DRAINAGE, WATER & WASTEWATER IMPROVEMENTS"

WILLIAMSON COUNTY, TX

JULY 2024



SCALE: 1" = 2000'

Sheet List Table

SHEET NUMBER	SHEET TITLE
1	COVER
2	GENERAL NOTES (SHEET 1 OF 2)
3	GENERAL NOTES (SHEET 2 OF 2)
4	PRELIMINARY PLAT (SHEET 1 OF 4)
5	PRELIMINARY PLAT (SHEET 2 OF 4)
6	PRELIMINARY PLAT (SHEET 3 OF 4)
7	PRELIMINARY PLAT (SHEET 4 OF 4)
8	EXISTING CONDITIONS AND DEMOLITION PLAN
9	EROSION CONTROL PLAN (SHEET 1 OF 2)
10	EROSION CONTROL PLAN (SHEET 2 OF 2)
11	BULLHIDE SPRINGS DRIVE (STA. 1+00 TO 5+50)
12	BULLHIDE SPRINGS DRIVE (STA. 5+50 TO END)
13	COACH SIDE LANE (STA. 1+00 TO END)
14	FINDERS PASS (STA. 1+00 TO 7+50)
15	FINDERS PASS (STA. 7+50 TO END)
16	GIMLET TRAIL (STA. 1+00 TO END)
17	GOLDEN PAINT TRAIL (STA. 1+00 TO END)
18	REARBOOT WAY, STAGEHORN PASS, AND WAGON TRAIN DRIVE
19	LIGHTING, SIGNAGE & STRIPING PLAN
20	OVERALL DRAINAGE AREA MAP
21	INLET CAPACITY CALCULATIONS (SHEET 1 OF 3)
22	INLET CAPACITY CALCULATIONS (SHEET 2 OF 3)
23	INLET CAPACITY CALCULATIONS (SHEET 3 OF 3)
24	STORM SEWER LINE B1 & LATERALS (STA 13+12 TO 14+21)
25	LATERAL C1.5 (STA 1+00 TO END)
26	STORM SEWER LINE D1 (STA 1+00 TO END)
27	STORM SEWER LINE D1 LATERALS
28	STORM SEWER LINE D2 (STA 1+00 TO 8+42)
29	STORM SEWER LINE D2 LATERALS
30	STORM SEWER LINE F1 (STA 1+00 TO END)
31	BATCH DETENTION POND B
32	BATCH DETENTION POND B DETAILS
33	VEGETATIVE FILTER STRIP 2
34	VEGETATIVE FILTER STRIP 3
35	GRASSY SWALE F
36	OVERALL WATER DISTRIBUTION PLAN (1 OF 2)
37	OVERALL WATER DISTRIBUTION PLAN (2 OF 2)
38	WATER LINE A (OS) (STA 1+00 TO 8+50)
39	WATER LINE A (OS) (STA 8+50 TO 16+50)
40	WATER LINE A (OS) (STA 16+50 TO 25+00)
41	WATER LINE A (OS) (STA 25+00 TO END)
42	WATER LINE C (STA 3+42 TO 7+50)
43	WATER LINE C (STA 7+50 TO END)
44	OVERALL WASTEWATER COLLECTION PLAN
45	WASTEWATER LINE G (STA 1+00 TO END)
46	WASTEWATER LINE K (STA 1+00 TO END)
47	WASTEWATER LINE M (STA 1+00 TO END)
48	WASTEWATER LINE N (STA 1+00 TO END)
49	WASTEWATER LINE O (STA 1+00 TO END)
50	WASTEWATER LINE P (STA 1+00 TO END)
51	EROSION DETAILS
52	STREET DETAILS (SHEET 1 OF 2)
53	STREET DETAILS (SHEET 2 OF 2)
54	DRAINAGE DETAILS (SHEET 1 OF 3)
55	DRAINAGE DETAILS (SHEET 2 OF 3)
56	DRAINAGE DETAILS (SHEET 3 OF 3)
57	WATER DETAILS (SHEET 1 OF 3)
58	WATER DETAILS (SHEET 2 OF 3)
59	WATER DETAILS (SHEET 3 OF 3)
60	WASTEWATER DETAILS (SHEET 1 OF 2)
61	WASTEWATER DETAILS (SHEET 2 OF 2)

REVIEWED BY:
REVIEWED FOR COMPLIANCE WITH COUNTY REQUIREMENTS **(WCSR 2021B)**

WILLIAMSON COUNTY DATE

GEORGETOWN UTILITY SYSTEMS DATE

WILLIAMSON COUNTY MUD 39 DATE

NO.	DATE	SHEETS	REVISION DESCRIPTION

STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER

SUBMITTED BY:

7/9/2024
DATE

NATHAN D. KELLY, TEXAS PE #141451
GRAY ENGINEERING, INC. TBPELS FIRM #2946

GRAY ENGINEERING
8834 N. Capital of Texas Hwy.
Suite 140
Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946

PROJECT NO. 1636-11802 CASCADE PHASE 2

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-COVR.DWG DATE: 7/9/2024 4:36:57 PM BY: NKELLY

GENERAL NOTES

1. ALL ROADS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AS APPROVED BY THE COUNTY ENGINEER AND IN ACCORDANCE WITH THE SPECIFICATIONS FOUND IN THE CURRENT VERSION OF THE "TEXAS DEPARTMENT OF TRANSPORTATION MANUAL STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS, AND BRIDGES."
2. ANY EXISTING UTILITIES, PAVEMENT, CURBS, SIDEWALKS, STRUCTURES, TREES, ETC., NOT PLANNED FOR DESTRUCTION OR REMOVAL THAT ARE DAMAGED OR REMOVED SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR SHALL VERIFY ALL DEPTHS AND LOCATIONS OF EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES WITH THE CONSTRUCTION PLANS FOUND IN THE FIELD SHALL BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER WHO SHALL BE RESPONSIBLE FOR REVISING THE PLANS AS APPROPRIATE.
4. MANHOLE FRAMES, COVERS, VALVES, CLEANOUTS, ETC. SHALL BE RAISED TO FINISHED GRADE PRIOR TO FINAL PAVING CONSTRUCTION.
5. THE CONTRACTOR SHALL GIVE THE WILLIAMSON COUNTY 48 HOURS NOTICE BEFORE BEGINNING EACH PHASE OF CONSTRUCTION. TELEPHONE (512) 943-3367 (ENGINEERING AND DEVELOPMENT SERVICES DEPARTMENT).
6. ALL AREAS DISTURBED OR EXPOSED DURING CONSTRUCTION SHALL BE REVEGETATED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. REVEGETATION OF ALL DISTURBED OR EXPOSED AREAS SHALL CONSIST OF SODDING OR SEEDING, AT THE CONTRACTOR'S OPTION. HOWEVER, THE TYPE OF REVEGETATION MUST EQUAL OR EXCEED THE TYPE OF VEGETATION PRESENT BEFORE CONSTRUCTION.
7. THE CONTRACTOR AND THE ENGINEER SHALL KEEP ACCURATE RECORDS OF ALL CONSTRUCTION THAT DEVIATES FROM THE PLANS.THE ENGINEER SHALL FURNISH WILLIAMSON COUNTY ACCURATE "AS-BUILT" DRAWINGS FOLLOWING COMPLETION OF ALL CONSTRUCTION. THESE "AS-BUILT" DRAWINGS SHALL MEET WITH THE SATISFACTION OF THE ENGINEERING AND DEVELOPMENT SERVICES DEPARTMENT PRIOR TO FINAL ACCEPTANCE.
8. WHEN CONSTRUCTION IS BEING CARRIED OUT WITHIN THE EASEMENTS, THE CONTRACTOR SHALL CONFINE HIS WORK TO WITHIN THE PERMANENT AND ANY TEMPORARY EASEMENTS. PRIOR TO FINAL ACCEPTANCE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL TRASH AND DEBRIS WITHIN THE PERMANENT AND TEMPORARY EASEMENTS. CLEAN-UP SHALL BE TO THE SATISFACTION OF THE COUNTY ENGINEER.
9. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL APPLY FOR AND SECURE ALL PROPER PERMITS FROM THE APPROPRIATE AUTHORITIES.

TRENCH SAFETY NOTES

1. IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS AND THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ALL TRENCHES OVER 5 FEET IN DEPTH IN EITHER HARD AND COMPACT OR SOFT AND UNSTABLE SOIL SHALL BE SLOPED, SHORED, SHEETED, BRACED OR OTHERWISE SUPPORTED. FURTHERMORE, ALL TRENCHES LESS THAN 5 FEET IN DEPTH SHALL ALSO BE EFFECTIVELY PROTECTED WHEN HAZARDOUS GROUND MOVEMENT MAY BE EXPECTED. TRENCH SAFETY SYSTEMS TO BE UTILIZED FOR THIS PROJECT (WILL BE PROVIDED BY THE CONTRACTOR; ARE ON SHEET______, ETC.).
2. IN ACCORDANCE WITH THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, WHEN PERSONS ARE IN TRENCHES 4-FEET DEEP OR MORE, ADEQUATE MEANS OF EXIT, SUCH AS A LADDER OR STEPS, MUST BE PROVIDED AND LOCATED SO AS TO REQUIRE NO MORE THAN 25 FEET OF LATERAL TRAVEL.
3. IF TRENCH SAFETY SYSTEM DETAILS WERE NOT PROVIDED IN THE PLANS BECAUSE TRENCHES WERE ANTICIPATED TO BE LESS THAN 5 FEET IN DEPTH AND DURING CONSTRUCTION IT IS FOUND THAT TRENCHES ARE IN FACT 5 FEET OR MORE IN DEPTH OR TRENCHES LESS THAN 5 FEET IN DEPTH ARE IN AN AREA WHERE HAZARDOUS GROUND MOVEMENT IS EXPECTED, ALL CONSTRUCTION SHALL CEASE, THE TRENCHED AREA SHALL BE BARRICADED AND THE ENGINEER NOTIFIED IMMEDIATELY. CONSTRUCTION SHALL NOT RESUME UNTIL APPROPRIATE TRENCH SYSTEM DETAILS, AS DESIGNED BY A PROFESSIONAL ENGINEER, ARE RETAINED AND COPIES SUBMITTED TO WILLIAMSON COUNTY.

STREET AND DRAINAGE NOTES

1. ALL TESTING SHALL BE DONE BY AN INDEPENDENT LABORATORY AT THE OWNER'S EXPENSE. ANY RETESTING SHALL BE PAID FOR BY THE CONTRACTOR. A COUNTY INSPECTOR SHALL BE PRESENT DURING ALL TESTS. TESTING SHALL BE COORDINATED WITH THE COUNTY INSPECTOR AND HE SHALL BE GIVEN A MINIMUM OF 24 HOURS NOTICE PRIOR TO ANY TESTING. TELEPHONE (512) 943-3367 (INSPECTIONS).
2. BACKFILL BEHIND THE CURB SHALL BE COMPACTED TO OBTAIN A MINIMUM OF 95% MAXIMUM DENSITY TO WITHIN 3" OF TOP OF CURB. MATERIAL USED SHALL BE PRIMARILY GRANULAR WITH NO ROCKS LARGER THAN 6" IN THE GREATEST DIMENSION. THE REMAINING 3" SHALL BE CLEAN TOPSOIL FREE FROM ALL CLODS AND SUITABLE FOR SUSTAINING PLANT LIFE.
3. DEPTH OF COVER FOR ALL CROSSINGS UNDER PAVEMENT INCLUDING GAS, ELECTRIC, TELEPHONE, CABLE TV, WATER SERVICES, ETC., SHALL BE A MINIMUM OF 30" BELOW SUBGRADE.
4. BARRICADES BUILT TO WILLIAMSON COUNTY STANDARDS SHALL BE CONSTRUCTED ON ALL DEAD-END STREETS AND AS NECESSARY DURING CONSTRUCTION TO MAINTAIN JOB AND PUBLIC SAFETY.
5. ALL R.C.P. SHALL BE MINIMUM CLASS III.
6. THE SUBGRADE MATERIAL FOR THE STREETS SHOWN HEREIN WAS TESTED BY TERRADYNE AND THE PAVING SECTIONS DESIGNED IN ACCORDANCE WITH THE CURRENT WILLIAMSON COUNTY DESIGN CRITERIA. THE PAVING SECTIONS ARE TO BE CONSTRUCTED AS FOLLOWS:

CLASSIFICATION - LOCAL STREETS:
BULLHIDE SPRING DRIVE, COACH SIDE LANE, GIMLET TRAIL,
GOLDEN PAINT TRAIL, WAGON TRAIN DRIVE:

MATERIALS	THICKNESS
CRUSHED LIMESTONE BASE	12.0 INCHES
HOT MIX ASPHALTIC CONCRETE	2.0 INCHES

CLASSIFICATION - MAJOR COLLECTOR STREETS:
FINDERS PASS:

MATERIALS	THICKNESS
CRUSHED LIMESTONE BASE	16.0 INCHES
HOT MIX ASPHALTIC CONCRETE	2.0 INCHES

CLASSIFICATION - MINOR COLLECTOR STREETS:
BULLHIDE SPRINGS DRIVE, FINDERS PASS:

MATERIALS	THICKNESS
CRUSHED LIMESTONE BASE	14.0 INCHES
HOT MIX ASPHALTIC CONCRETE	2.0 INCHES

7. THE GEOTECHNICAL ENGINEER SHALL INSPECT THE SUBGRADE FOR COMPLIANCE WITH THE DESIGN ASSUMPTIONS MADE DURING PREPARATIONS OF THE SOILS REPORT. ANY ADJUSTMENTS THAT ARE REQUIRED SHALL BE MADE THROUGH REVISION OF THE CONSTRUCTION PLANS.
8. WHERE PI'S ARE OVER 20, THE SUBGRADES MUST BE STABILIZED UTILIZING A METHOD ACCEPTABLE TO THE COUNTY ENGINEER. THE GEOTECHNICAL ENGINEER SHALL RECOMMEND AN APPROPRIATE SUBGRADE STABILIZATION IF SULFATES ARE DETERMINED TO BE PRESENT.
9. ANY EXPANSIVE FILL (PI > 20) PLACED IN THE SUBGRADE SHALL BE CONSIDERED EXPANSIVE SUBGRADE.
10. THE PRIMARY PAVEMENT DESIGN OPTION FOR AREAS WITH MORE THAN 2 FEET OF EXPANSIVE CLAY SHALL BE THE HIGH PLASTICITY SUB-BASE OPTION. IF NOT FEASIBLE, AN ALTERNATE STABILIZING DESIGN SHALL BE PROPOSED AND SUBMITTED TO THE COUNTY ENGINEER FOR APPROVAL.
11. DELINEATION BETWEEN THESE DIFFERENT PAVEMENT THICKNESS SECTIONS SHOULD BE COMPLETED IN THE FIELD BY OBSERVATION OF OPEN UTILITIES TRENCHES AND THE PAVEMENT SUBGRADE BY THE GEOTECHNICAL ENGINEER OR HIS DESIGNATE. GIVEN THE KNOWN VARIABILITY OF SURFACE SOILS AND THE PRESENCE OF FAULTS AT THIS SITE, THE GEOTECHNICAL ENGINEER MUST VERIFY THE SUBGRADE BEFORE INSTALLATION OF THE PAVEMENT SYSTEM CAN PROCEED. MULTIPLE SITE VISITS MAY BE REQUIRED DEPENDING UPON THE CONSTRUCTION SCHEDULE. FINALIZED DISTINCTION BETWEEN PAVEMENT SECTIONS SHALL BE PROVIDED AS ADDENDUMS TO THIS REPORT AS THESE OBSERVATIONS ARE COMPLETED. PLEASE CONTACT THE GEOTECHNICAL ENGINEER WITH THE UTILITY TRENCHES ARE OPEN.
12. THE SUBGRADE IMPROVEMENT (LOW PLASTICITY SUB-BASE OR APPROVED ALTERNATE) SHOULD BE EXTENDED 3 FEET BEYOND THE BACK OF THE CURB LINE.
13. THESE PAVEMENT THICKNESS DESIGNS ARE INTENDED TO TRANSFER THE LOAD FROM THE ANTICIPATED TRAFFIC CONDITIONS.
14. THE RESPONSIBILITY OF ASSIGNING STREET CLASSIFICATION TO THE STREETS IN THIS PROJECT IS LEFT TO THE CIVIL ENGINEER.
15. IF PAVEMENT DESIGNS OTHER THAN THOSE LISTED ABOVE ARE DESIRED, PLEASE CONTACT HOLT ENGINEERING.
16. CONTRACTOR IS TO AVOID INSTALLATION OF UTILITIES, IRRIGATION LINES, PLANTINGS, ETC. IN THE BASE OVERBUILD.

TRAFFIC MARKING NOTES

1. ALL PAVEMENT MARKINGS, MARKERS, PAINT, TRAFFIC BUTTONS, TRAFFIC CONTROLS AND SIGNS SHALL BE INSTALLED IN ACCORDANCE WITH THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, LATEST EDITIONS.

EROSION AND SEDIMENTATION CONTROL NOTES

1. EROSION CONTROL MEASURES, SITE WORK AND RESTORATION WORK SHALL BE IN ACCORDANCE WITH THE CITY OF GEORGETOWN EROSION AND SEDIMENTATION CONTROL ORDINANCE.
2. ALL SLOPES SHALL BE SODDED OR SEEDED WITH APPROVED GRASS, GRASS MIXTURES OR GROUND COVER SUITABLE TO THE AREA AND SEASON IN WHICH THEY ARE APPLIED.
3. SILT FENCES, ROCK BERMS, SEDIMENTATION BASINS AND SIMILARLY RECOGNIZED TECHNIQUES AND MATERIALS SHALL BE EMPLOYED DURING CONSTRUCTION TO PREVENT POINT SOURCE SEDIMENTATION LOADING OF DOWNSTREAM FACILITIES. SUCH INSTALLATION SHALL BE REGULARLY INSPECTED BY WILLIAMSON COUNTY FOR EFFECTIVENESS. ADDITIONAL MEASURES MAY BE REQUIRED IF, IN THE OPINION OF THE COUNTY ENGINEER, THEY ARE WARRANTED.
4. ALL TEMPORARY EROSION CONTROL MEASURES SHALL NOT BE REMOVED UNTIL FINAL INSPECTION AND APPROVAL OF THE PROJECT BY THE ENGINEER. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN ALL TEMPORARY EROSION CONTROL STRUCTURES AND TO REMOVE EACH STRUCTURE AS APPROVED BY THE ENGINEER.
5. ALL MUD, DIRT, ROCKS, DEBRIS, ETC., SPILLED, TRACKED OR OTHERWISE DEPOSITED ON EXISTING PAVED STREETS, DRIVES AND AREAS USED BY THE PUBLIC SHALL BE CLEANED UP IMMEDIATELY.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY CONTRIBUTING ZONE 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 GROUND DISTURBANCE OR CONSTRUCTION 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 SHOULD BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED CONTRIBUTING ZONE PLAN (CZP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTOR(S) SHOULD KEEP COPIES OF THE APPROVED PLAN AND APPROVAL LETTER ONSITE.
3. NO HAZARDOUS SUBSTANCE STORAGE TANK SHALL BE INSTALLED WITHIN 150 FEET OF A WATER SUPPLY SOURCE, DISTRIBUTION SYSTEM, WELL, OR SENSITIVE FEATURE.
4. 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 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.
5. 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.
6. SEDIMENT MUST BE REMOVED FROM THE SEDIMENT TRAPS OR SEDIMENTATION BASINS WHEN IT OCCUPIES 50% OF THE BASIN'S DESIGN CAPACITY.
7. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BEING DISCHARGED OFFSITE.
8. ALL EXCAVATED MATERIAL THAT WILL BE STORED ON-SITE MUST HAVE PROPER E&S CONTROLS.
9. IF PORTIONS OF THE SITE WILL HAVE A 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.
10. THE FOLLOWING RECORDS SHOULD 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.
11. THE HOLDER OF ANY APPROVED CZP MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:

11.A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY BEST MANAGEMENT PRACTICES (BMPS) OR STRUCTURE(S), INCLUDING BUT NOT LIMITED TO TEMPORARY OR PERMANENT PONDS, DAMS, BERMS, SILT FENCES, AND DIVERSIONARY STRUCTURES;
11.B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED;
11.C. ANY CHANGE THAT WOULD SIGNIFICANTLY IMPACT THE ABILITY TO PREVENT POLLUTION OF THE EDWARDS AQUIFER; OR
11.D. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE APPROVED CONTRIBUTING ZONE PLAN.

AUSTIN REGIONAL OFFICE
12100 PARK 35 CIRCLE, BUILDING A
AUSTIN, TEXAS 78753-1808
PHONE (512) 339-2929
FAX (512) 339-3795

SAN ANTONIO REGIONAL OFFICE
14250 JUDSON ROAD
SAN ANTONIO, TEXAS 78233-4480
PHONE (210) 490-3096
FAX (210) 545-4329

STORM WATER POLLUTION PREVENTION PLAN GENERAL NOTES

1. ALL CONSTRUCTION ACTIVITES DISTURBING ONE ACRE AND GREATER MUST OBTAIN STORM WATER DISCHARGE AUTHORIZATION FROM THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ)UGH COMPLIANCE WITH TCEQ'S GENERAL PERMIT #TXR150000. THE PRIMARY CONSTRUCTION SITE OPERATOR(S) [PCSO]PREPARE AND IMPLEMENT AN SWP3 THROUGHOUT CONSTRUCTION WHICH INCLUDES THE EROSION AND SEDIMENT CONTROL (ESC) PLAN AND OTHER BEST MANAGEMENT PRACTICES (BMPS) SPECIFIED IN THESE PLANS APPROVED BY WILLIAMSON COUNTY.
2. SMALL CONSTRUCTION ACTIVITIES DISTURBING BETWEEN ONE AND FIVE ACRES SHALL POST A TCEQ CONSTRUCTION SITE NOTICE (CSN) ON SITE PRIOR TO COMMENCING CONSTRUCTION. LARGE CONSTRUCTION ACTIVITIES DISTURBING FIVE ACRES OR GREATER SHALL SUBMIT A NOTICE OF INTENT (NOI) TO TCEQ AND POST THE NOI ON SITE AT LEAST SEVEN (7) DAYS PRIOR TO BEGINNING CONSTRUCTION. NOTICES POSTED MUST BE MAINTAINED THROUGHOUT CONSTRUCTION.
3. THE PCSO MUST REVISE THE SWP3 WHENEVER CHANGING SITE CONDITIONS, OR A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE HAS A SIGNIFICANT EFFECT ON THE DISCHARGE OF POLLUTANTS NOT PREVIOUSLY ADDRESSED; OR WHEN RESULTS OF INSPECTIONS BY SITE OPERATORS, WILLIAMSON COUNTY , TCEQ, OR OTHER LOCAL AGENCY AUTHORIZED TO APPROVE ESC PLANS INDICATE THE SWP3 IS PROVING INEFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING POLLUTANTS IN DISCHARGES FROM THE SITE.
4. TEMPORARY OR PERMANENT EROSION CONTROL AND STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE, AND AS SPECIFIED ON THE PLANS, IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. THESE MEASURES MUST BE INITIATED N LATER THAN 14 DAYS AFTER CESSATION, UNLESS CONSTRUCTION ACTIVITIES WILL RESUME WITHIN 21 DAYS IN THE AREA.
5. UPON FINAL STABILIZATION OF THE ENTIRE SITE, INCLUDING COMPLETION OF ALL STABILIZATION REQUIREMENTS OF THE APPROVED PLANS AND PERMIT AS VERIFIED BY WILLIAMSON COUNTY, THE PCSO SHALL SUBMIT A NOTICE OF TERMINATION (NOT) TO TCEQ.

UTILITY COMPANY CONTACT NUMBERS

P.E.C.
FOR PRE-CONSTRUCTION MEETINGS
CALL 505-7649
FOR UTILITY LINE LOCATION
CALL 505-7542

AT&T
FOR PRE-CONSTRUCTION MEETINGS
CALL 370-1000
FOR UTILITY LINE LOCATION
CALL 370-1000

TIME WARNER CABLE
FOR PRE-CONSTRUCTION MEETINGS
CALL 485-6433
FOR UTILITY LINE LOCATION
CALL 485-6356

WILLIAMSON COUNTY MUNICIPAL UTILITY DISTRICT NO. 39
FOR PRE-CONSTRUCTION MEETINGS
CALL 512-879-0400

WILLIAMSON COUNTY NOTES
B4 CONSTRUCTION - GENERAL

1. A PRECONSTRUCTION MEETING SHALL BE SCHEDULED PRIOR TO THE START OF CONSTRUCTION. THE DESIGN ENGINEER, OWNER, CONTRACTOR, SUBCONTRACTORS, AND COUNTY ENGINEER SHALL ATTEND THIS MEETING. ALL ROADS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AS APPROVED BY THE COUNTY ENGINEER AND IN ACCORDANCE WITH THE SPECIFICATIONS FOUND IN THE CURRENT VERSION OF THE"TEXAS DEPARTMENT OF TRANSPORTATION MANUAL STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS, AND BRIDGES" UNLESS OTHERWISE STATED ON THE CONSTRUCTION DOCUMENTS APPROVED BY THE COUNTY ENGINEER.
2. ALL MATERIALS SHALL BE SAMPLED AND TESTED BY AN INDEPENDENT TESTING LABORATORY IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS APPROVED BY THE COUNTY ENGINEER. THE OWNER SHALL PAY FOR ALL TESTING SERVICES AND SHALL FURNISH THE COUNTY ENGINEER WITH CERTIFIED COPIES OF THESE TEST RESULTS. THE COUNTY ENGINEER MUST APPROVE THE TEST RESULTS PRIOR TO CONSTRUCTING THE NEXT COURSE OF THE ROADWAY STRUCTURE. ANY MATERIAL WHICH DOES NOT MEET THE MINIMUM REQUIRED TEST SPECIFICATIONS SHALL BE REMOVED AND RECOMPACTED OR REPLACED UNLESS ALTERNATIVE REMEDIAL ACTION IS APPROVED IN WRITING FROM THE COUNTY ENGINEER.
3. ALL MATERIALS SHALL BE SAMPLED AND TESTED BY AN INDEPENDENT TESTING LABORATORY IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS APPROVED BY THE COUNTY ENGINEER. THE OWNER SHALL PAY FOR ALL TESTING SERVICES AND SHALL FURNISH THE COUNTY ENGINEER WITH CERTIFIED COPIES OF THESE TEST RESULTS. THE COUNTY ENGINEER MUST APPROVE THE TEST RESULTS PRIOR TO CONSTRUCTING THE NEXT COURSE OF THE ROADWAY STRUCTURE. ANY MATERIAL WHICH DOES NOT MEET THE MINIMUM REQUIRED TEST SPECIFICATIONS SHALL BE REMOVED AND RECOMPACTED OR REPLACED UNLESS ALTERNATIVE REMEDIAL ACTION IS APPROVED IN WRITING FROM THE COUNTY ENGINEER.
4. ALL PROPOSED PAVEMENTS (FLEXIBLE AND RIGID) ARE TO BE SPECIFIED IN THE GEOTECH REPORT. THE GEOTECH REPORT IS TO BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER. PAVEMENT DESIGNS SHALL FOLLOW THE BELOW COUNTY REQUIREMENTS BASED UPON SOIL CONDITIONS FROM SAMPLES TAKEN ALONG THE PROPOSED ROADWAYS. TEST BORINGS SHALL BE PLACED AT A MAXIMUM SPACING OF 500 FEET OR OTHER SAMPLING FREQUENCY APPROVED BY THE COUNTY ENGINEER BASED ON RECOMMENDATIONS PROVIDED BY THE GEOTECHNICAL ENGINEER. BORINGS SHALL BE TO A DEPTH OF TEN FT OR, IF SOLID ROCK IS ENCOUNTERED, ONE FT BELOW NON-FRACTURED ROCK OR 3 FT BELOW FRACTURED ROCK. THE PAVEMENT DESIGN MUST MEET AT LEAST THE MINIMUM OF ONE OF THE APPROVED COUNTY DESIGNS AND PROVIDED IN THE GEOTECHNICAL REPORT FOR REVIEW AND APPROVAL PRIOR TO THE REVIEW AND APPROVAL OF THE CONSTRUCTION PLANS. IN ADDITION TO THE BASIS OF THE PAVEMENT DESIGN, THE SOILS REPORT SHALL CONTAIN THE RESULTS OF SAMPLED AND TESTED SUBGRADE FOR PLASTICITY INDEX.
5. FLEXIBLE PAVEMENT DESIGNS BASED ON ROADWAY CLASSIFICATION:

Minimum Local Roadway (Urban/Rural) Flexible Pavement design

Plasticity Index	PI <20	PI 20-35	PI 35-55 (4)	Material Requirements
Soil Classification	Clayey Sand	Lean Clay	Fat Clay	
HMA Surface (1)	2"	2"	2"	TxDOT Item 340 D- GR HMA PG 70-22 SAC B
Prime Coat or One Course Underseal	YES	YES	YES	AEP or TxDOT Item 316
Flexible Base (2)(5)	12"	12"	14"	TxDOT Item 247 FLBS TY A GR 5
Lime treated Subgrade (3)	NO	8"	8"	TxDOT Item 260
Notes:	(1) For Urban See Appendix B7 – B10 for HMA material requirements. Rural is also allowed B7.11 (2) See Appendix B6 for additional Flexible Base specifications. (3) Pelletized lime is not allowed. Use hydrated lime or lime slurry. Confirm sulfates are not present in soil. (4) For PI >55 additional pavement structure is necessary and shall be reviewed and approved by the County Engineer. (5) Should solid rock be encountered prior to the depth necessary for 12" of base material underneath 2" HMA, a substitute pavement design may be allowed. Substitute pavement design shall have a base thickness no less than 8" and existing material shall be excavated to the exposed solid rock layer. No significant amount of existing material shall be left remaining between the base layer and the rock layer.			

Minimum Collector Roadway (Urban/Rural) Flexible Pavement design

Plasticity Index	PI <20	PI 20-35	PI 35-55 (4)	Material Requirements
Soil Classification	Clayey Sand	Lean Clay	Fat Clay	
HMA Surface (1)	2"	2"	2"	TxDOT Item 340 D- GR HMA PG 70-22 SAC B
Prime Coat or One Course Underseal	YES	YES	YES	AEP or TxDOT Item 316
Flexible Base (2)(5)	14"	14"	16"	TxDOT Item 247 FLBS TY A GR 5
Lime treated Subgrade (3)	NO	8"	8"	TxDOT Item 260
Notes:	(1) . (1) For Urban See Appendix B7 – B10 for HMA material requirements. Rural is also allowed B7.11 (2) See Appendix B6 for additional Flexible Base specifications. (3) Pelletized lime is not allowed. Use hydrated lime or lime slurry. Confirm sulfates are not present in soil. (4) For PI >55 additional pavement structure is necessary and shall be reviewed and approved by the County Engineer. (5) Should solid rock be encountered prior to the depth necessary for 14" of base material underneath 2" HMA, a substitute pavement design may be allowed. Substitute pavement design shall have a base thickness no less than 10" and existing material shall be excavated to the exposed solid rock layer. No significant amount of existing material shall be left remaining between the base layer and the rock layer.			

B5 SUBGRADE

1. THE PREPARATION OF THE SUBGRADE SHALL FOLLOW GOOD ENGINEERING PRACTICES AS DIRECTED BY THE COUNTY ENGINEER IN CONJUNCTION WITH RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT. WHEN THE PLASTICITY INDEX (PI) IS GREATER THAN 20, A SUFFICIENT AMOUNT OF LIME SHALL BE ADDED AS DESCRIBED IN ITEM 260 OF THE CURRENT EDITION OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION UNTIL THE PI IS LESS THAN 20. IF THE ADDITION OF LIME AS DESCRIBED IN ITEM 260 IS NOT FEASIBLE, AN ALTERNATE STABILIZING DESIGN SHALL BE PROPOSED AND SUBMITTED TO THE COUNTY ENGINEER FOR APPROVAL. THE SUBGRADE SHALL BE PREPARED AND COMPACTED TO ACHIEVE A DRY DENSITY PER TXDOT ITEM 132. IN ADDITION, PROOF ROLLING MAY BE REQUIRED BY THE COUNTY ENGINEER.
2. IF LIME IS NECESSARY, THEN A SUFFICIENT AMOUNT OF LIME SHALL BE ADDED, AS DESCRIBED IN ITEM 260 OF THE CURRENT EDITION OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION TO PROPERLY STABILIZE SUBGRADE. THE USE OF HYDRATED LIME OR LIME SLURRY IS APPROVED; HOWEVER, THE USE OF PELLETIZED LIME IS NOT APPROVED. .
3. PRIOR TO LIME STABILIZATION, A SULFATE TEST OF IN SITU SOILS SHALL BE PERFORMED BY DEVELOPER TO CONFIRM THE APPROPRIATE MEANS AND METHODS OF STABILIZATION. PROVIDE SULFATE TEST TO COUNTY ENGINEER PRIOR TO STABILIZATION.
4. ANY VARIATION TO THE COUNTY'S STABILIZATION REQUIREMENTS MUST BE APPROVED BY THE COUNTY ENGINEER.
5. THE SUBGRADE SHALL BE PREPARED AND COMPACTED TO ACHIEVE A DRY DENSITY PER TXDOT ITEM 132. IN ADDITION, PROOF ROLLING MAY BE REQUIRED BY THE COUNTY ENGINEER.
6. THE SUBGRADE SHALL BE INSPECTED AND APPROVED BY AN INDEPENDENT TESTING LABORATORY AND A CERTIFIED COPY OF ALL INSPECTION REPORTS FURNISHED TO THE COUNTY ENGINEER. THE COUNTY ENGINEER MUST APPROVE THE REPORT PRIOR TO APPLICATION OF THE BASE MATERIAL. ALL DENSITY TEST REPORTS SHALL INCLUDE A COPY OF THE WORK SHEET SHOWING THE PERCENTAGE OF THE MAXIMUM DRY (PROCTOR) DENSITY. THE NUMBER AND LOCATION OF ALL SUBGRADE TESTS SHALL BE DETERMINED BY THE COUNTY ENGINEER.

B6 BASE MATERIAL

1. BASE MATERIAL SHALL CONFORM TO ITEM 247 OF THE CURRENT EDITION OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, "FLEXIBLE BASE". THE BASE MATERIAL SHALL BE TYPE A GRADE 4, OR AS APPROVED BY THE COUNTY ENGINEER. GRADE 4 MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF TABLE B6.1 BELOW:

Table B6.1: Gradation Specification for TY A, Grade 4

Master gradation sieve size	Cumulative % Retained
2 ½"	-
1 ¾"	0
7/8"	10% - 35%
3/8"	30% - 65%
#4	45% - 75%
#40	70% - 90%
#200	87% - 95%

2. EACH LAYER OF BASE COURSE SHALL BE TESTED FOR IN-PLACE DRY DENSITY AND MEASURED FOR COMPACTED THICKNESS. THE NUMBER AND LOCATION OF ALL BASE TEST SAMPLES SHALL BE DETERMINED BY THE COUNTY ENGINEER.
3. THE BASE SHALL BE PREPARED AND COMPACTED TO ACHIEVE A MINIMUM OF 100% OF THE MAXIMUM (PROCTOR) DRY DENSITY OR AS APPROVED BY THE COUNTY ENGINEER UPON RECOMMENDATION BY THE TESTING LABORATORY. THE MAXIMUM LIFT SHALL NOT EXCEED SIX INCHES. THE BASE MUST BE INSPECTED AND APPROVED BY AN INDEPENDENT TESTING LABORATORY AND A CERTIFIED COPY OF THE TEST RESULTS FURNISHED TO THE COUNTY ENGINEER FOR APPROVAL. PRIOR TO THE PLACEMENT OF THE FIRST LIFT OF BASE, THE STOCKPILE SHALL BE TESTED FOR THE SPECIFICATIONS FOUND IN ITEM 247 TABLE 1 AND THE RESULT FURNISHED TO THE COUNTY ENGINEER FOR APPROVAL.

B7 BITUMINOUS PAVEMENT

1. URBAN ROADS REQUIRE A MINIMUM 2 INCH WEARING SURFACE OF HMAC TYPE D. THE MIX SHALL BE FROM A TXDOT CERTIFIED PLANT AND THE MIX DESIGN SHALL BE SUBMITTED TO THE COUNTY ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF THE MATERIAL.
2. IF PROVIDING MIXTURE TYPE C OR D, USE PERFORMANCE GRADE (PG) BINDER 70-22. PROVIDE PG BINDER THAT DOES NOT CONTAIN RECYCLED ENGINE OIL BOTTOMS (REOBS) OR POLY PHOSPHORIC ACID (PPA). RECYCLED ASPHALT PAVEMENT (RAP) IS NOT PERMITTED FOR USE AS A COMPONENT OF THE HMACP. THE CONTRACTOR IS ALSO NOT PERMITTED THE USE RECYCLED ASPHALT SHINGLES (RAS) AS A COMPONENT OF THE HMACP.
3. IF PROVIDING MIXTURE TYPE B, USE PG BINDER 64-22. PROVIDE PG BINDERS THAT DO NOT CONTAIN REOBS OR PPA. FOR SUBSURFACE COURSE TYPE B, THE USE OF TWENTY PERCENT (20%) RAP IS PERMITTED IN THE MIX DESIGN. THE CONTRACTOR IS NOT PERMITTED TO USE RAS AS A COMPONENT OF THE HMACP.
4. TARGET LABORATORY MOLDED DENSITY IS 96.5% FOR ALL MIXTURES WITHOUT RAP AND WHEN USING A TEXAS GYRATORY COMPACTOR (TGC) FOR DESIGNING THE MIXTURE. WHEN USING SUPERPAVE GYRATORY COMPACTOR (SGC) TO DESIGN MIXTURES, SUBMIT THE SGC MIX DESIGN TO THE ENGINEER FOR APPROVAL.
5. ALL MIXTURES MUST MEET THE HAMBURG REQUIREMENT AS STATED IN THE TABLE BELOW.

High-Temperature Binder Grade	Test Method	Hamburg Wheel Test Requirements*
		Minimum # of Passes @ 0.5" Rut Depth, Tested @122°F
PG 64 or lower	Tex-242-F	7,000
PG 70	Tex-242-F	15,000
PG 76 or higher	Tex-242-F	20,000

*THE COUNTY ENGINEER MAY ACCEPT HAMBURG WHEEL TEST RESULTS FOR PRODUCTION AND PLACEMENT IF NO MORE THAN 1OF THE 5 MOST RECENT TESTS IS BELOW THE SPECIFIED NUMBER OF PASSES AND THE FAILING TEST IS NO MORE THAN 2,000 PASSES BELOW THE SPECIFIED NUMBER OF PASSES.

6. SUBMIT ANY PROPOSED ADJUSTMENTS OR CHANGES TO A JOB MIX FORMULA TO THE COUNTY ENGINEER BEFORE PRODUCTION OF THE NEW JOB MIX FORMULA.
7. UNLESS OTHERWISE APPROVED, PROVIDE TYPE B MIXTURES THAT HAVE NO LESS THAN 4.5% ASPHALT BINDER, AND TY C AND D MIXTURES WITH NO LESS THAN 4.7% BINDER.
8. FOR MIXTURE DESIGN VERIFICATION, PROVIDE THE ENGINEER WITH TWO 5-GALLON BUCKETS OF EACH AGGREGATE STOCKPILE TO BE USED ON THE PROJECT AND THREE GALLONS OF EACH PG BINDER TO BE USED ON THE PROJECT. ALSO PROVIDE SUFFICIENT QUANTITIES OF ANY OTHER ADDITIVES THAT WILL BE USED IN THE HMA MIXTURE. THIS MUST BE DONE PRIOR TO APPROVAL OF THE MIX DESIGN, UNLESS ALREADY PERFORMED WITHIN A ONE-YEAR TIME PERIOD.
9. PRIOR TO ALLOWING PRODUCTION OF THE TRIAL BATCH, THE ENGINEER WILL USE THE MATERIALS PROVIDED BY THE CONTRACTOR TO PERFORM THE FOLLOWING TESTS TO VERIFY THE HMA MIXTURE DESIGN.

   1. INDIRECT TENSILE TEST IN ACCORDANCE WITH TEX-226-F
   2. HAMBURG WHEEL TEST IN ACCORDANCE WITH TEX-242-F
   3. OVERLAY TEST IN ACCORDANCE WITH TEX-248-F
   4. CANTABRO TEST IN ACCORDANCE WITH TEX-245-F

   FOR MIXTURES DESIGNED WITH A TEXAS GYRATORY COMPACTOR (TGC), THE ENGINEER MAY REQUIRE THAT THE TARGET LABORATORY MOLDED DENSITY BE RAISED TO NO MORE THAN 97.5% OR MAY LOWER THE DESIGN NUMBER OF GYRATIONS TO NO LESS THAN 35 FOR MIXTURES DESIGNED WITH AN SGC IF ANY OF THE FOLLOWING CONDITIONS EXIST.

   1. THE INDIRECT TENSILE TEST RESULTS IN A VALUE GREATER THAN 200 PSI
   2. THE HAMBURG WHEEL TEST RESULTS IN A VALUE LESS THAN 3.0 MM
   3. THE OVERLAY TEST RESULTS IN A VALUE LESS THAN 100 CYCLES
   4. THE CANTABRO TEST RESULTS IN A VALUE OF MORE THAN 20% LOSS

   IN LIEU OF, OR IN ADDITION TO EVALUATING THE MIXTURE DESIGN PRIOR TO ALLOWING A TRIAL BATCH TO BE PRODUCED, THE ENGINEER MAY ALSO EVALUATE THE MIXTURE PRODUCED DURING THE TRIAL BATCH FOR COMPLIANCE WITH THE 4 TESTS LISTED ABOVE.

10. CONTRACTOR'S QUALITY CONTROL (CQC) TEST REPORTS SHALL BE SUBMITTED TO THE COUNTY ENGINEER ON A DAILY BASIS. AS A MINIMUM, DAILY CQC TESTING ON THE PRODUCED MIX SHALL INCLUDE: SIEVE ANALYSIS TEX-200-F, ASPHALT CONTENT TEX-236-F, HVEEM STABILITY TEX-208-F, LABORATORY COMPACTED DENSITY TEX-207-F, AND MAXIMUM SPECIFIC GRAVITY TEX-227-F. THE NUMBER AND LOCATION OF ALL HMAC TESTS SHALL BE DETERMINED BY THE COUNTY ENGINEER WITH A MINIMUM OF THREE, 6-INCH DIAMETER FIELD CORES SECURED AND TESTED BY THE CONTRACTOR FROM EACH DAY'S PAVING. EACH HMAC COURSE SHALL BE TESTED FOR IN-PLACE DENSITY, BITUMINOUS CONTENT AND AGGREGATE GRADATION, AND SHALL BE MEASURED FOR COMPACTED THICKNESS. THE NUMBER AND LOCATION OF ALL HMAC TEST SAMPLES SHALL BE DETERMINED BY THE COUNTY ENGINEER.
11. RURAL ROADS MAY USE EITHER THE SPECIFICATIONS FOUND IN SECTION B7.1 OR A TWO-COURSE SURFACE IN ACCORDANCE WITH ITEM 316, TREATMENT WEARING SURFACE, OF THE CURRENT EDITION OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. THE TYPE AND RATE OF ASPHALT AND AGGREGATE SHALL BE INDICATED ON THE PLANS AS A BASIS OF ESTIMATE AND SHALL BE DETERMINED AT THE PRECONSTRUCTION CONFERENCE. AGGREGATE USED IN THE MIX SHALL BE ON THE TXDOT QUALITY MONITORING SCHEDULE. AGGREGATE SHALL BE TYPE B GRADE 4. GRADATION TESTS SHALL BE REQUIRED FOR EACH 300 CUBIC YARDS OF MATERIAL PLACED WITH A MINIMUM OF TWO TESTS PER EACH GRADE PER EACH PROJECT. TEST RESULTS SHALL BE REVIEWED BY THE COUNTY ENGINEER PRIOR TO APPLICATION OF THE MATERIAL.

B8 CONCRETE PAVEMENT

1. IN LIEU OF BITUMINOUS PAVEMENT, PORTLAND CEMENT CONCRETE PAVEMENT MAY BE USED. IN SUCH CASES, THE PAVEMENT THICKNESS SHALL BE A MINIMUM OF 9 INCHES OF CONCRETE, AND SHALL BE JOINTED AND REINFORCED IN ACCORDANCE WITH THE DETAIL INCLUDED IN APPENDIX I. THE MIX SHALL BE FROM A TXDOT CERTIFIED PLANT. THE MIX DESIGN SHALL BE SUBMITTED TO THE COUNTY ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF THE MATERIAL.

B9 CONCRETE - GENERAL

1. UNLESS OTHERWISE SPECIFIED, CONCRETE SHALL BE IN ACCORDANCE WITH ITEM 421 OF THE CURRENT EDITION OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND BE PLACED IN ACCORDANCE WITH THE APPLICABLE ITEM.
2. ALL CONCRETE SHALL BE TESTED FOR COMPRESSIVE STRENGTH. ONE SET OF THREE CONCRETE TEST CYLINDERS SHALL BE MOLDED FOR EVERY 50 CUBIC YARDS OF CONCRETE PLACED FOR EACH CLASS OF CONCRETE PER DAY, OR AT ANY OTHER INTERVAL AS DETERMINED BY THE COUNTY ENGINEER. A SLUMP TEST SHALL BE REQUIRED WITH EACH SET OF TEST CYLINDERS. ONE CYLINDER SHALL BE TESTED FOR COMPRESSIVE STRENGTH AT AN AGE OF SEVEN DAYS AND THE REMAINING TWO CYLINDERS SHALL BE TESTED AT 28 DAYS OF AGE.

CITY OF GEORGETOWN - GENERAL NOTES

1. THESE CONSTRUCTION PLANS WERE PREPARED, SEALED, SIGNED AND DATED BY A TEXAS LICENSED PROFESSIONAL ENGINEER. THEREFORE BASED ON THE ENGINEER'S CONCURRENCE OF COMPLIANCE, THE CONSTRUCTION PLANS FOR CONSTRUCTION OF THE PROPOSED PROJECT ARE HEREBY APPROVED SUBJECT TO THE STANDARD CONSTRUCTION SPECIFICATIONS AND DETAILS MANUAL AND ALL OTHER APPLICABLE CITY STATE , AND FEDERAL REQUIREMENTS AND CODES.
2. THIS PROJECT IS SUBJECT TO ALL CITY REGULATIONS, STANDARD SPECIFICATIONS AND DETAILS IN EFFECT AT THE TIME OF SUBMITTAL OF THE PROJECT TO THE CITY.
3. THE SITE CONSTRUCTION PLANS SHALL MEET ALL REQUIREMENTS OF THE APPROVED SITE PLAN.
4. PRIVATE WATER SYSTEM FIRE LINES SHALL BE TESTED BY THE CONTRACTOR TO 200 PSI FOR 2 HOURS.
5. PRIVATE WATER SYSTEM FIRE LINES SHALL BE DUCTILE IRON PIPING FROM THE WATER MAIN TO THE BUILDING SPRINKLER SYSTEM, AND 200 PSI C900 PVC FOR ALL OTHERS.
6. PUBLIC WATER SYSTEM MAINS SHALL BE 150 PSI C900 PVC AND TESTED BY THE CONTRACTOR AT 150 PSI FOR 4 HOURS.
7. ALL BENDS AND CHANGES IN DIRECTION ON WATER MAINS SHALL BE RESTRAINED AND THRUST BLOCKED.
8. LONG FIRE HYDRANT LEADS SHALL BE RESTRAINED.
9. ALL WATER LINES ARE TO BE BACTERIA TESTED BY THE CONTRACTOR ACCORDING TO THE CITY STANDARDS AND SPECIFICATIONS.
10. WATER AND SEWER MAIN CROSSINGS SHALL MEET ALL REQUIREMENTS OF THE TCEQ AND THE CITY.
11. ALL SIDEWALK RAMPS ARE TO BE INSTALLED WITH THE PUBLIC INFRASTRUCTURE.
12. A MAINTENANCE BOND IS REQUIRED TO BE SUBMITTED TO THE CITY PRIOR TO ACCEPTANCE OF THE PUBLIC IMPROVEMENTS. THIS BOND SHALL BE ESTABLISHED FOR 2 YEARS IN THE AMOUNT OF 10% OF THE COST OF THE WATER MAIN IMPROVEMENTS AND SHALL FOLLOW THE CITY FORMAT UNLESS OTHERWISE SPECIFIED BY THE AGREEMENT.

RECORD DRAWINGS WILL BE REQUIRED.

TCEQ WATER DISTRIBUTION SYSTEM GENERAL CONSTRUCTION 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;

    $Q=LD\sqrt{P} / 148,000$

    WHERE:
    Q = THE QUANTITY OF MAKEUP WATER IN GALLONS PER HOUR,
    L = THE LENGTH OF 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;

    $L=SD\sqrt{P} / 148,000$

    WHERE:
    L = THE QUANTITY OF MAKEUP WATER IN GALLONS PER HOUR,
    S = THE LENGTH OF 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 C651-14 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.

8834 N. Capital of Texas Hwy.
Suite 140
Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946

GRAY
ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

GENERAL
NOTES
(SHEET
1
OF
2)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A
SEALED DRAWING
WITHOUT PROPER
NOTIFICATION TO THE
RESPONSIBLE ENGINEER
IS A VIOLATION OF THE
TEXAS ENGINEERING
PRACTICE ACT.

NATHAN D. KELLY
141451
7/9/2024

CONSTRUCTION SEQUENCE OF EVENTS

1. CALL DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION, DEVELOPMENT ENGINEERING, CONSTRUCTION INSPECTION, AND THE ENVIRONMENTAL AND CONSERVATION SERVICES DEPARTMENT 48 HOURS PRIOR TO BEGINNING ANY WORK. CALL THE ONE CALL CENTER FOR UTILITY LOCATIONS AND OBTAIN PERMIT FOR ANY WORK WITHIN THE CITY OF GEORGETOWN OR WILLIAMSON COUNTY R.O.W. TREE PROTECTION WILL ALSO BE INSTALLED.
2. INSTALL TEMPORARY EROSION CONTROL MEASURES AND STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH LOCATIONS AND DETAILS SHOWN ON THE PLANS. PRIOR TO CLEARING AND GRUBBING, NOTIFY CITY OF GEORGETOWN AND WILLIAMSON COUNTY INSPECTORS WHEN EROSION CONTROLS ARE INSTALLED.
3. HOLD PRE-CONSTRUCTION CONFERENCE ON SITE WITH THE CONTRACTOR, DESIGN ENGINEER, OWNERS REPRESENTATIVE AND THE CITY'S ENVIRONMENTAL INSPECTOR(UTILITY DEPARTMENT DEVELOPMENT ENGINEER, (512) 930-3582 REQUIRES 72 HOURS ADVANCE NOTICE) AFTER INSTALATION OF THE EROSION / SEDIMENTATION AND PRIOR TO BEGINNING ANY WORK.
4. BEGIN CONSTRUCTION OF PROJECT AS FOLLOWS:
   - A. ROUGH CUT / GRADE STREET, CHANNELS, PONDS, DRAINAGE FACILITIES TO ENSURE NO MAJOR DEVIATIONS TO PROPOSED DRAINAGE PATTERNS OCCUR DURING CONSTRUCTION
   - B. INSTALL ALL UTILITIES
   - C. INSTALL ALL CROSSINGS WITHIN STREET RIGHT-OF-WAYS
   - D. PREPARE SUBGRADE
   - E. CONSTRUCT STREET BASE
   - F. INSTALL CURB AND GUTTER
   - G. COMPLETE ALL ROUGH GRADING AND UNDERGROUND UTILITIES IN STREET RIGHT-OF-WAYS
   - H. LAY FINAL BASE COURSE
   - I. LAY ASPHALT
   - J. COMPLETE ALL NECESSARY FINAL GRADING AND DRESS UP OF AREAS DISTURBED DURING CONSTRUCTION
5. HOLD OWNERS POST-CONSTRUCTION CONFERENCE ON SITE WITH THE CONTRACTOR, DESIGN ENGINEER, OWNER'S REPRESENTATIVE AND THE CITY'S ENVIRONMENTAL ENGINEER.
6. AFTER ACCEPTANCE OF REVEGETATION BY THE OWNER AND THE CITY'S INSPECTOR, REMOVE TEMPORARY SEDIMENTATION AND EROSION CONTROLS
7. FINAL INSPECTION BY COUNTY AND CITY WITH CONTRACTOR AND ENGINEER.

W.C.E.S.D. #4 NOTES

(2) SECTION C105.2 INSTALLATION

FIRE HYDRANTS MUST BE INSTALLED WIT HTHE CENTER OF THE FIVE (5) INCH STEAMER OPENING AT LEAST 18 INCHES ABOVE FINISHED GRADE. THE FIVE (5) INCH OPENING MUST FACE THE DRIVEWAY OR STREET AND MUST BE TOTALLY UNOBSTRUCTED TO THE STREET. FIRE HYDRANT DESIGN SHALL BE 2-2.5" NST OUTLETS, 1 - 5.0" STORZ CONNECTION WITH A CAP TO INCLUDE A HEX NUT TO FIT A HYDRANT WRENCH ALONG WITH A REFLECTIVE BAND. THE FIRE HYDRANT SHALL BE PAINTED SILVER IN COLOR AND DESIGNATED BY A BLUE REFLECTOR IN THE CENTER OF THE STREET.

PEDERNALES ELECTRIC COMPANY NOTES

1. A PRE-CONSTRUCTION SAFETY MEETING WITH PEDERNALES ELECTRIC COOPERATIVE, INC. ("PEC") IS REQUIRED 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION. FAILURE TO DO SO MAY RESULT IN THE PROJECT BEING SHUT DOWN. CALL MARSHA MOORE, AT 1-800-868-4791 EXT. 7161 TO SCHEDULE A PRE-CONSTRUCTION SAFETY MEETING.
2. BARRICADES MUST BE ERECTED 15 FEET FROM ELECTRIC TRANSMISSION STRUCTURES DURING CONSTRUCTION.
3. WARNING SIGNS MUST BE PLACED UNDER THE OVERHEAD ELECTRIC TRANSMISSION FACILITIES AS NOTIFICATION OF THESE ELECTRICAL FACILITIES. (THIS NOTE SHOULD BE SHOWN ON GRADING PLANS).
4. FEDERAL, STAT AND LOCAL LAWS REGULATE THE ACTIVITIES OF THOSE WHO WORK NEAR OVERHEAD POWER LINES, INCLUDING MOVING EQUIPMENT, AND GOVERN MINIMUM ELECTRIC LINE CLEARANCE REQUIREMENTS FOR SUCH WORK. CRIMINAL PENALTIES MAY RESULT FOR ANY VIOLATIONS. CONSTRUCTION WILL BE WITHIN THE MOST RESTRICTIVE MINIMUM ELECTRIC CLEARANCE.
5. PROPERTY OWNER SHALL NOT CONSTRUCT, LOCATE, OR CAUSE TO BE CONSTRUCTED OR LOCATED, ANY BUILDING OR HABITABLE STRUCTURE WITHIN PEC'S EASEMENT AND RIGHT-OF-WAY. THE TERMS "BUILDING" AND "HABITABLE STRUCTURE" SHALL INCLUDE, BUT ARE NOT LIMITED TO, ANY HOUSE, APARTMENT, DWELLING, MOBILE HOME, GARAGE, OUT BUILDING, EQUIPMENT SHELTER,FARM OR LIVESTOCK FACILITIES, STORAGE BARNS, HUNTING STRUCTURE, OR STORAGE SHEDS. IT IS FURTHER EXPRESSLY UNDERSTOOD BY PROPERTY OWNER, AND PROPERTY OWNER FURTHER COVENANTS, THAT PROPERTY OWNER WILL NOT CONSTRUCT, LOCATE, OR CAUSE TO BE CONSTRUCTED OR LOCATED ANY ADDITION OR IMPROVEMENT TO ANY HOUSE, APARTMENT, DWELLING, MOBILE HOME, GARAGE, OUT BUILDING, EQUIPMENT SHELTER, FARM OR LIVESTOCK FACILITIES, STORAGE BARNS, HUNTING STRUCTURES, OR STORAGE SHEDS, WHICH ARE LOCATED IN THE VICINITY OF PEC'S EASEMENT IN SUCH A WAY THAT THE ADDITION OR IMPROVEMENT WILL BE LOCATED, EITHER IN WHOLE OR IN PART, WITHIN PEC'S EASEMENT.
6. DUMPSTERS, STAGING OF MATERIAL OR EQUIPMENT, AND SPOIL PILES ARE NOT PERMITTED WITHIN PEC'S EASEMENT.
7. THE PROJECT SHALL NOT INTERFERE WITH PEC'S 24-HOUR ACCESS TO ELECTRIC FACILITIES AND EASEMENTS.
8. TEMPORARY OR PERMANENT SECURITY FENCING SHALL NOT PREVENT PEC'S ACCESS OR CROSSING OF THE TRANSMISSION EASEMENT(S). THE OWNER SHALL INSTALL GATE(S) WITH PEC COMPANY LOCK AS REQUIRED BY TO MAINTAIN ACCESS.
9. PROPERTY OWNER IS RESPONSIBLE FOR DUST CONTROL TO PREVENT INSULATOR FLASHOVER DUE TO CONTAMINATION. PROPERTY OWNER IS RESPONSIBLE FOR ALL OUTAGES THAT PEC DETERMINES TO HAVE RESULTED OR ARISEN FROM DUST FROM THIS PROJECT.
10. PROPERTY OWNER WILL BE BILLED FOR ANY OUTAGES AND REPAIRS THAT PEC DETERMINES TO HAVE RESULTED OR ARISEN FROM THIS PROJECT.
11. PROPERTY OWNER IS RESPONSIBLE FOR ALL DAMAGES TO CURBING, SIDEWALKS, LANDSCAPING, WALLS, AND OTHER IMPROVEMENTS MADE WITHIN PEC'S ELECTRIC TRANSMISSION EASEMENT.

8834 N. Capital of Texas Hwy.
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NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

GENERAL NOTES (SHEET 2 OF 2)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

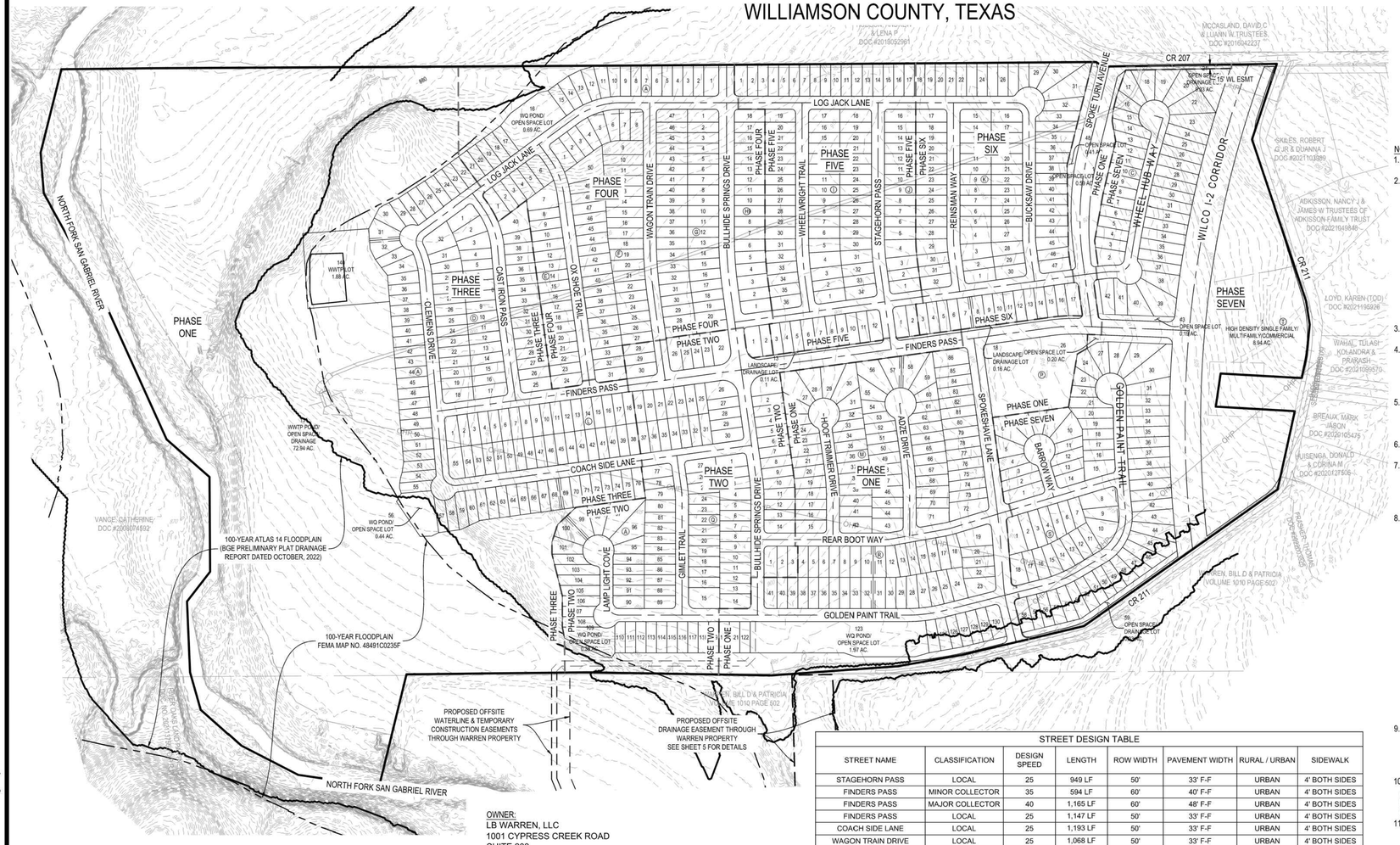
NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/1/2024

SHEET 3 OF 61

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-NOTE.DWG DATE: 7/9/2024 4:37:06 PM BY: BELLIOTT

WARREN TRACT
"CASCADE"
PRELIMINARY PLAT
WILLIAMSON COUNTY, TEXAS



LEGEND

PROPERTY BOUNDARY

PHASE BOUNDARY

NOTES:

1. ALL SIDEWALKS SHALL BE MAINTAINED BY EACH OF THE ADJACENT PROPERTY OWNERS.
2. THE CONTRACTOR SHALL OBTAIN A "NOTICE OF PROPOSED INSTALLATION OF UTILITY LINE" PERMIT FROM WILLIAMSON COUNTY FOR ANY WORK PERFORMED IN THE EXISTING COUNTY RIGHT-OF-WAY (DRIVEWAY APRON, WATER MAIN TIE-IN, ETC.) THIS PERMIT APPLICATION WILL REQUIRE A LIABILITY AGREEMENT, A CONSTRUCTION COST ESTIMATE FOR WORK WITHIN THE RIGHT-OF-WAY INCLUDING PAVEMENT REPAIR (IF NEEDED), A PERFORMANCE BOND, CONSTRUCTION PLANS AND, IF NECESSARY, A TRAFFIC CONTROL PLAN. AN INSPECTION FEE, AND A RE-CONSTRUCTION MEETING MAY ALSO BE REQUIRED, DEPENDING ON THE SCOPE OF WORK. THE PERMIT WILL BE REVIEWED AND APPROVED BY THE COUNTY ENGINEER AND MUST ALSO BE APPROVED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT IF ANY ROAD CLOSURE IS INVOLVED.
3. NO LOTS WITHIN THIS SUBDIVISION SHALL BE FURTHER SUBDIVIDED. (WCSR F1.2)
4. THE FRONT BUILDING SETBACK LINE ON ALL PUBLIC ROADS SHALL BE 25 FEET FROM THE EDGE OF THE RIGHT-OF-WAY, 10 FEET FROM THE BACK OF LOT LINE AND 5 FEET FROM THE SIDES OF LOT LINES. CORNER LOTS WILL BE 15 FT ON THE RIGHT-OF-WAY SIDE INSTEAD OF 5 FEET.
5. THIS DEVELOPMENT IS CONSIDERED EXEMPT FROM ON-SITE STORMWATER DETENTION REQUIREMENT IN ACCORDANCE WITH WCSR SECTION B11.1.1 DUE TO ITS PROXIMITY TO THE DETENTION EXEMPT STREAM REACH OF THE NORTH FORK SAN GABRIEL RIVER.
6. THE INTERSECTION OF FINDERS PASS AND THE I-2 CORRIDOR MAY NOT HAVE ACCESS OR MAY HAVE POTENTIALLY LIMITED ACCESS.
7. UTILITY PROVIDERS WILL BE:
   WATER: CITY OF GEORGETOWN
   WASTEWATER: WCMUD 38
   ELECTRICAL: PEDERNALES ELECTRICAL COOPERATIVE
   TELECOM: AT&T
8. THE PURPOSE OF THIS PRELIMINARY PLAT IS TO SHOW THE PROPOSED IMPROVEMENTS TO THE OWNER'S PROPERTY, INCLUDING THE EXISTING TOPOGRAPHY, TO EVALUATE THE EXISTING AND PROPOSED DRAINAGE PATTERNS. THERE ARE NO IMPROVEMENTS OR SUBDIVISIONS OF LOT 1 BLOCK T. A REVISED PRELIMINARY PLAT SHALL BE SUBMITTED AND APPROVED PRIOR TO ANY DIVISION OF LOT X BLOCK T INTO TWO OR MORE PARTS TO LAY OUT (1) A SUBDIVISION OF THE TRACT, INCLUDING AN ADDITION; (2) LOTS; OR (3) STREETS, ALLEYS, SQUARES, PARKS, OR OTHER PARTS OF THE TRACT INTENDED TO BE DEDICATED TO PUBLIC USE OR FOR THE USE OF PURCHASERS OR OWNERS OF LOTS FRONTING ON OR ADJACENT TO THE STREETS, ALLEYS, SQUARES, PARKS, OR OTHER PARTS. A LOT IS ANY PARCEL OR TRACT OF LAND EXCLUSIVE OF ANY ADJOINING ROAD OR ROAD RIGHT-OF-WAY THAT IS SEPARATED FROM OTHER PARCELS BY A LEGAL DESCRIPTION, A SUBDIVISION OF RECORD, OR SURVEY MAP. THE TERMS "STREET" OR "ROAD" ARE INTERCHANGEABLE AND ARE USED TO DESCRIBE ALL VEHICULAR WAYS, REGARDLESS OF ANY OTHER DESIGNATION THEY MAY CARRY OR WHETHER THE STREET OR ROAD WILL BE PUBLIC OR PRIVATELY OWNED.
9. THIS SUBDIVISION IS VESTED TO THE WILLIAMSON COUNTY SUBDIVISION REGULATIONS DATED DECEMBER 7, 2021. RESIDENTIAL DRIVEWAYS SHALL ONLY CONNECT TO AN INTERNAL PLATTED ROAD AND NOT TO COUNTY ROAD 211, THE ADJACENT COUNTY ROAD, OR THE I2 CORRIDOR.
10. ADDITIONAL ADJACENT PROPERTY OWNERSHIP INFORMATION:
    A: AYORDINE, OLADIPO & ABIMBOLA, DOC #2022089010
    B: STOUT, SETH & TIFFANY, DOC #2020118229
    C: ANTON, CAROL & MANUEL, DOC #2020115197
11. CORRIDOR I2 IS NOT PROPOSED TO BE CONSTRUCTED AS PART OF THIS PRELIMINARY PLAT. IT IS ANTICIPATED THAT CONSTRUCTION OF CORRIDOR I2 WILL BE COMPLETED IN THE FUTURE BY WILLIAMSON COUNTY AND/OR ANOTHER GOVERNMENTAL ENTITY, BUT NOT BY THE OWNER OR DEVELOPER OF THIS SUBDIVISION. THE 120' RIGHT-OF-WAY SHOWN FOR CORRIDOR I2 WILL BE DEDICATED BY FINAL PLAT.

Sheet List Table

Sheet Number	Sheet Title
1	OVERALL PROPERTY BOUNDARY
2	PRELIMINARY PLAT (SHEET 1 OF 3)
3	PRELIMINARY PLAT (SHEET 2 OF 3)
4	PRELIMINARY PLAT (SHEET 3 OF 3)
5	PRELIMINARY DRAINAGE PLAN
6	PRELIMINARY UTILITY PLAN (SHEET 1 OF 2)
7	PRELIMINARY UTILITY PLAN (SHEET 2 OF 2)

TOTAL NO. OF LOTS:
NO. OF BLOCKS: 20
NO. OF SINGLE FAMILY LOTS: 827
NO. OF HIGH DENSITY SINGLE FAMILY/ MULTI FAMILY/COMMERCIAL LOTS: 1
NO. OF OPEN SPACE LOTS: 8
NO. OF AMENITY CENTER LOTS: 1
NO. OF OPEN WQ POND/OPEN SPACE LOTS: 4
NO. OF WWTP POND/OPEN SPACE/DRAINAGE LOTS: 1
NO. OF WW TREATMENT PLANT LOTS: 1

TOTAL LINEAR FOOTAGE OF STREETS: 26,714 LF

ACREAGE ENTIRE SUBDIVISION: 232.44 ACRES

ORIGINAL SUBMITTAL DATE: 21 SEPTEMBER, 2022

OWNER:
LB WARREN, LLC
1001 CYPRESS CREEK ROAD
SUITE 203
CEDAR PARK, TX 78613

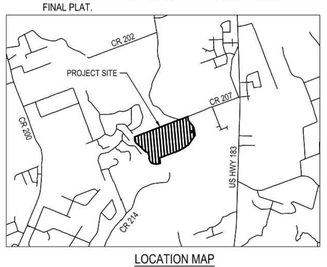
DEVELOPER:
CLAYTON PROPERTIES GROUP, INC.
DBA BROHN HOMES
6720 VAUGHT RANCH ROAD
SUITE 200
AUSTIN, TX 78730
512-320-8833

ENGINEER:
BGE, INC., TBPE F-1046
101 WEST LOUIS HENNA BLVD, SUITE 400
AUSTIN, TEXAS 78728
(512) 879-0400

SURVEYOR:
BGE, INC., TBPE F-1046
101 WEST LOUIS HENNA BLVD, SUITE 400
AUSTIN, TEXAS 78728
(512) 879-0400

STREET DESIGN TABLE

STREET NAME	CLASSIFICATION	DESIGN SPEED	LENGTH	ROW WIDTH	PAVEMENT WIDTH	RURAL / URBAN	SIDEWALK
STAGEHORN PASS	LOCAL	25	949 LF	50'	33' F-F	URBAN	4' BOTH SIDES
FINDERS PASS	MINOR COLLECTOR	35	594 LF	60'	40' F-F	URBAN	4' BOTH SIDES
FINDERS PASS	MAJOR COLLECTOR	40	1,165 LF	60'	48' F-F	URBAN	4' BOTH SIDES
FINDERS PASS	LOCAL	25	1,147 LF	50'	33' F-F	URBAN	4' BOTH SIDES
COACH SIDE LANE	LOCAL	25	1,193 LF	50'	33' F-F	URBAN	4' BOTH SIDES
WAGON TRAIN DRIVE	LOCAL	25	1,068 LF	50'	33' F-F	URBAN	4' BOTH SIDES
CLEMENS DRIVE	LOCAL	25	971 LF	50'	33' F-F	URBAN	4' BOTH SIDES
LAMP LIGHT COVE	LOCAL	25	279 LF	50'	33' F-F	URBAN	4' BOTH SIDES
LOG JACK LANE	LOCAL	25	2,529 LF	50'	33' F-F	URBAN	4' BOTH SIDES
SPOKESHAVE LANE	MINOR COLLECTOR	35	1,179 LF	60'	40' F-F	URBAN	4' BOTH SIDES
REINSMAN WAY	LOCAL	25	725 LF	50'	33' F-F	URBAN	4' BOTH SIDES
GOLDEN PAINT TRAIL	LOCAL	25	2,656 LF	50'	33' F-F	URBAN	4' BOTH SIDES
GIMLET TRAIL	LOCAL	25	614 LF	50'	33' F-F	URBAN	4' BOTH SIDES
CAST IRON PASS	LOCAL	25	824 LF	50'	33' F-F	URBAN	4' BOTH SIDES
WHEEL HUB WAY	LOCAL	25	809 LF	50'	33' F-F	URBAN	4' BOTH SIDES
BUCKSAW DRIVE	LOCAL	25	686 LF	50'	33' F-F	URBAN	4' BOTH SIDES
OX SHOE TRAIL	LOCAL	25	976 LF	50'	33' F-F	URBAN	4' BOTH SIDES
SPOKE TURN AVENUE	MAJOR COLLECTOR	40	1,013 LF	60'-80'	48'-60' F-F	URBAN	4' BOTH SIDES
WHEELWRIGHT TRAIL	LOCAL	25	804 LF	50'	33' F-F	URBAN	4' BOTH SIDES
REAR BOOT WAY	LOCAL	25	1,432 LF	50'	33' F-F	URBAN	4' BOTH SIDES
BULLHIDE SPRINGS DRIVE	MINOR COLLECTOR	35	1,173 LF	60'	40' F-F	URBAN	4' BOTH SIDES
BULLHIDE SPRINGS DRIVE	LOCAL	25	946 LF	50'	33' F-F	URBAN	4' BOTH SIDES
OREGON ROAD	LOCAL	25	1,355 LF	50'	33' F-F	URBAN	4' BOTH SIDES
HOOF TRIMMER DRIVE	LOCAL	25	487 LF	50'	33' F-F	URBAN	4' BOTH SIDES
ADZE DRIVE	LOCAL	25	514 LF	50'	33' F-F	URBAN	4' BOTH SIDES
BARROW WAY	LOCAL	25	190 LF	50'	33' F-F	URBAN	4' BOTH SIDES
CORRIDOR I2	ARTERIAL	DESIGN BY OTHERS					



LOCATION MAP
SCALE: 1" = 5000'

NO.	BY	DATE	REVISION DESCRIPTION
			DESCRIPTION
			DATE
			APR
			REV

DESIGNED BY: AU,AC,MK
REVIEWED BY: JAB
DRAWN BY: MS,AU,AC

BGE, INC.
101 W. LOUIS HENNA BLVD., SUITE 400
AUSTIN, TEXAS 78728
TBPE Registration No. F-1046
TEL: 512-879-0400 www.bgeinc.com

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TBPELS FIRM #2946
GRAY ENGINEERING

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

WARREN TRACT
WILLIAMSON COUNTY, TEXAS

OVERALL PROPERTY BOUNDARY

PRELIMINARY PLAT
(SHEET 1 OF 4)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
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STATE OF TEXAS
J. ADAM BERRY
120743
LICENSED PROFESSIONAL ENGINEER
09/26/2023

1 OF 7

SHEET 4 OF 61

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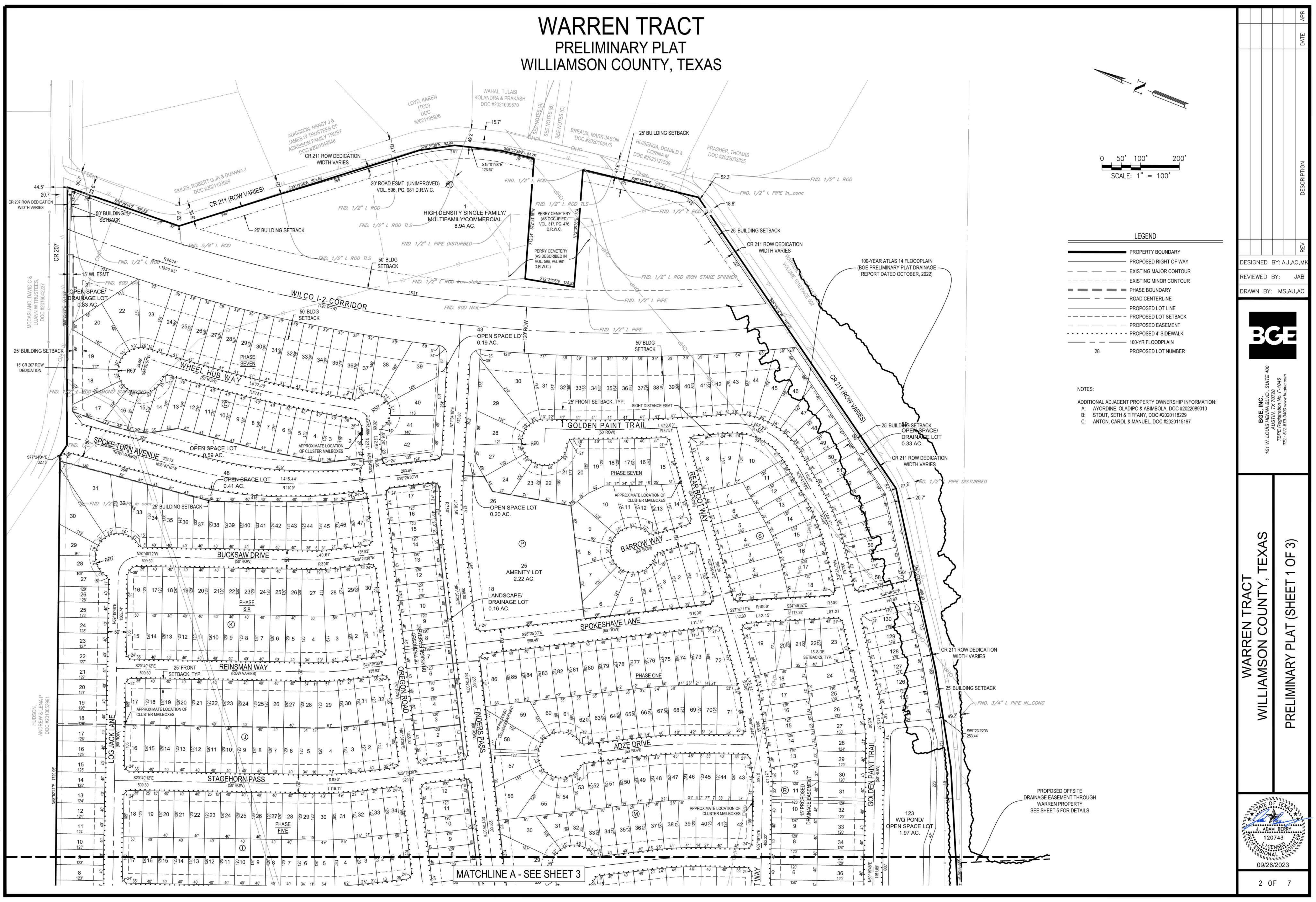

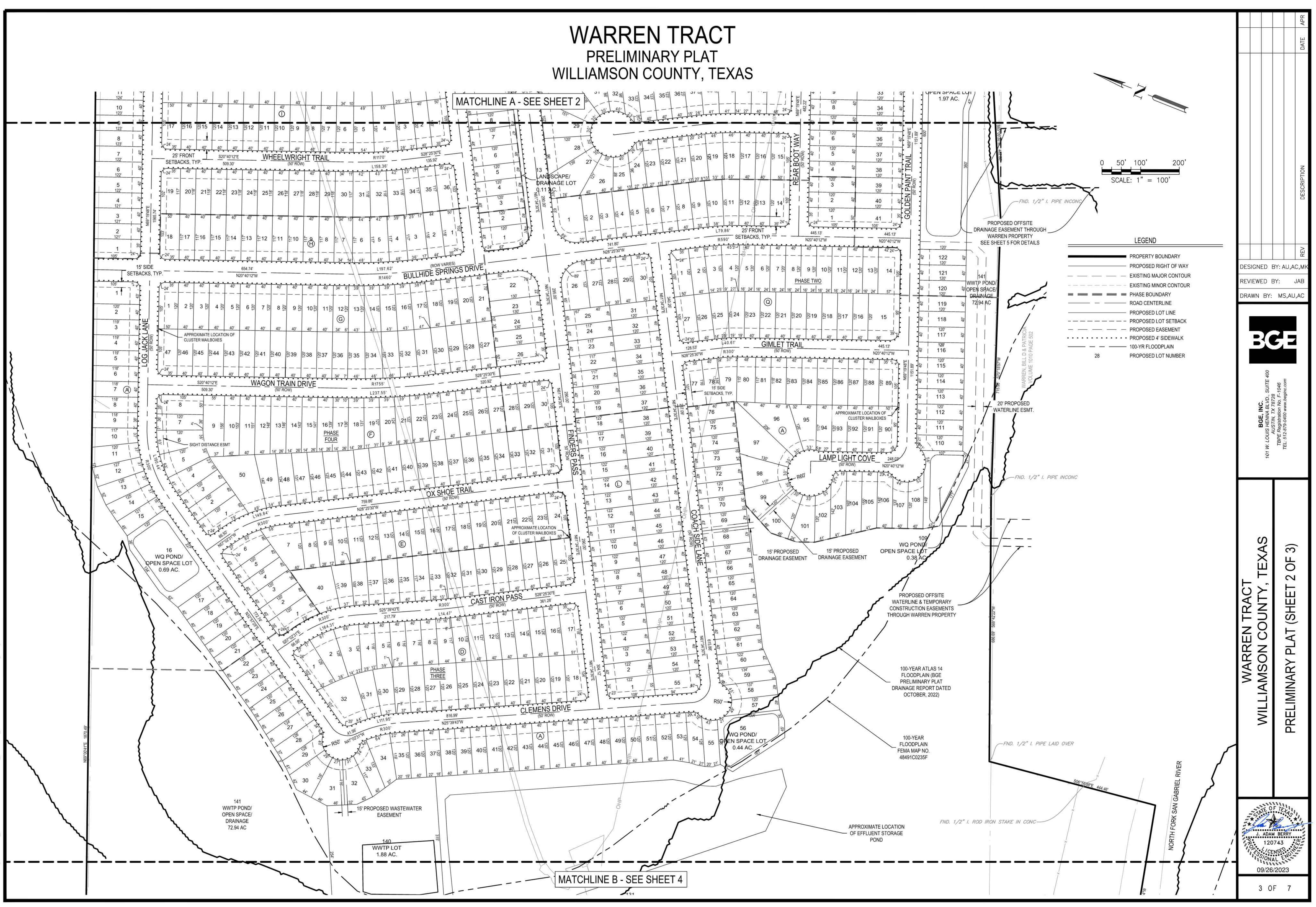

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PRELIMINARY PLAT
(SHEET 2 OF 4)

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

NO.	BY	DATE	REVISION DESCRIPTION

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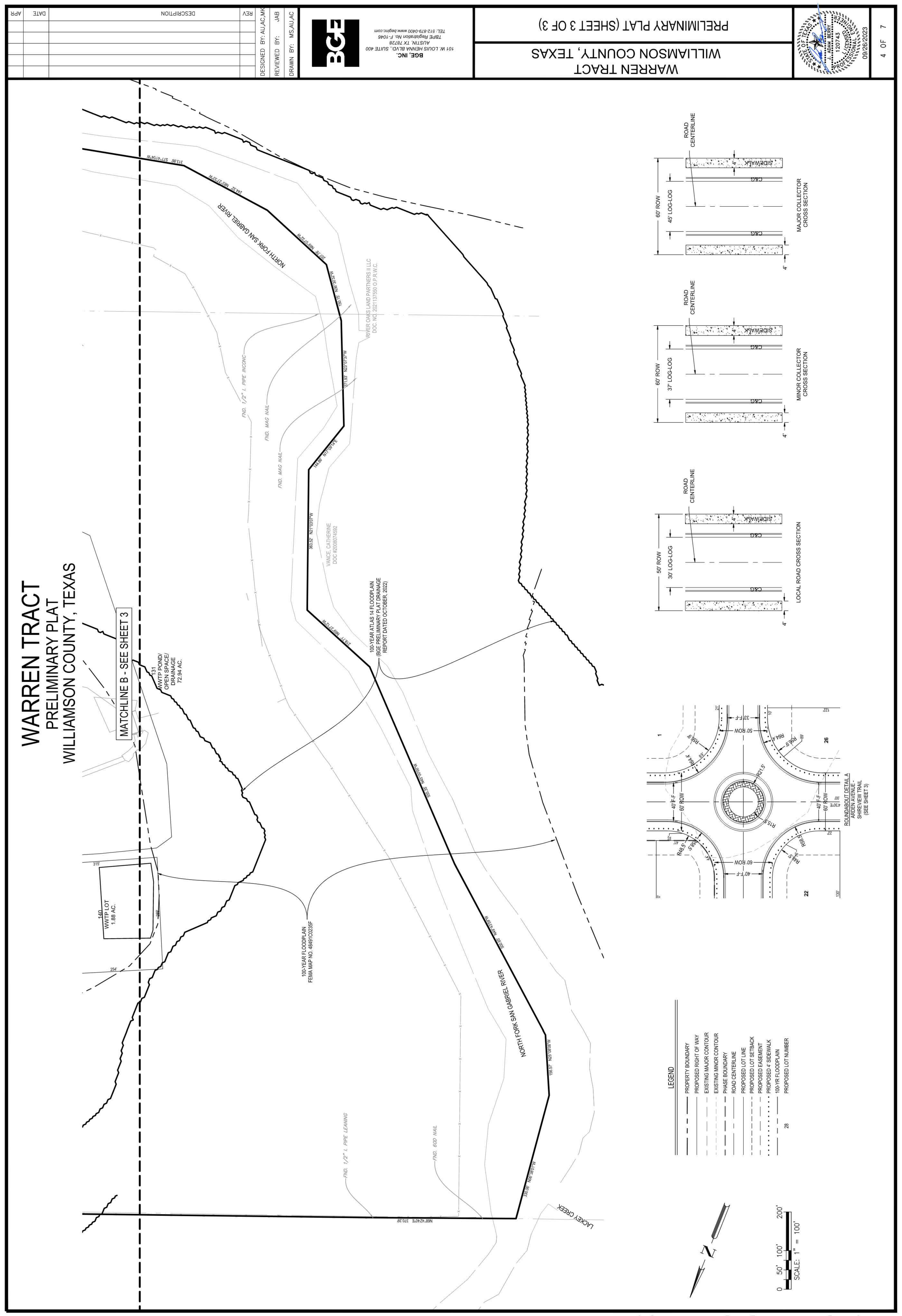

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CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

PRELIMINARY PLAT
(SHEET 3 OF 4)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

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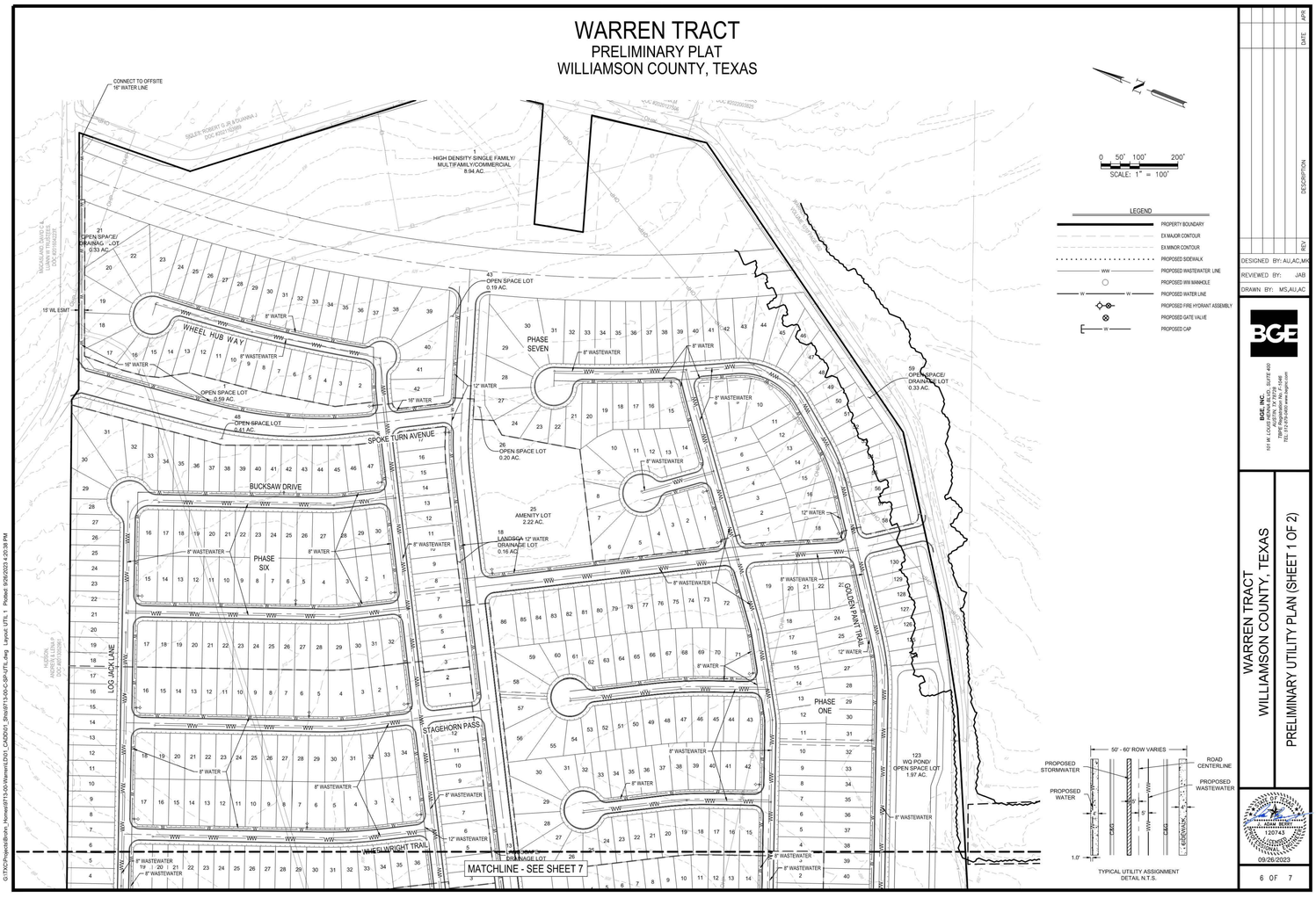

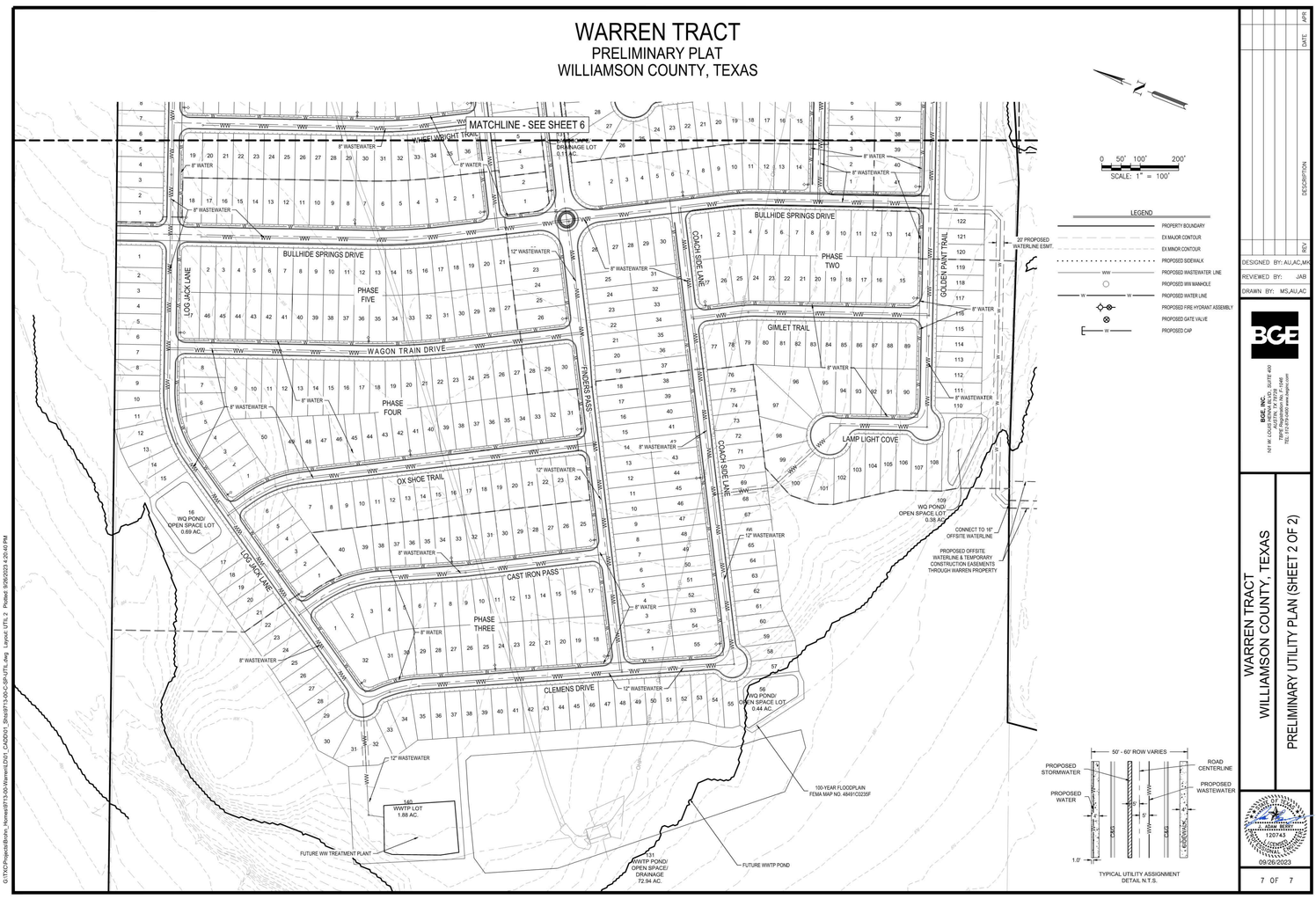

SHEET 7 OF 61

NOTICE: ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER AUTHORITY IS A VIOLATION OF THE ENGINEERING PRACTICE ACT.

CHECKED BY: NK

DRAWN BY: DPC/BE

DESIGNED BY: NK

PROJECT NO: 1636-11802

PRELIMINARY PLAT
(SHEET 4 OF 4)

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

NO.	BY	DATE	REVISION DESCRIPTION

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1500 LF TEMPORARY DEWATERING CHANNEL

10 LF TEMPORARY ROCK BERM

10 LF TEMPORARY ROCK BERM

10 LF TEMPORARY ROCK BERM

10 LF TEMPORARY ROCK BERM

10 LF TEMPORARY ROCK BERM

WAGON TRAIN DRIVE

BULLHIDE SPRINGS DRIVE

BULLHIDE SPRINGS DRIVE

STAGEHORN PASS

FINDERS PASS

STABILIZED CONSTRUCTION ENTRANCE

CONCRETE WASHOUT

STAGING / SPOILS AREA

FUTURE CASCADE PHASE 3

COACH SIDE LANE

GOLDEN PAINT TRAIL

GIMLET TRAIL

GOLDEN PAINT TRAIL

108 LIFT STATION

109 POND

STABILIZED CONSTRUCTION ENTRANCE

REARBOOT WAY

REARBOOT WAY

CASCADE PHASE 1

CASCADE PHASE 1 WQ POND

123 DRAINAGE 1.84 AC

GOLDEN PAINT TRAIL

MATCHLINE - SEE SHEET 10

SCALE: 1" = 80'
GRAPHIC SCALE IN FEET
0 40' 80' 160'

LEGEND

- PROPERTY BOUNDARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- LIMITS OF CONSTRUCTION
- LIMITS OF CONSTRUCTION/ SILT FENCE
- SILT FENCE
- SILT FENCE W/ J-HOOKS
- DIVERSION DIKE
- INLET PROTECTION
- TEMPORARY ROCK BERM
- DIRECTION OF FLOW
- CONSTRUCTION ENTRANCE
- CONCRETE WASHOUT
- STAGING / SPOILS AREA

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

EROSION CONTROL PLAN (SHEET 1 OF 2)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

NOTICE:
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STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/9/2024

SHEET 9 OF 61

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MATCHLINE - SEE SHEET 9

SCALE: 1" = 80'
GRAPHIC SCALE IN FEET
0 40' 80' 160'

MATCHLINE - SEE THIS SHEET

MATCHLINE - SEE THIS SHEET

SCALE: 1" = 80'
GRAPHIC SCALE IN FEET
0 40' 80' 160'

LEGEND

- PROPERTY BOUNDARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- LOC — LOC — LIMITS OF CONSTRUCTION
- LOC–SF — LIMITS OF CONSTRUCTION/ SILT FENCE
- SF — SF — SILT FENCE
- SF — SF — SILT FENCE W/ J-HOOKS
- DIVERSION DIKE
- INLET PROTECTION
- TEMPORARY ROCK BERM
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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

EROSION CONTROL PLAN
(SHEET 2 OF 2)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

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STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/9/2024

SHEET 10 OF 61

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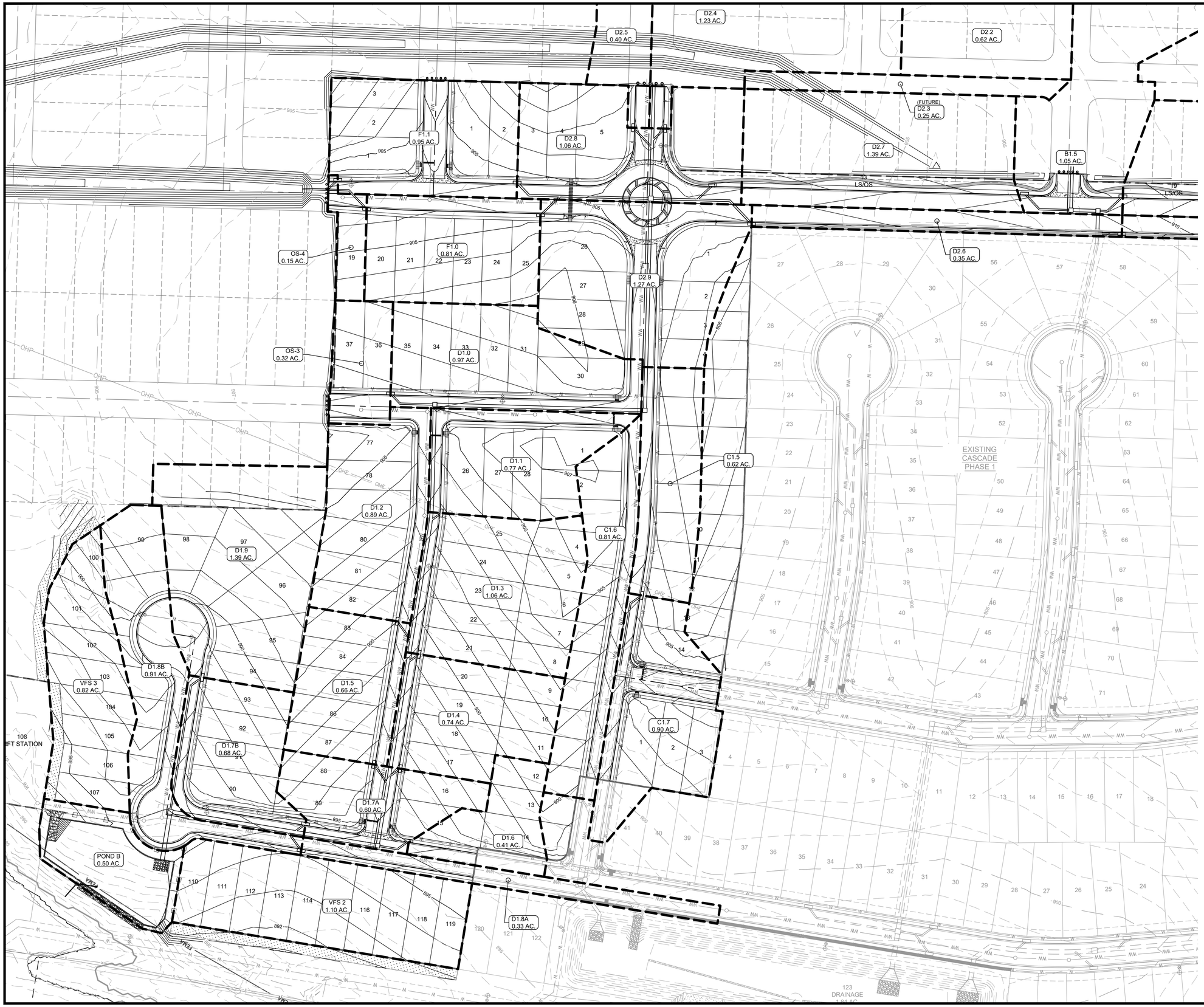

SCALE: 1" = 60'
GRAPHIC SCALE IN FEET
0 30' 60' 120'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
1. ALL INLET WYE CONNECTIONS TO BE 45 DEGREES UNLESS OTHERWISE NOTED
2. ALL FITTINGS AND WYES SHALL BE PRECAST ELEMENTS AND NOT CAST-IN-PLACE WITHOUT PRIOR APPROVAL FROM THE COUNTY.
3. ALL STORM LATERALS TO BE 18" CLIII RCP UNLESS OTHERWISE NOTED.
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

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NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

OVERALL DRAINAGE AREA MAP

PROJECT NO: 1636-11802
DESIGNED BY: NK
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STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
4/4/2024

SHEET 20 OF 61

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-DRAN-P.DWG DATE: 7/9/2024 4:40:23 PM BY: NKELLY

LAND USE TABLE

Condition	Drainage Area	Area (ft²)	Area (Acre)	Width of Street (ft)	Length of Street (ft)	Width of Street (ft)	Length of Street (ft)	Width of Street (ft)	Length of Street (ft)	Impervious Area, Street	Additional Impervious Cover	Number of Lots	Impervious Area, Lots (ft²)	Impervious Area (ft²)	Pervious Area (ft²)	Pervious Type	Impervious (%)	Pervious (%)	Runoff Coefficent			
																			2 Year	10 Year	25 Year	100 Year
DEVELOPED	B1.5	45,738	**1.05**	33	486	40		48	136	13,771		5.00	**15,000**	**28,771**	**16,967**	Grass (0-2%)	**62.90%**	**37.10%**	**0.71**	**0.73**	**0.74**	**0.76**
DEVELOPED	B1.6	37,439	**0.86**	33		40		48	249	6,972		5.50	**16,500**	**23,472**	**13,967**	Grass (0-2%)	**62.69%**	**37.31%**	**0.71**	**0.73**	**0.74**	**0.76**
DEVELOPED	B1.7	6,894	**0.16**	33		40		48	240	6,720		0.00		**6,720**	**174**	Grass (0-2%)	**97.48%**	**2.52%**	**0.95**	**0.95**	**0.95**	**0.96**
DEVELOPED	C1.5	27,095	**0.62**	33	315	40		48		6,458		4.00	**12,000**	**18,458**	**8,638**	Grass (0-2%)	**68.12%**	**31.88%**	**0.75**	**0.76**	**0.77**	**0.79**
DEVELOPED	C1.6	34,669	**0.80**	33	530	40		48		10,865		5.75	**17,250**	**28,115**	**6,554**	Grass (0-2%)	**81.10%**	**18.90%**	**0.84**	**0.85**	**0.85**	**0.86**
DEVELOPED	C1.7	39,246	**0.90**	33	585	40		48		11,993		4.75	**14,250**	**26,243**	**13,004**	Grass (0-2%)	**66.87%**	**33.13%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	D1.0	42,409	**0.97**	33	422	40		48		8,651		6.50	**19,500**	**28,151**	**14,258**	Grass (0-2%)	**66.38%**	**33.62%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	D1.1	33,608	**0.77**	33	434	40		48		8,897		4.50	**13,500**	**22,397**	**11,211**	Grass (0-2%)	**66.64%**	**33.36%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	D1.2	38,739	**0.89**	33	356	40		48		7,298		6.00	**18,000**	**25,298**	**13,441**	Grass (0-2%)	**65.30%**	**34.70%**	**0.73**	**0.74**	**0.75**	**0.78**
DEVELOPED	D1.3	46,336	**1.06**	33	196	40		48		4,018		7.50	**22,500**	**26,518**	**19,818**	Grass (0-2%)	**57.23%**	**42.77%**	**0.67**	**0.69**	**0.70**	**0.73**
DEVELOPED	D1.4	32,372	**0.74**	33	160	40		48		3,280		5.50	**16,500**	**19,780**	**12,592**	Grass (0-2%)	**61.10%**	**38.90%**	**0.70**	**0.72**	**0.73**	**0.75**
DEVELOPED	D1.5	28,607	**0.66**	33	200	40		48		4,100		5.00	**15,000**	**19,100**	**9,507**	Grass (0-2%)	**66.77%**	**33.23%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	D1.6	17,991	**0.41**	33	192	40		48		3,936		2.00	**6,000**	**9,936**	**8,055**	Grass (0-2%)	**55.23%**	**44.77%**	**0.66**	**0.68**	**0.69**	**0.72**
DEVELOPED	D1.7A	25,919	**0.60**	33	229	40		48		4,695		3.50	**10,500**	**15,195**	**10,725**	Grass (0-2%)	**58.62%**	**41.38%**	**0.68**	**0.70**	**0.71**	**0.74**
DEVELOPED	D1.7B	29,766	**0.68**	33	378	40		48		7,749		4.00	**12,000**	**19,749**	**10,017**	Grass (0-2%)	**66.35%**	**33.65%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	D1.8A	14,579	**0.33**	33	592	40		48		12,136		0.00		**12,136**	**2,443**	Grass (0-2%)	**83.24%**	**16.76%**	**0.85**	**0.86**	**0.87**	**0.88**
DEVELOPED	D1.8B	39,646	**0.91**	33	490	40		48		10,045	4,145	3.00	**9,000**	**23,190**	**16,456**	Grass (0-2%)	**58.49%**	**41.51%**	**0.68**	**0.70**	**0.71**	**0.74**
DEVELOPED	D1.9	60,703	**1.39**	33	113	40		48		2,317	1,695	8.00	**24,000**	**28,011**	**32,692**	Grass (0-2%)	**46.14%**	**53.86%**	**0.60**	**0.62**	**0.64**	**0.67**
DEVELOPED	D2.0	51,143	**1.17**	33	292	40		48		5,986		9.00	**27,000**	**32,986**	**18,157**	Grass (0-2%)	**64.50%**	**35.50%**	**0.73**	**0.74**	**0.75**	**0.77**
DEVELOPED	D2.1	26,295	**0.60**	33	292	40		48		5,986		3.50	**10,500**	**16,486**	**9,809**	Grass (0-2%)	**62.70%**	**37.30%**	**0.71**	**0.73**	**0.74**	**0.76**
DEVELOPED	D2.2	27,025	**0.62**	33	350	40		48		7,175		5.00	**15,000**	**22,175**	**4,850**	Grass (0-2%)	**82.05%**	**17.95%**	**0.85**	**0.85**	**0.86**	**0.87**
DEVELOPED	D2.3	10,964	**0.25**	33	450	40		48		9,225		0.00		**9,225**	**1,739**	Grass (0-2%)	**84.14%**	**15.86%**	**0.86**	**0.87**	**0.87**	**0.88**
DEVELOPED	D2.4	53,495	**1.23**	33	475	40	256	48		15,882		6.00	**18,000**	**33,882**	**19,614**	Grass (0-2%)	**63.34%**	**36.66%**	**0.72**	**0.73**	**0.74**	**0.76**
DEVELOPED	D2.5	17,611	**0.40**	33		40	256	48		6,144		2.50	**7,500**	**13,644**	**3,967**	Grass (0-2%)	**77.47%**	**22.53%**	**0.81**	**0.82**	**0.83**	**0.84**
DEVELOPED	D2.6	15,330	**0.35**	33		40		48	511	14,308		0.00		**14,308**	**1,022**	Grass (0-2%)	**93.33%**	**6.67%**	**0.92**	**0.93**	**0.93**	**0.93**
DEVELOPED	D2.7	60,548	**1.39**	33		40		48	390	10,920		9.00	**27,000**	**37,920**	**22,628**	Grass (0-2%)	**62.63%**	**37.37%**	**0.71**	**0.73**	**0.74**	**0.76**
DEVELOPED	D2.8	46,174	**1.06**	33	204	40		48	310	12,862		5.00	**15,000**	**27,862**	**18,312**	Grass (0-2%)	**60.34%**	**39.66%**	**0.70**	**0.71**	**0.72**	**0.75**
DEVELOPED	D2.9	55,330	**1.27**	33	456	40		48	292	17,524		6.50	**19,500**	**37,024**	**18,306**	Grass (0-2%)	**66.91%**	**33.09%**	**0.74**	**0.75**	**0.76**	**0.78**
DEVELOPED	POND B	21,819	**0.50**	33		40		48		0		0.00			**21,819**	Grass (0-2%)	**0.00%**	**100.00%**	**0.28**	**0.32**	**0.35**	**0.41**
DEVELOPED	VFS 2	47,900	**1.10**	33		40		48		0		10.00	**30,000**	**30,000**	**17,900**	Grass (0-2%)	**62.63%**	**37.37%**	**0.71**	**0.73**	**0.74**	**0.76**
DEVELOPED	VFS 3	35,826	**0.82**	33		40		48		0		6.00	**18,000**	**18,000**	**17,826**	Grass (0-2%)	**50.24%**	**49.76%**	**0.63**	**0.65**	**0.66**	**0.69**
DEVELOPED	F1.0	35,363	**0.81**	33		40		48	240	6,720		6.00	**18,000**	**24,720**	**10,643**	Grass (0-2%)	**69.90%**	**30.10%**	**0.76**	**0.77**	**0.78**	**0.80**
DEVELOPED	F1.1	41,208	**0.95**	33	320	40		48	247	13,476		5.00	**15,000**	**28,476**	**12,732**	Grass (0-2%)	**69.10%**	**30.90%**	**0.76**	**0.77**	**0.78**	**0.80**
DEVELOPED	OS-3	13,982	**0.32**	33	168	40		48		3,444		2.00	**6,000**	**9,444**	**4,538**	Grass (0-2%)	**67.54%**	**32.46%**	**0.75**	**0.76**	**0.77**	**0.79**
DEVELOPED	OS-4	6,562	**0.15**	33		40		48	53	1,484		1.00	**3,000**	**4,484**	**2,078**	Grass (0-2%)	**68.33%**	**31.67%**	**0.75**	**0.76**	**0.77**	**0.79**
	Total	**1168331**	**26.82**							**265034.50**	**5839.50**	**157.00**	**471000.00**	**741874.00**	**426456.60**		**63.50%**	**36.50%**				

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

INLET CAPACITY CALCULATIONS
(SHEET 1 OF 3)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/1/2024

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CADSHEETS\11802-C-DRAN-P.DWG DATE: 7/9/2024 4:40:24 PM BY: NKELLY

Drainage Area	Sheet Flow					Shallow Concentrated Flow							Channel or Storm Drain Flow					Time of Concentration (min.)
						Unpaved			Paved			Total						
	Surface Type	n	Length (ft)	Slope (%)	Tt (min.)	Length (ft)	Slope (%)	Tt (min.)	Length (ft)	Slope (%)	Tt (min.)	Tt (min.)	Q,peak(ft³/s)	Area (ft²)	Velocity (ft/s)	Length (ft)	Tt (min.)	Tc (min.)
B1.5	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	66	2.0%	**0.48**	295	1.00%	**2.42**	**2.90**						**15.57**
B1.6	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	48	2.0%	**0.35**	192	1.30%	**1.38**	**1.73**						**14.40**
B1.7	Asphalt	**0.016**	47	1.0%	**1.05**				203	1.30%	**1.46**	**1.46**						**5.00**
C1.5	Grass (Dense grasses2)	**0.24**	65	2.0%	**8.98**				316	1.90%	**1.88**	**1.88**						**10.86**
C1.6	Grass (Dense grasses2)	**0.24**	70	2.0%	**9.52**				450	1.90%	**2.68**	**2.68**						**12.20**
C1.7	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	30	2.0%	**0.22**	350	1.90%	**2.08**	**2.30**						**14.97**
D1.0	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	35	2.0%	**0.26**	160	0.57%	**1.74**	**1.99**						**14.66**
D1.1	Grass (Dense grasses2)	**0.24**	77	3.2%	**8.52**				220	1.80%	**1.34**	**1.34**						**9.86**
D1.2	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	24	2.0%	**0.18**	257	1.80%	**1.57**	**1.75**						**14.41**
D1.3	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	110	2.0%	**0.80**	159	1.80%	**0.97**	**1.78**						**14.44**
D1.4	Grass (Dense grasses2)	**0.24**	88	2.0%	**11.44**	128	2.0%	**0.93**	121	1.80%	**0.74**	**1.67**						**13.11**
D1.5	Grass (Dense grasses2)	**0.24**	67	2.0%	**9.20**	88	2.0%	**0.64**	108	1.80%	**0.66**	**1.30**						**10.50**
D1.6	Grass (Dense grasses2)	**0.24**	83	2.0%	**10.91**	107	2.0%	**0.78**	68	0.90%	**0.59**	**1.37**						**12.28**
D1.7A	Grass (Dense grasses2)	**0.24**	92	2.0%	**11.85**	12	2.0%	**0.09**	130	0.90%	**1.12**	**1.21**						**13.06**
D1.7B	Grass (Dense grasses2)	**0.24**	63	2.0%	**8.75**	106	2.0%	**0.77**	226	1.03%	**1.83**	**2.60**						**11.35**
D1.8A	Grass (Dense grasses2)	**0.24**	9	2.0%	**1.85**				592	0.90%	**5.12**	**5.12**						**6.96**
D1.8B	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	36	2.0%	**0.26**	492	1.03%	**3.97**	**4.24**						**16.91**
D1.9	Grass (Dense grasses2)	**0.24**	72	2.0%	**9.74**	192	2.0%	**1.40**	100	1.03%	**0.81**	**2.21**						**11.95**
D2.0	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	69	2.0%	**0.50**	270	0.50%	**3.13**	**3.63**						**16.30**
D2.1	Grass (Dense grasses2)	**0.24**	69	2.0%	**9.42**				236	0.50%	**2.74**	**2.74**						**12.15**
D2.2	Grass (Dense grasses2)	**0.24**	98	3.0%	**10.60**				132	0.50%	**1.53**	**1.53**						**12.13**
D2.3	Asphalt	**0.016**	35	0.5%	**1.09**				419	0.50%	**4.86**	**4.86**						**5.95**
D2.4	Grass (Dense grasses2)	**0.24**	100	3.0%	**10.77**				237	0.50%	**2.75**	**2.75**						**13.52**
D2.5	Grass (Dense grasses2)	**0.24**	61	1.0%	**11.26**				256	0.50%	**2.97**	**2.97**						**14.23**
D2.6	Grass (Dense grasses2)	**0.24**	7	2.0%	**1.51**				507	0.50%	**5.88**	**5.88**						**7.39**
D2.7	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	43	2.0%	**0.31**	428	0.50%	**4.96**	**5.28**						**17.95**
D2.8	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	32	2.0%	**0.23**	273	0.50%	**3.17**	**3.40**						**16.07**
D2.9	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	42	2.0%	**0.31**	204	0.50%	**2.37**	**2.67**						**15.34**
POND B	Grass (Dense grasses2)	**0.24**	99	2.0%	**12.57**													**12.57**
VFS 2	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	19	2.0%	**0.14**				**0.14**						**12.81**
VFS 3	Grass (Dense grasses2)	**0.24**	100	2.0%	**12.67**	5	2.0%	**0.04**				**0.04**						**12.71**
F1.0	Grass (Dense grasses2)	**0.24**	100	2.5%	**11.59**	34	2.5%	**0.22**	198	0.50%	**2.30**	**2.52**						**14.11**
F1.1	Grass (Dense grasses2)	**0.24**	100	2.4%	**11.78**	44	2.4%	**0.29**	156	0.50%	**1.81**	**2.10**						**13.88**
OS-3	Grass (Dense grasses2)	**0.24**	100	2.1%	**12.42**	35	2.1%	**0.25**	43	0.57%	**0.47**	**0.72**						**13.14**
OS-4	Grass (Dense grasses2)	**0.24**	100	2.8%	**11.07**	37	2.8%	**0.23**	12	0.50%	**0.14**	**0.37**						**11.44**
Total	Grass (Dense grasses2)	**0.24**																**5.00**

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

INLET CAPACITY CALCULATIONS (SHEET 2 OF 3)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

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SHEET 22 OF 61

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-DRAN-P.DWG DATE: 7/9/2024 4:40:32 PM, BY: NKELLY

25 Year Storm

							Street Capacity					Inlet on Grade							Sump Inlet					
Drainage Area	Inlet	Type	Upstream	Qadd (ft^3/s)	Qpeak (ft^3/s)	Width Calc*	Street Width (ft)	Slope (%)	Gutter Depression (ft)	Water Depth (ft)	Ponded Width	Qa/La	Length Needed (ft)	Length (ft)	L/Lneed	a/Y_0	Possible Q (ft^3/s)	Qpass (ft^3/s)	Clogging Factor	Q (ft^3/s)	Allowable head (ft)	Inlet Length (ft)	Calculated head (ft)	Remarks
B1.5	B1.5	GRADE			5.64	48	48	0.50%	0.42	**0.46**	**7.4**	0.93	6.08	10	1.00	0.90	9.29	0.00						
B1.6	B1.6	GRADE			4.74	48	48	1.30%	0.42	**0.37**	**5.6**	0.82	5.76	10	1.00	1.14	8.23	0.00						
B1.7	B1.7	GRADE			1.49	48	48	1.30%	0.42	**0.24**	**3.5**	0.69	2.14	10	1.00	1.72	6.94	0.00						
C1.5	C1.5	GRADE			3.94	48	33	2.00%	0.42	**0.32**	**3.3**	0.77	5.11	10	1.00	1.31	7.71	0.00						
C1.6	C1.6	GRADE			5.36	48	33	1.90%	0.42	**0.36**	**3.7**	0.81	6.59	10	1.00	1.16	8.14	0.00						
C1.7	C1.7	GRADE			5.07	48	33	1.90%	0.42	**0.35**	**3.7**	0.81	6.29	10	1.00	1.19	8.06	0.00						
D1.0	D1.0	GRADE			5.50	48	33	0.57%	0.42	**0.45**	**4.9**	0.92	5.99	10	1.00	0.94	9.19	0.00						
D1.1	D1.1	GRADE			4.96	30	33	1.80%	0.42	**0.38**	**8.3**	0.83	5.95	10	1.00	1.10	8.34	0.00						
D1.2	D1.2	GRADE			5.01	30	33	1.80%	0.42	**0.38**	**8.4**	0.84	6.00	10	1.00	1.10	8.36	0.00						
D1.3	D1.3	GRADE			5.59	30	33	1.80%	0.42	**0.39**	**8.9**	0.85	6.57	10	1.00	1.06	8.51	0.00						
D1.4	D1.4	GRADE			4.18	30	33	1.80%	0.42	**0.36**	**7.7**	0.81	5.15	10	1.00	1.17	8.12	0.00						
D1.5	D1.5	GRADE			4.15	30	33	1.80%	0.42	**0.36**	**7.6**	0.81	5.12	10	1.00	1.17	8.11	0.00						
D1.6	D1.6	GRADE			2.25	30	33	0.90%	0.42	**0.33**	**6.8**	0.78	2.89	10	1.00	1.28	7.80	0.00						
D1.7A	D1.7A	SUMP			3.28	30	33	0.90%	0.42	**0.37**	**8.1**								10%	7.49	0.583	10	0.43	
D1.7B	D1.7B	SUMP			4.21	30	33	1.03%	0.42	**0.39**	**8.8**													
D1.8A	D1.8A	SUMP			2.67	30	33	0.90%	0.42	**0.34**	**7.3**								10%	7.23	0.583	10	0.42	
D1.8B	D1.8B	SUMP			4.56	30	33	1.03%	0.42	**0.40**	**9.2**													
D1.9	D1.9	GRADE			7.05	30	33	1.65%	0.42	**0.43**	**10.3**	0.89	7.91	10	1.00	0.97	8.91	0.00						
D2.4	D2.4	GRADE			6.96	30	33	1.34%	0.42	**0.44**	**10.9**	0.91	7.69	10	1.00	0.94	9.06	0.00						
D2.5	D2.5	GRADE			2.52	30	33	1.34%	0.42	**0.32**	**6.5**	0.77	3.27	10	1.00	1.32	7.70	0.00						
D2.6	D2.6	GRADE			2.97	48	48	0.50%	0.42	**0.37**	**5.6**	0.82	3.60	10	1.00	1.13	8.24	0.00						
D2.7	D2.7	GRADE			7.05	48	48	0.50%	0.42	**0.50**	**8.2**	0.97	7.26	10	1.00	0.83	9.72	0.00						
D2.8	D2.8	GRADE			5.51	48	48	0.50%	0.42	**0.46**	**7.3**	0.92	5.96	10	1.00	0.91	9.24	0.00						
D2.9	D2.9	GRADE			7.09	48	48	0.50%	0.42	**0.50**	**8.2**	0.97	7.29	10	1.00	0.83	9.73	0.00						
F1.0	F1.0	GRADE			1.37	48	48	0.50%	0.42	**0.28**	**4.1**	0.73	1.88	10	1.00	1.49	7.31	0.00						
F1.1	F1.1	GRADE			6.31	48	48	0.50%	0.42	**0.48**	**7.8**	0.95	6.65	10	1.00	0.86	9.50	0.00						

100 Year Storm

						Street Capacity					Inlet on Grade							Sump Inlet					
Drainage Area	Inlet	Type	Upstream	Qadd (ft^3/s)	Qpeak (ft^3/s)	Street Width (ft)	Slope (%)	Gutter Depression (ft)	Water Depth (ft)	Ponded Width	Qa/La	Length Needed (ft)	Length (ft)	L/Lneed	a/Y_0	Possible Q (ft^3/s)	Qpass (ft^3/s)	Clogging Factor	Q (ft^3/s)	Allowable head (ft)	Inlet Length (ft)	Calculated head (ft)	Remarks
B1.5	B1.5	GRADE			7.11	48	0.50%	0.42	**0.50**	**8.2**	0.97	7.30	10	1.00	0.83	9.74	0.00						
B1.6	B1.6	GRADE			5.97	48	1.30%	0.42	**0.40**	**6.2**	0.86	6.97	10	1.00	1.05	8.57	0.00						
B1.7	B1.7	GRADE			1.80	48	1.30%	0.42	**0.26**	**3.8**	0.71	2.53	10	1.00	1.61	7.11	0.00						
C1.5	C1.5	GRADE			4.91	33	2.00%	0.42	**0.34**	**3.6**	0.80	6.15	10	1.00	1.21	7.99	0.00						
C1.6	C1.6	GRADE			6.63	33	1.90%	0.42	**0.39**	**4.1**	0.84	7.85	10	1.00	1.08	8.44	0.00						
C1.7	C1.7	GRADE			6.37	33	1.90%	0.42	**0.38**	**4.0**	0.84	7.60	10	1.00	1.09	8.38	0.00						
D1.0	D1.0	GRADE			6.91	33	0.57%	0.42	**0.49**	**5.4**	0.95	7.24	10	1.00	0.86	9.55	0.00						
D1.1	D1.1	GRADE			6.20	33	1.80%	0.42	**0.41**	**9.4**	0.87	7.16	10	1.00	1.03	8.65	0.00						
D1.2	D1.2	GRADE			6.30	33	1.80%	0.42	**0.41**	**9.4**	0.87	7.26	10	1.00	1.02	8.68	0.00						
D1.3	D1.3	GRADE			7.09	33	1.80%	0.42	**0.42**	**10.1**	0.89	8.01	10	1.00	0.98	8.85	0.00						
D1.4	D1.4	GRADE			5.27	33	1.80%	0.42	**0.38**	**8.6**	0.84	6.25	10	1.00	1.08	8.42	0.00						
D1.5	D1.5	GRADE			5.19	33	1.80%	0.42	**0.38**	**8.5**	0.84	6.17	10	1.00	1.09	8.40	0.00						
D1.6	D1.6	GRADE			2.86	33	0.90%	0.42	**0.35**	**7.5**	0.81	3.54	10	1.00	1.18	8.08	0.00						
D1.7A	D1.7A	SUMP			4.14	33	0.90%	0.42	**0.40**	**9.1**								10%	9.41	0.583	10	0.50	
D1.7B	D1.7B	SUMP			5.26	33	1.03%	0.42	**0.42**	**10.0**													
D1.8A	D1.8A	SUMP			3.27	33	0.90%	0.42	**0.37**	**8.1**								10%	9.06	0.583	10	0.48	
D1.8B	D1.8B	SUMP			5.79	33	1.03%	0.42	**0.44**	**10.6**													
D1.9	D1.9	GRADE			9.04	33	1.65%	0.42	**0.47**	**12.2**	0.93	9.70	10	1.00	0.89	9.32	0.00						
D2.4	D2.4	GRADE			8.76	33	1.34%	0.42	**0.48**	**13.0**	0.94	9.27	10	1.00	0.87	9.45	0.00						
D2.5	D2.5	GRADE			3.13	33	1.34%	0.42	**0.34**	**7.2**	0.80	3.94	10	1.00	1.22	7.95	0.00						
D2.6	D2.6	GRADE			3.61	48	0.50%	0.42	**0.40**	**6.1**	0.85	4.24	10	1.00	1.05	8.53	0.00						
D2.7	D2.7	GRADE			8.92	48	0.50%	0.42	**0.55**	**9.1**	1.02	8.72	10	1.00	0.76	10.23	0.00						
D2.8	D2.8	GRADE			6.97	48	0.50%	0.42	**0.50**	**8.1**	0.97	7.19	10	1.00	0.83	9.70	0.00						
D2.9	D2.9	GRADE			8.91	48	0.50%	0.42	**0.55**	**9.1**	1.02	8.71	10	1.00	0.76	10.22	0.00						
F1.0	F1.0	GRADE			1.96	48	0.50%	0.42	**0.32**	**4.8**	0.77	2.55	10	1.00	1.31	7.71	0.00						
F1.1	F1.1	GRADE			7.94	48	0.50%	0.42	**0.52**	**8.6**	1.00	7.96	10	1.00	0.79	9.97	0.00						

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

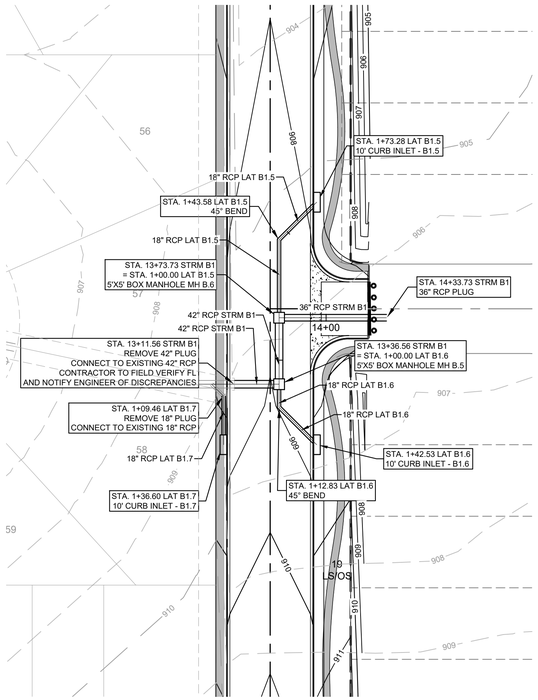
INLET CAPACITY CALCULATIONS
(SHEET 3 OF 3)

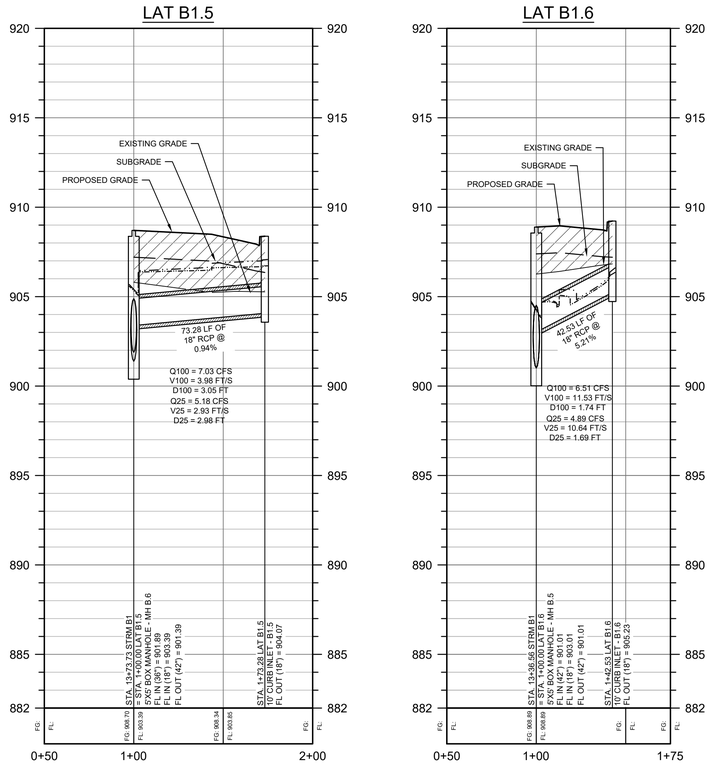
PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

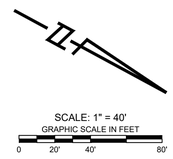
NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/1/2024

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-DRAN-P.DWG DATE: 7/9/2024 4:40:46 PM BY: NKELLY







LEGEND

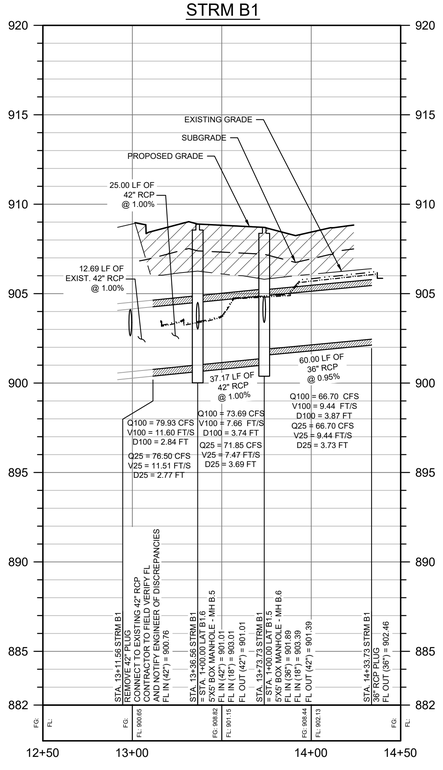
- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- **950** PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

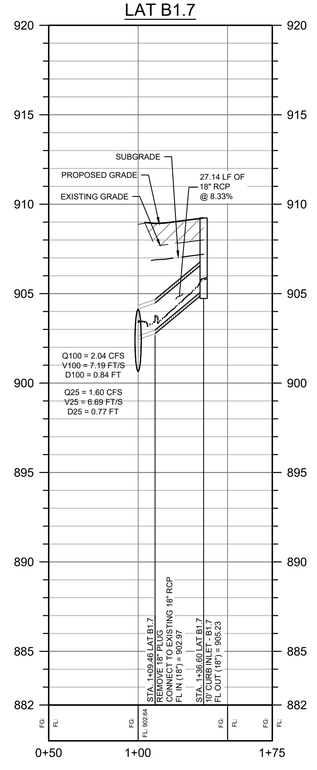
NOTES:

1. ALL INLET WYE CONNECTIONS TO BE 45 DEGREES UNLESS OTHERWISE NOTED.
2. ALL FITTINGS AND WYES SHALL BE PRECAST ELEMENTS AND NOT CAST-IN-PLACE WITHOUT PRIOR APPROVAL FROM THE COUNTY.
3. ALL STORM LATERALS TO BE 18" CLIII RCP UNLESS OTHERWISE NOTED.
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL





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NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE B1
& LATERALS (STA
13+12 TO 14+21)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

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NATHAN D. KELLY
141451
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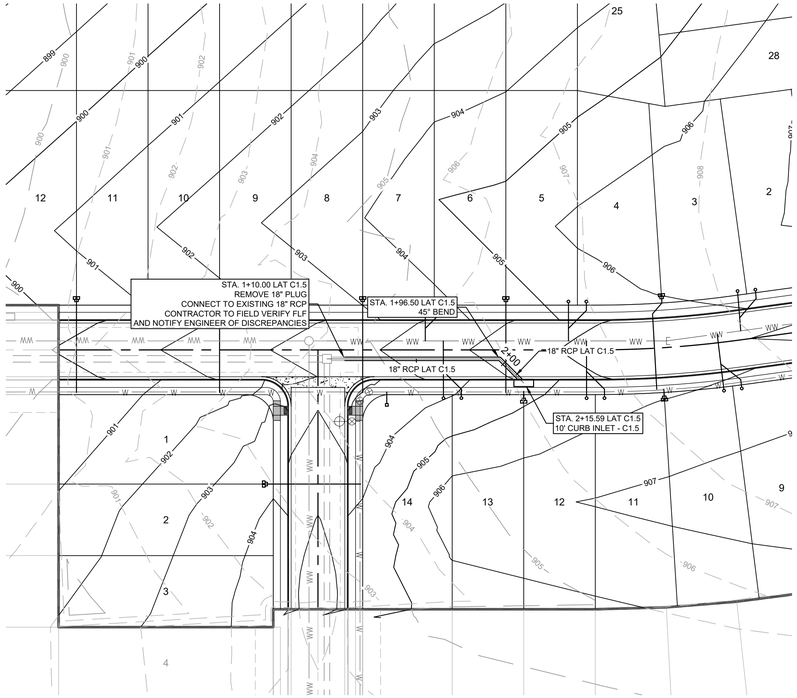
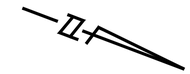
4/1/2024

SHEET 24 OF 61

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:41:29 PM BY: NKELLY





SCALE: 1" = 40'
GRAPHIC SCALE IN FEET
0 20' 40' 80'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- EXISTING CONTOUR
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
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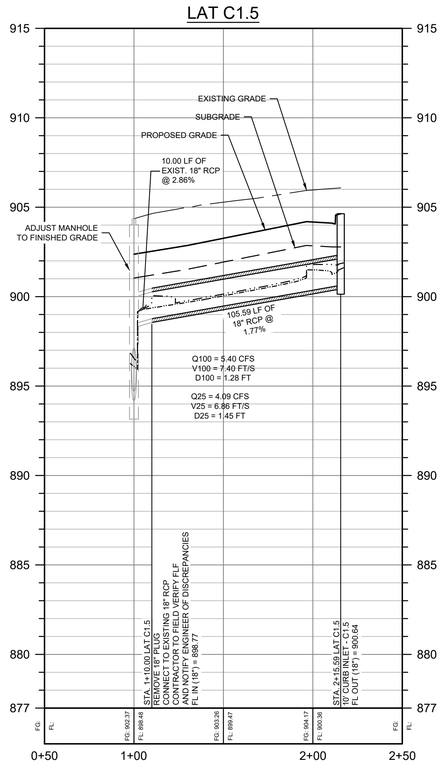
3. ALL STORM LATERALS TO BE 18" CLIII RCP UNLESS OTHERWISE NOTED.
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL



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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

LATERAL C1.5
(STA 1+00 TO END)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
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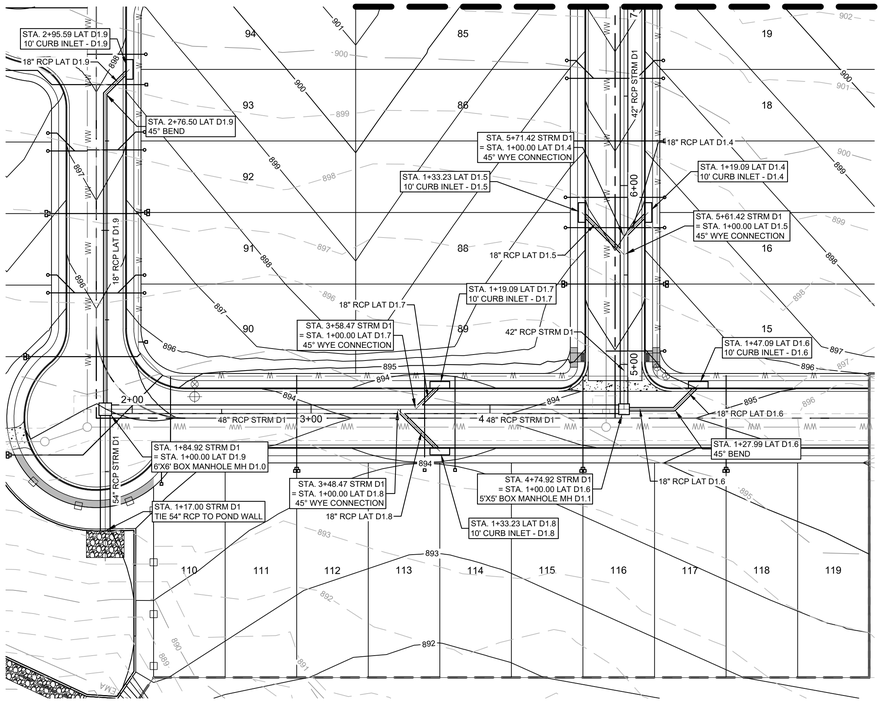
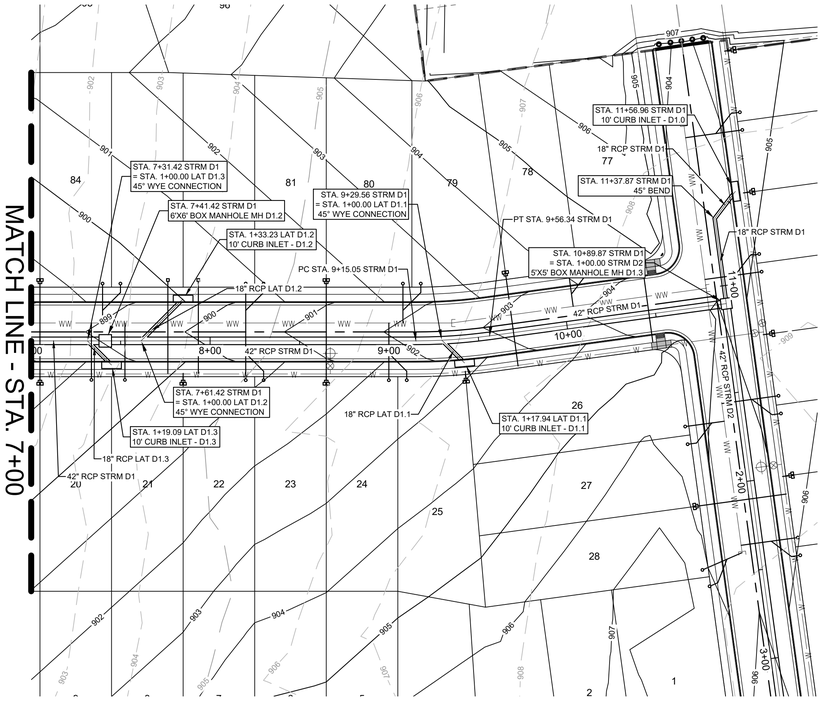
H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:41:36 PM BY: NKELLY

MATCH LINE - STA. 7+00
(SEE THIS SHEET)



MATCH LINE - STA. 7+00
(SEE THIS SHEET)



LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
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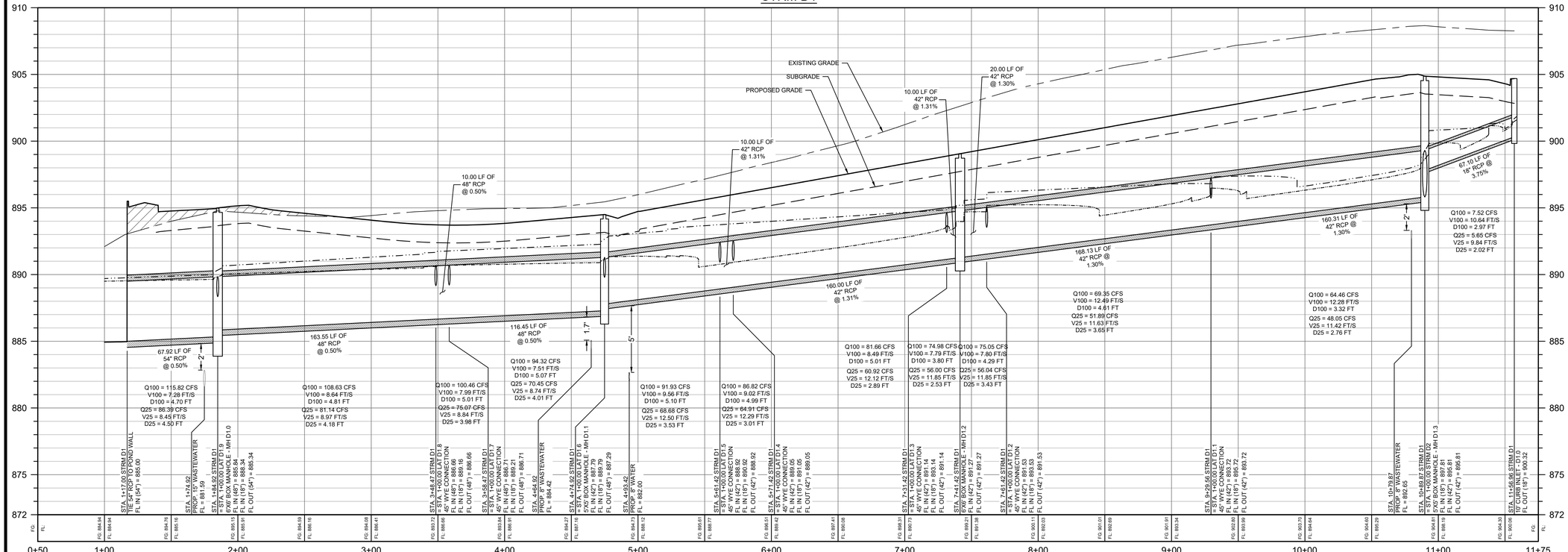
PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL

STRM D1



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NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE D1
(STA 1+00 TO END)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

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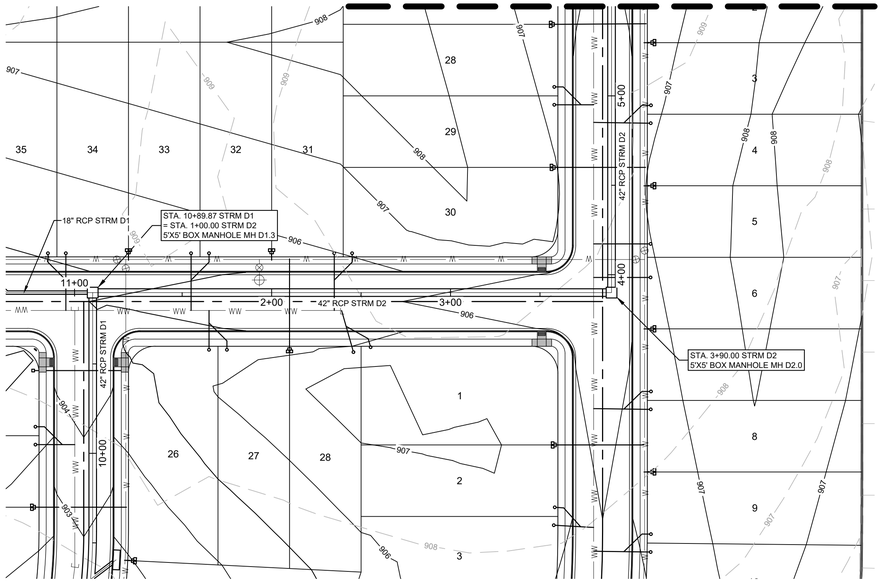
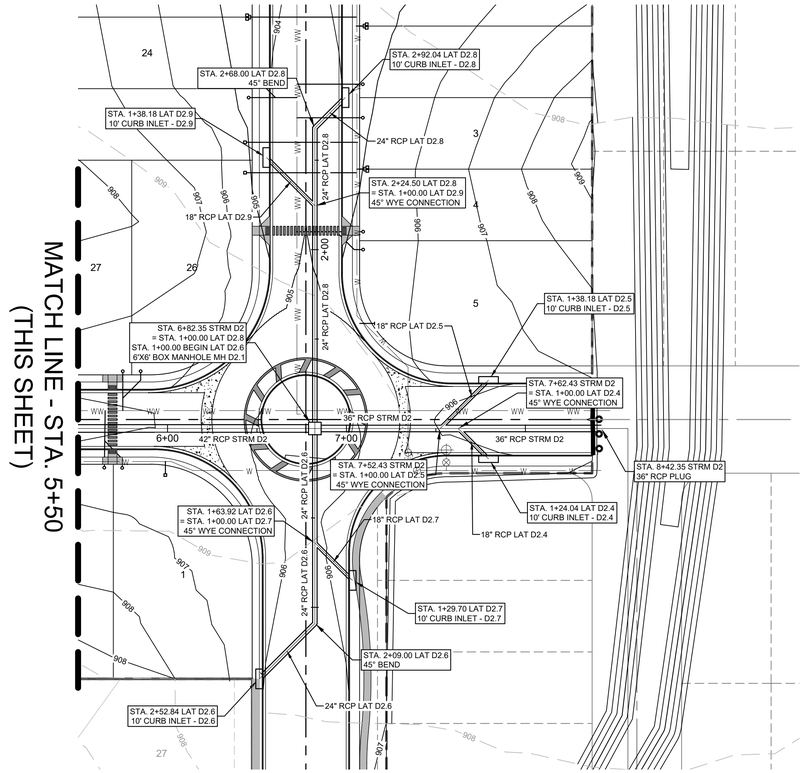
STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
9/6/2024

SHEET 26 OF 61

H:\PROJECT\51636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:41:48 PM BY: NKELLY





SCALE: 1" = 40'
GRAPHIC SCALE IN FEET
0 20' 40' 80'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
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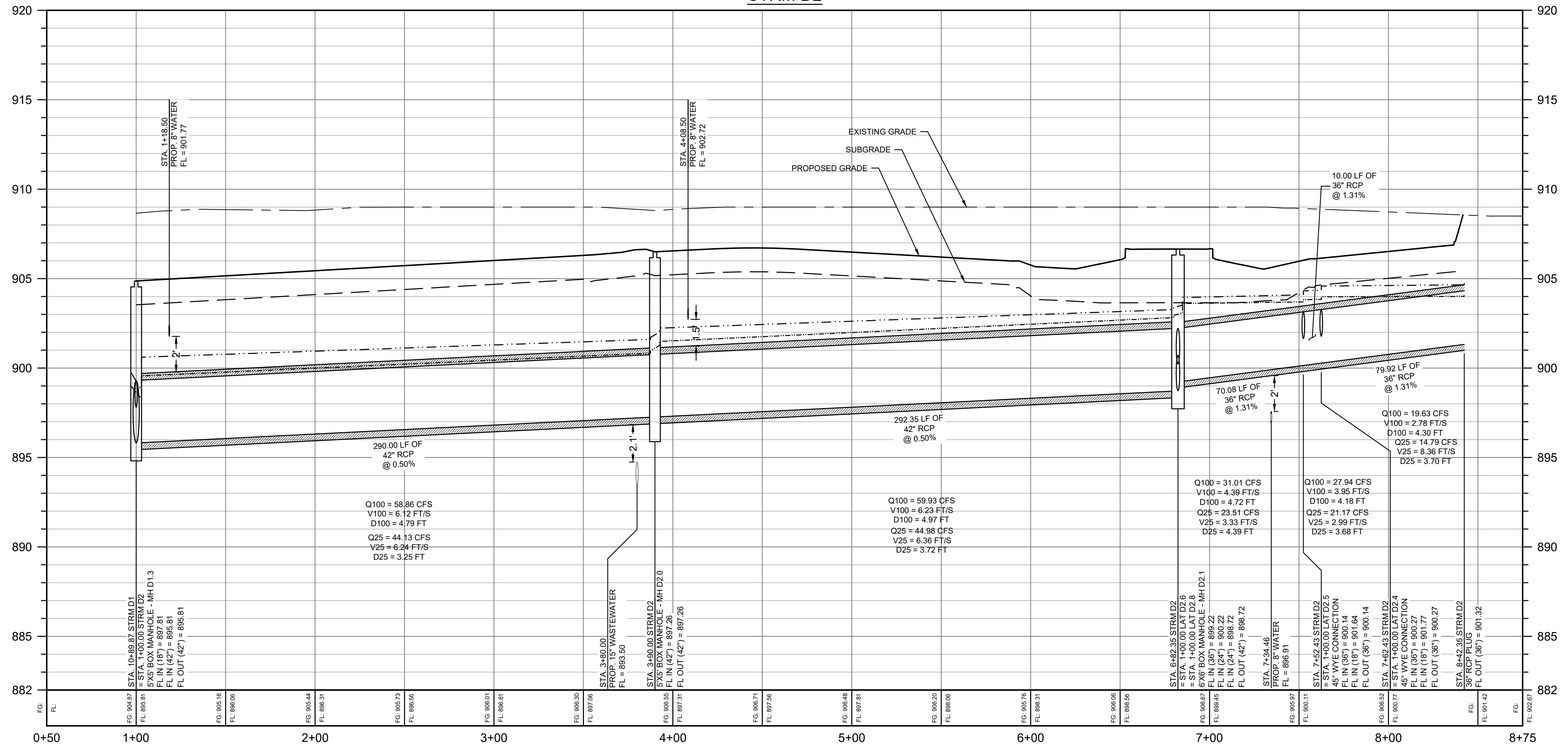
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL

STRM D2



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NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE D2
(STA 1+00 TO 8+42)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

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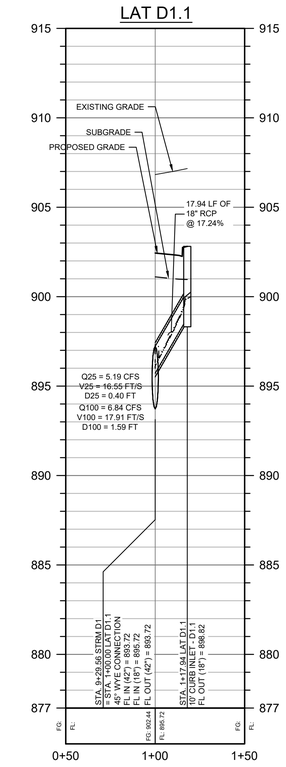
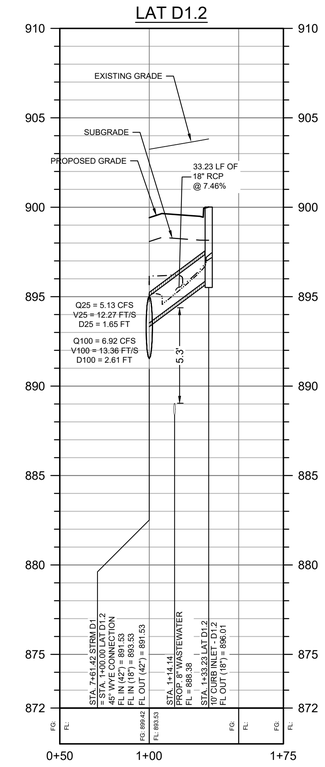
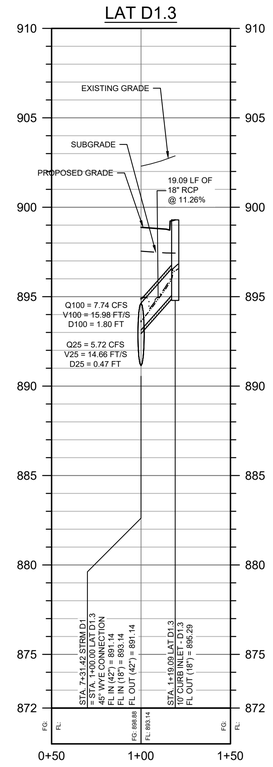
LICENSED PROFESSIONAL ENGINEER
7/9/2024

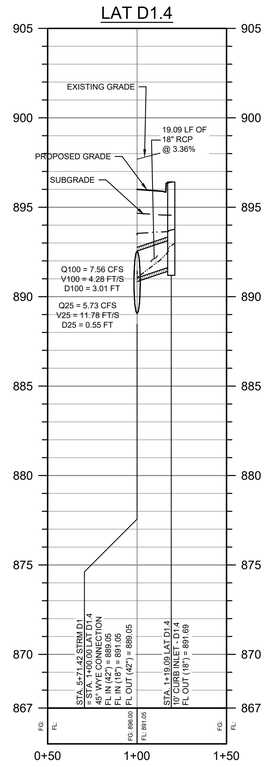
SHEET 28 OF 61

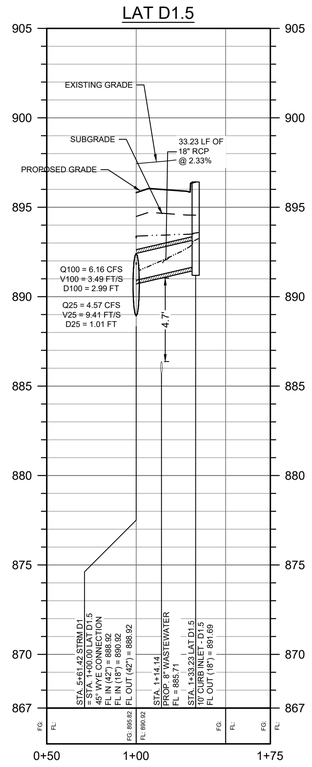
H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:41:59 PM BY: NKELLY





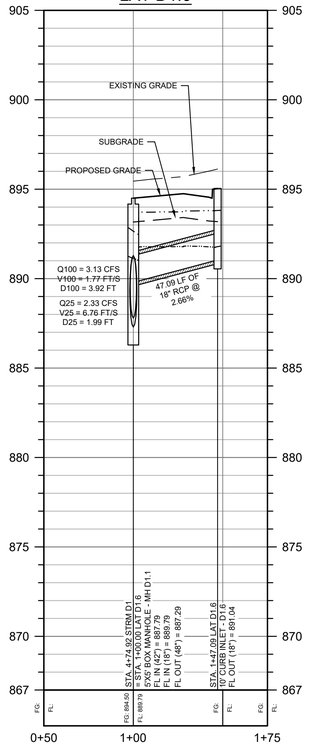


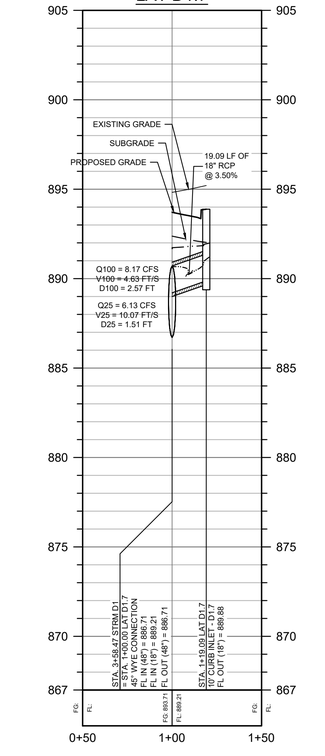


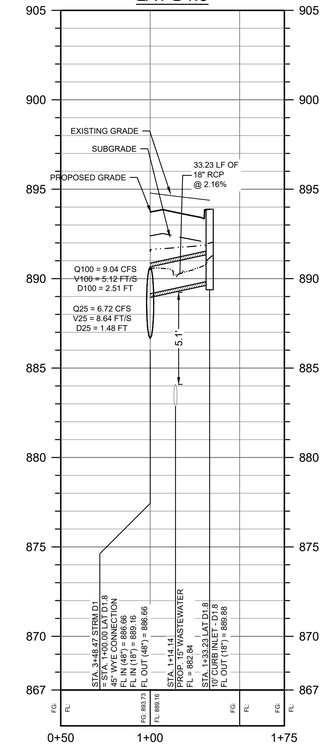


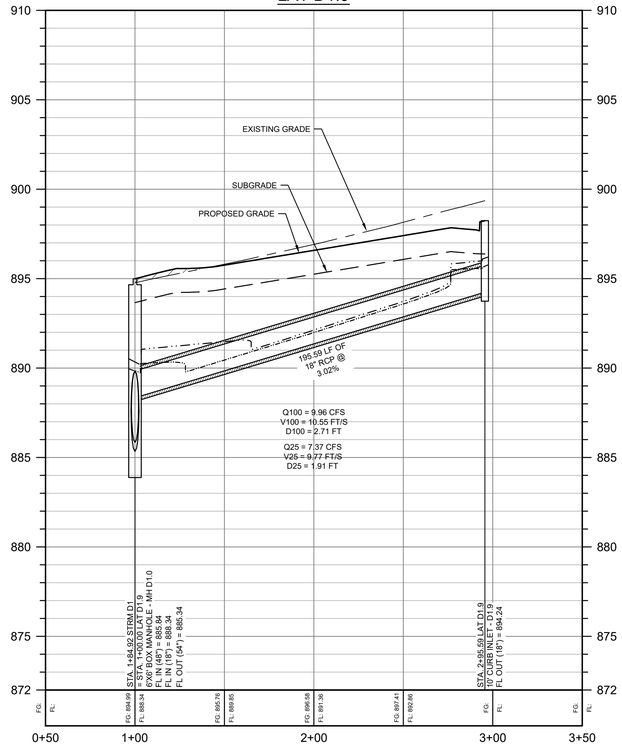
PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL









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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE D1 LATERALS

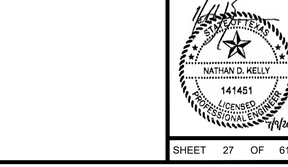
PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

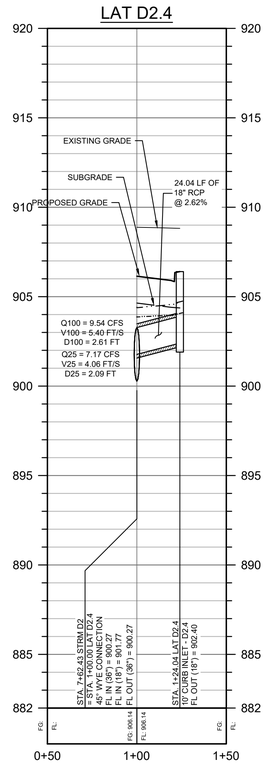
CHECKED BY: NK

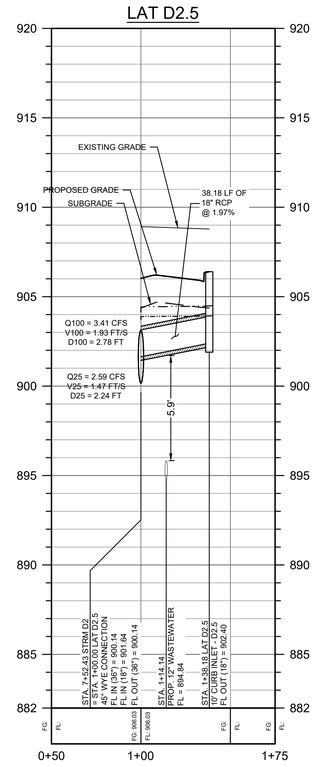
NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

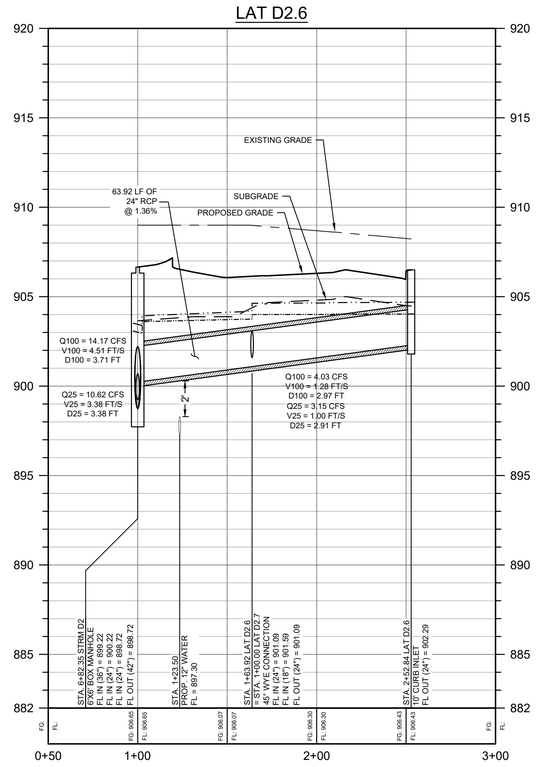


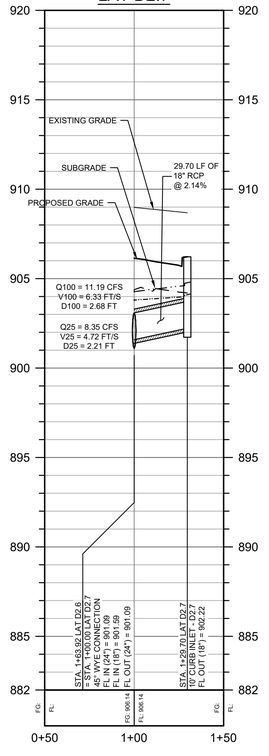
SHEET 27 OF 61

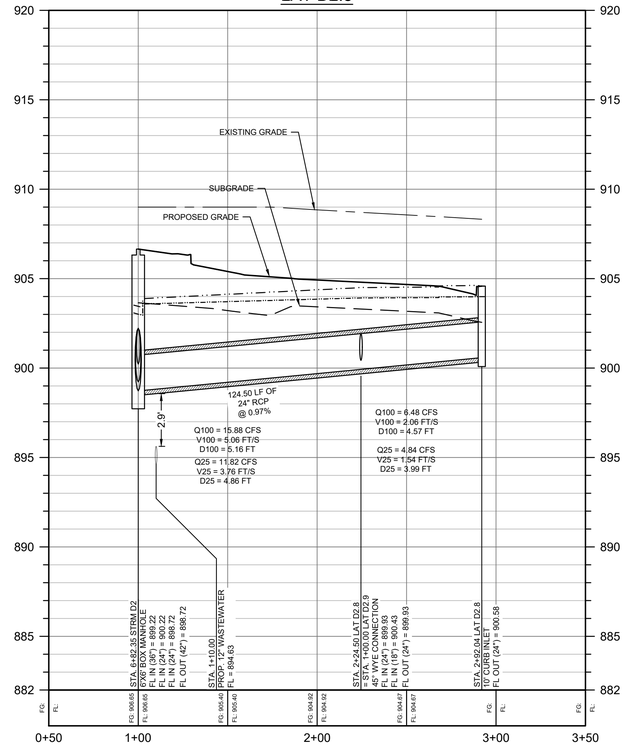
H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:42:06 PM BY: NKELLY

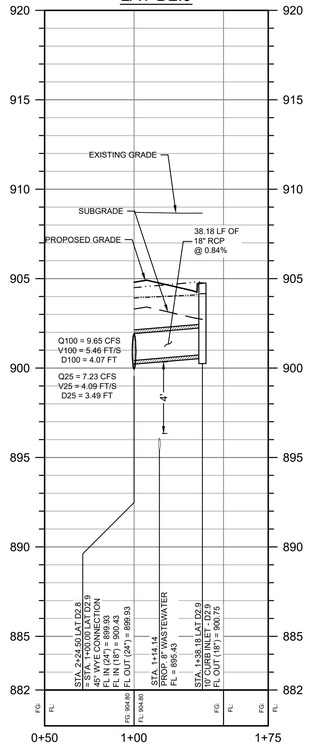












PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE D2 LATERALS

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

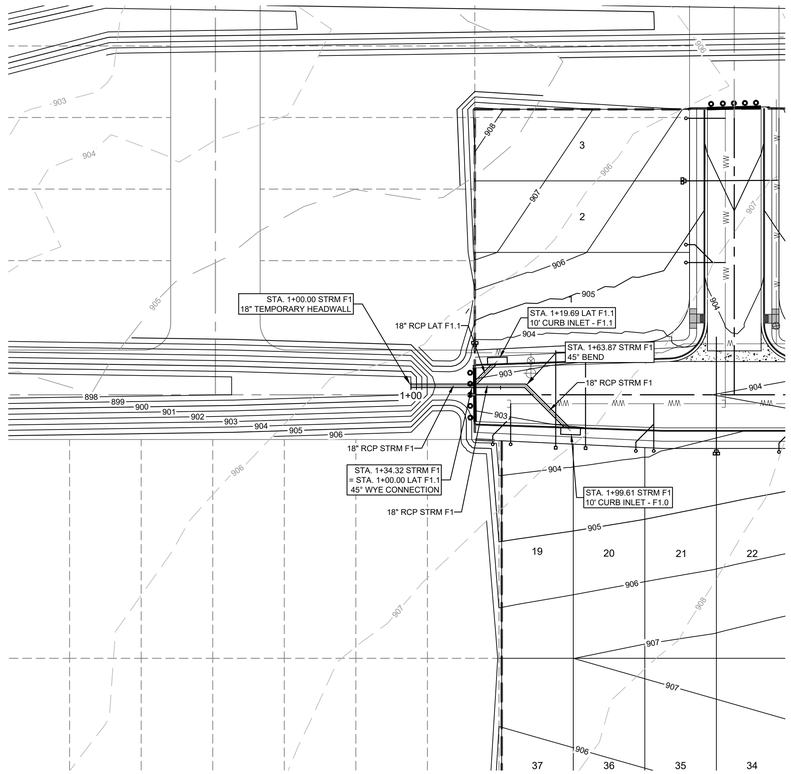
CHECKED BY: NK

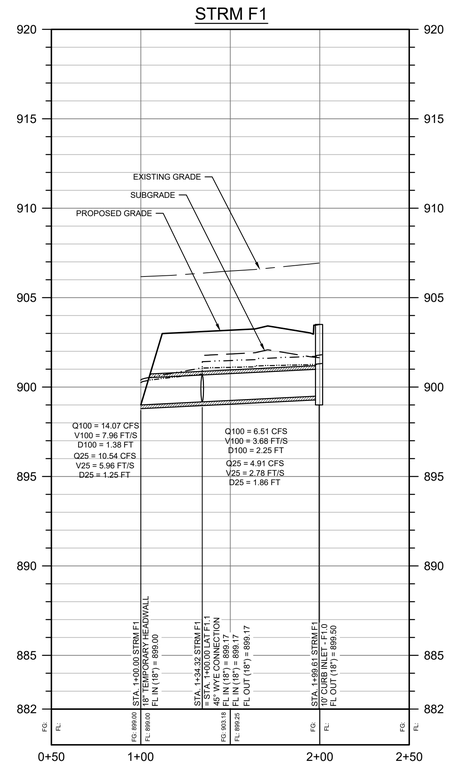
NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

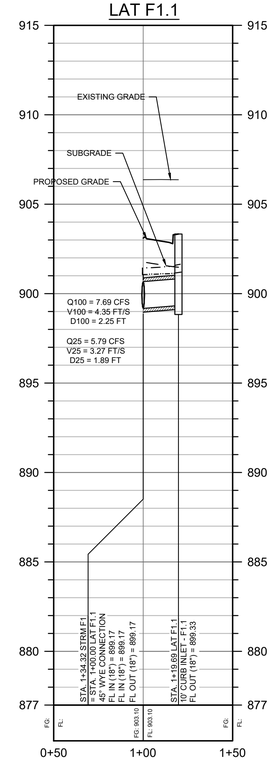
STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
9/9/2024

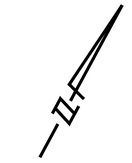
SHEET 29 OF 61

H:\PROJECT\51636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:42:12 PM BY: NKELLY









SCALE: 1" = 40'
GRAPHIC SCALE IN FEET
0 20' 40' 80'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
1. ALL INLET WYE CONNECTIONS TO BE 45 DEGREES UNLESS OTHERWISE NOTED.
2. ALL FITTINGS AND WYES SHALL BE PRECAST ELEMENTS AND NOT CAST-IN-PLACE WITHOUT PRIOR APPROVAL FROM THE COUNTY.
3. ALL STORM LATERALS TO BE 18" CLIII RCP UNLESS OTHERWISE NOTED.
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

PROFILE LEGEND

- FINISHED GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND AT CENTERLINE
- 25YR HGL
- 100 YR HGL
- PROPOSED FILL

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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

STORM SEWER LINE F1
(STA 1+00 TO END)

PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

NOTICE:
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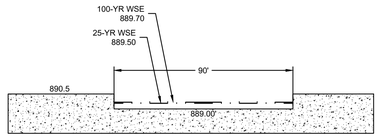
SHEET 30 OF 61

H:\PROJECT\51636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-STRM.DWG DATE: 7/9/2024 4:42:20 PM BY: NKELLY



90' WEIR DETAIL

N.T.S.
(STRUCTURAL BY OTHERS)

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**POND B**	
Total drainage basin/outfall area =	**18.37**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**11.40**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.62**	
$L_{M\ THIS\ BASIN}$ =	**9923**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Batch Detention**
Removal efficiency = **91** 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 = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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 =	**18.37**	acres
A_I =	**11.40**	acres
A_P =	**6.97**	acres
L_R =	**11596**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ =	**10222**	lbs.
F =	**0.88**	

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area. Calculations from RG-348 Pages 3-34 to 3-36

Rainfall Depth =	**1.50**	inches
Post Development Runoff Coefficient =	**0.44**	
On-site Water Quality Volume =	**43581**	cubic feet

Calculations from RG-348 Pages 3-36 to 3-37

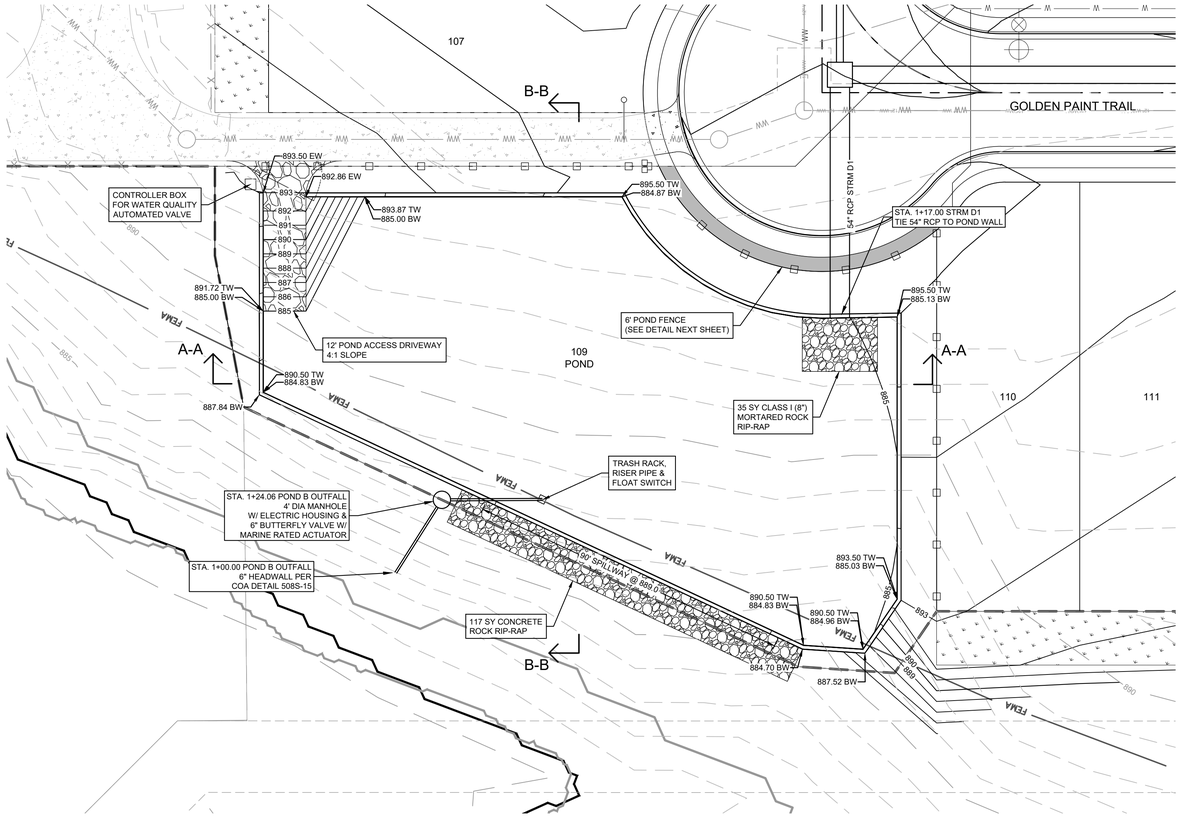
Off-site area draining to BMP =	**0.00**	acres
Off-site Impervious cover draining to BMP =	**0.00**	acres
Impervious fraction of off-site area =	**0**	
Off-site Runoff Coefficient =	**0.00**	
Off-site Water Quality Volume =	**0**	cubic feet
Storage for Sediment =	**8716**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**52297**	cubic feet

BATCH DETENTION POND B STAGE / STORAGE / DISCHARGE TABLE

STAGE (msl)	AREA (sf)	AREA (ac)	STORAGE (cf)	CUMULATIVE STORAGE (cf)	TOTAL STORAGE (ac-ft)	CUMULATIVE DETENTION STORAGE (ac-ft)	DISCHARGE (cfs)
884.00	0	0.000	0	0	0.000	0	0
885.00	11382	0.261	3794	3794	0.087	0.087	0
886.00	12366	0.284	11871	15665	0.360	0.360	0
887.00	12973	0.298	12668	28333	0.650	0.650	0
888.00	13578	0.312	13274	41607	0.955	0.955	0
889.00	14181	0.326	13878	55486	1.274	1.274	0
890.00	14784	0.339	14481	69967	1.606	1.606	286.20

POND B STAGE	
STORM EVENT	WATER SURFACE ELEVATION
2-YR	889.3
10-YR	889.5
25-YR	889.5
100-YR	889.7

POND B INFLOW & OUTFLOW		
STORM EVENT	INFLOW (cfs)	OUTFLOW (cfs)
2-YR	59.4	59.1
10-YR	97.2	96.7
25-YR	122.1	121.5
100-YR	161.8	161.0



SCALE: 1" = 20'
GRAPHIC SCALE IN FEET
0 10' 20' 40'

LEGEND

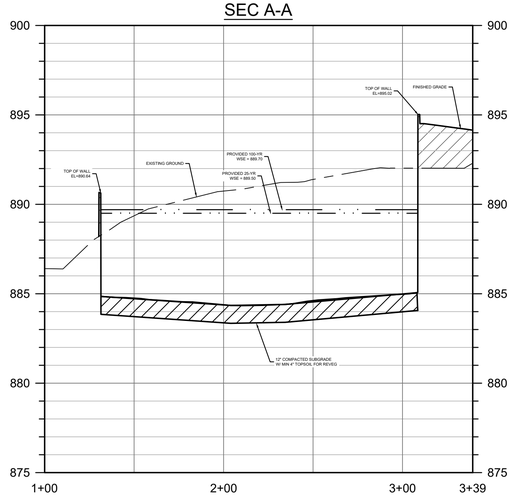
- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- EXISTING CONTOUR
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED CONTOUR
- WATER SURFACE ELEVATION

PROFILE LEGEND

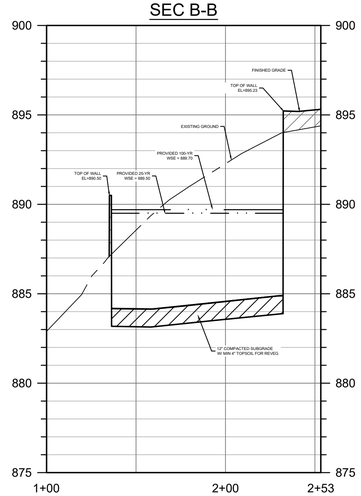
- PROPERTY GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND

NOTES:
1. POND CALCULATIONS AND SIZING ARE BASED ON THE FULL BUILD OUT OF THE SUBDIVISION.

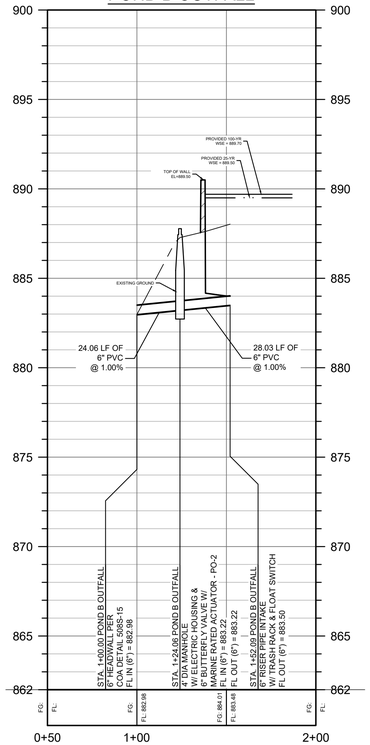
SEC A-A



SEC B-B



POND B OUTFALL



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GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

BATCH DETENTION POND B

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
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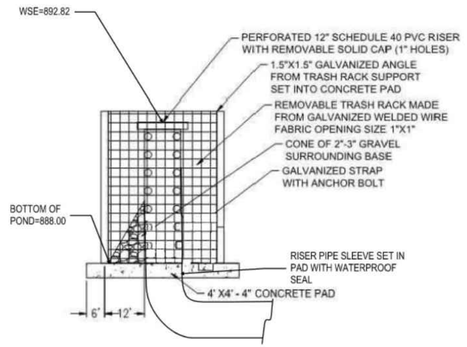
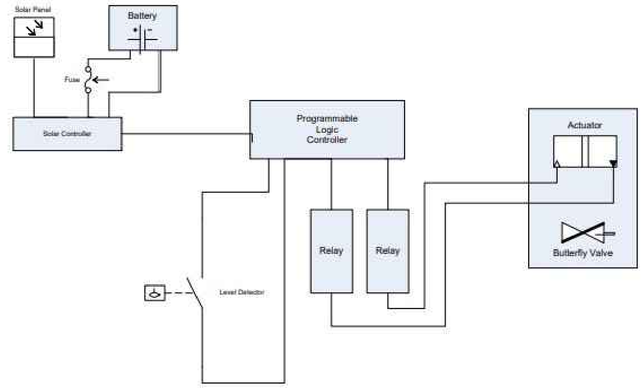


TRASH RACK/RISER PIPE DETAIL

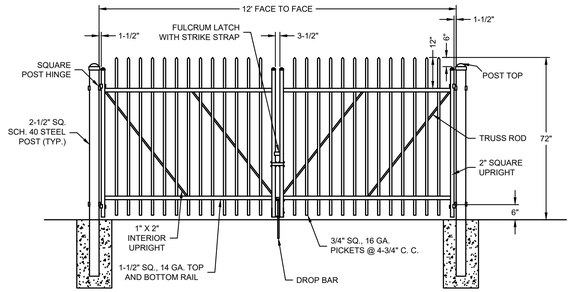
NTS



CONTROLLER CIRCUIT DIAGRAM

NOTES:

1. A SIGN WILL BE POSTED NEXT TO THE ALARM LIGHT THAT INCLUDES THE PHONE NUMBERS OF THE OWNER AND THE TCEQ AUSTIN REGIONAL OFFICE.
2. THE CONTROLLER DETECTS WATER FILLING THE BASIN FROM THE LEVEL SENSOR AND INITIATES A 12-HOUR DETENTION TIME. AT THE END OF THE REQUIRED DETENTION TIME, THE CONTROLLER OPENS THE VALVE AND DRAINS OUT OF THE BASIN. SUBSEQUENT RAINFALL EVENTS THAT OCCUR PRIOR TO THE BASIN DRAINING SHOULD CAUSE THE VALVE TO REMAIN OPEN AND ALLOW THE ADDITIONAL STORMWATER RUNOFF TO PASS THROUGH THE BASIN. ONCE THE BASIN IS DRAINED, THE CONTROLLER CLOSES THE VALVE.
3. THE ACTUATOR VALVE FOR THE PONDS WILL BE SIZED TO ALLOW FROM COMPLETE DRAWDOWN OF THE WATER QUALITY VOLUME WITHIN 48 HOURS AFTER THE VALVES IS OPENED.
4. THE LOGIC CONTROLLER SYSTEM PROVIDES THE FOLLOWING: A TEST SEQUENCE TO SIGNAL LOW BATTER/POWER OUTAGES, AN ON/OFF/RESET SWITCH, MANUAL OPEN/CLOSE SWITCHES, CLEARLY VISIBLE EXTERNAL INDICATOR TO INDICATE WHEN A CYCLE IS IN PROGRESS WITHOUT OPENING THE BOX. THE ABILITY TO EXERCISE THE VALVE TO PREVENT SEIZING.

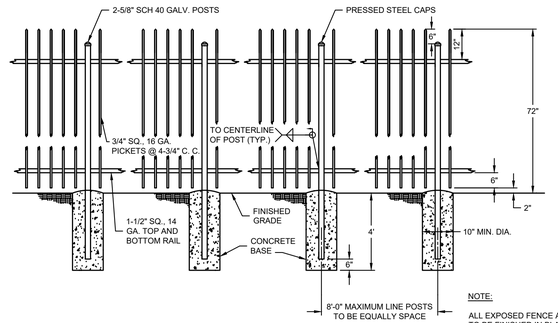


ORNAMENTAL IRON FENCE DETAIL

N.T.S.

NOTE:

ALL EXPOSED FENCE AND GATE METAL TO BE FINISHED IN BLACK EXTERIOR PAINT (COMMERCIAL GRADE).



ORNAMENTAL IRON FENCE DETAIL

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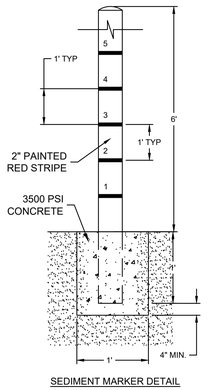
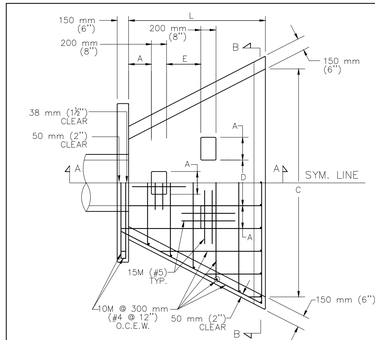
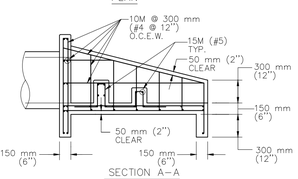


SEDIMENT MARKER DETAIL

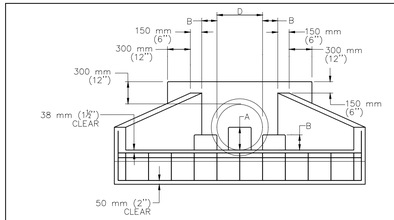


PLAN



SECTION A–A

CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW		STANDARD HEADWALL AND ENERGY DISSIPATORS	
RECORD COPY SIGNED BY BILL GARDNER	08/20/07 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S–13 1 OF 2



SECTION B–B

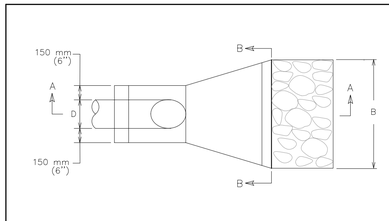
NOTES:

1. ALL CONCRETE SHALL BE TYPE "C" AS PER SPEC. 403S, CONCRETE FOR STUCRTURES.
2. CHAMFER ALL EXTERNAL VISIBLE CORNERS.
3. DISSIPATOR BLOCKS REQUIRED ON DISCHARGE HEADWALLS ONLY.

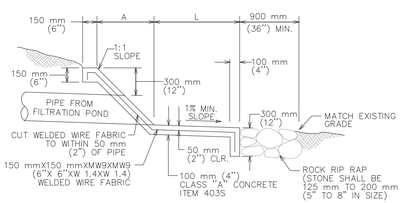
D	457 mm (18")	533 mm (21")	610 mm (24")	685 mm (27")	765 mm (30")	838 mm (33")	914 mm (36")	1.067 m (42")	1.219 m (48")	1.372 m (54")	1.524 m (60")
A	225 mm (9")	250 mm (10")	300 mm (12")	350 mm (14")	375 mm (15")	400 mm (16")	450 mm (18")	525 mm (21")	600 mm (24")	675 mm (27")	750 mm (30")
B	150 mm (6")	175 mm (7")	200 mm (8")	225 mm (9")	250 mm (10")	275 mm (11")	300 mm (12")	350 mm (14")	400 mm (16")	450 mm (18")	500 mm (20")
C	2.29 m (90")	2.67 m (105")	3.05 m (120")	343 m (135")	3.81 m (150")	4.19 m (165")	4.57 m (180")	5.33 m (210")	6.10 m (240")	6.86 m (270")	7.62 m (300")
L	1.37 m (54")	1.60 m (63")	1.83 m (72")	2.06 m (81")	2.29 m (90")	2.51 m (99")	2.74 m (108")	3.20 m (126")	3.66 m (144")	4.11 m (162")	4.57 m (180")
E	300 mm (12")	350 mm (14")	400 mm (16")	450 mm (18")	500 mm (20")	550 mm (22")	600 mm (24")	700 mm (28")	800m (32")	900 mm (36")	1000 mm (40")

DIMENSIONS IN MILLIMETERS, METERS AND (INCHES).
DISCHARGE VELOCITIES GREATER THAN 3 METERS/SECOND (10 fps) REQUIRE ROCK OUTLET PROTECTION.

CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW		STANDARD HEADWALL AND ENERGY DISSIPATORS	
RECORD COPY SIGNED BY BILL GARDNER	08/20/07 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S–13 2 OF 2

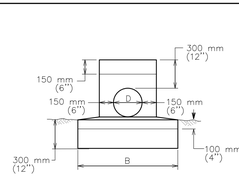


PLAN



SECTION A – A

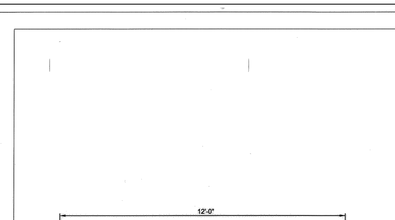
CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW		HEADWALL FOR FILTRATION PONDS W/OUTFALL PIPE 150 mm (6") TO 375 mm (15") DIA.	
RECORD COPY SIGNED BY GEORGE E. OSWALD	3/15/05 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S–15 1 OF 2



SECTION B – B

A	450 mm (18")	500 mm (20")	550 mm (22")	600 mm (24")	675 mm (27")
B	750 mm (30")	800 mm (32")	850 mm (34")	1.05 m (42")	1.27 m (51")
D	150 mm (6")	200 mm (8")	250 mm (10")	300 mm (12")	375 mm (15")
L	600 mm (24")	600 mm (24")	750 mm (30")	900 mm (36")	1.2 m (48")

CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW		HEADWALL FOR FILTRATION PONDS W/OUTFALL PIPE 150 mm (6") TO 375 mm (15") DIA.	
RECORD COPY SIGNED BY GEORGE E. OSWALD	3/15/05 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S–15 2 OF 2



NOTES:

1. **STONE SIZE: 75–125 mm (3–5") OPEN GRADED ROCK.**
2. **THICKNESS: NOT LESS THAN 200 mm (8").**
3. **WIDTH: NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS/EGRESS.**

CITY OF AUSTIN DEPARTMENT OF PUBLIC WORKS	POND MAINTENANCE ROAD CROSS SECTION
E. D. L., P.E. 1/4/2024 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 662S-2

8834 N. Capital of Texas Hwy.
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Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946

GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

BATCH DETENTION POND B
DETAILS

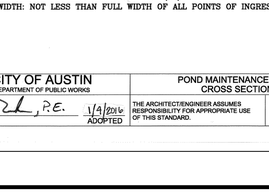
PROJECT NO: 1636-11802

DESIGNED BY: NK

DRAWN BY: DPG/BE

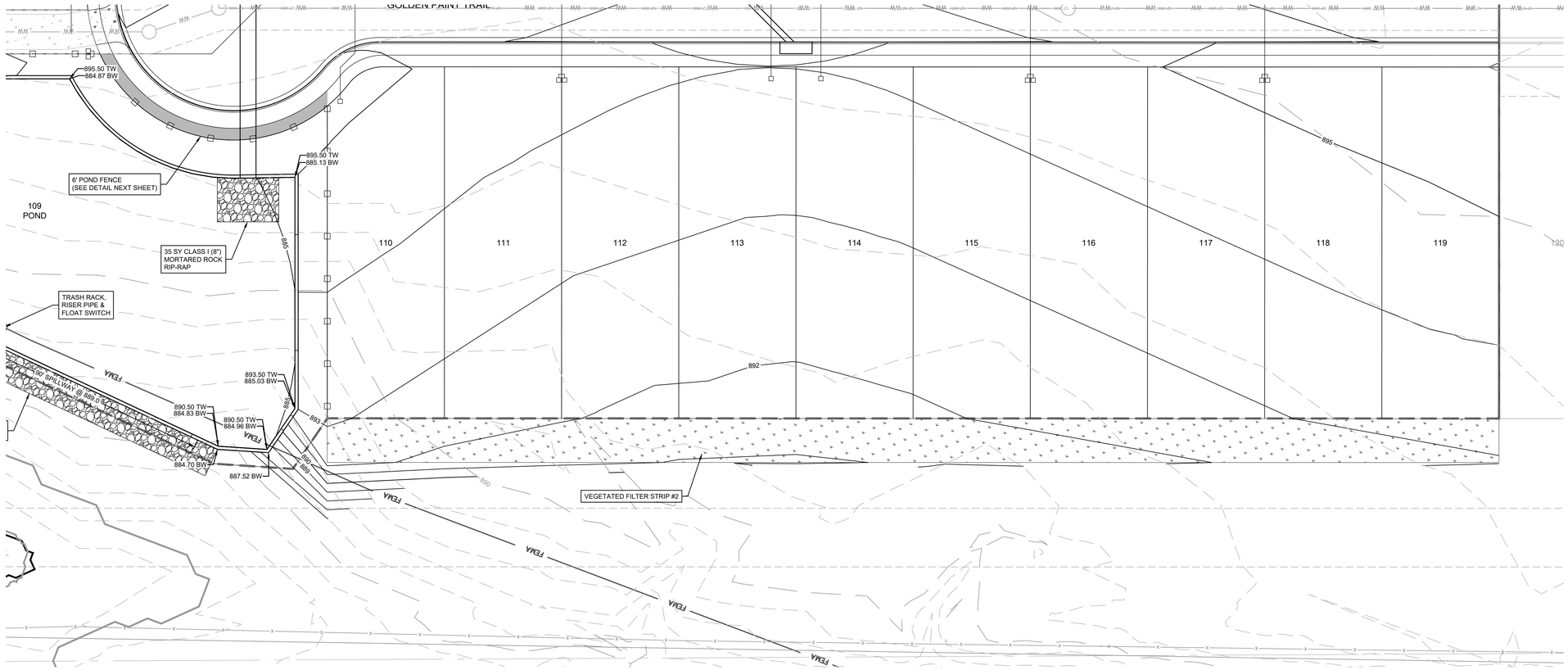
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.



SHEET 32 OF 61

H:\PROJECTS\1636 - BROWN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-POND.DWG DATE: 7/9/2024 4:42:55 PM BY: NKELLY



SCALE: 1" = 20'
GRAPHIC SCALE IN FEET
0 10' 20' 40'

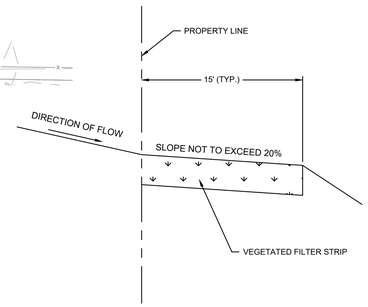
LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- WATER SURFACE ELEVATION

PROFILE LEGEND

- PROPERTY GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND

NOTES:
1. POND CALCULATIONS AND SIZING ARE BASED ON THE FULL BUILD OUT OF THE SUBDIVISION.



2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS 2**	
Total drainage basin/outfall area =	**1.10**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**0.69**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.63**	
$L_{M\ THIS\ BASIN}$ =	**599**	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 = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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 =	**1.10**	acres
A_I =	**0.69**	acres
A_P =	**0.41**	acres
L_R =	**654**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ =	**654**	lbs.
F =	**1.00**	

VFS NOTES (TCEQ RG348):

1. THE FILTER STRIP SHOULD EXTEND ALONG THE ENTIRE LENGTH OF THE CONTRIBUTING AREA AND THE SLOPE SHOULD NOT EXCEED 20%. THE MINIMUM DIMENSION OF THE FILTER STRIP (IN THE DIRECTION OF FLOW) SHOULD BE NO LESS THAN 15 FEET. THE MAXIMUM WIDTH (IN THE DIRECTION OF FLOW) OF THE CONTRIBUTING IMPERVIOUS ARE SHOULD NOT EXCEED 72 FEET. FOR ROADWAYS WITH A VEGETATED STRIP ALONG BOTH SIDES, THE TOTAL WIDTH OF THE ROADWAY SHOULD NOT EXCEED 144 FEET (I.E. 72 FEET DRAINING TO EACH SIDE).
2. THE MINIMUM VEGETATED COVER FOR ENGINEERED STRIPS IS 80%.
3. THE AREA CONTRIBUTING RUNOFF TO A FILTER STRIP SHOULD BE RELATIVELY FLAT SO THAT THE RUNOFF IS DISTRIBUTED EVENLY TO THE VEGETATED AREA WITHOUT THE USE OF A LEVEL SPREADER.
4. THE AREA TO BE USED FOR THE STRIP SHOULD BE FREE OF GULLIES OR RILLS THAT CAN CONCENTRATE OVERLAND FLOW (SCHUELER, 1987).
5. THE TOP EDGE OF THE FILTER STRIP ALONG THE PAVEMENT WILL BE DESIGNED TO AVOID THE SITUATION WHERE RUNOFF WOULD TRAVEL ALONG THE TOP OF THE FILTER STRIP, RATHER THAN THROUGH IT.
6. TOP EDGE OF THE FILTER STRIP SHOULD BE LEVEL, OTHERWISE RUNOFF WILL TEND TO FORM A CHANNEL IN THE LOW SPOT. A LEVEL SPREADER SHOULD NOT BE USED TO DISTRIBUTE RUNOFF TO AN ENGINEERED FILTER STRIP.
7. FILTER STRIPS SHOULD BE LANDSCAPED AFTER OTHER PORTIONS OF THE PROJECT ARE COMPLETED.

8834 N. Capital of Texas Hwy.
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FAX(512)454-9933
TBPELS FIRM #2946
GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

VEGETATIVE FILTER STRIP 2

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

STATE OF TEXAS
NATHAN D. KELLY
141451
LICENSED PROFESSIONAL ENGINEER
7/9/2024

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-POND.DWG DATE: 7/9/2024 4:42:59 PM BY: NKELLY

SCALE: 1" = 20'
GRAPHIC SCALE IN FEET
0 10' 20' 40'

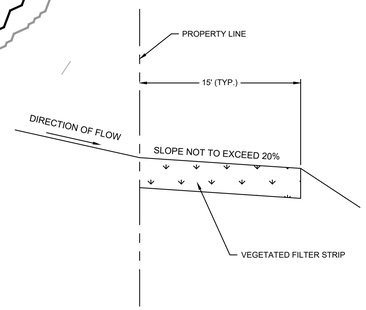
LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- WATER SURFACE ELEVATION

PROFILE LEGEND

- PROPERTY GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND

NOTES:
1. POND CALCULATIONS AND SIZING ARE BASED ON THE FULL BUILD OUT OF THE SUBDIVISION.



2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	**VFS 3**	
Total drainage basin/outfall area =	**0.82**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**0.41**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.50**	
$L_{M\ THIS\ BASIN}$ =	**360**	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 = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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 =	**0.82**	acres
A_I =	**0.41**	acres
A_P =	**0.41**	acres
L_R =	**395**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ =	**395**	lbs.
F =	**1.00**	

VFS NOTES (TCEQ RG348):

1. THE FILTER STRIP SHOULD EXTEND ALONG THE ENTIRE LENGTH OF THE CONTRIBUTING AREA AND THE SLOPE SHOULD NOT EXCEED 20%. THE MINIMUM DIMENSION OF THE FILTER STRIP (IN THE DIRECTION OF FLOW) SHOULD BE NO LESS THAN 15 FEET. THE MAXIMUM WIDTH (IN THE DIRECTION OF FLOW) OF THE CONTRIBUTING IMPERVIOUS ARE SHOULD NOT EXCEED 72 FEET. FOR ROADWAYS WITH A VEGETATED STRIP ALONG BOTH SIDES, THE TOTAL WIDTH OF THE ROADWAY SHOULD NOT EXCEED 144 FEET (I.E. 72 FEET DRAINING TO EACH SIDE).
2. THE MINIMUM VEGETATED COVER FOR ENGINEERED STRIPS IS 80%.
3. THE AREA CONTRIBUTING RUNOFF TO A FILTER STRIP SHOULD BE RELATIVELY FLAT SO THAT THE RUNOFF IS DISTRIBUTED EVENLY TO THE VEGETATED AREA WITHOUT THE USE OF A LEVEL SPREADER.
4. THE AREA TO BE USED FOR THE STRIP SHOULD BE FREE OF GULLIES OR RILLS THAT CAN CONCENTRATE OVERLAND FLOW (SCHUELER, 1987).
5. THE TOP EDGE OF THE FILTER STRIP ALONG THE PAVEMENT WILL BE DESIGNED TO AVOID THE SITUATION WHERE RUNOFF WOULD TRAVEL ALONG THE TOP OF THE FILTER STRIP, RATHER THAN THROUGH IT.
6. TOP EDGE OF THE FILTER STRIP SHOULD BE LEVEL, OTHERWISE RUNOFF WILL TEND TO FORM A CHANNEL IN THE LOW SPOT. A LEVEL SPREADER SHOULD NOT BE USED TO DISTRIBUTE RUNOFF TO AN ENGINEERED FILTER STRIP.
7. FILTER STRIPS SHOULD BE LANDSCAPED AFTER OTHER PORTIONS OF THE PROJECT ARE COMPLETED.

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FAX(512)454-9933
TBPELS FIRM #2946

GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

VEGETATIVE FILTER STRIP 3

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
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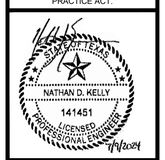

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2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. = SWALE F

Total drainage basin/outfall area =	**1.76**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.22**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.69**	
$L_{M\ THIS\ BASIN}$ =	**1063**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Grassy Swale**
Removal efficiency = **70** 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 = (BMP efficiency) x P x (A_I x 34.6 + A_P x 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 = Pervous area remaining in the BMP catchment area
L_R = TSS Load removed from this catchment area by the proposed BMP

A_C =	**1.76**	acres
A_I =	**1.22**	acres
A_P =	**0.54**	acres
L_R =	**953**	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ = **953** lbs.

F = **1.00**

15. Grassy Swales — Designed as Required in RG-348 — Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A =	1.76 acres
Impervious Cover in Drainage Area =	1.22 acres
Rainfall intensity = i =	1.1 in/hr
Swale Slope =	0.01 ft/ft
Side Slope (z) =	3
Design Water Depth = y =	0.33 ft
Weighted Runoff Coefficient = C =	0.61
A_{CS} = cross-sectional area of flow in Swale =	3.33 sf
P_W = Wetted Perimeter =	11.09 feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.30 feet
n = Manning's roughness coefficient =	0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$$ = 8.98 feet

Q = CiA = 1.19 cfs

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.36 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 107.24 feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA = 1.19 cfs

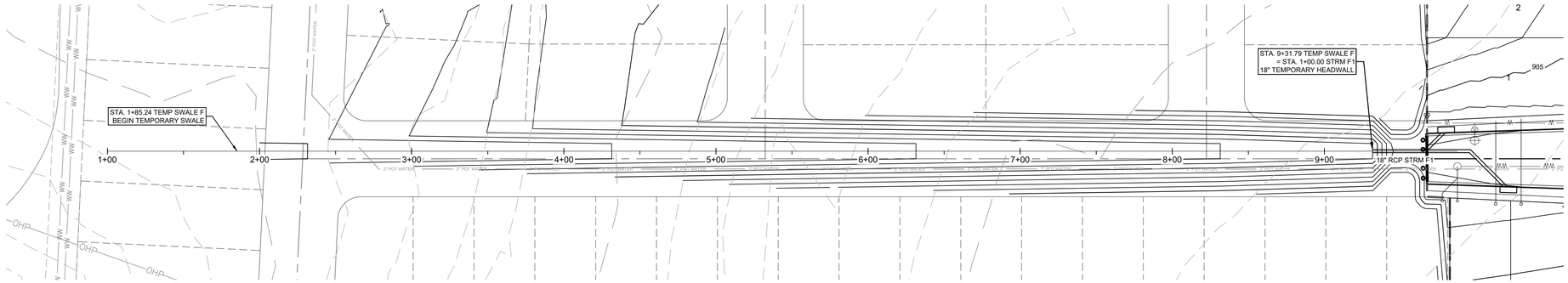
Manning's Equation Q =	1.19 cfs	Error 1 =	0.00
Swale Width=	9.64 ft		

Instructions are provided to the right (green comments).

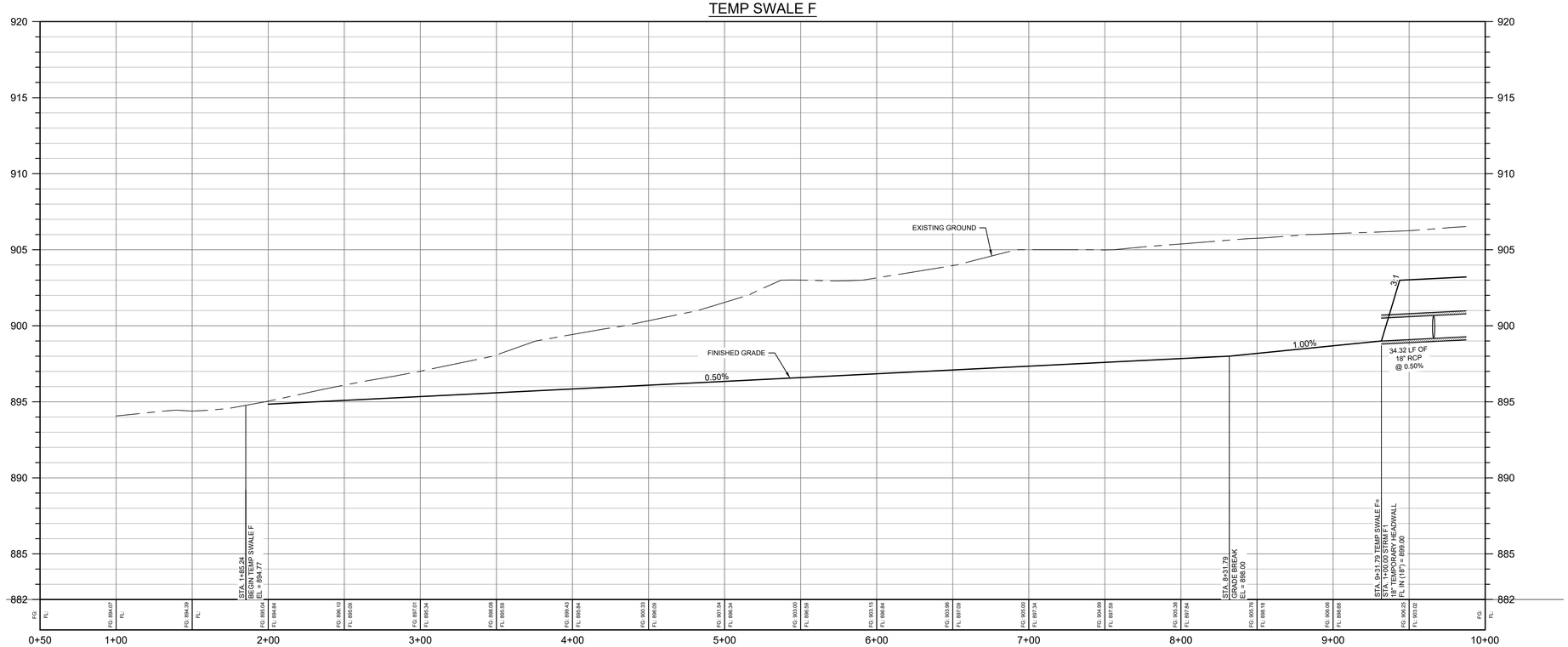
Flow Velocity	0.36 ft/s
Minimum Length =	107.24 ft

Instructions are provided to the right (blue comments).

Design Width =	10 ft		
Design Discharge =	1.19 cfs	Error 2 =	0.00
Design Depth =	0.33 ft		
Flow Velocity =	0.33 cfs		
Minimum Length =	99.57 ft		



TEMP SWALE F



SCALE: 1" = 40'
GRAPHIC SCALE IN FEET
0 20' 40' 80'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- WATER SURFACE ELEVATION

PROFILE LEGEND

- PROPERTY GRADE LINE
- PROPOSED SUBGRADE
- EXISTING GROUND

NOTES:
1. POND CALCULATIONS AND SIZING ARE BASED ON THE FULL BUILD OUT OF THE SUBDIVISION.

GRASSY SWALE NOTES (TCEQ RG348):

1. SWALE SHOULD HAVE A LENGTH THAT PROVIDES A MINIMUM HYDRAULIC RESIDENCE TIME OF AT LEAST 5 MINUTES.
2. MAXIMUM BOTTOM WIDTH IS 10 FEET UNLESS A DIVIDING BERM IS PROVIDED AND SHOULD NOT EXCEED 16 FEET.
3. THE DEPTH OF FLOW SHOULD NOT EXCEED 4 INCHES DURING A 1.1 INCH/HOUR STORM.
4. THE CHANNEL SLOPE SHOULD BE AT LEAST 0.5% AND NO GREATER THAN 2.5%.
5. THE SIDE SLOPES SHOULD BE NO STEEPER THAN 3:1 (H:V).
6. SWALES MUST HAVE AT LEAST 80 PERCENT VEGETATED COVER IN ORDER TO PROVIDE ADEQUATE TREATMENT OF RUNOFF.
7. SWALES SHOULD BE VEGETATED WITH FINE, CLOSE-GROWING, WATER-RESISTANT GRASSES.
8. SWALE SHOULD NOT RECEIVE CONSTRUCTION-STAGE RUNOFF.

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TBPELS FIRM #2946
GRAY ENGINEERING

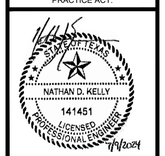
NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

GRASSY SWALE F

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.



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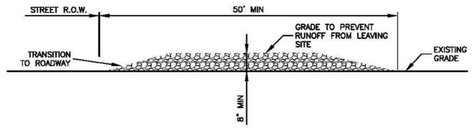
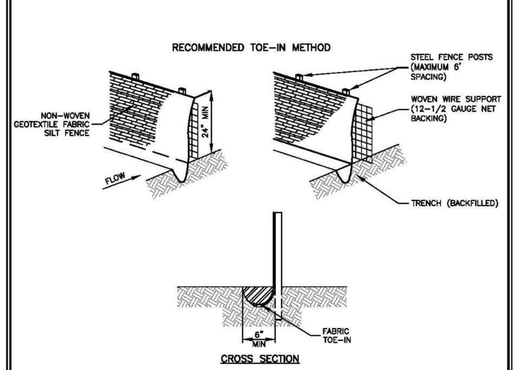


CROSS SECTION

NOTES:

1. STONE SIZE SHALL BE 3" – 8" OPEN GRADED ROCK.
2. THICKNESS OF CRUSHED STONE PAD TO BE NOT LESS THAN 8".
3. LENGTH SHALL BE A MINIMUM OF 50' FROM ACTUAL ROADWAY, AND WIDTH NOT LESS THAN FULL WIDTH OF INGRESS/EGRESS.
4. ENTRANCE SHALL BE PROPERLY GRADED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.
5. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY BY CONTRACTOR.
6. AS NECESSARY, WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO:
APPROVED 03-25-11 DATE	STABILIZED CONSTRUCTION ENTRANCE DETAIL	EC-09
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)		ROUND ROCK, TEXAS HOME RULE MUNICIPALITY

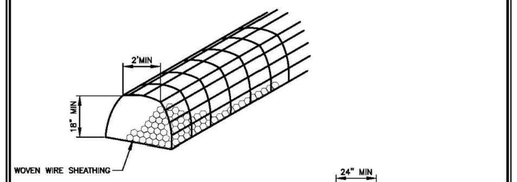


CROSS SECTION

NOTES:

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MIN. OF ONE (1') FOOT.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G. PAVEMENT) WEIGHT FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
3. THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS SECURELY FASTENED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES. THE SILT SHALL BE DISPOSED OF IN AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. SILT FENCE SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO:
APPROVED 03-25-11 DATE	SILT FENCE DETAIL	EC–10
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)		ROUND ROCK, TEXAS HOME RULE MUNICIPALITY



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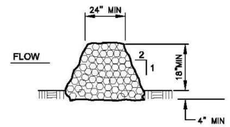
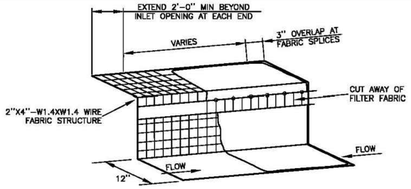


CROSS SECTION

NOTES:

1. USE ONLY OPEN GRADED ROCK (3 to 5") DIAMETER FOR ALL CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM 1" OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.
3. THE ROCK BERM SHALL BE INSPECTED DAILY OR AFTER EACH RAIN, AND THE STONE AND/ OR FABRIC CORE–WOVEN SHEATHING SHALL BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED, DUE TO SEDIMENT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. IF SEDIMENT REACHES A DEPTH OF 6", THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF ON AN APPROVED SITE AND IN A MANNER THAT WILL NOT CREATE A SEDIMENTATION PROBLEM.
5. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO:
APPROVED 03-25-11 DATE	ROCK BERM DETAIL	EC–12
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)		ROUND ROCK, TEXAS HOME RULE MUNICIPALITY



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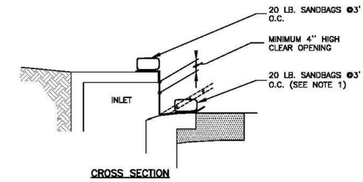
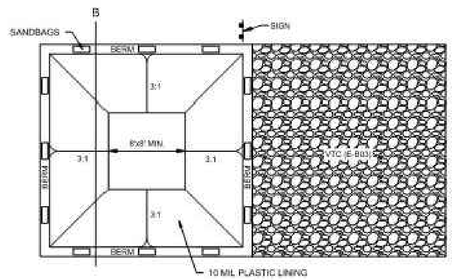


CROSS SECTION

NOTES:

1. WHERE MINIMUM CLEARANCES CAUSE TRAFFIC TO DRIVE IN THE GUTTER, THE CONTRACTOR MAY SUBSTITUTE A 1" X 4" BOARD SECURED WITH CONCRETE NAILS 3' O.C. NAILED INTO THE GUTTER IN LIEU OF SANDBAGS TO HOLD THE FILTER DIKE IN PLACE. UPON REMOVAL, CLEAN ANY DIRT/DEBRIS FROM NAILING LOCATIONS, APPLY CHEMICAL SANDING AGENT AND APPLY NON–SHRINK GROUT FLUSH WITH SURFACE OF GUTTER.
2. A SECTION OF FILTER FABRIC SHALL BE REMOVED AS SHOWN ON THIS DETAIL OR AS DIRECTED BY THE ENGINEER OR DESIGNATED REPRESENTATIVE. FABRIC MUST BE SECURED TO WIRE BACKING WITH CLIPS OR HOG RINGS AT THIS LOCATION.
3. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTH REACHES 2".
4. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND IMMEDIATELY REMOVE THE INLET PROTECTIONS IF THE STORM–WATER BEGINS TO OVERTOP THE CURB.
5. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO:
APPROVED 03-25-11 DATE	CURB INLET PROTECTION DETAIL	EC–14
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)		ROUND ROCK, TEXAS HOME RULE MUNICIPALITY



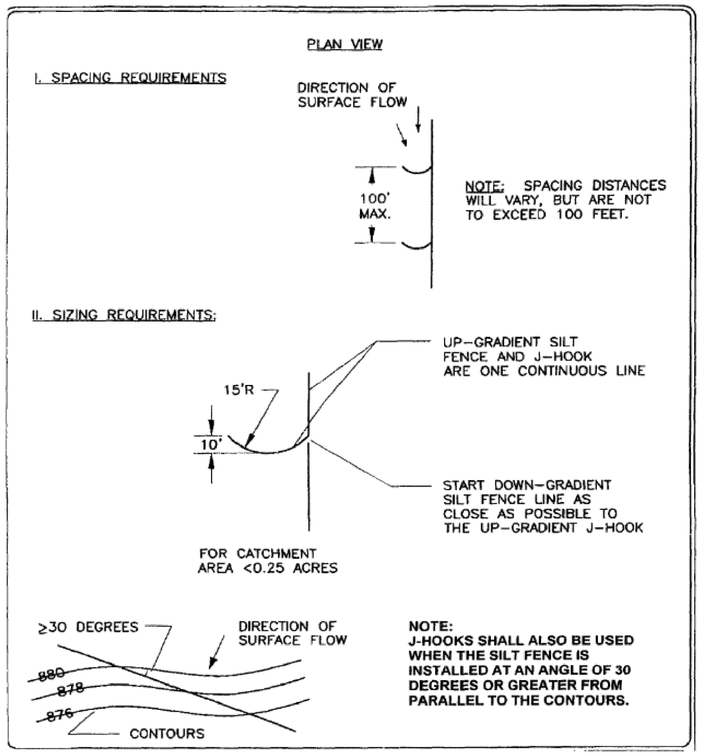
CONCRETE WASHOUT AREA INSTALLATION NOTES

1. CONTRACTOR SHALL SELECT A SUITABLE LOCATION FOR CONCRETE WASHOUT AREA(S). (TO BE PLACED A MINIMUM OF 100' FROM DRAINAGEWAYS, BODIES OF WATER, AND INLETS.)
2. LOCATION FOR CONCRETE WASHOUT SHALL BE ADDED TO APPROVED SWPPP KEPT ON SITE.
3. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON SITE.
4. VEHICLE TRACKING CONTROL (DETAIL E-603) IS REQUIRED AT THE ACCESS POINT.
5. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE WASHOUT AREA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT AREA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
6. EXCAVATED MATERIAL SHALL BE UTILIZED IN PERIMETER BERM CONSTRUCTION.

CONCRETE WASHOUT AREA MAINTENANCE NOTES

1. THE CONCRETE WASHOUT AREA SHALL BE REPAIRED AND ENLARGED OR CLEANED OUT AS NECESSARY TO MAINTAIN CAPACITY FOR WASTED CONCRETE.
2. AT THE END OF CONSTRUCTION, ALL CONCRETE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE SITE.
3. WHEN THE CONCRETE WASHOUT AREA IS REMOVED, THE DISTURBED AREA SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.
4. INSPECT WEEKLY, DURING AND AFTER ANY STORM EVENT.
5. IMMEDIATELY REPAIR/REPLACE PLASTIC LINING IN THE EVENT OF TEARS, HOLES, OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY.

CONCRETE WASHOUT AREA



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FAX(512)454-9933
TBPELS FIRM #2946
GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

EROSION DETAILS

PROJECT NO: 1636-11802

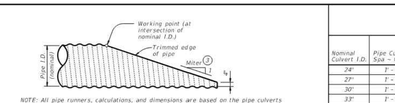
DESIGNED BY: NK

DRAWN BY: DPG/BE

CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

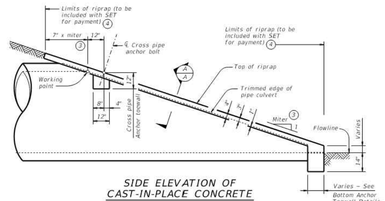
H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\SHEETS\11802-C-DET.DWG DATE: 7/9/2024 4:48:21 PM BY: NKELLY



NOTE: All pipe runners, 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.

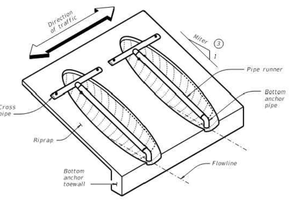
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details of reinforced concrete pipe (RCP) culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS 1 2

Nominal Culvert I.D.	Pipe Culvert Slope ~ G	Cross Pipe Length	Pipe Runner Length													
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope					
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew		
24"	7' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	N/A	8' - 1"	N/A	N/A	N/A	12' - 9"		
27"	1' - 8"	3' - 8"	N/A	N/A	5' - 5"	6' - 11"	N/A	N/A	7' - 7"	9' - 7"	N/A	N/A	11' - 11"	14' - 11"		
30"	1' - 10"	3' - 11"	N/A	N/A	6' - 4"	8' - 0"	N/A	N/A	8' - 9"	11' - 0"	N/A	N/A	13' - 8"	17' - 0"		
33"	1' - 11"	4' - 2"	6' - 2"	6' - 5"	7' - 3"	9' - 1"	8' - 6"	8' - 10"	10' - 0"	12' - 5"	13' - 3"	13' - 9"	15' - 5"	19' - 2"		
36"	2' - 1"	4' - 5"	6' - 11"	7' - 3"	8' - 2"	10' - 2"	9' - 6"	9' - 11"	11' - 2"	13' - 10"	14' - 9"	15' - 3"	17' - 2"	21' - 3"		
42"	2' - 4"	4' - 11"	8' - 6"	8' - 10"	9' - 11"	12' - 4"	11' - 7"	12' - 0"	13' - 6"	16' - 8"	17' - 9"	18' - 5"	20' - 8"	25' - 7"		
48"	2' - 7"	5' - 5"	10' - 1"	10' - 5"	11' - 9"	N/A	13' - 7"	14' - 2"	15' - 10"	N/A	20' - 9"	21' - 6"	24' - 2"	N/A		
54"	3' - 0"	5' - 11"	11' - 8"	12' - 1"	N/A	N/A	15' - 8"	16' - 3"	N/A	N/A	23' - 10"	24' - 8"	N/A	N/A		
60"	3' - 3"	6' - 5"	13' - 3"	N/A	N/A	N/A	17' - 9"	N/A	N/A	N/A	26' - 10"	N/A	N/A	N/A		

TYPICAL PIPE CULVERT MITERS 3

Slope	Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	33%	3.106:1	3.464:1	4.243:1	5.657:1
4:1	25%	4.141:1	4.619:1	5.657:1	7.542:1
6:1	16.7%	6.212:1	6.928:1	8.485:1	11.313:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED 2

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS 1

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' -0"
4" STD	4.500"	4.026"	19' -8"
5" STD	5.563"	5.047"	34' -2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

3) Miter = slope of mitered end of pipe culvert.

4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

5) 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.

SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: CD-SETP-CD-20.dgn	DN: GAF	CK: CAE	DW: JBP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

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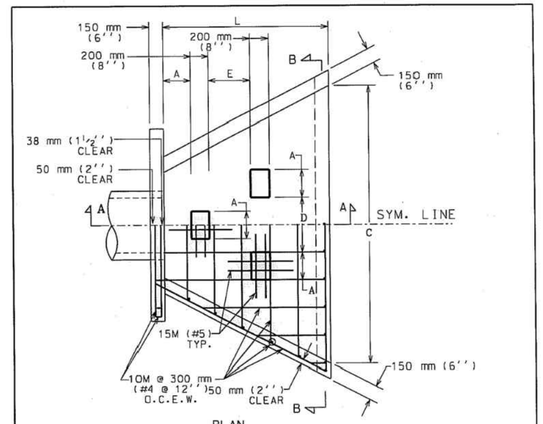
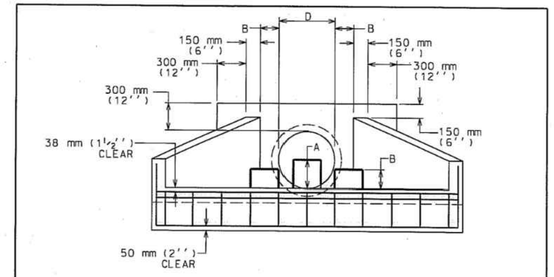
DATE: FILE:



CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW	STANDARD HEADWALL AND ENERGY DISSIPATORS	
Bill Gardner 8/20/07 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S-13 1 OF 2



SECTION B-B

NOTES:

1. ALL CONCRETE SHALL BE TYPE "C" AS PER SPEC. 403S. CONCRETE FOR STURCTURES.
2. CHAMFER ALL EXTERNAL VISIBLE CORNERS.
3. DISSIPATOR BLOCKS REQUIRED ON DISCHARGE HEADWALLS ONLY.

D	457 mm (18'')	533 mm (21'')	610 mm (24'')	685 mm (27'')	765 mm (30'')	838 mm (33'')	914 mm (36'')	1.067 m (42'')	.219 m (48'')	.372 m (54'')	.524 m (60'')	
A	225 mm (9'')	250 mm (10'')	300 mm (12'')	350 mm (14'')	375 mm (15'')	400 mm (16'')	450 mm (18'')	525 mm (21'')	600 mm (24'')	675 mm (27'')	750 mm (30'')	
B	150 mm (6'')	175 mm (7'')	200 mm (8'')	225 mm (9'')	250 mm (10'')	275 mm (11'')	300 mm (12'')	350 mm (14'')	400 mm (16'')	450 mm (18'')	500 mm (20'')	
C	2.29 m (90'')	2.67 m (105'')	3.05 m (120'')	343 m (135'')	3.81 m (150'')	4.19 m (165'')	4.57 m (180'')	5.33 m (210'')	6.10 m (240'')	6.86 m (270'')	7.62 m (300'')	
L	1.37 m (54'')	1.60 m (63'')	1.83 m (72'')	2.06 m (81'')	2.29 m (90'')	2.51 m (99'')	2.74 m (108'')	3.20 m (126'')	3.66 m (144'')	4.11 m (162'')	4.57 m (180'')	
E	300 mm (12'')	350 mm (14'')	400 mm (16'')	450 mm (18'')	500 mm (20'')	550 mm (22'')	600 mm (24'')	700 mm (28'')	800m (32'')	900 mm (36'')	1000 mm (40'')	

DIMENSIONS IN MILLIMETERS, METERS AND (INCHES).

DISCHARGE VELOCITIES GREATER THAN 3 METERS/SECOND (10 fps) REQUIRE ROCK OUTLET PROTECTION.

CITY OF AUSTIN DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW	STANDARD HEADWALL AND ENERGY DISSIPATORS	
Bill Gardner 8/20/07 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 508S-13 2 OF 2

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TBPELS FIRM #2946
GRAY ENGINEERING

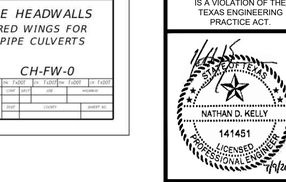
NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

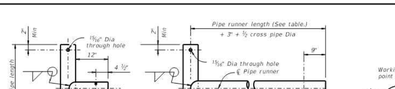
DRAINAGE DETAILS
(SHEET 1 OF 3)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

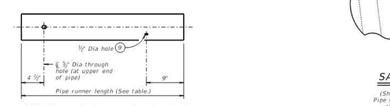


SHEET 54 OF 61



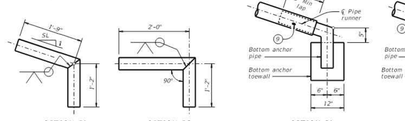
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



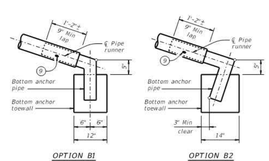
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS



OPTION B1 OPTION B2

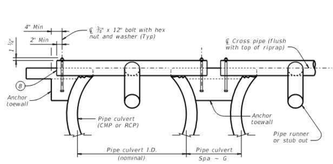
BOTTOM ANCHOR PIPE DETAILS 10



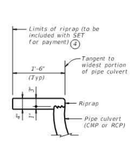
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL

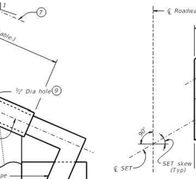


SHOWING TYPICAL PIPE CULVERT AND RIPRAP

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 toewalls and anchor pipe.
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5L/X52.
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:
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross Drainage Culverts," 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 pipe runners.
Payment for riprap and toewall is included in the price bid for each safety end treatment.
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

SECTION A-A



PLAN OF SKEWED INSTALLATION

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: CD-SETP-CD-20.dgn	DN: GAF	CK: CAE	DW: JBP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

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 translation of this standard or for incorrect results or damages resulting from its use.

DATE: FILE:

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL 5

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Add'l Pipe	
		W	X	Y	L	Reinf (Lbs)	Conc (C.Y.) 7	X and W	Reinf (Lbs)	Conc (C.Y.) 7
3:1	12"	4' - 7 ½"	2' - 6"	2' - 10"	3' - 3 ¼"	88	0.6	1' - 9"	20	0.2
	15"	5' - 5 ½"	2' - 9 ½"	3' - 4"	3' - 10 ½"	103	0.7	2' - 2"	24	0.3
	18"	6' - 4 ½"	3' - 1"	3' - 10"	4' - 5"	124	0.9	2' - 8"	32	0.3
	21"	7' - 2 ½"	3' - 4 ½"	4' - 4"	5' - 0"	143	1.1	3' - 1"	43	0.4
	24"	8' - 2 ½"	3' - 9 ½"	4' - 10"	5' - 7"	164	1.3	3' - 7"	50	0.5
	27"	9' - 1"	4' - 1"	5' - 4"	6' - 2"	179	1.5	3' - 11"	56	0.6
	30"	9' - 11 ½"	4' - 4 ½"	5' - 10"	6' - 8 ½"	203	1.7	4' - 4"	65	0.8
	33"	10' - 10"	4' - 8"	6' - 4"	7' - 3 ½"	224	2.0	4' - 8"	71	0.9
	36"	11' - 8 ½"	4' - 11 ½"	6' - 10"	7' - 10 ½"	249	2.2	5' - 1"	81	1.0
	42"	13' - 5 ½"	5' - 6 ½"	7' - 10"	9' - 0 ½"	298	2.8	5' - 10"	97	1.3
	48"	15' - 9"	6' - 1 ½"	9' - 4"	10' - 9 ¼"	360	3.8	6' - 7"	117	1.7
	54"	17' - 5 ½"	6' - 8 ½"	10' - 4"	11' - 11 ½"	427	4.5	7' - 6"	151	2.1
	60"	19' - 2 ½"	7' - 3 ½"	11' - 4"	13' - 1"	481	5.3	8' - 3"	174	2.5
	66"	20' - 11 ½"	7' - 10 ½"	12' - 4"	14' - 3"	544	6.2	8' - 9"	194	2.9
	72"	22' - 8 ½"	8' - 5 ½"	13' - 4"	15' - 4 ½"	601	7.1	9' - 4"	213	3.3
2:1	12"	6' - 3"	2' - 6"	4' - 3"	4' - 11"	118	0.8	1' - 9"	22	0.2
	15"	7' - 5"	2' - 9 ½"	5' - 0"	5' - 9 ½"	137	1.1	2' - 2"	28	0.3
	18"	8' - 6 ½"	3' - 1"	5' - 9"	6' - 7 ½"	170	1.3	2' - 8"	37	0.5
	21"	9' - 8 ½"	3' - 4 ½"	6' - 6"	7' - 6"	195	1.6	3' - 1"	48	0.6
	24"	11' - 0"	3' - 9 ½"	7' - 3"	8' - 4 ½"	227	2.0	3' - 7"	58	0.7
	27"	12' - 2"	4' - 1"	8' - 0"	9' - 2 ½"	251	2.3	3' - 11"	67	0.8
	30"	13' - 4"	4' - 4 ½"	8' - 9"	10' - 1 ½"	293	2.7	4' - 4"	77	1.0
	33"	14' - 5 ½"	4' - 8"	9' - 6"	10' - 11 ½"	318	3.1	4' - 8"	84	1.2
	36"	15' - 7 ½"	4' - 11 ½"	10' - 3"	11' - 10"	351	3.5	5' - 1"	96	1.4
	42"	17' - 11 ½"	5' - 6 ½"	11' - 9"	13' - 6 ½"	432	4.5	5' - 10"	119	1.7
	48"	21' - 1 ½"	6' - 1 ½"	14' - 0"	16' - 2"	537	6.1	6' - 7"	146	2.3
	54"	23' - 5 ½"	6' - 8 ½"	15' - 6"	17' - 10 ½"	630	7.3	7' - 6"	186	2.9
	60"	25' - 9 ½"	7' - 3 ½"	17' - 0"	19' - 7 ½"	719	8.7	8' - 3"	219	3.4
	66"	28' - 1"	7' - 10 ½"	18' - 6"	21' - 4 ½"	811	10.1	8' - 9"	242	3.9
	72"	30' - 4 ½"	8' - 5 ½"	20' - 0"	23' - 1 ½"	924	11.7	9' - 4"	272	4.4
4:1	12"	7' - 10 ¾"	2' - 6"	5' - 8"	6' - 6 ½"	148	1.1	1' - 9"	24	0.3
	15"	9' - 4"	2' - 9 ½"	6' - 8"	7' - 8 ½"	181	1.5	2' - 2"	32	0.4
	18"	10' - 9 ½"	3' - 1"	7' - 8"	8' - 10 ½"	221	1.9	2' - 8"	42	0.5
	21"	12' - 2 ½"	3' - 4 ½"	8' - 8"	10' - 0"	260	2.3	3' - 1"	57	0.7
	24"	13' - 9 ½"	3' - 9 ½"	9' - 8"	11' - 2"	301	2.8	3' - 7"	67	0.9
	27"	15' - 3"	4' - 1"	10' - 8"	12' - 3 ½"	334	3.3	3' - 11"	77	1.0
	30"	16' - 8 ½"	4' - 4 ½"	11' - 8"	13' - 5 ½"	385	3.8	4' - 4"	89	1.3
	33"	18' - 1 ½"	4' - 8"	12' - 8"	14' - 7 ½"	425	4.5	4' - 8"	101	1.4
	36"	19' - 7"	4' - 11 ½"	13' - 8"	15' - 9 ¼"	472	5.1	5' - 1"	115	1.7
	42"	22' - 5 ½"	5' - 6 ½"	15' - 8"	18' - 1"	583	6.5	5' - 10"	141	2.1
	48"	26' - 6 ½"	6' - 1 ½"	18' - 8"	21' - 6 ½"	730	8.9	6' - 7"	175	2.8
	54"	29' - 5"	6' - 8 ½"	20' - 8"	23' - 10 ½"	875	10.7	7' - 6"	226	3.6
	60"	32' - 3 ½"	7' - 3 ½"	22' - 8"	26' - 3"	998	12.7	8' - 3"	264	4.3
	66"	35' - 2 ½"	7' - 10 ½"	24' - 8"	28' - 5 ½"	1,140	14.8	8' - 9"	300	4.9
	72"	38' - 1 ½"	8' - 5 ½"	26' - 8"	30' - 9 ½"	1,297	17.3	9' - 4"	334	5.6
6:1	12"	11' - 2"	2' - 6"	8' - 6"	9' - 9 ½"	224	1.9	1' - 9"	28	0.4
	15"	13' - 2 ½"	2' - 9 ½"	10' - 0"	11' - 6 ½"	268	2.5	2' - 2"	37	0.5
	18"	15' - 2 ½"	3' - 1"	11' - 6"	13' - 3 ¼"	330	3.2	2' - 8"	50	0.7
	21"	17' - 2 ½"	3' - 4 ½"	13' - 0"	15' - 0 ¼"	387	3.9	3' - 1"	69	0.9
	24"	19' - 4 ½"	3' - 9 ½"	14' - 6"	16' - 9"	453	4.8	3' - 7"	80	1.2
	27"	21' - 4 ½"	4' - 1"	16' - 0"	18' - 5 ½"	512	5.7	3' - 11"	96	1.4
	30"	23' - 5 ½"	4' - 4 ½"	17' - 6"	20' - 2 ½"	593	6.7	4' - 4"	110	1.7
	33"	25' - 5 ½"	4' - 8"	19' - 0"	21' - 11 ½"	675	7.8	4' - 8"	127	2.0
	36"	27' - 5 ½"	4' - 11 ½"	20' - 6"	23' - 8"	735	9.0	5' - 1"	144	2.3
	42"	31' - 6 ½"	5' - 6 ½"	23' - 6"	27' - 1 ½"	922	11.5	5' - 10"	179	3.0
	48"	37' - 3 ½"	6' - 1 ½"	28' - 0"	32' - 4"	1,161	15.9	6' - 7"	231	4.0
	54"	41' - 4 ½"	6' - 8 ½"	31' - 0"	35' - 9 ½"	1,424	19.2	7' - 6"	300	5.0
	60"	45' - 4 ½"	7' - 3 ½"	34' - 0"	39' - 3"	1,631	22.9	8' - 3"	353	6.0

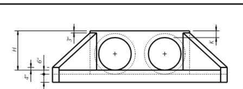
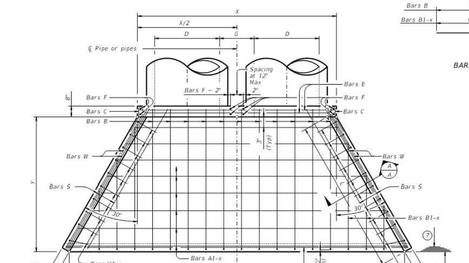


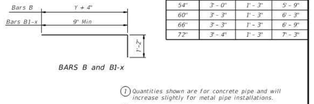
TABLE OF 9 REINFORCING STEEL

Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 0"	~
C	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' - 0"	~
W	#3	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K 6	H
12"	0' - 9"	1' - 0"	2' - 0"
15"	0' - 11"	1' - 0"	2' - 3"
18"	1' - 3"	1' - 0"	2' - 6"
21"	1' - 4"	1' - 0"	2' - 9"
24"	1' - 7"	1' - 0"	3' - 0"
27"	1' - 8"	1' - 0"	3' - 3"
30"	1' - 10"	1' - 0"	3' - 6"
33"	1' - 11"	1' - 0"	3' - 9"
36"	2' - 1"	1' - 0"	4' - 0"
42"	2' - 4"	1' - 0"	4' - 6"
48"	2' - 7"	1' - 3"	5' - 3"
54"	3' - 0"	1' - 3"	5' - 9"
60"	3' - 3"	1' - 3"	6' - 3"
66"	3' - 3"	1' - 3"	6' - 9"
72"	3' - 4"	1' - 3"	7' - 3"





1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3) Provide a 3'-0" footing as shown where required to maintain 4" minimum cover for pipes.

4) Dimensions shown are usual and maximum.

5) Quantities shown are for one structure end only (one headwall).

6) Min Length = $6' + 2' \times \left(\frac{12" \times H - 7}{12" \times 1}\right)$

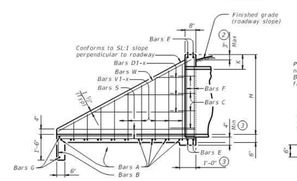
Max Length = $12' \times H - 3' \times \left(\sqrt{\frac{12" \times H - 7}{12" \times 1}}\right) - 1"$

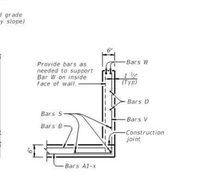
7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



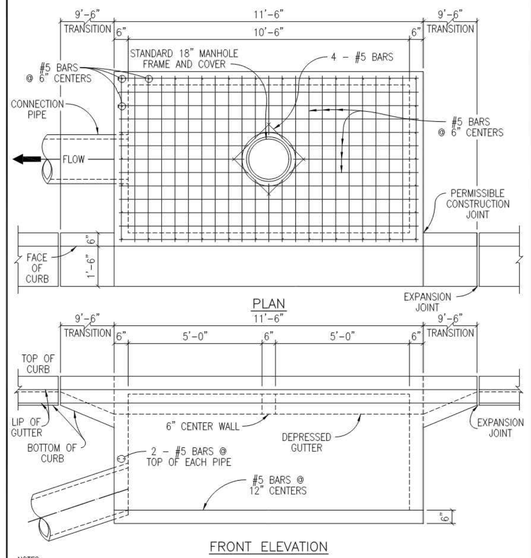


Texas Department of Transportation | Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

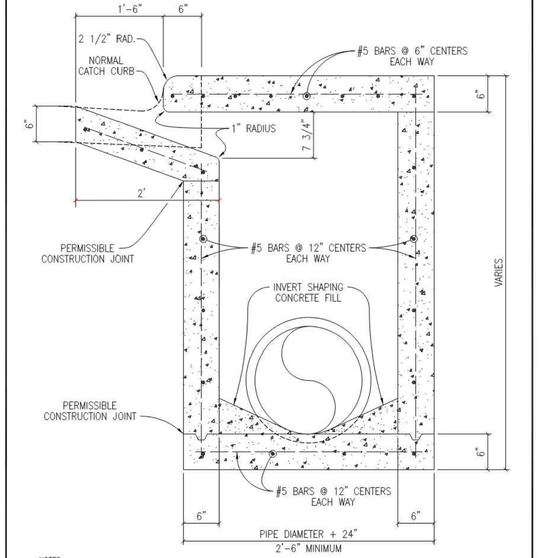
FILE: CD-CH-FW0-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.



NOTES:
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS CURB INLET DETAIL	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: SD09 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB

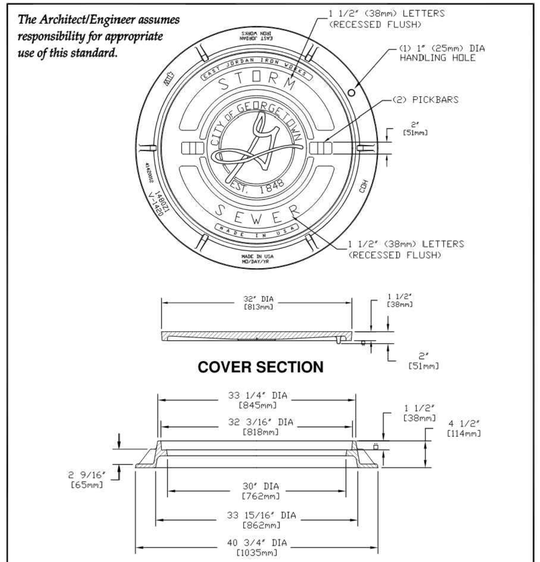


NOTES:
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS CURB DRAIN INLET TYPICAL SECTION	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: SD10 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB

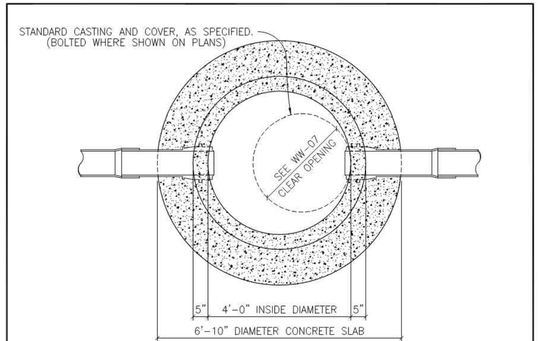
The Architect/Engineer assumes responsibility for appropriate use of this standard.



NOTES:
1. STANDARD STORM SEWER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480A V-1420\1480Z1, COVER TO BE STAMPED WITH "STORM SEWER".
2. STANDARD STORM SEWER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 41420012 00148391.
4. FOR BOLTED STORM SEWER MANHOLE SET REFER TO DETAIL SD11A.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS STANDARD STORM SEWER MANHOLE SET	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: SD11 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



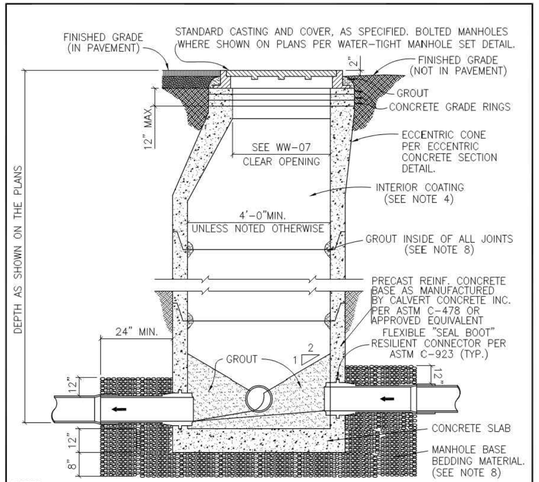
CITY OF GEORGETOWN NOTES:

MANHOLE DETAILS SHALL REFLECT THE CITY'S MINIMUM SPECIFICATIONS, AS STATED BELOW:

A. ALL MANHOLES SHALL BE 48" I.D., R.C.P., CLASS III, WITH RUBBER O-RING GASKET JOINTS CONFORMING TO ASTM C478, C433 AND C76.
B. ALL MANHOLES SHALL HAVE FRAME AND COVER, AS MANUFACTURED BY EAST JORDAN IRON WORKS (AS PER DETAIL # WW-07) OR APPROVED EQUIVALENT.
C. ALL MANHOLES SHALL BE CONCRETE WITH CAST IRON FRAME AND COVER.
D. ALL MANHOLES SHALL HAVE AN ECCENTRIC CONE.
E. MANHOLES MAY HAVE A FLAT LID, IF APPROVED BY CITY OF GEORGETOWN, BEING 12" THICK WITH A MINIMUM 30" OPENING, AS MANUFACTURED BY CALVERT CONCRETE OR APPROVED EQUAL M.F.G. CONFORMING TO ASTM C478, 5000 P.S.I. CONCRETE, TRAFFIC BEARING, AND O-RING JOINT CONFORMING TO ASTM C443.
F. INVERTS AND FLEXIBLE SEAL BOOTS, PER ASTM C-923, SHALL BE CAST INTO BASE SECTION.
G. MINIMUM DROP BETWEEN INVERTS SHALL BE ONE-TENTH OF A FOOT (0.1').
H. GRADE RINGS WITH AN I.D. TO MATCH FRAMES CLEAR OPENING WITH A MAXIMUM OF FIVE (5) GRADE RINGS ARE ALLOWED.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS STANDARD STORM SEWER MANHOLE PLAN	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: SD12 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



NOTES:
1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET – SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
4. AN 80 MIL COAT OF RAVEN LINING SYSTEMS, RAVEN 405 ULTRA HIGH BUILD EPOXY COATING, OR SPRAY WALL EPOXY COATING, OR APPROVED EQUAL, TO BE APPLIED TO ENTIRE INTERIOR OF EACH STORM SEWER MANHOLE AND UNDERSIDE OF FLAT TOPS.
5. ALL MANHOLE COVERS SHALL BE BOLTED AND GASKETTED WHEN MANHOLES ARE LOCATED OUT FROM PAVEMENT.
6. MANHOLES TO BE VENTED ARE IDENTIFIED ON MANHOLE SCHEDULE. REFERENCE MANHOLE VENT DETAIL.
7. MANHOLES ARE TO BE DESIGNED TO RESIST LATERAL AND VERTICAL SOIL FORCES RESULTING FROM MANHOLE DEPTH. ADDITIONALLY, MANHOLES LOCATED IN PAVEMENT TO BE DESIGNED FOR HS-20 TRAFFIC LOADS.
8. GROUT SHALL MEET THE REQUIREMENTS AS STATED BY THE COATING MANUFACTURER.
8. MANHOLE BASE BEDDING MATERIAL SPECS. FOR 3/4" WASHED GRAVEL:
SIEVE SIZE 2", PERCENT (%) RETAINED 0
SIEVE SIZE 1 1/2", % RETAINED 0-10
SIEVE SIZE 1", % RETAINED 45-80
SIEVE SIZE 3/4", % RETAINED 85-100
SIEVE SIZE 3/8", % RETAINED 95-100

The Architect/Engineer assumes responsibility for appropriate use of this standard.

	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS STANDARD STORM SEWER MANHOLE – SECTION	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: SD13 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB

8834 N. Capital of Texas Hwy.
Suite 140
Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946
GRAY ENGINEERING

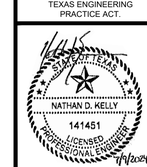
NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

DRAINAGE DETAILS
(SHEET 2 OF 3)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.



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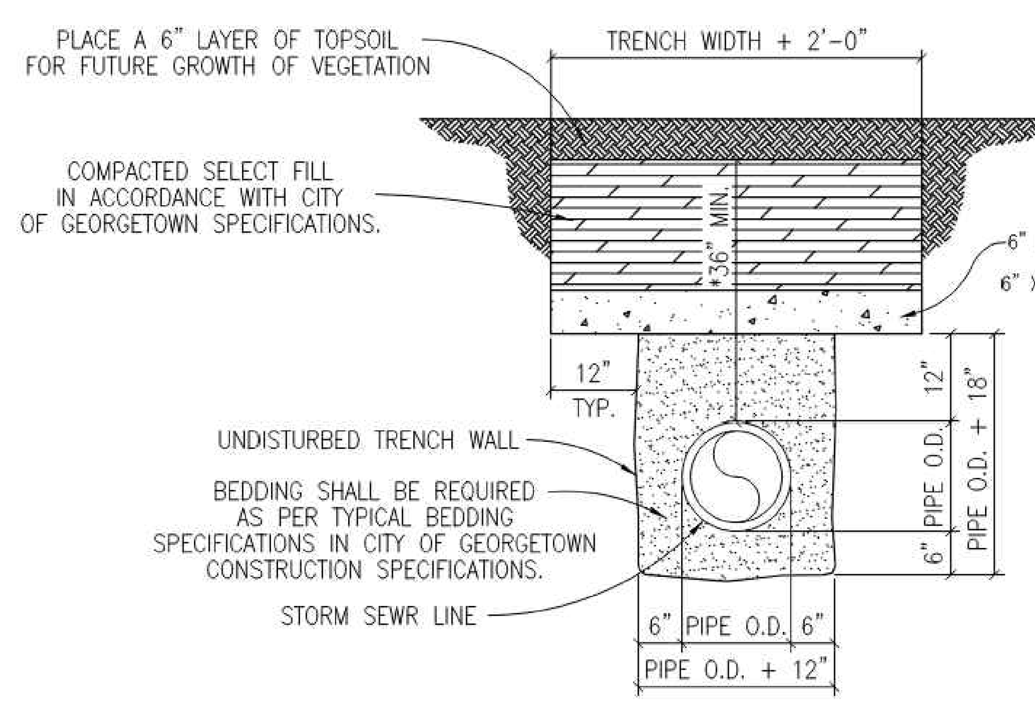
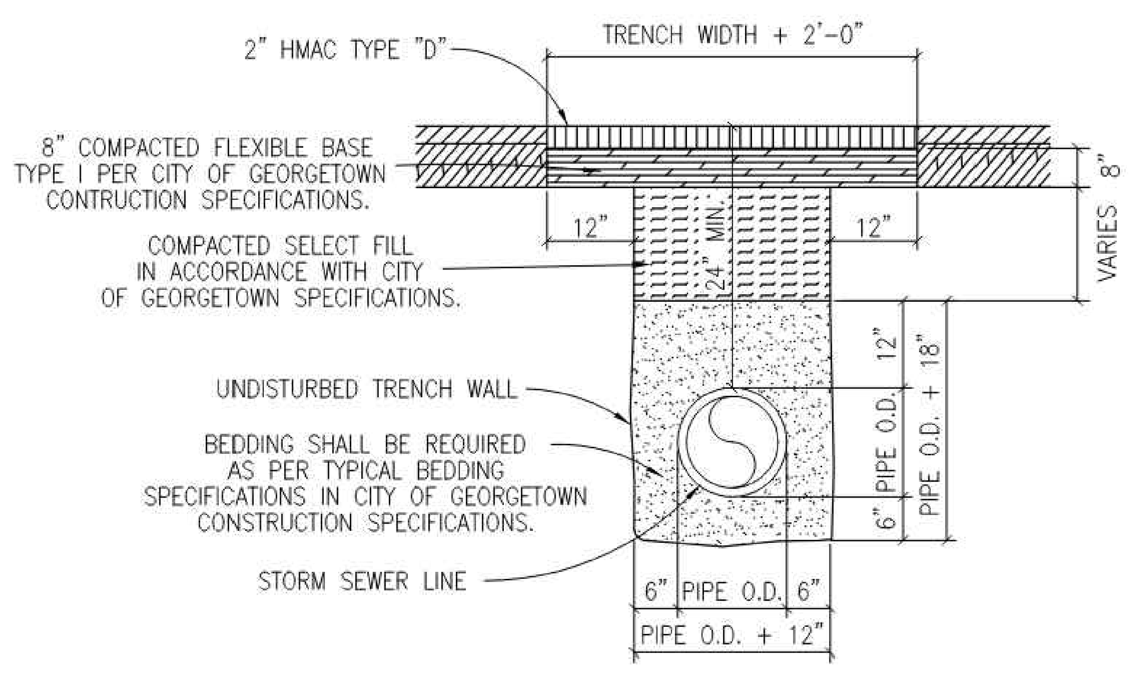


TRENCH WIDTHS
*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
CONCRETE TRANCH CAP DETAIL FOR STORM SEWER
SD39 — NTS — 1/2003 — MRS — TRB



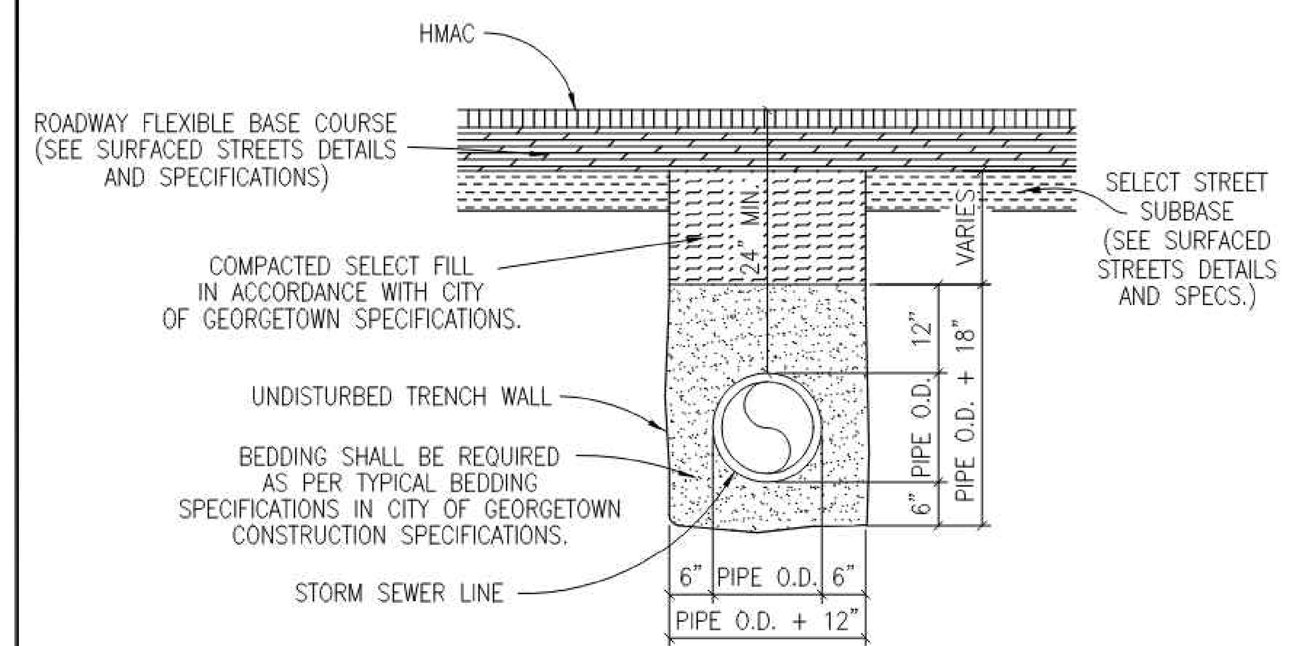
TRENCH WIDTHS
*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

NOTES:
1. REPLACED BASE MATERIAL OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE.
2. BASE MATERIAL SHALL BE IN LIFTS NOT TO EXCEED 6" AND EACH LIFT THOROUGHLY ROLLED OR TAMPED TO SPECIFIED MAXIMUM DENSITY.
3. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
4. SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE.
5. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
6. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

The Architect/Engineer assumes responsibility for appropriate use of this standard.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TRENCH, EMBEDMENT AND PAVEMENT REPLACEMENT DETAIL UNDER EXISTING ROADWAY FOR STORM SEWER
SD40 — NTS — 1/2003 — MRS — TRB



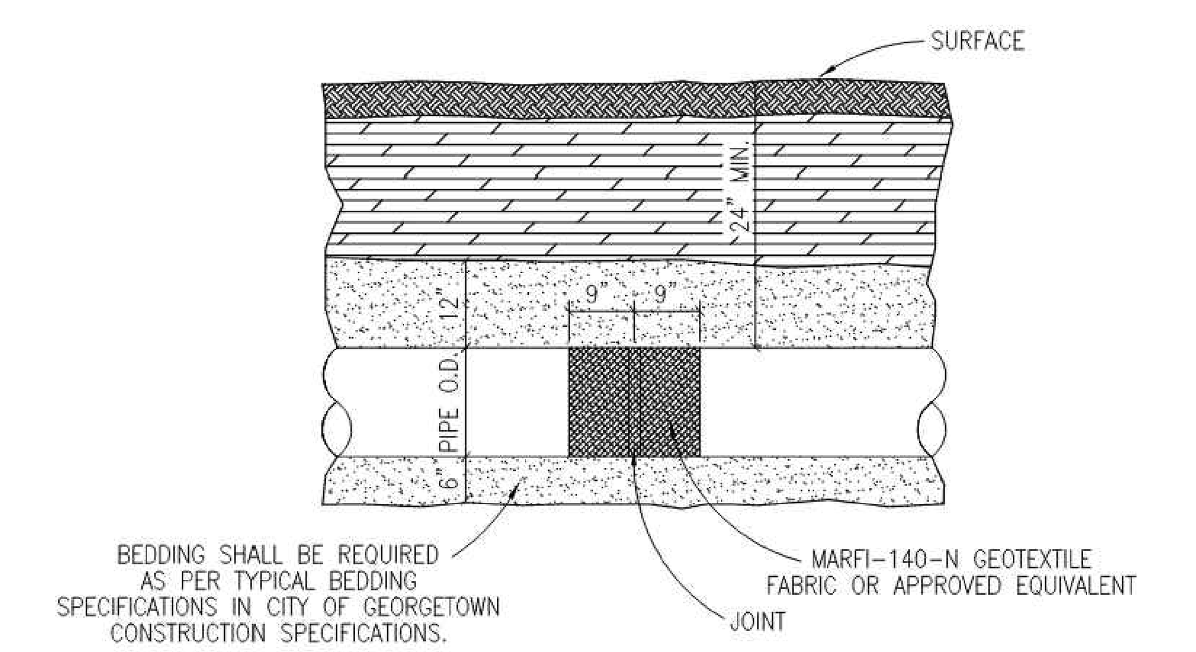
NOTES:
1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

TRENCH WIDTHS
*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY FOR STORM SEWER
SD41 — NTS — 1/2003 — MRS — TRB

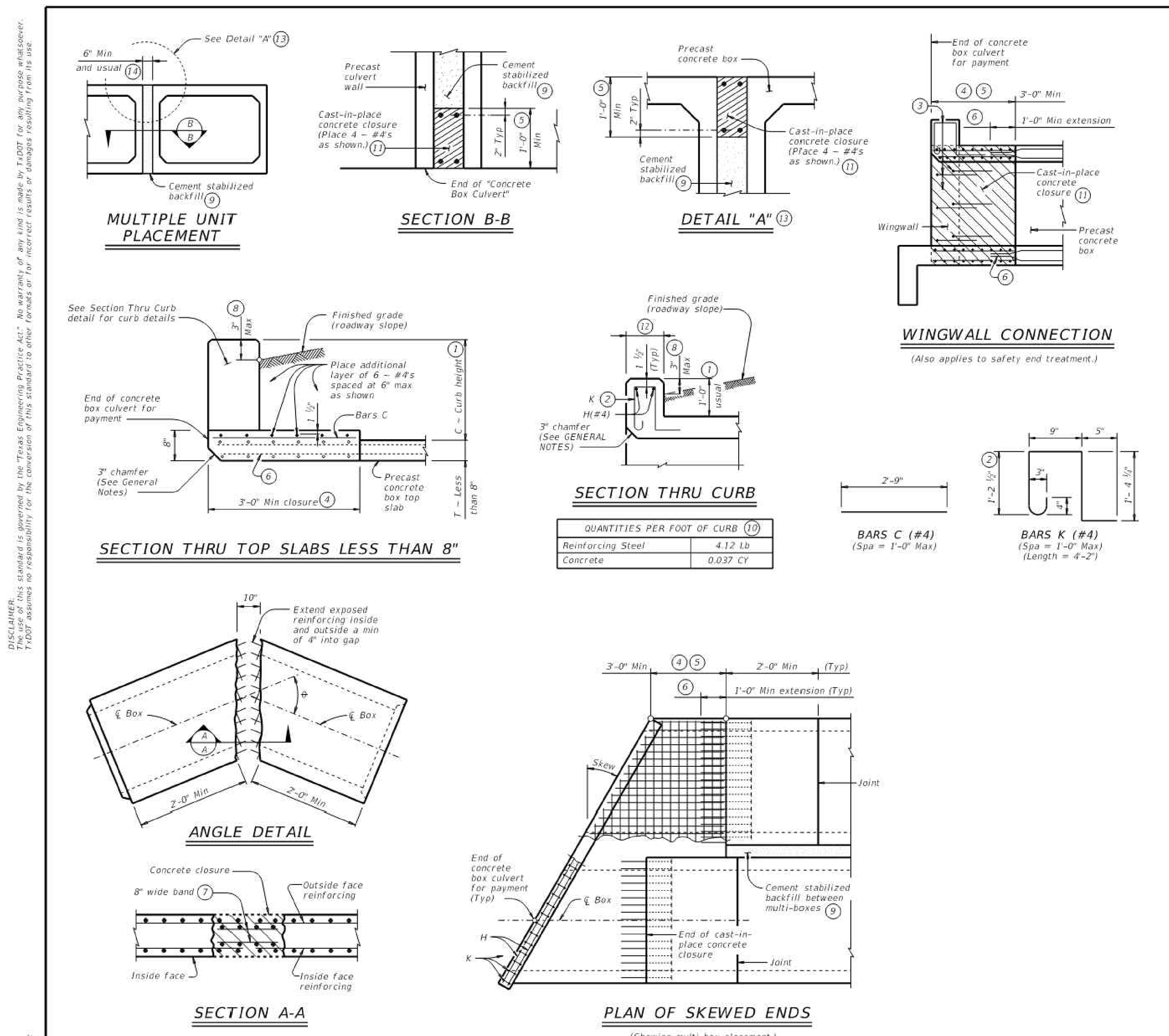


NOTES
1. PIPE SHALL BE REINFORCED CONCRETE PIPE CLASS III UNLESS THE DEPTH OF PIPE REQUIRES A STRONGER CLASS.
2. ALL FITTINGS AND WYES SHALL BE MANUFACTURED AND NOT CONSTRUCTED ON THE PROJECT WITHOUT PRIOR APPROVAL FROM THE CITY.
3. ALL JOINTS SHALL BE WRAPPED WITH MARFI-140-N GEOTEXTILE FABRIC OR APPROVED EQUIVALENT. EACH JOINT SHALL BE WRAPPED WITH 18" WIDE FABRIC CENTERED ON THE JOINT.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL (PROFILE) FOR STORM SEWER
SD42 — NTS — 1/2003 — MRS — TRB



QUANTITIES PER FOOT OF CURB	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(3) Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.

(4) Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.

(5) For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.

(6) Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).

(7) Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) Cement stabilized backfill between boxes is considered part of the box culvert for payment.

(10) All curb concrete and reinforcing is considered part of the box culvert for payment.

(11) Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.

(12) 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

(13) For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".

(14) This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

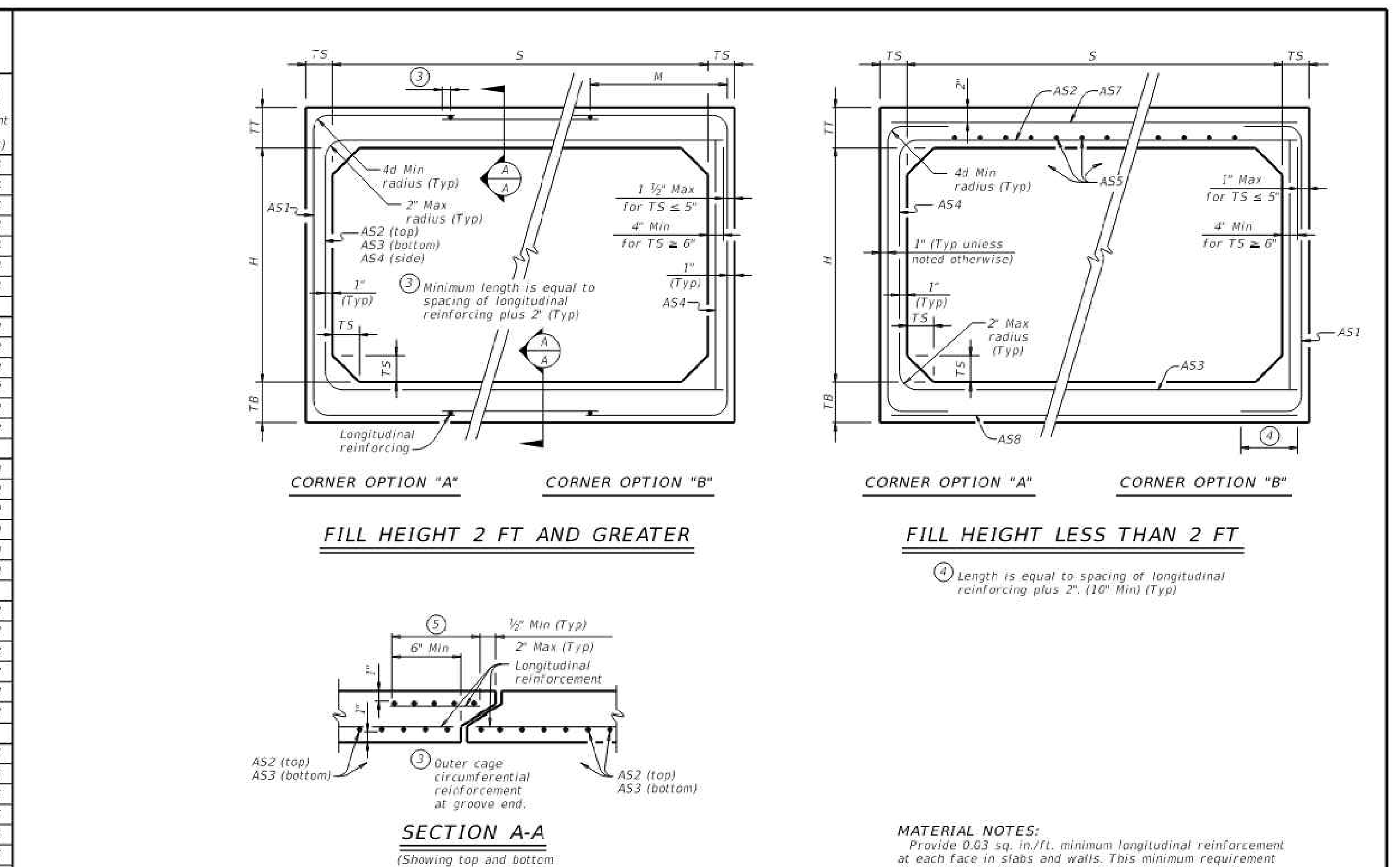
SCP-MD

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.

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
8	3	8	8	8	< 2	-	0.31	0.35	0.25	0.19	0.19	0.19	0.19	10.4
8	3	8	8	8	2 < 3	55	0.35	0.29	0.28	0.19	-	-	-	10.4
8	3	8	8	8	3 - 5	50	0.28	0.23	0.24	0.19	-	-	-	10.4
8	3	8	8	8	10	45	0.29	0.25	0.26	0.19	-	-	-	10.4
8	3	8	8	8	15	45	0.39	0.33	0.34	0.19	-	-	-	10.4
8	3	8	8	8	20	45	0.51	0.43	0.44	0.19	-	-	-	10.4
8	3	8	8	8	25	45	0.63	0.53	0.54	0.19	-	-	-	10.4
8	4	8	8	8	< 2	-	0.27	0.38	0.29	0.19	0.19	0.19	0.19	11.2
8	4	8	8	8	2 < 3	50	0.31	0.34	0.32	0.19	-	-	-	11.2
8	4	8	8	8	3 - 5	50	0.25	0.27	0.27	0.19	-	-	-	11.2
8	4	8	8	8	10	45	0.26	0.28	0.29	0.19	-	-	-	11.2
8	4	8	8	8	15	41	0.34	0.37	0.38	0.19	-	-	-	11.2
8	4	8	8	8	20	41	0.44	0.48	0.49	0.19	-	-	-	11.2
8	5	8	8	8	< 2	-	0.24	0.40	0.32	0.19	0.19	0.19	0.19	12.0
8	5	8	8	8	2 < 3	50	0.28	0.37	0.35	0.19	-	-	-	12.0
8	5	8	8	8	3 - 5	45	0.23	0.29	0.30	0.19	-	-	-	12.0
8	5	8	8	8	10	45	0.23	0.31	0.32	0.19	-	-	-	12.0
8	5	8	8	8	15	41	0.30	0.41	0.42	0.19	-	-	-	12.0
8	5	8	8	8	20	41	0.39	0.52	0.54	0.19	-	-	-	12.0
8	6	8	8	8	< 2	-	0.22	0.42	0.35	0.19	0.19	0.19	0.19	12.8
8	6	8	8	8	2 < 3	50	0.25	0.40	0.38	0.19	-	-	-	12.8
8	6	8	8	8	3 - 5	50	0.21	0.32	0.33	0.19	-	-	-	12.8
8	6	8	8	8	10	45	0.22	0.33	0.34	0.19	-	-	-	12.8
8	6	8	8	8	15	41	0.28	0.43	0.45	0.19	-	-	-	12.8
8	6	8	8	8	20	41	0.36	0.55	0.57	0.19	-	-	-	12.8
8	7	8	8	8	< 2	-	0.20	0.44	0.37	0.19	0.19	0.19	0.19	13.6
8	7	8	8	8	2 < 3	55	0.23	0.43	0.41	0.19	-	-	-	13.6
8	7	8	8	8	3 - 5	55	0.19	0.34	0.35	0.19	-	-	-	13.6
8	7	8	8	8	10	50	0.20	0.34	0.36	0.19	-	-	-	13.6
8	7	8	8	8	15	41	0.26	0.45	0.47	0.19	-	-	-	13.6
8	7	8	8	8	20	41	0.33	0.57	0.60	0.19	-	-	-	13.6
8	8	8	8	8	< 2	-	0.20	0.45	0.40	0.19	0.19	0.19	0.19	14.4
8	8	8	8	8	2 < 3	65	0.21	0.45	0.44	0.19	-	-	-	14.4
8	8	8	8	8	3 - 5	65	0.19	0.36	0.38	0.19	-	-	-	14.4
8	8	8	8	8	10	55	0.19	0.35	0.38	0.19	-	-	-	14.4
8	8	8	8	8	15	45	0.24	0.46	0.49	0.19	-	-	-	14.4
8	8	8	8	8	20	45	0.31	0.59	0.62	0.19	-	-	-	14.4

(1) For box length = 8'-0"
(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)

MATERIAL NOTES:
Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:
Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.
See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.
In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS PRECAST 8'-0" SPAN

SCP-8

GRAY ENGINEERING
8834 N. Capital of Texas Hwy. Suite 140
Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

DRAINAGE DETAILS
(SHEET 3 OF 3)

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

STATE OF TEXAS — NATHAN D. KELLY — 141451 — LICENSED PROFESSIONAL ENGINEER — 7/9/2024

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Attachment N – Inspection, Maintenance, Repair, & Retrofit Plan

Batch Detention Pond

Inspections should occur at least twice a year. If possible, these inspections should be conducted during wet weather to determine if the pond is meeting target detention times. Inspections should check for clogging of the primary outfall mechanism, as well as erosion problems in all flow paths, and any erodible areas inside and downstream of the basin. If any slumping or erosion is discovered, immediate regrading or revegetation should be performed to correct the problems. Structural faults discovered during inspection should be identified and repaired immediately. Faults to check for include cracked concrete, sealing of voids, and removal of vegetation from cracks and joints. All inlet/outlet and riser pipes will eventually deteriorate and require replacement.

The basin, basin side-slopes, and embankment of the basin must be mowed to prevent woody growthy and control weeds. A mulching mower should be used, or the grass clippings should be caught and removed. Mowing should take place at least twice a year, or more frequently if vegetation exceeds 18 inches in height. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas. At the time of mowing, litter and debris should be removed from the surface of the basin. Particular attention should be paid to floatable debris around the outlet structure. The outlet should be checked for possible clogging or obstructions and any debris removed. Additionally, at this time, the facility should be evaluated in terms of nuisance control (insects, weeds, odors, algae, etc.).

With each inspection, any damage to structural elements of the basin (pipes, concrete drainage structures, retaining walls, etc.) should be identified and repaired immediately. An example of this type of repair can include patching of cracked concrete, sealing of voids, removal of vegetation from cracks and joints. The various inlet/outlet structures in a basin will eventually deteriorate and must be replaced.

Sediment shall be removed from the basin at least every 5 years, when sediment depth exceeds 6 inches, when the sediment interferes with the level sensor or when the basin does not drain within 48 hours. Care should be taken not to compromise the basin lining during maintenance.

The Logic Controller should be inspected as part of the twice-yearly investigations. Verify that the external indicators (active, cycle in progress) are operating properly by turning the controller off and on, and by initiating a cycle by triggering the level sensor in the basin. The valve should be manually opened and closed using the open/close switch to verify valve operation and to assist in inspecting the valve for debris. The solar panel should be inspected and any dust or debris on the panel should be carefully removed. The controller and all other circuitry and wiring should be inspected for signs of corrosion, damage from insects, water leaks, or other damage. At the end of the inspection, the controller should be reset.

Vegetative Filter Strips

Inspections of the VFS for erosion and damage to vegetation should occur at least twice per year; additional inspection periods, however, should occur after heavy rainfall. The BMPs should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. If areas are found that have bare spots or that need restoration, those areas should be replanted to meet the TCEQ requirements.

Inspections for debris and litter removal should be performed twice per year, at a minimum. Routine periodic checks are preferred. The filter strips should be kept free of obstructions and debris to allow for proper usage and minimal blockage. Additionally, monitoring to ensure channels and preferential flow paths have not developed should be conducted during routine inspection.

Grass areas in and around basins must be mowed at least four times a year to limit vegetation height to 18 inches. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas. When mowing is performed, a mulching mower should be used, or grass clippings should be caught and removed. Regular mowing should also include weed control practices; herbicide usage, however, should be kept to a minimum.

*All inspection and maintenance records must be kept at the office of the operator for the previous three years.

*An amended copy of this document will be provided to the TCEQ within thirty (30) days of any changes in the following information.

Grassy Swale (Temporary)

Inspections of the grassy swale for erosion and damage to vegetation should occur at least twice per year; additional inspection periods, however, should occur after heavy rainfall. The BMPs should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. If areas are found that have bare spots or that need restoration, those areas should be replanted to meet the TCEQ requirements.

Inspections for debris and litter removal should be performed twice per year, at a minimum. Routine periodic checks are preferred. The swale should be kept free of obstructions and debris to allow for proper usage and minimal blockage.

Sediment must be removed from the swale once accumulation has reached 3 inches in any spot. Excess sediment should be removed by hand or with flat-bottomed shovels. If areas are eroded, they should be filled, compacted, and reseeded so that the final grade is level with the bottom of the swale. Grass damaged by the sediment removal process should be promptly replaced using the same seed mix used during swale establishment. If possible, flow should be diverted from the damaged areas until the grass is firmly established.

Responsible Party: Vinod Nagi – LB Warren LLC

Mailing Address: 1001 Cypress Creek Road, Suite 203

City, State, Zip: Cedar Park, Texas 78613

7/2/2024

(Signature of Responsible Party)

Agent/Engineer: Nathan D. Kelly, P.E. – Gray Engineering, Inc.

Mailing Address: 8834 N Capital of Texas Highway, Suite 140

City, State, Zip: Austin, Texas, 78759

Telephone: (512) 452-0371

7/1/2024

(Signature of Agent/Engineer)

Attachment O – Pilot-Scale Field Testing Plan

Not applicable to this project.

Attachment P – Measures for Minimizing Surface Stream Contamination

The site will be stabilized using silt fence; all stabilization will be installed prior to construction and will be removed after construction has been completed. These methods will minimize any increases in erosion caused by construction. Additionally, the proposed permanent BMPs will treat any stormwater passing through the site prior to that stormwater's returning to existing drainage patterns and eventually flowing to surface streams.

Temporary Stormwater Section

Texas Commission on Environmental Quality

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

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

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

Signature

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

Print Name of Customer/Agent: Nathan D. Kelly, P.E.

Date: 7/1/24

Signature of Customer/Agent:

Regulated Entity Name: Cascade Subdivision

Project Information

Potential Sources of Contamination

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

1. Fuels for construction equipment and hazardous substances which will be used during construction:

   ☐ The following fuels and/or hazardous substances will be stored on the site: _____

   These fuels and/or hazardous substances will be stored in:

   ☐ Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.

☐ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.

☒ Fuels and hazardous substances will not be stored on the site.

2. ☒ **Attachment A - Spill Response Actions**. A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.

3. ☒ Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. ☒ **Attachment B - Potential Sources of Contamination**. A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

Sequence of Construction

5. ☒ **Attachment C - Sequence of Major Activities**. A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.

   ☒ For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.

   ☒ For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

6. ☒ Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: North Fork San Gabriel River

Temporary Best Management Practices (TBMPs)

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

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

☒ A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.

☒ A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.

☒ A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.

☒ A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.

8. ☒ The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

☐ **Attachment E - Request to Temporarily Seal a Feature**. A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.

☒ There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. ☒ **Attachment F - Structural Practices**. A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided.

10. ☒ **Attachment G - Drainage Area Map**. A drainage area map supporting the following requirements is attached:

☒ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.

☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.

☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.

☐ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

☐ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.

11. ☒ **Attachment H - Temporary Sediment Pond(s) Plans and Calculations**. Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.

☐ N/A

12. ☒ **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.

13. ☒ All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. ☒ If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. ☒ Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. ☒ Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

Soil Stabilization Practices

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

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

18. ☒ Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. ☒ Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

Administrative Information

20. ☒ All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.

21. ☒ If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. ☒ Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

Attachment A – Spill Response Action

No spills of hydrocarbons or hazardous substances are expected. However, in the event that such an incident does occur, the contractor should carefully follow the following TCEQ guidelines:

Cleanup:

1. Onsite personnel must be trained in spill prevention and spill cleanup.
2. Clean up leaks and spills immediately
3. Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
4. Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly.

Minor Spills:

1. Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
2. Use absorbent materials on small spills rather than hosing down or burying the spill.
3. Absorbent materials should be promptly removed and disposed of properly.
4. Follow the practice below for a minor spill:
    a. Contain the spread of the spill.
    b. Recover spilled materials.
    c. Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills:

Semi-significant spills can still be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. this response may require the cessation of all other activities. Spills should be cleaned up immediately, using the following practices:

1. Contain spread of the spill.
2. Notify the project foreman immediately.
3. If the spill occurs on paved or impermeable surfaces, clean up using “dry” methods (absorbent materials, cat litter, and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
4. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
5. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills:

For highly toxic materials, the Reportable Quantity (RQ) > 25 gallons. For petroleum/hydrocarbon liquids, RQ> 250 gallons (on land) or any amount which creates a "sheen" on water. Only certified Haz-Mat teams will be responsible for handling the material at the site.

For significant or hazardous spills that are in reportable quantities:

1. Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site. Additionally, in the event of a hazardous material spill, local Williamson County and/or city of Liberty Hill police, fire, and potentially EMS should be contacted in order to initiate the hazardous material response team.
2. For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,191, and 302, the contractor should notify the National Response Center at (800) 424-8802.
3. Notification should first be made by telephone and followed up with a written report of which one copy is to be kept on-site in the report binder and one copy is to be provided to the TCEQ.
4. The services of a spill contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
5. Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff's Office, Fire Department, etc.

More information on spill rules and appropriate responses is available on the TCEQ website at: http://www.tceq.state.tx.us/response/spills.html

Attachment B – Potential Sources of Contamination

No particular activity or process during construction of the project is anticipated to present a significant risk of being a potential source of contamination. However, during regular construction operations, several common and minor risks of contamination are anticipated. Should any unforeseen mishaps occur during construction, the contractor shall follow the guidelines set forth in “Attachment A – Spill Response Plan.”

Potential Sources of Sediment to Stormwater Runoff:

- Clearing and grubbing
- Grading and excavation
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping

Potential Pollutants and Sources, other than Sediment, to Stormwater Runoff:

- Combined Staging Area – small fueling, minor equipment maintenance, sanitary facility.
- Materials Staging Area – solvents, adhesives, paving materials, aggregate, trash, etc.
- Construction Activities – paving, concrete pouring
- Concrete washout areas

Potential On-Site Pollutants:

- Fertilizer
- Concrete
- Glue, adhesives
- Gasoline, diesel fuel, hydraulic fluids, antifreeze
- Sanitary toilets

Attachment C – Sequence of Major Activities

1. Temporary erosion and sedimentation controls are to be installed as indicated on the approved subdivision construction plans and in accordance with the stormwater pollution prevention plan (SWPPP) that is required to be posted on the site. Install tree protection and initiate tree mitigation measures.
2. The environmental project manager, and/or site supervisor, and/or designated responsible party, and the general contractor will follow the storm water pollution prevention plan (SWPPP) posted on the site. Temporary erosion and sedimentation controls will be revised, if needed to comply with city inspectors' directives, and revised construction schedule relative to the water quality plan requirements and the erosion and sedimentation plan.
3. Temporary erosion and sedimentation controls will be inspected maintained in accordance with the storm water pollution prevention plan (SWPPP) posted on the site.
4. A sequence of major construction activities, as well as an estimated area of disturbance for each, is listed below:
    - Clearing and grubbing – 23.869 acres
    - Rough Cut BMPs – 0.50 acres
    - Grading and excavation for roadway and lots – 19.848 acres
    - Excavation for utilities and storm sewer – 2.784 acres
    - Install Final BMPs and stabilize – 0.50 acres
    - Construction of utilities and storm sewer system – 2.784 acres
    - Paving, striping, etc. – 3.558 acres
    - Revegetation – 11.410 acres
    - Landscaping – 0.529 acres
5. Upon completion of construction and revegetation, the design engineer shall submit an engineer's letter of concurrence to Williamson County and the M.U.D. indicating that construction, including revegetation, is complete and in substantial conformity with the approved plans. After receiving this letter, a final inspection will be scheduled by the appropriate inspector.
6. After construction is complete and all disturbed areas have been revegetated per plan to at least 90 percent established, remove the temporary erosion and sedimentation controls and complete any necessary final revegetation resulting from removal of the controls. Conduct any maintenance and rehabilitation of the permanent BMPs.

Attachment D – Temporary Best Management Practices and Measures

Prior to the commencement of any construction activity, the contractor shall install silt fence, and construction entrances, per the Erosion and Sedimentation Control Plan. Once inlets are installed, inlet protection shall be installed. All temporary BMPs are to be installed per TCEQ and local requirements.

As surface water flows from and through disturbed areas, the proposed temporary BMPs will prevent pollution by filtering the increased sediment loads and other pollutant sources (listed in "Attachment B – Potential Sources of Contamination") prior to any runoff leaving the site. As shown in attached construction plans, silt fence will be utilized downstream of any grading and construction activities to remove debris and sediment from runoff in the area (activities here will primarily involve road grading and storm sewer excavation). Inlet protection will prevent sediment laden runoff from entering the storm sewer system during construction. Concrete washout basins will contain pollutants discharged when concrete trucks are washed out, and stabilized construction entrances will prevent the transport of sediment off-site.

In using these treatment methods and maintaining natural drainage patterns downgradient of the proposed site, any flow to naturally occurring sensitive features, both know and unknown, will be maintained.

Attachment E – Request to Temporarily Seal a Feature

Not applicable to this project.

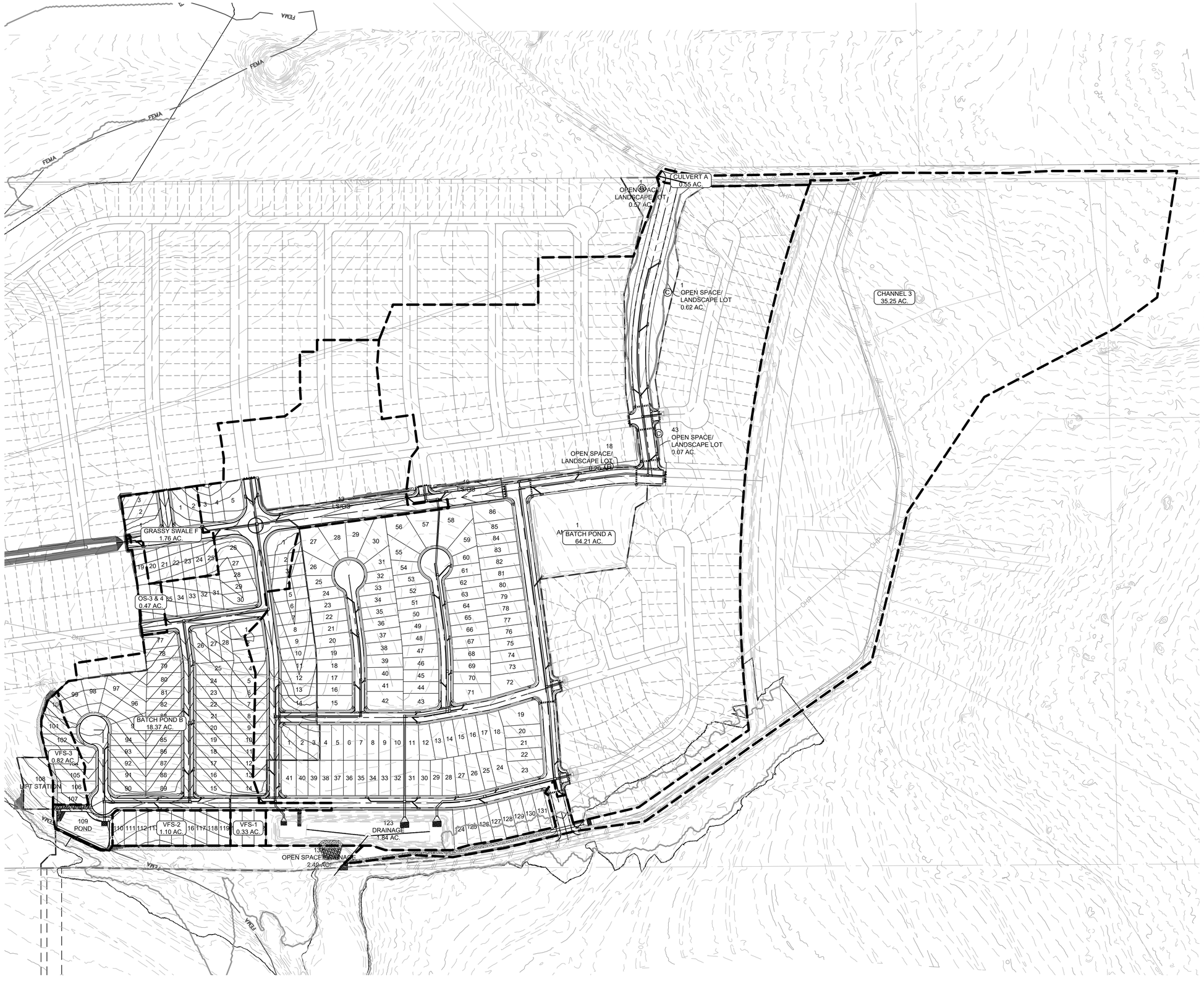
Attachment F – Structural Practices

The following temporary BMPs structural practices will be employed on the site:

- Silt Fence – used for sediment filtration along the downslope perimeter of portions of the project, as well as to prevent runoff from storage to excavated materials during utility construction. The fence retains sediment primarily by retarding flow and promoting deposition of sediment on the uphill side of the slope. Runoff is filtered as it passes through the geotextile.
- Inlet Protection – to be provided around all proposed storm sewer inlets during construction. Locations are indicated on the attached site plan. The measures will trap and settle out sediment and debris prior to runoff entering the proposed storm sewer system.
- Construction Entrance – stone pads will be constructed at entrances and exists to the project to prevent off-site transport of sediment by construction vehicles. They will be graded to prevent runoff from leaving the site.

Attachment G – Drainage Area Map

Drainage area maps are shown in the attached construction plans and an overall BMP map showing interim and final condition drainage area designations is included with this submittal.



SCALE: 1" = 150'
GRAPHIC SCALE IN FEET
0 75' 150' 300'

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- 950 EXISTING CONTOUR
- 950 EXISTING CONTOUR
- 950 PROPOSED CONTOUR
- PROPOSED CONTOUR
- STORM SEWER FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED BOX MANHOLE
- 10' CURB INLET
- 15' CURB INLET

NOTES:
1. ALL INLET WYE CONNECTIONS TO BE 45 DEGREES UNLESS OTHERWISE NOTED
2. ALL FITTINGS AND WYES SHALL BE PRECAST ELEMENTS AND NOT CAST-IN-PLACE WITHOUT PRIOR APPROVAL FROM THE COUNTY.
3. ALL STORM LATERALS TO BE 18" CLIII RCP UNLESS OTHERWISE NOTED.
4. ALL CURB INLETS TO BE 10' UNLESS OTHERWISE NOTED.

8834 N. Capital of Texas Hwy.
Suite 140
Austin, Texas 78759
(512)452-0371
FAX(512)454-9933
TBPELS FIRM #2946
GRAY ENGINEERING

NO.	BY	DATE	REVISION DESCRIPTION

CASCADE - PHASE 2
WILLIAMSON COUNTY, TEXAS

WATER QUALITY DRAINAGE AREA MAP

PROJECT NO: 1636-11802
DESIGNED BY: NK
DRAWN BY: DPG/BE
CHECKED BY: NK

NOTICE:
ALTERATION OF A SEALED DRAWING WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS A VIOLATION OF THE TEXAS ENGINEERING PRACTICE ACT.

SHEET 01 OF 01

H:\PROJECTS\1636 - BROHN HOMES\11802 - WARREN PHASE 2\CAD\XREF\11802-C-DAM.WD.DWG DATE: 7/1/2024 9:51:00 AM BY: DPEREZ-GUERRA

Attachment H – Temporary Sediment Ponds Plan and Calculations

As part of managing erosion control, the contractor will rough cut Batch Detention Pond B to be a temporary sedimentation pond for the sake of stormwater management during construction. The temporary sedimentation pond will then be converted into a batch detention pond for permanent stormwater management.

Attachment I – Inspection and Maintenance for BMPs

The inspection and maintenance of temporary BMPs will be made according to TCEQ RG-348, "Complying with the Edwards Aquifer Rules: technical Guidance on Best Management Practices."

Inspection Personnel:

Inspections shall be conducted by qualified representatives of the contractor acting on behalf of the owner or a designated party, if hired separately by the owner. Each operator must delegate authority to the specifically described position or person performing inspections, as provided by 30 TAC 305.128, as an authorized person for signing reports and performing certain activities requested by the director or required by TPDES general permit. This delegation of authority must be provided to the director of TCEQ in writing and a copy shall be kept along with the signed effective copy of the SWPPP.

Inspection Schedule and Procedures:

An inspection shall occur weekly and after any rain event.

The authorized party shall inspect all disturbed areas of the site, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site.

Disturbed areas and areas used for storage of materials that are exposed to precipitation or within the limits of the 1% annual chance (100 year) floodplain must be inspected for evidence of, or the potential for, pollutants entering the runoff from the site. Erosion and sediment control measures identified in the plan must be observed to ensure that they are operating correctly. Observations can be made during wet or dry weather conditions. Where discharge locations or points are accessible, they must be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. This can be done by inspecting receiving waters to see where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

Based on the results of the inspection, the site description and the pollution prevention measures identified in the plan must be revised as soon as possible after an inspection tat reveals inadequacies. The inspection and plan review process must provide for timely implementation of any changes to the plan within 7 calendar days of the inspection.

An inspection report shall be completed, which summarizes the scope of the inspection, name(s) and qualifications of personnel conducting the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWPPP. Major observations shall include, at a minimum, location of discharges of sediment or other pollutants from the site, location of BMPs that need to be maintained, location of BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where BMPs are needed.

Actions taken as a result of the insp3ecctions must be described within, and retained as a part of, the SWPPP. Reports must identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the preort must contain a certification that the facility or site is in compliance with the SWPPP and the TPDES general permit. The report must be signed by the authorized representative delegated by the operators in accordance with TAC 305.128.

Maintenance and Corrective Actions:

Maintenance of erosion control facilities shall consist of the minimum requirements as follows:

- In ongoing construction areas, inspect erosion control improvements to confirm facilities are in place and operable. Where facilities have been temporarily set aside or damaged due to construction activity, place facilities in service before leaving job site.
- If weather forecast predicts possibility of rain, check entire facilities throughout site to ensure that they are in place and operable. If job site weather conditions indicate high probability of rain, make special inspection of erosion control facilities.
- After rainfall events, review erosion control facilities as soon as site is accessible. Clean rock berms, construction entrances, and other structural facilities. Determine where additional facilities or alternative techniques are needed to control sediment leaving site.
- After portions of site have been seeded, review these areas on regular basis in accordance with project specifications to assure proper watering until gras is established. Re-seed areas where grass is not well-established.
- Spills are to be handled as specified by the manufacturer of the product in a timely and safe manner by qualified personnel. The site superintendent will be responsible for coordinating spill prevention and cleanup operations.
- Concrete trucks will discharge extra concrete or wash out drum only at an approved location on site. Residual product shall be properly disposed of.
- Inspect vehicle entrance and exits for evidence of off-site tracking and correct as needed.
- Remove sediment from traps/ponds no later than when the design capacity has been reduced by 50%.
- If sediment escapes the site, the contractor, where feasible and where access is available, shall collect and remove sedimentation material by appropriate non-damaging methods. Additionally, the contractor shall correct the condition causing discharges.
- If inspections or other information sources reveal a control that has been used incorrectly, or that control is performing inadequately, the contractor must replace, correct, or modify the control as soon as practical after discovery of the deficiency.

Attachment J – Schedule of Interim and Permanent Soil Stabilization Practices

Silt fence will be used during the period of construction near the perimeter of the disturbed area to intercept sediment while allowing water to percolate through. Silt fencing will be installed prior to any site clearing. This silt fence will remain in place until the disturbed area is permanently stabilized. Tree protection fencing will be installed around all protected trees. A stabilized pad of crushed stone will be placed at the point where traffic will be entering and leaving the construction site to eliminate the tracking or flowing of sediment onto public rights-of-way. Once all site grading activities and landscaping plantings have been completed, all disturbed areas and exposed soil will be revegetated with hydro-mulch as needed. All controls will remain in place until the revegetated areas are permanently stabilized.

If portions of the site will have a temporary or permanent cease in construction activity lasting longer than 14 days, soil stabilization (via hydro-mulch revegetation) 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.

Should construction activities be interrupted for a period of at least 4 weeks of non-activity, Contractor shall revegetate all disturbed areas as required for permanent revegetation. Contractor shall keep all temporary BMPs in place until the disturbed areas become permanently stabilized.

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

I Adam Boenig,
Print Name

President,
Title - Owner/President/Other

of LB Warren LLC,
Corporation/Partnership/Entity Name

have authorized Nathan D. Kelly, P.E.
Print Name of Agent/Engineer

of Gray Engineering, Inc.
Print Name of Firm

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

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Vinod Nagi
Applicant's Signature

7/2/2024
Date

THE STATE OF Texas §

County of Williamson §

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

GIVEN under my hand and seal of office on this 2nd day of July, 2024.

ALBERTA L MARTINEZ
Notary ID #126173843
My Commission Expires
May 25, 2028

NOTARY PUBLIC

Alberta L. Martinez
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: May 25, 2028

Application Fee Form

Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Cascade - Phase 2

Regulated Entity Location: Approximately 1 mile Southwest of US HWY 183 and County Road 207 intersection

Name of Customer: LB Warren LLC

Contact Person: Adam Boenig Phone: (512) 334-6775

Customer Reference Number (if issued):CN N/A

Regulated Entity Reference Number (if issued):RN N/A

Austin Regional Office (3373)

☐ Hays ☐ Travis ☒ Williamson

San Antonio Regional Office (3362)

☐ Bexar ☐ Medina ☐ Uvalde

☐ Comal ☐ Kinney

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment**. This payment is being submitted to:

☒ Austin Regional Office

☒ Mailed to: TCEQ - Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☐ San Antonio Regional Office

☐ Overnight Delivery to: TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
(512)239-0357

Site Location (Check All That Apply):

☐ Recharge Zone ☒ Contributing Zone ☐ Transition Zone

Type of Plan	***Size***	***Fee Due***
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	219,293 Acres	$ 8,000.00
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	L.F.	$
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

Signature: _____ Date: 7/1/24

Application Fee Schedule

Texas Commission on Environmental Quality

Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

Project	*Project Area in Acres*	*Fee*
One Single Family Residential Dwelling	< 5	$650
Multiple Single Family Residential and Parks	< 5 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $10,000

Organized Sewage Collection Systems and Modifications

Project	*Cost per Linear Foot*	*Minimum Fee-Maximum Fee*
Sewage Collection Systems	$0.50	$650 - $6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

Project	*Cost per Tank or Piping System*	*Minimum Fee-Maximum Fee*
Underground and Aboveground Storage Tank Facility	$650	$650 - $6,500

Exception Requests

Project	*Fee*
Exception Request	$500

Extension of Time Requests

Project	***Fee***
Extension of Time Request	$150

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 606215515		**RN 111868394**

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:*

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:

City		**State**		**ZIP**		**ZIP + 4**	

16. Country Mailing Information *(if outside USA)*	**17. E-Mail Address** *(if applicable)*

18. Telephone Number	**19. Extension or Code**	**20. Fax Number** *(if applicable)*

( ) -		( ) -

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.)*

23. Street Address of the Regulated Entity: ***(No PO Boxes)***							
	City		**State**		**ZIP**		**ZIP + 4**
24. County							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:					
26. Nearest City			**State**		**Nearest ZIP Code**

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:			**28. Longitude (W) In Decimal:**		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

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)

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

34. Mailing Address:							
	City		**State**		**ZIP**		**ZIP + 4**
35. E-Mail Address:							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
( ) -		( ) -

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:	Nathan Kelly	41. Title:	Project Manager

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
( ) -		( ) -	NKelly@grayengineeringinc.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:	Gray Engineering, Inc	Job Title:	Project Manager
Name *(In Print)*:	Nathan Kelly, P.E.	Phone:	(210) 875-9669
Signature:		Date:	7/1/2024