WOLF RANCH WEST

SECTION 4G

Sewage Collection System

Modification Application (51127-42)

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/6/23

Prepared By:
PAPE-DAWSON ENGINEERS, INC.
Texas Board of Professional Engineers, Firm Registration # 470
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September 2023

PAPE-DAWSON ENGINEERS

Transportation | Water Resources | Land Development | Surveying | Environmental

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 if not withdrawn the application will be denied and 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 to you:

- You can withdraw your application, and your fees will be refunded or credited for a resubmittal.
- 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 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 effected 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: Wolf Ranch West, Section 4G						**2. Regulated Entity No.:** 111446985			
3. Customer Name: H4 Georgetown Phase 4G, LLC						**4. Customer No.:** 605990142			
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):**		35.85
9. Application Fee:	$1,265.50		**10. Permanent BMP(s):**					N/A	
11. SCS (Linear Ft.):	2,531		**12. AST/UST (No. Tanks):**					N/A	
13. County:	Williamson		**14. Watershed:**					San Gabriel River	

Application Distribution

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

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

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

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

San Antonio Region					
County:	**Bexar**	**Comal**	**Kinney**	**Medina**	**Uvalde**
Original (1 req.)	___	___	___	___	___
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.
Austin Conner, P.E.
Print Name of Customer/Authorized Agent
08/31/2023
Signature of Customer/Authorized Agent Date

FOR TCEQ INTERNAL USE ONLY			
Date(s)Reviewed:		Date Administratively Complete:	
Received From:		Correct Number of Copies:	
Received By:		Distribution Date:	
EAPP File Number:		Complex:	
Admin. Review(s) (No.):		No. AR Rounds:	
Delinquent Fees (Y/N):		Review Time Spent:	
Lat./Long. Verified:		SOS Customer Verification:	
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):
Core Data Form Complete (Y/N):			Signed (Y/N):
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):

GENERAL INFORMATION

General Information Form

Texas Commission on Environmental Quality

For Regulated Activities on the Edwards Aquifer Recharge and Transition Zones and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B) Effective June 1, 1999

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

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

Signature

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

Print Name of Customer/Agent: Austin Conner, P.E.

Date: 08/31/2023

Signature of Customer/Agent:

Project Information

1. Regulated Entity Name: Wolf Ranch West, Section 4G
2. County: Williamson
3. Stream Basin: San Gabriel River
4. Groundwater Conservation District (If applicable): N/A
5. Edwards Aquifer Zone:

   ☒ Recharge Zone
   ☐ Transition Zone

6. Plan Type:

   ☐ WPAP
   ☒ SCS
   ☒ Modification
   ☐ AST
   ☐ UST
   ☐ Exception Request

7. Customer (Applicant):

   Contact Person: Duke Kerrigan
   Entity: H4 Georgetown Phase 4G, LLC
   Mailing Address: 3000 Turtle Creek Blvd.
   City, State: Dallas, TX   Zip: 75219
   Telephone: (972) 201-2897   FAX: (972) 201-2959
   Email Address: Duke.Kerrigan@hillwood.com

8. Agent/Representative (If any):

   Contact Person: Austin Conner, PE
   Entity: Pape-Dawson Engineers, Inc.
   Mailing Address: 10801 N MoPac Expy., Bldg. 3 Suite 200
   City, State: Austin, TX   Zip: 78759
   Telephone: (512) 454-8711   FAX: N/A
   Email Address: AConner@Pape-Dawson.com

9. Project Location:

   ☒ The project site is located inside the city limits of Georgetown.
   ☐ 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.

10. ☒ The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

    From TCEQ's Regional office, proceed north on IH-35 for approximately 16.6 miles. Exit 261 toward Texas 29/Burnet and keep right at the fork, following signs for Taylor. Turn left onto West University Avenue/Texas 29 W and proceed approximately 0.6 miles. Turn left onto Wolf Ranch Parkway and proceed for 1.2 miles to Blue Blaze Trail. Turn left onto Legends Lane and continue to the end of the road. The project site is located approximately 0.15 miles South from the end of Blue Blaze Trail.

11. ☒ **Attachment A – Road Map**. A road map showing directions to and the location of the project site is attached. The project location and site boundaries are clearly shown on the map.

12. ☒ **Attachment B - USGS / Edwards Recharge Zone Map**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached. The map(s) clearly show:

    ☒ Project site boundaries.
    ☒ USGS Quadrangle Name(s).
    ☒ Boundaries of the Recharge Zone (and Transition Zone, if applicable).
    ☒ Drainage path from the project site to the boundary of the Recharge Zone.

13. ☒ **The TCEQ must be able to inspect the project site or the application will be returned**. Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment.

☒ Survey staking will be completed by this date: Already Complete

14. ☒ **Attachment C – Project Description**. Attached at the end of this form is a detailed narrative description of the proposed project. 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

15. 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/Uncleared)
☐ Other: ______

Prohibited Activities

16. ☒ I am aware that the following activities are prohibited on the Recharge Zone and are not proposed for this project:

(1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);

(2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;

(3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;

(4) The use of sewage holding tanks as parts of organized collection systems; and

(5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

(6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

17. ☒ I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:

    (1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);

    (2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and

    (3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

Administrative Information

18. The fee for the plan(s) is based on:

    ☐ For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
    ☒ For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
    ☐ For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
    ☐ A request for an exception to any substantive portion of the regulations related to the protection of water quality.
    ☐ A request for an extension to a previously approved plan.

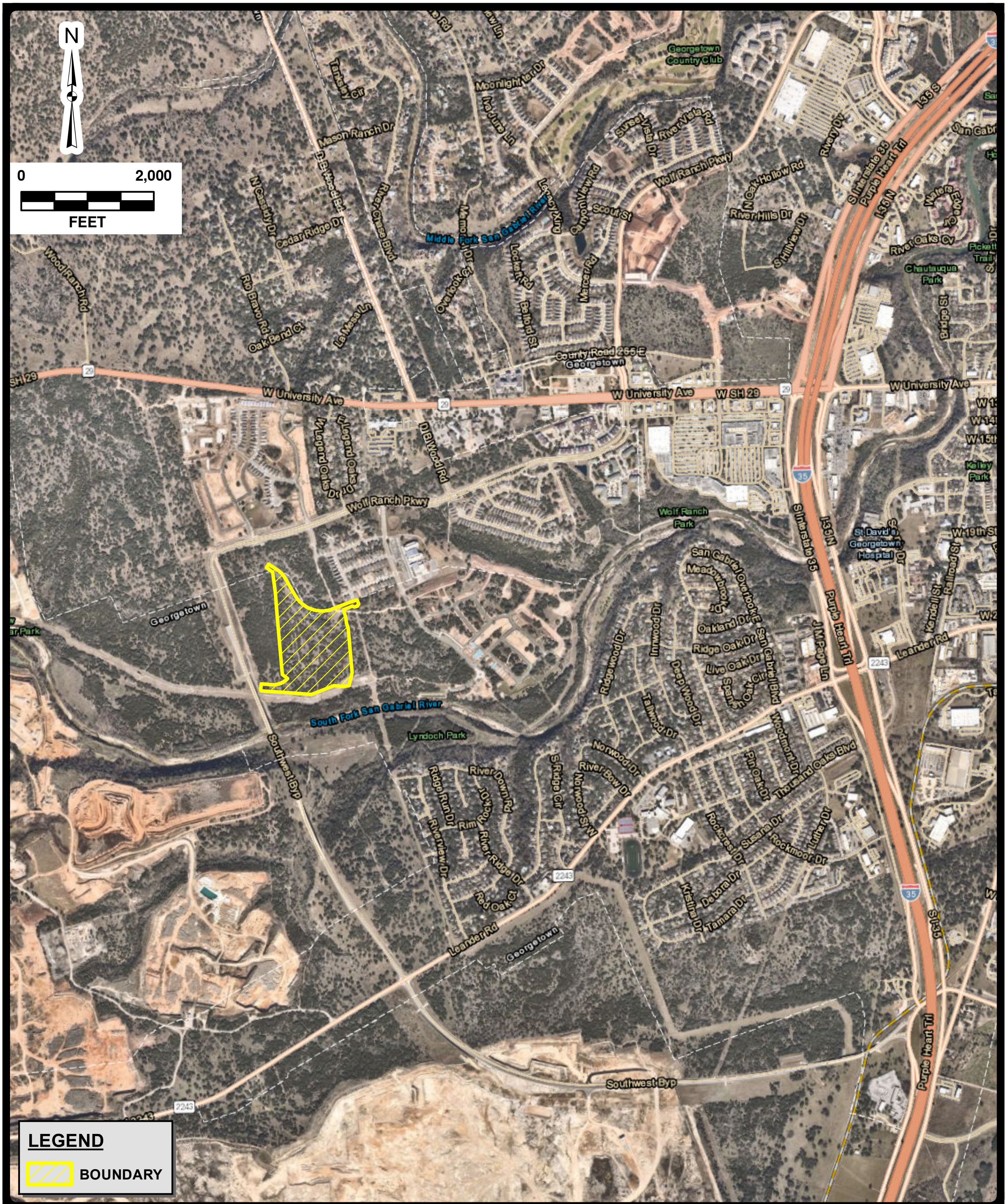
19. ☒ Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

    ☐ TCEQ cashier
    ☒ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
    ☐ San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

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

21. ☒ No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

ATTACHMENT A



JOB NO.	51127-42	
DATE	Feb 2022	
DESIGNER	CR	
CHECKED	JB	DRAWN CR
SHEET	Attachment A	

WOLF RANCH WEST

SECTION 4G

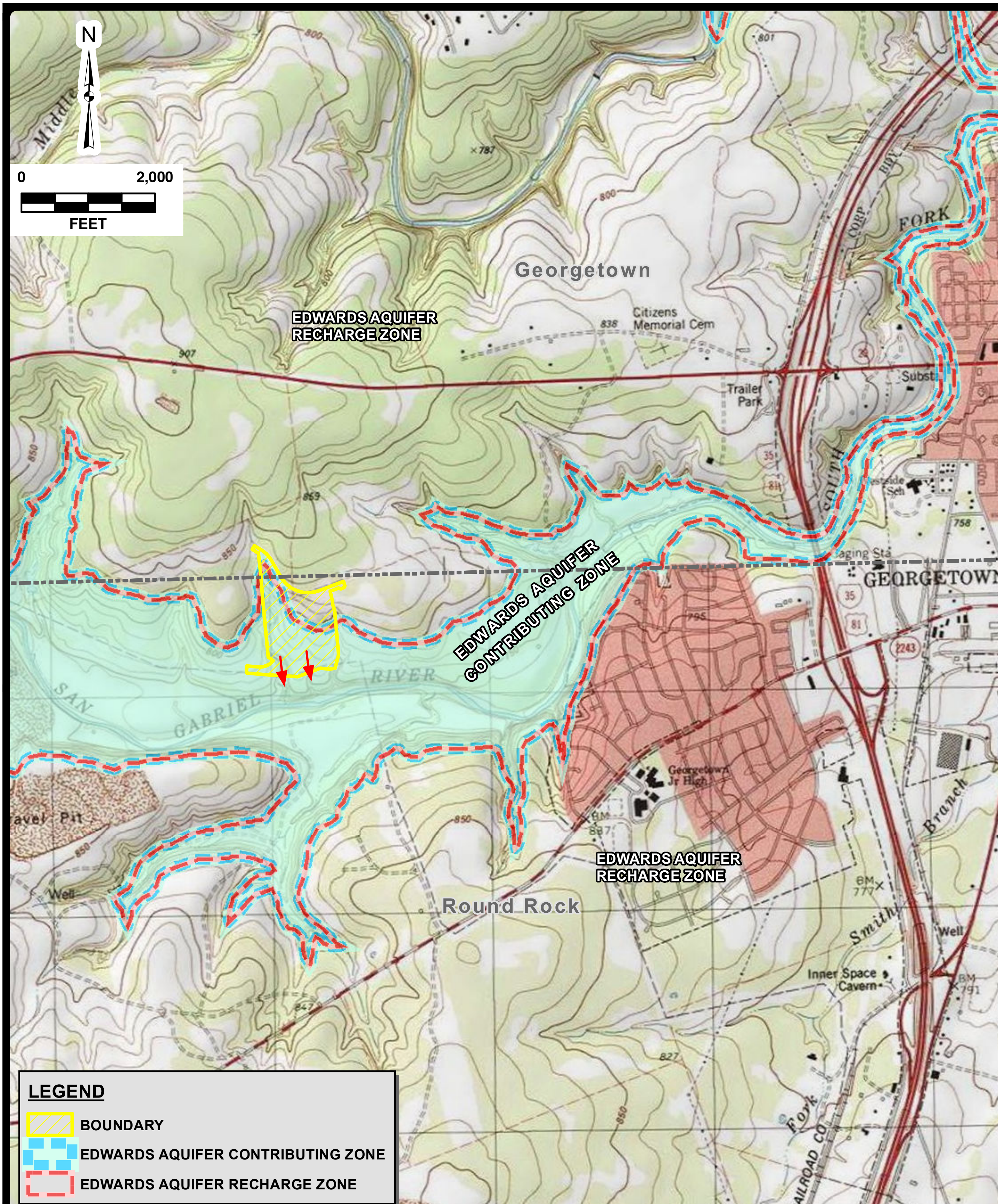
PROJECT LOCATION MAP

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY. BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

Date: Feb 15, 2022 7:58:43 PM User: croe
File: H:\Projects\511\27\42\GIS\Project Location WR Section 4G Aerial.mxd

ATTACHMENT B



Data Sources: TCEQ Edwards Aquifer; USGS data ©2013 National Geographic Society, i-cubed.

Date: Feb 16, 2022 10:56:50 AM User: croe
File: \\pape-dawson.com\aus-pd\Projects\51127\42\GIS\Project Location WR Section 4G USGS.mxd

JOB NO. 51127-42
DATE Feb 2022
DESIGNER CR
CHECKED JB DRAWN CR
SHEET Attachment B

WOLF RANCH WEST

SECTION 4G

PROJECT LOCATION MAP
USGS 7.5' QUAD - GEORGETOWN

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY. BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

ATTACHMENT C
SCS NARRATIVE

PROJECT DESCRIPTION

Wolf Ranch West, Section 4G is located on approximately 35.85 acres south of the intersection of Wolf Ranch Parkway & Blue Blaze Trail, south of Wolf Ranch West, Section 5 (EAPP11002668), within the city limits of Georgetown in Williamson County, Texas. The project limits are located over the Edwards Aquifer Recharge Zone and Contributing Zone as shown on Attachment B. A Water Pollution Abatement Plan (WPAP) Modification Application for this development was approved on January 20, 2023.

The Wolf Ranch West, Section 4G, SCS Modification Application proposes the construction of approximately 3,991 linear feet of 8-inch gravity wastewater main, 172 linear feet of 27-inch gravity wastewater main, 1,310 linear feet of 30" gravity wastewater main, and 1,049 linear feet of 36-inch gravity wastewater main. Approximately 40 LF of the proposed 3,991 LF of 8-inch gravity sewer mains are to be constructed of PVC, SDR 26, 160 psi pressure-rated pipe, centered on water/sewer-line crossings. This application also includes 1,524 linear feet of double wastewater service laterals for a total of 8,046 linear feet of sewage collection system. Regulated activities proposed include excavation, construction of sewer mains, manhole installation, backfill, and compaction. Approximately 15.05 acres may be disturbed, as identified by the limits of the fifty-foot (50') radius SCS/GA envelope shown on the plans. The SCS proposed with this application will connect to an existing 36-inch wastewater line.

The Guy Tract Geologic Assessment (GA) and Wolf Ranch GA included with this SCS Application states that there are no naturally occurring geologic features within Wolf Ranch West, Section 4G. There are no existing water wells within the Project Boundary submitted with this application.

This SCS application will directly serve a total of 494 LUE’s defined as follows:

- Wolf Ranch West, Section 4G (35.85 AC) – 77 single family units = 97 LUE’s
- Wolf Ranch West, Section 5G (66.99 AC) – 217 single family units = 217 LUE’s
- Avanta Multifamily (25.98 AC) - 266 multi-family units = 200 LUE’s

Approximately 154,376 gallons per day (average flow) of domestic wastewater will be generated from the Wolf Ranch West, Section 4G SCS. Sewage flow will be disposed of by conveyance to the existing San Gabriel Wastewater Treatment Plant. The San Gabriel Wastewater Treatment Plant has the capacity to adequately treat the proposed peak flow. Potable water will be provided by the City of Georgetown. Any future wastewater mains will be permitted with their own SCS Application and submitted to the TCEQ for review and approval.

GUY TRACT GEOLOGIC ASSESSMENT

Environmental Services, Inc.

GEOLOGIC ASSESSMENT
APPROXIMATELY 366-ACRE
GUY TRACT
SOUTHERN TERMINUS OF D B WOOD ROAD
GEORGETOWN, WILLIAMSON COUNTY, TEXAS
HJN 170167 GA

PREPARED FOR:

HILLWOOD COMMUNITIES
DALLAS, TEXAS

PREPARED BY:

HORIZON ENVIRONMENTAL SERVICES, INC.
TBPG FIRM REGISTRATION NO. 50488

SEPTEMBER 2017

CORPORATE HEADQUARTERS
1507 S Interstate 35 ★ Austin, TX 78741-2502 ★ (512) 328-2430 ★ www.horizon-esi.com
An LJA Company

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II. ATTACHMENTS:

- A GEOLOGIC ASSESSMENT TABLE
- B STRATIGRAPHIC COLUMN
- C DESCRIPTION OF SITE GEOLOGY
- D SITE GEOLOGIC MAP
- E SUPPORTING INFORMATION
- F ADDITIONAL SITE MAPS
- G SITE PHOTOGRAPHS

Geologic Assessment

Texas Commission on Environmental Quality

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

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

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

Signature

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

Print Name of Geologist: James Killian

Telephone: 512 328-2430

Date: 29 September 2017

Fax: 512 328-1804

Representing: Horizon Environmental Services, Inc. and TBPG Firm Registration No. 50488 (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:

____

Regulated Entity Name: 366-acre Guy Tract, Southern Terminus D B Wood Road, Georgetown, Williamson County, Texas

Project Information

1. Date(s) Geologic Assessment was performed: 21, 22, 23, and 24 August and 8, 11, and 12 September 2017
2. Type of Project:

   ☐ WPAP
   ☒ SCS
   ☐ AST
   ☐ UST
3. Location of Project:

   ☒ Recharge Zone
   ☐ Transition Zone

☐ Contributing Zone within the Transition Zone

4. ☒ **Attachment A - Geologic Assessment Table**. Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.

5. ☒ Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness(feet)
Brackett gravelly clay loam, 3 to 16% slopes (BkE)	C	1 to 2
Eckrant cobbly clay, 1 to 8% slopes (EaD)	D	0.5 to 1
Eckrant-Rock outcrop, 1 to 10% slopes (ErE)	D	0.5 to 1
Georgetown silty clay loam, 1 to 3% slopes (GsB)	D	2 to 4
Oakalla soils, 0 to 1% slopes, channeled, frequently flooded (Oc)	B	3 to 5

** Soil Group Definitions (Abbreviated)*

A. Soils having a high infiltration rate when thoroughly wetted.
B. Soils having a moderate infiltration rate when thoroughly wetted.
C. Soils having a slow infiltration rate when thoroughly wetted.
D. Soils having a very slow infiltration rate when thoroughly wetted.

6. ☒ **Attachment B – Stratigraphic Column**. A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.

7. ☒ **Attachment C – Site Geology**. A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.

8. ☒ **Attachment D – Site Geologic Map(s)**. The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1”: 400'

   Applicant's Site Plan Scale: 1" = 300'
   Site Geologic Map Scale: 1" = 300'
   Site Soils Map Scale (if more than 1 soil type): 1" = 1200'

9. Method of collecting positional data:

   ☒ Global Positioning System (GPS) technology.
   ☐ Other method(s). Please describe method of data collection: _____

10. ☒ The project site and boundaries are clearly shown and labeled on the Site Geologic Map.

11. ☒ Surface geologic units are shown and labeled on the Site Geologic Map.

12. ☒ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

   ☐ Geologic or manmade features were not discovered on the project site during the field investigation.

13. ☒ The Recharge Zone boundary is shown and labeled, if appropriate.

14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.

   ☒ There are 2 (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
      ☐ The wells are not in use and have been properly abandoned.
      ☒ The wells are not in use and will be properly abandoned.
      ☒ The wells are in use and comply with 16 TAC Chapter 76.
   ☐ There are no wells or test holes of any kind known to exist on the project site.

Administrative Information

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

ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE

GEOLOGIC ASSESSMENT TABLE			PROJECT NAME: 366-ac Guy tract; so. DB Wood Rd Georgetown, Williamson Co. Tx																		
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
F-1	30.62425	-97.70658	SH	20	Ked	6	6	2	--	0	--	--	C,F,O	30	50	X		X		Hillside
F-2	30.62507	-97.7121	SC	20	Ked	1	1	1.5	--	0	--	--	C,F,O	25	45	X		X		Hilltop
F-2A	30.6251	-97.7215	SC	20	Ked	1	1	1.5	--	0	--	--	C,F,O	22	42	X		X		Hilltop
F-3	30.6222	-97.71203	SF	20	Kc	6	0.5	1	N75E	10	--	--	C,F,O	7	37	X		X		Hillside
F-4	30.6227	-97.7108	SC	20	Ked	0.8	0.3	1	--	0	--	--	C,F,O	7	27	X		X		Hillside
F-5	30.62459	-97.62459	C	30	Ked	20	15	3	--	0	--	--	C,F,O	5	35	X		X		Cliff
M-1	30.62457	-97.7225	MB	30	Ked	0.2	0.2	--	--	0	--	--	X	5	35	X		X		Hilltop
M-2	30.62291	-97.7045	MB	30	Kc	0.5	0.5	--	--	0	--	--	X	5	35	X		X		Hillside

* DATUM:___________________

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Man-made feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials: **steel casing/conctrete**

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understood, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Date : September 29, 2017

Sheet ___1___ of __1____

____

Horizon
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ATTACHMENT B

STRATIGRAPHIC COLUMN

Geologic Unit	Hydrologic Unit	Approx. Thickness at Project Site (ft)
Edwards Formation (Ked)	Edwards Aquifer	65
Comanche Peak Formation (Kc)		60
Walnut Formation (Kwa)	Confining Unit	175

Elevation (ft msl)	Depth (ft)
845	0
780	65
720	125
545	300

Note: Unit elevation and thickness given with respect to a ground surface elevation of 845 feet on the northern boundary of the subject site.

Horizon Environmental Services, Inc.

Date:	09/14/2017
Drawn:	REO
HJN NO:	170167

Attachment B

Stratigraphic Column
Guy Tract
Southern Terminus of D B Wood Road
Georgetown, Williamson County, Texas

STATE OF TEXAS
JAMES P. KILLIAN
GEOLOGY
No. 10391
LICENSED
PROFESSIONAL GEOSCIENTIST

170167 - Hillwood Guy Tract\Graphics\170167GA_05A_Strat.mxd

ATTACHMENT C

DESCRIPTION OF SITE GEOLOGY

Geologic information for the subject site obtained via literature review is provided in Attachment E, Supporting Information.

A geologic assessment of the approximately 366-acre Guy Tract was conducted pursuant to Texas rules for regulated activities on the Edwards Aquifer Recharge Zone (EARZ) (30 TAC 213). The subject site consists of undeveloped rangeland located at the southern terminus of D B Wood Road in Georgetown, Williamson County, Texas. Assessment findings were used to develop recommendations for site construction measures intended to be protective of water resources at the subject site and adjacent areas.

The northern portion (approximately 76.3 acres) of the subject site is located within the Edwards Aquifer Recharge Zone (EARZ), as defined by the Texas Commission on Environmental Quality (TCEQ). The EARZ occurs where surface water enters the subsurface through exposed limestone bedrock containing faults, fractures, sinkholes, and caves. The western and southern portions of the site (approximately 289.7 acres) are located within the Edwards Aquifer Contributing Zone.

The subject site is predominantly underlain by both the undifferentiated Edwards Limestone Formation (Ked) and Comanche Peak Limestone (Kc) (UT-BEG, 1981), with estimated maximum thicknesses of about 65 and 60 feet, respectively. In addition, recent alluvium deposits (Qal) occur along the lower, eroded areas located along and near the South Fork of the San Gabriel River, with an estimated maximum thickness of up to 30 feet.

Six natural geologic features (F-1, F-2, F-2A, F-3, F-4, and F-5) and 2 man-made features (M-1 and M-2) were identified at the subject site. Further information pertaining to the geologic and man-made features are presented in Attachments D, E, and F. Photographs of the geologic and man-made features are presented in Attachment G.

Horizon
Environmental Services, Inc.

ATTACHMENT D

SITE GEOLOGIC MAP

Horizon Environmental Services, Inc.

Date:	9/29/2017
Drawn:	REO
HJN NO:	170167
Source:	UT-BEG, 1981; USDA, 2016

Legend

- Geologic Feature
- Man-Made Feature
- Subject Site
- Alluvium (Qal)
- Edwards Limestone (Ked)
- Comanche Peak (Kc)

Attachment D

Site Geologic Map
Guy Tract
Southern Terminus D B Wood Road
Georgetown, Williamson County, Texas

STATE OF TEXAS
JAMES P. KILLIAN
GEOLOGY
No. 10281
LICENSED
PROFESSIONAL GEOSCIENTIST

N

0 150 300
Feet

Scale: 1" = 300'

170167 - Hillwood Guy Tract\Graphics\170167GA_06D_SGM.mxd

ATTACHMENT E

SUPPORTING INFORMATION

1.0 INTRODUCTION AND METHODOLOGY

This report and any proposed abatement measures are intended to fulfill Texas Commission on Environmental Quality (TCEQ) reporting requirements (TCEQ, 2005b). This geologic assessment includes a review of the subject site for potential aquifer recharge and documentation of general geologic characteristics for the subject site. Horizon Environmental Services, Inc. (Horizon) conducted the necessary field and literature studies according to TCEQ *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones* (TCEQ, 2004).

Horizon walked transects spaced less than 50 feet apart, mapped the locations of features using a sub-foot accurate Trimble Geo HX handheld GPS, and posted processed data utilizing GPS Pathfinder Office software, topographic maps, and aerial photographs. Horizon also searched the area around any potential recharge features encountered to look for additional features. When necessary, Horizon removed loose rocks and soil (by hand) to preliminarily assess each feature's subsurface extent while walking transects. However, labor-intensive excavation was not conducted during this assessment. Features that did not meet the TCEQ definition of a potential recharge feature (per TCEQ, 2004), such as surface weathering, karren, or animal burrows, were evaluated in the field and omitted from this report.

The results of this survey do not preclude the possibility of encountering subsurface voids or abandoned test or water wells during the clearing or construction phases of the proposed project. If a subsurface void is encountered during any phase of the project, work should be halted until the TCEQ (or appropriate agency) is contacted and a geologist can investigate the feature.

2.0 ENVIRONMENTAL SETTING

2.1 LOCATION AND GENERAL DESCRIPTION

The subject site consists of approximately 366 acres of mostly undeveloped rangeland located at the southern terminus of D B Wood Road in Georgetown, Williamson County, Texas (Attachment F, Figure 1).

2.2 LAND USE

The subject site is currently undeveloped rangeland used to raise beef cattle. Surrounding lands are generally used for agricultural, single-family residential, and/or commercial retail purposes.

2.3 TOPOGRAPHY AND SURFACE WATER

The subject site is situated on gently to steeply sloping terrain that is located within the San Gabriel River watershed (Attachment F, Figures 2 and 3). Surface elevations on the subject site vary from a minimum of approximately 720 feet above mean sea level (amsl) along the southern property boundary at the South Fork of the San Gabriel River to a maximum of approximately 845 feet amsl along the northern property boundary (USGS, 1987). In general, drainage on the site occurs by overland sheet flow in multiple directions (from north to south, northwest to southeast, and northeast to southwest) into several unnamed tributaries of the South Fork of the San Gabriel River.

2.4 EDWARDS AQUIFER ZONE

The northern portion of the subject site (approximately 76.3 acres) is located within the Edwards Aquifer Recharge Zone (EARZ) (TCEQ, 2017) (Attachment F, Figure 2). The Recharge Zone is described as an area where the stratigraphic units constituting the Edwards Aquifer crop out, including the outcrops of other geologic formations in proximity to the Edwards Aquifer, where caves, sinkholes, faults, fractures, or other permeable features would create a potential for recharge of surface waters into the Edwards Aquifer. The western and southern portions of the site (approximately 289.7 acres) are located within the Edwards Aquifer Contributing Zone. The Contributing Zone of the Edwards Aquifer includes all watersheds that feed runoff into rivers and streams that flow over the Recharge Zone (TCEQ, 2005b). TCEQ rules regulate activities in the portions of the Contributing Zone that are within the counties already regulated by the Edwards Aquifer rules. These areas are generally north and west of the Recharge Zone.

2.5 SURFACE SOILS

Six soil units are mapped within the subject site (NRCS, 2017) (Attachment F, Figure 4). Generally, the soil series are similar in their physical, chemical, and engineering properties, with the principal exception being rock fragment content and thickness. The soil units are described in further detail below.

Brackett gravelly clay loam, 3 to 12% slopes (BkE): This soil has a moderately alkaline, pale brown, clay loam surface layer about 5 inches thick, with about 15% cover of limestone fragments that range from 4 to 12 inches in diameter. The subsoil, to 16 inches, is moderately alkaline, pale yellow clay loam with about 5% weakly cemented fine limestone fragments. The underlying layer is very pale brown, interbedded, calcareous loam and limestone. This soil is well drained, permeability is moderately slow, and available water capacity is very low. Runoff is rapid.

Eckrant cobbly clay, 1 to 8% slopes (EaD): This soil has a surface layer about 13 inches thick. The upper part is dark grayish-brown cobbly clay and the lower part is dark brown cobbly clay. The underlying material is coarsely fractured, indurated limestone. This soil is calcareous and moderately alkaline. The surface has about 50% cover of limestone fragments that are mostly 4 to 8 inches across. This soil is well drained, permeability is moderately slow, and runoff is rapid. The available water capacity is very low.

Eckrant-Rock outcrop complex, rolling (ErE): This unit occurs along hills, ridges, and on sides of drainageways on uplands. This complex is made up of about 70% Eckrant soils, 15% Rock outcrop, and 15% other soils. Typically, the surface layer of Eckrant soils is calcareous, moderately alkaline, dark grayish-brown, extremely stony clay about 8 inches thick. The underlying material is fractured, indurated limestone. Fragments of limestone from 6 inches to 2 feet across cover about 35% of the surface. Rock outcrop consists of exposed limestone bedrock in narrow bands within areas of Eckrant soils. Loose cobbles and stones on the surface are common. Permeability is moderately slow, and surface runoff is rapid. The available water capacity is very low.

Georgetown stony clay loam, 1 to 3% slopes (GsB): This a gently sloping soil that occurs within central upland areas of the subject site. Typically, this soil has a slightly acidic, brown, stony clay loam surface layer about 7 inches thick and few stones on or near the surface. The subsoil, which extends down to a depth of about 35 inches, is neutral reddish-brown clay in the upper part and slightly acidic, reddish-brown, cobbly clay in the lower part. The underlying material is indurated, fractured limestone that has clay loam in crevices and fractures. This soil is well drained. Permeability is slow, and surface runoff is medium. The available water capacity is low. Reaction is neutral to slightly acidic. The erosion hazard is slight.

Oakalla soils, channeled (Oc) occur primarily along the bottomlands of the South Fork of the San Gabriel River. The surface layer is dark brown loam about 7 inches thick, followed by a dark brown clay loam layer about 16 inches thick. The underlying layer, to 66 inches, is dark brown, sandy, clay loam. This soil is calcareous and moderately alkaline. The available water capacity is high.

Sunev silty clay loam, 1 to 3% slopes (SuB): The upper layer is dark grayish-brown, silty clay loam about 18 inches thick. The subsoil, to 52 inches, is light yellowish-brown silty clay loam. The underlying layer, which extends to 60 inches, is reddish-yellow silty clay loam and has many soft masses and concretions of calcium carbonate. This soil is calcareous and moderately alkaline throughout. This soil is well drained, permeability is moderate, and surface runoff is medium. The available water capacity is moderate, and erosion is a slight hazard.

2.6 WATER WELLS

A review of TCEQ and Texas Water Development Board (TWDB) records revealed no water wells on the subject site and 3 wells within 0.5 miles of the subject site (TCEQ, 2017; TWDB, 2017). According to the TWDB records, 2 of the off-site wells (ID nos. 5827217 and 5819702) are reportedly completed within the Edwards Aquifer at total depths of 121 and 106 feet below surface grade, respectively. The third well (ID no. 54762) is reportedly completed within the Trinity Aquifer at a total depth of 840 feet below surface grade. Additionally, Horizon observed 2 unused private water wells (M-1 and M-2) at the subject site; however, no available records for these wells were found.

The results of this assessment do not preclude the existence of additional undocumented or abandoned wells on the site. If a water well or casing is encountered during construction, work should be halted near the object until the TCEQ is contacted. If any on-site wells are not intended for future use, they should be capped or properly abandoned according to the Administrative Rules of the Texas Department of Licensing and Regulation (TDLR), 16 Texas Administrative Code (TAC), Chapter 76. A plugging report must be submitted by a licensed water well driller to the TDLR Water Well Driller's Program, Austin, Texas. TCEQ publication RG-347, "Landowner's Guide to Plugging Abandoned Water Wells," provides specific guidance. If a well is intended for use, it must comply with 16 TAC §76.

2.7 GEOLOGY

Literature Review

A review of existing literature shows the subject site is predominantly underlain by both the undifferentiated Edwards Limestone Formation (Ked) and Comanche Peak Limestone (Kc) (UT-BEG, 1981), with estimated maximum thicknesses of about 65 and 60 feet, respectively. In addition, recent alluvium deposits (Qal - gravel, sand, silt, and clay) occur along the lower, eroded areas located along and near the South Fork of the San Gabriel River, with an estimated maximum thickness of up to 30 feet.

The Edwards Formation consists mostly of gray to light brownish-gray, thin to medium-bedded, dense dolomite, dolomitic limestone, and limestone. The Comanche Peak Limestone Formation underlies the Edwards and crops out on the south-facing slopes located near the South Fork of the San Gabriel River. It is approximately 60 feet thick and consists of white, soft, nodular limestone interbedded with marl and calcareous clay. Underlying the Comanche Peak Limestone is the Walnut Formation (Kwa). The uppermost 50 feet of the Walnut Formation is named the Keys Valley Marl Member, and consists of cream-colored, fossiliferous marl with some thin interbeds of soft limestone. The Keys Valley Marl is underlain by the Cedar Park Limestone and Bee Creek Marl members of the Walnut Formation. In general, the rock strata beneath the subject site dip to the east-southeast at about 10 to 30 feet per mile.

The subject site is located within the Balcones Fault Zone, and available geologic reports indicate the nearest mapped fault is located about 2 miles to the northeast. In general, the rock strata beneath the site dip to the east-southeast at about 10 to 30 feet per mile (less than 1°). The site Stratigraphic Column is provided as Attachment B, and the Site Geologic Map is Attachment D.

Field Assessment

A field survey of the subject site was conducted by a licensed Horizon geologist and support staff on 21, 22, 23, and 24 August 2017 and 8, 11, and 12 September 2017. Horizon identified 6 geologic features (F-1, F-2, F-2A, F-3, F-4, and F-5) and 2 man-made features (M-1 and M-2; private water wells previously discussed) on the subject site that meet the TCEQ definition of a potential recharge feature. In addition, Horizon observed no apparent springs at the subject site.

Geologic features identified on the subject site are described as follows:

Geologic Feature F-1: Small upland sinkhole measuring approximately 6 feet in diameter by 1 foot deep, with a semi-open drainage portal (approximately 1.5 feet long by 0.5 feet wide by 1.5 feet deep) amongst rock and loose soil infilling. Slight air flow conductivity was noted at the opening. After limited hand excavation, probing with a steel rod encountered loose soil, small rocks, and/or cobbles about 2 feet below the surface. On 8 September 2017, Horizon staff hand- excavated an area (3 feet long by 2 feet wide by 4 feet deep) and found the portal narrows to only about 1 foot in diameter at 6 feet below the surface. No other voids and/or drainage portals were observed along the excavated floor or walls. Additional probing within the portal revealed loose soil and/or rocks infilling at 8 feet below the surface. The excavation area was left open. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.4 acres.

Geologic Features F-2 and F-2A: Two small solution cavities spaced about 15 feet apart, measuring approximately 0.5 feet in diameter by 1.5 feet deep, with semi-open drainage portals along soil/rock-filled floor areas. Probing with a steel rod encountered light brown clay soil about 2 feet below the surface. Slight air flow conductivity was noted at the openings. On 8 and 11 September 2017, Horizon staff hand-excavated both cavities (approximately 3 feet in diameter by 1.5 feet deep [F-2A] and 3 feet long by 2 feet wide by 2 feet deep [F-2]) and exposed 2 open drainage portals along the excavated floor of the eastern (F-2) solution cavity. The larger portal was about 0.5 feet long by 0.2 feet wide by 1.5 feet deep, with an apparent thin (6-inch high) bedding plane void below. The excavation areas were left open. These features have an intermediate infiltration rate and a surface runoff catchment of less than 0.1 acres, since they are located on a flat to very gently sloping area.

Geologic Feature F-3: Solution-enlarged fracture measuring approximately 6 feet long by 0.5 feet wide by 1.5 feet deep (azimuth: N75°E), with apparent semi-open drainage portals and no apparent air flow conductivity. After limited hand excavation, probing with a steel rod encountered loose clay and cobbles about 2 feet below the surface. On 12 September 2017, Horizon staff hand-excavated an area (2.5 feet long by 2 feet wide by 2.5 feet deep) near the center of the fracture and found no voids and/or drainage portals along the excavated floor and/or walls. Additional probing within the excavation revealed soft weathered bedrock at 3 feet below the surface. The excavation area was left open. This feature has a low infiltration rate and an apparent surface runoff catchment of less than 0.1 acres.

Geologic Feature F-4: Epikarstic solution cavity measuring approximately 0.8 feet long by 0.3 feet wide by 1 foot deep, with firm soil and/or rock infilling. No air flow conductivity or apparent drainage portals were noted. After limited hand excavation, probing with a steel rod encountered firm soil infilling about 1.5 feet below the surface. This feature has a low infiltration rate and an apparent surface runoff catchment of less than 0.1 acres.

Geologic Feature F-5: Small rock shelter cave located along a steep cliff edge within an unnamed tributary of the San Gabriel River near the northeastern corner of the subject site (west tract). The cave measures approximately 15 feet across by 3 feet high along the entrance and extends into the cliff face for about 20 feet. Near the back of the cave is a narrow, low passage about 2 feet wide by 0.5 to 1 foot high that extends for an unknown distance. Slight to moderate air flow conductivity was noted near this opening. This feature is a relic discharge feature that, at one time in the past, may have had groundwater flowing out of the cave entrance as a spring. No water was observed inside the cave. This feature has a very low infiltration rate and no surface runoff catchment.

The geologic and man-made features were evaluated for their potential to be significant pathways for fluid movement into the Edwards Aquifer. The Geologic Assessment

Table (Attachment A) summarizes this evaluation and assigns each feature's sensitivity a total point value. Those with a point value of 40 or higher are deemed to be sensitive groundwater recharge features and should be protected during site development pursuant to TCEQ rules for protection of the Edwards Aquifer (30 TAC 213).

3.0 CONCLUSIONS AND RECOMMENDATIONS

Three geologic features (F-1, F-2, and F-2A) have been evaluated as sensitive for groundwater recharge capability and would therefore require a TCEQ protective setback buffer. In general, a protective buffer encompassing a sensitive feature is recommended to meet the TCEQ guidance for a setback of at least 50 feet in all directions from the feature's areal extent (perimeter), plus its watershed catchment up to 200 feet from the perimeter of the feature. However, for features F-2 and F-2A, only a 50-foot-diameter setback buffer around each opening is recommended, since the immediate topography is relatively flat surrounding these features.

Three geologic features (F-3, F-4, and F-5) have been evaluated as non-sensitive for groundwater recharge capability and would therefore not require a TCEQ protective setback buffer. No further action is recommended for these non-sensitive geologic features. The man-made features (M-1 and M-2) have also been evaluated as non-sensitive for groundwater recharge capability and would therefore not require TCEQ protective setback buffers. Additionally, some of the larger unnamed tributaries of the South Fork of the San Gabriel River would require protection or mitigation pursuant to the City of Georgetown Edwards Aquifer Recharge Zone Water Quality Ordinance No. 2013-59.

The site generally appears well suited to development prospectuses. It should be noted that soil and drainage erosion would increase with ground disturbance. Native grasses and the cobbly content of the soil aid to prevent erosion. Soil and sedimentation fencing should be placed in all appropriate areas prior to any site-disturbing activities.

Because a portion of the subject site is located over the Edwards Aquifer Recharge Zone, it is possible that subsurface voids underlie the site. If any subsurface voids are encountered during site development, work should halt immediately so that a geologist may assess the potential for the void(s) to provide meaningful contribution to the Edwards Aquifer.

4.0 REFERENCES

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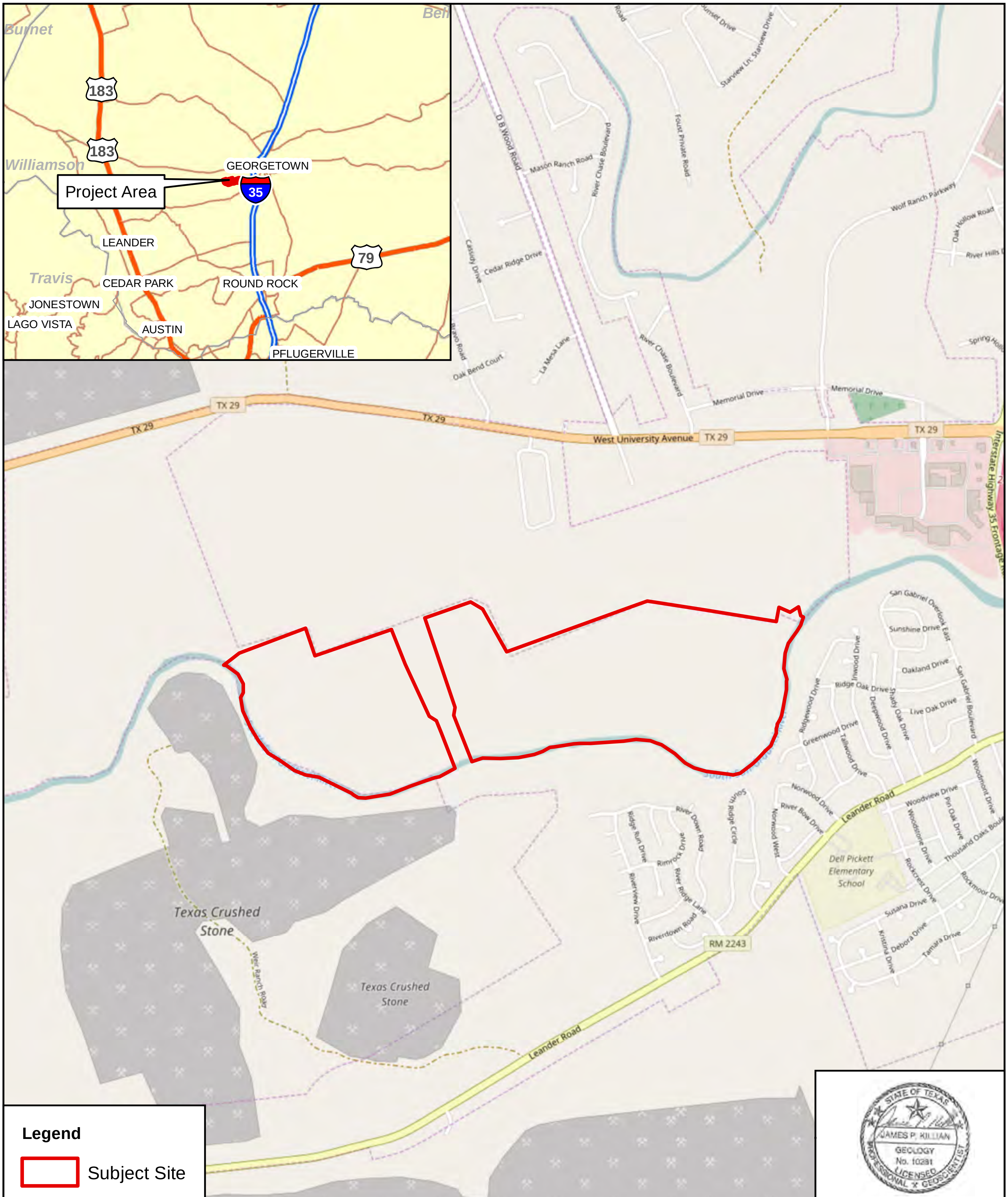
ATTACHMENT F

ADDITIONAL SITE MAPS



Horizon
Environmental Services, Inc.

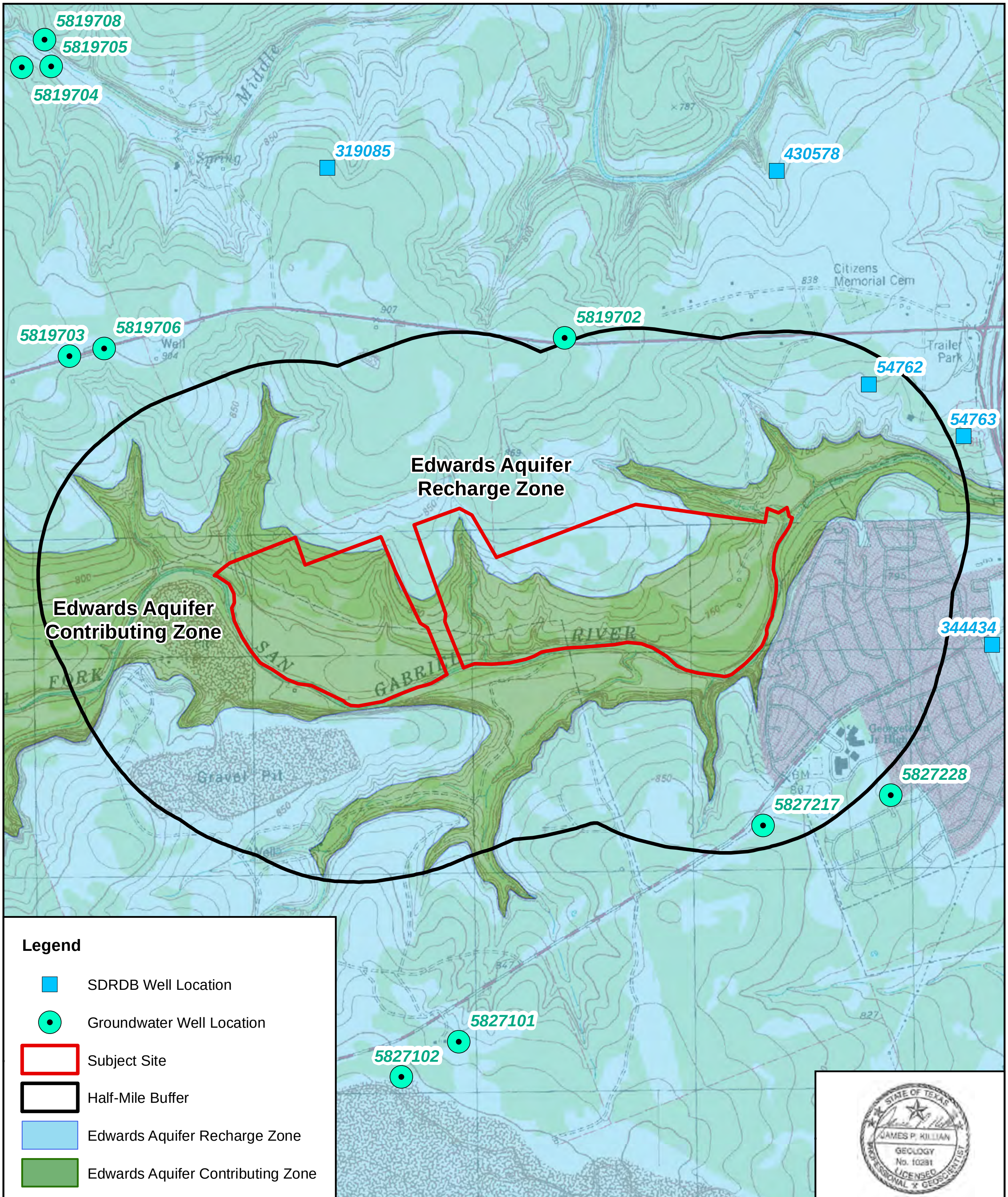
Date:	08/23/2017
Drawn:	REO
HJN NO:	170167
Source:	OSM, 2017

Attachment F, Figure 1

Vicinity Map
Guy Tract
Southern Terminus of D B Wood Road
Georgetown, Williamson County, Texas

0 1,000 2,000
Feet

170167 - Hillwood Guy Tract\Graphics\170167GA_01A_Vicinity.mxd



Horizon Environmental Services, Inc.

Date:	08/23/2017
Drawn:	REO
HJN NO:	170167
Source:	USGS, 1987; TCEQ, 2107; TWDB, 2017

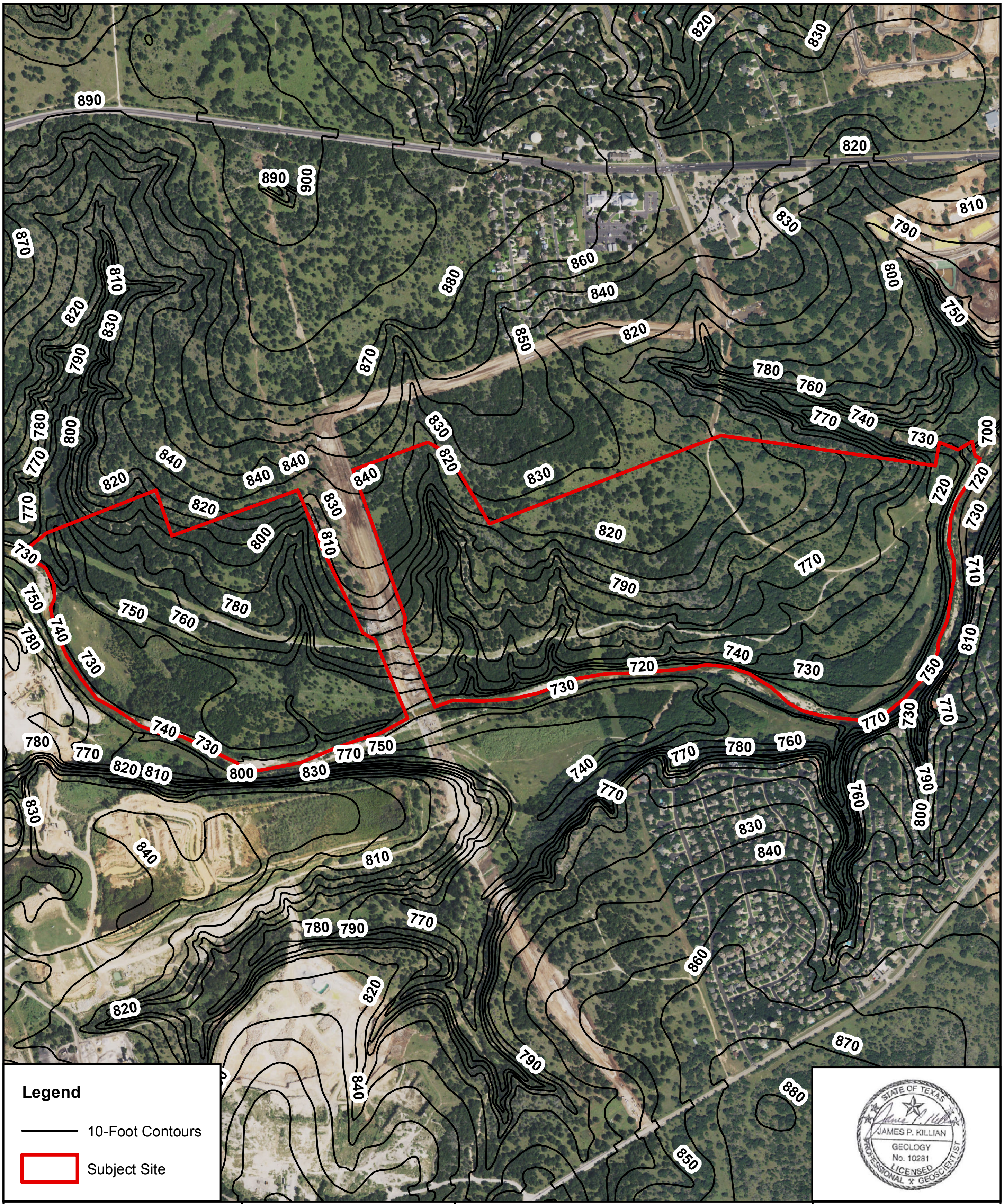
Attachment F, Figure 2

Topography and Hydrogeology Map
Guy Tract
Southern Terminus of D B Wood Road
Georgetown, Williamson County, Texas

N

0 1,000 2,000
Feet

170167 - Hillwood Guy Tract\Graphics\170167GA_02A_Topo_Hydro.mxd



Horizon
Environmental Services, Inc.

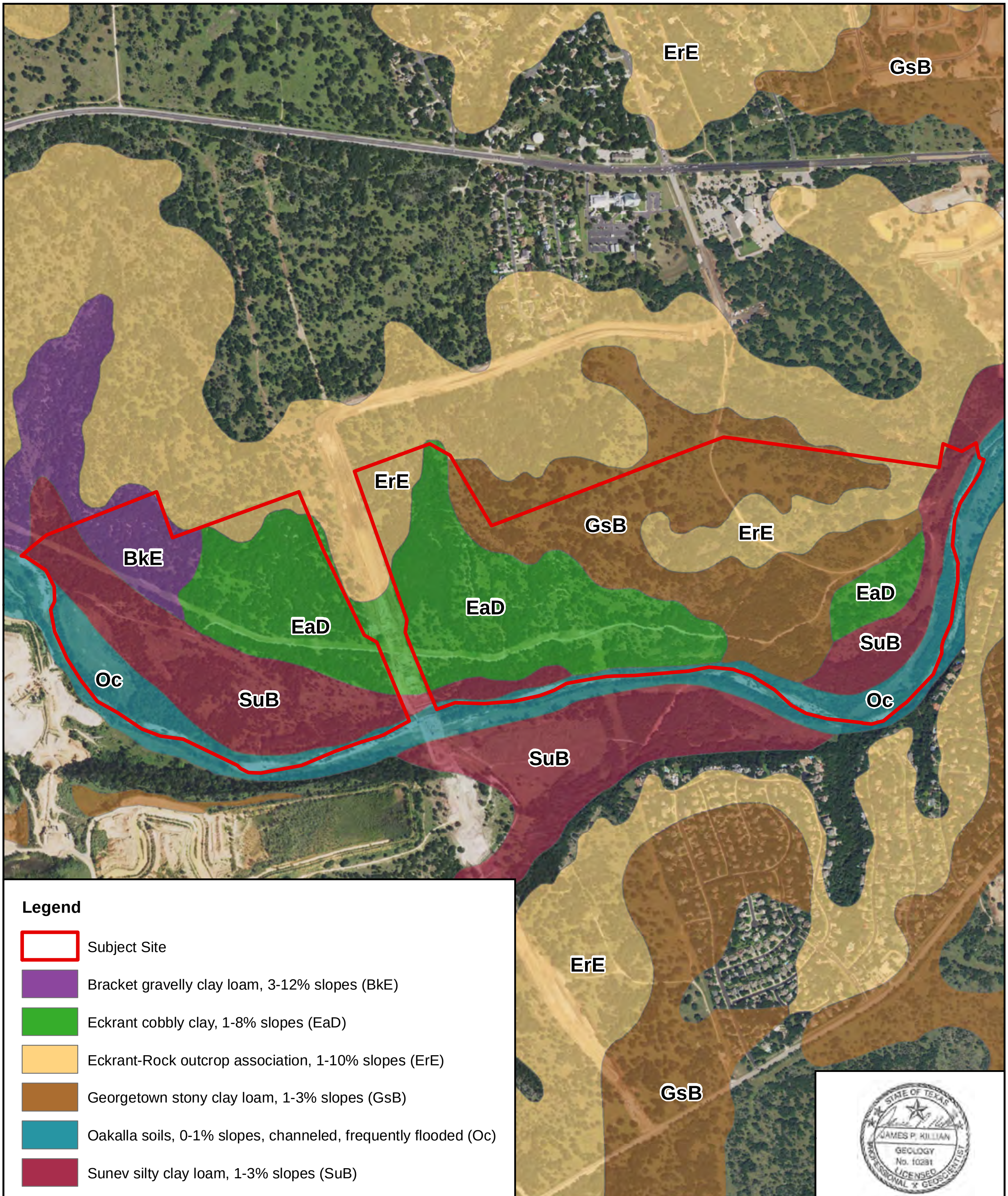
Date:	08/23/2017
Drawn:	REO
HJN NO:	170167
Source:	CAPCOG, 2013; USDA, 2016

Attachment F, Figure 3

Site Topography Map
Guy Tract
Southern Terminus D B Wood Road
Georgetown, Williamson County, Texas

0 600 1,200
Feet

170167 - Hillwood Guy Tract\Graphics\170167GA_03A_Topo.mxd



Horizon Environmental Services, Inc.

Date:	08/23/2017
Drawn:	REO
HJN NO:	170167
Source:	USDA, 2016; NRCS, 2017

Attachment F, Figure 4

Surface Soil Map
Guy Tract
Southern Terminus of D B Wood Road
Georgetown, Williamson County, Texas

N

0 600 1,200
Feet

170167 - Hillwood Guy Tract\Graphics\170167GA_04A_Soils.mxd

Horizon
Environmental Services, Inc.

ATTACHMENT G

SITE PHOTOGRAPHS

PHOTO 1
View of geologic feature F-1 (sinkhole), facing down

PHOTO 2
View of F-1 after hand excavation with narrow, open drainage portal(s)

PHOTO 3
View of geologic feature F-2 (solution cavity), facing down

PHOTO 4
View of F-2 after hand excavation with open drainage portals

PHOTO 5
View of geologic feature F-2A (solution cavity), facing down

PHOTO 6
View of F-2A after hand excavation with open drainage portal

PHOTO 7
View of geologic feature F-3 (solution-enlarged fracture), facing east

PHOTO 8
View of F-3 after hand excavation with no voids or open drainage portals

PHOTO 9
View of geologic feature F-4 (epikarstic solution cavity), facing north

PHOTO 10
View of geologic feature F-5 (rock shelter cave), facing northeast

PHOTO 11
View inside F-5 (rock shelter cave), facing northeast

PHOTO 12
Another view inside F-5, facing east

PHOTO 13
View of man-made feature M-1 (unused water well), facing south

PHOTO 14
View of man-made feature M-2 (water well) used to water livestock, facing west

WOLF RANCH GEOLOGIC ASSESSMENT

Horizon™
Environmental Services, Inc.

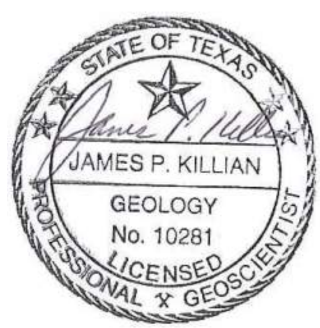
GEOLOGIC ASSESSMENT
767 ACRES – WOLF RANCH PROPERTIES
STATE HIGHWAY 29 WEST
GEORGETOWN, WILLIAMSON COUNTY, TEXAS
HJN 130219 GA

PREPARED FOR:

HILLWOOD COMMUNITIES
DALLAS, TEXAS

PREPARED BY:

HORIZON ENVIRONMENTAL SERVICES, INC.



NOVEMBER 2013

Revised Hillwood Wolf Ranch GA

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Horizon Environmental Services, Inc.

TCEQ GEOLOGIC ASSESSMENT FORM

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

REGULATED ENTITY NAME: 767 acres – Wolf Ranch Properties;
SH 29 West Georgetown, Williamson County, Texas

TYPE OF PROJECT: X WPAP _ AST X SCS _ UST

LOCATION OF PROJECT: X Recharge Zone __ Transition Zone X Contributing Zone

PROJECT INFORMATION

Figure 1 shows the Site Location and Edwards Aquifer Recharge Zone.

1. X Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE** provided in Appendix C.

2. X Soil cover on the project site is summarized in the table below (Table 1) and uses the Soil Conservation Service (SCS) Hydrologic Soil Groups* (*Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A*, SCS, 1986) (NRCS, 1975, and Werchan et al., 1983).

TABLE 1 – SURFACE SOILS

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Brackett gravelly clay loam, 3 to 16% slopes (BkE)	C	1 - 2
Eckrant cobbly clay, 1 to 8% slopes (EaD)	D	0.5 - 1
Eckrant extremely stony clay, 0 to 3% slopes (EeB)	D	0.5 - 1
Eckrant-Rock outcrop complex, rolling (ErE)	D	0.5 - 1
Eckrant-Rock outcrop complex, hilly (ErG)	D	0.5 - 1
Georgetown stony clay loam, 1 to 3% slopes (GsB)	D	2 - 4
Oakalla soils, 0 to 1% channeled (Oc)	B	5 - 7
Sunev silty clay loam, 1 to 3% slopes (SuB)	B	9 - 11

* Soil Group Definitions (Abbreviated)

A. Soils having a high infiltration rate when thoroughly wetted.

B. Soils having a moderate infiltration rate when thoroughly wetted.

C. Soils having a slow infiltration rate when thoroughly wetted.

D. Soils having a very slow infiltration rate when thoroughly wetted.

3. X A **STRATIGRAPHIC COLUMN** is attached at the end of this form in the additional comments section and shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column (Appendix A, Figure 5).

4. X A **NARRATIVE DESCRIPTION OF SITE-SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. X Appropriate **SITE GEOLOGIC MAP(S)** are attached in Appendix B:

The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1": 400'

Applicant's Site Plan Scale	1" = 200'
Site Geologic Map Scale	1" = 200'
Site Soils Map Scale (if more than 1 soil type)	1" = 1800'

6. Method of collecting positional data:
   X Global Positioning System (GPS) technology.
   _ Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map (Appendix B).

8. X Surface geologic units are shown and labeled on the Site Geologic Map (Appendix B).

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map (Appendix B) and are described in the attached Geologic Assessment Table (Appendix C).

   _ Geologic or manmade features were not discovered on the project site during the field investigation.

10. X The Recharge Zone boundary is shown and labeled, if appropriate (Appendix A, Figure 2).

11. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.):

   X There are 3 (#) wells and 0 test wells present on the project site, and the locations are shown and labeled. (Check all of the following that apply.)
   _ The test well is not in use and has been properly abandoned.
   X The wells are not in use and will be properly abandoned.
   _ The wells are in use and comply with 16 TAC §76.

_ There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

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

Date(s) Geologic Assessment was performed:

8 to 11, 17, 18, 22 to 25 October and 26 November 2013
Date(s)

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

For Horizon Environmental Services, Inc.

James Killian, PG[1]
Print Name of Geologist

(512) 328-2430, Ext. 112
Telephone

(512) 328-2633
Fax

____
Signature of Geologist

27 November 2013
Date

Representing: Horizon Environmental Services, Inc., Austin, Texas

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

[1] Registered Professional Geologist, State of Texas

TCEQ GEOLOGIC ASSESSMENT
ADDITIONAL COMMENTS

1.0 INTRODUCTION AND METHODOLOGY

This report and the planned abatement measures are intended to fulfill Texas Commission on Environmental Quality (TCEQ) reporting requirements (TCEQ, 1999). This geologic assessment includes a review of the site for potential aquifer recharge and documentation of general geologic characteristics for the subject property. Horizon conducted the necessary field and literature studies according to TCEQ Instructions to Geologists for completing Geologic Assessments within the Edwards Aquifer Recharge Zone (TCEQ, 2004).

Horizon walked transects spaced less than 50 feet apart and mapped the location of features using a subfoot accurate Trimble GeoHX handheld GPS and post-processed data utilizing aerial photographs, topographic maps, and GPS Pathfinder Office software. Horizon also searched the area around any potential recharge features that were encountered to look for any additional features.

The Geologic Assessment Table in Appendix C provides a description of any features that meet the TCEQ definition of potential recharge features (TCEQ, 2004). Features that do not meet the TCEQ definition, which include surface weathering, karren, or animal burrows, were evaluated in the field and omitted from this report. While walking transects, Horizon removed loose rocks and soil (by hand), when necessary, to preliminarily assess each feature's subsurface extent. However, labor-intensive excavation was not conducted.

The results of this survey do not preclude the possibility of finding subsurface voids or abandoned test or water wells during the clearing or construction phases of the proposed project. If a subsurface void is encountered during any phase of the project, construction should be halted until the TCEQ (or appropriate agency) is contacted and a geologist can investigate the feature.

2.0 ENVIRONMENTAL SETTING

2.1 LAND USE

The subject property is undeveloped rangeland and/or woodland currently used for wildlife management. It consists of 4 separate tracts, totaling approximately 767 acres, located west of Georgetown, Williamson County, Texas along either side of State Highway (SH) 29 West (Appendix A, Figures 1 and 2). Five rural homesteads are located within the subject property, 4 of which are located throughout tract 1, and 1 abandoned homestead that is located near SH 29 in tract 3. Local electrical, sewer, and water utilities were observed along portions of the subject property. Surrounding land use consists of residential, undeveloped, and commercial properties. A privately owned golf course (Georgetown Country Club) is situated along the Middle Fork of the San Gabriel River that divides part of tract 1. Additionally, Texas Crushed Stone Company operates 2 active (open pit) limestone quarries located immediately northwest and south of tract 2.

2.2 TOPOGRAPHY AND SURFACE WATER

The subject property is situated on gently to steeply sloping terrain along the Middle and South Forks of the San Gabriel River watershed (Appendix A, Figures 3A to 3C and 4A to 4D). Surface elevations vary from a minimum of approximately 700 feet above mean sea level (amsl) at the southeast boundary of tract 1 to a maximum of approximately 910 feet amsl at the northwest corner of tract 3. In general, slopes vary greatly depending on their proximity to the San Gabriel River and/or its surrounding tributaries.

Surface drainage occurs primarily by overland sheet flow into the Middle and South Forks of the San Gabriel River, which eventually converge into the San Gabriel River, located farther to the east. In addition, several unnamed intermittent tributaries located along portions of the subject property drain into the Middle and South Forks of the San Gabriel River.

2.3 EDWARDS AQUIFER ZONE

As shown in Appendix A, Figures 3A to 3C, approximately 686 acres of the subject property are found within the Edwards Aquifer Recharge Zone, as mapped by the TCEQ Recharge Zone Boundary Maps. However, select portions (about 81 acres near the South Fork of the San Gabriel River and its tributaries) are located outside of the recharge zone and mapped within the Edwards Aquifer Contributing Zone (TCEQ, 2013).

2.4 SURFACE SOILS

Mapping by the Natural Resources Conservation Service (NRCS, 2013) shows a total of 8 soil mapping units within the subject property (Appendix A, Figure 5) associated with soil series, as described below.

Brackett gravelly clay loam (BkE) occurs along an unnamed tributary of tract 2. This soil has a moderately alkaline, pale brown clay loam surface layer about 5 inches thick with about 15% cover of limestone fragments that range from 4 to 12 inches in diameter. The subsoil, to 16 inches, is moderately alkaline, pale yellow clay loam with about 5% weakly cemented fine limestone fragments. The underlying layer is very pale brown interbedded calcareous loam and limestone. This soil is well-drained, permeability is moderately slow, and available water capacity is very low. Runoff is rapid.

Eckrant cobbly clay (EaD) is situated at the head of an unnamed tributary within the southwest corner of tract 4. This soil has a surface layer about 13 inches thick. The upper part is dark grayish-brown cobbly clay and the lower part is dark brown cobbly clay. The underlying material is coarsely fractured, indurated limestone. This soil is calcareous and moderately alkaline. The surface has about 50% cover of limestone fragments that are mostly 4 to 8 inches across. This soil is well-drained, permeability is moderately slow, and runoff is rapid. The available water capacity is very low.

Eckrant extremely stony clay (EeB) occurs mostly in the southern property tracts (2 to 4) along nearly level to gently sloping broad ridges and shallow valleys of uplands. This soil has an extremely stony, very dark gray clay surface layer about 11 inches thick. The underlying material is indurated limestone. About 25% of the surface is covered with limestone fragments, ranging from 3 inches to 3 feet across and as much as 10 inches thick. The soil is calcareous and moderately alkaline. This soil is well-drained, permeability is moderately slow, and surface runoff is rapid. The available water capacity is very low.

Eckrant-Rock outcrop complex, rolling (ErE) is located throughout most of the subject property. It consists of Eckrant soils and Rock outcrop located along hills, ridges, and on sides of drainageways on uplands. This complex is made up of about 70% Eckrant soils, 15% Rock outcrop, and 15% other soils. Typically, the surface layer of Eckrant soils is calcareous, moderately alkaline, dark grayish-brown extremely stony clay about 8 inches thick. The underlying material is fractured, indurated limestone. Fragments of limestone from 6 inches to 2 feet across cover about 35% of the surface. Rock outcrop consists of exposed limestone bedrock in narrow bands within areas of Eckrant soils. Loose cobbles and stones on the surface are common. The other soils included in this complex are Doss, Denton, and Georgetown. Permeability is moderately slow and surface runoff is rapid. The available water capacity is very low.

Eckrant-Rock outcrop complex, hilly (ErG) occurs primarily within tract 1, consisting of Eckrant soils and Rock outcrop mostly along major streams where erosion has formed sharp hills, ridges, and ravines. This complex is made up of about 41% Eckrant soils, 38% Rock outcrop, and 21% other soils. Typically, the Eckrant soils have a calcareous, moderately alkaline, extremely stony, dark grayish-brown silty clay loam surface layer about 11 inches thick. The underlying material is indurated limestone. About 55% of the soil surface is covered with fragments of limestone that are 1 to 6 feet across. Rock outcrop consists of exposed limestone bedrock below the crest of hills and ridges. Loose cobbles and stones on the surface are common. The other soil included in this complex is Doss. The soils are well-drained, permeability is moderately slow, and surface runoff is rapid. The available water capacity is low.

Georgetown stony clay loam (GsB) is situated within tracts 1 and 4 on higher parts of uplands. This soil has a slightly acid, brown stony clay loam surface layer about 7 inches thick and few to common stones on or near the surface. The subsoil, which extends down to a depth of about 35 inches, is neutral, reddish-brown clay in the upper part and slightly acid, reddish-brown cobbly clay in the lower part. The underlying material is indurated, fractured limestone that has clay loam in crevices and fractures. This soil is well-drained, permeability is slow, and surface runoff is medium. The available water capacity is low, reaction is neutral to slightly acid, and erosion hazards range to slight.

Oakalla soils, channeled (Oc) occur primarily along the bottomlands of the Middle Fork of the San Gabriel River within tract 1. The surface layer is dark brown loam about 7 inches thick, followed by a dark brown clay loam layer about 16 inches thick. The underlying layer, to 66 inches, is dark brown sandy clay loam. This soil is calcareous and moderately alkaline. The available water capacity is high.

Sunev silty clay loam (SuB) occurs primarily along gently sloping stream terraces of the subject property. The upper layer is dark grayish-brown silty clay loam about 18 inches thick. The subsoil, to 52 inches, is light yellowish-brown silty clay loam. The underlying layer, which extends to 60 inches, is reddish-yellow silty clay loam and has many soft masses and concretions of calcium carbonate. This soil is calcareous and moderately alkaline throughout. This soil is well-drained, permeability is moderate, and surface runoff is medium. The available water capacity is moderate and erosion is a slight hazard (NRCS, 2013).

2.5 GEOLOGY

A review of existing geologic literature shows that the subject property is predominately underlain by the undifferentiated Edwards Limestone Formation (Ked) Bureau of Economic Geology (UT-BEG, 1995), with an estimated maximum thickness of up to 100 feet at higher surface elevations (Appendix A, Figure 6, and Appendix B, Figures 1A to 1C). The Comanche Peak Limestone (Kc) crops out in select portions of the subject property, typically at lower surface elevations situated along the South and Middle Forks of the San Gabriel River and its tributaries (tracts 1, 2, and 4). Underlying the Comanche Peak Limestone is the Walnut Formation (Kwa). In general, the rock strata beneath the subject property dip to the east-southeast at about 10 to 30 feet per mile.

Additionally, recent (Quaternary-age) floodplain deposits (alluvium [Qal]) consisting of clay, silt, sand, and gravel occur within both forks of the San Gabriel River (tracts 1 and 4). Fluviatile terrace deposits (Qt) consist of gravel, sand, silt, and clay in various proportions, with gravel more prominent in the older, higher terraces; dolomite, limestone, and chert from the Edwards Plateau; and sand that is mostly quartz (UT-BEG, 1995). These deposits occur primarily along the sides of the South Fork of the San Gabriel River (tracts 2 and 4).

The subject property is located about 1 mile west of the Balcones Fault Zone and available geologic reports indicate that the immediate area has not been affected by geologically inactive, normal faulting. A normal fault is an inclined fault in which the hanging wall appears to have slipped downward relative to the footwall. The nearest mapped fault is located about 1 mile east of the subject property and strikes N10-15°E (UT-BEG, 1995).

Table 2 (below) depicts the stratigraphic relationship and approximate thicknesses of the uppermost geologic unit found at the subject property.

TABLE 2 – GEOLOGIC STRATIGRAPHIC COLUMN

Geologic Period	Hydrologic Unit	Geologic Unit	Geologic Member	Approximate Thickness (feet)	Description
Lower Cretaceous	Edwards Aquifer	Edwards Formation (Ked)	--	Up to 100	Gray to light brownish-gray, thin to medium-bedded, dense, dolomite, dolomitic limestone, and limestone containing rudists (long, conical bivalves). Gray to black chert is common. Moderate to high cave development.
Lower Cretaceous	Edwards Aquifer	Comanche Peak Formation (Kc)	--	60	Gray to very light brown, fine-grained, nodular limestone, marly limestone, and marl. No cave development.
Lower Cretaceous	Confining Unit	Walnut Formation (Kwa)	--	175	Composed of 4 thinly bedded limestone and marl members (Keys Valley Marl, Cedar Park Limestone, Bee Cave Marl, and Bull Creek Limestone). Low cave development.

2.6 WATER WELLS

A search was made for water wells on and within 0.5 miles of the subject property. A review of the records of the TCEQ and the Texas Water Development Board (TWDB) revealed no water wells at the subject property. However, there was evidence of water wells present during the field investigation. Three unused private water wells were found, including 2 cased wells (M-6 and M-11) in tracts 3 and 1, respectively, and an old, apparently collapsed (hand-dug) well (M-5) in tract 3 behind an abandoned homestead. The results of this survey do not preclude the existence of additional unused/abandoned wells.

Five documented water wells were found within 0.5 miles from the subject property (TWDB, 2013). Three of these water wells are reported to be test holes that were completed in the Edwards Formation at total depths ranging from 105 to 134 feet. The fourth water well (No. 5819706) is reported to have been completed in the Glen Rose Formation (Upper and/or Middle Trinity aquifers) at a total depth of 898 feet. The fifth water well (No. 5819822) is reported to be a natural groundwater spring and is not a water well. Appendix A, Figures 3A to 3C, show the water well/spring locations.

Abandoned wells must be capped or properly abandoned according to the Administrative Rules of the Texas Department of Licensing and Regulation, 16 Texas Administrative Code (TAC), Chapter 76, effective 3 January 1999. A plugging report must be submitted (by a licensed water well driller) to the Texas Department of Licensing and Regulation, Water Well Driller's Program, Austin, Texas. If a well is intended for use, it must comply with 16 TAC §76.

2.7 GEOLOGIC AND MANMADE FEATURES

A field survey of the subject property was conducted by a licensed Horizon geologist with support staff on 8 to 11, 17, 18, and 22 to 25 October 2013. A total of 32 natural geologic features (F-1 to F-22, F-22A, and F-23 to F-31) were identified and are further described below. In addition, 3 natural geologic features (NF-7 [F-32], NF-5 [F-33], and NF-1 [F-34]) have been included in this survey from previous investigation(s) for proposed roadway alignment of Wolf Ranch Parkway conducted by HDR Engineering, Inc. and SWCA Environmental Consultants in December 2010.

A total of 12 manmade features (M-1 to M-12) were found at the subject property. Three manmade features (M-1 to M-3) in tract 4 were identified as sanitary sewer manholes. These manholes and their associated underground sewer line(s) are maintained by the City of Georgetown and appeared to be in good working condition. Manmade feature M-4 is a borrow pit (about 200 feet long x 120 feet wide x 20 feet deep) located in the northwest corner of tract 3 and has apparently been partially filled in with boulders, rubble, dirt fill, and scattered inert waste debris (e.g., wood, tin, etc.). Three manmade features (M-5, M-6, and M-11) identified as unused, private water wells (previously described) were found at the subject property (tracts 1 and 3). Four manmade features (M-7 to M-10) in tract 1 are part of an existing storm water retention pond system, also maintained by the City of Georgetown. The last manmade feature (M-12) is a large stock pond within an unnamed tributary of the South Fork of the San Gabriel River (southwest corner of tract 2).

Geologic Feature F-1 (tract 4): Solution-enlarged fracture (azimuth: N280ºW) measuring approximately 4 feet long x 1 foot wide x 2.5 feet deep with apparent drainage portal openings amongst loose, in-filled rocks. Very slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 3.5 to 4 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-2 (tract 4): Upland sinkhole measuring approximately 15 feet in diameter x 3 feet deep with open drainage portal measuring 7 feet long x 4.5 feet wide x 4 feet deep near center of sink. Air flow conductivity was noted. A low (1 to 3 feet high), bedding plane void appears to extend for over 15 feet to the west, north, and east from the entrance drop. This void area meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. This cave appears to have been previously excavated based on the presence of dirt/rock piles located on the surface, immediately to the southwest. In addition, old flagging tape attached to tree limbs was observed near the entrance. Inside the cave, the floor consists of thick, dry to moist, very dark gray to black clay and loose rocks and appears to slope down toward the east, for about 10 feet from the entrance, into an apparent internal drain of unknown extent. This cave has a high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-3 (tract 4): Solution cavity measuring approximately 1.5 feet in diameter x 1.5 feet deep. This feature is clay-filled with no apparent drainage portals or air flow conductivity. Probing with a steel rod encountered firmer clay soil and cobbles about 2 to 2.5 feet below the surface. The feature appears to have been previously excavated based on the presence of small dirt/rock piles located on the surface, immediately to the south. In addition, old flagging tape attached to tree limbs was observed near the opening. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Geologic Feature F-4 (tract 4): Two small solution cavities spaced about 2 feet apart near the base of a small cedar elm tree. One solution cavity measures approximately 0.4 feet long x 0.2 feet wide x 1.5 feet deep with an apparent drainage portal. Slight air flow conductivity was noted. The second cavity measures approximately 0.4 feet long x 0.2 feet wide x 0.5 feet deep with no apparent drainage portal or air flow conductivity. Probing with a steel rod encountered firmer clay soil/rocks about 1.5 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-5 (tract 3): Large upland sinkhole measuring approximately 25 feet in diameter x 4 feet deep next to a big live oak tree. Within the center of the sinkhole is an open drainage portal measuring about 8 feet long x 2.5 feet wide x 1.5 feet deep. Strong air flow conductivity was noted. A low (1 to 4 feet high) bedding plane void room appears to extend from the opening in a west-to-south direction for about 30 feet. At the southwest end of this room is a headwall with an underlying, low opening which leads into a larger, open room about 100 feet long x 60 feet wide x 3 to 8 feet high. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. According to available records, this cave was previously discovered in 1991 and has been officially named **Lobo's Lair Cave** (TPWD, 2013). Inside the cave, the floor areas consist of loose rock and thin, dry to moist, black and red clay. An apparent large internal drain of unknown extent is located within the cave's largest room. At the back of the cave is an upper room with an open connection (skylight) leading back up to the surface that measures about 3 feet long x 2.5 feet wide x 6 feet deep. This cave has a very high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-6 (tract 3): Solution cavity measuring approximately 3 feet long x 2 feet wide x 1.5 feet deep with no apparent drainage portal openings or air flow conductivity. Probing with a steel rod encountered clay soil and cobbles about 2.5 feet below the feature's floor. This feature appears to have been previously excavated based on the presence of small dirt/rock piles located on the immediate surrounding surface. In addition, old flagging tape attached to bushes/tree limbs was observed near the feature. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres. Additionally, there is a large, non-karst, closed depression located about 10 feet north of the solution cavity feature that measures 18 feet in diameter x 2 feet deep with a thick, dense, reddish-brown clay floor. Probing with a steel rod encountered firm clay soil and cobbles about 2 feet below the feature's floor, and no internal drainage portals/pathways were found along the extent of its floor.

Geologic Feature F-7 (about 60 feet west/southwest of Feature F-6; adjacent to tract 3): Large upland sinkhole measuring approximately 25 feet in diameter x 3 to 4 feet deep. Within the center of the sinkhole is a live oak tree that has a large taproot extending into an open drainage portal measuring about 8 feet long x 5 feet wide x 5 feet deep. Additional rock-choked drainage portals occur along the south side of the opening. Air flow conductivity was noted. A low (1 to 3.5 feet high) bedding plane void room appears to extend from the opening in an eastern direction for over 40 feet. At the east end of this room is an internal drain of unknown extent. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. According to available records, this cave was previously discovered in 1991 and has been officially named **Wolf's Rattlesnake Cave** (TPWD, 2013). Inside the cave, the floor areas consist of dry to moist black clay and loose rocks. This cave has a very high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-8 (tract 3): Solution cavity measuring approximately 3 feet long x 2 feet wide x 2.5 feet deep with apparent drainage portal openings amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 5 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-9: Large upland sinkhole measuring approximately 30 feet long x 20 feet wide x 3 feet deep within a wooded area. Near the middle of the sinkhole are two open drainage portals, the larger measuring about 7 feet in diameter x 4 feet deep and the smaller measuring 3 feet in diameter x 8 feet deep. Air flow conductivity was noted only at the smaller, but deeper drainage portal opening. This feature appears to have been previously excavated based on the presence of large dirt/rock piles located on the surface near both openings. In addition, a blue tarp was partially draped over the top of the smaller (vertical) opening. At the base of the smaller opening, a low (1 to 4 feet high) bedding plane void room appears to extend in a northeast-to-southeast direction for over 40 to 60 feet. At the east end of this room is an internal drain of unknown extent that had incised scour marks along the clay/rock floor that leads back upslope to where the larger portal opening on the surface is located. Another room that trends farther to the northeast (at least 35 feet long x 10 feet wide; unknown full extent) with higher ceiling heights was visible through a low crawlway at the north side of the bedding plane room. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. According to available records, this sink/cave was previously discovered and has been officially named **Wolf's Algorita Sink** (TSS, 2013). Inside the cave, the floor areas consist of loose rock and thin, dry to moist, black and red clay. This cave has a high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-10 (tract 3): Solution cavity measuring approximately 1 foot long x 0.5 feet wide x 2 feet deep within a small sinkhole (6 feet long x 7 feet wide x 2 feet deep) with apparent drainage portal openings amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 3 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-11 (tract 3): Very large upland sinkhole measuring approximately 60 feet long x 45 feet wide x 4 to 7 feet deep containing a large cedar elm tree and small trees/brush. Along the north central side of the sinkhole is a partially rimmed edge of exposed bedrock (about 80 to 100 feet long) with multiple drainage portal openings. Two of the largest openings are spaced about 40 to 50 feet apart and measure approximately 7 feet long x 5 feet wide x 3 feet deep and 8 feet long x 2 feet high. Strong air flow conductivity was noted at each opening. Multiple bedding plane void rooms and/or passages ranging from 1 to 7 feet high appeared to extend in a general west-to-southeast direction from the openings. Two large internal drains are present about 40 feet and 80 feet due north/northeast from the larger opening. Another internal drain appears to be present at the west interior side based on floor slopes observed from the smaller opening entrance. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. According to available records, this cave was previously discovered in 1983 and has been officially named **Wolf Cave** (TSS, 2013). Inside the cave, the floor areas consist of loose rock and thin, dry to moist, black and red clay. This cave has a very high infiltration rate and a surface runoff catchment of less than 2 acres.

Geologic Feature F-12 (tract 3): Upland sinkhole measuring approximately 15 feet in diameter x 3 feet deep with a partially open (rock-choked) drainage portal measuring 4 feet long x 3.5 feet wide x 3 feet deep near center of sink. A second, smaller drainage portal (solution-enlarged fracture) about 1 foot x 0.4 feet wide x 2 feet deep is located about 10 feet upslope of the larger portal. Air flow conductivity was noted at both openings. This feature has a high infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-13 (tract 3): Very large upland sinkhole measuring approximately 60 feet long x 50 feet wide x 4 to 7 feet deep with an open drainage portal measuring 7 feet long x 4 feet wide x 7 feet deep near the center of sink. Very strong air flow conductivity was noted when standing above this area. The drainage portal drops another 10 feet, at a 35 degree angle, to an area that has been blocked off by in-filled rocks. On 14 November 2013, Horizon staff excavated feature F-13 with a backhoe down to the lower, in-filled rock area; however, further entry was not possible due to very large rocks blocking the passage. Based on the presence of excessive air flow conductivity, the potential for additional subgrade passage is very probable.

This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. A large pecan tree is located immediately east of the sink edge and an unused private water well (M-6) is located to the south of this feature, about 60 to 70 feet away. According to available records, this sink/cave was previously discovered and has been officially named **Wolf's Pecan Sink** (TSS, 2013). This cave has a very high infiltration rate and a surface runoff catchment of less than 2 acres.

Geologic Feature F-14 (tract 1): Small solution cavity with visible groundwater discharge (spring) located along the side of an unnamed tributary to the Middle Fork of the San Gabriel River. This feature has a very slow discharge rate from an opening that measures about 0.4 feet in diameter x 2 feet long. No air flow conductivity was noted. This spring is classified as a discharge geologic feature and does not have an infiltration rate or surface runoff catchment. It apparently was used to water livestock based on the presence of a nearby (concrete) watering trough and piping from the trough to a small concreted trap at the head of the spring.

Geologic Feature F-15 (tract 1): Upland sinkhole measuring approximately 20 feet in diameter x 2 feet deep within a Texas persimmon/dead cedar thicket. Near the center of this sinkhole is an open drainage portal (solution-enlarged fracture [azimuth: N65ºE]) measuring approximately 8 feet long x 2 feet wide x over 27 feet deep. The opening had been covered with cedar posts to keep livestock from falling into it. After removing some of these posts from the opening, air flow conductivity was noted. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. On 9 January, 2013, Horizon staff rigged a tripod with climbing gear over the cave entrance and were able to enter a narrow horizontal bedding plane void (57 feet long x 4 feet wide x 3 to 4 feet high) at the base of the entrance drop that extends to the southwest for approximately 7 feet and to the northeast for approximately 50 feet. This cave has a high infiltration rate and a surface runoff catchment of less than 1.6 acres.

Geologic Feature F-16 (tract 1): Solution-enlarged fracture (azimuth: N70ºE) measuring approximately 4 feet long x 1.8 feet wide x 15 feet deep. Slight air flow conductivity was noted. Due to the feature's smooth walls and vertical depth, entry was not possible during the survey to determine if additional subgrade passages were present. (Climbing gear is required.) On 14 November 2013, Horizon staff rigged a cable ladder and were able to enter into a large horizontal bedding plane void (~120 feet long x 20 feet wide x 3 to 4 feet high) at the base of the entrance drop that extends to the southwest for approximately 20 feet and to the northeast for approximately 100 feet. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. Inside the cave, the floor areas consist of loose rock and thin to thick, moist, black and red clay. This cave has a high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-17 (tract 1): Upland sinkhole measuring approximately 12 feet long x 10 feet wide x 2 feet deep with a clay-filled solution cavity about 2 feet long x 1 foot wide x 1 foot deep near the center of sink. No air flow conductivity was noted and the cavity had no apparent drainage portals. Some of the solution cavity had been dug into by an animal. Probing with a steel rod encountered firmer clay soil/rocks about 3 feet below the surface. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Geologic Feature F-18 (tract 1): Large upland sinkhole measuring approximately 30 feet long x 20 feet wide x 4 feet deep within a wooded area. Near the middle of the sinkhole are several small (2 to 6 inches), open drainage portals amongst loose rocks and old household trash debris (e.g., tin cans, bottles, etc.). Strong air flow conductivity was noted at most of the portals and even around some of the buried trash debris. This feature, in its present condition, does not meet the requirements to be classified as a cave; however, a very high probability exists based on the air flow conductivity and overall size of the sinkhole, without massive amounts of in-filled fine material. On 13 November 2013, Horizon staff excavated down about 7 feet near the center of the sinkhole using a backhoe and discovered a small horizontal bedding plane room (~ 20 feet long x 10 feet wide x 2 to 3 feet high) along the west side of the entrance drop. At the west side of this room is a headwall with an underlying low opening that leads into a larger bedding plane void room about 35 feet long x 25 feet wide x 0.5 to 2.5 feet high. Along the west side of this lower room is an upper bedding plane void that could not be entered, which is about 15 feet wide x 2.5 feet high x at least 10 feet long (unknown southwest extent). This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. This cave has a high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-19 (tract 1): Upland sinkhole measuring approximately 20 feet long x 12 feet wide x 2 feet deep with large rocks and a semi-open (clay and rock) drainage portal measuring about 0.3 feet in diameter x 1 foot deep near the north central part of sink. Very slight air flow conductivity was noted. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-20 (tract 1): Solution cavity measuring approximately 0.7 feet in diameter x 2 feet deep with an apparent drainage portal opening amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 3 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-21 (tract 2): Two small solution cavities spaced about 8 feet apart. The larger cavity measures approximately 0.8 feet long x 0.6 feet wide x 1 foot deep with clay floor. The smaller cavity measures approximately 0.5 feet long x 0.2 feet wide x 1.5 feet deep with an apparent drainage portal amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted only at the smaller cavity. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 2 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-22 (tract 2): Solution-enlarged fracture (azimuth: N85ºE) measuring approximately 2 feet long x 0.5 feet wide x 5 feet deep within a small sinkhole (8 feet in diameter x 2 feet deep) with apparent drainage portal openings amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 6 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-22A (tract 2): Solution cavity about 35 feet south-southeast of F-22 that measures approximately 1 foot long x 0.3 feet wide x 2.5 feet deep with apparent drainage portal opening amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 3.5 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-23 (tract 2): Solution cavity by Texas persimmon trees measuring approximately 1.5 feet long x 0.7 feet wide x 3 feet deep with apparent drainage portal opening amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 4 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-24 (tract 2): Small sinkhole measuring approximately 6 feet long x 5 feet wide x 2 feet deep with a clay-filled small solution cavity near center of sink. No air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional clay/small rocks and cobbles down about 3 feet below the surface. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Geologic Feature F-25 (tract 2): Two small solution cavities with visible groundwater discharge (spring) located along the side of an unnamed tributary to the South Fork of the San Gabriel River. This feature had a slow to moderate discharge rate from openings that measure, on average, about 0.3 feet high x 2.5 feet long. No air flow conductivity was noted. This spring is classified as a discharge geologic feature and does not have an infiltration rate or surface runoff catchment.

Geologic Feature F-26 (tract 2): Solution cavity measuring approximately 1 foot long x 0.7 feet wide x 1.2 feet deep with no apparent drainage portal openings or air flow conductivity. Probing with a steel rod encountered clay soil and cobbles about 2 feet below the feature's floor. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Geologic Feature F-27 (tract 2): Upland sinkhole measuring approximately 12 feet long x 10 feet wide x 2 feet deep along the side of a narrow drainage swale in a wooded area about 100 feet south of SH 29. Near the east side of the sinkhole was a very small (0.3 feet in diameter x 1 foot deep) drainage portal amongst loose rocks and leaf litter. Air flow conductivity was noted at this portal. On 13 November 2013, Horizon staff excavated Feature F-27 down to bedrock (~7 feet below the surface) with a backhoe. A small void measuring about 3 feet wide x 1 foot high was found approximately 4.5 feet below surface grade along the southwest side that extended about 5 feet horizontally. However, no open drainage portals or air flow conductivity was found within this void area. Probing with a steel rod encountered additional densely packed dark gray clay soil within the floor of this void area. Based on the results of the excavation, this feature has a low infiltration rate and minimal catchment (<0.1 acres) area for surface water runoff. All material was placed back into subject excavated area.

Geologic Feature F-28 (tract 2): Large upland sinkhole measuring approximately 30 feet long x 15 feet wide x 2 feet deep in a thickly wooded area. Within the north central part of the sinkhole is an open drainage portal (solutioned-enlarged fracture; azimuth: N330ºW) measuring about 3 feet long x 1.8 feet wide x 3.5 feet deep. Air flow conductivity was noted. A low (1 to 3 feet high) bedding plane void room extends from the opening in a northeast to east direction for about 15 feet. At the north side of this room is a headwall with an underlying, low opening that leads into a larger bedding plane void room about 40 feet long x 35 feet wide x 0.5 to 2.5 feet high. Additionally, several smaller (0.2 to 0.4 feet in diameter x 2 feet deep) drainage portals occur up on the surface along the southeast part of the sinkhole. These surface drainage portals appear to connect into the underlying subgrade void passages. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. Inside the cave, the floor areas consist of loose rock and thin to thick, dry to moist, black and red clay. This cave has a very high infiltration rate and a surface runoff catchment of less than 1.7 acres.

Geologic Feature F-29 (tract 2): Large upland sinkhole measuring approximately 30 feet long x 25 feet wide x 4 feet deep with 2 semi-open (clay and rock) drainage portals on opposite sides (east and west) measuring about 2 feet long x 1.5 feet wide x 1.5 feet deep and 1.5 feet long x 1 foot wide x 1 foot deep. Slight air flow conductivity was noted. Most of the sinkhole has thick amounts of in-filled clay/cobbles and Texas persimmon trees upslope along the edge. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-30 (tract 2): Large upland sinkhole measuring approximately 40 feet long x 35 feet wide x 3 to 4 feet deep with an open drainage portal measuring 5 feet long x 2.5 feet wide x 6 feet deep near the center of sink. Air flow conductivity was noted. Sections of cattle panel fencing were erected around the perimeter of this portal to keep out livestock. The drainage portal extends toward the southeast in a low, small room about 8 feet long x 4 feet wide x 3 feet high. From this room, a low (1 to 1.5 feet high) crawlway curves toward the east-northeast for another 32 feet where massive amounts of in-filled clay have invaded the area and prevent further entry. Very low (0.5 feet high) bedding plane voids continue off to the east/northeast for an unknown extent. Inside, a large, apparent drain could be seen in the floor about 10 feet to the north. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. According to available records, this sink/cave was previously discovered and has been officially named **Grape Arbor Sink** (TSS, 2013). This cave has a high infiltration rate and a surface runoff catchment of less than 2 acres.

Geologic Feature F-31 (tract 2): Solution cavity measuring approximately 1 foot long x 0.8 feet wide x 1.5 feet deep within a small sinkhole (4 feet long x 3 feet wide x 2.5 feet deep) with apparent drainage portal openings amongst loose, in-filled rocks and dark gray clay. Slight air flow conductivity was noted. After limited hand excavation, probing with a steel rod encountered additional small rocks and/or cobbles down about 3 feet below the surface. This feature has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-32 (NF-7; tract 4): Previously excavated solution cavity measuring approximately 4 feet long x 2 feet wide x 8 feet deep within small sinkhole about 7 feet in diameter x 1 foot deep. A brown tarp was lying partially inside the feature. Upon entry, a void occurs to the south about 4 feet long x 3 feet wide x 3 feet high. Slight air flow conductivity was noted from a smaller void (3 inches high x 6 inches wide) located along the floor's east side that appears to extend horizontally about 8 feet. This open area appears to function as the feature's primary drainage portal. This feature meets the requirements to be classified as a **cave**, based on it being a natural underground open space formed by dissolution of limestone that is large enough for an average-sized person to enter. This cave has an intermediate infiltration rate and a surface runoff catchment of less than 0.25 acres.

Geologic Feature F-33 (NF-5; tract 4): Previously excavated solution cavity measuring approximately 3 feet long x 2 feet wide x 4.5 feet deep with no apparent drainage portals, horizontal bedding plane voids, or air flow conductivity. A green tarp was lying inside one side of feature and excavated spoil piles are present immediately west of the opening. Probing with a steel rod encountered clay soil and cobbles about 6 feet below the feature's floor. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Geologic Feature F-34 (NF-1; tract 4): Small solution cavity measuring approximately 2 feet long x 1 foot wide x 2 feet deep that narrows down to 0.3 feet in diameter with clay-filled floor. No air flow conductivity was noted. Old pink flagging was present on nearby trees. Probing with a steel rod encountered clay soil and cobbles about 3 feet below the feature's floor. This feature has a low infiltration rate and a surface runoff catchment of less than 0.1 acres.

Maps detailing site geology and the location of geologic and manmade features are provided in Appendix B (Figures 1A to 1C). Further information pertaining to the geologic and manmade features is provided in the Geologic Assessment Table (Appendix C). Photographs of the geologic features and select manmade features are also provided in Appendix D.

3.0 CONCLUSIONS AND RECOMMENDATIONS

A total of 35 natural geologic features and 12 manmade features were identified at the subject property. All of these features were evaluated for their potential to be significant pathways for fluid movement into the Edwards Aquifer. The geologic assessment table (Appendix C) summarizes this evaluation and grades each feature's sensitivity a total point value. Those with a point value of 40 or higher are deemed to be sensitive groundwater recharge features and should be protected during site development pursuant to TCEQ rules for protection of the Edwards Aquifer (30 TAC 213).

Twenty-five geologic features (F-1, F-2, F-4, F-5, F-7 to F-13, F-15, F-16, F-18 to F-22, F-22A, F-23, and F-28 to F-32) have been evaluated as sensitive for groundwater recharge capability and would therefore require TCEQ protective setback buffers. In general, a protective buffer encompassing sensitive features is recommended to meet the TCEQ guidance for a setback of at least 50 feet in all directions from each feature's areal extent (perimeter), plus each feature's watershed catchment up to 200 feet from the perimeter of each feature. However, a larger protective buffer for 12 of these (cave) features (F-2, F-5, F-7, F-9, F-11, F-13, F-15, F-16, F-18, F-28, F-30, and F-32) is recommended to meet the TCEQ guidance for a setback for features identified as caves. Caves with an unknown subsurface footprint are assumed to extend 150 feet in all directions from the surface opening(s) and then a protective buffer zone extending an additional 50 feet in all directions from the footprint is applied, plus each cave's watershed catchment up to 200 feet from the footprint. Caves with a known subsurface footprint (i.e., surveyed/mapped) include a protective buffer zone extending an additional 50 feet in all directions from the footprint, plus each cave's watershed catchment up to 200 feet from the footprint.

The 10 remaining geologic features (F-3, F-6, F-14, F-17, F-24 to F-27, F-33, and F-34) have been evaluated as non-sensitive for groundwater recharge capability and would therefore not require TCEQ protective setback buffers. No further action is recommended for F-3, F-6, F-17, F-24, F-26, and F-27 other than the placement of compactable, fine-grained soil, in appropriate lifts, to bring the ground surface to proposed grade for subject property development. Features F-14 and F-25 are active groundwater discharge features (springs) and the placement of compactable fill over these is not recommended. Additionally, all of the manmade features have been evaluated as non-sensitive for groundwater recharge capability and would therefore not require TCEQ protective setback buffers.

The subject property appears generally well-suited to development prospectus. It should be noted that soil and drainage erosion would increase with ground disturbance. Native grasses and the cobbly content of the soil aid to prevent erosion. Soil and sedimentation fencing should be placed in all appropriate areas prior to any site construction activities.

Because the majority of the subject property is located over the Edwards Aquifer Recharge Zone, it is possible that subsurface voids underlie the property. The nature of the sub-grade is fault-influenced, which can result with variable-sized voids in materials that may otherwise not be noted as void- or cave-forming. If any subsurface voids are encountered during the proposed development, construction should halt immediately so that a geologist may assess potential for the void(s) to provide meaningful recharge to the Edwards Aquifer.

4.0 REFERENCES

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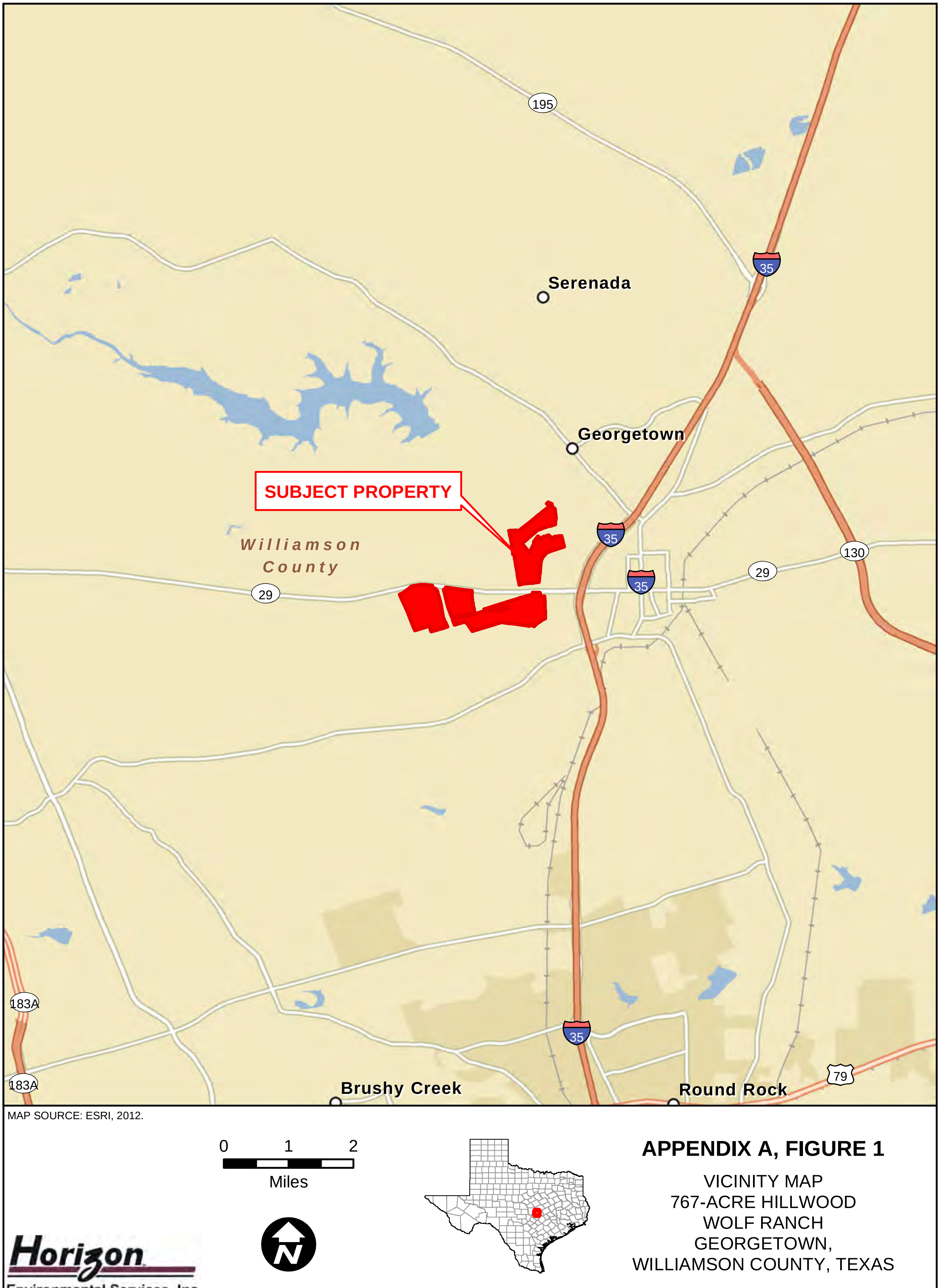
APPENDIX A

PROJECT FIGURES

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A01GA_Vicinity.mxd | REM | 10-29-2013

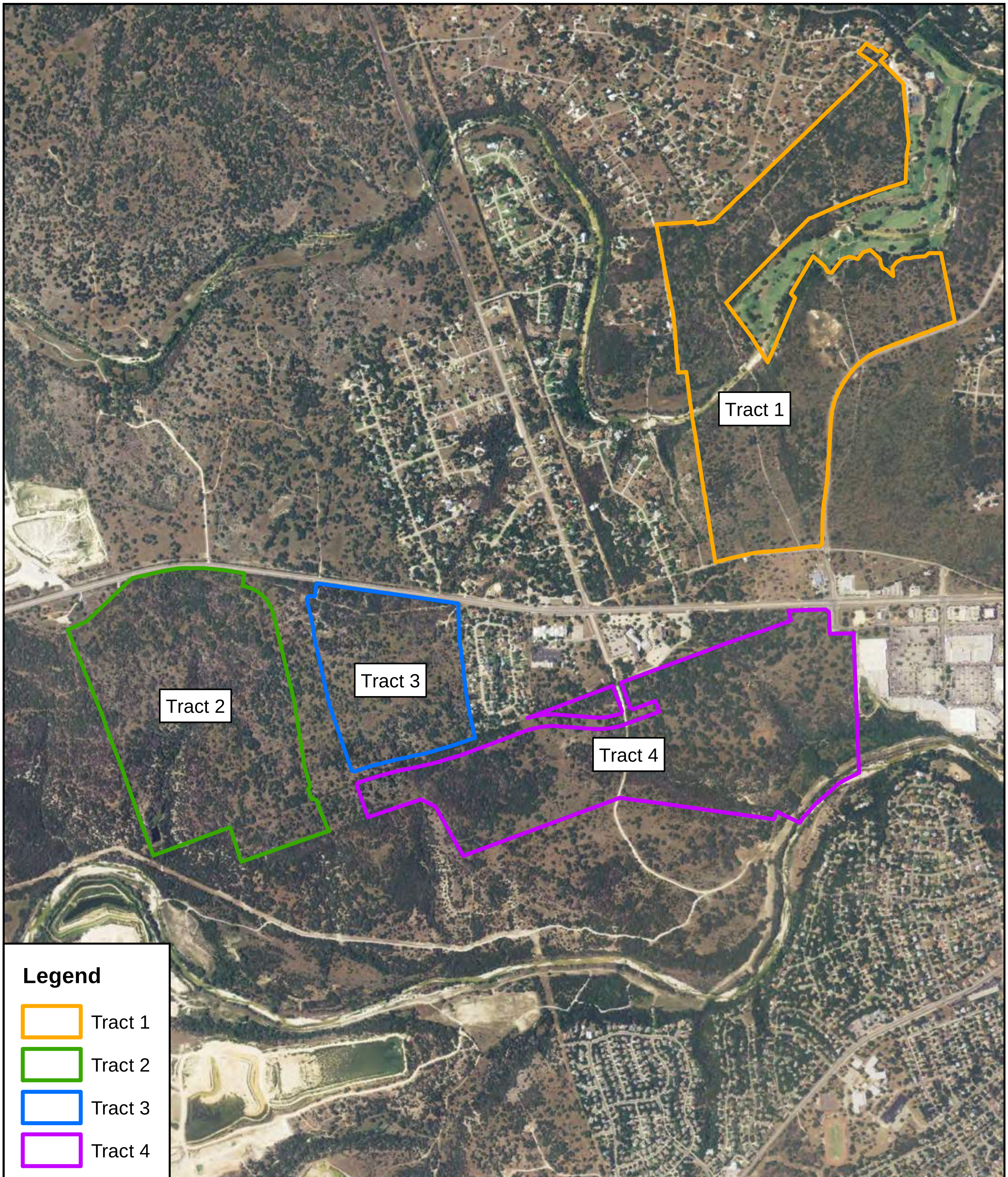


Horizon Environmental Services, Inc.

APPENDIX A, FIGURE 1

VICINITY MAP
767-ACRE HILLWOOD
WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A02GA_Overall.mxd | REM | 10-29-2013



MAP SOURCE: USDA, 2012.

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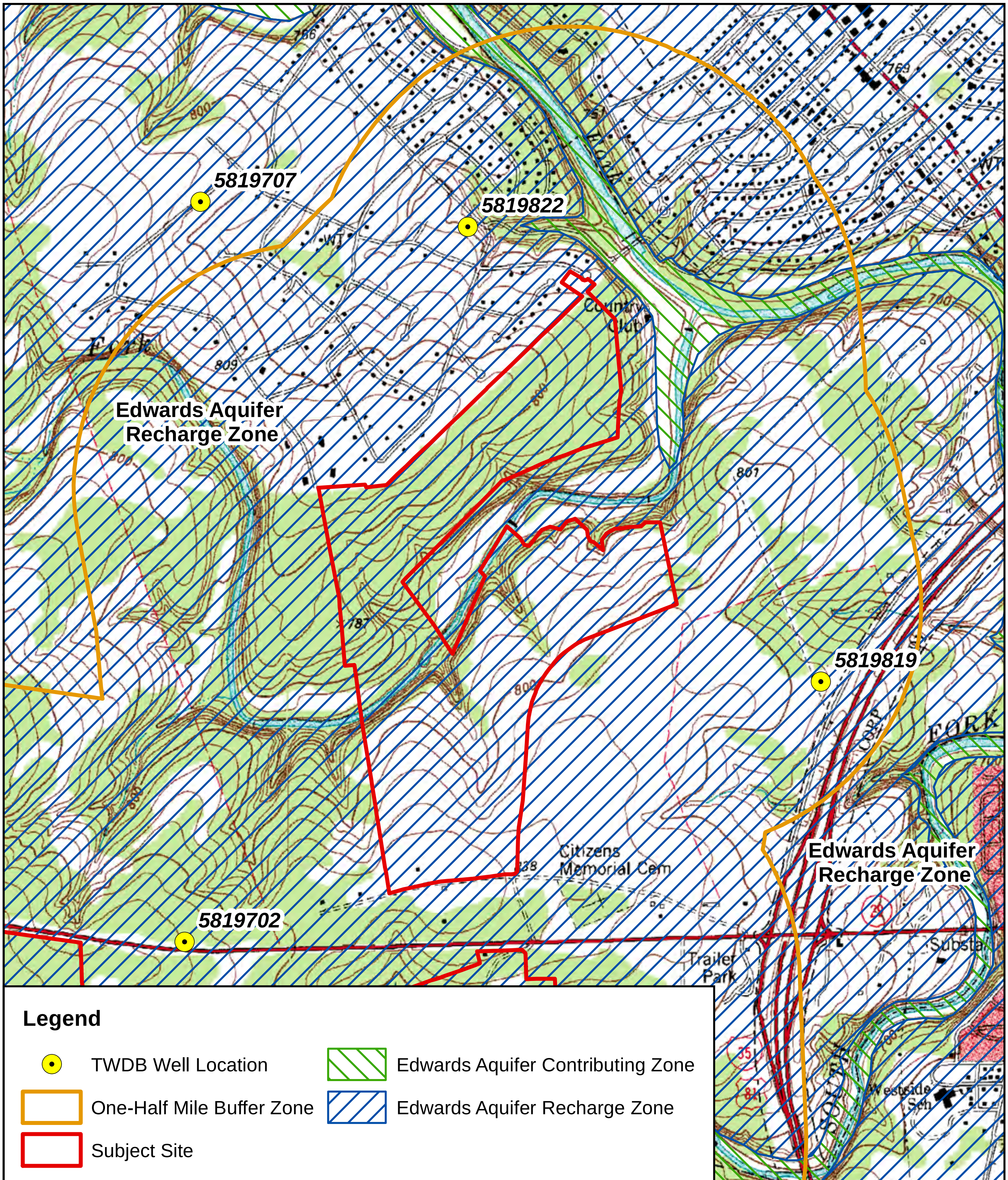
APPENDIX A, FIGURE 2

OVERALL PROPERTY MAP
TRACTS 1, 2, 3 AND 4
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

Horizon
Environmental Services, Inc.

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A03GA_T1_Topo_Hydro.mxd | REM | 10-29-2013



MAP SOURCE: USGS, 1982 AND 1987; TCEQ, 2013; AND TWDB, 2013.

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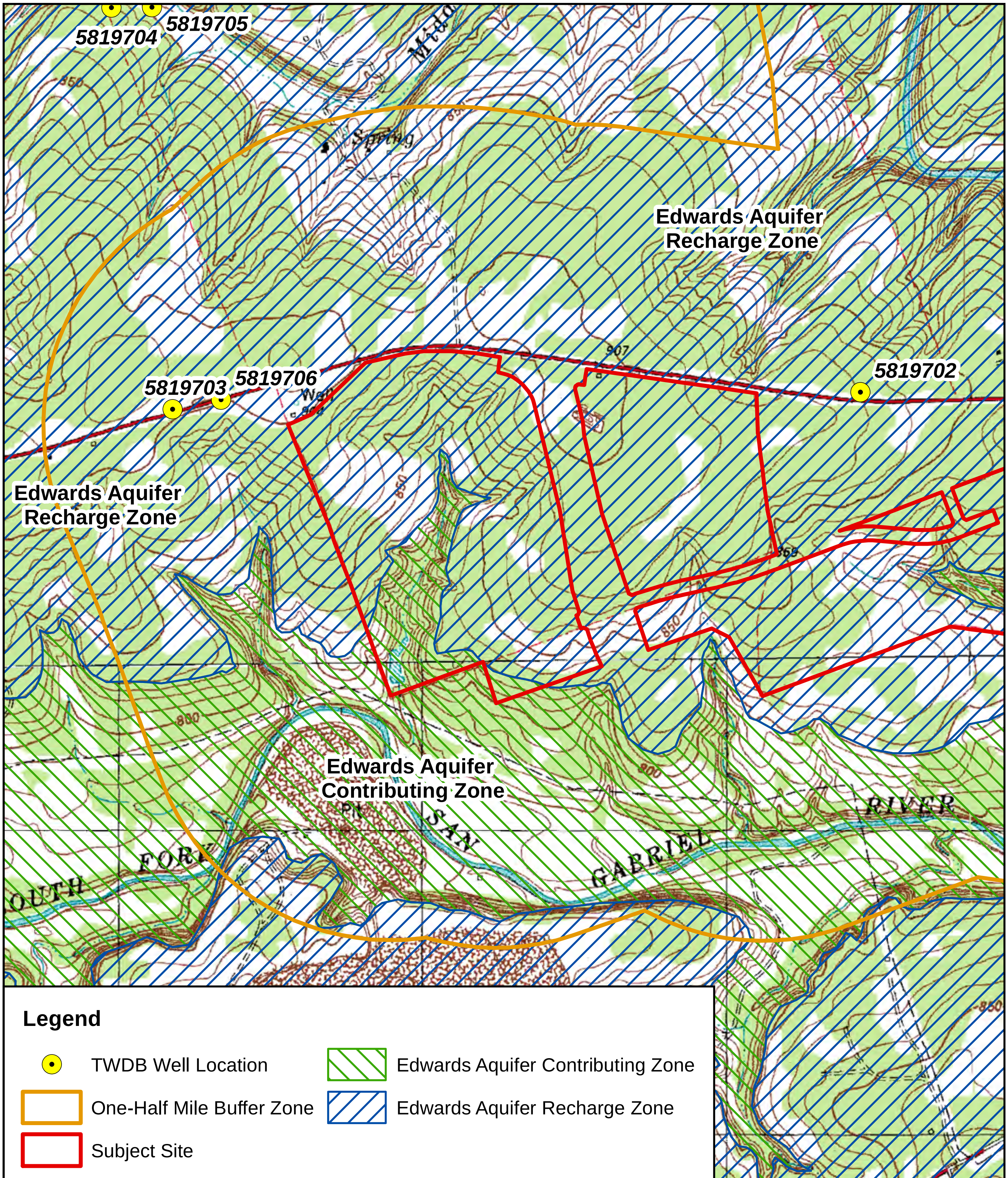
Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 3A

TOPOGRAPHY AND
HYDROGEOLOGY MAP
TRACT 1
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A04GA_T2-3_Topo_Hydro.mxd | REM | 10-29-2013



MAP SOURCE: USGS, 1982 AND 1987; TCEQ, 2013; AND TWDB, 2013.

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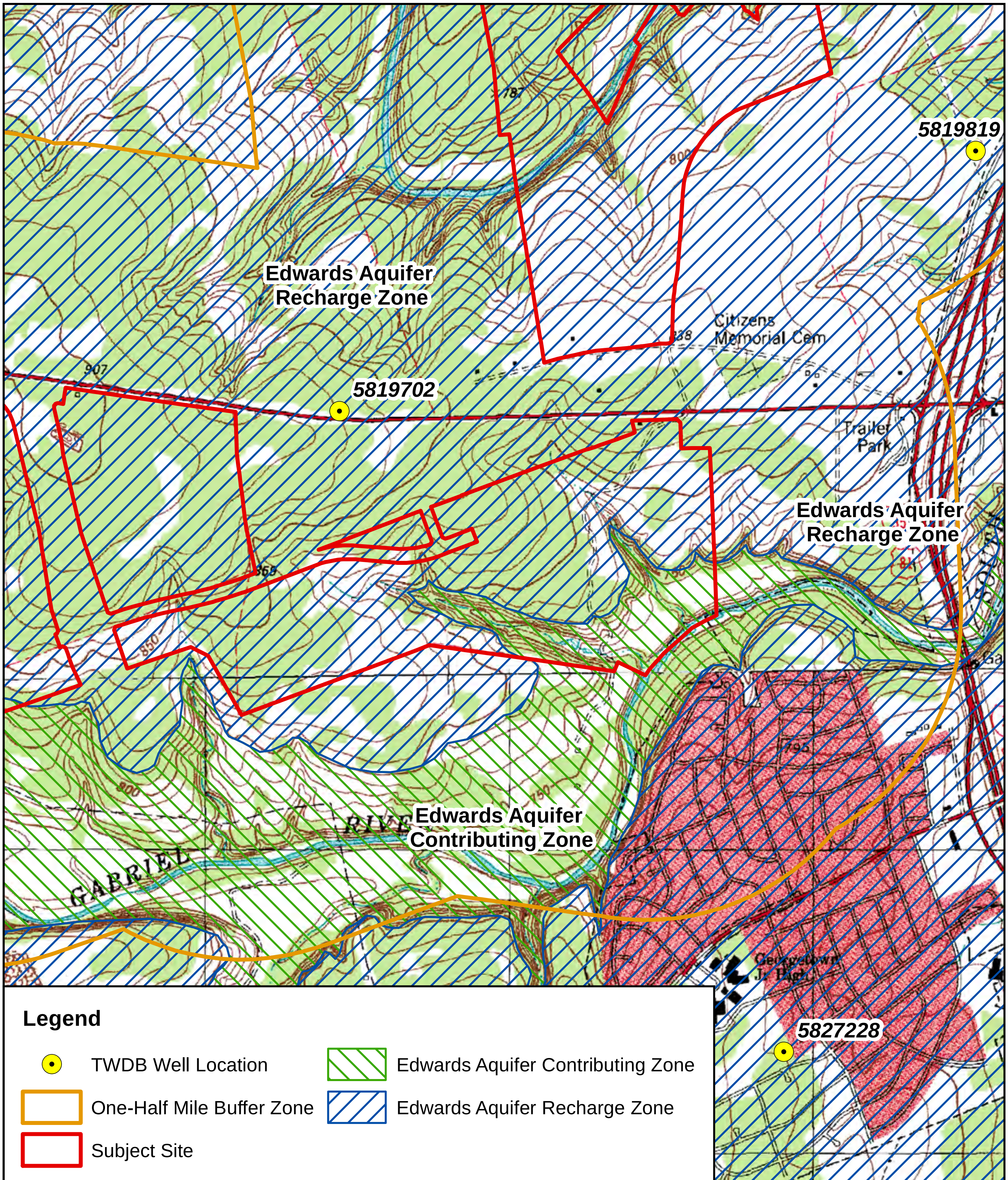
Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 3B

TOPOGRAPHY AND
HYDROGEOLOGY MAP
TRACTS 2 AND 3
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A05GA_T4_Topo_Hydro.mxd | REM | 10-29-2013



MAP SOURCE: USGS, 1982 AND 1987; TCEQ, 2013; AND TWDB, 2013.

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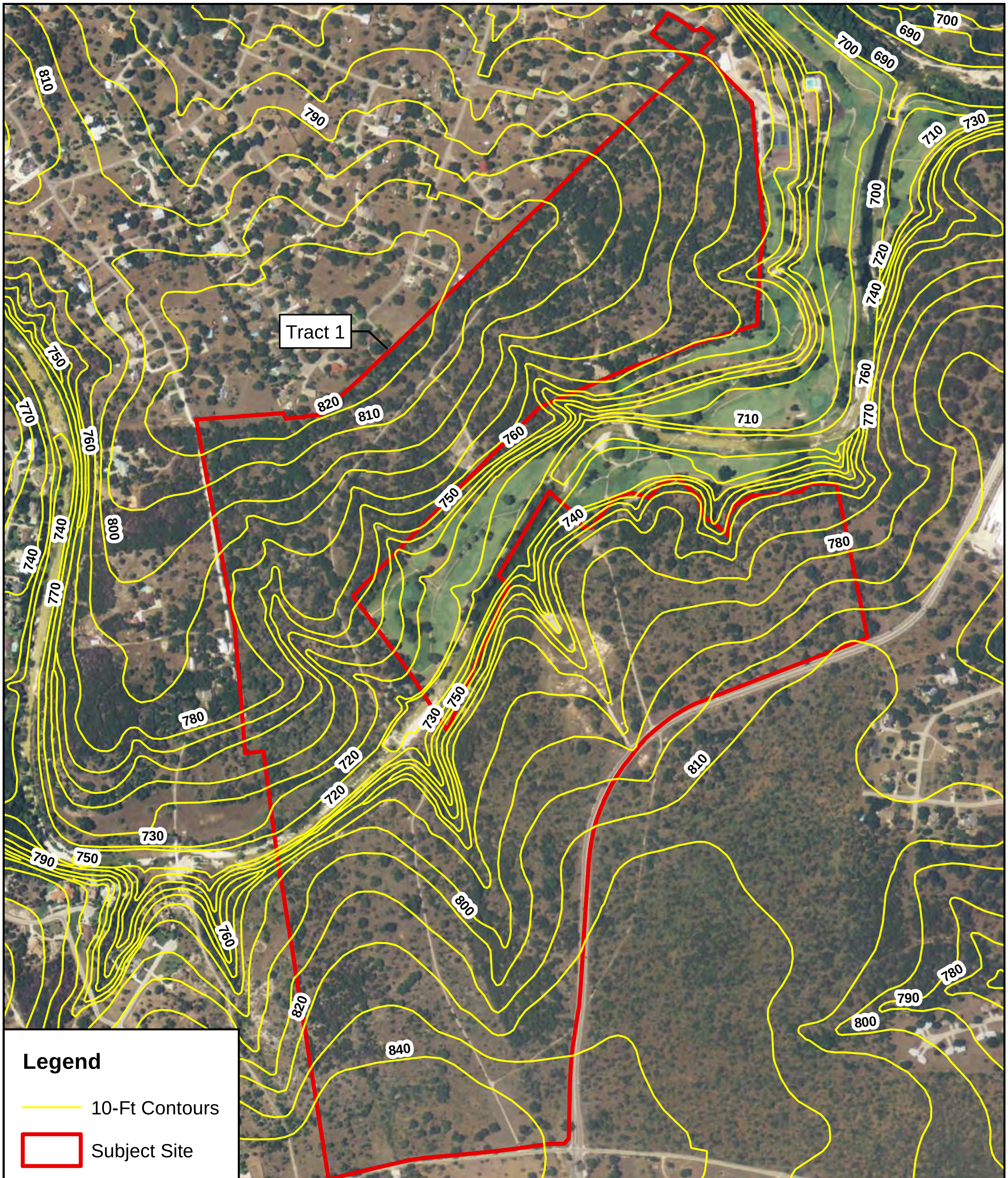
Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 3C

TOPOGRAPHY AND
HYDROGEOLOGY MAP
TRACT 4
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS



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MAP SOURCE: USDA, 2012; CAPCOG, 2013.

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Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 4A

SITE TOPOGRAPHY MAP
TRACT 1
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A07GA_T2_Topo.mxd | REM | 10-29-2013

MAP SOURCE: USDA, 2012; CAPCOG, 2013.

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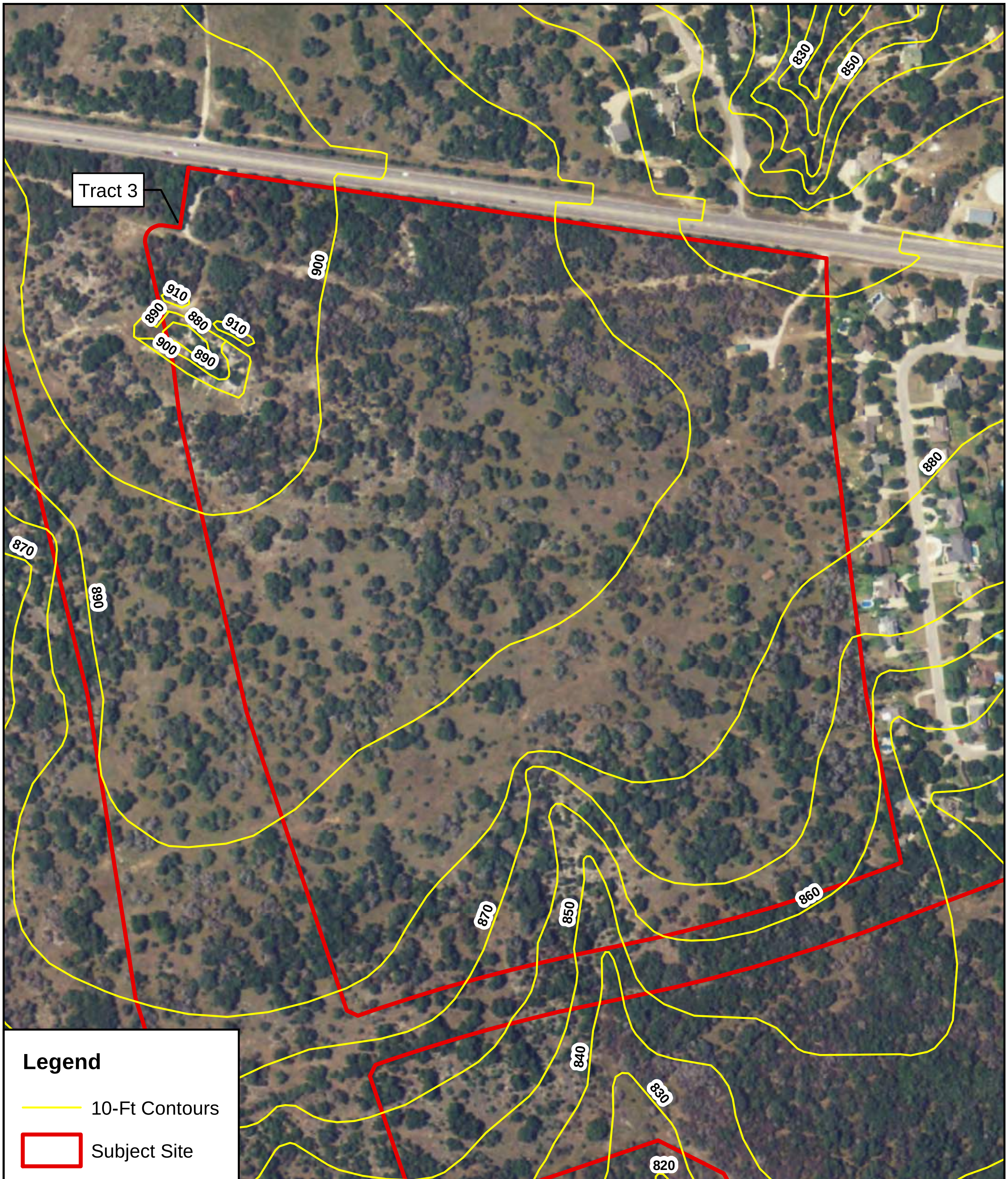
Feet

Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 4B

SITE TOPOGRAPHY MAP
TRACT 2
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS



MAP SOURCE: USDA, 2012; CAPCOG, 2013.

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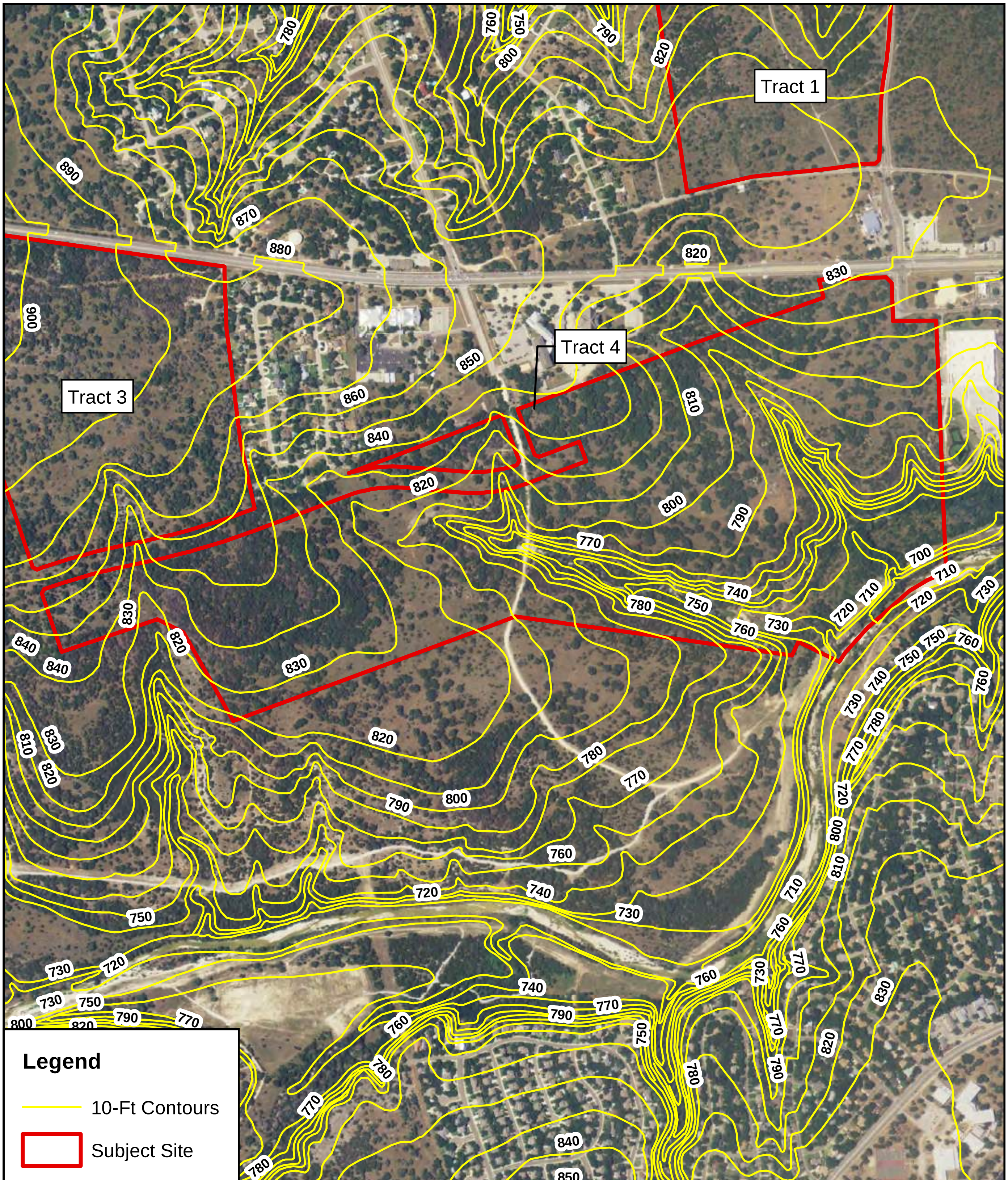
Feet

Horizon
Environmental Services, Inc.

APPENDIX A, FIGURE 4C

SITE TOPOGRAPHY MAP
TRACT 3
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A08GA_T3_Topo.mxd | REM | 10-29-2013



MAP SOURCE: USDA, 2012; CAPCOG, 2013.

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Feet

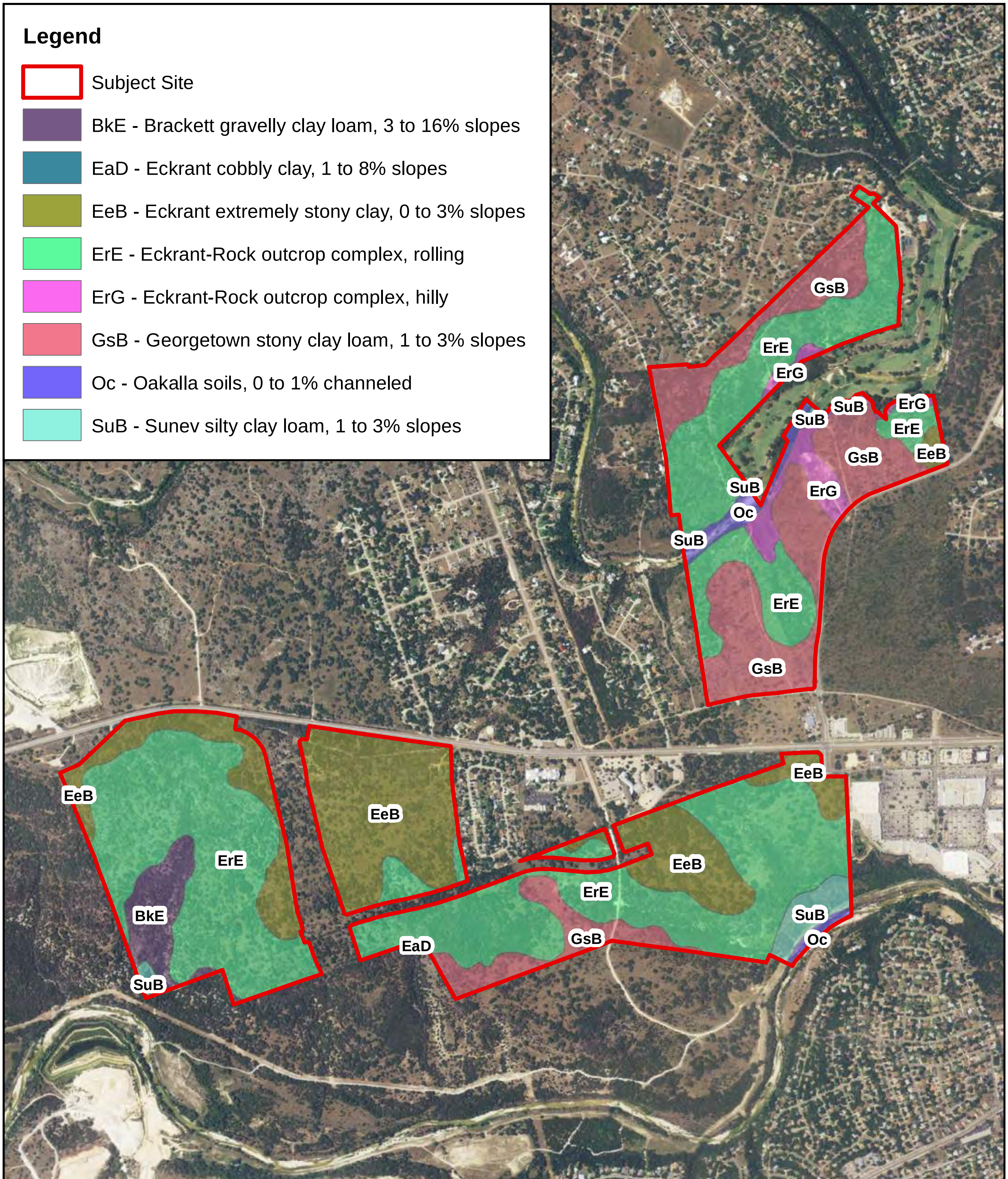
Horizon Environmental Services, Inc.

APPENDIX A, FIGURE 4D

SITE TOPOGRAPHY MAP
TRACT 4
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A09GA_T4_Topo.mxd | REM | 10-30-2013

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A10GA_Soils.mxd | REM | 10-29-2013



MAP SOURCE: USDA, 2012; NRCS, 2013.

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Horizon
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0 900 1,800
Feet

APPENDIX A, FIGURE 5

SURFACE SOILS MAP
TRACTS 1, 2, 3 AND 4
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219A11GA_Strat.mxd | REM | 11-01-2013

Geologic Unit	Hydrologic Unit	Approx. Thickness at Project Site (ft)
Edwards Formation (Ked)	Edwards Aquifer	100
Comanche Peak Formation (Kc)		60
Walnut Formation (Kwa)	Confining Unit	175

Elevation (ft msl)	Depth (ft)
910	0
810	100
750	160
575	335

Note: Unit elevations and thicknesses given with respect to a ground surface elevation of 910 ft msl on the northwest boundary of the project site (Tract 3). The Edwards Formation thins to zero east and south of this locale, due to formational dip and ground surface topography.

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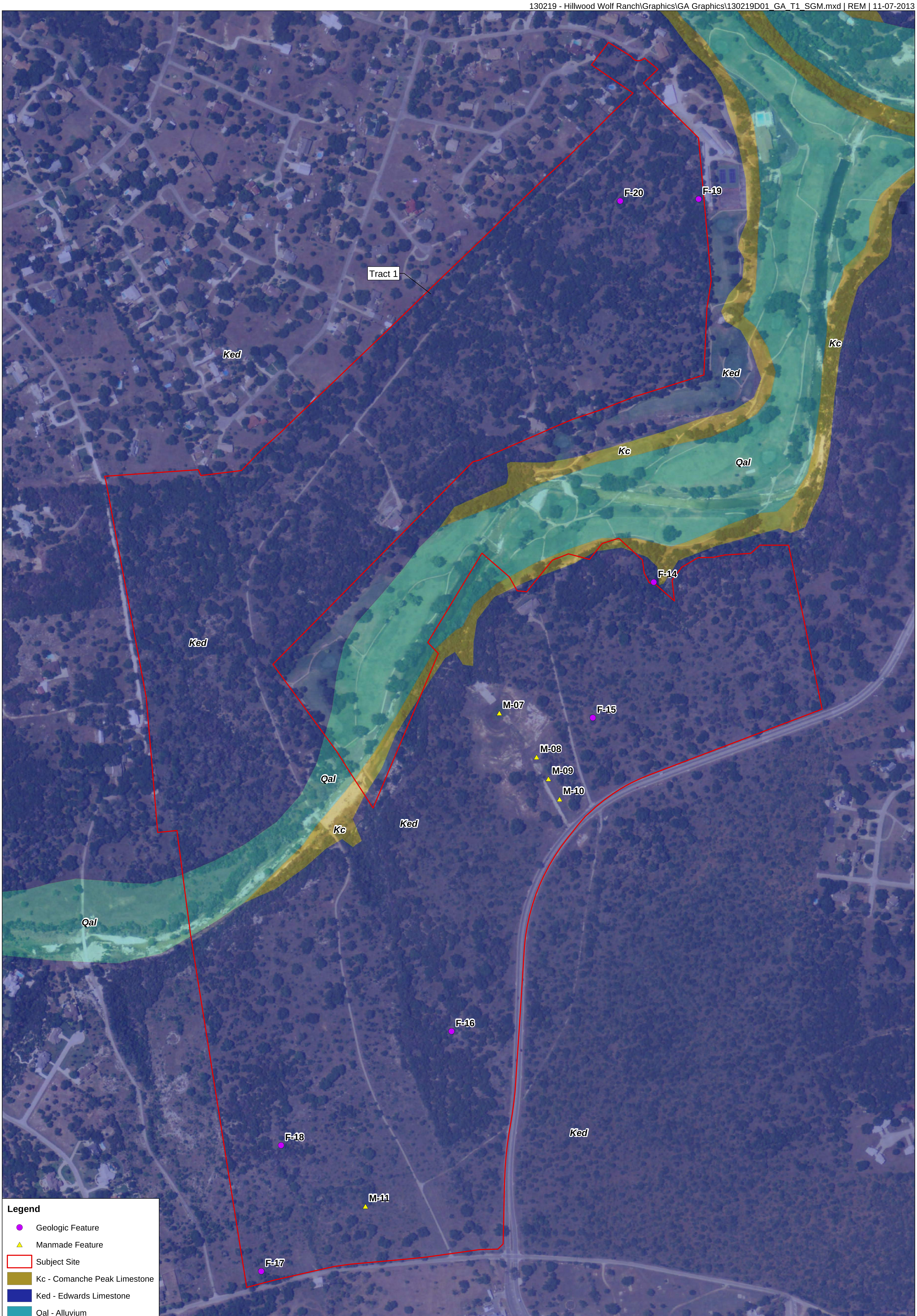
APPENDIX A, FIGURE 6

STRATIGRAPHIC COLUMN
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

APPENDIX B

SITE GEOLOGIC MAP



MAP SOURCE: UT-BEG, 1995; USDA, 2012.

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0 100 200
Feet

Scale: 1" = 200'

APPENDIX B, FIGURE 1A

SITE GEOLOGIC MAP
TRACT 1
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

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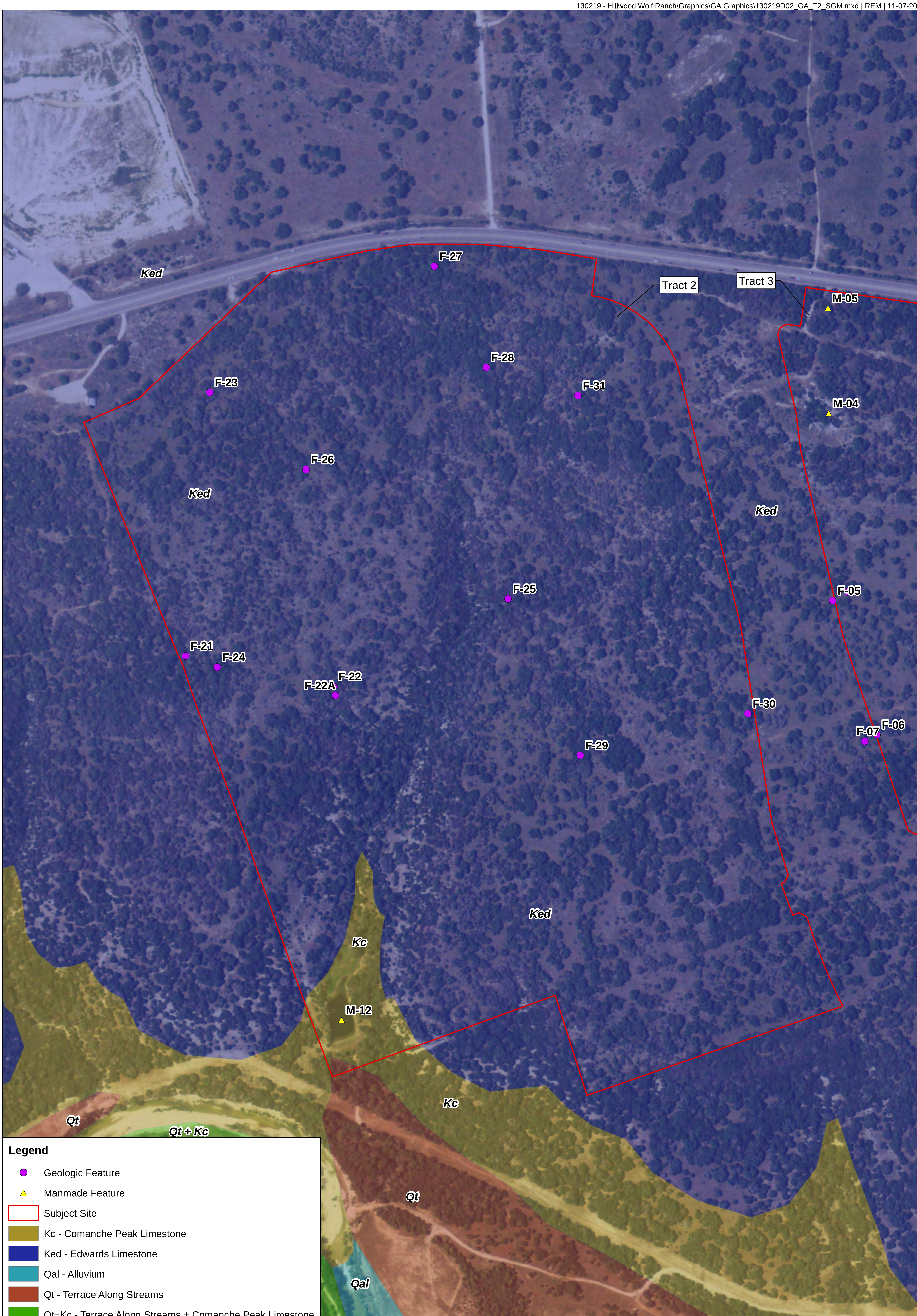
130219 - Hillwood Wolf Ranch\Graphics\GA Graphics\130219D02_GA_T2_SGM.mxd | REM | 11-07-2013



MAP SOURCE: UT-BEG, 1995; USDA, 2012.

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N

0 100 200
Feet

Scale: 1" = 200'

APPENDIX B, FIGURE 1B

SITE GEOLOGIC MAP
TRACT 2
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

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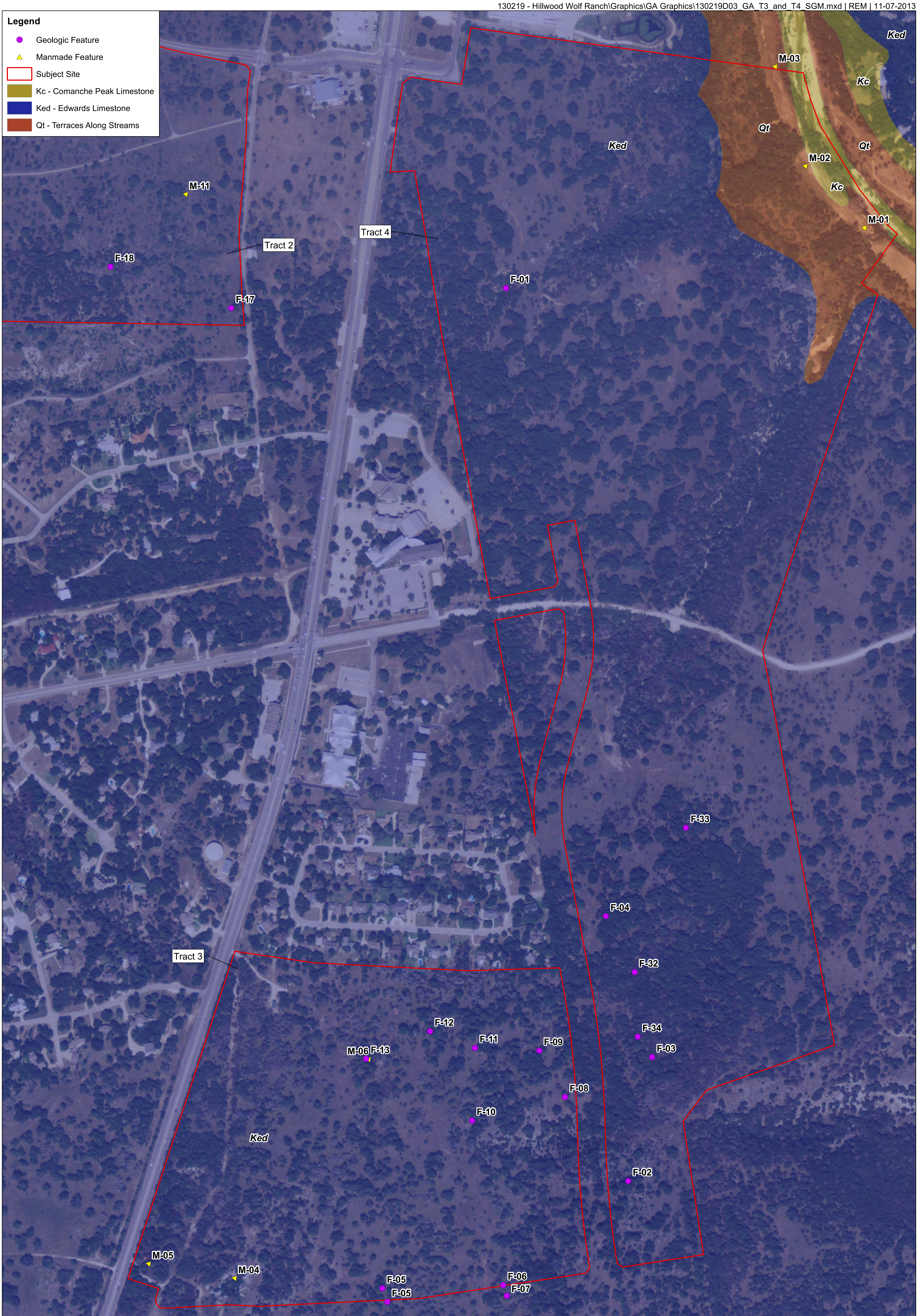

MAP SOURCE: UT-BEG, 1995; USDA, 2012.

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0 100 200
Feet

Scale: 1" = 200'

APPENDIX B, FIGURE 1C

SITE GEOLOGIC MAP
TRACTS 3 AND 4
767-ACRE HILLWOOD WOLF RANCH
GEORGETOWN,
WILLIAMSON COUNTY, TEXAS

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Environmental Services, Inc.

Horizon Environmental Services, Inc.

APPENDIX C

SITE GEOLOGIC ASSESSMENT TABLE

GEOLOGIC ASSESSMENT TABLE									PROJECT NAME: 767 acres - Wolf Ranch Properties; SH 29 W; Georgetown, Tx											
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
F-1	30.630696	-97.703815	SF	20	Ked	4	1	2.5	N280°W	0	--	--	C	30	50		X	X		Hillside
F-2	30.626763	-97.718564	SH/C	30	Ked	7.5	7.5	3	--	0	--	--	C,F,O	50	80		X		X	Hillside
F-3	30.6267113	-97.7164053	SC	20	Ked	0.8	0.7	1.5	--	0	--	--	F,O	12	32	X		X		Hillside
F-4	30.6277253	-97.7141506	SC	20	Ked	0.4	0.2	1.5	--	0	--	--	C,F,O	20	40		X	X		Hillside
F-5	30.6300972	-97.7210609	SH/C	30	Ked	12	13	4	--	0	--	--	C,F,FS,O	60	90		X		X	Hillside
F-6	30.628339	-97.7206703	SC	20	Ked	3	2	1.5	--	0	--	--	C,F,O	16	36	X		X		Hillside
F-7	30.6282607	-97.7208423	SH/C	30	Ked	12	13	4	--	0	--	--	C,F,FS,O	60	90		X		X	Hillside
F-8	30.627888	-97.717321	SC	20	Ked	3	2	5	--	0	--	--	C,F,O	27	47		X	X		Hillside
F-9	30.6283751	-97.7166082	SH/C	30	Ked	30	20	3	--	0	--	--	C,F,FS,O	55	85		X		X	Hillside
F-10	30.629189	-97.717977	SC/SH	20	Ked	1	0.5	2	--	0	--	--	C,F,O	30	50		X	X		Hillside
F-11	30.629322	-97.716741	SH/C	30	Ked	60	45	7	--	0	--	--	C,F,FS,O	65	95		X		X	Hillside

* DATUM: State Plane Texas Central

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

STATE OF TEXAS
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Sheet 1 of 5

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TCEQ-0585-Table (Rev. 10-01-04)

GEOLOGIC ASSESSMENT TABLE						PROJECT NAME: 767 acres - Wolf Ranch Properties; SH 29 W; Georgetown, Tx														
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
F-12	30.6300175	-97.7165837	SH	20	Ked	8	7	3	--	0	--	--	C,F,O	45	65		X	X		Hillside
F-13	30.630887	-97.717227	SH/C	30	Ked	60	50	7	--	0	--	--	C,F,O	65	95		X		X	Hillside
F-14	30.644811	-97.698051	SC	20	Ked	0.2	0.2	2	--	0	--	--	N	5	25	X		X		Hillside
F-15	30.642811	-97.699123	SH/SF/C	30	Ked	10	10	2	N65°E	0	--	--	C,F,O	60	90		X		X	Hillside
F-16	30.638188	-97.701607	SF/C	30	Ked	4	1.8	15	N70°E	0	--	--	C,F,O	60	90		X		X	Hillside
F-17	30.634662	-97.704916	SH	20	Ked	12	10	2	--	0	--	--	C,F,O	12	32	X		X		Hilltop
F-18	30.636526	-97.704553	SH/C	30	Ked	30	20	4	--	0	--	--	C,F,O,X	45	75		X		X	Hillside
F-19	30.6504807	-97.6972072	SH	20	Ked	20	12	2	--	0	--	--	C,F,O	30	50		X	X		Hillside
F-20	30.650467	-97.698552	SC	20	Ked	0.4	0.3	2	--	0	--	--	C,F,O	25	45		X	X		Hillside
F-21	30.629401	-97.730471	SC	20	Ked	0.5	0.2	1.5	--	0	--	--	C,F,O	25	45		X	X		Hillside
F-22	30.629009	-97.728377	SH/SF	20	Ked	4	4	2	N85°E	0	--	--	C,F,O	40	60		X	X		Hillside

* DATUM: State Plane Texas Central

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

STATE OF TEXAS
James P. Killian
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James P. Killian

Sheet 2 of 5

TCEQ-0585-Table (Rev. 10-01-04)

GEOLOGIC ASSESSMENT TABLE						PROJECT NAME:			767 acres - Wolf Ranch Properties; SH 29 W; Georgetown, Tx												
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING			
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
F-22A	30.628897	-97.728349	SC	20	Ked	1	0.3	2.5	--	0	--	--	C,F,O	30	50		X	X		Hillside
F-23	30.632632	-97.730082	SC	20	Ked	1.5	0.7	3	--	0	--	--	C,F,O	35	55		X	X		Hilltop
F-24	30.629261	-97.7300215	SH	20	Ked	6	5	2	--	0	--	--	C,F,O	15	35	X		X		Hillside
F-25	30.630058	-97.725883	SC	20	Ked	--	0.3	2.5	--	0	--	--	N	5	25	X		X		Hillside
F-26	30.6316731	-97.7287284	SC	20	Ked	1	0.7	1.2	--	0	--	--	C,F,O	10	30	X		X		Hillside
F-27	30.6341486	-97.7268762	SH	20	Ked	12	10	2	--	0	--	--	C,F,O	19	39	X		X		Hilltop
F-28	30.6328998	-97.7261556	SH/SF/C	30	Ked	30	15	2	N330°W	0	--	--	C,F,FS,O	60	90		X		X	Hillside
F-29	30.6281267	-97.7248838	SH	20	Ked	30	25	4	--	0	--	--	C,F,O	30	50		X	X		Hillside
F-30	30.6286164	-97.7224986	SH/C	30	Ked	40	35	4	--	0	--	--	C,F,O	65	95		X		X	Hillside
F-31	30.6325428	-97.7248588	SC	20	Ked	1	0.8	3	--	0	--	--	C,F,O	28	48		X			Hillside
M-1	30.6256132	-97.7017999	MB	30	Qt	1.5	1.5	8	--	0	--	--	N	5	35	X		X		Floodplain

* DATUM: State Plane Texas Central

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
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12 TOPOGRAPHY
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Date : November 27, 2013

Sheet 3 of 5

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: 767 acres - Wolf Ranch Properties; SH 29 W; Georgetown, Tx

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
M-2	30.6266239	-97.7009221	MB	30	Qt	1	0.3	2.5	--	0	--	--	N	5	35	X		X		Hillside
M-3	30.627305	-97.699324	MB	30	Qt	1.5	0.7	3	--	0	--	--	N	5	35	X		X		Hillside
M-4	30.6322906	-97.7213021	MB/pit	30	Ked	200	120	20	--	0	--	--	C,F,O,X	9	39	X		X		Hilltop
M-5	30.633581	-97.721295	MB/well	30	Ked	2	2	--	--	0	--	--	F,O	8	38	X		X		Hilltop
M-6	30.6308594	-97.7172306	MB/well	30	Ked	0.2	0.2	--	--	0	--	--	N	5	35	X		X		Hillside
M-7	30.6428973	-97.7007256	MB/pond	30	Ked	70	70	15	--	0	--	--	C,F,O	7	37	X		X		Hillside
M-8	30.6422391	-97.7000951	MB	30	Ked	4	10	6	--	0	--	--	N	5	35	X		X		Hillside
M-9	30.641915	-97.6998959	MB	30	Ked	2	2	6	--	0	--	--	N	5	35	X		X		Hillside
M-10	30.641612	-97.69971	MB	30	Ked	2	2	6	--	0	--	--	N	5	35	X		X		Hillside
M-11	30.63561	-97.703118	MB/well	30	Ked	0.2	0.2	--	--	0	--	--	N	5	35	X		X		Hillside
M-12	30.6249138	-97.7283129	MB/pond	30	Kc	220	120	10	--	0	--	--	C,F,O	5	35	X		X		Hillside

* DATUM: State Plane Texas Central

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
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8A INFILLING	
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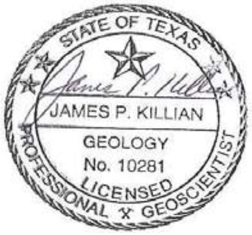
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed



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Sheet 4 of 5

TCEQ-0585-Table (Rev. 10-01-04)

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: 767 acres - Wolf Ranch Properties; SH 29 W; Georgetown, Tx

LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
F-32	30.6271723	-97.7150157	SC/C	30	Ked	4	2	8	--	0	--	--	C, F, O	30	60		X	X		Hillside
F-33	30.6267681	-97.7124339	SC	20	Ked	3	2	4.5	--	0	--	--	C, F, O	15	35	X		X		Hillside
F-34	30.6269705	-97.7161	SC	20	Ked	2	1	2	--	0	--	--	C, F, O	12	32	X		X		Hillside

* DATUM: State Plane Texas Central

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
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SH	Sinkhole	20
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8A INFILLING	
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C	Coarse - cobbles, breakdown, sand, gravel
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Date : November 27, 2013

Sheet ___5___ of __5____

____

Horizon Environmental Services, Inc.

APPENDIX D

SITE PHOTOGRAPHS

PHOTO 1
View of geologic feature F-1 (solution-enlarged fracture), facing southwest

PHOTO 2
View near center of geologic feature F-2 (sinkhole with cave), facing south

PHOTO 3
View of geologic feature F-3 (solution cavity), facing south

PHOTO 4
View of geologic feature F-4 (2 solution cavities), facing east

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PHOTO 5
View of geologic feature F-5 (large sinkhole with cave), facing east

PHOTO 6
Close up view of cave entrance near center of geologic feature F-5

PHOTO 7
Close up view of solution cavity (skylight) connected to geologic feature F-5 cave

PHOTO 8
View of geologic feature F-6 (solution cavity), facing southeast

PHOTO 9
View of geologic feature F-6 (closed depression), facing north

PHOTO 10
View near center of geologic feature F-7 (large sinkhole with cave), facing south

PHOTO 11
View inside cave at geologic feature F-7, facing east

PHOTO 12
View of geologic feature F-8 (solution cavity), facing east

PHOTO 13
Close up view of geologic feature F-8 (solution cavity)

PHOTO 14
View near center of geologic feature F-9 (large sinkhole with cave), facing southeast

PHOTO 15
Close up view of entrance drop (solution cavity) into cave for geologic feature F-9

PHOTO 16
View of geologic feature F-10 (solution cavity with small sinkhole), facing northwest

PHOTO 17
View of geologic feature F-11 (very large sinkhole with cave), facing south

PHOTO 18
View near west side of geologic feature F-11 (cave entrance), facing north

PHOTO 19
View near northeast side of geologic feature F-11 (cave entrance), facing north

PHOTO 20
View inside cave of geologic feature F-11, facing north-northeast

Horizon
Environmental Services, Inc.

PHOTO 21
View of geologic feature F-12 (sinkhole), facing east

PHOTO 22
Close up view near center of geologic feature F-12

PHOTO 23
View near center of geologic feature F-13 (very large sinkhole with probable cave), facing north

PHOTO 24
View of geologic feature F-14 (spring), facing west

PHOTO 25
View of cattle trough from geologic feature F-14 (spring), facing northeast

PHOTO 26
View of geologic feature F-15 (sinkhole with solution enlarged fracture cave), facing south

PHOTO 27
Close up view near center of geologic feature F-15 (solution enlarged fracture cave)

PHOTO 28
View of geologic feature F-16 (solution enlarged fracture cave), facing west

Horizon
Environmental Services, Inc.

PHOTO 29
Close up view of geologic feature F-16 (solution enlarged fracture cave)

PHOTO 30
View of geologic feature F-17 (sinkhole), facing north

PHOTO 31
View near center of geologic feature F-18 (large sinkhole with cave), facing south

PHOTO 32
View of geologic feature F-19 (sinkhole), facing south

PHOTO 33
View of geologic feature F-20 (solution cavity), facing southwest

PHOTO 34
View of geologic feature F-21 (2 small solution cavities 8 ft apart), facing northwest

PHOTO 35
View of geologic feature F-22 (solution enlarged fracture within small sinkhole), facing northwest

PHOTO 36
View of geologic feature F-22A (solution cavity), facing north

PHOTO 37
View of geologic feature F-23 (solution cavity), facing northwest

PHOTO 38
View of geologic feature F-24 (small sinkhole), facing east

PHOTO 39
View of geologic feature F-25 (spring), facing west

PHOTO 40
View of geologic feature F-26 (solution cavity), facing south

PHOTO 41
View of geologic feature F-27 (sinkhole along edge of small drainage swale), facing north

PHOTO 42
Close up view of apparent drainage portal prior to excavation at geologic feature F-27

PHOTO 43
View of geologic feature F-28 (large sinkhole with cave), facing north

PHOTO 44
View of cave entrance (solution enlarged fracture) at north side of geologic feature F-28, facing southeast

PHOTO 45
View of geologic feature F-29 (large sinkhole), facing north

PHOTO 46
View near center of geologic feature F-30 (large sinkhole with cave), facing north

PHOTO 47
Close up view of cave entrance for geologic feature F-30

PHOTO 48
View of geologic feature F-31 (solution cavity within small sinkhole), facing east

PHOTO 49
View of geologic feature F-32 (NF-7, solution cavity), facing southwest

PHOTO 50
Close up view of geologic feature F-32 (NF-7, solution cavity)

PHOTO 51
Close up view of geologic feature F-33 (NF-5, solution cavity)

PHOTO 52
View of geologic feature F-34 (NF-1, solution cavity), facing east

PHOTO 53

View of manmade feature M-4 (borrow pit), facing east

PHOTO 54

View of manmade feature M-7 (stormwater retention pond), facing south

PHOTO 55

View of manmade feature M-12 (stock pond), facing east

Modification of a Previously Approved Plan

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Transition Zone and Relating to 30 TAC 213.4(j), 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 request for a **Modification of a Previously Approved Plan** is hereby submitted for TCEQ review and executive director approval. The request was prepared by:

Print Name of Customer/Agent: Austin Conner, P.E.

Date: 8/31/2023

Signature of Customer/Agent:

Project Information

1. Current Regulated Entity Name: Wolf Ranch West, Section 4G
   Original Regulated Entity Name: Wolf Ranch West, Section 4G
   Regulated Entity Number(s) (RN): 111446985
   Edwards Aquifer Protection Program ID Number(s): 11002959
   ☒ The applicant has not changed and the Customer Number (CN) is: 605990142
   ☐ The applicant or Regulated Entity has changed. A new Core Data Form has been provided.

2. ☒ **Attachment A: Original Approval Letter and Approved Modification Letters**. A copy of the original approval letter and copies of any modification approval letters are attached.

3. A modification of a previously approved plan is requested for (check all that apply):
   - ☐ Physical or operational modification of any water pollution abatement structure(s) including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
   - ☐ Change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
   - ☐ Development of land previously identified as undeveloped in the original water pollution abatement plan;
   - ☒ Physical modification of the approved organized sewage collection system;
   - ☐ Physical modification of the approved underground storage tank system;
   - ☐ Physical modification of the approved aboveground storage tank system.

4. ☒ Summary of Proposed Modifications (select plan type being modified). If the approved plan has been modified more than once, copy the appropriate table below, as necessary, and complete the information for each additional modification.

WPAP Modification Summary	***Approved Project***	***Proposed Modification***
Acres	______	______
Type of Development	______	______
Number of Residential Lots	______	______
Impervious Cover (acres)	______	______
Impervious Cover (%	______	______
Permanent BMPs	______	______
Other	______	______

SCS Modification Summary	***Approved Project***	***Proposed Modification***
Linear Feet	6,517 Main / 1,524 Lateral	6,522 Main / 1,524 Lateral
Pipe Diameter	12” & 8” Main / 6-in Lateral	Add 27”, 30”, & 36” Main
Other	______	See Narrative – Att. B

AST Modification Summary	***Approved Project***	***Proposed Modification***
Number of ASTs	______	______
Volume of ASTs	______	______
Other	______	______

UST Modification Summary	***Approved Project***	***Proposed Modification***
Number of USTs	______	______
Volume of USTs	______	______
Other	______	______

5. ☒ **Attachment B: Narrative of Proposed Modification**. A detailed narrative description of the nature of the proposed modification is attached. It discusses what was approved, including any previous modifications, and how this proposed modification will change the approved plan.

6. ☒ **Attachment C: Current Site Plan of the Approved Project**. A current site plan showing the existing site development (i.e., current site layout) at the time this application for modification is attached. A site plan detailing the changes proposed in the submitted modification is required elsewhere.
   - ☐ The approved construction has not commenced. The original approval letter and any subsequent modification approval letters are included as Attachment A to document that the approval has not expired.
   - ☐ The approved construction has commenced and has been completed. Attachment C illustrates that the site was constructed as approved.
   - ☐ The approved construction has commenced and has been completed. Attachment C illustrates that the site was **not** constructed as approved.
   - ☒ The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was constructed as approved.
   - ☐ The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was **not** constructed as approved.

7. ☐ The acreage of the approved plan has increased. A Geologic Assessment has been provided for the new acreage.
   ☒ Acreage has not been added to or removed from the approved plan.

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

ATTACHMENT A

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

January 20, 2023

Mr. Fred Balda
H4 Georgetown Phase 1, LLC
3000 Turtle Creek Blvd.
Dallas, Texas 75219

Re: Edwards Aquifer, Williamson County

NAME OF PROJECT: Wolf Ranch West Section 4G; Located South of Wolf Ranch Pkwy. and Blue Blaze Tr.; Georgetown, Texas

TYPE OF PLAN: Request for Modification of a Previously Approved Water Pollution Abatement Plan (WPAP-MOD) and an Approved Organized Sewage Collection System (SCS-MOD); 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Edwards Aquifer Protection Program ID Nos. 11003328 (WPAP-MOD) and 11003329 (SCS-MOD); Regulated Entity No. RN111446985

Dear Mr. Balda:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP-MOD and SCS-MOD Applications for the above-referenced project submitted to the Austin Regional Office by Pape-Dawson Engineers, Inc. on behalf of H4 Georgetown Phase 1, LLC on October 26, 2022. Final review was completed after additional material was received on January 19, 2023. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) were selected and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213 and Chapter 217. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

BACKGROUND

The Wolf Ranch West Section 5 WPAP, approved by letter dated December 3, 2021 (EAPP ID No. 11002667), included the construction of 76 single-family units with associated roadways, sidewalks, and utilities, as well as a batch detention (Pond 1), and five vegetative filter strips to provide permanent stormwater treatment for the 24.67 acres site.

The Wolf Ranch West Section 4G WPAP and SCS, approved by letter dated July 11, 2022 (EAPP ID Nos. 11002958 (WPAP) and 11002959 (SCS)), included the construction of 97 single-family units with associated drives, utilities including a 6,585 linear feet SCS consisting of 6-inch, 8-inch, and 12-inch pipes, a new extended detention basin (Pond 2), in series with a grassy swale, and a total of fourteen vegetative filter strips to provide permanent stormwater treatment for the 35.85 acres site.

PROJECT DESCRIPTION

WPAP DESCRIPTON

The modification of the residential development proposes no changes to the total area of 35.85-acre site, to the existing batch detention (Pond 1), or to the approved extended detention basin (Pond 2), in series with a grassy swale. With this modification the total number of single-family units will be reduced to 77 and the total number of vegetative filter strips will be reduced to eleven. The proposed impervious cover will be reduced to 14.02 acres (39.1 percent).

SCS DESCRIPTION

The modified 8,061 linear feet SCS will consist of approximately 1,049 linear feet of 12-inch, 5,448 linear feet of 8-inch, and 1,524 linear feet of 6-inch SDR 26 PVC ASTM D3034, and 40 linear feet of 8-inch SDR 26 PVC ASTM D2241, with associated manholes and stub-outs.

The wastewater generated by this project will be conveyed to the existing San Gabriel Treatment Plant for treatment and disposal. The project is located within the City of Georgetown and will conform to all applicable codes, ordinances, and requirements of the City of Georgetown.

PERMANENT POLLUTION ABATEMENT MEASURES

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, an existing batch detention (Pond 1; EAPP ID No. 11002667), an extended detention basin (Pond 2; EAPP ID No. 11002958), in series with a grassy swale, and a total of eleven natural (VFS1, VFS3, VFS4, and VFS5) and engineered (VFS2, VFS6 through VFS11) vegetative filter strips designed using the TCEQ technical guidance document, Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 12,203 pounds of TSS generated from the 14.02 acres of impervious cover. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

GEOLOGY

According to the Geologic Assessment (GA) included with the application, no sensitive geologic features were observed at the site. The surface geology of the area consists of Edwards Limestone Formation (Ked) and Comanche Peak limestone Formation (Kc). The site is located entirely within Edwards Aquifer Recharge Zone. The TCEQ site assessment conducted on January 17, 2023, revealed the site to be generally as described by the GA.

SPECIAL CONDITIONS

I. This WPAP modification is subject to all Special and Standard Conditions listed in the approval letter dated July 11, 2022.

II. The SCS application approved July 11, 2022 (EAPP ID No. 11002959) for Wolf Ranch West Section 4G is superseded by this SCS-MOD application.

III. All permanent pollution abatement measures shall be operational prior to occupancy of the facility.

IV. All sediment and/or media removed from the water quality basins during maintenance activities shall be properly disposed of according to 30 TAC 330 or 30 TAC 335, as applicable.

V. All wastewater conveyance and treatment infrastructure shall be operational prior to any occupancy of the facility and prior to any wastewater flow being introduced into the sewage collection system.

STANDARD CONDITIONS

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.
2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.
3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the Austin Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.
5. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.
6. Modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.
7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the Austin Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.
8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

<u>During Construction:</u>

10. During the course of regulated activities related to this project, the applicant or agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity.
11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.
12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the Austin Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.
13. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.
14. If sediment escapes the construction site, the 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). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.
15. Intentional discharges of sediment laden water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.
16. The following records shall be maintained and made available to the executive director 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.
17. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.
18. No part of the system shall be used as a holding tank for a pump-and-haul operation.

After Completion of Construction:

19. 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 Austin Regional Office within 30 days of site completion.

20. The applicant shall be 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. A copy of the transfer of responsibility must be filed with the executive director through Austin Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.

21. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.

22. Certification by a Texas Licensed Professional Engineer of the testing of sewage collection systems required by 30 TAC Chapter 213 and Chapter 217 shall be submitted to the Austin Regional Office within 30 days of test completion and prior to the new sewage collection system being put into service. The certification should include the project name as it appeared on the approved application, the program ID number, and two copies of a site plan sheet(s) indicating the wastewater lines and manholes that were tested and are being certified as complying with the appropriate regulations. The engineer must certify in writing that all wastewater lines have passed all required testing to the appropriate regional office within 30 days of test completion and prior to use of the new collection system. Should any test result fail to meet passing test criteria and then subsequently pass testing, the result(s) and an explanation of what repair, adjustment, or other means were taken to facilitate a subsequent passing result shall be provided.

    Every five years after the initial certification, the sewage collection system shall be retested. Any lines that fail the test must be repaired and retested. Certification that the system continues to meet the requirements of 30 TAC Chapter 213 and Chapter 217 shall be submitted to the Austin Regional Office. The certification should include the project name as it appeared on the approved application, the program ID number and two copies of a site plan sheet(s) indicating the wastewater lines and manholes that were tested and are being certified as complying with the appropriate regulations. Should any test result fail to meet passing test criteria, and then subsequently pass testing, the result(s) and an explanation of what repair, adjustment, or other means were taken to facilitate a subsequent passing result shall be provided.

23. If ownership of this organized sewage collection system is legally transferred (e.g., developer to city or Municipal Utility District), the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.

24. An Edwards Aquifer protection plan approval or extension will expire, and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the Austin Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.

25. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality. If you have any questions or require additional information, please contact Mihaela (Miki) Chilarescu, P.E. of the Edwards Aquifer Protection Program of the Austin Regional Office at (512) 339-2929.

Sincerely,

Lillian Butler

Lillian Butler, Section Manager
Edwards Aquifer Protection Program
Texas Commission on Environmental Quality

LIB/mec

Enclosure: Deed Recordation Affidavit, Form TCEQ-0625
Change in Responsibility for Maintenance of Permanent BMPs, Form TCEQ-10263

Cc: Ms. Jennifer Franklin, P.E. – Pape-Dawson Engineers, Austin

ATTACHMENT B

Attachment B – **NARRATIVE** of Proposed Modification

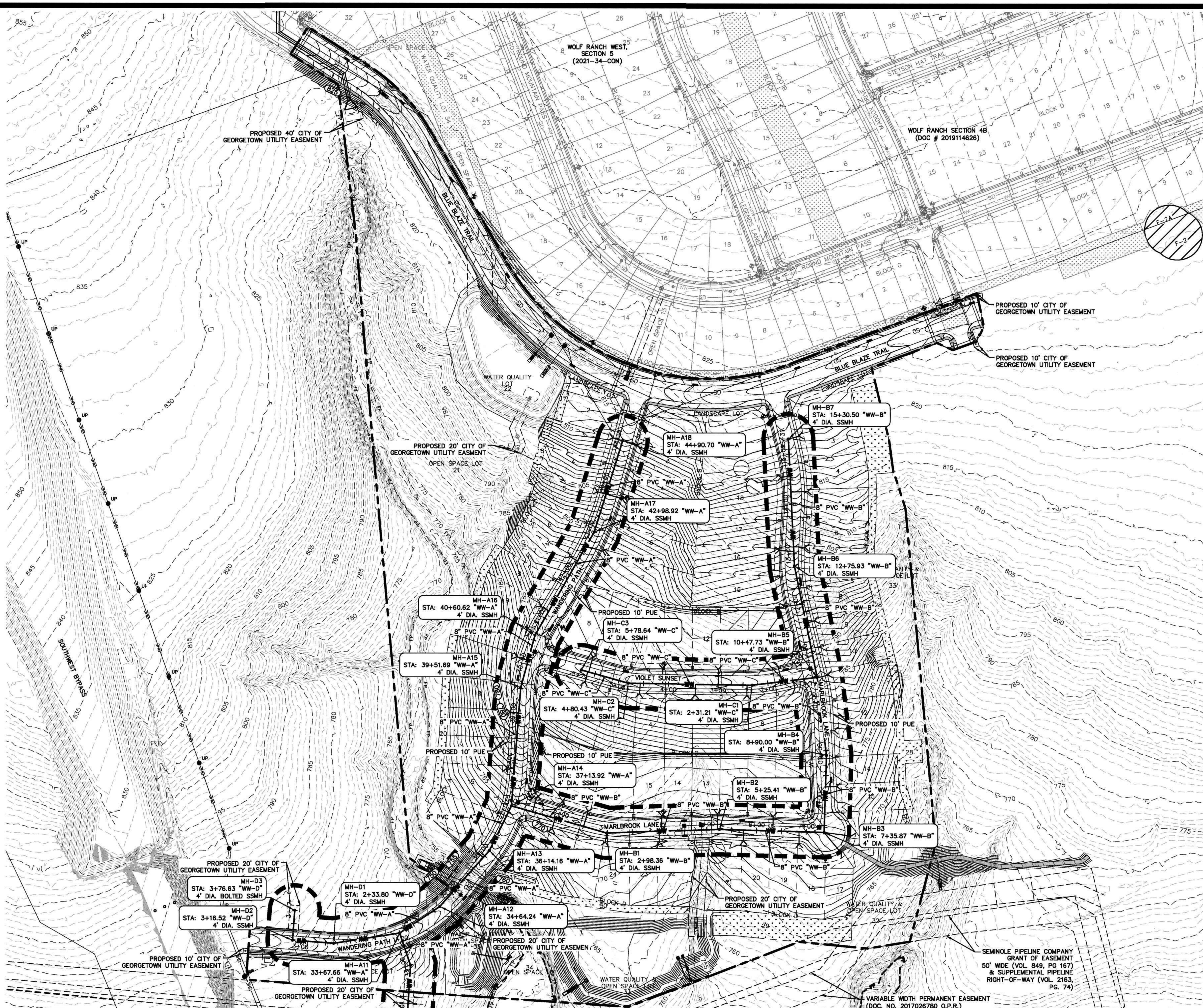
On January 20, 2023, the Texas Commission on Environmental Quality approved the Wolf Ranch West, Section 4G SCS Modification Application (EAPP ID No. 11003329). The approved SCS Modification Application provided for disposal services for 294 single family residences and 266 multi-family residences.

The proposed modifications to the Sewage Collection System (SCS) application include changes to the proposed pipe sizes as detailed below. The change in sizing is due to requests made by the City of Georgetown.

Nominal Pipe Diameter (in)	Approved Linear Feet	Modified Linear Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
6	*1,524*	***1,524*** ***(No Change)***	***PVD SDR 26***	***ASTM D3034***	***ASTM D3212***
8	*5,448*	***3,951***	***PVC SDR 26***	***ASTM D3034***	***ASTM D3212***
8	*40*	***40*** ***(No Change)***	***PVC SDR 26***	***ASTM 2241, Class 160***	***ASTM D3139***
12	*1,049*	***---***	***PVC SDR 26***	***ASTM D3034***	***ASTM D3212***
27	---	***172***	***PVC PS 115***	***ASTM F679***	***ASTM D3212***
30	---	***1,310***	***PVC PS 115***	***ASTM F679***	***ASTM D3212***
36	---	***1,049***	***PVC PS 115***	***ASTM F679***	***ASTM D3212***

The site is located within the city limits of the City of Georgetown, Texas and is entirely over the Edwards Aquifer Recharge Zone. Because the project is located entirely over the Edwards Aquifer Recharge Zone, a Geologic Assessment was conducted and submitted with the original SCS application.

ATTACHMENT C



MATCH LINE SEE SHEET 2 OF 2

SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- WASTEWATER LINE & MH
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- EXISTING WASTEWATER LINE
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- PROPERTY BOUNDARY
- 50' SCS BUFFER
- VEGETATIVE FILTER STRIP

NO.	REVISION	DATE

STATE OF TEXAS MICHAEL S. FISHER 87724 LICENSED PROFESSIONAL ENGINEER 9/22/22

PAPE-DAWSON ENGINEERS

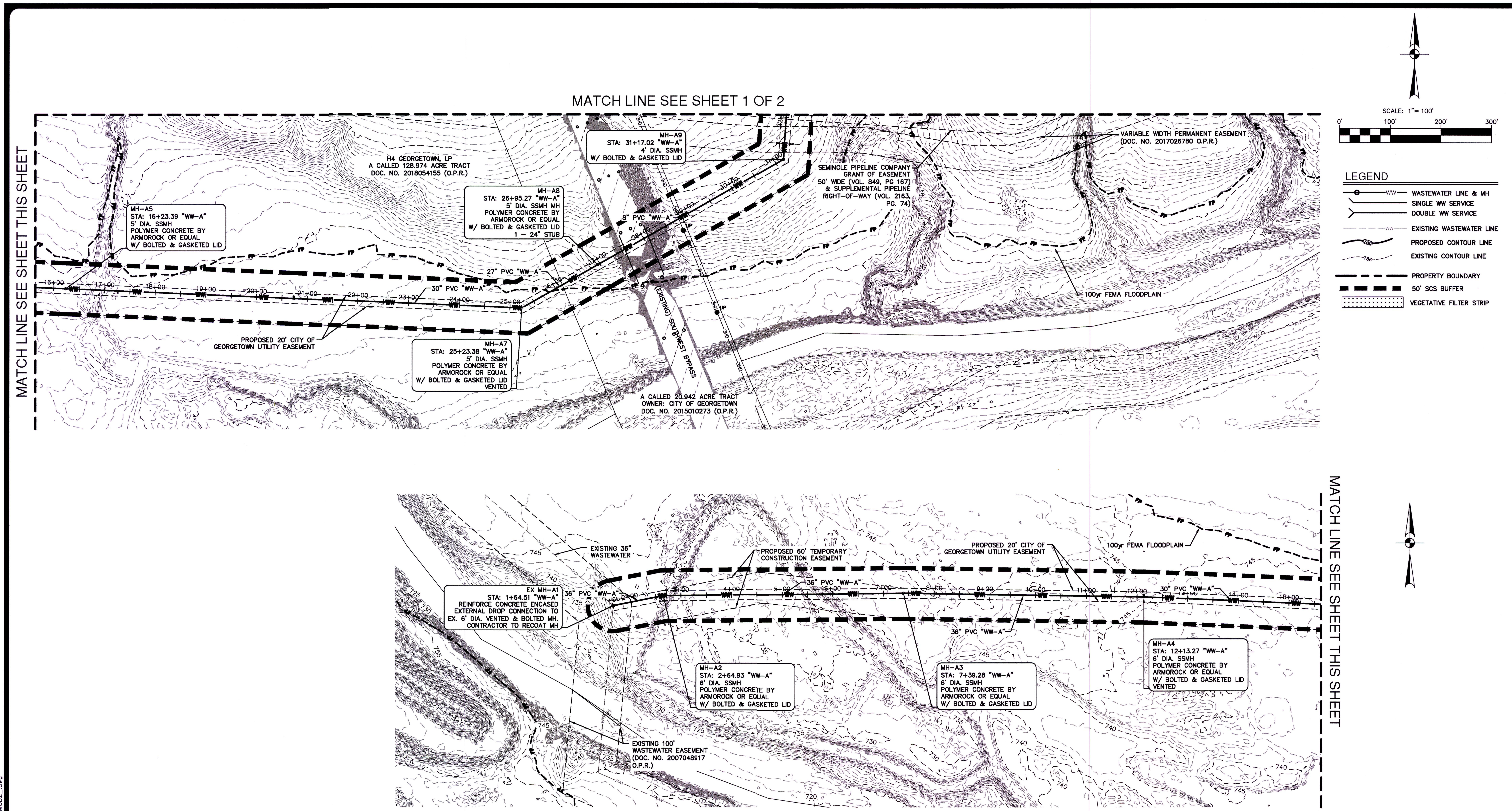
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G
CITY OF GEORGETOWN, TEXAS

SITE PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 22, 2022
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 02 OF 02

Date: Sep 22, 2022, 4:00pm User ID: aconner
File: H:\Projects\511\27\42\308 SCS\Exhibits\Site Plan_51127-42_SCS MOD.dwg



NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
SITE PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 12, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 01 OF 02

Date: Sep 12, 2023, 2:59pm User ID: jbennett
File: H:\Projects\511\27\42\308 SCS\Exhibits\Site Plan_51127-42_SCS M002_.dwg

ORGANIZED SEWAGE COLLECTION SYSTEM PLAN

Organized Sewage Collection System Application

Texas Commission on Environmental Quality

For Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(c), 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.

Regulated Entity Name: Wolf Ranch West, Section 4G

1. ☒ **Attachment A – SCS Engineering Design Report**. This Engineering Design Report is provided to fulfill the requirements of 30 TAC Chapter 217, including 217.10 of Subchapter A, §§217.51 – 217.70 of Subchapter C, and Subchapter D as applicable, and is required to be submitted with this SCS Application Form.

Customer Information

2. The entity and contact person responsible for providing the required engineering certification of testing for this sewage collection system upon completion (including private service connections) and every five years thereafter to the appropriate TCEQ region office pursuant to 30 TAC §213.5(c) is:

   Contact Person: Wesley Wright, P.E.
   Entity: City of Georgetown
   Mailing Address: 300-1 Industrial Avenue
   City, State: Georgetown, TX Zip: 78626
   Telephone: (512) 931-7672 Fax: _____
   Email Address: Wesley.Wright@georgetown.org
   The appropriate regional office must be informed of any changes in this information within 30 days of the change.

3. The engineer responsible for the design of this sewage collection system is:

   Contact Person: Michael S. Fisher, P.E.
   Texas Licensed Professional Engineer's Number: 87704
   Entity: Pape-Dawson Engineers, Inc.
   Mailing Address: 10801 N MoPac Expy., Bldg 3, Suite 200
   City, State:Austin, TX Zip: 78759
   Telephone:(512) 454-8711 Fax:N/A
   Email Address:mfisher@pape-dawson.com

Project Information

4. Anticipated type of development to be served (estimated future population to be served, plus adequate allowance for institutional and commercial flows):

   ☒ Residential: Number of single-family lots: 294
   ☒ Multi-family: Number of residential units: 266
   ☐ Commercial
   ☐ Industrial
   ☐ Off-site system (not associated with any development)
   ☐ Other:

5. The character and volume of wastewater is shown below:

   100% Domestic 154,376 gallons/day
   _____% Industrial _____ gallons/day
   _____% Commingled _______ gallons/day
   Total gallons/day: 128,500

6. Existing and anticipated infiltration/inflow is 108,144 gallons/day. This will be addressed by: adequate sizing of the sewer main.

7. A Water Pollution Abatement Plan (WPAP) is required for construction of any associated commercial, industrial or residential project located on the Recharge Zone.

   ☒ The WPAP application for this development was approved by letter dated Jan 20, 2023. A copy of the approval letter is attached.
   ☐ The WPAP application for this development was submitted to the TCEQ on___, but has not been approved.
   ☐ A WPAP application is required for an associated project, but it has not been submitted.
   ☐ There is no associated project requiring a WPAP application.

8. Pipe description:

Table 1 - Pipe Description

Pipe Diameter(Inches)	*Linear Feet (1)*	*Pipe Material (2)*	*Specifications (3)*
8" Gravity	3,951	PVC, SDR 26	ASTM D3034, ASTM D3212
8" Pressure-Rated (160 psi)	40	PVC, SDR 26	ASTM D2241, Class 160, ASTM D3139
6" Wastewater Service (Double)	1,524	PVC, SDR 26	ASTM D3034, ASTM D3212
27" Gravity	172	PVC, PS115	ASTM D3034, ASTM D3212

Pipe Diameter(Inches)	***Linear Feet (1)***	***Pipe Material (2)***	***Specifications (3)***
30" Gravity	1,310	PVC, PS115	ASTM D3034, ASTM D3212
36" Gravity	1,049	PVC, PS115	ASTM D3034, ASTM D3212

Total Linear Feet: 8,046

(1) Linear feet - Include stub-outs and double service connections. Do not include private service laterals.
(2) Pipe Material - If PVC, state SDR value.
(3) Specifications - ASTM / ANSI / AWWA specification and class numbers should be included.

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

☒ Existing
☐ Proposed

10. All components of this sewage collection system will comply with:

☒ The City of Georgetown standard specifications.
☐ Other. Specifications are attached.

11. ☒ No force main(s) and/or lift station(s) are associated with this sewage collection system.

☐ A force main(s) and/or lift station(s) is associated with this sewage collection system and the **Lift Station/Force Main System Application** form (TCEQ-0624) is included with this application.

Alignment

12. ☒ There are no deviations from uniform grade in this sewage collection system without manholes and with open cut construction.

13. ☒ There are no deviations from straight alignment in this sewage collection system without manholes.

☐ **Attachment B - Justification and Calculations for Deviation in Straight Alignment without Manholes**. A justification for deviations from straight alignment in this sewage collection system without manholes with documentation from pipe manufacturer allowing pipe curvature is attached.

☐ For curved sewer lines, all curved sewer line notes (TCEQ-0596) are included on the construction plans for the wastewater collection system.

Manholes and Cleanouts

14. ☒ Manholes or clean-outs exist at the end of each sewer line(s). These locations are listed below: (Please attach additional sheet if necessary)

Table 2 - Manholes and Cleanouts

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
See attached table for manholes			

15. ☒ Manholes are installed at all Points of Curvature and Points of Termination of a sewer line.

16. ☒ The maximum spacing between manholes on this project for each pipe diameter is no greater than:

Pipe Diameter (inches)	**Max. Manhole Spacing (feet)**
6 - 15	500
16 - 30	800
36 - 48	1000
≥54	2000

☐ **Attachment C – Justification for Variance from Maximum Manhole Spacing**. The maximum spacing between manholes on this project (for each pipe diameter used) is greater than listed in the table above. A justification for any variance from the maximum spacing is attached and must include a letter from the entity which will operate and maintain the system stating that it has the capability to maintain lines with manhole spacing greater than the allowed spacing.

17. ☐ All manholes will be monolithic, cast-in-place concrete.

☒ The use of pre-cast manholes is requested for this project. The manufacturer's specifications and construction drawings, showing the method of sealing the joints, are attached.

Site Plan Requirements

Items 18 - 25 must be included on the Site Plan.

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

Site Plan Scale: 1" = 100'.

19. ☒ The Site Plan must include the sewage collection system general layout, including manholes with station numbers, and sewer pipe stub outs (if any). Site plan must be overlain by topographic contour lines, using a contour interval of not greater than ten feet and showing the area within both the five-year floodplain and the 100-year floodplain of any drainage way.

20. Lateral stub-outs:

☒ The location of all lateral stub-outs are shown and labeled.

☐ No lateral stub-outs will be installed during the construction of this sewer collection system.

21. Location of existing and proposed water lines:

☒ The entire water distribution system for this project is shown and labeled.
☐ If not shown on the Site Plan, a Utility Plan is provided showing the entire water and sewer systems.
☐ There will be no water lines associated with this project.

22. 100-year floodplain:

☐ After construction is complete, no part of this project will be in or cross a 100-year floodplain, either naturally occurring or manmade. (Do not include streets or concrete-lined channels constructed above of sewer lines.)
☒ After construction is complete, all sections located within the 100-year floodplain will have water-tight manholes. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Table 3 - 100-Year Floodplain

Line	*Sheet*	*Station*
WW-A	35-37 of 61	1+64.51 to 25+89.25
	of	to
	of	to
	of	to

23. 5-year floodplain:

☒ After construction is complete, no part of this project will be in or cross a 5-year floodplain, either naturally occurring or man-made. (Do not include streets or concrete-lined channels constructed above sewer lines.)
☐ After construction is complete, all sections located within the 5-year floodplain will be encased in concrete or capped with concrete. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Table 4 - 5-Year Floodplain

Line	*Sheet*	*Station*
	of	to
	of	to
	of	to
	of	to

24. ☒ Legal boundaries of the site are shown.

25. ☒ The ***final plans and technical specifications*** are submitted for the TCEQ's review. Each sheet of the construction plans and specifications are dated, signed, and sealed by the Texas Licensed Professional Engineer responsible for the design on each sheet.

Items 26 - 33 must be included on the Plan and Profile sheets.

26. ☒ All existing or proposed water line crossings and any parallel water lines within 9 feet of sewer lines are listed in the table below. These lines must have the type of pressure rated pipe to be installed shown on the plan and profile sheets. Any request for a variance from the required pressure rated piping at crossings must include a variance approval from 30 TAC Chapter 290.

☐ There will be no water line crossings.
☐ There will be no water lines within 9 feet of proposed sewer lines.

Table 5 - Water Line Crossings

Line	***Station or Closest Point***	***Crossing or Parallel***	***Horizontal Separation Distance***	***Vertical Separation Distance***
WW-A	33+40.12	Crossing	NA	10.57'
WW-B	1+27.50	Crossing	NA	5.5'
WW-C	1+26.44	Crossing	NA	3.46'

27. Vented Manholes:

☐ **No part** of this sewer line is within the 100-year floodplain and vented manholes are not required by 30 TAC Chapter 217.
☒ **A portion** of this sewer line is within the 100-year floodplain and vented manholes will be provided at less than 1500-foot intervals. These water-tight manholes are listed in the table below and labeled on the appropriate profile sheets.
☐ **A portion** of this sewer line is within the 100-year floodplain and an alternative means of venting shall be provided at less than 1500 feet intervals. A description of the alternative means is described on the following page.
☐ **A portion** of this sewer line is within the 100-year floodplain; however, there is no interval longer than 1500 feet located within. No vented manholes will be used.

Table 6 - Vented Manholes

Line	***Manhole***	***Station***	***Sheet***
WW-A	EX MH-A1	1+64.51	37 of 61
WW-A	MH-A7	25+23.38	39 of 61

28. Drop manholes:

☐ There are no drop manholes associated with this project.

☒ Sewer lines which enter new or existing manholes or "manhole structures" higher than 24 inches above the manhole invert are listed in the table below and labeled on the appropriate profile sheets. These lines meet the requirements of 30 TAC §217.55(l)(2)(H).

Table 7 - Drop Manholes

Line	*Manhole*	*Station*	*Sheet*
WW-A	MH-EX	1+64.51	37 of 61

29. Sewer line stub-outs (For proposed extensions):

☒ The placement and markings of all sewer line stub-outs are shown and labeled.

☐ No sewer line stub-outs are to be installed during the construction of this sewage collection system.

30. Lateral stub-outs (For proposed private service connections):

☒ The placement and markings of all lateral stub-outs are shown and labeled.

☐ No lateral stub-outs are to be installed during the construction of this sewage collection system.

31. Minimum flow velocity (From Appendix A)

☒ Assuming pipes are flowing full; all slopes are designed to produce flows equal to or greater than 2.0 feet per second for this system/line.

32. Maximum flow velocity/slopes (From Appendix A)

☒ Assuming pipes are flowing full, all slopes are designed to produce maximum flows of less than or equal to 10 feet per second for this system/line.

☐ **Attachment D – Calculations for Slopes for Flows Greater Than 10.0 Feet per Second.** Assuming pipes are flowing full, some slopes produce flows which are greater than 10 feet per second. These locations are listed in the table below. Calculations are attached.

Table 8 - Flows Greater Than 10 Feet per Second

Line	*Profile Sheet*	*Station to Station*	*FPS*	*% Slope*	*Erosion/Shock Protection*

Line	*Profile Sheet*	*Station to Station*	*FPS*	*% Slope*	*Erosion/Shock Protection*

33. Assuming pipes are flowing full, where flows are ≥ 10 feet per second, the provisions noted below have been made to protect against pipe displacement by erosion and/or shock under 30 TAC §217.53(l)(2)(B).

☐ Concrete encasement shown on appropriate Plan and Profile sheets for the locations listed in the table above.

☐ Steel-reinforced, anchored concrete baffles/retards placed every 50 feet shown on appropriate Plan and Profile sheets for the locations listed in the table above.

☒ N/A

Administrative Information

34. ☒ The final plans and technical specifications are submitted for TCEQ review. Each sheet of the construction plans and specifications are dated, signed, and sealed by the Texas Licensed Professional Engineer responsible for the design on each sheet.

35. ☒ Standard details are shown on the detail sheets, which are dated, signed, and sealed by the Texas Licensed Professional Engineer, as listed in the table below:

Table 9 - Standard Details

Standard Details	*Shown on Sheet*
Lateral stub-out marking **[Required]**	59 of 61
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) **[Required]**	59 of 61
Alternate method of joining lateral to existing SCS line for potential future connections **[Required]**	N/A of N/A
Typical trench cross-sections **[Required]**	60 of 61
Bolted manholes **[Required]**	N/A of N/A
Sewer Service lateral standard details **[Required]**	60 of 61
Clean-out at end of line **[Required, if used]**	60 of 61
Baffles or concrete encasement for shock/erosion protection **[Required, if flow velocity of any section of pipe >10 fps]**	N/A of N/A
Detail showing Wastewater Line/Water Line Crossing **[Required, if crossings are proposed]**	60 of 61
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) **[Required, if Flexible Pipe is used]**	6 of 61
Drop manholes **[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]**	59 of 61

36. ☒ All organized sewage collection system general construction notes (TCEQ-0596) are included on the construction plans for this sewage collection system.

37. ☐ All proposed sewer lines will be sufficiently surveyed/staked to allow an assessment prior to TCEQ executive director approval. If the alignments of the proposed sewer lines are not walkable on that date, the application will be deemed incomplete and returned.

☒ Survey staking was completed on this date: 9/1/2023.

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

39. ☒ Any modification of this SCS application will require TCEQ approval, prior to construction, and may require submission of a revised application, with appropriate fees.

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 **Organized Sewage Collection System Application** is hereby submitted for TCEQ review and executive director approval. The system was designed in accordance with the requirements of 30 TAC §213.5(c) and 30 TAC §217 and prepared by:

Print Name of Licensed Professional Engineer: Michael Fisher, P.E.

Date: 9/6/23

Place engineer's seal here:

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

9/6/23

Signature of Licensed Professional Engineer:

____

Appendix A-Flow Velocity Table

Flow Velocity (Flowing Full) All gravity sewer lines on the Edwards Aquifer Recharge Zone shall be designed and constructed with hydraulic slopes sufficient to give a velocity when flowing full of not less than 2.0 feet per second, and not greater than 10 feet per second. The grades shown in the following table are based on Manning's formula and an n factor of 0.013 and shall be the minimum and maximum acceptable slopes unless provisions are made otherwise.

Table 10 - Slope Velocity

Pipe Diameter(Inches)	***% Slope required for minimum flow velocity of 2.0 fps***	***% Slope which produces flow velocity of 10.0 fps***
6	0.50	12.35
8	0.33	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.30
24	0.08	1.93
27	0.06	1.65
30	0.055	1.43
33	0.05	1.26
36	0.045	1.12
39	0.04	1.01
>39	*	*

**For lines larger than 39 inches in diameter, the slope may be determined by Manning's formula (as shown below) to maintain a minimum velocity greater than 2.0 feet per second when flowing full and a maximum velocity less than 10 feet per second when flowing full.*

$$v = \frac{1.49}{n} \times R_h^{0.67} \times \sqrt{S}$$

Figure 1 - Manning's Formula

Where:

v = velocity (ft/sec)
n = Manning's roughness coefficient (0.013)
Rh = hydraulic radius (ft)
S = slope (ft/ft)

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
WW-A	37	1+64.51	EX MH
WW-A	37	2+64.93	MH
WW-A	37	7+39.28	MH
WW-A	38	12+13.27	MH
WW-A	38	16+23.39	MH
WW-A	39	20+73.39	MH
WW-A	39	25+23.38	MH
WW-A	39	26+95.27	MH
WW-A	40	31+17.02	MH
WW-A	40	32+99.45	MH
WW-A	40	33+67.66	MH
WW-A	40	34+64.24	MH
WW-A	40	36+14.16	MH
WW-A	40	37+13.92	MH
WW-A	41	39+51.69	MH
WW-A	41	40+60.62	MH
WW-A	41	42+98.92	MH
WW-A	41	44+90.70	MH
WW-B	42	2+98.36	MH
WW-B	42	5+25.41	MH
WW-B	42	7+35.87	MH
WW-B	42	8+90.00	MH
WW-B	43	10+47.73	MH
WW-B	43	12+75.93	MH
WW-B	43	15+30.50	MH
WW-C	44	2+31.21	MH
WW-C	44	4+80.43	MH
WW-C	44	5+78.64	MH
WW-C	44	2+33.80	MH
WW-C	44	3+16.52	MH
WW-C	44	3+76.63	MH

ATTACHMENT A

Wolf Ranch West, Section 4G

Engineering Design Report

Prepared in Accordance with the City of Georgetown Wastewater Design Criteria

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/6/23

SEPTEMBER 2023

by
Pape-Dawson Engineers, Inc.
TBPE, Firm Registration #470

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This Engineering Design Report has been prepared to comply with the Texas Commission on Environmental Quality's Design Criteria for Domestic Wastewater Systems (30 TAC 217), and regulations over the Edwards Aquifer Recharge Zone (30 TAC 213). Please note that throughout this application, in the case of multiple regulations, the more stringent shall apply.

PROJECT INFORMATION

Wolf Ranch West, Section 4G is located on approximately 35.85 acres south of the intersection of Wolf Ranch Parkway & Blue Blaze Trail, south of Wolf Ranch West, Section 5 (EAPP11002668), within the city limits of Georgetown in Williamson County, Texas. The project limits are located over the Edwards Aquifer Recharge Zone and Contributing Zone as shown on Attachment B. A Water Pollution Abatement Plan (WPAP) Modification Application for this development was approved on January 20, 2023.

The Wolf Ranch West, Section 4G, SCS Modification Application proposes the construction of approximately 3,991 linear feet of 8-inch gravity wastewater main, 172 linear feet of 27-inch gravity wastewater main, 1,310 linear feet of 30-inch gravity wastewater main, and 1,049 linear feet of 36-inch gravity wastewater main. Approximately 40 LF of the proposed 3,991 LF of 8-inch gravity sewer mains are constructed of PVC, SDR 26, 160 psi pressure-rated pipe, centered on water/sewer-line crossings. This application also includes 1,524 linear feet of double wastewater service laterals for a total of 8,046 linear feet of sewage collection system. Regulated activities proposed include excavation, construction of sewer mains, manhole installation, backfill, and compaction. Approximately 15.05 acres may be disturbed, as identified by the limits of the fifty-foot (50') radius SCS/GA envelope shown on the plans. The SCS proposed with this application will connect to an existing 36-inch wastewater line.

The Guy Tract Geologic Assessment (GA) and Wolf Ranch GA included with this SCS Application states that there are no naturally occurring geologic features within Wolf Ranch West, Section 4G. There are no existing water wells within the Project Boundary submitted with this application.

This SCS application will directly serve a total of 494 LUE's defined as follows:

- Wolf Ranch West, Section 4G (35.85 AC) – 77 single family units = 97 LUE's
- Wolf Ranch West, Section 5G (66.99 AC) – 217 single family units = 217 LUE's
- Avanta Multifamily (25.98 AC) - 266 multi-family units = 200 LUE's

Approximately 154,376 gallons per day (average flow) of domestic wastewater will be generated from the Wolf Ranch West, Section 4G SCS. Sewage flow will be disposed of by conveyance to the existing San Gabriel Wastewater Treatment Plant. The San Gabriel Wastewater Treatment Plant has the capacity to adequately treat the proposed peak flow. Potable water will be provided by the City of Georgetown. Any future wastewater mains will be permitted with their own SCS Application and submitted to the TCEQ for review and approval.

GRAVITY SANITARY SEWER PIPING: FLOW & CAPACITY ANALYSIS

Basis for average flow used for design of collection system (**check one or more**):

Per Capita Contributions:	______
Service Connections:	✓
Land Area and Use:	✓
Fixture Analysis:	______

Odor Control

Odor Control is not necessary on this project as it is a gravity line and there will be no conditions where sewage is standing and will become septic.

Flow Calculation

Peaking Factor used for design:	**Reference Equations A & B below.**
Peaking Factor is based on:	**Design Requirements for peak flow (from City of Georgetown, Texas CDM Memorandum on Water & Wastewater System Recommended Design Criteria)**

***Wolf Ranch West, Section 4G**:*

*Total LUEs = 494**

- *77 LUE – Residential Single Family , Section 4G (BWF = 250 gpd)*
- *217 LUE – Residential Single Family, Section 5G (BWF = 250 gpd)*
- *200 LUE – Residential Multi-Family, Avanta Multifamily (BWF = 250 gpd)*
  - * *Base Wastewater flowrates (BWF) from the City of Georgetown, Texas CDM on Water & Wastewater System Recommended Design Criteria*

1 Living Unit Equivalent (LUE) = 250 gallons per day (average wastewater flow)
Population = 1,235 persons (Based on an assumed 2.5 persons per unit)

Residential – Single Family, Section 4G

Base Wastewater Flow (BWF) = $\#\,of\ LUEs\ x\ \frac{250\,\frac{gal}{day}}{1\,LUE}$ *= 19,250 gpd or **0.01925 mgd***

77 LUEs x 250 gpd/LUE = 19,250 gpd

*Groundwater Inflow (GWI) = 25% x BWF = 4,813 gpd or **0.00481 mgd***

*Average Dry Weather Flowrate (AvgDWF) = BWF + GWI = 24,063 gpd or **0.02406 mgd***

Peaking Factor = $2.8\ x\ AvgDWF^{-0.0732}$ *=3.68* *Equation A*

Peak Dry Weather Flow = $3.68\ x\ 24{,}063\ gpd\ x\ \frac{1\ day}{24\ hr}\ x\ \frac{1\ hr}{60\ min}$ *=* ***61.5 gpm***

Peak Wet Weather Flow = Q_{PW} *= Peak Dry Weather Flow + Infiltration* *Equation B*

Infiltration = 1,000 gallons per day per acre served

$$= \frac{[(1{,}000\ gpd/acre)x\ 15.05\ acres]}{1{,}440} = \mathbf{10.5}\ \boldsymbol{gpm}$$

Q_{PW} *= 61.5 gpm + 10.5 gpm =* ***72.0 gpm***

Residential – Single Family, Section 5G

Base Wastewater Flow (BWF) = $\#\,of\ LUEs\ x\ \frac{250\,\frac{gal}{day}}{1\,LUE}$ *= 54,250 gpd or **0.05425 mgd***

217 LUEs x 250 gpd/LUE = 54,250 gpd

*Groundwater Inflow (GWI) = 25% x BWF = 13,563 gpd or **0.01356 mgd***

*Average Dry Weather Flowrate (AvgDWF) = BWF + GWI = 67,813 gpd or **0.06781 mgd***

Peaking Factor = 2.8 x AvgDWF$^{-0.0732}$ *=3.41* *Equation A*

Peak Dry Weather Flow = 3.41 x 67,813 gpd x $\frac{1\ day}{24\ hr}$ *x* $\frac{1\ hr}{60\ min}$ = ***160.6 gpm***

Peak Wet Weather Flow = Q_{PW} *= Peak Dry Weather Flow + Infiltration* *Equation B*

Infiltration = 1,000 gallons per day per acre served

$$= \frac{[(1{,}000\ gpd/acre) x\ 66.99\ acres]}{1{,}440} = \mathbf{46.5\ gpm}$$

Q_{PW} *= 160.6 gpm + 46.5 gpm =* ***207.1 gpm***

Residential – Multi-Family, Avanta Multi-Family

Base Wastewater Flow (BWF) = $\#\ of\ LUEs\ x\ \frac{250\frac{gal}{day}}{1\ LUE}$ *= 50,000 gpd or* ***0.05 mgd***

200 LUEs x 250 gpd/LUE = 50,000 gpd

Groundwater Inflow (GWI) = 25% x BWF = 12,500 gpd or ***0.0125 mgd***

Average Dry Weather Flowrate (AvgDWF) = BWF + GWI = 62,500 gpd or ***0.0625 mgd***

Peaking Factor = 2.8 x AvgDWF$^{-0.0732}$ *=3.43* *Equation A*

Peak Dry Weather Flow = 3.43 x 62,500 gpd x $\frac{1\ day}{24\ hr}$ *x* $\frac{1\ hr}{60\ min}$ = ***148.9 gpm***

Peak Wet Weather Flow = Q_{PW} *= Peak Dry Weather Flow + Infiltration* *Equation B*

Infiltration = 1,000 gallons per day per acre served

$$= \frac{[(1{,}000\ gpd/acre) x\ 25.98\ acres]}{1{,}440} = \mathbf{18\ gpm}$$

Q_{PW} *= 148.9 gpm + 18 gpm =* ***166.9 gpm***

Capacity Calculation

Characteristics of 6" ASTM D3034, SDR 26, PVC Sewer Pipe:

Nominal Size = 6"

Outer Diameter (D_o) *= 6.275"*

Minimum Wall Thickness (t) = 0.241"

Inner Diameter (D_i) *= 5.793"*

<u>Characteristics of 8" ASTM D3034, SDR 26, PVC Sewer Pipe:</u>

Nominal Size = 8"

Outer Diameter (D_o) = 8.40"

Minimum Wall Thickness (t) = 0.323"

Inner Diameter (D_i) = 7.754"

<u>Characteristics of 8" ASTM 2241, Class 160, SDR 26, PVC Sewer Pipe:</u>

Nominal Size = 8"

Outer Diameter (D_o) = 8.625"

Minimum Wall Thickness (t) = 0.332"

Inner Diameter (D_i) = 7.921"

<u>Characteristics of 27" ASTM F679, PS 115, PVC Sewer Pipe:</u>

Nominal Size = 27"

Outer Diameter (D_o) = 27.953"

Minimum Wall Thickness (t) = 1.077"

Inner Diameter (D_i) = 26.254"

<u>Characteristics of 30" ASTM F679, PS 115, PVC Sewer Pipe:</u>

Nominal Size = 30"

Outer Diameter (D_o) = 32.000"

Minimum Wall Thickness (t) = 1.233"

Inner Diameter (D_i) = 30.055"

<u>Characteristics of 36" ASTM F679, PS 115, PVC Sewer Pipe:</u>

Nominal Size = 36"

Outer Diameter (D_o) = 38.300"

Minimum Wall Thickness (t) = 1.373"

Inner Diameter (D_i) = 35.464"

Manning's Equation:

$Q = (k/n)(A)(R^{2/3})(S^{1/2})$

$v = Q/A$

Where:

Q = *Discharge (cfs)*

k = *Constant [(1.49 ft$^{1/3}$)/sec.]*

n = *Manning's roughness coefficient (unitless) = 0.013 [as required by 30 TAC 213.53 A(i)]*

A = *Flow area (ft^2)*

R = *Hydraulic Radius (ft)= A/P = Cross sectional area of flow (ft^2)/Wetted perimeter (ft.)*

S = *Slope (ft/ft)*

v = *Velocity of flow (ft/s)*

<u>Calculations for 6" ASTM D3034, SDR 26, PVC Sewer Pipe:</u>

$A = \pi(D_i^2)/4 = \pi(5.793\ in)^2/4 = 0.18\ ft^2$

$P = \pi(D_i) = \pi(5.793\ in) = 1.52\ ft$

$R = A/P = 0.20\ ft^2/1.52\ ft. = 0.12\ ft$

$S = 0.01$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.18\ ft^2)(0.12\ ft)^{2/3}(0.01)^{1/2}$

$Q = 0.50\ cfs = 224\ gpm = Q_{full}$

$v = 0.50\ cfs/0.18\ ft^2 =$ ***2.78 ft/s***

*Qmax =0.50 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)=1**79.5 gpm***

Calculations for 8" ASTM D3034, SDR 26, PVC Sewer Pipe:

$A = \pi(D_i^2)/4=\pi(7.754\ in)^2/4=0.33\ ft^2$

$P = \pi(D_i)=\pi(7.754\ in)=2.03\ ft$

$R = A/P = 0.33\ ft^2/2.03\ ft.=0.16\ ft$

$S = 0.005$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.33\ ft^2)(0.16\ ft)^{2/3}(0.005)^{1/2}$

$Q = 0.79\ cfs = 355\ gpm =Q_{full}$

$v = 0.79\ cfs/0.35\ ft^2 =$ ***2.39 ft/s***

*Qmax =0.79 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)=**283.6 gpm***

Calculations for 8" ASTM 2241, Class 160, SDR 26, PVC Sewer Pipe:

$A = \pi(D_i^2)/4=\pi(7.921\ in)^2/4=0.34\ ft^2$

$P = \pi(D_i)=\pi(7.921\ in)=2.07\ ft$

$R = A/P = 0.35\ ft^2/2.09\ ft.=0.16\ ft$

$S = 0.005$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.34\ ft^2)(0.16\ ft)^{2/3}(0.005)^{1/2}$

$Q = 0.81\ cfs = 364\ gpm =Q_{full}$

$v = 0.81\ cfs/0.34\ ft^2 =$ ***2.38 ft/s***

*Qmax =0.81 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)=**290.8 gpm***

Calculations for 27" ASTM F679, PS115, PVC Sewer Pipe:

$A = \pi(D_i^2)/4=\pi(26.254\ in)^2/4=3.76\ ft^2$

$P = \pi(D_i)=\pi(26.254\ in)=6.87\ ft$

$R = A/P = 3.76\ ft^2/6.87\ ft.=0.55\ ft$

$S = 0.005$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.34\ ft^2)(0.16\ ft)^{2/3}(0.005)^{1/2}$

$Q = 20.46\ cfs = 9{,}182\ gpm =Q_{full}$

$v = 20.46\ cfs/3.76\ ft^2 =$ ***5.44 ft/s***

*Qmax =20.46 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)=**7,346 gpm***

Calculations for 30" ASTM F679, PS115, PVC Sewer Pipe:

$A = \pi(D_i^2)/4=\pi(30.055\ in)^2/4=4.93\ ft^2$

$P = \pi(D_i)=\pi(30.055\ in)=7.87\ ft$

$R = A/P = 4.93\ ft^2/7.87\ ft.=0.63\ ft$

$S = 0.005$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.34\ ft^2)(0.16\ ft)^{2/3}(0.003)^{1/2}$

$Q = 29.36\ cfs = 13{,}176.8\ gpm = Q_{full}$

v = 29.36 cfs/4.93 ft^2*=* ***5.96 ft/s***

*Qmax =29.36 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)=****10,541 gpm***

Calculations for 36" ASTM F679, PS115, PVC Sewer Pipe:

$A = \pi(D_i^2)/4=\pi(35.454\ in)^2/4=6.86\ ft^2$

$P = \pi(D_i)=\pi(35.454\ in)=9.28\ ft$

$R = A/P = 6.86\ ft^2/9.28\ ft.=0.74\ ft$

$S = 0.003$

$Q = [(1.49\ ft^{1/3}/sec)/0.013)](0.34\ ft^2)(0.16\ ft)^{2/3}(0.003)^{1/2}$

$Q = 35.23\ cfs = 15{,}811\ gpm = Q_{full}$

v = 35.23 cfs/6.86 ft^2*=* ***5.14 ft/s***

Qmax =35.23 cfs (0.80)(7.48 gallons/1 cf)(60 sec/1 min.)= ***12,649.0 gpm***

Nominal Main Size (in)	Inner Diameter (in)	Minimum Slope	Area (ft^2)	Hydraulic Radius (A/P)	$R^{2/3}$	$S^{1/2}$	Q-Full (cfs)	Max Pipe (%)	Velocity (ft/s)	Q-Max (gpm)
6	*5.793*	*0.01*	*0.18*	*0.12*	*0.24*	*0.10*	*0.50*	*80*	*2.78*	*179.5*
8	*7.754*	*0.005*	*0.33*	*0.16*	*0.29*	*0.07*	*0.79*	*80*	*2.39*	*283.6*
8	*7.921*	*0.005*	*0.34*	*0.16*	*0.29*	*0.07*	*0.81*	*80*	*2.38*	*290.8*
27	*26.254*	*0.005*	*3.76*	*0.55*	*0.67*	*0.07*	*20.46*	*80*	*5.44*	*7,346*
30	*30.055*	*0.005*	*4.93*	*0.63*	*0.73*	*0.07*	*29.36*	*80*	*5.96*	*10,541*
36	*35.454*	*0.003*	*6.86*	*0.74*	*0.82*	*0.05*	*35.23*	*80*	*5.14*	*12,649*

Conclusion

The proposed pipe sizes at the minimum slopes listed in the immediately preceding table have sufficient capacity to convey the projected average and peak flows.

GENERAL STRUCTURAL COMPONENTS

Project Materials (Pipe and Joints):

Nominal Pipe Diameter (in)	Linear Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
6	*1,524*	*PVD SDR 26*	*ASTM D3034*	*ASTM D3212*
8	*3,951*	*PVC SDR 26*	*ASTM D3034*	*ASTM D3212*
8	*40*	*PVC SDR 26*	*ASTM 2241, Class 160*	*ASTM D3139*
27	*172*	*PVC PS115*	*ASTM F679*	*ASTM D3139*
30	*1,310*	*PVC PS115*	*ASTM F679*	*ASTM D3139*
36	*1,049*	*PVC PS115*	*ASTM F679*	*ASTM D3212*

Note: Section 217.53 (j)(4) requires a minimum pipe diameter of 6 inches for all gravity sanitary sewer collection system piping.

Watertight, size on size resilient connectors conforming to ASTM C-923 have been specified for connecting pipe to manholes.

Where a collection system parallels a water supply pipe and a nine-foot separation distance cannot be achieved, Section 217.53 (d)(3)(A)(i) requires a collection system pipe be constructed of cast iron, ductile iron, or PVC meeting ASTM specifications with at least a 150 pounds per square inch (psi) rating for both the pipe and joints. The proposed project will comply with these requirements. Where a collection system pipe crosses a water supply line and a nine-foot separation distance cannot be achieved, Section 217.53(d)(3)(B)(i) requires the collection system pipe be constructed of cast iron, ductile iron, or PVC with a minimum pressure rating of 150 psi. The proposed project will comply with this requirement and that of 30 TAC 217.53(d)(3)(B)(iii).

Project Materials (Bedding):

The specified bedding will comply with ASTM D2321-11 Class I, II or III for materials and densification. A minimum of 6 inches of bedding is required for all pipes.

Pipe Diameter (in)	Pipe Material	Bedding Class
6	***PVC***	***Class I & Class III***
8	***PVC***	***Class I & Class III***
27	***PVC***	***Class I & Class III***
30	***PVC***	***Class I & Class III***
36	***PVC***	***Class I & Class III***

Initial backfill for the pipe sizes shown above will be Class I. Secondary backfill will be Class III. See Table 2 of ASTM D2321-11 "Soil Classes" in Appendix A of this subsection.

Project Materials (Manholes):

Section 217.55 (f) prohibits the use of bricks to adjust a manhole cover to grade or construct a manhole. The proposed project will comply with this requirement.

The inside diameter of a manhole must be no less than 48 inches.

Section 217.55 (n) requires watertight, size-on-size resilient connectors that allow for differential settlement and must conform to American Society for Testing and Materials C-923. The proposed project complies with this requirement.

Under 30 TAC 213.5(C)(3)(A), all manholes over the Recharge Zone must be watertight, with watertight rings and covers. The proposed project complies with this requirement.

The materials specified for manhole construction are **precast concrete.**

Project Materials (Manhole Covers):

Manhole covers must be constructed of impervious materials. If personnel entry is required, a minimum 30-inch diameter clear opening must be provided. Inclusion of steps in a manhole is prohibited. If a manhole must be located within a 100-year floodplain, then a means of preventing inflow is required. A manhole cover that is in a roadway must meet or exceed the American Association of State Highways and Transportation Officials Standard M-306 for load bearing.

Under 30 TAC 213.5 (c)(3)(A), all manholes over the Edwards Aquifer Recharge Zone must be watertight, with watertight rings and covers. This proposed project complies with this requirement.

Minimum and Maximum Slopes

Note: All pipes are designed with a slope that will provide a velocity of at least 2 ft/s flowing full, as calculated using Manning's equation with an "n" value of 0.013. Additionally, the collection system is designed to ensure that, with pipes flowing full, the velocities will be less than 10 feet per second.

The following are the minimum and maximum slopes for each pipe diameter:

Pipe Diameter: : ***6"(NR)*** Min. Slope: ***1.00%*** Max. Slope: ***8.30%***
Pipe Diameter: ***8"(NR)*** Min. Slope: ***0.50%*** Max. Slope: ***8.40%***
Pipe Diameter: ***8" (160 psi)*** Min. Slope: ***0.50%*** Max. Slope: ***8.40%***
Pipe Diameter: ***27" (NR)*** Min. Slope: ***0.50%*** Max. Slope: ***0.50%***
Pipe Diameter: ***30" (NR)*** Min. Slope: ***0.50%*** Max. Slope: ***0.50%***
Pipe Diameter: ***36" (NR)*** Min. Slope: ***0.30%*** Max. Slope: ***0.30%***

Backfill

Note: The backfill will be free of stones greater than 6 inches in diameter and free of organic or any other unstable material.

Trenching

Note: The trench width will be minimized while still allowing adequate width for proper compaction of backfill, and while still ensuring that at least 6 inches of backfill exists below and on each side of the pipe. The trench walls will be vertical to at least one foot above the pipe.

Minimum and Maximum Trench Width

Based on 30 TAC 217.54:

Pipe Diameter: ***6" (NR)*** Min. Trench Width: ***18***" Max. Trench Width: ***30"***
Pipe Diameter: ***8" (NR)*** Min. Trench Width: ***20***" Max. Trench Width: ***32"***
Pipe Diameter: ***8" (160 psi)*** Min. Trench Width: ***21***" Max. Trench Width: ***33"***
Pipe Diameter: ***27" (NR)*** Min. Trench Width: ***52***" Max. Trench Width: ***64"***
Pipe Diameter: ***30" (NR)*** Min. Trench Width: ***56***" Max. Trench Width: ***68"***
Pipe Diameter: ***36" (NR)*** Min. Trench Width: ***62***" Max. Trench Width: ***74"***

These trench widths account for the bell diameter.

Corrosion Prevention

Proposed collection system components (pipes, manholes, etc.) will not be susceptible to deterioration through the corrosive effects of an anaerobic sewage environment. Manholes shall be constructed of or lined with a corrosion resistant material. Where new construction ties into an existing manhole, the existing manholes must be lined, coated, or replaced with a corrosion resistant material.

Manholes (General)

Note: Manholes are provided at all changes in size, grade or alignment of pipe, at the intersection of all pipes and at the end of all lines that may be extended at a future date. A clean-out with watertight plugs may be installed instead of a manhole if no extensions are anticipated. Clean outs must pass all testing requirements outlined for gravity collection pipes.

The project complies with the maximum manhole spacing allowed by the TCEQ:

Pipe Diameter (in)	Max. Manhole Spacing (ft)
6 - 15	500
18 - 30	800
36 - 48	1000
54 or larger	2000

Manhole Spacing:

Pipe Diameter: ***6"*** Max. Spacing: ***500 LF***

Pipe Diameter: ***8"*** Max. Spacing: ***500 LF***

Pipe Diameter: **27", 30", & 36"** Max. Spacing: ***500 LF***

Manholes (Inverts)

The bottom of a manhole must contain a U-shaped channel which is a smooth continuation of the inlet and outlet pipes. The bench above the channel must be sloped a minimum of 0.5 inches per foot. See the City of Georgetown Detail No. WW06 which complies with these requirements. Note, a manhole connected to a pipe less than 15 inches in diameter must have a channel depth equal to at least half the largest pipe's diameter.

Manholes (Ventilation)

Manholes located within the 100-year floodplain are gasketed and bolted to prevent inflow. Under 30 TAC 217.55 (n), the collection system must be vented at least every 1,500 feet. The proposed project complies with this requirement.

Reduction of Inflow

Connection of storm water or roof drains to the sewage collection system is prohibited in accordance with 30 TAC 217.55(j)(6).

FLEXIBLE PIPE COMPUTATIONS

Please note, all flexible pipe computations are based on engineering principles and practices for the design of buried PVC pipe systems. Equations used can be found in "The Uni-Bell PVC Pipe Association Handbook of PVC Pipe: Design and Construction" and Buried Pipe Design, 3rd Edition by Moser and Folkman. Please note, the equations used may be in a different format than shown in the Uni-Bell Handbook or Buried Pipe Design, 3rd Edition. Throughout this application "160 psi" pipe refers to the pressure rating of the ASTM 2241, Class 160, SDR 26 pipe used at water/sewer crossings.

Live Load Calculations

No influence of live loads on the performance of the SCS are anticipated. The average burial depth for this line is such that the influence of live loads is negligible.

Buckling Pressure Calculations

This area of the Edwards Aquifer is unsaturated; consequently, there are no anticipated areas where sewer pipe will be placed below the water table. The value of $h_w = 0$ as there will be no height or time period of perched water or groundwater above the pipe crowns of the proposed sewer line. No geotechnical borings were done for this line.

The value of H for use in these calculations is 23' as it exceeds the maximum burial depth for this line. The value of γ_s equals 143 pcf is a conservative value based on a dry unit weight of 135 pcf and a moisture content of 6%. This value is conservative as it corresponds to saturated unit weights of commonly used backfill materials.

Allowable Buckling Pressure:

$q_a = 0.4 * \sqrt{32 * R_w * B' * E_b * (E * I/D^3)}$ *Equation 1*

$q_a = 0.4 * \sqrt{32 * 1 * 0.46 * 400 * (400{,}000 * 0.001/6.03^3)}$ = *41.5 psi (6" PVC SDR 26)*

$q_a = 0.4 * \sqrt{32 * 1 * 0.46 * 400 * (400{,}000 * 0.003/8.08^3)}$ = *46.4 psi (8" PVC SDR 26)*

$q_a = 0.4 * \sqrt{32 * 1 * 0.46 * 400 * (400{,}000 * 0.003/8.29^3)}$ = *44.6 psi (8" PVC SDR 26, 160 psi)*

$q_a = 0.4 * \sqrt{32 * 1 * 0.53 * 400 * (400{,}000 * 0.104/26.88^3)}$ = *48.1 psi (27" PVC PS115)*

$q_a = 0.4 * \sqrt{32 * 1 * 0.53 * 400 * (400{,}000 * 0.156/30.77^3)}$ = *48.1 psi (30" PVC PS115)*

$q_a = 0.4 * \sqrt{32 * 1 * 0.53 * 400 * (400{,}000 * 0.216/36.93^3)}$ = *43.0 psi (36" PVC PS115)*

$R_W = 1 - 0.33 * (h_w/h)$ *Equation 2*

$R_W = 1 - 0.33 * (0/360) = 1$

$B' = \frac{1}{1 + 4 * e^{-0.065H}}$ *Equation 3*

$B' = \frac{1}{1+4*e^{-0.065(19)}} = 0.53$ *6" & 8" PVC*

$B' = \frac{1}{1+4*e^{-0.065(23)}} = 0.53$ *27", 30", & 36" PVC*

$I = (t^3/12) * (inches^4/linear\ inch)$ *Equation 4*

$I = (0.241^3/12) = 0.001 in^3$ (6" PVC, SDR 26)

$I = (0.323^3/12) = 0.003 in^3$ (8" PVC, SDR 26)

$I = (0.332^3/12) = 0.003 in^3$ (8" PVC, SDR 26, 160 psi)

$I = (1.077^3/12) = 0.104 in^3$ (27" PVC, PS115)

$I = (1.233^3/12) = 0.156 in^3$ (30" PVC, PS115)

$I = (1.373^3/12) = 0.216 in^3$ (36" PVC, PS115)

$$D = D_o - t \qquad \textit{Equation 5}$$

$$D = 6.275inches - 0.241inches = 6.03inches\ (6''PVC, SDR\ 26)$$

$$D = 8.40inches - 0.323inches = 8.08inches\ (8''PVC, SDR\ 26)$$

$$D = 8.625inches - 0.332inches = 8.29inches\ (8''PVC, SDR\ 26, 160\ psi)$$

$$D = 27.953inches - 1.077inches = 26.88inches\ (27''PVC, PS115)$$

$$D = 32.0inches - 1.233inches = 30.77inches\ (30''PVC, PS115)$$

$$D = 38.300inches - 1.373inches = 36.93inches\ (36''PVC, PS115)$$

Where:

q_a	=	Allowable buckling pressure, pounds per square inch (psi)
h	=	Height of soil surface above top of pipe in inches (in)
h_w	=	Height of water surface above top of pipe in inches (in) (groundwater elevation)
R_w	=	Water buoyancy factor. If hw = 0, Rw = 1. If 0 ≤ hw ≤ h (groundwater elevation is between the top of the pipe and the ground surface), calculate Rw with Equation 2
H	=	Depth of burial in feet (ft) from ground surface to crown of pipe.
B'	=	Empirical coefficient of elastic support
E_b	=	Modulus of soil reaction for the bedding material (psi)
E	=	Modulus of elasticity of the pipe material (psi)
I	=	Moment of inertia of the pipe wall cross section per linear inch of pipe, $inch^4$/lineal inch = $inch^3$. For solid wall pipe, "I" is calculated with Equation 4
t	=	Pipe structural wall thickness (in)
D	=	Mean pipe diameter (in)
D_o	=	Pipe outer diameter (in)

Pressure Under Installed Conditions

$$q_p = \gamma_w * h_w + R_w * (W_c/D) + L_I \qquad \textit{Equation 6}$$

$$q_p = 0.0361 * 0 + 1 * \left(\frac{143.3}{6.03}\right) + 0 = 23.75\ \mathrm{psi}\ (6''\mathrm{PVC, SDR\ 26})$$

$$\mathrm{q_p} = 0.0361 * 0 + 1 * \left(\frac{191.9}{8.08}\right) + 0 = 23.75\ \text{psi (8”PVC, SDR 26)}$$

$$\mathrm{q_p} = 0.0361 * 0 + 1 * \left(\frac{197.0}{8.29}\right) + 0 = 23.76\ \text{psi (8”PVC, SDR 26,160 psi)}$$

$$\mathrm{q_p} = 0.0361 * 0 + 1 * \left(\frac{638.5}{26.88}\right) + 0 = 23.76\ \text{psi (27" PVC,}\ PS115)$$

$$\mathrm{q_p} = 0.0361 * 0 + 1 * \left(\frac{730.9}{30.77}\right) + 0 = 23.76\ \text{psi (30"}\ PVC, PS115)$$

$$\mathrm{q_p} = 0.0361 * 0 + 1 * \left(\frac{874.8}{36.93}\right) + 0 = 23.69\ \text{psi (36"}\ PVC, PS115)$$

Where:

q_p = Pressure applied to pipe under installed conditions (psi)

γ_w = 0.0361 pounds per cubic inch (pci), specific weight of water

W_c = Vertical soil load on the pipe per unit length in pounds per linear inch (lb/in)

L_l = Live load (lbs)

$$\mathrm{W_c} = \gamma_s * H * (D + t)/144 \qquad \textit{Equation 7}$$

$$\mathrm{W_c} = 143 * 19 * (6.03 + 0.241)/144 = 118.4\ lb/in\ \text{(6” PVC, SDR 26)}$$

$$\mathrm{W_c} = 143 * 19 * (8.08 + 0.323)/144 = 158.5\ lb/in\ \text{(8” PVC, SDR 26)}$$

$$\mathrm{W_c} = 143 * 19 * (8.29 + 0.332)/144 = 162.7\ lb/in\ \text{(8” PVC, SDR 26,160psi)}$$

$$\mathrm{W_c} = 143 * 23 * (26.88 + 1.077)/144 = 638.5\ lb/in\ \text{(27” PVC,}\ PS115)$$

$$\mathrm{W_c} = 143 * 23 * (30.77 + 1.233)/144 = 730.9\ lb/in\ \text{(30” PVC,}\ PS115)$$

$$\mathrm{W_c} = 143 * 23 * (36.93 + 1.373)/144 = 874.8\ lb/in\ \text{(36” PVC,}\ PS115)$$

Where:

γ_s = Specific weight of soil in pounds per cubic foot (pcf)

D = Mean pipe diameter (in)

Pipe Diameter: ***6" (NR)*** Pipe Material: ***PVC, SDR 26*** q_a: ***44.34*** q_p: ***23.75***

Pipe Diameter: ***8" (NR)*** Pipe Material: ***PVC, SDR 26*** q_a: ***49.58*** q_p: ***23.75***

Pipe Diameter: ***8" (160 psi)*** Pipe Material: ***PVC, SDR 26*** q_a: ***47.66*** q_p: ***23.75***

Pipe Diameter: ***27" (NR)*** Pipe Material: ***PVC, F679*** q_a: ***48.10*** q_p: ***23.76***

Pipe Diameter: ***30" (NR)*** Pipe Material: ***PVC, F679*** q_a: ***48.10*** q_p: ***23.76***

Pipe Diameter: ***36" (NR)*** Pipe Material: ***PVC, F679*** q_a: ***43.04*** q_p: ***23.69***

Since $q_a \geq q_p$, the specified pipe is acceptable for the proposed installation.

Installation Temperature Effects

Flexible pipe will be installed under favorable ambient conditions, per pipe manufacturer's specifications.

Wall Crushing

Tensile Strength

The information below is from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" Table 2.1 pages 14-15.

Pipe Material: ***PVC SDR 26*** Tensile Strength: ***7,000*** Cell Class (PVC only) ***12454***

Pipe Material: ***PVC F679*** Tensile Strength: ***6,000*** Cell Class (PVC only) ***12364***

Strain

The conditions of this installation are such that strain-related failure will not be a problem. Strain is generally not a performance-limiting factor for buried PVC pipe or a design-limiting criterion for PVC pipes according to the Uni-Bell Handbook of PVC Pipe (Chapter VII, Pages 255 and 257). As pipe deflection will be below 5%, strain-related failure is not anticipated.

Modulus of Soil Reaction

The modulus of soil reaction for the bedding material, E_b, is **400 psi**.

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D2321-11 and Table 7.3 "Average Values of Modulus of Soil Reaction, E" from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" attached in Appendix A of this subsection. Class III material was chosen. As the secondary backfill (Class III) has a lower Modulus of Soil Reaction than initial backfill (Class I), its value was used in the calculations that follow. Class III on Table 2 corresponds to coarse-grained soils with fines (GM, GC, SM or SC) and sandy or gravelly fine-grained soils (CL or ML). On Table 7.3, coarse-grained soils with fines at a slight compaction have an E' equal to 400 psi.

The modulus of soil reaction for the in-situ soil, $E'_{n,}$ is **3,000 psi.**

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D 2321-11 and Table 7.3 "Average Values of Modulus of Soil Reaction, E" from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" attached in Appendix A of this subsection. Class I material was chosen, which includes crushed rock as shown on Table 2. Compacted crushed rock on Table 7.3 has an E' equal to 3,000 psi. Values in Table 7.3 are based on empirical data and derived from laboratory and field tests for buried pipe.

Bedding to in-situ soil modulus of soil reaction ratio = E_b/E'_n = **400 psi/3,000 psi = 0.13**

Zeta Calculation

Where native soil is significantly weaker than bedding material, or where predicted deflection approaches 5%, the effect of native soil must be quantified using Leonhardt's Zeta factor. If the ratio of bedding modulus to soil modulus is not equal to 1.0, a zeta factor must be calculated using the equations below. Zeta is a factor, which corrects for the effect of in-situ soil on pipe stability (Uni-Bell Handbook of Pipe, page 267). To calculate zeta, directly use the formulas below.

$$zeta = \frac{1.44}{f + (1.44 - f) * (E_b/E'_n)} \qquad Equation\ 9$$

$$\text{zeta} = \frac{1.44}{0.94 + (1.44 - 0.94) * (0.13)} = \ 1.43\ (6"\ \text{PVC, SDR 26})$$

$$\text{zeta} = \frac{1.44}{0.78 + (1.44 - 0.78) * (0.13)} = \ 1.66\ (8"\ \text{PVC, SDR 26})$$

$$\text{zeta} = \frac{1.44}{0.80 + (1.44 - 0.80) * (0.13)} = \ 1.62\ (8"\ \text{PVC, SDR 26, 160 psi})$$

$$\text{zeta} = \frac{1.44}{0.56 + (1.44 - 0.56) * (0.13)} = \ 2.13\ (27"\ \text{PVC, PS115})$$

$$\text{zeta} = \frac{1.44}{0.50 + (1.44 - 0.50) * (0.13)} = \ 2.29\ (30"\ \text{PVC, PS115})$$

$$\text{zeta} = \frac{1.44}{0.43 + (1.44 - 0.43) * (0.13)} = \ 2.54\ (36"\ \text{PVC, PS115})$$

$$\text{f} = \frac{b/d_a - 1}{1.154 + 0.444 * (b/d_a - 1)} \qquad \textit{Equation}\ 10$$

$$\text{f} = \frac{18/6.275 - 1}{1.154 + 0.444 * (20/6.275 - 1)} = 0.94\ (6"\ \text{PVC, SDR 26})$$

$$\text{f} = \frac{20/8.40 - 1}{1.154 + 0.444 * (20/8.40 - 1)} = 0.78\ (8"\ \text{PVC, SDR 26})$$

$$\text{f} = \frac{21/8.625 - 1}{1.154 + 0.444 * (21/8.625 - 1)} = 0.80\ (8"\ \text{PVC, SDR 26, 160 psi})$$

$$\text{f} = \frac{52/27.953 - 1}{1.154 + 0.444 * (52/27.953 - 1)} = 0.56\ (27"\ \text{PVC, PS115})$$

$$\text{f} = \frac{56/32.000 - 1}{1.154 + 0.444 * (56/32.000 - 1)} = 0.50\ (30"\ \text{PVC, PS115})$$

$$\text{f} = \frac{62/38.300 - 1}{1.154 + 0.444 * (62/38.300 - 1)} = 0.43\ (36"\ \text{PVC, PS115})$$

Where:

f	=	Pipe/trench width coefficient
b	=	Trench width (in)
d_a	=	Pipe diameter (in)
E_b	=	Modulus of soil reaction for the bedding material (psi)
E'_n	=	Modulus of soil reaction for the in-situ soil (psi)

Pipe Diameter: 6″ ***(NR)*** Trench Width: ***18″*** Zeta: ***1.43***

Pipe Diameter: ***8″ (NR)*** Trench Width: ***20″*** Zeta: ***1.66***

Pipe Diameter: ***8" (160 psi)*** Trench Width: ***21"*** Zeta: ***1.62***

Pipe Diameter: ***27" (NR)*** Trench Width: ***52"*** Zeta: ***2.13***

Pipe Diameter: ***30" (NR)*** Trench Width: ***56"*** Zeta: ***2.29***

Pipe Diameter: ***36" (NR)*** Trench Width: ***62"*** Zeta: ***2.54***

Pipe Stiffness

Pipe stiffness is based on National Reference Standards and manufacturer's data. Please see Table 7.1 of the "The Uni-Bell Handbook of PVC Pipe: Design and Construction" listing the pipe stiffness of 8" PVC SDR 26 as 115 psi for E = 400,000 psi.

Pipe Diameter: ***6"*** Pipe Material: ***PVC SDR 26*** Ps: ***115 psi***

Pipe Diameter: ***8"*** Pipe Material: ***PVC SDR 26*** Ps: ***115 psi***

Pipe Diameter: ***27"*** Pipe Material: ***PVC PS115*** Ps: ***115 psi***

Pipe Diameter: ***30"*** Pipe Material: ***PVC PS115*** Ps: ***115 psi***

Pipe Diameter: ***36"*** Pipe Material: ***PVC PS115*** Ps: ***115 psi***

Deflection

Maximum allowable deflection in installed lines is 5% (per 30 TAC 217), as determined by the deflection analysis and verified by a mandrel test. The percent of vertical deflection must be below this range.

Note: Per Table 7.2 attached in Appendix A of the SCS Application, K = 0.096 when the bedding angle is 90 degrees.

$$\Delta Y/D(\%) = \frac{K * (L_P + L_l) * 100}{(0.149 * P_s) + (0.061 * zeta * E_b)} \qquad \textit{Equation } 11$$

$$\Delta Y/D(\%) = \frac{(0.096)(18.87) * 100}{(0.149 * 115) + (0.061 * 1.43 * 400)} = 3.48\% \text{ for 6" NR psi pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(18.87) * 100}{(0.149 * 115) + (0.061 * 1.66 * 400)} = 3.15\% \text{ for 8" NR psi pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(18.87) * 100}{(0.149 * 115) + (0.061 * 1.62 * 400)} = 3.19\% \text{ for 8" 160 psi pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(22.84) * 100}{(0.149 * 115) + (0.061 * 2.13 * 400)} = 3.18\% \text{ for 27" NR psi pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(22.84) * 100}{(0.149 * 115) + (0.061 * 2.29 * 400)} = 3.00\% \text{ for 30" NR psi pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(22.84) * 100}{(0.149 * 115) + (0.061 * 2.54 * 400)} = 2.77\% \text{ for 36" NR psi pipe}$$

$$L_P = \frac{\gamma_S * H}{144} \qquad \textit{Equation } 12$$

$$L_P = \frac{143*19}{144} = 18.87 \text{ psi for 6" and 8" pipe}$$

$$L_P = \frac{143 * 23}{144} = 22.84 \text{ psi for 27", 30", and 36" pipe}$$

Where:

$\Delta Y/D$ (%) = Predicted % vertical deflection under load

ΔY = Change in vertical pipe diameter under load

D = Undeflected mean pipe diameter (in)

K = Bedding angle constant

γ_s = Unit weight of soil (pcf)

H = Depth of burial (ft) from ground surface to crown of pipe

L_p = Prism load (psi)

	Type of Pipe Material	P_s (psi)	Zeta Factor Assumed or Calculated	E_b (psi)	% Deflection
Pipe Diameter 1	***6" PVC SDR 26 (NR)***	***115***	***1.43***	***400***	***3.48***
Pipe Diameter 2	***8" PVC SDR 26 (NR)***	***115***	***1.66***	***400***	***3.15***
Pipe Diameter 3	***8" PVC SDR 26 (160 psi)***	***115***	***1.62***	***400***	***3.19***
Pipe Diameter 4	***27" PVC PS115 (NR)***	***115***	***2.13***	***400***	***3.18***
Pipe Diameter 5	***30" PVC PS115 (NR)***	***115***	***2.29***	***400***	***3.00***
Pipe Diameter 6	***36" PVC PS115 (NR)***	***115***	***2.54***	***400***	***2.77***

APPENDIX A

Appendix A-Flow Velocity Table

Flow Velocity (Flowing Full) All gravity sewer lines on the Edwards Aquifer Recharge Zone shall be designed and constructed with hydraulic slopes sufficient to give a velocity when flowing full of not less than 2.0 feet per second, and not greater than 10 feet per second. The grades shown in the following table are based on Manning's formula and an n factor of 0.013 and shall be the minimum and maximum acceptable slopes unless provisions are made otherwise.

Table 10 - Slope Velocity

Pipe Diameter(Inches)	*% Slope required for minimum flow velocity of 2.0 fps*	*% Slope which produces flow velocity of 10.0 fps*
6	0.50	12.35
8	0.33	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.30
24	0.08	1.93
27	0.06	1.65
30	0.055	1.43
33	0.05	1.26
36	0.045	1.12
39	0.04	1.01
>39	*	*

**For lines larger than 39 inches in diameter, the slope may be determined by Manning's formula (as shown below) to maintain a minimum velocity greater than 2.0 feet per second when flowing full and a maximum velocity less than 10 feet per second when flowing full.*

$$v = \frac{1.49}{n} \times R_h^{0.67} \times \sqrt{S}$$

Figure 1 - Manning's Formula

Where:

v = velocity (ft/sec)
n = Manning's roughness coefficient (0.013)
Rh = hydraulic radius (ft)
S = slope (ft/ft)

Raba Kistner

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January 14, 2009

Charles P. "Frosty" Forster, P.E., P.G.
Pape Dawson Engineers
555 East Ramsey
San Antonio, Texas 78216

RE: Soil Unit Weight Values for Backfill Materials
Various Projects
San Antonio, Texas

Dear Mr. Forster:

Raba-Kistner Consultants Inc. (R-K) is pleased to submit this letter providing general guidance for selecting design soil unit weights for use in utility trench design.

In general, the following table contains a list of the frequently used trench backfill materials in the San Antonio area. The table also contains approximate values for the soil dry unit weight, moist unit weight and saturated unit weight for these materials assuming 90 to 95 percent compaction utilizing a standard Proctor (ASTM D 698.)

MATERIAL DESCRIPTION	DRY UNIT WEIGHT, PCF	MOIST UNIT WEIGHT, PCF	SATURATED UNIT WEIGHT, PCF
TxDOT TEX-113E Type A, Gr. 1 or 2	130	137	143
TxDOT TEX-113E Type A, Gr. 3 thru 5	128	135	143
Limestone Millings	115	124	134
Gravelly Clay	110	120	132
Clay	100	120	127
Clayey Sand	95	106	123
Gravel (Clean)	115	120	134
Sand (Clean)	92	98	120
Pit Run Gravel	127	137	142

We appreciate the opportunity to be of service to you. If you have any questions or need additional assistance, please call.

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

STATE OF TEXAS
CHRIS L. SCHULTZ
80680
LICENSED
PROFESSIONAL ENGINEER
1/14/09

Chris L. Schultz, P.E.
Senior Vice President

CLS/mem

SOIL CLASSIFICATION CHART

From ASTM D2321-11: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

TABLE 1 Soil Classification Chart (see Classification D2487)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean gravels Less than 5% of fines[E]	$C \geq 4$ and $1 \leq Cc \leq 3$[C]		GW	Well-graded gravel[D]
			$Cu < 4$ and/or $1 > Cc > 3$[C]		GP	Poorly graded gravel[D]
		Gravels with more than 12% fines[E]	Fines classify as ML or MH		GM	Silty gravel[DFG]
			Fines classify as CL or CH		GC	Clayey gravel[DFG]
	Sands 50% or more of coarse fraction passes on No. 4 sieve	Clean sands Less than 5% fines[I]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[C]		SW	Well-graded sand[H]
			$Cu < 6$ and/or $1 > Cc > 3$[C]		SP	Poorly graded sand[H]
		Sand with fines More than 12% fines[I]	Fines classify as ML or MH		SM	Silty sand[FGH]
			Fines classify as CL or CH		SC	Clayey sand[FGH]
Fine-Grained Soils 50% or more passes the No. 200 Sieve	Silts and clays Liquid limit less than 50	Inorganic	$PI > 7$ and plots on or above "A" line[J]		CL	Lean clay[KLM]
			$PI < 4$ and plots below "A" line[J]		ML	silt[KLM]
		Organic	Liquid Limit-Oven dried	<0.75	OL	Organic clay[KLMN]
			Liquid Limit-Not dried			Organic silt[KLMO]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line		CH	Fat clay[KLM]
			Plots below "A" line		MH	Elastic silt[KLM]
		Organic	Liquid Limit-Oven Dried	<0.75	OH	Organic clay[KLMP]
			Liquid Limit-Not Dried			Organic silt[KLMQ]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	peat

[A] Based on the material passing the 3-in. (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] $Cu = D_{60} / D_{10}$

$$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$$

[D] If soil contains $\geq$15 % sand, add "with sand" to group name.
[E] Gravels with 5 to 12 % fines require dual symbols:
- GW-GM well-graded gravel with silt:
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[F] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[G] If fines are organic, add "with organic fines" to group name.
[H] If soil contains $\geq$ 15 % gravel, add "with gravel" to group name.
[I] Sands with 5 to 12 % fines require dual symbols:
- SW-SM well graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay (see Test Method D4318).
[K] If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel", whichever is predominant.
[L] If soil contains $\geq$ 30 % plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains $\geq$ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] $PI \geq 4$ and plots on or above "A" line.
[O] $PI < 4$ or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.

SOIL CLASSIFICATION CHART

From ASTM D2321-11: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

TABLE 2 Soil Classes

Soil Group [A,B]	Soil Class	American Association of State Highway and Transportation Officials (AASHTO) Soil Groups [C]
Crushed rock, angular [D], 100% passing 1-1/2 in. sieve, </=15 % passing #4 sieve, </= 25 % passing 3/8 in. sieve and </= 12 % passing #200 sieve	Class I	--
Clean, coarse grained soils: SW, SP, GW, GP or any soil beginning with one of these symbols with </= 12 % passing #200 sieve[E,F]	Class II	A1, A3
Coarse grained soils with fines: GM, GC, SM, SC or any soil beginning with one of these symbols, containing > 12 % passing #200 sieve; Sandy or gravelly fine-grained soils: CL, ML, or any soil beginning with one of these symbols, with >/= 30 % retained on #200 sieve	Class III	A-2-4, A-2-5, A-2-6, or A-4 or A-6 soils with more than 30% retained on #200 sieve
Fine-grained soils: CL, ML, or any soil beginning with one of these symbols, with <30 % retained on #200 sieve	Class IV	A-2-7, or A-4, or A-6 soils with 30% or less retained on #200 sieve
MH, CH, OL, OH, PT	Class V Not for use as embedment	A5, A7

[A] See Classification D2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
[B] Limits may be imposed on the soil group to meet project or local requirements if the specified soil remains within the group. For example, some project applications require a Class I material with minimal fines to address specific structural or hydraulic conditions and the specification may read "Use Class I soil with a maximum of 5% passing the #200 sieve."
[C] AASHTO M145, Classification of Soils and Soil Aggregate Mixtures.
[D] All particle face shall be fractured.
[E] Materials such as broken coral, shells, and recycled concrete, with $\leq$ = 12% passing a No. 200 sieve, are considered to be Class II materials. These materials should only be used when evaluated and approved by the Engineer.
[F] Uniform fine sands (SP) with more than 50% passing a No. 100 sieve (0.006 in., 0.15 mm) are very sensitive to moisture and should not be used as backfill unless specifically allowed in the contract documents. If use of these materials is allowed, compaction and handling procedures should follow the guidelines for Class III materials.

SOIL CLASSIFICATION CHART

From ASTM D2321-11: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

TABLE 3 Recommendations for Installation and Use of Soils and Aggregates for Foundation and Pipe-Zone Embedment

Soil Class[A]	Class I[B]	Class II	Class III	Class IV
General Recommendations and Restrictions	Acceptable and common where no migration is probable or when combined with a geotextile filter media. Suitable for use as a drainage blanket and under drain where adjacent material is suitably graded or when used with a geotextile filter fabric (see X1.8).	Where hydraulic gradient exists check gradation to minimize migration. Clean groups are suitable for use as a drainage blanket and underdrain (see Table 2). Uniform fine sands (SP) with more than 50 % passing a #100 sieve (0.006 in., 0.15 mm) behave like silts and should be treated as Class IV soils.	Do not use where water conditions in trench prevent proper placement and compaction. Not recommended for use with pipes with stiffness of 9 psi or less.	Difficult to achieve high-soil stiffness. Do not use where water conditions in trench prevent proper placement and compaction. Not recommended for use with pipes with stiffness of 9 psi or less.
Foundation	Suitable as foundation and for replacing over-excavated and unstable trench bottom as restricted above.	Suitable as foundation and for replacing over-excavated and unstable trench bottom as restricted above. Install and compact in 12 in. (300 mm) maximum layers.	Suitable for replacing over-excavated trench bottom as restricted above. Install and compact in 6 in. (150 mm) maximum layers.	Suitable for replacing over-excavated trench bottom as restricted above. Install and compact in 6-in (150 mm) maximum layers.
Pipe Embedment	Suitable as restricted above. Work material under pipe to provide uniform haunch support.	Suitable as restricted above. Work material under pipe to provide uniform haunch support.	Suitable as restricted above. Difficult to place and compact in the haunch zone.	Suitable as restricted above. Difficult to place and compact in the haunch zone.
Embedment Compaction: Min Recommended Percent Compaction, SPD[D]	See Note[C]	85 % (SW and SP soils) For GW and GP soils See Note[E]	90 %	95 %
Relative Compactive Effort Required to Achieve Minimum Percent Compaction	Low	Moderate	High	Very high
Compaction Methods	Vibration or impact	Vibration or impact	Impact	Impact
Required Moisture Control	None	None	Maintain near optimum to minimize compactive effort	Maintain near optimum to minimize compactive effort

[A] Class V materials are unsuitable as embedment. They may be used as final backfill as permitted by the engineer.
[B] Class I materials have higher stiffness than Class II materials, but data on specific soil stiffness of placed, uncompacted Class I materials can be taken equivalent to Class II materials compacted to 95% of maximum standard Proctor density (SPD95), and the soil stiffness of compacted Class I materials can be taken equivalent to Class II materials compacted to 100% of maximum standard Proctor density (SPD100). Even if placed uncompacted (that is, dumped), Class I materials should always be worked into the haunch zone to assure completed placement.
[C] Suitable compaction typically achieved by dumped placement (that is, uncompacted but worked into haunch zone to ensure complete placement).
[D] SPD is standard Proctor density as determined by Test Method D698.
[E] Place and compact GW and GP soils with at least two passes of compaction equipment.

TABLE 6.6
LIVE LOADS ON PVC PIPE
From Uni-Bell Handbook of PVC Pipe: Design and Construction, Fourth Edition (2001)

Height of Cover (ft)	Live Load Transferred to Pipe, lb/in²			Height of Cover (ft)	Live Load Transferred to Pipe, lb/in²		
	Highway H20[1]	Railway E80[2]	Airport[3]		Highway H20[1]	Railway E80[2]	Airport[3]
1	12.50			14	*	4.17	3.06
2	5.56	26.39	13.14	16	*	3.47	2.29
3	4.17	23.61	12.28	18	*	2.78	1.91
4	2.78	18.40	11.27	20	*	2.08	1.53
5	1.74	16.67	10.09	22	*	1.91	1.14
6	1.39	15.63	8.79	24	*	1.74	1.05
7	1.22	12.15	7.85	26	*	1.39	*
8	0.69	11.11	6.93	28	*	1.04	*
10	*	7.64	6.09	30	*	0.69	*
12	*	5.56	4.76	35	*	*	*
				40	*	*	*

[1] *Simulates 20 ton truck traffic + impact (Source: ASTM A 796)*
[2] *Simulates 80,000 lb/ft railway load + impact (Source: ASTM A 796)*
[3] *180,000 lbs. dual tandem gear assembly. 26 inch spacing between tires and 66 inch center-to-center spacing between fore and aft tires under a rigid pavement 12 inches thick + impact.*
** Negligible live load influence.*

FIGURE 7.4
BEDDING ANGLE
From Uni-Bell Handbook of PVC Pipe: Design and Construction, Fourth Edition (2001)

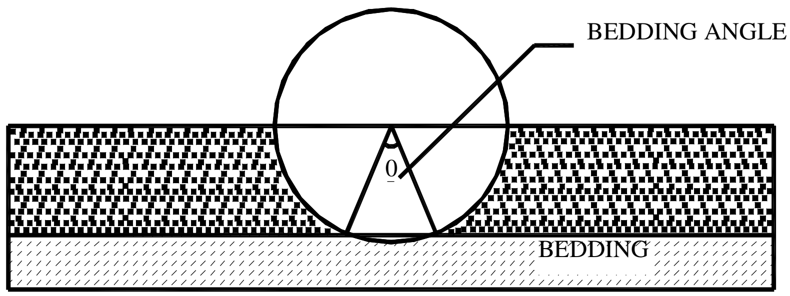


TABLE 7.2
VALUES OF BEDDING CONSTANT, K

BEDDING ANGLE (DEGREES)	K
0	0.110
30	0.108
45	0.105
60	0.102
90	0.096
120	0.090
180	0.083

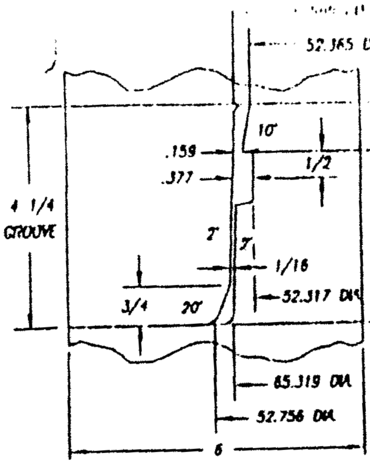
TABLE 7.3
AVERAGE VALUES OF MODULUS OF SOIL REACTION, E’
(For Initial Flexible Pipe Deflection)
From Uni-Bell Handbook of PVC Pipe: Design and Construction, Fourth Edition (2001)

Soil type-pipe bedding material (Unified Classification System[a]) (1)	E’ for Degree of Compaction of Bedding, in pounds per square inch			
	Dumped (2)	Slight, < 85% Proctor, <40% relative density (3)	Moderate, 85%-95% Proctor, 40%-70% relative density (4)	High, >95% Proctor, >70% relative density (5)
Fine-grained Soils (LL>50)[b] Soils with medium to high plasticity, CH, MH, CH-MH	No data available; consult a competent soils engineer; Otherwise use E’ = 0			
Fine-grained Soils (LL<50) Soils with medium to no plasticity, CL, ML, ML-CL, with less than 25% coarse-grained particles	50	200	400	1,000
Fine-grained Soils (LL<50) Soils with medium to no plasticity, CL, ML, ML-CL, with more than 25% coarse-grained particles Coarse-grained Soils with Fines GM, GC, SM, SC[c] contains more than 12% fines	100	400	1,000	2,000
Coarse-grained Soils with Little or no Fines GW, GP, SW, SP[c] contains less than 12% fines	200	1,000	2,000	3,000
Crushed Rock	1,000	3,000	3,000	3,000
Accuracy in Terms of Percentage Deflection[d]	± 2	± 2	± 1	± 0.5

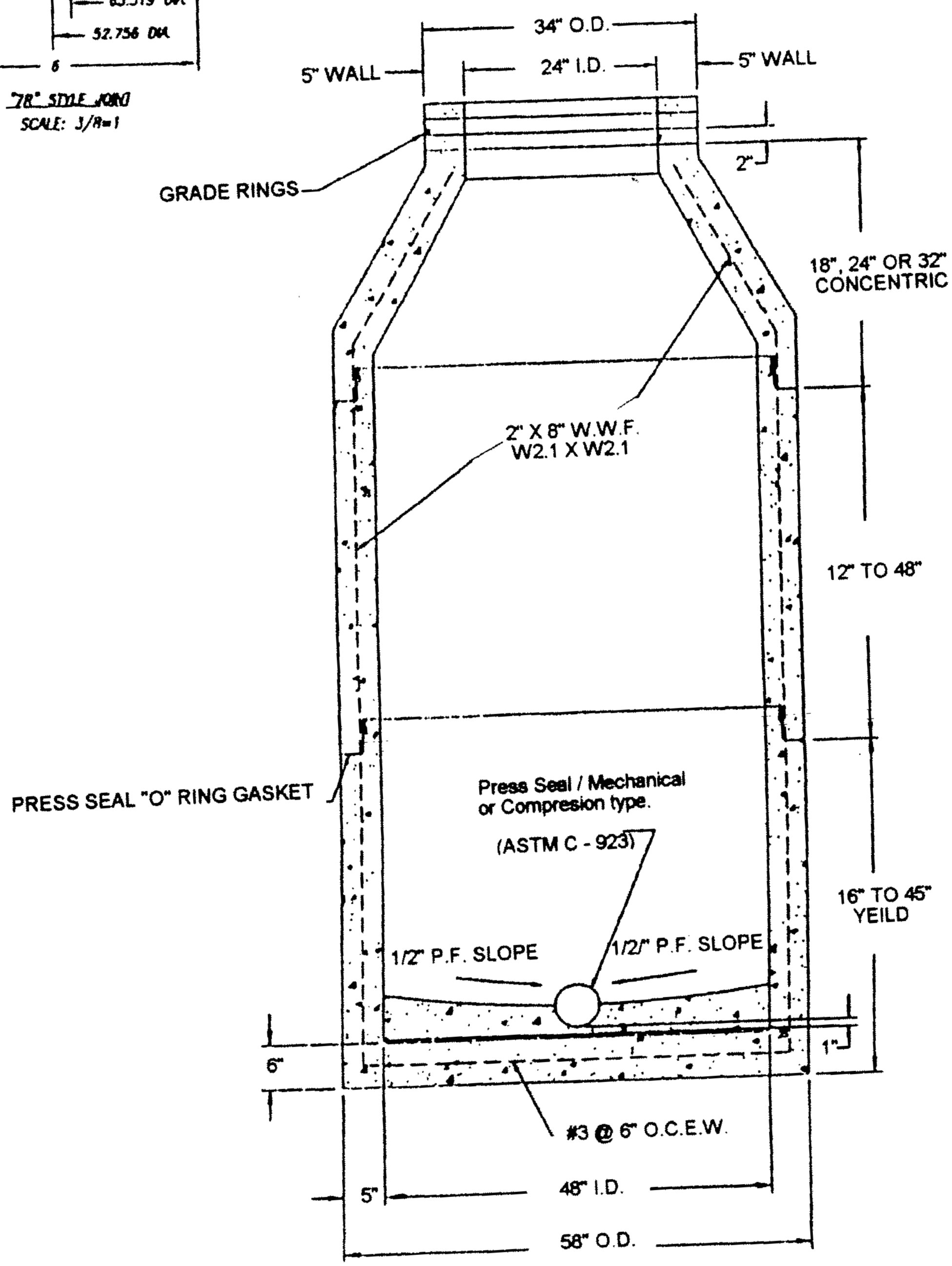
[a]ASTM Designation D 2487, USBR Designation E-3.
[b]LL = Liquid limit.
[c]Or any borderline soil beginning with one of these symbols (i.e. GM-GC, GC-SC).
[d]For ± 1% accuracy and predicted deflection of 3%, actual deflection would be between 2% and 4%
Note: Values applicable only for fills less than 50 ft (15 m). Table does not include any safety factor. For use in predicting initial deflections only, appropriate Deflection Lag Factor must be applied for long-term deflections. If bedding falls on the borderline between two compaction categories, select lower E’ value or average the two values. Percentage Proctor based on laboratory maximum dry density from test standards using about 12,500 ft-lb/cu ft (598,000 J/m^3) (ASTM D 698, AASHTO T-99, USBR Designation E-11). 1 psi = 6.9 kPa.

SOURCE: “Soil Reaction for Buried Flexible Pipe” by Amster K. Howard, U.S. Bureau of Reclamation, Denver, Colorado. Reprinted with permission from American Society of Civil Engineers.

PRE-CAST MANHOLE DRAWINGS & SPECIFICATIONS



"7R" STYLE JOINT
SCALE: 3/8=1

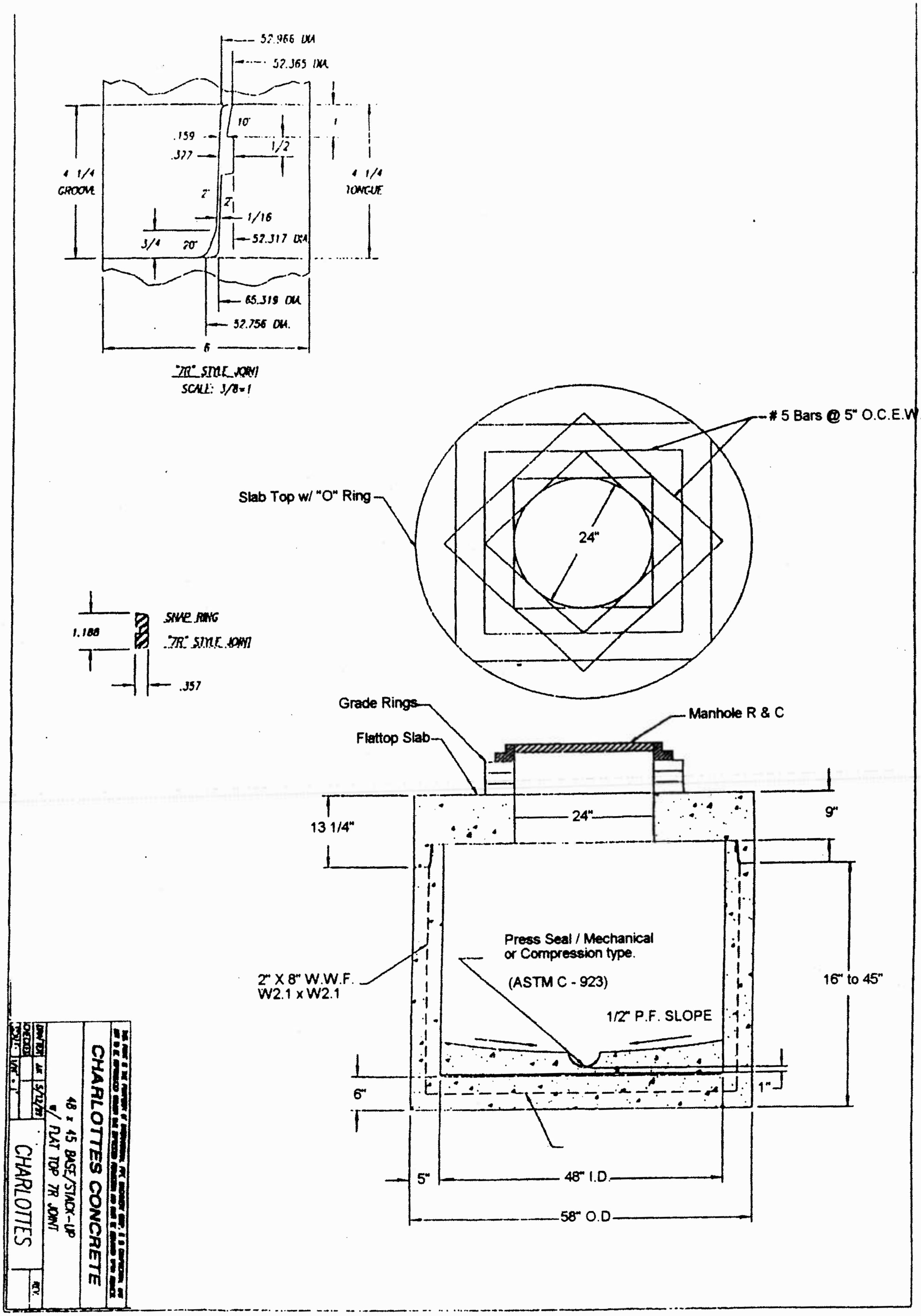


ALL MATERIALS MEET
OR EXCEED ASTM C-478

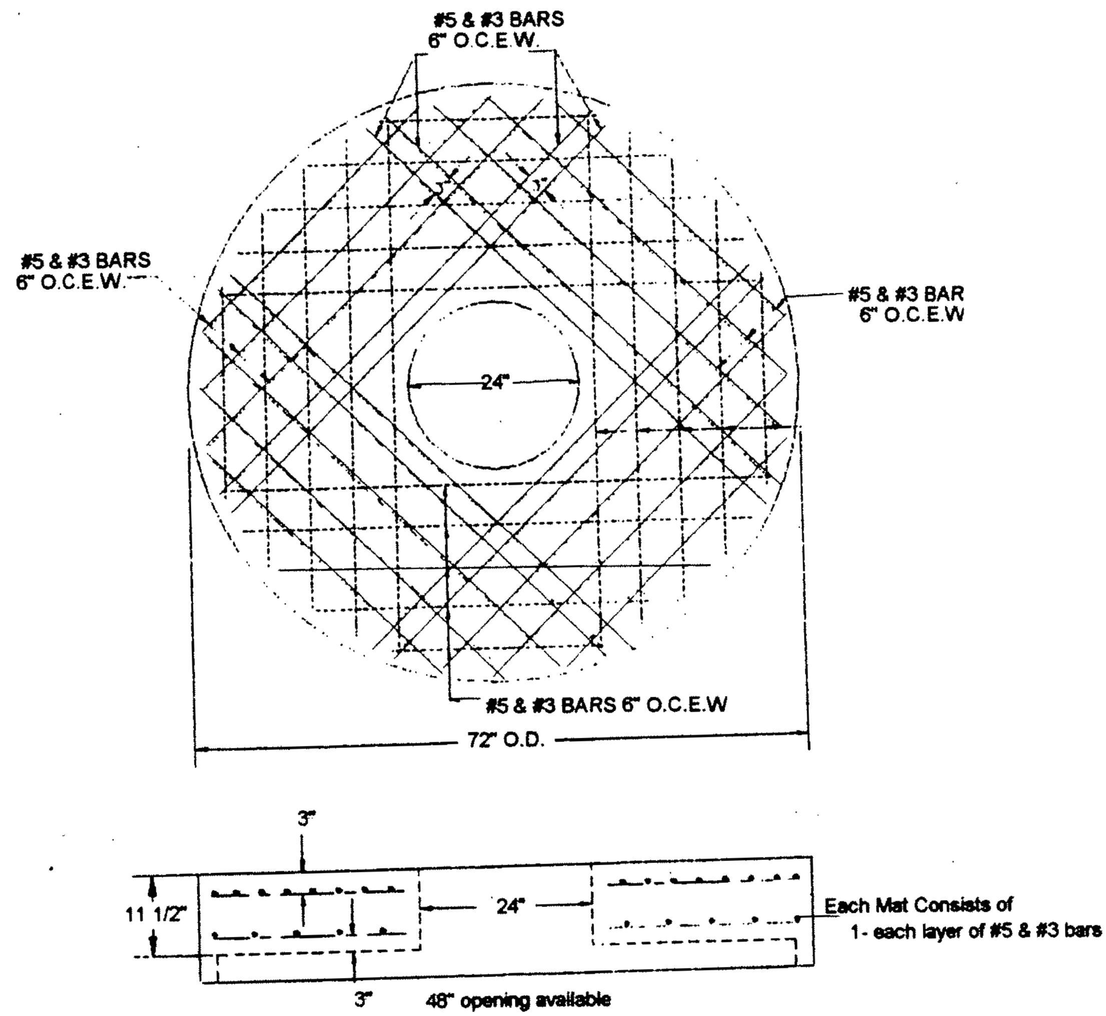
CHARLOTTES CONCRETE

48 x 45 BASE/STACK-UP
w/ FLAT TOP 7R JOINT

CHARLOTTES


52.966 DIA
52.365 DIA
10°
.159
.327
1/2
1
4 1/4
GROOVE
4 1/4
TONGUE
2°
2°
1/16
3/4
20°
52.317 DIA
65.319 DIA
52.756 DIA.
6
"7R" STYLE JOINT
SCALE: 3/8=1
SNAP RING
1.188
"7R" STYLE JOINT
.357
5 Bars @ 5" O.C.E.W.
Slab Top w/ "O" Ring
24"
Grade Rings
Manhole R & C
Flattop Slab
13 1/4"
24"
9"
Press Seal / Mechanical
or Compression type.
(ASTM C - 923)
2" X 8" W.W.F.
W2.1 x W2.1
16" to 45"
1/2" P.F. SLOPE
6"
1"
5"
48" I.D.
58" O.D.
CHARLOTTES CONCRETE
48 x 45 BASE/STACK-UP
w/ FLAT TOP 7R JOINT
CHARLOTTES

Concrete @ 4000 psi
Steel Grade 60
ASTM C - 478
H - 20 Traffic Rated

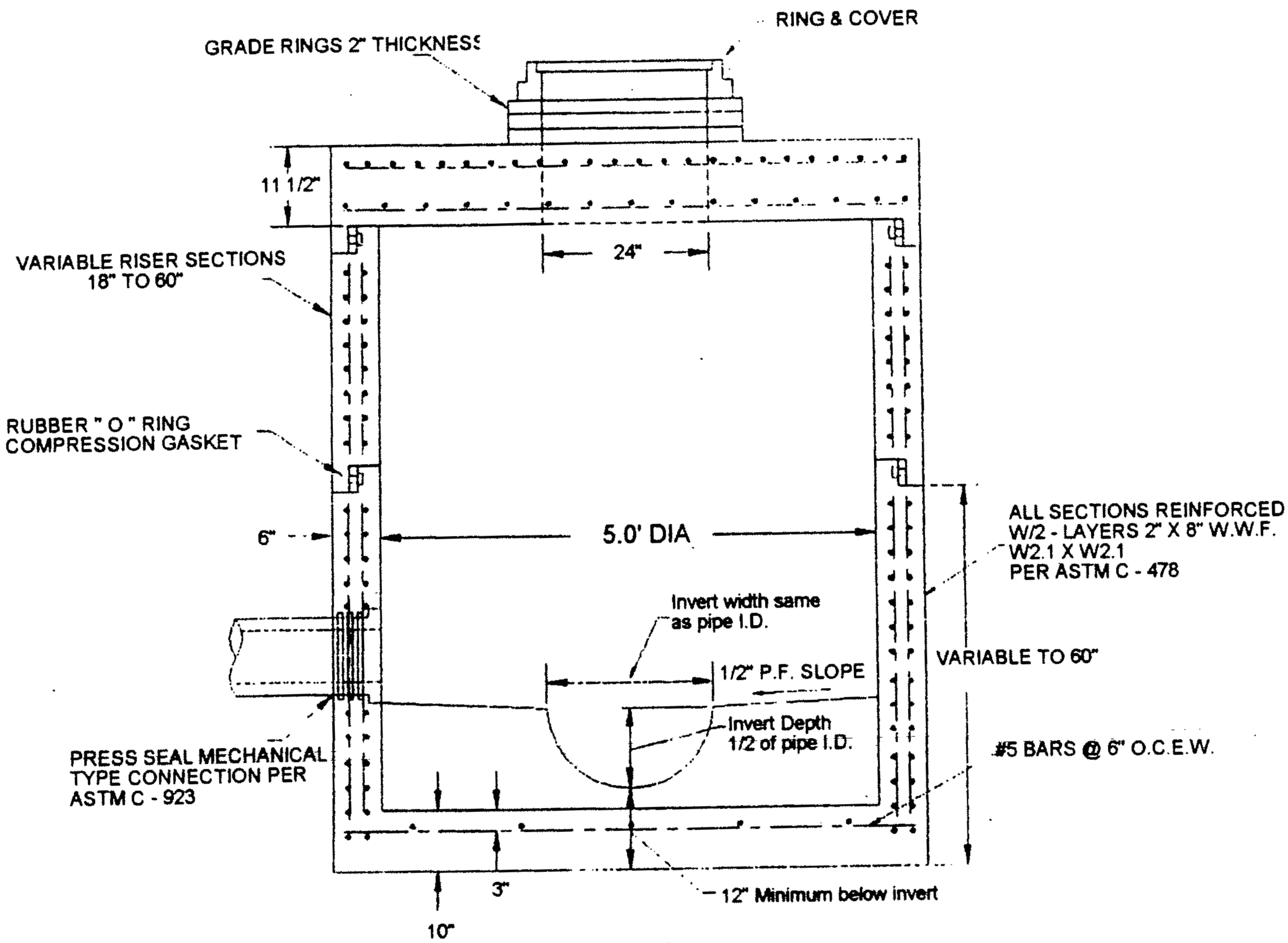


(N.T.S.)

Charlotte's Concrete, Inc.

60 " I.D.
FLATTOP SLAB

CONCRETE @ 4000psi
STEEL GRADE 60
ASTM C - 478
H - 20 TRAFFIC RATED

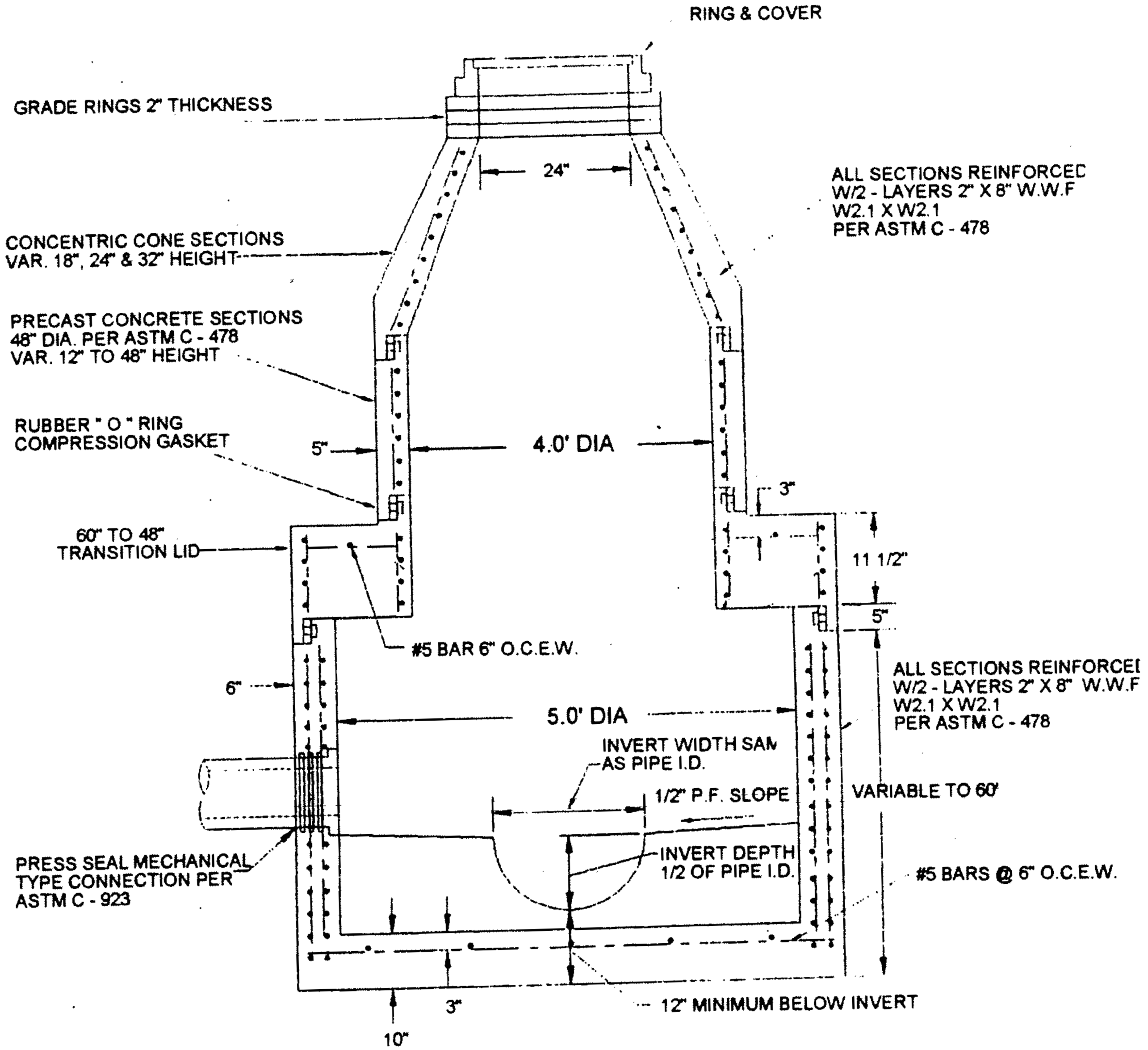


(N.T.S.)

Charlotte's Concrete, Inc.

60" DIA. MANHOLE
W/ FLATTOP

CONCRETE @ 4000psi
STEEL GRADE 60
ASTM C - 478
H - 20 TRAFFIC RATED

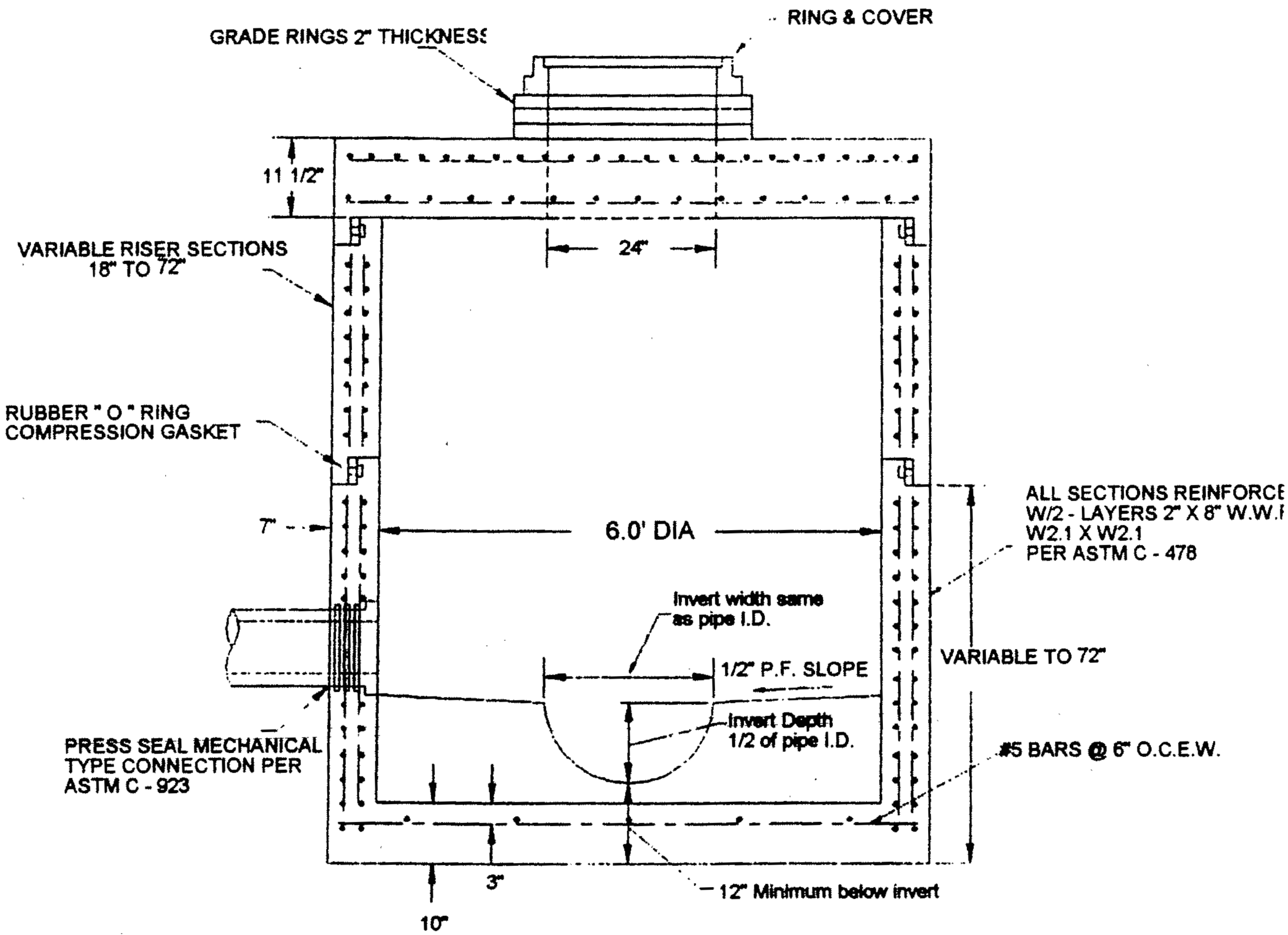


(N.T.S.)

Charlotte's Concrete, Inc.

60" DIA. M.H. TO
48" DIA. M.H.

CONCRETE @ 4000psi
STEEL GRADE 60
ASTM C - 478
H - 20 TRAFFIC RATED

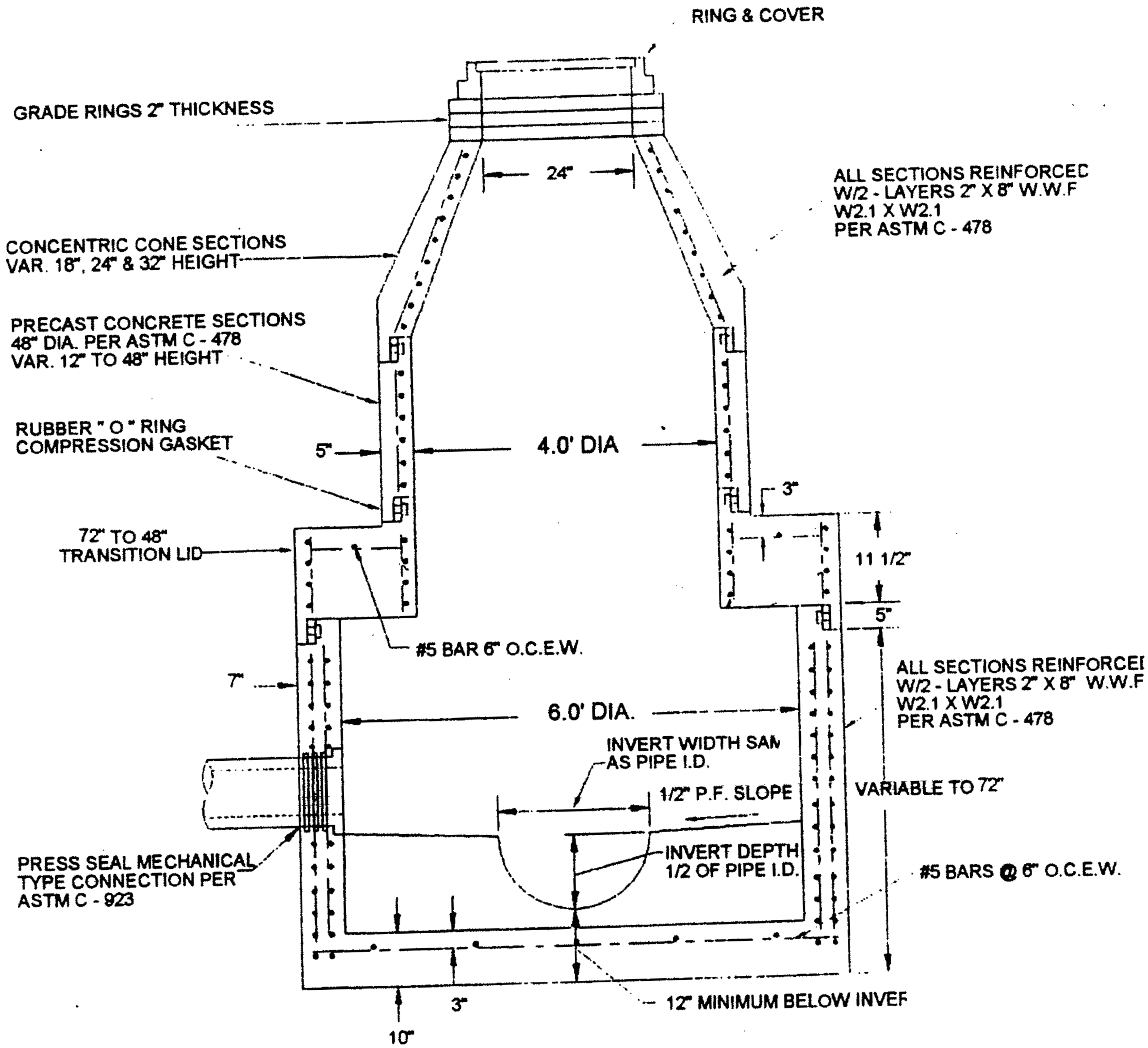


(N.T.S.)

Charlotte's Concrete, Inc.

72" DIA. MANHOLE
W/ FLATTOP

CONCRETE @ 4000psi
STEEL GRADE 60
ASTM C - 478
H - 20 TRAFFIC RATED

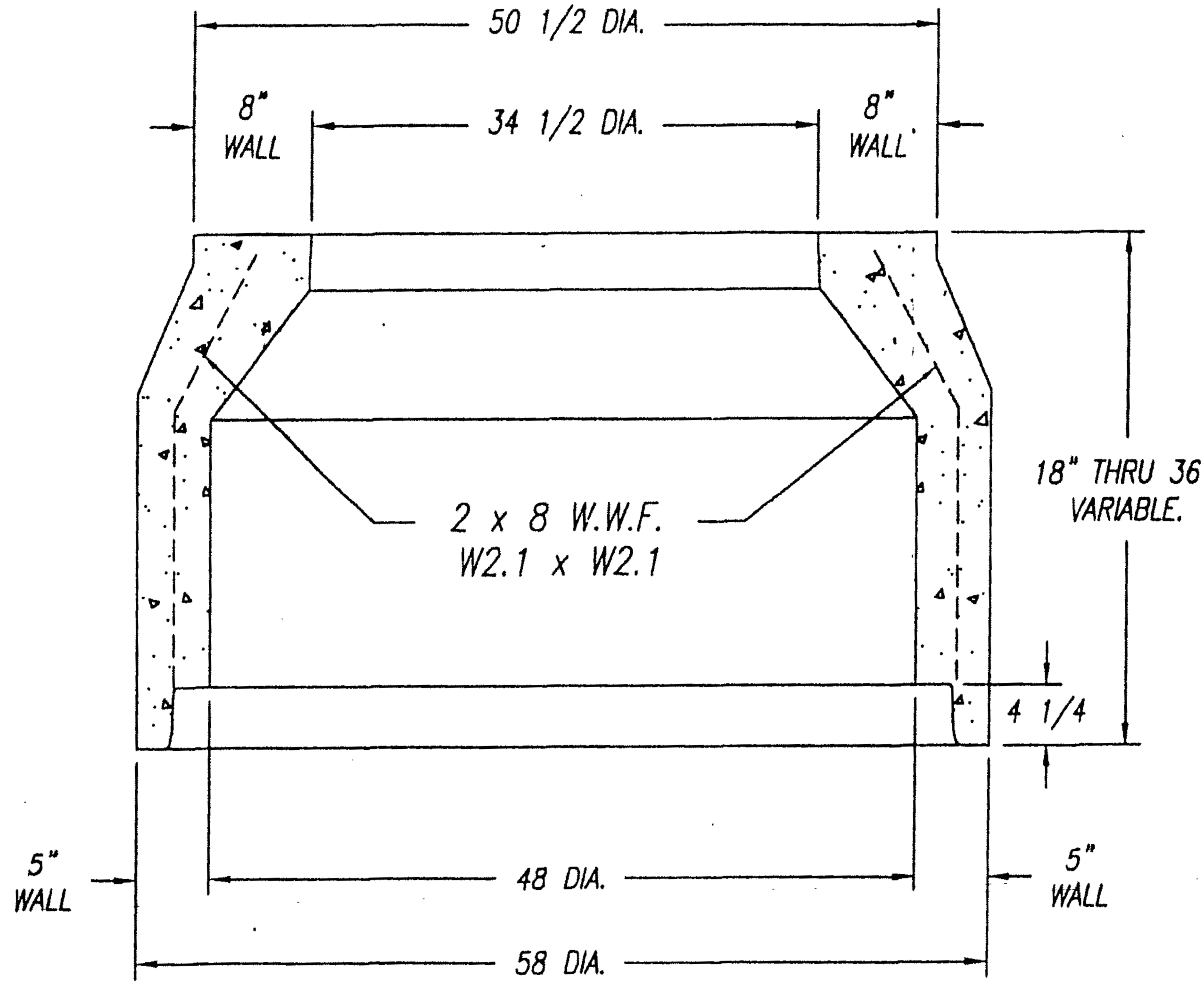


(N.T.S.)

Charlotte's Concrete, Inc.

72" DIA. M.H. TO
48" DIA. M.H.

\APPROVAL\CONCENTRIC.DWG



(7R JOINT)
REF. FORM DWG. 3-303-5561

INTERNATIONAL	**QUINN** MACHINE & FOUNDRY CORP. A MEMBER OF THE BESSER FAMILY OF COMPANIES BOONE, IOWA U.S.A.

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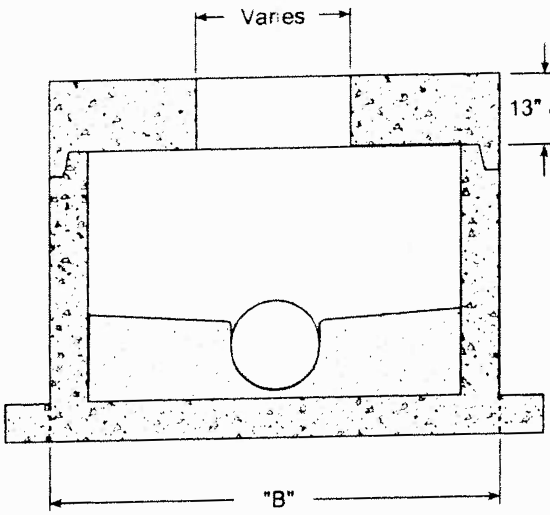
CHARLOTTES

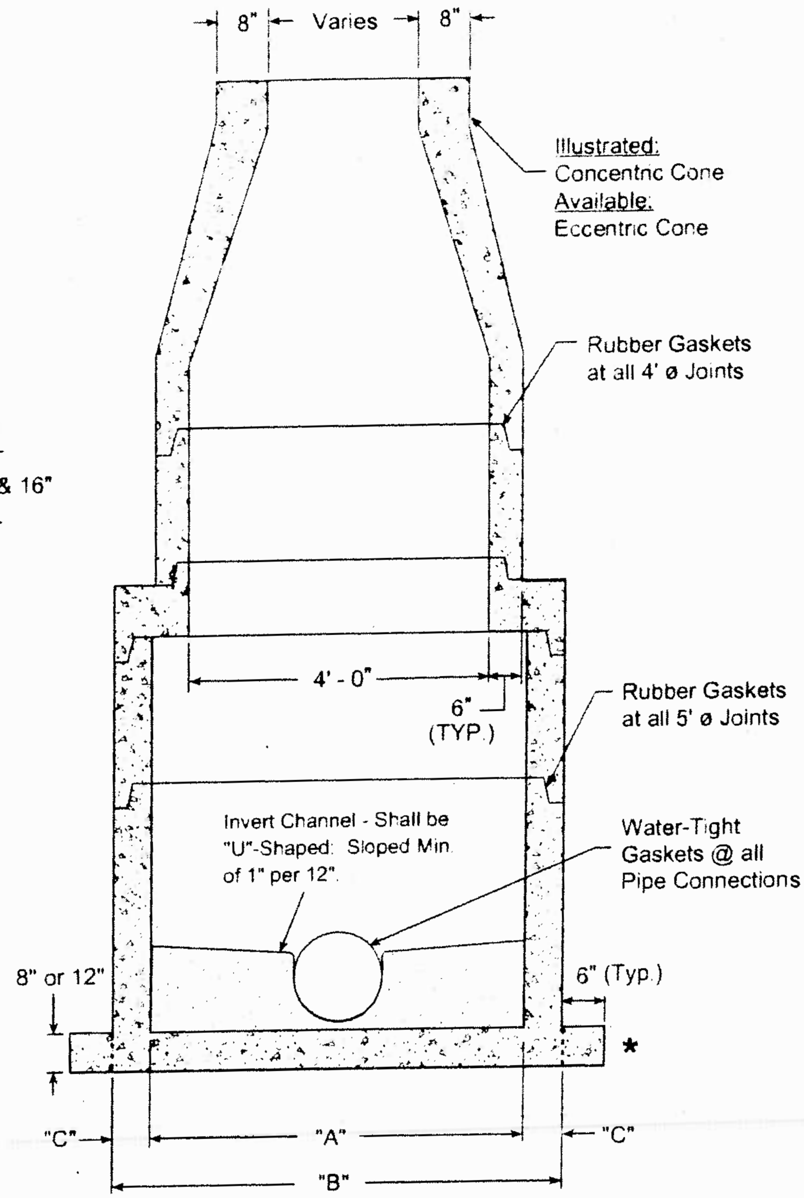
48 x 5 x 34 1/2 x 8 x 36 & 18
CONCENTRIC CONCRETE SECTION

DRAFTER	JJK	4/19/02	CONCENTRIC	REV.
CHECKED				
SCALE:	1/12" = 1"			

Precast Manholes



Flattop Illustration
for Shallow Manhole



Section View
5'/4' & 6'/4' I.D. Manhole
Extended Base with Reducing Cone

Materials & Features

HOLES AS SPECIFIED: for 5' I.D. max diameter = 40"
for 6' I.D. max diameter = 54"

CONCRETE: 5,000 PSI, 28 day strength.

REINFORCING: Meets or exceeds ASTM C478 requirements.

Average weight of 24" depth base w/8" invert:
for 5' I.D. = 7,500 lbs.
for 6' I.D. = 10,600 lbs.

Estimated weight of riser and sections:
for 5' I.D. = 1,325 lbs. / vt. ft.
for 6' I.D. = 1,800 lbs. / vt. ft.

For pipe sizes 15" and larger, invert shall be equal to the larger pipe diameter.

★ - Extended base shown: Regular base also available."

In the event a boot is loose contact your Hanson representative to resolve.

"Manufactured to your specifications."

Pipe Size	I.D. "A"	O.D. "B"	Wall Thk. "C"
5'	5' - 0"	6' - 0"	6"
6'	6' - 0"	7' - 2"	7"

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE
5'/4' & 6'/4'I.D. Manhole Extended Base w/Reducing Cone	All Plants	TX	5.6	08-15-06

Hanson

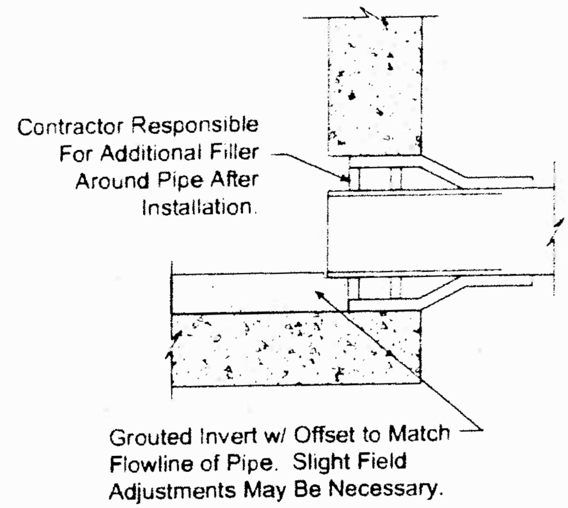
Contact Hanson

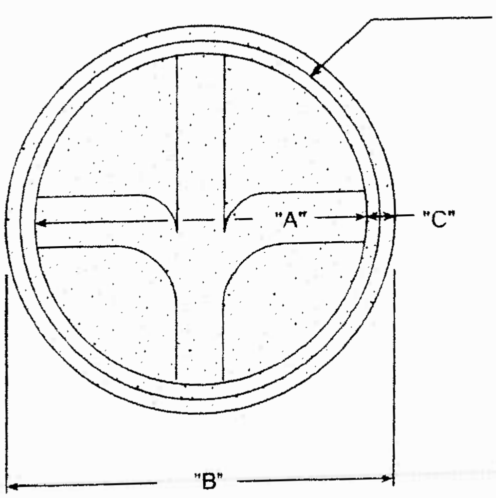
Go to Index

EXIT

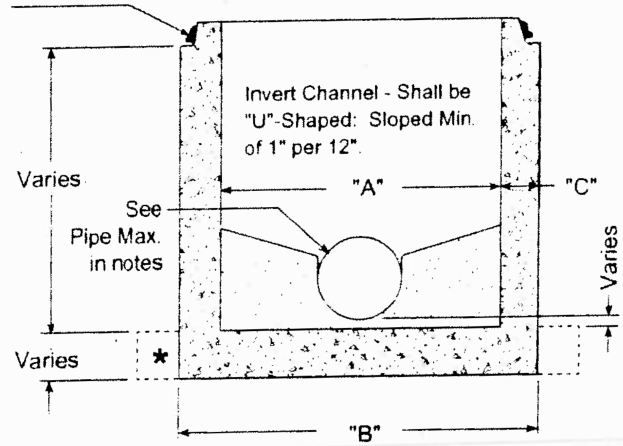
Precast Manholes

For Pipe Entering the Manhole at Excessive Depths Above the Flow Line Out, the Contractor May be Responsible for Grout Work Necessary to Bring Channel up to Flow Line on Inlet Pipe.





Plan View



Section View

Pipe Size	I.D. "A"	O.D. "B"	Wall Thk. "C"
4'	4' - 0"	4' - 10"	5"
5'	5' - 0"	6' - 0"	6"
6'	6' - 0"	7' - 2"	7"

Materials & Features

HOLES AS SPECIFIED:

For 4' I.D. max. diameter = 32"
For 5' I.D. max. diameter = 40"
For 6' I.D. max. diameter = 54"

CONCRETE: 5,000 PSI, 28 day strength
REINFORCING: Meets or exceeds ASTM C478 requirements.
Average weight of 24" depth base w/8" invert = 4,500 lbs
Water-tight gaskets at all pipe connections.
★ - Regular base shown: Extended base also available.
In the event a boot is loose contact your Hanson representative to resolve.

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE
Details: 4', 5' & 6' I.D. Precast Regular Manhole Base	All Plants	TX	5.7	08-15-06

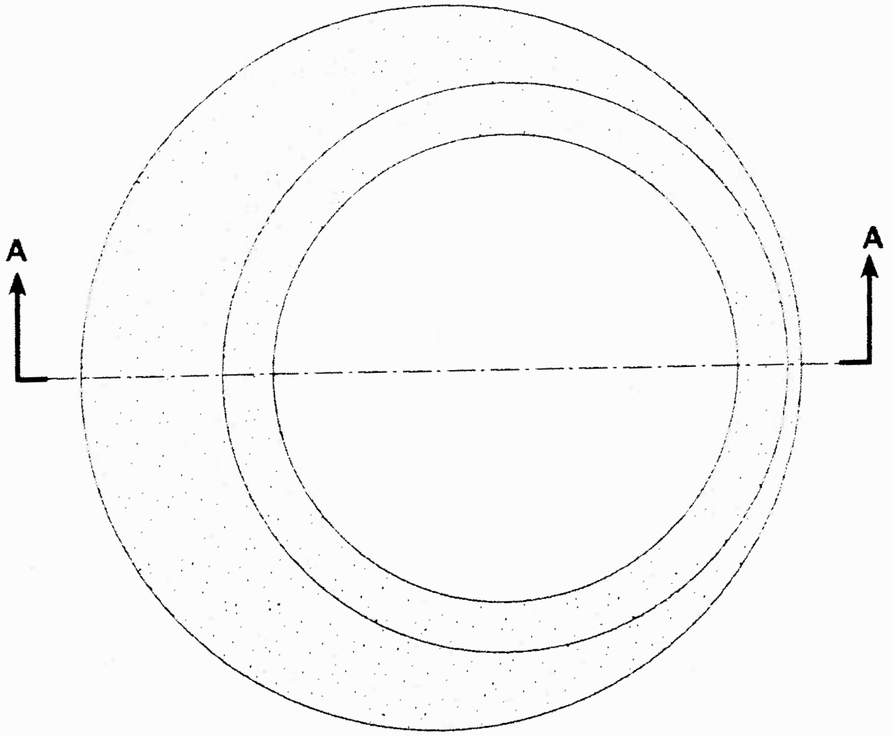
Hanson

Contact Hanson

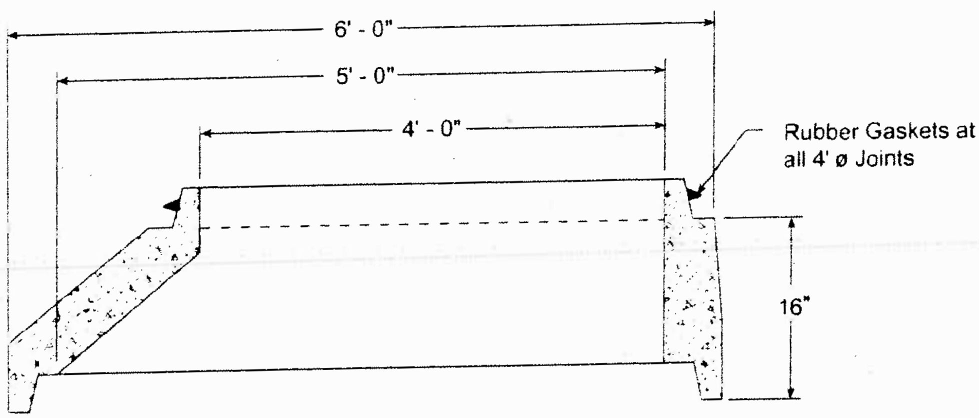
Go to Index

EXIT

Precast Manholes



Plan View



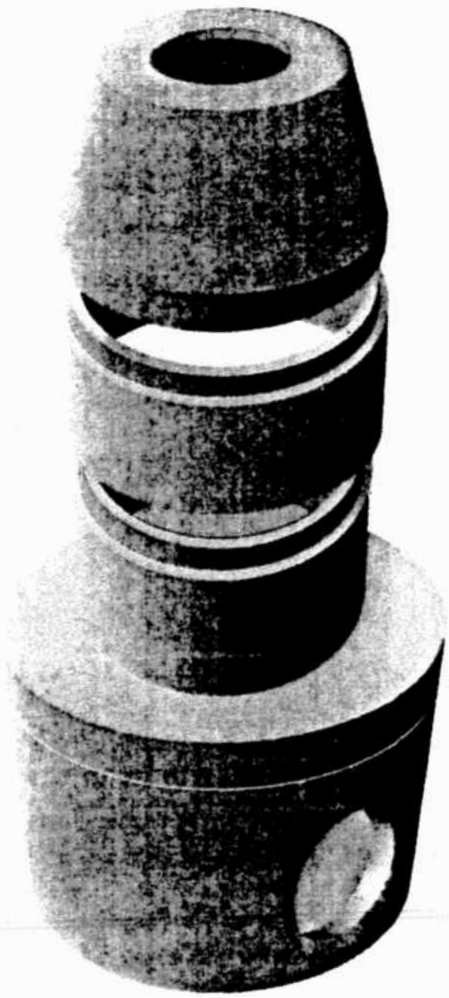
Section View

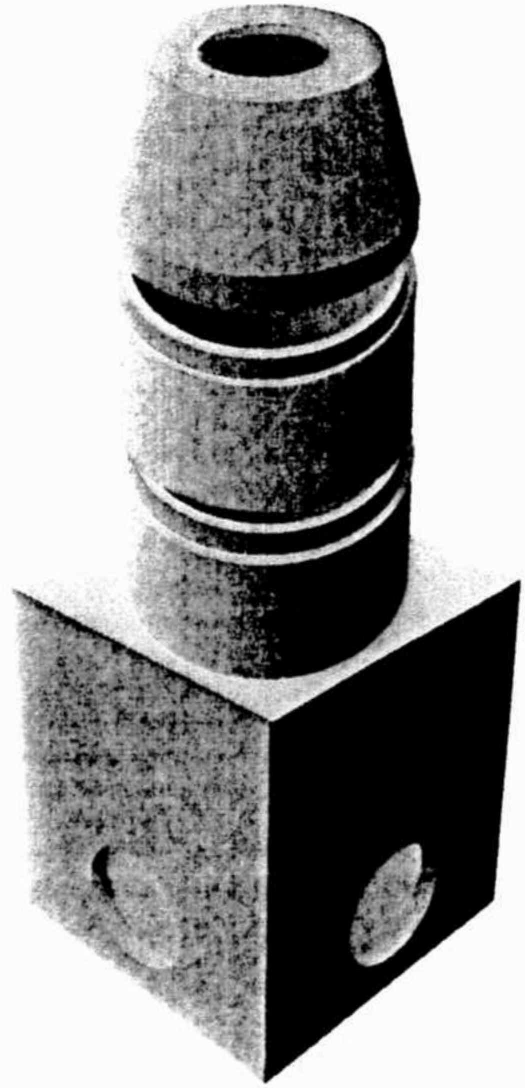
Materials & Features

CONCRETE: 5,000 PSI, 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
CONSTRUCTION OF PRECAST is in accordance with ASTM C478.
Concrete is poured according to ACI-500.

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
5' x 4' Conical Adaptor	Waco	TX	5.8	08-15-06	Hanson





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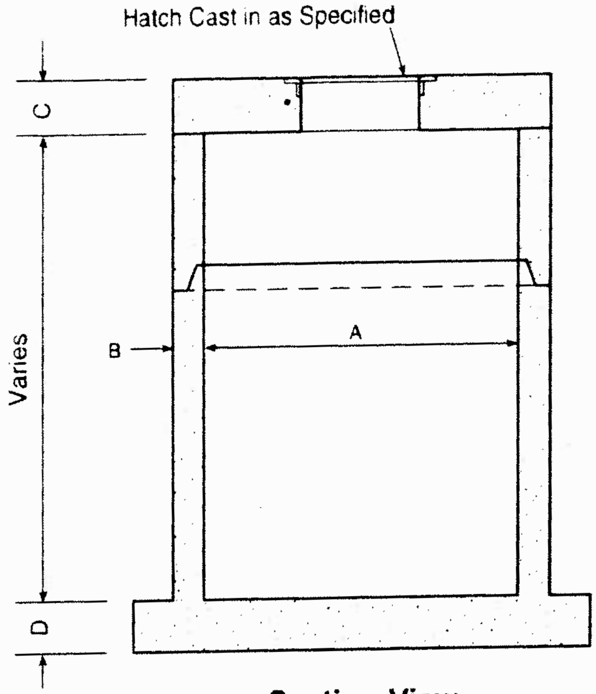
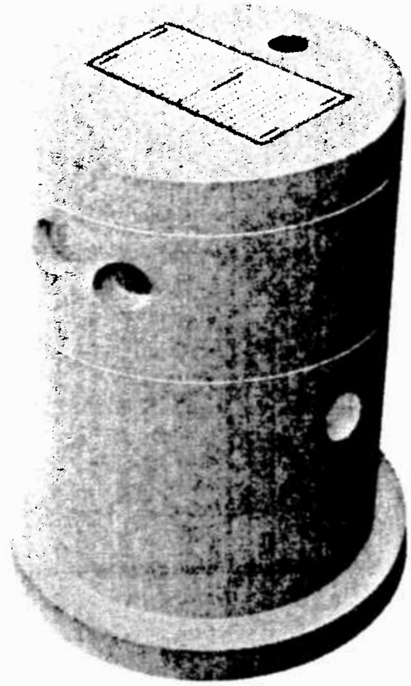
Precast Manholes



Section View
(Base configuration for 60", 72" & 84")

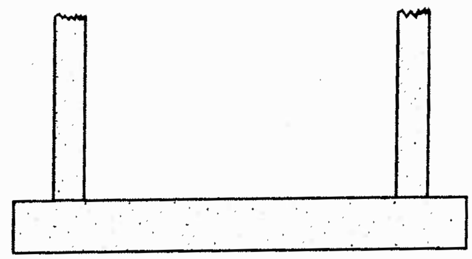


Isometric View

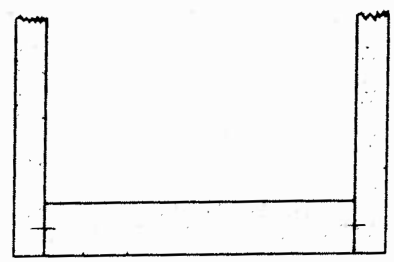
Product Dimensions

A	B	C	D	
60"				
72"				
84"				
96"				
108"				
120"				
132"				
144"				

Contact your local Hanson representative for product dimensions.



Section View
Base configuration for 96"



Section View
Base configuration for 108"-144"

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

REINFORCING STEEL: per ASTM A-615 / A-185

REINFORCING to meet AASHTO HS 20-44 Loading.

BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

(A). Hatches as specified by Engineer.

In the event a boot is loose contact your Hanson representative to resolve.

-No Scale-
All dimensions subject to allowable specification tolerances.

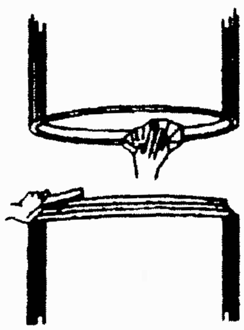
TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Typical Wetwells - Various Diameters	All Plants	TX	5.13	08-15-06	Hanson

Contact Hanson

Go to Index

EXIT

① "O"-Ring Gasket

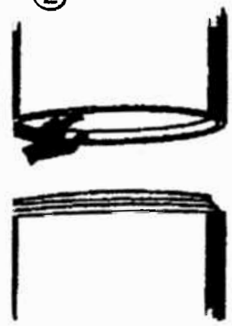


Carefully clean all dirt & foreign objects from the joining surface of the bell or groove end of pipe.

Carefully clean spigot or tongue end of pipe, including the gasket recess. Inspect the bell and spigot ends of each section to make sure they are free from cracks, chips or voids that will interfere with gasket.

Improperly prepared bell and spigot surfaces may prevent homing of the pipe or keep the gasket from sealing.

②



Lubricate bell joint surface liberally, covering entire inside surface using proper pipe gasket lubricant.

③

Lubricate the gasket throughly before it is placed on the spigot or tongue.

Bell and Gasket not lubricated or improperly lubricated may cause the gasket to roll and leak or possibly damage the bell.

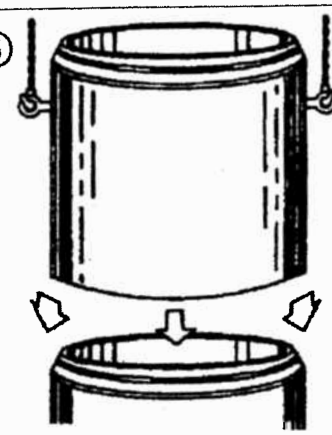
④

IMPORTANT

Fit the gasket carefully, equalizing the rubber gasket stretch by running a smooth, round object (inserted between the gasket & spigot) around the entire circumference several times.

Unequal stretch could cause bunching of the gasket and may cause leaks in the joint or crack the bell.

⑤



Align the bell & spigot to be joined. Before homing the joint, check that the gasket is in contact with the bell end entrance taper around the entire circumference.

Do not force sections together. If sections do not seat properly, unstack and contact your Hanson Sales Representative.

Improper alignment can dislodge gasket, causing leaks or possibly breaking the bell.

Profile Gasket

1. Manhole sections should be handed with extreme caution to avoid chipping of the bell or spigot ends. Proper lifting devices must be used on all sections.
2. Inspect gasket sealing area for any voids or rough edges that may interfere with the seal.
3. Place the 4-G Gasket in the step of the spigot. (Making sure that the pointed end of the gasket is toward the end of the pipe as shown in Fig A.)
4. **IMPORTANT** Equalize the stretch on the gasket by pulling the sealing lube away from the spigot at least one inch and then releasing the gasket. Repeat this every three or four inches around the circumference of the pipe. Equalization of stretch makes sure that the gasket has the same stretched cross-section and tension throughout. **Do not lube the gasket or spigot end of the pipe.**
5. Remove all dirt and other foreign matter from the inside surface of the bell. Apply lube to the inner surface of the bell including the lead-in taper surface on the outer edge of the bell. Align spigot with the bell. Gasket should touch lead-in taper around the entire circumference before pushing the pipe home.
6. Push the manhole section carefully, until the spigot is all the way home. (Fig B) Do not force sections together. If sections do not seat properly, unstack and contact your Hanson Sales Representative.
7. Every manhole will not come home exactly the same. Differences in application, consistency of lubricants, dimensions in the spigot and groove will cause variations in installation. If joining problems arise, please contact the manhole manufacturer immediately rather than forcing manhole sections together with subsequent damage to the manhole.
8. All testing should be performed prior to backfill of the manhole. Problems can not be detected after the manhole is backfilled. **Testing the manhole after backfill voids all warranties.**

Fig. A

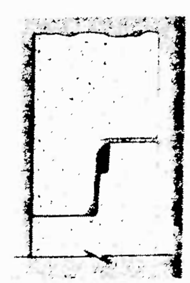
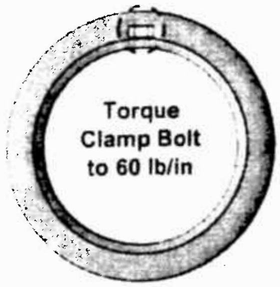


Fig. B

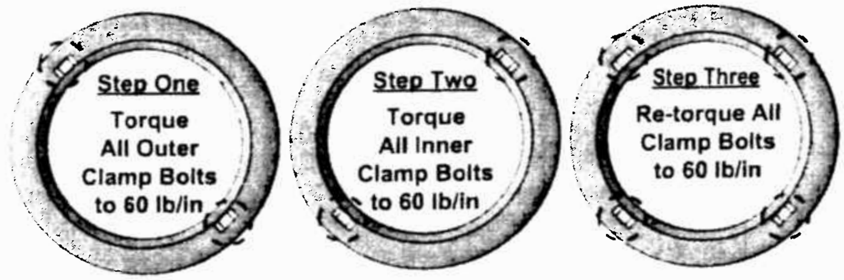
Note: Manholes in excess of 30' *in depth must be vacuum tested prior to backfill. The loads* presented by soils and possible groundwater at 30' in addition to the load from the vacuum may exceed the design capacity of the pipe to manhole connector.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
O-Ring & Profile Gasket Installation on Manholes	All Plants	TX	5.14	08-15-06	Hanson

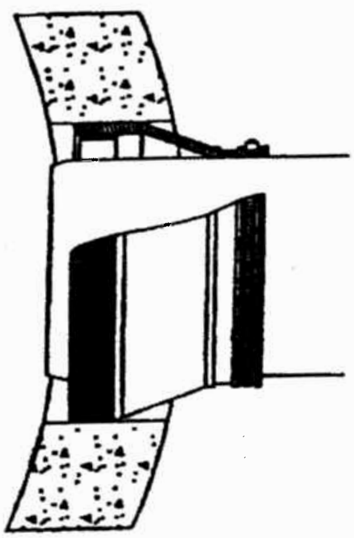
Precast Manholes



Single Clamp



Multiple Clamps



Instructions

1. Clean pipe and boot to ensure no dirt or foreign materials are present.
2. Clamping surface on pipe must be clean and smooth.
3. Center pipe in opening and insert until pipe is at least equal to the inside plane of the manhole.
4. Attach take-up clamps(s) and stagger screw(s) of clamps(s) around the groove of the gasket so that take-up pressure will be equalized. Make sure each clamp is completely in the correct groove.
5. Using a torque ratchet or torque wrench, gradually tighten all screw(s) of clamp(s) in an alternating pattern to 60 lbs/in torque.
6. After reaching 60 lbs/in torque on final screw, check all screws again to ensure equal compression of all clamps.
7. If system is to be tested, testing shall be completed prior to backfilling, following all recommendations and requirements of the test system manufacturer. Vacuum testing shall be conducted in accordance with ASTM C-1244.
8. Adjust pipe to line and grade. Use proper bedding, backfill materials and techniques so that pipe deflection and deformation is minimized.
9. Any pipe stubs installed in the manhole must be positively restrained from movement.
10. Vacuum testing after backfill voids warranty.

For more information contact yor local Hanson Representative.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Pipe to Manhole Connector Installation Guide	All Plants	TX	5.15	08-15-06	Hanson

SITE PLAN

MATCH LINE SEE SHEET 2 OF 2

SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- WASTEWATER LINE & MH
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- EXISTING WASTEWATER LINE
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- PROPERTY BOUNDARY
- 50' SCS BUFFER
- VEGETATIVE FILTER STRIP

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S FISHER
87724
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G
CITY OF GEORGETOWN, TEXAS

SITE PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 22, 2022
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 02 OF 02

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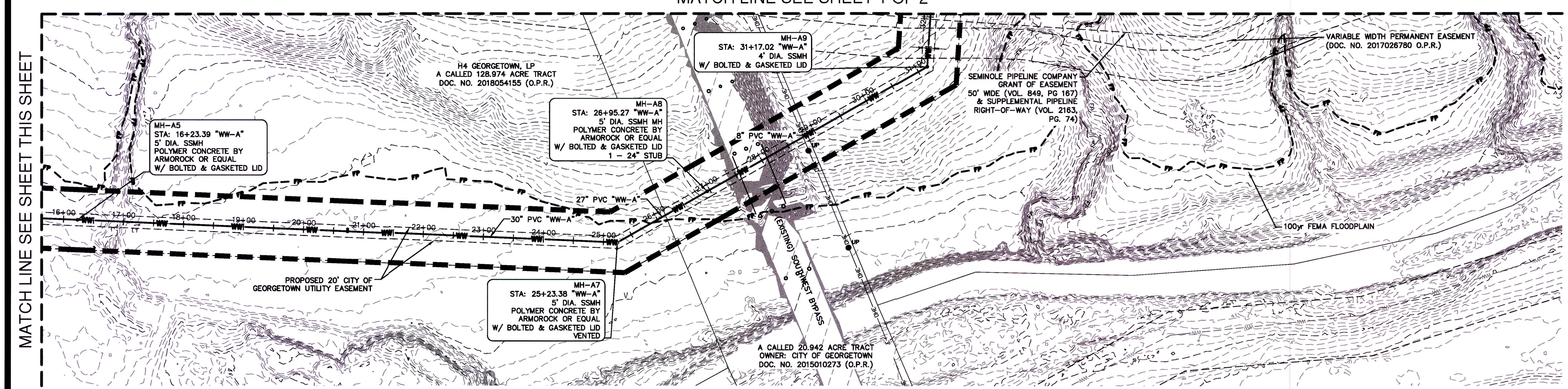

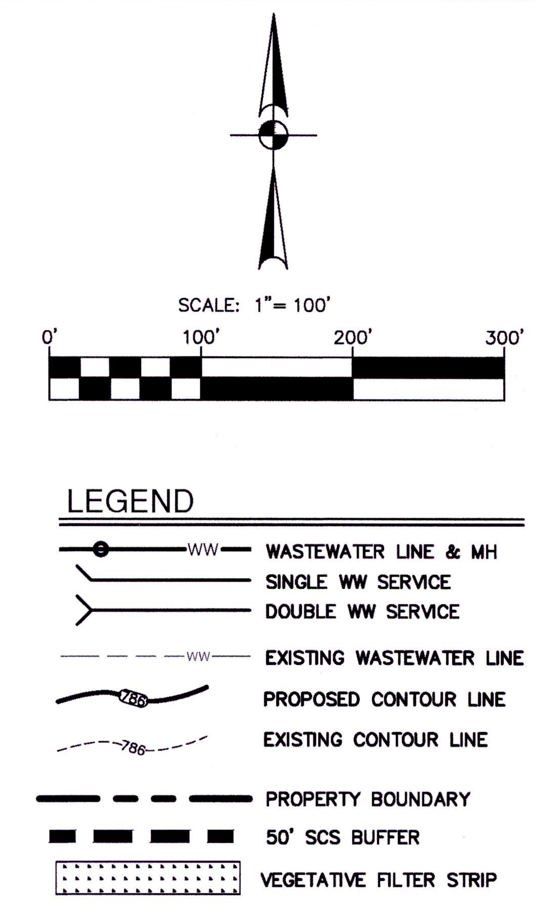

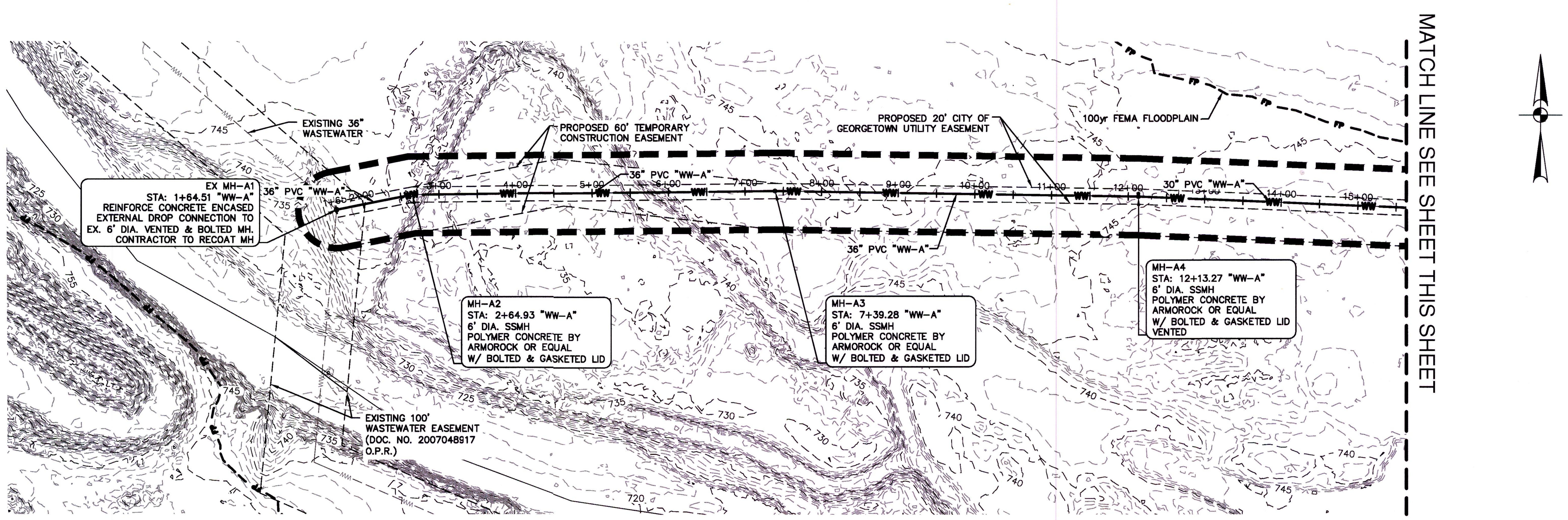

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
SITE PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 12, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 01 OF 02

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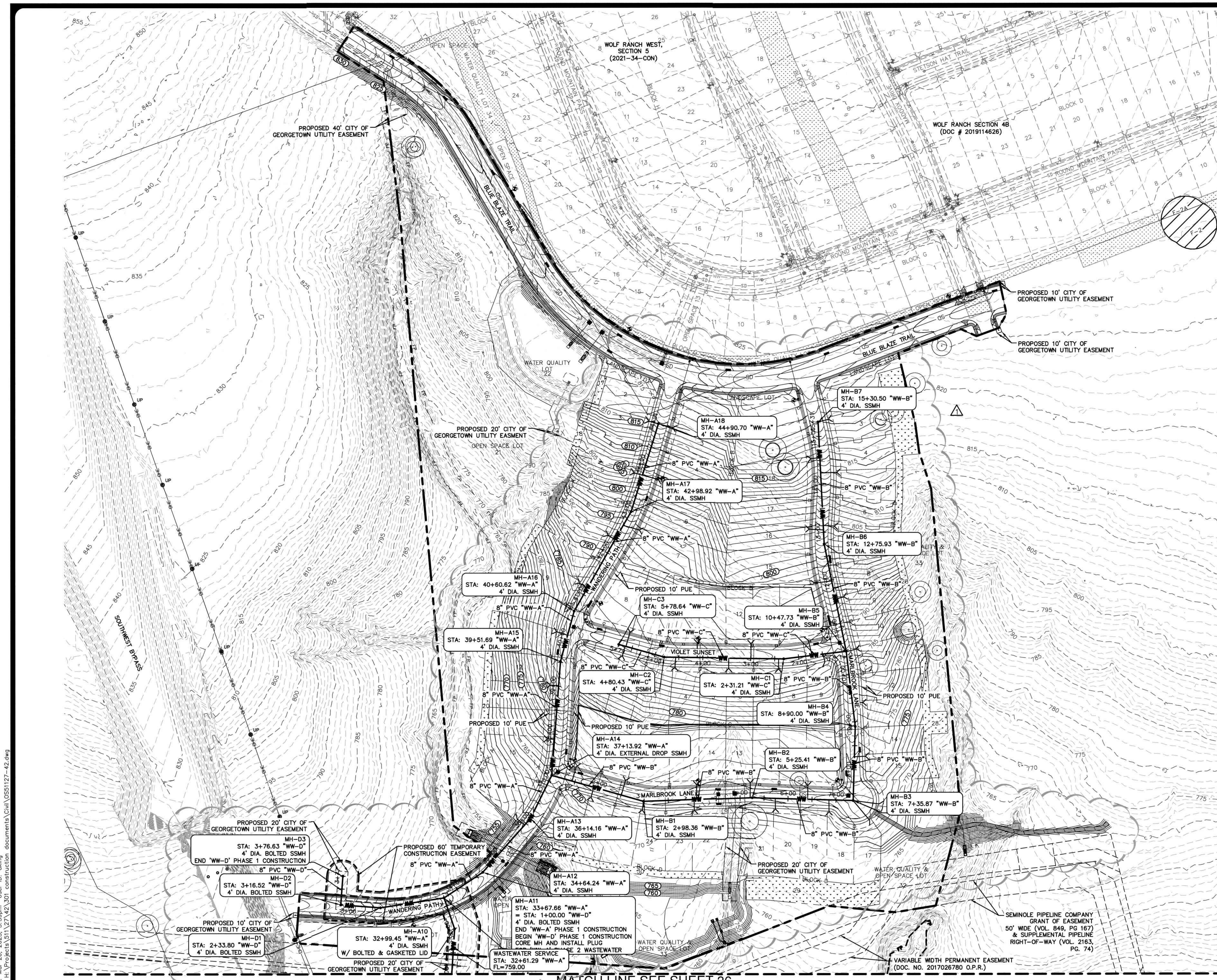
FINAL PLAN AND PROFILE SHEETS



SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- W — WATER LINE
- WW — WASTEWATER LINE & MH
- SD — STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- 786 — EXISTING CONTOUR LINE
- 786 — PROPOSED CONTOUR LINE
- PROPERTY BOUNDARY
- PHASE BOUNDARY
- VEGETATIVE FILTER STRIP
- 1/2 CRITICAL ROOT ZONE
- CRITICAL ROOT ZONE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECT THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO COG SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS SHALL BE LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

NO.	REVISION	DATE
1	REVISE SERVICES AND MHS A18 & B7 FOR NEW LOT LAYOUT	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
10/14/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

OVERALL WASTEWATER PLAN 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 35 OF 61

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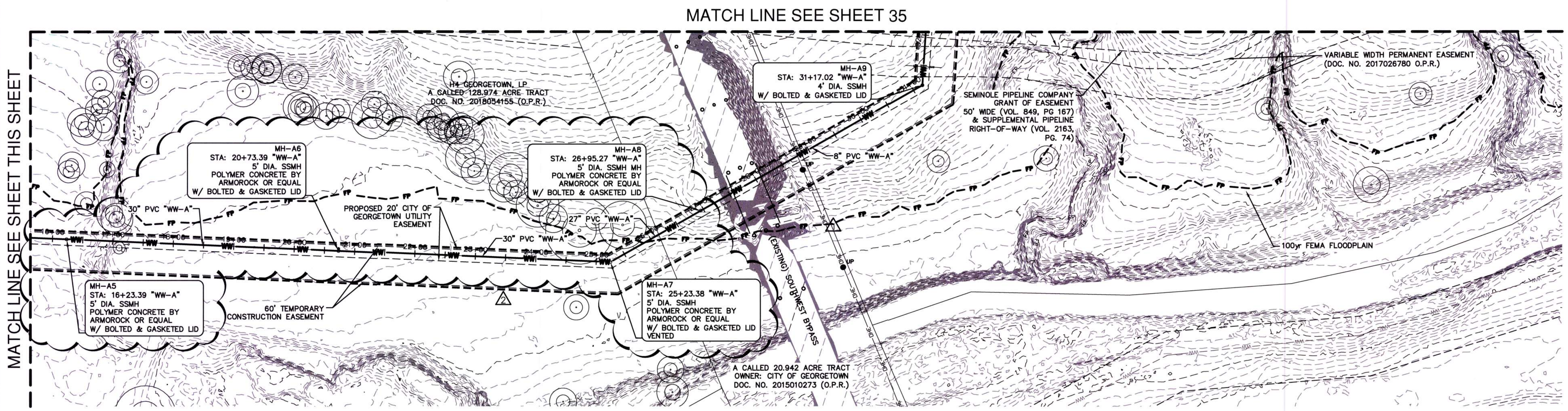
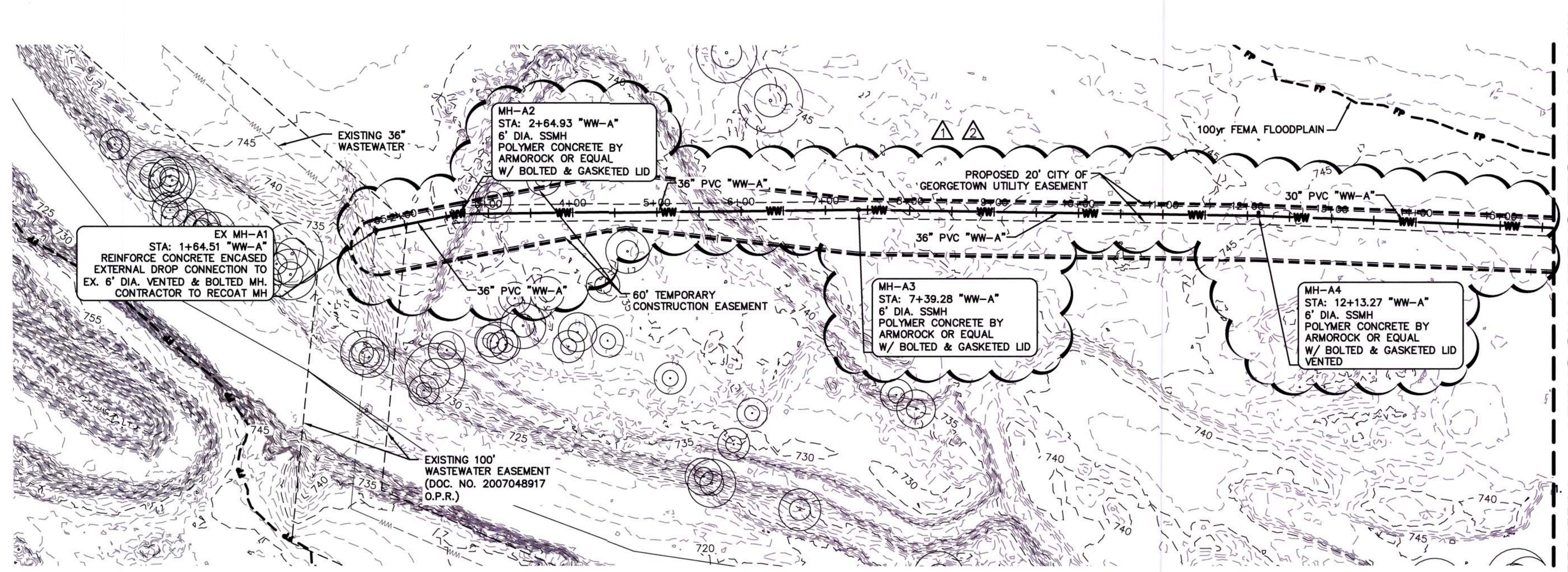


SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PROPERTY BOUNDARY
- PHASE BOUNDARY
- VEGETATIVE FILTER STRIP
- 1/2 CRITICAL ROOT ZONE
- CRITICAL ROOT ZONE



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2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECT THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO COG SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS SHALL BE LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/08/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS

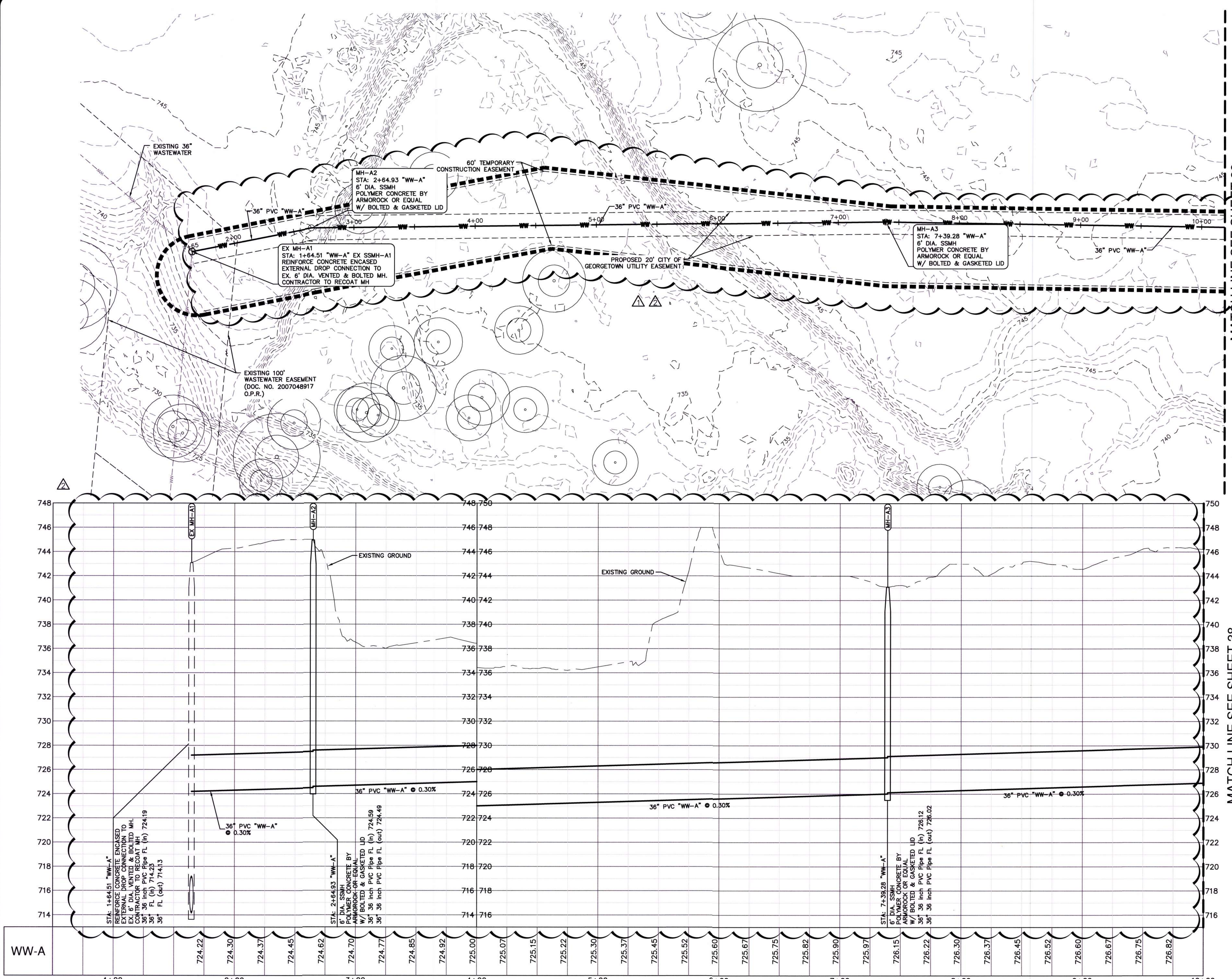
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL WASTEWATER PLAN 2 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB

SHEET 36 OF 61

Date: Sep 11, 2023, 9:34am User ID: jbennett
File: H:\Projects\511\27\42\30 Construction Documents\Civil\OS51127-42.dwg



SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECTION THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
9. CONTRACTOR TO CONTACT ENTERPRISE/SEMINOLE PIPELINE PRIOR TO COMMENCEMENT OF WORK.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 1+00 TO 10+00

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 37 OF 61

Date: Sep 11, 2023, 1:56pm User ID: jbennett
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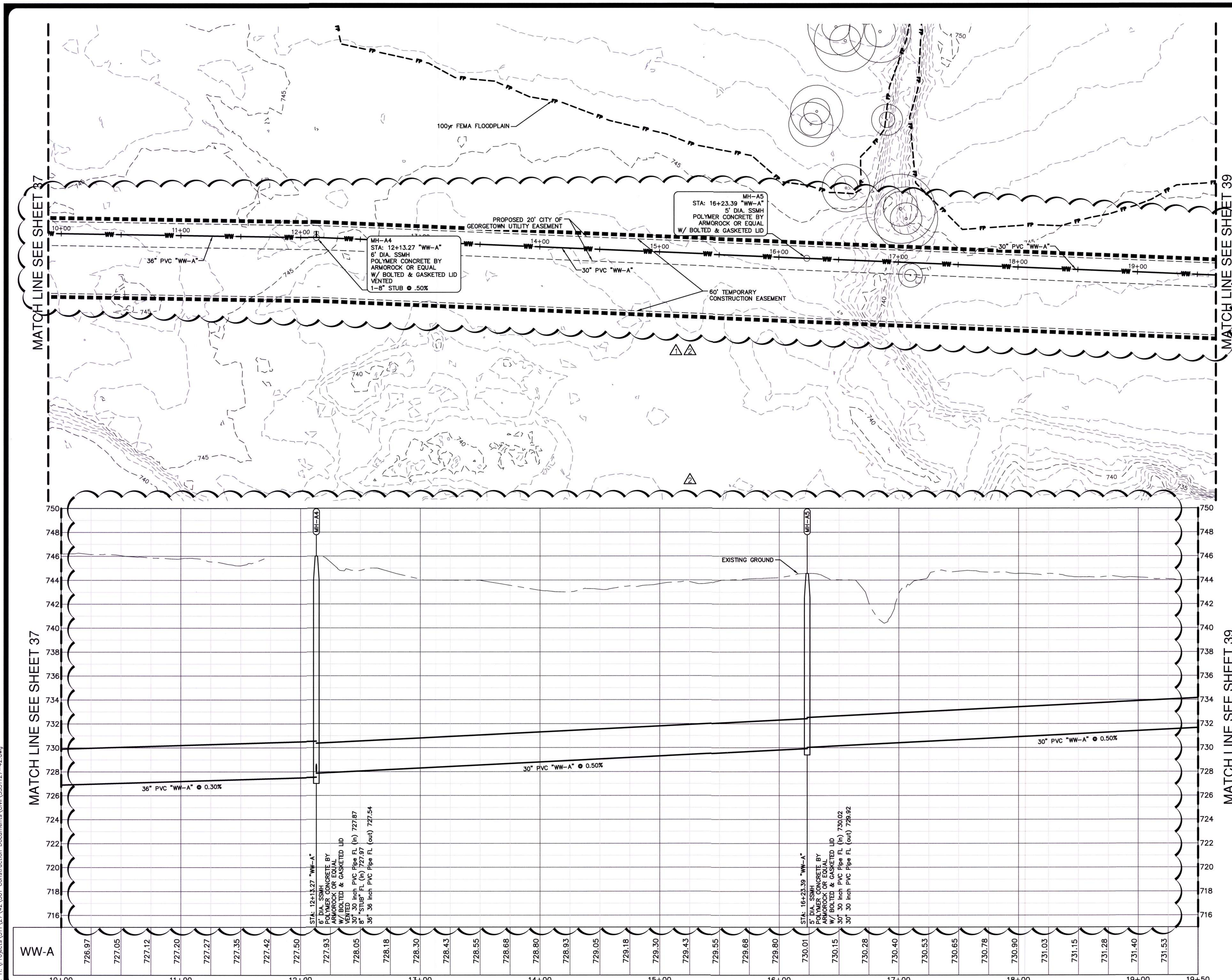


SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 100-YR FEMA FLOODPLAIN
- PHASE BOUNDARY

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECTION THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SUBGRADE
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

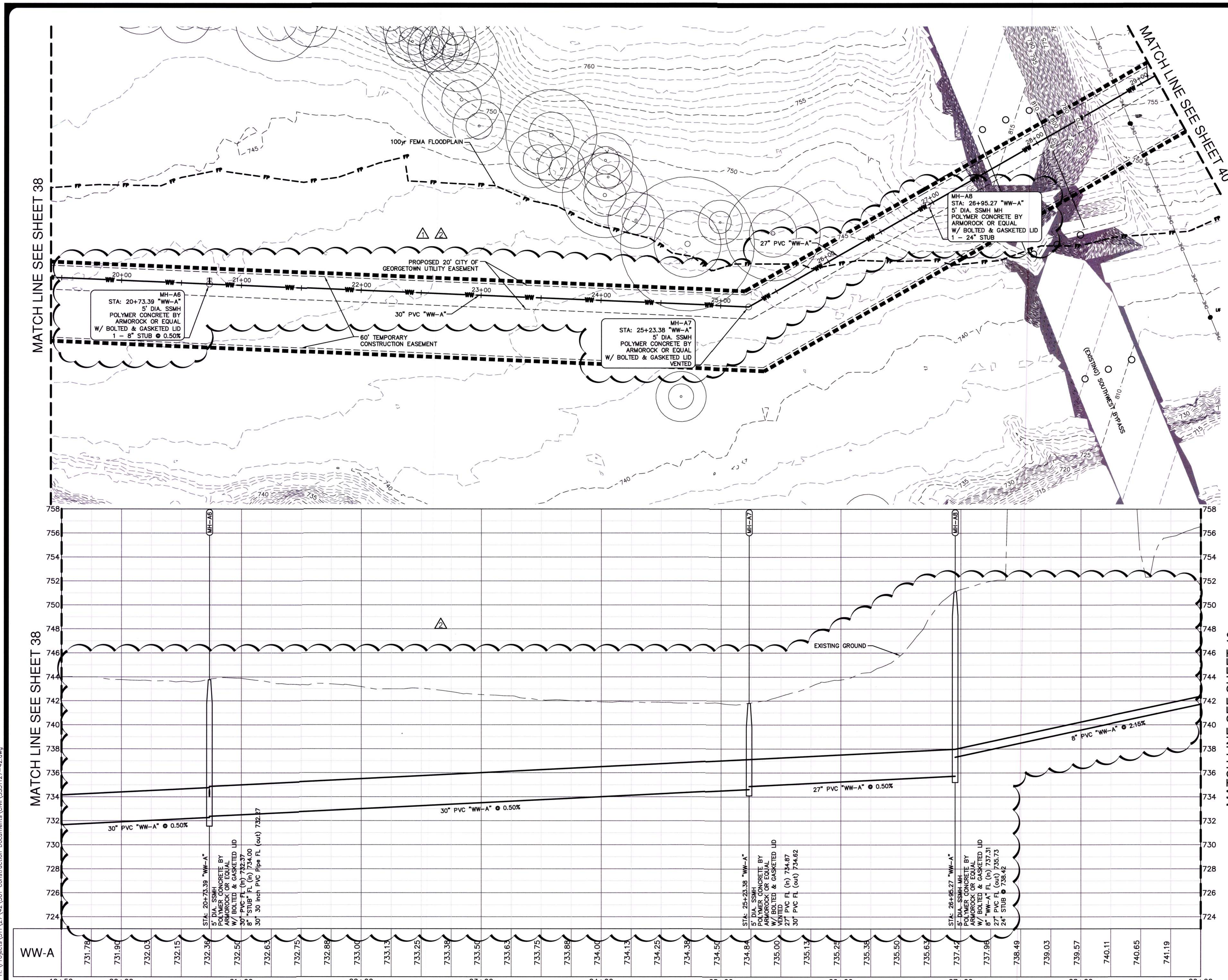
STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 10+00 TO 19+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB



SCALE: 1"= 40'
0' 40' 80' 120'

LEGEND

- W — WATER LINE
- WW — WASTEWATER LINE & MH
- SD — STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- 786 — EXISTING CONTOUR LINE
- 786 — PROPOSED CONTOUR LINE
- FP - 100-YEAR FEMA FLOODPLAIN
- PHASE BOUNDARY

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
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7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER
- 1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 19+50 TO 29+00

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 39 OF 61

Date: Sep 11, 2023, 1:57pm User ID: bennett
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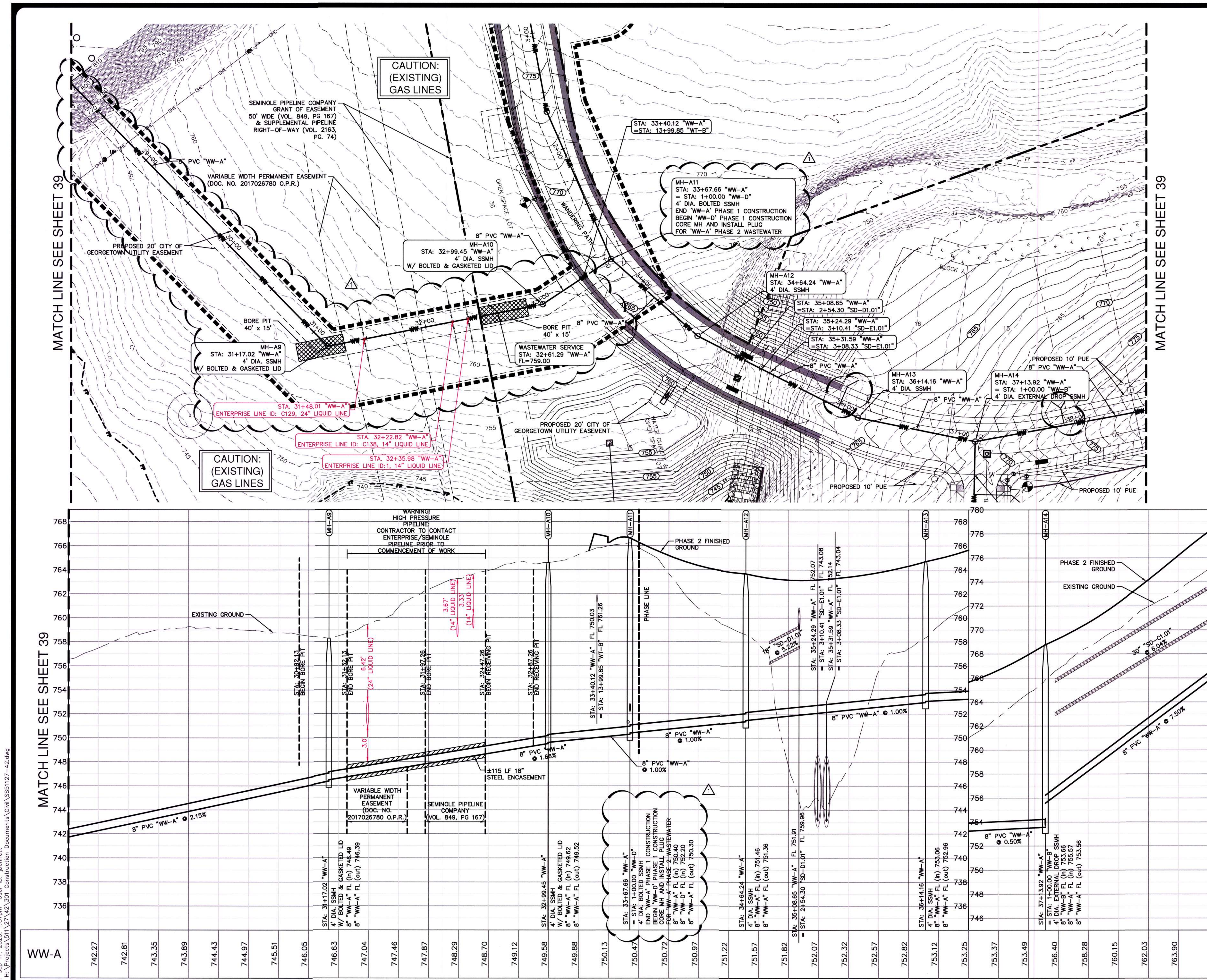

SCALE: 1" = 40'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
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3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
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6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
9. THE WASTEWATER COLLECTION LINE WITHIN THE STEEL ENCASEMENT SHALL BE CONSTRUCTED OF AT LEAST 150 PSI PRESSURE CLASS PIPE.
10. THE STEEL ENCASEMENT PIPE SHALL BE SEALED AT BOTH ENDS WITH CEMENT GROUT OR A MANUFACTURED SEAL.
11. THE WASTEWATER COLLECTION LINE WITHIN THE STEEL ENCASEMENT SHALL BE SUPPORTED BY SPACERS BETWEEN THE COLLECTION SYSTEM PIPE AND THE STEEL ENCASEMENT AT A MAXIMUM OF FIVE-FOOT INTERVAL CONSISTENT WITH CITY OF GEORGETOWN DETAIL W14.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER
- 1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 29+00 TO 38+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB

SHEET 40 OF 61

Date: Sep 11, 2023, 1:57pm User ID: jbennett
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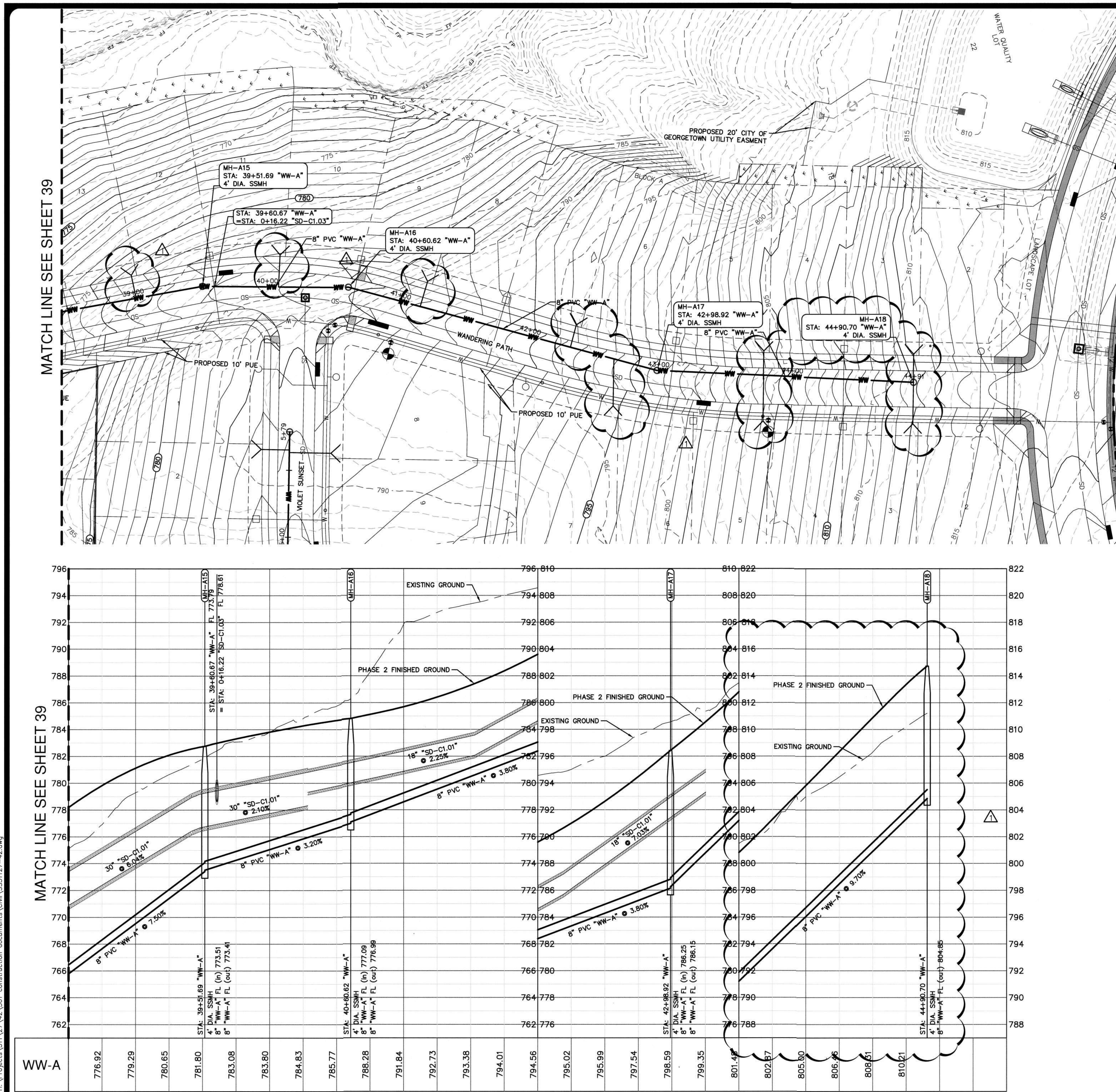

SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE

NOTES:

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3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
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7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS AND MH A18	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
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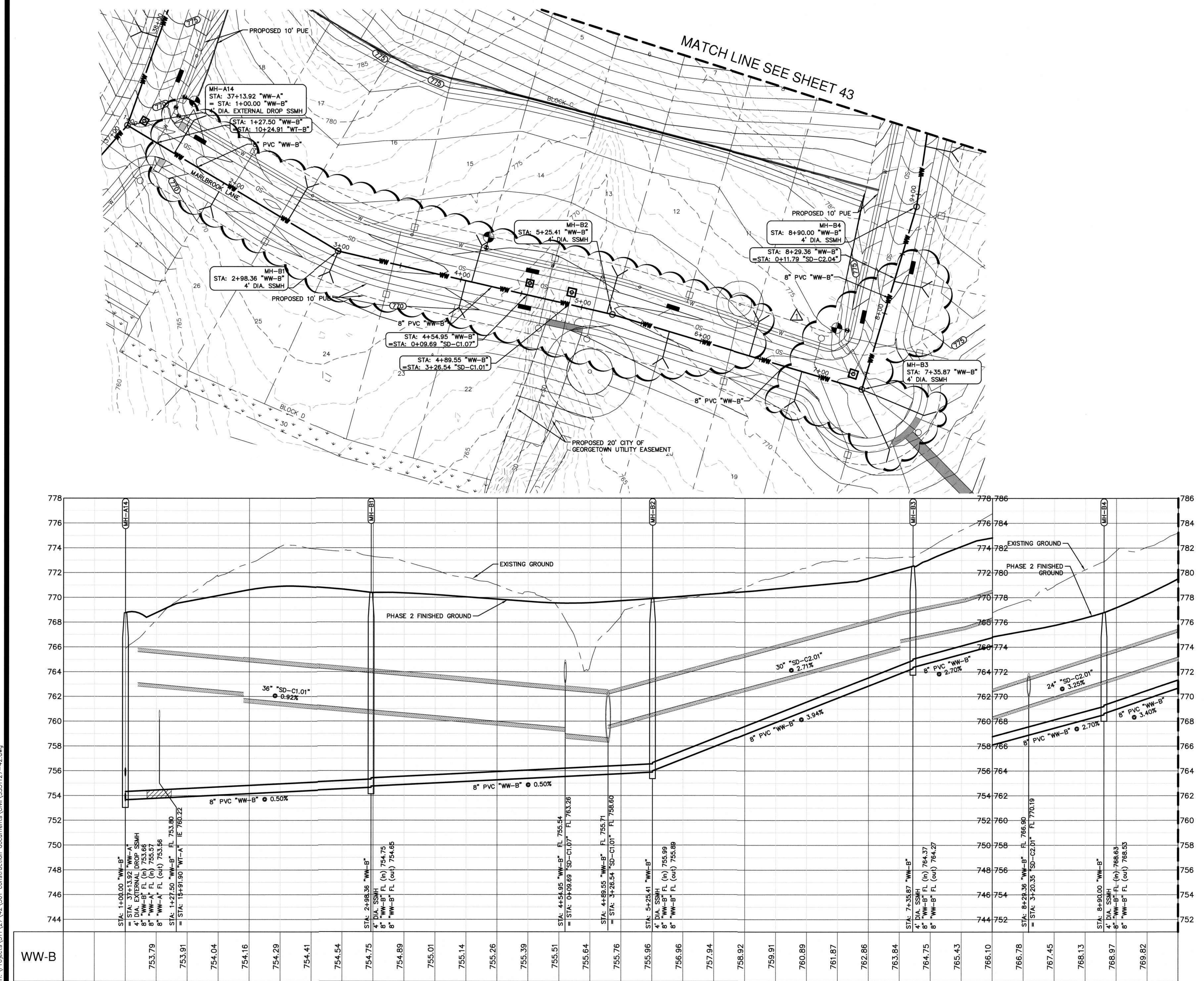
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 38+50 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB

Date: Mar 20, 2023, 3:43pm User ID: dking
File: H:\Projects\511\27\42\301 construction documents\Civil\SS51127-42.dwg



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

W	WATER LINE
WW	WASTEWATER LINE & MH
SD	STORM DRAIN LINE & MH
	CURB INLET
	SINGLE WATER SERVICE
	DOUBLE WATER SERVICE
	SINGLE WW SERVICE
	DOUBLE WW SERVICE
	GATE VALVE
	FIRE HYDRANT
	EXISTING GATE VALVE
	EXISTING FIRE HYDRANT
W	EXISTING WATER LINE
W	EXISTING WASTEWATER LINE
SD	EXISTING STORM DRAIN LINE
786	EXISTING CONTOUR LINE
786	PROPOSED CONTOUR LINE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
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PROFILE SCALES:

1" = 40' HORIZONTAL
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PROFILE LEGEND:

NATURAL GROUND
SURGRADE
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'B' - STA 1+00 TO 9+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 42 OF 61

Date: Mar 20, 2023, 3:44pm User ID: aking
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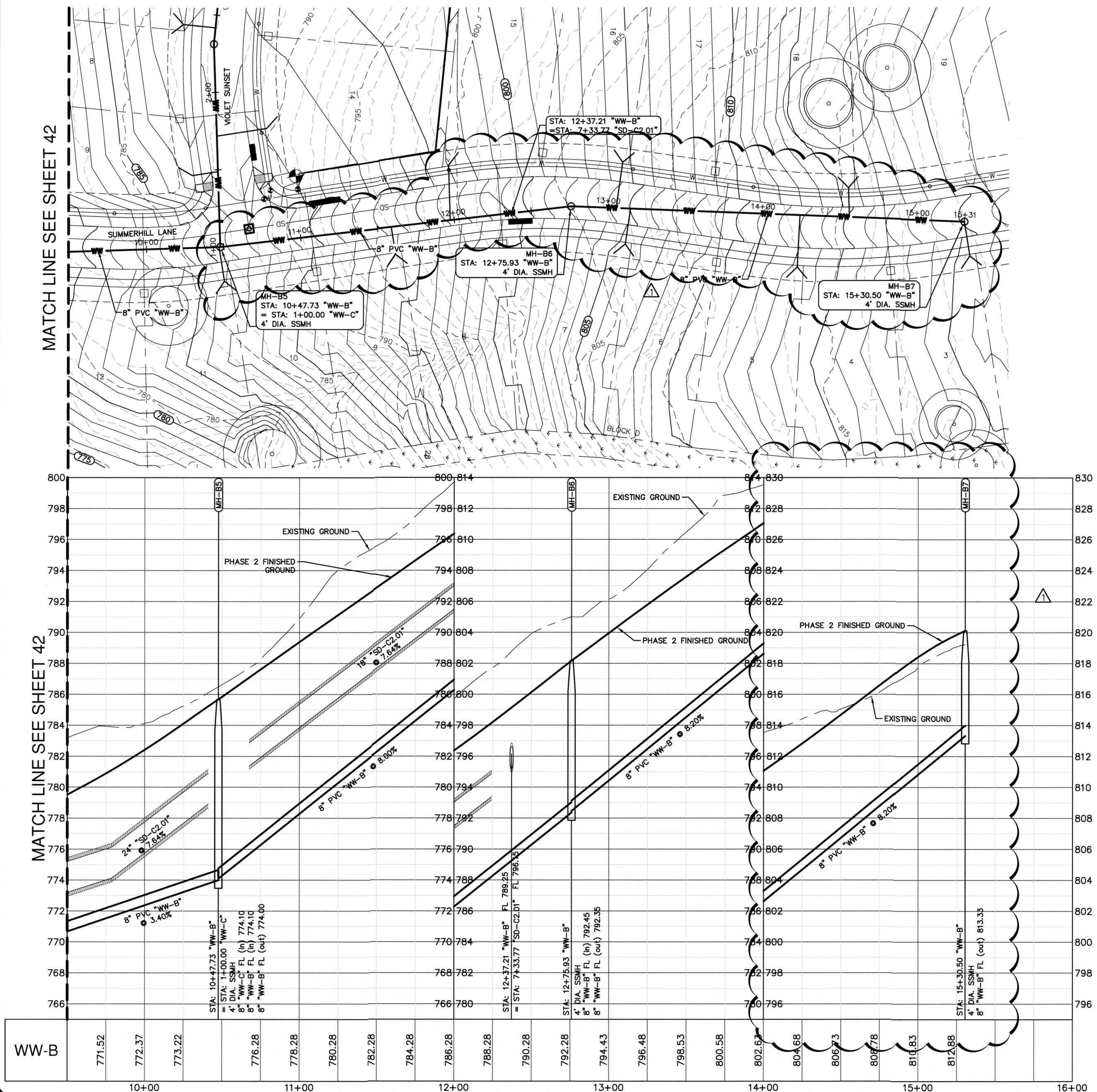

SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

W	WATER LINE
WW	WASTEWATER LINE & MH
SD	STORM DRAIN LINE & MH
	CURB INLET
	SINGLE WATER SERVICE
	DOUBLE WATER SERVICE
	SINGLE WW SERVICE
	DOUBLE WW SERVICE
	GATE VALVE
	FIRE HYDRANT
	EXISTING GATE VALVE
	EXISTING FIRE HYDRANT
W	EXISTING WATER LINE
W	EXISTING WASTEWATER LINE
SD	EXISTING STORM DRAIN LINE
786	EXISTING CONTOUR LINE
786	PROPOSED CONTOUR LINE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECTION THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SUBGRADE
FINISHED GRADE
PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE MH B7 AND SERVICE LOCATIONS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'B' - STA 9+50 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
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SHEET 43 OF 61

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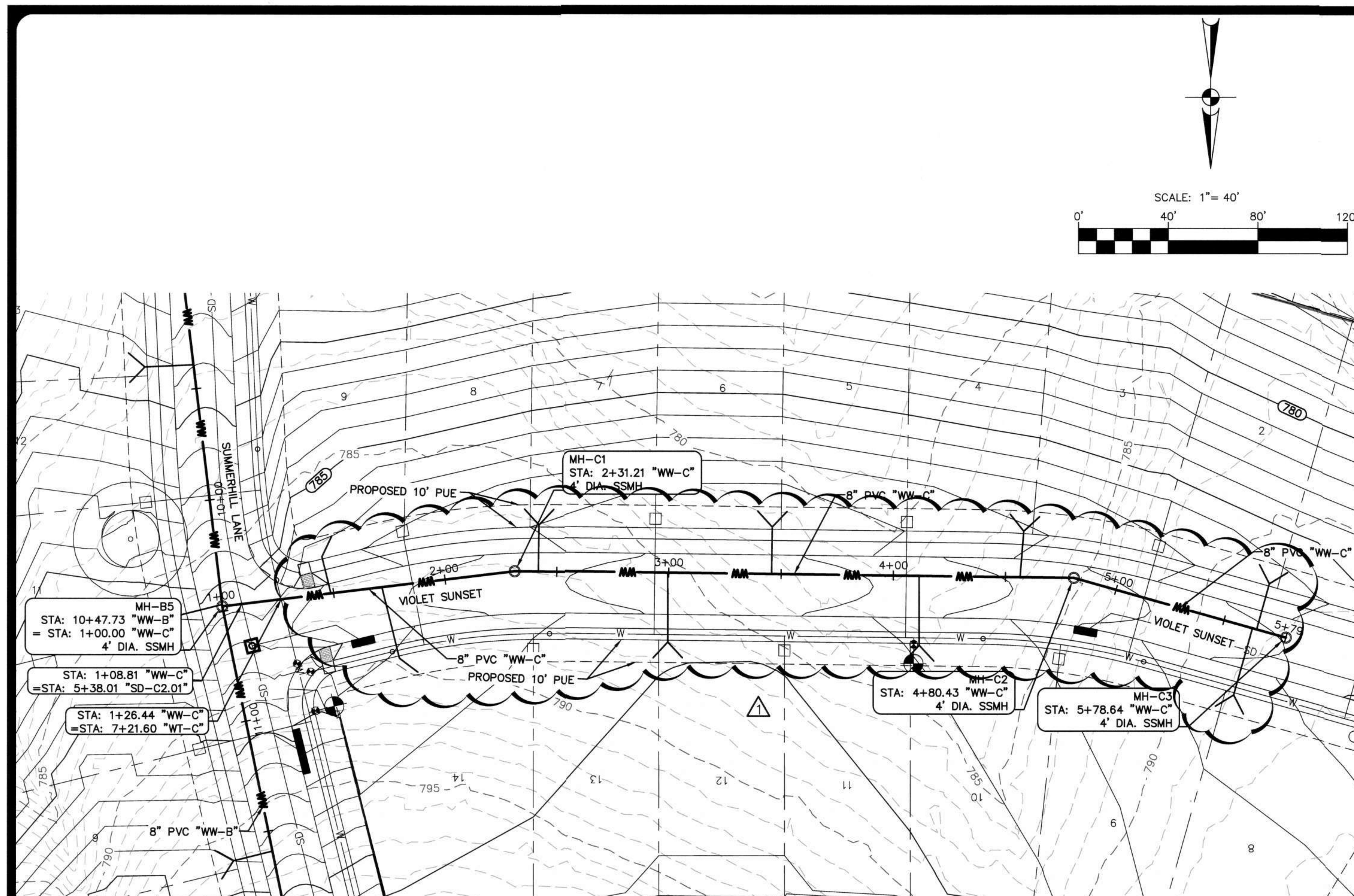

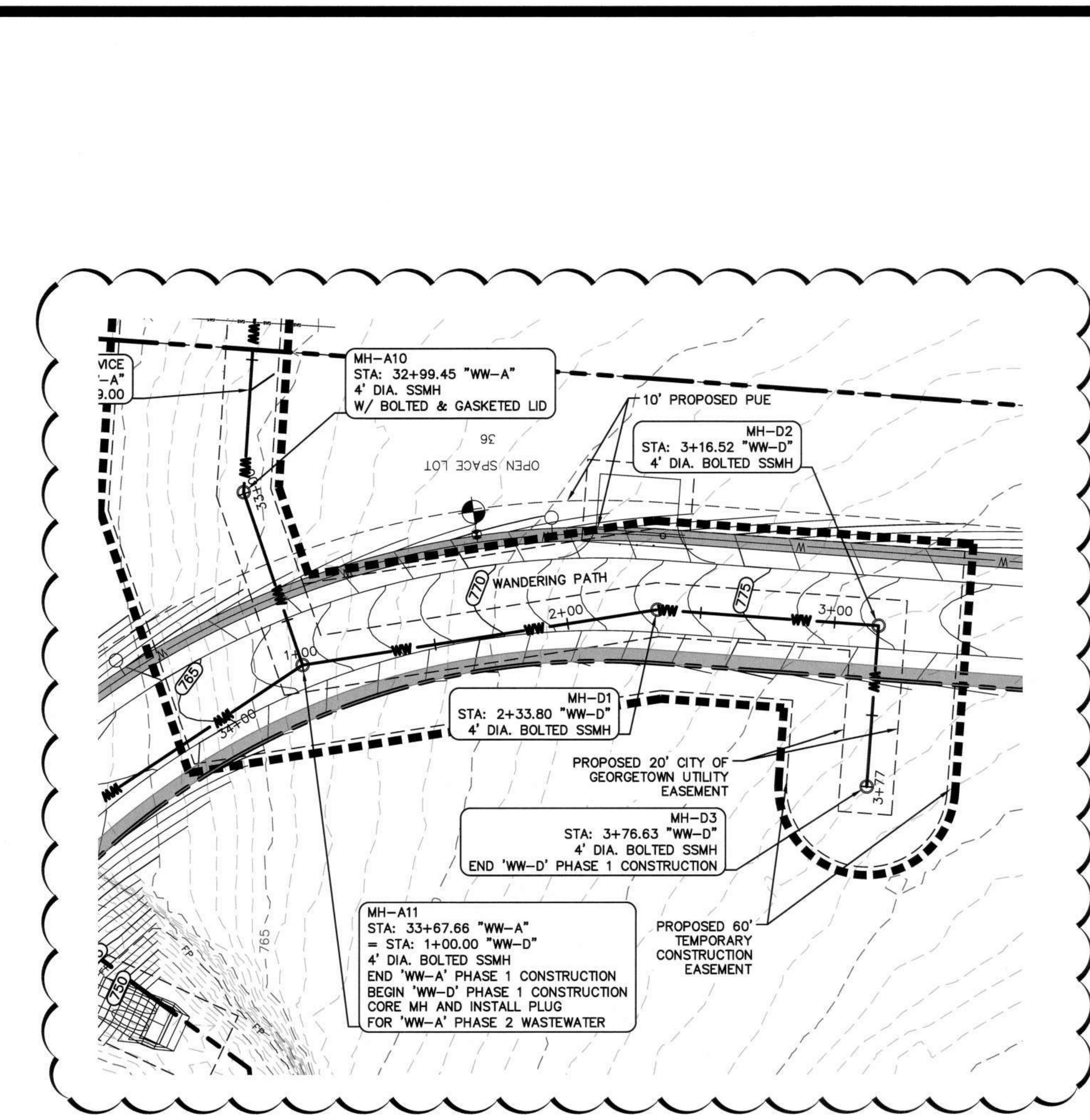

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

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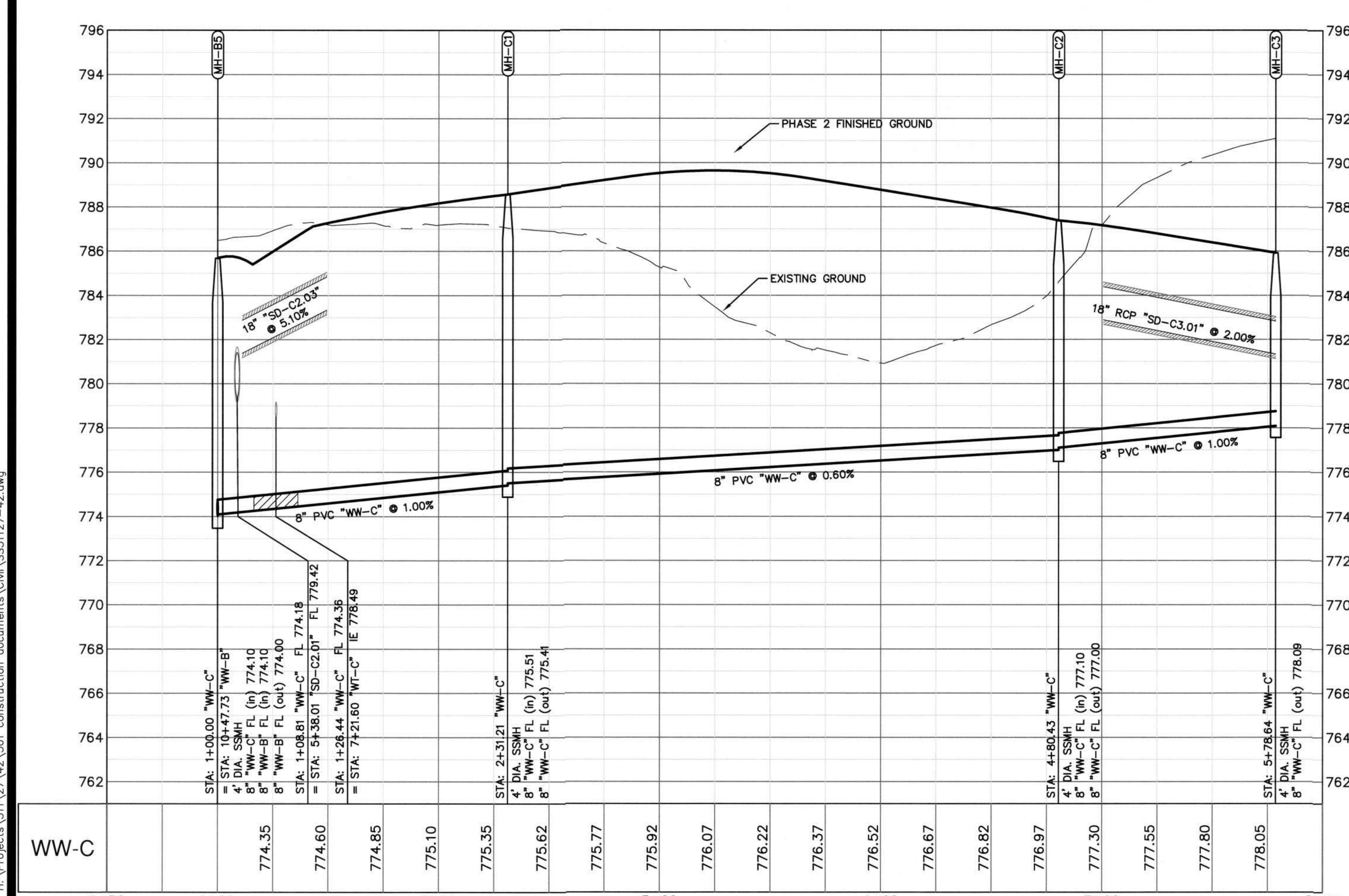
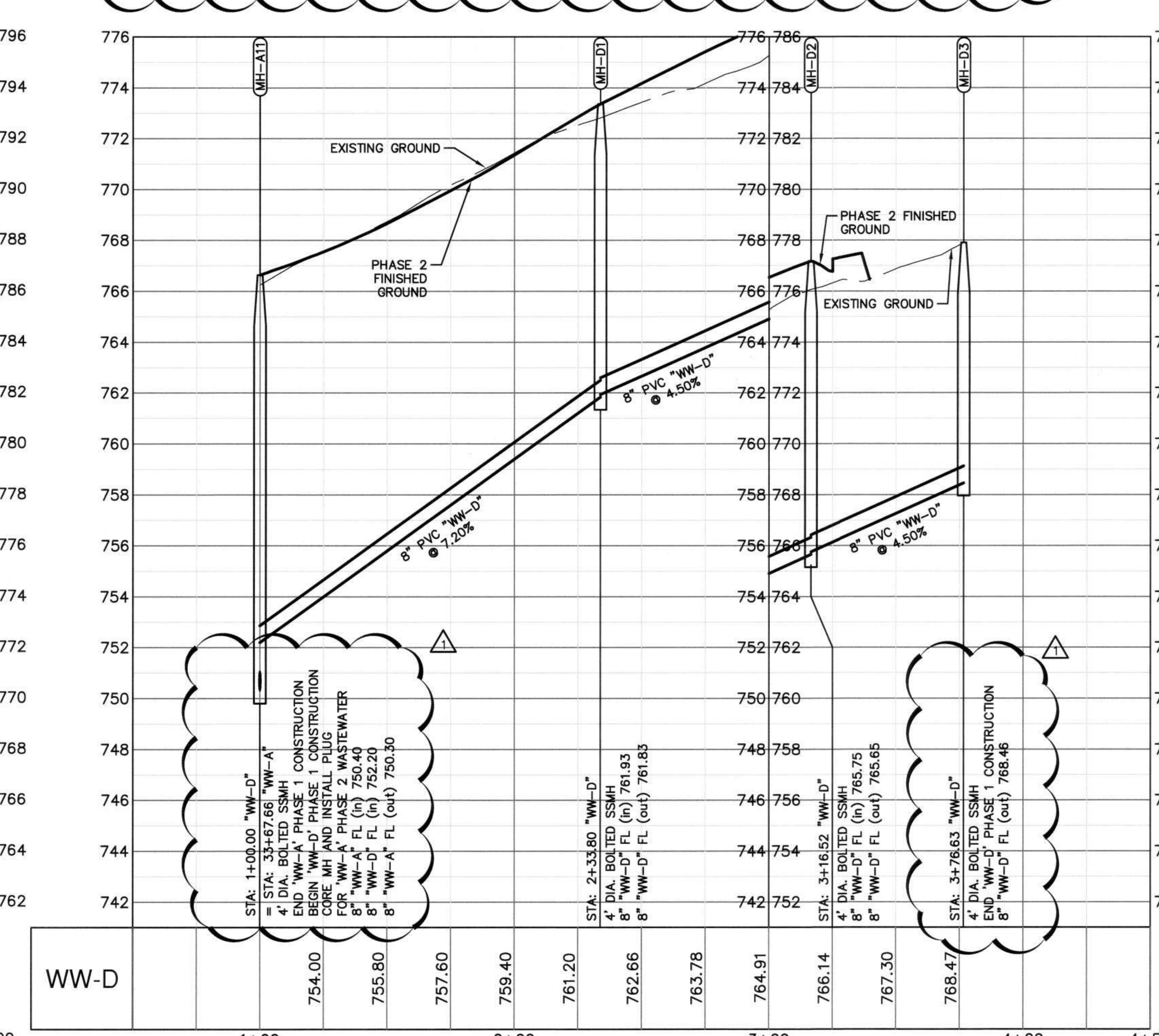
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.





NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
3/14/23

PAPE-DAWSON ENGINEERS
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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
WASTEWATER COLLECTION SYSTEM LINE 'C & 'D' - STA 1+00 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 44 OF 61

TEMPORARY STORMWATER

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: Austin Conner, PE

Date: 08/31/2023

Signature of Customer/Agent:

Regulated Entity Name: Wolf Ranch West, Section 4G

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: oil and petroleum products and substances

      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: South Fork San Gabriel River

Temporary Best Management Practices (TBMPs)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

☐ 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 Actions

In the event of an accidental leak or spill:

- Onsite personnel will be trained to follow the spill response actions for the site.

- Spill must be contained and cleaned up immediately.

- Spills will not be merely buried or washed with water.

- Contractor shall take action to contain spill. Contractor may use sand or other absorbent material stockpiled on site to absorb spill. Absorbent material should be spread over the spill area to absorb the spilled product.

- In the event of an uncontained discharge the contractor shall utilize onsite equipment to construct berms downgradient of the spill with sand or other absorbent material to contain and absorb the spilled product.

- Spill containment/absorbent materials along with impacted media must be collected and stored in such a way so as not to continue to affect additional media (soil/water). Once the spill has been contained, collected material should be placed on poly or plastic sheeting until removed from the site. The impacted media and cleanup materials should be covered with plastic sheeting and the edges weighed down with paving bricks or other similarly dense objects as the material is being accumulated. This will prevent the impacted media and cleanup materials from becoming airborne in windy conditions or impacting runoff during a rain event. The stockpiled materials should not be located within an area of concentrated runoff such as along a curb line or within a swale.

- Contaminated soils and cleanup materials will be sampled for waste characterization. When the analysis results are known the contaminated soils and cleanup materials will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.

- The contractor will be required to notify the owner, who will in turn contact TCEQ to notify them in the event of a significant hazardous/reportable quantity spill. Additional notifications as required by the type and amount of spill will be conducted by owner or owner's representative.

In the event of an accidental significant or hazardous spill:

- The contractor will be required to report significant or hazardous spills in reportable quantities as soon as possible and within 24 hours to:
  - the National Response Center at (800) 424-8802
  - the TCEQ Regional Office (512) 339-2929 (if during business hours: 8 AM to 5 PM) or
  - the State Emergency Response Center (800) 832-8224 (if after hours)

- reportable quantities can be found at the following link: https://www.tceq.texas.gov/response/spills/spill_rq.html

- Contaminated soils will be sampled for waste characterization. When the analysis results are known the contaminated soils will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.

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

ATTACHMENT B

POTENTIAL SOURCES OF CONTAMINATION

Potential Source ● Asphalt products used on this project.

Preventative Measure
- ■ After placement of asphalt, emulsion or coatings, the contractor will be responsible for immediate cleanup should an unexpected rain occur. For the duration of the asphalt product curing time, the contractor will maintain standby personnel and equipment to contain any asphalt wash-off should an unexpected rain occur. The contractor will be instructed not to place asphalt products on the ground within 48 hours of a forecasted rain.

Potential Source ● Oil, grease, fuel and hydraulic fluid contamination from construction equipment and vehicle dripping.

Preventative Measure
- ■ Vehicle maintenance when possible will be performed within the construction staging area.
- ■ Construction vehicles and equipment shall be checked regularly for leaks and repaired immediately.

Potential Source ● Accidental leaks or spills of oil, petroleum products and substances listed under 40 CFR parts 110, 117, and 302 used or stored temporarily on site.

Preventative Measure
- ■ Contractor to incorporate into regular safety meetings, a discussion of spill prevention and appropriate disposal procedures.
- ■ Contractor's superintendent or representative overseer shall enforce proper spill prevention and control measures.
- ■ Hazardous materials and wastes shall be stored in covered containers and protected from vandalism.

- ■ A stockpile of spill cleanup materials shall be stored on site where it will be readily accessible.

Potential Source ● Miscellaneous trash and litter from construction workers and material wrappings.

Preventive Measure ■ Trash containers will be placed throughout the site to encourage proper trash disposal.

Potential Source ● Construction debris.

Preventive Measure ■ Construction debris will be monitored daily by contractor. Debris will be collected weekly and placed in disposal bins. Situations requiring immediate attention will be addressed on a case by case basis.

Potential Source ● Spills/Overflow of waste from portable toilets

Preventative Measure

- ■ Portable toilets will be placed away from high traffic vehicular areas and storm drain inlets.
- ■ Portable toilets will be placed on a level ground surface.
- ■ Portable toilets will be inspected regularly for leaks and will be serviced and sanitized at time intervals that will maintain sanitary conditions.

ATTACHMENT C

SEQUENCE OF MAJOR ACTIVITIES

The sequence of major activities which disturb soil during construction on this site are listed below.

1) Set erosion controls – approximately 10,586 LF of silt fence, 349 LF of diversion dike, approximately 53 SY of rock rip-rap, and 96 SY of rock berm.
2) Clear and grub streets – approximately 6.76 acres
3) Rough grade streets – approximately 6.76 acres
4) Pond excavation – approximately 1.60 acres
5) Trench utilities – approximately 16,660 LF
6) Install water, wastewater, and storm – approximately 15,204 LF
7) Install subbase/base for streets – approximately 4.28 acres
8) Pave streets – approximately 3.44 acres
9) Pond completion – approximately 1.60 acres
10) Site cleanup – approximately 35.85 acres
11) Remove erosion controls – approximately 10,586 LF of silt fence, 349 LF of diversion dike, approximately 53 SY of rock rip-rap, and 96 SY of rock berm.

ATTACHMENT D

TEMPORARY BEST MANAGEMENT PRACTICES AND MEASURES

Please see the Erosion Control sheets included in the Construction Plans Section for TBMP layout and the responses below for more details.

There are no offsite areas up gradient from the site that will flow onto the project area.

Site preparation, which is the initiation of all activity on the project, will disturb the largest amount of soil. Therefore, before any of this work can begin, the clearing and grading contractor will be responsible for the installation of all on-site control measures. The methodology for pollution prevention of on-site stormwater will include: (1) erection of silt fences along the downgradient boundary of construction activities for temporary erosion and sedimentation controls, (2) installation of stabilized construction entrance/exit(s) to reduce the dispersion of sediment from the site, and (3) installation of construction staging area(s).

Prior to the initiation of construction, all previously installed control measures will be repaired or reestablished for their designed or intended purpose. This work, which is the remainder of all activities on the project, may also disturb additional soil. The construction contractor will be responsible for the installation of all remaining on-site control measures that includes installation of the concrete truck washout pit(s), as construction phasing warrants.

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

The South Fork of the San Gabriel River is located south of the site. A combination of TBMPs including silt fence is proposed to capture sediment from on-site stormwater runoff and preserve the quality of the river.

Temporary measures are intended to provide a method of slowing the flow of runoff from the construction site in order to allow sediment and suspended solids to settle out of the runoff. By containing the sediment and solids within the site, they will not enter the aquifer, surface streams and/or sensitive features that may exist downstream of the site. BMP measures utilized in this plan are intended to allow stormwater to continue downstream after passing through the BMPs. This will allow stormwater runoff to continue downgradient to streams or features that may exist downstream of the site. Features discovered during construction will be reported and assessed in accordance with applicable regulations.

ATTACHMENT F

STRUCTURAL PRACTICES

The following structural measures will be installed prior to the initiation of site preparation activities:

- Erection of silt fences along the downgradient boundary of construction activities and rock berms for secondary protection, as located on the Erosion Control Plan sheets and illustrated on the Construction Details - Erosion Control sheet.
- Installation of stabilized construction entrance/exit(s) and construction staging area(s), as located on the Erosion Control Plan sheets and illustrated on the Construction Details - Erosion Control sheet.

The following structural measures will be installed at the initiation of construction activities or as appropriate based on the construction sequencing:

- Installation of inlet protection, as required and located on the Erosion Control Plan sheets and illustrated on the Construction Details - Erosion Control sheet.
- Installation of concrete truck washout pit(s), as required and located on the Erosion Control Plan sheets and illustrated on the Construction Details - Erosion Control sheet.

ATTACHMENT I

INSPECTIONS & MAINTENANCE

Designated and qualified person(s) shall inspect Pollution Control Measures weekly and within 24 hours after a storm event. An inspection report that summarizes the scope of the inspection, names and qualifications of personnel conducting the inspection, date of the inspection, major observations, and actions taken as a result of the inspection will be recorded and maintained as part of Storm Water TPDES data for a period of three years after the Notice of Termination (NOT) has been filed. A copy of the Inspection Report Form is provided in this Sewage Collection System application.

As a minimum, the inspector shall observe: (1) significant disturbed areas for evidence of erosion, (2) storage areas for evidence of leakage from the exposed stored materials, (3) structural controls (rock berm outlets, silt fences, drainage swales, etc.) for evidence of failure or excess siltation (over 6 inches deep), (4) vehicle exit point for evidence of off-site sediment tracking, (5) vehicle storage areas for signs of leaking equipment or spills, (6) concrete truck rinse-out pit for signs of potential failure, (7) embankment, spillways, and outlet of sediment basin (where applicable) for erosion damage, and (8) sediment basins (where applicable) for evidence that basin has accumulated 50% of its volume in silt. Deficiencies noted during the inspection will be corrected and documented within seven calendar days following the inspection or before the next anticipated storm event if practicable. Temporary sediment basins and permanent basins will be inspected until final stabilization of 70% within the basin watershed is achieved.

BMP inspection and maintenance requirements from sections 1.3 and 1.4 of TCEQ's Technical Guidance Manual are detailed below.

Temporary Construction Entrance/Exit

- The entrance should be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.
- All sediment spilled, dropped, washed or tracked onto public rights-of-way should be removed immediately by contractor.
- When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way.
- When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.
- All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

Silt Fence

- Inspect all fencing weekly, and after any rainfall.
- Remove sediment when buildup reaches 6 inches.
- Replace any torn fabric or install a second line of fencing parallel to the torn section.
- Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.
- When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt

fence should be revegetated. The fence itself should be disposed of in an approved landfill.

Rock Berms

- Inspection should be made weekly and after each rainfall by the responsible party. For installations in streambeds, additional daily inspections should be made.
- Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt in an approved manner that will not cause any additional siltation.
- Repair any loose wire sheathing.
- The berm should be reshaped as needed during inspection.
- The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.
- The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

Inlet Protection

- Inspection should be made weekly and after each rainfall. Repair or replacement should be made promptly as needed by the contractor.
- Remove sediment when buildup reaches a depth of 3 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode.
- Check placement of device to prevent gaps between device and curb.
- Inspect filter fabric and patch or replace if torn or missing. 1-100

- Structures should be removed and the area stabilized only after the remaining drainage area has been properly stabilized.

Concrete Washout Areas

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- Locate washout area at least 50 feet from sensitive features, storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
- Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.

Pollution Prevention Measure	Inspected in Compliance	Corrective Action Required	
		Description (use additional sheet if necessary)	**Date Completed**
Best Management Practices			
Natural vegetation buffer strips			
Temporary vegetation			
Permanent vegetation			
Sediment control basin			
Silt fences			
Rock berms			
Gravel filter bags			
Drain inlet protection			
Other structural controls			
Vehicle exits (off-site tracking)			
Material storage areas (leakage)			
Equipment areas (leaks, spills)			
Concrete washout pit (leaks, failure)			
General site cleanliness			
Trash receptacles			
Evidence of Erosion			
Site preparation			
Roadway or parking lot construction			
Utility construction			
Drainage construction			
Building construction			
Major Observations			
Sediment discharges from site			
BMPs requiring maintenance			
BMPs requiring modification			
Additional BMPs required			

_____ A brief statement describing the qualifications of the inspector is included in this SWP3.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

"I further certify I am an authorized signatory in accordance with the provisions of 30 TAC §305.128."

_______________________ Inspector's Name

_______________________ Inspector's Signature

_______________ Date

PROJECT MILESTONE DATES

Date when major site grading activities begin:

Construction Activity	Date
Installation of BMPs	

Dates when construction activities temporarily or permanently cease on all or a portion of the project:

Construction Activity	Date

Dates when stabilization measures are initiated:

Stabilization Activity	Date
Removal of BMPs	

ATTACHMENT J

SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

Interim on-site stabilization measures, which are continuous, will include minimizing soil disturbances by exposing the smallest practical area of land required for the shortest period of time and maximizing use of natural vegetation. As soon as practical, all disturbed soil will be stabilized via permanent revegetation. Details, such as installation, irrigation, and maintenance are provided below.

Installation:

- Final grading must be completed prior to seeding, minimizing all steep slopes. In addition, all necessary erosion structures such as dikes, swales, diversions, should also be installed.
- Seedbed should be well pulverized, loose, and uniform.
- Fertilizer should be applied at the rate of 40 pounds of nitrogen and 40 pounds of phosphorus per acre, which is equivalent to about 1.0 pounds of nitrogen and phosphorus per 1000 square feet. Compost can be used instead of fertilizer and applied at the same time as the seed.

Irrigation:

- Temporary irrigation should be provided according to the schedule described below, or to replace moisture loss to evapotranspiration (ET), whichever is greater. Significant rainfall (on-site rainfall of ½” or greater) may allow watering to be postponed until the next scheduled irrigation.

Time Period	Irrigation Amount and Frequency
Within 2 hours of installation	Irrigate entire root depth, or to germinate seed
During the next 10 business days	Irrigate entire root depth every Monday, Wednesday, and Friday
During the next 30 business days or until Substantial Completion	Irrigate entire root depth a minimum of once per week, or as necessary to ensure vigorous growth
During the next 4 months or until Final Acceptance of the Project	Irrigate entire root depth once every two weeks, or as necessary to ensure vigorous growth

Inspection and Maintenance Guidelines:

- Permanent vegetation should be inspected weekly and after each rain event to locate and repair any erosion.
- Erosion from storms or other damage should be repaired as soon as practical by regrading the area and applying new seed.
- If the vegetated cover is less than 80%, the area should be reseeded.

Stabilization measures will be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and except as provided below, will be initiated no more than fourteen (14) days after the construction activity in that portion of the site has temporarily or permanently ceased. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practicable.

CONSTRUCTION PLANS

REVISIONS			
No.	Revision Description	Sheet(s) Effected:	Prepared by: (Date)
1	REVISE LOT LAYOUT AND SUPPORTING INFRASTRUCTURE	6–9, 18–20, 25–27, 29, 30, 33–44, 47–48	A. CONNER 08/11/22
2	REVISE LOT GRADING AND VIOLET SUNSET GRADING	7, 11, 18, 19, 29, 31	A. CONNER 02/20/23
	ADD POST EROSION CONTROL	9	

WOLF RANCH WEST

SECTION 4G, PHASES 1 & 2

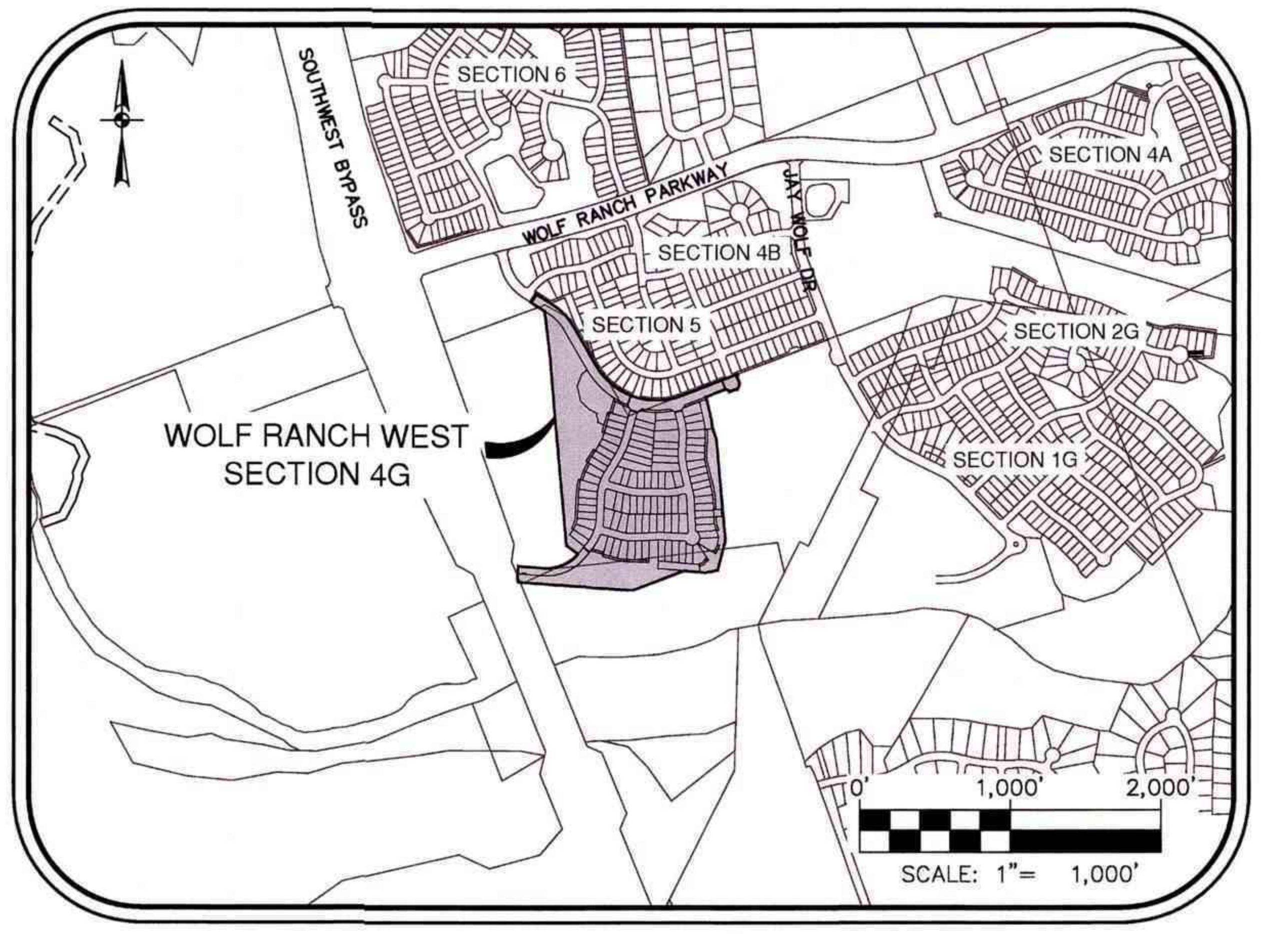
STREET, DRAINAGE, WATER, & WASTEWATER IMPROVEMENTS

WILLIAMSON COUNTY MUD 29

(2022-5-CON)

GENERAL NOTES

1. THESE PLANS WERE PREPARED, SEALED, SIGNED AND DATED BY A TEXAS LICENSED PROFESSIONAL ENGINEER. THEREFORE, BASED ON THE ENGINEER'S CONCURRENCE OF COMPLIANCE, THE 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 SPECIFICATIONS AND DETAILS IN EFFECT AT THE TIME OF SUBMITTAL OF THE PROJECT TO THE CITY.
3. ALL ELECTRIC DISTRIBUTION LINES AND INDIVIDUAL SERVICE LINES SHALL BE INSTALLED UNDERGROUND. IF OVERHEAD LINES EXISTED PRIOR TO UNDERGROUND INSTALLATION, SUCH POLES, GUY WIRES, AND RELATED STRUCTURES SHALL BE REMOVED FOLLOWING CONSTRUCTION OF THE UNDERGROUND INFRASTRUCTURE.
4. ALL ELECTRIC AND COMMUNICATION INFRASTRUCTURE SHALL COMPLY WITH UDC SECTION 13.06.
5. THE PROPERTY SUBJECT TO THIS APPLICATION IS SUBJECT TO THE WATER QUALITY REGULATIONS OF THE CITY OF GEORGETOWN.
6. A GEOLOGIC ASSESSMENT, IN ACCORDANCE WITH THE CITY OF GEORGETOWN WATER QUALITY REGULATIONS, WAS COMPLETED IN SEPTEMBER OF 2017. ANY SPRINGS AND STREAMS IDENTIFIED IN THE GEOLOGIC ASSESSMENT ARE SHOWN HEREIN.
7. THIS SUBDIVISION IS SUBJECT TO THE DEVELOPMENT AGREEMENT BETWEEN THE WOLF LEGACY, L.P. AND THE CITY OF GEORGETOWN UNDER DOCUMENT NUMBER 2014095878, APPROVED BY THE CITY OF GEORGETOWN CITY COUNCIL ON AUGUST 12, 2014 AND EXECUTED ON AUGUST 26, 2014.
8. THIS SUBDIVISION IS SUBJECT TO THE CITY OF GEORGETOWN ORDINANCE NUMBER 2018–66 AMENDING THE OFFICIAL ZONING MAP TO BE REZONED FROM AGRICULTURE (AG) DISTRICT TO PLANNED UNIT DEVELOPMENT (PUD) KNOWN AS WOLF RANCH HILLWOOD, APPROVED BY THE CITY OF GEORGETOWN CITY COUNCIL ON NOVEMBER 13, 2018.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

PROJECT ACREAGE: 34.41

SUBMITTED BY:

I, MICHAEL S. FISHER, P.E. #87704, DO HEREBY CERTIFY THAT THE ENGINEERING WORK BEING SUBMITTED HEREIN COMPLIES WITH ALL THE PROVISION OF THE TEXAS ENGINEERING PRACTICE ACT, INCLUDING 131.152 (e). I HEREBY ACKNOWLEDGE THAT ANY MISREPRESENTATION REGARDING THIS CERTIFICATION CONSTITUTES A VIOLATION OF THE ACT, AND MAY RESULT IN CRIMINAL, CIVIL AND/OR ADMINISTRATIVE PENALTIES AGAINST ME, AS AUTHORIZED BY THE ACT.

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

6/20/22

PAPE–DAWSON ENGINEERS
MICHAEL S. FISHER, P.E. #87704
SR. VICE PRESIDENT
TBPE FIRM REGISTRATION #470

DATE

APPROVED BY:

Shane Potter 01/30/2023

MUD ENGINEER DATE

OWNER:
H4 GEORGETOWN PHASE 4G, LLC
3000 TURTLE CREEK BLVD.
DALLAS, TX 75219
(972) 201–2984

APPLICANT:
PAPE–DAWSON ENGINEERS, INC.
10801 N MOPAC EXPY
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

SUBMITTAL DATE:
1ST SUBMITTAL: FEB 14, 2022
2ND SUBMITTAL: APRIL 4, 2022
3RD SUBMITTAL: MAY 2, 2022
4TH SUBMITTAL: MAY 23, 2022

REVISION 1
1ST SUBMITTAL: AUGUST 22, 2022
2ND SUBMITTAL: OCTOBER 17, 2022

REVISION 2
1ST SUBMITTAL: FEBRUARY 21, 2023

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2

PD JOB NO. 51127-42

Date: May 19, 2022, 5:04pm User ID: ohernandez
File: H:\Projects\511\27\42\301 construction documents\Civil\CS51127-42.dwg

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2

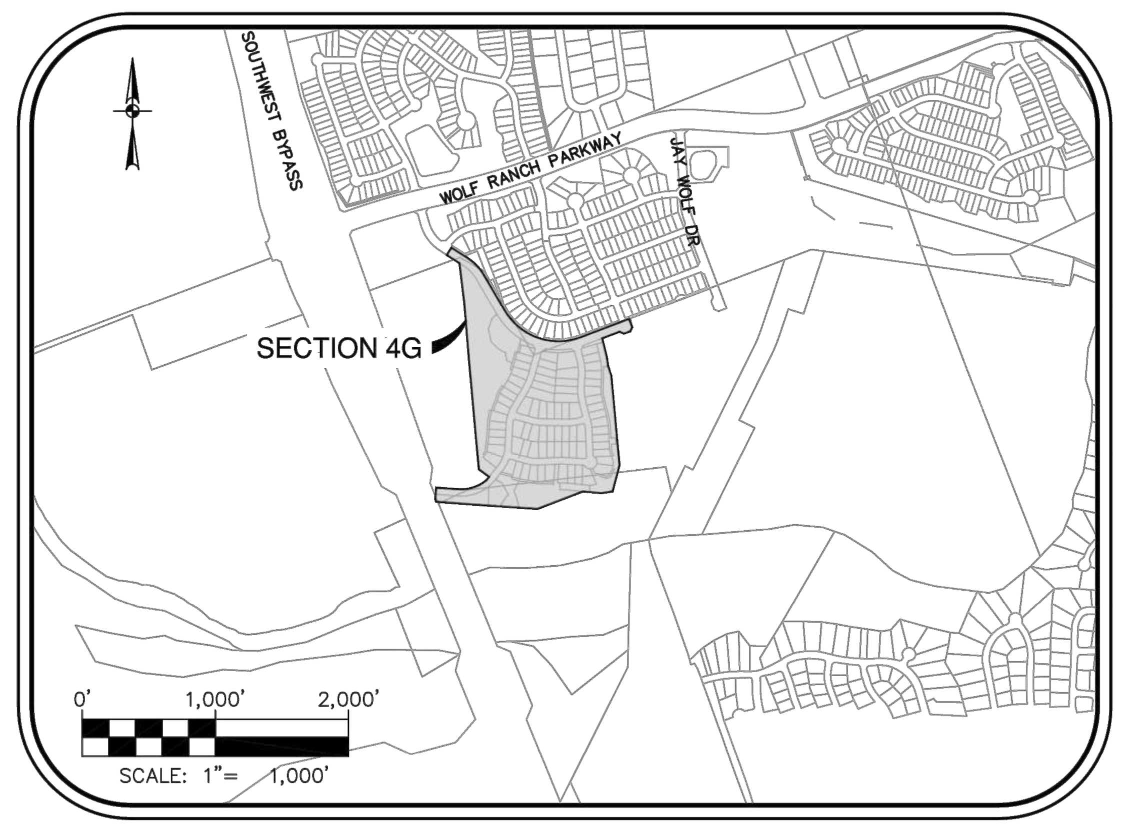
PRELIMINARY PLAT AMENDMENT

GEORGETOWN, TEXAS

OCTOBER 2022

GENERAL NOTES

1. UTILITY PROVIDERS FOR THIS DEVELOPMENT ARE WATER: CITY OF GEORGETOWN, WASTEWATER: CITY OF GEORGETOWN, AND ELECTRIC: PEDERNALES ELECTRIC COOPERATIVE.
2. ALL STRUCTURES/ OBSTRUCTIONS ARE PROHIBITED IN DRAINAGE EASEMENTS.
3. A PORTION OF TRACT IS WITHIN A FLOOD HAZARD AREA AS SHOWN ON THE FLOOD INSURANCE RATE MAP PANEL NUMBER 48491C0480F FOR WILLIAMSON COUNTY, EFFECTIVE DECEMBER 20, 2019.
4. NO DEVELOPMENT SHALL BEGIN PRIOR TO THE ISSUANCE OF A FLOODPLAIN DEVELOPMENT PERMIT FOR EACH OF THE FOLLOWING LOTS: LOT 26, BLOCK D.
5. PRIOR TO ANY CHANNEL ALTERATION OR BRIDGE CONSTRUCTION, WHICH WILL CHANGE EXISTING FLOOD PATTERNS OR ELEVATIONS, A LETTER OF MAP AMENDMENT MUST BE SUBMITTED TO THE CITY OF GEORGETOWN FLOODPLAIN ADMINISTRATOR FOR APPROVAL AND APPROVAL BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.
6. IN ORDER TO PROMOTE DRAINAGE AWAY FROM A STRUCTURE, THE SLAB ELEVATION SHOULD BE BUILT AT LEAST ONE-FOOT ABOVE THE SURROUNDING GROUND, AND THE GROUND SHOULD BE GRADED AWAY FROM THE STRUCTURE AT A SLOPE OF 1/2" PER FOOT FOR A DISTANCE OF AT LEAST 10 FEET.
7. ALL SEDIMENTATION, FILTRATION, DETENTION, AND/OR RETENTION BASINS AND RELATED APPURTENANCES SHOWN SHALL BE SITUATED WITHIN A DRAINAGE EASEMENT OR DRAINAGE LOT. THE OWNERS, HOA, OR ASSIGNEES OF THE TRACTS UPON WHICH ARE LOCATED SUCH EASEMENTS, APPURTENANCES, AND DETENTION FACILITIES SHALL MAINTAIN SAME AND BE RESPONSIBLE FOR THEIR MAINTENANCE, ROUTINE INSPECTION, AND UPKEEP.
8. PARKLAND DEDICATION REQUIREMENTS ARE BEING MET BY THE DEVELOPMENT AGREEMENT BETWEEN THE WOLF LEGACY, L.P. AND THE CITY OF GEORGETOWN, APPROVED BY THE CITY OF GEORGETOWN CITY COUNCIL ON AUGUST 12, 2014 AND EXECUTED ON AUGUST 26, 2014.
9. ANY HERITAGE TREE AS NOTED ON THIS PLAT IS SUBJECT TO EXHIBIT H-7 OF THE CITY GEORGETOWN ORDINANCE NO. 2018-026 AMENDING THE OFFICIAL ZONING MAP TO BE REZONED FROM AGRICULTURE (AG) DISTRICT TO PLANNED UNIT DEVELOPMENT (PUD) KNOWN AS WOLF RANCH HILLWOOD, APPROVED BY THE CITY OF GEORGETOWN CITY COUNCIL ON OCTOBER 23, 2018.
10. ALL INDIVIDUAL LOTS CONTAINING HERITAGE TREES ARE CONFIGURED AND DESIGNED SO THAT THE LOT IS DEVELOPABLE FOR THE INTENDED PURPOSE WITHOUT REQUIRING REMOVAL OF THE HERITAGE TREES OR EXCEEDING THE PERCENTAGE OF ALLOWABLE DISTURBANCE WITHIN THE HERITAGE TREES CRZ.
11. A 10-FOOT PUBLIC UTILITY EASEMENT IS RESERVED ALONG ALL STREET FRONTAGES WITHIN THIS PLAT.
12. THE MONUMENTS OF THIS PLAT HAVE BEEN ROTATED TO THE NAD 83/93 HARN-TEXAS CENTRAL ZONE AND NAVD 88.
13. THE MAXIMUM GROSS IMPERVIOUS COVER FOR THE PARCEL IS 50% PER RESPECTIVE EXHIBITS E AND H-3 OF THE DEVELOPMENT AGREEMENT BETWEEN THE WOLF LEGACY, L.P. AND THE CITY OF GEORGETOWN UNDER DOCUMENT NUMBER 2014095878, APPROVED BY THE CITY OF GEORGETOWN ON AUGUST 12, 2014 AND EXECUTED ON AUGUST 26, 2014. THE MAXIMUM IMPERVIOUS COVER PER RESIDENTIAL LOT IS 60% AND THE MAXIMUM IMPERVIOUS COVER PER OPEN SPACE LOT AND PARK LOT IS 5%.
14. THE LANDOWNER ASSUMES ALL RISKS ASSOCIATED WITH IMPROVEMENTS LOCATED IN THE RIGHT-OF-WAY, OR ROAD WIDENING EASEMENTS. BY PLACING ANYTHING IN THE RIGHT-OF-WAY OR ROAD WIDENING EASEMENTS, THE LANDOWNER INDEMNIFIES AND HOLDS THE CITY OF GEORGETOWN, WILLIAMSON COUNTY, THEIR OFFICERS, AGENTS AND EMPLOYEES HARMLESS FROM ANY LIABILITY OWING TO PROPERTY DEFECTS OR NEGLIGENCE NOT ATTRIBUTABLE TO THEM AND ACKNOWLEDGES THAT THE IMPROVEMENTS MAY BE REMOVED BY THE CITY AND/OR COUNTY AND THAT THE OWNER OF THE IMPROVEMENTS WILL BE RESPONSIBLE FOR THE RELOCATION AND/OR REPLACEMENT OF THE IMPROVEMENTS.
15. THE BUILDING OF ALL STREETS, ROADS, AND OTHER PUBLIC THOROUGHFARES AND ANY BRIDGES OR CULVERTS NECESSARY TO BE CONSTRUCTED OR PLACED IS THE RESPONSIBILITY OF THE OWNERS OF THE TRACT OF LAND COVERED BY THIS PLAT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS PRESCRIBED BY THE CITY OF GEORGETOWN AND/OR WILLIAMSON COUNTY, TEXAS. NEITHER THE CITY OF GEORGETOWN NOR WILLIAMSON COUNTY ASSUMES ANY OBLIGATION TO BUILD ANY OF THE STREETS, ROADS, OR OTHER PUBLIC THOROUGHFARES SHOWN ON THIS PLAT OR OF CONSTRUCTING ANY OF THE BRIDGES OR DRAINAGE IMPROVEMENTS IN CONNECTION THEREWITH. NEITHER THE CITY OF GEORGETOWN NOR WILLIAMSON COUNTY ASSUMES ANY RESPONSIBILITY FOR DRAINAGE WAYS OR EASEMENTS IN THE SUBDIVISION, OTHER THAN THOSE DRAINING OR PROTECTING THE ROAD SYSTEM AND STREETS IN THEIR RESPECTIVE JURISDICTIONS.
16. NEITHER THE CITY OF GEORGETOWN NOR WILLIAMSON COUNTY ASSUMES ANY RESPONSIBILITY FOR THE ACCURACY OF REPRESENTATIONS BY OTHER PARTIES IN THIS PLAT. FLOODPLAIN DATA, IN PARTICULAR, MAY CHANGE DEPENDING ON SUBSEQUENT DEVELOPMENT. IT IS FURTHER UNDERSTOOD THAT THE OWNERS OF THE TRACT OF LAND COVERED BY THIS PLAT MUST INSTALL AT THEIR OWN EXPENSE ALL TRAFFIC CONTROL DEVICES AND SIGNAGE THAT MAY BE REQUIRED BEFORE THE STREETS IN THE SUBDIVISION HAVE FINALLY BEEN ACCEPTED FOR MAINTENANCE BY THE CITY AND/OR COUNTY.
17. RIGHT-OF-WAY EASEMENTS FOR WIDENING ROADWAYS OR IMPROVING DRAINAGE SHALL BE MAINTAINED BY THE LANDOWNER UNTIL ROAD OR DRAINAGE IMPROVEMENTS ARE ACTUALLY CONSTRUCTED ON THE PROPERTY. THE CITY AND/OR COUNTY HAVE THE RIGHT AT ANY TIME TO TAKE POSSESSION OF ANY ROAD WIDENING EASEMENT FOR CONSTRUCTION, IMPROVEMENT, OR MAINTENANCE OF THE ADJACENT ROAD.
18. THIS PLAT IS SUBJECT TO THE CITY OF GEORGETOWN WATER CONSERVATION ORDINANCE.
19. THE SUBDIVISION SUBJECT TO THIS APPLICATION IS SUBJECT TO THE WATER QUALITY REGULATIONS OF THE CITY OF GEORGETOWN. WATER QUALITY PONDS WITHIN THIS SUBDIVISION SHALL REMOVE 85% TSS.
20. A GEOLOGIC ASSESSMENT, IN ACCORDANCE WITH THE CITY OF GEORGETOWN WATER QUALITY REGULATIONS, WAS COMPLETED IN NOVEMBER OF 2013. ANY SPRINGS OR STREAMS AS IDENTIFIED IN THE GEOLOGIC ASSESSMENT ARE SHOWN HEREIN.
21. UNLESS OTHERWISE NOTED HEREIN, ALL EASEMENTS DEDICATED TO THE CITY OF GEORGETOWN BY THIS PLAT SHALL BE EXCLUSIVE TO THE CITY OF GEORGETOWN, AND GRANTOR COVENANTS THAT GRANTOR AND GRANTOR'S HEIRS, SUCCESSORS, AND ASSIGNS SHALL NOT CONVEY ANY OTHER EASEMENT, LICENSE, OR CONFLICTING RIGHT TO USE IN ANY MANNER, THE AREA (OR ANY PORTION THEREOF) COVERED BY THIS GRANT.
22. ALL EASEMENTS DEDICATED TO THE CITY OF GEORGETOWN BY THIS PLAT ADDITIONALLY INCLUDE THE FOLLOWING RIGHTS: (1) THE RIGHT OF THE CITY TO CHANGE THE SIZE OF ANY FACILITIES INSTALLED, MAINTAINED, OR OPERATED WITHIN THE EASEMENT AREA; (2) THE RIGHT OF THE CITY TO RELOCATE ANY FACILITIES WITHIN THE EASEMENT AREA; AND (3) THE RIGHT OF THE CITY TO REMOVE FROM THE EASEMENT AREA ALL TREES AND PARTS THEREOF, OR OTHER OBSTRUCTIONS, WHICH ENDANGER OR MAY INTERFERE WITH THE EFFICIENCY AND MAINTENANCE OF ANY FACILITIES WITHIN THE EASEMENT AREA.



LOT TABLE	
TOTAL LOTS	96
TOTAL BLOCKS	4
TOTAL SINGLE FAMILY LOTS	77
TOTAL OPEN SPACE LOTS	6
TOTAL WATER QUALITY LOTS	10
TOTAL OPEN SPACE & WATER QUALITY LOTS	3

LAND USE	ACREAGE
RIGHT-OF-WAY	6.76
TOTAL SINGLE FAMILY LOTS	14.66
TOTAL OPEN SPACE LOTS	7.32
TOTAL WATER QUALITY LOTS	2.20
TOTAL OPEN SPACE & WATER QUALITY LOTS	3.48
TOTAL	34.42

STREET TABLE						
STREET NAME	CLASSIFICATION	ROW DIMENSION	PAVEMENT WIDTH	PEDESTRIAN CLEAR ZONE	CURB TYPE	DESIGN SPEED
BLUE BLAZE TRAIL	RESIDENTIAL COLLECTOR	65' ROW	37' BOC-BOC	5-FEET	6" STANDARD	30 MPH
WANDERING PATH	RESIDENTIAL STREET	50' ROW	28' BOC-BOC	5-FEET	6" STANDARD	30 MPH
MARLBROOK LANE	RESIDENTIAL STREET	50' ROW	28' BOC-BOC	5-FEET	6" STANDARD	30 MPH
VIOLET SUNSET	RESIDENTIAL STREET	50' ROW	28' BOC-BOC	5-FEET	6" STANDARD	30 MPH

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BENCHMARKS

COMBINED SCALE FACTOR OF 0.999960001599936.

BENCHMARK #51
SQUARE CUT ON EAST END OF CONCRETE HEADWALL ON THE SOUTH SIDE OF WOLF RANCH PARKWAY.
HEADWALL IS +/-2800 FEET WEST OF THE INTERSECTION OF DB WOODS ROAD AND WOLF RANCH PARKWAY.
TEXAS STATE PLANE, CENTRAL ZONE GRID COORDINATES (NAD83):
NORTHING: 10201550.7
EASTING: 3119247.2
ELEVATION: 850.55 (NAVD88 GEOID 03)

BENCHMARK #108
SET CHISELED SQUARE ON CURB INLET
GRID NORTHING: 10201296.7'
GRID EASTING: 3119886.3'
ELEVATION = 845.93' (NVDA 88 GEOID 03)

BENCHMARK #109
SET CHISELED SQUARE ON CURB INLET
GRID NORTHING: 10200751.4'
GRID EASTING: 3120350.9'
ELEVATION = 832.09' (NVDA 88 GEOID 03)

OWNER:
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H4 GEORGETOWN, LP
3000 TURTLE CREEK BLVD.
DALLAS, TX 75219
(972) 201-2984

APPLICANT:
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AUSTIN, TEXAS 78759
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ENGINEER:
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SURVEY:
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SUBMITTAL DATE:
FIRST SUBMITTAL: AUGUST 22, 2022
SECOND SUBMITTAL: OCTOBER 31, 2022

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

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SHEET 1 OF 4

PD JOB NO. 51127-42

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2

2022-28-PP

NO.	REVISION	DATE

PAPE-DAWSON ENGINEERS
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10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
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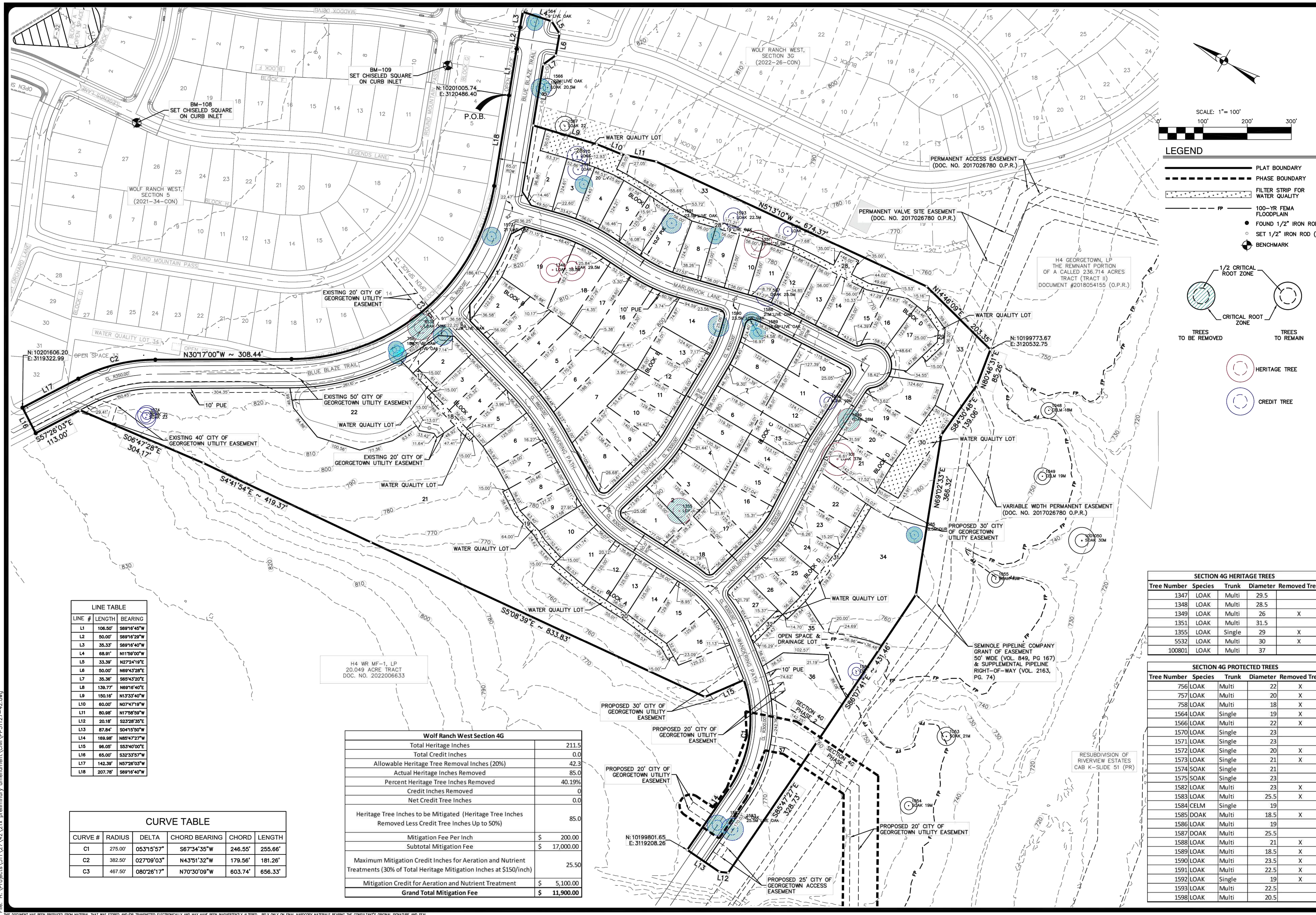
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

PRELIMINARY PLAT 1 OF 4

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE February 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 02 OF 61



LINE TABLE		
LINE #	LENGTH	BEARING
L1	106.50'	S69°16'45"W
L2	50.00'	S69°16'29"W
L3	35.33'	S69°16'40"W
L4	68.91'	N11°59'00"W
L5	33.39'	N27°24'19"E
L6	50.00'	N69°43'28"E
L7	35.36'	S65°43'20"E
L8	139.77'	N69°16'40"E
L9	150.16'	N13°33'40"W
L10	60.00'	N07°47'19"W
L11	80.98'	N17°58'59"W
L12	20.18'	S23°28'35"E
L13	87.84'	S04°15'50"W
L14	169.98'	N85°47'27"W
L15	96.05'	S53°40'00"E
L16	65.00'	S32°33'57"W
L17	142.39'	N57°26'03"W
L18	207.78'	S69°16'40"W

CURVE TABLE					
CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C1	275.00'	053°15'57"	S67°34'35"W	246.55'	255.66'
C2	382.50'	027°09'03"	N43°51'32"W	179.56'	181.26'
C3	467.50'	080°26'17"	N70°30'09"W	603.74'	656.33'

Wolf Ranch West Section 4G		
Total Heritage Inches		211.5
Total Credit Inches		0.0
Allowable Heritage Tree Removal Inches (20%)		42.3
Actual Heritage Inches Removed		85.0
Percent Heritage Tree Inches Removed		40.19%
Credit Inches Removed		0
Net Credit Tree Inches		0.0
Heritage Tree Inches to be Mitigated (Heritage Tree Inches Removed Less Credit Tree Inches Up to 50%)		85.0
Mitigation Fee Per Inch	$	200.00
Subtotal Mitigation Fee	$	17,000.00
Maximum Mitigation Credit Inches for Aeration and Nutrient Treatments (30% of Total Heritage Mitigation Inches at $150/inch)		25.50
Mitigation Credit for Aeration and Nutrient Treatment	$	5,100.00
Grand Total Mitigation Fee	**$**	**11,900.00**

SECTION 4G HERITAGE TREES				
Tree Number	Species	Trunk	Diameter	Removed Tree
1347	LOAK	Multi	29.5	
1348	LOAK	Multi	28.5	
1349	LOAK	Multi	26	X
1351	LOAK	Multi	31.5	
1355	LOAK	Single	29	X
5532	LOAK	Multi	30	X
100801	LOAK	Multi	37	

SECTION 4G PROTECTED TREES				
Tree Number	Species	Trunk	Diameter	Removed Tree
756	LOAK	Multi	22	X
757	LOAK	Multi	20	X
758	LOAK	Multi	18	X
1564	LOAK	Single	19	X
1566	LOAK	Multi	22	X
1570	LOAK	Single	23	
1571	LOAK	Single	23	
1572	LOAK	Single	20	X
1573	LOAK	Single	21	X
1574	SOAK	Single	21	
1575	SOAK	Single	23	
1582	LOAK	Multi	23	X
1583	LOAK	Multi	25.5	X
1584	CELM	Single	19	
1585	DOAK	Multi	18.5	X
1586	LOAK	Multi	19	
1587	DOAK	Multi	25.5	
1588	LOAK	Multi	21	X
1589	LOAK	Multi	18.5	X
1590	LOAK	Multi	23.5	X
1591	LOAK	Multi	22.5	X
1592	LOAK	Single	19	X
1593	LOAK	Multi	22.5	
1598	LOAK	Multi	20.5	

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
PRELIMINARY PLAT AMENDMENT

CITY NO. 2022-28-PP
JOB NO. 51127-42
DATE OCTOBER 2022
DESIGNER DB
CHECKED AC DRAWN ZC
SHEET 2 OF 4

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL.

2022-28-PP

NO. REVISION DATE

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
PRELIMINARY PLAT 2 OF 4

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE February 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 03 OF 61

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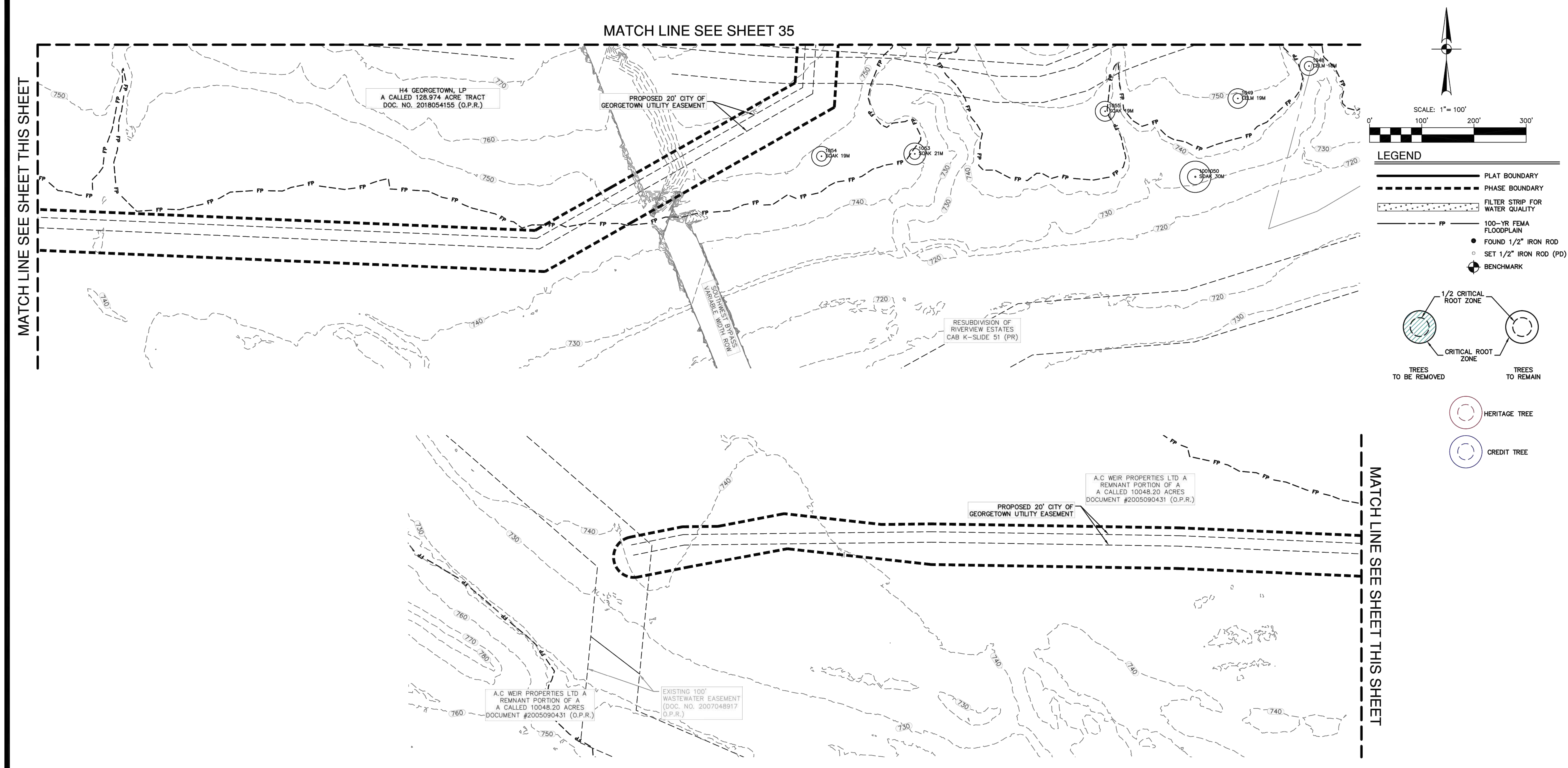

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
PRELIMINARY PLAT AMENDMENT

CITY NO. 2022-28-PP
JOB NO. 51127-42
DATE OCTOBER 2022
DESIGNER DB
CHECKED AC DRAWN ZC
SHEET 3 OF 4

Date: Feb 15, 2023, 1:23pm User ID: dhernandez
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2022-28-PP

NO.	REVISION	DATE

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

PRELIMINARY PLAT 3 OF 4

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
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DESIGNER DB
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SHEET 04 OF 61

PARCEL TABLE			
LOT No.	BLOCK	SQFT	ACRES
1	BLOCK A	3,156.09	0.07
2	BLOCK A	6,752.26	0.16
3	BLOCK A	7,014.81	0.16
4	BLOCK A	7,020.96	0.16
5	BLOCK A	7,910.01	0.18
6	BLOCK A	8,013.39	0.18
7	BLOCK A	7,230.44	0.17
8	BLOCK A	7,074.87	0.16
9	BLOCK A	7,031.45	0.16
10	BLOCK A	7,493.48	0.17
11	BLOCK A	8,593.50	0.20
12	BLOCK A	7,385.39	0.17
13	BLOCK A	7,000.00	0.16
14	BLOCK A	7,114.11	0.16
15	BLOCK A	9,748.55	0.22
16	BLOCK A	9,526.87	0.22
17	BLOCK A	920.89	0.02
18	BLOCK A	2,052.66	0.05
19	BLOCK A	2,979.75	0.07
20	BLOCK A	5,133.79	0.12
21	BLOCK A	255,817.76	5.87
22	BLOCK A	44,181.65	1.01

PARCEL TABLE			
LOT No.	BLOCK	SQFT	ACRES
1	BLOCK B	4,561.37	0.10
2	BLOCK B	8,631.60	0.20
3	BLOCK B	7,907.27	0.18
4	BLOCK B	8,518.19	0.20
5	BLOCK B	9,166.30	0.21
6	BLOCK B	10,038.78	0.23
7	BLOCK B	15,010.52	0.34
8	BLOCK B	10,997.90	0.25
9	BLOCK B	8,969.85	0.21
10	BLOCK B	8,088.63	0.19
11	BLOCK B	7,127.29	0.16
12	BLOCK B	7,000.50	0.16
13	BLOCK B	7,000.73	0.16
14	BLOCK B	10,452.51	0.24
15	BLOCK B	12,164.40	0.28
16	BLOCK B	9,564.15	0.22
17	BLOCK B	9,404.86	0.22
18	BLOCK B	12,753.20	0.29
19	BLOCK B	17,609.73	0.40

PARCEL TABLE			
LOT No.	BLOCK	SQFT	ACRES
1	BLOCK C	9,926.56	0.23
2	BLOCK C	7,000.21	0.16
3	BLOCK C	8,489.47	0.19
4	BLOCK C	7,287.39	0.17
5	BLOCK C	6,714.52	0.15
6	BLOCK C	6,659.72	0.15
7	BLOCK C	6,605.33	0.15
8	BLOCK C	6,693.35	0.15
* 9	BLOCK C	8,224.24	0.19
10	BLOCK C	9,272.95	0.21
11	BLOCK C	7,043.62	0.16
12	BLOCK C	6,865.07	0.16
13	BLOCK C	6,837.01	0.16
14	BLOCK C	6,957.78	0.16
15	BLOCK C	7,837.28	0.18
16	BLOCK C	9,062.82	0.21
17	BLOCK C	7,006.82	0.16
18	BLOCK C	10,050.57	0.23

PARCEL TABLE			
LOT No.	BLOCK	SQFT	ACRES
1	BLOCK D	3,560.62	0.08
2	BLOCK D	7,644.42	0.18
3	BLOCK D	7,554.48	0.17
4	BLOCK D	7,994.25	0.18
5	BLOCK D	7,665.18	0.18
6	BLOCK D	6,998.48	0.16
7	BLOCK D	8,780.50	0.20
8	BLOCK D	7,605.88	0.17
9	BLOCK D	7,000.00	0.16
10	BLOCK D	7,000.00	0.16
11	BLOCK D	8,021.39	0.18
12	BLOCK D	7,453.07	0.17
13	BLOCK D	7,000.00	0.16
14	BLOCK D	7,000.00	0.16
15	BLOCK D	7,255.52	0.17
16	BLOCK D	7,707.79	0.18
17	BLOCK D	9,984.93	0.23
19	BLOCK D	8,124.63	0.19
20	BLOCK D	7,972.62	0.18
21	BLOCK D	9,818.71	0.23
22	BLOCK D	9,117.92	0.21
23	BLOCK D	7,103.61	0.16
24	BLOCK D	7,545.45	0.17
25	BLOCK D	7,325.39	0.17
26	BLOCK D	7,014.54	0.16
28	BLOCK D	20,873.84	0.48
29	BLOCK D	2,055.79	0.05
30	BLOCK D	11,289.95	0.26
31	BLOCK D	4,751.05	0.11
32	BLOCK D	1,371.79	0.03
33	BLOCK D	61,939.18	1.42
34	BLOCK D	68,179.60	1.57
35	BLOCK D	23,538.69	0.54
36	BLOCK D	21,381.42	0.49
37	BLOCK D	28,409.60	0.65

NOTE: * DENOTES SMALLEST RESIDENTIAL LOT

FIELD NOTES
FOR

A 34.423 TRACT OF LAND BEING ALL OF A CALLED 0.644 ACRE TRACT (TRACT 6) AND A CALLED 0.217 ACRE TRACT (TRACT 5) CONVEYED TO H4 GEORGETOWN, LP, RECORDED IN DOCUMENT NO. 2022006590 OF THE OFFICIAL PUBLIC RECORDS OF WILLIAMSON COUNTY, TEXAS, AND BEING OUT OF A REMNANT PORTION OF A CALLED 236.714 ACRE TRACT CONVEYED TO H4 GEORGETOWN, LP, RECORDED IN DOCUMENT NO. 2018054155 OF SAID OFFICIAL PUBLIC RECORDS, AND OUT OF A CALLED 50.285 ACRE TRACT CONVEYED TO H4 GEORGETOWN PHASE 1, LCC, RECORDED IN DOCUMENT NO. 2020157115 OF SAID OFFICIAL PUBLIC RECORDS, AND BEING OUT OF A CALLED 20.049 ACRE TRACT CONVEYED TO H4 WR MF-1, LP, RECORDED IN DOCUMENT NO. 2022006633 OF SAID OFFICIAL PUBLIC RECORDS, SITUATED IN THE JOSEPH THOMPSON SURVEY, ABSTRACT NO. 608, WILLIAMSON COUNTY, TEXAS. SAID 34.423 ACRE TRACT BEING MORE FULLY DESCRIBED AS FOLLOWS, WITH BEARINGS BASED ON THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE CENTRAL ZONE FROM THE NORTH AMERICAN DATUM OF 1983 NAD 83 (NA2011) EPOCH 2010.00;

BEGINNING at a ½" iron rod with yellow cap marked "Pape-Dawson" found on a point in the east right-of-way line of Southwest Bypass, a variable width right-of-way, described as a called 20.942 acre tract of land conveyed to the City of Georgetown, recorded in Document No. 2015010273 of said Official Public Records, same being the south corner of said 20.049 acre tract, and same being a northwest corner of the Remnant Portion of said 236.714 acre tract for the POINT OF BEGINNING hereof;

THENCE N 04°15'50" E, departing the east right-of-way line of said Southwest Bypass, with the south boundary line of said 20.049 acre tract, same being the north boundary line of the Remnant Portion of said 236.714-acre tract, in part through the interior of said 20.049 acre tract, a distance of 87.84 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for an angle point hereof;

THENCE continuing through the interior of said 20.049 acre tract, the following two (2) courses and distances:

1. S 85°47'27" E, a distance of 169.98 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for a calculated point of tangent curvature hereof,
2. along the arc of a curve to the left, having a radius of 275.00 feet, a central angle of 53°15'57, a chord bearing and distance of N 67°34'35" E 246.55 feet, for an arc length of 255.66 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for a point of tangency on the southeast corner of said 20.049 acre tract, same being a northwest corner of the Remnant Portion of said 236.714 hereof,

THENCE with the east boundary line of said 20.049 acre tract, same being the west boundary line of the Remnant Portion of said 236.714 acre tract, the following four (4) courses and distances:

1. N 53°40'00" W, a distance of 96.05 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
2. N 05°08'39" W, a distance of 833.83 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
3. N 04°41'54" W, a distance of 419.37 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof, and
4. N 06°47'28" W, a distance of 304.17 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,

THENCE N 57°47'28" W, continuing with the with the east boundary line of said 20.049 acre tract, same being the west boundary line of the Remnant Portion of said 236.714 acre tract, in part being with the east boundary line of a called 6.551 acre tract, recorded in Document No. 2022006634 of the said Official Public Records, same being the west boundary line of said 0.217 acre tract, a distance of 113.00 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found on an interior ell corner of said 6.551 acre tract, same being the northwest corner of said 0.217 acre tract for an angle point hereof;

THENCE N 32°33'57" E, continuing with the east boundary line of said 6.551 acre tract, same being the west boundary line of said 0.217 acre tract, a distance of 65.00 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found on the west boundary line of a called 18.852 acre tract, recorded in Document No. 2022024798 of said Official Public Records, same being an east corner of said 6.551 acre tract, also being the north corner of said 0.217 acre tract for the northernmost north corner hereof;

THENCE S 57°26'03" E, departing the east boundary line of said 6.551 acre tract, with the west boundary line of said 18.852 acre tract, same being the east boundary line of said 0.217 acre tract, a distance of 142.39 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for a point of tangent curvature hereof;

THENCE, continuing with the west boundary line of said 18.852 acre tract, same being the east boundary line of said 0.217 acre tract, in part with the east boundary line of the Remnant Portion of said 236.714 acre tract, along the arc of a curve to the right, having a radius of 382.50 feet, a central angle of 27°09'03", a chord bearing and distance of S 43°51'32" E 179.56 feet, for an arc length of 181.26 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for a point of tangency hereof;

THENCE, S 30°17'00" E, continuing with the west boundary line of said 18.852 acre tract, same being the east boundary line of the Remnant Portion of said 236.714 acre tract, a distance of 308.44 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for a point of tangent curvature hereof;

THENCE, continuing with the west boundary line of said 18.852 acre tract, same being the east boundary line of the Remnant Portion of said 236.714 acre tract, in part with the northeast boundary line of said 0.644 acre tract, along the arc of a curve to the left, having a radius of 467.50 feet, a central angle of 80°26'17", a chord bearing and distance of S 70°30'09" E 603.74 feet, for an arc length of 656.33 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found on the southeast corner of said 0.644 acre tract, same being on the south boundary line of said 18.852 acre tract, also being the north boundary line of the Remnant Portion of said 236.714 acre tract for a point of tangency hereof;

THENCE N 69°16'40" E, departing the southeast corner of said 0.644 acre tract, with the south boundary line of said 18.852 acre tract, also being the north boundary line of the Remnant Portion of said 236.714 acre tract, in part with the south boundary line on Wolf Ranch West, Section 4B, Phase 2, a subdivision according to the plat recorded in Document No. 2019114626 of said Official Public Records, same being the north boundary line of said 50.285 acre tract, a distance of 399.61 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for the easternmost northeast corner hereof;

THENCE, departing the south line of Wolf Ranch West, Section 4B, Phase 2, through the interior of said 50.285 acre tract, the following four (4) courses and distances:

1. S 11°59'00" E, a distance of 68.90 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
2. S 27°18'29" W, a distance of 33.44 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
3. S 69°48'42" W, a distance of 50.00 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof, and
4. N 65°43'20" W, a distance of 35.36 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,

THENCE S 69°16'40" W, continuing through the interior of said 50.285 acre tract, in part with a north boundary line of said 50.285, same being a south boundary line of the Remnant Portion of said 236.714 acre tract, a distance of 139.77 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof;

THENCE, departing the south line of the Remnant Portion of said 236.714 acre tract, through the interior of said 50.285 acre tract, the following two (2) courses and distances:

1. S 13°33'40" E, a distance of 150.16 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof, and
2. S 07°47'19" E, a distance of 60.00 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found on the west boundary line of said 50.285 acre tract, same being the east boundary line of the Remnant Portion of said 236.714 acre tract for an angle point hereof,

THENCE, with the west boundary line of said 50.285 acre tract, same being the east boundary line of the Remnant Portion of said 236.714 acre tract, the following three (3) courses and distances:

1. S 17°58'59" E, a distance of 80.98 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
2. S 05°13'10" E, a distance of 674.37 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" found for an angle point hereof,
3. S 14°46'09" W, a distance of 203.35 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for the southeast corner hereof,

THENCE, departing the west boundary line of said 50.285 acre tract, through the interior of the Remnant Portion of said 236.714 acre tract, the following five (5) courses and distances:

1. S 80°46'31" W, a distance of 85.26 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for an angle point hereof,
2. N 84°30'48" W, a distance of 139.06 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for an angle point hereof,
3. S 69°02'33" W, a distance of 366.32 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for an angle point hereof,
4. N 86°07'41" W, a distance of 431.46 feet to a ½" iron rod with yellow cap marked "Pape-Dawson" set for an angle point hereof,
5. N 85°47'27" W, a distance of 329.15 feet to the POINT OF BEGINNING hereof and containing 34.423 acres in the City of Georgetown, Williamson County Texas. Said tract being described in accordance with q preliminary plat prepared under job no. 51127-42 by Pape-Dawson Engineers, Inc.

ENGINEER'S CERTIFICATION

I, MICHAEL S. FISHER, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THIS WOLF RANCH WEST, SECTION 4G IS IN THE EDWARDS AQUIFER RECHARGE ZONE AND A PORTION OF THIS TRACT IS WITHIN A FLOOD HAZARD ZONE, AS DENOTED HEREIN, AND AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT ADMINISTRATION FLOOD HAZARD BOUNDARY MAP, COMMUNITY PANEL NUMBER 48491C0480F, EFFECTIVE DATE DECEMBER 20, 2019, AND THAT EACH LOT CONFORMS TO THE CITY OF GEORGETOWN REGULATIONS.

THE FULLY DEVELOPED, CONCENTRATED STORMWATER RUNOFF RESULTING FROM THE ONE HUNDRED (100) YEAR FREQUENCY STORM IS CONTAINED WITHIN THE DRAINAGE EASEMENTS SHOWN AND/OR PUBLIC RIGHTS-OF-WAY DEDICATED BY THIS PLAT.

TO CERTIFY WHICH, WITNESS MY HAND AND SEAL AT TRAVIS, COUNTY, TEXAS THIS ____ DAY OF ____________________, 20___.

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF REVIEW UNDER THE AUTHORITY OF MICHAEL S. FISHER, PROFESSIONAL ENGINEER NO. 87704 ON February 15, 2023. IT IS NOT TO BE USED FOR BIDDING, PERMIT OR CONSTRUCTION.

MICHAEL S. FISHER
PROFESSIONAL ENGINEER NO. 87704
PAPE-DAWSON ENGINEERS, INC.
TBPE, FIRM REGISTRATION NO. 470
TBPLS, FIRM REGISTRATION NO. 10028801
10801 N MOPAC EXPY,
BLDG. 3, SUITE 200
AUSTIN, TEXAS, 78759

SURVEYOR'S CERTIFICATION

STATE OF TEXAS §
KNOW ALL MEN BY THESE PRESENTS
COUNTY OF ____________ §

I, PARKER GRAHAM, REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THIS PLAT IS TRUE AND CORRECTLY MADE FROM AN ACTUAL SURVEY MADE ON THE GROUND OF THE PROPERTY LEGALLY DESCRIBED HEREON, AND THAT THERE ARE NO APPARENT DISCREPANCIES, CONFLICTS, OVERLAPPING OF IMPROVEMENTS, VISIBLE UTILITY LINES OR ROADS IN PLACE, EXCEPT AS SHOWN ON THE ACCOMPANYING PLAT, AND THAT THE CORNER MONUMENTS SHOWN THEREON WERE PROPERLY PLACED UNDER MY SUPERVISION IN ACCORDANCE WITH THE SUBDIVISION REGULATIONS OF THE CITY OF GEORGETOWN, TEXAS.

TO CERTIFY WHICH, WITNESS MY HAND AND SEAL AT TRAVIS, COUNTY, TEXAS THIS ____ DAY OF ____________________, 20___.

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF REVIEW UNDER THE AUTHORITY OF PARKER J. GRAHAM, REGISTERED PROFESSIONAL LAND SURVEYOR 5556 ON February 15, 2023. IT IS NOT TO BE USED FOR BIDDING, PERMIT OR CONSTRUCTION.

PARKER J. GRAHAM
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5556
PAPE-DAWSON ENGINEERS, INC.
TBPE, FIRM REGISTRATION NO. 470
TBPLS, FIRM REGISTRATION NO. 10028801
10801 N MOPAC EXPY,
BLDG. 3, SUITE 200
AUSTIN, TEXAS, 78759

NO.	REVISION	DATE

THIS DOCUMENT IS RELEASED FOR INTERIM REVIEW PURPOSES ONLY UNDER THE AUTHORITY OF MICHAEL S. FISHER, P.E. 87704 DATE: February 15, 2023 IT IS NOT TO BE USED FOR BIDDING, CONSTRUCTION OR PERMITTING PURPOSES, PER T.E.P.A. 137.33(c)

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
PRELIMINARY PLAT AMENDMENT
FIELD NOTES

CITY NO. 2022-28-PP
JOB NO. 51127-42
DATE OCTOBER 2022
DESIGNER DB
CHECKED AC DRAWN ZC
SHEET 4 OF 4

2022-28-PP

NO.	REVISION	DATE

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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
PRELIMINARY PLAT 4 OF 4

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE February 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 05 OF 61

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 STANDARD SPECIFICATIONS AND DETAILS AND UDC REGULATIONS 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. WASTEWATER MAINS AND SERVICE LINES SHALL BE SDR 26 PVC.

5. WASTEWATER MAINS SHALL BE INSTALLED WITHOUT HORIZONTAL OR VERTICAL BENDS.

6. MAXIMUM DISTANCE BETWEEN WASTEWATER MANHOLES IS 500 FEET.

7. WASTEWATER MAINS SHALL BE LOW PRESSURE AIR TESTED AND MANDREL TESTED BY THE CONTRACTOR ACCORDING TO CITY OF GEORGETOWN AND TCEQ REQUIREMENTS.

8. WASTEWATER MANHOLES SHALL BE VACUUM TESTED AND COATED BY THE CONTRACTOR ACCORDING TO CITY OF GEORGETOWN AND TCEQ REQUIREMENTS.

9. WASTEWATER MAINS SHALL BE CAMERA TESTED BY THE CONTRACTOR AND SUBMITTED TO THE CITY IN DVD FORMAT PRIOR TO PAVING THE STREETS.

10. PRIVATE WATER SYSTEM FIRE LINES SHALL BE TESTED BY THE CONTRACTOR TO 200 PSI FOR 2 HOURS.

11. 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.

12. PUBLIC WATER SYSTEM FIRE LINES SHALL BE 150 PSI C900 PVC AND TESTED BY THE CONTRACTOR AT 150 PSI FOR 4 HOURS.

13. ALL BENDS AND CHANGES IN DIRECTIONS ON WATER MAINS SHALL BE RESTRAINED AND THRUST BLOCKED.

14. LONG FIRE HYDRANT LEADS SHALL BE RESTRAINED.

15. ALL WATER LINES ARE TO BE BACTERIA TESTED BY THE CONTRACTOR ACCORDING TO THE CITY STANDARDS AND SPECIFICATIONS.

16. WATER AND SEWER MAIN CROSSINGS SHALL MEET ALL REQUIREMENTS OF THE TCEQ AND THE CITY.

17. FLEXIBLE BASE MATERIAL FOR PUBLIC STREETS SHALL BE TXDOT TYPE A GRADE 1.

18. HOT MIX ASPHALTIC CONCRETE PAVEMENT SHALL BE TYPE D UNLESS OTHERWISE SPECIFIED AND SHALL BE A MINIMUM OF 2 INCHES THICK ON PUBLIC STREETS AND ROADWAYS.

19. ALL SIDEWALK RAMPS AND PUBLIC AREA SIDEWALKS (I.E., NOT ADJACENT TO INDIVIDUAL LOTS) ARE TO BE INSTALLED WITH THE PUBLIC INFRASTRUCTURE.

20. RECORD DRAWINGS OF THE PUBLIC IMPROVEMENTS SHALL BE SUBMITTED TO THE CITY BY THE DESIGN ENGINEER PRIOR TO ACCEPTANCE OF THE PROJECT. THESE DRAWINGS SHALL BE TIFF OR PDF (300P DPI) . IF A DISK IS SUBMITTED, A BOND SET SHALL BE INCLUDED WITH THE DISK.

GENERAL NOTES - SIDEWALKS

1. SIDEWALKS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE T.A.S. AS ADMINISTERED BY THE TDLR ("TDLR COMPLIANT").

2. SIDEWALKS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE UDC, SECTION 12.02.020.

GEOMETRIC AND DESIGN STANDARDS FOR SIDEWALKS

DESIGN AND CONSTRUCTION OF SIDEWALKS SHALL OCCUR IN COMPLIANCE WITH THE FOLLOWING STANDARDS:

A. IN ORDER TO PROVIDE SAFE AND ADEQUATE ACCESS ON CITY SIDEWALKS, ALL SIDEWALKS SHALL MEET MINIMUM CLEAR WIDTH REQUIREMENTS AROUND ALL OBSTRUCTIONS, NATURAL OR MANMADE, AS DESCRIBED HEREIN. CLEAR WIDTH SHALL MEAN THE DISTANCE AS MEASURED FROM THE OUTSIDE EDGE OF THE OBSTRUCTION TO THE OUTSIDE EDGE OF THE SIDEWALK OR FROM THE INSIDE EDGE OF THE OBSTRUCTION TO THE INSIDE EDGE OF THE SIDEWALK. IF THE CLEAR WIDTH IS TO BE OBTAINED BETWEEN THE INSIDE EDGE OF THE SIDEWALK AND OBSTRUCTION, GIVEN THAT THE SIDEWALK IS PLACED AGAINST THE BACK OF CURB, THE CLEAR WIDTH SHALL BE A MINIMUM OF FIVE FEET. IN ALL OTHER CASES, THE MINIMUM CLEAR WIDTH SHALL BE FOUR FEET.

B. ALL SIDEWALKS SHALL MEET CITY STANDARDS AND SPECIFICATIONS. SIDEWALKS MAY BE PLACED SO THAT THEY VARY THE DISTANCE FROM BACK OF CURB, PROVIDED THAT THE MINIMUM WIDTH AND DISTANCE FROM BACK OF CURB IS NOT REDUCED.

C. GIVEN THAT A COMBINATION OR VARIATION FROM THE TWO PLACEMENT METHODS IS NECESSARY OR DESIRED OR THAT AN OBSTRUCTION IS LOCATED WITHIN THE PAVED AREA, THE FOLLOWING CRITERIA SHALL BE SATISFIED:
1. ALL RADII IN THE TRANSITION SECTION SHALL BE A MINIMUM OF TEN FEET.

20. 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 YEAR IN THE AMOUNT OF 10% OF THE COST OF THE PUBLIC IMPROVEMENTS AND SHALL FOLLOW THE CITY FORMAT.

21. THE CITY OF GEORGETOWN SHALL BE CONTACTED 48 HOURS IN ADVANCE FOR CONNECTIONS AND TESTING.

GEOTECH

1. THE SUBGRADE WAS TESTED BY MLA LABS, INC. IN JANUARY OF 2022. THE STREET SECTIONS WERE DESIGNED ACCORDINGLY. THE STREET SECTIONS ARE DESIGNED ACCORDING TO CITY OF GEORGETOWN DESIGN CRITERIA. PAPE-DAWSON ENGINEERS, INC. IS NOT RESPONSIBLE FOR THE BASE AND PAVEMENT DESIGN AS RECOMMENDED BY THE SOILS ENGINEER IN HIS / HER GEOTECHNICAL REPORT.

2. EMBANKMENT, SUBGRADE, BASE, ASPHALT, AND TESTING MUST MEET ALL REQUIREMENTS IN THE CITY SPECIFICATIONS AND STANDARDS MANUAL.
NOTE:
GEOTECHNICAL ENGINEER TO VERIFY FINAL PAVEMENT DESIGN AFTER ROUGH CUT OF STREETS.
THE BELOW TABLE IS BASED ON PRELIMINARY GEOTECHNICAL INVESTIGATION PAVEMENT THICKNESS RECOMMENDATIONS DATED JANUARY 2022

RECOMMENDATIONS - PAVEMENT THICKNESS SECTIONS

Street Classification	Subgrade Material	Hot Mix Asphaltic Concrete	Crushed Limestone Base	Lime Stabilized Subgrade	Geogrid
Local Streets	Subgrade PI greater than 20 - Option 1	2.0	14	-	-
	Subgrade PI greater than 20 - Option 2	2.0	8	18**	-
	Subgrade PI greater than 20 - Option 3	2.0	8	-	X*
	Subgrade PI less than 20	2.0	8	-	-
Residential Collector	Subgrade PI greater than 20 - Option 1	2.0	15	-	-
	Subgrade PI greater than 20 - Option 2	2.0	10	18**	-
	Subgrade PI greater than 20 - Option 3	2.0	10	-	X*
	Subgrade PI less than 20	2.0	10	-	-

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
WATER POLLUTION ABATEMENT PLAN
GENERAL CONSTRUCTION NOTES

1. WRITTEN CONSTRUCTION NOTIFICATION MUST BE GIVEN TO THE APPROPRIATE TCEQ REGIONAL OFFICE NO LATER THAN 48 HOURS PRIOR TO COMMENCEMENT OF THE REGULATED ACTIVITY. INFORMATION MUST INCLUDE THE DATE ON WHICH THE REGULATED ACTIVITY WILL COMMENCE, THE NAME OF THE APPROVED PLAN FOR THE REGULATED ACTIVITY, AND THE NAME OF THE PRIME CONTRACTOR AND THE NAME AND TELEPHONE NUMBER OF THE CONTACT PERSON.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.

3. IF ANY SENSITIVE FEATURE IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.

4. NO TEMPORARY ABOVEGROUND HYDROCARBON AND HAZARDOUS SUBSTANCE STORAGE TANK SYSTEM MAY BE INSTALLED WITHIN 150 FEET OF A DOMESTIC, INDUSTRIAL, IRRIGATION, OR PUBLIC WATER SUPPLY WELL, OR OTHER SENSITIVE FEATURE.

5. PRIOR TO COMMENCEMENT OF CONSTRUCTION, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND GOOD ENGINEERING PRACTICES. CONTROLS SPECIFIED IN THE TEMPORARY STORM WATER SECTION OF THE APPROVED EDWARDS AQUIFER PROTECTION PLAN ARE REQUIRED DURING CONSTRUCTION. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THE CONTROLS MUST REMAIN IN PLACE UNTIL DISTURBED AREAS ARE REVEGETATED AND THE AREAS HAVE BECOME PERMANENTLY STABILIZED.

6. IF SEDIMENT ESCAPES THE CONSTRUCTION SITE, OFF-SITE ACCUMULATIONS OF SEDIMENT MUST BE REMOVED AT A FREQUENCY SUFFICIENT TO MINIMIZE OFF-SITE IMPACTS TO WATER QUALITY (E.G., FUGITIVE SEDIMENT IN STREET BEING WASHED INTO SURFACE STREAMS OR SENSITIVE FEATURES BY THE NEXT RAIN).

7. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS NOT LATER THAN WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%. A PERMANENT STAKE MUST BE PROVIDED THAT CAN INDICATE WHEN THE SEDIMENT OCCUPIES 50% OF THE BASIN VOLUME.

8. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORMWATER DISCHARGES (E.G., SCREENING OUTFALLS, PICKED UP DAILY).

9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.

10. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARY OR PERMANENTLY CEASE IS PRECLUDED BY WEATHER CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 21 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE. IN AREAS EXPERIENCING DROUGHTS WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY HAS TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SEASONAL ARID CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.

11. THE FOLLOWING RECORDS SHALL BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON REQUEST: THE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR; THE DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND THE DATES WHEN STABILIZATION MEASURES ARE INITIATED.

12. THE HOLDER OF ANY APPROVED EDWARDS AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:

A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;

B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;

C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
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TCEQ ORGANIZED SEWAGE
COLLECTION SYSTEM (SCS)
GENERAL CONSTRUCTION NOTES

1. THIS ORGANIZED SEWAGE COLLECTION SYSTEM MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S (TCEQ) EDWARDS AQUIFER RULES 30 TEXAS ADMINISTRATIVE CODE (TAC) §§213.5(C) AND 217.51-217.70 AND 30 TAC CHAPTER 217, SUBCHAPTER D, AND THE CITY OF GEORGETOWN STANDARD SPECIFICATIONS.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROPOSED REGULATED PROJECT MUST BE PROVIDED WITH COPIES OF THE SEWAGE COLLECTION SYSTEM PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS MUST BE REQUIRED TO KEEP ON-SITE COPIES OF THE PLAN AND THE APPROVAL LETTER.

3. NO LATER THAN 48 HOURS PRIOR TO COMMENCING ANY REGULATED ACTIVITY, THE APPLICANT OR HIS AGENT MUST NOTIFY THE AUSTIN REGIONAL OFFICE, IN WRITING, OF THE DATE ON WHICH THE REGULATED ACTIVITY WILL BEGIN.

4. ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED SCS APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF AN SCS APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.

5. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE INSTALLED PRIOR TO CONSTRUCTION, MUST BE MAINTAINED DURING CONSTRUCTION, AND MUST BE REMOVED WHEN SUFFICIENT VEGETATION IS ESTABLISHED TO CONTROL THE EROSION AND SEDIMENTATION AND THE CONSTRUCTION AREA IS STABILIZED.

6. THE SEWER LINE TRENCH DETAILS SHOWING THE CROSS SECTION WITH THE DIMENSIONS, PIPE PLACEMENT, AND BACKFILL INSTRUCTIONS ARE INCLUDED ON PLAN SHEET 50 of 52 OF THESE PLANS. ALL SEWER PIPES JOINTS MUST MEET THE REQUIREMENTS IN 30 TAC §§217.53(C) AND 217.65.

GRAVITY LINES MUST HAVE A SDR 26 OR LESS. PRESSURIZED SEWER SYSTEMS MUST HAVE PIPE WITH A MINIMUM WORKING PRESSURE RATING OF 150 PSI.

THE ASTM, ANSI, OR AWWA SPECIFICATION NUMBERS FOR THE PIPE(S) AND JOINTS ARE: ASTM D3034, ASTM 3212, ASTM D2241 CLASS 160 AND ASTM D3139

THE PIPE MATERIAL, THE PRESSURE CLASSES, AND THE SDR AND/OR DR DESIGNATIONS ARE: PVC, SDR 26; PVC, 160 PSI, SDR 26.

7. IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPLICANT MUST IMMEDIATELY NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY OF THE FEATURE DISCOVERED. A GEOLOGIST'S ASSESSMENT OF THE LOCATION AND EXTENT OF THE FEATURE DISCOVERED MUST BE REPORTED TO THAT REGIONAL OFFICE IN WRITING WITHIN TWO WORKING DAYS. THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.

8. SEWER LINES LOCATED WITHIN OR CROSSING THE 5-YEAR FLOODPLAIN OF A DRAINAGE WAY WILL BE PROTECTED FROM INUNDATION AND STREAM VELOCITIES WHICH COULD CAUSE EROSION AND SCOURING OF BACKFILL. THE TRENCH MUST BE CAPPED WITH CONCRETE TO PREVENT SCOURING OF BACKFILL, OR THE SEWER LINES MUST BE ENCASED IN CONCRETE. ALL CONCRETE SHALL HAVE A MINIMUM THICKNESS OF SIX (6) INCHES.

9. BLASTING PROCEDURES FOR PROTECTION OF EXISTING SEWER LINES AND OTHER UTILITIES WILL BE IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA. SAND IS NOT ALLOWED AS BEDDING OR BACKFILL IN TRENCHES THAT HAVE BEEN BLASTED. IF ANY EXISTING SEWER LINES ARE DAMAGED, THE LINES MUST BE REPAIRED AND RETESTED.

10. ALL MANHOLES CONSTRUCTED OR REHABILITATED ON THIS PROJECT MUST HAVE WATERTIGHT SIZE ON SIZE RESILIENT CONNECTORS ALLOWING FOR DIFFERENTIAL SETTLEMENT. IF MANHOLES ARE CONSTRUCTED WITHIN THE 100-YEAR FLOODPLAIN, THE COVER MUST HAVE A GASKET AND BE BOLTED TO THE RING. WHERE GASKETED MANHOLE COVERS ARE REQUIRED FOR MORE THAN THREE MANHOLES IN SEQUENCE OR FOR MORE THAN 1500 FEET, ALTERNATE MEANS OF VENTING WILL BE PROVIDED. BRICKS ARE NOT AN ACCEPTABLE CONSTRUCTION MATERIAL FOR ANY PORTION OF THE MANHOLE.

THE DIAMETER OF THE MANHOLES MUST BE A MINIMUM OF FOUR FEET AND THE MANHOLE FOR ENTRY MUST HAVE A MINIMUM CLEAR OPENING DIAMETER OF 30 INCHES. THESE DIMENSIONS AND OTHER DETAILS SHOWING COMPLIANCE WITH THE COMMISSION'S RULES CONCERNING MANHOLES AND SEWER LINE/MANHOLE INVERTS DESCRIBED IN 30 TAC §217.55 ARE INCLUDED IN THESE PLANS.

IT IS SUGGESTED THAT ENTRANCE INTO MANHOLES IN EXCESS OF FOUR FEET DEEP BE ACCOMPLISHED BY MEANS OF A PORTABLE LADDER. THE INCLUSION OF STEPS IN A MANHOLE IS PROHIBITED.

11. WHERE WATER LINES AND NEW SEWER LINE ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN NINE FEET (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES) THE INSTALLATION MUST MEET THE REQUIREMENTS OF 30 TAC §217.53(D) (PIPE DESIGN) AND 30 TAC §290.44(E) (WATER DISTRIBUTION).

12. WHERE SEWERS LINES DEVIATE FROM STRAIGHT ALIGNMENT AND UNIFORM GRADE ALL CURVATURE OF SEWER PIPE MUST BE ACHIEVED BY THE FOLLOWING PROCEDURE WHICH IS RECOMMENDED BY THE PIPE MANUFACTURER.

IF PIPE FLEXURE IS PROPOSED, THE FOLLOWING METHOD OF PREVENTING DEFLECTION OF THE JOINT MUST BE USED.

SPECIFIC CARE MUST BE TAKEN TO ENSURE THAT THE JOINT IS PLACED IN THE CENTER OF THE TRENCH AND PROPERLY BEDDED IN ACCORDANCE WITH 30 TAC §217.54.

13. NEW SEWAGE COLLECTION SYSTEM LINES MUST BE CONSTRUCTED WITH STUB OUTS FOR THE CONNECTION OF ANTICIPATED EXTENSIONS. THE LOCATION OF SUCH STUB OUTS MUST BE MARKED ON THE GROUND SUCH THAT THEIR LOCATION CAN BE EASILY DETERMINED AT THE TIME OF CONNECTION OF THE EXTENSIONS. SUCH STUB OUTS MUST BE MANUFACTURED WYES OR TEES THAT ARE COMPATIBLE IN SIZE AND MATERIAL WITH BOTH THE SEWER LINE AND THE EXTENSION. AT THE TIME OF ORIGINAL CONSTRUCTION, NEW STUB-OUTS MUST BE CONSTRUCTED SUFFICIENTLY TO EXTEND BEYOND THE END OF THE STREET PAVEMENT. ALL STUB-OUTS MUST BE SEALED WITH A MANUFACTURED CAP TO PREVENT LEAKAGE. EXTENSIONS THAT WERE NOT ANTICIPATED AT THE TIME OF ORIGINAL CONSTRUCTION OR THAT ARE TO BE CONNECTED TO AN EXISTING SEWER LINE NOT FURNISHED WITH STUB OUTS MUST BE CONNECTED USING A MANUFACTURED SADDLE AND IN ACCORDANCE WITH ACCEPTED PLUMBING TECHNIQUES.

IF NO STUB-OUT IS PRESENT AN ALTERNATE METHOD OF JOINING LATERALS IS SHOWN IN THE DETAIL ON PLAN SHEET 50 of 52 (FOR POTENTIAL FUTURE LATERALS).

THE PRIVATE SERVICE LATERAL STUB-OUTS MUST BE INSTALLED AS SHOWN ON THE PLAN AND PROFILE SHEETS ON PLAN SHEET N/A AND MARKED AFTER BACKFILLING AS SHOWN IN THE DETAIL ON PLAN SHEET N/A.

14. TRENCHING, BEDDING AND BACKFILL MUST CONFORM WITH 30 TAC §217.54. THE BEDDING AND BACKFILL FOR FLEXIBLE PIPE MUST COMPLY WITH THE STANDARDS OF ASTM D-2321, CLASSES IA, IB, II OR III. RIGID PIPE BEDDING MUST COMPLY WITH THE REQUIREMENTS OF ASTM C 12 (ANSI A 106.2) CLASSES A, B OR C.

15. SEWER LINES MUST BE TESTED FROM MANHOLE TO MANHOLE. WHEN A NEW SEWER LINE IS CONNECTED TO AN EXISTING STUB OR CLEAN-OUT, IT MUST BE TESTED FROM EXISTING MANHOLE TO NEW MANHOLE. IF A STUB OR CLEAN-OUT IS USED AT THE END OF THE PROPOSED SEWER LINE, NO PRIVATE SERVICE ATTACHMENTS MAY BE CONNECTED BETWEEN THE LAST MANHOLE AND THE CLEANOUT UNLESS IT CAN BE CERTIFIED AS CONFORMING WITH THE PROVISIONS OF 30 TAC §213.5(C)(3)(E).

16. ALL SEWER LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.57. THE ENGINEER MUST RETAIN COPIES OF ALL TEST RESULTS WHICH MUST BE MADE AVAILABLE TO THE EXECUTIVE DIRECTOR UPON REQUEST. THE ENGINEER MUST CERTIFY IN WRITING THAT ALL WASTEWATER LINES HAVE PASSED ALL REQUIRED TESTING TO THE APPROPRIATE REGIONAL OFFICE WITHIN 30 DAYS OF TEST COMPLETION AND PRIOR TO USE OF THE NEW COLLECTION SYSTEM. TESTING METHOD WILL BE:

(a) FOR A COLLECTION SYSTEM PIPE THAT WILL TRANSPORT WASTEWATER BY GRAVITY FLOW, THE DESIGN MUST SPECIFY AN INFILTRATION AND EXFILTRATION TEST OR A LOW-PRESSURE AIR TEST. A TEST MUST CONFORM TO THE FOLLOWING REQUIREMENTS:

(1) LOW PRESSURE AIR TEST.

(A) A LOW PRESSURE AIR TEST MUST FOLLOW THE PROCEDURES DESCRIBED IN AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C-828, ASTM C-924, OR ASTM F-1417 OR OTHER PROCEDURE APPROVED BY THE EXECUTIVE DIRECTOR, EXCEPT AS TO TESTING TIMES AS REQUIRED IN TABLE C.3 IN SUBPARAGRAPH (C) OF THIS PARAGRAPH OR EQUATION C.3 IN SUBPARAGRAPH (B)(II) OF THIS PARAGRAPH.

(B) FOR SECTIONS OF COLLECTION SYSTEM PIPE LESS THAN 36 INCH AVERAGE INSIDE DIAMETER, THE FOLLOWING PROCEDURE MUST APPLY, UNLESS A PIPE IS TO BE TESTED AS REQUIRED BY PARAGRAPH (2) OF THIS SUBSECTION.

(I) A PIPE MUST BE PRESSURIZED TO 3.5 POUNDS PER SQUARE INCH (PSI) GREATER THAN THE PRESSURE EXERTED BY GROUNDWATER ABOVE THE PIPE.

(II) ONCE THE PRESSURE IS STABILIZED, THE MINIMUM TIME ALLOWABLE FOR THE PRESSURE TO DROP FROM 3.5 PSI GAUGE TO 2.5 PSI GAUGE IS COMPUTED FROM THE FOLLOWING EQUATION:

WHERE: $$T = \frac{0.085 \times D \times K}{Q} \qquad \text{(EQ. C.3)}$$

T = TIME FOR PRESSURE TO DROP 1.0 POUND PER SQUARE INCH GAUGE IN SECONDS
K = 0.000419 X D X L, BUT NOT LESS THAN 1.0
D = AVERAGE INSIDE PIPE DIAMETER IN INCHES
L = LENGTH OF LINE OF SAME SIZE BEING TESTED, IN FEET
Q = RATE OF LOSS, 0.0015 CUBIC FEET PER MINUTE PER SQUARE FOOT INTERNAL SURFACE

(C) SINCE A K VALUE OF LESS THAN 1.0 MAY NOT BE USED, THE MINIMUM TESTING TIME FOR EACH PIPE DIAMETER IS SHOWN IN THE FOLLOWING TABLE C.3:

PIPE DIAMETER (INCHES)	MINIMUM TIME (SECONDS)	MAXIMUM LENGTH FOR MINIMUM TIME (FEET)	TIME FOR LONGER LENGTH (SECONDS/FOOT)
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1020	133	7.693
21	1190	114	10.471
24	1360	100	13.676
27	1530	88	17.309
30	1700	80	21.369
33	1870	72	25.856

(D) AN OWNER MAY STOP A TEST IF NO PRESSURE LOSS HAS OCCURRED DURING THE FIRST 25% OF THE CALCULATED TESTING TIME.

(E) IF ANY PRESSURE LOSS OR LEAKAGE HAS OCCURRED DURING THE FIRST 25% OF A TESTING PERIOD, THEN THE TEST MUST CONTINUE FOR THE ENTIRE TEST DURATION AS OUTLINED ABOVE OR UNTIL FAILURE.

(F) WASTEWATER COLLECTION SYSTEM PIPES WITH A 27 INCH OR LARGER AVERAGE INSIDE DIAMETER MAY BE AIR TESTED AT EACH JOINT INSTEAD OF FOLLOWING THE PROCEDURE OUTLINED IN THIS SECTION.

(G) A TESTING PROCEDURE FOR PIPE WITH AN INSIDE DIAMETER GREATER THAN 33 INCHES MUST BE APPROVED BY THE EXECUTIVE DIRECTOR.

(2) INFILTRATION/EXFILTRATION TEST.

(A) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF 2.0 FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE.

(B) AN OWNER SHALL USE AN INFILTRATION TEST IN LIEU OF AN EXFILTRATION TEST WHEN PIPES ARE INSTALLED BELOW THE GROUNDWATER LEVEL.

(C) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE, OR AT LEAST TWO FEET ABOVE EXISTING GROUNDWATER LEVEL, WHICHEVER IS GREATER.

(D) FOR CONSTRUCTION WITHIN A 25-YEAR FLOOD PLAIN, THE INFILTRATION OR EXFILTRATION MUST NOT EXCEED 10 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT THE SAME MINIMUM TEST HEAD AS IN SUBPARAGRAPH (C) OF THIS PARAGRAPH.

(E) IF THE QUANTITY OF INFILTRATION OR EXFILTRATION EXCEEDS THE MAXIMUM QUANTITY SPECIFIED, AN OWNER SHALL UNDERTAKE REMEDIAL ACTION IN ORDER TO REDUCE THE INFILTRATION OR EXFILTRATION TO AN AMOUNT WITHIN THE LIMITS SPECIFIED. AN OWNER SHALL RETEST A PIPE FOLLOWING A REMEDIATION ACTION.

(b) IF A GRAVITY COLLECTION PIPE IS COMPOSED OF FLEXIBLE PIPE, DEFLECTION TESTING IS ALSO REQUIRED. THE FOLLOWING PROCEDURES MUST BE FOLLOWED:

(1) FOR A COLLECTION PIPE WITH INSIDE DIAMETER LESS THAN 27 INCHES, DEFLECTION MEASUREMENT REQUIRES A RIGID MANDREL.

(A) MANDREL SIZING.

(I) A RIGID MANDREL MUST HAVE AN OUTSIDE DIAMETER (OD) NOT LESS THAN 95% OF THE BASE INSIDE DIAMETER (ID) OR AVERAGE ID OF A PIPE, AS SPECIFIED IN THE APPROPRIATE STANDARD BY THE ASTM, AMERICAN WATER WORKS ASSOCIATION, UNI-BELL, OR AMERICAN NATIONAL STANDARDS INSTITUTE, OR ANY RELATED APPENDIX.

(II) IF A MANDREL SIZING DIAMETER IS NOT SPECIFIED IN THE APPROPRIATE STANDARD, THE MANDREL MUST HAVE AN OD EQUAL TO 95% OF THE ID OF A PIPE. IN THIS CASE, THE ID OF THE PIPE, FOR THE PURPOSE OF DETERMINING THE OD OF THE MANDREL, MUST EQUAL BE THE AVERAGE OUTSIDE DIAMETER MINUS TWO MINIMUM WALL THICKNESSES FOR OD CONTROLLED PIPE AND THE AVERAGE INSIDE DIAMETER FOR ID CONTROLLED PIPE.

(III) ALL DIMENSIONS MUST MEET THE APPROPRIATE STANDARD.

(B) MANDREL DESIGN.

(I) A RIGID MANDREL MUST BE CONSTRUCTED OF A METAL OR A RIGID PLASTIC MATERIAL THAT CAN WITHSTAND 200 PSI WITHOUT BEING DEFORMED.

(II) A MANDREL MUST HAVE NINE OR MORE ODD NUMBER OF RUNNERS OR LEGS.

(III) A BARREL SECTION LENGTH MUST EQUAL AT LEAST 75% OF THE INSIDE DIAMETER OF A PIPE.

(IV) EACH SIZE MANDREL MUST USE A SEPARATE PROVING RING.

(C) METHOD OPTIONS.

(I) AN ADJUSTABLE OR FLEXIBLE MANDREL IS PROHIBITED.

(II) A TEST MAY NOT USE TELEVISION INSPECTION AS A SUBSTITUTE FOR A DEFLECTION TEST.

(III) IF REQUESTED, THE EXECUTIVE DIRECTOR MAY APPROVE THE USE OF A DEFLECTOMETER OR A MANDREL WITH REMOVABLE LEGS OR RUNNERS ON A CASE-BY-CASE BASIS.

(2) FOR A GRAVITY COLLECTION SYSTEM PIPE WITH AN INSIDE DIAMETER 27 INCHES AND GREATER, OTHER TEST METHODS MAY BE USED TO DETERMINE VERTICAL DEFLECTION.

(3) A DEFLECTION TEST METHOD MUST BE ACCURATE TO WITHIN PLUS OR MINUS 0.2% DEFLECTION.

(4) AN OWNER SHALL NOT CONDUCT A DEFLECTION TEST UNTIL AT LEAST 30 DAYS AFTER THE FINAL BACKFILL.

(5) GRAVITY COLLECTION SYSTEM PIPE DEFLECTION MUST NOT EXCEED FIVE PERCENT (5%).

(6) IF A PIPE SECTION FAILS A DEFLECTION TEST, AN OWNER SHALL CORRECT THE PROBLEM AND CONDUCT A SECOND TEST AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.

17. ALL MANHOLES MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC §217.58.

(a) ALL MANHOLES MUST PASS A LEAKAGE TEST.

(b) AN OWNER SHALL TEST EACH MANHOLE (AFTER ASSEMBLY AND BACKFILLING) FOR LEAKAGE, SEPARATE AND INDEPENDENT OF THE COLLECTION SYSTEM PIPES, BY HYDROSTATIC EXFILTRATION TESTING, VACUUM TESTING, OR OTHER METHOD APPROVED BY THE EXECUTIVE DIRECTOR.

(1) HYDROSTATIC TESTING.

(A) THE MAXIMUM LEAKAGE FOR HYDROSTATIC TESTING OR ANY ALTERNATIVE TEST METHODS IS 0.025 GALLONS PER FOOT DIAMETER PER FOOT OF MANHOLE DEPTH PER HOUR.

(B) TO PERFORM A HYDROSTATIC EXFILTRATION TEST, AN OWNER SHALL SEAL ALL WASTEWATER PIPES COMING INTO A MANHOLE WITH AN INTERNAL PIPE PLUG, FILL THE MANHOLE WITH WATER, AND MAINTAIN THE TEST FOR AT LEAST ONE HOUR.

(C) A TEST FOR CONCRETE MANHOLES MAY USE A 24-HOUR WETTING PERIOD BEFORE TESTING TO ALLOW SATURATION OF THE CONCRETE.

(2) VACUUM TESTING.

(A) TO PERFORM A VACUUM TEST, AN OWNER SHALL PLUG ALL LIFT HOLES AND EXTERIOR JOINTS WITH A NON-SHRINK GROUT AND PLUG ALL PIPES ENTERING A MANHOLE.

(B) NO GROUT MUST BE PLACED IN HORIZONTAL JOINTS BEFORE TESTING.

(C) STUB-OUTS, MANHOLE BOOTS, AND PIPE PLUGS MUST BE SECURED TO PREVENT MOVEMENT WHILE A VACUUM IS DRAWN.

(D) AN OWNER SHALL USE A MINIMUM 60 INCH/LB TORQUE WRENCH TO TIGHTEN THE EXTERNAL CLAMPS THAT SECURE A TEST COVER TO THE TOP OF A MANHOLE.

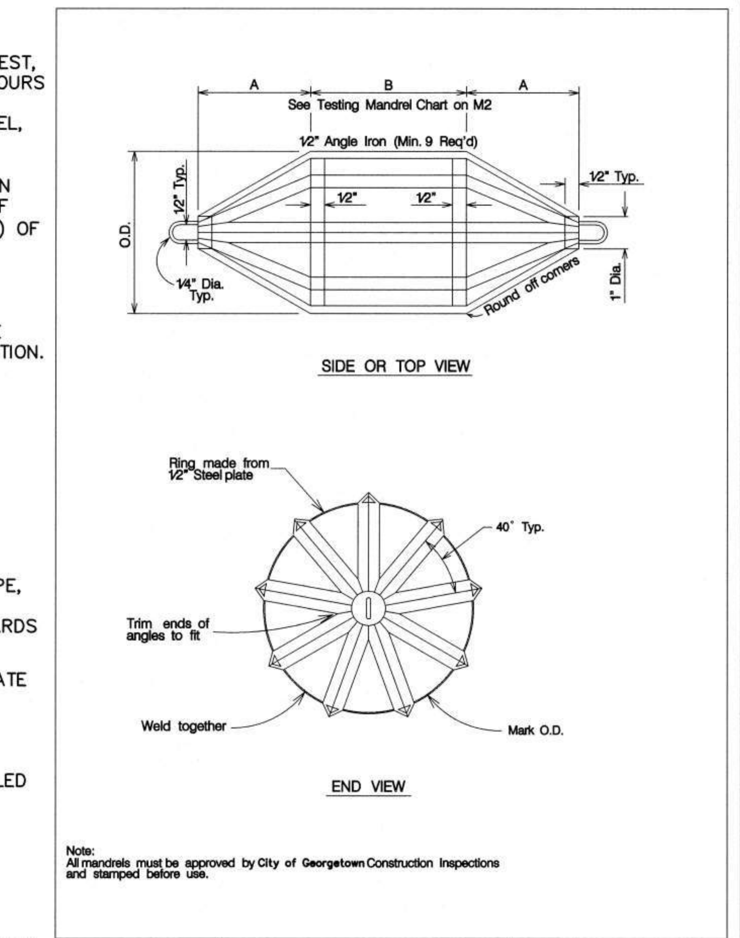
(E) A TEST HEAD MUST BE PLACED AT THE INSIDE OF THE TOP OF A CONE SECTION, AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

(F) THERE MUST BE A VACUUM OF 10 INCHES OF MERCURY INSIDE A MANHOLE TO PERFORM A VALID TEST.

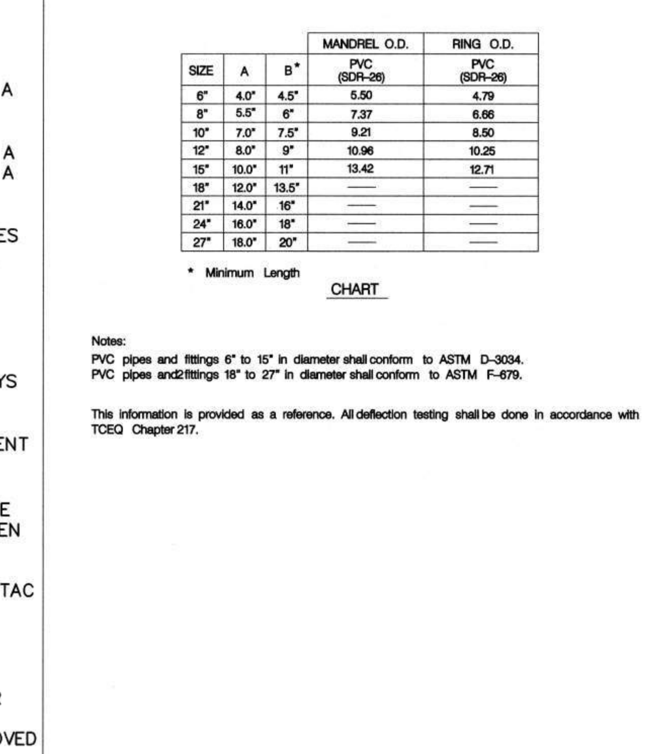
(G) A TEST DOES NOT BEGIN UNTIL AFTER THE VACUUM PUMP IS OFF.

(H) A MANHOLE PASSES THE TEST IF AFTER 2.0 MINUTES AND WITH ALL VALVES CLOSED, THE VACUUM IS AT LEAST 9.0 INCHES OF MERCURY.

18. ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(3)(I). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY INSPECTOR MUST VISUALLY INSPECT THE PRIVATE SERVICE LATERAL AND THE CONNECTION TO THE SEWAGE COLLECTION SYSTEM, AND CERTIFY THAT IT IS CONSTRUCTED IN CONFORMITY WITH THE APPLICABLE PROVISIONS OF THIS SECTION. THE OWNER OF THE COLLECTION SYSTEM MUST MAINTAIN SUCH CERTIFICATIONS FOR FIVE YEARS AND FORWARD COPIES TO THE APPROPRIATE REGIONAL OFFICE UPON REQUEST. CONNECTIONS MAY ONLY BE MADE TO AN APPROVED SEWAGE COLLECTION SYSTEM.



GO, NO GO DEFLECTION TESTING MANDREL | M-1



GO, NO GO DEFLECTION TESTING MANDREL CHART | M-2

BENCHMARKS

COMBINED SCALE FACTOR OF 0.999960001599936.

BENCHMARK #51
SQUARE CUT ON EAST END OF CONCRETE HEADWALL ON THE SOUTH SIDE OF WOLF RANCH PARKWAY.
HEADWALL IS +/-2800 FEET WEST OF THE INTERSECTION OF DB WOODS ROAD AND WOLF RANCH PARKWAY.
TEXAS STATE PLANE, CENTRAL ZONE GRID COORDINATES
NORTHING: 10201550.7
EASTING: 3119247.2
ELEVATION: 850.55
NAVD88 (GEOID 03)

BENCHMARK #109
SET CHISELED SQUARE
ON CURB INLET
GRID NORTHING: 10200751.4'
GRID EASTING: 3120350.9'
ELEVATION = 832.09'
NVDA88 (GEOID 03)

BENCHMARK #108
SET CHISELED SQUARE
ON CURB INLET
GRID NORTHING: 10201296.7'
GM RID EASTING: 3119886.3'
ELEVATION = 845.93'
NVDA88 (GEOID 03)

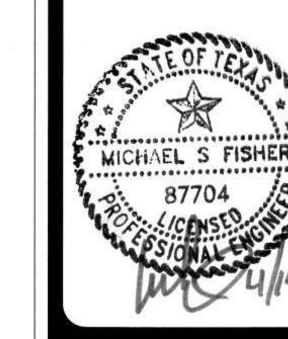
DISTRICT NOTES

1. THE DISTRICT ENGINEER, JONES-HEROY & ASSOCIATES, INC. (PH:512/989-2200) SHALL BE CONTACTED 48 HOURS PRIOR TO:
A) PRE-CONSTRUCTION MEETINGS
B) BEGINNING EACH PHASE OF CONSTRUCTION
C) TESTING OF WATER AND/OR WASTEWATER LINES
D) FINAL WALK-THROUGH OF FACILITIES

2. REVIEW OF THE PLANS BY THE DISTRICT IS LIMITED TO WATER, WASTEWATER AND DRAINAGE AND DOES NOT INDICATE A REVIEW OF THE ADEQUACY OF THE DESIGN FOR THE FACILITIES. IN APPROVING THESE PLANS, THE DISTRICT MUST RELY ON THE ADEQUACY OF THE WORK OF THE DESIGN ENGINEER.

3. NOTE TO MANDATE COMPLIANCE WITH TCEQ RULE 30 TAC SECTION 290.44 RELATED TO SEPARATION OF WATER DISTRIBUTION LINES FROM WASTEWATER LINES MUST APPEAR IN THE PLANS.

NO. | REVISION | DATE



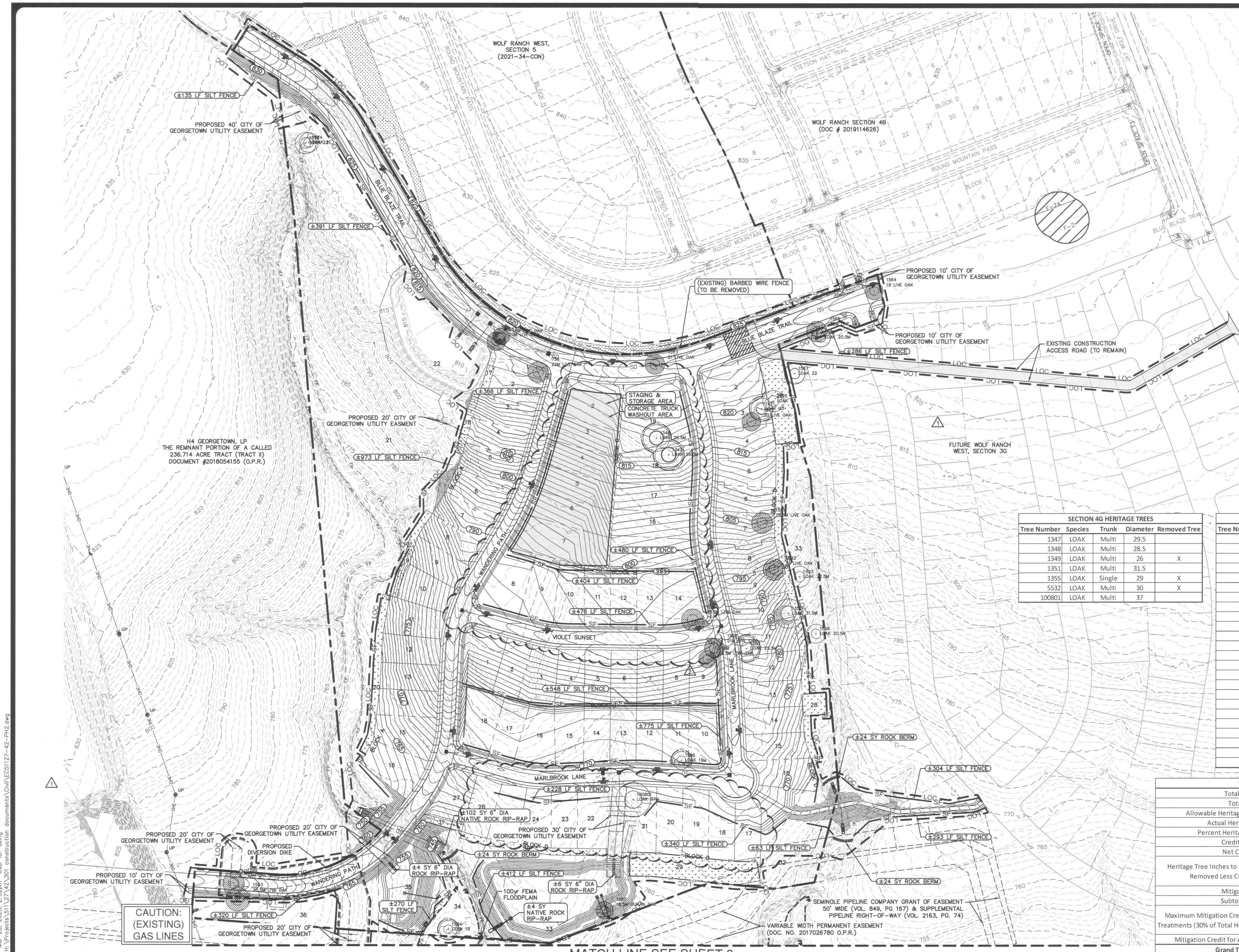
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION NOTES

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 06 OF 61

Date: Mar 20, 2023, 2:50pm User ID: akiing
File: H:\Projects\511\27\42\301 construction documents\Civil\CN51127-42.dwg



SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

TREES TO BE REMOVED

TREES TO BE PROTECTED

LOC — LIMITS OF CONSTRUCTION

SF — SILT FENCE

STABILIZED CONSTRUCTION ENTRANCE

ROCK RIP RAP

ROCK BERM

IP — INLET PROTECTION

PROPOSED CONTOUR LINE

EXISTING CONTOUR LINE

VEGETATIVE FILTER STRIP

DD — DIVERSION DIKE

PROPERTY BOUNDARY

PHASE BOUNDARY

NOTES

1. ANY DIRT, MUD, ROCK, DEBRIS, ETC. THAT IS SPILLED, TRACKED, OR OTHERWISE DEPOSITED ON ANY EXISTING PAVED STREETS SHALL BE CLEANED UP IMMEDIATELY.
2. ALL DISTURBED AREAS SHALL BE REVEGETATED.
3. CONTRACTOR TO PRESERVE ALL TREES OUTSIDE THE LIMITS OF CONSTRUCTION SHOWN ON THIS SHEET.
4. ALL CONSTRUCTION ACCESS SHALL BE PROVIDED THROUGH BLUE BLAZE TRAIL

SECTION 4G HERITAGE TREES

Tree Number	Species	Trunk	Diameter	Removed Tree
1347	LOAK	Multi	29.5	
1348	LOAK	Multi	28.5	
1349	LOAK	Multi	26	X
1351	LOAK	Multi	31.5	
1355	LOAK	Single	29	X
5532	LOAK	Multi	30	X
100801	LOAK	Multi	37	

SECTION 4G PROTECTED TREES

Tree Number	Species	Trunk	Diameter	Removed Tree
756	LOAK	Multi	22	X
757	LOAK	Multi	20	X
758	LOAK	Multi	18	X
1564	LOAK	Single	19	X
1566	LOAK	Multi	22	X
1570	LOAK	Single	23	
1571	LOAK	Single	23	
1572	LOAK	Single	20	X
1573	LOAK	Single	21	X
1574	SOAK	Single	21	
1575	SOAK	Single	23	
1582	LOAK	Multi	23	X
1583	LOAK	Multi	25.5	X
1584	CELM	Single	19	
1585	DOAK	Multi	18.5	X
1586	LOAK	Multi	19	
1587	DOAK	Multi	25.5	
1588	LOAK	Multi	21	X
1589	LOAK	Multi	18.5	X
1590	LOAK	Multi	23.5	X
1591	LOAK	Multi	22.5	X
1592	LOAK	Single	19	X
1593	LOAK	Multi	22.5	
1598	LOAK	Multi	20.5	

Wolf Ranch West Section 4G

Total Heritage Inches		211.5
Total Credit Inches		0.0
Allowable Heritage Tree Removal Inches (20%)		42.3
Actual Heritage Inches Removed		85.0
Percent Heritage Tree Inches Removed		40.19%
Credit Inches Removed		0
Net Credit Tree Inches		0.0
Heritage Tree Inches to be Mitigated (Heritage Tree Inches Removed Less Credit Tree Inches Up to 50%)		85.0
Mitigation Fee Per Inch	$	200.00
Subtotal Mitigation Fee	$	17,000.00
Maximum Mitigation Credit Inches for Aeration and Nutrient Treatments (30% of Total Heritage Mitigation Inches at $150/inch)		25.50
Mitigation Credit for Aeration and Nutrient Treatment	$	5,100.00
Grand Total Mitigation Fee	**$**	**11,900.00**

NO.	REVISION	DATE
1	REVISE LOT LAYOUT	08/11/22
1	PLAN REVISED FOR PHASING	10/14/22
2	REVISE LOT GRADING	02/20/23

STATE OF TEXAS MICHAEL S FISHER 87704 LICENSED PROFESSIONAL ENGINEER 3/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
EROSION CONTROL PLAN 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB

Date: Mar 20, 2023, 2:52pm User ID: dking
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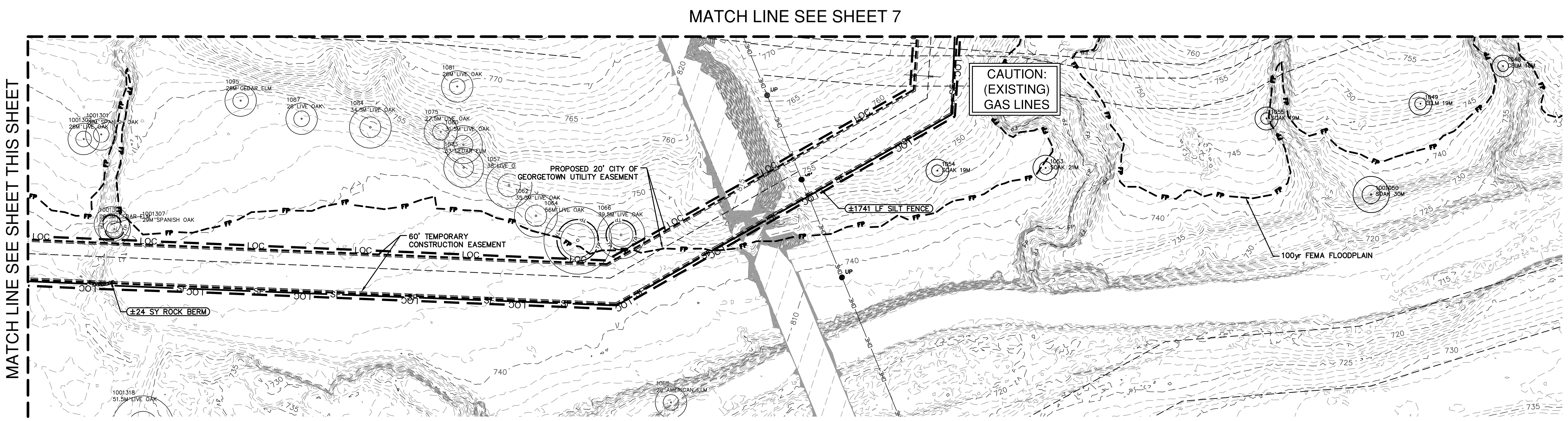

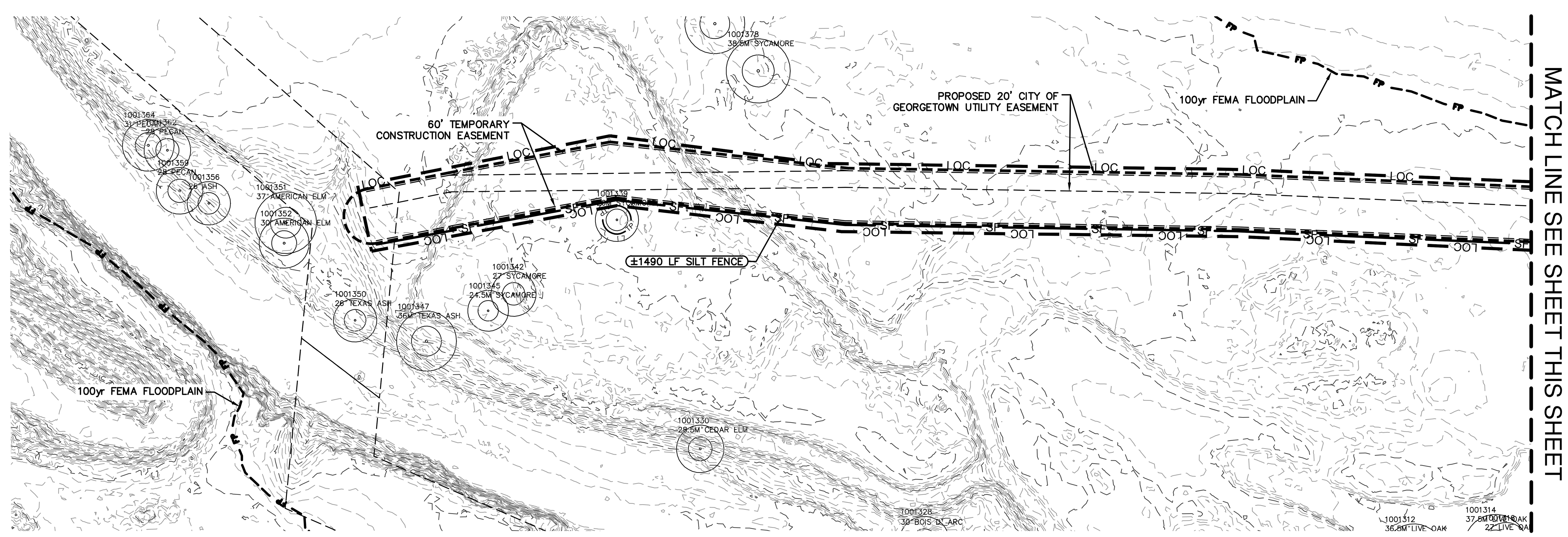

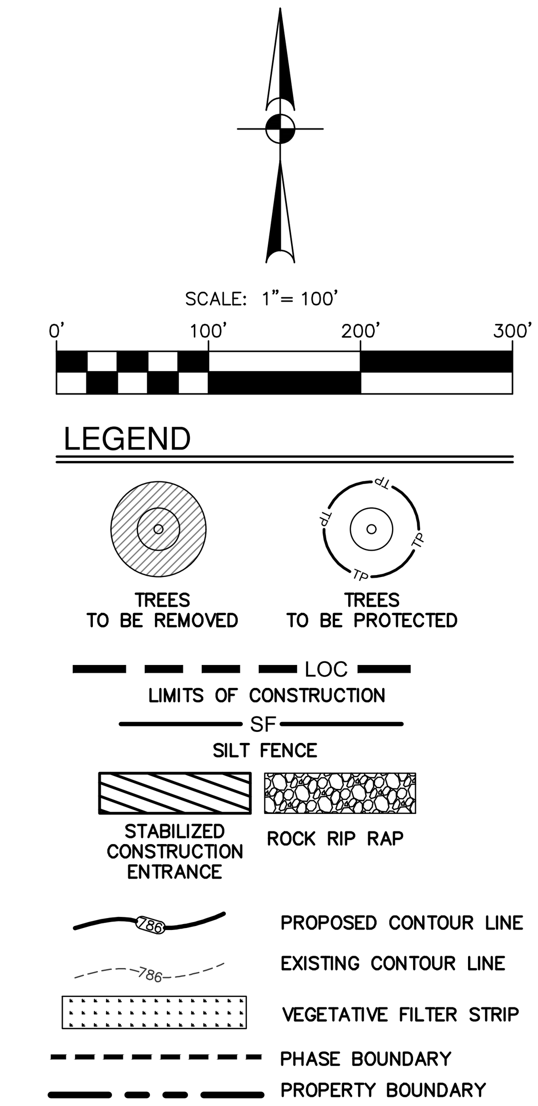

NOTES

1. ANY DIRT, MUD, ROCK, DEBRIS, ETC. THAT IS SPILLED, TRACKED, OR OTHERWISE DEPOSITED ON ANY EXISTING PAVED STREETS SHALL BE CLEANED UP IMMEDIATELY.
2. ALL DISTURBED AREAS SHALL BE REVEGETATED.
3. CONTRACTOR TO PRESERVE ALL TREES OUTSIDE THE LIMITS OF CONSTRUCTION SHOWN ON THIS SHEET.
4. ALL CONSTRUCTION ACCESS SHALL BE PROVIDED THROUGH THE EXISTING CONSTRUCTION DRIVE ON JAY WOLF DRIVE.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
–	PLAN REVISED FOR PHASING	10/14/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
4/14/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

EROSION CONTROL PLAN 2 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE April 18, 2023
DESIGNER DB
CHECKED JF DRAWN DB

Date: Apr 18, 2023, 1:52pm User ID: oconner
File: H:\Projects\511\27\42\301 Construction Documents\Civil\EC51127-42-PH2.dwg

LEGEND

- TREES TO BE REMOVED
- TREES TO BE PROTECTED
- LOC — LIMITS OF CONSTRUCTION
- SF — SILT FENCE
- STABILIZED CONSTRUCTION ENTRANCE
- ROCK RIP RAP
- ROCK BERM
- IP — INLET PROTECTION
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- VEGETATIVE FILTER STRIP
- DD — DIVERSION DIKE
- PROPERTY BOUNDARY
- PHASE BOUNDARY

NOTES

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758	LOAK	Multi	18	X
1564	LOAK	Single	19	X
1566	LOAK	Multi	22	X
1570	LOAK	Single	23	
1571	LOAK	Single	23	
1572	LOAK	Single	20	X
1573	LOAK	Single	21	X
1574	SOAK	Single	21	
1575	SOAK	Single	23	
1582	LOAK	Multi	23	X
1583	LOAK	Multi	25.5	X
1584	CELM	Single	19	
1585	DOAK	Multi	18.5	X
1586	LOAK	Multi	19	
1587	DOAK	Multi	25.5	
1588	LOAK	Multi	21	X
1589	LOAK	Multi	18.5	X
1590	LOAK	Multi	23.5	X
1591	LOAK	Multi	22.5	X
1592	LOAK	Single	19	X
1593	LOAK	Multi	22.5	
1598	LOAK	Multi	20.5	

Wolf Ranch West Section 4G

Total Heritage Inches		211.5
Total Credit Inches		0.0
Allowable Heritage Tree Removal Inches (20%)		42.3
Actual Heritage Inches Removed		85.0
Percent Heritage Tree Inches Removed		40.19%
Credit Inches Removed		0
Net Credit Tree Inches		0.0
Heritage Tree Inches to be Mitigated (Heritage Tree Inches Removed Less Credit Tree Inches Up to 50%)		85.0
Mitigation Fee Per Inch	$	200.00
Subtotal Mitigation Fee	$	17,000.00
Maximum Mitigation Credit Inches for Aeration and Nutrient Treatments (30% of Total Heritage Mitigation Inches at $150/inch)		25.50
Mitigation Credit for Aeration and Nutrient Treatment	$	5,100.00
Grand Total Mitigation Fee	**$**	**11,900.00**

NO.	REVISION	DATE
2	SHEET ADDED	02/20/23

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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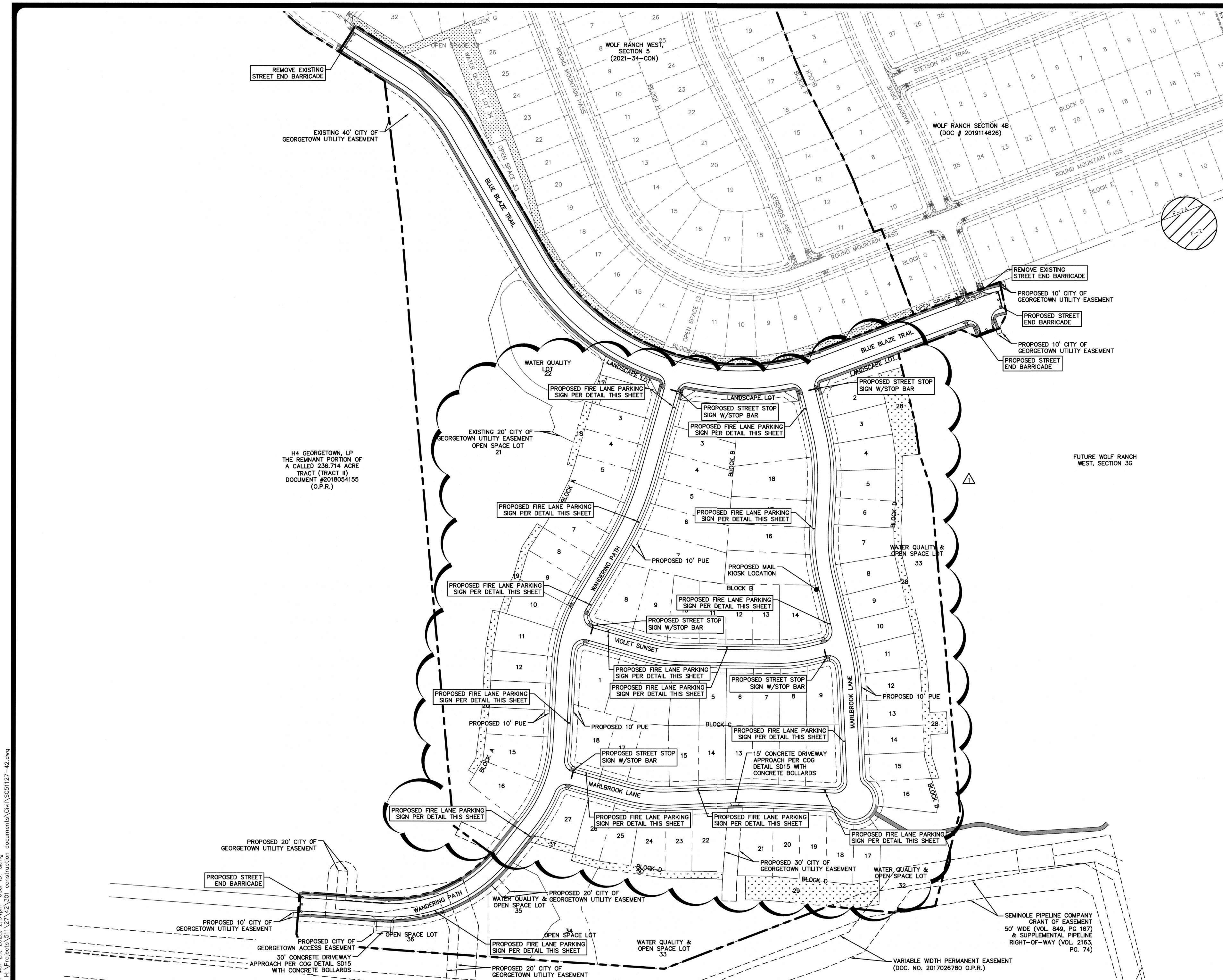
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

POST CONSTRUCTION EROSION CONTROL PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 09 OF 61



LEGEND

- SIDEWALK THIS CONTRACT (5' UNLESS OTHERWISE NOTED)
- SIDEWALK TO BE BUILT BY THE HOMEBUILDER
- SIGN POST
- BARRICADE
- ADA RAMP
- STOP BAR
- PROPERTY BOUNDARY
- VEGETATIVE FILTER STRIP
- WALL AND FENCING

SIGNAGE NOTES:

1. STREET SIGNS TO INCLUDE BLOCK NUMBERS.
2. ALL SIGNAGE AND STRIPING TO COMPLY WITH THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
3. SIDEWALKS ARE 5' WIDE UNLESS OTHERWISE NOTED.
4. REFERENCE SHEET 56 FOR CUSTOM STREET SIGN DETAIL.
5. ON SUBDIVISION STREETS WHERE PARKING IS NOT ALLOWED ON ONE SIDE OR BOTH SIDES OF THE STREET, FIRE LANES ARE REQUIRED AND SHALL BE MARKED AND MAINTAINED IN THE FOLLOWING MANNER:
   5.1. A SIGN 12-INCHES WIDE AND 18-INCHES IN HEIGHT WITH RED LETTING ON A WHITE REFLECTIVE BACKGROUND AND BORDER IN RED STATING "FIRE LANE – TOW AWAY ZONE", ALONG WITH THE WORDS "THIS SIDE OF THE STREET". THE WORDS "FIRE LANE" BY THEMSELVES ARE NOT ACCEPTABLE. SIGN SHALL BE MOUNTED CONSPICUOUSLY ALONG THE EDGE OF THE FIRE LANE. SIGN MUST BE AT THE BEGINNING OF A STREET AND SPACED NO MORE THAN 250 FEET APART AT A MINIMUM HEIGHT OF 7 FEET ABOVE FINISHED GRADE. THIS PROJECT WILL ONLY HAVE PARKING ON ONE SIDE OF THE ROAD.

SIDEWALK NOTES:

1. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
2. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.
3. REFER TO TYPICAL CURB RAMP AND PEDESTRIAN CROSSING DETAIL FOR CURB RAMP LOCATION AND PEDESTRIAN CROSSING REQUIREMENTS. ALL CURB RAMPS ARE TYPE I CURB RAMPS UNLESS OTHERWISE NOTED.

LIGHTING NOTES:

1. STREETLIGHTS TO BE SELUX CATALOG NUMBER SACL-R3-1-5G105-40-18-BK-120-PCT. STREETLIGHT POLE TO BE SELUX CATALOG NUMBER S35-16-BK. STREETLIGHTS TO MATCH WOLF RANCH WEST, SECTION 1A STREETLIGHTS. PHOTOCELLS TO BE INCLUDED WITH STREETLIGHT INSTALLATION.
2. STREET LIGHTS SHALL NOT BE CONSTRUCTED IN THE SIDEWALK.

FIRE LANE PARKING SIGN DETAIL

NOTE:
- A SIGN 12-INCHES WIDE & 18-INCHES IN HEIGHT WITH RED LETTERING ON A WHITE REFLECTIVE BACKGROUND AND BORDER IN RED STATING "FIRE LANE – TOW AWAY ZONE", ALONG WITH "THIS SIDE OF THE STREET" OR "BOTH SIDES OF THE STREET"
- THE WORDS "FIRE LANE" BY THEMSELVES ARE NOT ACCEPTABLE
- SIGN SHALL BE MOUNTED CONSPICUOUSLY ALONG THE EDGE OF THE FIRE LANE. SIGN MUST BE AT THE BEGINNING OF THE STREET AND SPACED NO MORE THAN 250-FEET APART AT A MINIMUM HEIGHT OF 7-FEET ABOVE FINISHED GRADE

NO.	REVISION	DATE
1	REVISE LOT LAYOUT	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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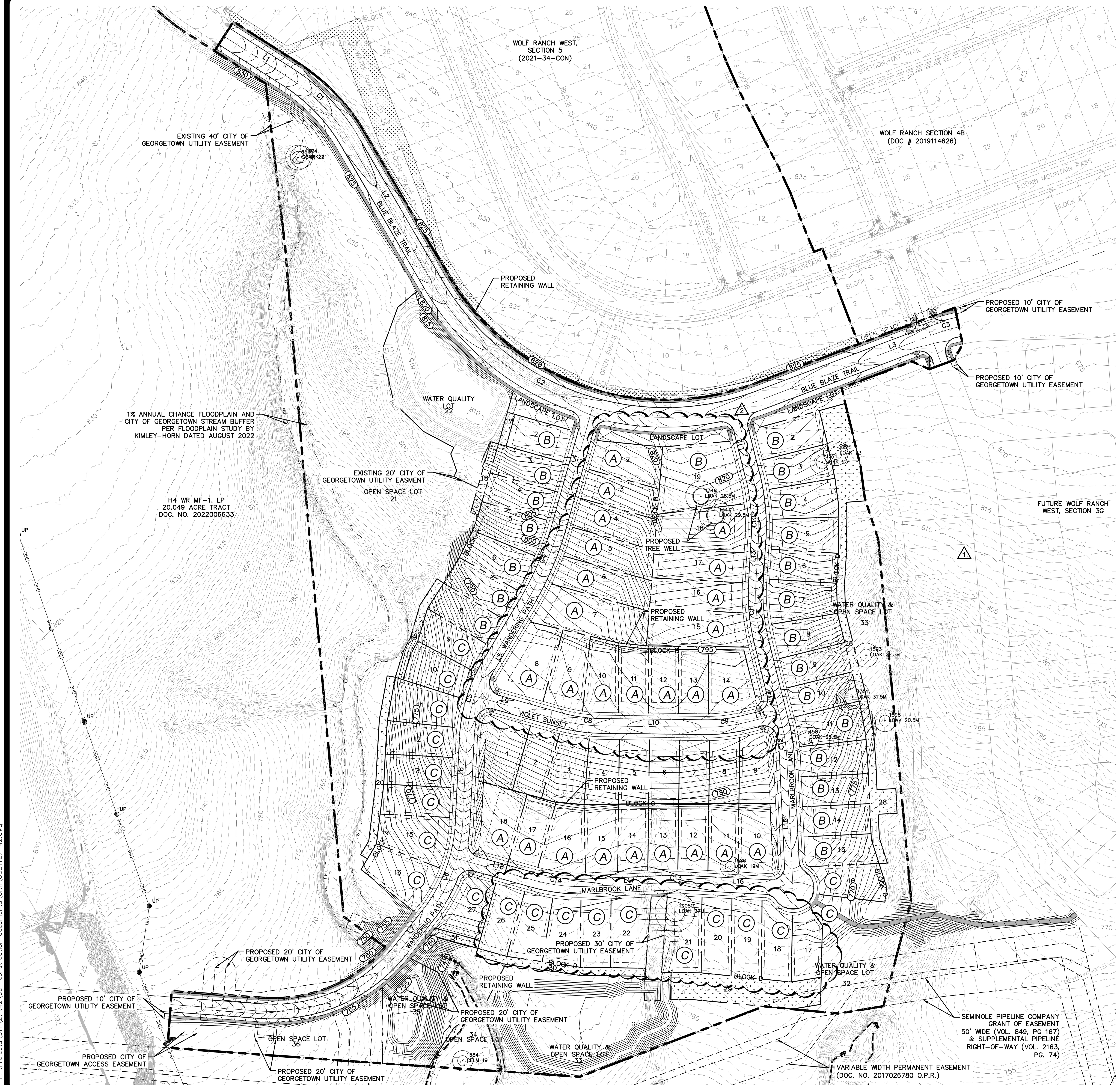
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
SIGNAGE & STRIPING PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 10 OF 61

Date: Mar 20, 2023, 2:54pm User ID: okling
File: H:\Projects\511\27\42\301 construction documents\Civil\SG51127-42.dwg



SCALE: 1"= 100'

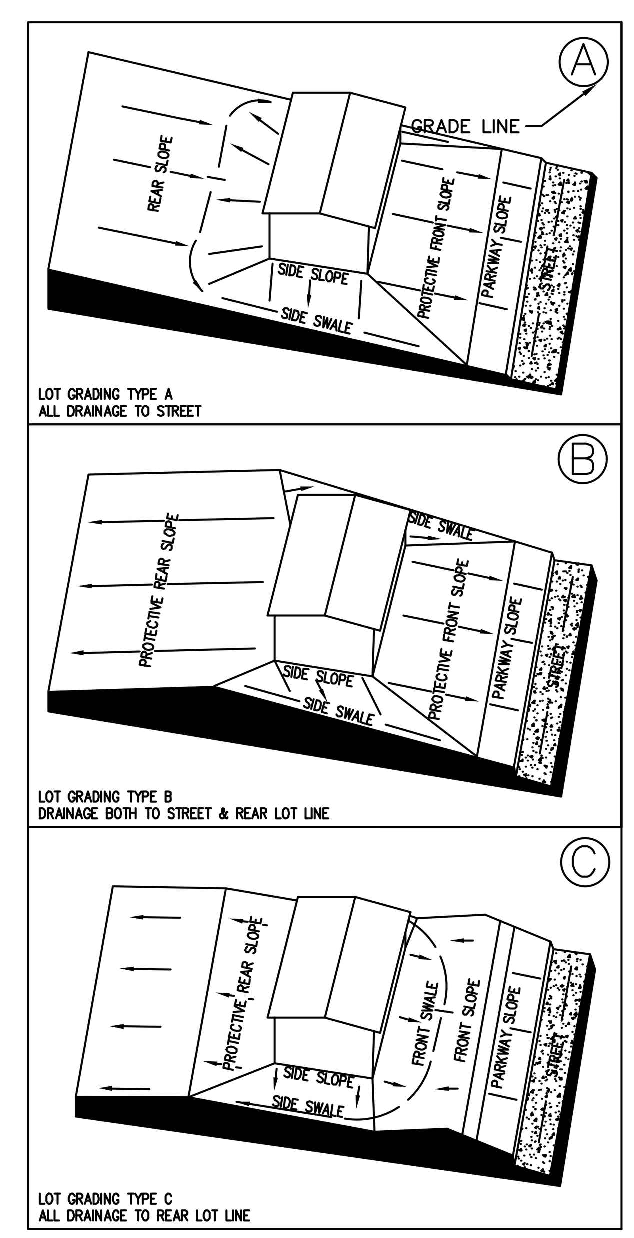
0' 100' 200' 300'

LEGEND

PROPOSED CONTOUR LINE
EXISTING CONTOUR LINE
VEGETATIVE FILTER STRIP
PROPERTY BOUNDARY
100-YR FEMA FLOODPLAIN
WALL
HERITAGE TREES
CREDIT TREES

NOTES:

1. ANY DIRT, MUD, ROCK, DEBRIS, ETC. THAT IS SPILLED, TRACKED, OR OTHERWISE DEPOSITED ON ANY EXISTING PAVED STREETS SHALL BE CLEANED UP IMMEDIATELY.
2. ALL DISTURBED AREAS SHALL BE REVEGETATED.
3. CONTRACTOR TO PRESERVE ALL TREES OUTSIDE THE LIMITS OF CONSTRUCTION SHOWN ON THIS SHEET.
4. PAD GRADING, INCLUDING SIDE SWALES, WILL BE PROVIDED BY THE HOME BUILDERS IN CONFORMANCE WITH THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT LAND PLANNING PRINCIPLES FOR HOME MORTGAGE INSURANCE HANDBOOK SECTION 4140.1 FIGURE CC. LOT GRADING TYPE A: ALL DRAINAGE TO STREET, FIGURE DD. LOT GRADING TYPE B: DRAINAGE BOTH TO STREET AND TO REAR LOT LINE, AND FIGURE EE. LOT GRADING TYPE C: ALL DRAINAGE TO REAR LOT LINE.



LINE TABLE

LINE #	LENGTH	BEARING
L1	142.39'	S57°26'03"E
L2	308.44'	S30°17'00"E
L3	348.49'	N69°16'40"E
L4	229.07'	S15°41'54"W
L5	127.38'	S31°03'49"W
L6	156.83'	S02°49'34"W
L7	83.99'	S38°15'29"W
L9	163.57'	N74°19'42"W
L10	193.27'	N89°17'51"W
L11	65.06'	S76°07'14"W
L12	128.54'	N14°02'39"W
L13	78.54'	N03°21'01"E
L14	159.05'	N13°52'46"W
L15	241.75'	N02°40'38"W
L16	199.83'	S87°00'00"E
L17	156.81'	N87°27'48"E
L18	151.75'	S74°19'42"E

CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C1	350.00'	027°09'03"	S43°51'32"E	164.31'	165.85'
C2	500.00'	080°26'19"	S70°30'10"E	645.72'	701.96'
C3	300.00'	008°44'20"	N73°38'50"E	45.71'	45.76'
C4	600.00'	015°21'54"	S23°22'52"W	160.42'	160.90'
C5	300.00'	028°14'15"	S16°56'41"W	146.36'	147.85'
C6	300.00'	035°25'55"	S20°32'31"W	182.58'	185.52'
C8	300.00'	014°58'08"	N81°48'47"W	78.15'	78.38'
C9	300.00'	014°34'55"	S83°24'42"W	76.15'	76.35'
C10	400.00'	017°23'40"	N05°20'49"W	120.97'	121.44'
C11	375.00'	017°13'47"	N05°15'52"W	112.34'	112.77'
C12	325.00'	011°12'08"	N08°16'42"W	63.44'	63.54'
C13	300.00'	005°32'12"	S89°46'06"E	28.98'	28.99'
C14	300.00'	018°12'29"	S83°25'57"E	94.94'	95.34'

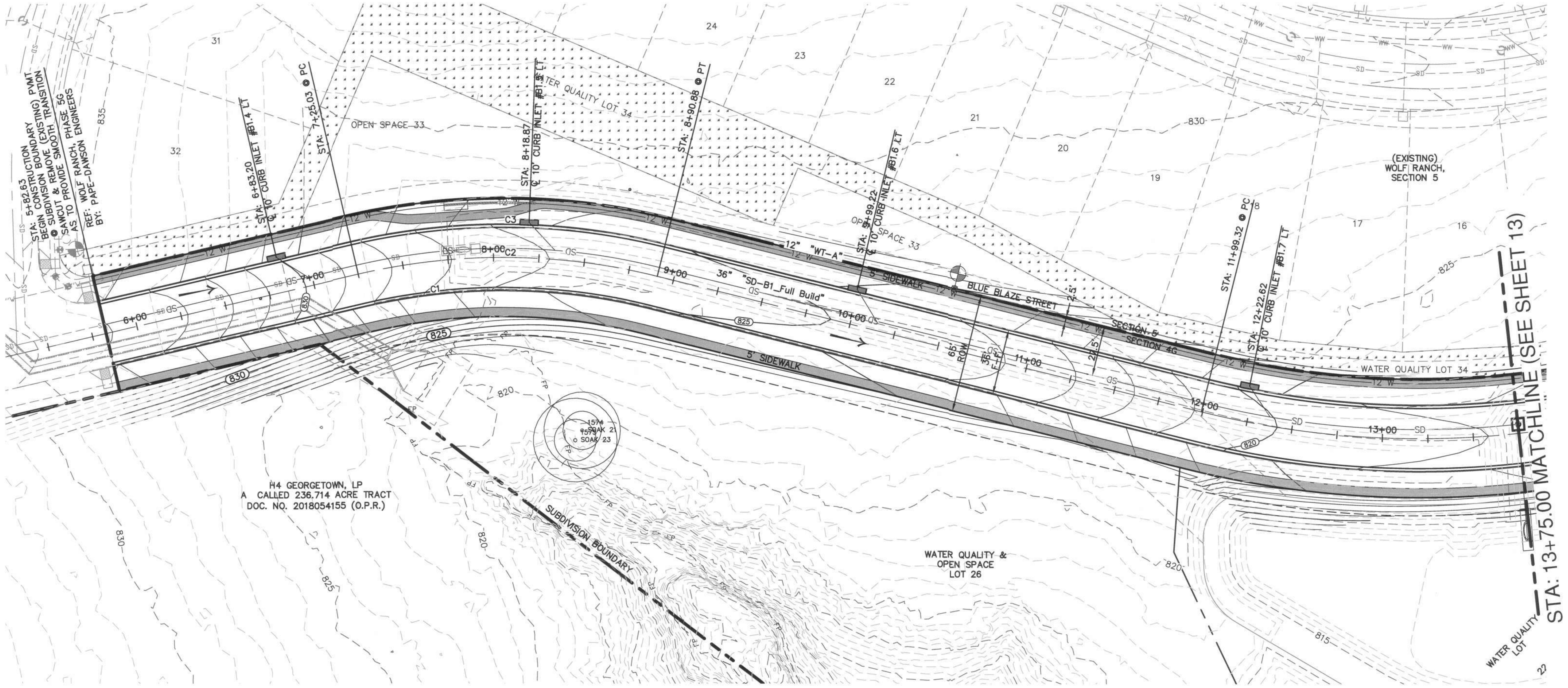
NO.	REVISION	DATE
1	REVISE LOT LAYOUT & GRADING	08/11/22
2	REVISE GRADING	02/20/23

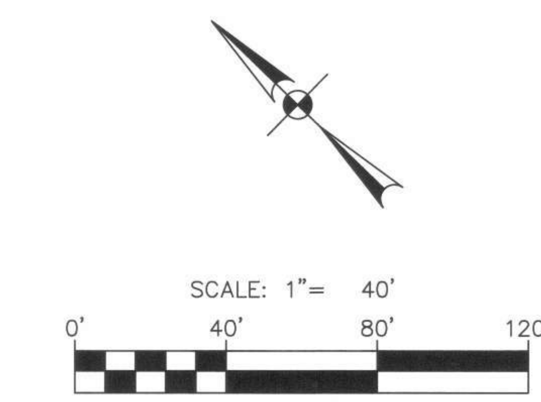
STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL GRADING PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE May 8, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 11 OF 61





LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

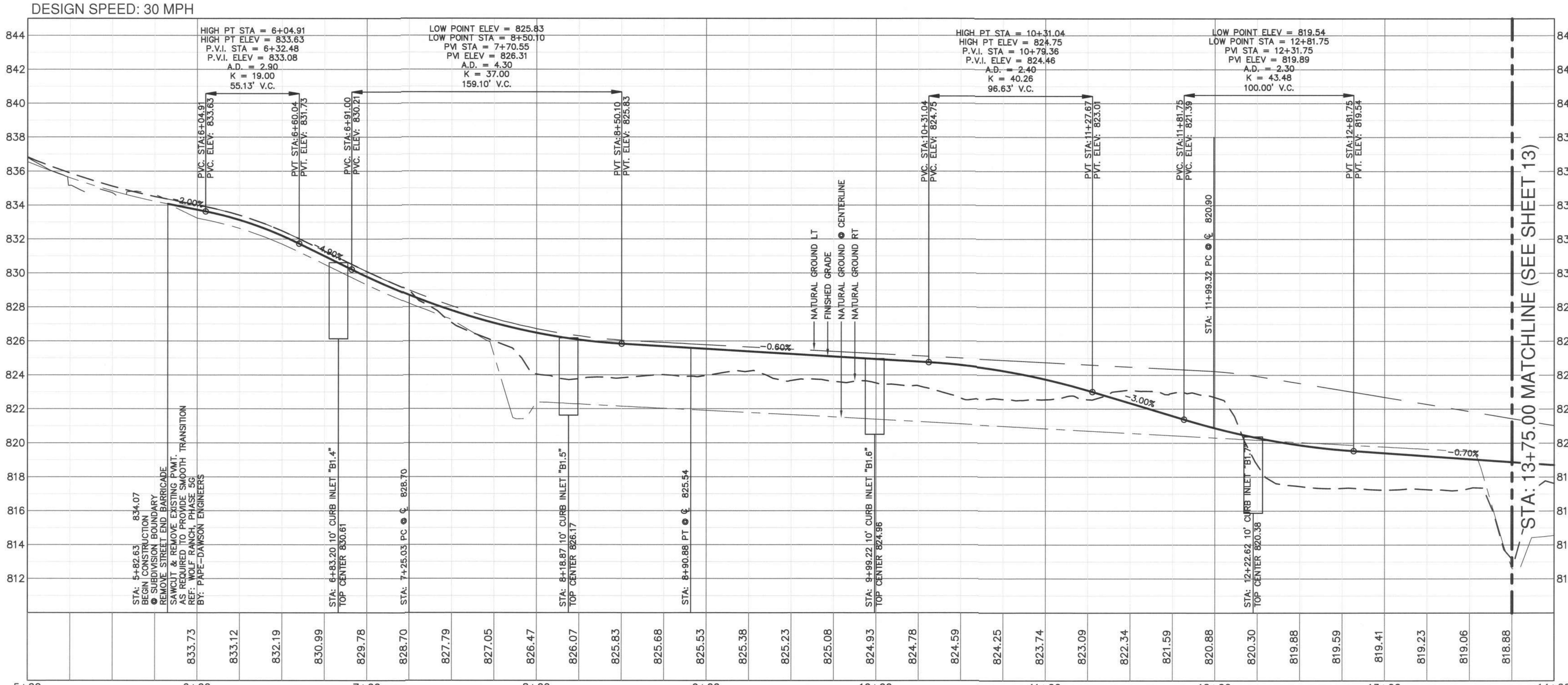
PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND RT @ ROW
- NATURAL GROUND LT @ ROW
- NATURAL GROUND @ CENTER LINE
- PROPOSED GRADELINE @ TOP OF CURB (TC)

DESIGN SPEED: 30 MPH



CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C1	332.00'	027°09'03"	N43°51'32"W	155.86'	157.33'
C2	350.00'	027°09'03"	N43°51'32"W	164.31'	165.85'
C3	368.00'	027°09'03"	N43°51'32"W	172.76'	174.38'
C4	518.00'	039°57'08"	S50°15'34"E	353.93'	361.20'
C5	500.00'	080°26'19"	S70°30'10"E	645.72'	701.96'
C6	482.00'	080°26'19"	S70°30'10"E	622.47'	676.69'

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

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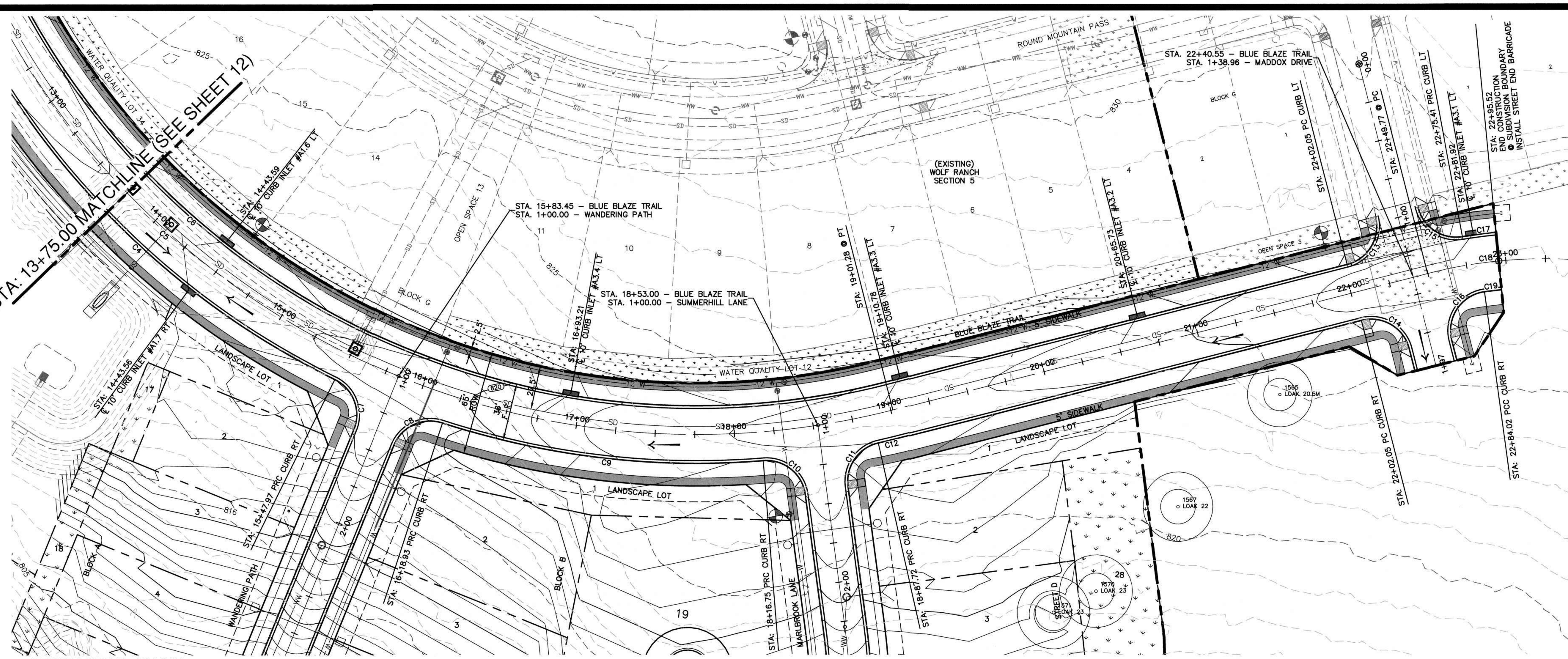
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

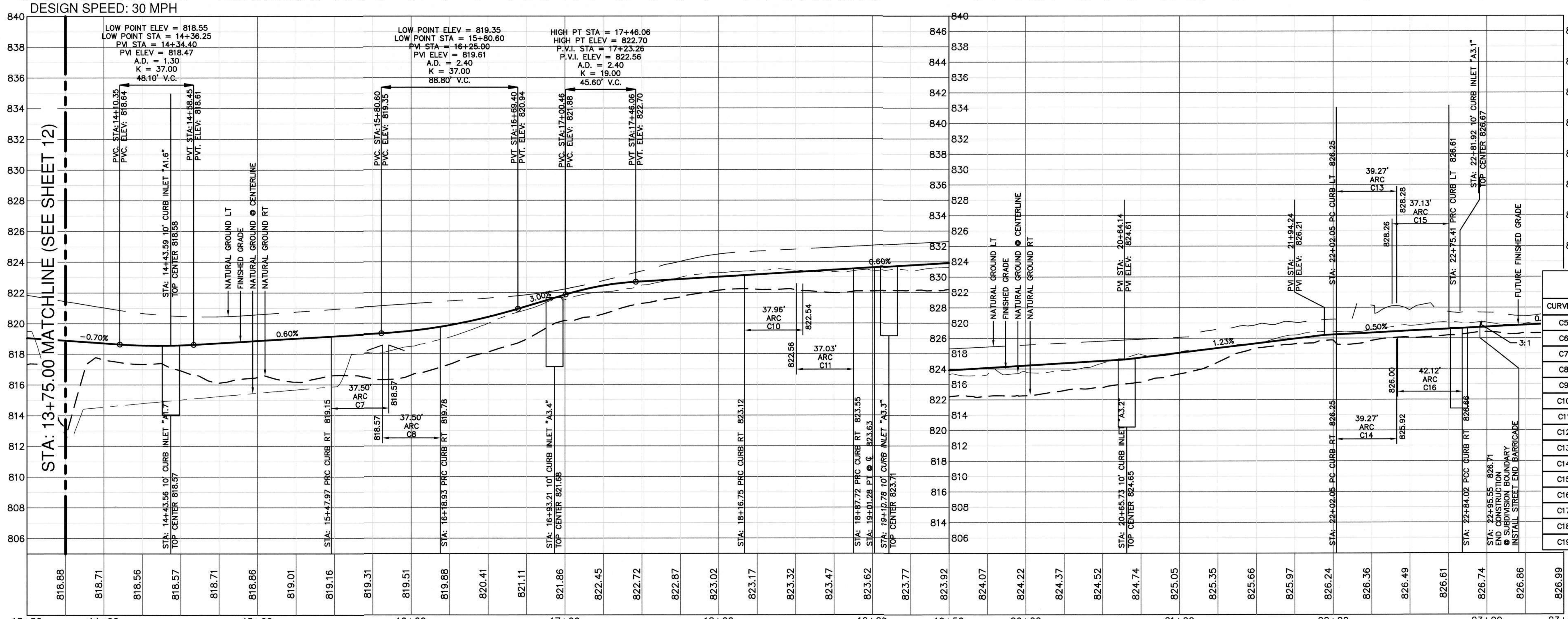
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
BLUE BLAZE TRAIL (1 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 12 OF 61



DESIGN SPEED: 30 MPH



LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

SCALE: 1" = 40'

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND RT @ ROW
- NATURAL GROUND LT @ ROW
- NATURAL GROUND @ CENTER LINE
- PROPOSED GRADELINE @ TOP OF CURB (TC)

CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C5	500.00'	080°26'19"	S70°30'10"E	645.72'	701.96'
C6	482.00'	080°26'19"	S70°30'10"E	622.47'	676.69'
C7	25.00'	085°56'03"	N27°16'07"W	34.08'	37.50'
C8	25.00'	085°56'03"	S58°39'56"W	34.08'	37.50'
C9	518.00'	022°40'06"	S89°42'05"E	203.60'	204.94'
C10	25.00'	086°59'29"	N57°32'23"W	34.42'	37.96'
C11	25.00'	084°52'32"	S28°23'37"W	33.74'	37.03'
C12	518.00'	001°33'13"	N70°03'17"E	14.05'	14.05'
C13	25.00'	090°00'00"	N24°16'40"E	35.36'	39.27'
C14	25.00'	090°00'00"	N65°43'20"W	35.36'	39.27'
C15	25.00'	085°06'10"	S63°16'25"E	33.81'	37.13'
C16	25.00'	096°32'32"	S27°32'56"W	37.32'	42.12'
C17	318.00'	003°50'30"	S76°05'45"W	21.32'	21.32'
C18	300.01'	008°44'18"	S73°38'50"W	45.71'	45.76'
C19	282.00'	002°11'48"	S76°55'06"W	10.81'	10.81'

NO.	REVISION	DATE

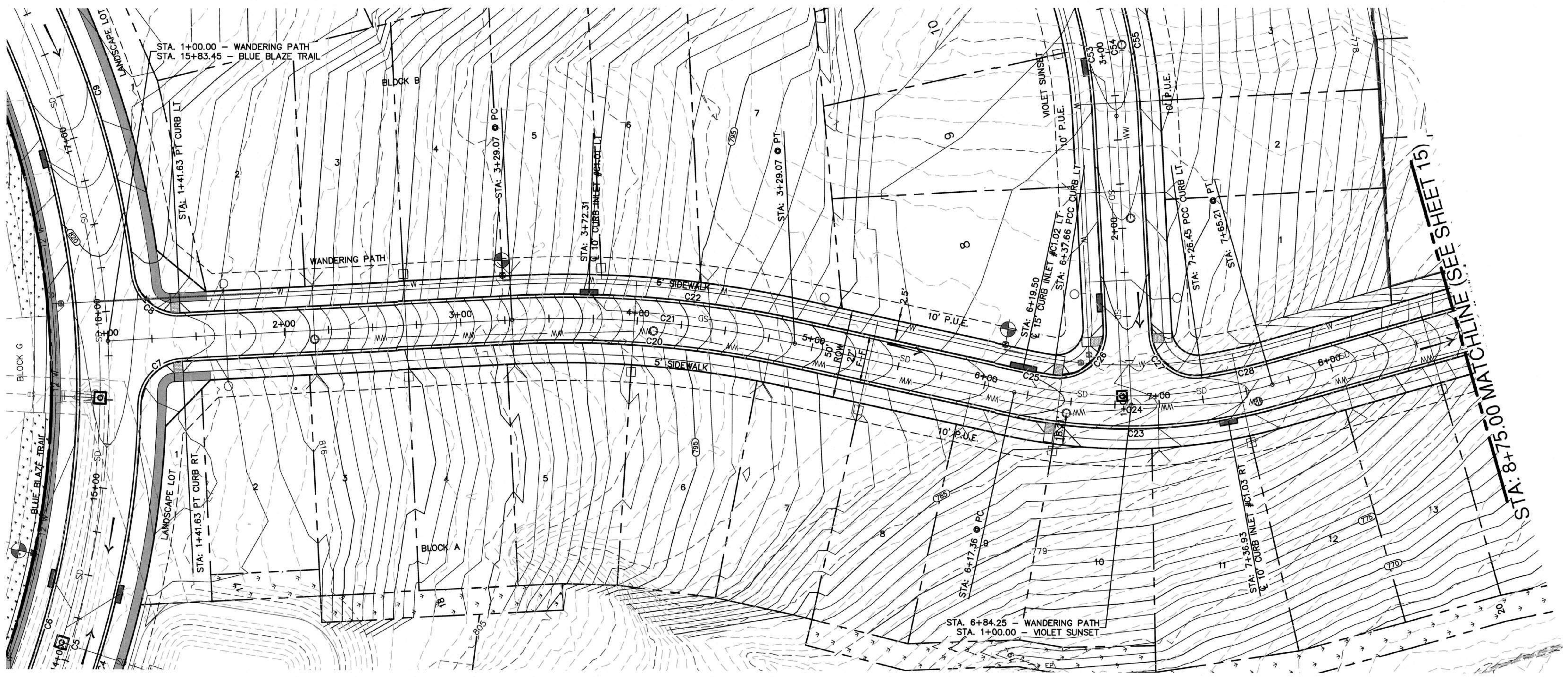
STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
3/20/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
BLUE BLAZE TRAIL (2 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 13 OF 61



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE

HERITAGE TREES CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

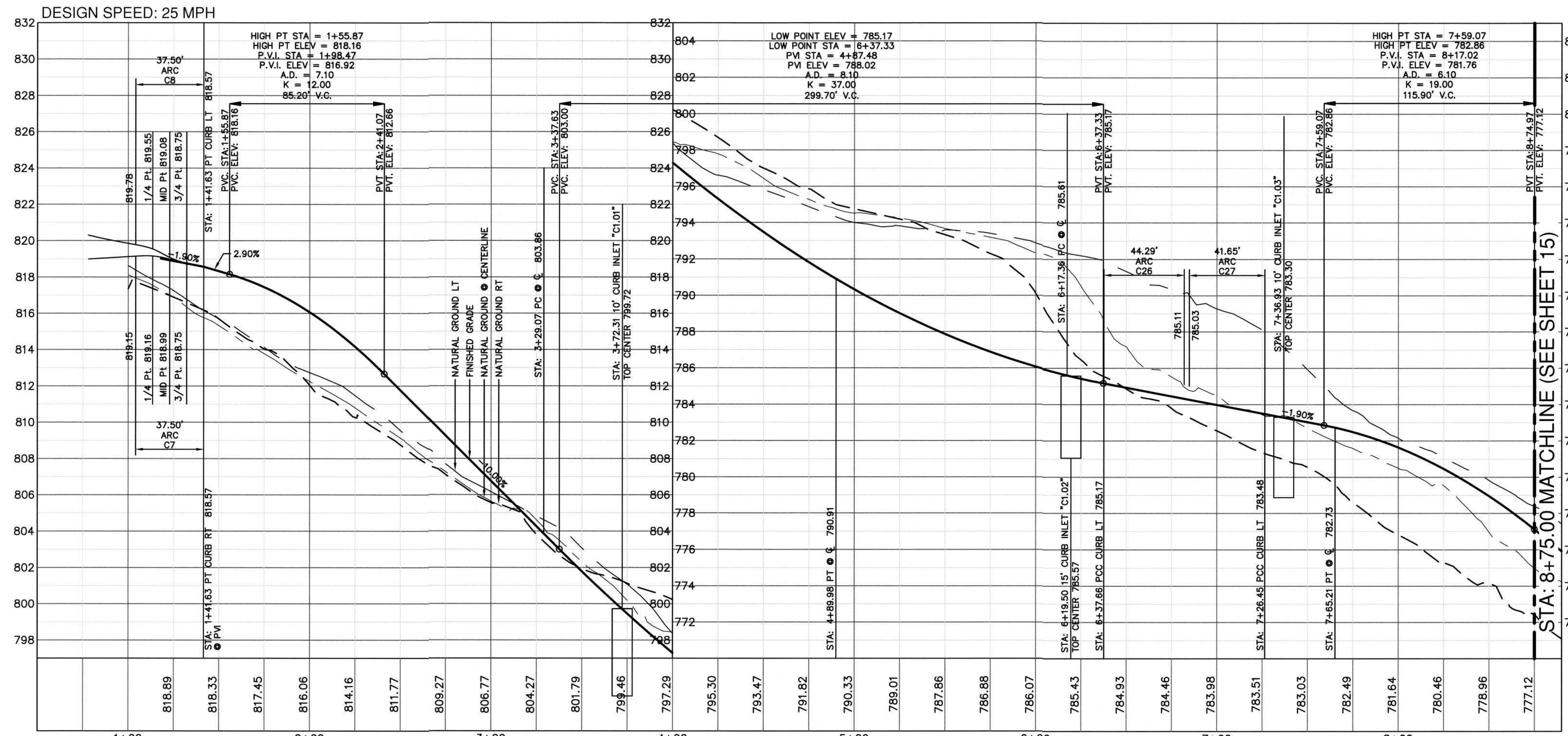
PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND RT @ ROW
NATURAL GROUND LT @ ROW
NATURAL GROUND @ CENTER LINE
PROPOSED GRADELINE @ TOP OF CURB (TC)

DESIGN SPEED: 25 MPH



CURVE TABLE					
CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C7	25.00'	085°56'03"	N27°16'07"W	34.08'	37.50'
C8	25.00'	085°56'03"	S58°39'56"W	34.08'	37.50'
C20	586.50'	015°21'54"	N23°22'52"E	156.81'	157.28'
C21	600.00'	015°21'54"	N23°22'52"E	160.42'	160.90'
C22	613.50'	015°21'54"	N23°22'52"E	164.03'	164.52'
C23	313.50'	028°14'15"	S16°56'41"W	152.95'	154.50'
C24	300.00'	028°14'15"	S16°56'41"W	146.36'	147.85'
C25	286.50'	003°52'42"	S29°07'28"W	19.39'	19.39'
C26	25.00'	101°30'50"	S23°34'18"E	38.72'	44.29'
C27	25.00'	095°26'34"	S57°57'01"W	36.99'	41.64'
C28	286.50'	007°24'10"	S06°31'39"W	36.99'	37.02'

NO. REVISION DATE

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
WANDERING PATH (1 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 14 OF 61

Date: Mar 20, 2023, 3:01pm User ID: dking
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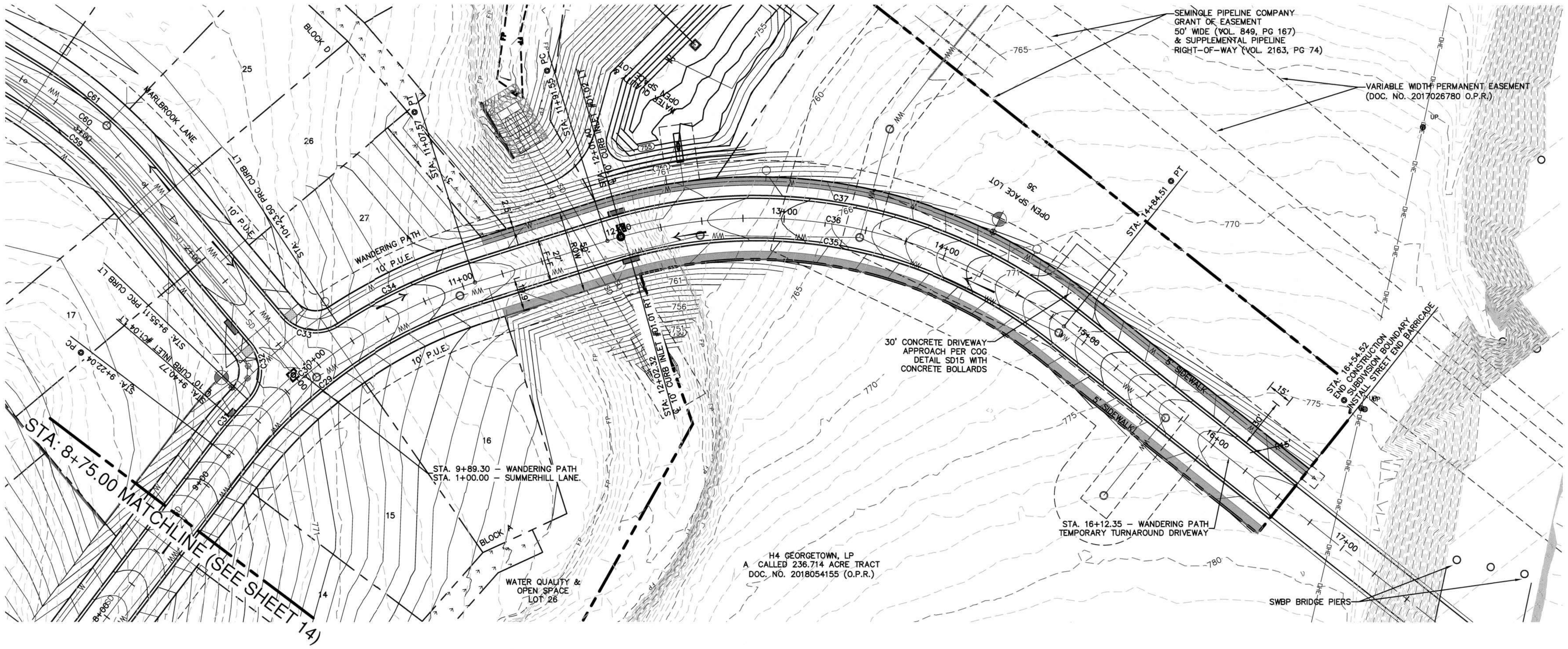


SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- OVER HEAD EQUIPMENT
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

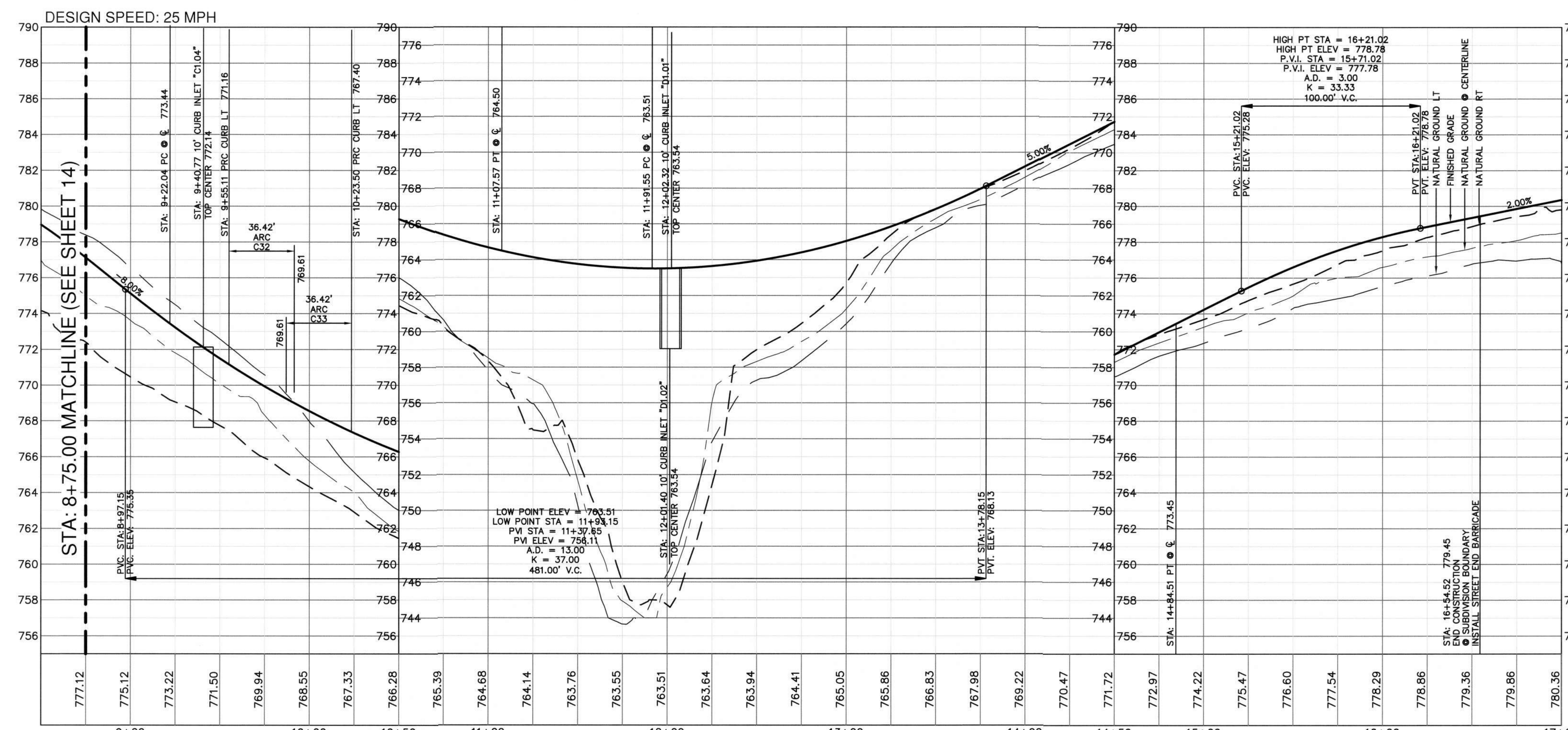
PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND RT @ ROW
- NATURAL GROUND LT @ ROW
- NATURAL GROUND @ CENTER LINE
- PROPOSED GRADELINE @ TOP OF CURB (TC)

DESIGN SPEED: 25 MPH



CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C29	286.50'	035°25'55"	N20°32'31"E	174.36'	177.17'
C30	300.00'	035°25'55"	N20°32'31"E	182.58'	185.52'
C31	313.50'	006°18'53"	N05°59'00"E	34.53'	34.55'
C32	25.00'	083°28'09"	S32°35'38"E	33.28'	36.42'
C33	25.00'	083°28'09"	S63°56'13"W	33.28'	36.42'
C34	313.50'	016°03'20"	N30°13'49"E	87.56'	87.85'
C35	286.50'	055°57'05"	N66°14'01"E	268.79'	279.78'
C36	300.00'	055°57'05"	N66°14'01"E	281.46'	292.96'
C37	313.50'	055°57'05"	N66°14'01"E	294.12'	306.14'

NO. | REVISION | DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
WANDERING PATH (2 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 15 OF 61

Date: Mar 20, 2023, 3:02pm User ID: aking
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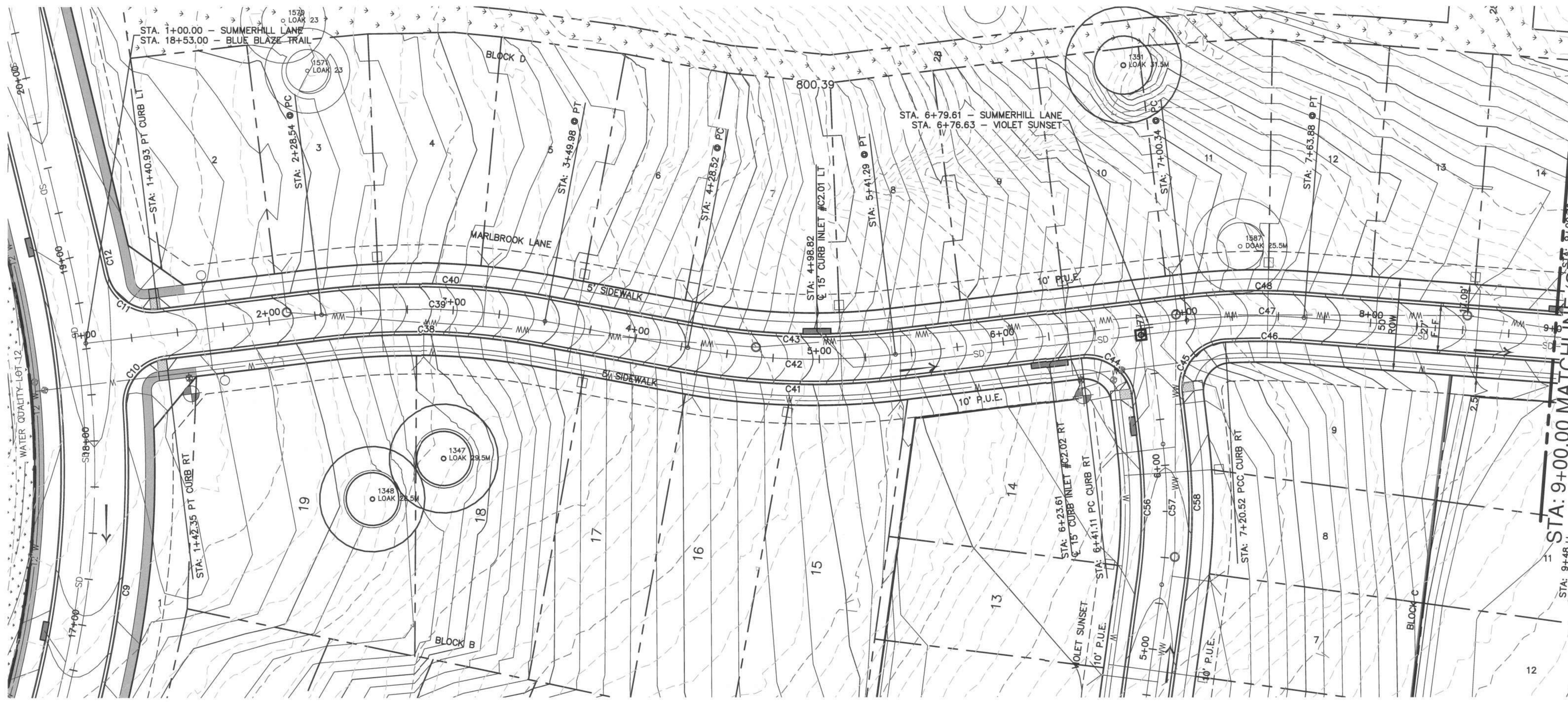

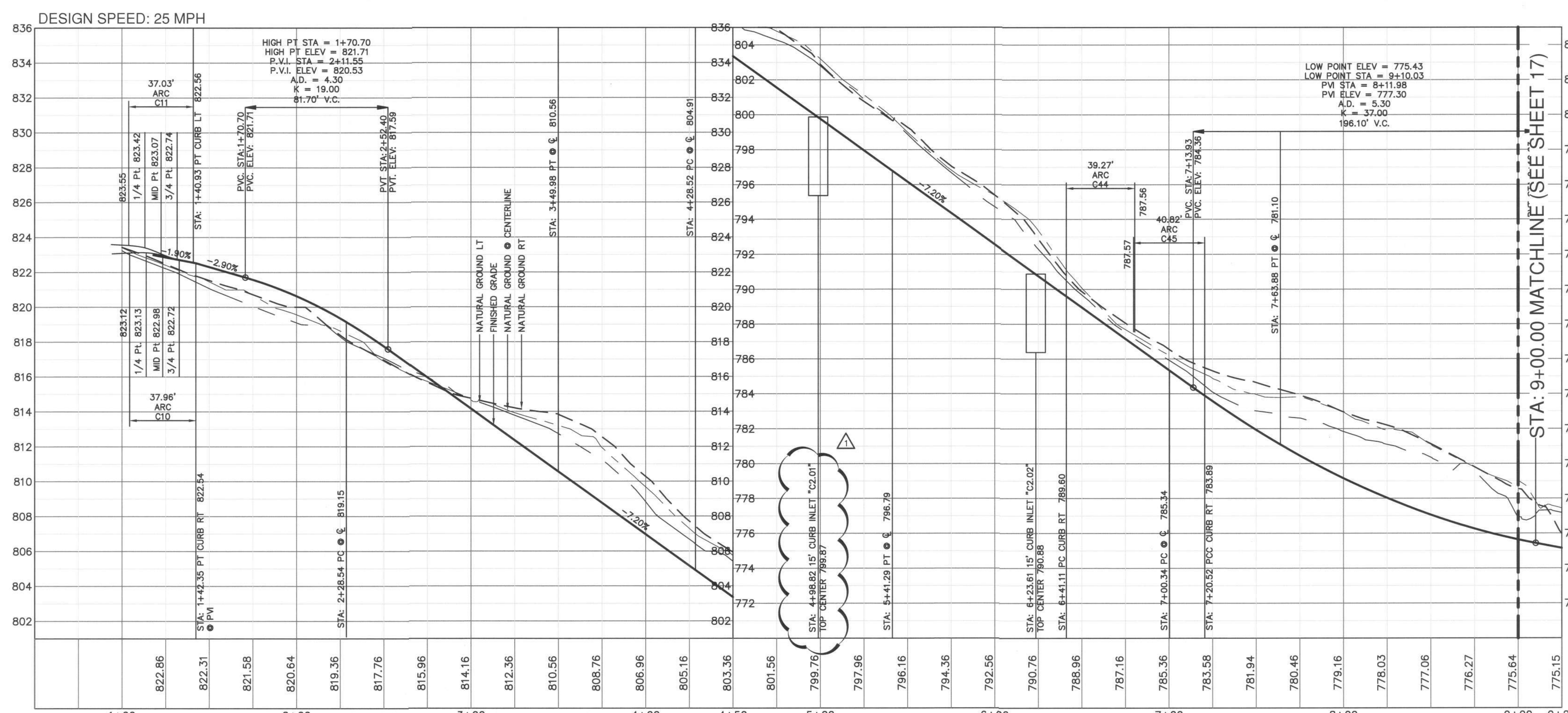

SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND RT @ ROW
- NATURAL GROUND LT @ ROW
- NATURAL GROUND @ CENTER LINE
- PROPOSED GRADELINE @ TOP OF CURB (TC)

CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C10	25.00'	086°59'29"	N57°32'23"W	34.42'	37.96'
C11	25.00'	084°52'32"	S28°23'37"W	33.74'	37.03'
C38	386.50'	017°23'40"	N05°20'49"W	116.89'	117.34'
C39	400.00'	017°23'40"	N05°20'49"W	120.97'	121.44'
C40	413.50'	017°23'40"	N05°20'49"W	125.05'	125.53'
C41	388.50'	017°13'47"	S05°15'52"E	116.39'	116.83'
C42	375.00'	017°13'47"	S05°15'52"E	112.34'	112.77'
C43	361.50'	017°13'47"	S05°15'52"E	108.30'	108.71'
C44	25.00'	090°00'00"	N31°07'14"E	35.36'	39.27'
C45	25.00'	093°33'28"	N57°06'02"W	36.44'	40.82'
C46	311.50'	007°38'40"	N06°29'58"W	41.53'	41.56'
C47	325.00'	011°12'08"	N08°16'42"W	63.44'	63.54'
C48	338.50'	011°12'08"	N08°16'42"W	66.08'	66.18'

NO.	REVISION	DATE
1	REVISE INLET STATIONING	10/14/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
MARLBROOK LANE (1 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 16 OF 61

Date: Mar 20, 2023, 3:03pm User ID: dking
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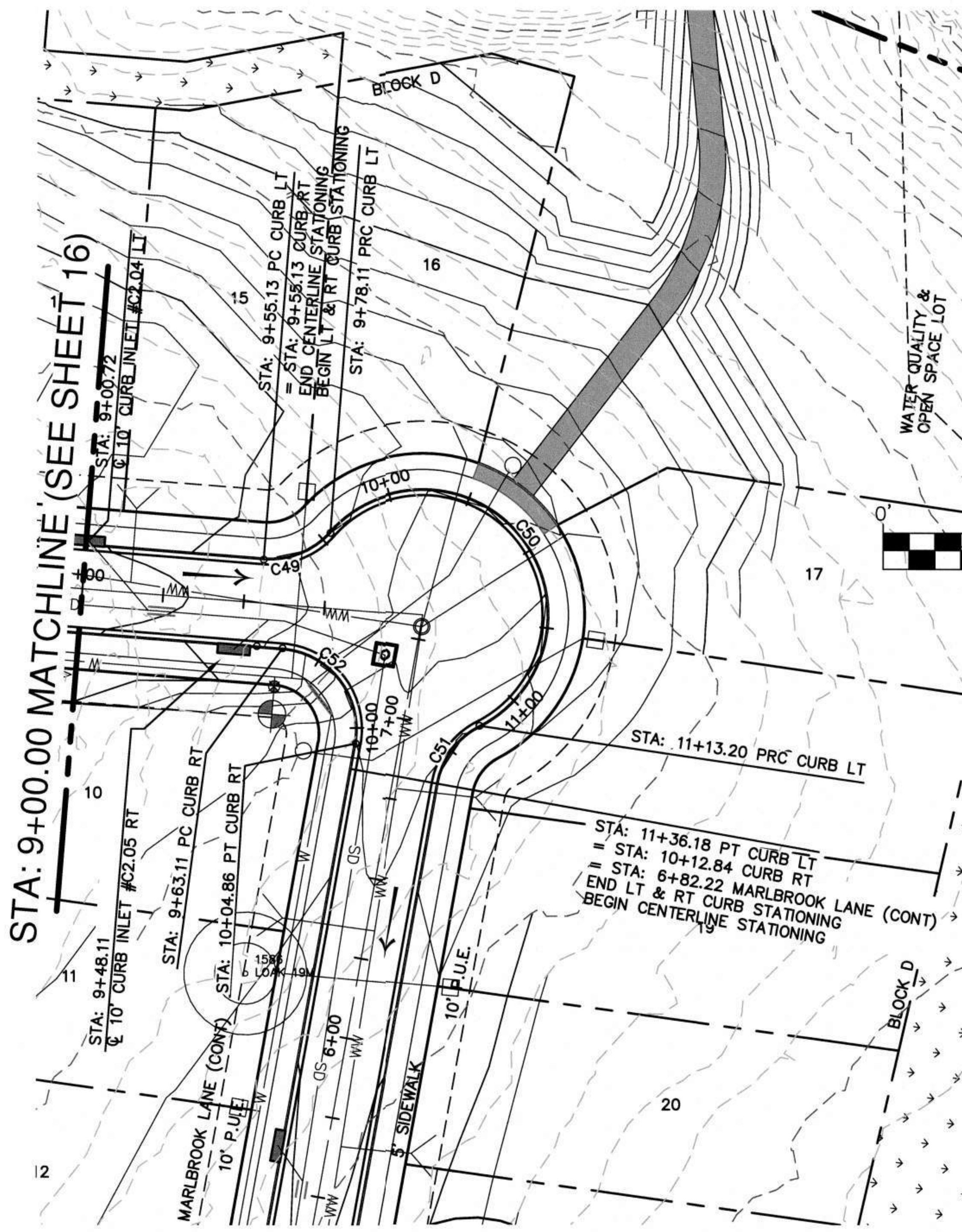
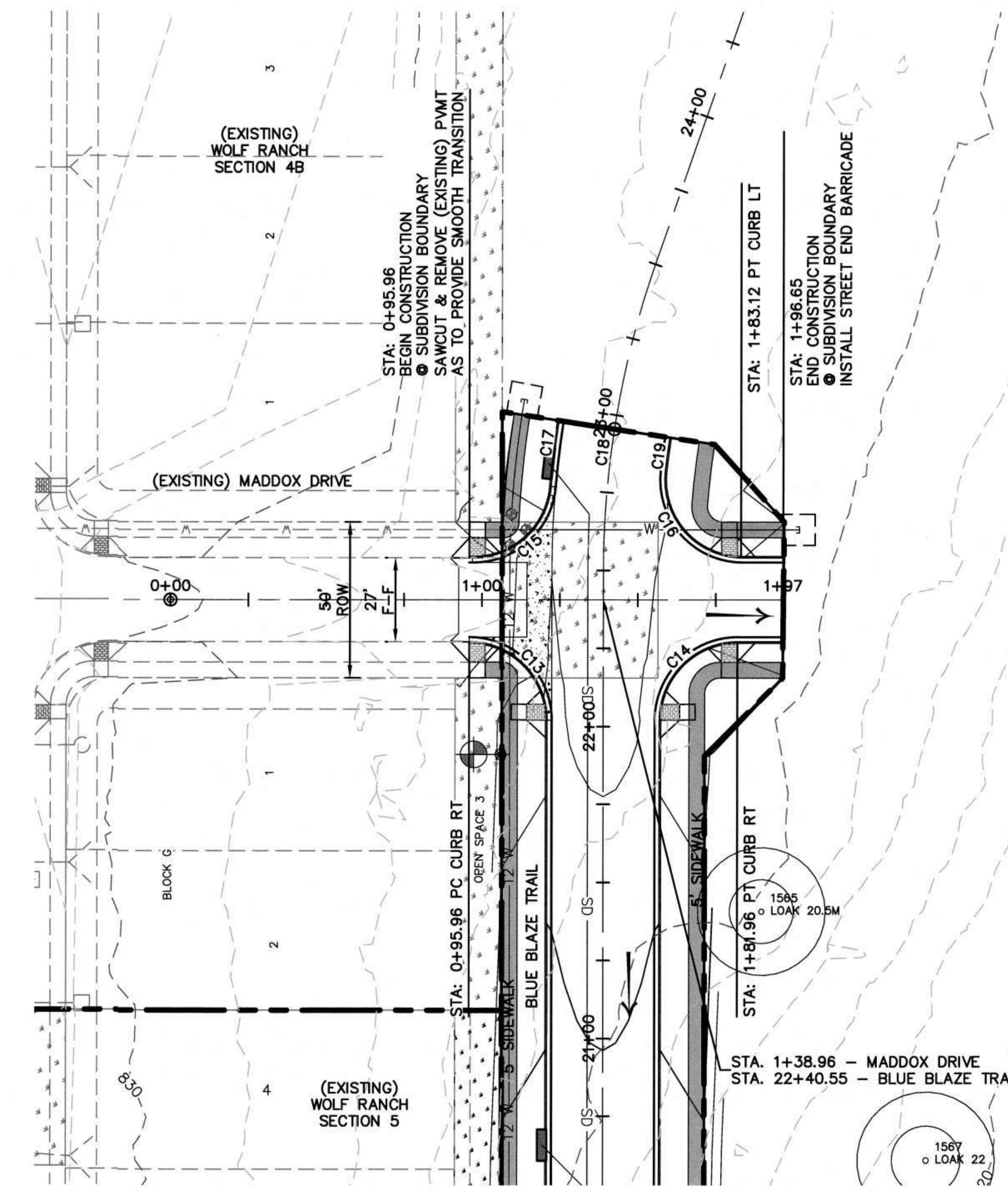
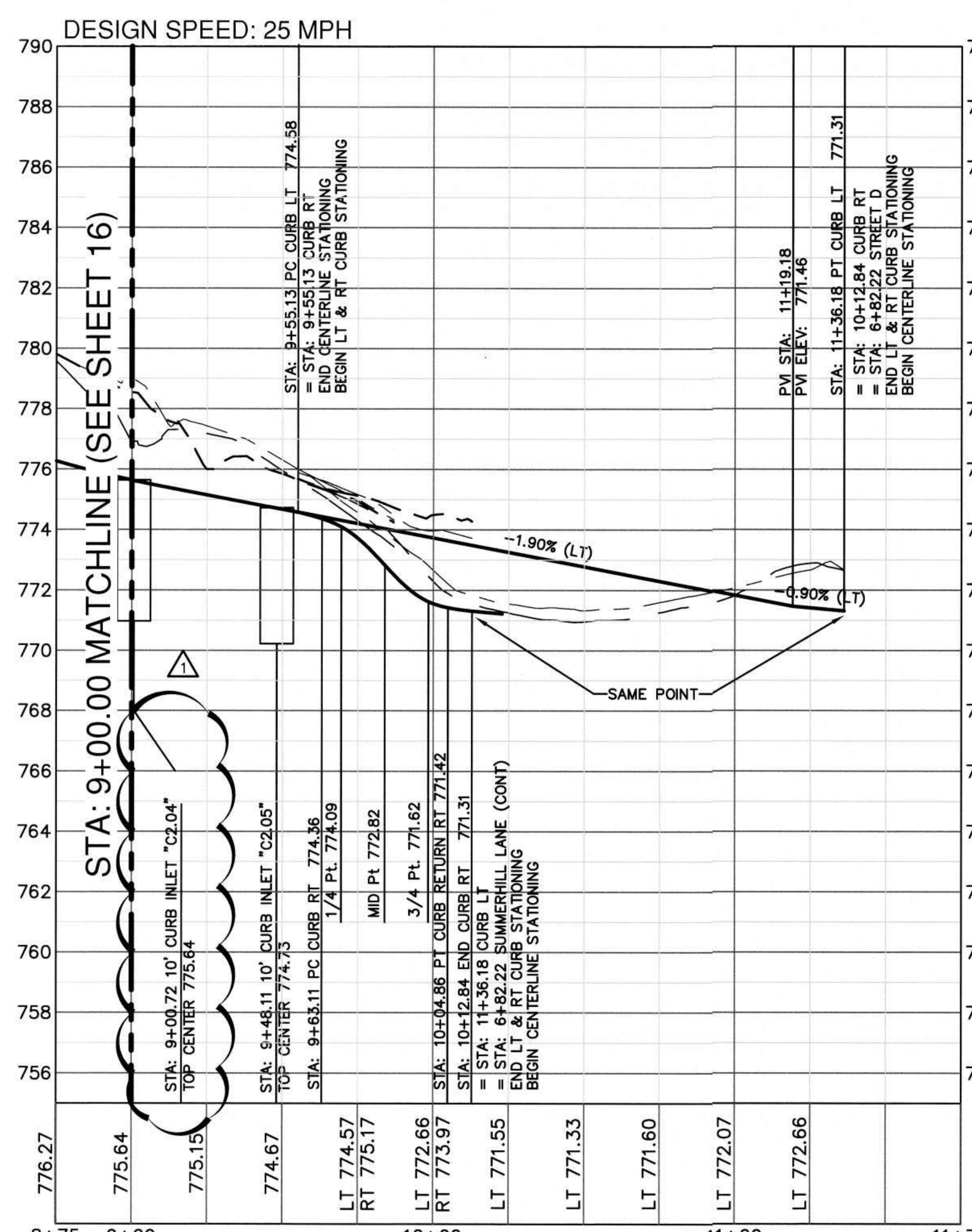
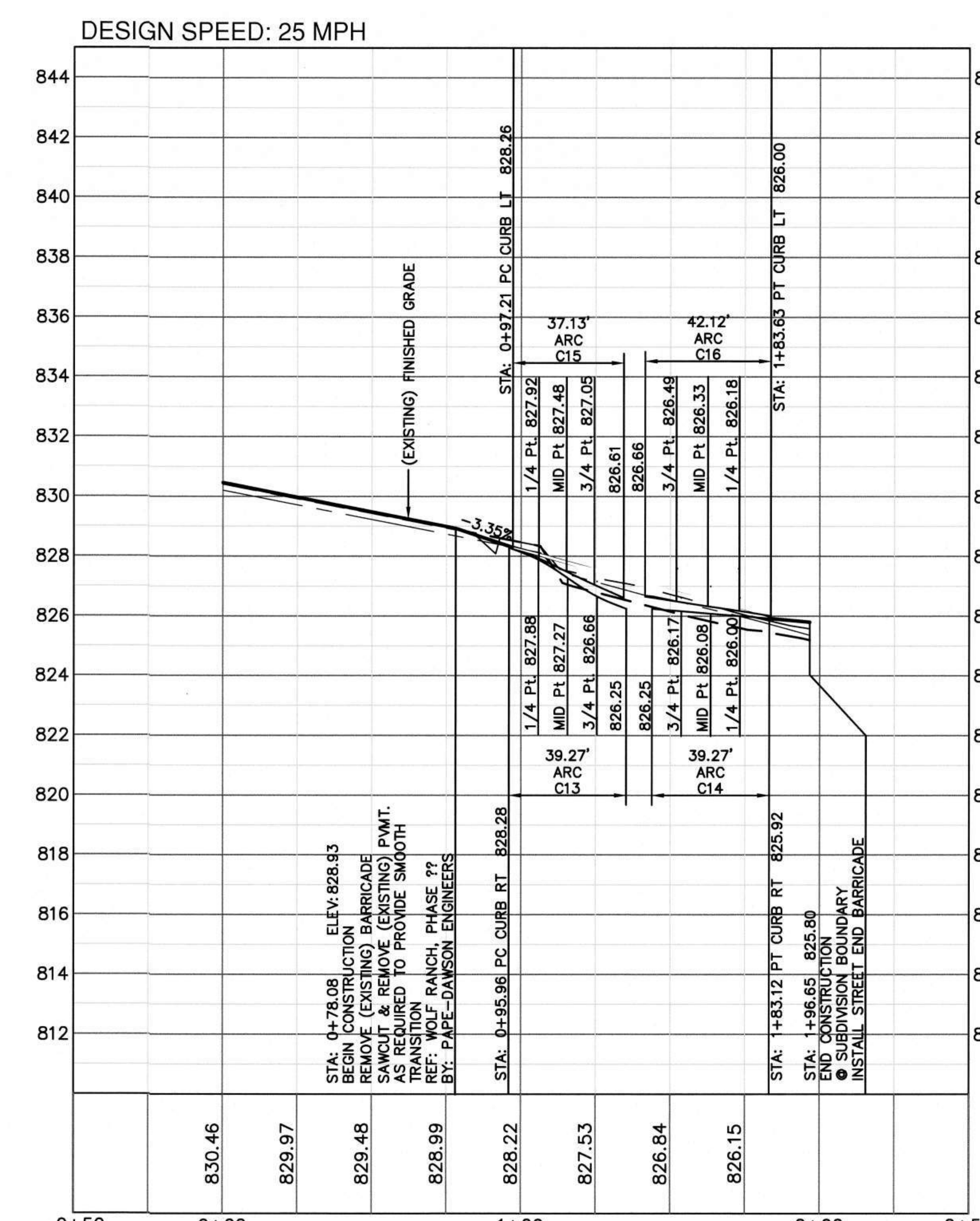






CURVE TABLE					
CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C49	25.00'	052°40'39"	S29°00'57"E	22.18'	22.98'
C50	38.50'	201°01'57"	N45°09'41"E	75.71'	135.08'
C51	25.00'	052°40'39"	N60°39'40"W	22.18'	22.98'
C52	25.00'	095°40'38"	N45°09'41"E	37.06'	41.75'



CURVE TABLE					
CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C13	25.00'	090°00'00"	N24°16'40"E	35.36'	39.27'
C14	25.00'	090°00'00"	N65°43'20"W	35.36'	39.27'
C15	25.00'	085°06'10"	S63°16'25"E	33.81'	37.13'
C16	25.00'	096°32'32"	S27°32'56"W	37.32'	42.12'
C17	318.00'	003°50'30"	S76°05'45"W	21.32'	21.32'
C18	300.01'	008°44'18"	S73°38'50"W	45.71'	45.76'
C19	282.00'	002°11'48"	S76°55'06"W	10.81'	10.81'

SCALE: 1"= 40'
0' 40' 80' 120'

LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND RT @ ROW
NATURAL GROUND LT @ ROW
NATURAL GROUND @ CENTER LINE
PROPOSED GRADELINE @ TOP OF CURB (TC)

NO.	REVISION	DATE
1	REVISE INLET STATIONING	10/14/22

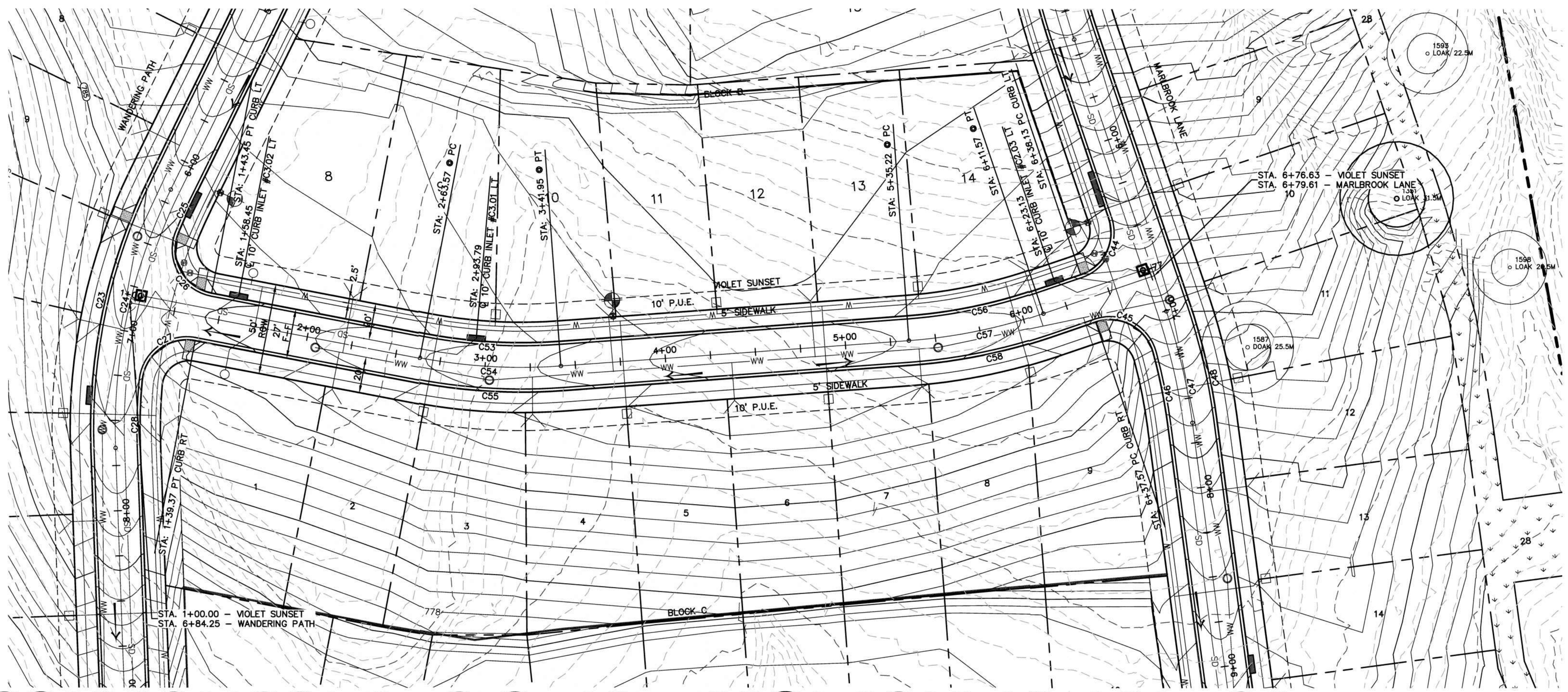
STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
STREET PLAN & PROFILES MARLBROOK LANE (2 OF 2)

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 17 OF 61

Date: Mar 20, 2023, 3:05pm User ID: cking
File: H:\Projects\511\27\42\301 construction documents\Civil\ST51127-42.dwg



SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- CENTER LINE
- FIRE HYDRANT
- CURB INLET
- STORM DRAIN JUNCTION BOX
- 2.00% MAXIMUM CROSS SLOPE LOCATION
- DIRECTION OF FLOW
- CONCRETE VALLEY GUTTER
- STREET END BARRICADE
- PROPERTY BOUNDARY
- PROPOSED CONTOUR LINE
- EXISTING CONTOUR LINE
- HERITAGE TREES
- CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

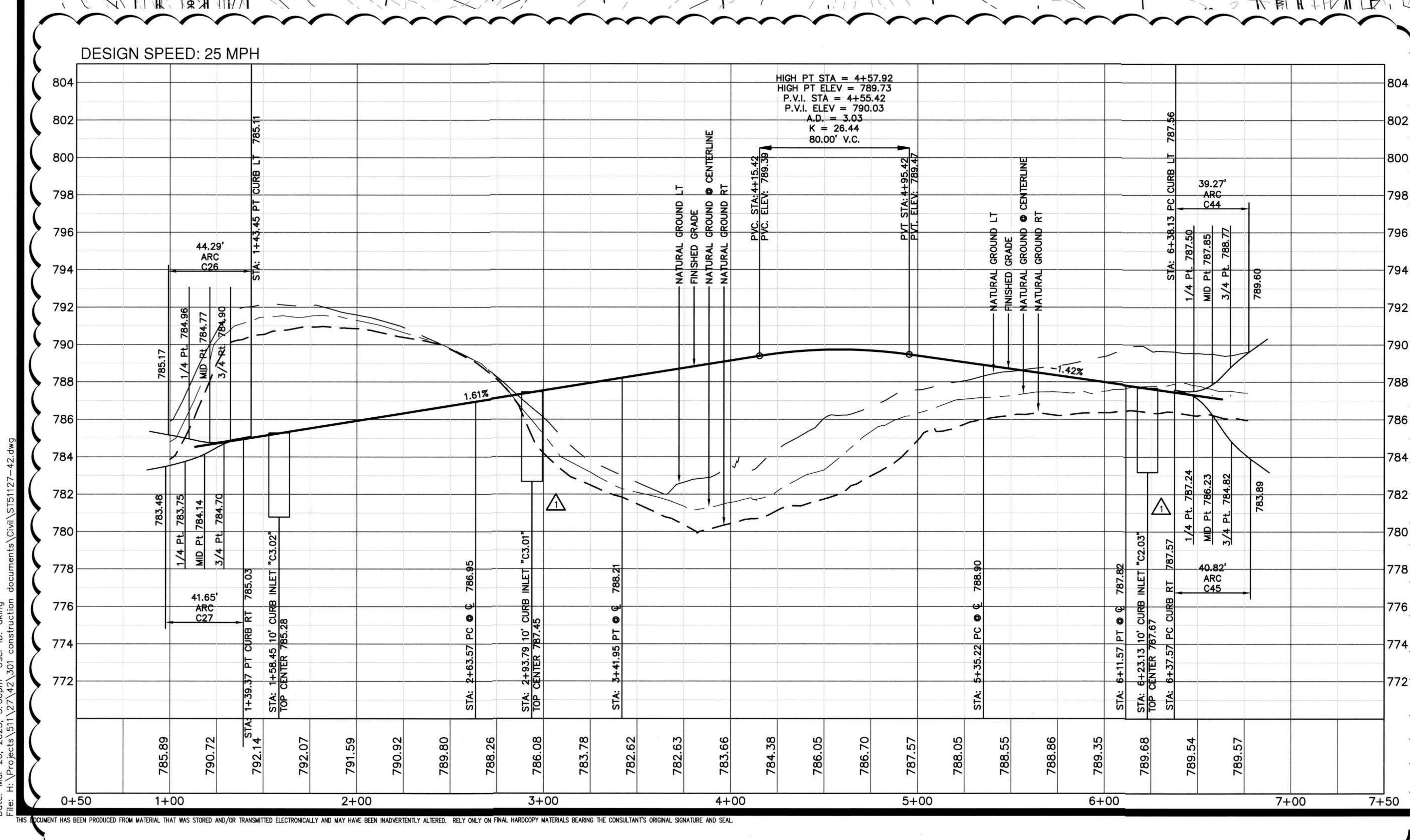
PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND RT @ ROW
- NATURAL GROUND LT @ ROW
- NATURAL GROUND @ CENTER LINE
- PROPOSED GRADELINE @ TOP OF CURB (TC)

DESIGN SPEED: 25 MPH



CURVE TABLE

CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C26	25.00'	101°30'50"	S23°34'18"E	38.72'	44.29'
C27	25.00'	095°26'34"	S57°57'01"W	36.99'	41.64'
C44	25.00'	090°00'00"	N31°07'14"E	35.36'	39.27'
C45	25.00'	093°33'28"	N57°06'02"W	36.44'	40.82'
C53	286.50'	014°58'08"	S81°48'47"E	74.64'	74.85'
C54	300.00'	014°58'08"	S81°48'47"E	78.15'	78.38'
C55	313.50'	014°58'08"	S81°48'47"E	81.67'	81.90'
C56	286.50'	014°34'55"	N83°24'42"E	72.72'	72.92'
C57	300.00'	014°34'55"	N83°24'42"E	76.15'	76.35'
C58	313.50'	014°34'55"	N83°24'42"E	79.57'	79.79'

NO.	REVISION	DATE
1	REVISE INLET STATIONING	10/4/22
2	REVISE STREET GRADE	02/20/23

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
VIOLET SUNSET

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 18 OF 61

Date: Mar 20, 2023, 3:06pm User ID: oking
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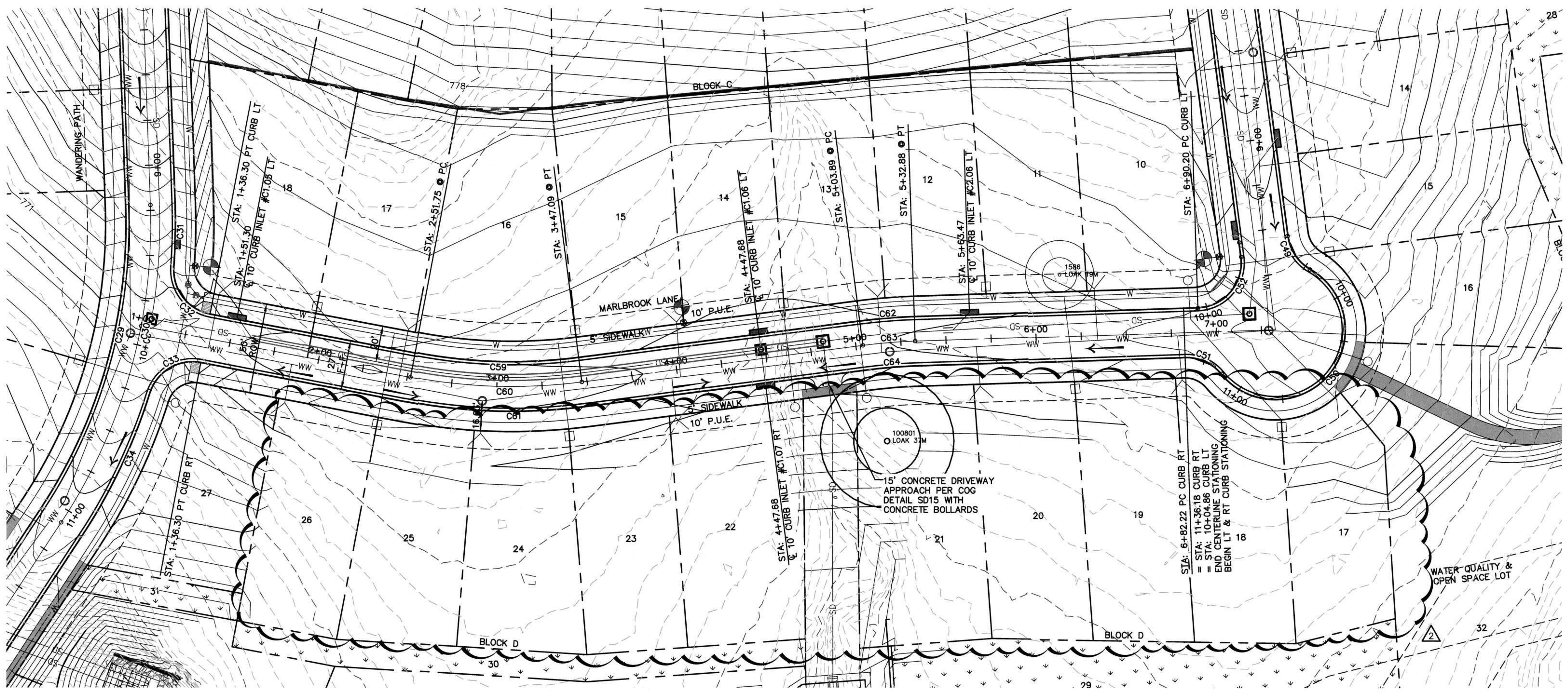

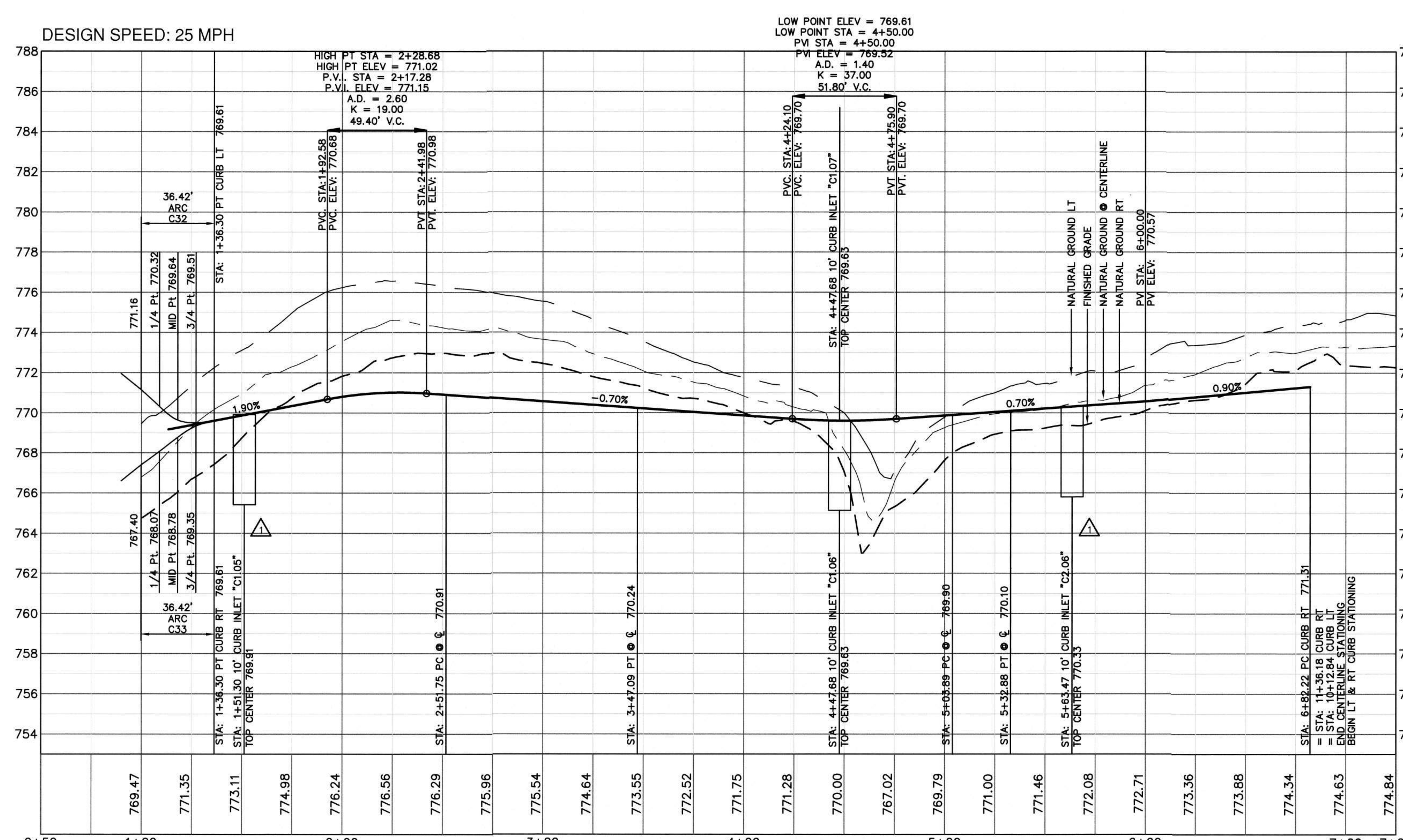

SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

CENTER LINE

FIRE HYDRANT

CURB INLET

STORM DRAIN JUNCTION BOX

2.00% MAXIMUM CROSS SLOPE LOCATION

DIRECTION OF FLOW

CONCRETE VALLEY GUTTER

STREET END BARRICADE

PROPERTY BOUNDARY

PROPOSED CONTOUR LINE

EXISTING CONTOUR LINE

HERITAGE TREES

CREDIT TREES

NOTES:

1. ALL CURB RETURNS (FACE OF CURB) HAVE A RADIUS OF 25' UNLESS OTHERWISE NOTED.
2. SIDEWALK IS 5' WIDE UNLESS OTHERWISE NOTED
3. SIDEWALKS ADJACENT TO SINGLE FAMILY LOTS ARE TO BE CONSTRUCTED CONCURRENTLY WITH EACH SINGLE FAMILY HOUSE.
4. SIDEWALKS ADJACENT TO PUBLIC SPACES ARE TO BE CONSTRUCTED WITH THESE SUBDIVISION IMPROVEMENTS AS NOTED BY SHADING.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND RT @ ROW

NATURAL GROUND LT @ ROW

NATURAL GROUND @ CENTER LINE

PROPOSED GRADELINE @ TOP OF CURB (TC)

CURVE TABLE					
CURVE #	RADIUS	DELTA	CHORD BEARING	CHORD	LENGTH
C32	25.00'	083°28'09"	S32°35'38"E	33.28'	36.42'
C33	25.00'	083°28'09"	S63°56'13"W	33.28'	36.42'
C51	25.00'	052°40'39"	N60°39'40"W	22.18'	22.98'
C52	25.00'	095°40'38"	N45°09'41"E	37.06'	41.75'
C59	286.50'	018°12'29"	S83°25'57"E	90.66'	91.05'
C60	300.00'	018°12'29"	S83°25'57"E	94.94'	95.34'
C61	313.50'	018°12'29"	S83°25'57"E	99.21'	99.63'
C62	313.50'	005°32'12"	N89°46'06"W	30.28'	30.29'
C63	300.00'	005°32'12"	N89°46'06"W	28.98'	28.99'
C64	286.50'	005°32'12"	N89°46'06"W	27.67'	27.69'

NO.	REVISION	DATE
1	REVISE INLET STATIONING	10/14/22
2	REVISE LOT GRADING	02/20/23

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STREET PLAN & PROFILES
MARLBROOK LANE

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 19 OF 61

Date: Mar 20, 2023, 3:07pm User ID: ckling
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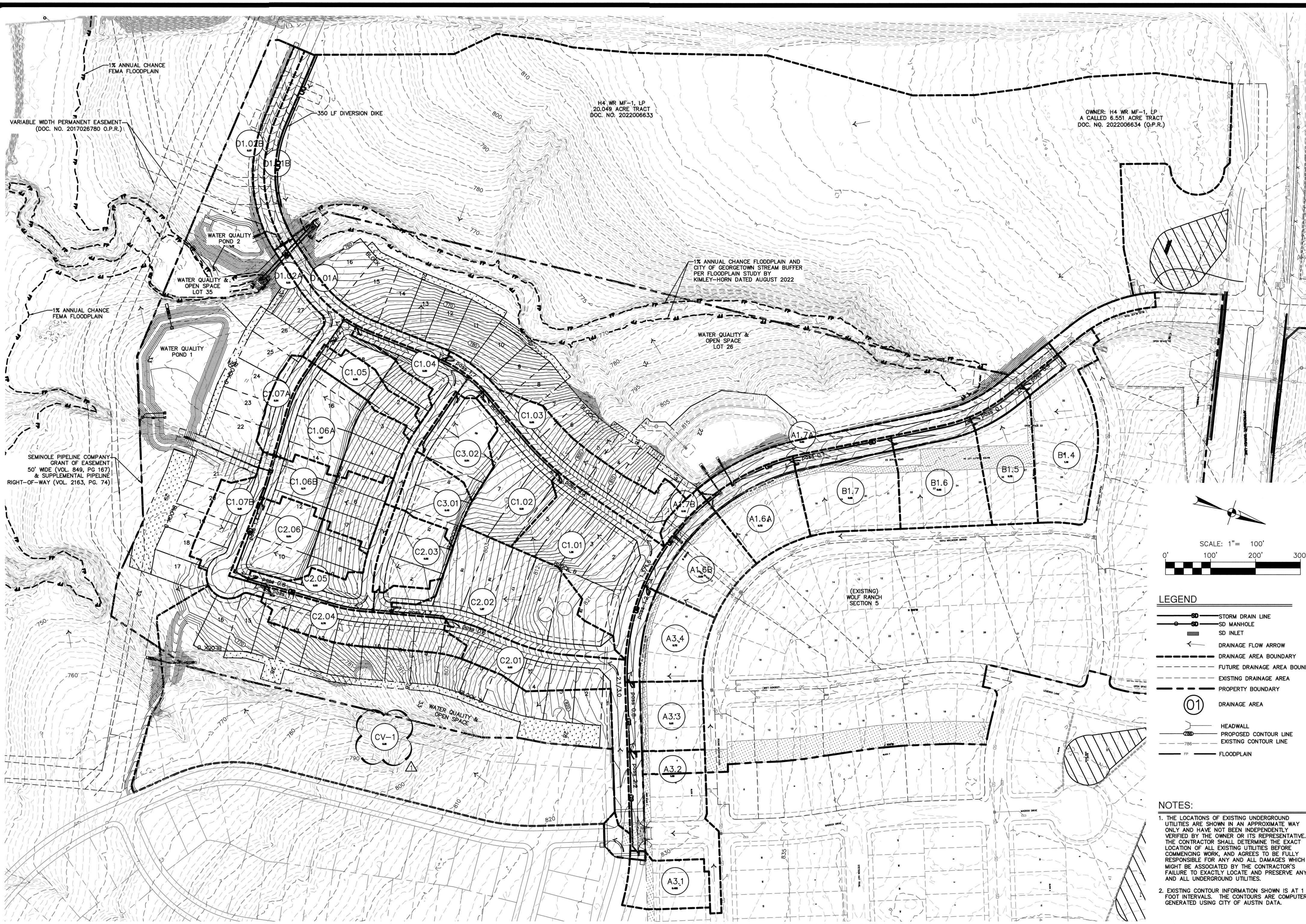


SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- STORM DRAIN LINE
- SD MANHOLE
- SD INLET
- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- FUTURE DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE AREA
- PROPERTY BOUNDARY
- 01 DRAINAGE AREA
- HEADWALL
- 786 PROPOSED CONTOUR LINE
- 786 EXISTING CONTOUR LINE
- FP FLOODPLAIN

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. EXISTING CONTOUR INFORMATION SHOWN IS AT 1 FOOT INTERVALS. THE CONTOURS ARE COMPUTER GENERATED USING CITY OF AUSTIN DATA.

NO.	REVISION	DATE
1	ADD CV-1 AREA	08/22/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

OVERALL DRAINAGE STUDY

1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
1
SHEET 20 OF 61

Date: Mar 20, 2023, 3:08pm User ID: akling
File: H:\Projects\511\27\42\301 construction documents\Civil\OD51127-42.dwg

DRAINAGE AREA	INLET NUMBER	AREA (acres)	COMPOSITE C: C_c	C_{10}	C_{25}	C_{100}	A·C_c	A·C_{10}	A·C_{25}	A·C_{100}	SHEET FLOW: Length (ft)	Manning's (n)	Slope (ft/ft)	Tc (min)	SHALLOW CONCENTRATED FLOW: Length (ft)	Manning's (n)	Slope (ft/ft)	Tc (min)	CHANNELIZED FLOW: Length (ft)	Manning's (n)	Slope (ft/ft)	Velocity (ft/s)	Tc (min)	Cumulative Tc (min)	INTENSITY: I 2yr (in/hr)	I 10yr (in/hr)	I 25yr (in/hr)	I 100yr (in/hr)	DISCHARGE: Q 2 (cfs)	Q 10 (cfs)	Q 25 (cfs)	Q 100 (cfs)
ULTIMATE CONDITION DRAINAGE AREAS																																
A1.6A	A1.6A	0.73	0.69	0.71	0.72	0.75	0.502	0.518	0.527	0.549	20	0.30	0.100	0.45	120	0.30	0.042	2.93	130	0.016	0.007	3.0	0.718	5.00	6.48	8.64	9.84	11.88	3.3	4.5	5.2	6.5
A1.6B	A1.6B	0.80	0.62	0.65	0.66	0.70	0.497	0.518	0.531	0.560	20	0.30	0.100	0.45	120	0.30	0.047	2.77	228	0.016	0.005	2.8	1.360	5.00	6.48	8.64	9.84	11.88	3.2	4.5	5.2	6.7
A1.6	A1.6	1.53	0.65	0.68	0.69	0.72	0.999	1.036	1.058	1.109	-	-	-	-	-	-	-	-	-	-	-	-	-	5.00	6.48	8.64	9.84	11.88	6.5	9.0	10.4	13.2
A1.7A	A1.7A	0.83	0.78	0.80	0.81	0.83	0.65	0.66	0.67	0.69	0	0.30	0.020	0.00	0	0.30	0.020	0.00	1107	0.016	0.007	3.0	6.11	6.11	6.19	8.29	9.47	11.46	4.0	5.5	6.3	7.9
A1.7B	A1.7B	0.10	0.80	0.82	0.82	0.84	0.08	0.08	0.08	0.08	0	0.30	0.020	0.00	0	0.30	0.020	0.00	139	0.016	0.008	2.8	0.83	5.00	6.48	8.64	9.84	11.88	0.5	0.7	0.8	1.0
A1.7	A1.7	0.93	0.79	0.80	0.81	0.83	0.73	0.74	0.75	0.77	-	-	-	-	-	-	-	-	-	-	-	-	-	6.11	6.19	8.29	9.47	11.46	4.5	6.2	7.1	8.8
A3.1	A3.1	0.47	0.66	0.68	0.70	0.73	0.31	0.32	0.33	0.34	20	0.30	0.020	1.01	120	0.30	0.045	2.83	110	0.016	0.005	2.6	0.72	5.00	6.48	8.64	9.84	11.88	2.0	2.8	3.2	4.1
A3.2	A3.2	1.06	0.72	0.74	0.75	0.78	0.76	0.78	0.80	0.82	20	0.30	0.030	0.82	120	0.30	0.023	3.96	160	0.016	0.012	4.0	0.62	5.40	6.37	8.51	9.70	11.72	4.9	6.7	7.7	9.7
A3.3	A3.3	0.61	0.69	0.71	0.72	0.75	0.42	0.43	0.44	0.46	20	0.30	0.023	0.94	120	0.30	0.035	3.21	160	0.016	0.006	2.8	0.89	5.04	6.47	8.63	9.82	11.86	2.7	3.7	4.3	5.4
A3.4	A3.4	0.73	0.69	0.71	0.72	0.75	0.50	0.52	0.53	0.55	20	0.30	0.025	0.91	120	0.30	0.035	3.35	220	0.016	0.030	6.2	0.59	5.00	6.48	8.64	9.84	11.88	3.2	4.5	5.2	6.5
B1.5	B1.5	0.75	0.37	0.42	0.45	0.51	0.28	0.31	0.34	0.38	20	0.30	0.020	1.01	235	0.30	0.038	6.03	110	0.016	0.017	4.7	0.39	7.43	5.89	7.92	9.07	11.00	1.7	2.5	3.0	4.2
B1.6	B1.6	0.98	0.37	0.42	0.45	0.51	0.37	0.41	0.44	0.50	20	0.30	0.028	0.85	200	0.30	0.059	4.13	165	0.016	0.005	2.6	1.06	6.04	6.21	8.31	9.49	11.48	2.3	3.4	4.2	5.7
B1.7	B1.7	0.95	0.39	0.44	0.46	0.52	0.37	0.41	0.44	0.50	20	0.30	0.035	0.77	160	0.30	0.044	3.81	193	0.016	0.007	3.0	1.07	5.65	6.31	8.43	9.62	11.63	2.4	3.5	4.2	5.8
C1.01	C1.01	1.36	0.67	0.69	0.71	0.74	0.91	0.95	0.96	1.01	43	0.30	0.065	1.20	143	0.30	0.021	4.93	184	0.016	0.100	11.4	0.23	6.36	6.13	8.22	9.39	11.37	5.6	7.8	9.0	11.4
C1.02	C1.02	0.81	0.73	0.75	0.76	0.78	0.59	0.61	0.61	0.64	37	0.30	0.118	0.77	159	0.30	0.028	4.76	162	0.016	0.034	6.7	0.45	5.97	6.23	8.33	9.52	11.51	3.7	5.0	5.8	7.3
C1.03	C1.03	0.95	0.76	0.77	0.78	0.81	0.72	0.74	0.74	0.77	15	0.30	0.018	0.80	70	0.30	0.015	2.86	580	0.016	0.019	5.0	1.94	5.60	6.32	8.45	9.64	11.65	4.6	6.2	7.2	8.9
C1.04	C1.04	0.50	0.73	0.75	0.76	0.79	0.37	0.38	0.38	0.39	0	0.30	0.018	0.00	0	0.30	0.020	0.00	525	0.016	0.076	10.0	0.88	5.00	6.48	8.64	9.84	11.88	2.4	3.2	3.7	4.7
C1.05	C1.05	0.35	0.72	0.74	0.75	0.78	0.25	0.26	0.26	0.27	20	0.30	0.040	0.71	265	0.30	0.067	4.93	45	0.016	0.019	5.0	0.15	5.79	6.27	8.39	9.57	11.58	1.6	2.2	2.5	3.2
C1.06A	C1.06A	1.07	0.73	0.75	0.76	0.79	0.78	0.80	0.81	0.84	20	0.30	0.040	0.71	235	0.30	0.067	4.64	230	0.016	0.019	5.0	0.77	6.02	6.21	8.32	9.50	11.49	4.9	6.7	7.7	9.6
C1.06B	C1.06B	0.71	0.72	0.74	0.75	0.78	0.51	0.52	0.53	0.55	20	0.30	0.100	0.45	235	0.30	0.077	4.23	94	0.016	0.019	5.0	0.32	5.00	6.48	8.64	9.84	11.88	3.3	4.5	5.2	6.5
C1.06	C1.06	1.78	0.73	0.74	0.75	0.78	1.29	1.32	1.34	1.39	-	-	-	-	-	-	-	-	-	-	-	-	-	6.02	6.21	8.32	9.50	11.49	8.0	11.0	12.8	16.0
C1.07A	C1.07A	0.24	0.79	0.81	0.82	0.83	0.19	0.19	0.20	0.20	0	0.30	0.020	0.00	0	0.30	0.020	0.00	225	0.016	0.019	5.0	0.75	5.00	6.48	8.64	9.84	11.88	1.2	1.7	1.9	2.4
C1.07B	C1.07B	0.61	0.72	0.74	0.75	0.78	0.44	0.45	0.46	0.47	0	0.30	0.020	0.00	50	0.30	0.016	2.04	370	0.016	0.019	5.0	1.24	5.00	6.48	8.64	9.84	11.88	2.8	3.9	4.5	5.6
C1.07	C1.07	0.85	0.74	0.76	0.77	0.79	0.63	0.64	0.65	0.67	-	-	-	-	-	-	-	-	-	-	-	-	-	5.00	6.48	8.64	9.84	11.88	4.1	5.6	6.4	8.0
C2.01	C2.01	0.93	0.74	0.76	0.77	0.80	0.69	0.71	0.72	0.74	0	0.30	0.020	0.00	51	0.30	0.046	1.19	261	0.016	0.080	10.2	0.43	5.00	6.48	8.64	9.84	11.88	4.5	6.1	7.1	8.8
C2.02	C2.02	1.57	0.73	0.75	0.76	0.79	1.15	1.18	1.20	1.24	55	0.30	0.050	1.76	60	0.30	0.077	1.08	312	0.016	0.080	10.2	0.51	5.00	6.48	8.64	9.84	11.88	7.5	10.2	11.8	14.7
C2.03	C2.03	0.52	0.71	0.73	0.75	0.77	0.37	0.38	0.39	0.40	33	0.30	0.039	1.19	97	0.30	0.020	3.43	128	0.016	0.014	4.3	0.50	5.12	6.45	8.60	9.80	11.83	2.4	3.3	3.8	4.8
C2.04	C2.04	0.76	0.77	0.78	0.79	0.81	0.58	0.60	0.60	0.62	55	0.30	0.079	1.73	28	0.30	0.086	0.40	379	0.016	0.019	5.0	1.27	5.00	6.48	8.64	9.84	11.88	3.8	5.1	5.9	7.4
C2.05	C2.05	0.56	0.81	0.82	0.83	0.84	0.45	0.46	0.46	0.47	30	0.30	0.047	0.99	45	0.30	0.300	0.37	300	0.016	0.019	5.0	1.01	5.00	6.48	8.64	9.84	11.88	2.9	4.0	4.6	5.6
C2.06	C2.06	0.84	0.74	0.76	0.77	0.79	0.62	0.63	0.64	0.66	20	0.30	0.042	0.70	261	0.30	0.074	4.60	30	0.016	0.019	5.0	0.10	5.40	6.37	8.51	9.70	11.72	4.0	5.4	6.2	7.8
C3.01	C3.01	0.43	0.74	0.76	0.77	0.79	0.32	0.33	0.33	0.34	40	0.30	0.035	1.53	100	0.30	0.020	3.54	114	0.016	0.016	4.6	0.42	5.48	6.35	8.49	9.68	11.69	2.0	2.8	3.2	4.0
C3.02	C3.02	0.54	0.74	0.76	0.77	0.79	0.40	0.41	0.41	0.43	55	0.30	0.060	1.60	89	0.30	0.020	3.15	103	0.016	0.010	3.6	0.48	5.23	6.42	8.57	9.76	11.79	2.6	3.5	4.0	5.0
D1.01A	D1.01A	0.26	0.87	0.88	0.88	0.89	0.23	0.23	0.23	0.23	0	0.30	0.020	0.00	0	0.30	0.020	0.00	450	0.016	0.010	3.6	2.08	5.00	6.48	8.64	9.84	11.88	1.5	2.0	2.3	2.8
D1.01B	D1.01B	0.25	0.83	0.84	0.85	0.86	0.21	0.21	0.21	0.22	0	0.30	0.020	0.00	0	0.30	0.020	0.00	454	0.016	0.010	3.6	2.10	5.00	6.48	8.64	9.84	11.88	1.3	1.8	2.1	2.6
D1.01	D1.01	0.51	0.85	0.86	0.87	0.88	0.43	0.44	0.44	0.45	-	-	-	-	-	-	-	-	-	-	-	-	-	5.00	6.48	8.64	9.84	11.88	2.8	3.8	4.3	5.3
D1.02A	D1.02A	0.51	0.75	0.77	0.78	0.80	0.38	0.39	0.40	0.41	20	0.30	0.040	0.71	265	0.30	0.067	4.93	240	0.016	0.019	5.0	0.80	6.44	6.11	8.19	9.37	11.34	2.3	3.2	3.7	4.6
D1.02B	D1.02B	0.27	0.79	0.81	0.82	0.83	0.21	0.22	0.22	0.23	0	0.30	0.020	0.00	0	0.30	0.020	0.00	404	0.016	0.010	3.6	2.10	5.00	6.48	8.64	9.84	11.88	1.4	1.9	2.2	2.7
D1.02	D1.02	0.78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	6.44	6.11	8.19	9.37	11.34	[illegible]	[illegible]	[illegible]	7.2
CV-1	CV-1	7.85	0.54	0.57	0.59	0.64	4.22	4.48	4.64	4.99	100	0.30	0.020	5.05	323	0.30	0.089	5.41	703	0.016	0.067	9.3	1.26	11.72	5.08	6.92	8.00	9.76	21.4	31.0	37.1	48.7

STREET FLOW AND INLET CALCULATIONS
100 YEAR STORM

Inlet No.	Inlet Type	Drainage Area	Q 100 (cfs)	Q pass (cfs)	Q total (cfs)	STREET CAPACITY: Street Width F-F (ft)	Crown Type	Curb Height (ft)	Gutter Slope (%)	a (ft)	Yo (ft)	Crown Height (ft)	Ponded Width (-) (ft)	INLET ON GRADE CAPACITY: Eo	S'w	Sx	Se	LT	L	E	Qi	Qpass (cfs)	Pass to Inlet #	SUMP INLET CAPACITY CURB (with Depression): Qtotal (cfs)	Length (ft)	d (ft)	d (ft) (d ≤ h + a)
ULTIMATE CONDITION DRAINAGE AREAS																											
A1.6A	S	0.73	6.52	0.1	6.6	36	P	0.50	0.70%	0.42	0.45	0.50	12.24	0.36	0.28	0.03	0.13	12.31	10	0.95	6.3	0.3		-	-	-	-
A1.6B	S	0.80	6.66	1.2	7.9	36	P	0.50	0.60%	0.42	0.49	0.50	15.90	0.27	0.28	0.03	0.10	14.43	10	0.88	6.9	0.9		-	-	-	-
A1.6	S	1.53	13.18	0.0	13.2	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		13.2	10	0.59	0.59
A1.7A	S	0.83	7.86	0.0	7.9	36	P	0.50	0.70%	0.42	0.48	0.50	14.33	0.30	0.28	0.03	0.11	14.38	10	0.88	6.9	0.9		-	-	-	-
A1.7B	S	0.10	1.00	0.0	1.0	36	P	0.50	0.60%	0.42	0.23	0.50	4.72	0.85	0.28	0.03	0.26	3.44	10	1.00	1.0	0.0		-	-	-	-
A1.7	S	0.93	8.83	0.0	8.9	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		8.8	10	0.45	0.45
A3.1	G-1	0.47	4.07	0.0	4.1	36	P	0.50	0.50%	0.42	0.40	0.50	9.89	0.46	0.28	0.03	0.16	8.04	10	1.00	4.1	0.0		-	-	-	-
A3.2	G-1	1.06	9.67	0.0	9.7	36	P	0.50	1.24%	0.42	0.47	0.50	13.25	0.33	0.28	0.03	0.12	17.89	10	0.77	7.5	2.2	A3.3	-	-	-	-
A3.3	G-1	0.61	5.44	2.2	7.6	36	P	0.50	0.60%	0.42	0.49	0.50	15.23	0.28	0.28	0.03	0.11	13.98	10	0.90	6.9	0.8	A3.4	-	-	-	-
A3.4	G-1	0.73	6.52	0.8	7.3	36	P	0.50	3.00%	0.42	0.35	0.50	8.31	0.57	0.28	0.03	0.19	15.80	10	0.84	6.1	1.2	A1.6B	-	-	-	-
B1.5	G-1	0.75	4.21	0.9	5.1	36	P	0.50	1.68%	0.42	0.34	0.50	7.98	0.60	0.28	0.03	0.20	11.09	10	0.98	5.0	0.1	B1.6	-	-	-	-
B1.6	G-1	0.98	5.73	0.1	5.8	36	P	0.50	0.52%	0.42	0.45	0.50	12.44	0.35	0.28	0.03	0.13	10.77	10	0.99	5.8	0.0		-	-	-	-
B1.7	G-1	0.95	5.79	0.0	5.8	36	P	0.50	0.70%	0.42	0.43	0.50	11.13	0.40	0.28	0.03	0.14	11.05	10	0.99	5.7	0.1	A1.6A	-	-	-	-
C1.01	G-1	1.36	11.44	0.0	11.4	27	P	0.50	10.00%	0.42	0.37	0.50	6.70	0.70	0.28	0.04	0.23	24.11	10	0.62	7.1	4.4	C1.02	-	-	-	-
C1.02	G-1	0.81	7.31	4.4	11.7	27	P	0.50	3.44%	0.42	0.46	0.50	9.64	0.45	0.28	0.04	0.16	21.78	15	0.88	10.2	1.4	C1.04	-	-	-	-
C1.03	G-1	0.95	8.92	0.0	8.9	27	P	0.50	1.90%	0.42	0.46	0.50	9.88	0.44	0.28	0.04	0.16	16.50	10	0.81	7.3	1.7	D1.01A	-	-	-	-
C1.04	G-1	0.50	4.67	1.4	6.1	27	P	0.50	7.64%	0.42	0.31	0.50	5.18	0.85	0.28	0.04	0.27	15.44	15	1.00	6.1	0.0		-	-	-	-
C1.05	G-1	0.35	3.15	0.0	3.2	27	P	0.50	1.90%	0.42	0.31	0.50	5.27	0.85	0.28	0.04	0.27	7.71	10	1.00	3.2	0.0		-	-	-	-
C1.06A	S	1.07	9.64	0.0	9.6	27	P	0.50	1.90%	0.42	0.48	0.50	10.66	0.40	0.28	0.04	0.15	17.71	10	0.78	7.5	2.2		-	-	-	-
C1.06B	S	0.71	6.54	1.4	8.0	27	P	0.50	1.90%	0.42	0.44	0.50	9.01	0.49	0.28	0.04	0.17	14.97	10	0.86	6.9	1.1		-	-	-	-
C1.06	S	1.78	15.97	0.0	16.0	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		16.0	10	0.67	0.67
C1.07A	S	0.24	2.38	0.0	2.4	27	P	0.50	1.90%	0.42	0.28	0.50	4.60	0.85	0.28	0.04	0.27	6.85	10	1.00	2.4	0.0		-	-	-	-
C1.07B	S	0.61	5.63	1.1	6.7	27	P	0.50	1.90%	0.42	0.42	0.50	7.99	0.56	0.28	0.04	0.19	13.01	10	0.93	6.2	0.5		-	-	-	-
C1.07	S	0.85	8.01	0.0	8.0	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		8.0	10	0.42	0.42
C2.01	G-1	0.93	8.79	0.0	8.8	27	P	0.50	8.00%	0.42	0.35	0.50	6.17	0.77	0.28	0.04	0.25	19.16	15	0.94	8.2	0.6	C2.04	-	-	-	-
C2.02	G-1	1.57	14.71	0.0	14.7	27	P	0.50	8.00%	0.42	0.43	0.50	8.36	0.53	0.28	0.04	0.19	28.59	20	0.89	13.0	1.7	C2.05	-	-	-	-
C2.03	G-1	0.52	4.75	0.0	4.8	27	P	0.50	1.40%	0.42	0.39	0.50	7.11	0.65	0.28	0.04	0.22	9.59	10	1.00	4.8	0.0		-	-	-	-
C2.04	G-1	0.76	7.35	0.6	7.9	27	P	0.50	1.90%	0.42	0.44	0.50	8.97	0.49	0.28	0.04	0.17	14.89	10	0.87	6.8	1.1	C1.07B	-	-	-	-
C2.05	G-1	0.56	5.61	1.7	7.3	27	P	0.50	1.90%	0.42	0.43	0.50	8.47	0.53	0.28	0.04	0.18	13.94	10	0.90	6.5	0.8	C2.06	-	-	-	-
C2.06	G-1	0.84	7.79	0.8	8.5	27	P	0.50	1.90%	0.42	0.46	0.50	9.52	0.46	0.28	0.04	0.16	15.88	10	0.83	7.1	1.4	C1.06B	-	-	-	-
C3.01	G-1	0.43	3.98	0.0	4.0	27	P	0.50	1.60%	0.42	0.35	0.50	6.21	0.77	0.28	0.04	0.25	8.50	10	1.00	4.0	0.0	C3.02	-	-	-	-
C3.02	G-1	0.54	5.03	0.0	5.0	27	P	0.50	1.00%	0.42	0.42	0.50	8.18	0.55	0.28	0.04	0.19	9.64	10	1.00	5.0	0.0	C1.04	-	-	-	-
D1.01A	G-1	0.26	2.76	1.7	4.4	27	P	0.50	1.00%	0.42	0.40	0.50	7.54	0.60	0.28	0.04	0.20	8.71	10	1.00	4.4	0.0		-	-	-	-
D1.01B	S	0.25	2.57	0.0	2.6	27	P	0.50	1.00%	0.42	0.33	0.50	5.58	0.85	0.28	0.04	0.27	5.83	10	1.00	2.6	0.0		-	-	-	-
D1.01	S	0.51	5.32	0.0	5.3	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		5.3	10	0.32	0.32
D1.02A	G-1	0.51	4.64	0.0	4.6	27	P	0.50	1.90%	0.42	0.36	0.50	6.44	0.73	0.28	0.04	0.24	9.77	10	1.00	4.6	0.0		-	-	-	-
D1.02B	S	0.27	2.68	0.0	2.7	27	P	0.50	1.00%	0.42	0.33	0.50	5.70	0.85	0.28	0.04	0.27	5.93	10	1.00	2.7	0.0		-	-	-	-
D1.02	S	0.78	7.19	0.0	7.2	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		7.2	10	0.39	0.39
CV-1	-	7.85	48.74	0.0	48.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-

STREET FLOW AND INLET CALCULATIONS
25 YEAR STORM

Inlet No.	Inlet Type	Drainage Area	Q 25 (cfs)	Q pass (cfs)	Q total (cfs)	STREET CAPACITY: Street Width F-F (ft)	Crown Type	Curb Height (ft)	Gutter Slope (%)	a (ft)	Yo (ft)	Crown Height (ft)	Ponded Width (ft)	INLET ON GRADE CAPACITY: Eo	S'w	Sx	Se	LT	L	E	Qi	Qpass (cfs)	Pass to Inlet #	SUMP INLET CAPACITY CURB (with Depression): Qtotal (cfs)	Length (ft)	d (ft)	d (ft) (d ≤ h + a)
ULTIMATE CONDITION DRAINAGE AREAS																											
A1.6A	S	0.73	5.18	0.0	5.2	36	P	0.50	0.70%	0.42	0.41	0.50	10.36	0.44	0.28	0.03	0.15	10.12	10	1.00	5.2	0.0		-	-	-	-
A1.6B	S	0.80	5.22	0.2	5.5	36	P	0.50	0.60%	0.42	0.43	0.50	11.27	0.40	0.28	0.03	0.14	10.36	10	1.00	5.4	0.0		-	-	-	-
A1.6	S	1.53	10.41	0.0	10.4	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		10.4	10	0.50	0.50
A1.7A	S	0.83	6.35	0.0	6.3	36	P	0.50	0.70%	0.42	0.44	0.50	11.88	0.37	0.28	0.03	0.13	11.91	10	0.96	6.1	0.2		-	-	-	-
A1.7B	S	0.10	0.81	0.0	0.8	36	P	0.50	0.60%	0.42	0.21	0.50	4.30	0.85	0.28	0.03	0.26	3.15	10	1.00	0.8	0.0		-	-	-	-
A1.7	S	0.93	7.13	0.0	7.1	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		7.1	10	0.39	0.39
A3.1	G-1	0.47	3.22	0.0	3.2	36	P	0.50	0.50%	0.42	0.36	0.50	8.65	0.55	0.28	0.03	0.18	6.71	10	1.00	3.2	0.0		-	-	-	-
A3.2	G-1	1.06	7.73	0.0	7.7	36	P	0.50	1.24%	0.42	0.43	0.50	11.16	0.40	0.28	0.03	0.14	14.83	10	0.87	6.7	1.0	A3.3	-	-	-	-
A3.3	G-1	0.61	4.32	1.0	5.3	36	P	0.50	0.60%	0.42	0.43	0.50	11.12	0.40	0.28	0.03	0.14	10.20	10	1.00	5.3	0.0	A3.4	-	-	-	-
A3.4	G-1	0.73	5.18	0.0	5.2	36	P	0.50	3.00%	0.42	0.31	0.50	6.96	0.72	0.28	0.03	0.23	12.16	10	0.96	5.0	0.2	A1.6B	-	-	-	-
B1.5	G-1	0.75	3.04	0.2	3.2	36	P	0.50	1.68%	0.42	0.29	0.50	6.38	0.81	0.28	0.03	0.25	7.89	10	1.00	3.2	0.0	B1.6	-	-	-	-
B1.6	G-1	0.98	4.15	0.0	4.2	36	P	0.50	0.52%	0.42	0.40	0.50	9.90	0.46	0.28	0.03	0.16	8.21	10	1.00	4.2	0.0		-	-	-	-
B1.7	G-1	0.95	4.23	0.0	4.2	36	P	0.50	0.70%	0.42	0.38	0.50	9.17	0.51	0.28	0.03	0.17	8.63	10	1.00	4.2	0.0	A1.6A	-	-	-	-
C1.01	G-1	1.36	9.05	0.0	9.0	27	P	0.50	10.00%	0.42	0.34	0.50	5.90	0.82	0.28	0.04	0.26	20.15	10	0.71	6.4	2.6	C1.02	-	-	-	-
C1.02	G-1	0.81	5.85	2.6	8.5	27	P	0.50	3.44%	0.42	0.41	0.50	7.69	0.59	0.28	0.04	0.20	16.78	15	0.98	8.3	0.1	C1.04	-	-	-	-
C1.03	G-1	0.95	7.18	0.0	7.2	27	P	0.50	1.90%	0.42	0.43	0.50	8.37	0.53	0.28	0.04	0.19	13.75	10	0.90	6.5	0.7	D1.01A	-	-	-	-
C1.04	G-1	0.50	3.74	0.1	3.9	27	P	0.50	7.64%	0.42	0.26	0.50	4.19	0.85	0.28	0.04	0.27	12.79	15	1.00	3.9	0.0		-	-	-	-
C1.05	G-1	0.35	2.52	0.0	2.5	27	P	0.50	1.90%	0.42	0.29	0.50	4.73	0.85	0.28	0.04	0.27	7.02	10	1.00	2.5	0.0		-	-	-	-
C1.06A	S	1.07	7.71	0.0	7.7	27	P	0.50	1.90%	0.42	0.44	0.50	8.80	0.50	0.28	0.04	0.18	14.58	10	0.88	6.8	1.0		-	-	-	-
C1.06B	S	0.71	5.23	0.3	5.5	27	P	0.50	1.90%	0.42	0.39	0.50	7.12	0.65	0.28	0.04	0.22	11.21	10	0.98	5.4	0.1		-	-	-	-
C1.06	S	1.78	12.76	0.0	12.8	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		12.8	10	0.58	0.58
C1.07A	S	0.24	1.93	0.0	1.9	27	P	0.50	1.90%	0.42	0.26	0.50	4.17	0.85	0.28	0.04	0.27	6.27	10	1.00	1.9	0.0		-	-	-	-
C1.07B	S	0.61	4.50	0.2	4.7	27	P	0.50	1.90%	0.42	0.37	0.50	6.52	0.72	0.28	0.04	0.24	9.94	10	1.00	4.7	0.0		-	-	-	-
C1.07	S	0.85	6.43	0.0	6.4	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		6.4	10	0.36	0.36
C2.01	G-1	0.93	7.06	0.0	7.1	27	P	0.50	8.00%	0.42	0.32	0.50	5.51	0.85	0.28	0.04	0.27	16.65	15	0.98	7.0	0.1	C2.04	-	-	-	-
C2.02	G-1	1.57	11.79	0.0	11.8	27	P	0.50	8.00%	0.42	0.39	0.50	7.27	0.63	0.28	0.04	0.21	24.02	20	0.96	11.3	0.5	C2.05	-	-	-	-
C2.03	G-1	0.52	3.80	0.0	3.8	27	P	0.50	1.40%	0.42	0.36	0.50	6.28	0.76	0.28	0.04	0.25	8.07	10	1.00	3.8	0.0		-	-	-	-
C2.04	G-1	0.76	5.93	0.1	6.0	27	P	0.50	1.90%	0.42	0.40	0.50	7.49	0.61	0.28	0.04	0.21	11.99	10	0.96	5.8	0.2	C1.07B	-	-	-	-
C2.05	G-1	0.56	4.55	0.5	5.0	27	P	0.50	1.90%	0.42	0.37	0.50	6.73	0.69	0.28	0.04	0.23	10.40	10	1.00	5.0	0.0	C2.06	-	-	-	-
C2.06	G-1	0.84	6.24	0.0	6.3	27	P	0.50	1.90%	0.42	0.41	0.50	7.66	0.59	0.28	0.04	0.20	12.33	10	0.95	5.9	0.3	C1.06B	-	-	-	-
C3.01	G-1	0.43	3.19	0.0	3.2	27	P	0.50	1.60%	0.42	0.33	0.50	5.53	0.85	0.28	0.04	0.27	7.36	10	1.00	3.2	0.0	C3.02	-	-	-	-
C3.02	G-1	0.54	4.04	0.0	4.0	27	P	0.50	1.00%	0.42	0.39	0.50	7.13	0.65	0.28	0.04	0.22	8.11	10	1.00	4.0	0.0	C1.04	-	-	-	-
D1.01A	G-1	0.26	2.26	0.7	2.9	27	P	0.50	1.00%	0.42	0.35	0.50	6.00	0.80	0.28	0.04	0.26	6.37	10	1.00	2.9	0.0		-	-	-	-
D1.01B	S	0.25	2.09	0.0	2.1	27	P	0.50	1.00%	0.42	0.30	0.50	5.04	0.85	0.28	0.04	0.27	5.35	10	1.00	2.1	0.0		-	-	-	-
D1.01	S	0.51	4.35	0.0	4.3	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		4.3	10	0.28	0.28
D1.02A	G-1	0.51	3.72	0.0	3.7	27	P	0.50	1.90%	0.42	0.33	0.50	5.73	0.85	0.28	0.04	0.27	8.26	10	1.00	3.7	0.0		-	-	-	-
D1.02B	S	0.27	2.17	0.0	2.2	27	P	0.50	1.00%	0.42	0.31	0.50	5.13	0.85	0.28	0.04	0.27	5.43	10	1.00	2.2	0.0		-	-	-	-
D1.02	S	0.78	5.78	0.0	5.8	-	P	-	-	-	-	0.50	-	-	-	-	-	-	10	-	-	-		5.8	10	0.34	0.34
CV-1	-	7.85	37.10	0.0	37.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-

NO.	REVISION	DATE
1	ADD CV-1 AREA	08/22/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
3/14/23

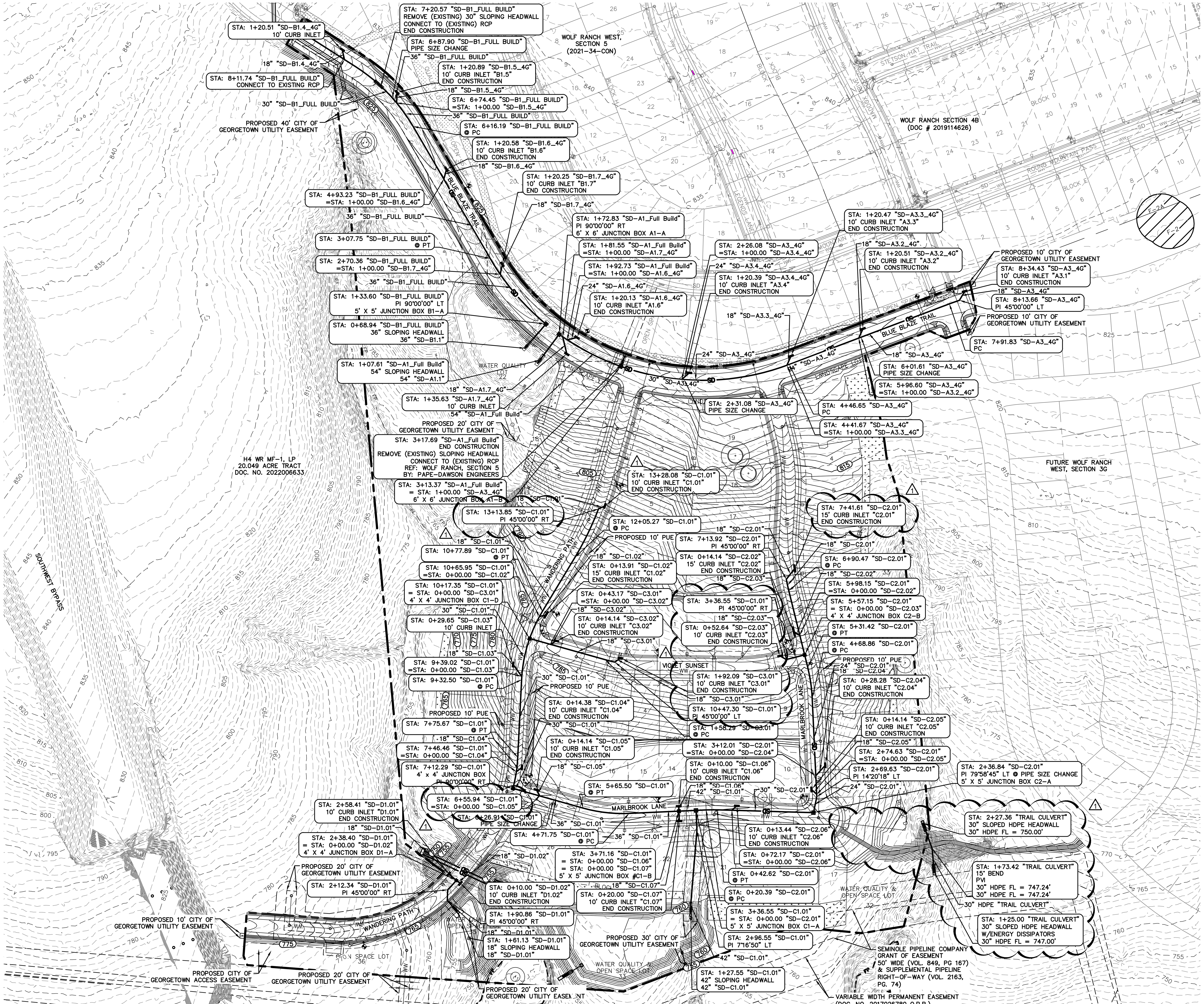
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

DRAINAGE CALCULATIONS

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 21 OF 61

Date: Mar 20, 2023, 3:08pm User ID: dking
File: H:\Projects\511\27\42\Civil\01 construction documents\Civil\DD51127-42.dwg



SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

—W—	WATER LINE
—WW—	WASTEWATER LINE & MH
—SD—	STORM DRAIN LINE & MH
	CURB INLET
	SINGLE WATER SERVICE
	DOUBLE WATER SERVICE
	SINGLE WW SERVICE
	DOUBLE WW SERVICE
	GATE VALVE
	FIRE HYDRANT
	EXISTING GATE VALVE
	EXISTING FIRE HYDRANT
	EXISTING WATER LINE
	EXISTING WASTEWATER LINE
	EXISTING STORM DRAIN LINE
—786—	EXISTING CONTOUR LINE
(786)	PROPOSED CONTOUR LINE
	PROPERTY BOUNDARY
	VEGETATIVE FILTER STRIP
—FP—	100-YEAR FEMA FLOODPLAIN
	500-YEAR FEMA FLOODPLAIN

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. ALL RCP IS CLASS III UNLESS OTHERWISE NOTED.
3. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.

NO.	REVISION	DATE
1	REVISE FOR 56FT LOTS ADD PRIVATE TRAIL	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL STORM DRAINAGE PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE April 18, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 22 OF 61

Date: Apr 18, 2023, 10:10am User ID: cconner
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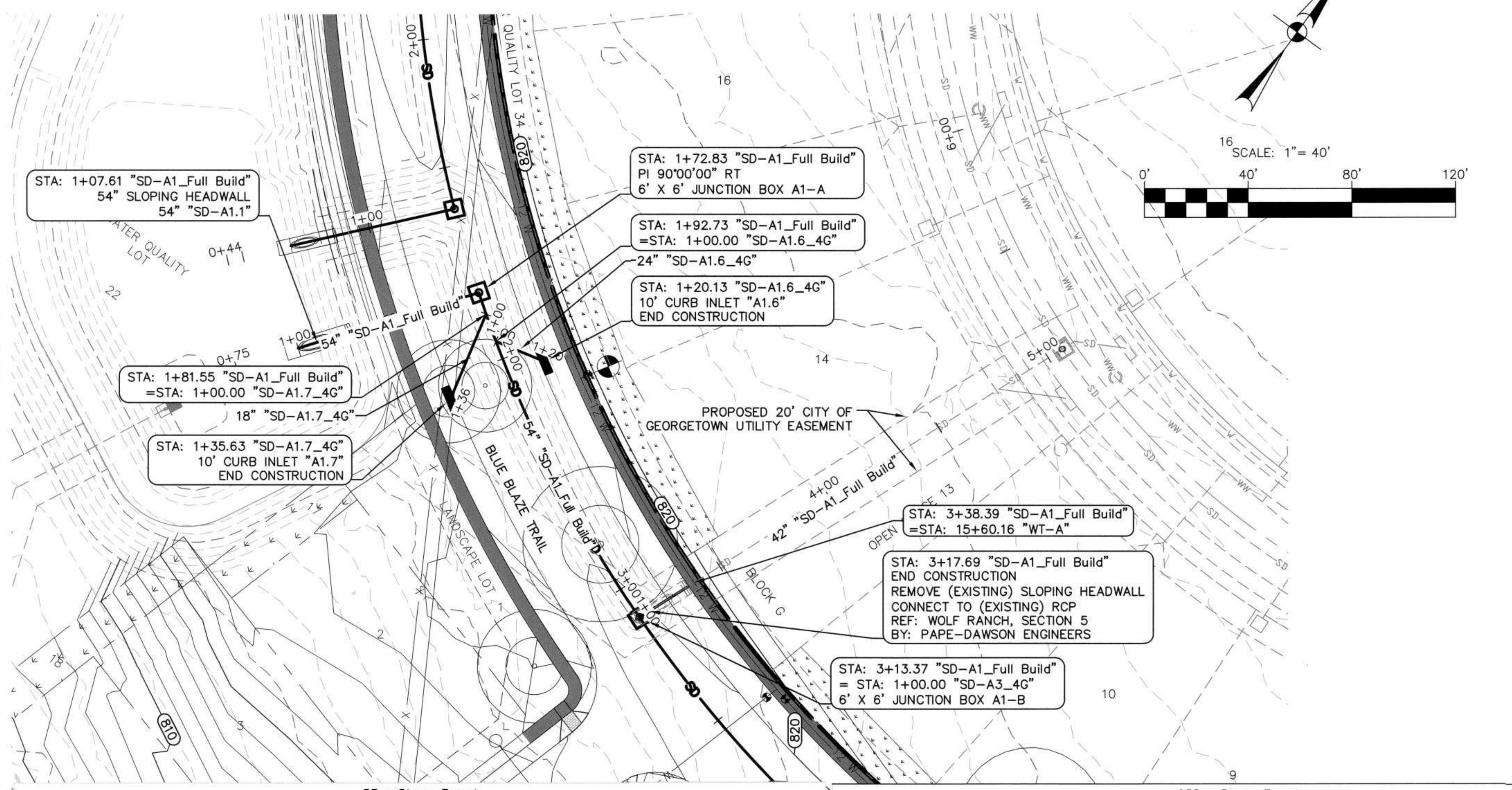

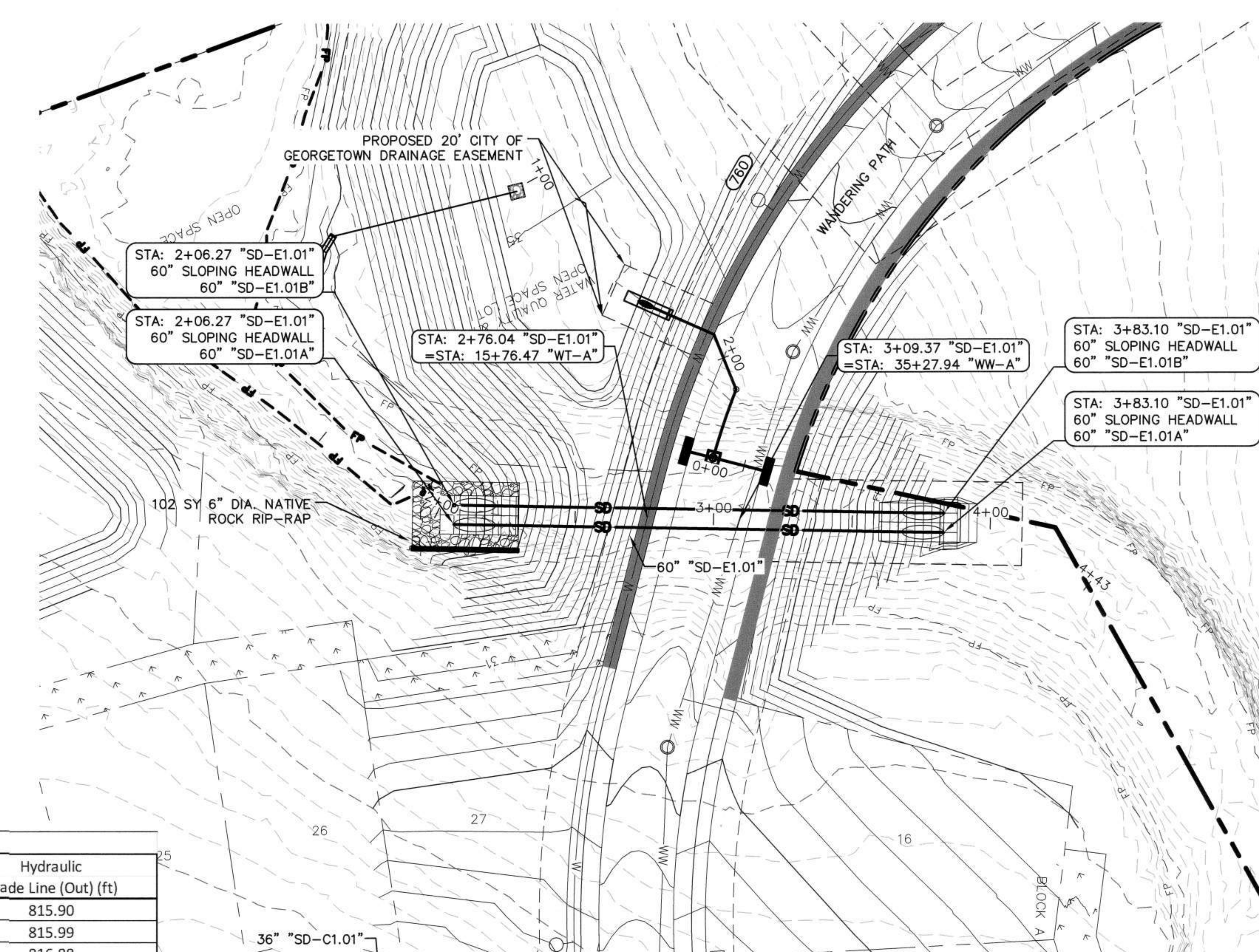

NOTES:

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2. ALL RCP IS CLASS III UNLESS OTHERWISE NOTED.
3. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.

25 yr Storm Event

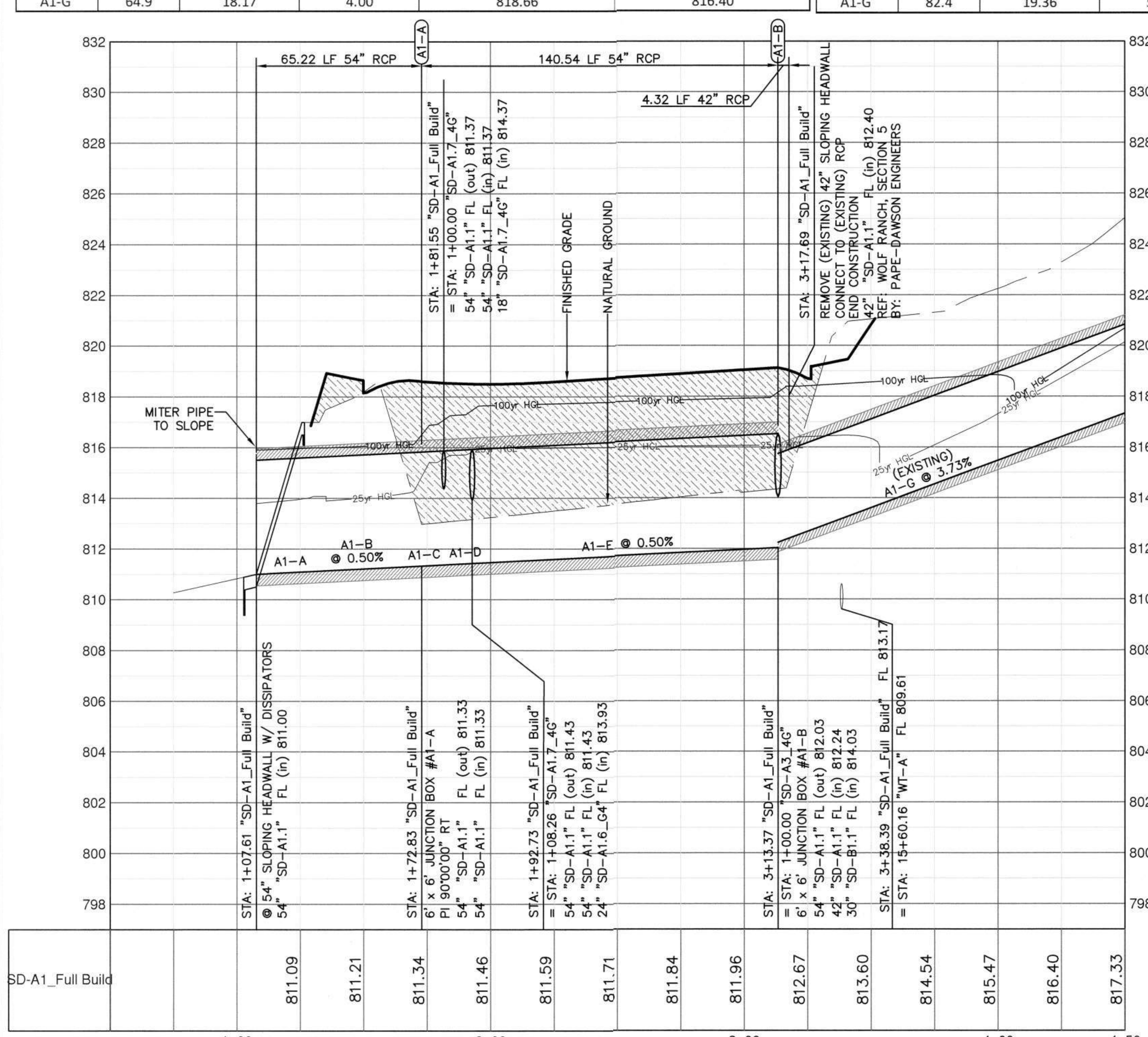
Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A1-A	101.0	10.15	2.79	814.08	813.80
A1-B	101.1	10.15	2.77	814.28	813.90
A1-C	101.1	10.15	4.08	815.41	815.40
A1-D	94.1	9.99	4.32	815.71	815.70
A1-E	84.4	9.74	4.52	816.07	815.94
A1-F	64.9	6.74	4.14	816.40	816.38
A1-G	64.9	18.17	4.00	818.66	816.40

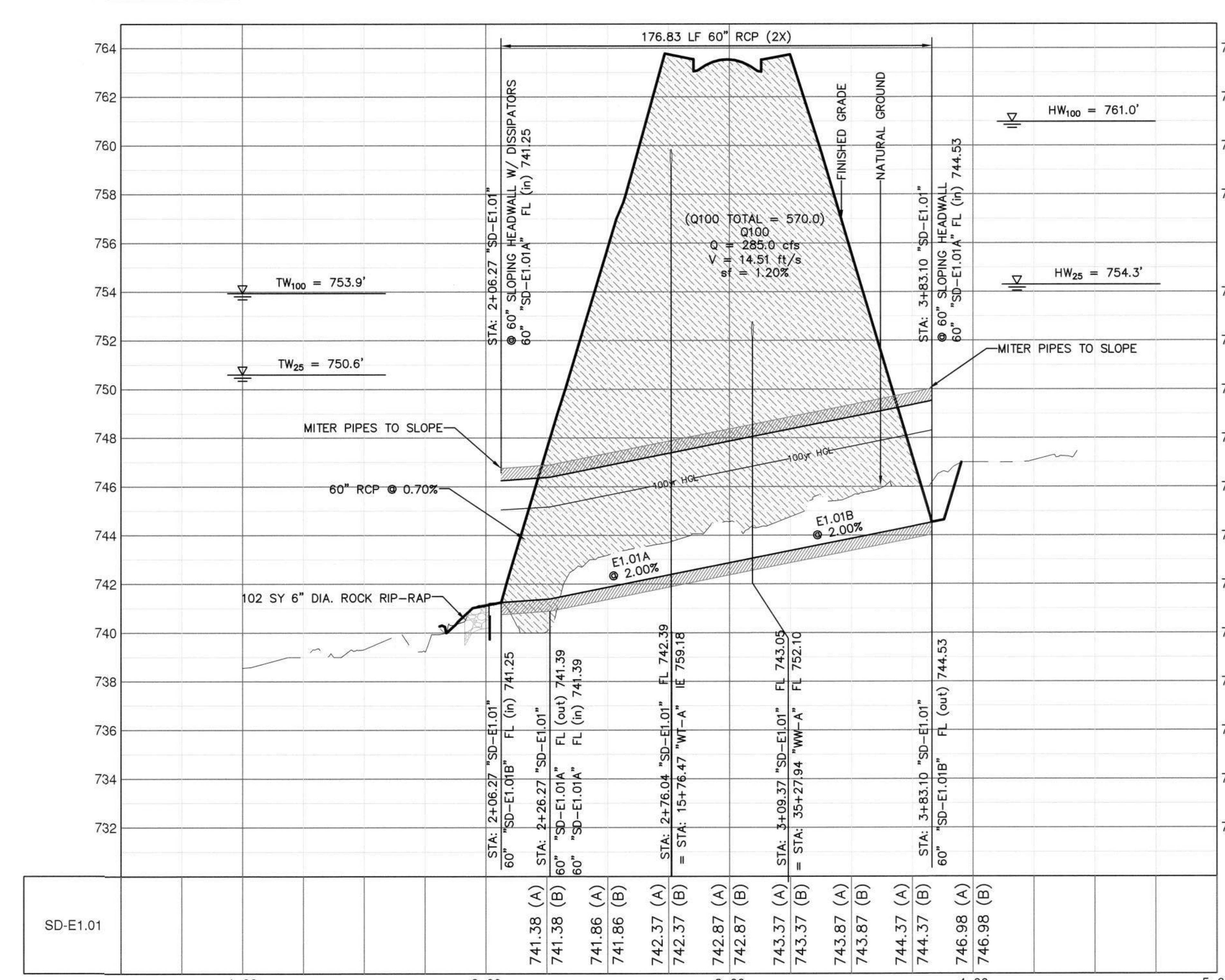
100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A1-A	127.5	8.02	4.90	815.99	815.90
A1-B	127.6	8.02	4.86	816.13	815.99
A1-C	127.7	8.03	5.56	816.92	816.88
A1-D	119.1	7.49	5.89	817.30	817.26
A1-E	106.9	6.72	6.22	817.95	817.64
A1-F	82.4	8.56	6.12	818.39	818.36
A1-G	82.4	19.36	5.99	818.96	818.39

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PROPOSED BOUNDARY LINE
- 100-YEAR FEMA FLOODPLAIN
- 500-YEAR FEMA FLOODPLAIN





PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- FINISHED GRADE
- SUBGRADE
- PROPOSED STORM DRAIN
- 25-YR HGL
- 100-YR HGL

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-A1_FULL BUILD - STA 1+00 - END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 23 OF 61

Date: Mar 20, 2023, 3:17pm User ID: dking
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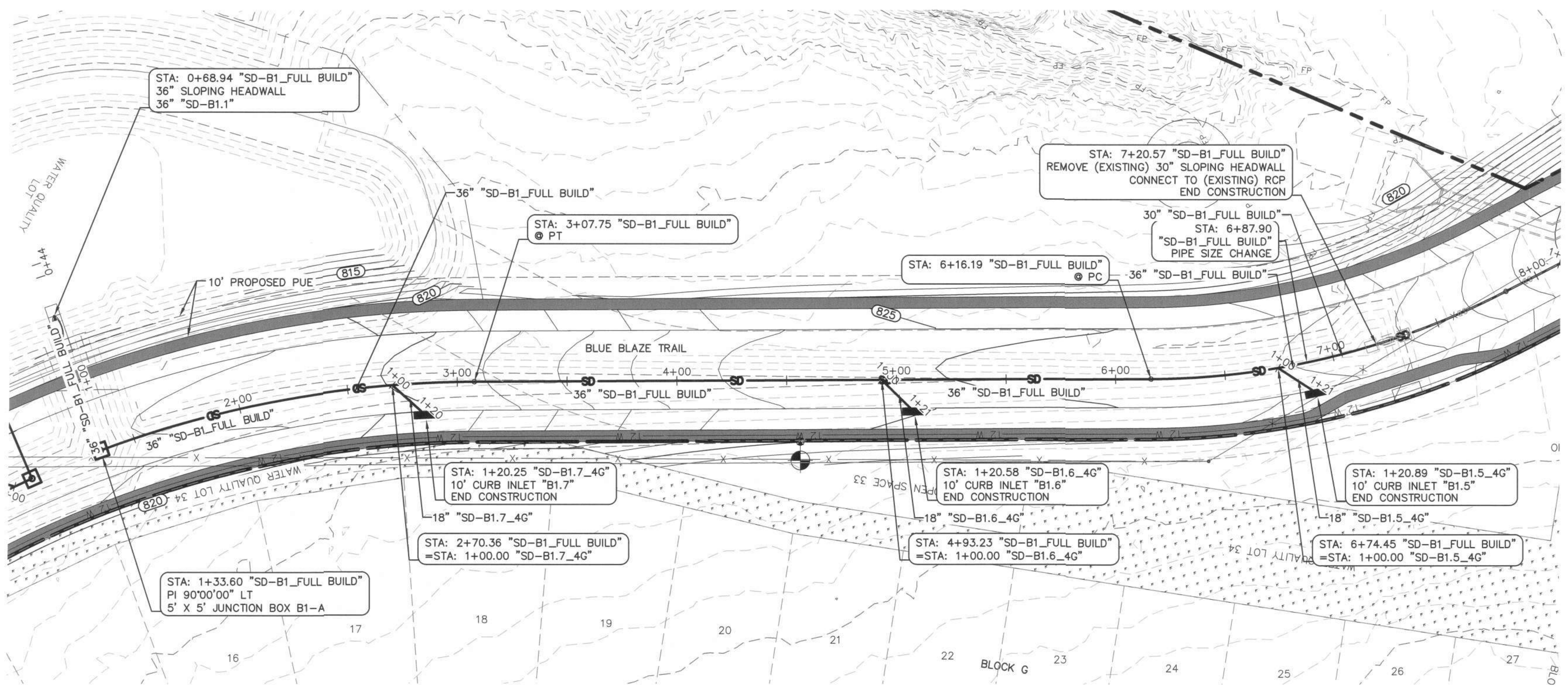


SCALE: 1"= 40'

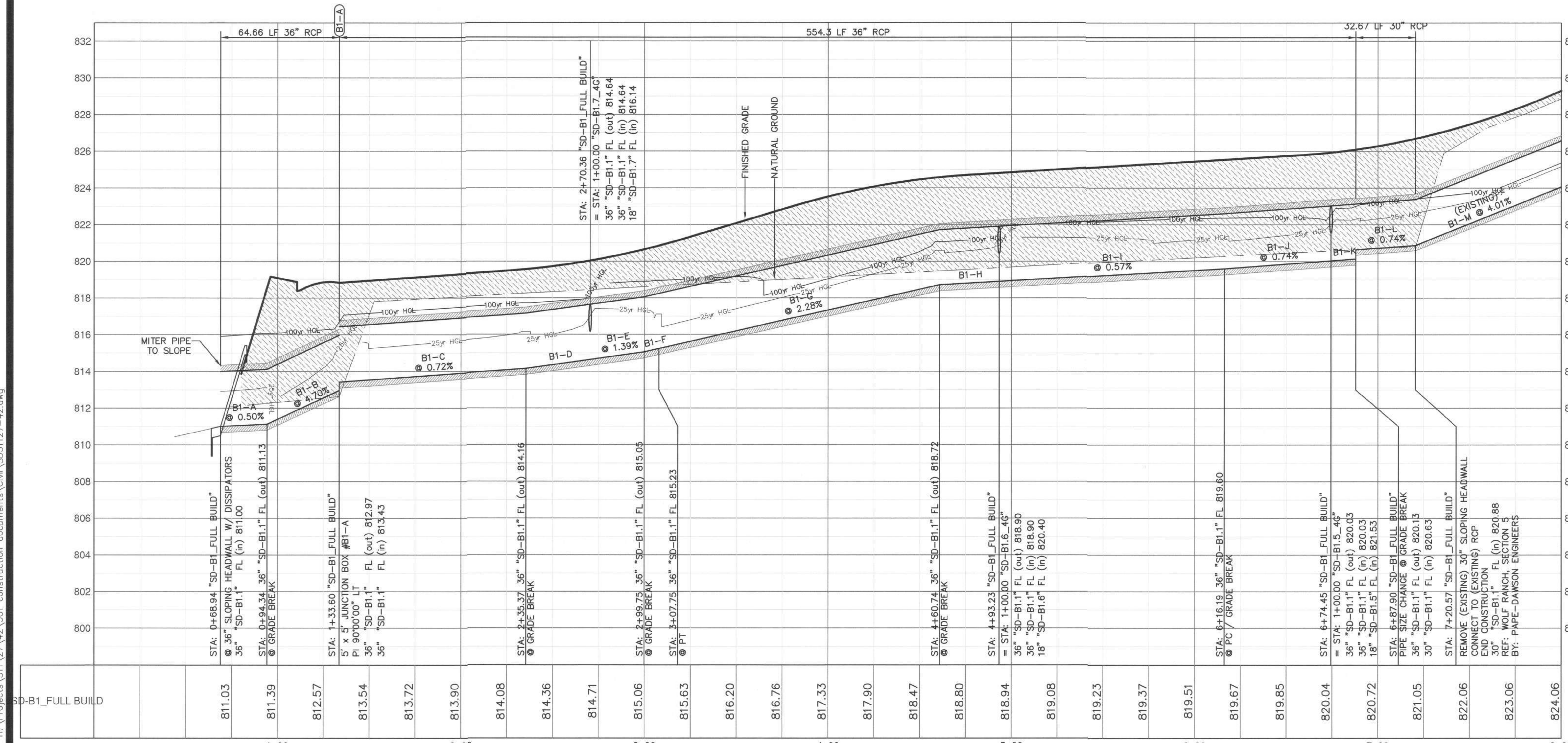
0' 40' 80' 120'

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. ALL RCP IS CLASS III UNLESS OTHERWISE NOTED.
3. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PROPOSED BOUNDARY LINE



25 yr Storm Event					
Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
B1-A	37.2	7.88	1.91	813.11	812.91
B1-B	37.2	18.15	1.23	814.96	812.35
B1-C	37.3	9.08	2.23	816.14	815.66
B1-D	37.3	11.65	1.58	816.63	815.74
B1-E	33.4	11.33	2.77	817.32	817.41
B1-F	33.4	13.55	2.26	817.11	817.32
B1-G	33.4	13.55	1.17	820.59	816.40
B1-H	33.4	8.12	1.73	820.78	820.45
B1-I	29.5	7.88	2.40	821.36	821.31
B1-J	29.5	8.68	1.50	821.80	821.11
B1-K	26.5	8.44	2.23	822.25	822.27
B1-L	26.5	8.40	1.58	822.63	822.22

100 yr Storm Event					
Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
B1-A	57.3	8.11	4.90	816.06	815.90
B1-B	57.3	8.11	4.93	816.31	816.06
B1-C	57.4	8.12	3.65	817.72	817.07
B1-D	57.5	8.13	3.56	817.94	817.72
B1-E	52.1	7.37	4.11	818.91	818.75
B1-F	52.1	7.37	3.85	818.95	818.91
B1-G	52.1	15.25	3.71	821.06	818.95
B1-H	52.1	8.80	2.34	821.25	821.06
B1-I	46.7	8.68	3.04	822.37	821.94
B1-J	46.7	9.65	2.76	822.26	822.37
B1-K	42.5	9.46	2.86	822.92	822.90
B1-L	42.5	8.65	2.46	823.39	823.10

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- FINISHED GRADE
- SUBGRADE
- PROPOSED STORM DRAIN
- 25-YR HGL
- 100-YR HGL

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER

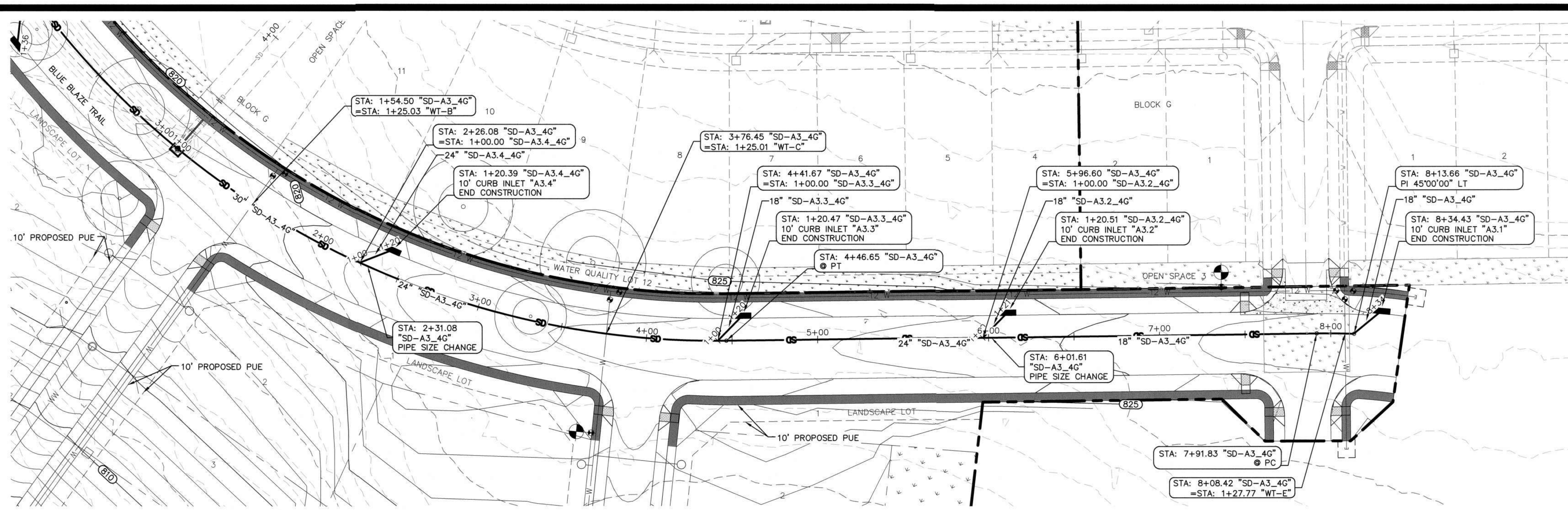
PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

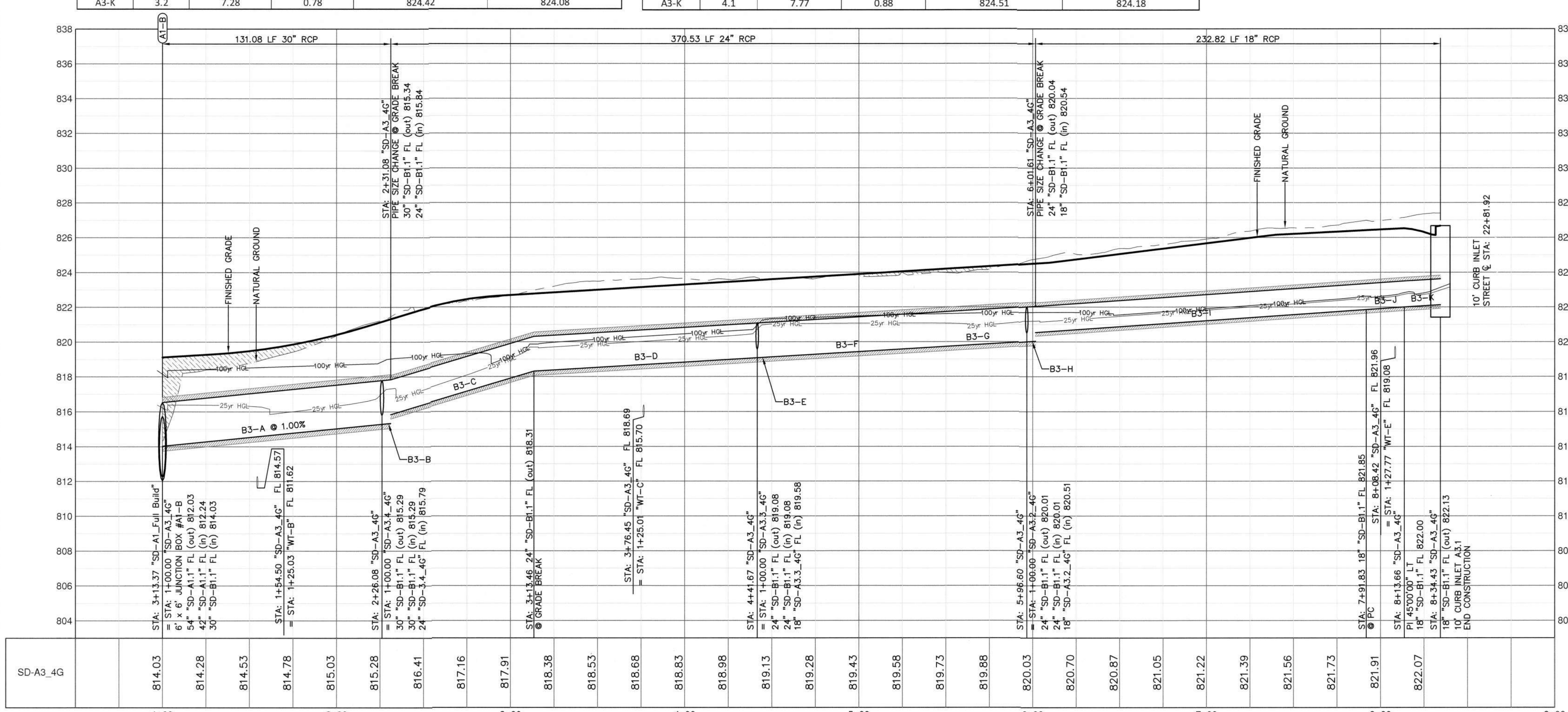
STORM PLAN & PROFILES
SD-B1_FULL BUILD - STA 1+00 - END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 24 OF 61



25 yr Storm Event					
Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A3-A	19.7	8.78	2.35	816.80	816.38
A3-B	14.7	8.13	1.99	817.28	817.29
A3-C	14.8	12.30	1.50	819.70	817.34
A3-D	15.0	6.70	1.34	820.48	819.65
A3-E	10.8	6.23	1.89	820.97	820.97
A3-F	10.8	6.24	1.92	821.08	821.03
A3-G	10.9	6.25	1.41	821.20	821.08
A3-H	3.2	4.48	1.18	821.19	821.20
A3-I	3.2	6.10	0.51	823.70	821.05
A3-J	3.2	6.10	0.54	823.98	823.55
A3-K	3.2	7.28	0.78	824.42	824.08

100 yr Storm Event					
Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A3-A	24.9	5.06	4.33	818.76	818.36
A3-B	18.6	3.79	3.70	819.00	818.99
A3-C	18.7	13.08	3.22	819.87	819.07
A3-D	18.8	6.89	1.56	820.71	819.87
A3-E	13.5	4.31	2.15	821.24	821.23
A3-F	13.6	6.57	2.22	821.61	821.33
A3-G	13.7	6.58	1.94	821.71	821.61
A3-H	4.0	4.79	1.69	821.71	821.71
A3-I	4.1	6.50	1.17	823.79	821.72
A3-J	4.1	6.50	0.61	824.07	823.63
A3-K	4.1	7.77	0.88	824.51	824.18



NOTES:

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LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
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- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PROPOSED BOUNDARY LINE

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- FINISHED GRADE
- SUBGRADE
- PROPOSED STORM DRAIN
- 25-YR HGL
- 100-YR HGL

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

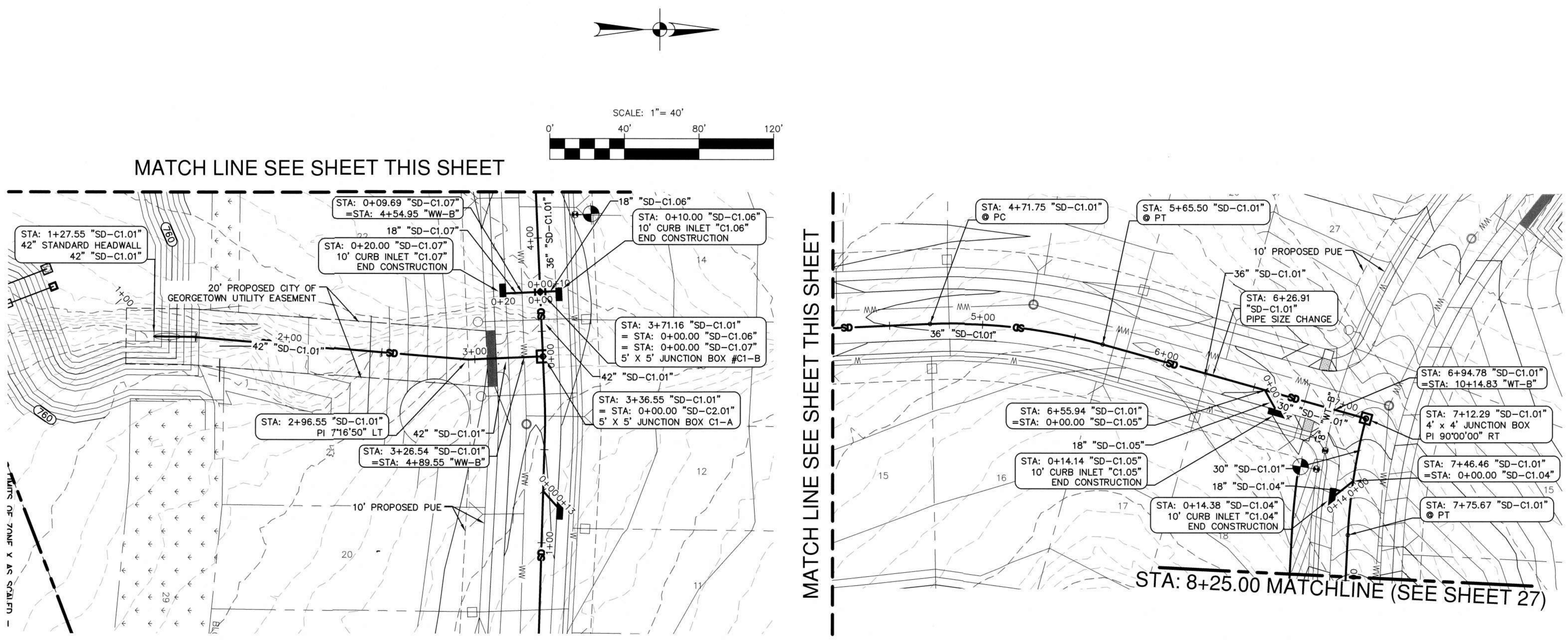
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-A3_4G - STA 1+00 - END

NO.	REVISION	DATE

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 25 OF 61



SCALE: 1"= 40'

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PROFILE SCALES:

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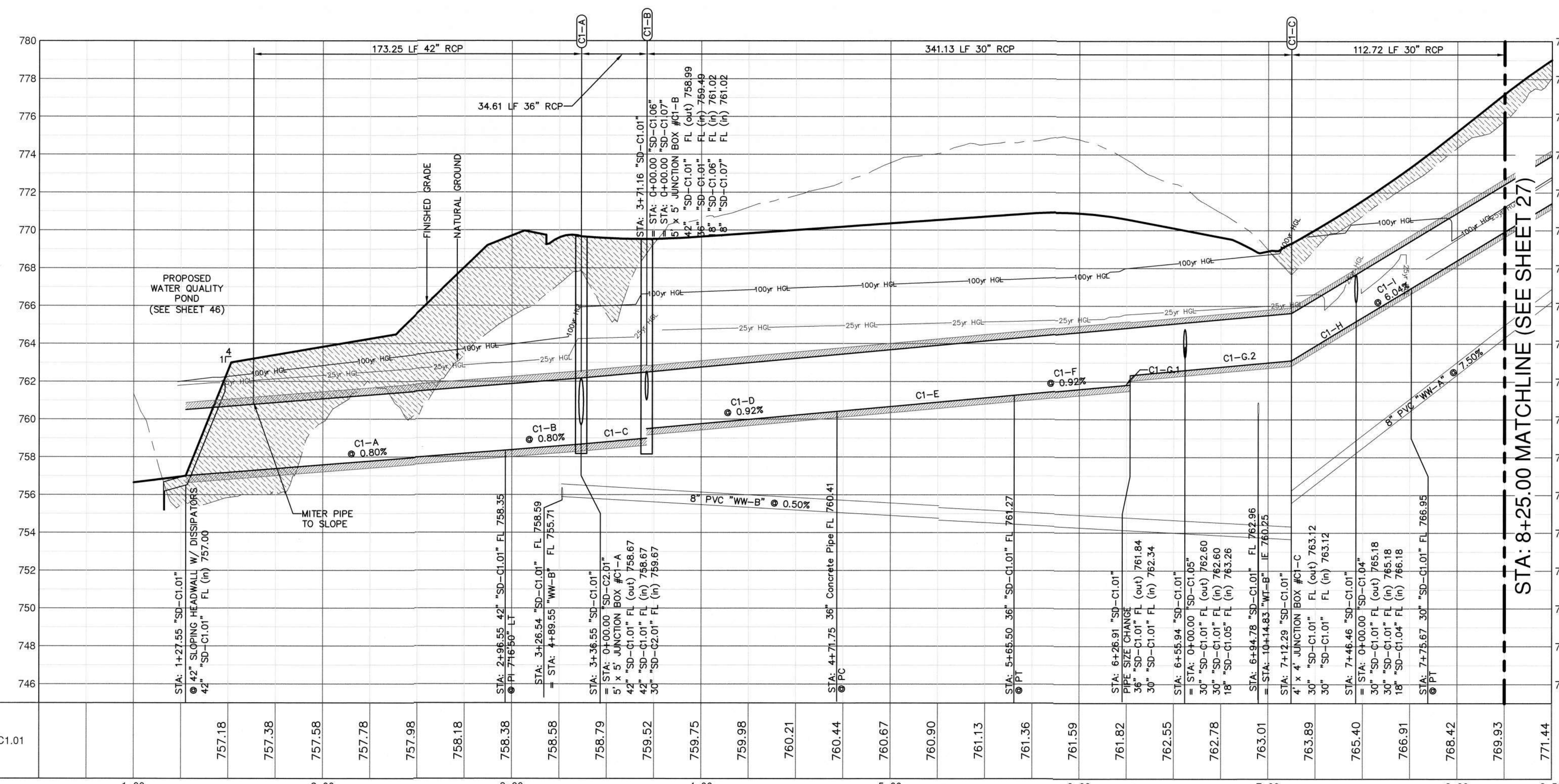
PROFILE LEGEND:

NATURAL GROUND
FINISHED GRADE
SUBGRADE
PROPOSED STORM DRAIN
25-YR HGL
100-YR HGL



25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1-A	84.7	10.63	4.80	761.94	761.80
C1-B	84.7	10.63	4.57	763.19	762.92
C1-C	50.7	10.15	5.57	764.30	764.21
C1-D	33.8	9.01	5.15	764.90	764.64
C1-E	33.8	9.01	4.49	765.15	764.90
C1-F	33.8	9.01	3.88	765.30	765.15
C1-G.2	31.7	8.92	3.66	765.44	765.43
C1-H	31.7	18.18	3.48	767.13	766.60
C1-I	28.4	17.64	2.52	768.80	767.70
C1-J	28.4	17.64	0.93	778.28	767.88

100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1-A	107.0	11.12	5.00	763.80	762.22
C1-B	107.0	11.12	5.07	764.22	763.80
C1-C	64.2	10.73	5.55	766.00	765.87
C1-D	42.6	6.03	7.29	766.97	766.54
C1-E	42.6	6.03	7.14	767.37	766.97
C1-F	42.6	6.03	6.62	767.60	767.37
C1-G.2	39.9	9.13	6.06	767.83	767.80
C1-H	39.9	19.34	5.66	770.01	769.66
C1-I	35.8	18.79	6.45	770.67	770.43
C1-J	35.8	18.79	5.13	778.49	770.67

NO. REVISION DATE

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

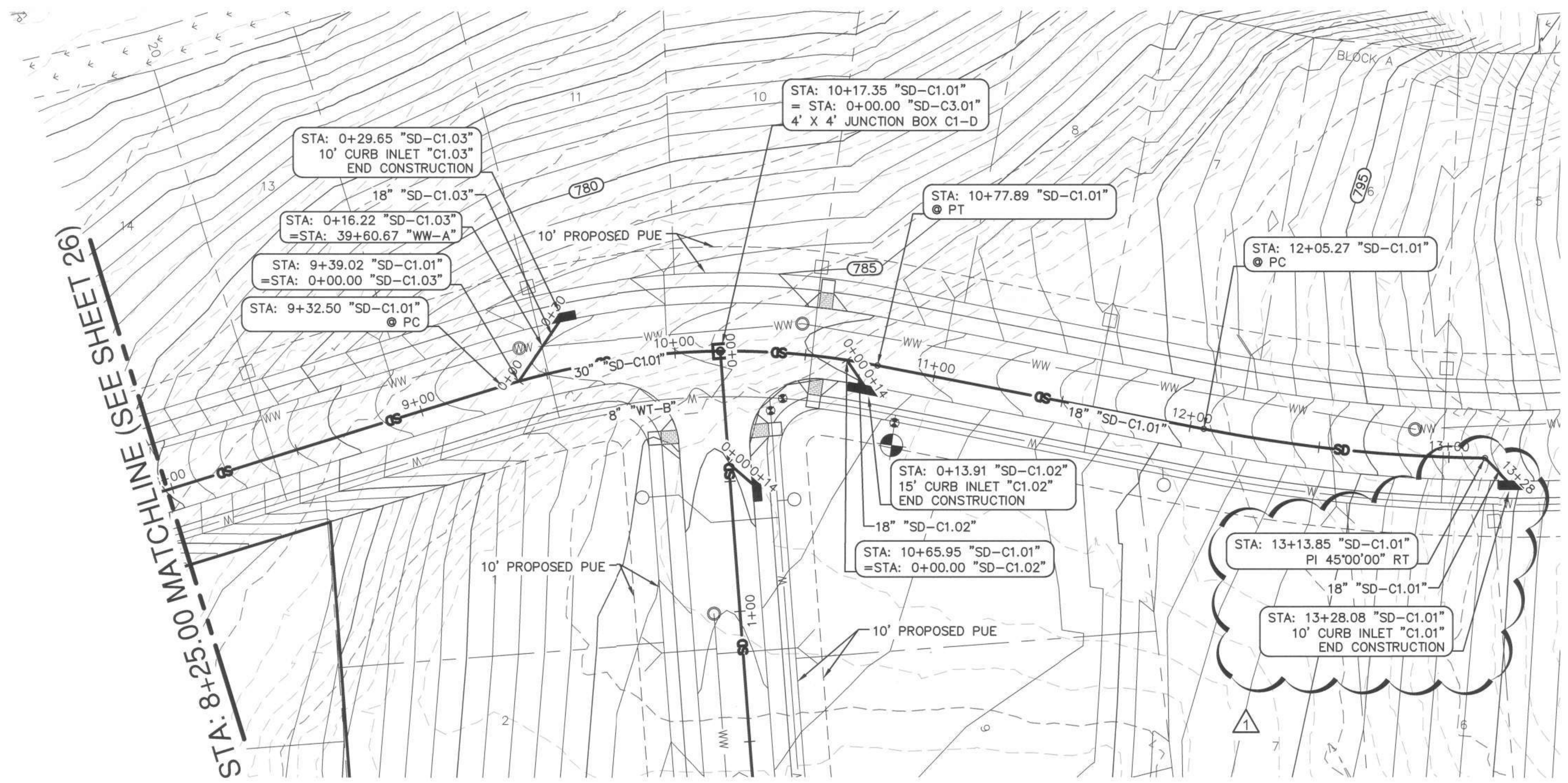
PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-C1.01 - STA 1+00 - 8+00

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN DB
SHEET 26 OF 61



SCALE: 1"= 40'

0' 40' 80' 120'

NOTES:

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LEGEND

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- STORM DRAIN LINE & MH
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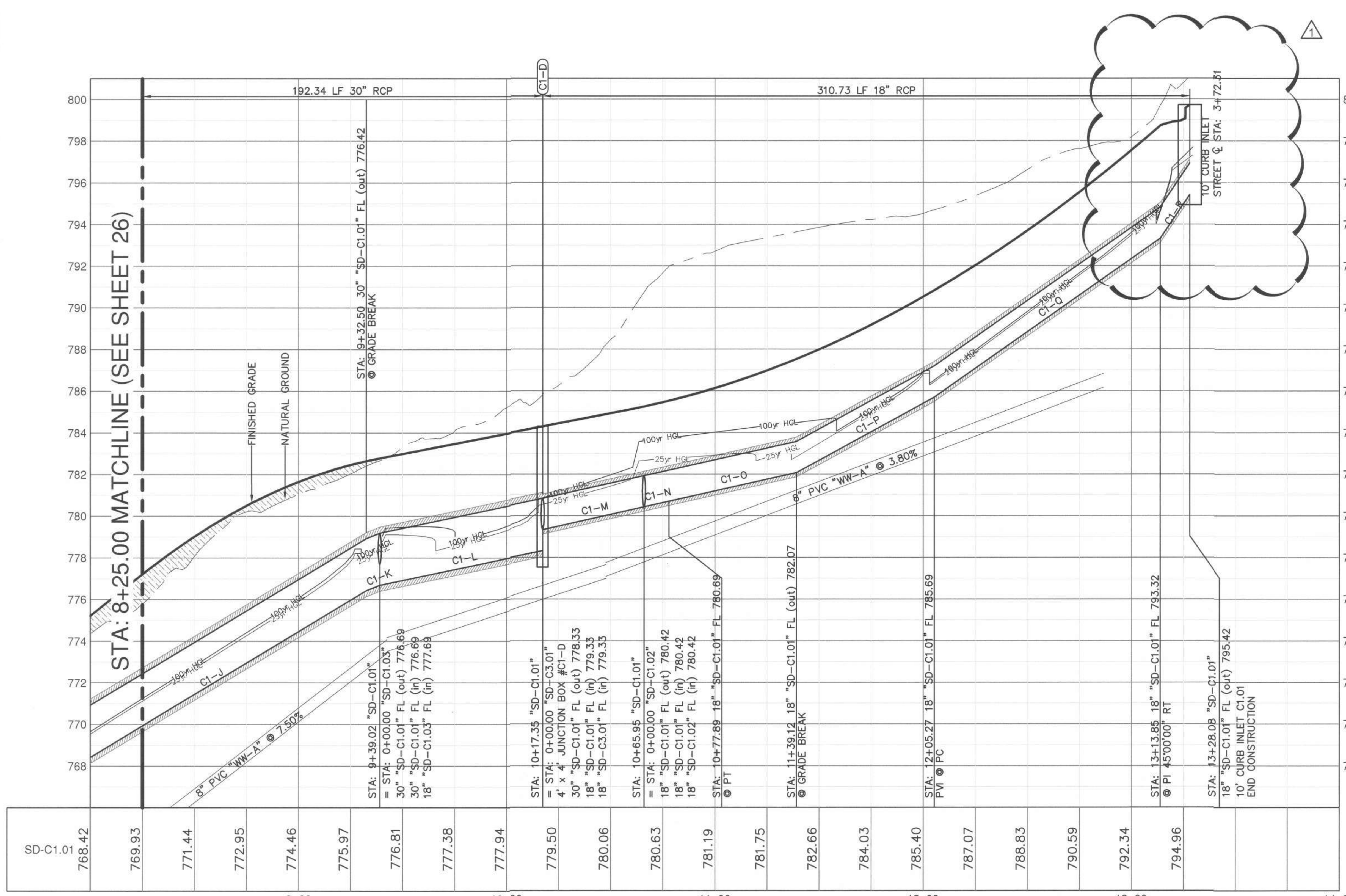

25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1-J	28.4	17.64	0.93	778.28	767.88
C1-K	28.4	15.28	1.53	778.54	777.95
C1-L	21.5	11.13	2.49	779.97	779.17
C1-M	14.7	10.13	1.15	781.81	780.48
C1-N	9.1	9.24	2.21	782.71	782.63
C1-O	9.1	9.24	2.01	783.19	782.71
C1-P	9.1	12.89	0.62	786.81	782.69
C1-Q	9.1	14.10	0.56	794.45	786.25
C1-R	9.1	18.43	0.50	796.54	794.64

100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1-J	35.8	18.79	5.13	778.49	770.67
C1-K	35.8	16.25	3.59	778.75	778.17
C1-L	27.3	11.85	1.71	780.18	779.48
C1-M	18.6	10.55	2.76	782.23	780.78
C1-N	11.6	9.75	1.46	783.53	783.41
C1-O	11.6	9.75	3.03	784.17	783.53
C1-P	11.6	13.71	2.39	786.94	784.17
C1-Q	11.6	15.04	0.67	794.58	786.33
C1-R	11.6	19.72	1.57	796.67	794.83

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- FINISHED GRADE
- SUBGRADE
- PROPOSED STORM DRAIN
- 25-YR HGL
- 100-YR HGL

NO.	REVISION	DATE
1	SHIFT INLET FOR REVISED LOT LAYOUT	08/11/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-C1.01 - STA 8+00 - END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 27 OF 61

Date: Mar 20, 2023, 3:21pm User ID: dking
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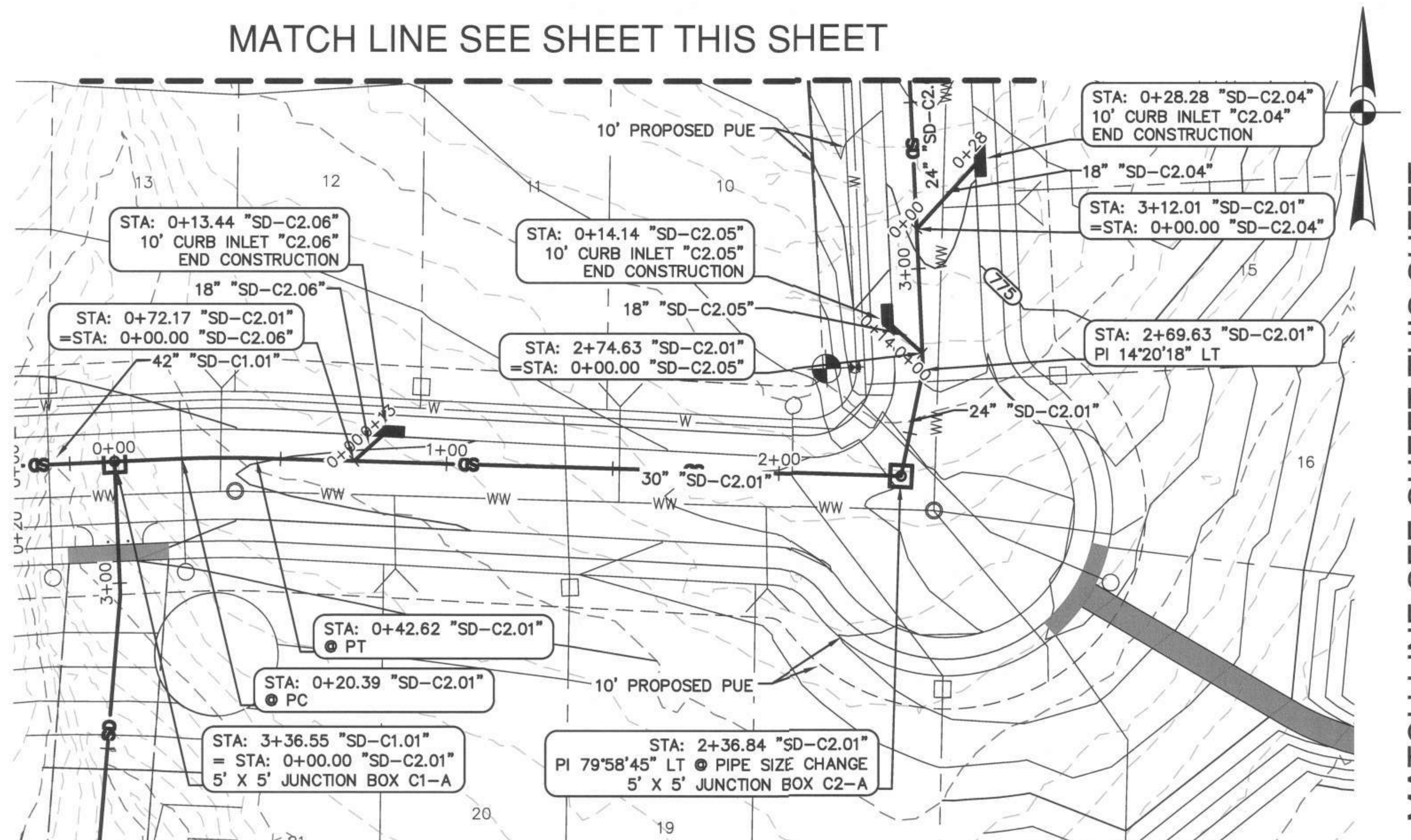
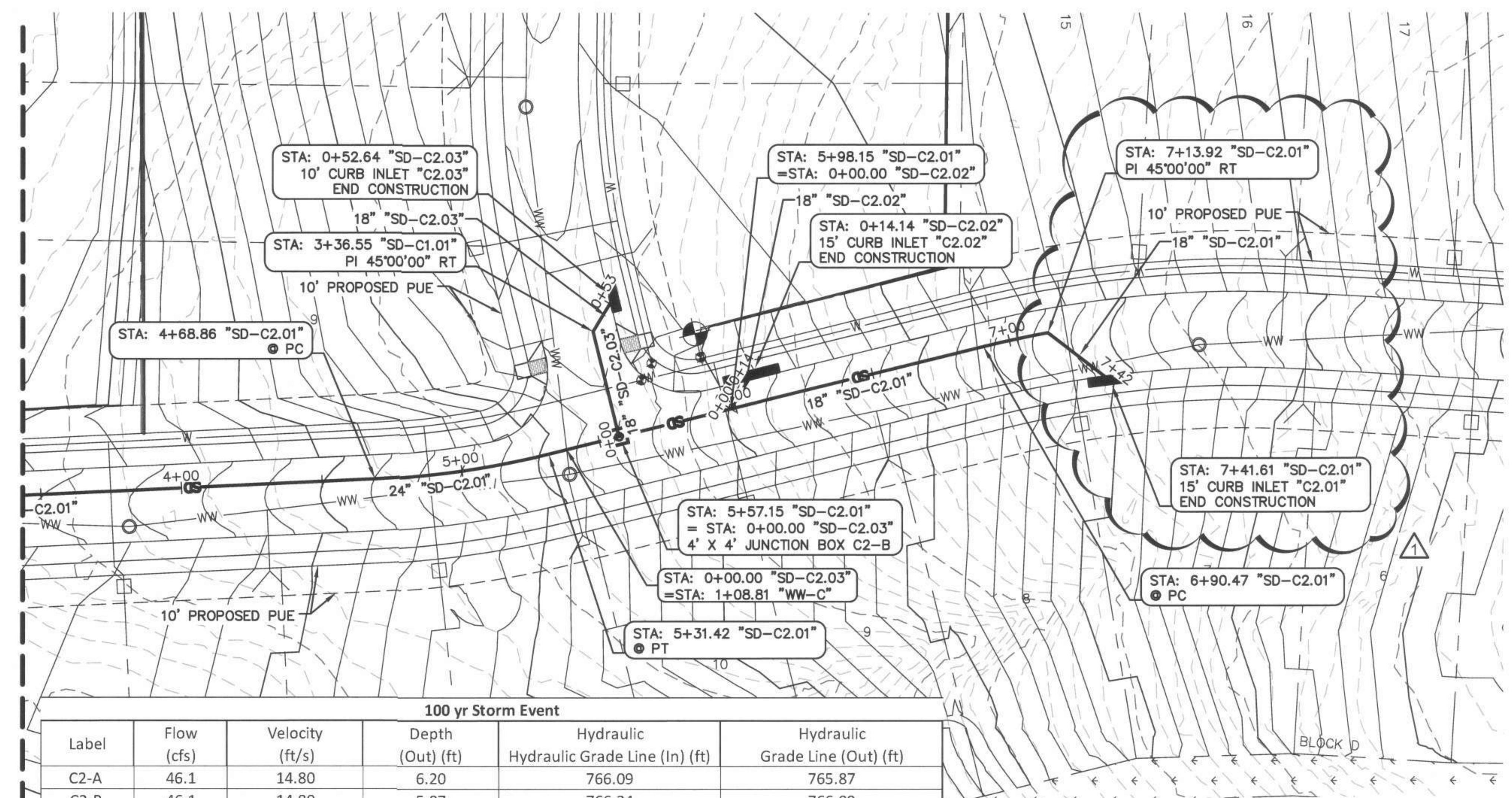


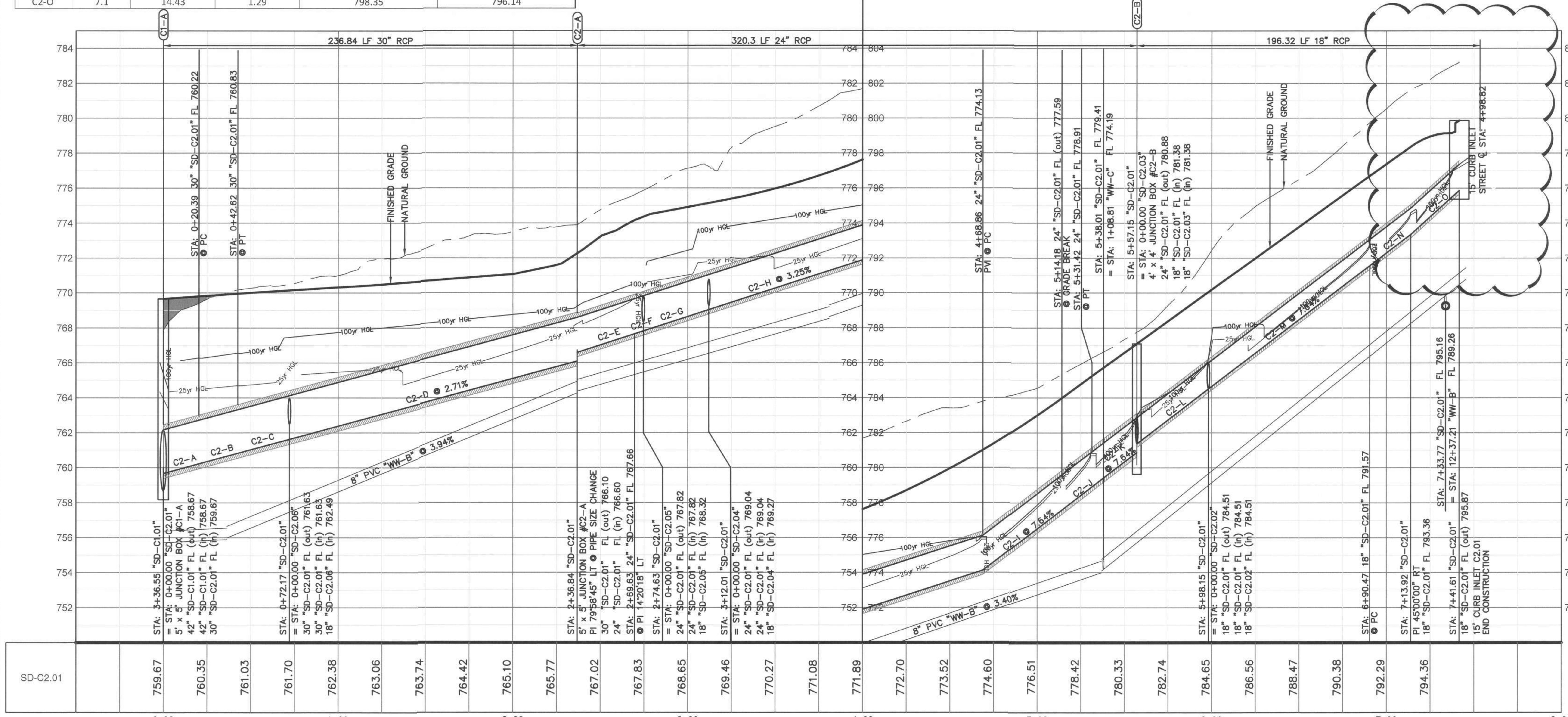
25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C2-A	37.2	14.09	4.54	764.36	764.21
C2-B	37.2	14.09	4.13	764.52	764.36
C2-C	37.2	14.09	3.69	764.69	764.52
C2-D	32.7	13.64	3.53	767.98	765.02
C2-E	32.7	14.02	1.47	769.53	768.06
C2-F	32.7	14.02	1.68	769.69	769.34
C2-G	28.3	9.01	2.66	770.84	770.48
C2-H	22.7	13.33	2.53	775.79	771.30
C2-I	22.7	18.31	0.92	779.25	775.05
C2-J	22.7	18.31	1.07	780.57	778.66
C2-K	22.7	18.31	1.00	782.54	779.91
C2-L	18.9	17.49	1.79	785.93	783.17
C2-M	7.1	13.57	2.43	792.68	786.94
C2-N	7.1	13.57	0.58	795.96	792.15
C2-O	7.1	14.43	1.29	798.35	796.14



100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C2-A	46.1	14.80	6.20	766.09	765.87
C2-B	46.1	14.80	5.87	766.34	766.09
C2-C	46.1	14.80	5.51	766.61	766.34
C2-D	40.8	14.40	5.63	768.57	767.12
C2-E	40.8	14.80	2.26	769.78	768.85
C2-F	40.8	14.80	2.12	769.92	769.78
C2-G	35.3	14.61	3.20	771.59	771.03
C2-H	28.3	13.45	3.54	775.93	772.30
C2-I	28.3	18.51	1.05	779.40	775.18
C2-J	28.3	18.51	1.22	780.72	778.81
C2-K	28.3	18.51	1.15	782.68	780.06
C2-L	23.6	18.30	2.10	785.97	783.48
C2-M	8.9	14.45	2.97	792.80	787.48
C2-N	8.9	14.45	0.66	796.08	792.23
C2-O	8.9	15.37	1.46	798.47	796.31



SCALE: 1" = 40'

0' 40' 80' 120'

NOTES:

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- 25-YR HGL
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NO.	REVISION	DATE
1	ADJUST INLET FOR REVISED LOT LAYOUT	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER
3/20/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-C2.01 - STA 1+00 - END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 28 OF 61

Date: Mar 20, 2023, 3:22pm User ID: ckling
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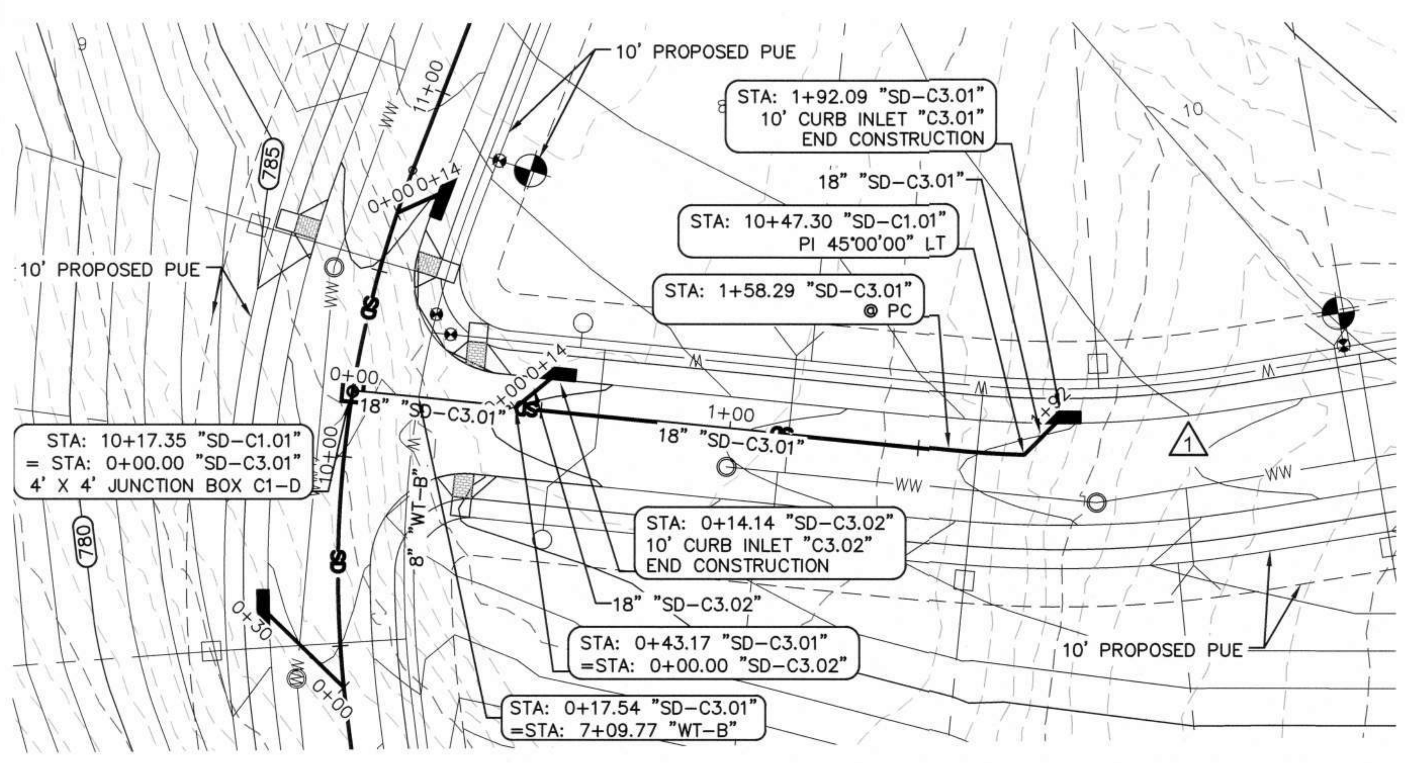

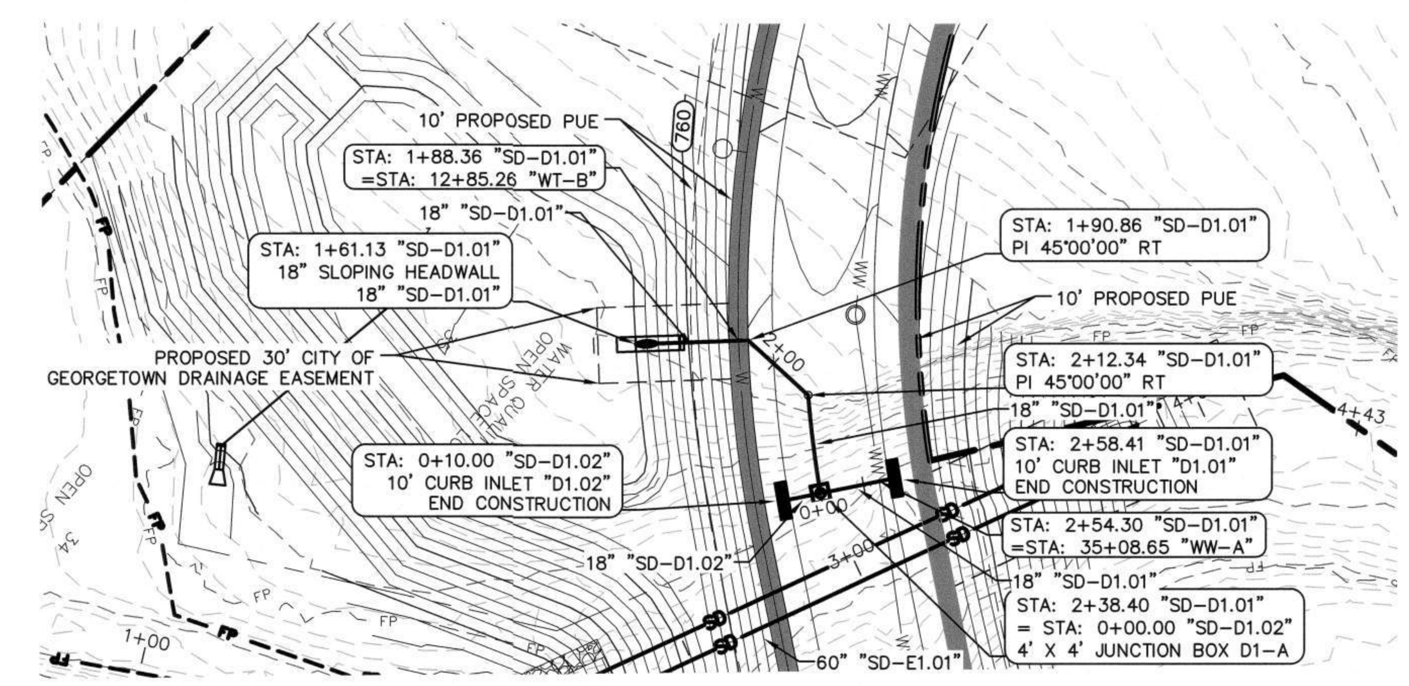

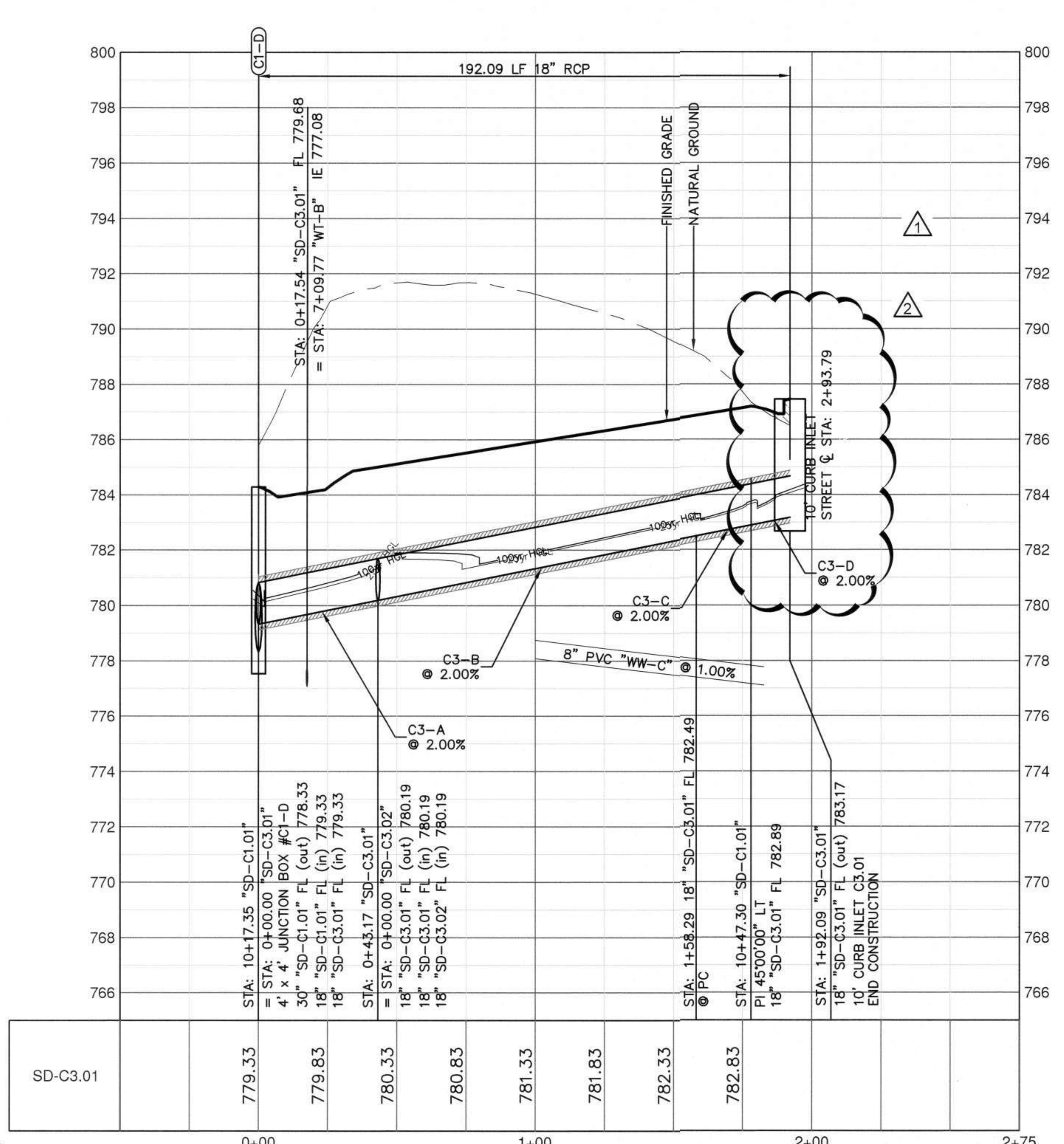

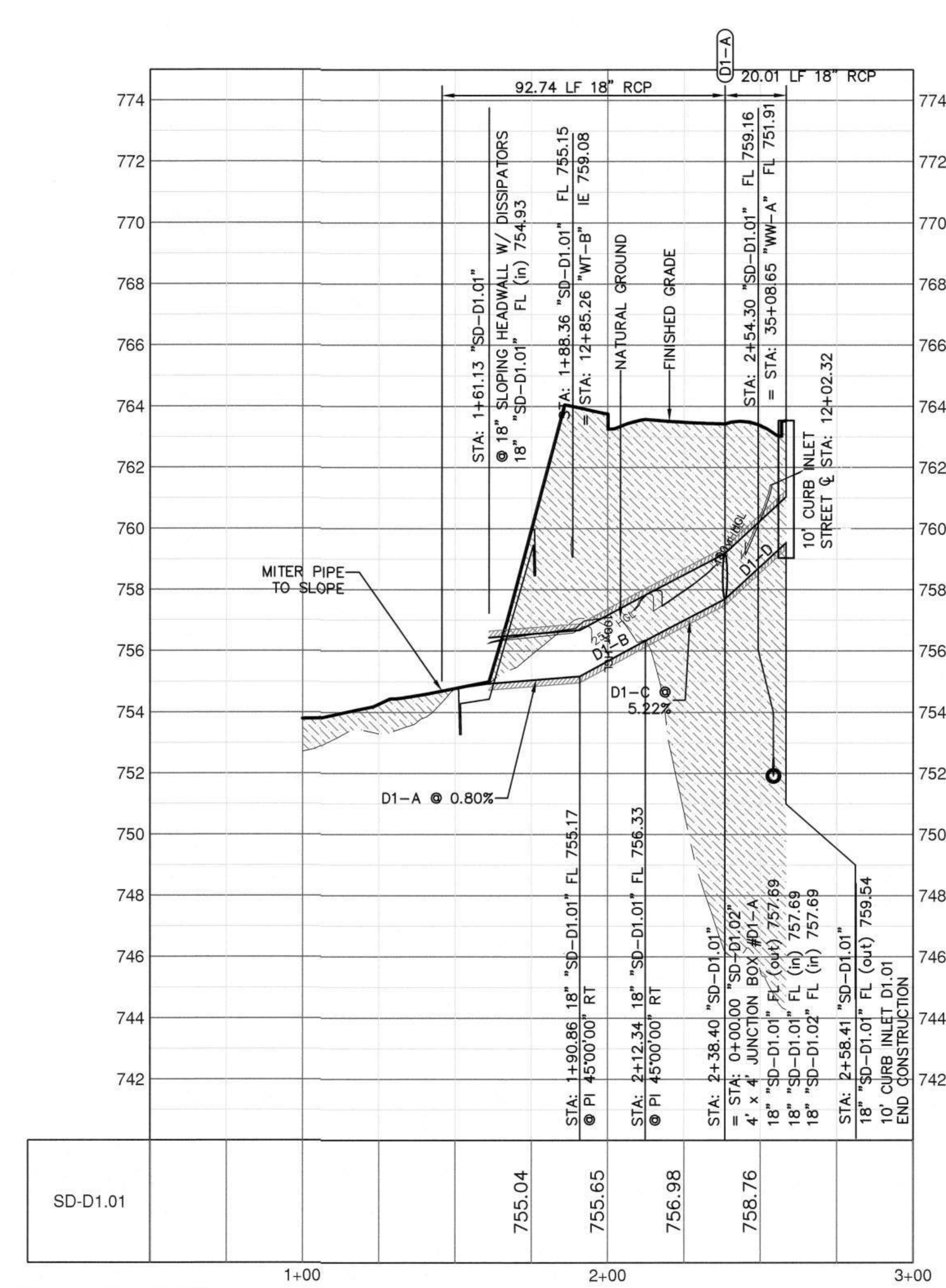

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25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C3-A	7.1	8.31	1.17	780.98	780.49
C3-B	3.2	6.70	1.77	781.78	781.53
C3-C	3.2	6.70	0.74	782.21	781.65
C3-D	3.2	6.71	0.77	784.18	783.85
D1-A	10.2	5.76	1.23	756.51	756.16
D1-B	10.2	13.17	1.54	757.56	756.71
D1-C	10.2	13.02	1.46	758.92	757.79
D1-D	4.4	14.77	1.86	761.35	759.55

100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C3-A	9.0	8.81	1.33	781.35	780.66
C3-B	4.0	7.13	2.21	782.39	781.97
C3-C	4.0	7.13	1.48	782.38	782.39
C3-D	4.0	7.14	0.09	784.31	783.94
D1-A	12.1	6.82	1.32	756.73	756.25
D1-B	12.1	13.77	1.80	757.65	756.97
D1-C	12.1	13.61	1.61	759.01	757.94
D1-D	5.3	15.54	2.09	761.43	759.78

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- FINISHED GRADE
- SUBGRADE
- PROPOSED STORM DRAIN
- 25-YR HGL
- 100-YR HGL

NO.	REVISION	DATE
1	ADJUST INLET FOR REVISED LOT LAYOUT	08/11/22
2	REVISE INLET TOP AND FL	02/20/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
SD-C3.01 & SD-D1.01 - STA 1+00 - END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER RBB
CHECKED JF DRAWN JB
SHEET 29 OF 61

Date: Mar 20, 2023, 3:23pm User ID: dking
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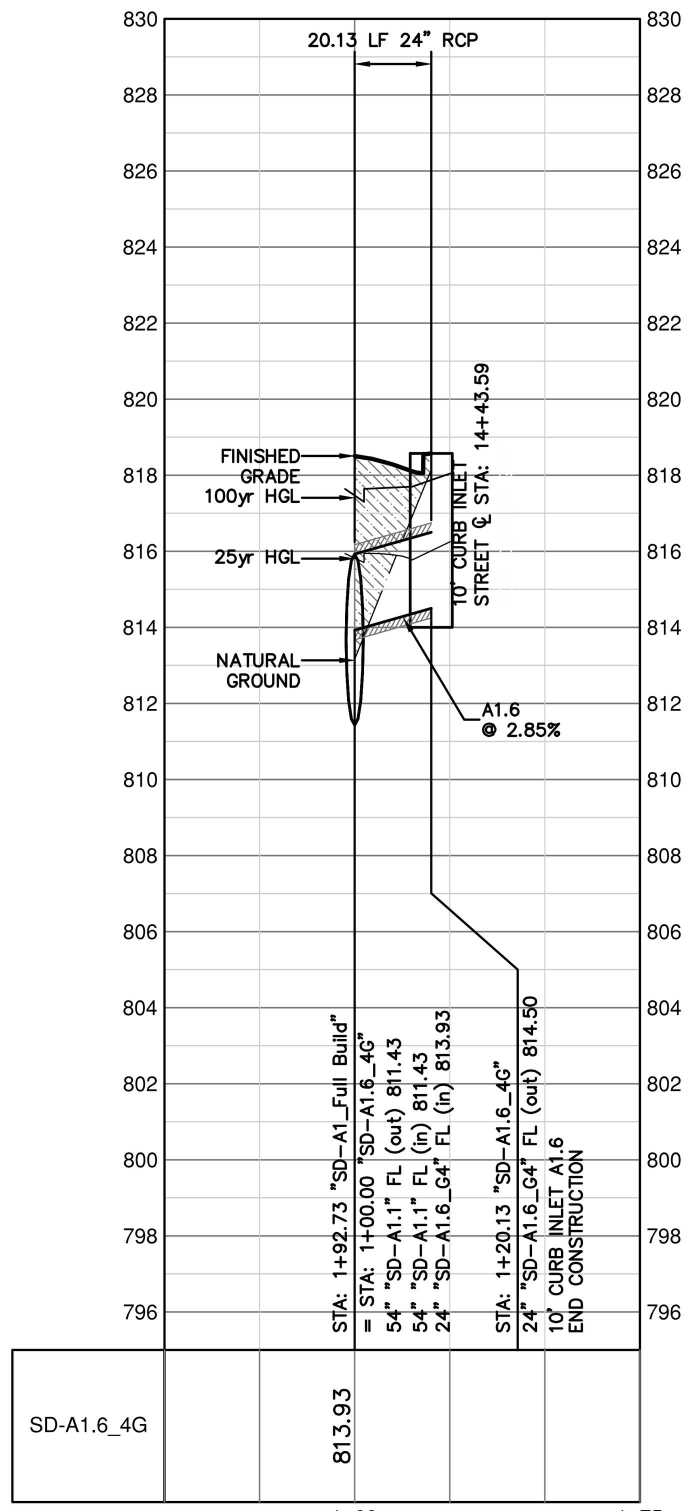
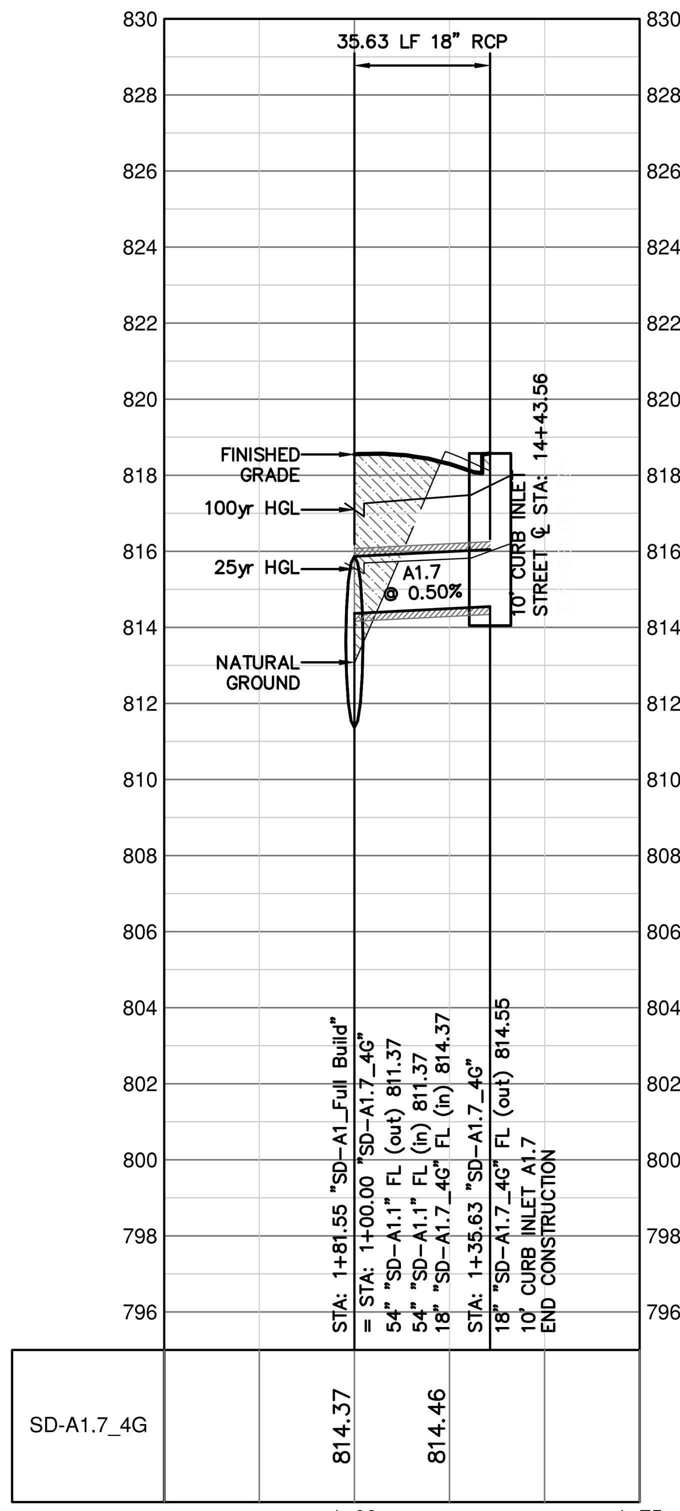
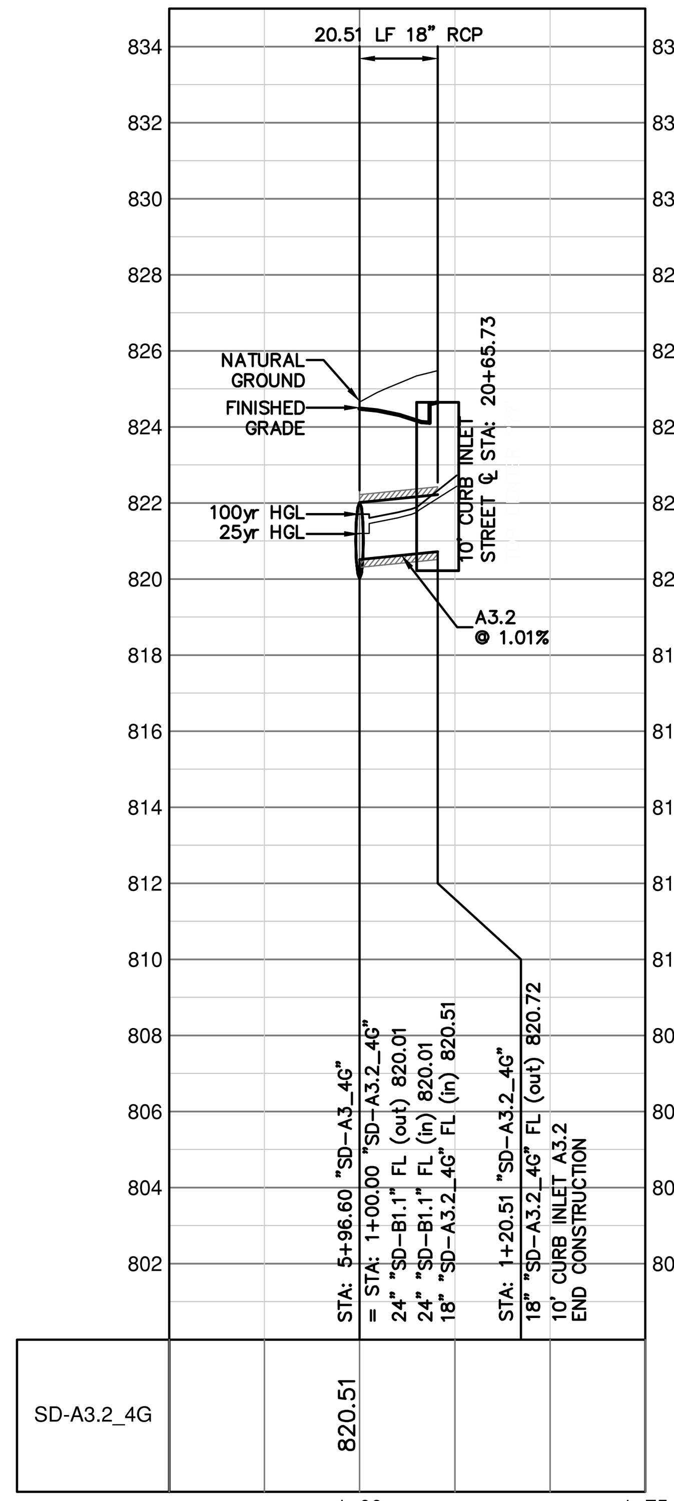
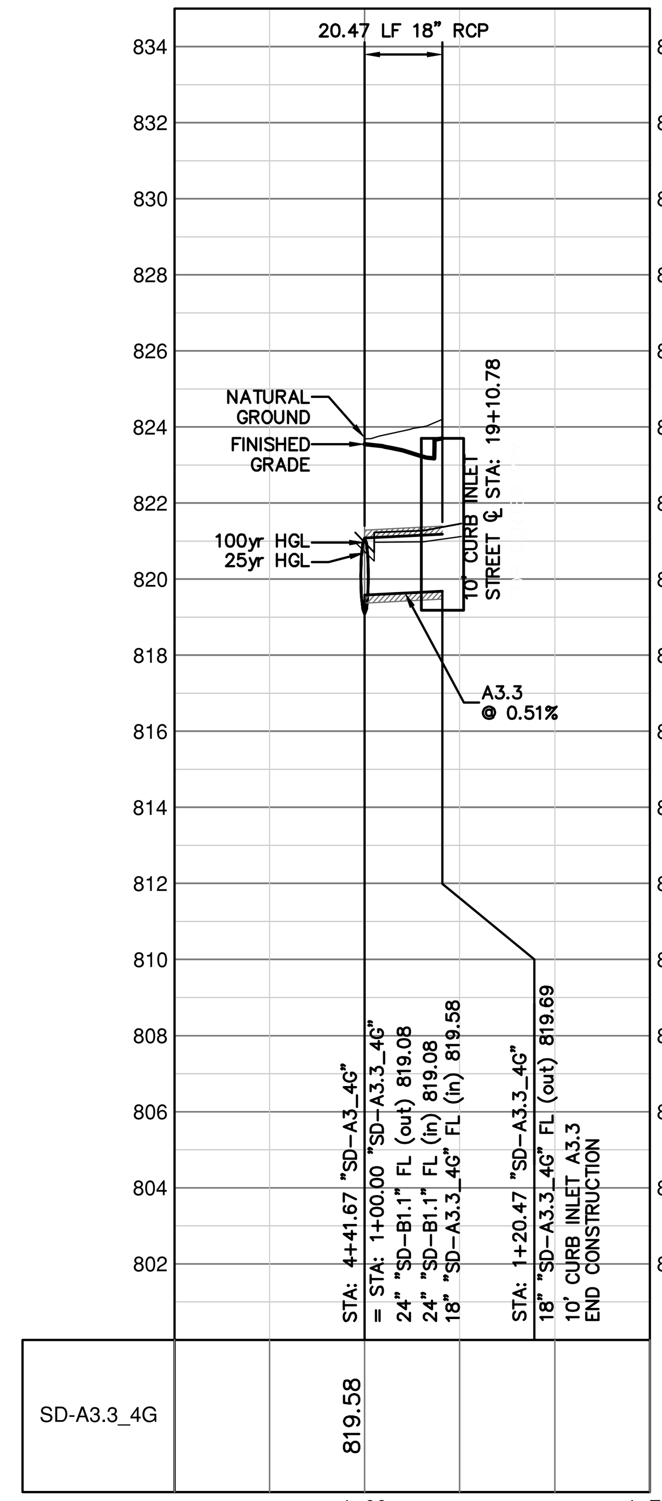
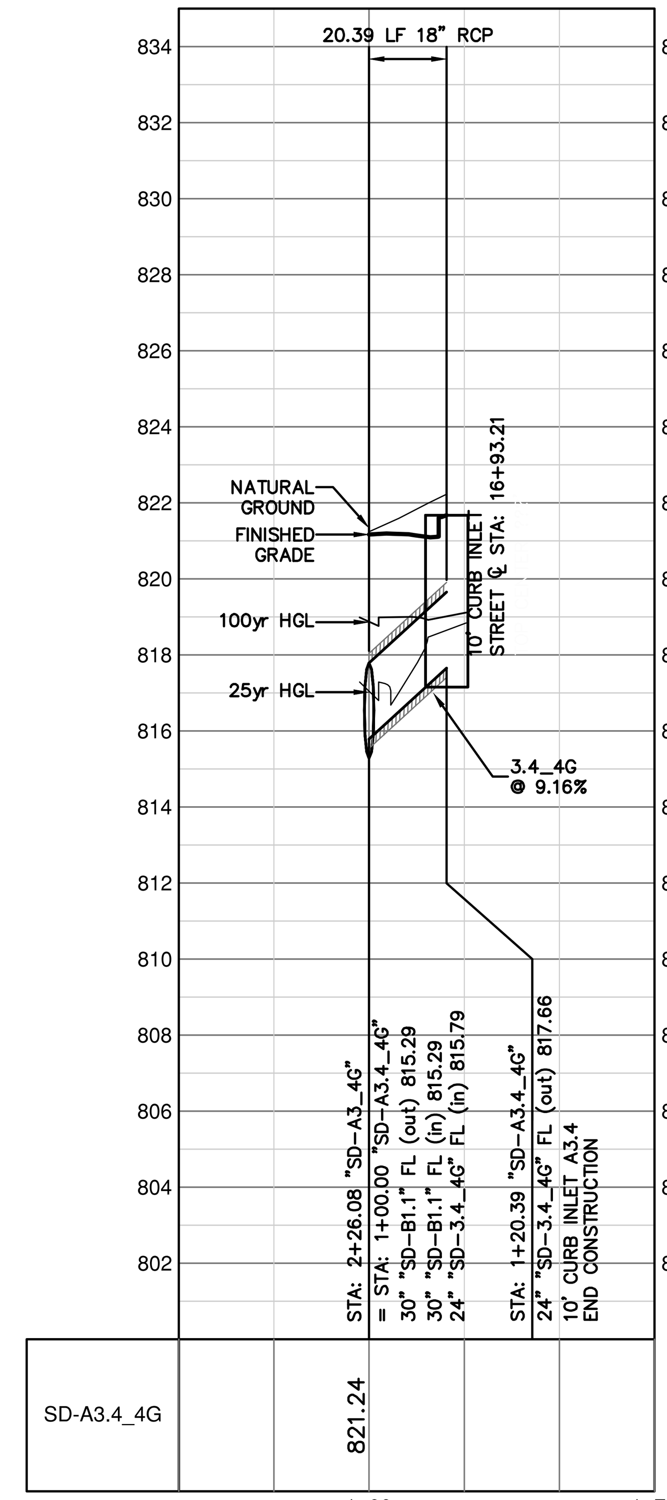
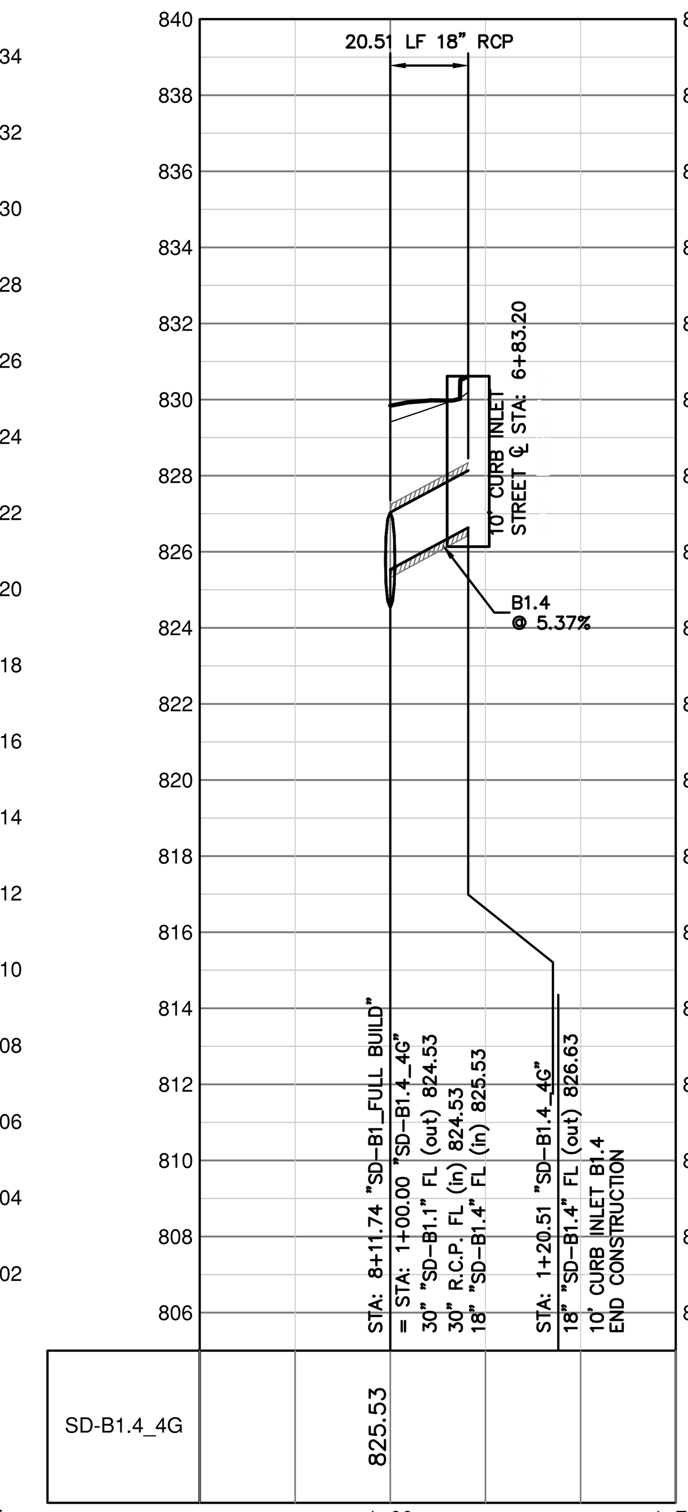


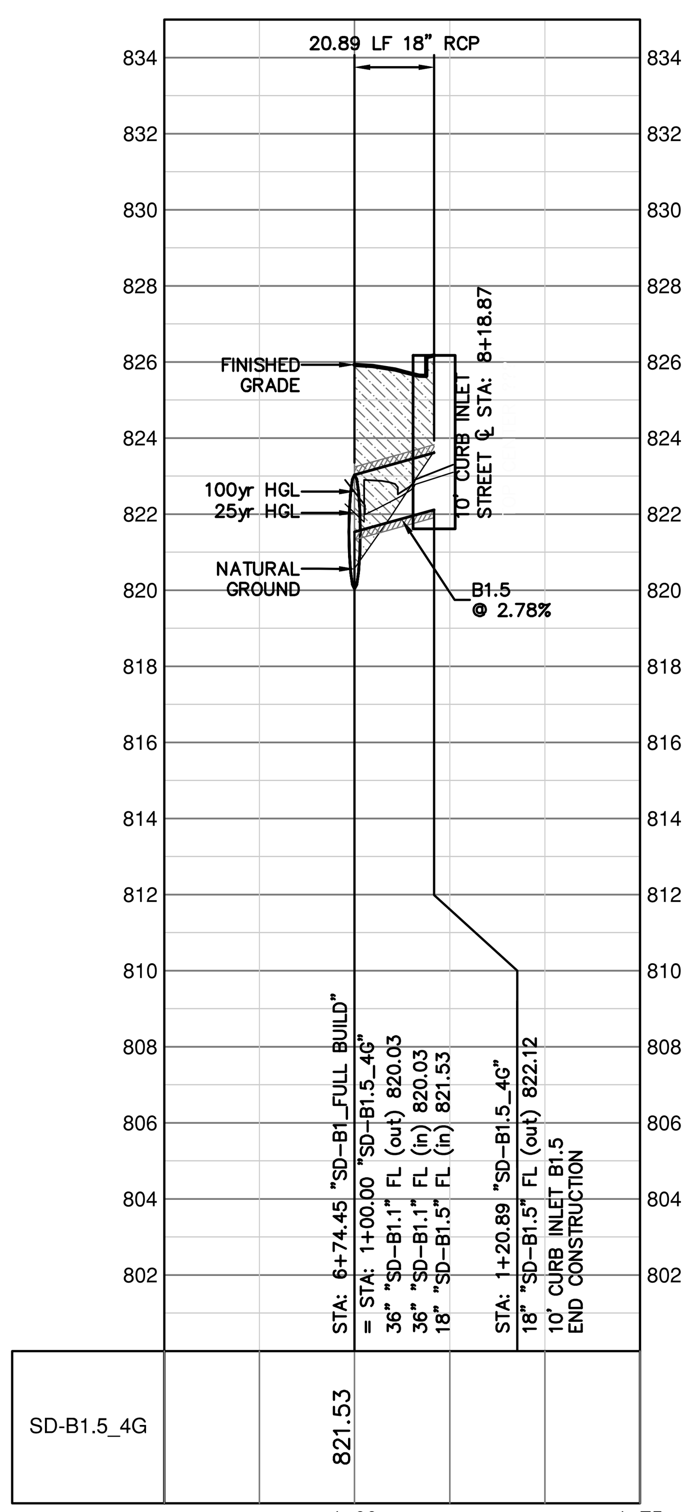


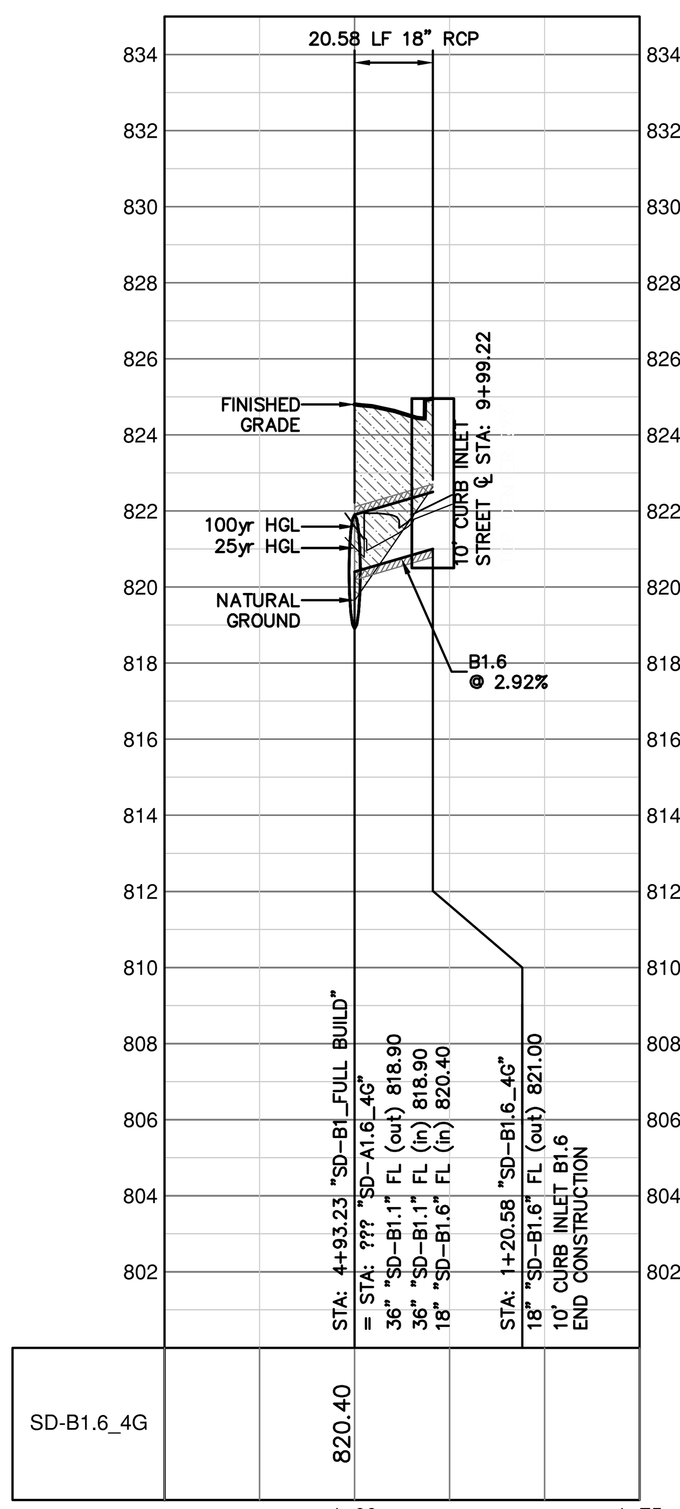


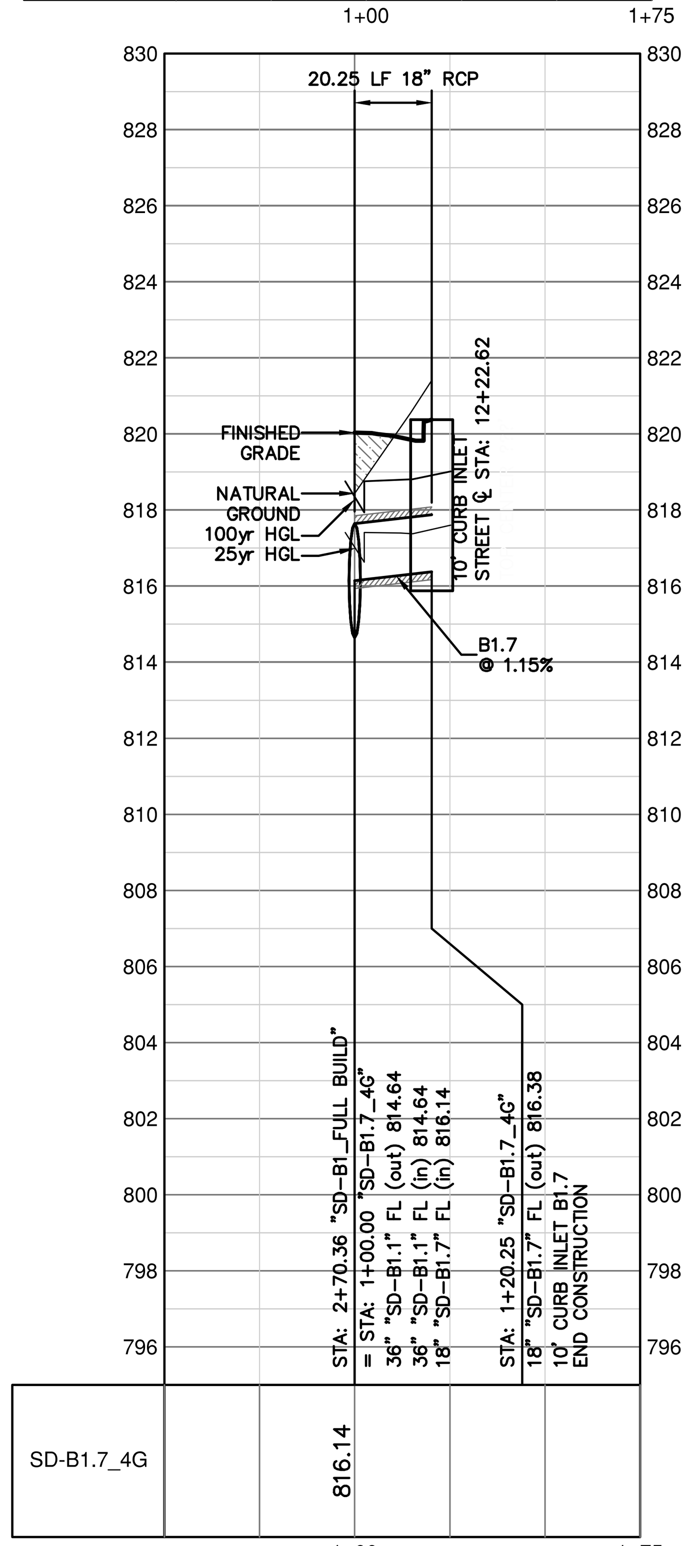


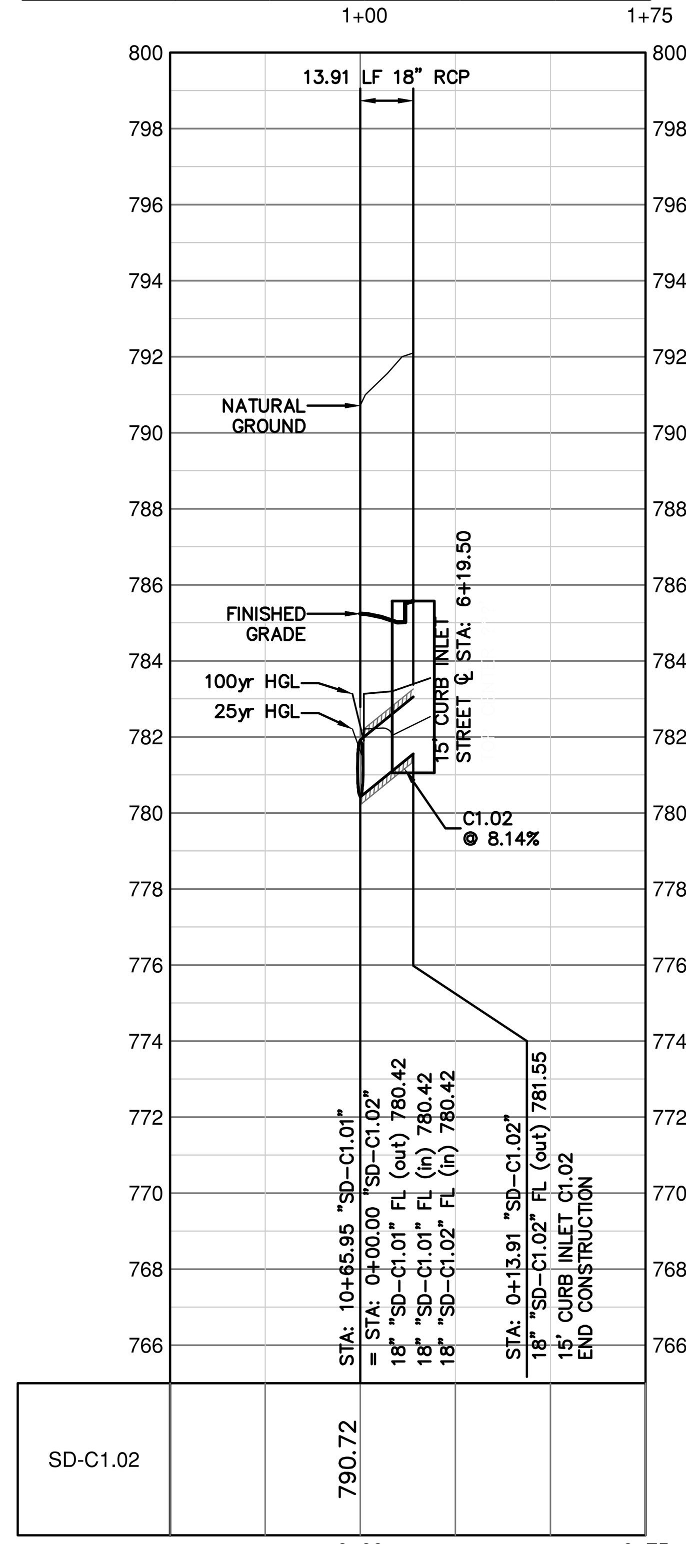


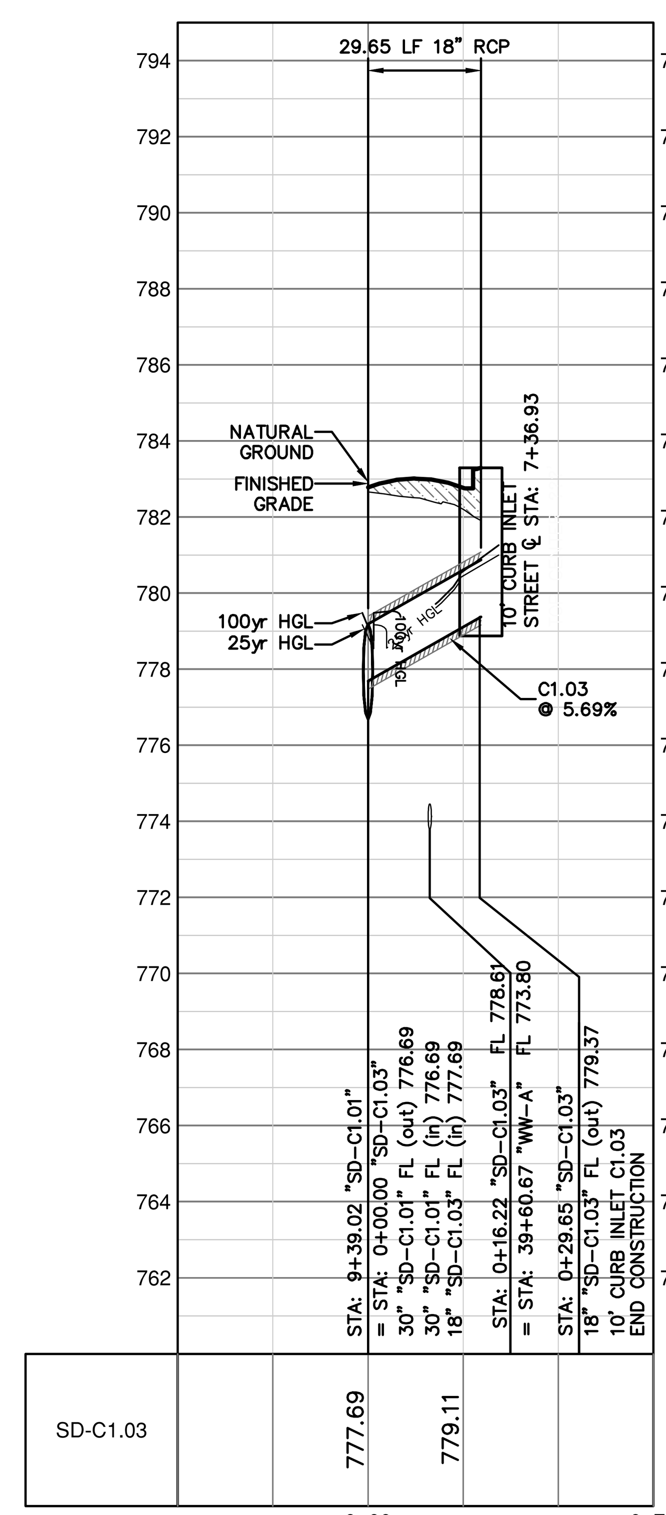












25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A1.6	10.5	10.99	2.02	815.77	815.94
A1.7	7.2	4.41	1.32	815.82	815.70
A3.2	7.8	6.97	0.95	821.80	821.46
A3.3	4.4	4.69	1.39	820.99	820.97
A3.4	5.2	13.60	1.49	818.47	817.29
B1.5	3.1	7.89	0.73	822.78	822.27
B1.6	4.2	8.76	0.90	821.79	821.31
B1.7	4.3	6.29	1.27	817.38	817.41
C1.02	8.5	14.60	2.21	782.51	782.63
C1.03	7.2	12.30	1.49	780.41	779.17
C1.04	3.9	14.04	1.52	768.88	767.70

100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
A1.6	13.3	4.23	3.72	817.70	817.64
A1.7	8.9	5.04	2.89	817.48	817.26
A3.2	9.8	7.27	1.09	821.92	821.61
A3.3	5.5	3.10	1.65	821.28	821.23
A3.4	6.6	14.55	3.20	818.92	818.99
B1.5	4.2	8.65	1.36	822.91	822.90
B1.6	5.8	9.59	1.54	821.93	821.94
B1.7	5.8	3.30	2.61	818.81	818.75
C1.02	11.7	15.91	2.99	783.48	783.41
C1.03	8.9	12.97	1.80	780.53	779.48
C1.04	6.1	15.98	4.25	770.46	770.43

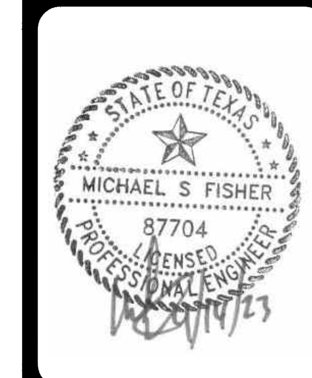
PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
FINISHED GRADE
SUBGRADE
PROPOSED STORM DRAIN
25–YR HGL — 25yr HGL
100–YR HGL — 100yr HGL

NO. | REVISION | DATE

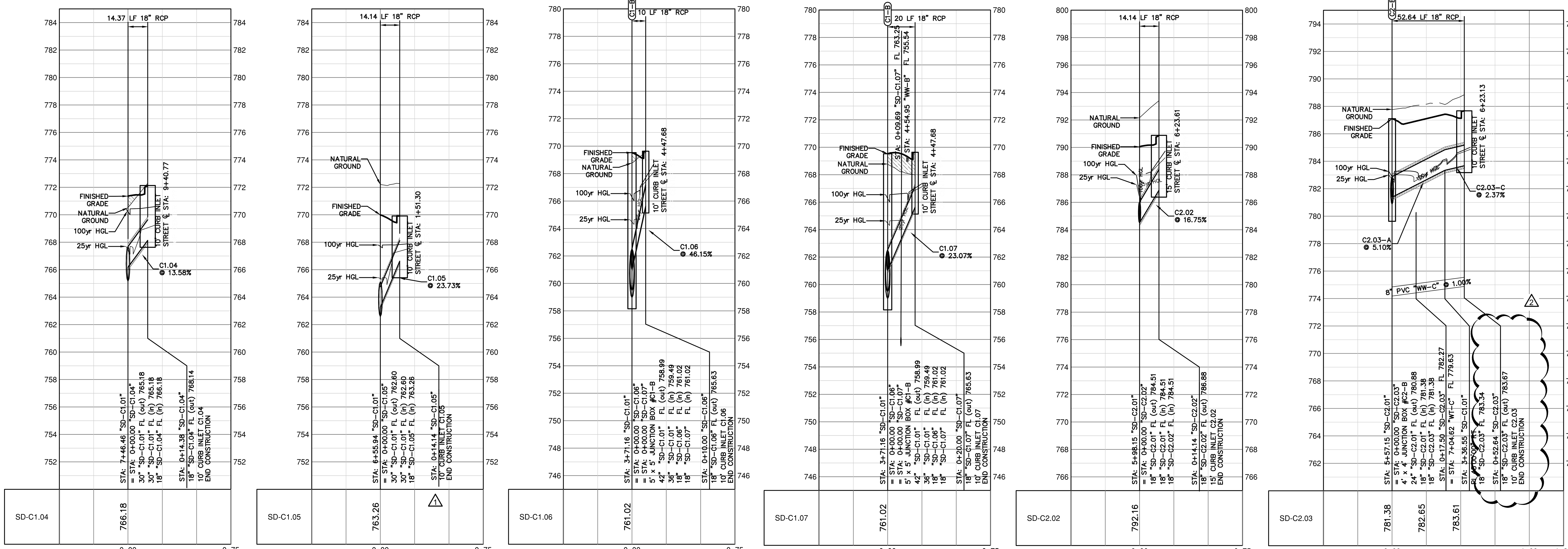


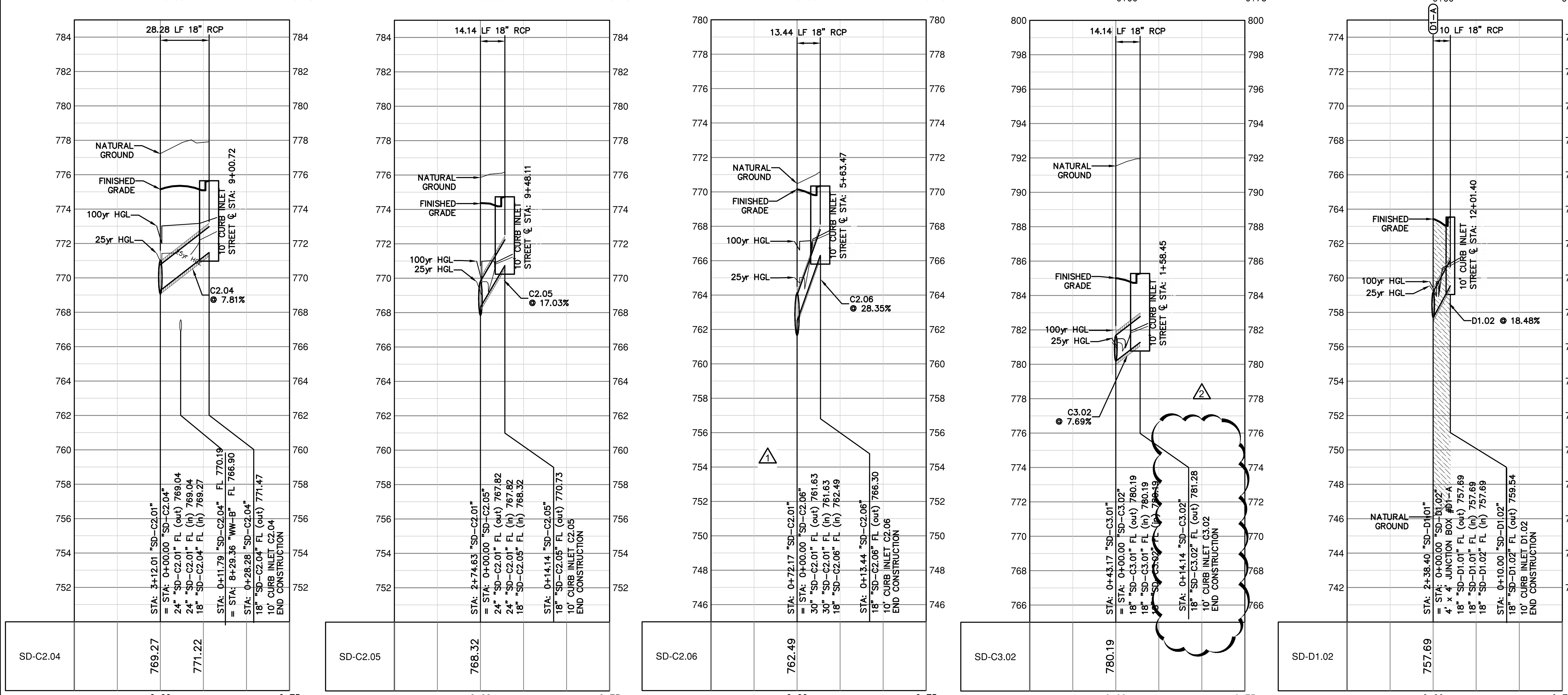
PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 I AUSTIN, TX 78759 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
STORM DRAIN LATERALS 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE April 18, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 30 OF 61





25 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1.05	2.5	14.90	2.16	767.22	765.43
C1.06	12.8	29.56	3.62	766.98	764.64
C1.07	6.4	19.44	3.62	766.62	764.64
C2.02	11.8	20.75	2.43	787.94	786.94
C2.03-A	3.8	9.84	1.79	783.85	783.17
C2.03-B	3.8	9.84	0.71	784.31	783.59
C2.03-C	3.8	7.48	1.12	785.60	784.46
C2.04	6.0	13.05	2.03	772.24	771.30
C2.05	5.0	16.35	2.16	771.73	770.48
C2.06	6.3	20.95	2.53	767.15	765.02
C3.02	4.0	11.56	1.77	782.28	781.53
D1.02	6.0	17.62	1.86	760.48	759.55

100 yr Storm Event

Label	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Hydraulic Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C1.05	3.2	16.14	4.54	767.79	767.80
C1.06	16.0	32.56	5.53	767.06	766.54
C1.07	8.0	20.87	5.53	766.73	766.54
C2.02	14.7	22.03	2.97	788.06	787.48
C2.03-A	4.8	10.52	2.10	783.96	783.48
C2.03-B	4.8	10.52	0.81	784.42	783.69
C2.03-C	4.8	7.98	1.26	785.72	784.60
C2.04	7.9	14.09	3.04	772.33	772.30
C2.05	7.3	18.23	2.70	771.84	771.03
C2.06	8.5	22.85	4.63	767.25	767.12
C3.02	5.0	12.33	2.21	782.39	781.97
D1.02	7.0	18.48	2.09	760.57	759.78

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
FINISHED GRADE
SUBGRADE
PROPOSED STORM DRAIN
25-YR HGL
100-YR HGL

NO.	REVISION	DATE
1	ADJUST INLET FOR REVISED LOT LAYOUT	08/11/22
2	REVISE INLET TOP AND FL	02/20/23

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

STORM PLAN & PROFILES
STORM DRAIN LATERALS 2 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE April 18, 2023
DESIGNER RBB
CHECKED JF DRAWN RBB
SHEET 31 OF 61

Date: Apr 18, 2023, 11:43am User ID: ocanner
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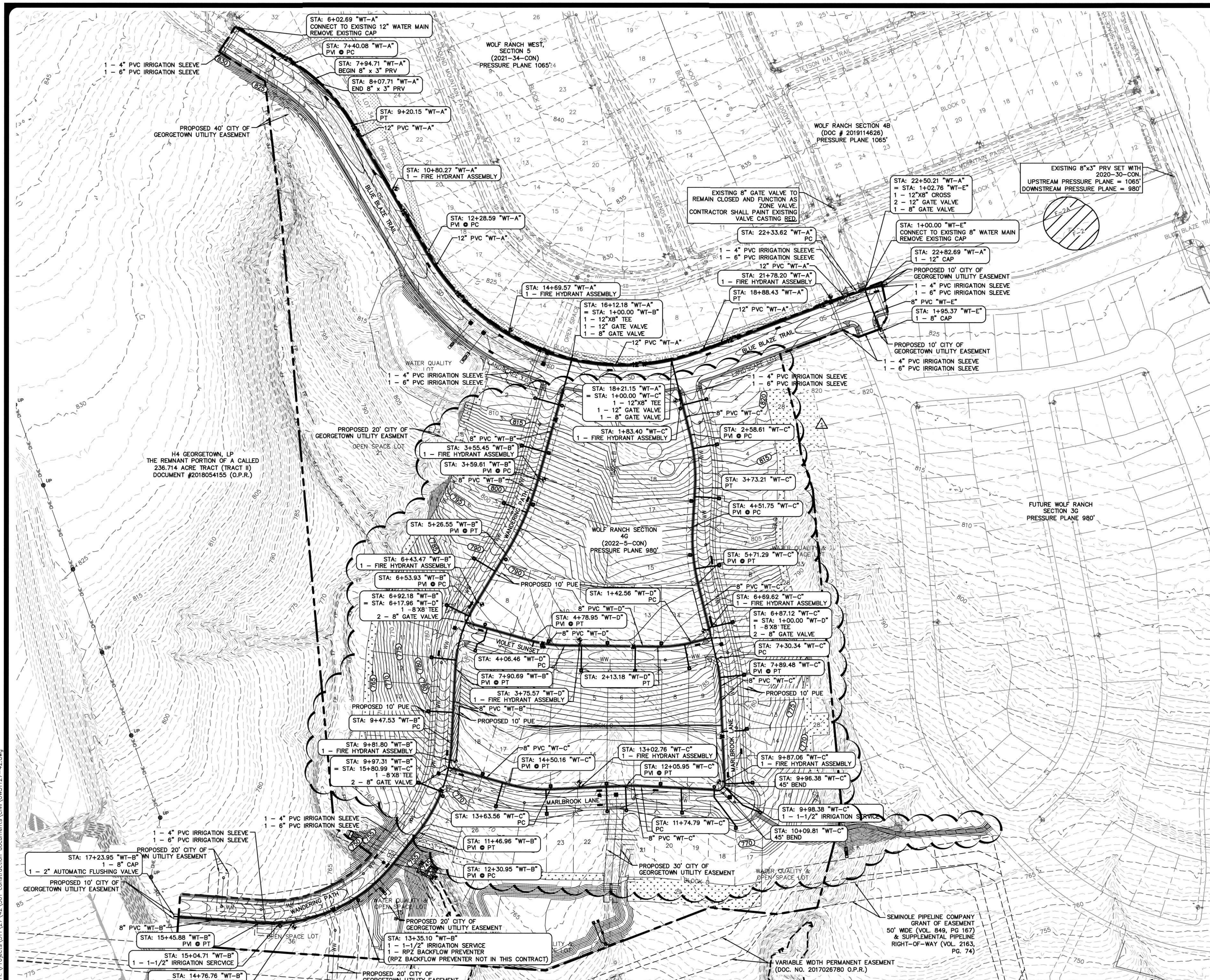

SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- W — WATER LINE
- 12"W — 12" WATER LINE
- WW — WASTEWATER LINE & MH
- SD — STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- PROPERTY BOUNDARY
- VEGETATIVE FILTER STRIP
- 1/2 CRITICAL ROOT ZONE
- CRITICAL ROOT ZONE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. SERVICES ARE LOCATED AS PER DETAIL SHEETS 57.
3. ALL WATER LINES ARE AWWA C900 DR 18, CLASS 150 PVC PIPE UNLESS OTHERWISE NOTED.
4. ALL WATER LINES AND SERVICE LINES WILL BE INSTALLED WITH TRACER TAPE.
5. NO WATER METERS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
6. FIRE HYDRANTS ARE SHOWN FOR SCHEMATIC PURPOSES ONLY. SEE DETAIL SHEET FOR PLACEMENT OF APPURTENANCES. FIRE HYDRANTS ASSEMBLY CONSISTS OF, BUT NOT LIMITED TO, 5¼" FIRE HYDRANT, 6" GATE VALVE, 6" D.I. FIRE LEAD.
7. ALL HORIZONTAL AND VERTICAL WATER LINE BENDS, TEE'S AND DEAD END'S SHALL BE RESTRAINED TO THE WATER MAIN USING MECHANICAL JOINT RESTRAINT DEVICES AS APPROVED IN THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. ALL WATERLINE P.I.'S BOTH HORIZONTAL AND VERTICAL SHALL BE ACHIEVED BASED UPON THE PIPE MANUFACTURER'S SPECIFIED MAXIMUM ALLOWABLE JOINT DEFLECTION. P.I.'S LESS THAN OR EQUAL TO 80% OF THE MANUFACTURER'S MAXIMUM SHALL BE CONSTRUCTED AS A SINGLE JOINT DEFLECTION. P.I.'S IN EXCESS OF 80% OF THE MANUFACTURER'S MAXIMUM ALLOWABLE JOINT DEFLECTION ANGLE SHALL BE CONSTRUCTED AS A SERIES OF EVENLY DISTRIBUTED DEFLECTIONS OVER MULTIPLE JOINTS, SO THAT NO SINGLE DEFLECTION IS GREATER THAN 80% OF THE MAXIMUM.
9. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
10. AT THE CONCLUSION OF CONSTRUCTION AND AS PART OF THE PROCESS FOR THE CITY TO ACCEPT THIS PHASE, THE FIRE HYDRANTS SHALL BE FLOWED AND TESTED. A COPY OF THE REPORT SHALL BE EMAILED INTO THE FIRE DEPARTMENT AND THE HYDRANTS SHALL BE PAINTED AND COLOR CODED.
11. IF PRESSURE REDUCING VALVES WERE INSTALLED IN THIS PHASING, THEY MUST BE SET PRIOR TO FIRE HYDRANT FLOW TESTING
12. ALL PRIVATE HYDRANT BARRELS WILL BE PAINTED RED WITH THE BONNET PAINTED USING THE HYDRANT FLOW CODING STANDARDS SHOWN ON THIS SHEET
13. ALL PRIVATE FIRE HYDRANTS SHOULD BE TESTED ANNUALLY AND SHALL BE COLOR CODED TO INDICATE THE EXPECTED FIRE FLOW FROM THE HYDRANT DURING NORMAL OPERATION. SUCH COLOR SHALL BE APPLIED TO THE FIRE HYDRANT BY PAINTING THE BONNET THE APPROPRIATE COLOR FOR THE EXPECTED FLOW CONDITION.
14. PUBLIC HYDRANTS WILL HAVE THE BONNETS PAINTED SILVER, THE HYDRANTS WILL BE FLOW TESTED, AND THE BONNET PAINTED USING THE HYDRANT FLOW CODING STANDARDS SHOWN ON THIS SHEET

STATIC PRESSURE SUMMARY (HIGHEST LOT):
PRESSURE PLANE = 980'
HIGHEST LOT = LOT 25, BLOCK B
FINISHED FLOOR = 826.50'
STATIC PRESSURE = 66.45 PSI

STATIC PRESSURE SUMMARY (LOWEST LOT):
PRESSURE PLANE = 980'
LOWEST LOT =LOT 27, BLOCK C
FINISHED FLOOR = 744.03
STATIC PRESSURE = 102.15 PSI

FLOW	COLOR
> 1500 GPM	BLUE
1000–1500 GPM	GREEN
500–999 GPM	ORANGE
< 500 GPM	RED
NOT WORKING	BLACK OR BAGGED

NO.	REVISION	DATE
1	REVISE FOR 56FT LOTS	08/11/22

STATE OF TEXAS MICHAEL S FISHER 87704 LICENSED PROFESSIONAL ENGINEER 3/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL WATER PLAN

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 32 OF 61

Date: Mar 20, 2023, 3:35pm User ID: akling
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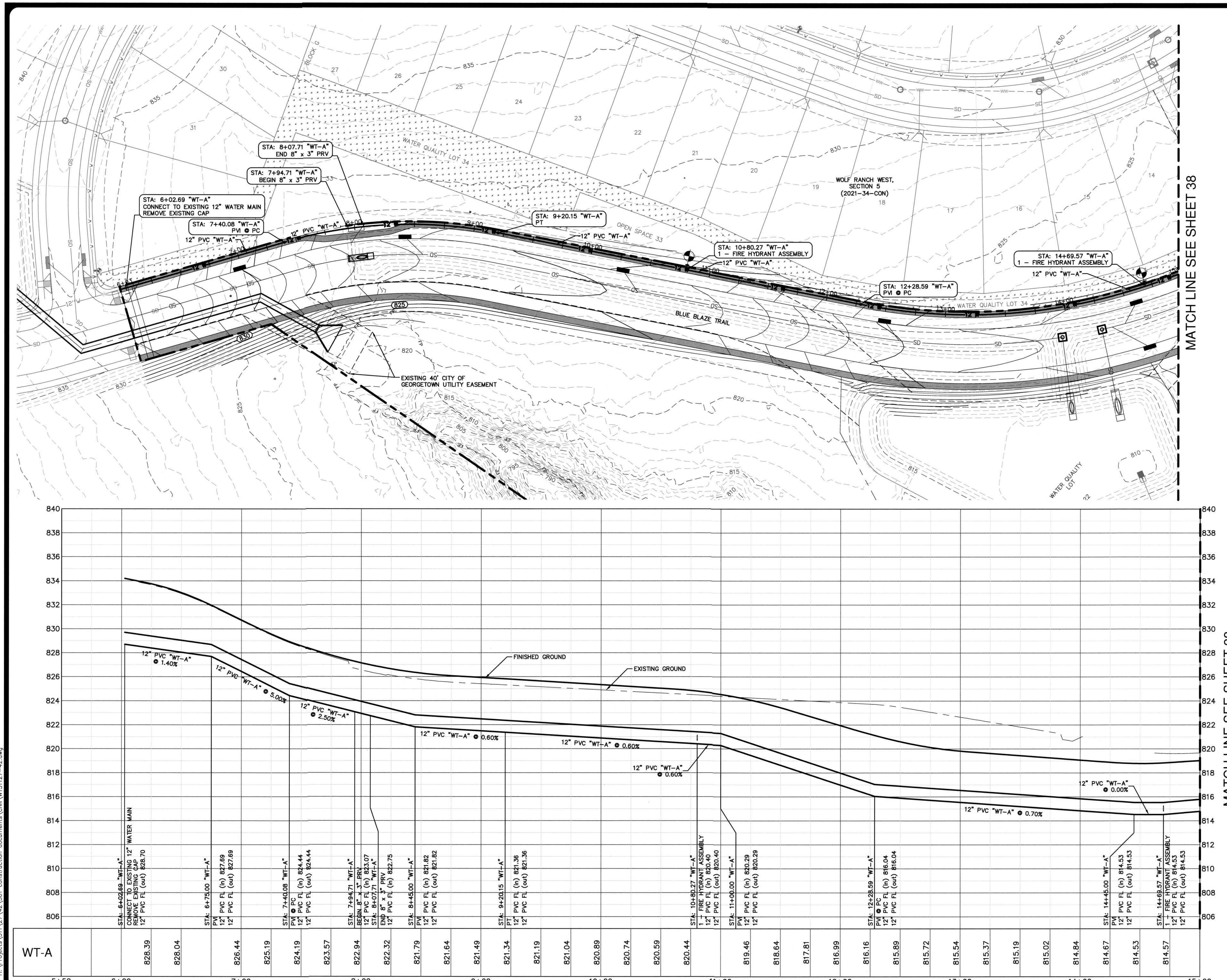

SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- 12" WATER LINE
- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- VEGETATIVE FILTER STRIP
- PROPERTY BOUNDARY

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND

SUBGRADE

FINISHED GRADE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. SERVICES ARE LOCATED AS PER DETAIL SHEETS 57.
3. ALL WATER LINES ARE AWWA C900 DR 18, CLASS 150 PVC PIPE UNLESS OTHERWISE NOTED.
4. ALL WATER LINES AND SERVICE LINES WILL BE INSTALLED WITH TRACER TAPE.
5. NO WATER METERS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
6. FIRE HYDRANTS ARE SHOWN FOR SCHEMATIC PURPOSES ONLY. SEE DETAIL SHEET FOR PLACEMENT OF APPURTENANCES. FIRE HYDRANTS ASSEMBLY CONSISTS OF, BUT NOT LIMITED TO, 5¼" FIRE HYDRANT, 6" GATE VALVE, 6" D.I. FIRE LEAD.
7. ALL HORIZONTAL AND VERTICAL WATER LINE BENDS, TEE'S AND DEAD END'S SHALL BE RESTRAINED TO THE WATER MAIN USING MECHANICAL JOINT RESTRAINT DEVICES AS APPROVED IN THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. ALL WATERLINE P.I.'S BOTH HORIZONTAL AND VERTICAL SHALL BE ACHIEVED BASED UPON THE PIPE MANUFACTURER'S SPECIFIED MAXIMUM ALLOWABLE JOINT DEFLECTION. P.I.'S LESS THAN OR EQUAL TO 80% OF THE MANUFACTURER'S MAXIMUM SHALL BE CONSTRUCTED AS A SINGLE JOINT DEFLECTION. P.I.'S IN EXCESS OF 80% OF THE MANUFACTURER'S MAXIMUM ALLOWABLE JOINT DEFLECTION ANGLE SHALL BE CONSTRUCTED AS A SERIES OF EVENLY DISTRIBUTED DEFLECTIONS OVER MULTIPLE JOINTS, SO THAT NO SINGLE DEFLECTION IS GREATER THAN 80% OF THE MAXIMUM.
9. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER
3/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WATER LINE 'A' - STA 5+50 TO 15+00

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 33 OF 61

Date: Mar 20, 2023, 3:37pm User ID: dking
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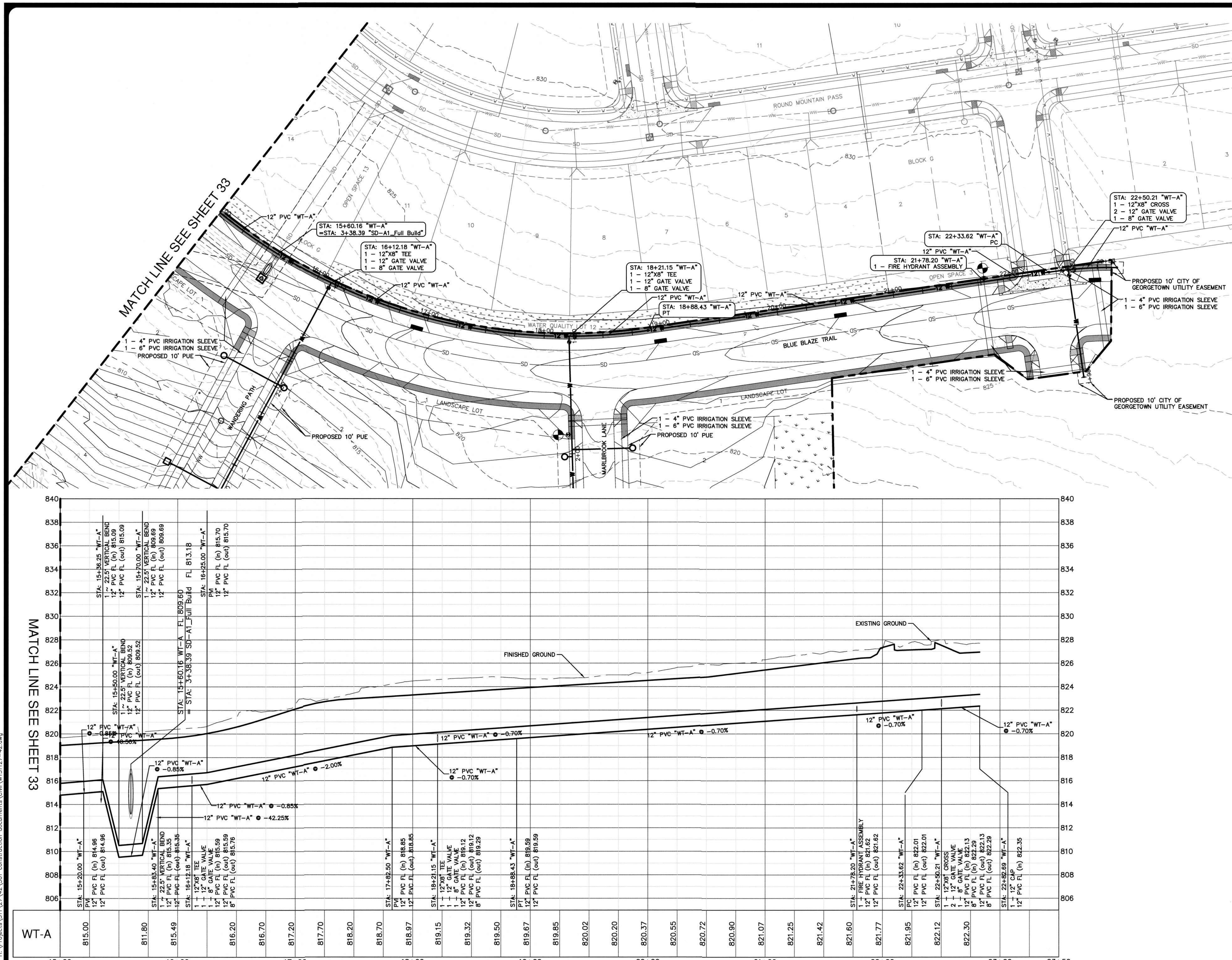

SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- 12" WATER LINE
- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- VEGETATIVE FILTER STRIP
- PROPERTY BOUNDARY

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SUBGRADE
FINISHED GRADE

NOTES:

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2. SERVICES ARE LOCATED AS PER DETAIL SHEETS 44.
3. ALL WATER LINES ARE AWWA C900 DR 18, CLASS 150 PVC PIPE UNLESS OTHERWISE NOTED.
4. ALL WATER LINES AND SERVICE LINES WILL BE INSTALLED WITH TRACER TAPE.
5. NO WATER METERS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
6. FIRE HYDRANTS ARE SHOWN FOR SCHEMATIC PURPOSES ONLY. SEE DETAIL SHEET FOR PLACEMENT OF APPURTENANCES. FIRE HYDRANTS ASSEMBLY CONSISTS OF, BUT NOT LIMITED TO, 5¼" FIRE HYDRANT, 6" GATE VALVE, 6" D.I. FIRE LEAD.
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9. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
4/14/23

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 I AUSTIN, TX 78759 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
WATER LINE 'A' - STA 15+00 TO END

1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
1 SHEET 34 OF 61

Date: Mar 20, 2023, 3:37pm User ID: dking
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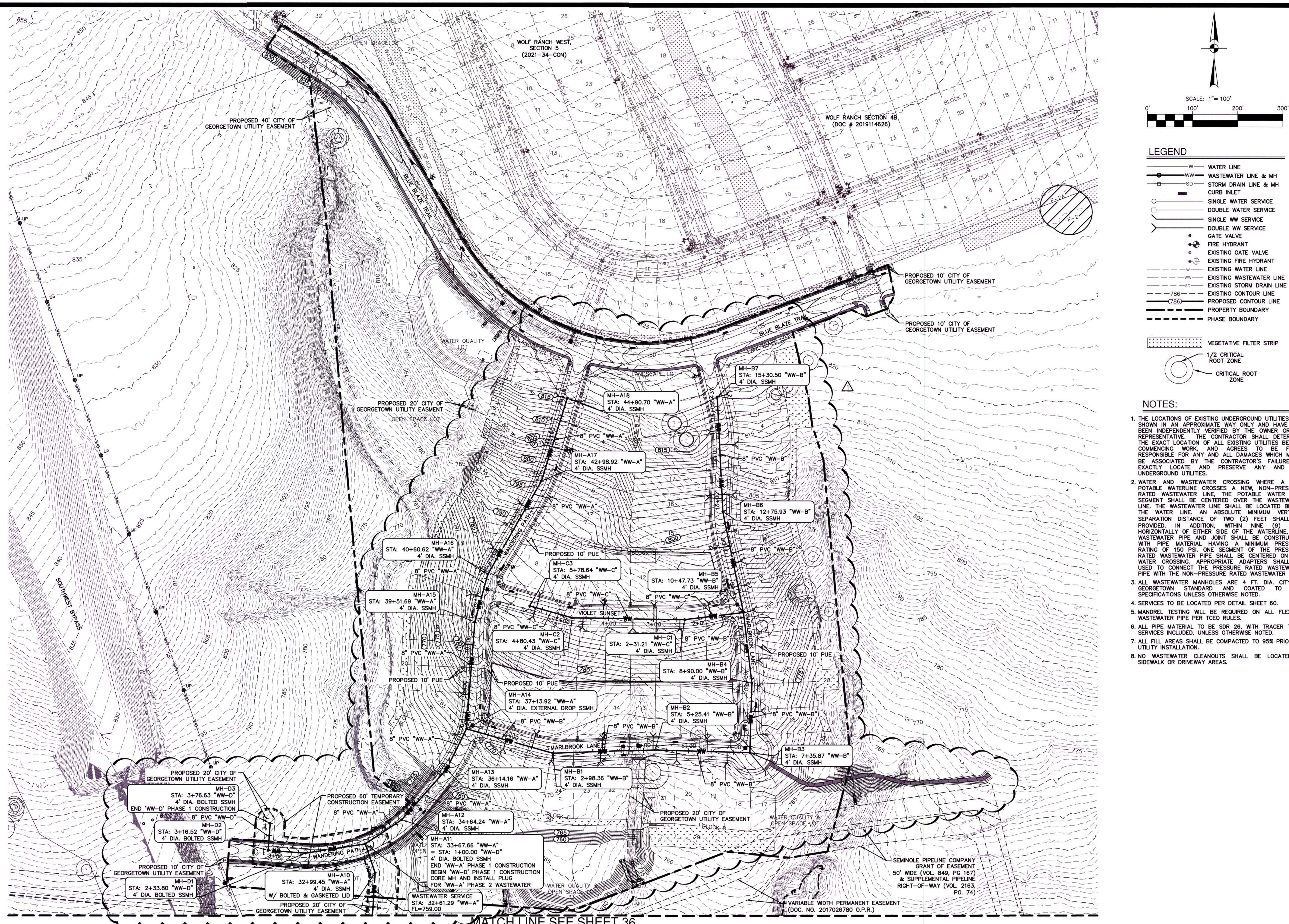


MATCH LINE SEE SHEET 36

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PROPERTY BOUNDARY
- PHASE BOUNDARY
- VEGETATIVE FILTER STRIP
- 1/2 CRITICAL ROOT ZONE
- CRITICAL ROOT ZONE

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. WATER AND WASTEWATER CROSSING WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER LINE, THE POTABLE WATER PIPE SEGMENT SHALL BE CENTERED OVER THE WASTEWATER LINE. THE WASTEWATER LINE SHALL BE LOCATED BELOW THE WATER LINE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE PROVIDED. IN ADDITION, WITHIN NINE (9) FEET HORIZONTALLY OF EITHER SIDE OF THE WATERLINE, THE WASTEWATER PIPE AND JOINT SHALL BE CONSTRUCTED WITH PIPE MATERIAL HAVING A MINIMUM PRESSURE RATING OF 150 PSI. ONE SEGMENT OF THE PRESSURE RATED WASTEWATER PIPE SHALL BE CENTERED ON THE WATER CROSSING. APPROPRIATE ADAPTERS SHALL BE USED TO CONNECT THE PRESSURE RATED WASTEWATER PIPE WITH THE NON-PRESSURE RATED WASTEWATER PIPE.
3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO COG SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS SHALL BE LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

NO.	REVISION	DATE
1	REVISE SERVICES AND MHS A18 & B7 FOR NEW LOT LAYOUT	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

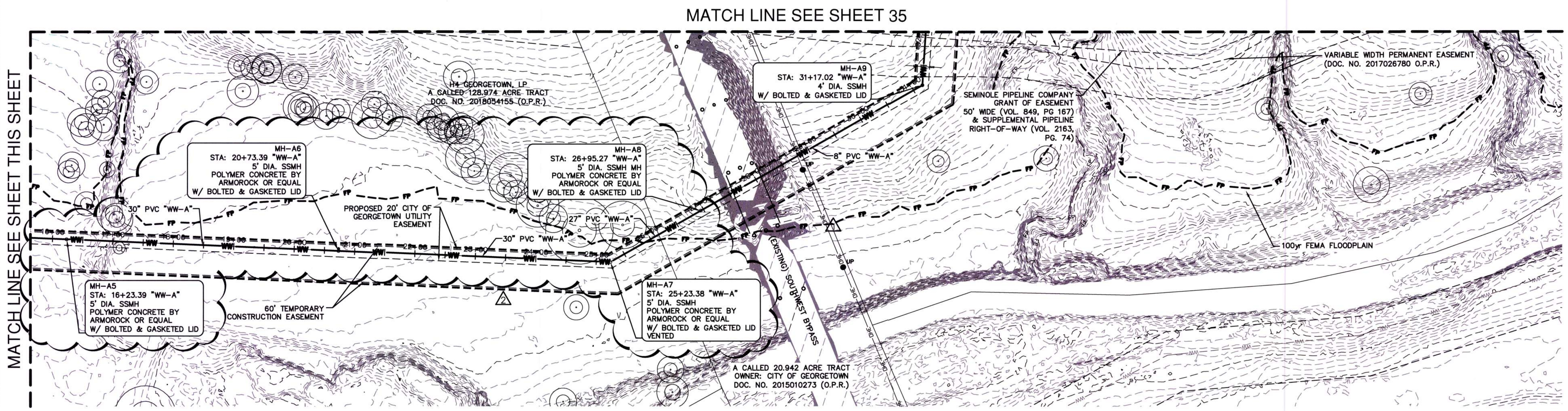
STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL WASTEWATER PLAN 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 35 OF 61

Date: Sep 11, 2023, 1:13pm User ID: jbennett
File: H:\Projects\511\27\42\301 Construction Documents\Civil\OS51127-42.dwg

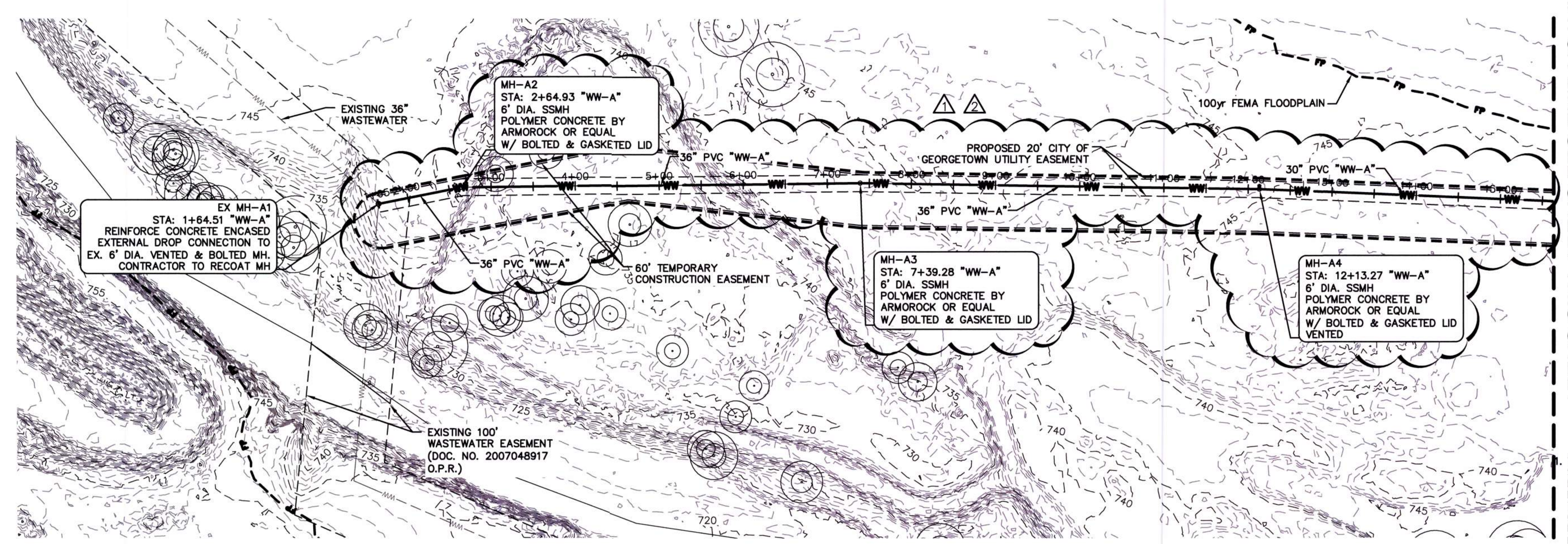


SCALE: 1"= 100'

0' 100' 200' 300'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- 786 EXISTING CONTOUR LINE
- 786 PROPOSED CONTOUR LINE
- PROPERTY BOUNDARY
- PHASE BOUNDARY
- VEGETATIVE FILTER STRIP
- 1/2 CRITICAL ROOT ZONE
- CRITICAL ROOT ZONE



NOTES:

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3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO COG SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS SHALL BE LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/08/23

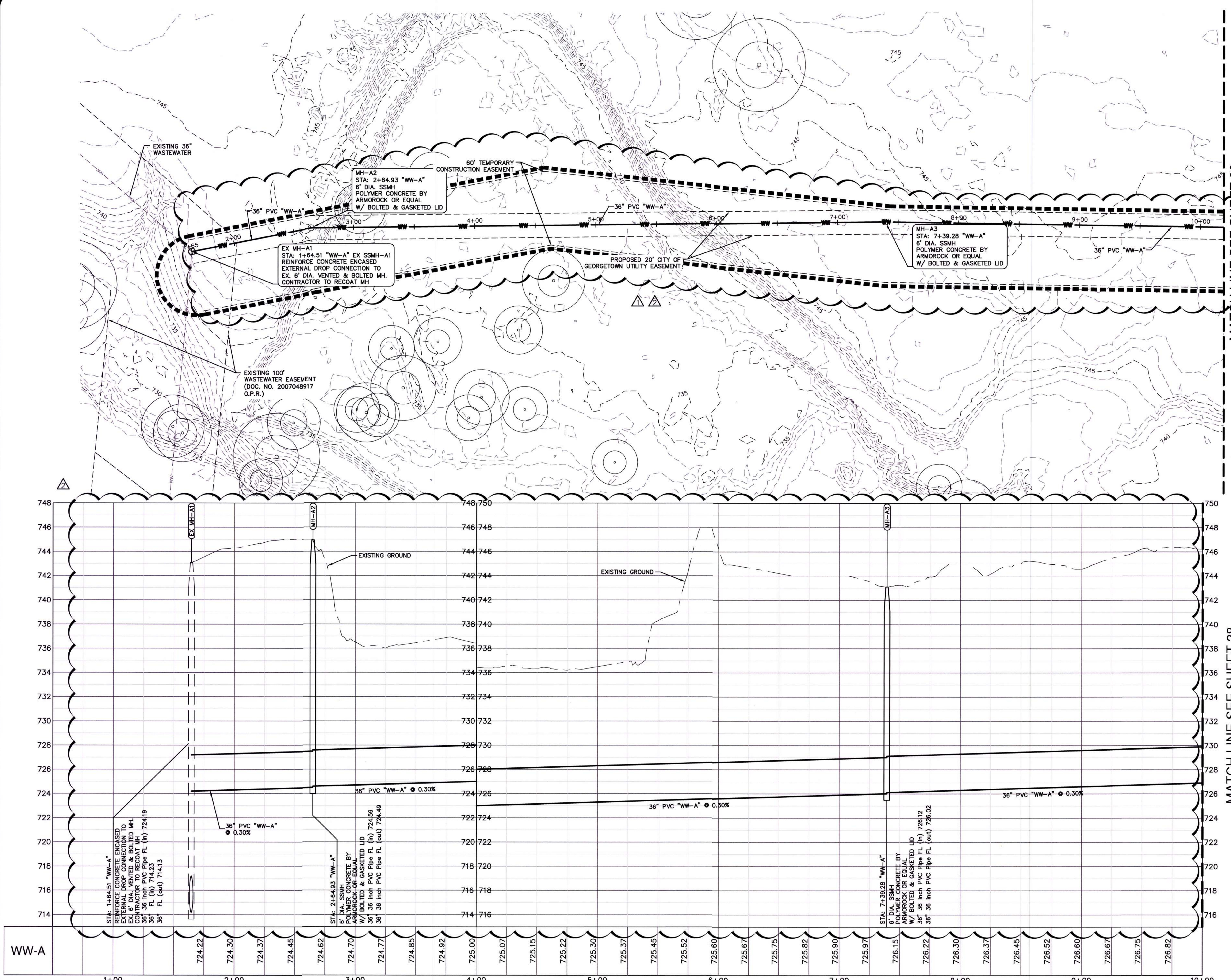
STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
OVERALL WASTEWATER PLAN 2 OF 2

CITY JOB No. 2022–5–CON
JOB NO. 51127–42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 36 OF 61

Date: Sep 11, 2023, 9:34am User ID: jbennett
File: H:\Projects\511\27\42\30 Construction Documents\Civil\OS51127-42.dwg



SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE ASSOCIATED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
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6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
9. CONTRACTOR TO CONTACT ENTERPRISE/SEMINOLE PIPELINE PRIOR TO COMMENCEMENT OF WORK.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
11/23

PAPE-DAWSON ENGINEERS

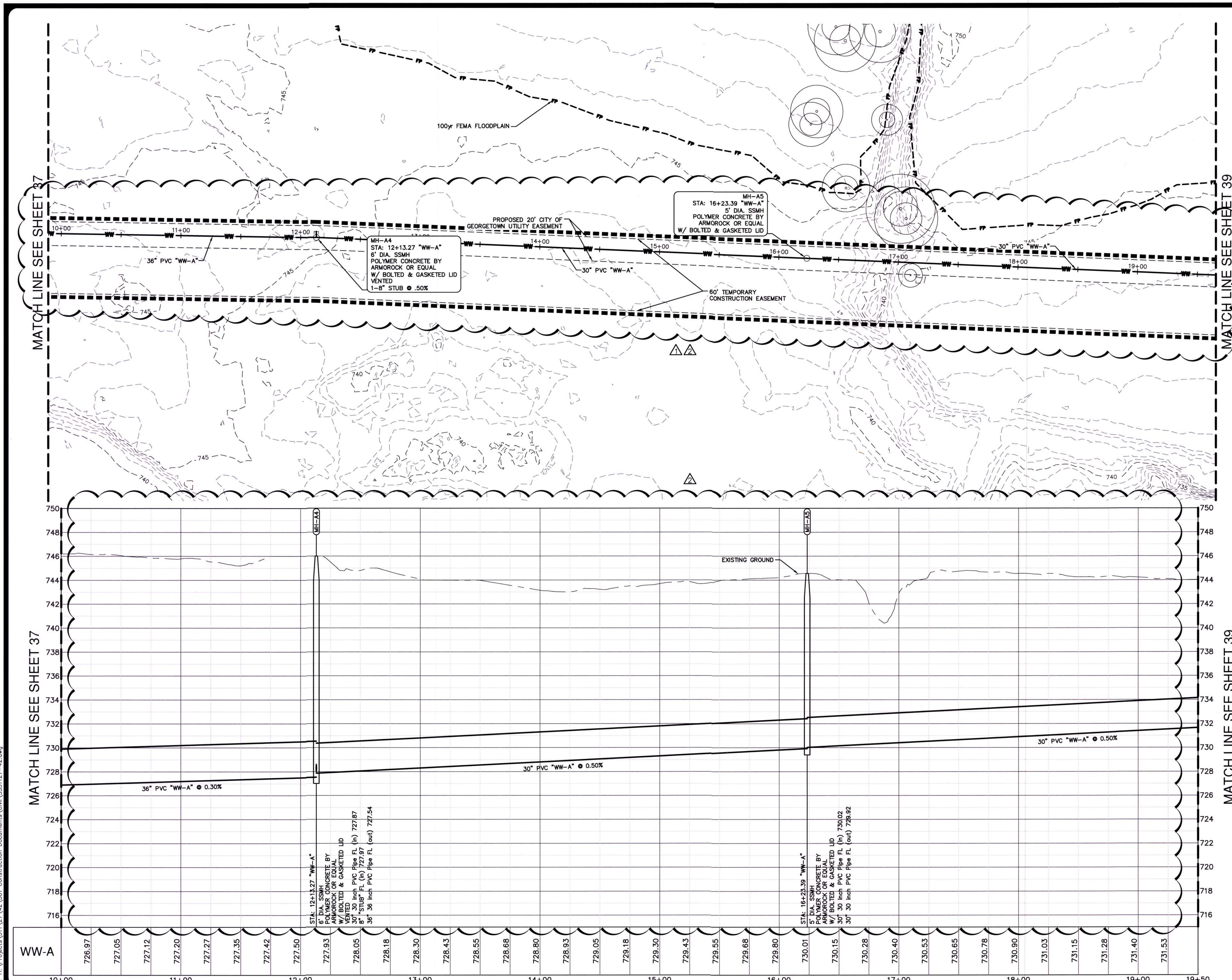
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 1+00 TO 10+00

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 37 OF 61

Date: Sep 11, 2023, 1:56pm User ID: jbennett
File: H:\Projects\511\27\42\301 Construction Documents\Civil\SS51127-42.dwg



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- W — WATER LINE
- WW — WASTEWATER LINE & MH
- SD — STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- 786 EXISTING CONTOUR LINE
- 786 PROPOSED CONTOUR LINE
- FP 100-YR FEMA FLOODPLAIN
- PHASE BOUNDARY

NOTES:

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8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SUBGRADE
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

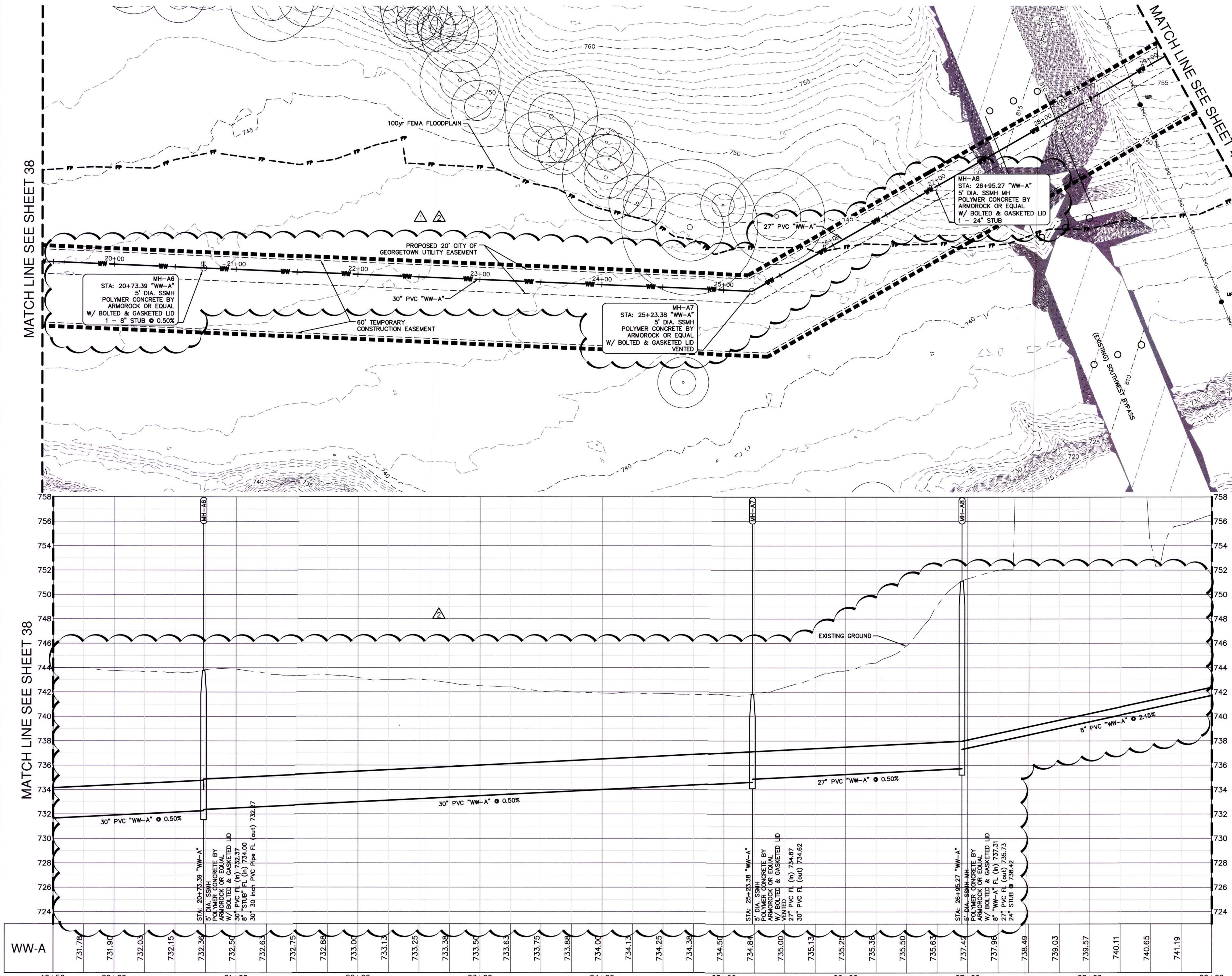
STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM LINE 'A' - STA 10+00 TO 19+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 38 OF 61



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 100-YEAR FEMA FLOODPLAIN
- PHASE BOUNDARY

NOTES:

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PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	
2	REVISE PIPE SIZES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 I AUSTIN, TX 78759 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 19+50 TO 29+00

1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB
1 SHEET 39 OF 61

Date: Sep 11, 2023, 1:57pm User ID: bennett
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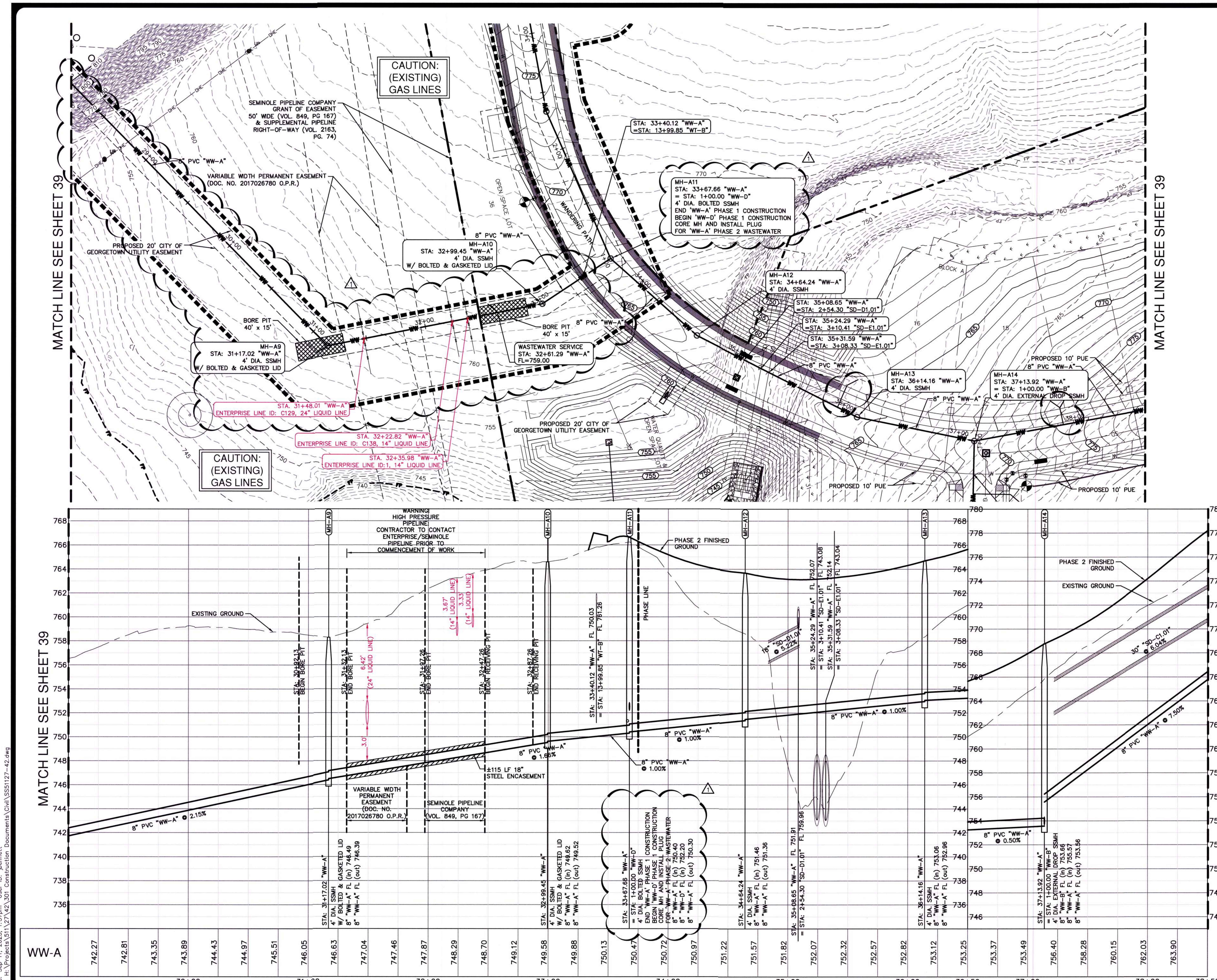

SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

- WATER LINE
- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

NOTES:

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7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.
9. THE WASTEWATER COLLECTION LINE WITHIN THE STEEL ENCASEMENT SHALL BE CONSTRUCTED OF AT LEAST 150 PSI PRESSURE CLASS PIPE.
10. THE STEEL ENCASEMENT PIPE SHALL BE SEALED AT BOTH ENDS WITH CEMENT GROUT OR A MANUFACTURED SEAL.
11. THE WASTEWATER COLLECTION LINE WITHIN THE STEEL ENCASEMENT SHALL BE SUPPORTED BY SPACERS BETWEEN THE COLLECTION SYSTEM PIPE AND THE STEEL ENCASEMENT AT A MAXIMUM OF FIVE-FOOT INTERVAL CONSISTENT WITH CITY OF GEORGETOWN DETAIL W14.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER

1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	ADD TEMPORARY CONSTRUCTION EASEMENT	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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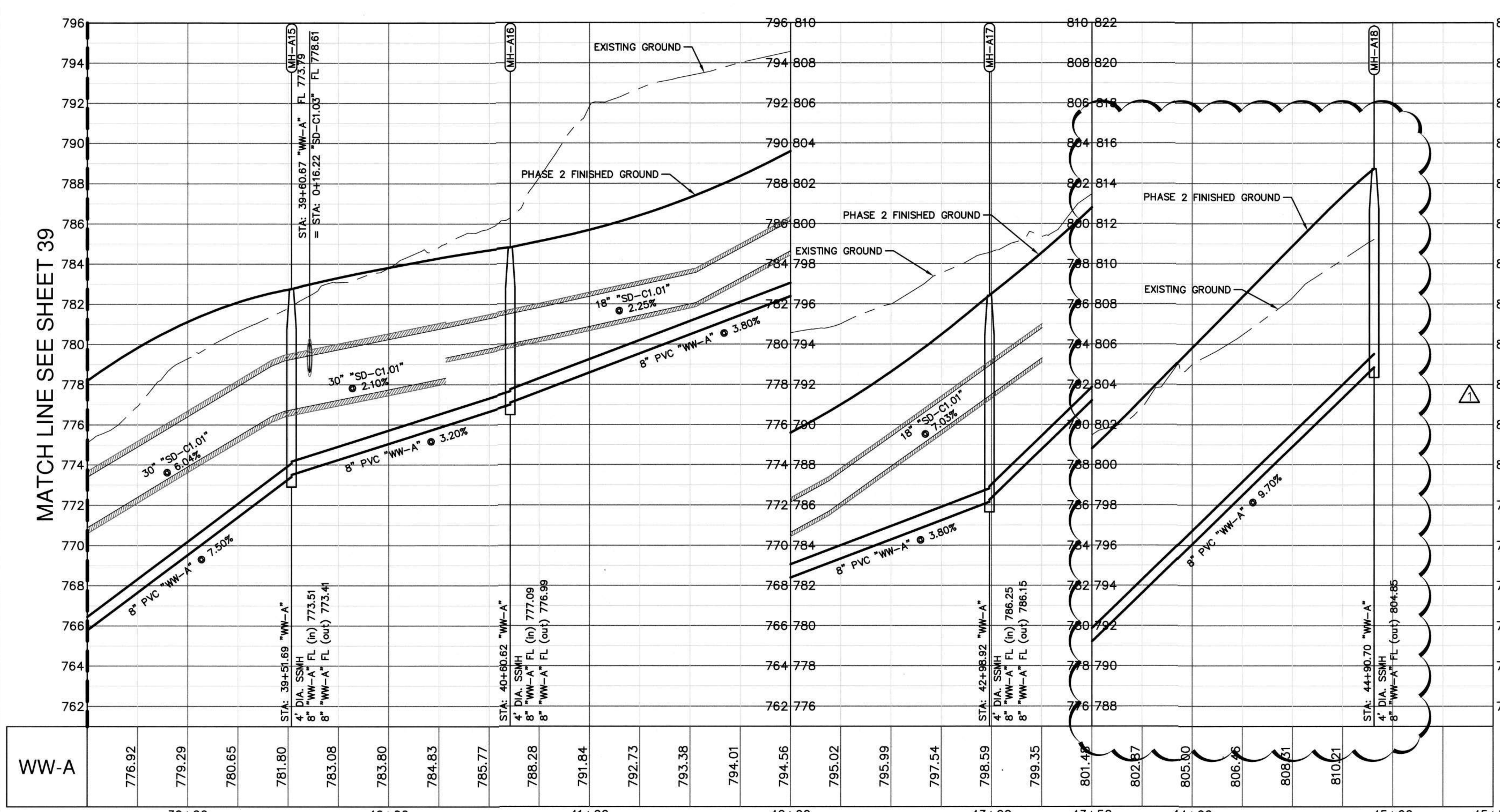
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM LINE 'A' - STA 29+00 TO 38+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 11, 2023
DESIGNER DB
CHECKED JF DRAWN DB



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

- W — WATER LINE
- WW — WASTEWATER LINE & MH
- SD — STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- SINGLE WW SERVICE
- DOUBLE WW SERVICE
- GATE VALVE
- FIRE HYDRANT
- EXISTING GATE VALVE
- EXISTING FIRE HYDRANT
- W — EXISTING WATER LINE
- W — EXISTING WASTEWATER LINE
- SD — EXISTING STORM DRAIN LINE
- 786 — EXISTING CONTOUR LINE
- 786 — PROPOSED CONTOUR LINE

NOTES:

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3. ALL WASTEWATER MANHOLES ARE 4 FT. DIA. CITY OF GEORGETOWN STANDARD AND COATED TO GEORGETOWN SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. SERVICES TO BE LOCATED PER DETAIL SHEET 60.
5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

- NATURAL GROUND
- SUBGRADE
- FINISHED GRADE
- PROPOSED WASTEWATER
- 1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS AND MH A18	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

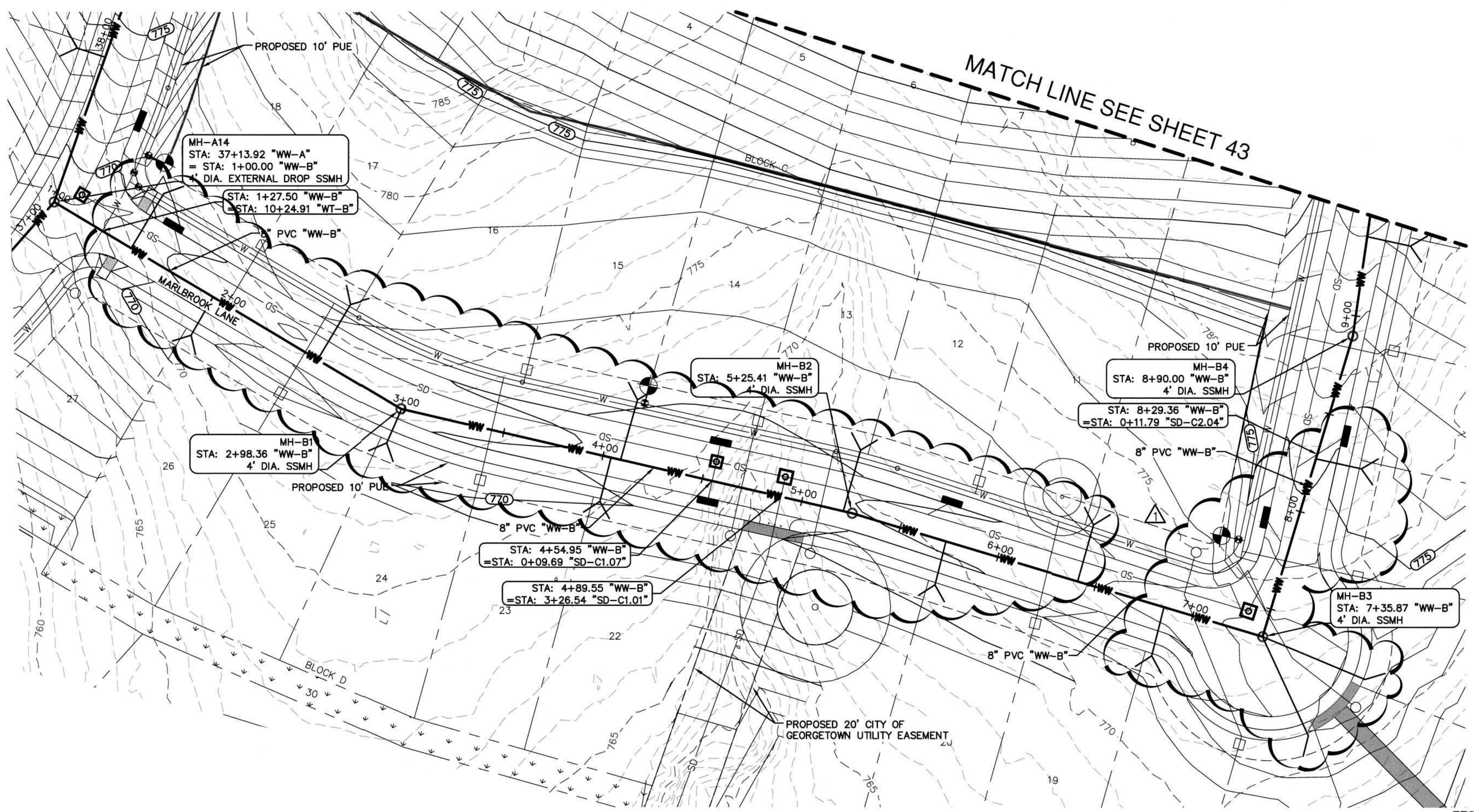
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'A' - STA 38+50 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB

Date: Mar 20, 2023, 3:43pm User ID: dking
File: H:\Projects\511\27\42\301 construction documents\Civil\SS51127-42.dwg



SCALE: 1" = 40'

0' 40' 80' 120'

LEGEND

W	WATER LINE
WW	WASTEWATER LINE & MH
SD	STORM DRAIN LINE & MH
	CURB INLET
	SINGLE WATER SERVICE
	DOUBLE WATER SERVICE
	SINGLE WW SERVICE
	DOUBLE WW SERVICE
	GATE VALVE
	FIRE HYDRANT
	EXISTING GATE VALVE
	EXISTING FIRE HYDRANT
W	EXISTING WATER LINE
W	EXISTING WASTEWATER LINE
SD	EXISTING STORM DRAIN LINE
786	EXISTING CONTOUR LINE
786	PROPOSED CONTOUR LINE

NOTES:

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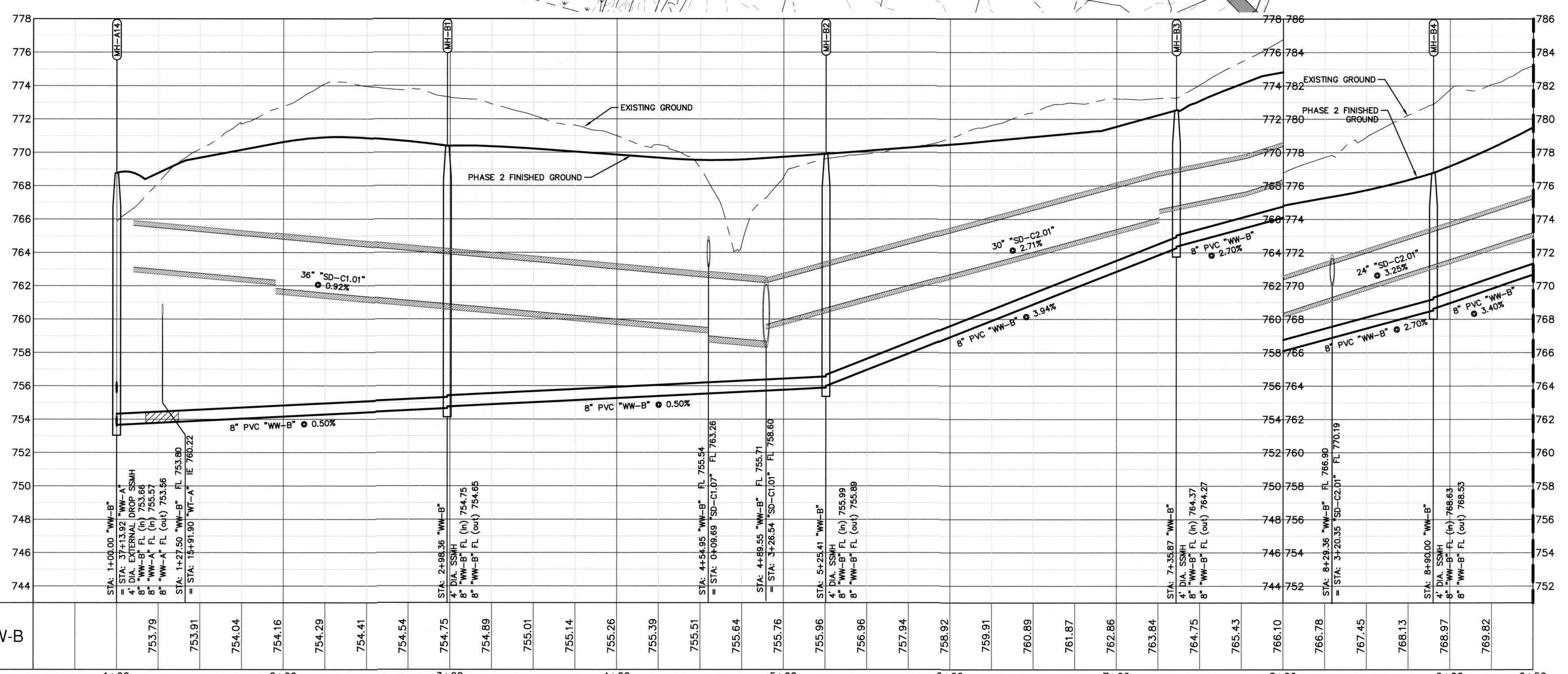


PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SURGRADE
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

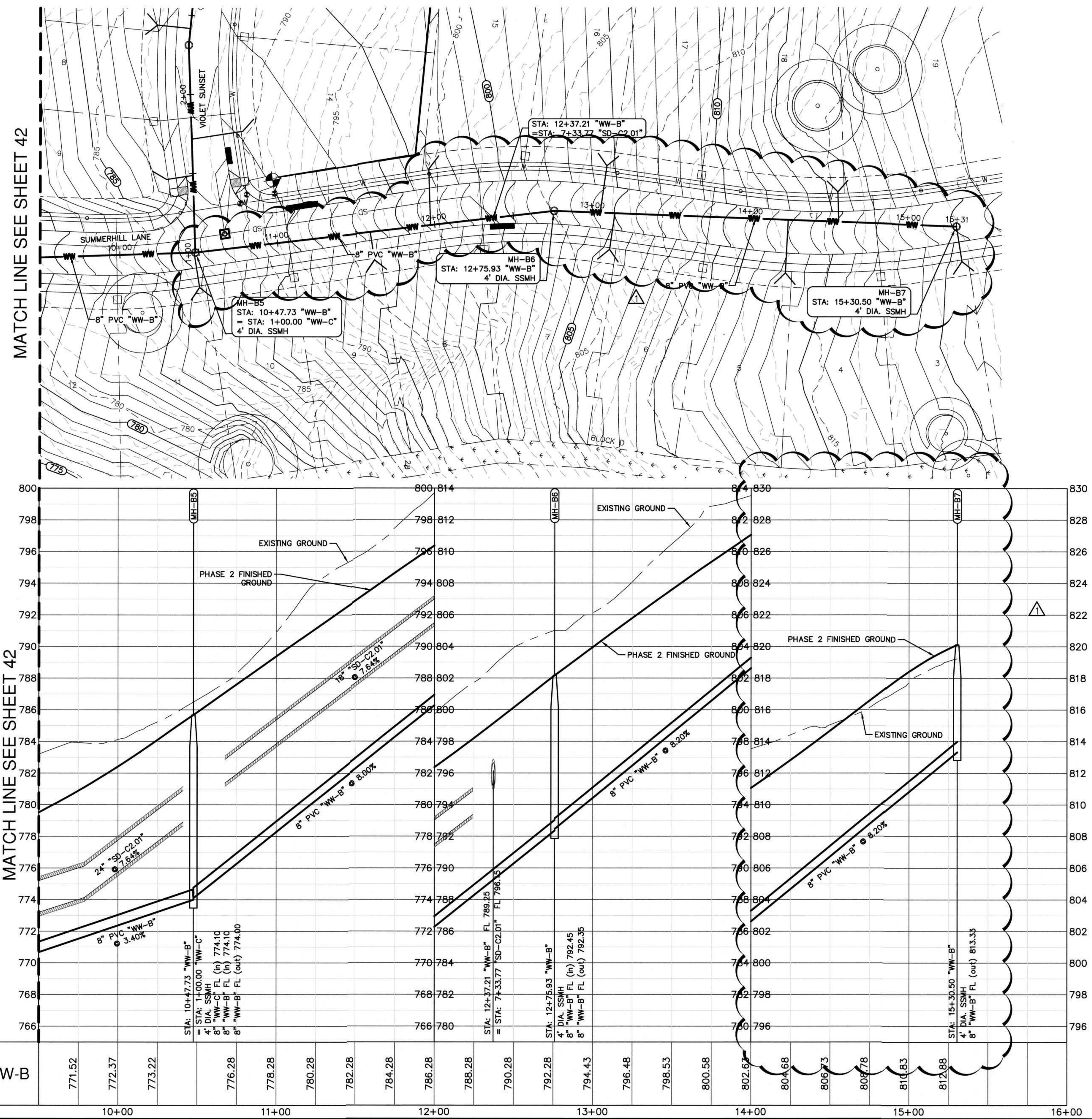
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'B' - STA 1+00 TO 9+50

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 42 OF 61

Date: Mar 20, 2023, 3:44pm User ID: aking
File: H:\Projects\511\27\42\501 construction documents\Civil\SS51127-42.dwg



SCALE: 1"= 40'

0' 40' 80' 120'

LEGEND

—W—	WATER LINE
—WW—	WASTEWATER LINE & MH
—SD—	STORM DRAIN LINE & MH
	CURB INLET
	SINGLE WATER SERVICE
	DOUBLE WATER SERVICE
	SINGLE WW SERVICE
	DOUBLE WW SERVICE
	GATE VALVE
	FIRE HYDRANT
	EXISTING GATE VALVE
	EXISTING FIRE HYDRANT
—W—	EXISTING WATER LINE
—W—	EXISTING WASTEWATER LINE
—SD—	EXISTING STORM DRAIN LINE
786	EXISTING CONTOUR LINE
786	PROPOSED CONTOUR LINE

NOTES:

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5. MANDREL TESTING WILL BE REQUIRED ON ALL FLEXIBLE WASTEWATER PIPE PER TCEQ RULES.
6. ALL PIPE MATERIAL TO BE SDR 26, WITH TRACER TAPE, SERVICES INCLUDED, UNLESS OTHERWISE NOTED.
7. ALL FILL AREAS SHALL BE COMPACTED TO 95% PRIOR TO UTILITY INSTALLATION.
8. NO WASTEWATER CLEANOUTS LOCATED IN SIDEWALK OR DRIVEWAY AREAS.

PROFILE SCALES:

1" = 40' HORIZONTAL
1" = 4' VERTICAL

PROFILE LEGEND:

NATURAL GROUND
SUBGRADE
FINISHED GRADE
PROPOSED WASTEWATER
1-JOINT OF PRESSURE PIPE SEE NOTE THIS SHEET.

NO.	REVISION	DATE
1	REVISE MH B7 AND SERVICE LOCATIONS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'B' - STA 9+50 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 43 OF 61

Date: Mar 20, 2023, 3:44pm User ID: aking
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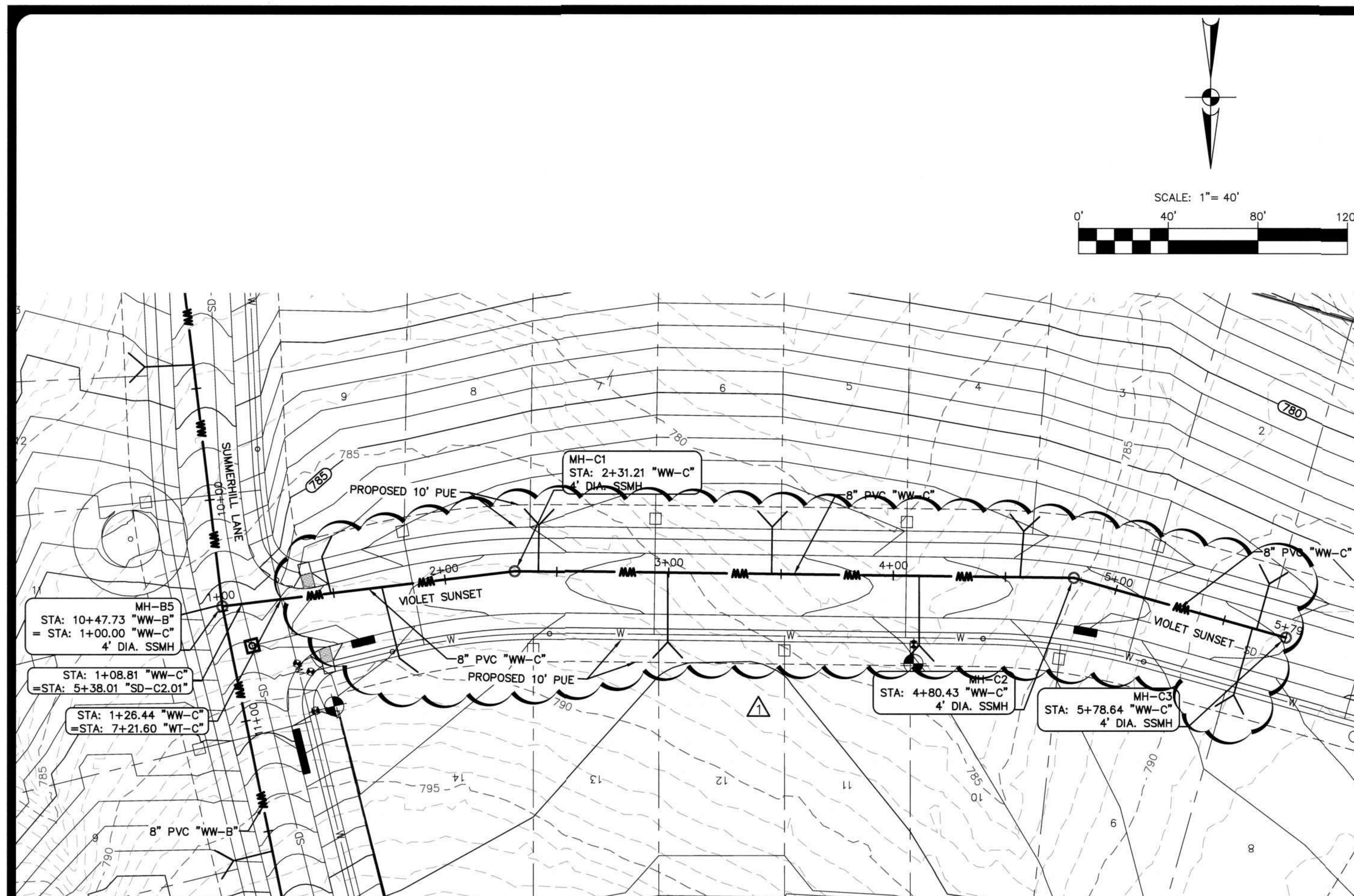

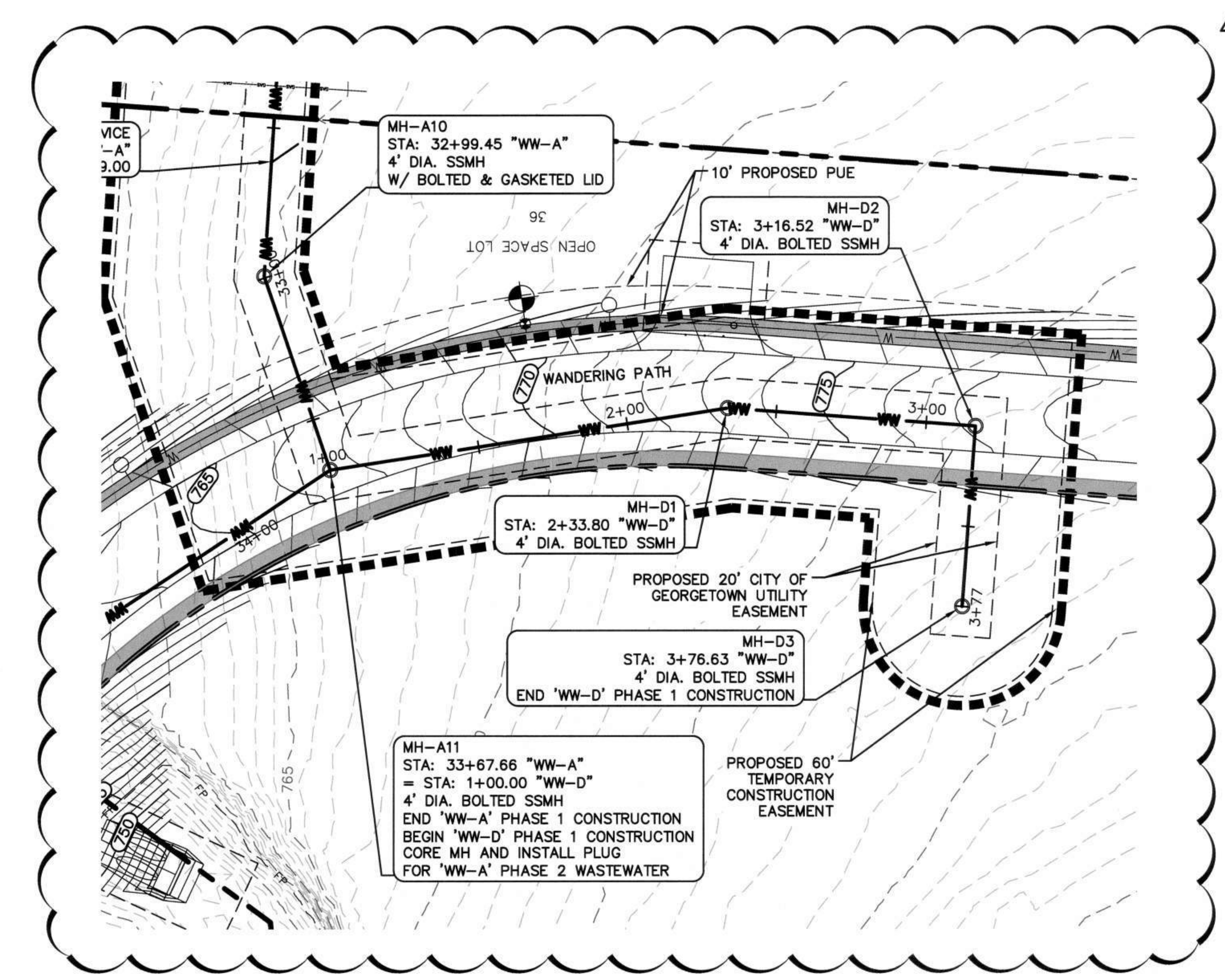

SCALE: 1" = 40'

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- WASTEWATER LINE & MH
- STORM DRAIN LINE & MH
- CURB INLET
- SINGLE WATER SERVICE
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- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM DRAIN LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- PHASE BOUNDARY

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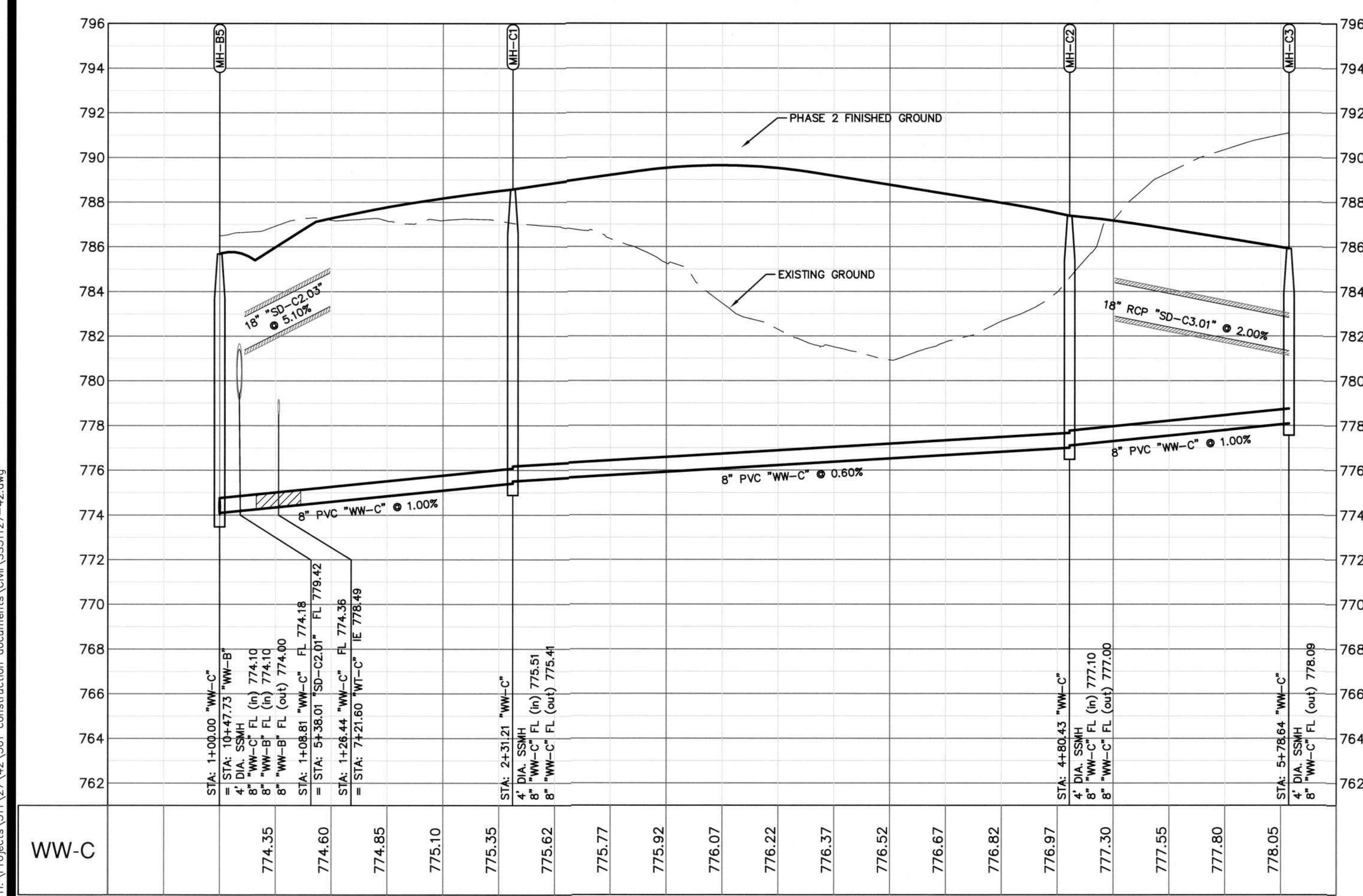

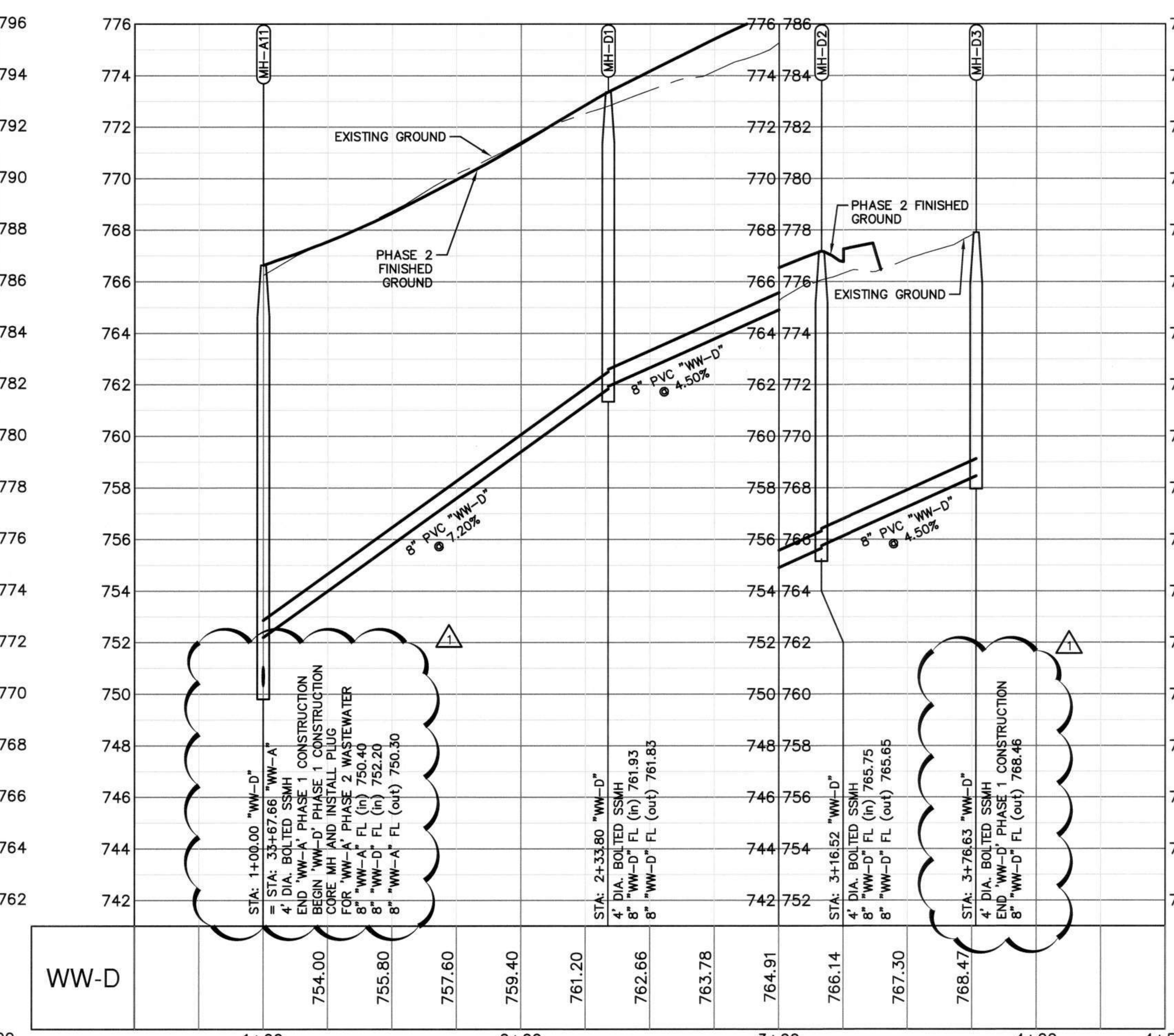

NO.	REVISION	DATE
1	REVISE SERVICE LOCATIONS	08/11/22
	PHASED CONSTRUCTION ADDED	10/14/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER
2/14/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

WASTEWATER COLLECTION SYSTEM
LINE 'C & 'D' - STA 1+00 TO END

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 44 OF 61

Date: Mar 20, 2023, 3:45pm User ID: aking
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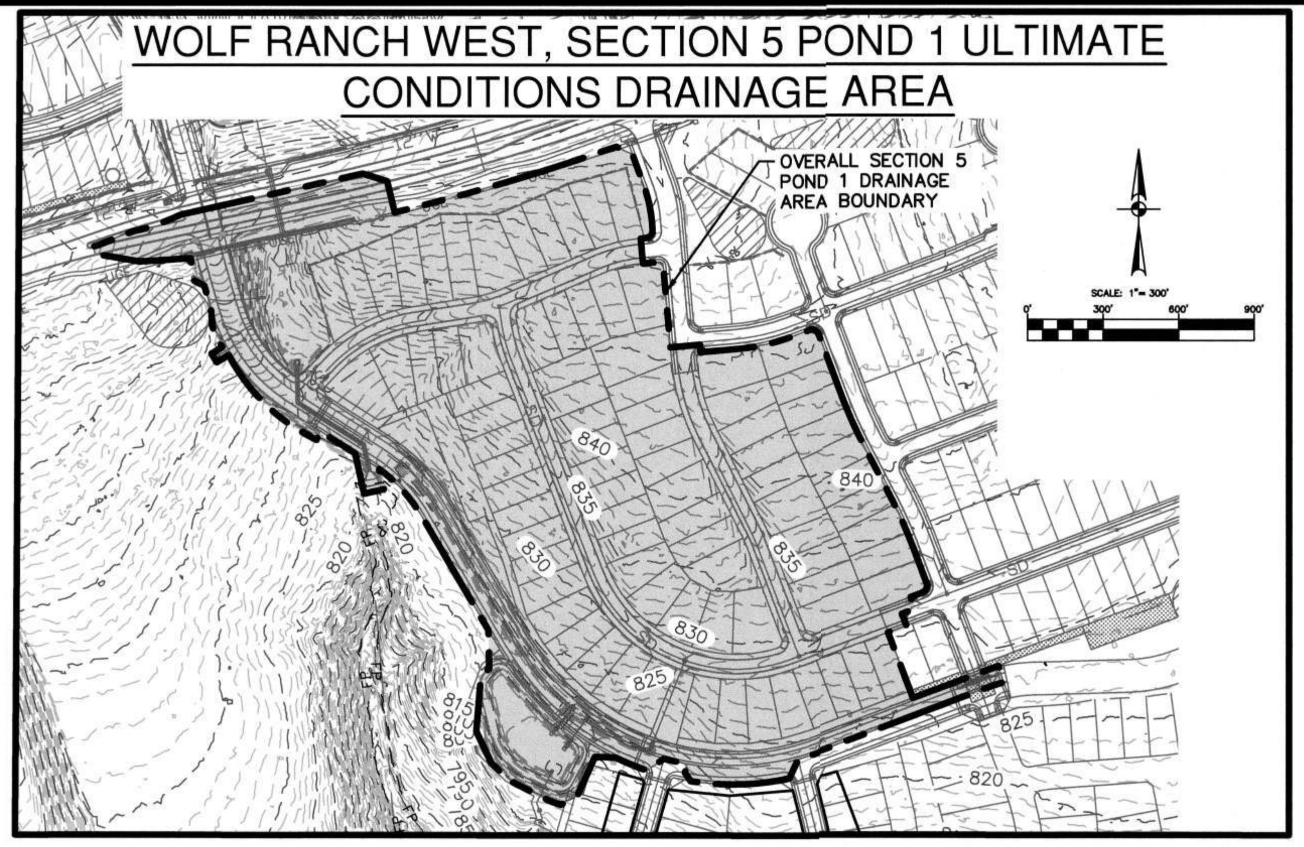
WOLF RANCH WEST, SECTION 5 POND 1 ULTIMATE CONDITIONS DRAINAGE AREA



Texas Commission on Environmental Quality
TSS Removal Calculations for Vegetative Filter Strip   Project: *Wolf Ranch West, Section 4G*

Input By User   Job No.: 51127-42
Automatically Calculated Variables   Date: 9/23/2022

1. Calculate Required Load Reduction

Lm = 27.2 (An x P)   80% TSS Removal   Lm = 28.9 (An x P)   85% TSS Removal

where:
Lm = Required TSS removal from proposed development
An = Net increase in impervious area, acres
P = Average annual precipitation by county, inches

Site Data:

County =	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson	Williamson
Vegetative Filter Strip Name =	1	2	3	4	5	6	7	8	9	10	11
VFS Type =	50' Natural VFS	15' Engineered VFS	50' Natural VFS	15' Engineered VFS	50' Natural VFS	15' Engineered VFS	15' Engineered VFS	15' Engineered VFS	15' Engineered VFS	15' Engineered VFS	15' Engineered VFS
Proposed drainage area to be treated by VFS =	0.27	0.88	0.08	0.16	0.88	0.51	0.12	0.58	0.31	0.23	0.08
Proposed amount of impervious cover to be treated by VFS =	0.16	0.53	0.05	0.10	0.53	0.31	0.07	0.35	0.19	0.14	0.05
P =	32	32	32	32	32	32	32	32	32	32	32
80% Lm (lbs) =	139	460	42	84	461	266	63	303	162	120	42
85% Lm (lbs) =	148	488	44	89	490	283	67	322	172	128	44

Lr = TSS Load removed by VFS

Vegetative Filter Strip Name =	1	2	3	4	5	6	7	8	9	10	11
Overtreatment Provided at 80% TSS Removal (lbs) =	13	42	4	7	43	25	5	28	15	11	4
Overtreatment Provided at 85% TSS Removal (lbs) =	4	14	2	2	14	8	1	9	5	3	2
Lr = Desired Lm (lbs)	152	502	46	91	504	291	68	331	177	131	46

Wolf Ranch West, Section 4G - Impervious Cover Summary

BMP Watershed	Drainage Area Treated (ac.)	Existing Impervious Cover (ac.)	Projected Impervious Cover (ac.)	PBMP	85% TSS Removal Required (lb.)	80% TSS Removal Required (lb.)	TSS Removal Provided (lb.)	Notes
Pond 1	14.69	0.00	8.52	Batch Detention Pond 1	7879	7416	8564	
Pond 2	0.84	0.00	0.65	Extended Detention with Grassy Swale	601	566	601	
Overtreatment	—	0.00	0.74	Batch Detention Pond 1	685	645	—	
	—	0.00	0.05	15' Engineered Vegetated Filter Strip	44	41	—	
	—	0.00	0.02	50' Natural Vegetated Filter Strip	20	19	—	
Treated by Vegetative Filter Strip	2.87	0.00	1.72	15' Engineered Vegetated Filter Strip	1591	1498	1635	
	1.23	0.00	0.74	50' Natural Vegetated Filter Strip	684	644	704	
Wolf Ranch West, Section 5 (Pond 1) *	25.54	10.14	11.72	Batch Detention	10,839	10,201	10,895	Existing impervious cover acreage includes 1.07 acres of impervious cover from Wolf Ranch West, Section 4B. See EAPP# 11002667 for additional detail.
TOTAL	**45.17**	**10.14**	**24.16**	-	**22,343**	**21,030**	**22,399**	

*1.58 AC of impervious cover proposed with 4G to be treated by Section 5 - Pond 1; Total Impervious Cover for 4G = 14.02 AC; 10.14 AC of impervious cover approved w/ Section 5 WPAP; 10.14+1.58=11.72 AC of impervious cover in Section 5 - Pond 1 Watershed

WATER QUALITY POND 1

Wolf Ranch West, Section 4G - Water Quality Pond 1

Elevation	Area (ft^2)	Area (ac)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)	h-Weir (ft)	Weir Discharge (cfs)	Notes
756	0	0.000	-	-	-		
757	11,181	0.257	5,591	5,591	-	-	
758	23,927	0.549	17,554	23,145	-	-	
759	27,173	0.624	25,550	48,695	-	-	
760	29,405	0.675	28,289	76,984	-	-	
760.7	31,014	0.712	21,147	98,130	0	0	Water Qualty Volume/Weir Elevation
761	31,704	0.728	9,408	107,538	0.3	9.9	
761.8	33,568	0.771	26,109	133,647	1.1	69.2	25-yr WSE
762	34,034	0.781	6,760	140,407	1.3	88.9	100-yr WSE
763	36,425	0.836	35,230	175,637	2.3	209.3	Top of Pond

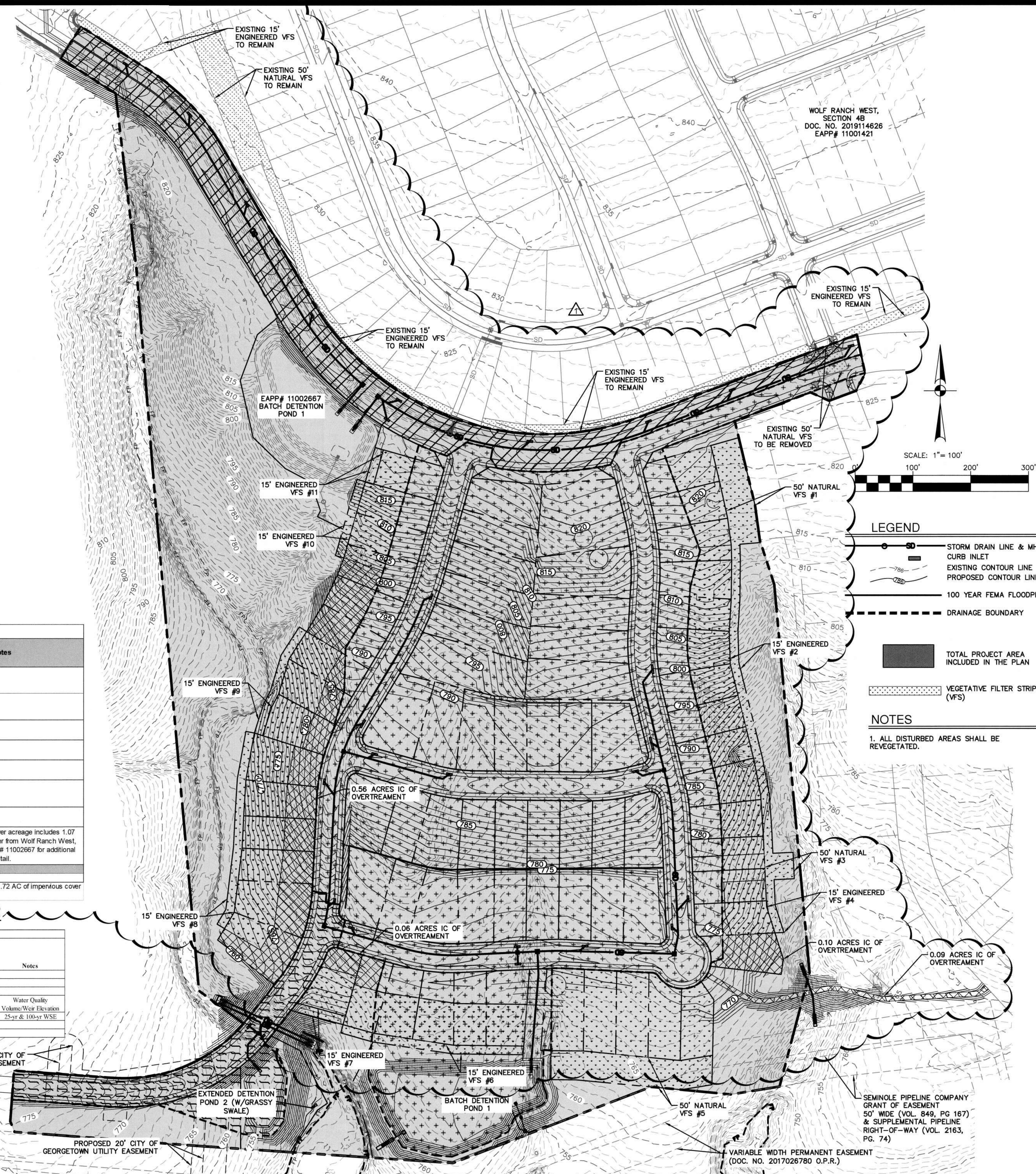
Spillway	
Elevation (ft) =	760.70
Length (ft) =	20.00
Coefficient =	3.00

WATER QUALITY POND 2

Wolf Ranch West, Section 4G - Water Quality Pond 2

Elevation	Area (ft^2)	Area (ac)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)	h-Weir (ft)	Weir Discharge (cfs)	Notes
752.5	20	0.000	-	-	-		
753	1,052	0.024	268	268	-	-	
754	2,565	0.059	1,809	2,077	-	-	
755	4,121	0.095	3,343	5,420	0.0	0.0	Water Quality Volume/Weir Elevation
755.4	4,789	0.110	1,782	7,202	0.4	9.1	25-yr & 100-yr WSE
756	5,792	0.133	3,174	10,376	1.0	36.0	
757	7,472	0.172	6,632	17,008	2.0	101.8	

Spillway	
Elevation (ft) =	755.00
Length (ft) =	12.00
Coefficient =	3.00



SCALE: 1"= 100'
0' 100' 200' 300'

LEGEND

- STORM DRAIN LINE & MH
- CURB INLET
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 100 YEAR FEMA FLOODPLAIN
- DRAINAGE BOUNDARY
- TOTAL PROJECT AREA INCLUDED IN THE PLAN
- VEGETATIVE FILTER STRIP (VFS)

NOTES

1. ALL DISTURBED AREAS SHALL BE REVEGETATED.

NO.	REVISION	DATE
1	REVISE WQ CALCS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER
4/14/23

PAPE-DAWSON ENGINEERS
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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
WATER QUALITY DRAINAGE AREA MAP

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
SHEET 45 OF 61

Date: Mar 20, 2023, 3:48pm User ID: aking
File: H:\Projects\511\27\42\301 construction documents\Civil\WQ51127-42.dwg

BATCH DETENTION POND 1 UNDERDRAIN SIZING CALCULATIONS

DRAIN LINE ID	WATER QUALITY VOLUME **WQV** (cf)	AVERAGE DRAWDOWN FLOWRATE FROM ORIFICE (VALVE) **Q** (cfs)	PIPE DIAMETER **D** (in)	MANNINGS N **n**	PIPE SLOPE **S** (ft/ft)	FULL FLOW CAPACITY **Qcap**	**K**	FRICTION SLOPE **SF** (ft/ft)
POND DRAIN 1	98,130	0.86	8.00	0.013	0.005	0.85	12.08	0.0051

ORIFICE DRAWDOWN BATCH DETENTION POND 1

Contour Elevation (ft)	Contour Area (ft^2)	Average End Area Method $V_{1,2} = \left[\frac{A_1 + A_2}{2}\right] * d$ Incremental Volume (ft^3)	Total Volume (ft^3)	Orifice Discharge (cfs)	Incremental Drawdown Time (hr)	Total Drawdown Time (hr)
760.70	31	0	0			0.00
760.00	29,022	10,168	10,168	1.11	2.55	2.55
759.00	26,820	27,921	38,089	1.04	7.49	10.04
758.00	23,586	25,203	63,292	0.95	7.40	17.44
757.00	10,853	17,220	80,512	0.85	5.64	23.08
756.00	0	5,427	85,938	0.74	2.05	25.13

ORIFICE DIAMETER	4.00	in
ORIFICE FL ELEV	753.26	
ORIFICE CENTROID ELEV	753.43	
ORIFICE AREA (Ao)	0.087	sf
ORIFICE COEFFICIENT	0.6	

ORIFICE EQUATION

$$Q = CA_o\sqrt{2gH}$$

Total Drawdown Time (Maximum 48 Hours)	25.1	hours
Total Hold + Drawdown Time (Maximum 60 Hours)	37.1	hours
Orifice Discharge Rate (Average)	0.95	cfs

1 2

WATER QUALITY POND 1

Wolf Ranch West, Section 4G - Water Quality Pond 1							
Elevation	Area (ft²)	Area (ac)	Incremental Volume (ft³)	Cumulative Volume (ft³)	h-Weir (ft)	Weir Discharge (cfs)	Notes
756	0	0.000	-	-	-		
757	10,853	0.249	5,427	5,427	-	-	
758	23,586	0.541	17,220	22,646	-	-	
759	26,820	0.616	25,203	47,849	-	-	
760	29,022	0.666	27,921	75,770	-	-	
760.7	30,647	0.704	20,884	96,654	0	0	Water Qualty Volume/Weir Elevation
761	31,343	0.720	9,298	105,953	0.3	9.9	
761.8	33,225	0.763	25,827	131,780	1.1	69.2	25-yr WSE
762	33,696	0.774	6,692	138,472	1.3	88.9	100-yr WSE
763	36,425	0.836	35,061	173,533	2.3	209.3	Top of Pond

Spillway	
Elevation (ft) =	760.70
Length (ft) =	20.00
Coefficient =	3.00

Table 3-6 Clay Liner Specifications (COA, 2004)

Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	1×10^{-6}
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM D-422	%	Not less than 30
Clay Compaction	ASTM D-2216	%	95% of Standard Proctor Density

SCALE: 1"= 20'

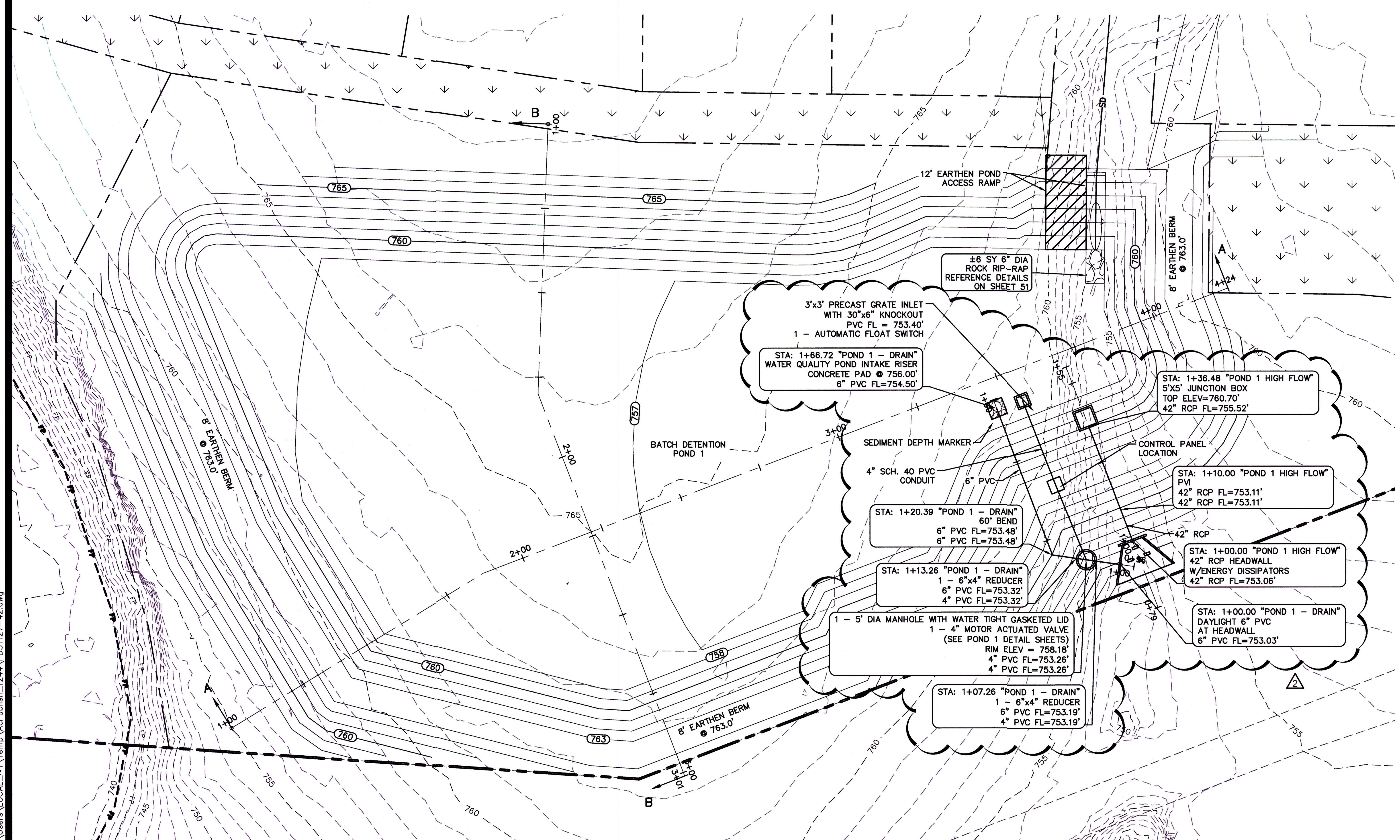
0' 20' 40' 60'

LEGEND

- STORM DRAIN LINE & MH
- CURB INLET
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 100 YEAR FEMA FLOODPLAIN
- VEGETATIVE FILTER STRIP (VFS)

NOTES

1. ALL DISTURBED AREAS SHALL BE REVEGETATED.



Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Wolf Ranch West, Section 4G, Pond 1
Date Prepared: 9/23/2022

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

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: $L_M = 28.9(A_N \times P)$

where:
$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 85% 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 * =	47.13	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	14.02	acres
Total post-development impervious cover fraction * =	0.30	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	12966	lbs. ADJUSTED FOR 85% TSS REMOVAL

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

Number of drainage basins / outfalls areas leaving the plan area = 2

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

Drainage Basin/Outfall Area No. =	1	
Total drainage basin/outfall area =	14.69	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	8.52	acres
Post-development impervious fraction within drainage basin/outfall area =	0.58	
$L_{M\ THIS\ BASIN}$ =	7879	lbs. ADJUSTED FOR 85% TSS REMOVAL

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 =	14.69	acres
A_I =	8.52	acres
A_P =	6.17	acres
L_R =	8681	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	8564	lbs.
F =	0.99	

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 =	3.66	inches
Post Development Runoff Coefficient =	0.41	
On-site Water Quality Volume =	79292	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 =	15858	
Total Capture Volume (required water quality volume(s) x 1.20) =	95151	cubic feet

NO.	REVISION	DATE
1	REVISE WQ CALCS	08/11/22
2	REVISE OUTFLOW STRUCTURES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

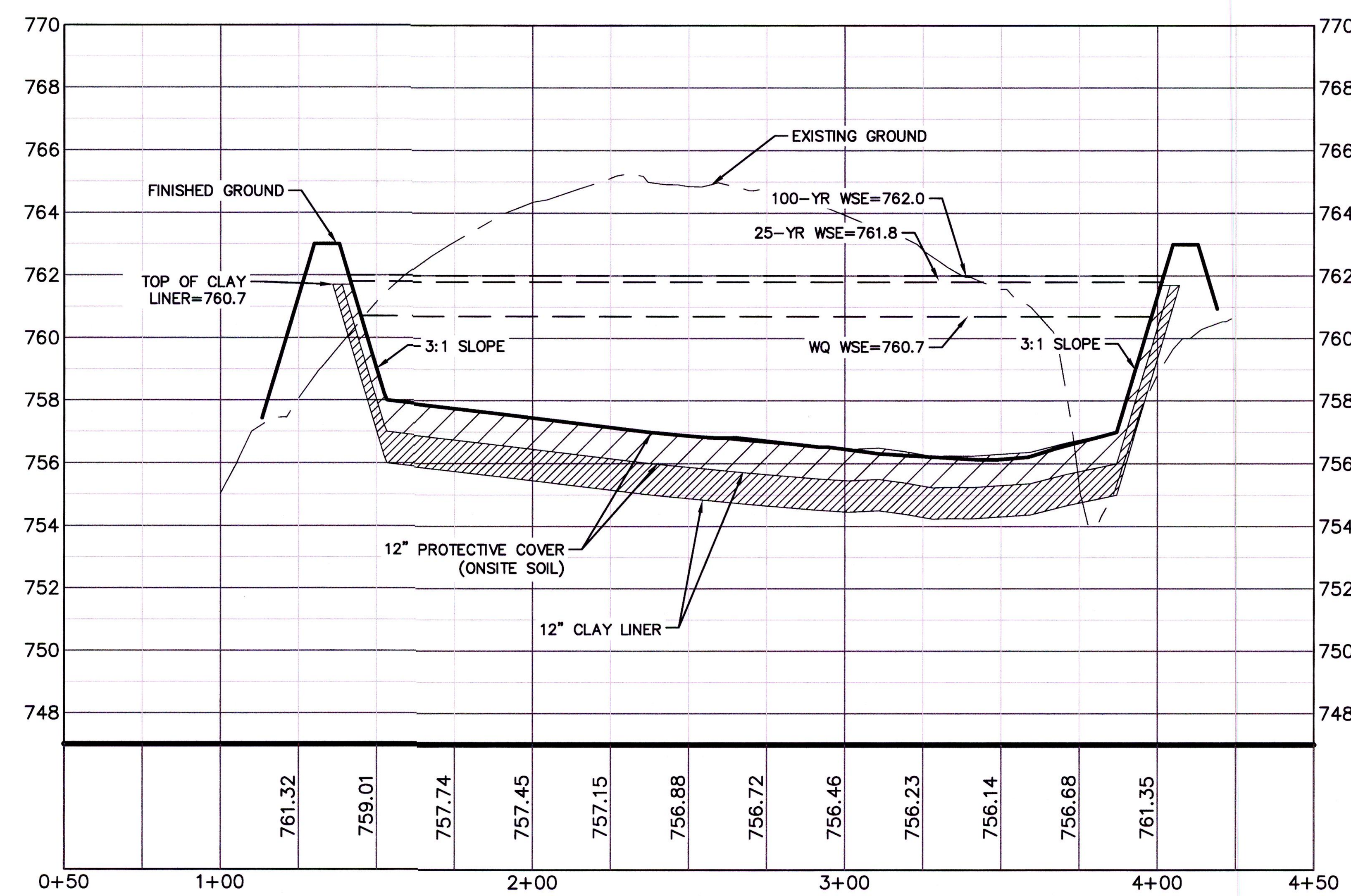
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

POND 1 PLAN VIEW

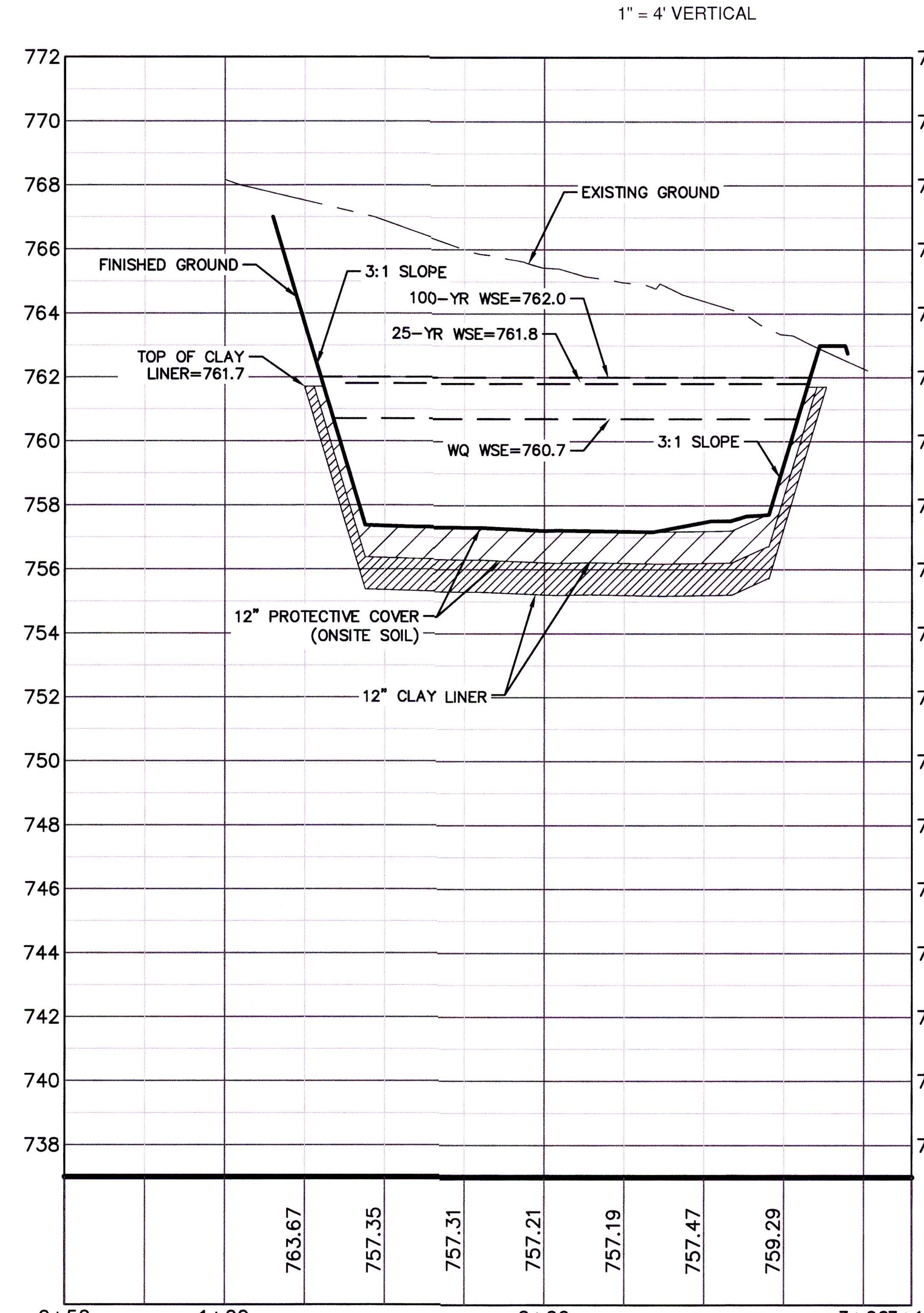
1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 7, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
SHEET 46 OF 61

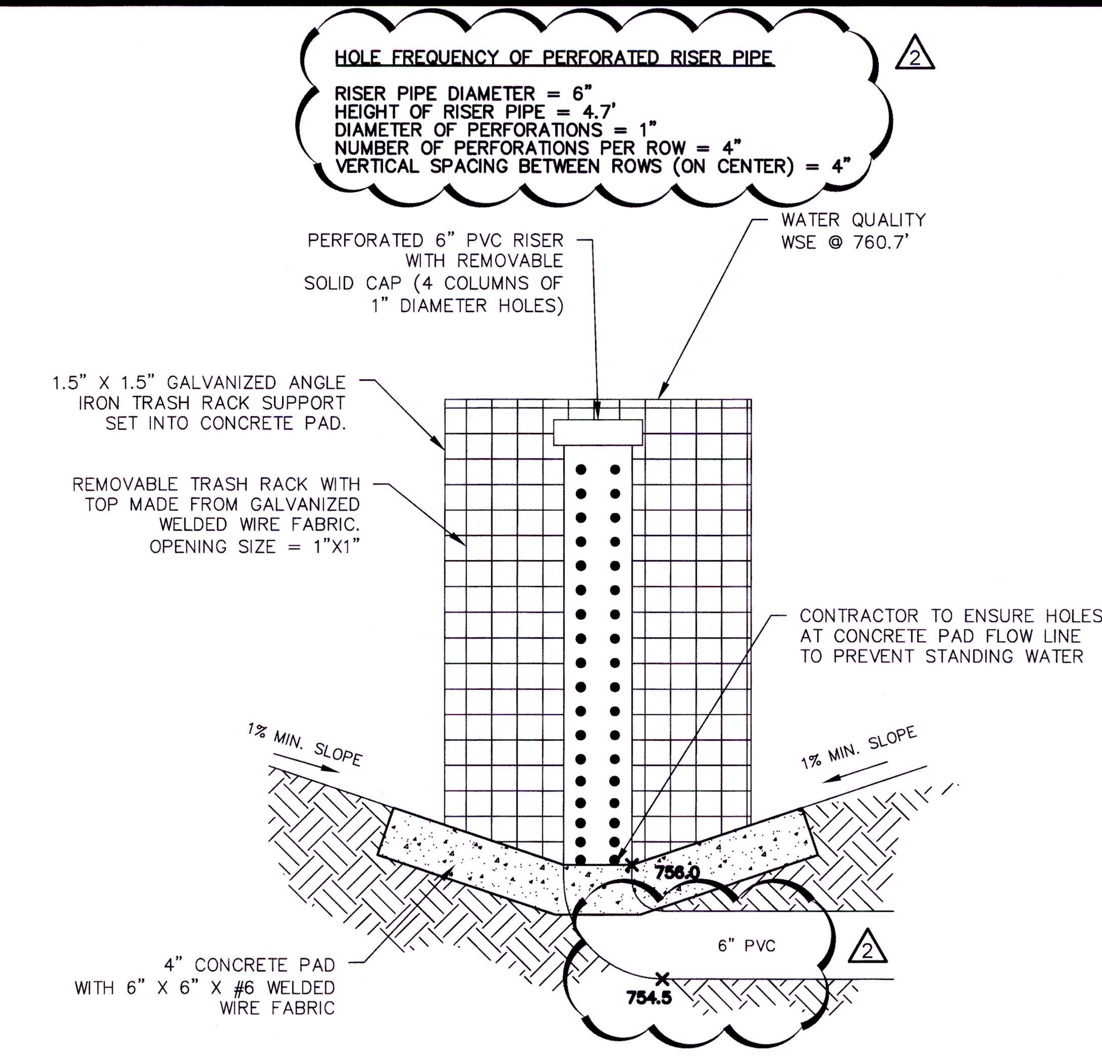
Date: Sep 07, 2023, 4:54pm User ID: cconner
File: C:\Users\LOCAL_~1\Temp\AcPublish_1244\PD51127-42.dwg



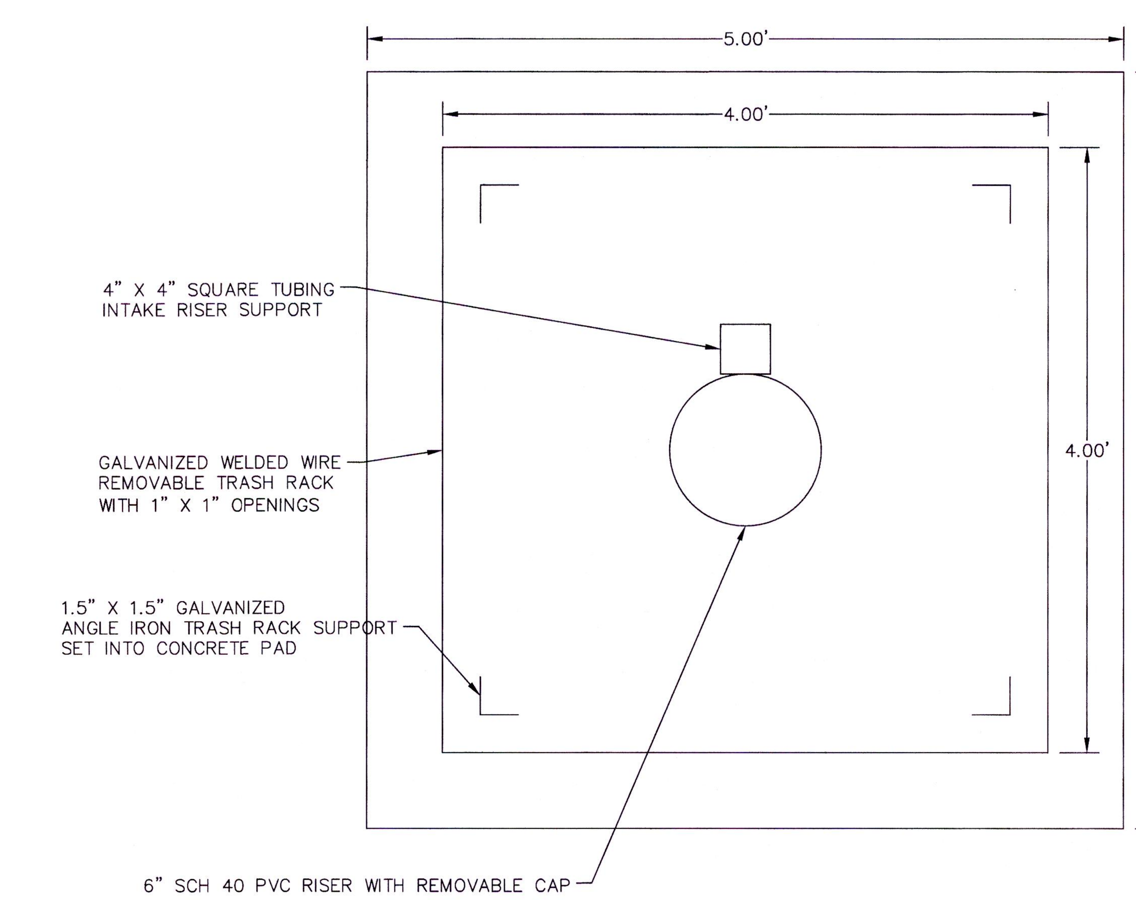
WATER QUALITY POND 1
SECTION A-A
1" = 40' HORIZONTAL
1" = 4' VERTICAL



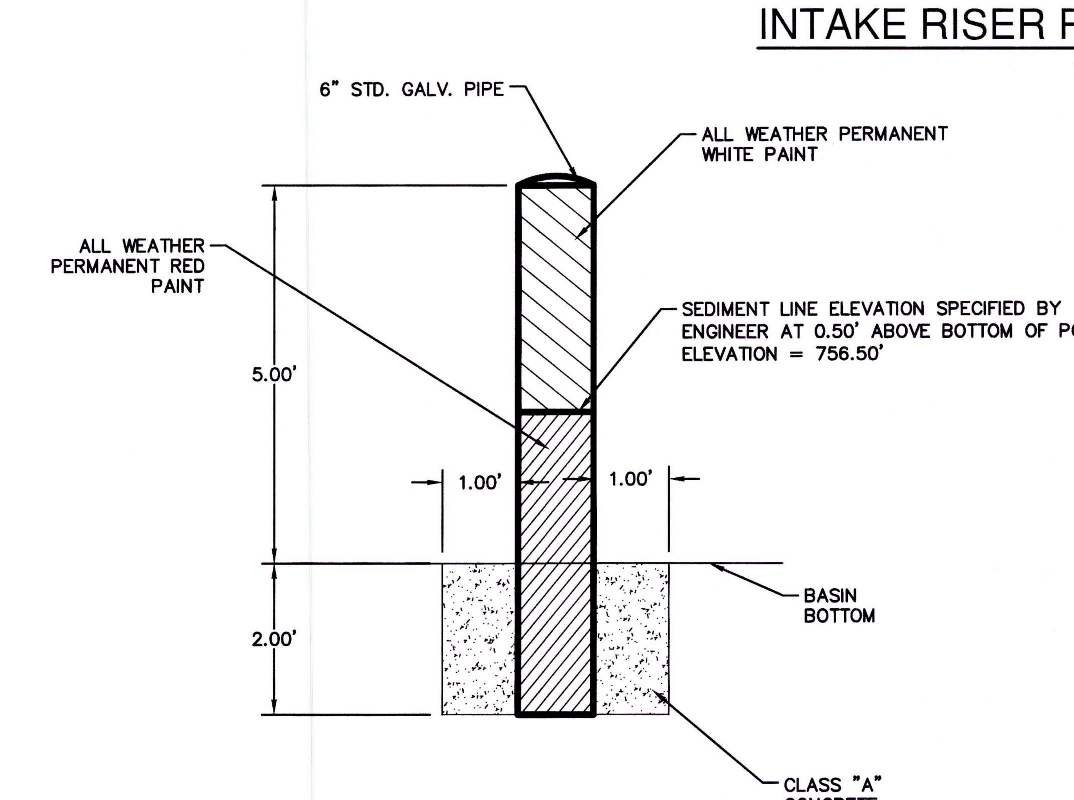
WATER QUALITY POND 1
SECTION B-B
1" = 40' HORIZONTAL
1" = 4' VERTICAL



INTAKE RISER SECTION VIEW DETAIL
NTS



INTAKE RISER PLAN VIEW DETAIL
1" = 1'



SEDIMENT DEPTH MARKER DETAIL
1" = 2'

NO.	REVISION	DATE
2	REVISE OUTFLOW STRUCTURES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
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LICENSED PROFESSIONAL ENGINEER
9/11/23

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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

POND 1 DETAILS 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 7, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
SHEET 47 OF 61

Date: Sep 07, 2023, 4:55pm User ID: oconner
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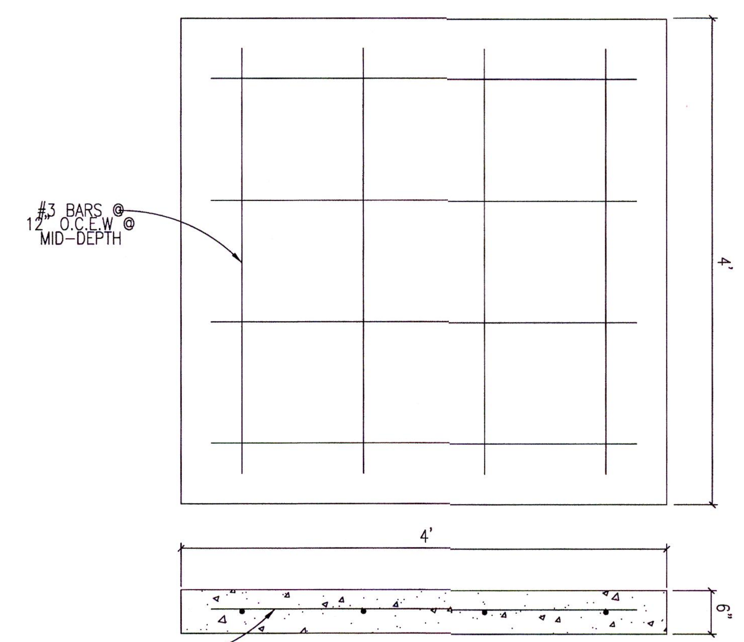
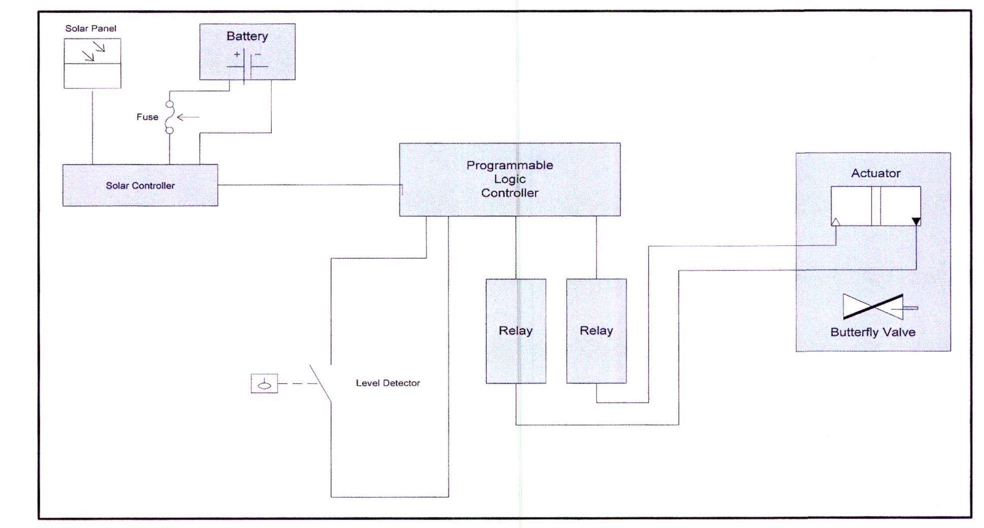


CONTROLLER PAD DETAIL
NTS

CONTROLLER CIRCUIT DIAGRAM

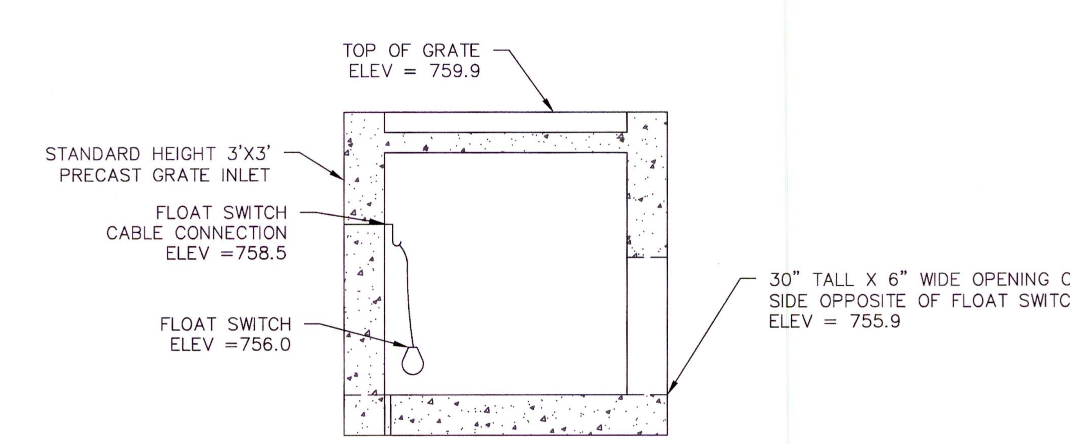
CONTROLLER NOTES:
1. REFER TO THE LOGIC CONTROLLER CYCLE OVERVIEW.
2. CLEARLY VISIBLE ALARM SYSTEM TO BE PROVIDED TO INDICATE SYSTEM MALFUNCTION.
3. SIGN TO BE POSTED WITH PHONE NUMBERS OF THE OWNER AND APPROPRIATE TCEQ REGIONAL OFFICE.



Batch Detention Pond Controller Information		
Component	Description	Voltage
Power System	Solar Charged 12 VDC Battery (Model MK Powered 8Gu1) (Or approved equal)	
Logic Controller	IDEC FL1C-H12RCE (Or approved equal)	12
Parts Enclosure	Southwest Photovoltaic Model BBG-1 (15.75" wide x 9.75" deep x 11.75" tall) (Or approved equal)	
Nature of Event Sensing	Anchor Scientific Float Switch (Or approved equal)	
Valve Type	4" Eccentric Plug Valve with over torque sensors and mechanical hand crank for physical override if necessary. Able to withstand 100 psi minimum. (Or approved equal)	
Actuator	EPI-6 12 VDC. Able to withstand 100 psi minimum. (Or approved equal)	12
Power Consumption (actuator, controller, relay, PLC)	242.58 W, 46.5 W-hours	

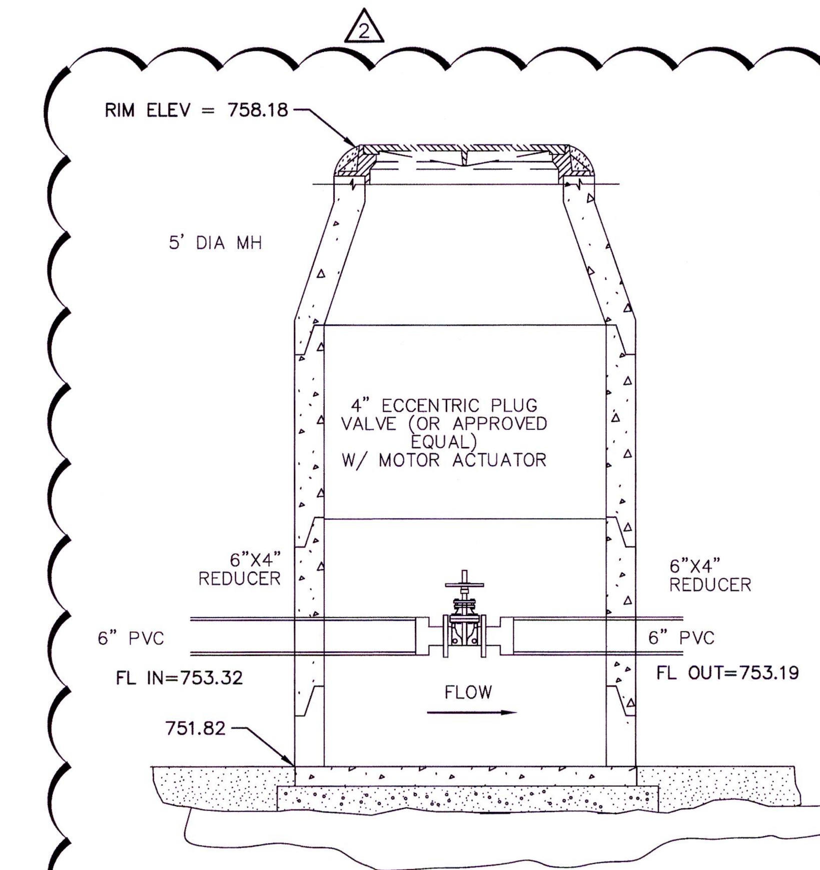
LOGIC CONTROLLER CYCLE OVERVIEW:
THE LOGIC CONTROLLER SYSTEM PROVIDES THE FOLLOWING; A TEST SEQUENCE, BE ABLE TO DEAL WITH LOW BATTERY/POWER OUTAGES; AN ON/OFF/RESET SWITCH, MANUAL OPEN/CLOSE SWITCHES, CLEARLY VISIBLE EXTERNAL INDICATOR THE CYCLE IS IN PROGRESS WITHOUT OPENING THE BOX, AND ABILITY TO EXERCISE THE VALVE TO PREVENT SEIZING.

1. CASE 1: A SINGLE RAIN EVENT FILLS THE BATCH DETENTION BASIN. THE BASIN HOLDS THE DIVERTED STORM WATER FOR THE DETENTION TIME (12 HOURS) AND THEN RELEASES THE WATER. ONCE THE BATCH DETENTION BASIN IS EMPTY, A DELAY OF 2 HOURS IS STARTED TO ALLOW THE BASIN TO COMPLETELY DRAIN, AND THEN A CLOSE SIGNAL IS SENT TO THE ACTUATOR TO CLOSE THE VALVE.
2. CASE 2: A SINGLE RAIN EVENT OCCURS, BUT DOES NOT COMPLETELY FILL THE BATCH DETENTION BASIN. THE BASIN HOLDS THE WATER FOR THE DETENTION PERIOD (12 HOURS), AND THEN RELEASES IT. ONCE THE BATCH DETENTION BASIN IS EMPTY, A DELAY OF 2 HOURS IS STARTED TO ALLOW THE BASIN TO COMPLETELY DRAIN, AND THEN A CLOSE SIGNAL IS SENT TO THE ACTUATOR TO CLOSE THE VALVE.
3. CASE 3: A SINGLE RAIN EVENT FILLS THE BATCH DETENTION BASIN UNDER THE TRIP POINT OF THE LEVEL SENSOR. THE LEVEL SENSOR DOES NOT TRIP. THE CAPTURED WATER IS HELD UNTIL IT INFILTRATES / EVAPORATES OR IS JOINED BY STORM WATER FROM A SUBSEQUENT STORM.
4. CASE 4: BEGINS THE SAME AS CASE 1. DURING THE DRAWDOWN PERIOD, ONE OR MORE ADDITIONAL RAIN EVENTS OCCUR CAUSING ADDITIONAL WATER TO ENTER THE BATCH DETENTION BASIN. THE VALVE REMAINS OPEN AND THE ADDITIONAL WATER VOLUME IS DRAINED. ONCE THE BATCH DETENTION BASIN IS EMPTY, A DELAY OF 2 HOURS IS STARTED TO ALLOW THE BASIN TO COMPLETELY DRAIN, AND THEN A CLOSE SIGNAL IS SENT TO THE ACTUATOR TO CLOSE THE VALVE.
5. CASE 5: BEGINS THE SAME AS CASE 2. DURING THE DRAWDOWN PERIOD, ONE OR MORE ADDITIONAL RAIN EVENTS CAN OCCUR CAUSING ADDITIONAL WATER TO ENTER THE BASIN. THE VALVE REMAINS OPEN AND THE ADDITIONAL WATER VOLUME IS DRAINED. ONCE THE BATCH DETENTION BASIN IS EMPTY, A DELAY OF 2 HOURS IS STARTED TO ALLOW THE BASIN TO COMPLETELY DRAIN, AND THEN A CLOSE SIGNAL IS SENT TO THE ACTUATOR TO CLOSE THE VALVE.
6. CASE 6: INTERMITTENT NUISANCE WATER LESS THAN THE FLOAT ON ELEVATION. TO ALLEVIATE SMALL FLOWS DUE TO IRRIGATION OUTSIDE OF STORM EVENTS, THE CONTROLLER WILL OPEN THE VALVE ONCE A WEEK FOR TWO HOURS TO DRAIN ANY NUISANCE WATER.



FLOAT SWITCH
N.T.S.

2



STORM SEWER MANHOLE DETAIL
NTS

NOTE:
CONTROL VALVE TO BE MOTOR ACTUATED VALVE. VALVE SHALL BE WIRED TO A CONTROLLER THAT ACTUATES THE VALVE IS ACCORDANCE WITH THE LOGIC CONTROLLER CYCLE OVERVIEW PROVIDED IN THE CONSTRUCTION PLANS. THE CONTROLLER SHALL INCLUDE PROVISIONS FOR A MANUAL OVERRIDE SWITCH.

NO.	REVISION	DATE
2	REVISE OUTFLOW STRUCTURES	09/07/23

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
9/11/23

PAPE-DAWSON ENGINEERS
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WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

POND 1 DETAILS 2 OF 2

1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE September 7, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
1
SHEET 48 OF 61

Date: Sep 07, 2023, 4:55pm User ID: oconner
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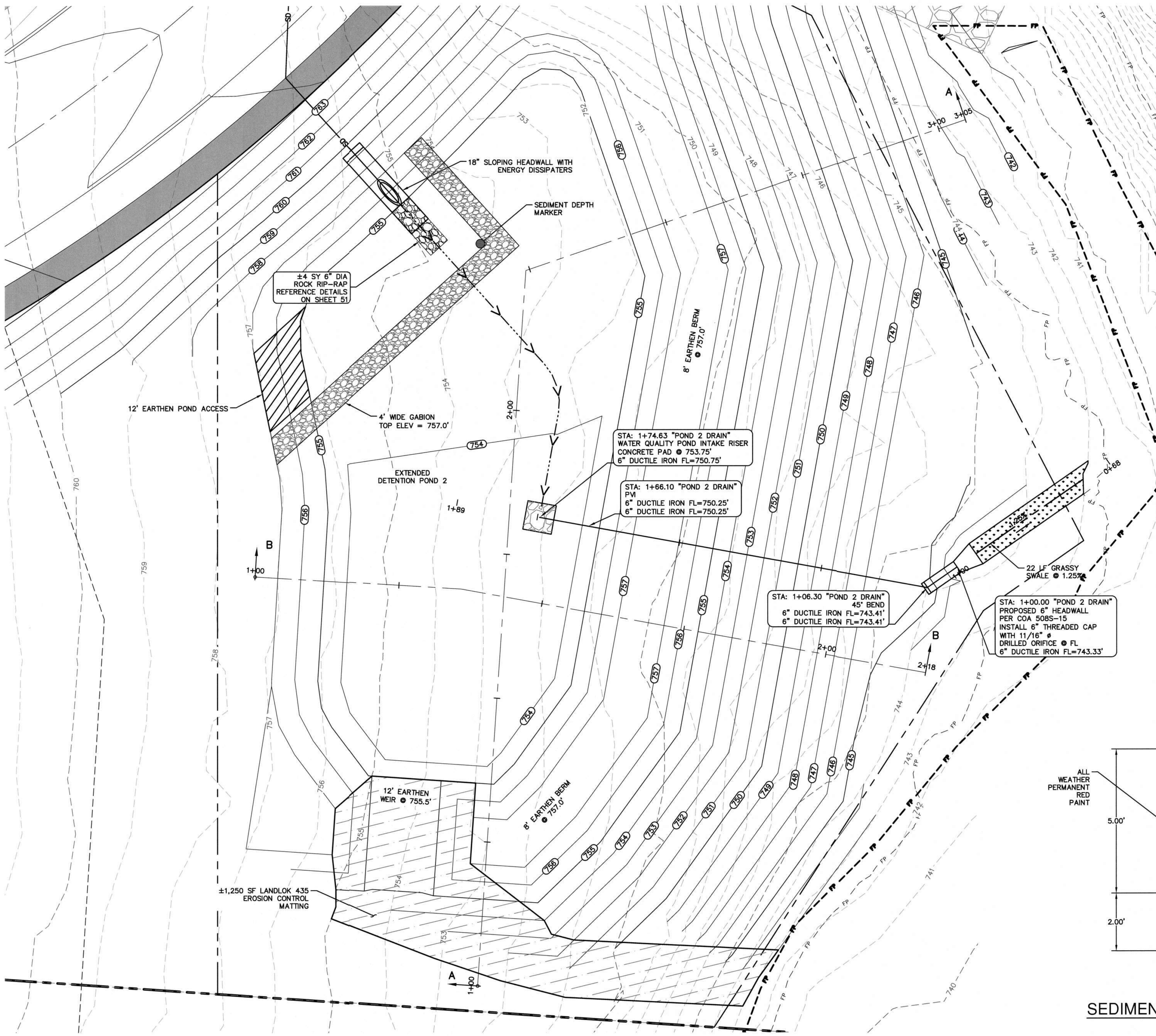
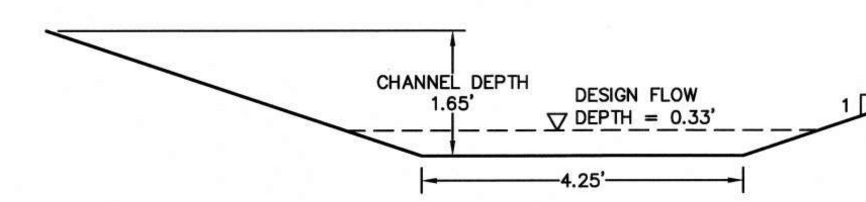




GRASSY SWALE SECTION VIEW

1" = 2'

SCALE: 1" = 10'

LEGEND

- STORM DRAIN LINE & MH
- CURB INLET
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 100 YEAR FEMA FLOODPLAIN
- FLOW PATH (2% SLOPE)

NOTES

1. ALL DISTURBED AREAS SHALL BE REVEGETATED.

WATER QUALITY POND 2

Wolf Ranch West, Section 4G - Water Quality Pond 2

Elevation	Area (ft²)	Area (ac)	Incremental Volume (ft³)	Cumulative Volume (ft³)	h-Weir (ft)	Weir Discharge (cfs)	Notes
753.75	20	0.000	-	-	-		
754	2,027	0.047	256	256	-	-	
755	5,235	0.120	3,631	3,887	-	-	
755.5	5,748	0.132	2,746	6,633	-	-	Water Quality Volume/Weir Elevation
756	6,261	0.144	5,748	9,635	0.5	12.7	25-yr & 100-yr WSE
757	757	0.017	4,879	11,511	-	-	Top of Pond

Spillway	
Elevation (ft) =	755.50
Length (ft) =	12.00
Coefficient =	3.00

ORIFICE DRAWDOWN TIME FOR EXTENDED DETENTION POND

Average End Area Method

$$V_{1,2} = \left[\frac{A_1 + A_2}{2}\right] * d$$

Contour Elevation (ft)	Contour Area (ft^2)	Incremental Volume (ft^3)	Total Volume (ft^3)	Orifice Discharge (cfs)	Incremental Drawdown Time (hr)	Total Drawdown Time (hr)
755.5	5,748					
755	5,235	2,746	2,746	0.04	17.8	17.8
754	2,027	3,631	6,377	0.04	24.3	42.2
753.75	20	256	6,633	0.04	1.8	43.9

ORIFICE DIAMETER	0.688	in
ORIFICE FL ELEV	743.33	
ORIFICE CENTROID ELEV	743.36	
ORIFICE AREA (Ao)	0.003	sf
ORIFICE COEFFICIENT	0.6	

ORIFICE EQUATION

$$Q = CA_o\sqrt{2gH}$$

1

Orifice Discharge Rate (Average)	0.04	cfs

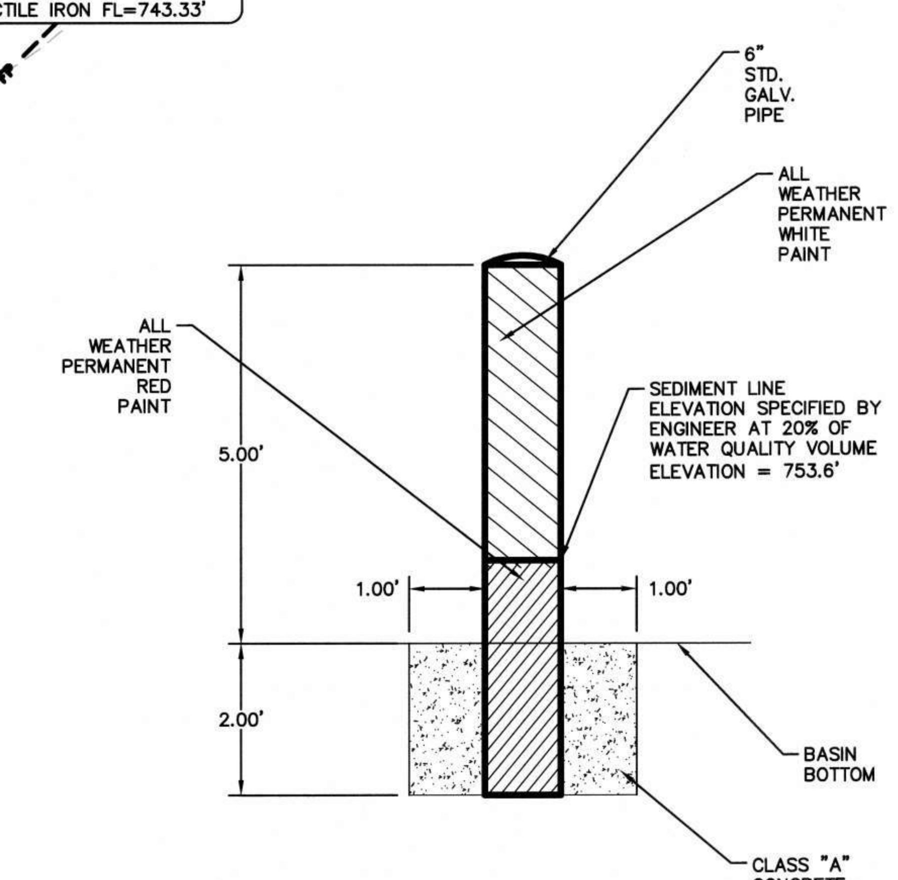
Extended Detention Pond 2 - Sediment Forebay Volume

Stage (ft. msl)	Pond ContourArea (sf)	Incremental Height (ft)	Incremental Volume Avg. End Area (cf)	Cumulative Volume (cf)
752	0	-	-	-
753	336	1.0	168	169
754	994	1.0	665	835
755	1,636	1.0	1,315	2,151

Required water quality volume =	5,221	cf
Required forebay volume =	522	cf
Forebay Volume Percentage Provided =	41.2%	

Table 3-6 Clay Liner Specifications (COA, 2004)

Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	1×10^{-6}
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM D-422	%	Not less than 30
Clay Compaction	ASTM D-2216	%	95% of Standard Proctor Density



SEDIMENT DEPTH MARKER DETAIL

1" = 2'

NO.	REVISION	DATE
1	REVISE WQ CALCS	08/11/22

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
4/14/23

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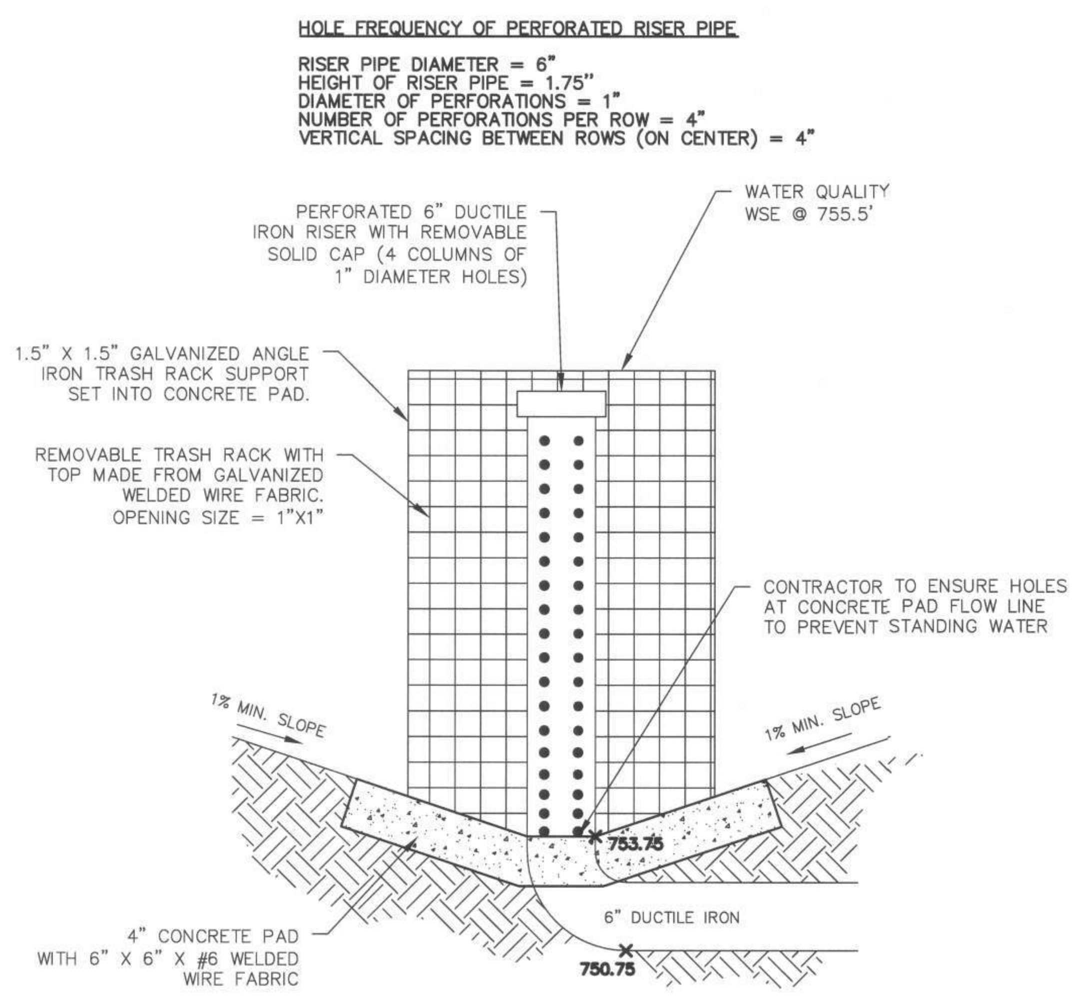
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
1

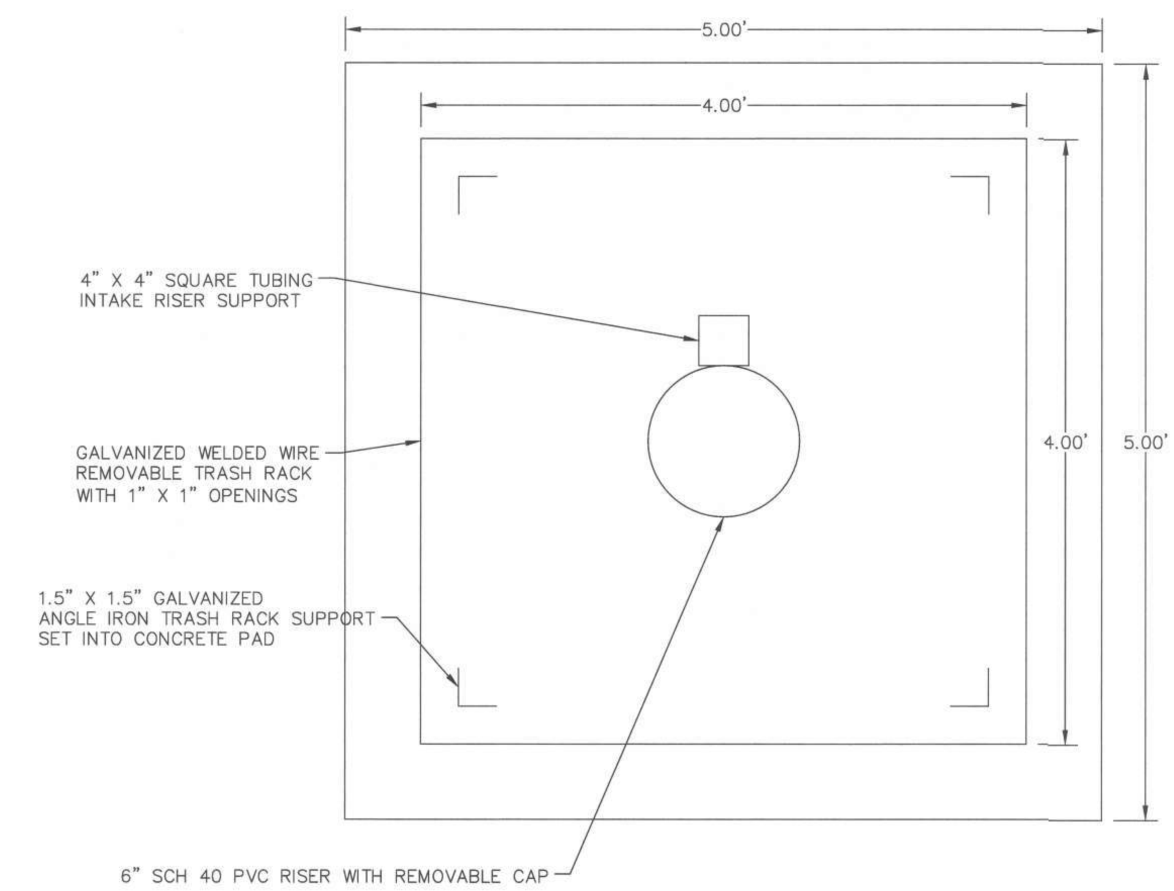
POND 2 PLAN VIEW

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
1
SHEET 49 OF 61

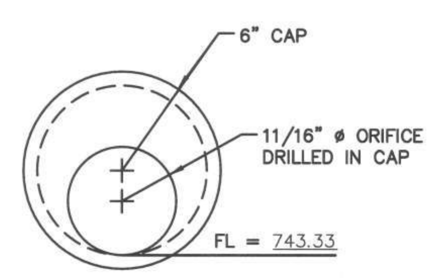
Date: Mar 20, 2023, 3:50pm User ID: cking
File: H:\Projects\511\27\42\301 construction documents\Civil\PD51127-42.dwg



INTAKE RISER SECTION VIEW DETAIL
NTS

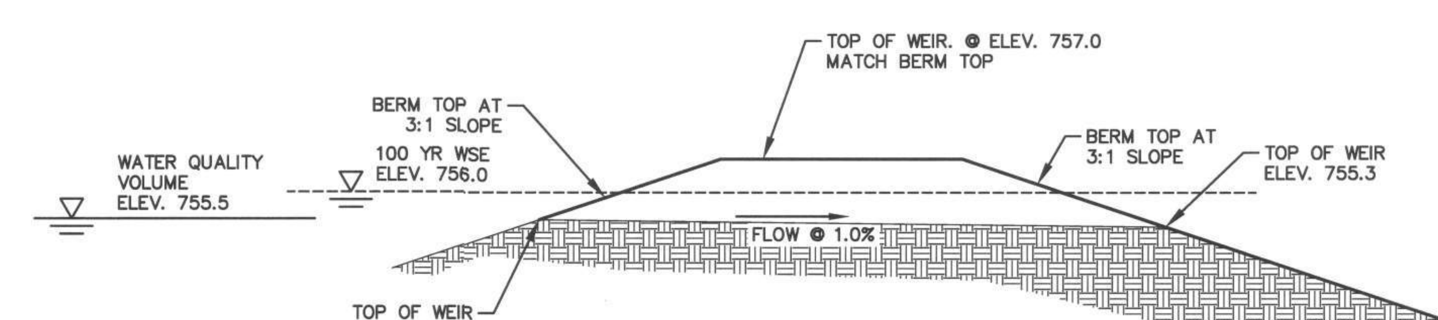


INTAKE RISER PLAN VIEW DETAIL
1" = 1'

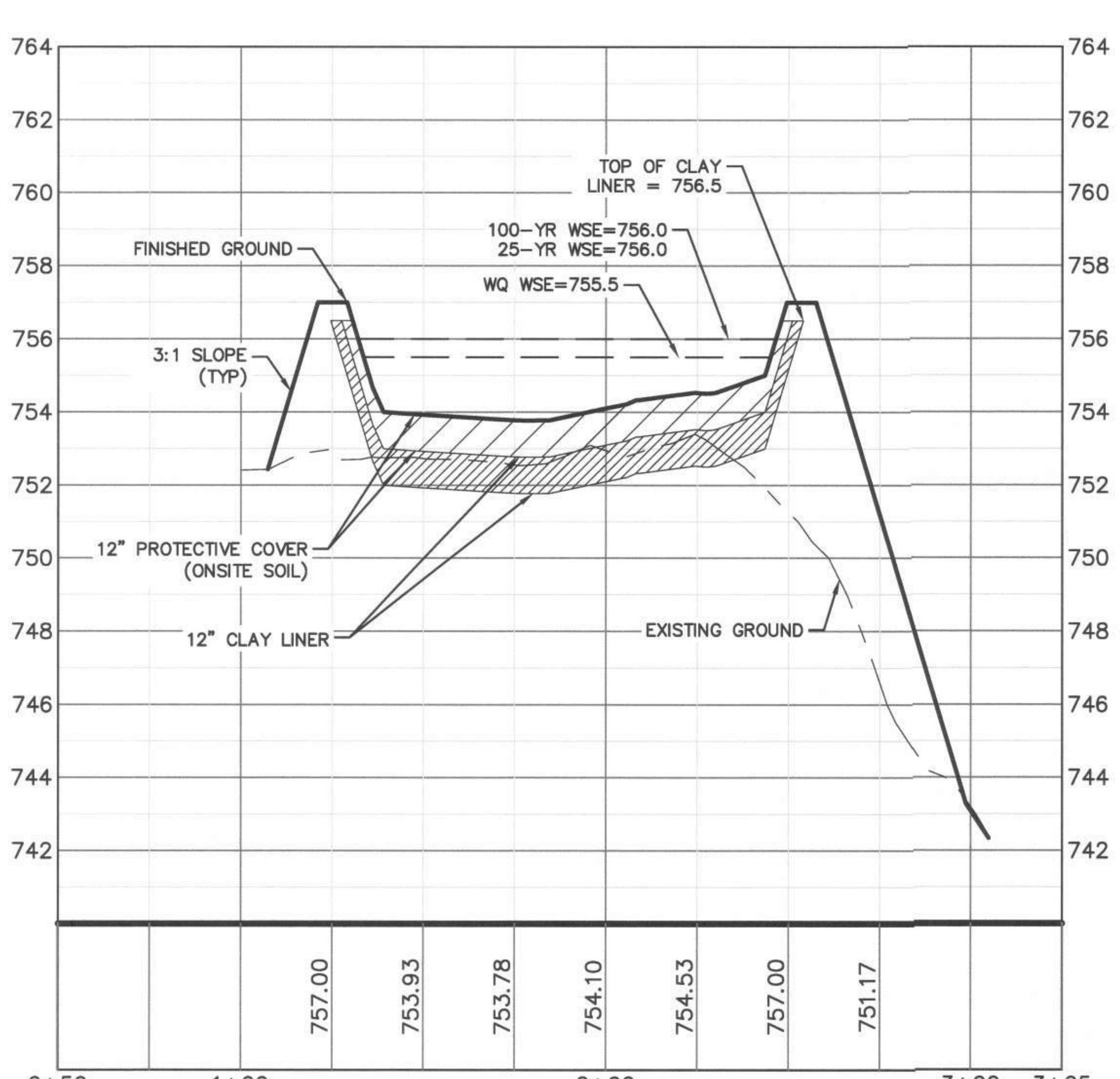


ORIFICE DETAIL
NTS

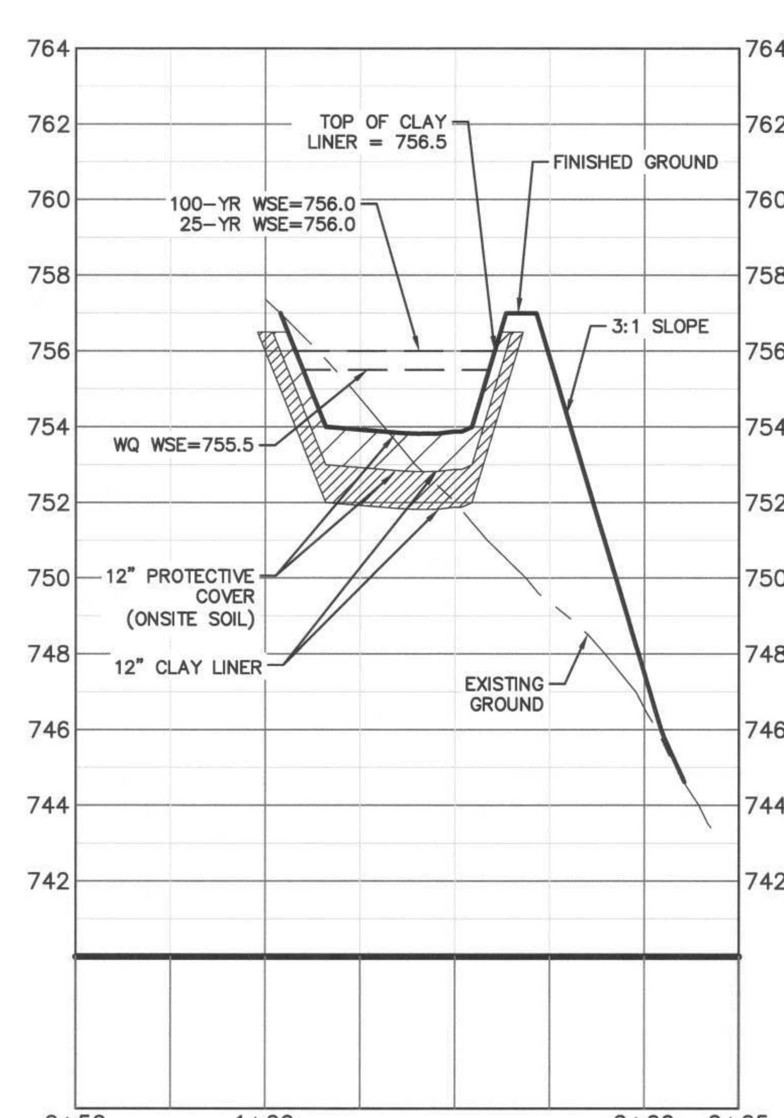
POND OVERFLOW STRUCTURE DETAIL - EARTHEN WEIR POND 1
1" = 5'



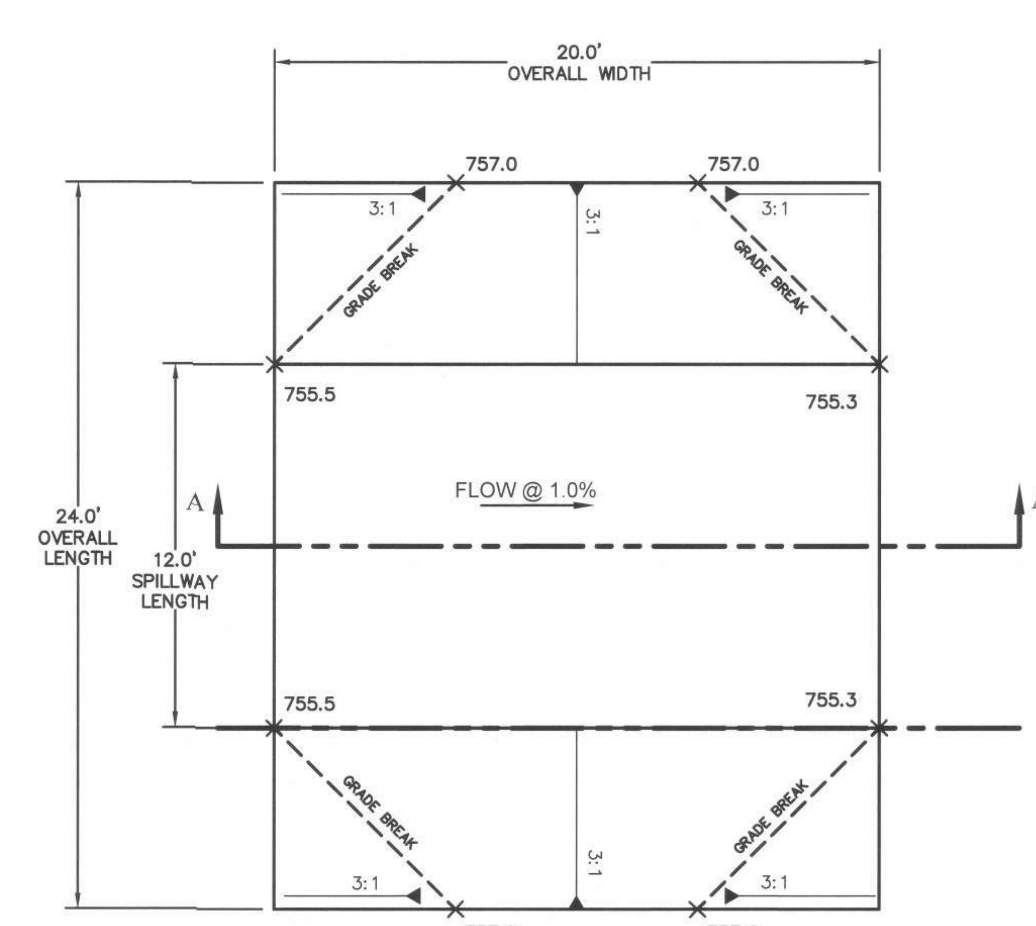
SECTION A-A



WATER QUALITY POND 2 SECTION A-A
1" = 40' HORIZONTAL
1" = 4' VERTICAL



WATER QUALITY POND 2 SECTION B-B
1" = 40' HORIZONTAL
1" = 4' VERTICAL



PLAN VIEW
1" = 5'

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Wolf Ranch West, Section 4G, Pond 2
Date Prepared: 9/23/2022

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.
Characters shown in red are data entry fields.
Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

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 = 28.9(A_N x P)

where: $L_{M\,TOTAL\,PROJECT}$ = Required TSS removal resulting from the proposed development = 85% 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 * =	47.13	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	14.02	acres
Total post-development impervious cover fraction * =	**0.30**	
P =	**32**	inches
$L_{M\,TOTAL\,PROJECT}$ =	**12966**	lbs. ADJUSTED FOR 85% TSS REMOVAL

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

Number of drainage basins / outfalls areas leaving the plan area = 2

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

Drainage Basin/Outfall Area No. =	2	
Total drainage basin/outfall area =	1.27	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.65	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.51**	
$L_{M\,THIS\,BASIN}$ =	**601**	lbs. ADJUSTED FOR 85% TSS REMOVAL

1

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Extended Detention + Grassy Swale
Removal efficiency = **86** 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 =	1.27	acres
A_I =	0.65	acres
A_P =	**0.62**	acres
L_R =	**631**	lbs

1

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

Desired $L_{M\,THIS\,BASIN}$ = 601 lbs.

F = **0.95**

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 =	**2.60**	inches
Post Development Runoff Coefficient =	**0.36**	
On-site Water Quality Volume =	**4364**	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 =	**873**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**5237**	cubic feet

8. Extended Detention Basin System Designed as Required in RG-348 Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = **5237** cubic feet

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 =	1.27	acres
Impervious Cover in Drainage Area =	0.65	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 =	0.54	
A_{CS} = cross-sectional area of flow in Swale =	1.00	sf
P_W = Wetted Perimeter =	4.11	feet
R_H = hydraulic radius of flow cross-section = A_{CS}/P_W =	0.24	feet
n = Manning's roughness coefficient =	0.2	

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

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

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy$ = 2.00 feet — For provided Q, result is negative. Value set to 2.00 as per guidance

Q = CIA = 0.04 cfs — Average orifice flow rate from Pond 2

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = Q/A_{CS} = 0.04 ft/sec

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = 12.00 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.

19. BMPs Installed in a Series Designed as Required in RG-348 Pages 3-32

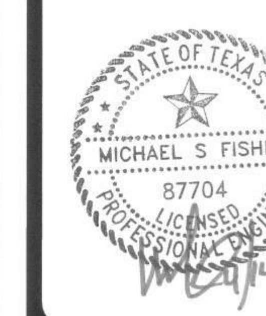
Michael E. Barrett, Ph.D.. P.E. recommended that the coefficient for E_2 be changed from 0.5 to 0.65 on May 3, 2006

E_{TOT} = [1 - ((1 - E_1) X (1 - 0.65E_2) x (1 - 0.25E_3))] X 100 =	86.38 percent	NET EFFICIENCY OF THE BMPs IN THE SERIES
EFFICIENCY OF FIRST BMP IN THE SERIES = E_1 =	75.00 percent	
EFFICIENCY OF THE SECOND BMP IN THE SERIES = E_2 =	70.00 percent	
EFFICIENCY OF THE THIRD BMP IN THE SERIES = E_3 =	0.00 percent	

THEREFORE, THE NET LOAD REMOVAL WOULD BE:
(A_I AND A_P VALUES ARE FROM SECTION 3 ABOVE)

L_R = E_{TOT} X P X (A_I X 34.6 X A_P X0.54) = 630.88 lbs

NO.	REVISION	DATE
1	REVISE WQ CALCS	08/11/22



PAPE-DAWSON ENGINEERS
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

POND 2 DETAILS

1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER ARC
CHECKED JF DRAWN ARC
1
SHEET 50 OF 61

Date: Mar 20, 2023, 3:51pm User ID: dking
File: H:\Projects\511\27\42\301 construction documents\Civil\PD51127-42.dwg

GUIDELINES FOR DESIGN AND INSTALLATION OF TEMPORARY EROSION AND SEDIMENTATION CONTROLS

TYPE OF STRUCTURE	REACH LENGTH	MAXIMUM DRAINAGE AREA	SLOPE
SILT FENCE	N/A	2 ACRES	0 – 10%
	200 FEET	2 ACRES	10 – 20%
	100 FEET	1 ACRE	20 – 30%
	50 FEET	1/2 ACRE	> 30%
TRIANGLE FILTER DIKE	100 FEET	1/2 ACRE	< 30% SLOPE
	50 FEET	1/4 ACRE	> 30% SLOPE
ROCK BERM *, **	500 FEET	< 5 ACRES	0 – 10%

* FOR ROCK BERM DESIGN WHERE PARAMETERS ARE OTHER THAN STATED, DRAINAGE AREA CALCULATIONS AND ROCK BERM DESIGN MUST BE SUBMITTED FOR REVIEW.

** HIGH SERVICE ROCK BERMS MAY BE REQUIRED IN AREAS OF ENVIRONMENTAL SIGNIFICANCE AS DETERMINED BY THE CITY OF GEORGETOWN.

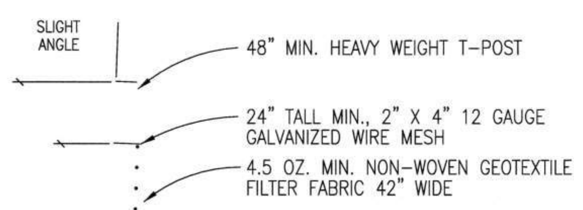
NOTE: THIS SECTION IS INTENDED TO ASSIST THOSE PERSONS PREPARING WATER POLLUTION ABATEMENT PLANS (WPAP) OR STORM WATER POLLUTION PREVENTION PLANS (SW3P) THAT COMPLY WITH FEDERAL, STATE AND/OR LOCAL STORM WATER REGULATIONS.

1. THE CONTRACTOR TO INSTALL AND MAINTAIN EROSION/SEDIMENTATION CONTROLS AND TREE/NATURAL AREA PROTECTIVE FENCING PRIOR TO ANY SITE PREPARATION WORK (CLEARING, GRUBBING, GRADING, OR EXCAVATION). CONTRACTOR TO REMOVE EROSION/SEDIMENTATION CONTROLS AT THE COMPLETION OF PROJECT AND GRASS RESTORATION.
2. ALL PROJECTS WITHIN THE RECHARGE ZONE OF THE EDWARD'S AQUIFER SHALL SUBMIT A BEST MANAGEMENT PRACTICES AND WATER POLLUTION AND ABATEMENT PLAN TO THE TNRCC FOR APPROVAL PRIOR TO ANY CONSTRUCTION.
3. THE PLACEMENT OF EROSION/SEDIMENTATION CONTROLS TO BE IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN AND WATER POLLUTION ABATEMENT PLAN. DEVIATIONS FROM THE APPROVED PLAN MUST BE SUBMITTED TO AND APPROVED BY THE OWNER'S REPRESENTATIVE.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS TEMPORARY EROSION AND SEDIMENTATION CONTROL GUIDELINES	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC01 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB

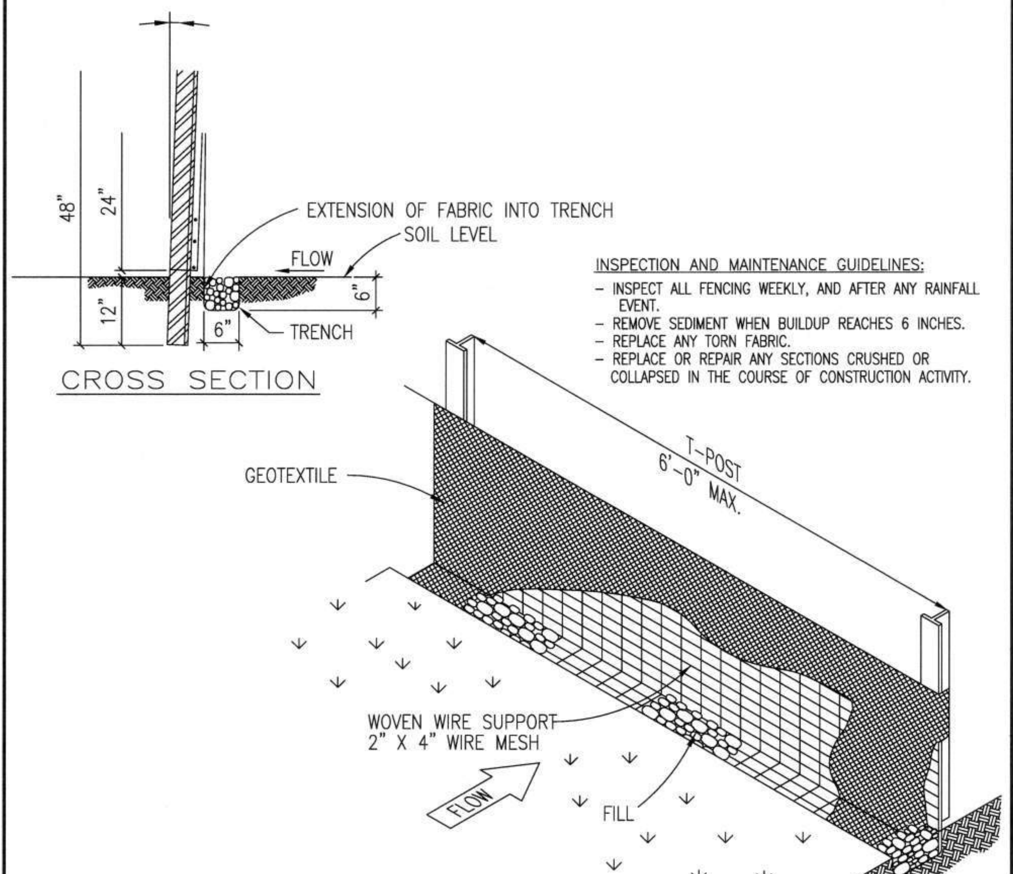
The Architect/Engineer assumes responsibility for appropriate use of this standard.



4. ALL PLANTING SHALL BE DONE BETWEEN MAY 1 AND SEPTEMBER 15 EXCEPT AS SPECIFICALLY AUTHORIZED IN WRITING. IF PLANTING IS AUTHORIZED TO BE DONE OUTSIDE THE DATES SPECIFIED, THE SEED SHALL BE COMMON BERMUDA GRASS, HULLED, MINIMUM 82% PURE LIVE SEED. ALL GRASS SEED SHALL BE FREE FROM NOXIOUS WEED, GRADE "A" RECENT CROP, RECLEANED AND TREATED WITH APPROPRIATE FUNGICIDE AT TIME OF MIXING. SEED SHALL BE FURNISHED IN SEALED, STANDARD CONTAINERS WITH DEALER'S GUARANTEED ANALYSIS.
5. ALL DISTURBED AREAS TO BE RESTORED AS NOTED IN THE WATER POLLUTION ABATEMENT PLAN.
6. THE PLANTED AREA TO BE IRRIGATED OR SPRINKLED IN A MANNER THAT WILL NOT ERODE THE TOPSOIL, BUT WILL SUFFICIENTLY SOAK THE SOIL TO A DEPTH OF FOUR (4) INCHES. THE IRRIGATION TO OCCUR AT 10-DAY INTERVALS DURING THE FIRST TWO MONTHS TO INSURE GERMINATION AND ESTABLISHMENT OF THE GRASS. RAINFALL OCCURRENCES OF 1/2 INCH OR GREATER TO POSTPONE THE WATERING SCHEDULE ONE WEEK.
7. RESTORATION TO BE ACCEPTABLE WHEN THE GRASS HAS GROWN AT LEAST 1-1/2 INCHES HIGH WITH 95% COVERAGE, PROVIDED NO BARE SPOTS LARGER THAN 25 SQUARE FEET EXIST.
8. A MINIMUM OF FOUR (4) INCHES OF TOPSOIL TO BE PLACED IN ALL AREAS DISTURBED BY CONSTRUCTION.
9. THE CONTRACTOR TO HYDROMULCH OR SOD (AS SHOWN ON PLANS) ALL EXPOSED CUTS AND FILLS UPON COMPLETION OF CONSTRUCTION.
10. EROSION AND SEDIMENTATION CONTROLS TO BE INSTALLED OR MAINTAINED IN A MANNER WHICH DOES NOT RESULT IN SOIL BUILDUP WITHIN TREE DRIPLINE.
11. TO AVOID SOIL COMPACTION, CONTRACTOR SHALL NOT ALLOW VEHICULAR TRAFFIC, PARKING, OR STORAGE OF EQUIPMENT OR MATERIALS IN THE TREE DRIPLINE AREAS.
12. WHERE A FENCE IS CLOSER THAN FOUR (4) FEET TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF EIGHT (8) FEET (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE FENCING.
13. TREES TO BE REMOVED IN A MANNER WHICH DOES NOT IMPACT TREES TO BE PRESERVED.
14. ANY ROOT EXPOSED BY CONSTRUCTION ACTIVITY TO BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOPSOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN TWO DAYS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
15. CONTRACTOR TO PRUNE VEGETATION TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC, AND EQUIPMENT BEFORE DAMAGE OCCURS (RIPPING OF BRANCHES, ETC.). ALL FINISHED PRUNING TO BE DONE ACCORDING TO RECOGNIZED, APPROVED STANDARDS OF THE INDUSTRY (REFERENCE THE "NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES").
16. THE CONTRACTOR IS TO INSPECT THE CONTROLS AT WEEKLY INTERVALS AND AFTER EVERY RAINFALL EXCEEDING 1/4 INCH TO VERIFY THAT THEY HAVE NOT BEEN SIGNIFICANTLY DISTURBED. ANY ACCUMULATED SEDIMENT AFTER A SIGNIFICANT RAINFALL TO BE REMOVED AND PLACED IN THE OWNER DESIGNATED SPOIL DISPOSAL SITE. THE CONTRACTOR TO CONDUCT PERIODIC INSPECTIONS OF ALL EROSION/SEDIMENTATION CONTROLS AND MAKE ANY REPAIRS OR MODIFICATIONS NECESSARY TO ASSURE CONTINUED EFFECTIVE OPERATION OF EACH DEVICE.
17. WHERE THERE IS TO BE AN APPROVED GRADE CHANGE, IMPERMEABLE PAVING SURFACE, TREE WELL, OR OTHER SUCH SITE DEVELOPMENT IMMEDIATELY ADJACENT TO A PROTECTED TREE, ERECT THE FENCE APPROXIMATELY TWO TO FOUR FEET (2'-4') BEHIND THE AREA IN QUESTION.
18. NO ABOVE AND/OR BELOW GROUND TEMPORARY FUEL STORAGE FACILITIES TO BE STORED ON THE PROJECT SITE.
19. IF EROSION AND SEDIMENTATION CONTROL SYSTEMS ARE EXISTING FROM PRIOR CONTRACTS, OWNER'S REPRESENTATIVE AND THE CONTRACTOR TO EXAMINE THE EXISTING EROSION AND SEDIMENTATION CONTROL SYSTEMS FOR DAMAGE PRIOR TO CONSTRUCTION. ANY DAMAGE TO PREEXISTING EROSION AND SEDIMENTATION CONTROLS NOTED TO BE REPAIRED AT OWNER'S EXPENSE.
20. INTENTIONAL RELEASE OF VEHICLE OR EQUIPMENT FLUIDS ONTO THE GROUND IS NOT ALLOWED. CONTAMINATED SOIL RESULTING FROM ACCIDENTAL SPILL TO BE REMOVED AND DISPOSED OF PROPERLY.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS EROSION AND SEDIMENTATION AND TREE PROTECTION NOTES	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC01A SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



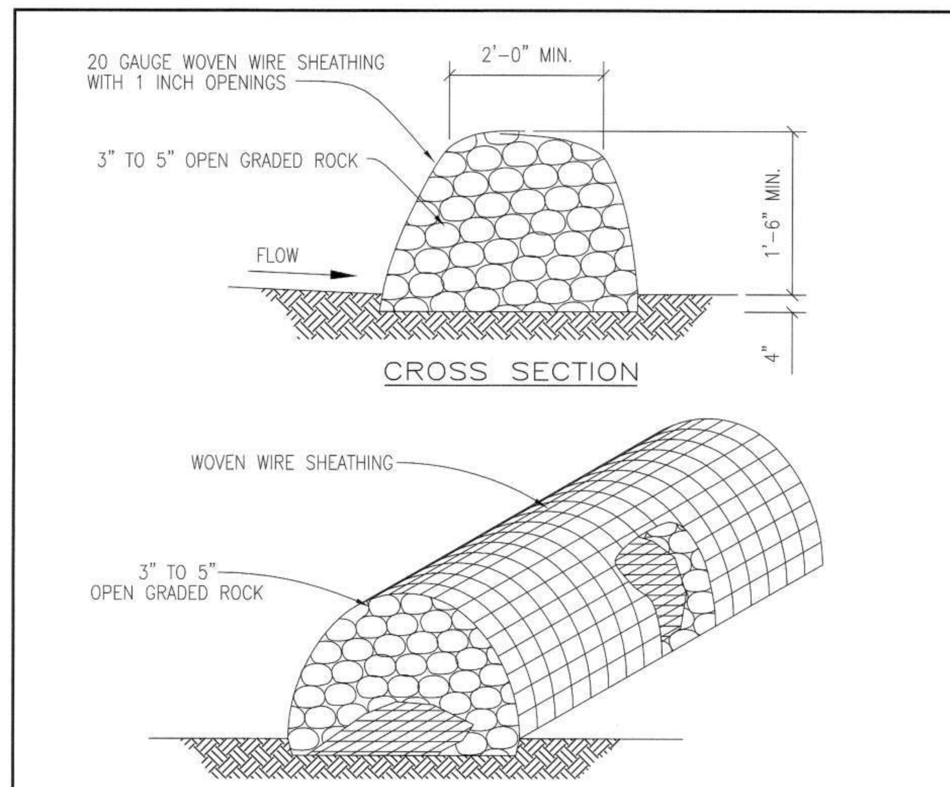
INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECT ALL FENCING WEEKLY, AND AFTER ANY RAINFALL EVENT.
- REMOVE SEDIMENT WHEN BUILDUP REACHES 6 INCHES.
- REPLACE ANY TORN FABRIC.
- REPLACE OR REPAIR ANY SECTIONS CRUSHED OR COLLAPSED IN THE COURSE OF CONSTRUCTION ACTIVITY.

INSTALLATION:

- LAYOUT THE SILT FENCE FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS, PLANTS (INCLUDING GRASSES TALLER THAN 2") TO PROVIDE A SMOOTH FLOW APPROACH SURFACE. EXCAVATE 6" DEEP X 6" WIDE TRENCH ON UPSTREAM SIDE OF FACE PER PLANS.
- DRIVE THE HEAVY DUTY T-POST AT LEAST 12 INCHES INTO THE GROUND AND AT A SLIGHT ANGLE TOWARDS THE FLOW.
- ATTACH THE 2" X 4" 12 GAUGE WELDED WIRE MESH TO THE T-POST WITH 11 1/2 GAUGE GALVANIZED T-POST CLIPS. THE TOP OF THE WIRE TO BE 24" ABOVE GROUND LEVEL. THE WELDED WIRE MESH TO BE OVERLAPPED 6" AND TIED AT LEAST 6 TIMES WITH HOG RINGS.
- THE SILT FENCE TO BE INSTALLED WITH A SKIRT A MINIMUM OF 6" WIDE PLACED ON THE UPHILL SIDE OF THE FENCE INSIDE EXCAVATED TRENCH. THE FABRIC TO OVERLAP THE TOP OF THE WIRE BY 1".
- ANCHOR THE SILT FENCE BY BACKFILLING WITH EXCAVATED DIRT AND ROCKS (NOT LARGER THAN 2").
- GEOTEXTILE SPLICES SHOULD BE A MINIMUM OF 18" WIDE ATTACHED IN AT LEAST 6 PLACES. SPLICES IN CONCENTRATED FLOW AREAS WILL NOT BE ACCEPTED.
- SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS SILT FENCE DETAIL	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC02 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



INSTALLATION:

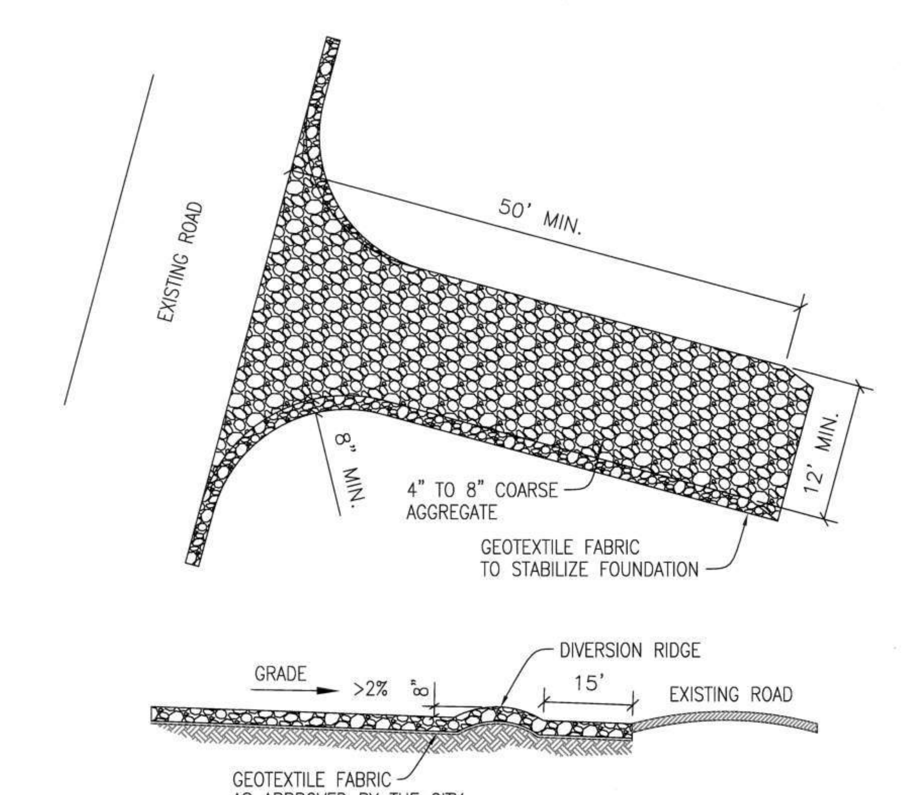
- LAYOUT THE ROCK BERM FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- PLACE WOVEN WIRE FABRIC ON THE GROUND ALONG THE PROPOSED INSTALLATION WITH ENOUGH OVERLAP TO COMPLETELY ENCIRCLE THE FINISHED SIZE OF THE BERM.
- PLACE THE ROCK ALONG THE CENTER OF THE WIRE TO THE DESIGNATED HEIGHT.
- WRAP THE STRUCTURE WITH THE PREVIOUSLY PLACED WIRE MESH SECURE ENOUGH SO THAT WHEN WALKED ACROSS THE STRUCTURE RETAINS IT'S SHAPE.
- SECURE WITH TIE WIRE.
- THE ENDS OF THE BERM SHOULD BE TIED INTO EXISTING UPSLOPE GRADE AND THE BERM SHOULD BE BURIED IN A TRENCH APPROX. 4 INCHES DEEP TO PREVENT FAILURE OF THE CONTROL.
- THE ROCK BERM SHOULD BE LEFT IN PLACE UNTIL ALL UPSTREAM AREAS ARE STABILIZED AND ACCUMULATED SILT REMOVED.

INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL EVENT BY THE RESPONSIBLE PARTY. FOR INSTALLATIONS IN STREAMBEDS, ADDITIONAL DAILY INSPECTIONS SHOULD BE MADE.
- REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6 INCHES AND DISPOSE OF THE ACCUMULATED SILT IN AN APPROVED MANNER.
- REPAIR ANY LOOSE WIRE SHEATHING.
- THE BERM SHOULD BE RESHAPED AS NEEDED DURING INSPECTION.
- THE BERM SHOULD BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS ROCK BERM DETAIL	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC03 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



INSTALLATION:

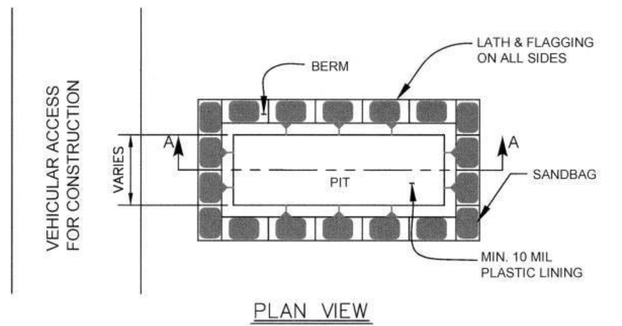
- CLEAR THE AREA OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- GRADE THE AREA FOR THE ENTRANCE TO FLOW BACK ON TO THE CONSTRUCTION SITE. RUNOFF FROM THE STABILIZED CONSTRUCTION
- PLACE GEOTEXTILE FABRIC AS APPROVED BY THE CITY.
- PLACE ROCK AS APPROVED BY THE CITY.

INSPECTIONS AND MAINTENANCE GUIDELINES:

- THE ENTRANCE SHOULD BE MAINTAINED IN A CONDITION, WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
- ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ON TO PUBLIC RIGHTS-OF-WAY SHOULD BE REMOVED IMMEDIATELY BY CONTRACTOR.
- WHEN NECESSARY, WHEELS SHOULD BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY.
- WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
- ALL SEDIMENT SHOULD BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATER COURSE BY USING APPROVED METHODS.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS STABILIZED CONSTRUCTION ENTRANCE	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC06 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



GENERAL NOTES:

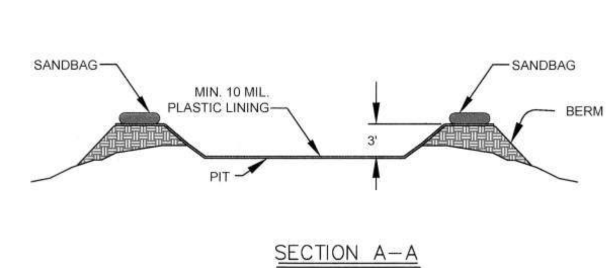
1) Detail above illustrates minimum dimensions. Pit can be increased in size depending on expected frequency of use.

2) Washout pit shall be located in an area easily accessible to construction traffic.

3) Washout pit shall not be located in areas subject to inundation from storm water runoff.

4) Locate washout area at least 50 feet from sensitive features, storm drains, open ditches, or water bodies.

5) Temporary concrete washout facility should be constructed with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.



MATERIALS:

1) Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

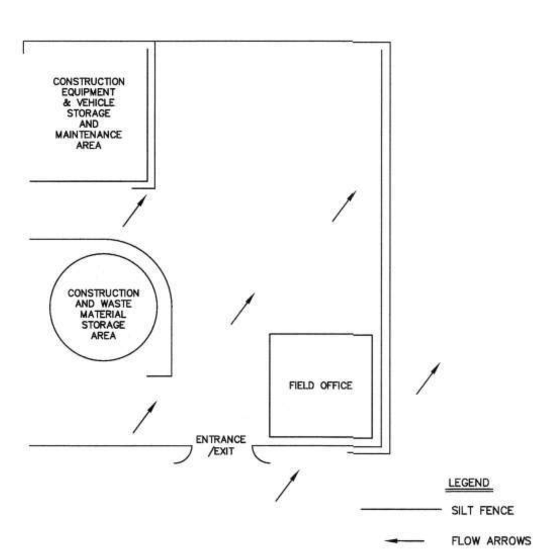
INSPECTION AND MAINTENANCE GUIDELINES:

1) When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of.

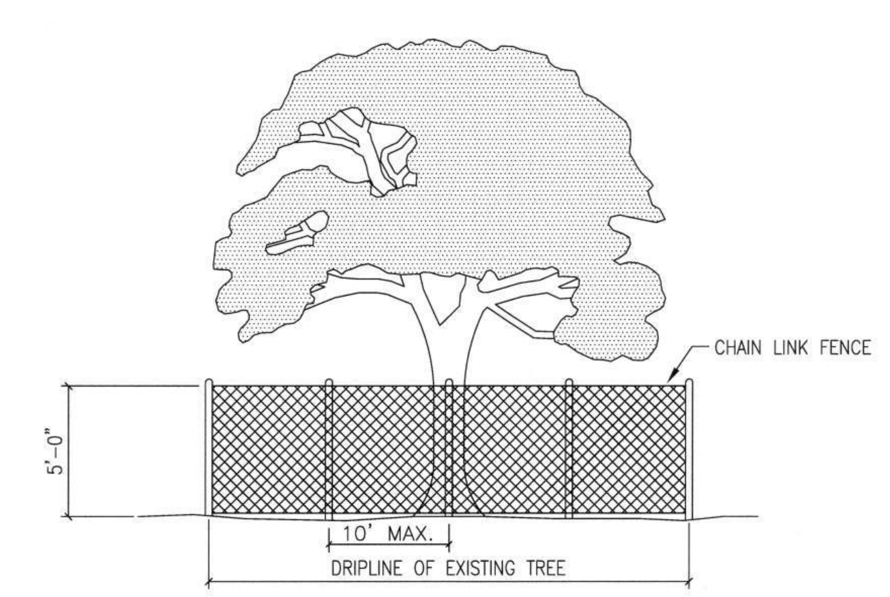
2) Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of.

3) Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

CONCRETE TRUCK WASHOUT PIT



TYP. CONSTRUCTION STAGING AREA

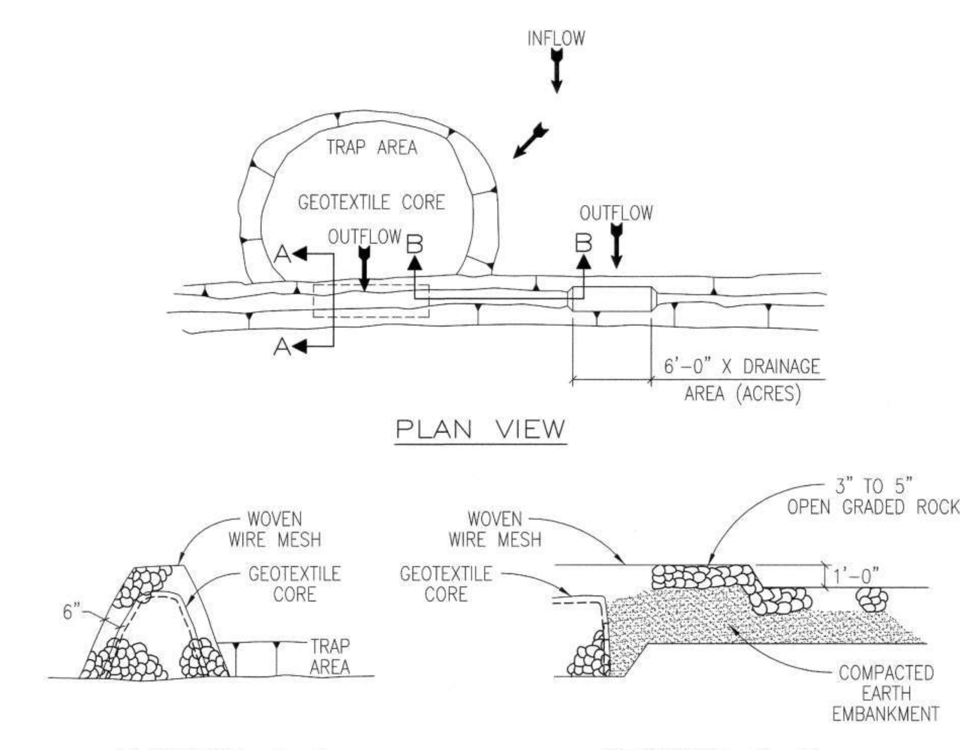


NOTES:

1. TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING OR GRADING).
2. FENCES SHALL COMPLETELY SURROUND THE TREE, OR CLUSTERS OF TREES; WILL BE LOCATED AT THE OUTERMOST LIMIT OF THE TREE BRANCHES (DRIPLINE), AND WILL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:
   A. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC, OR STORAGE OF EQUIPMENT OR MATERIALS.
   B. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN SIX INCHES (6") CUT OR FILL, OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE CITY.
   C. WOUNDS TO EXPOSED ROOTS, TRUNKS OR LIMBS BY MECHANICAL EQUIPMENT.
   D. OTHER ACTIVITIES DETRIMENTAL TO TREES, SUCH AS CHEMICAL STORAGE, CEMENT TRUCK CLEANING AND FIRE.
3. EXCEPTIONS TO INSTALLING FENCES AT TREE DRIPLINES MAY BE PERMITTED IN THE FOLLOWING CASES:
   A. WHERE PERMEABLE PAVING IS TO BE INSTALLED, ERECT THE FENCE AT THE OUTER LIMITS OF THE PERMEABLE PAVING AREA.
   B. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE NO CLOSER THAN SIX FEET (6'-0") TO BUILDING.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS TREE PROTECTION – CHAIN LINK FENCE	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC09 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB



INSTALLATION:

- LOCATE THE SEDIMENT TRAP SO AS TO DISTURB AS FEW TREES AS POSSIBLE.
- CLEAR AND GRUB THE AREA UNDER THE EMBANKMENT OF ALL VEGETATION AND ROOT MATS.
- LAYOUT THE WIRE MESH AND THEN THE GEOTEXTILE FABRIC.
- CONSTRUCT THE GEOTEXTILE CORE AND CORRESPONDING ROCK EMBANKMENT TO THE DESIGNATED HEIGHT AND CONFIGURATION.
- WRAP THE STRUCTURE WITH THE PREVIOUSLY PLACED WIRE MESH SECURE ENOUGH SO THAT WHEN WALKED ACROSS THE STRUCTURE RETAINS IT'S SHAPE. SECURE WITH TIE WIRE.
- PLACE THE EMBANKMENT MATERIAL IN 8 TO 12 INCH LIFTS AND MACHINE COMPACT.

INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. REPAIR SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
- TRASH AND OTHER DEBRIS SHOULD BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO HALF OF THE DESIGN DEPTH OF THE TRAP.
- SEDIMENT REMOVED FROM THE TRAP SHOULD BE DEPOSITED IN AN APPROVED SPOILS AREA AND IN SUCH A MANNER THAT IT WILL NOT CAUSE ADDITIONAL SILTATION.

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

GEORGETOWN TEXAS	CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS SEDIMENT TRAP DETAIL	REVISION NOTE: ADOPTED 6/21/2006 DRAWING NAME: EC07 SCALE: NTS DATE: 1/2003 DRAWN BY: MRS APPROVED BY: TRB

NO.	REVISION	DATE

STATE OF TEXAS MICHAEL S. FISHER 87704 LICENSED PROFESSIONAL ENGINEER 4/14/23

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 I AUSTIN, TX 78759 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
CONSTRUCTION DETAILS
EROSION CONTROL DETAILS

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 51 OF 61

Date: Mar 20, 2023, 3:51pm User ID: aking
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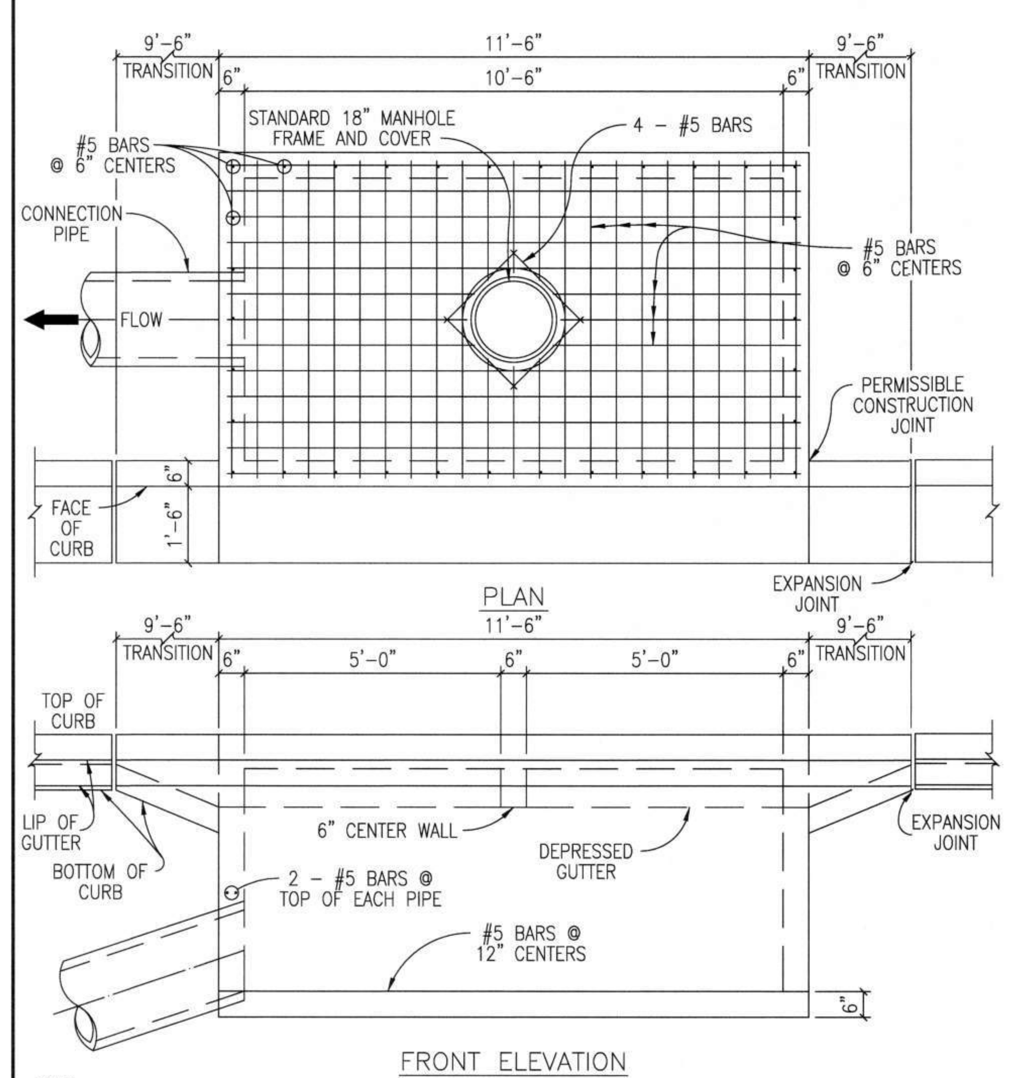
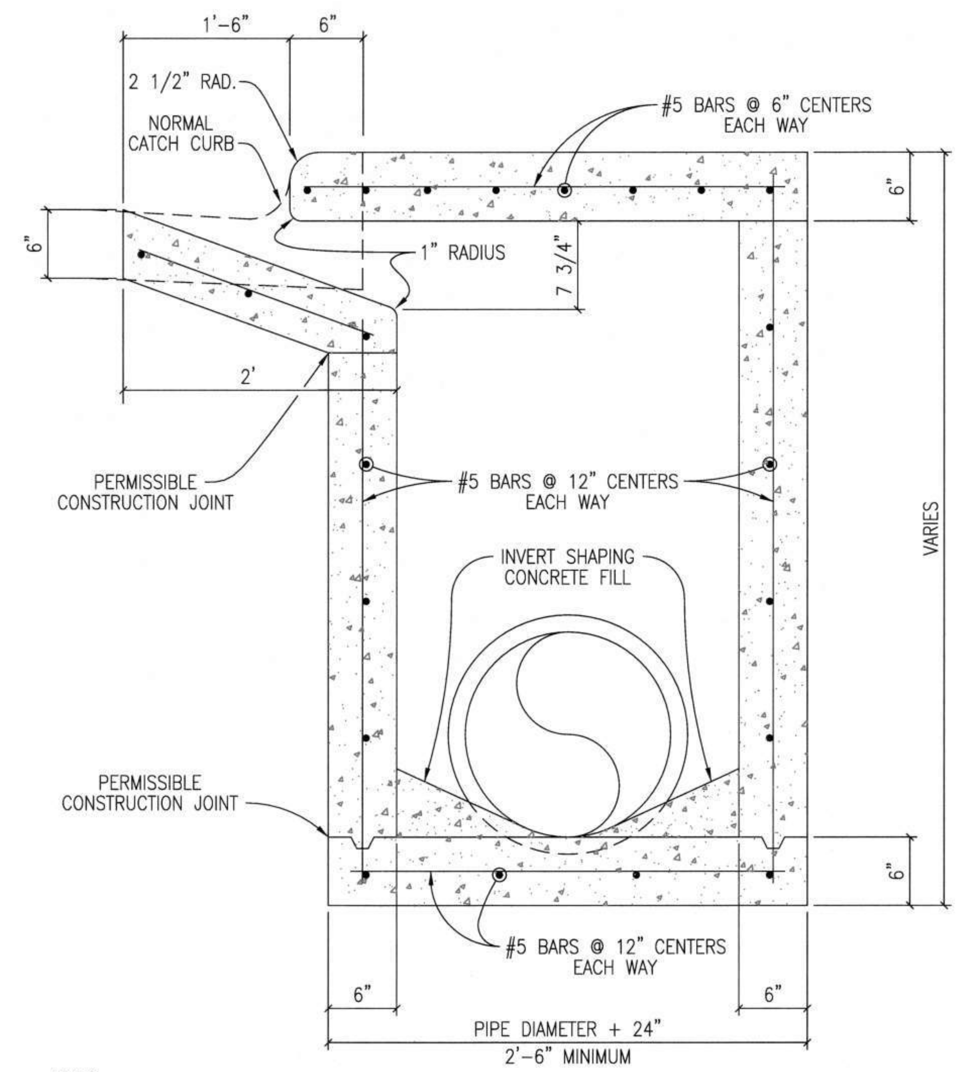


NOTES:
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

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

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
CURB INLET DETAIL
SD09 | NTS | 1/2003 | MRS | TRB



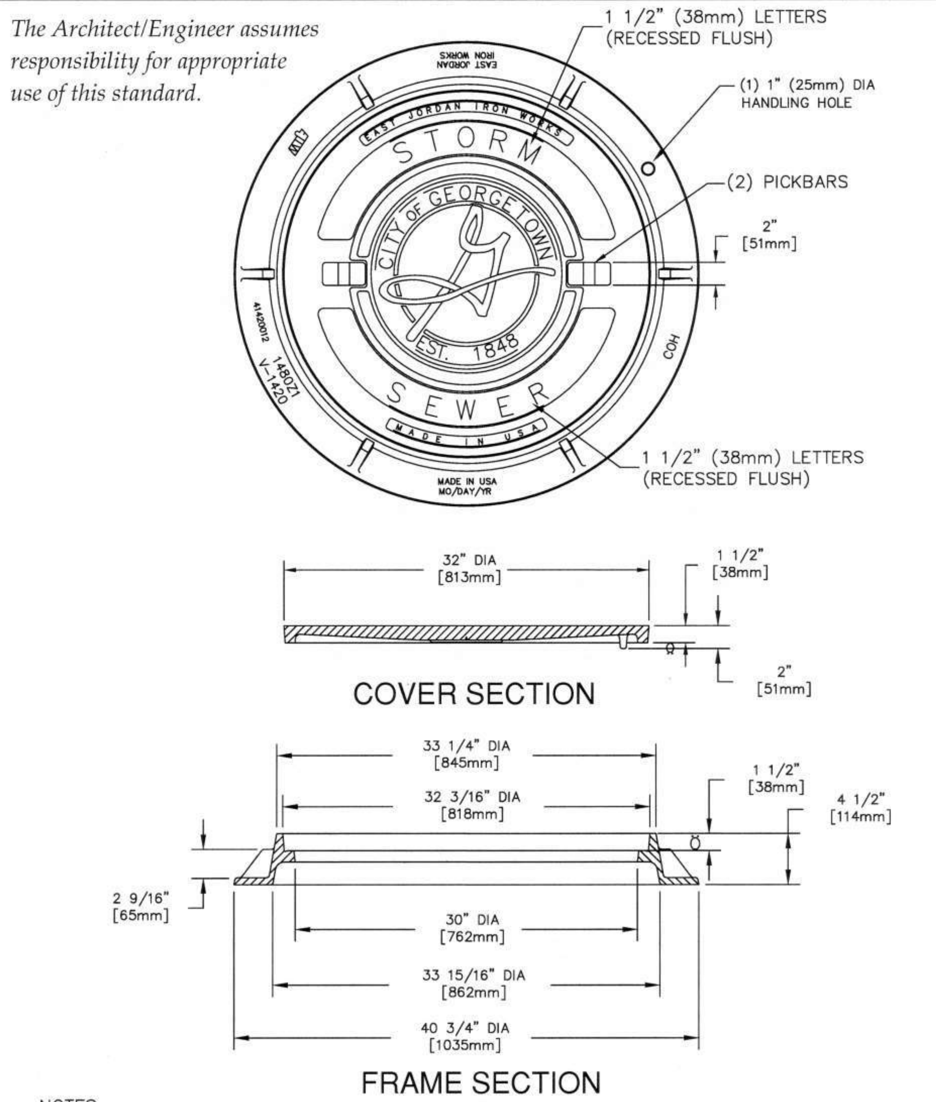
NOTES:
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

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

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
CURB DRAIN INLET TYPICAL SECTION
SD10 | NTS | 1/2003 | MRS | TRB

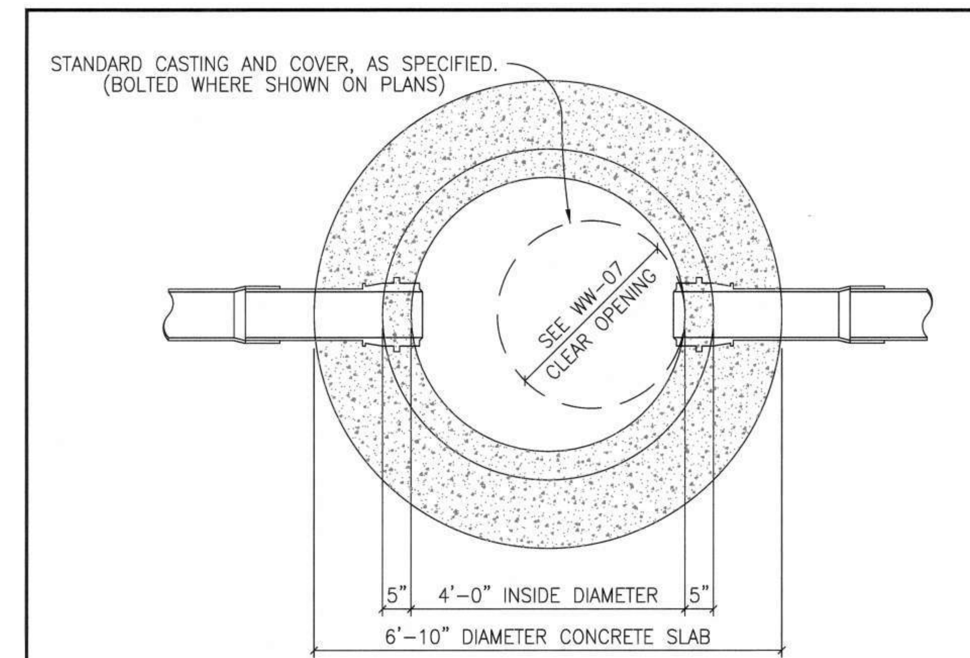
The Architect/Engineer assumes responsibility for appropriate use of this standard.



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.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD STORM SEWER MANHOLE SET
SD11 | NTS | 1/2003 | MRS | TRB



CITY OF GEORGETOWN NOTES:

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

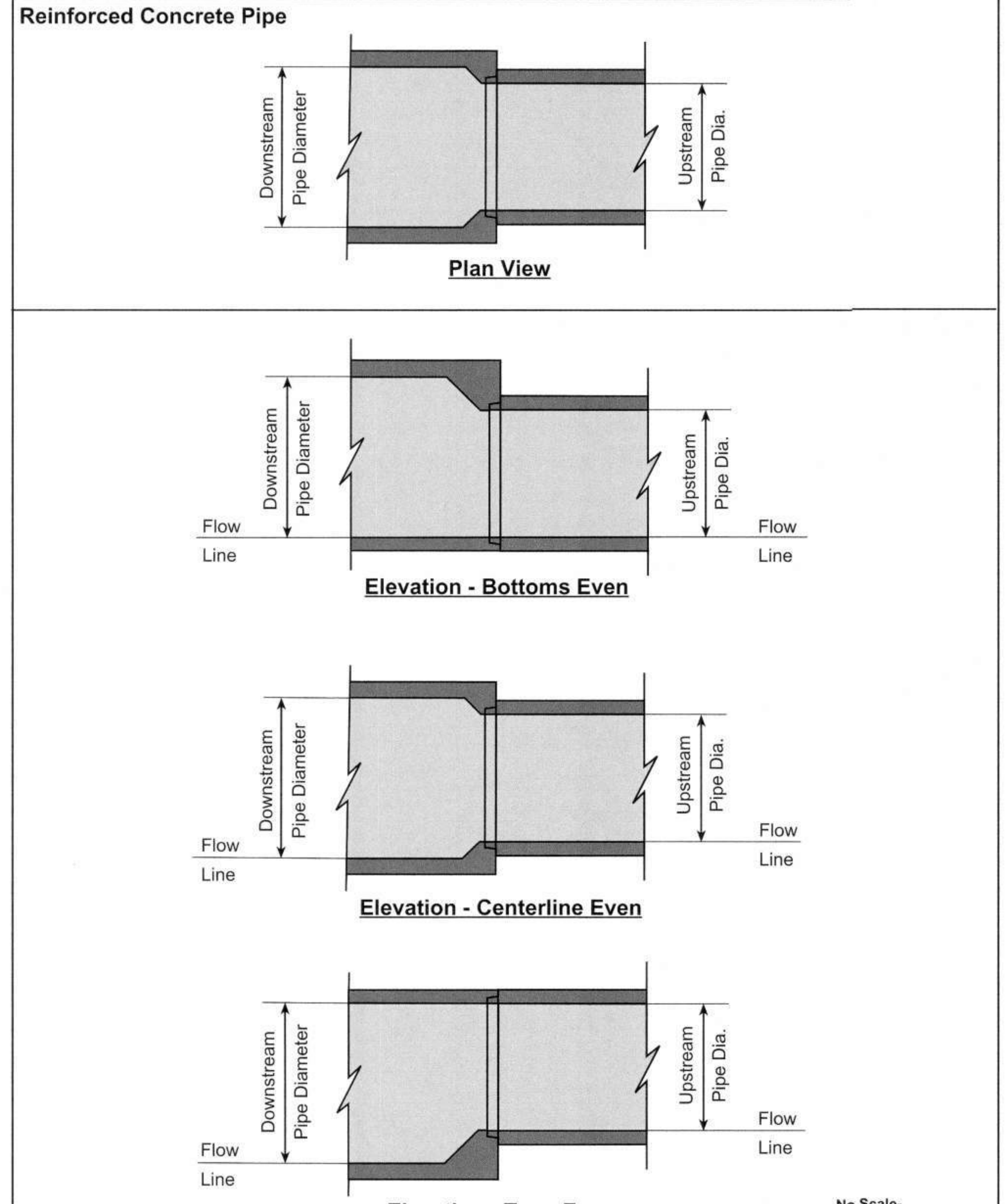
A. ALL MANHOLES SHALL BE 48" I.D., R.C.P., CLASS III, WITH RUBBER O-RING GASKET JOINTS CONFORMING TO ASTM C478, C433 AND C76.
B. ALL MANHOLES SHALL HAVE FRAME AND COVER, AS MANUFACTURED BY EAST JORDAN IRON WORKS (AS PER DETAIL # WW-07) OR APPROVED EQUIVALENT.
C. ALL MANHOLES SHALL BE CONCRETE WITH CAST 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.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD STORM SEWER MANHOLE PLAN
SD12 | NTS | 1/2003 | MRS | TRB

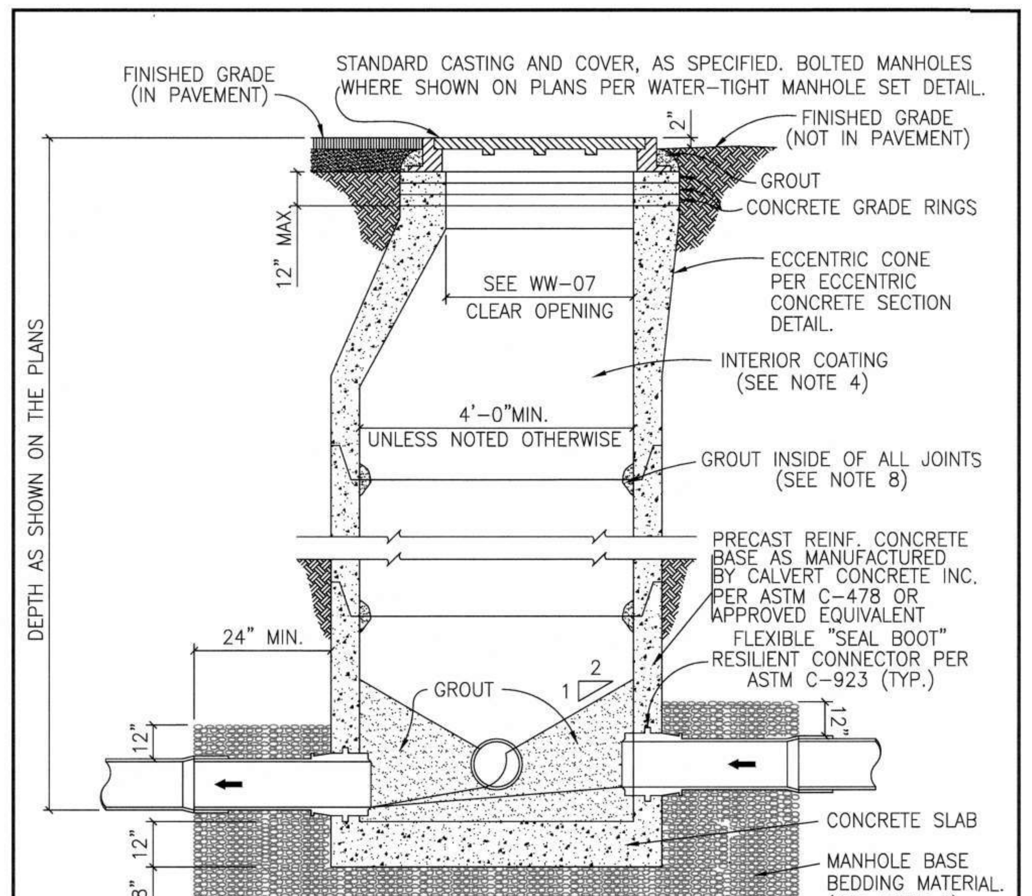
Reinforced Concrete Pipe



-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION-PAGE	DATE
Tongue and Groove Pipe Reducers - Option 1	Grand Prairie Houston	TX	2.8	Feb 2016

FORTERRA

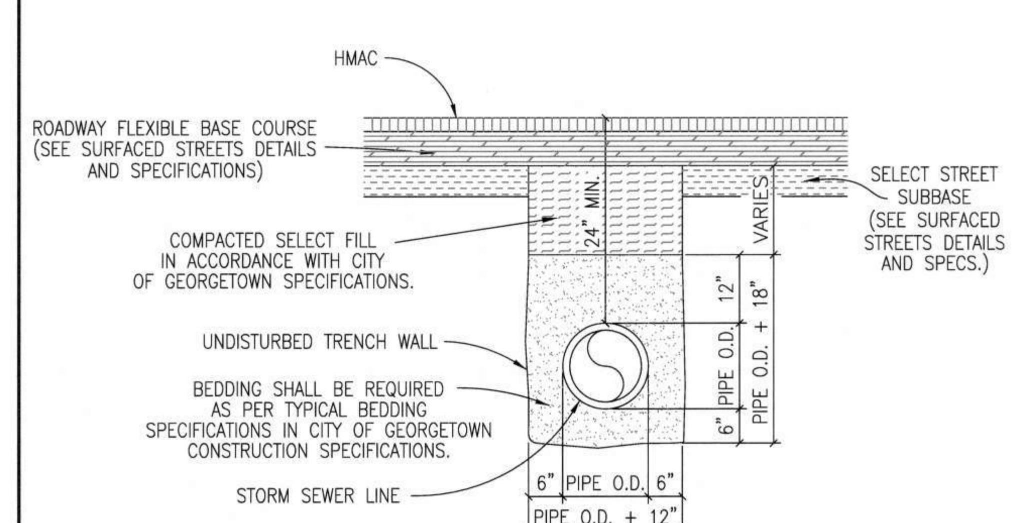


NOTES:
1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET - SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
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.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD STORM SEWER MANHOLE - SECTION
SD13 | NTS | 1/2003 | MRS | TRB



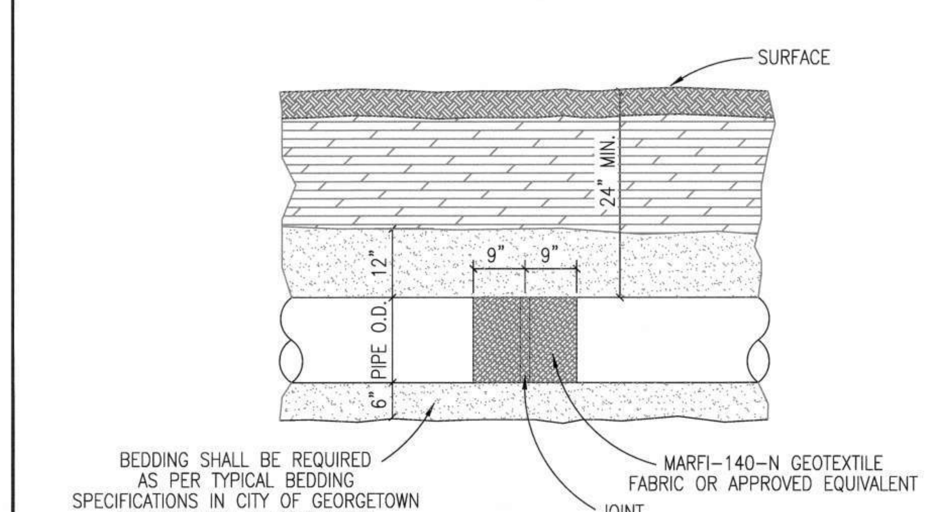
NOTES:
1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

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

NO. | REVISION | DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED PROFESSIONAL ENGINEER
3/20/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

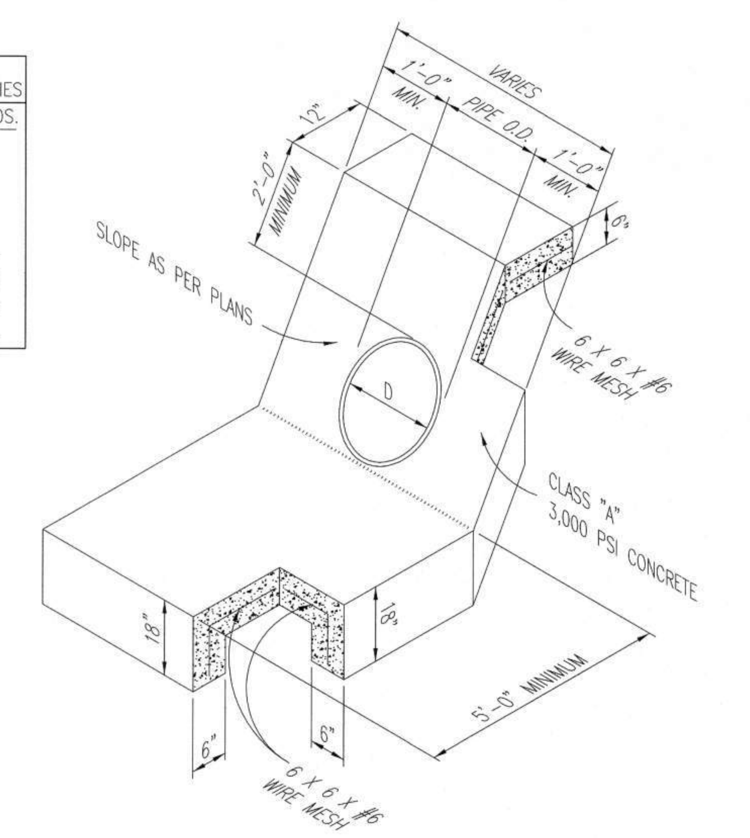
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
STORM DRAIN DETAILS 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 52 OF 61

Date: Mar 20, 2023, 3:51pm User ID: oking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg

MINIMUM RIP-RAP QUANTITIES	
PIPE	SQ. YDS.
18"	6.2
24"	6.9
27"	7.8
30"	9.5
36"	10.4
42"	12.0
48"	14.3
54"	16.4



NOTES:

1. WHEN HEADWALLS AND WINGWALLS ARE REQUIRED, THEY SHALL CONFORM TO THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARDS, OR AS DIRECTED BY THE CITY.
2. ENERGY DISSIPATERS SHALL BE REQUIRED IF PIPE VELOCITY IS GREATER THAN 5.0 F.P.S. OR AS DIRECTED BY THE CITY OF GEORGETOWN.
3. SUPPORT REINFORCING WIRE MESH REQUIRED AS SUPPORT FOR APPROACH SLAB AND SHALL BE SUPPORTED BY REBAR CHAIRS OR OTHER APPROVED METHODS.

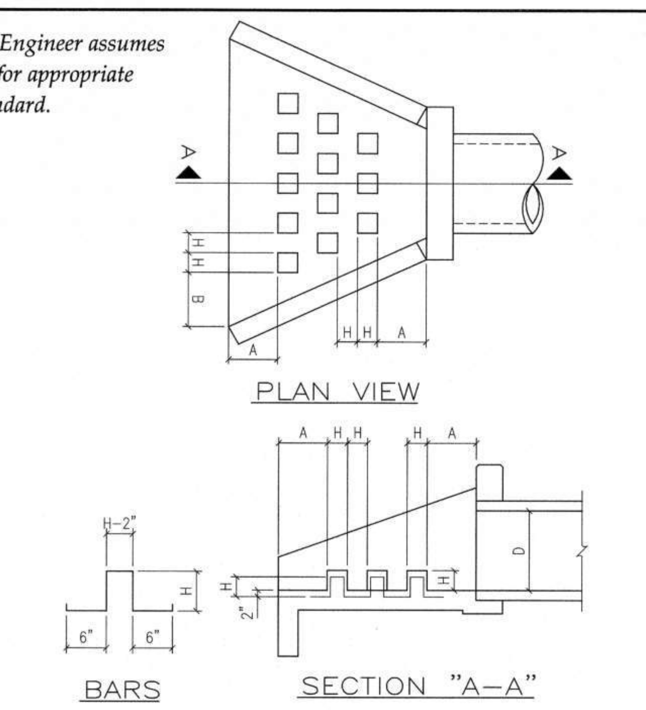
The Architect/Engineer assumes responsibility for appropriate use of this standard.

GEORGETOWN TEXAS EST. 1848 — Georgetown Utility Systems, Your Community Owned Utility

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL CONCRETE RIP-RAP AT PIPE

REVISION NOTE: ADOPTED 6/21/2006 | DRAWING NAME: SD19 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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



NOTES:

1. USE CLASS "A" CONCRETE, 3,000 PSI AT 28 DAYS, UNLESS NOTED.
2. REINFORCING STEEL – ASTM A615, GRADE 40, UNLESS NOTED.
3. LAP REINFORCING 30 BAR DIAMETERS MIN. AT SPLICES, UNLESS NOTED.
4. CHAMFER EXPOSED EDGES OF CONCRETE 3/4", UNLESS NOTED.
5. PLACE REINFORCING WITH THE CENTER OF THE OUTSIDE BARS 2 INCHES FROM THE SURFACE OF THE CONCRETE.

TABLE OF DIMENSIONS FOR ENERGY DISSIPATOR DETAIL

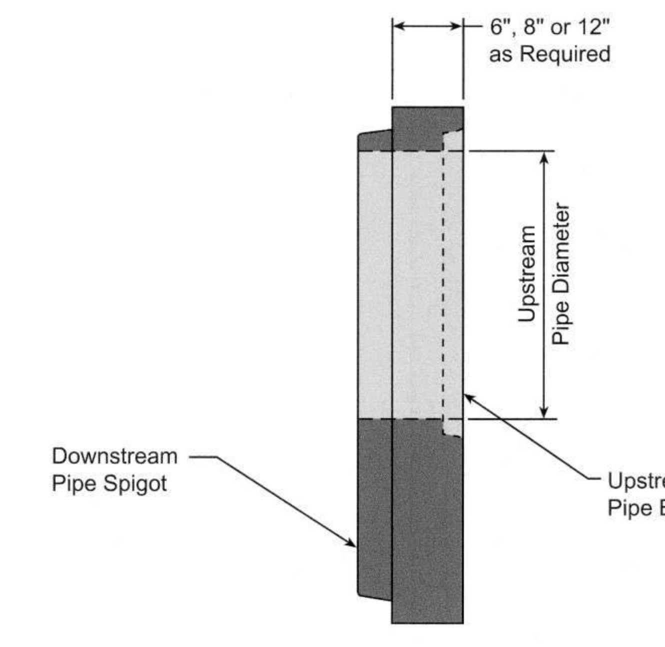
D PIPE DIAMETER (INCHES)	NUMBER OF ROWS OF DISSIPATORS	NUMBER OF DISSIPATORS IN FRONT ROW	H (INCHES)	A (INCHES)	B (INCHES)
12	1	3	4	4	9.1875
18	2	4	4 1/2	9 1/2	15.5625
24	2	5	6	14 3/4	16 1/2
30	3	6	7 1/2	12 1/2	14 3/8
36	3	6	9	16 1/4	18 5/16
42	3	6	10 1/2	20	22 1/4
48	3	6	12	23 3/4	26 1/4
54	3	6	13 1/2	27 1/2	27 3/4
60	3	6	15	31 1/4	31 5/8

GEORGETOWN TEXAS EST. 1848 — Georgetown Utility Systems, Your Community Owned Utility

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
ENERGY DISSIPATER DETAIL

REVISION NOTE: ADOPTED 6/21/2006 | DRAWING NAME: SD20 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

Reinforced Concrete Pipe



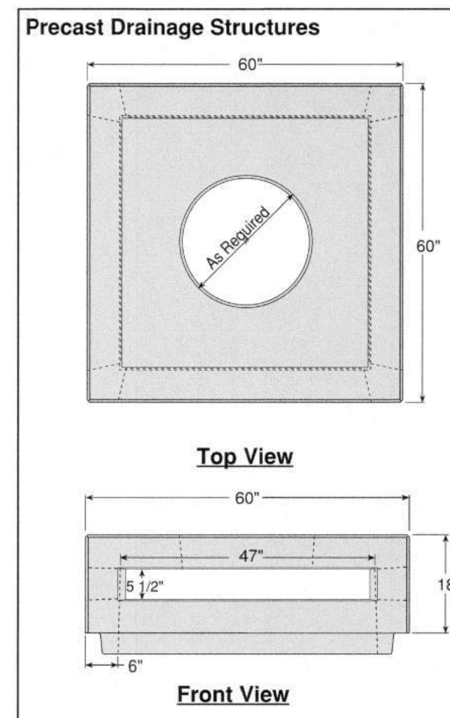
Reducing Stopper

Note:
- Reduction may be centered or offset as required.

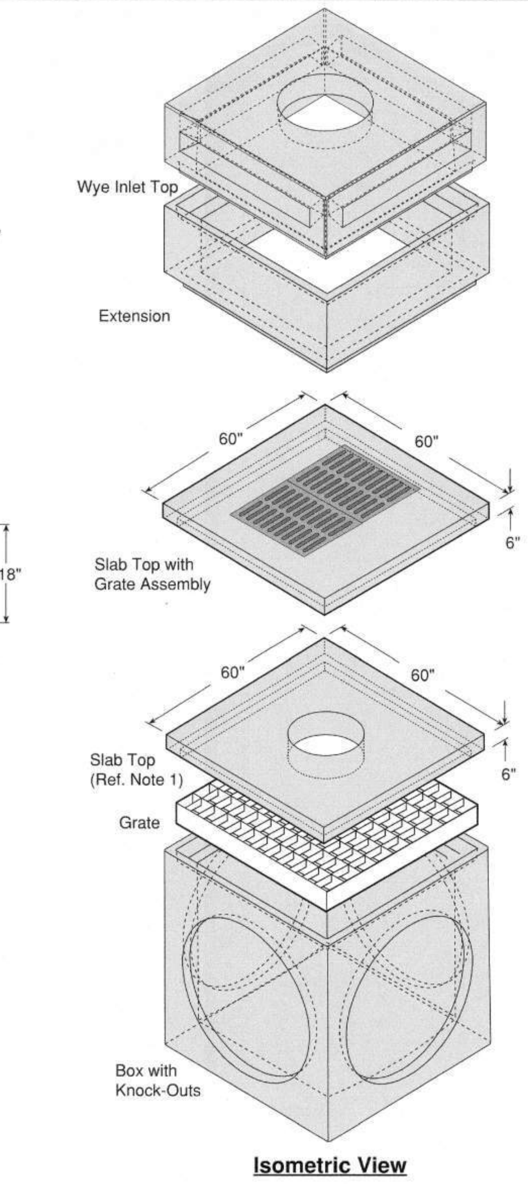
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Tongue and Groove Pipe Reducers - Option 2	Grand Prairie Houston	TX	2.9	Feb 2016	FORTERRA

Precast Drainage Structures



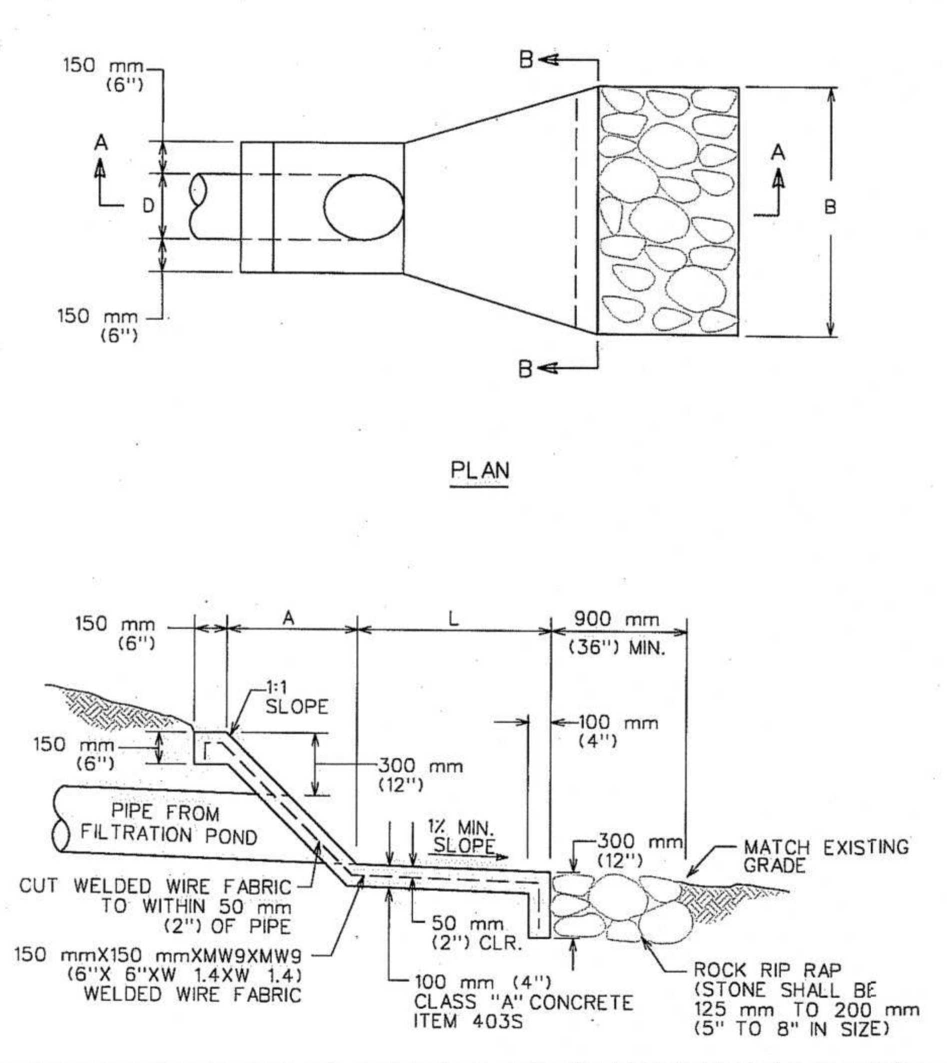
Item in Isometric View	Height (Inches)	Approx. Weight (Lbs.)
Wye Inlet Top	18	3,430
Extension	12 15 18 21 24	1,350 1,688 2,025 2,363 2,700
Slab Top	6	1,340
Grate	3 1/4	433
Box	Varies	



Note:
1.) Customer to specify opening size or cast iron ring and cover.

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Top Options for 4' x 4' Precast Box	Grand Prairie Houston	TX	9.2	Feb 2016	FORTERRA



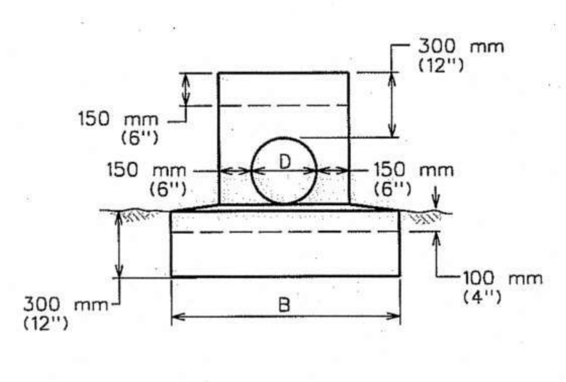
CITY OF AUSTIN
DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW

HEADWALL FOR FILTRATION PONDS W/OUTFALL PIPE 150 mm (6") TO 375 mm (15") DIA.

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



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.

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

TABLE OF DIMENSIONS & REINFORCING STEEL (Wings for One Structure End)

Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities (3) per ft of wing length (2~Wings) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING (2~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

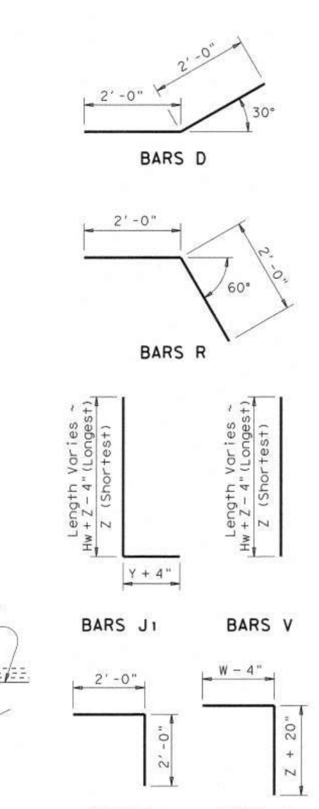
Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION CALCULATIONS:

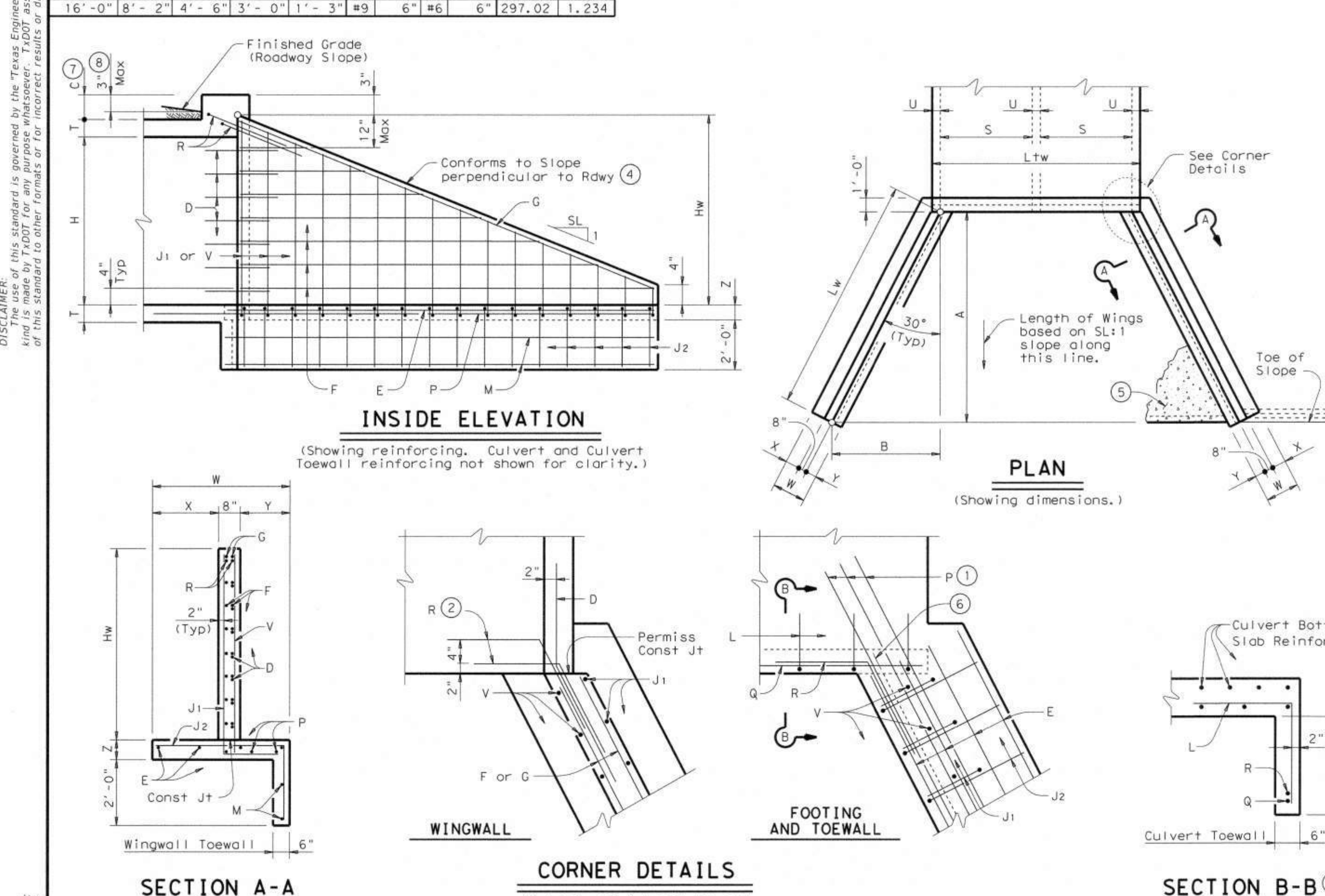
Formulas: (All values are in Feet)
Hw = H + T + C – 0.250'
A = (Hw – 0.333') (SL)
B = (A) Tangent (30°)
Lw = (A) ÷ Cosine (30°)
For Cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For Precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.500')
Total Wingwall Area (Two Wings ~ S.F.) = (Hw + 0.333') (Lw)

Hw = Height of Wingwall
SL:1 = Side Slope Ratio (Horizontal:1 Vertical)
Lw = Length of Wingwall
Ltw = Culvert Toewall Length
N = Number of Culvert Spans

See applicable box culvert standard for H, S, T, and U values.



1. Extend Bars P 3'-0" minimum into bottom slab of Box Culvert.
2. Adjust to fit as necessary to maintain 1 1/4" clear cover and 4" minimum between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.
4. Recommended values of Slope are: 2:1, 3:1, 4:1, & 6:1.
5. When shown elsewhere on the plans, a 5" deep concrete riprap shall be constructed. Payment for riprap shall be as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, the riprap shall have a 6" wide by 1'-6" deep reinforced concrete toewall along all edges adjacent to natural ground; the toewall shall be reinforced by extending typical riprap reinforcing into the toewall; construction joints or grooved joints, oriented in the direction of flow, shall extend across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
6. At Contractor's option, Culvert Toewall may be ended flush with Wingwall Toewall. Adjust reinforcing from that shown as necessary.
7. 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 ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
8. For vehicle safety, curb heights and wall heights shall be reduced, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.



GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
All reinforcing steel shall be Grade 60.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
All reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See BCS sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

DATE
NO.	REVISION

PAPE-DAWSON ENGINEERS

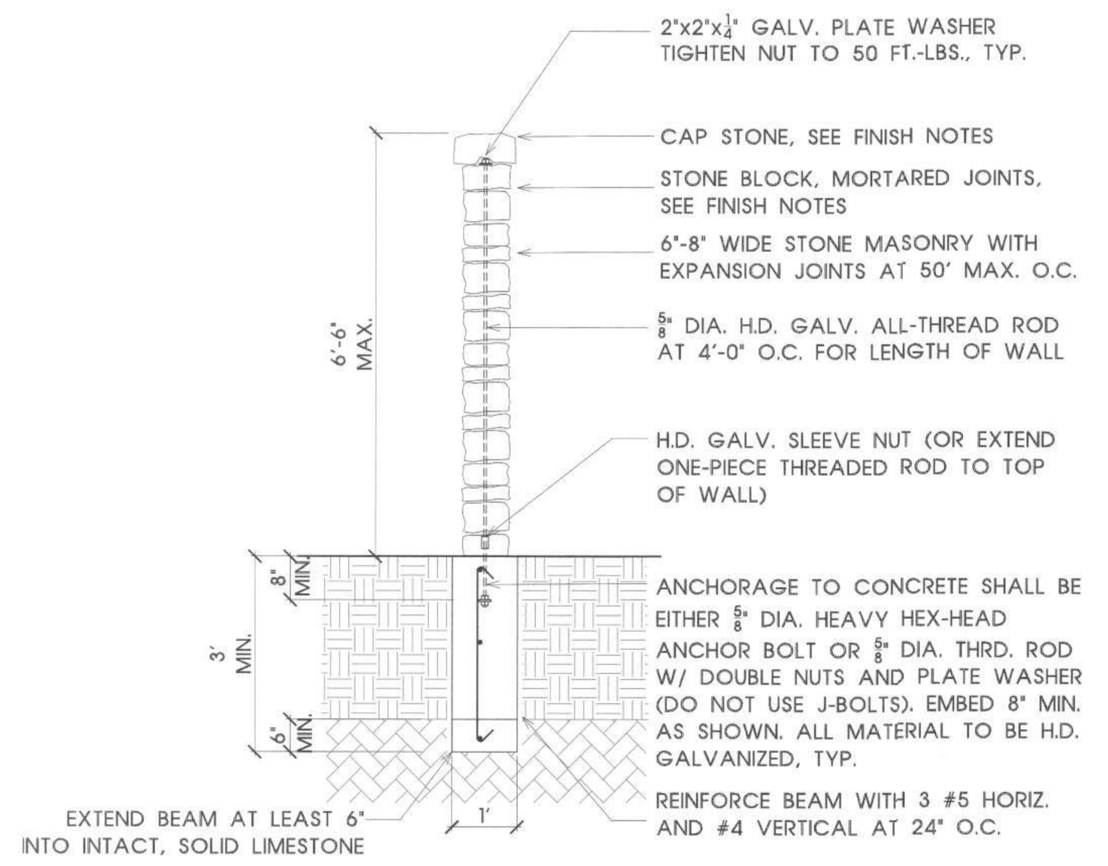
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

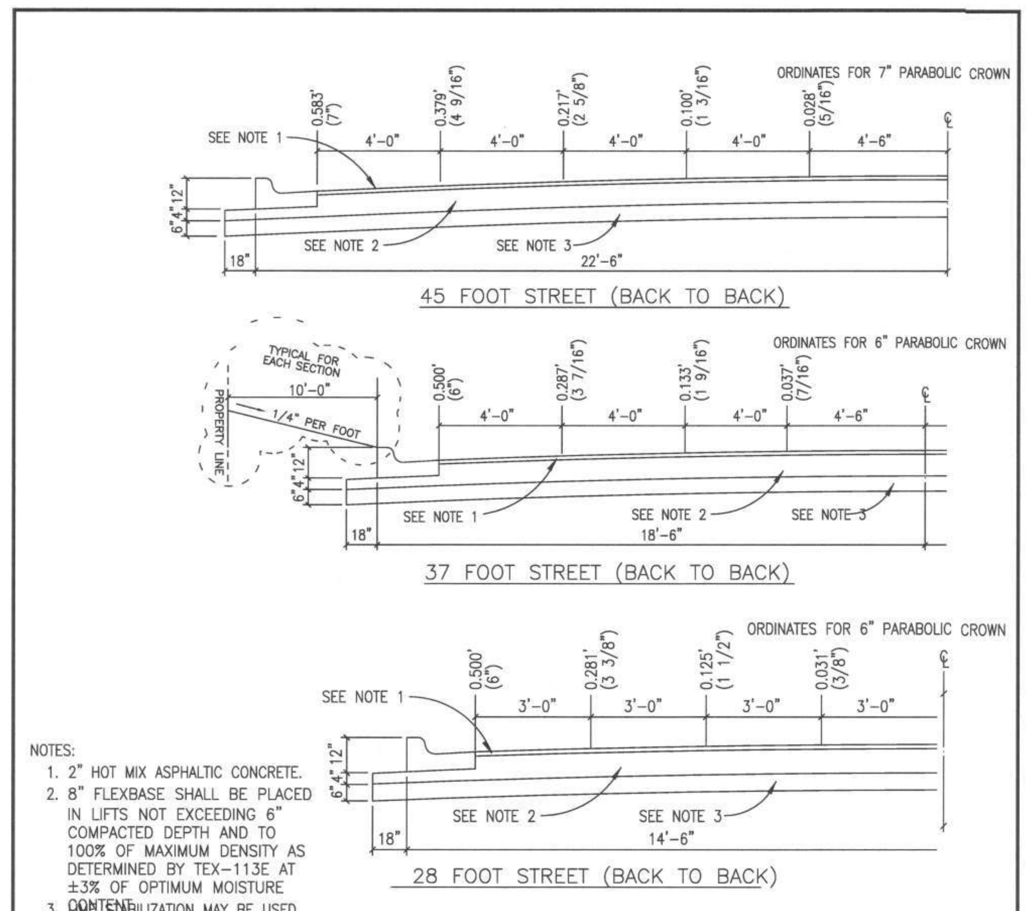
CONSTRUCTION DETAILS
STORM DRAIN DETAILS 2 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 53 OF 61

Date: Mar 20, 2023, 3:51pm User ID: dking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg



NOTES:
1. CONTRACTOR SHALL PROVIDE 4'X4' MOCKUP OF WALL STONE/BLOCK/VENEER FOR APPROVAL. PRIOR TO CONSTRUCTION.
2. JOINT MORTAR PER SHALL MATCH STONE COLOR, IF NOT SPECIFIED IN MATERIAL FINISH SCHEDULE OR NOTES..
3. PROVIDE WEEPS OR DRAINAGE BLOCK-OUTS, ±4"X4", AT MINIMUM SPACING OF 20' OC.
4. CONTRACTOR TO PROVIDE SHOP DRAWING FOR WALL INCLUDING STRUCTURE DETAILS, SEALED BY A LICENSED STRUCTURAL ENGINEER, PRIOR TO START.



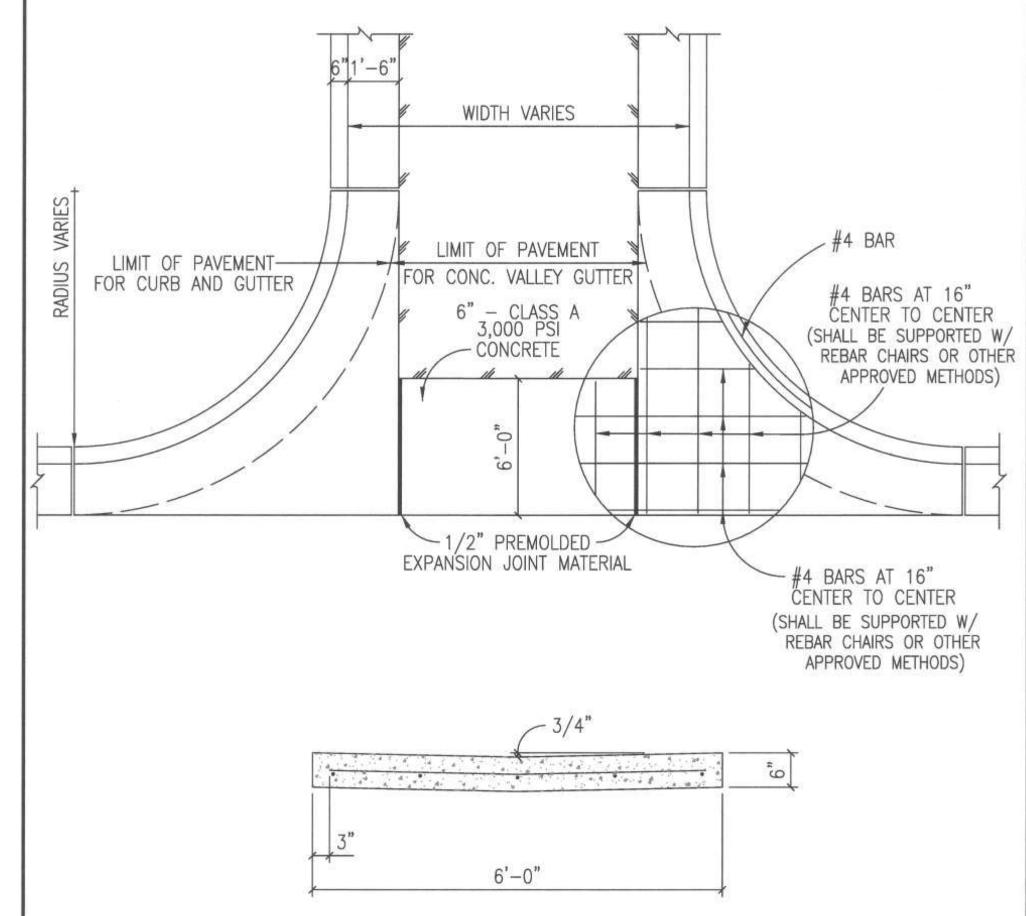
NOTES:
1. 2" HOT MIX ASPHALTIC CONCRETE.
2. 8" FLEXBASE SHALL BE PLACED IN LIFTS NOT EXCEEDING 6" COMPACTED DEPTH AND TO 100% OF MAXIMUM DENSITY AS DETERMINED BY TEX-113E AT ±3% OF OPTIMUM MOISTURE CONTENT.
3. LIME STABILIZATION MAY BE USED IF A QUALIFIED GEOTECHNICAL REPORT INDICATES THAT THE SULFATE LEVELS ARE LOW ENOUGH.

STREET AND ROADWAY DESIGN CRITERIA

STREET CLASSIFICATION	TOTAL EQUIVALENT 18K AXLE LOAD APPLICATIONS (20 YEAR FLEXIBLE DESIGN)
LOCAL	
ALLEY	20,000
RESIDENTIAL LANE	20,000
LOCAL STREET	20,000
COLLECTORS	
RESIDENTIAL	80,000
MAJOR NEIGHBOORHOOD	290,000
ARTERIALS	
MINOR ARTERIAL	1,020,000
MAJOR ARTERIAL	5,200,000

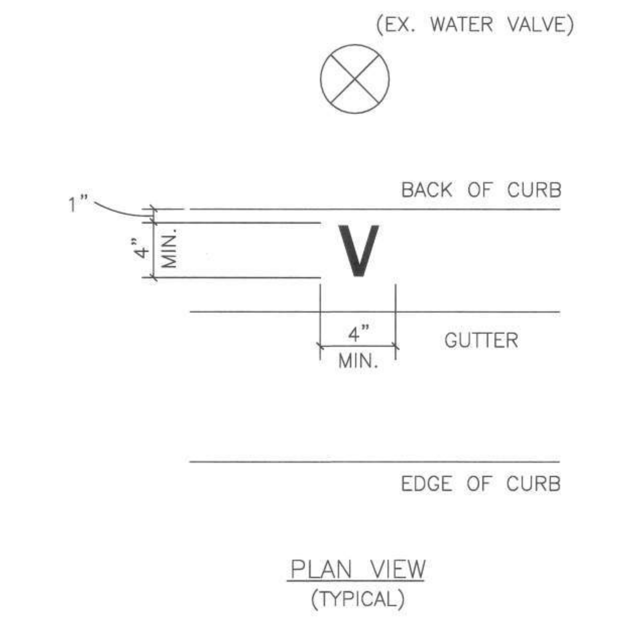
The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006
GEORGETOWN TEXAS Georgetown Utility Systems
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL HALF CROSS – SECTIONS FOR H.M.A.C. SURFACED STREETS
DRAWING NAME: SD01
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



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

REVISION NOTE: ADOPTED 6/21/2006
GEORGETOWN TEXAS
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE VALLEY GUTTER DETAIL
DRAWING NAME: SD03
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



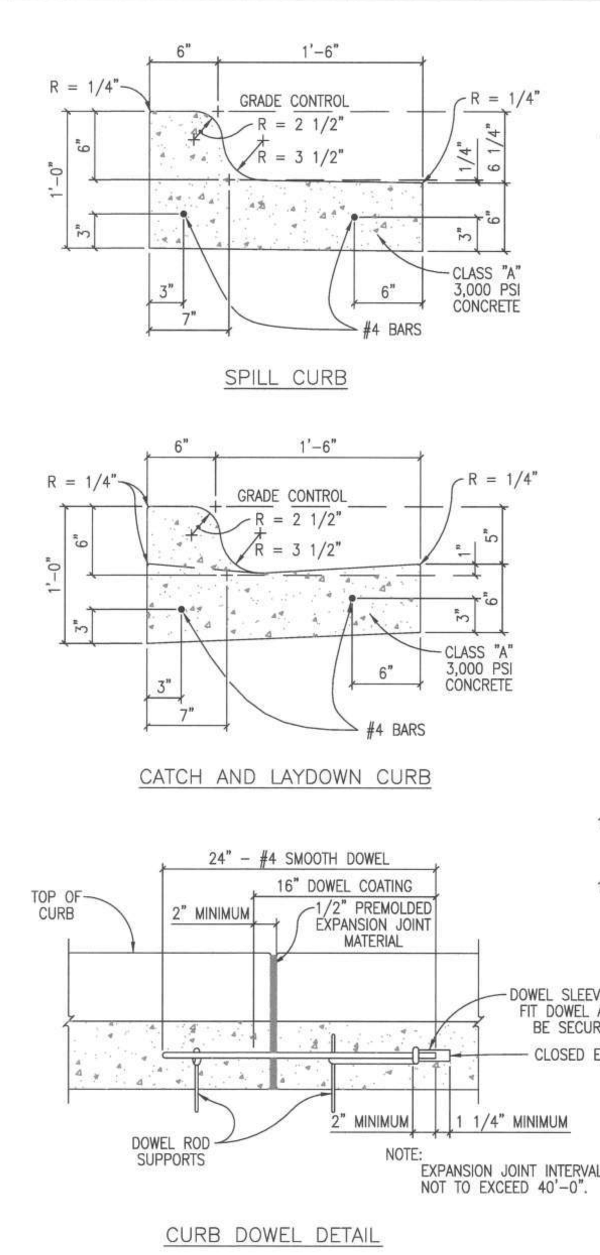
NOTES:
1. ALL WATER SERVICE, WASTE WATER SERVICE AND VALVE LOCATIONS SHALL BE APPROXIMATLEY MARKED AS FOLLOWS:

WATER SERVICE	"W"	TOP OF CURB
WASTE WATER SERVICE	"S"	TOP OF CURB
VALVE	"V"	TOP OF CURB

2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.

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

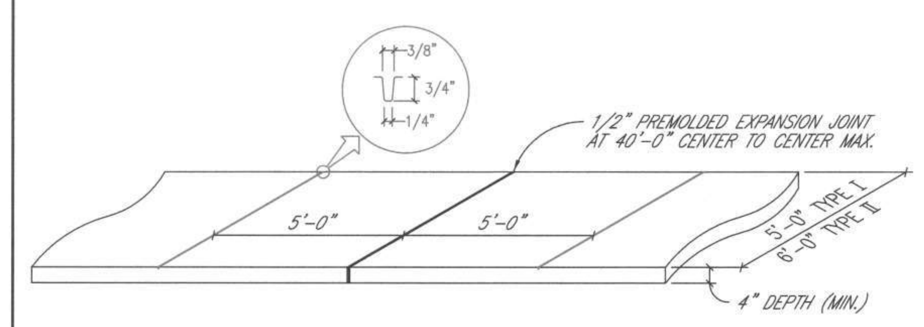
REVISION NOTE: ADOPTED 6/21/2006
GEORGETOWN TEXAS
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB STAMP DETAIL
DRAWING NAME: SD05
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



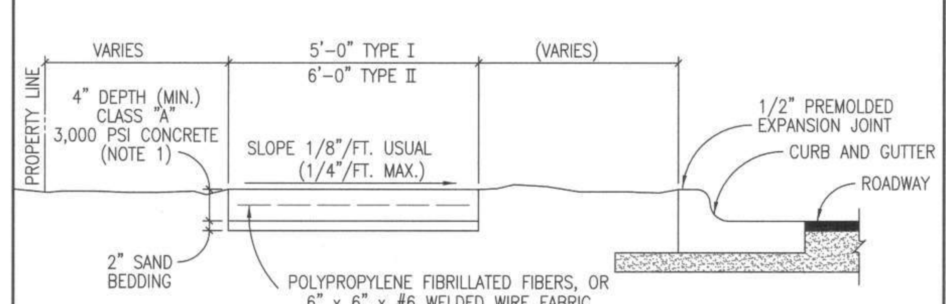
NOTES:
1. ALL WORK AND MATERIAL SHALL CONFORM TO ASTM A615, A615M, C309, AND D1752. BROOM FINISH EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10' MAX.
3. EXPANSION JOINTS AS PER STD. ASTM D-1752.
4. 1/2" EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB IS ADJACENT TO SIDEWALK OR RIP-RAP.
5. TRANSITIONS BETWEEN CURBS OR DIFFERING CROSS SECTIONS SHALL OCCUR OVER A 20 FOOT LENGTH AS APPROVED BY THE ENGINEER OR THE CITY OF GEORGETOWN.
6. ALL CONCRETE SHALL BE CLASS A, 3000 PSI.
7. ALL SURFACES THAT ARE CHIPPED OR OTHERWISE DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED.
8. THE FOLLOWING SCHEME OF REINFORCEMENT SHALL BE REQUIRED. THE MANNER OF PLACEMENT AND LOCATION SHALL BE TO THE SATISFACTION OF THE ENGINEER OR THE CITY OF GEORGETOWN.
   A. ALL CURB AND CURB AND GUTTER (REINFORCED) SHALL HAVE TWO #4 LONGITUDINAL REINFORCING BARS.
9. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 15 INCH.
10. REINFORCING BARS SHALL BE SUPPORTED WITH REBAR CHAIRS OR OTHER APPROVED METHODS.
11. REBAR SUPPORTS ARE NOT REQUIRED ON MACHINE PLACED CURB PROVIDED THAT REBAR IS PROPERLY GUIDED INTO THE CURB SECTION.

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

REVISION NOTE: ADOPTED 6/21/2006
GEORGETOWN TEXAS
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB AND GUTTER DETAILS
DRAWING NAME: SD06
SCALE: NTS
DRAWN BY: MRS APPROVED BY: TRB



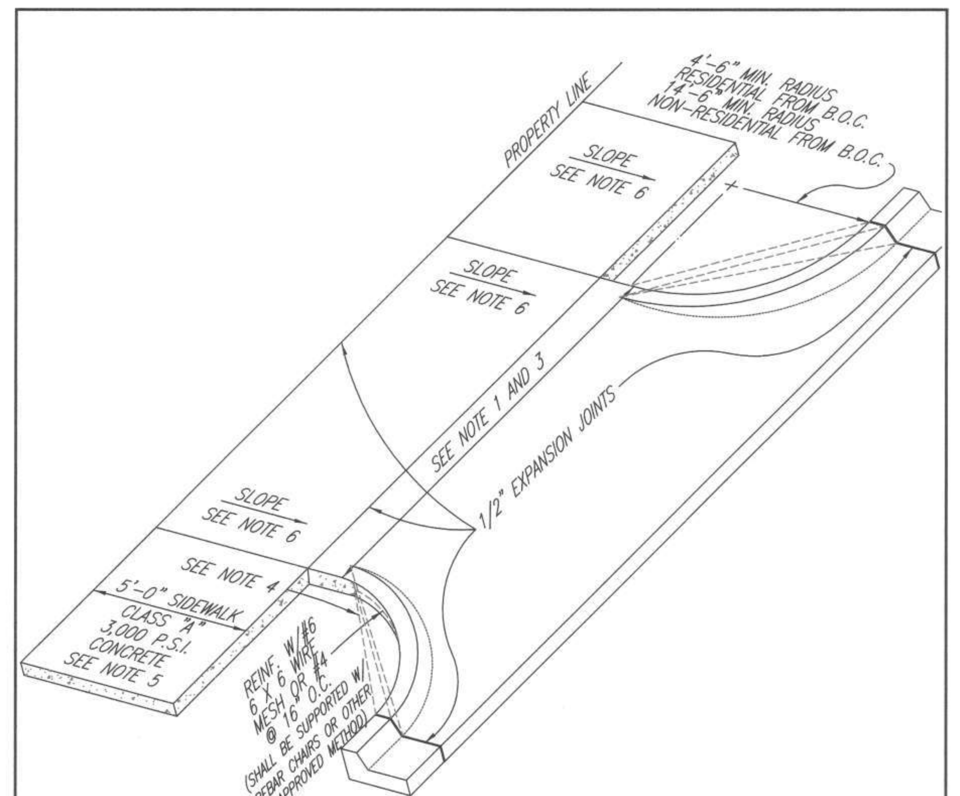
TYPE I – AS REQUIRED FOR SINGLE FAMILY, DUPLEXES AND TOWNHOUSES.
TYPE II – AS REQUIRED FOR APARTMENTS, OFFICE AND PARKING LOTS, COMMERCIAL AND INDUSTRIAL.



NOTES:
1. STANDARD LOCATION OF SIDEWALK IS OFF BACK OF CURB. SPECIAL DESIGNS MAY BE APPROVED BY THE CITY ENGINEER, PRIOR TO FINAL DESIGN AS APPROVED BY ENGINEER DURING PLAN REVIEW AN IN CONFORMANCE WITH CURRENT AASHTO STANDARDS.
2. SIDEWALK SHALL CONFORM TO CURRENT AMERICANS WITH DISABILITIES ACT STANDARDS.
3. ALL SIDEWALKS SHALL BE SUBMITTED AND APPROVED BY THE REGISTERED ACCESSIBILITY SPECIALIST (RAS) AND ENGINEER OF RECORD.
4. ANY VARIANCE IN TEXTURE, GRADE OR ALIGNMENT SHALL BE APPROVED BY THE REGISTERED ACCESSIBILITY SPECIALIST (RAS) AND ENGINEER OF RECORD.
5. SLIP DOWEL SHALL BE INSTALLED AT EVERY LONGITUDINAL EXPANSION JOINT (UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER DURING ENGINEERING PLAN REVIEW PRIOR TO FINAL DESIGN).

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

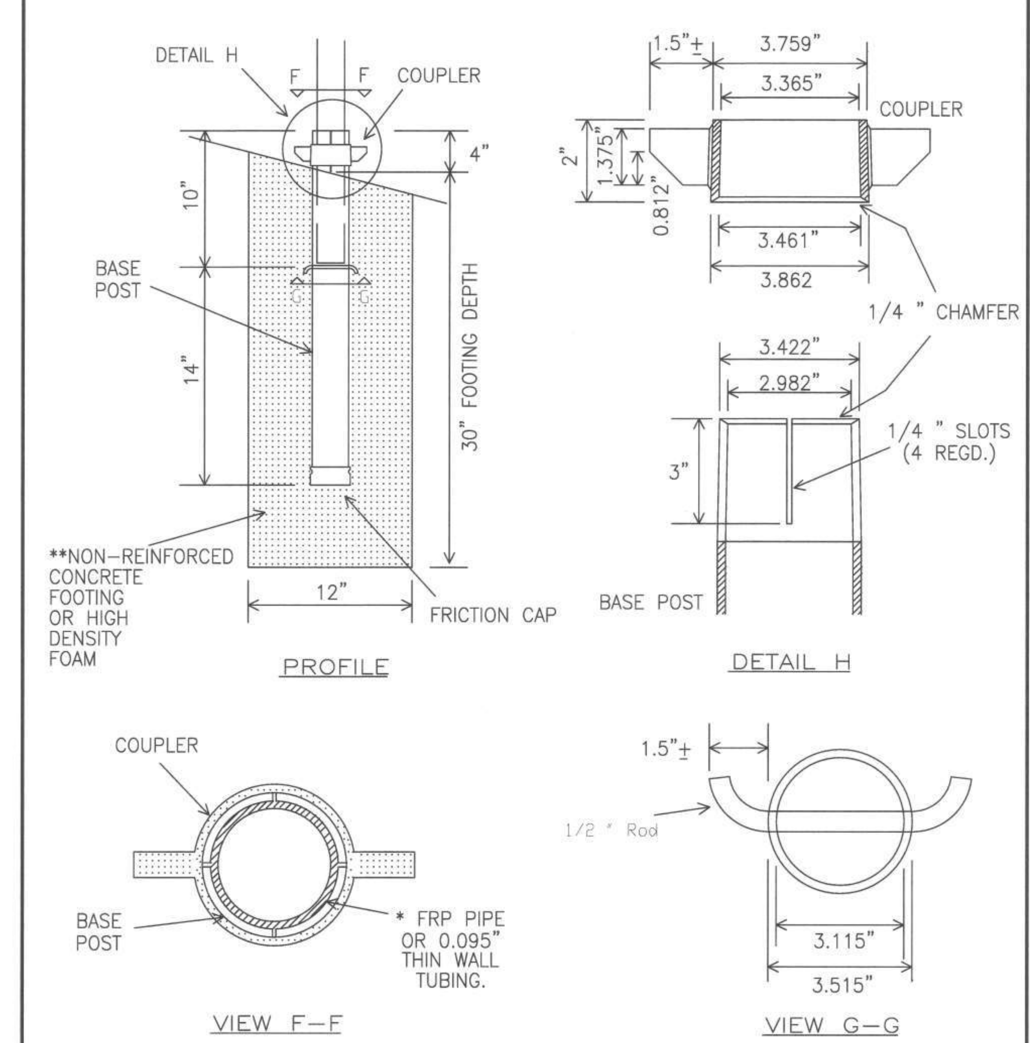
REVISION NOTE: REVISED 6/25/2015 WBD
REVISION NOTE: ADOPTED 6/21/2006 TRB
GEORGETOWN TEXAS Georgetown Utility Systems
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SIDEWALK SECTION AND JOINT DETAIL
DRAWING NAME: SD14
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



NOTES:
1. MAXIMUM WIDTH OF APPROACH SHALL BE 24'-0" FOR RESIDENTIAL, 30'-0" FOR NON-RESIDENTIAL UNDIVIDED AND 45'-0" FOR NON-RESIDENTIAL DIVIDED.
2. DRIVEWAY PERMITS SHALL BE ACQUIRED FROM CITY INSPECTION OFFICE.
3. MINIMUM WIDTH OF APPROACH SHALL BE 10'-0" FOR RESIDENTIAL AND 15'-0" FOR NON-RESIDENTIAL.
4. LINEAR "RADIUS" AT CORNERS, PERMITTED FOR "SINGLE FAMILY" OR "TWO FAMILY" RESIDENTIAL DRIVEWAY APPROACH.
5. SIDEWALK LOCATION SHALL BE APPROVED BY CITY ENGINEER PRIOR TO FINAL DESIGN.
6. SLOPE 1/8" PER FOOT USUAL, SHALL NOT EXCEED 2.0%.
7. DRIVEWAY APPROACH THICKNESS SHALL BE A MIN. OF 6".

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

REVISION NOTE: REVISED 6/25/2015 WBD
REVISION NOTE: ADOPTED 6/21/2006 TRB
GEORGETOWN TEXAS Georgetown Utility Systems
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE DRIVEWAY APPROACH TYPICAL
DRAWING NAME: SD15
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



* PLASTING INSERT MUST BE USED WITH 1/16" THIN WALL TUBING.
** FOOTING SHALL BE REMOVED AND BACKFILLED WHEN BARRICADE IS REMOVED.

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

REVISION NOTE: ADOPTED 6/21/2006
GEORGETOWN TEXAS
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UNIVERSAL ANCHOR SYSTEM
DRAWING NAME: SD23
SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S FISHER
87704
LICENSED PROFESSIONAL ENGINEER

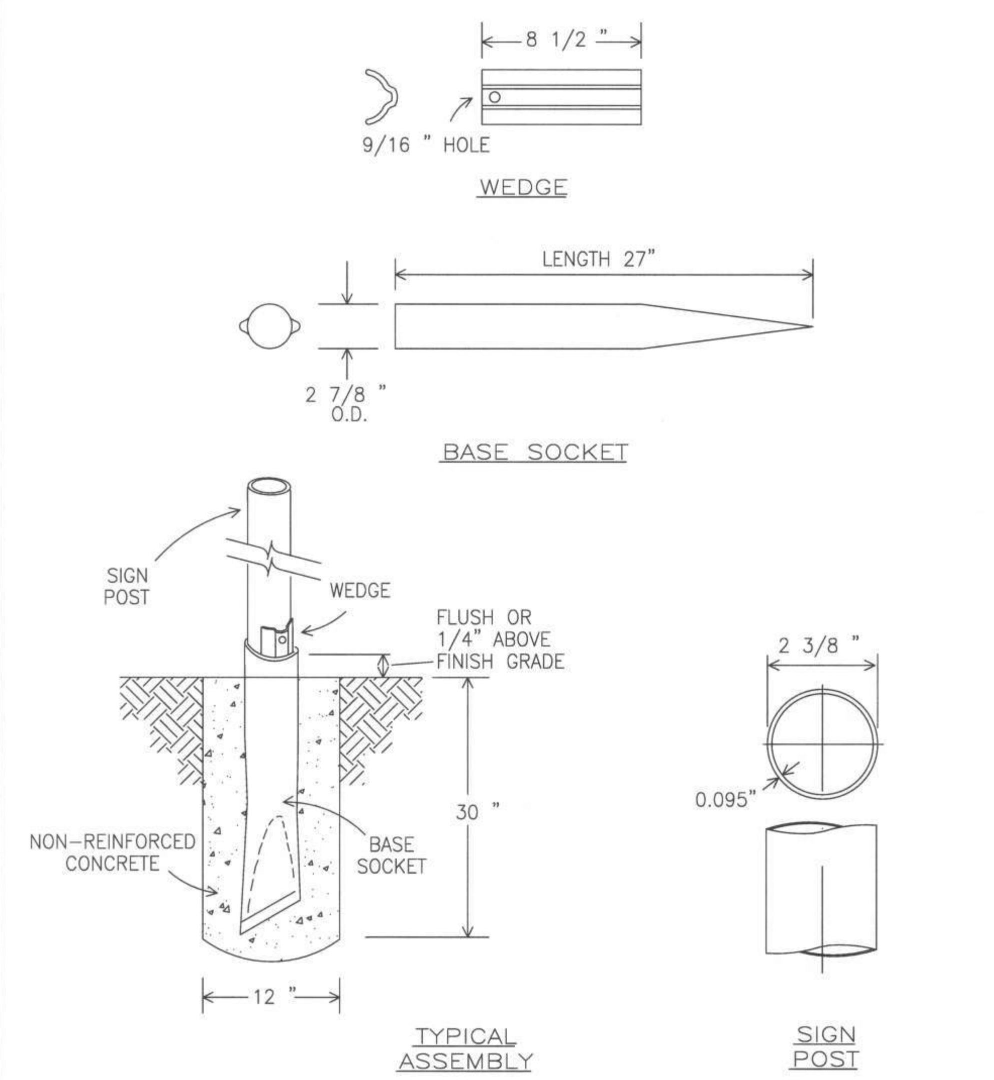
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
STREET DETAILS 1 OF 3

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 54 OF 61

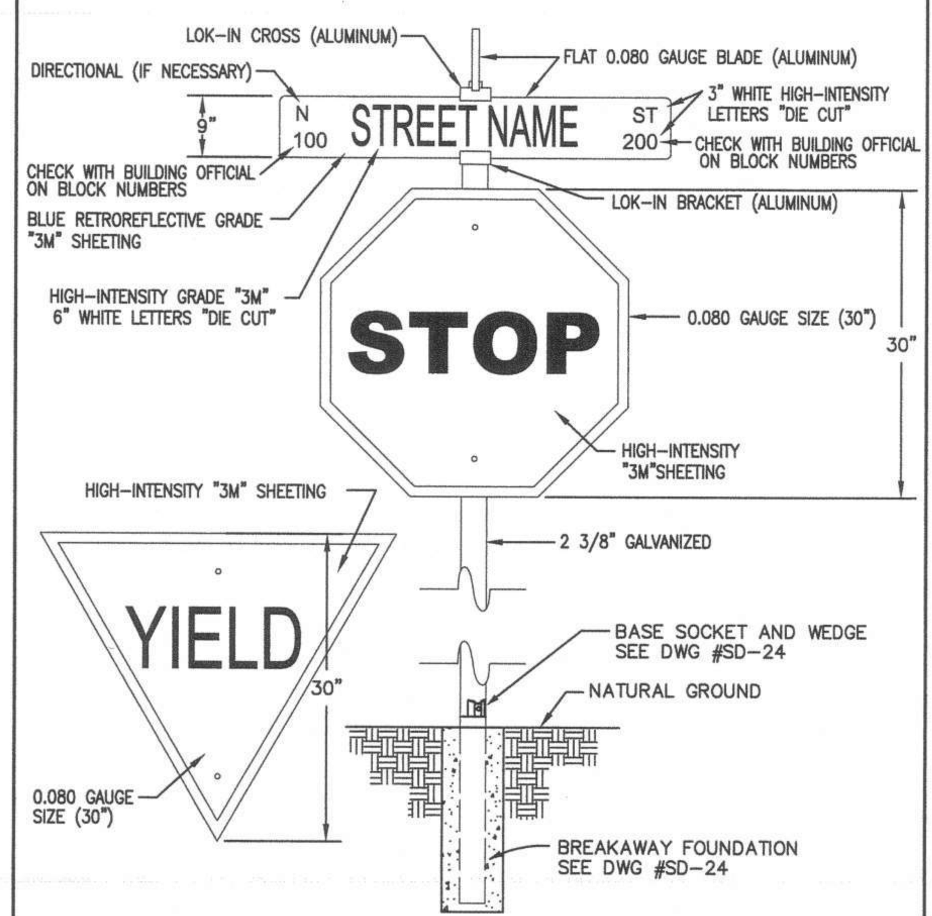
Date: Mar 20, 2023, 3:51pm User ID: cking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg



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

REVISION NOTE:	ADOPTED 6/21/2006
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD24
POZ-LOC (BREAKAWAY FOUNDATION)	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB

GEORGETOWN TEXAS — Georgetown Utility Systems



NOTES:
1. 7-FOOT MIN. HEIGHT FROM GROUND TO BOTTOM OF SIGN.
2. ALL SIGNS TO BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
3. ALL SIGNAGE SHEETINGS SHALL BE HIGH-INTENSITY "3M" SHEETING.

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

REVISION NOTE:	REVISED 1/14/2014 WBD
REVISION NOTE:	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD25
STANDARD STREET SIGN DETAIL	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS/AP; APPROVED BY: TRB

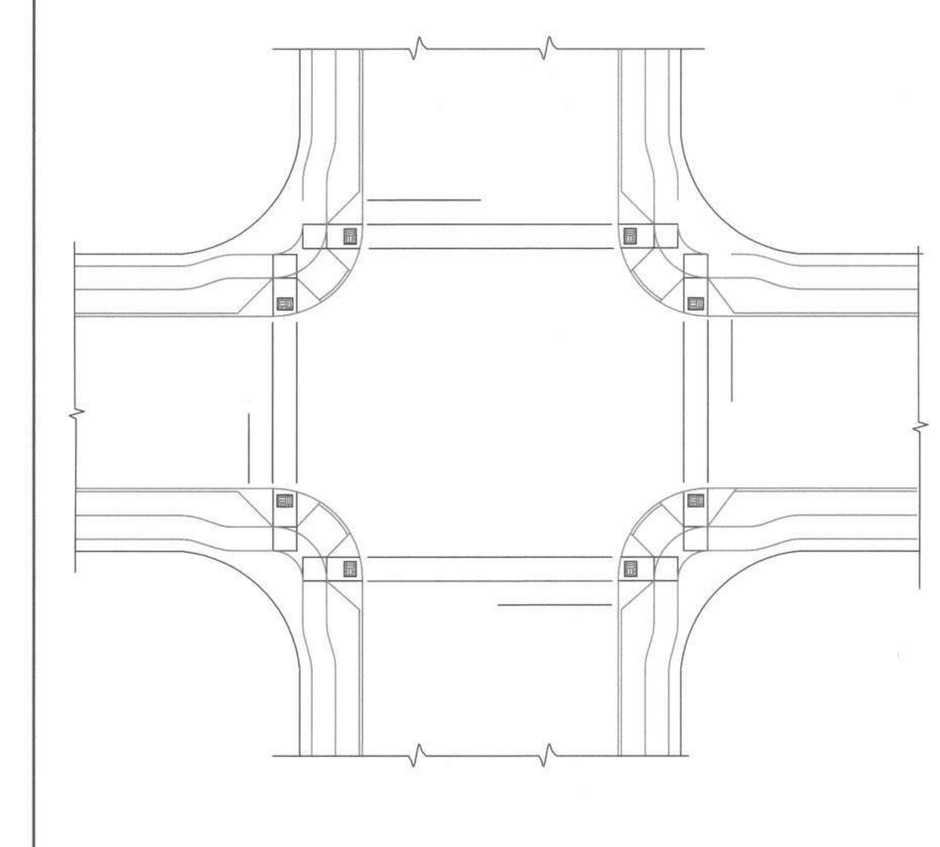
The Architect/Engineer assumes responsibility for appropriate use of this standard.

NOTES:

1. COMMERCIAL SIDEWALKS WIDTHS – 6'
   RESIDENTIAL SIDEWALKS WIDTHS – 5'
2. ALL SLOPES ARE MAXIMUM ALLOWABLE. FLATTER SLOPES THAT WILL STILL DRAIN PROPERLY ARE ENCOURAGED.
3. ALL CONCRETE SURFACES SHALL RECEIVE A LIGHT BROOM FINISH UNLESS NOTED OTHERWISE IN THE PLANS.
4. FOR PURPOSES OF WARNING, THE CURB RAMPS SHALL HAVE A LIGHT REFLECTIVE VALUE AND TEXTURE THAT SIGNIFICANTLY CONTRASTS WITH THAT OF ADJOINING PEDESTRIAN ROUTES.
5. TEXTURES MAY CONSIST OF PAVERS WITH TRUNCATED DOMED SURFACES. TEXTURES ARE REQUIRED TO BE DETECTABLE UNDERFOOT. SURFACES THAT WOULD ALLOW WATER TO ACCUMULATE ARE PROHIBITED.
6. COLOR CONTRAST, FOR EXAMPLE, MAY BE ACCOMPLISHED WITH COLORED CONCRETE PAVERS THAT HAVE TRUNCATED DOMES WHICH WOULD PROVIDE A CONTRAST WITH TYPICALLY LIGHT COLORED CONCRETE.
7. ADDITIONAL INFORMATION ON CURB RAMP LOCATION, DESIGN, VISIBILITY AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) PREPARED AND ADMINISTERED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR).
8. RAISED MEDIANS SEPARATE OPPOSING DIRECTIONS OF TRAFFIC AND PROVIDE A REFUGE AREA FOR PEDESTRIANS IF THEY ARE UNABLE TO CROSS THE ENTIRE ROADWAY IN THE ALLOTTED SIGNAL PHASE. MEDIAN CROSSING SHALL BE A MINIMUM OF 5' WIDE. MEDIANS SHIOULD BE DESIGNED TO PROVIDE ACCESSIBLE PASSAGE OVER OR TROUGH THEM.
9. ALL SIDEWALK PLANS AND DETAILS SHALL BE SUBMITTED AND APPROVED BY "REGISTERED ACCESSIBILITY SPECIALIST" (RAS).
10. ANY PART OF THE ACCESSIBLE ROUTE WITH A SLOPE GRATER THAN 1:20 (5%) SHALL BE CONSIDERED A RAMP. IF A RAMP HAS A RISE GREATER THAN 6 INCHES OR A HORIZONTAL PROJECTION GREATER THAN 72 INCHES, THEN IT SHALL MEET THE REQUIREMENTS OF A RAMP PER TAS 405.THE ONLY EXCEPTION IS AT CURB RAMPS. HANDRAILS ARE NOT REQUIRED ON CURB RAMPS. CURB RAMPS SHALL BE PROVIDED WHERE EVER AN ACCESSIBLE ROUTE CROSSES (PENETRATES) A CURB.
11. TRAFFIC SIGNAL OR ILLUMINATION POLES, GROUND BOXES, CONTROLLER BOXES, SIGNS, DRAINAGE FACILITIES AND OTHER ITEMS SHALL BE PLACED SO NOT TO OBSTRUCT THE ACCESSIBLE ROUTE OR ACT PROTRUDING OBJECTS.
12. ALL SIDEWALKS SHALL BE DOWELED INTO EXISTING SIDEWALKS, DRIVEWALKS, DRIVEWAYS, INLET BOXES, RETAINING WALLS, ETC.
13. ALL SIDEWALK CROSS-SLOPES SHALL NOT EXCEED 1:50, UNLESS A VARIANCE IS PROVIDED BY TDLR.

(PENETRATES) A CURB.

REVISION NOTE:	REVISED 6/25/2015 WBD
REVISION NOTE:	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD28
PEDESTRIAN RAMPS GENERAL NOTES	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB



NOTE: ALL RAMPS SHALL BE CONTAINED WITHIN THE RESPECTIVE CURB RETURN RADIUS.

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

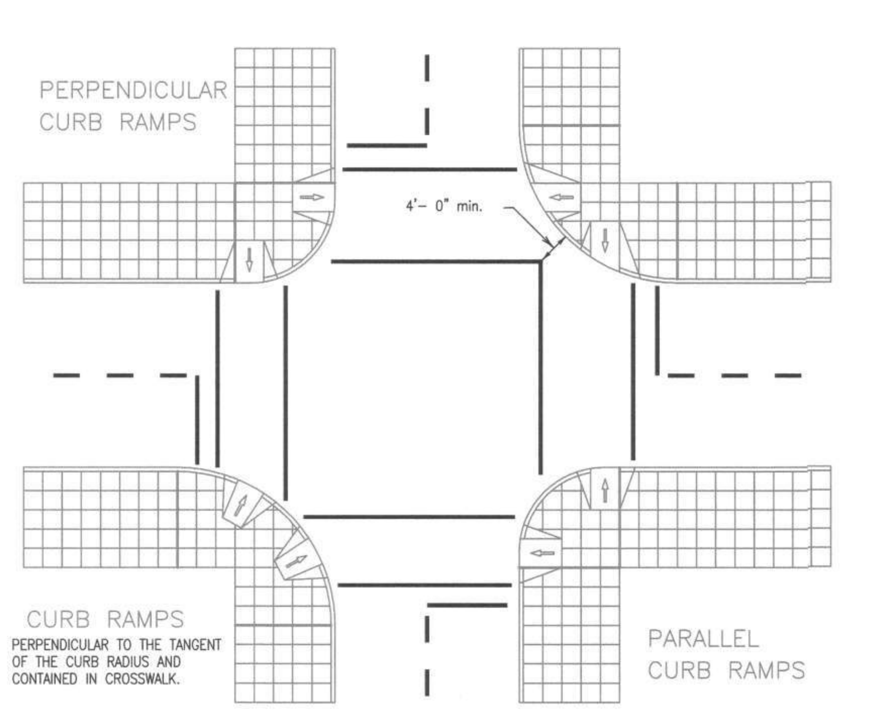
REVISION NOTE:	REVISED 6/29/2015 WBD
REVISION NOTE:	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD29
TYPICAL INTERSECTON LAYOUT	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB

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

CURB RAMP

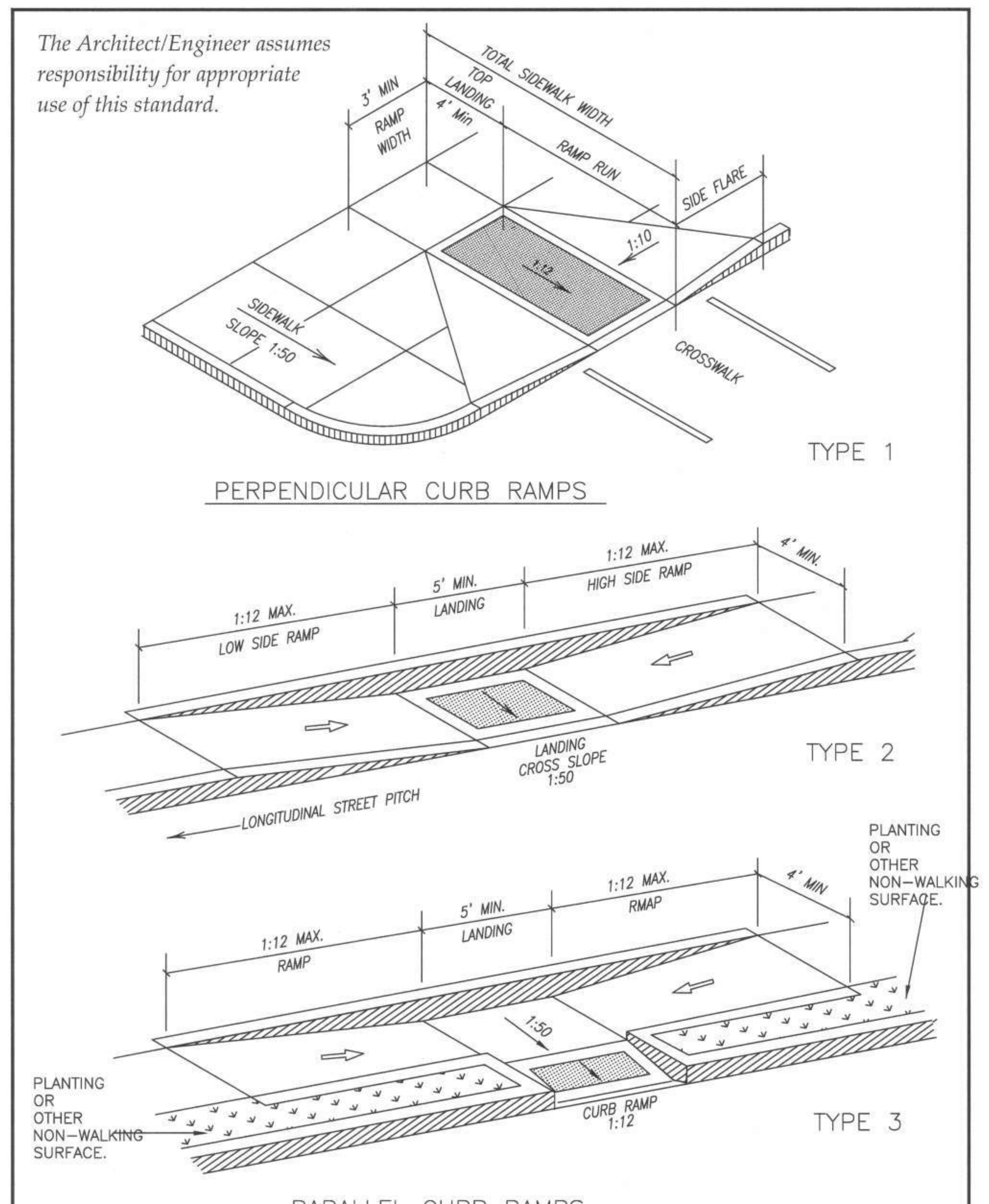
FOR ON-SYSTEM PROJECTS SUCH AS RESTORATION, SEAL COAT AND OVERLAY PROJECTS, PLACEMENT OF CURB RAMPS SHALL BE EVALUATED IN THE FOLLOWING ORDER OF PREFERENCE: PERPENDICULAR, PARALLEL OR COMBINATION. THE MOST PREFERABLE OPTION THAT IS FEASIBLE AT EACH CORNER SHALL BE PROVIDED.

ALL RAMPS SHALL BE CONTAINED WITHIN THE RESPECTIVE CURB RETURN RADIUS.



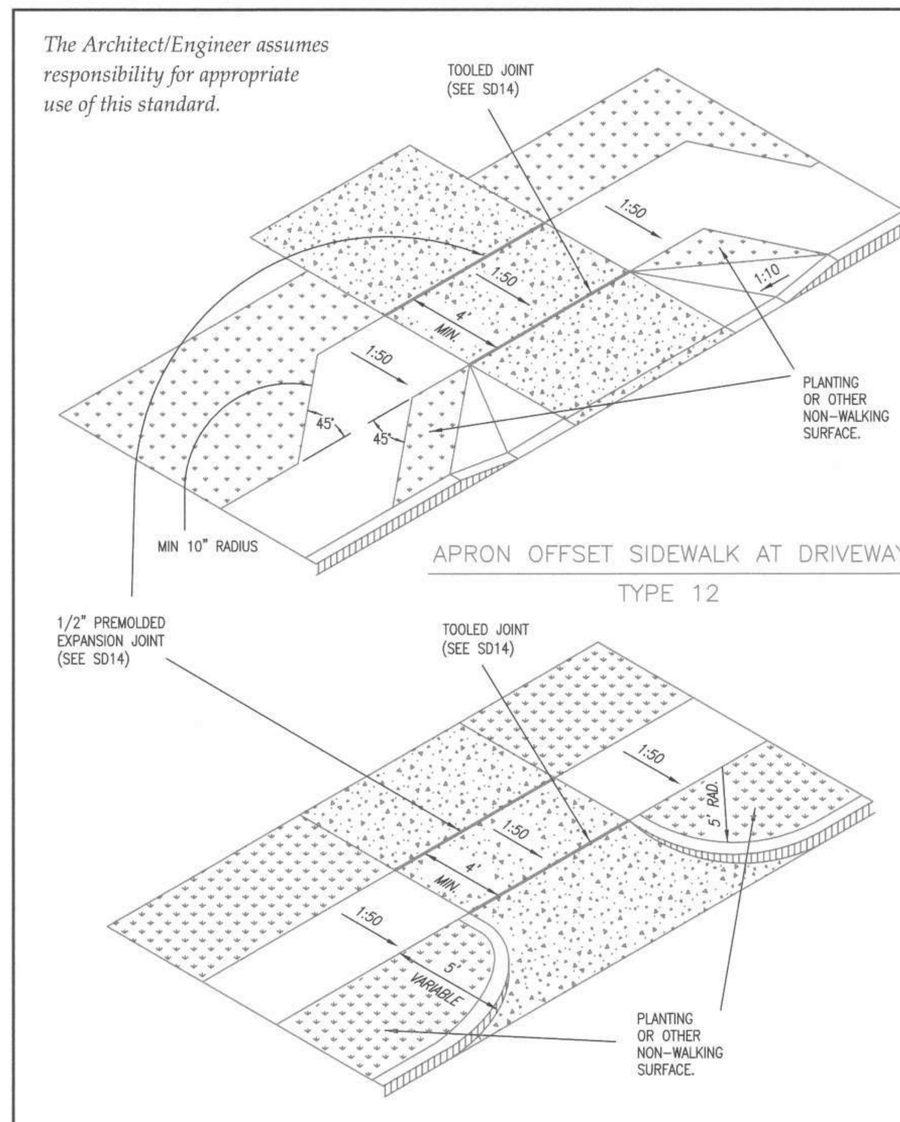
REVISION NOTE:	REVISED 6/26/2015 WBD
REVISION NOTE:	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD30
CURB RAMP PLACEMENTS AT INTERSECTIONS	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB

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

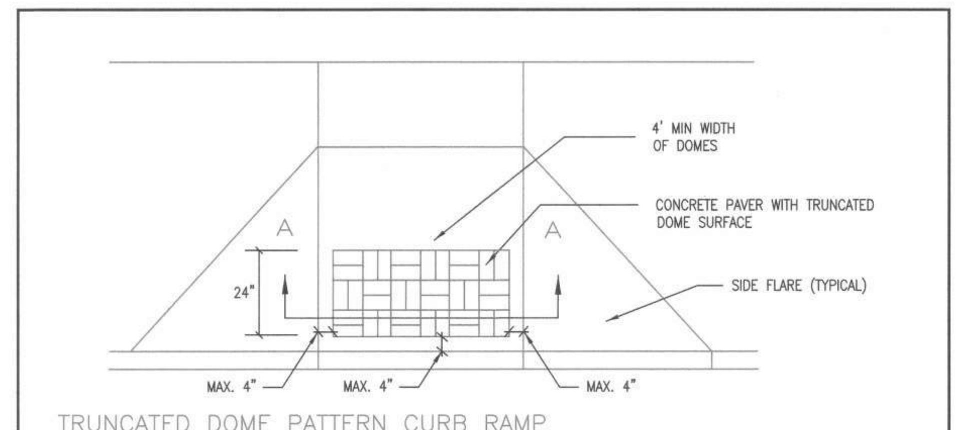


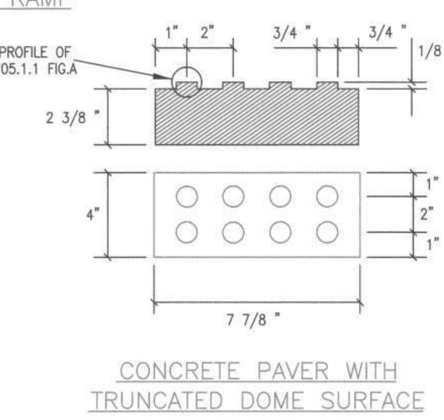
REVISION NOTE:	ADOPTED 6/21/2006
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD31
SIDEWALK RAMP DETAILS TYPE 1-3	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB

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



REVISION NOTE:	REVISED 7/7/2015 WBD
REVISION NOTE:	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD35
DRIVEWAY APRONS TYPES 12 & 13	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS; APPROVED BY: TRB





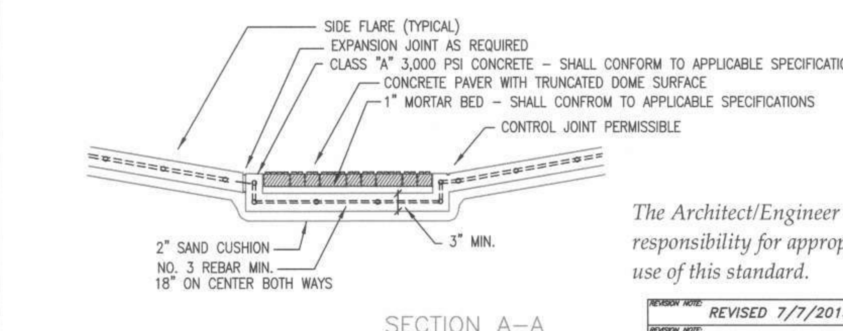
GENERAL NOTES

CONCRETE PAVER UNITS SHALL MEET ALL REQUIREMENTS OF ASTM C-936, C-33, AND SHALL BE LAID IN A TWO BY TWO UNIT BASKET WEAVE PATTERN, UNLESS SHOWN OTHERWISE IN THE PLANS.

CONCRETE PAVER UNIT SHALL HAVE A TRUNCATED DOME TOP SURFACE FOR DETECTABLE WARNING TO PEDESTRIANS.

CONCRETE PAVER UNIT COLOR FOR THE RAMP SHALL BE A CONTRASTING COLOR TO THE ADJACENT SURFACES. THE COLOR OF THE CONCRETE PAVER UNITS SHALL BE SHOWN ELSEWHERE IN THE PLANS. (ADJACENT SURFACES INCLUDE SIDE FLARES).

CONCRETE PAVER UNITS SHALL BE SAW CUT ONLY AND ANY CUT UNIT SHALL BE NOT LESS THAN 25 PERCENT OF A FULL UNIT.



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

REVISION NOTE:	REVISED 7/7/2015 WBD
REVISION NOTE:	REVISED 3/14/2014 WBD
	ADOPTED 6/21/2006 TRB
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DRAWING NAME: SD37
CURB RAMP TEXTURES TYPE A	SCALE: NTS; DATE: 1/2003; DRAWN BY: MRS/AP; APPROVED BY: TRB

NO.	REVISION	DATE

STATE OF TEXAS — MICHAEL S FISHER — 87704 — LICENSED PROFESSIONAL ENGINEER — 3/14/23

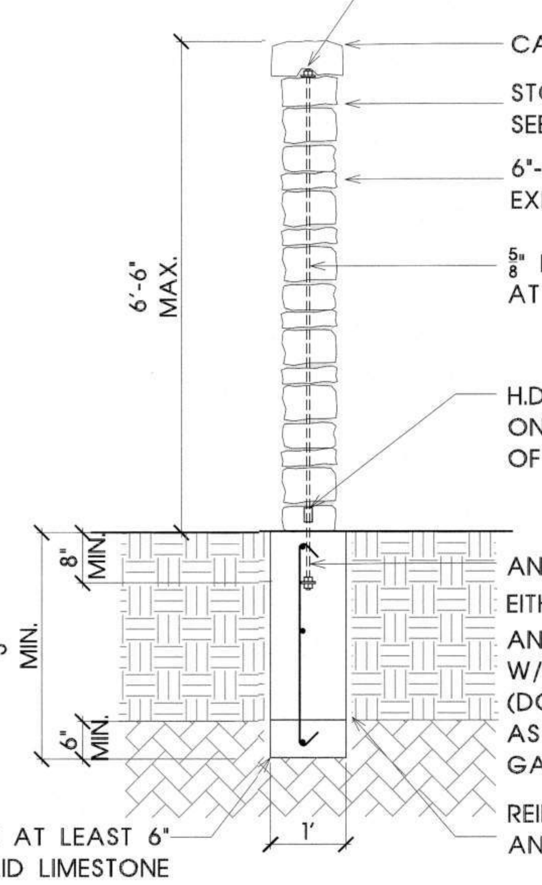
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

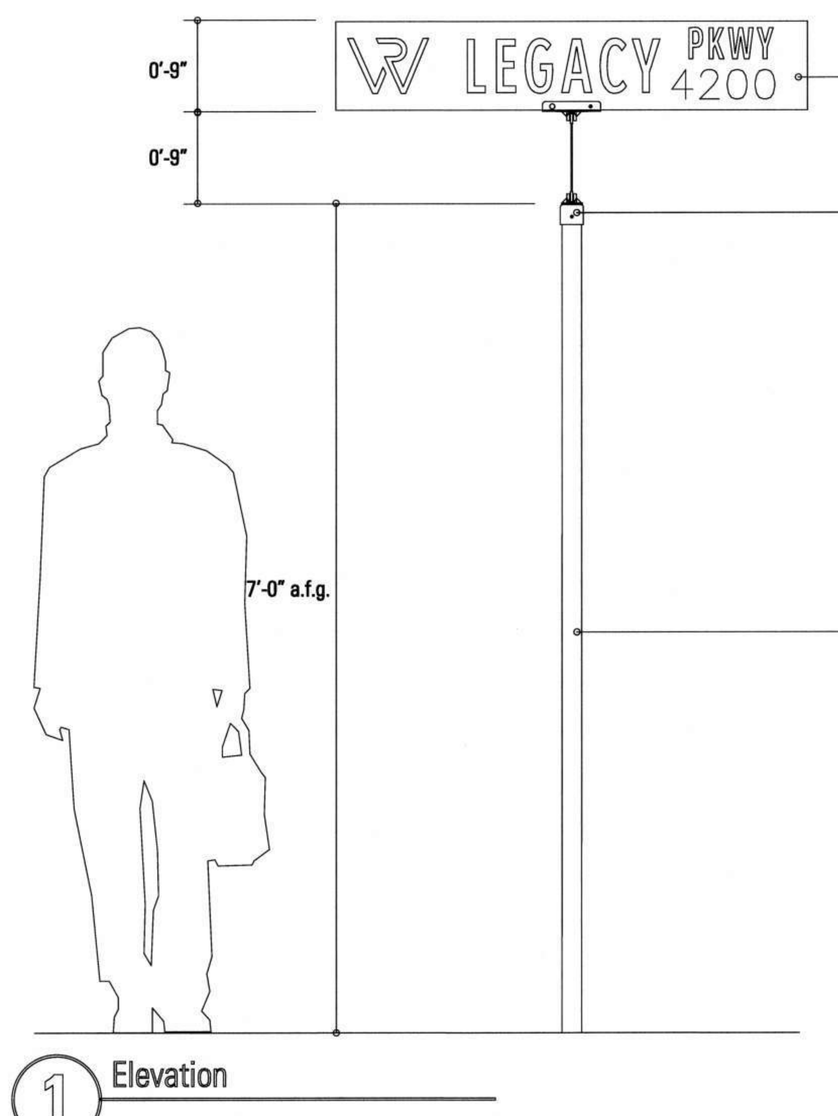
CONSTRUCTION DETAILS
STREET DETAILS 2 OF 3

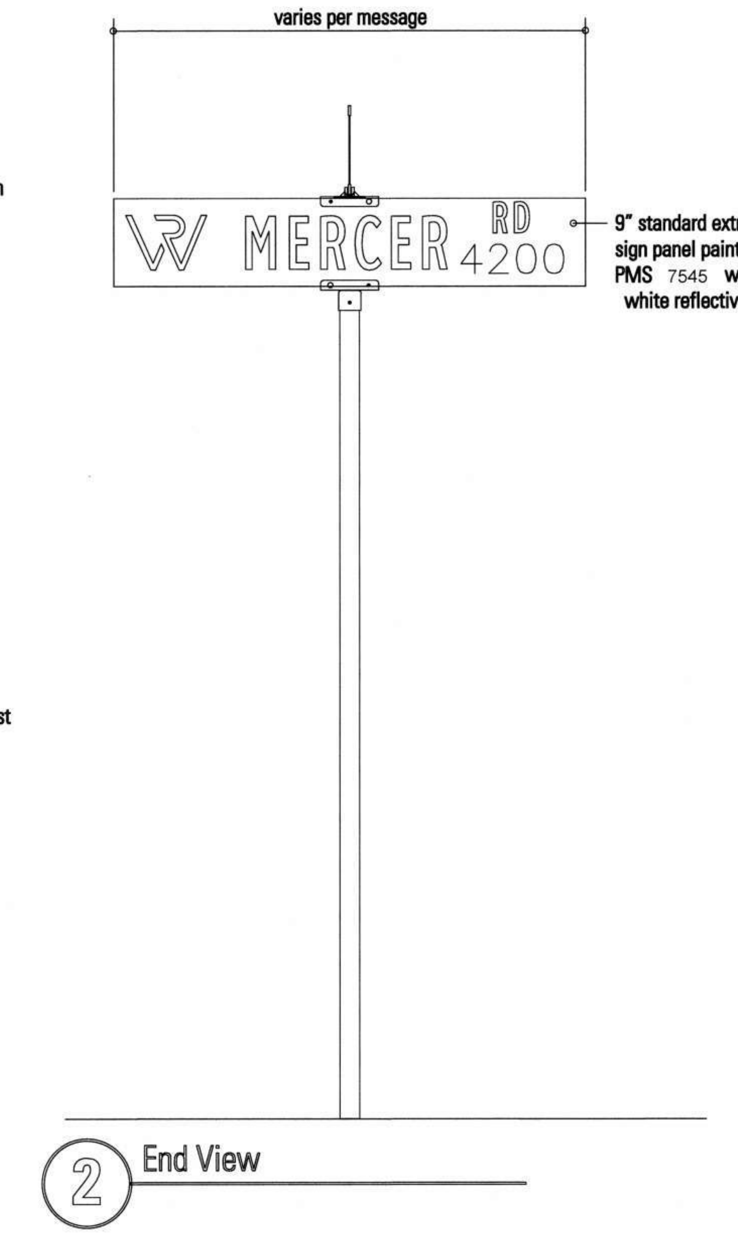
CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 55 OF 61

Date: Mar 20, 2023, 3:51pm User ID: aking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg

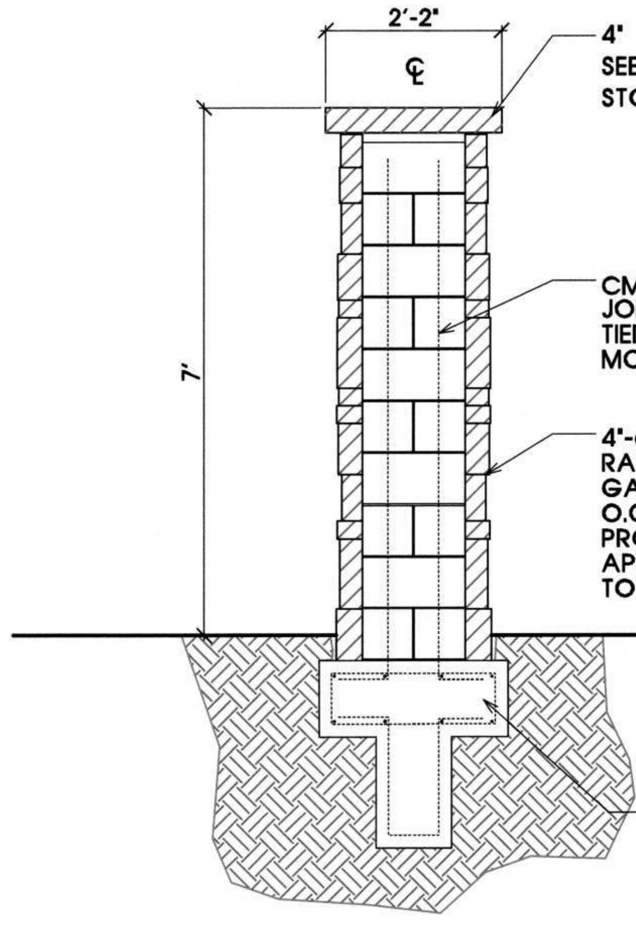


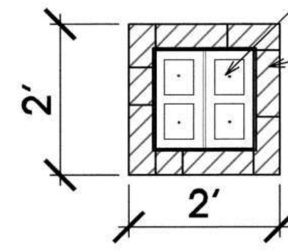
NOTES:
1. CONTRACTOR SHALL PROVIDE 4'X4' MOCKUP OF WALL STONE/BLOCK/VENEER FOR APPROVAL, PRIOR TO CONSTRUCTION.
2. JOINT MORTAR PER SHALL MATCH STONE COLOR, IF NOT SPECIFIED IN MATERIAL FINISH SCHEDULE OR NOTES..
3. PROVIDE WEEPS OR DRAINAGE BLOCK-OUTS, ±4"X4", AT MINIMUM SPACING OF 20' OC.
4. CONTRACTOR TO PROVIDE SHOP DRAWING FOR WALL INCLUDING STRUCTURE DETAILS, SEALED BY A LICENSED STRUCTURAL ENGINEER, PRIOR TO START.





CUSTOM STREET SIGN DETAIL





STONE COLUMN DETAIL

NO.	REVISION	DATE

STATE OF TEXAS
MICHAEL S. FISHER
87704
LICENSED
PROFESSIONAL ENGINEER
3/20/23

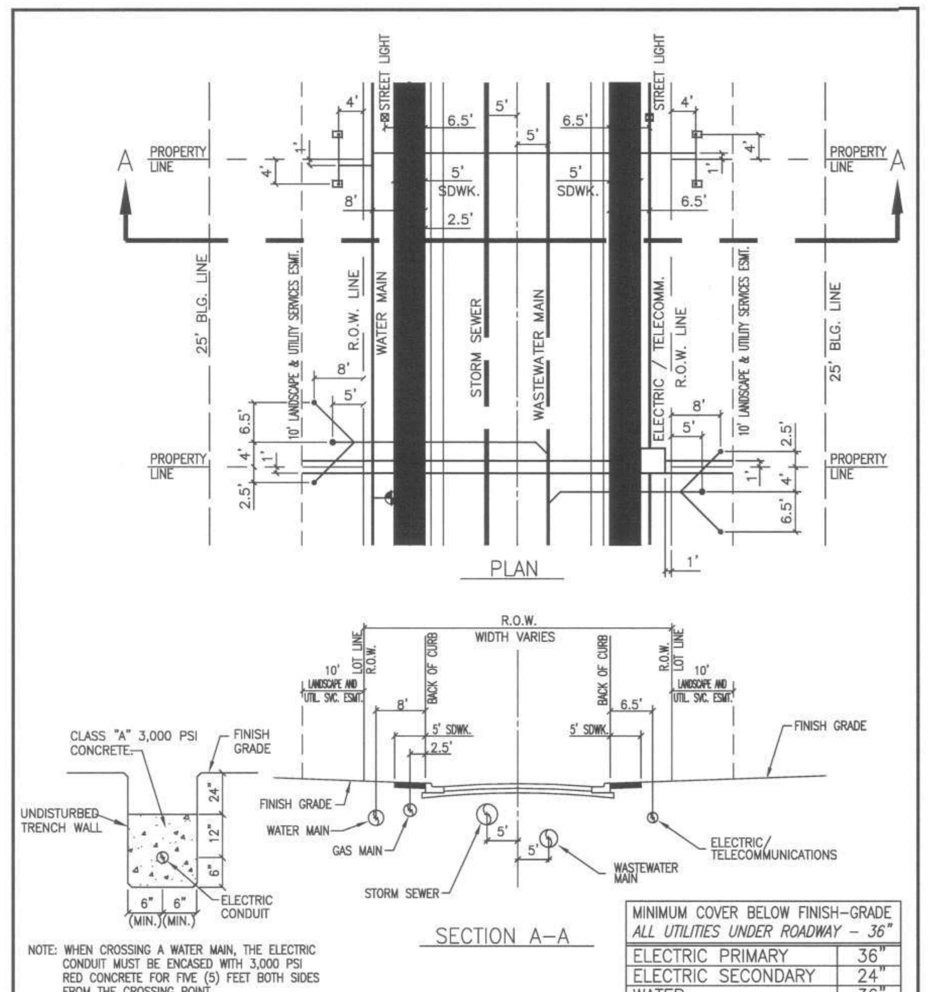
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
STREET DETAILS 3 OF 3

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 56 OF 61

Date: Mar 20, 2023, 3:51pm User ID: aking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg



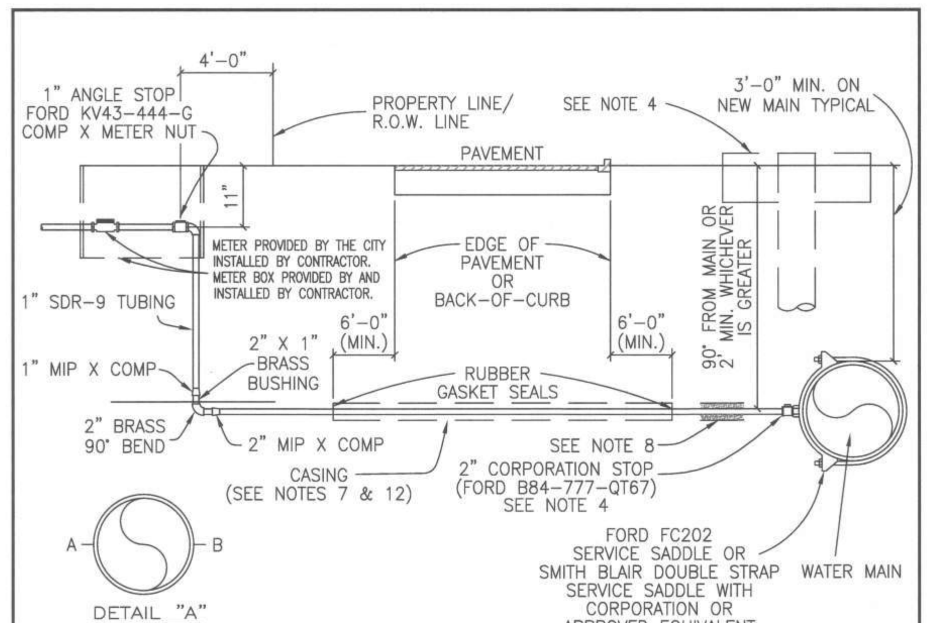
MINIMUM COVER BELOW FINISH-GRADE ALL UTILITIES UNDER ROADWAY – 36"	
ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

CLASSIFICATION	ROW	B-B	PVMT.
LOCAL STREET	50'	28'	24'
RESIDENTIAL STREET	65'	37'	33'
MAJOR COLLECTOR	73'	45'	41'

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

REVISION NOTE: ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL STREETS, RESIDENTIAL COLLECTORS AND MAJOR COLLECTORS
DRAWING NAME: W01A | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

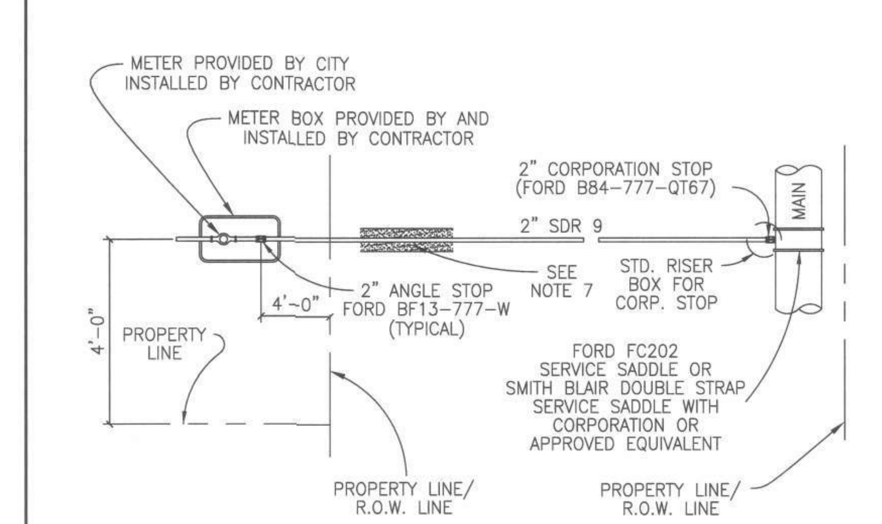


NOTES:
1. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" OFFSET AND AT THE CENTERLINE AS SHOWN ON DETAIL "A".
2. WHERE NO SIDEWALK EXISTS, METER BOXES SHALL BE SET TO CONFORM TO FINISHED GRADE.
3. AUTHORIZED SERVICE LINE MATERIAL: POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
4. ROTATE THE CORPORATION STOP SO THAT THE OPERATING NUT IS ACTUATED FROM THE VERTICAL POSITION RATHER THAN THE HORIZONTAL. SEE STD. RISER FOR CORP. STOP DETAIL, (DWG # W08).
5. SERVICE LINES SHALL BE CONTINUOUS FROM CORPORATION STOP TO CORPORATION STOP WITH NO FITTINGS IN BETWEEN.
6. SERVICE CASING SHALL NOT BE INSTALLED BY WATER JETTING UNDER ROADWAY.
7. CASING REQUIRED FOR ALL PAVEMENT CROSSINGS. 4" SDR-26 REQUIRED FOR OPEN-CUT. STEEL CASING PIPE REQUIRED FOR JACK AND BORE. LIMITS OF CASING SHOULD EXTEND SIX FEET BEYOND THE EDGE OF PAVEMENT OR BACK-OF-CURB.
8. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. METER BOX TO BE CAPABLE OF HOUSING ITRON AUTOMATIC METER READING DEVICE. USE DFW-PLASTICS, INC. PART NO. 1200.SBAMR OR APPROVED EQUAL.
11. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY. SEE DETAIL W23.
12. CASING SHALL EXTEND OUT TO WITHIN 4' INSIDE OF THE R.O.W. LINE, ON BOTH SIDES.

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

REVISION NOTE: ADOPTED 01/23/2013

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL WATER SERVICE-ELEVATION
DRAWING NAME: W03 | SCALE: NTS | DATE: 1/2013 | APPROVED BY: MH

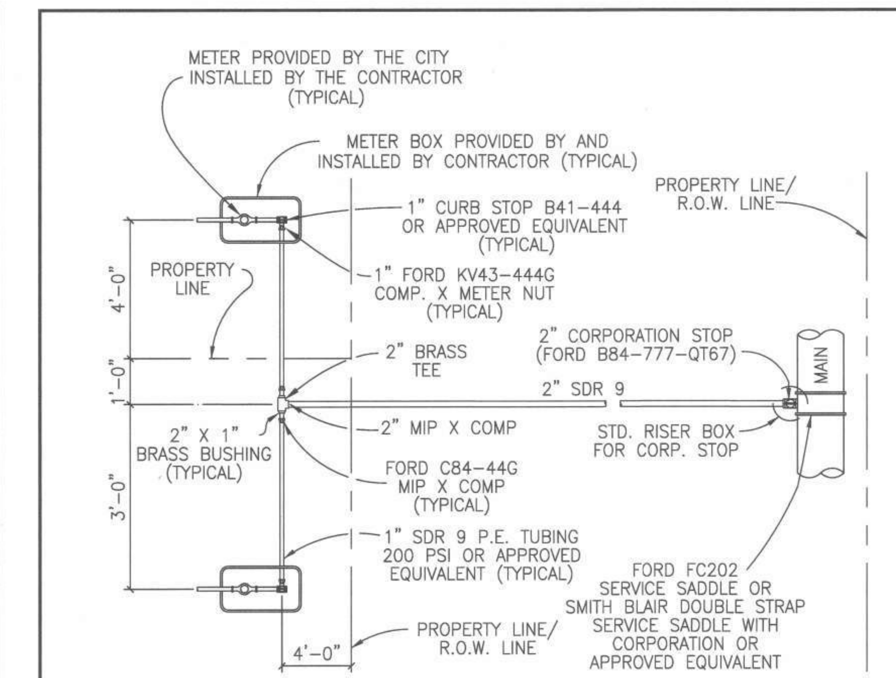


NOTES:
1. AUTHORIZED SERVICE LINE MATERIAL: POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
2. ANGLE STOP SHALL BE 1" MINIMUM.
3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
7. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

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

REVISION NOTE: ADOPTED 01/23/2013

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
SINGLE WATER SERVICE PLAN
DRAWING NAME: W04 | SCALE: NTS | DATE: 1/2013 | APPROVED BY: MH

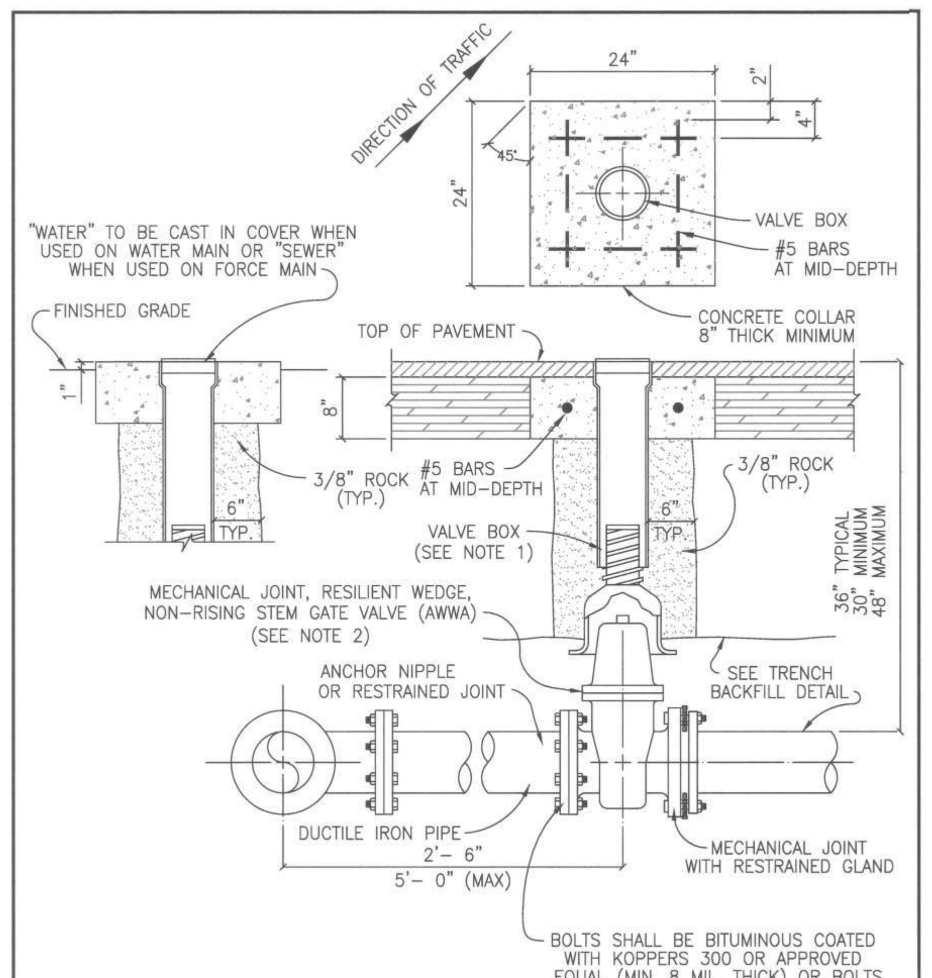


NOTES:
1. AUTHORIZED SERVICE LINE MATERIAL: POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
2. ANGLE STOP SHALL BE 1" MINIMUM.
3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
7. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

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

REVISION NOTE: ADOPTED 01/23/2013

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
DOUBLE WATER SERVICE PLAN
DRAWING NAME: W05 | SCALE: NTS | DATE: 1/2013 | APPROVED BY: MH

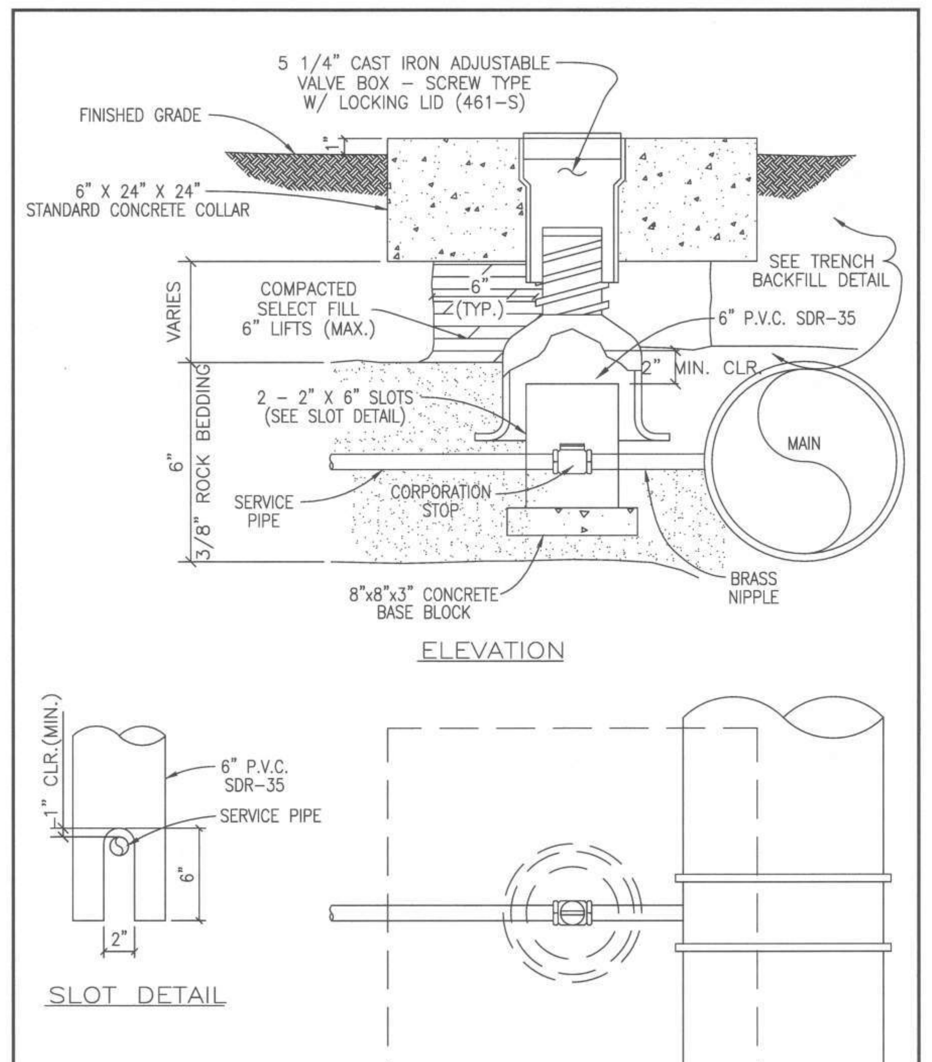


NOTES:
1. VALVE BOX SHALL BE 5 1/4" CAST IRON ADJUSTABLE HAVING AN ADJUSTABLE RANGE OF + OR – 6 INCHES FROM INSTALLED FINISH GRADE.
2. ACCEPTABLE GATE VALVES ARE:
   A. AMERICAN FLOW CONTROL – SERIES 2500
   B. MUELLER – 2360 SERIES
   C. CLOW

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

REVISION NOTE: ADOPTED 6/21/2006

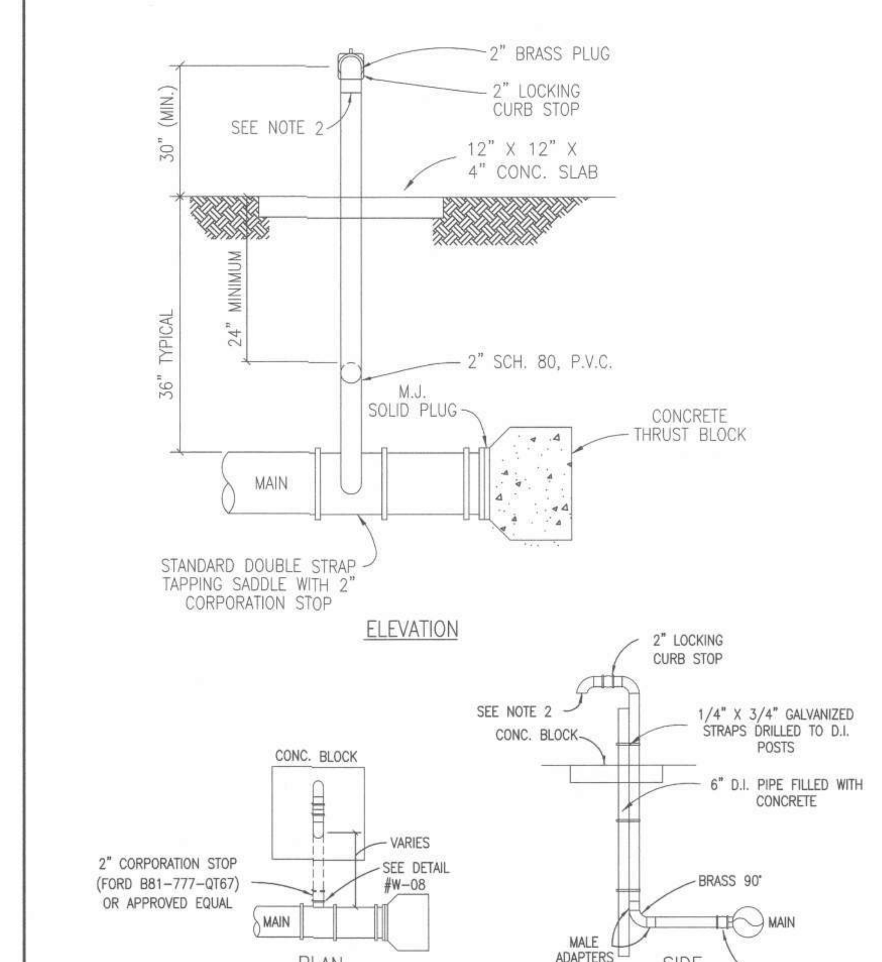
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL VALVE SETTING
DRAWING NAME: W07 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



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

REVISION NOTE: ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD RISER BOX FOR CORPORATION STOP
DRAWING NAME: W08 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

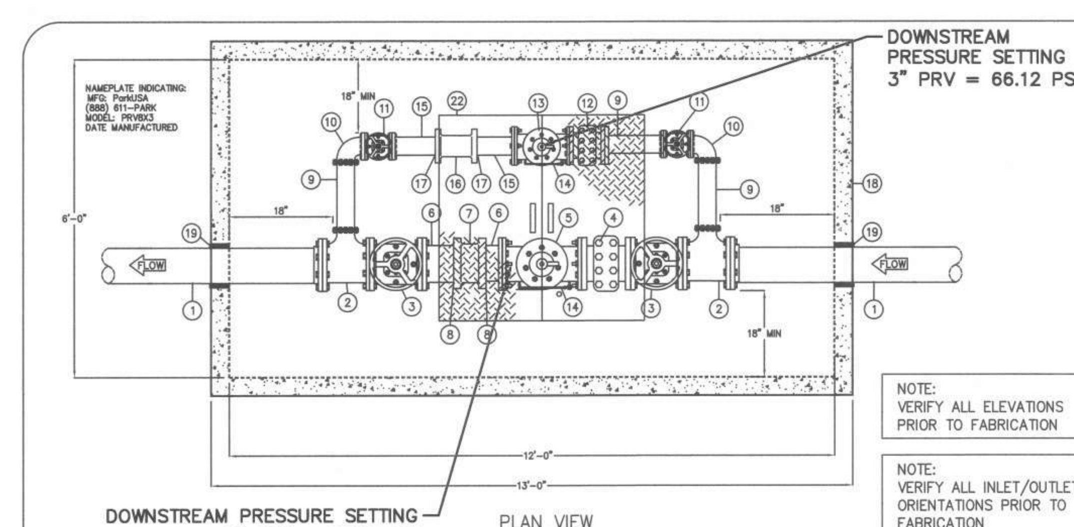


NOTE:
1. ATTACH FIRE HYDRANT CONNECTION AT THE END OF THE BLOW OFF VALVE.

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

REVISION NOTE: ADOPTED 6/21/2006

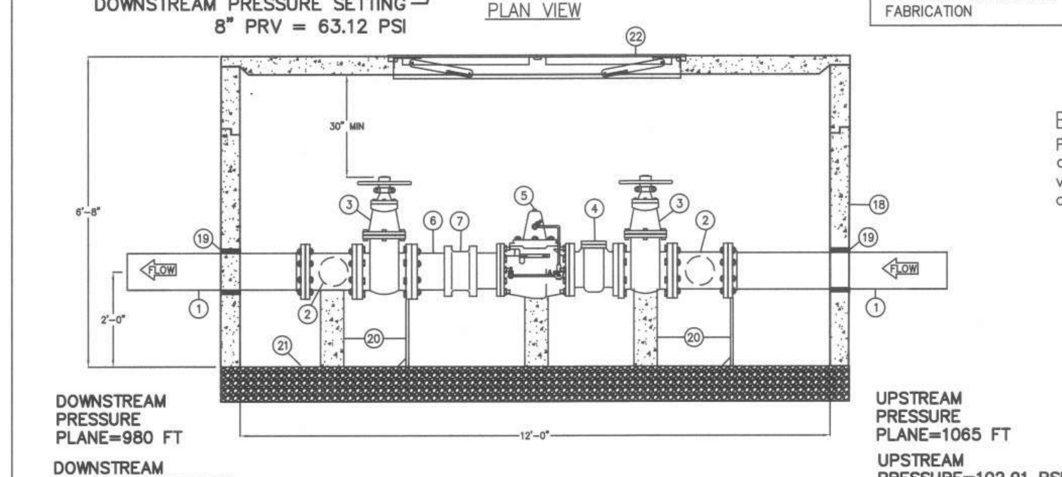
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD BLOW-OFF
DRAWING NAME: W09 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTE:
VERIFY ALL ELEVATIONS PRIOR TO FABRICATION

NOTE:
VERIFY ALL INLET/OUTLET ORIENTATIONS PRIOR TO FABRICATION

BILL OF MATERIAL			
ITEM NO.	QTY.	DESCRIPTION	
1	2	8" X 48" SPOOL PIPE	FL & PE
2	2	8"x3" SHORT TEE	FL & FL
3	2	8" RESILIENT WEDGE GATE VALVE	FL & FL
4	1	8" DOMESTIC PLATE STRAINER	FL & FL
5	1	8" PRESSURE REDUCING VALVE	FL & FL
6	2	8" X 12" SPOOL PIPE	FL & PE
7	1	8" MJ SHORT SLEEVE	MJ & MJ
8	2	8" MJ RESTRAINTS (STARGRIP)	MJ
9	3	3" X 12" SPOOL PIPE	FL & FL
10	2	3" 90° ELBOW	FL & FL
11	2	3" RESILIENT WEDGE GATE VALVE	FL & FL
12	1	3" DOMESTIC PLATE STRAINER	FL & FL
13	1	3" PRESSURE REDUCING VALVE	FL & FL
14	1	PRESSURE REDUCING VALVE TRIM (SS)	
15	2	3" X 16" SPOOL PIPE	FL & PE
16	1	3" MJ LONG SLEEVE	MJ & MJ
17	2	8" MJ RESTRAINTS (STARGRIP)	MJ
18	1	PRE-CAST CONCRETE VALVE VAULT	
19	2	PENETRATION FILLED w/ NON-SHRINK GROUT	
20	6	CONCRETE/GALVANIZED STEEL SUPPORT	
21	1	GRAVEL BED – BY OTHERS	
22	1	48" x 72" ALUMINUM DOUBLE-LEAF HATCHWAY	



ELEVATION

Engineering Data
Field excavation and preparation shall be completed prior to delivery of assembly. Use dimensional data as shown. Pipe, valves and fittings of the assembly are approved by one or more of the following associations:

© Park 2017

PROJECT :
CUSTOMER :
ARCHITECT :
ENGINEER :
ORDER # :
DATE : PM: MSS

888.611.7275
www.park-usa.com
PARK USA Design for Water

8" X 3" PRESSURE REDUCING VALVE ASSEMBLY w/ CONCRETE VAULT
SCALE: NONE | DATE: 02/17 | DWG. NO.: PRV8X3 | REV.: A

Specifications

CONCRETE :
Class I/II concrete with design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth. Gross empty weight of approximately 35,000 pounds.

REINFORCEMENT:
Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

ACCESS COVER:
Aluminum diamond plate cover with extruded aluminum frame. Hatch to be furnished with stainless steel slam lock & hinges.

NO.	REVISION	DATE

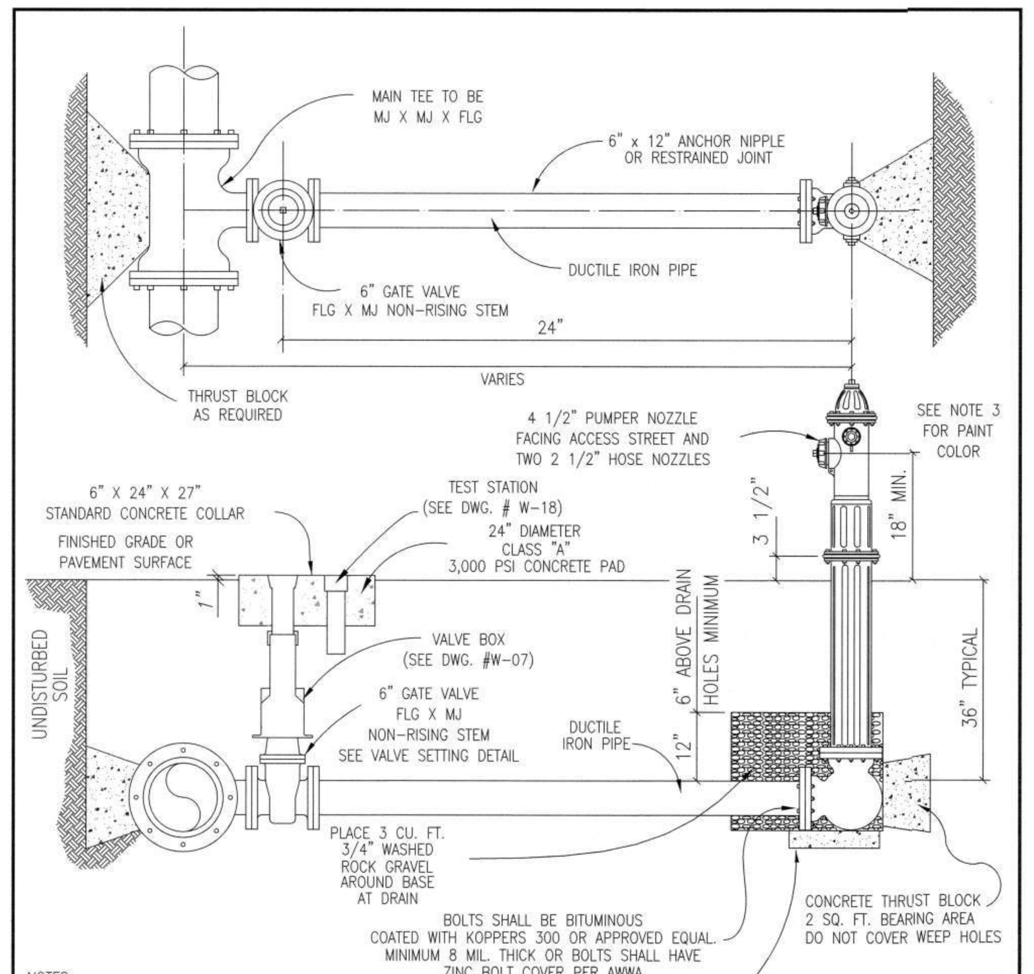
MICHAEL S. FISHER 87704 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS 3/20/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
WATER DETAILS 1 OF 2

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 57 OF 61



NOTES:

1. FIRE HYDRANT SHALL BE INSTALLED ON SAME SIDE OF ROAD AS WATER MAIN.
2. FIRE HYDRANT SHALL BE INSTALLED PLUMB AND TRUE.
3. ALL FIRE HYDRANT EXTERIORS SHALL BE FACTORY PRIMED AND PAINTED SILVER USING A HIGH GRADE ENAMEL.
4. HEEL AND THRUST BLOCKS TO REST IN UNDISTURBED SOIL.
5. THE ONLY FIRE HYDRANTS ACCEPTABLE ARE:
   A. KENNEDY – K81
   B. AMERICAN DARLING – B84B
   C. CLOW MEDALLION
6. DOUBLE BLUE REFLECTOR "HYE-LITES" BRAND, MANUFACTURED BY PAVEMENT MARKERS INC. TO BE INSTALLED AT CENTERLINE OF STREET PERPENDICULAR TO HYDRANT.
7. ALL METALLIC PIPES AND FITTINGS SHALL BE WRAPPED WITH 8 MILL. POLYETHELENE FILM.

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

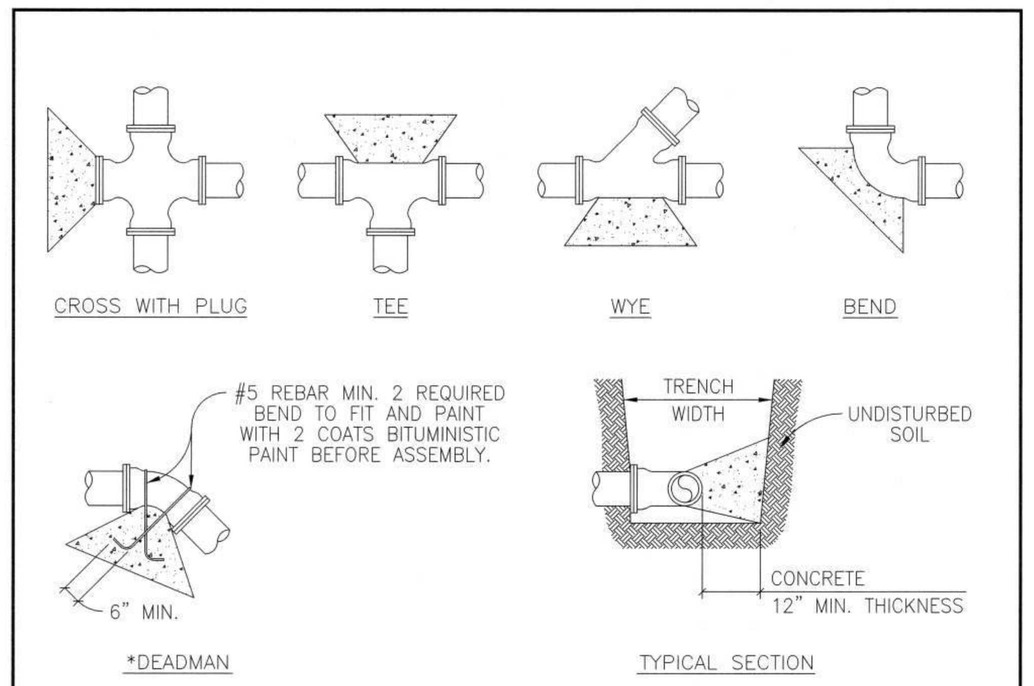
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

TYPICAL FIRE HYDRANT INSTALLATION

DRAWING NAME: W10 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



ALL THRUST BLOCKS SHALL BE FORMED. LAID FORMS SHALL BE INSPECTED BY THE CITY OF GEORGETOWN PRIOR TO THE POURING OF CONCRETE AND SHALL ALSO BE INSPECTED BY THE CITY OF GEORGETOWN PRIOR TO COVERING. TYPICAL LOCATIONS WHICH REQUIRE CONCRETE REACTION (THRUST) BLOCKS, FOR PRESSURE MAINS FOUR INCHES (4") AND GREATER. CONCRETE SHALL HAVE 2,500 P.S.I. MINIMUM STRENGTH AT TWENTY EIGHT (28) DAYS AND BEAR AGAINST UNDISTURBED STABLE SOILS, AREA OF CONTACT SHALL BE GOVERNED BY PIPE SIZE, MAXIMUM PRESSURE IN PIPE, AND BEARING CAPACITY OF SOIL. PROTECT FITTINGS, BOLTS, ETC. BY COVERING WITH VISQUEEN OR OTHER ACCEPTABLE MATERIAL. CONCRETE SHALL BE A MINIMUM OF TWELVE INCHES (12") THICK.

PIPE SIZE	THRUST BLOCK AREA REQUIRED	PIPE SIZE	THRUST BLOCK AREA REQUIRED	REMARKS
4"	2.0 SQ. FT.	18"	30.0 SQ. FT.	VALUES ARE FOR 90° BENDS, BASED ON 2000 P.S.F. SAFE BEARING LOAD AND PIPE PRESSURE OF 150 P.S.I. PLUS 33% SAFETY FACTOR FOR OTHER SOILS AND PRESSURES, THE AREA REQUIRED IS IN DIRECT PROPORTION.
6"	4.0 SQ. FT.	20"	37.0 SQ. FT.	
8"	6.6 SQ. FT.	24"	53.0 SQ. FT.	
10"	10.0 SQ. FT.	27"	80.0 SQ. FT.	
12"	14.0 SQ. FT.	30"	98.0 SQ. FT.	
14"	18.0 SQ. FT.	36"	127.0 SQ. FT.	
16"	24.0 SQ. FT.			

* THE ENGINEER OF RECORD SHALL CALCULATE THE SIZE OF THE DEADMAN REQUIRED AS WELL AS ANY INSTALLATION WHICH IS NOT COVERED BY THE ABOVE.

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

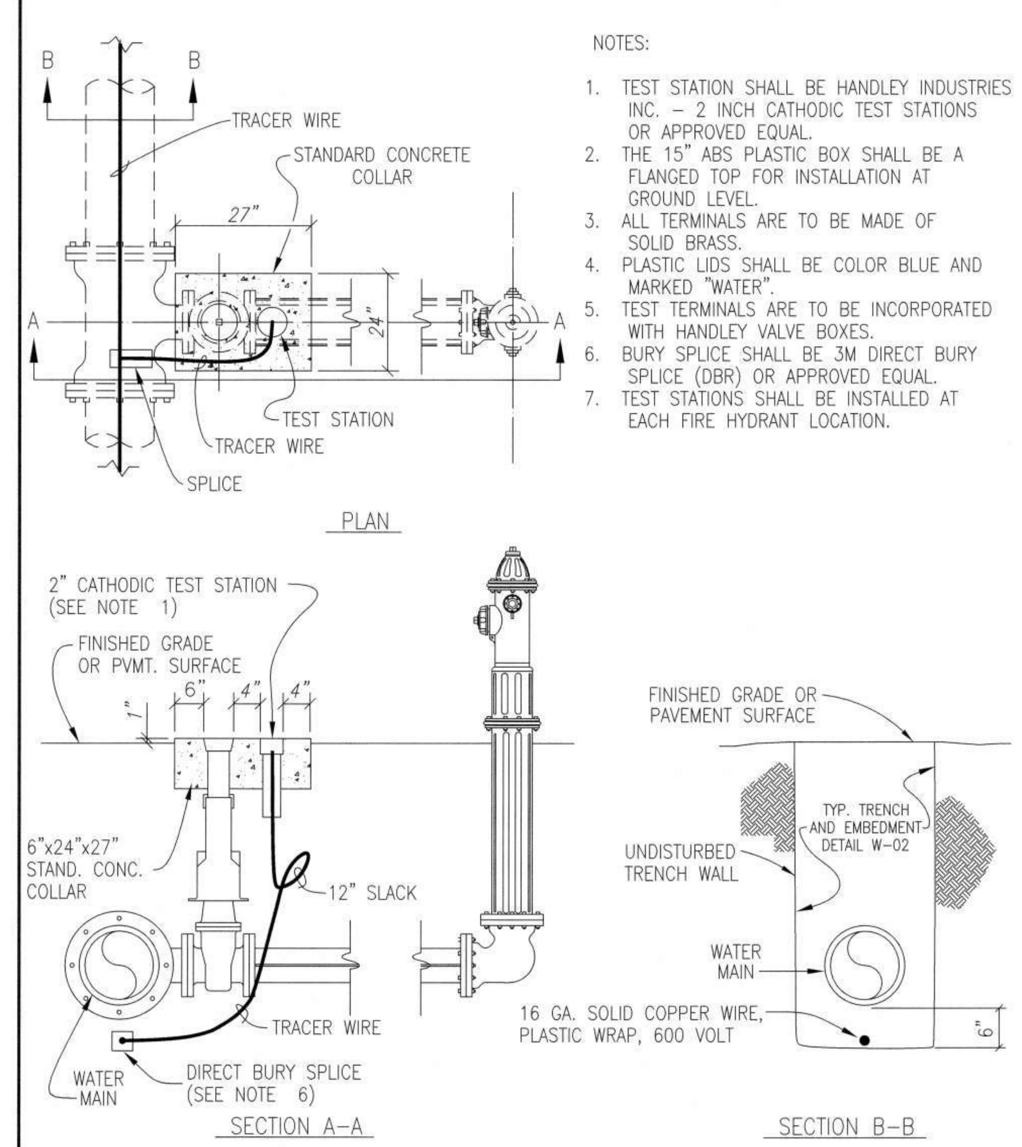
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

TYPICAL THRUST BLOCKS FOR WATER AND FORCE MAIN

DRAWING NAME: W11 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTES:

1. TEST STATION SHALL BE HANDLEY INDUSTRIES INC. – 2 INCH CATHODIC TEST STATIONS OR APPROVED EQUAL.
2. THE 15" ABS PLASTIC BOX SHALL BE A FLANGED TOP FOR INSTALLATION AT GROUND LEVEL.
3. ALL TERMINALS ARE TO BE MADE OF SOLID BRASS.
4. PLASTIC LIDS SHALL BE COLOR BLUE AND MARKED "WATER".
5. TEST TERMINALS ARE TO BE INCORPORATED WITH HANDLEY VALVE BOXES.
6. BURY SPLICE SHALL BE 3M DIRECT BURY SPLICE (DBR) OR APPROVED EQUAL.
7. TEST STATIONS SHALL BE INSTALLED AT EACH FIRE HYDRANT LOCATION.

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

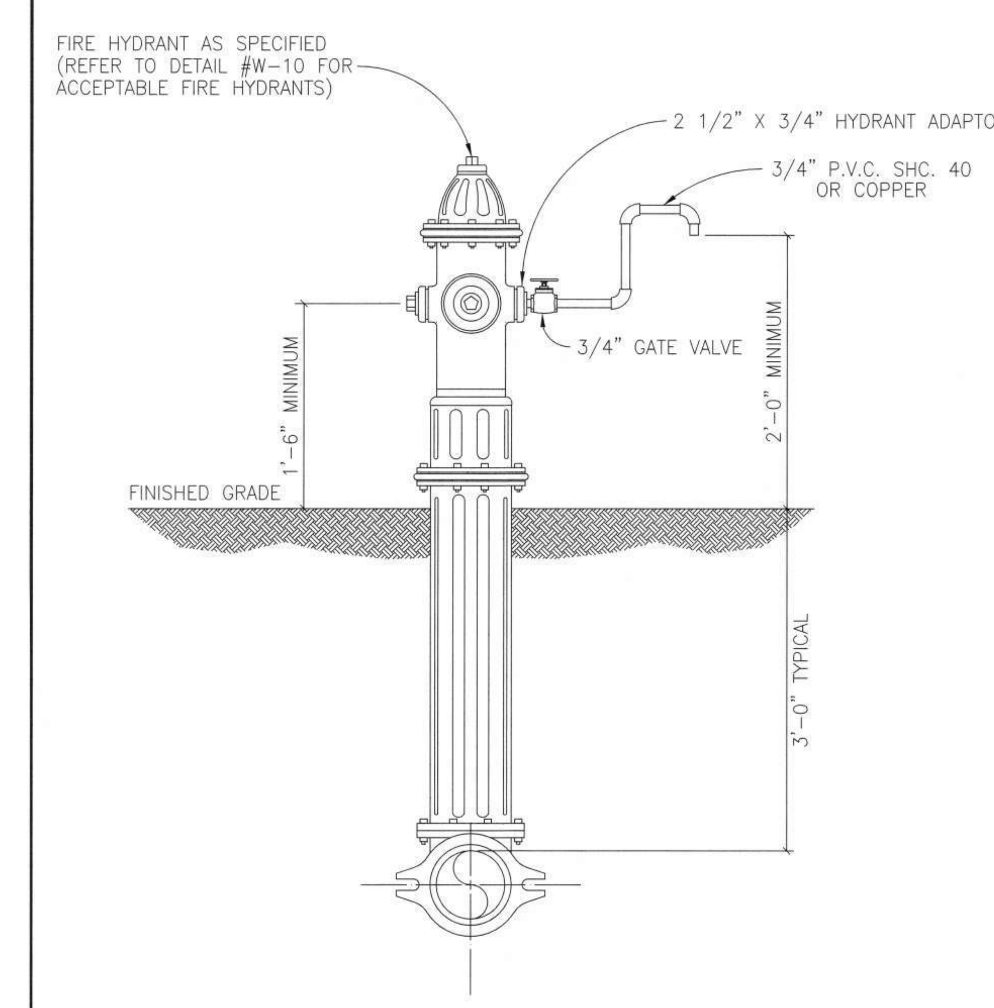
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

TRACER WIRE INSTALLATION AND TEST STATION LOCATION

DRAWING NAME: W18 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



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

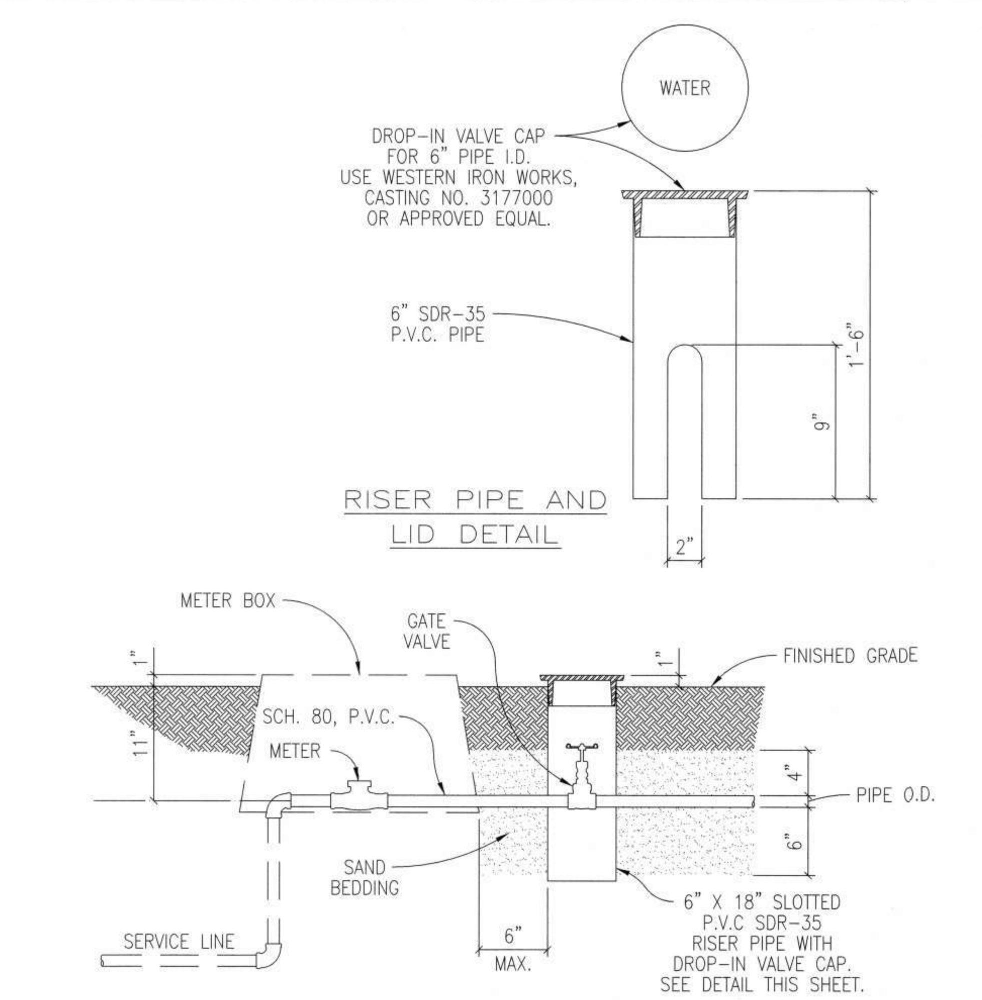
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

FIRE HYDRANT SAMPLING POINT

DRAWING NAME: W19 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTES:

1. GATE VALVE SHALL BE A HAMMOND IB645, CLASS 125, BRONZE GATE, SCREWED BONNET, NON-RISING STEM, SOLID WEDGE DISC WITH THREADED ENDS OR APPROVED EQUAL.
2. DROP-IN VALVE CAP SHALL BE CAST WITH THE WORD "WATER" ON TOP.
3. USE SCHEDULE 80, M.I.P. ADAPTER AS REQUIRED.

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

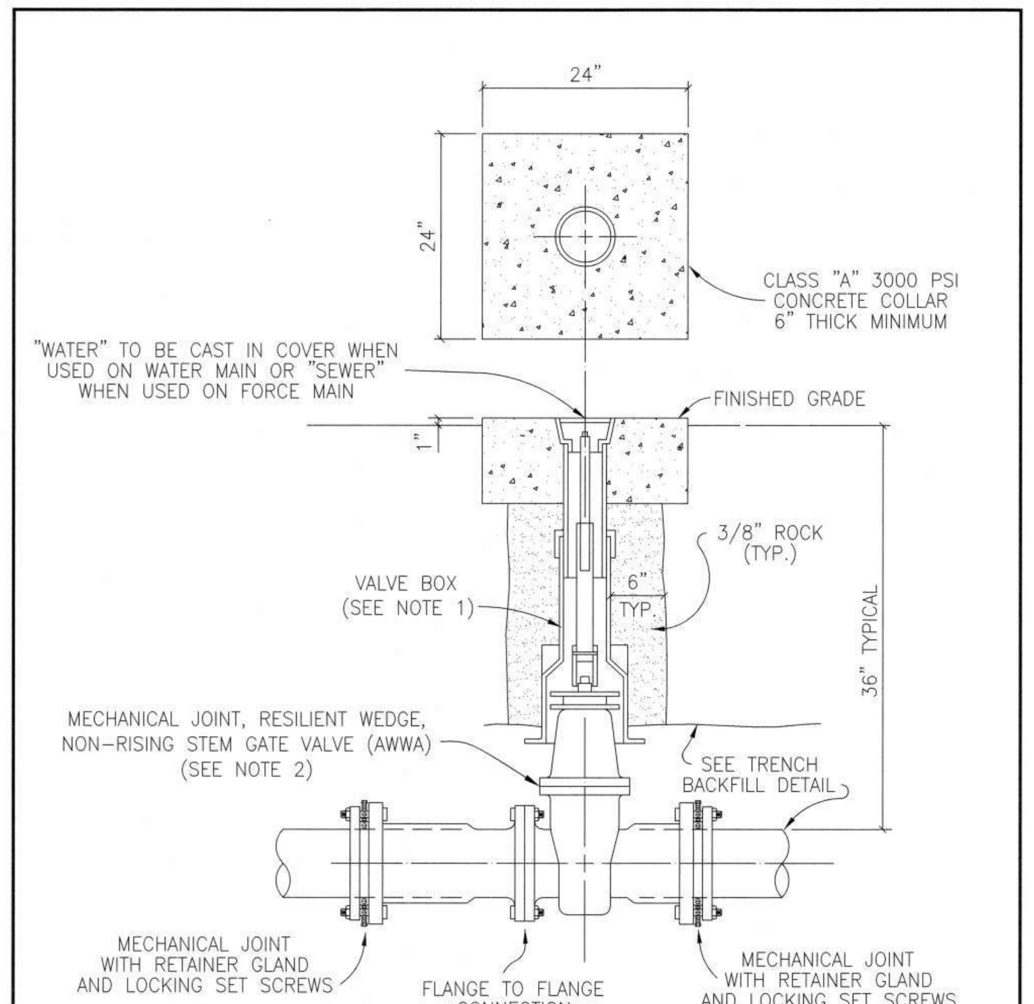
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

CUSTOMER'S CUT-OFF

DRAWING NAME: W20 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTES:

1. SEE VALVE SETTING DETAIL, DWG. #W-07.
2. ACCEPTABLE GATE VALVES ARE:
   A. MUELLER – 2360 SERIES
   B. CLOW

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

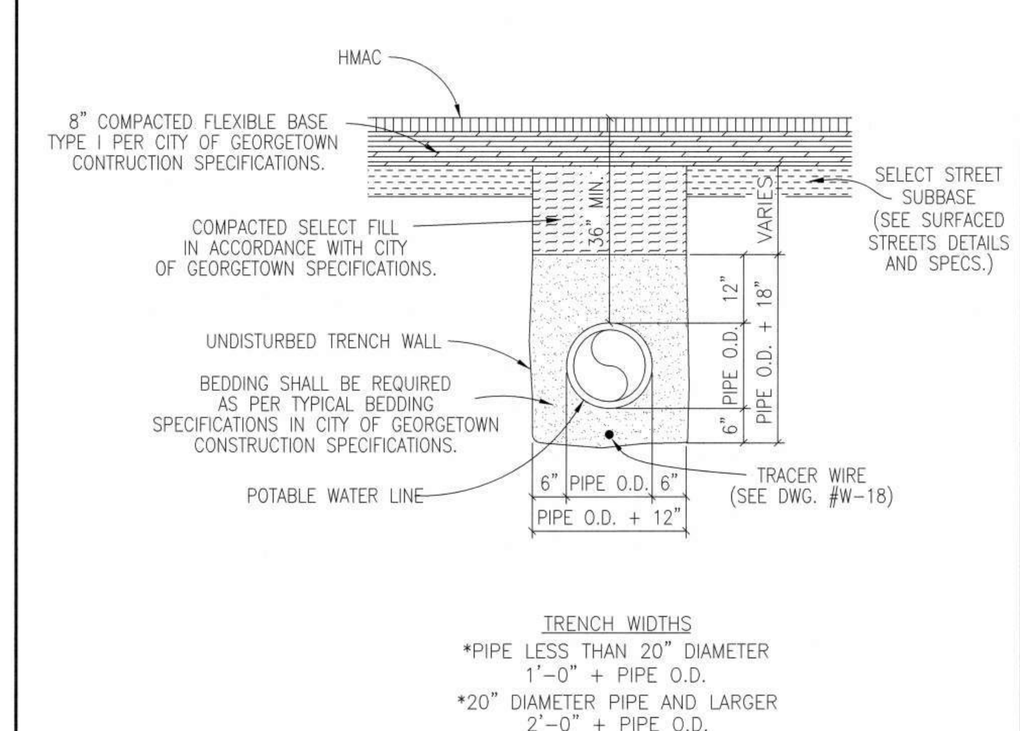
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

INLINE VALVE INSTALLATION

DRAWING NAME: W21 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: 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. 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).

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

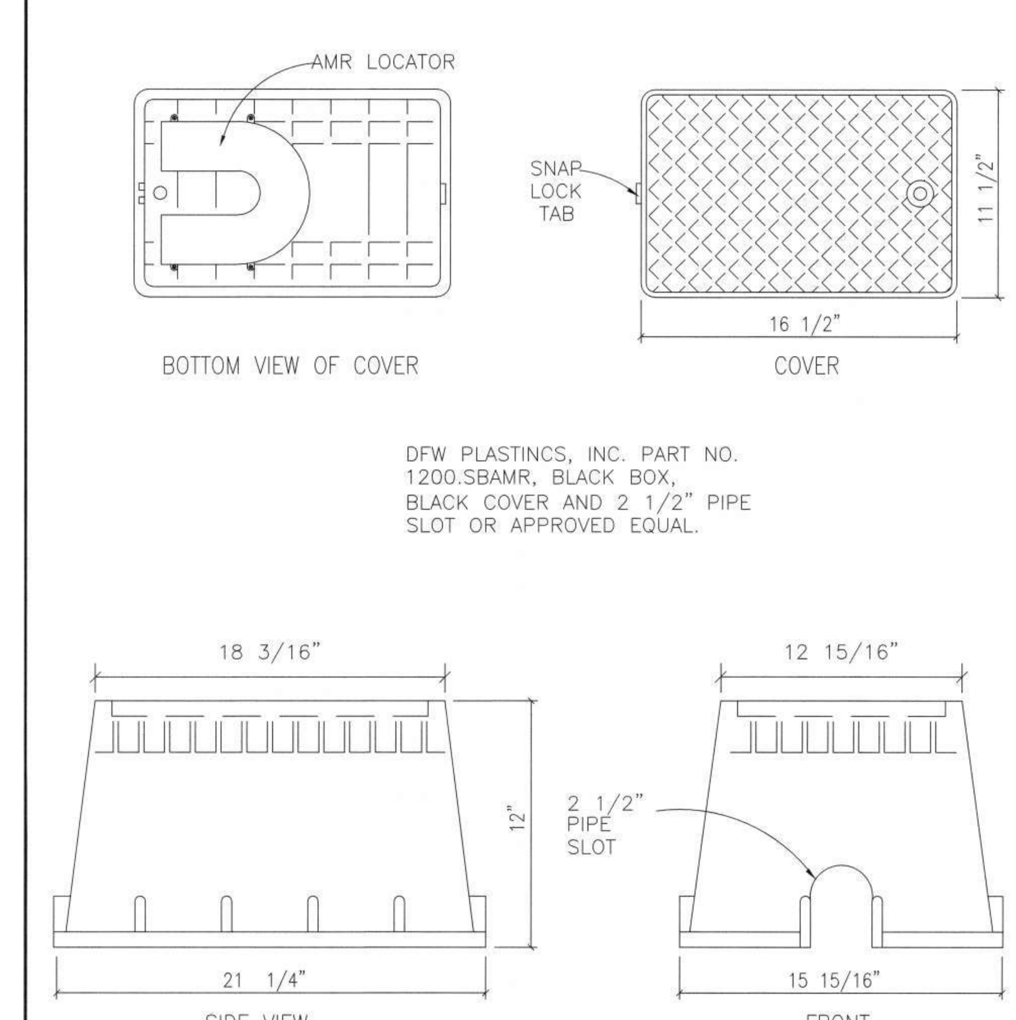
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY

DRAWING NAME: W22 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



DFW PLASTINCS, INC. PART NO. 1200.SBAMR, BLACK BOX, BLACK COVER AND 2 1/2" PIPE SLOT OR APPROVED EQUAL.

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

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS EST. 1848 Georgetown Utility Systems Your Community Owned Utility

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS

METER BOX (NON-TRAFFIC AREAS)

DRAWING NAME: W23 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

NO. | REVISION | DATE

STATE OF TEXAS MICHAEL S FISHER 87704 LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS

10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711

TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2 CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS WATER DETAILS 2 OF 2

CITY JOB No. 2022-5-CON

JOB NO. 51127-42

DATE March 20, 2023

DESIGNER DB

CHECKED JF DRAWN DB

SHEET 58 OF 61

Date: Mar 20, 2023, 3:52pm User ID: aking
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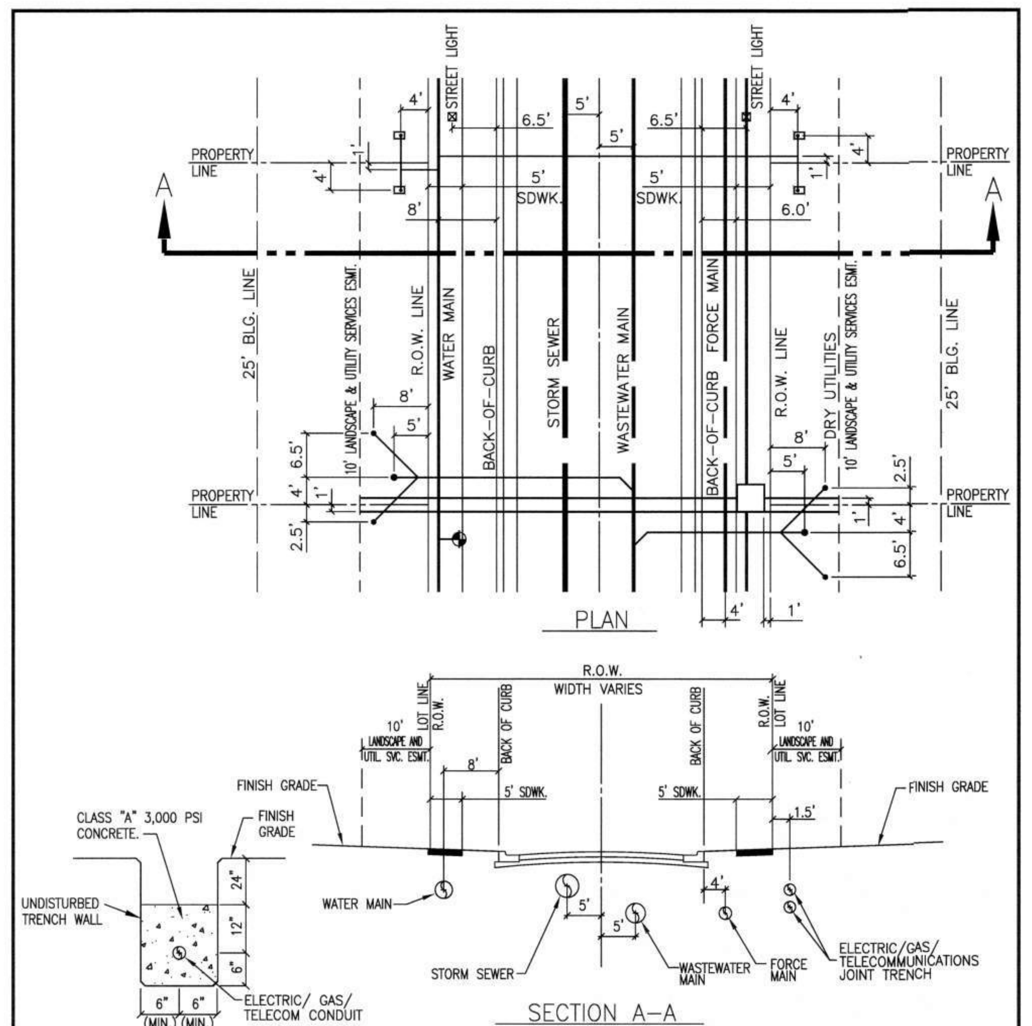


NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC/ GAS/ TELECOM CONDUIT MUST BE ENCASED WITH 3,000 PSI RED CONCRETE FOR FIVE (5) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT
CONCRETE ENCASEMENT DETAIL

CLASSIFICATION	ROW	B-B	PVMT.
LOCAL STREET	50'	28'	24'
RESIDENTIAL STREET	65'	37'	33'
MAJOR COLLECTOR	73'	45'	41'

MINIMUM COVER BELOW FINISH-GRADE ALL UTILITIES UNDER ROADWAY - 36"	
ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

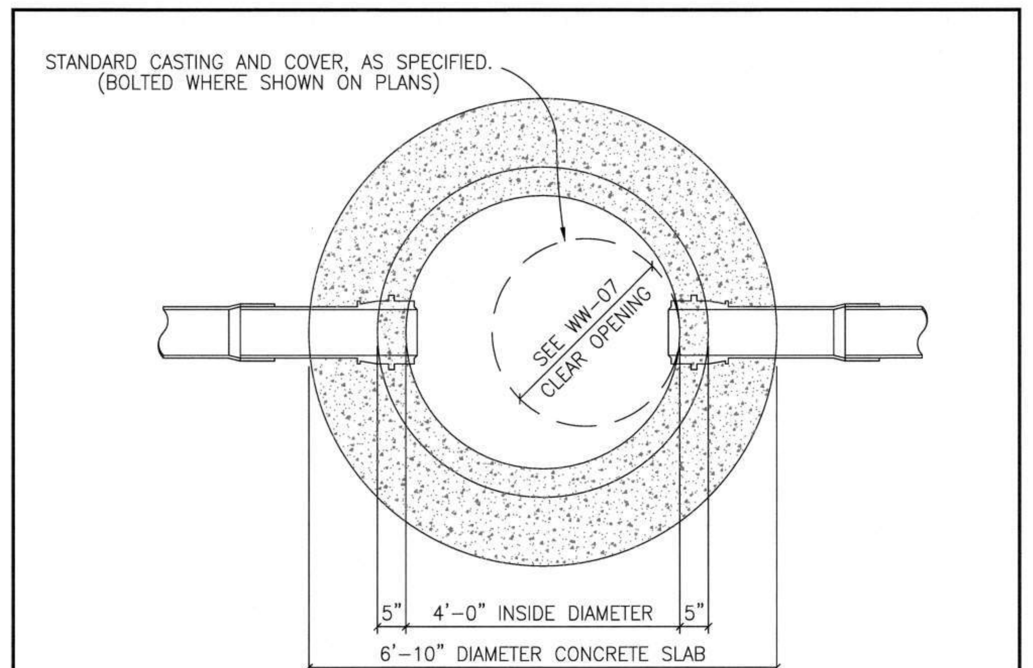
The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL STREETS, RESIDENTIAL COLLECTORS AND MAJOR COLLECTORS

DRAWING NAME: WW01A | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



SEE DETAIL WW-03

MANHOLE PLAN

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 PROFILE GASKET - SINGLE OFF-SET JOINT 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 HANSEN PIPE AND PRECAST OR APPROVED EQUAL M.F.G. CONFORMING TO ASTM C478, 5000 P.S.I. CONCRETE, TRAFFIC BEARING AND WITH PROFILE GASKET - SINGLE OFF-SET 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 ADJUSTMENT OF 12" ARE ALLOWED.

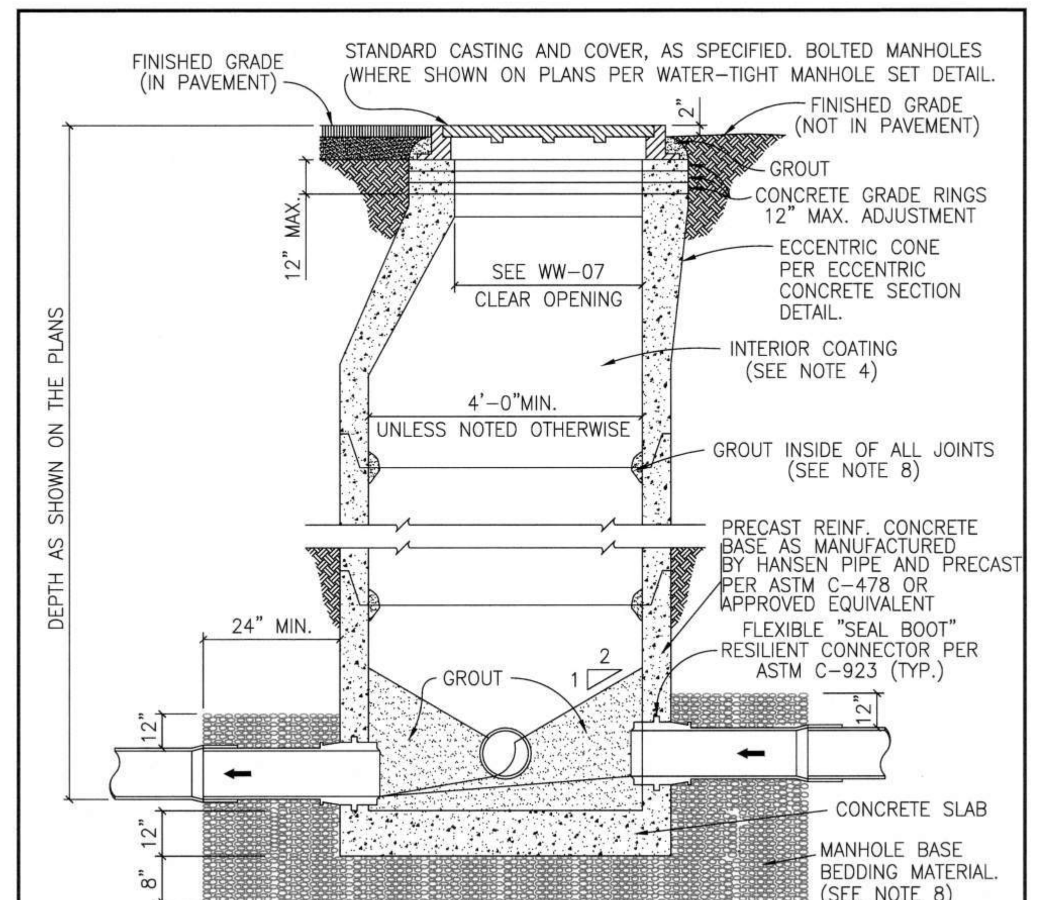
The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE - PLAN

DRAWING NAME: WW02 | 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 WASTEWATER 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.
9. 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

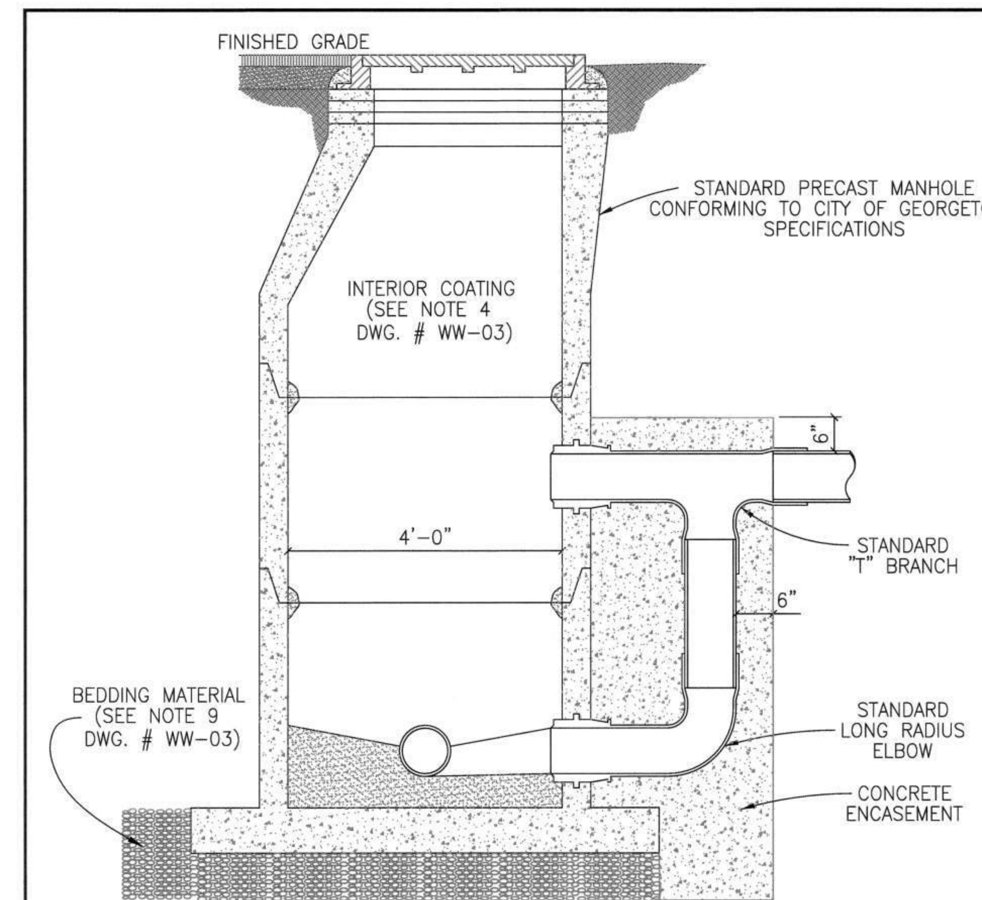
The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE - SECTION

DRAWING NAME: WW03 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTES:

1. CONCRETE ENCASEMENT FOR DROP CONNECTION TO BE POURED INTEGRALLY WITH BOTH MANHOLE SLAB AND WALL.
2. DROP CONNECTIONS SHALL BE REQUIRED WHENEVER AN INFLUENT SEWER IS LOCATED TWO FEET (2') OR MORE ABOVE THE MAIN INVERT CHANNEL.
3. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
4. WHEN P.V.C. IS USED IN SANITARY SEWER LINES, SOLVENT TYPE JOINT P.V.C. FITTINGS MAY BE UTILIZED IN THE DROP ASSEMBLY ONLY.
5. MINIMUM PIPE SIZE FOR DROP IS EIGHT INCHES (8").
6. SEE STANDARD MANHOLE DETAIL (DWG. # WW-03) FOR ADDITIONAL REQUIREMENTS.

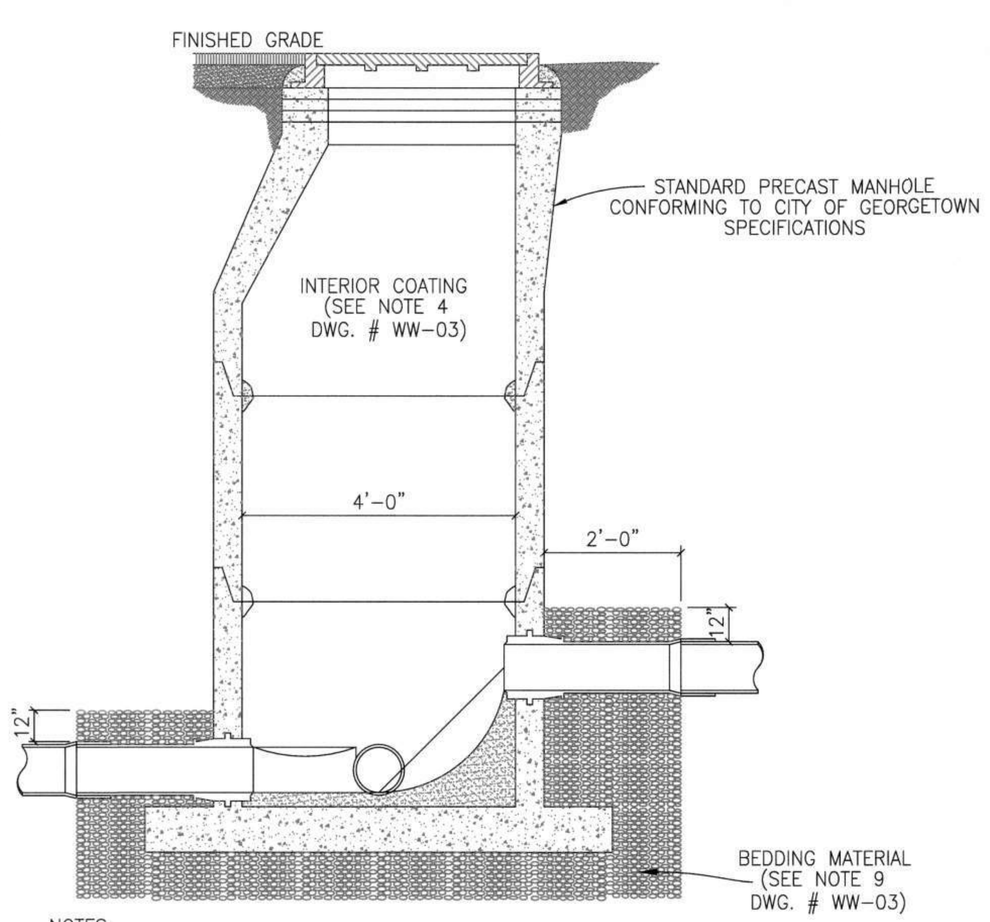
The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DROP CONNECTION-PRECAST MANHOLE TYPE "A"

DRAWING NAME: WW04 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



NOTES:

1. TO BE USED WHERE DROP IS SIX INCHES (6") TO TWO FEET (2'-0").
2. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
3. CONSTRUCTION OF DROP SHALL PROVIDE AN OVERSIZED SLAB TO EXTEND UNDER THE DROP CONNECTION.
4. MINIMUM PIPE SIZE FOR DROP IS EIGHT INCHES (8").
5. SEE STANDARD MANHOLE DETAIL (DWG. # WW-03) FOR ADDITIONAL REQUIREMENTS.

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

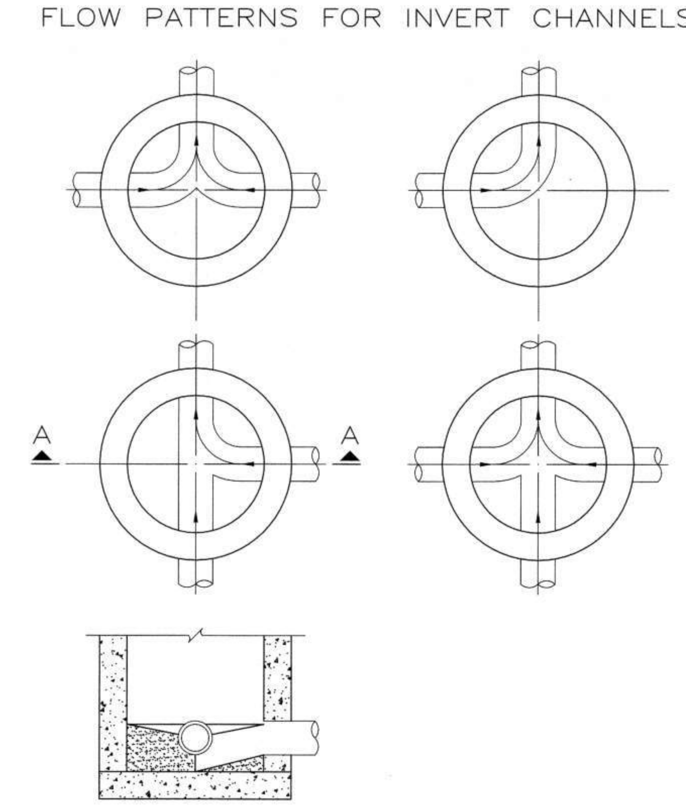
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DROP CONNECTION-PRECAST MANHOLE TYPE "B"

DRAWING NAME: WW05 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

FLOW PATTERNS FOR INVERT CHANNELS



SECTION "A-A"

NOTES:

1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOW.
3. CHANNELS FOR FUTURE CONSTRUCTIONS (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND, AND COVERED WITH 1" OF MORTAR.
4. SLOPE MANHOLE ITSELF WITH A 1:2 SLOPE FROM MANHOLE WALL TO CHANNEL.
5. INVERT SHALL BE A MINIMUM OF 1/2 THE DIAMETER OF THE LARGEST PIPE OR 4" DEEP.

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

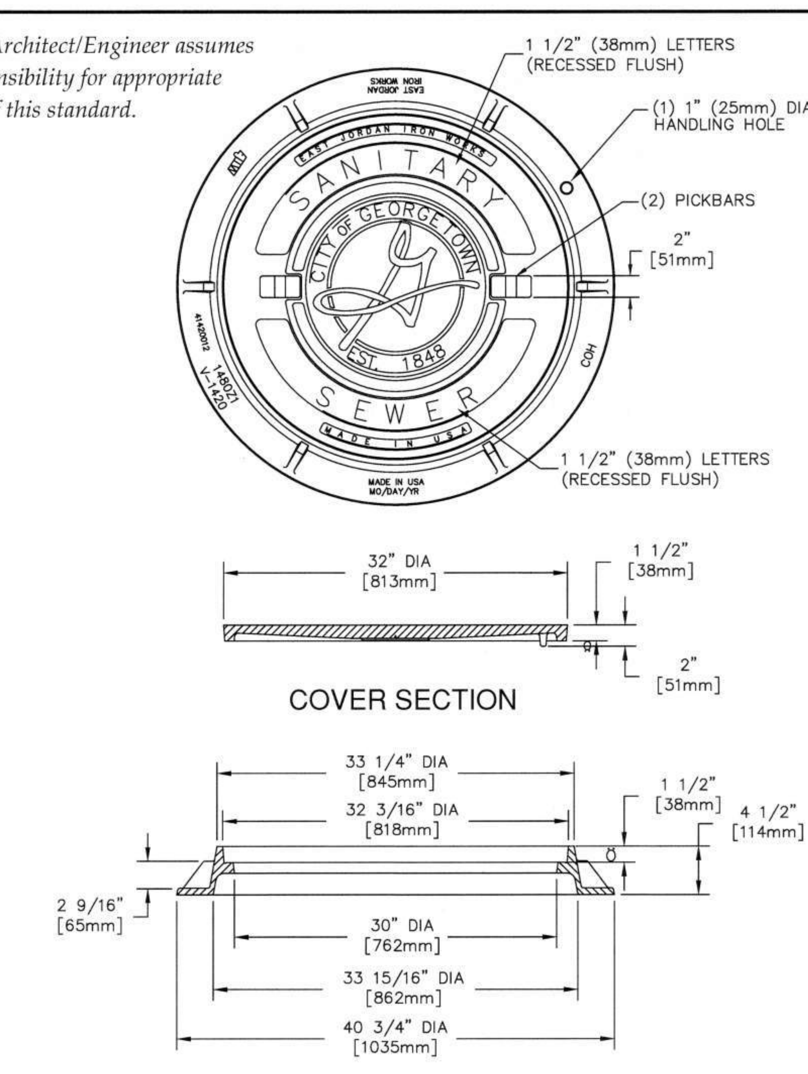
REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
FLOW PATTERNS FOR INVERT CHANNELS

DRAWING NAME: WW06 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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



NOTES:

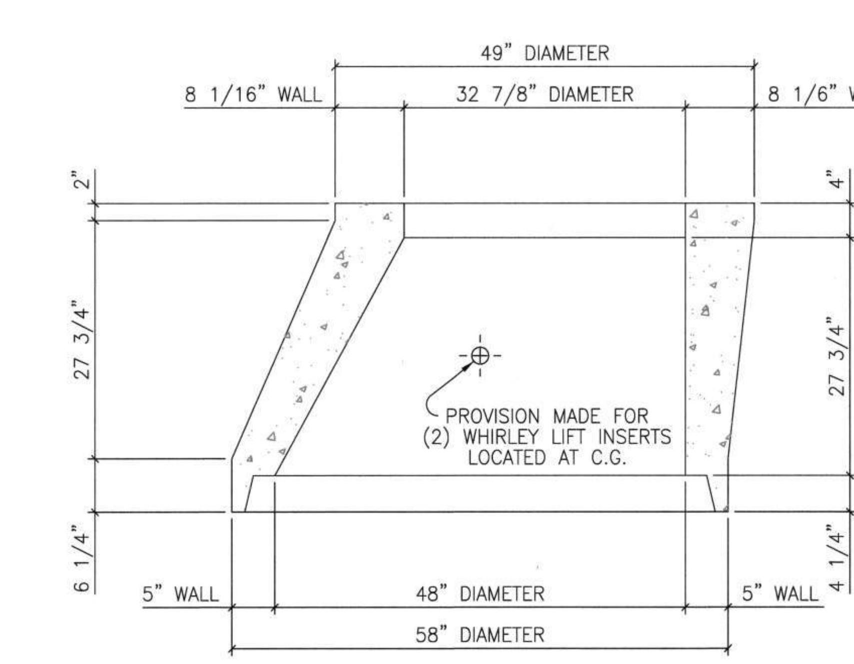
1. STANDARD WASTEWATER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480A V-1420/1480Z1, COVER TO BE STAMPED WITH "SANITARY SEWER".
2. STANDARD WASTEWATER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 41420012 00148390.
4. FOR BOLTED WASTEWATER MANHOLE SET REFER TO DETAIL WW07A.

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD WASTEWATER MANHOLE SET

DRAWING NAME: WW07 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB



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

REVISION NOTE: ADOPTED 6/21/2006

GEORGETOWN TEXAS — Georgetown Utility Systems

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
48"X5" TO 33"X8"X36" TALL ECCENTRIC CONCRETE SECTION

DRAWING NAME: WW08 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

NO. | REVISION | DATE

STATE OF TEXAS — MICHAEL S FISHER — 87704 — LICENSED PROFESSIONAL ENGINEER — 3/20/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

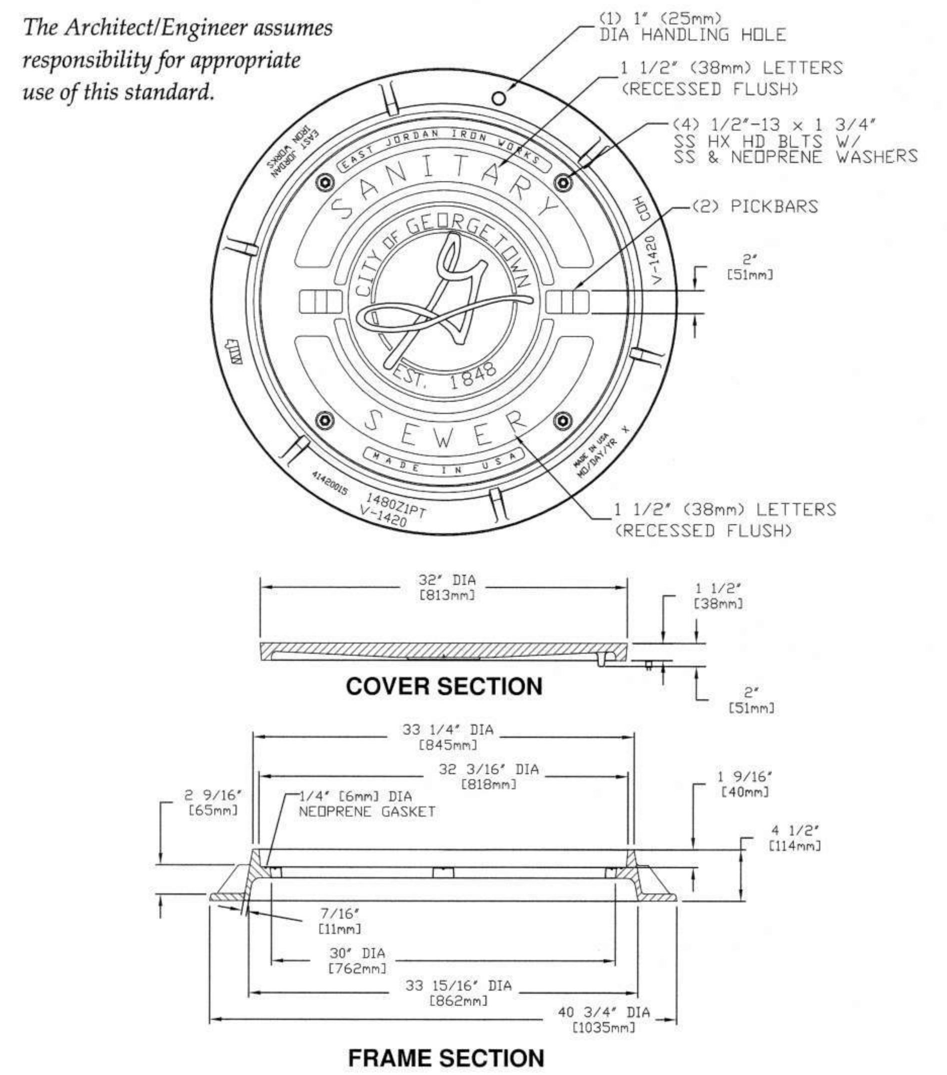
WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
WASTEWATER DETAILS 1 OF 3

△1

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
△1 SHEET 59 OF 61

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

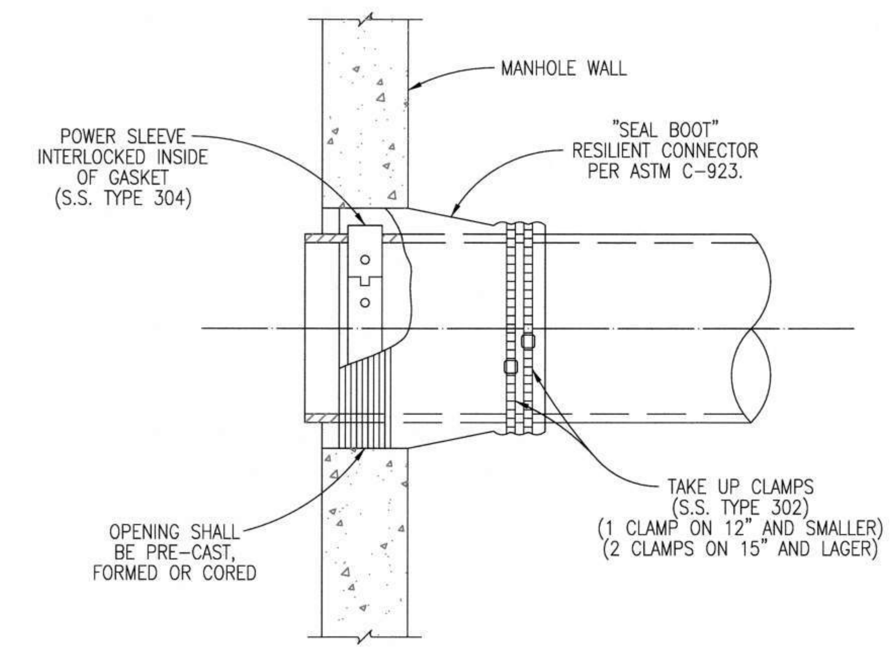


NOTES:

1. BOLTED WASTEWATER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480APT V-1420/1480Z1PT, COVER TO BE STAMPED WITH "SANITARY SEWER".
2. BOLTED WASTEWATER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 00148392 41420015.
4. FOR STANDARD WASTEWATER MANHOLE SET REFER TO DETAIL WW07.

ADOPTED 6/21/2006

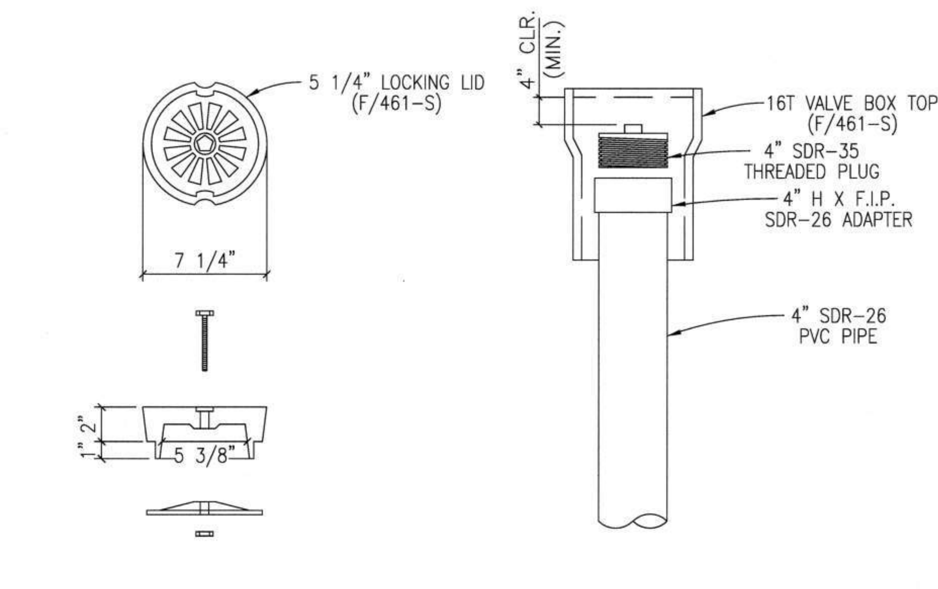
GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — BOLTED WASTEWATER MANHOLE SET — WW07A — NTS 1/2006 — MRS TRB



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

ADOPTED 6/21/2006

GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — FLEXIBLE "SEAL BOOT" CONNECTOR — WW10 — NTS 1/2003 — MRS TRB



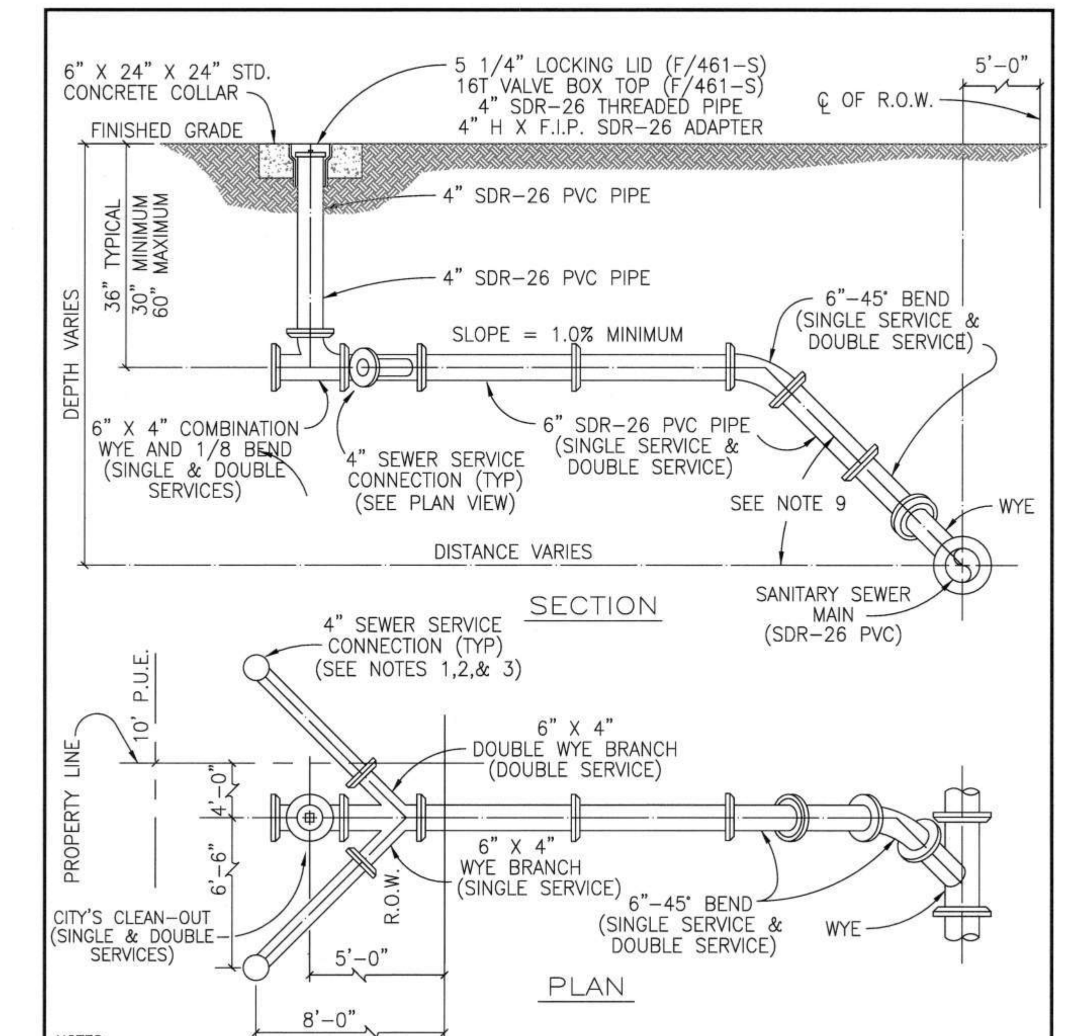
5 1/4" LOCKING LID (F/461-S)

SEWER CLEAN-OUT — CITY OF GEORGETOWN (RESIDENTIAL SERVICE)

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

ADOPTED 6/21/2006

GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — SEWER CLEAN-OUT DETAIL — WW12 — NTS 1/2003 — MRS TRB



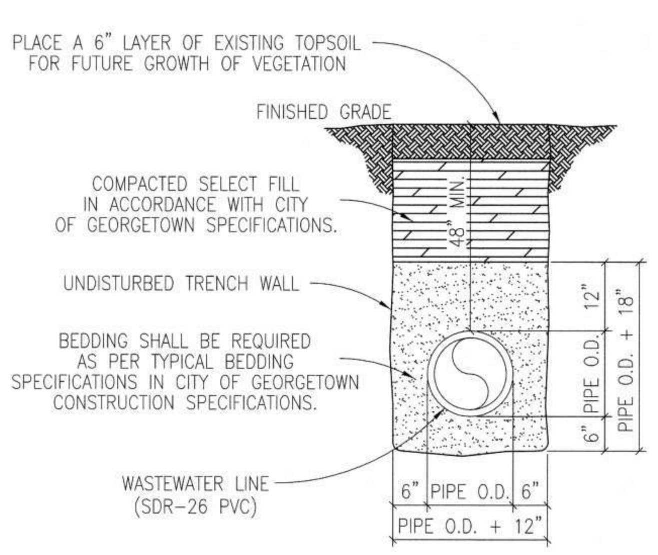
NOTES:

1. SERVICE CONNECTION RISERS SHALL TERMINATE 8" INSIDE THE PROPERTY LINE.
2. THE END OF EACH SERVICE CONNECTION RISER SHALL BE EXTENDED 12" ABOVE FINISH GRADE.
3. EACH SERVICE CONNECTION SHALL BE PLUGGED WATER-TIGHT WITH AN APPROVED CAP OR PLUG.
4. FOR P.V.C. INSTALLATIONS, CONNECT TO EXISTING "BELL END" AND CONNECT OPPSITE END WITH P.V.C. TO P.V.C. KNOCK ON SLEEVE.
5. SOLIDLY TAMP BACKFILL AT LEAST ONE FOOT (1'-0") ABOVE TOP OF PIPE. SERVICES UNDER PAVED AREAS SHALL BE BACKFILLED TO THE SAME SPECIFICATIONS AS SHOWN ON PAVEMENT REPLACEMENT DETAIL.
6. CONTRACTOR SHALL MARK ON A CLEAN SET OF PLANS THE FINAL STATIONING OR DISTANCE AND DIRECTION FROM MANHOLE TO EACH SERVICE LATERAL AND GIVE TO ENGINEER FOR RECORD DRAWING PURPOSES.
7. ANY DEVIATION FROM THESE METHODS MUST BE APPROVED BY THE CITY OF GEORGETOWN ENGINEERING DEPARTMENT.
8. SERVICE LINE MATERIAL SHALL BE P.V.C., SDR-26.
9. SEWER SERVICE SLOPE TO BE 45° OFF CENTERLINE OF MAIN.

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

ADOPTED 6/21/2006

GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — SEWER SERVICE CONNECTIONS — WW13 — NTS 1/2003 — MRS TRB



TRENCH WIDTHS

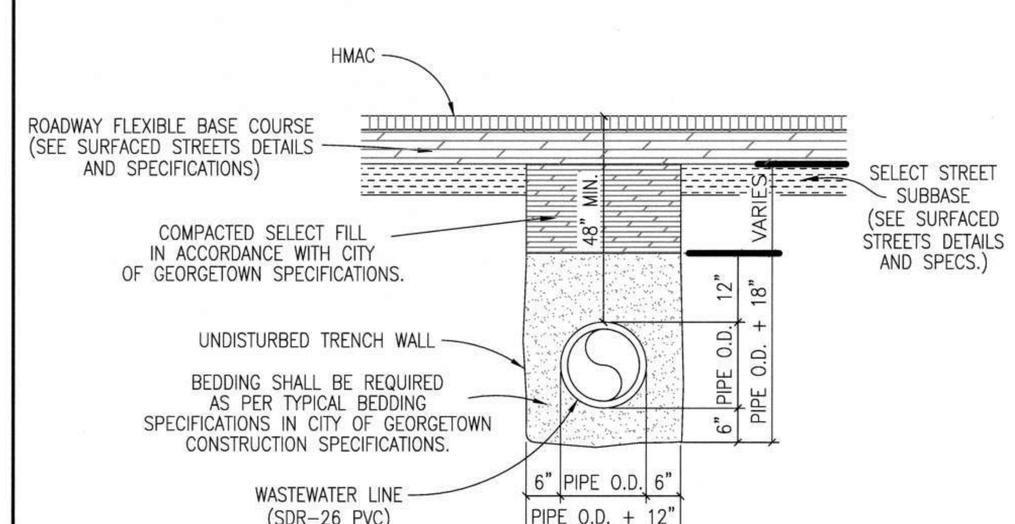
*PIPE LESS THAN 20" DIAMETER 1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER 2'-0" + PIPE O.D.

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

ADOPTED 6/21/2006

GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — TRENCH AND EMBEDMENT DETAIL UNDER NON-PAVED AREAS — WW16 — 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.

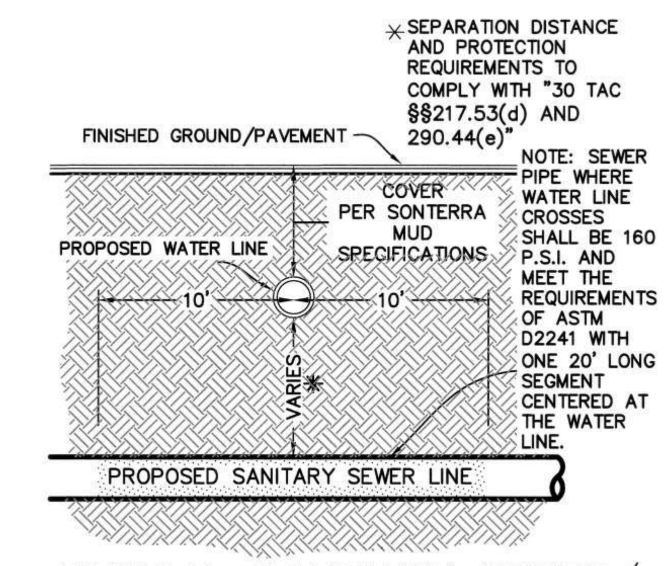
NOTES:

1. 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).

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

ADOPTED 6/21/2006

GEORGETOWN TEXAS — CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS — TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY — WW18 — NTS 1/2003 — MRS TRB



TYPICAL SANITARY SEWER/ WATER CROSSING DETAIL

NOT-TO-SCALE

NO.	REVISION	DATE

STATE OF TEXAS — MICHAEL S FISHER — 87704 — LICENSED PROFESSIONAL ENGINEER — 3/14/23

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS

10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711

TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS

CONSTRUCTION DETAILS
WASTEWATER DETAILS 2 OF 3

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 60 OF 61

Date: Mar 20, 2023, 3:52pm User ID: aking
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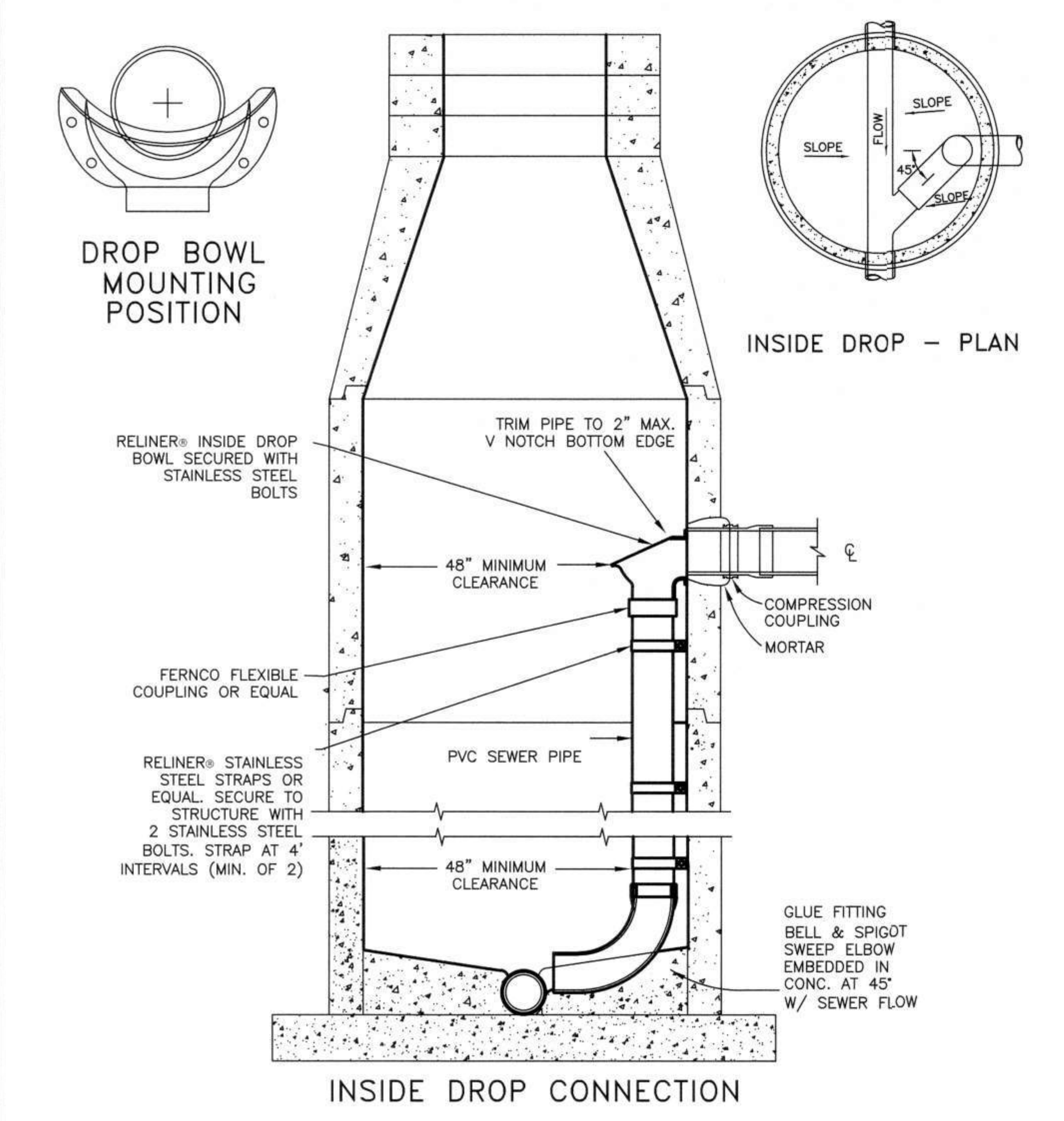
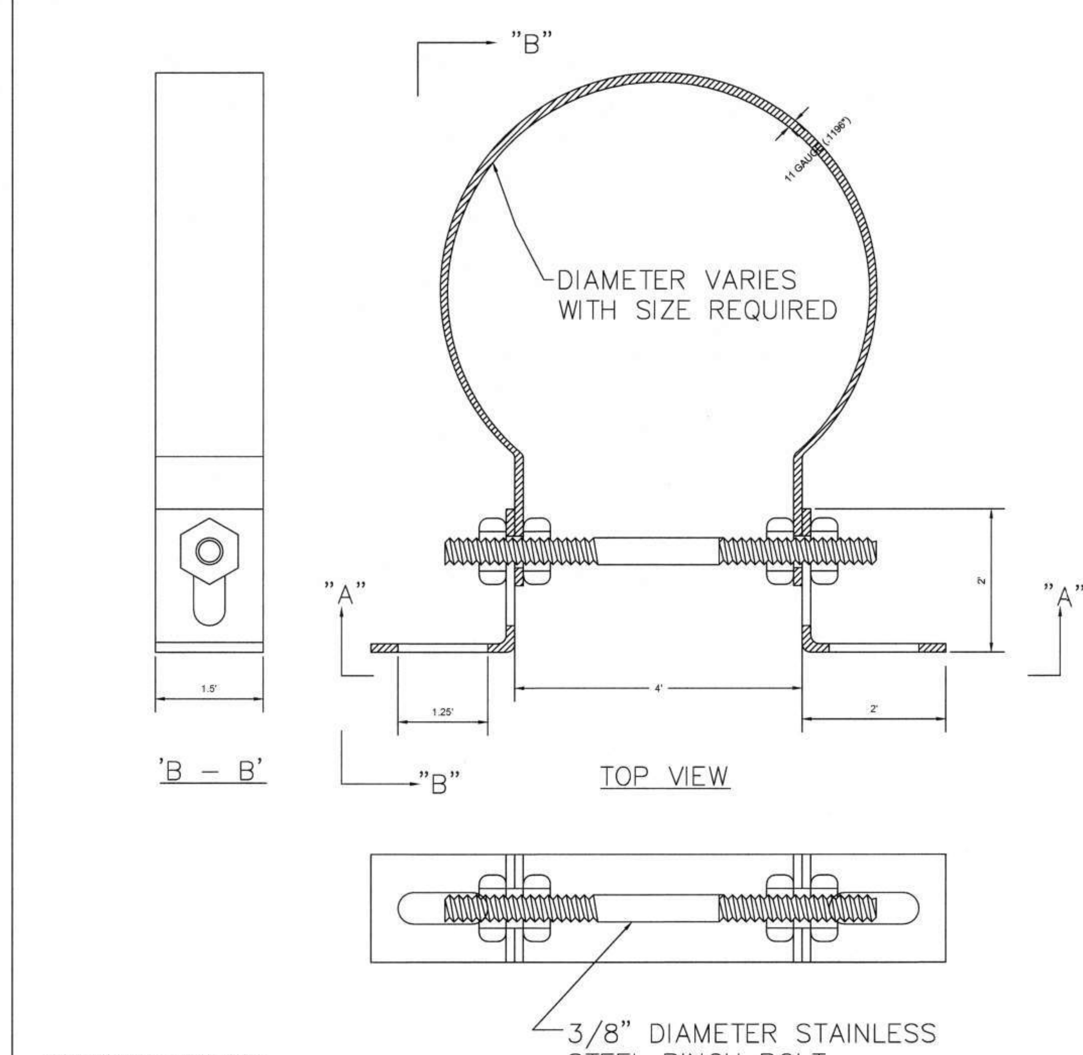


NOTES:
1. ALL INSIDE DROP CONNECTIONS FOR SERVICES AND COLLECTOR SEWERS SHALL USE THE DROP BOWL AS PRODUCED BY: RELINER-DURAN, INC. 53 MT. ARCHER RD. LYME, CT 06371 (860)434-0277 FAX: (860)434-3195
2. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS.

RELINER - DURAN, INC.
53 MT. ARCHER ROAD, LYME, CT. 06371
(800) 508-6001 FAX: (860)434-3195

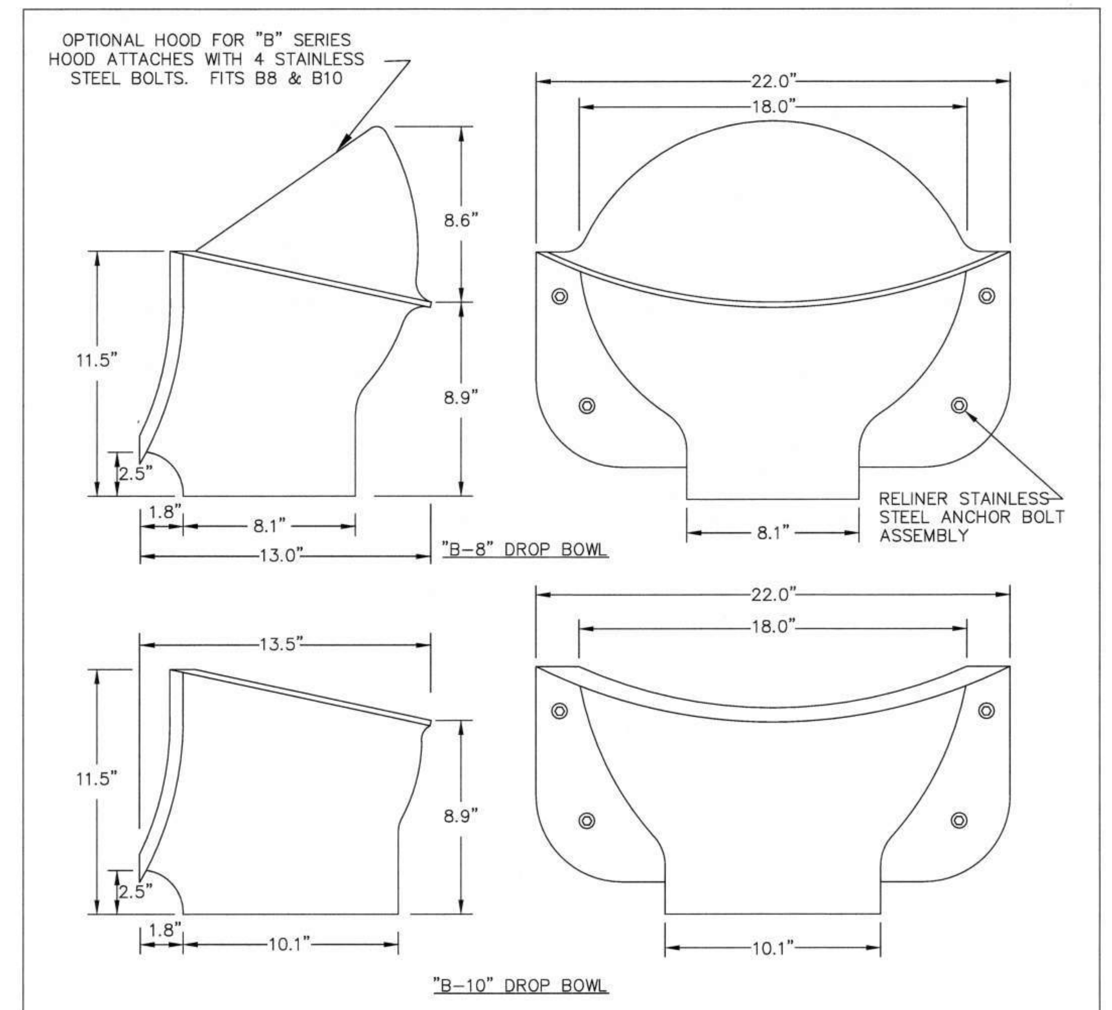
DESCRIPTION	SCALE
DROP CONNECTIONS	NONE



SPECIFICATIONS:
1) CLAMP AND BRACKETS IS TYPE 304 STAINLESS STEEL, 11 GAUGE (.1196").
2) 3/8" ø PINCH BOLT AND NUTS IS TYPE 18-8 STAINLESS STEEL.
3) WIDE RANGE OF SIZES FOR SDR35, SCH40, CIOD-C900 STOCKED FOR 4" -30"
OTHER SIZES AVAILABLE.

RELINER / DURAN, INC.
53 MT. ARCHER ROAD, LYME, CT. 06371
(800) 508-6001 FAX: (860)434-3195

DESCRIPTION	DATE	SCALE
STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS	09/02/99	NONE
	DRAWING NUMBER	BRACKET



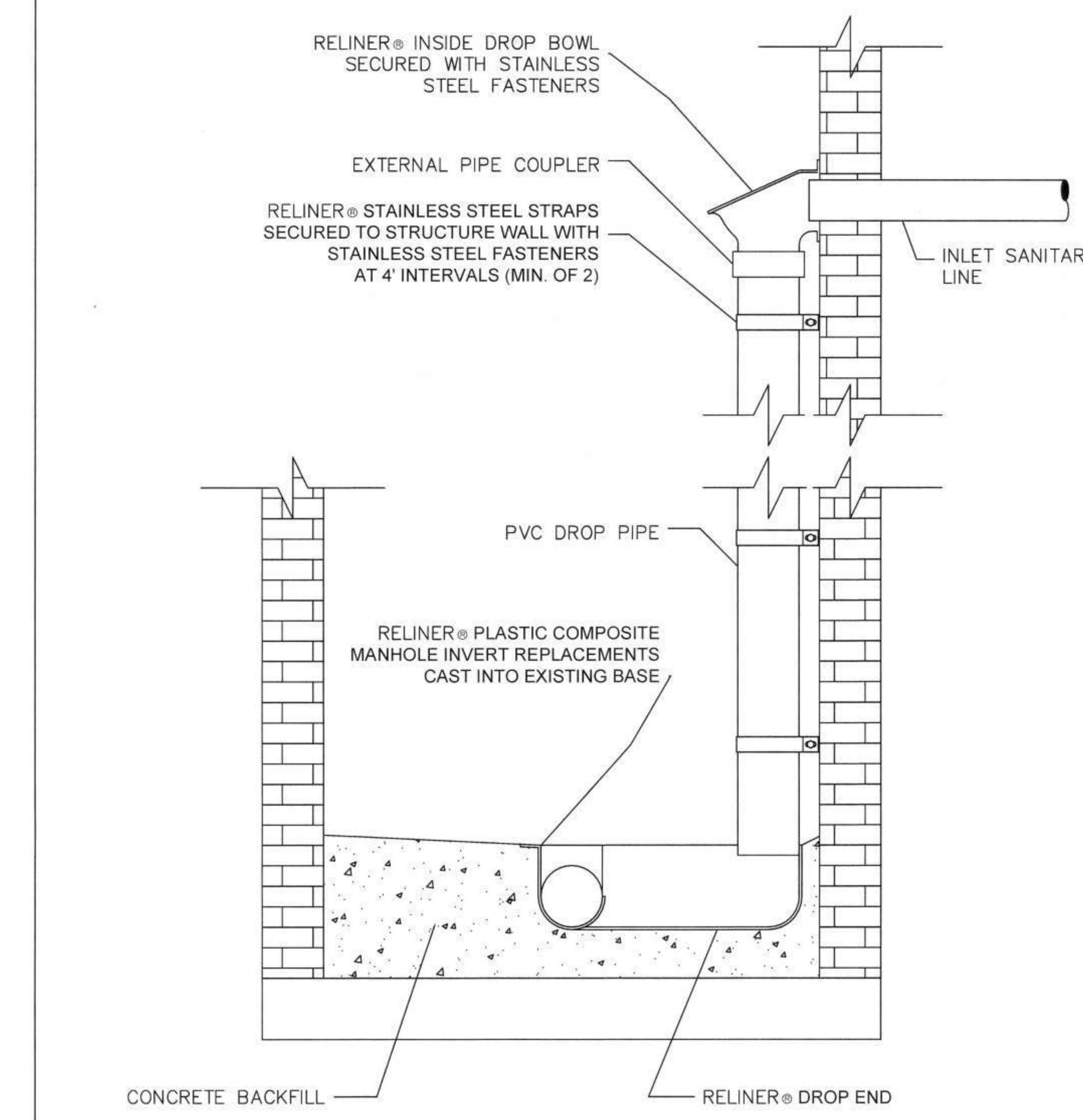
MODEL #
B8DB — 18" DROP BOWL WITH 8" OUTLET – USE FOR 4' – 5' DIA MH
B8DBR84 — 18" DROP BOWL WITH 8" OUTLET – USE FOR 6' – 8' DIA MH
B8DBR144 — 18" DROP BOWL WITH 8" OUTLET – USE FOR 9' – 12' DIA MH
B10DB — 18" DROP BOWL WITH 10" OUTLET – USE FOR 4' – 5' DIA MH
B10R96 — 18" DROP BOWL WITH 10" OUTLET – USE FOR 6' – 8' DIA MH
B10R144 — 18" DROP BOWL WITH 10" OUTLET – USE FOR 9' –12' DIA MH

MADE IN U.S.A.
U.S. PAT. # 6074130
CANADIAN PAT. # 2269565

THE "B-8" BOWL WILL SERVICE UP THROUGH FULL 10" INLETS. THE "B-10" BOWL WILL SERVICE UP THROUGH FULL 12" INLETS. CAN BE USED FOR 15" AND 16" INLET MODERATE FLOWS. ALL SIZES ARE FOR RETROFIT OR NEW CONSTRUCTION. FABRICATED IN MARINE GRADE FIBERGLASS AND FINISHED IN BRIGHT WHITE GEL COAT. RELINER ANCHOR ASSEMBLIES TO ATTACH DROP BOWL TO MANHOLE WALL. USE RELINER STAINLESS STEEL PIPE BRACKETS TO SUPPORT DOWN PIPE. EXTERNAL PIPE COUPLER REQUIRED.
PROVIDE SWEEP AT DOWN PIPE OUTLET.

RELINER / DURAN, INC.
53 MT. ARCHER ROAD, LYME, CT. 06371
(800) 508-6001 FAX: (860)434-3195
WWW.RELINER.COM

DESCRIPTION	DATE	SCALE
B8 & B10 DROP BOWLS FOR ROUND WALLS	10/8/15	NONE
	DRAWING NUMBER	B8DB B10DB



Drop Bowl U.S. Pat. # 6074130
Drop Bowl Canada Pat. #2269565
Reliner U.S. Pat. # 5553973
Reliner Canada Pat. #2176074

RELINER / DURAN, INC.
53 MT. ARCHER ROAD, LYME, CT. 06371
(800) 508-6001 FAX: (860)434-3195

DESCRIPTION	DATE	SCALE
INSIDE DROP MANHOLE DETAIL (EXISTING MANHOLE)	08/31/99	NONE
	DRAWING NUMBER	AP-REHAB

RELINER® INSIDE DROP SYSTEM SPECIFICATIONS

1. PRODUCT NAME

RELINER® INSIDE DROP SYSTEM
U.S. Patent 6074130 Canadian Patent # 2269565
All RELINER Products are proudly made in the U.S.A.

2. MANUFACTURER

RELINER®/Duran Inc.
53 Mount Archer Rd.
Lyme CT 06371
Phone: (800) 508-6001, (860) 434-0277
Fax: (860) 434-3195
E Mail: duran@reliner.com
Web site: http://www.reliner.com

3. PRODUCT DESCRIPTION

Basic Application: RELINER® INSIDE DROP SYSTEM is a plastic composite collection device that facilitates the controlled drop of effluent into the main stream flow of a sanitary manhole. The Drop Bowl permits easy inspection and cleaning without the need to enter the structure. The custom made adjustable stainless steel straps fully support the drop pipe.

Advantages of the INSIDE DROP SYSTEM by RELINER®
- Reduce maintenance
- Eliminate confined space entry
- Speed Inspection
- Simplify cleaning
- Reduce turbulence and odor
- Solids and liquids remain together
- Erosion of structure eliminated
- High corrosion resistance
- Allow workers to enter structure without risk of effluent contact
- Increase pump life in Wet Wells

Composition and Materials: RELINER® DROP BOWL is hand fabricated in the USA from marine grade fiberglass. The clamping pipe supports are of 304 stainless steel with 18-8 stainless nuts and bolts.

These materials have extremely high resistance to sewer acids while providing very smooth, low maintenance assemblies.

The open design allows for grade level inspection and cleaning while containing the incoming material and conducting it smoothly into the main flow of the system.
The RELINER Drop system is compatible with virtually all types of manhole construction and rehabilitation technologies and materials.

RELINER® US Patent # 5553973 Drop Bowl US Patent # 6074130 Canadian DB Patent # 2269565 3/30/10
1

RELINER® INSIDE DROP SYSTEM SPECIFICATIONS

4. TECHNICAL DATA

RELINER® INSIDE DROP components consist of
1) Standard size composite Drop Bowls
2) Stainless steel adjustable clamping brackets

RELINER composite components are hand and chopper gun laminations of these properties:

Physical Properties of Unsaturated Polyester Resin Reinforced Laminates
(33 / 66 Glass / Resin 1.5 oz mat Laminates .125 in.)

Flexural Strength (psi)	ASTM D-790	27,100
Flexural Modulus (psi)	ASTM D-790	1,157,000
Tensile Strength (psi)	ASTM D-638	16,700
Tensile Modulus (psi)	ASTM D-638	1,457,000
Tensile Elongation (%)	ASTM D-638	1.54
Hardness, Barcol 934.1	ASTM D-2583	55 - 60

Physical Properties of ISO Gel Coat

	Room Temperature Cured for 45 hours	Post Cured at 50_ for 24 hours
Tensile Strength	6,218	6,581
Elongation, %	2.70	1.90
Flexural Strength, psi	11,363	11,329
Heat Distortion, °F	0.544×10^6	0.713×10^6
Mandrel Flex, Mandrel Diameter in Inches	--	1.0

Stainless steel clamping bracket materials:
304 series non-magnetic stainless steel - 11GA
18-8 series non-magnetic stainless steel 3/8 x 18

Sample Specification for RELINER® INSIDE DROP SYSTEM:
All new and/or existing manhole structures employing inside drop connections for services and collector sewers shall use the RELINER® Inside Drop Bowl components as produced by RELINER® / Duran Inc. 53 Mt. Archer Rd. Lyme CT 06371 (800) 508-6001, fax (860) 434-3195 or equal. Bowl size shall be determined by incoming pipe sizes and flow rates. The bowl shall be installed as per manufacturer's instructions using stainless steel fasteners. The drop pipe of SDR 35, Schedule 40 or other shall be securely attached to the manhole wall using stainless steel RELINER® Adjustable Clamping Brackets and stainless steel fasteners. Bracket interval shall be 4 feet maximum (minimum of 2 brackets). The connection of Drop Bowl to drop pipe shall be by flexible external pipe coupler. The turn-out at the base end of the drop pipe shall be accomplished with an appropriately angled PVC pipe elbow (45 degree recommended).

RELINER® US Patent # 5553973 Drop Bowl US Patent # 6074130 Canadian DB Patent # 2269565 3/30/10
2

RELINER® INSIDE DROP SYSTEM SPECIFICATIONS

5. INSTALLATION

1. Select **Drop Bowl** of size appropriate to flow rate and pipe diameter. Examples: (The "A" Bowl with 4" outlet will service up through full 6" inlets. The "A" Bowl with 6" outlet will service up through full 8" inlets. Can be used for 10" & 12" inlet moderate flows. The "B" Bowl with 8" outlet will service up through full 10" inlets. The "B" Bowl with 10" outlet will service up through full 12" inlets. Can be used for 15" and 16" moderate flows. Larger sizes and flat configurations are also available) A pipe downsize is possible for most applications.

2a. Trim incoming pipe so that only 2" maximum protrudes into manhole.

2b. For improved flow control, cut a "V" shaped notch at bottom edge of incoming pipe.

3. Center Drop Bowl directly under incoming pipe, allow approximately 1" clearance between pipe and bowl.

4. Attach Drop Bowl to manhole wall with four 3/8" diameter stainless steel bolts in lead expansion anchors. (See following instructions).
   (1) Drill a 3/4"hole into the base material to the required depth (approximately 1-1/4" deep.)
   (2) Blow the hole clean of dust and other material.
   (3) Insert the anchor into the hole (Lead shield out).
   (4) Position a setting tool or a 9/16 socket against the anchor outer cone. (The outer rim of the tool or socket should seat onto the lead shield rim.)
   (5) Using the tool or socket, set the anchor by driving the lead sleeve over the cone using several sharp hammer blows. (Be sure the anchor is at the required embedment depth.)
   (6) Position the fixture, insert screw or bolt and tighten.

5. Cut and mount drop pipe of diameter appropriate to Drop Bowl size and flow using RELINER adjustable stainless steel clamping brackets. Use a minimum of 2 brackets with a maximum spacing of 4 feet. (RELINER clamping brackets will adjust to allow drop pipe to maintain correct stand off from wall). We recommend the use of SDR 35 PVC pipe for a drop pipe but we produce pipe brackets for most types of drop pipe.
6. Connection from Drop Bowl to drop pipe shall be by flexible external pipe connector ("Fernco" recommended.)
7. Install appropriate pipe elbow to provide smooth transition into channel flow.

Our Drop Bowl warranty is void if the drop pipe is not installed with the correct RELINER pipe support brackets as these brackets fully support the drop pipe and hold it off the wall the correct distance.

OPTIONAL DROP BOWL INSTALLATION ANCHORS: These parts are shipped assembled.
3/8 X 1" X 16 18-8 stainless hex cap screw full thread
3/8 18-8 stainless washers
3/8 16 x 1-1/4 lead tamp-in expansion anchors

RELINER® US Patent # 5553973 Drop Bowl US Patent # 6074130 Canadian DB Patent # 2269565 3/30/10
3

RELINER® INSIDE DROP SYSTEM SPECIFICATIONS

6. AVAILABILITY AND COST
RELINER® products are manufactured by Duran Inc. of Lyme CT and are sold nationally through local distributors and :

RELINER®/Duran Inc.
53 Mount Archer Rd.
Lyme CT 06371
800-508-6001
860-434-0277
860-434-3195 Fax
Http://www.reliner.com
duran@reliner.com

Price varies with complexity. Contact sales for quote 800-508-6001or visit our web site at www.reliner.com for suggested price list.

7. WARRANTY
Contact sales at above numbers for copy of warranty.

8. MAINTENANCE
Normal maintenance consists of routine inspection and flushing with a hose or pressure washer.

9. TECHNICAL SUPPORT

For technical consultation or additional information, and for custom design and fabrication services, please call or write Duran Inc. 53 Mt. Archer Rd. Lyme, CT 06371. Phone (800) 508-6001 (860) 434-0277 Fax (860)434-3195

E Mail: duran@reliner.com

Visit our web site at: **http://www.reliner.com**

RELINER® US Patent # 5553973 Drop Bowl US Patent # 6074130 Canadian DB Patent # 2269565 3/30/10
4

NO.	REVISION	DATE

MICHAEL S FISHER 87704 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS 3/20/23

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
10801 N MOPAC EXPY, BLDG 3, STE 200 | AUSTIN, TX 78759 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

WOLF RANCH WEST, SECTION 4G, PHASES 1 & 2
CITY OF GEORGETOWN, TEXAS
CONSTRUCTION DETAILS
WASTEWATER DETAILS 3 OF 3

CITY JOB No. 2022-5-CON
JOB NO. 51127-42
DATE March 20, 2023
DESIGNER DB
CHECKED JF DRAWN DB
SHEET 61 OF 61

Date: Mar 20, 2023, 3:52pm User ID: aking
File: H:\Projects\511\27\42\301 construction documents\Civil\DT51127-42.dwg

PLANNING AND ZONING COMMISSION

CERTIFICATE OF APPROVAL

DATE:	June 7, 2022
CASE NUMBER:	**2022-5-CON**
PROPERTY OWNER:	H4 Georgetown LP – John Tatum
LOCATION:	Blue Blaze Trl and Wandering Path
LEGAL DESCRIPTION:	34.41 acres in the Thompson J. Survey AW0608.
REQUEST:	Approval based on the findings that the request meets the City of Georgetown ordinances, rules and regulations identified in the Exhibits.

The above referenced request was **APPROVED** by the Georgetown Planning and Zoning Commission ("Commission") on June 7, 2022, by a vote of 4 in favor and 0 in opposition with 1 abstaining.

COMMISSION:

R. Travis Perthuis,
Chair

ATTEST:

Steve Dickey,
Secretary

PLANNING AND ZONING COMMISSION

CERTIFICATE OF APPROVAL

DATE:	November 1, 2022
CASE NUMBER:	**2022-5-CON**
PROPERTY OWNER:	H4 Georgetown LP – John Tatum
LOCATION:	Blue Blaze Trl and Wandering Path
LEGAL DESCRIPTION:	34.41 acres in the Thompson J. Survey AW0608.
REQUEST:	Approval based on the findings that the request meets the City of Georgetown ordinances, rules and regulations identified in the Exhibits.

The above referenced request was **APPROVED** by the Georgetown Planning and Zoning Commission ("Commission") on November 1, 2022, by a vote of 5 in favor and 0 in opposition with 2 abstaining.

COMMISSION:

R. Travis Perthuis,
Chair

ATTEST:

Steve Dickey,
Secretary

GEORGETOWN
TEXAS
more than welcome

PLANNING AND ZONING COMMISSION

CERTIFICATE OF APPROVAL

DATE:	March 21, 2023
CASE NUMBER:	**2022-5-CON**
PROPERTY OWNER:	H4 Georgetown Phase 4G, LLC – John Tatum
LOCATION:	Blue Blaze Trl and Wandering Path
LEGAL DESCRIPTION:	34.41 acres in the Thompson J. Survey AW0608
REQUEST:	Approval based on the findings that the request meets the City of Georgetown ordinances, rules and regulations identified in the Exhibits.

The above referenced request was **APPROVED** by the Georgetown Planning and Zoning Commission ("Commission") on March 21, 2023, by a vote of 7 in favor and 0 in opposition with 0 abstaining.

COMMISSION:

R. Travis Perthuis,
Chair

ATTEST:

Steve Dickey,
Secretary

AGENT AUTHORIZATION

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

I **Duke Kerrigan**,
Print Name

Austin General Manager,
Title - Owner/President/Other

of **H4 Georgetown Phase 4G, LLC**,
Corporation/Partnership/Entity Name

have authorized **Austin Conner, P.E.**
Print Name of Agent/Engineer

of **Pape-Dawson Engineers, 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:

[signature]

Applicant's Signature

8-30-23

Date

THE STATE OF Texas §

County of Williamson §

BEFORE ME, the undersigned authority, on this day personally appeared Duke Kerrigan 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 30th day of August, 2023.

TORI BETH STREFF
Notary ID #128797649
My Commission Expires
June 1, 2024

NOTARY PUBLIC STATE OF TEXAS

Tori Beth Streff

NOTARY PUBLIC

Tori Beth Streff

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: June 1, 2024

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

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Print Name

Austin General Manager,
Title - Owner/President/Other

of **H4 Georgetown Phase 1, LLC**,
Corporation/Partnership/Entity Name

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Austin General Manager,
Title - Owner/President/Other

of **H4 Georgetown LP**,
Corporation/Partnership/Entity Name

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TORI BETH STREFF
Notary ID #128797649
My Commission Expires
June 1, 2024

Tori Beth Streff
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: June 1, 2024

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

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Print Name

Austin General Manager,
Title - Owner/President/Other

of **H4 WR MR-1, LP**,
Corporation/Partnership/Entity Name

have authorized **Austin Conner, P.E.**
Print Name of Agent/Engineer

of **Pape-Dawson Engineers, Inc.**
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Applicant's Signature

Date 8/30/23

THE STATE OF Texas §

County of Williamson §

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GIVEN under my hand and seal of office on this 30 day of September, 2023.

Tori Beth Streff
NOTARY PUBLIC

Tori Beth Streff
Typed or Printed Name of Notary

NOTARY PUBLIC STATE OF TEXAS
TORI BETH STREFF
Notary ID #128797649
My Commission Expires
June 1, 2024

MY COMMISSION EXPIRES: June 1, 2024

APPLICATION FEE FORM

Application Fee Form

Texas Commission on Environmental Quality
Name of Proposed Regulated Entity: Wolf Ranch West, Section 4G
Regulated Entity Location: SW of the intersection of Wolf Ranch Parkway & Legends Lane
Name of Customer: H4 Georgetown Phase 4G, LLC
Contact Person: Duke Kerrigan Phone: (972) 201-2897
Customer Reference Number (if issued):CN 605990142
Regulated Entity Reference Number (if issued):RN 111446985

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	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	2,531 L.F.	$ 1,265.50
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: 08/31/2023

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

CORE DATA FORM

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of 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 **SCS Modification**

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 605990142		**RN 111446985**

SECTION II: Customer Information

4. General Customer Information	5. Effective Date for Customer Information Updates (mm/dd/yyyy)	2/28/2022

☐ 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:*

H4 Georgetown Phase 4G, LLC

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (*if applicable*)
0804320740	32081987979	26-772514	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited

Government: ☐ City ☐ County ☐ Federal ☐ 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 ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:

3000 Turtle Creek Blvd.

City	Dallas	State	TX	ZIP	75219	ZIP + 4	

16. Country Mailing Information (*if outside USA*)	17. E-Mail Address (*if applicable*)
	Duke.Kerrigan@Hillwood.com

18. Telephone Number	19. Extension or Code	20. Fax Number (*if applicable*)
(972) 201-2897		(972) 201-2959

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (*If 'New Regulated Entity" is selected below this form should be accompanied by a permit application*)

☐ 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 Agency 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.*)

Wolf Ranch West, Section 4G

23. Street Address of the Regulated Entity: *(No PO Boxes)*	Not yet assigned						
	City	Georgetown	**State**	TX	**ZIP**	78628	**ZIP + 4**
24. County							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	South of the intersection of Wolf Ranch Parkway & Blue Blaze Trail		
26. Nearest City		**State**	**Nearest ZIP Code**
Georgetown		TX	78628

27. Latitude (N) In Decimal:	30.622875		**28. Longitude (W) In Decimal:**	-97.714760	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
30	37	22.35	-97	42	53.14

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)
1521	1623	236115	237110

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

Single-family residential development

34. Mailing Address:	**3000 Turtle Creek Blvd**						
	City	**Dallas**	**State**	**TX**	**ZIP**	**75219**	**ZIP + 4**
35. E-Mail Address:	**Fred.Balda@Hillwood.com**						

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** ***(if applicable)***
(972) 201-2897		**(972) 201-2959**

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
		11003329		
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Austin Conner, PE	**41. Title:**	Project Manager
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(512) 454-8711		( ) -	AConner@Pape-Dawson.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:	Pape-Dawson Engineers, Inc.	**Job Title:**	Project Manager
Name *(In Print)*:	Austin Conner, PE	**Phone:**	(512) 454- **8711**
Signature:		**Date:**	08/31/2023