SCS & WPAP

Wolf Ranch Multi-Family
Georgetown, Williamson County, Texas

January 2025

Prepared For:

H4 WR MF-1, LP
129 Canyon View Road,
Georgetown, TX 786268

Prepared By:

Ryan Cunningham
Kimley-Horn and Associates, Inc.
10814 Jollyville Road
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Austin, TX 78759
TEXAS REGISTRATION #928

1/28/25

Organized Sewage Collection System Plan Checklist

- **Edwards Aquifer Application Cover Page (TCEQ-20705)**
- **General Information Form (TCEQ-0587)**

  Attachment A - Road Map
  Attachment B - USGS / Edwards Recharge Zone Map
  Attachment C - Project Description

- **Geologic Assessment Form (TCEQ-0585)**

  Attachment A - Geologic Assessment Table (TCEQ-0585-Table)
  Comments to the Geologic Assessment Table
  Attachment B - Soil Profile and Narrative of Soil Units
  Attachment C - Stratigraphic Column
  Attachment D - Narrative of Site Specific Geology
  Site Geologic Map(s)
  Table or list for the position of features' latitude/longitude (if mapped using GPS)

- **Organized Sewage Collection System Plan (TCEQ-0582)**

  Attachment A - Engineering Design Report
  Attachment B - Justification and Calculations for Deviation in Straight Alignment Without Manholes
  Attachment C - Justification for Variance from Manhole Spacing
  Attachment D - Explanation of Slopes for Flows Greater Than 10.0 Feet Per Second
  Site Plan
  Final Plan and Profile Sheets

- **Lift Station / Force Main System Application (TCEQ-0624) if applicable**

  Attachment A - Engineering Design Report
  Site Plan
  Final Plan and Profile Sheets

- **Temporary Stormwater Section (TCEQ-0602)**

  Attachment A - Spill Response Actions
  Attachment B - Potential Sources of Contamination
  Attachment C - Sequence of Major Activities
  Attachment D - Temporary Best Management Practices and Measures
  Attachment E - Request to Temporarily Seal a Feature, if sealing a feature
  Attachment F - Structural Practices
  Attachment G - Drainage Area Map
  Attachment H - Temporary Sediment Pond(s) Plans and Calculations
  Attachment I - Inspection and Maintenance for BMPs

Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices

- **Agent Authorization Form (TCEQ-0599), if application submitted by agent**
- **Application Fee Form (TCEQ-0574)**
- **Check Payable to the "Texas Commission on Environmental Quality"**
- **Core Data Form (TCEQ-10400)**

Water Pollution Abatement Plan Checklist

- **Edwards Aquifer Application Cover Page (TCEQ-20705)**
- **General Information Form (TCEQ-0587)**

  Attachment A - Road Map
  Attachment B - USGS / Edwards Recharge Zone Map
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- **Geologic Assessment Form (TCEQ-0585)**

  Attachment A - Geologic Assessment Table (TCEQ-0585-Table)
  Comments to the Geologic Assessment Table
  Attachment B - Soil Profile and Narrative of Soil Units
  Attachment C - Stratigraphic Column
  Attachment D - Narrative of Site Specific Geology
  Site Geologic Map(s)
  Table or list for the position of features' latitude/longitude (if mapped using GPS)

- **Water Pollution Abatement Plan Application Form (TCEQ-0584)**

  Attachment A - Factors Affecting Water Quality
  Attachment B - Volume and Character of Stormwater
  Attachment C - Suitability Letter from Authorized Agent (if OSSF is proposed)
  Attachment D - Exception to the Required Geologic Assessment (if requesting an exception)
  Site Plan

- **Temporary Stormwater Section (TCEQ-0602)**

  Attachment A - Spill Response Actions
  Attachment B - Potential Sources of Contamination
  Attachment C - Sequence of Major Activities
  Attachment D - Temporary Best Management Practices and Measures
  Attachment E - Request to Temporarily Seal a Feature, if sealing a feature
  Attachment F - Structural Practices
  Attachment G - Drainage Area Map
  Attachment H - Temporary Sediment Pond(s) Plans and Calculations
  Attachment I - Inspection and Maintenance for BMPs
  Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices

- **Permanent Stormwater Section (TCEQ-0600)**

  Attachment A - 20% or Less Impervious Cover Waiver, if project is multi-family residential, a school, or a small business and 20% or less impervious cover is proposed for the site
  Attachment B - BMPs for Upgradient Stormwater

Attachment C - BMPs for On-site Stormwater
Attachment D - BMPs for Surface Streams
Attachment E - Request to Seal Features (if sealing a feature)
Attachment F - Construction Plans
Attachment G - Inspection, Maintenance, Repair and Retrofit Plan
Attachment H - Pilot-Scale Field Testing Plan, if BMPs not based on Complying with the Edwards Aquifer Rules: Technical Guidance for BMPs
Attachment I -Measures for Minimizing Surface Stream Contamination

- **Agent Authorization Form (TCEQ-0599), if application submitted by agent**
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`Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

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

Administrative Review

1. Edwards Aquifer applications must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.

   To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: http://www.tceq.texas.gov/field/eapp.

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.

3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.

4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

   An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.

6. If the geologic assessment was completed before October 1, 2004 and the site contains "possibly sensitive" features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.

2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.

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

Mid-Review Modifications

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

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

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

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

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

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

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

1. Regulated Entity Name: WOLF RANCH MF						**2. Regulated Entity No.:**			
3. Customer Name: H4 WR MF-1, LP						**4. Customer No.:**			
5. Project Type: **(Please circle/check one)**	New **X**		Modification			Extension		Exception	
6. Plan Type: **(Please circle/check one)**	WPAP **X**	CZP	SCS **X**	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: **(Please circle/check one)**	Residential X		Non-residential			**8. Site (acres):**			25.703
9. Application Fee:	$8,027		**10. Permanent BMP(s):**			1 batch detention pond, VFS			
11. SCS (Linear Ft.):	3054		**12. AST/UST (No. Tanks):**			N/A			
13. County:	WILLIAMSON		**14. Watershed:**			South Fork San Gabriel River			

Application Distribution

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

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

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

Austin Region			
County:	**Hays**	**Travis**	**Williamson**
Original (1 req.)	___	___	1
Region (1 req.)	___	___	1
County(ies)	___	___	1
Groundwater Conservation 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 _1_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. Ryan Cunningham, P.E. - Kimley-Horn
Print Name of Customer/Authorized Agent 
Signature of Customer/Authorized Agent Date 01/23/2025

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 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: Ryan Cunningham

Date: 01/21/2024

Signature of Customer/Agent:

Project Information

1. Regulated Entity Name: Wolf Ranch Multifamily
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 WR MF-1, LP
   Mailing Address: 129 Canyon View Road
   City, State: Georgetown, Texas Zip: 78626
   Telephone: 713-314-7037 FAX: _____
   Email Address: duke.kerrigan@hillwood.com

8. Agent/Representative (If any):

   Contact Person: Ryan Cunningham
   Entity: Kimley-Horn
   Mailing Address: 10814 Jollyville Road, Campus IV, Suite 200
   City, State: Austin, Texas Zip: 78759
   Telephone: 737-787-7192 FAX: _____
   Email Address: ryan.cunningham@kimley-horn.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.

    The project site is located on the south side of Wolf Ranch Parkway Right of Way and East side of Southwest Bypass Right of Way.

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.

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.

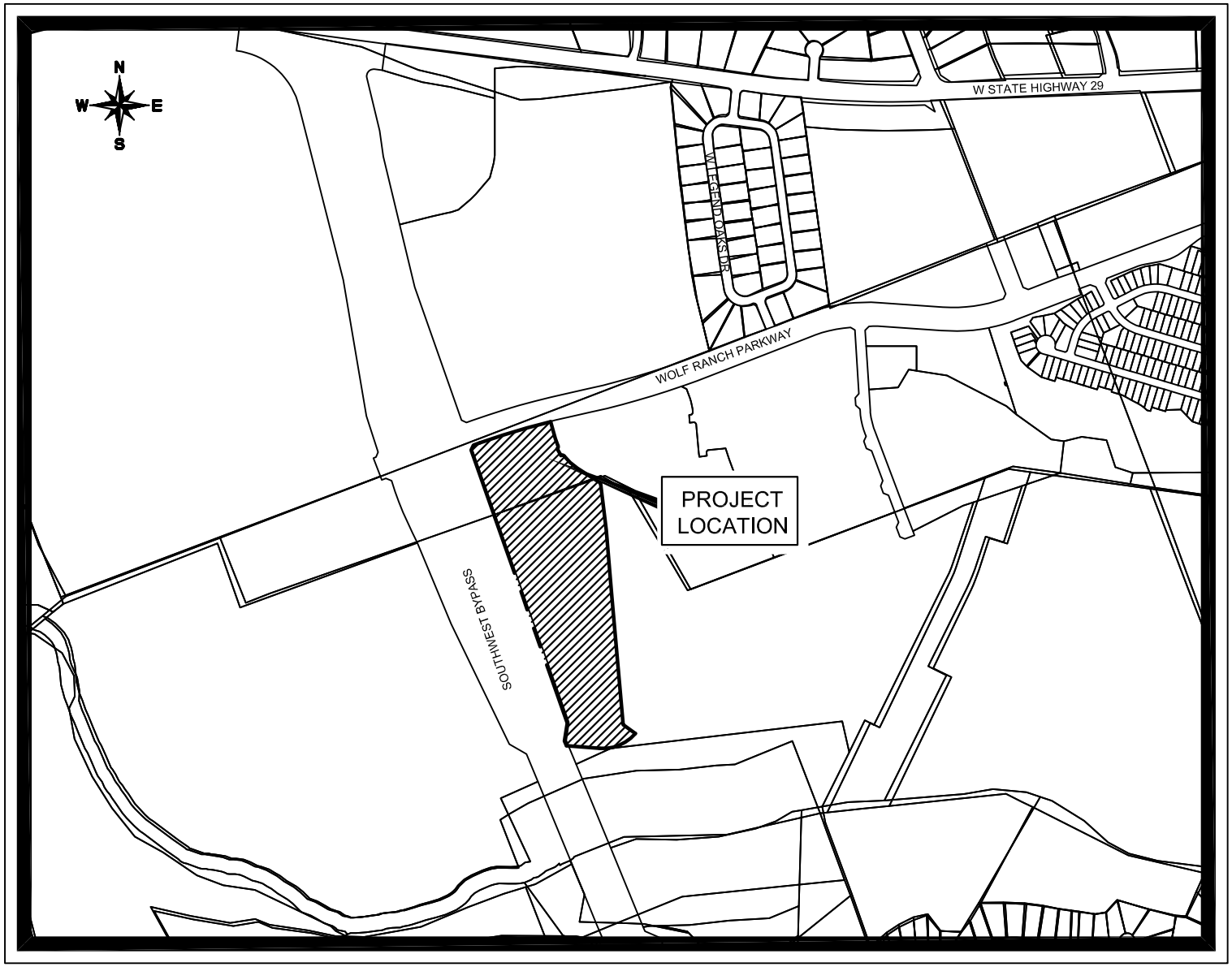
19. ☒ Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

- ☐ 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—ROAD MAP

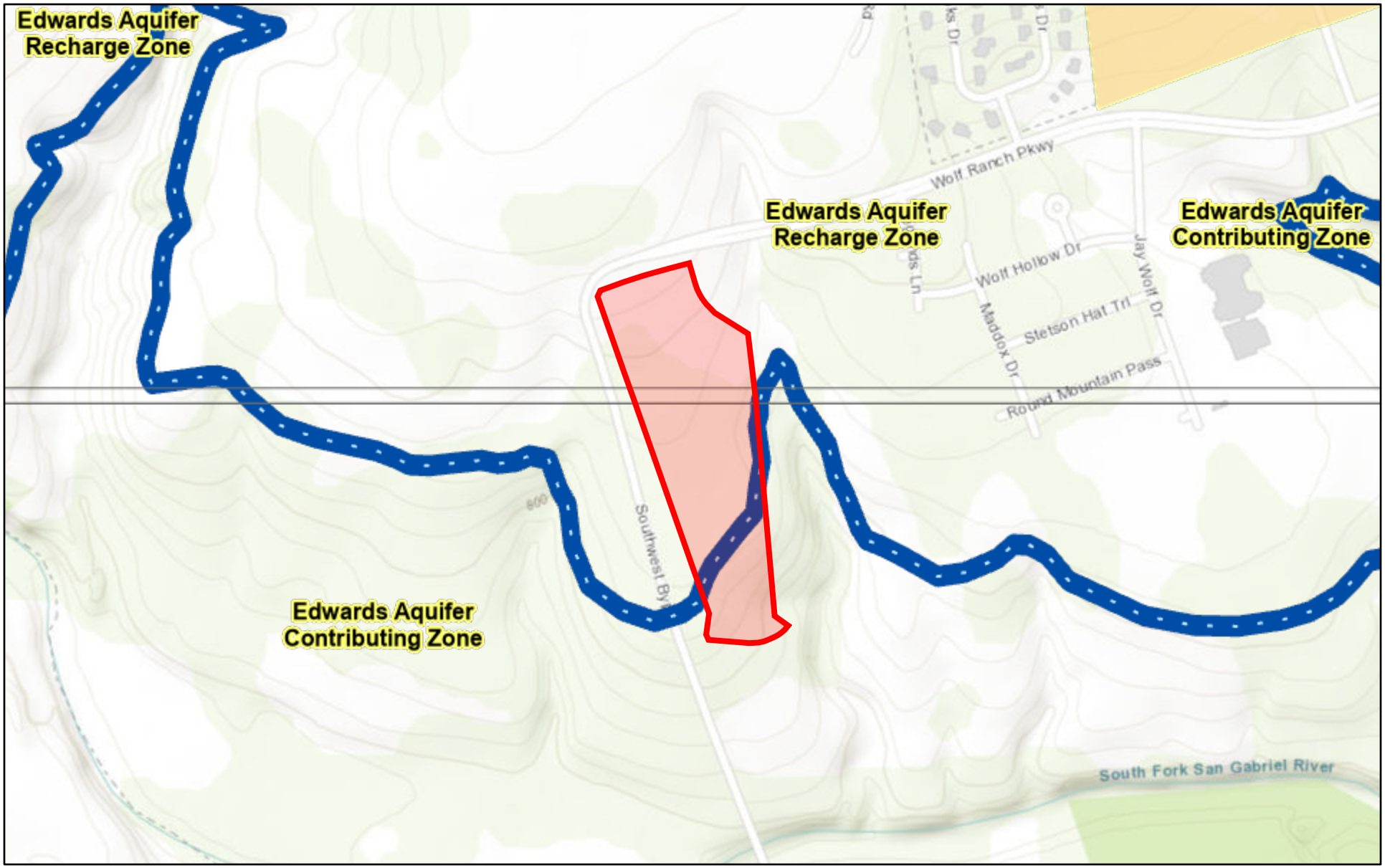


VICINITY MAP

SCALE: 1" = 1,000'

ATTACHMENT B—USGS QUADRANGLE MAP

Edwards Aquifer Viewer Custom Print



6/27/2022, 12:58:07 PM

Edwards Aquifer Label
Edwards Aquifer Boundary
Edwards Aquifer Boundary central line
City/Place
TX Counties
7.5 Minute Quad Grid
TCEQ_EDWARDS_OFFICIAL_MAPS

1:9,028

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

City of Austin, County of Williamson, Texas Parks & Wildlife, Esri, HERE, Garmin, GeoTechnologies, Inc., Intermap, USGS, METI/NASA, EPA, USDA,

Web AppBuilder for ArcGIS

TCEQ | City of Austin, County of Williamson, Texas Parks & Wildlife, Esri, HERE, Garmin, GeoTechnologies, Inc., Intermap, USGS, METI/NASA, EPA, USDA |

ATTACHMENT C—PROJECT DESCRIPTION

The development is located on the south side of Wolf Ranch Parkway Right of Way and East side of Southwest Bypass Right of Way in Georgetown Texas, Williamson County. This Water Pollution Abatement Plan (WPAP) application and Organized Sewage Collection System (SCS) application covers Wolf Ranch Multi-Family, a 25.70 acre multi-family development.

This section includes the development of 257 multi-family units and is located in the Edwards Aquifer Recharge Zone. The project includes the construction of ± 3744 linear feet of 18" to 48" private storm sewer, ± 3602 linear feet of 8" water line, and ± 3054 linear feet of 6" to 8" gravity wastewater within the Multi-family boundary. The limits of construction for this phase is 25.70 acres. This section is a part of the proposed larger Wolf Ranch Master Planned Community.

The SCS covers the wastewater for Wolf Ranch Multi-family that will gravity flow to an existing wastewater line currently under construction with Wolf Ranch Multi-Family, which connects to the San Gabriel wastewater interceptor, and ultimately is treated at the City of Georgetown San Gabriel Wastewater Treatment Plant.

This WPAP covers the storm water generated by Wolf Ranch Multi-family. The storm water from this Section will be treated in 2 different locations. The site will be treated by a proposed water quality pond and 1- proposed vegetative filter strips.

The proposed water quality pond is designed to account for the majority of the impervious cover and serve as the Permanent Best Management Practice (BMP). The 1-proposed vegetated filter strips were designed to accommodate the respective impervious cover ad serve as the Permanent Best Management Practice (BMP) for the remainder of the site.

A SWPPP will also be filed with TCEQ per the requirements of the TPDES program for Wolf Ranch Multi-family.

This site may possibly utilize imported fill material. That material shall consist of crushed limestone, select fill, and topsoil. The fill material will be used to facilitate drainage, roadway construction, and re-vegetation of the property and to elevate the building foundations.

All sensitive features and buffers are shown and labeled on the construction plans as per the Geological Assessment.

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

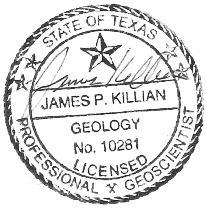
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: James Killian Telephone: 512-328-2430

Date: 8 April 2025 Fax: 512-328-1804

Representing: Horizon Environmental Services and TBPG Form Registration No. 50679 (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:



Regulated Entity Name: Approximately 6-acre Wolf Ranch Multifamily Tract 4; Southwest Bypass and Wolf Ranch Parkway, Georgetown, Williamson County, Texas

Project Information

1. Date(s) Geologic Assessment was performed: 31 March 2025
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)

Soil Name	Group*	Thickness(feet)
Eckrant-Rock outcrop association, 1-10% slopes (ErE)	D	0.9
Eckrant cobbly clay, 1-8% slopes (EaD)	D	0.9

** 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" = 400'
   Site Geologic Map Scale: 1" = 400'
   Site Soils Map Scale (if more than 1 soil type): 1" = 400'

9. Method of collecting positional data:

   ☒ Global Positioning System (GPS) technology.

☐ Other method(s). Please describe method of data collection: _____

10. ☒ The project site and boundaries are clearly shown and labeled on the Site Geologic Map.
11. ☒ Surface geologic units are shown and labeled on the Site Geologic Map.
12. ☒ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

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

13. ☒ The Recharge Zone boundary is shown and labeled, if appropriate.
14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.

    ☐ There are _____ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
    - ☐ The wells are not in use and have been properly abandoned.
    - ☐ The wells are not in use and will be properly abandoned.
    - ☐ The wells are in use and comply with 16 TAC Chapter 76.

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

Administrative Information

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

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: ~6-acre Wolf Ranch Mulitfamily Tract 4; Wolf Ranch Pkwy., 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)	DIM	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-2	30.626763	-97.718564	SH/C	30	Ked	7.5	7.5	3					C,F,O	50	80		X	X		Hillside
M-1	30.626594	-97.718316	MB	30	Ked	2	2	--					N	5	35	X		X		Hillside

* DATUM: _____

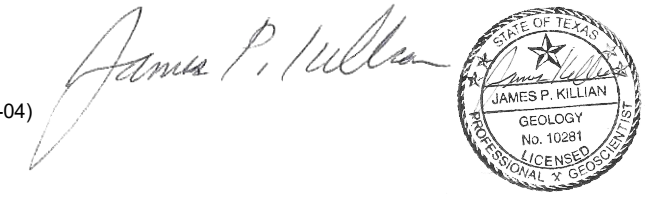
2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Man-made feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

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

12 TOPOGRAPHY

Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

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



Date: 2 April 2025

Sheet ___1___ of ___1___

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

Geologic Unit	Hydrologic Unit	Approx. Thickness at Project Site (ft)	Elevation (ft msl)	Depth (ft)
			865	0
Edwards Limestone (Ked)	Edwards Aquifer	40		
			825	40
Comanche Peak Formation (Kc)		50		
			775	90
Walnut Formation (Kwa)	Confining Unit	175		
			600	265

Note: Unit elevation and thickness given with respect to a ground surface elevation of 865 ft along the north western portion of the subject site.

Horizon Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA

Attachment B

Stratigraphic Column
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

STATE OF TEXAS
JAMES P. KILLIAN
GEOLOGY
No. 10291
LICENSED
PROFESSIONAL GEOSCIENTIST

LJAES_Filing_Master\Projects\2024\2791-24093--Wolf_Ranch_&_Guy_Tracts\Graphics\LJAES-2791-24093-002GA_05A_Strat.mxd

Horizon
Environmental Services

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) GEOLOGIC ASSESSMENT
WOLF RANCH MULTIFAMILY TRACT 4
GEORGETOWN, WILLIAMSON COUNTY, TEXAS
ATTACHMENT C - ADDITIONAL COMMENTS

GEOLOGY

A review of existing geologic literature shows that the subject site (~6 acres located at Wolf Ranch Parkway and Southwest Bypass; Georgetown, Williamson County, Texas) is completely underlain by undifferentiated Edwards Limestone (Ked) (UT-BEG, 1995), with an estimated maximum thickness of up to 70 feet at higher surface elevations along the northwest side of the site. 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 about 2 miles 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 2 miles east of the subject site and strikes N10-15°E (UT-BEG, 1995).

GEOLOGIC AND MAN-MADE FEATURES

Previously, a field survey of the subject site (Tract 4) was conducted by a licensed Horizon geologist with support staff between 8 to 11, 17, 18, and 22 to 25 October 2013 and more recently on 31 March 2025. No additional geologic features were found within the subject site. Previously, 1 natural geologic feature (F-2) was identified and is further described below. One man-made feature (M-1) was observed at the subject site, which is a storm sewer manhole located on the east side of Tract 4.

Geologic Feature F-2 is an upland sinkhole measuring approximately 15 feet in diameter by 3 feet deep, with an open drainage portal measuring 7 feet long by 4.5 feet wide by 4 feet deep near the center of the 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 of the feature. In addition, old flagging tape attached to tree limbs was observed near the entrance. This cave was fully explored, surveyed, and mapped by Horizon staff in 2013 and was named **Little Wolf Cave**. A plan and profile sketch of the cave is attached to this updated report. Inside the cave, the floor reportedly 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 acre.

Geologic feature F-2 (Little Wolf Cave) has been evaluated as sensitive for groundwater recharge capability and would therefore require a TCEQ protective setback buffer. 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 the feature's areal extent (perimeter), plus each feature's watershed catchment up to 200 feet from the perimeter of each feature. 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.

Man-made feature M-1 has 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 this feature.

REFERENCES

(CAPCOG) Capital Area Council of Governments. 2-foot contours, CAPCOG Center for Regional Development, Austin, Texas. 2015.

(Nearmap) Nearmap US, Inc. Nearmap Vertical™ digital orthographic photograph, <https://go.nearmap.com>. Imagery date 1 January 2025.

(NRCS) US Department of Agriculture, Natural Resources Conservation Service. Web Soil Survey, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>. Soil map data layer updated 12 September 2019. Accessed 1 April 2025.

(OSM) OpenStreetMap contributors. OpenStreetMap, <http://www.openstreetmap .org>. Available under the Open Database License (www.opendatacommons.org/ licenses/odbl). Accessed 1 April 2025.

(TCEQ) Texas Commission on Environmental Quality. Edwards Aquifer Protection Program. Edwards Aquifer Viewer, <http://www.tceq.state.tx.us/field/eapp/viewer.html>. Accessed day Month YEAR.

(TWDB) Texas Water Development Board. Water Information Integration and Dissemination System. TWDB Groundwater Database, <https://www3.twdb.texas.gov/apps/water datainteractive/groundwaterdataviewer>. Accessed 1 April 2025.

(TWSC) United States Geological Survey, Texas Water Science Center. Geologic Database of Texas, <https://txpub.usgs.gov/txgeology/>. Updated 1 February 2014; Accessed 02 April 2025.

(USGS) US Geological Survey. 7.5-minute series topographic maps, Georgetown, Texas, quadrangle, 1982.

_____. 7.5-minute series topographic maps, Round Rock, Texas, quadrangle, 1987.

(UT-BEG) The University of Texas at Austin Bureau of Economic Geology; C.V. Proctor, Jr., T.E. Brown, J.H. McGowen, N.B. Waechter, and V.E. Barnes. *Geologic Atlas of Texas*, Austin Sheet. Francis Luther Whitney Memorial Edition. 1974; revised 1995.

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

Horizon™ Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	Nearmap, 2025; TWSC, 2014

Attachment D

Site Geologic Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

N

0 200 400
Feet

LJAES_Filing_Master\Projects\2024\2791-24093--Wolf_Ranch_&_Guy_Tracts\Graphics\LJAES-2791-24093-001GA_06A_SGM

Legend

- Little Wolf Cave
- Man-Made Feature
- 2-Foot Contour
- Subject Site
- TCEQ Buffer Area

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

Horizon™ Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	CAPCOG, 2015; Nearmap, 2025

Attachment E

Geologic Feature Buffer Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

N

0 200 400
Feet

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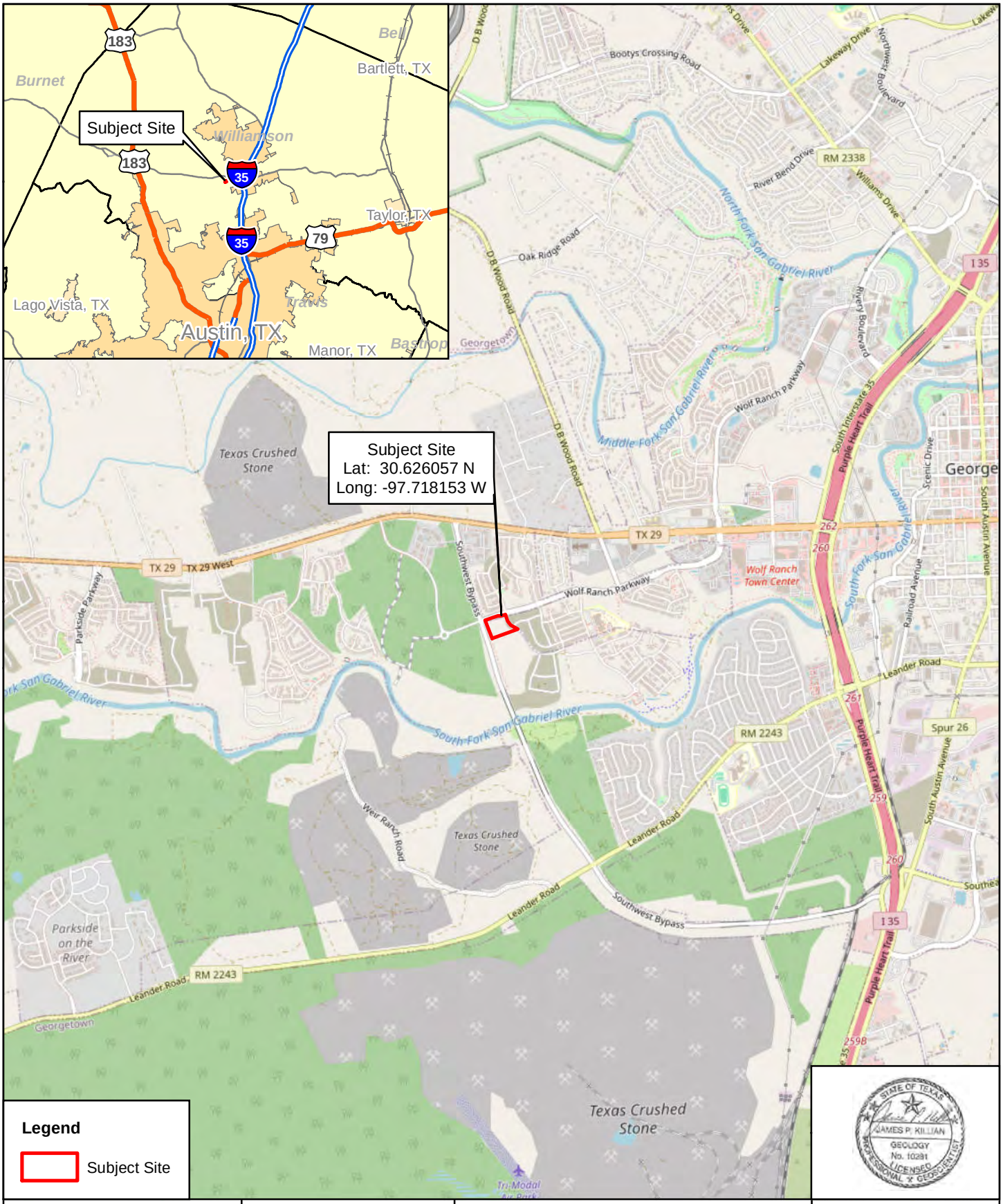

Date:	04/01/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	OSM, 2025

Attachment F, Figure 1

Vicinity Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

0 1,750 3,500
Feet

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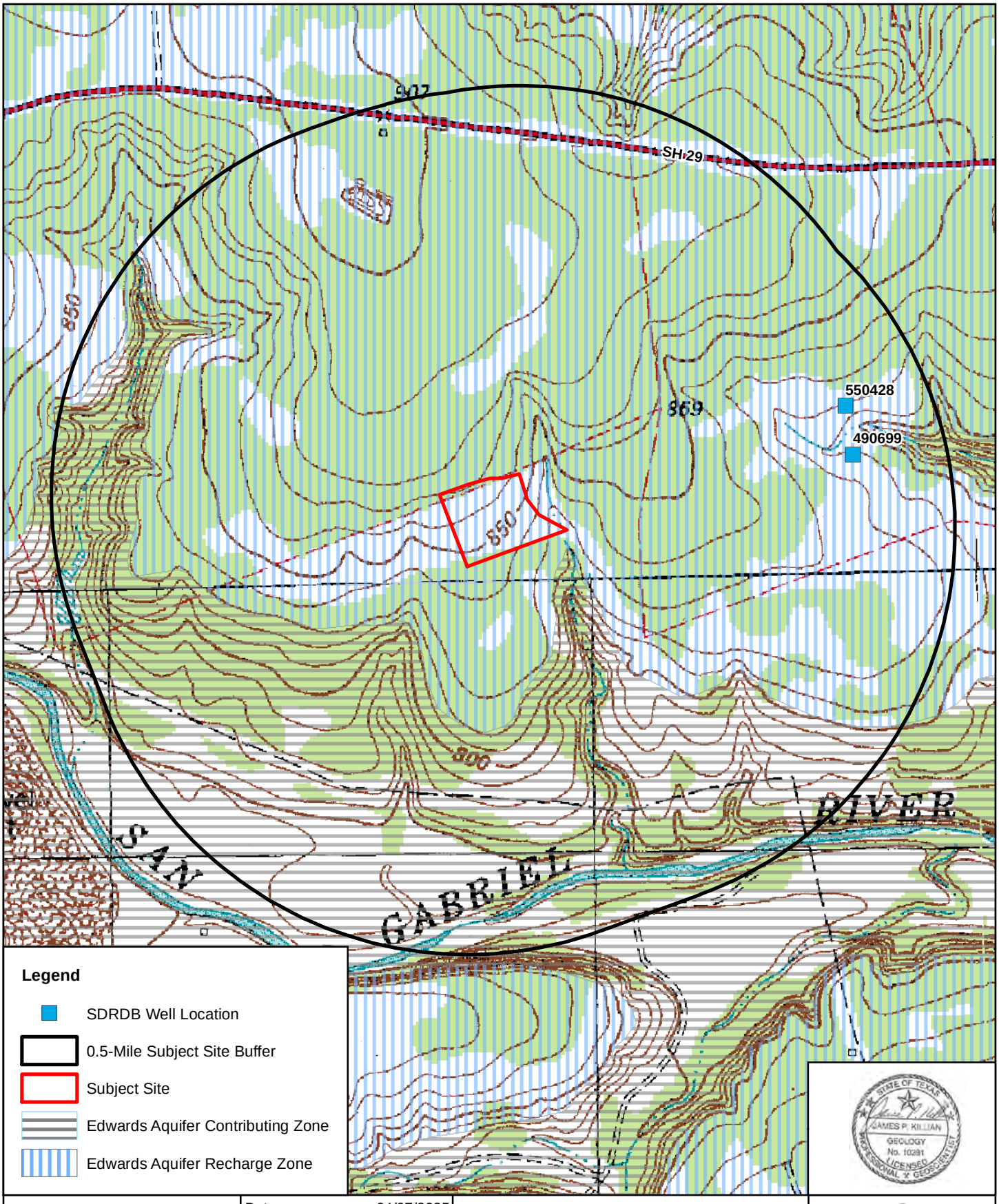


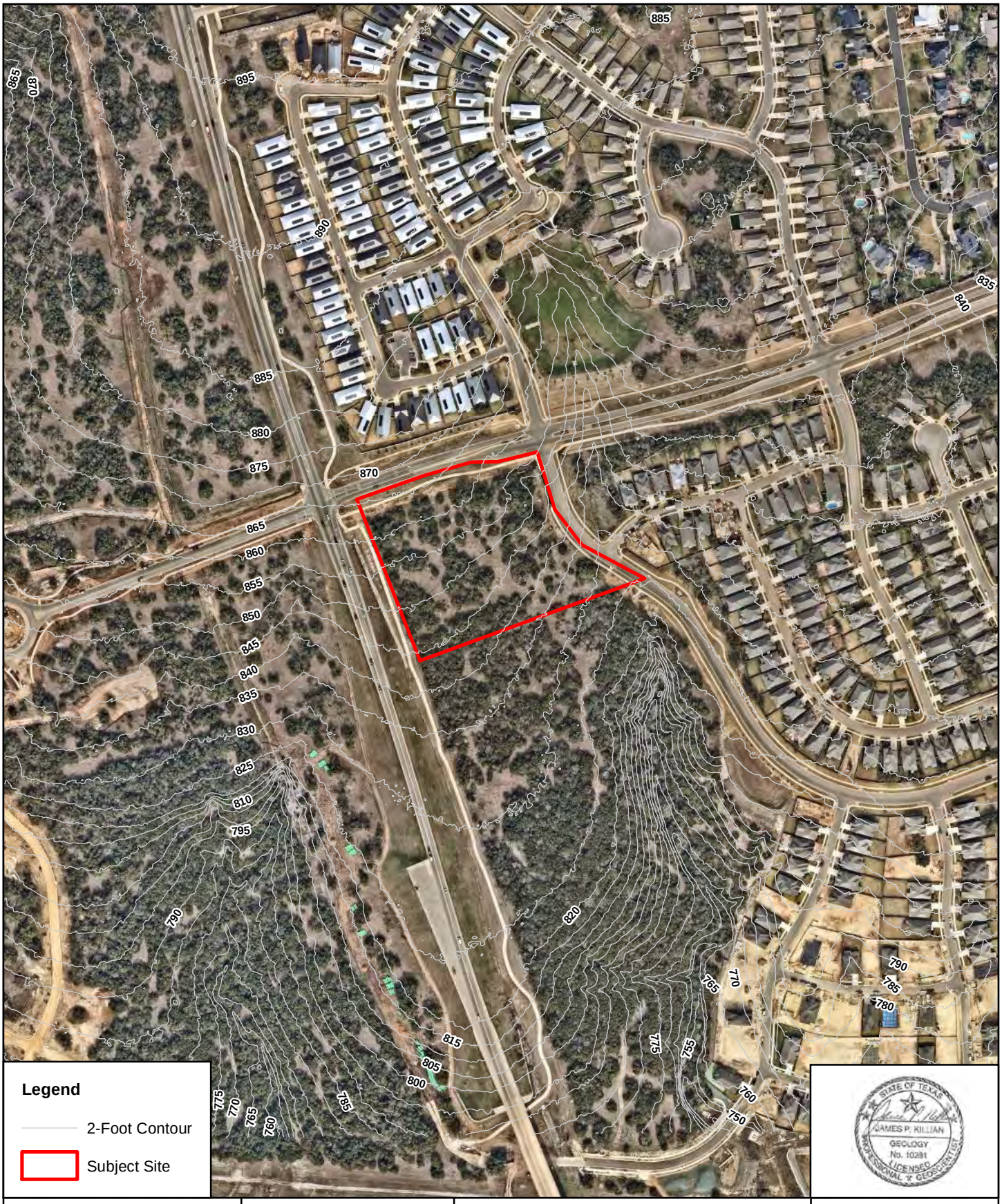
Horizon Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	TCEQ, 2025; TWDB, 2025; USGS, 1982, 1987

Attachment F, Figure 2

Topography and Hydrogeology Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

LJAES_Filing_Master\Projects\2024\2791-24093--Wolf_Ranch_&_Guy_Tracts\Graphics\LJAES-2791-24093-001GA_02A_TopoHydro



Legend

2-Foot Contour

Subject Site

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

Horizon™ Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	CAPCOG, 2015; Nearmap, 2025

Attachment F, Figure 3

Site Topography Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

N

0 200 400
Feet

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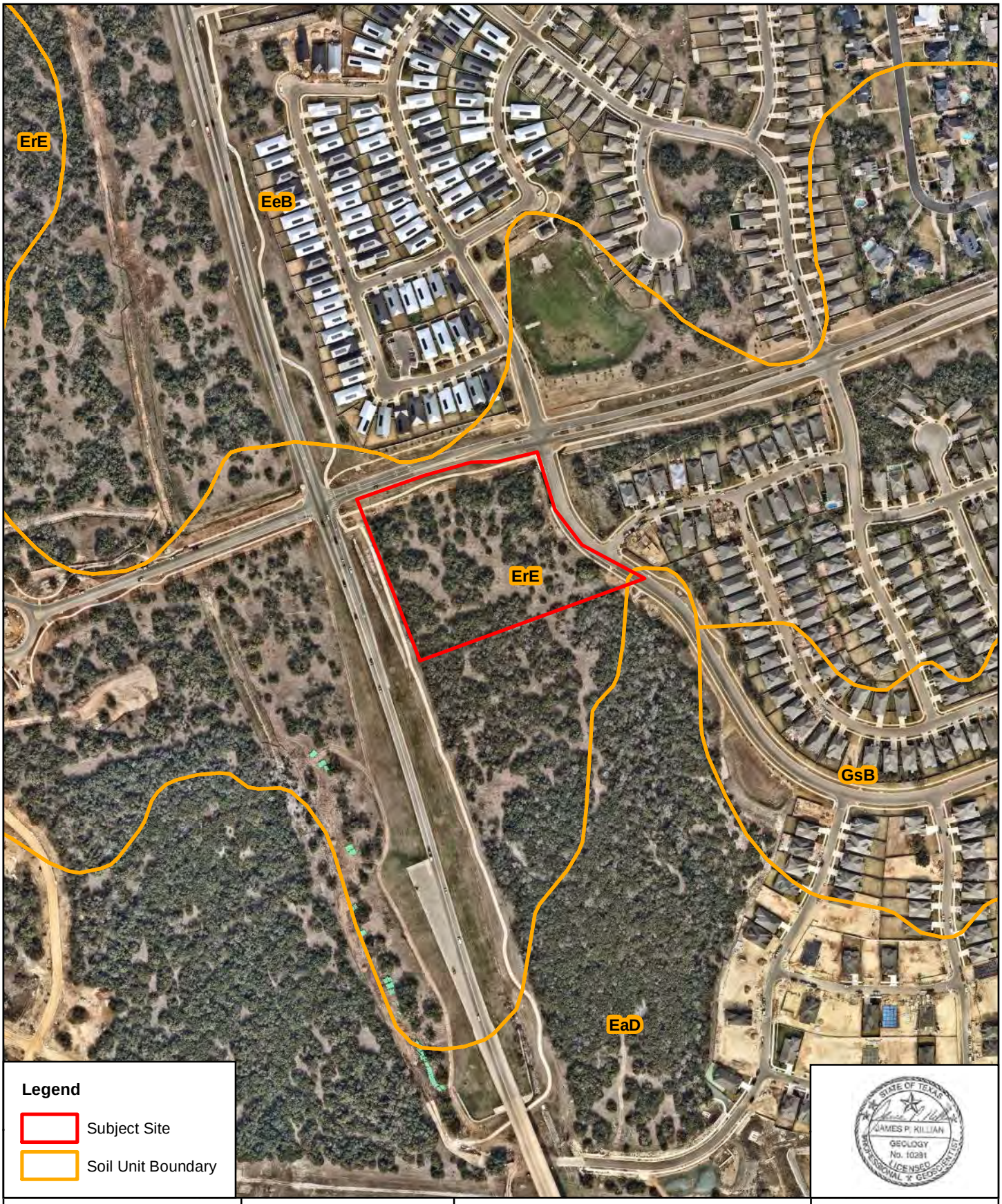

Legend

- Subject Site
- Soil Unit Boundary

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

Horizon™ Environmental Services

Date:	04/07/2025
Drawn:	KRW
HJN NO:	2791-24093 GA
Source:	Nearmap, 2025; NRCS, 2025

Attachment F, Figure 4

Site Soil Map
Wolf Ranch Multifamily Tract 4
Georgetown, Williamson County, Texas

N

0 200 400
Feet

LJAES_Filing_Master\Projects\2024\2791-24093--Wolf_Ranch_&_Guy_Tracts\Graphics\LJAES-2791-24093-001GA_04A_Soil

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PHOTO 1
Geologic Feature F-2 (Little Wolf Cave) entrance, facing northeast

PHOTO 2
Man-made feature M-1 (storm drain manhole), facing northwest

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Environmental Services

ENTRANCE 11' x 4.3' x 4D

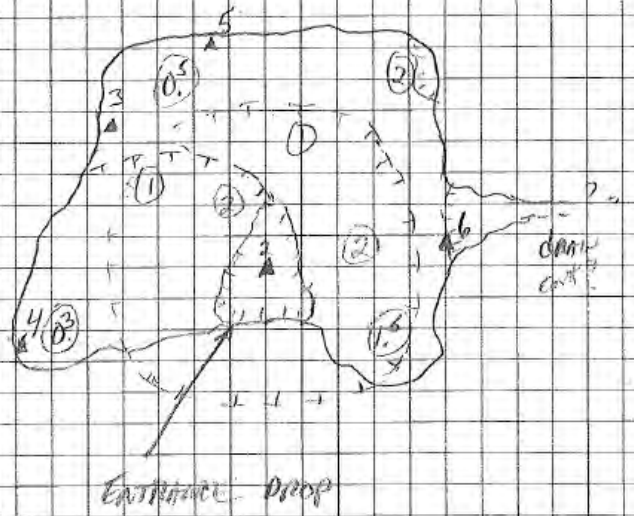
Corporate Headquarters:
Austin, TX

Offices:
Beaumont, TX
Houston, TX
Karnes City, TX
Pittsburg, TX
San Antonio, TX
Shreveport, LA
Ann Arbor, MI

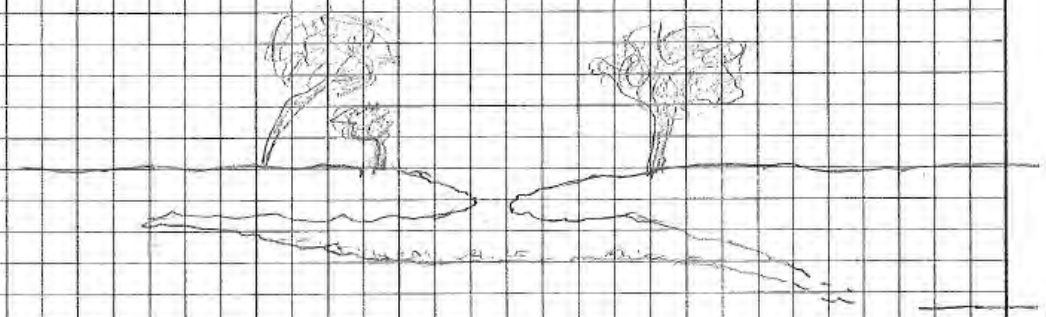
1"=10' F-2 Little WOLF CAVE 9N

Williamson Co. TX

12/2013
SUUNTOS & TAPE SURVEY
E. CARRELL
J. KILLIAN



35'L x 25'W



Horizon™
Environmental Services, Inc.

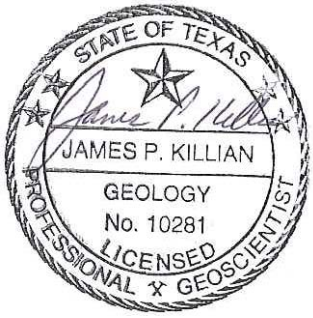
GEOLOGIC ASSESSMENT
APPROXIMATELY 366-ACRE
GUY TRACT
SOUTHERN TERMINUS OF D B WOOD ROAD
GEORGETOWN, WILLIAMSON COUNTY, TEXAS
HJN 170167 GA

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

Horizon
Environmental Services, Inc.

TABLE OF CONTENTS

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

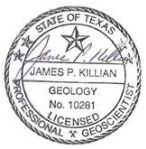
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

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.

Horizon
Environmental Services, Inc.

ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: 366-ac Guy tract; so. DB Wood Rd Georgetown, Williamson Co. Tx

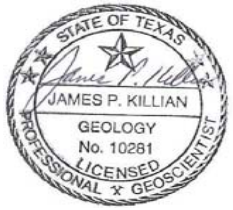
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	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____

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

Horizon
Environmental Services, Inc.

ATTACHMENT B

STRATIGRAPHIC COLUMN

Geologic Unit	Hydrologic Unit	Approx. Thickness at Project Site (ft)	Elevation (ft msl)	Depth (ft)
			845	0
Edwards Formation (Ked)	Edwards Aquifer	65	780	65
Comanche Peak Formation (Kc)		60	720	125
Walnut Formation (Kwa)	Confining Unit	175	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. 10291
LICENSED
PROFESSIONAL GEOSCIENTIST

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

Horizon
Environmental Services, Inc.

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
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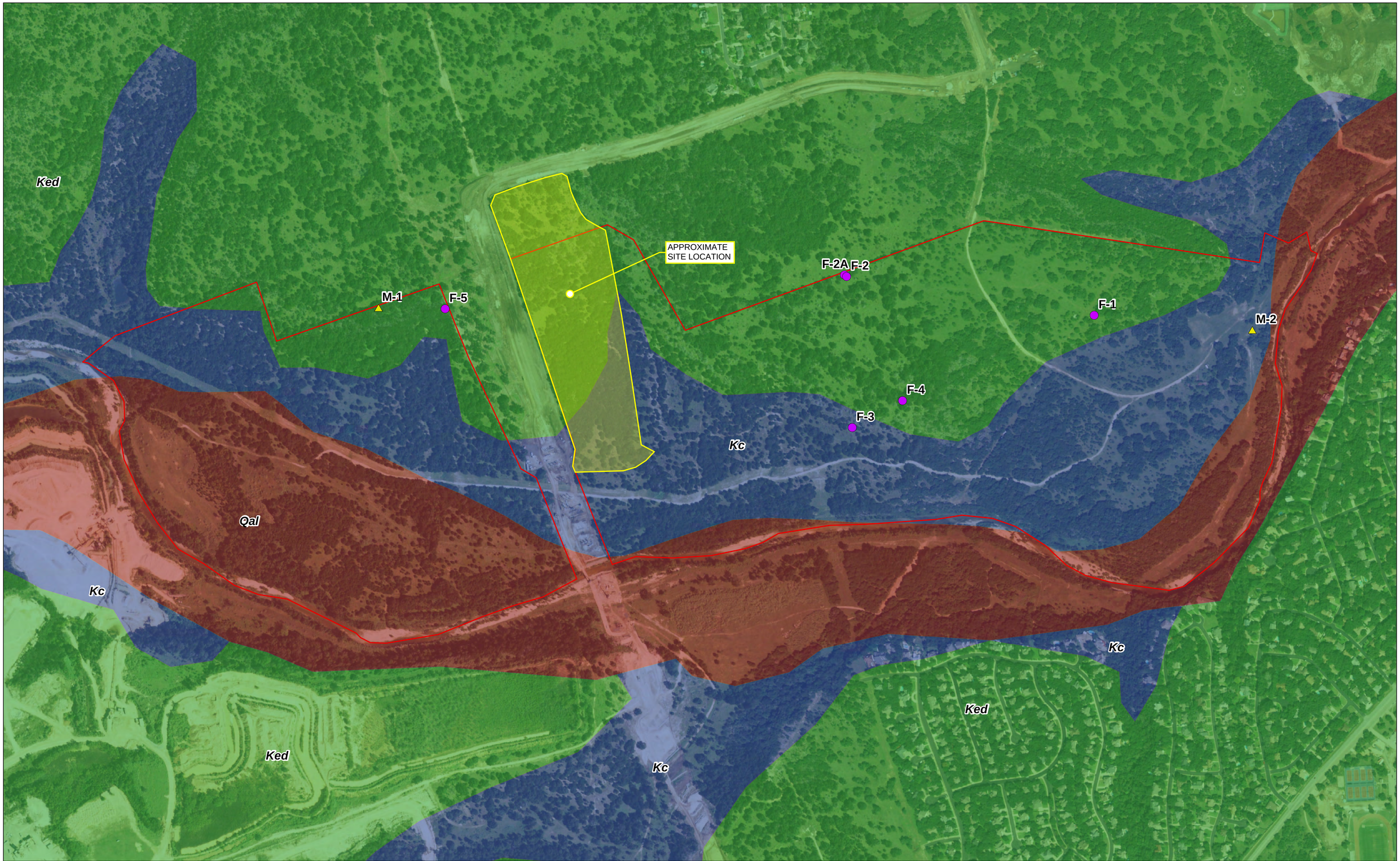
ATTACHMENT D

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

0 150 300
Feet

Scale: 1" = 300'

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

Horizon
Environmental Services, Inc.

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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(NRCS) Web Soil Survey, <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Accessed 27 September 2017.

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(USGS) US Geological Survey. 7.5-minute series topographic maps, Round Rock, Texas quadrangle, 1987.

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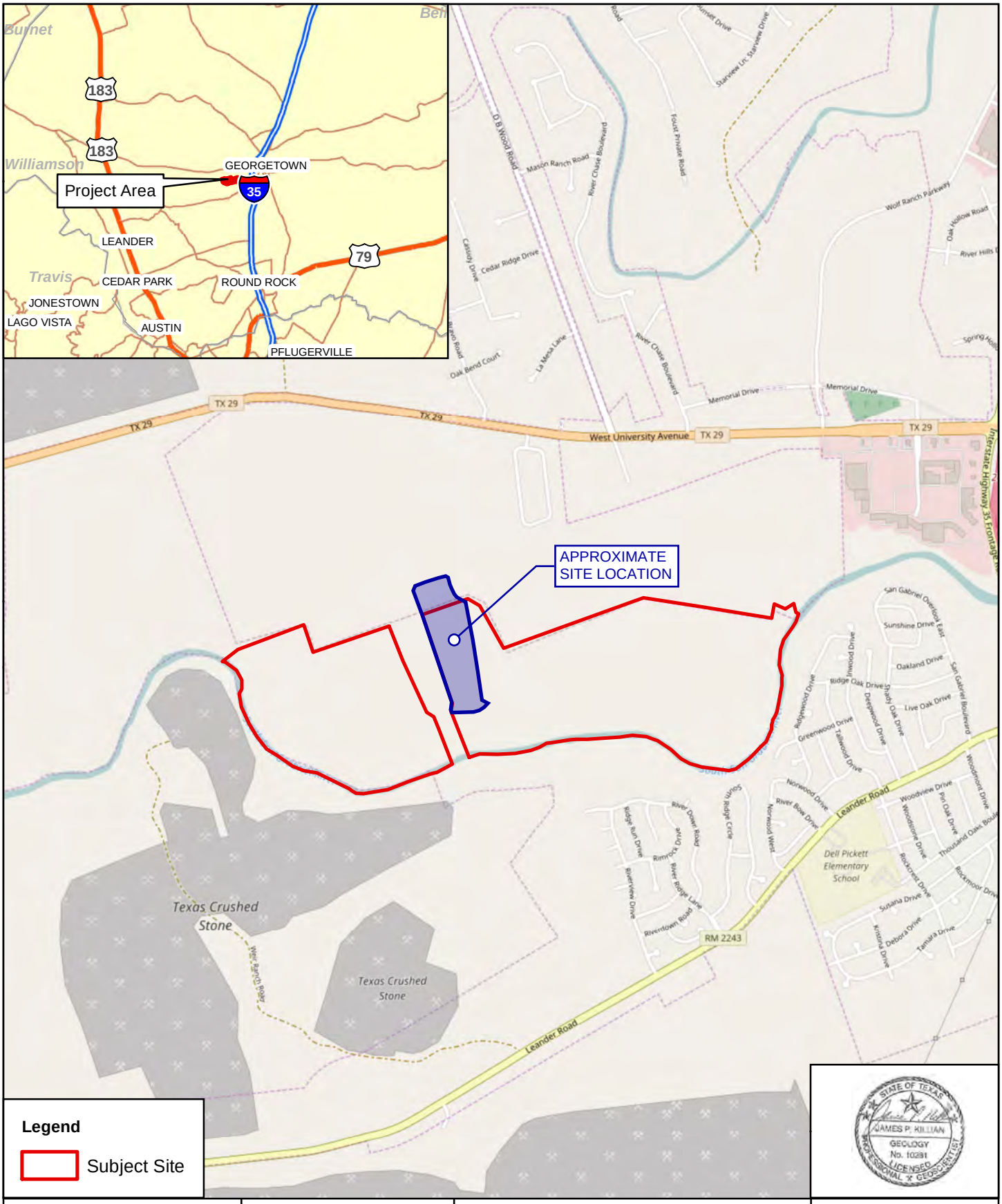
ATTACHMENT F

ADDITIONAL SITE MAPS



STATE OF TEXAS
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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

N

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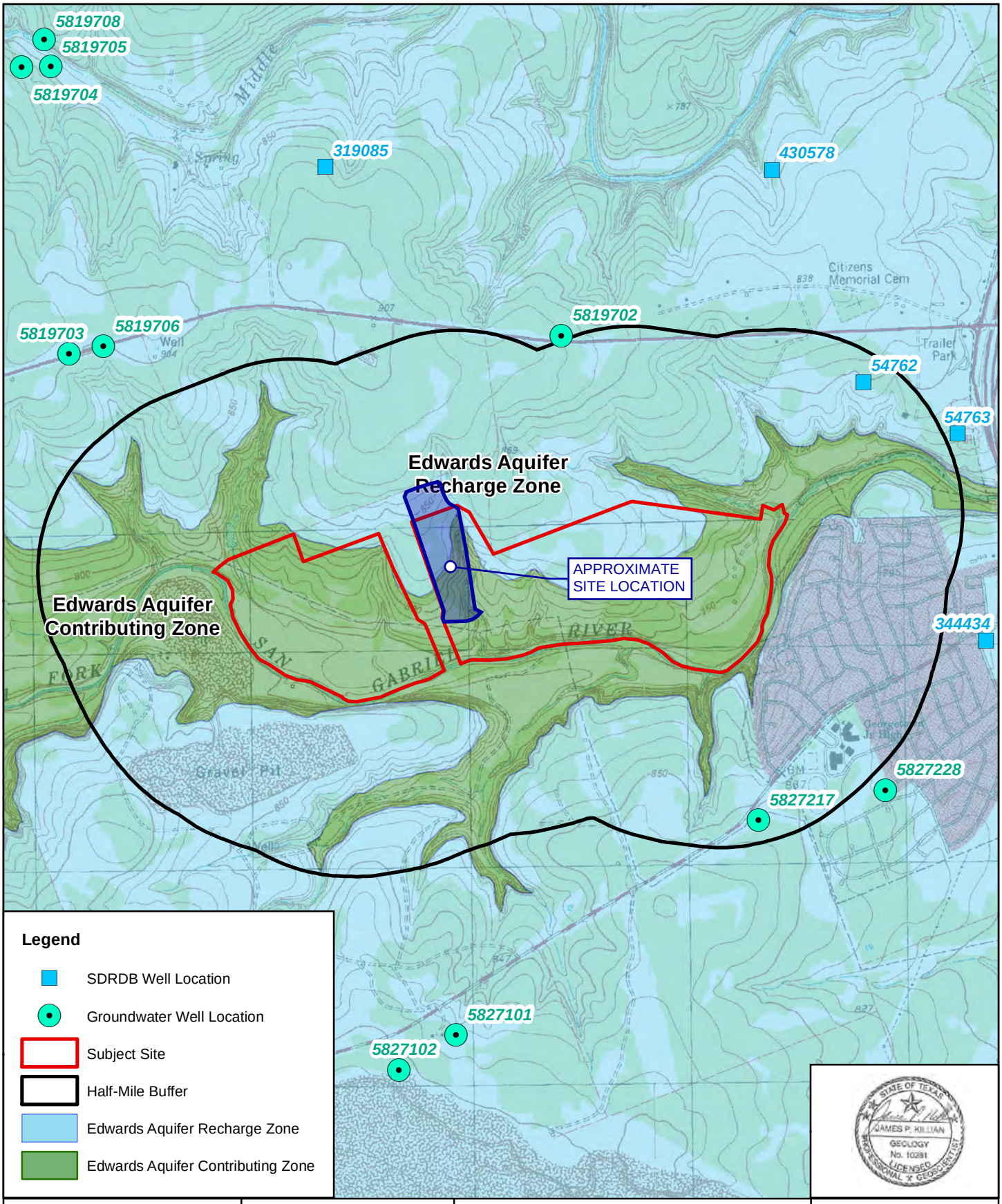
Feet

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



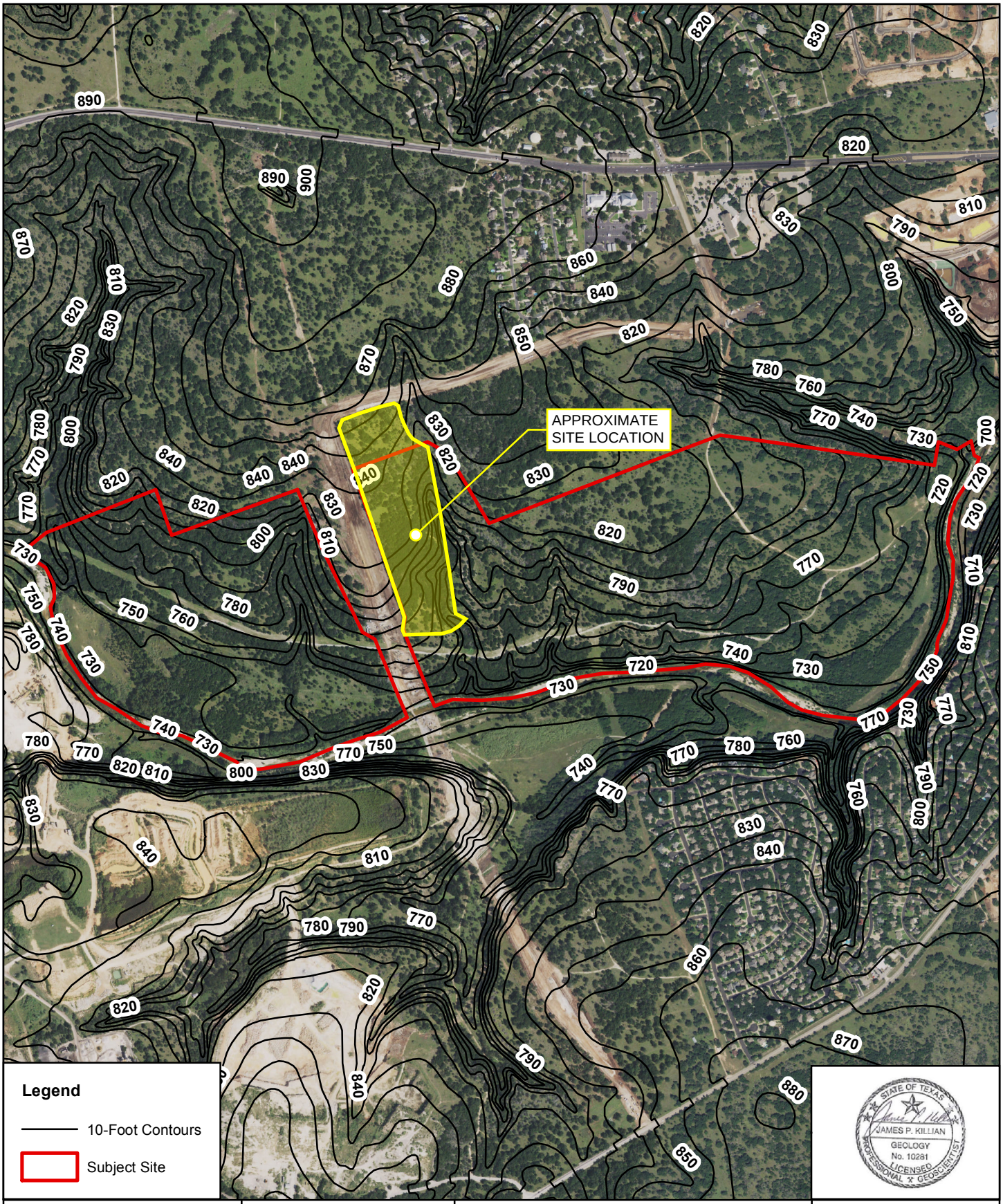
Horizon Environmental Services, Inc.

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

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



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STATE OF TEXAS

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

N

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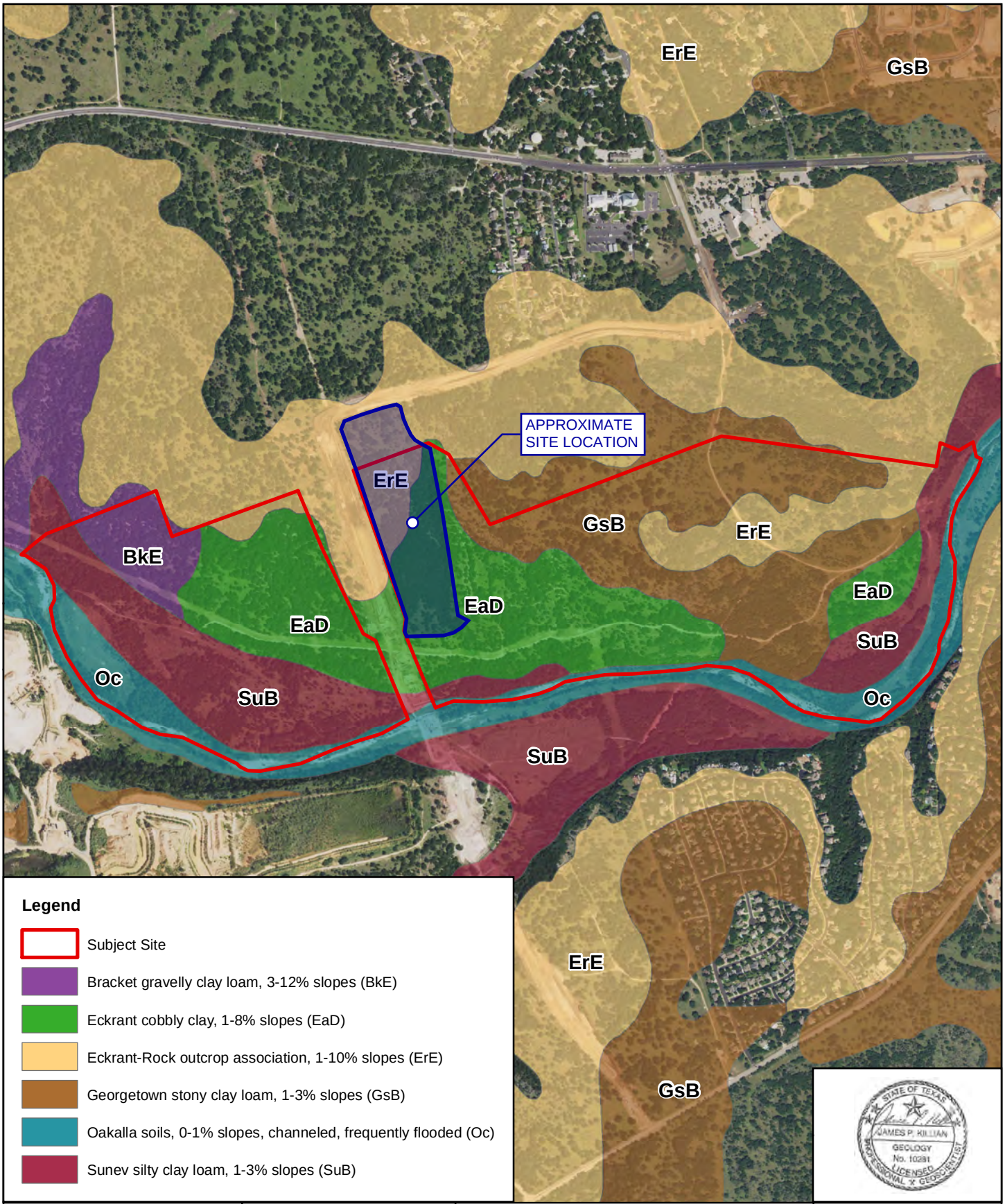
Feet

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



Legend

- Subject Site
- Bracket gravelly clay loam, 3-12% slopes (BkE)
- Eckrant cobbly clay, 1-8% slopes (EaD)
- Eckrant-Rock outcrop association, 1-10% slopes (ErE)
- Georgetown stony clay loam, 1-3% slopes (GsB)
- Oakalla soils, 0-1% slopes, channeled, frequently flooded (Oc)
- Sunev silty clay loam, 1-3% slopes (SuB)

STATE OF TEXAS
JAMES P. KILLIAN
GEOLOGY
No. 10291
LICENSED
PROFESSIONAL GEOSCIENTIST

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

Horizon
Environmental Services, Inc.

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

Horizon
Environmental Services, Inc.

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

Horizon
Environmental Services, Inc.

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

Horizon
Environmental Services, Inc.

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

ORGANIZED SEWAGE COLLECTION SYSTEM REPORT

Wolf Ranch Multifamily
Georgetown, Williamson County, Texas

Prepared By:

Ryan Cunningham
Kimley-Horn and Associates, Inc.
10814 Jollyville Road
Building IV, Suite 200
Austin, TX 78759
TEXAS REGISTRATION #928

January 2025

Kimley»Horn

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 MULTI-FAMILY

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: Duke Kerrigan
   Entity: H4 WR MF-1, LP
   Mailing Address: 129 Canyon View Road
   City, State: Georgetown, Texas Zip: 78626
   Telephone: 713-314-7037 Fax: _____
   Email Address: duke.kerrigan@hillwood.com
   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: Ryan Cunningham, P.E.
   Texas Licensed Professional Engineer's Number: 145422
   Entity: Kimley-Horn
   Mailing Address: 10814 Jollyville Road, Campus IV, Suite 200
   City, State:Austin, Texas Zip: 78759
   Telephone:737-787-7192 Fax:_____
   Email Address:ryan.cunningham@kimley-horn.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: _____
   ☒ Multi-family: Number of residential units: 257
   ☐ Commercial
   ☐ Industrial
   ☐ Off-site system (not associated with any development)
   ☐ Other: _____

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

100% Domestic	44,076 gallons/day
_____% Industrial	_____ gallons/day
_____% Commingled	_____ gallons/day

   Total gallons/day: 0

6. Existing and anticipated infiltration/inflow is 29,909 gallons/day. This will be addressed by: including infiltration/in flow with peak wet weather flow.

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 _____. A copy of the approval letter is attached.
   ☒ The WPAP application for this development was submitted to the TCEQ on with SCS application, 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)	2569	SDR-26-PVC	ASTM D 3034
8" (water crossings)	80	150 PSI SDR-26-PVC	ASTM D 2241
6" Gravity Laterals	485	SDR-26-PVC	ASTM 3034

Total Linear Feet: 3,134

(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 City of Georgetown (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?*
	Of		
	Of		
*SEE NEXT SHEET FOR "MANHOLES AND CLEANOUTS" TABLE			
	Of		
	Of		
	Of		
	Of		

WOLF RANCH MULTI-FAMILY WW MANHOLES & CLEANOUTS			
LINE	**SHOWN ON SHEET**	**STATION**	**MANHOLE OR CLEANOUT?**
A	39 OF 47	1+80.83	MH-0
A	39 OF 47	2+99.58	MH-1
A	39 OF 47	7+74.58	MH-2
A	39 OF 47	8+97.40	MH-3
A	39 OF 47	11+02.02	MH-4
A	39 OF 47	12+44.08	MH-5
A	38 OF 47	14+90.23	MH-6
A	38 OF 47	15+33.15	MH-7
WW-LAT-1	39 OF 47	1+77.79	CLEANOUT
WW-LAT-2	39 OF 47	1+43.62	CLEANOUT
B	38 OF 47	2+02.58	MH-8
B	38 OF 47	3+43.42	MH-9
B	38 OF 47	4+21.87	MH-10
B	38 OF 47	7+29.31	MH-11
B	38 OF 47	8+06.07	MH-12
B	38 OF 47	8+94.56	MH-13
B	38 OF 47	9+45.00	MH-14
WW-LAT-5	38 OF 47	1+25.05	CLEANOUT
WW-LAT-7	38 OF 47	1+85.52	CLEANOUT
WW-LAT-8	38 OF 47	2+16.83	CLEANOUT
C	38 OF 47	3+28.28	MH-15
C	38 OF 47	3+90.72	MH-16
WW-LAT-3	38 OF 47	1+48.99	CLEANOUT
WW-LAT-4	38 OF 47	1+35.25	CLEANOUT
WW-LAT-6	38 OF 47	1+52.35	CLEANOUT

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
	Of		
	Of		
	Of		

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', 60', 40''.

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*
	of	to
	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*
	*SEE NEXT SHEET FOR "WATER LINE CROSSINGS" TABLE			

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*

WOLF RANCH MULTI-FAMILY WW & WATER CROSSINGS				
Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance
WW A	11+26.31	Crossing		6.3'
WW A	15+19.08	Crossing		4.0'
WW B	2+16.58	Crossing		4.1'
WW B	6+71.17	Crossing		3.0'

Line	*Manhole*	*Station*	*Sheet*

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*

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*

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]**	46 of 47
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) **[Required]**	46 of 47
Alternate method of joining lateral to existing SCS line for potential future connections **[Required]**	46 of 47
Typical trench cross-sections **[Required]**	46 of 47
Bolted manholes **[Required]**	46 of 47
Sewer Service lateral standard details **[Required]**	46 of 47
Clean-out at end of line **[Required, if used]**	46 of 47
Baffles or concrete encasement for shock/erosion protection **[Required, if flow velocity of any section of pipe >10 fps]**	NA of NA
Detail showing Wastewater Line/Water Line Crossing **[Required, if crossings are proposed]**	46 of 47
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) **[Required, if Flexible Pipe is used]**	NA of NA

Standard Details	*Shown on Sheet*
Drop manholes **[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]**	NA of NA

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: _____

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: Ryan Cunningham, P.E.

Date: 01/06/2025

Place engineer's seal here:

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)

WASTEWATER ENGINEERING REPORT AND SPECIFICATIONS

Wolf Ranch Multi-Family
Georgetown, Williamson County, Texas

Prepared By:

Ryan Cunningham, P.E.
Kimley-Horn and Associates, Inc.
10814 Jollyville Road
Building IV, Suite 200
Austin, TX 78759
TEXAS REGISTRATION #928

01/23/2025

January 2025

Kimley»Horn

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ATTACHMENTS

Engineering Design Report

For

WOLF RANCH MULTIFAMILY

Organized Sewage Collection System

JANUARY 2025

Prepared By:
Kimley-Horn & Assocates, Inc.
10814 Jollyville Road, Building IV, Suite 200
Austin, Texas 78759
TBPE Registration Number F928

PROPOSED TYPE OF PIPE (8")

(8")

Type I, Grade I, Polyvinyl Chloride (PVC) Specifications:

Size of Pipe: 8.00 in.

SDR 26 Properties

Pipe Compliance:	ASTM D-3034
Joint Compliance:	ASTM D-3139
Cell Classification:	12454
Minimum Tensile Strength (psi):	7,000
Minimum Modulus of Elasticity (psi):	400,000
Average Inner Diameter (inch):	7.754
Average Outer Diameter inch):	8.4
Wall Thickness (inch):	0.323
Approximate Trenching Width (feet):	2.70
Minimum Pipe Depth (Cover) used (feet):	**4.50**
Maximum Pipe Depth (Cover) used (feet):	**11.25**

FLOW/CAPACITY ANALYSIS

For the Proposed Project:

Proposed Waste Water Usage: **44,076 GPD** (max)

Q_{max} (As determined in Attachment A) = 0.068 CFS

$$Q_{full} = \frac{1.486}{n} \times A \times R^{\frac{2}{3}} \times \sqrt{S}$$

For the Specified Pipe at the Minimum Design Slope, the full flow is

Q_{full} = 0.832 CFS

0.068 < 0.832

Design meets TCEQ Guidelines

MINIMUM AND MAXIMUM GRADES FOR PIPES (30 TAC §217.53(l)(2)(A))

(8")

Minimum and Maximum Pipe Slopes		
Size of Pipe	Minimum Slope (%)	Maximum Slope (%)
6	0.5	12.35
8	0.33	8.4
10	0.25	6.23
12	0.2	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.3
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 pipes larger than 39 inches in diameter, the slope is determined by Manning's formula to maintain a velocity greater than **2.0 feet per second and less than 10.0 feet per second** when flowing full.		

MINIMUM AND MAXIMUM VELOCITY FOR THE PROPOSED SYSTEM:

(8")

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

So, using 8.00 inch PVC Pipe:

V = velocity (ft/sec) = (solve)

n = Manning's coefficient = 0.013

R_h = hydraulic radius = 0.165

S = slope (ft/ft)

Minimum Slope Used (%): **0.50**

Maximum Slope Used (%): **6.87**

V_{min} = 2.44 ft/sec

V_{max} = 9.03 ft/sec

2.44 **>** **2.00** ft/sec

9.03 **<** **10.00** ft/sec

Design meets TCEQ Guidelines

Design meets TCEQ Guidelines

AVERAGE VALUES OF MODULUS OF SOIL REACTION, E'

Soil type-pipe bedding material (Unified Classification System)	E' for Degree of Compaction of Bedding, in pounds per square inch			
	Dumped	Slight <85% Proctor, <40% relative density	Moderate 85%-95% Proctor, 40%-70% relative density	High, >95% Proctor, >70% relative density
(1)	(2)	(3)	(4)	(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	1000
Fine-grained Soils (LL<50) Soils with medium to no plasticity, CL, ML, ML-CL,with more than 25% coarse-grained particles	100	400	1000	2000
Coarse-grained Soils with Fines GM, GC, SM, SC[c] contains more than 12% fines				
Coarse-grained Soils with Little or no Fines GW, GP, SW, SP[c] contains less than 12% fines	200	1000	2000	3000
Crushed Rock	1000	3000	3000	3000
Accuracy in Terms of Percentage Deflection	± 2	± 2	± 1	± 0.5

Taken from: Howard, Amster K. "Soil Reaction for Buried Flexible Pipe"
U.S. Bureau of Reclamation, Denver, CO and the American Society of Civil Engineers.

Modulus of Soil Reaction for the in-situ soil is determined to be = 1000 psi

PIPE BEDDING CLASS

Taken from the American Society for Testing and Material (ASTM) D 2321 and American Association of State Highway and Transportation Officials (AASHTO) M43, and as published on Table 7, in Deflection: The Pipe/Soil Mechanism UNI-TR-1-97, Uni-Bell PVC Pipe Association, Pg 24.

Pipe Embedment Material						E', psi (kPa) for Degree of Embedment Compaction				
ASTM D 2321*		ASTM D 2487		AASHTO M43 Notation	Min. Std. Proctor Density (%)	Lift Placement Depth	Dumped	Slightly < 85%	Moderate 85% - 95%	High > 95%
Class	Description	Notation	Description							
IA	Open-graded, clean manufactured aggregates	N/A	Angular crushed stone or rock, crushed gravel, crushed slag; large voids with little or no fines	5 56	Dumped	18" (0.45 m)	1000 (6,900)	3000 (20,700)	3000 (20,700)	3000 (20,700)
IB	Dense-graded, clean manufactured, processed aggregates	N/A	Angular crushed stone or other Class IA material and stone/sand mixtures; little or no fines							
II	Clean, coarse-grained soils	GW	Well-graded gravel, gravel/sand mixtures; little or no fines	57 6 67	85%	12" (0.30 m)	N/R	1000 (6,900)	2000 (13,800)	3000 (20,700)
		GP	Poorly graded gravel, gravel/sand mixtures; little or no fines							
		SW	Well-graded sands, gravelly sands; little or no fines							
		SP	Poorly graded sands, gravelly sands; little or no fines							
III	Coarse-grained soils with fines	GM	Silty gravels, gravel/sand/silt mixtures	Gravel and sand with <10% fines	90%	9" (0.20 m)	N/R	N/R	1000 (6,900)	2000 (13,800)
		GC	Claycy gravels, gravel/sand/clay mixtures							
		SM	Silty sands, sand/silt mixtures							
		SC	Clayey sands, sand/clay mixtures							

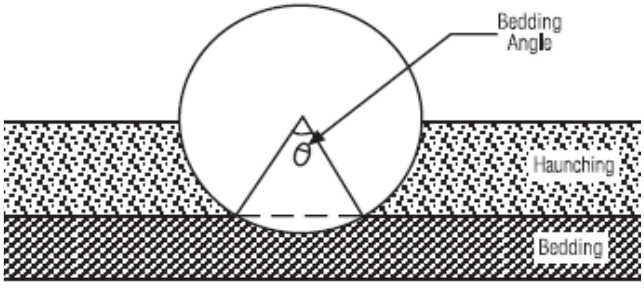
NOTE:

Per TCEQ guidelines, a contractor is allowed to use ASTM D 2321 Bedding Class 1A, 1B, II, or III at no less than 85% percent compaction. To grant the contractor its ability to make the proper judgment of which bedding class to use, the calculations provided in this Engineering Design Report reflect the use of **Bedding Class III, at 85%-95%** compaction, with an E' value of 1000 psi. This provides the "worst case" scenario for the SCS line. All other Bedding Class options will provide an improved value for the zeta factor as well as pipe deflection.

For Bedding Class III, 85%-95% Compaction, E_b = **1000** **psi**

PIPE BEDDING ANGLE

As Published on Figure 8 and Table 5, in Deflection: The Pipe/Soil Mechanism UNI-TR-1-97, Uni-Bell PVC Pipe Association, Pgs 18-19.



Bedding Constant Values

Bedding Angle, degrees	Bedding Constant
0	0.110
30	0.108
45	0.105
60	0.102
90	0.096
120	0.090
180	0.083

LIVE LOAD DETERMINATION

Source: AASHTO H20 and E80 Loads and as Published on Table 4, in Deflection: The Pipe/Soil Mechanism UNI-TR-1-97, Uni-Bell PVC Pipe Association, Pg 14.

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 + impact
[2] Simulates 80,000 lb/ft railway load + impact
[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

PRISM LOAD DETERMINATION

Also referred to as the 'dead' load, the prism load is the pressure acting on the pipe by the weight of the soil column above a given section of the pipe. The following prism load columns are industry standards as referenced from Table 3, Deflection: The Pipe/Soil Mechanism UNI-TR-1-97, Uni-Bell PVC Pipe Association, Pg 13.

Table 3
Prism Load Soil Pressure (lbs/in²)

Height of Cover (ft)	Soil Unit Weight (lb/ft³)				
	100	110	120	125	130
1	0.69	0.76	0.83	0.87	0.90
2	1.39	1.53	1.67	1.74	1.81
3	2.08	2.29	2.50	2.60	2.71
4	2.78	3.06	3.33	3.47	3.61
5	3.47	3.82	4.17	4.34	4.51
6	4.17	4.58	5.00	5.21	5.42
7	4.86	5.35	5.83	6.08	6.32
8	5.56	6.11	6.67	6.94	7.22
9	6.25	6.88	7.50	7.81	8.13
10	6.94	7.64	8.33	8.68	9.03
11	7.64	8.40	9.17	9.55	9.93
12	8.33	9.17	10.00	10.42	10.83
13	9.03	9.93	10.83	11.28	11.74
14	9.72	10.69	11.67	12.15	12.64
15	10.42	11.46	12.50	13.02	13.54
16	11.11	12.22	13.33	13.89	14.44
17	11.81	12.99	14.17	14.76	15.35
18	12.50	13.75	15.00	15.63	16.25
19	13.19	14.51	15.83	16.49	17.15
20	13.89	15.28	16.67	17.36	18.06
21	14.58	16.04	17.50	18.23	18.96
22	15.28	16.81	18.33	19.10	19.86
23	15.97	17.57	19.17	19.97	20.76
24	16.67	18.33	20.00	20.83	21.67
25	17.36	19.10	20.83	21.70	22.57
26	18.06	19.86	21.67	22.57	23.47
27	18.75	20.63	22.50	23.44	24.38
28	19.44	21.39	23.33	24.31	25.28
29	20.14	22.15	24.17	25.17	26.18
30	20.83	22.92	25.00	26.04	27.08
31	21.53	23.68	25.83	26.91	27.99
32	22.22	24.44	26.67	27.78	28.89
33	22.92	25.21	27.50	28.65	29.79
34	23.61	25.97	28.33	29.51	30.69
35	24.31	26.74	29.17	30.38	31.60
36	25.00	27.50	30.00	31.25	32.50
37	25.69	28.26	30.83	32.12	33.40
38	26.39	29.03	31.67	32.99	34.31
39	27.08	29.79	32.50	33.85	35.21
40	27.78	30.56	33.33	34.72	36.11
41	28.47	31.32	34.17	35.59	37.01
42	29.17	32.08	35.00	36.46	37.92
43	29.86	32.85	35.83	37.33	38.82
44	30.56	33.61	36.67	38.19	39.72
45	31.25	34.38	37.50	39.06	40.63
46	31.94	35.14	38.33	39.93	41.53
47	32.64	35.90	39.17	40.80	42.43
48	33.33	36.67	40.00	41.67	43.33
49	34.03	37.43	40.83	42.53	44.24
50	34.72	38.19	41.67	43.40	45.14

Note that the Prism Loads are calculated based upon the Marston Theory of Loads, developed by Professor Anson Marston, circa 1913, and is calculated using the formula:

$$P = \frac{\gamma_s * H}{144}$$

This formula determines the earth load on a flexible pipe and is regarded as a conservative approach to determining the dead load placed upon a buried flexible pipe.

BUCKLING PRESSURE (ALLOWABLE)

(8")

Where:	q_a	=	Allowable buckling pressure (psi)		
	h	=	Height of soil surface above top of pipe (in)		
	H	=	Depth of burial, feet, from ground surface to top 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, per linear inch of pipe (in^3)		
	t	=	Pipe wall thickness (in)		
	D	=	Mean pipe diameter, outer (in)	D =	8.4

Solving for the Empirical coefficient of elastic support, given by Luscher in 1966, as referenced on Pg 113 of Moser, A.P., Buried Pipe Design. 2nd Ed., McGraw-Hill:

$$B' = \frac{4(h^2 + Dh)}{1.5(2h + D)^2}$$

$$B' = \frac{884.25}{1432.22} = 0.617$$

Using the Allowable Buckling Pressure Equation as shown in Moser, A.P., Buried Pipe Design. 2nd Ed., McGraw-Hill, Pg 112, and an initial factor of safety (SF) of 2.5, the Allowable Buckling Pressure is then:

$$q_a = \frac{1}{FS} * \sqrt{32 * R_w * B' * E_b * \left(E * \frac{I}{D^3} \right)}$$

$$q_a = \frac{1}{2.5} \sqrt{\left[32 \right] \left[1 \right] \left[0.617 \right] \left[1000 \right] \left[400000 \ \frac{0.003}{592.70} \right]}$$

$$q_a = \mathbf{77.40} \ \mathbf{psi}$$

BUCKLING PRESSURE (INSTALLED CONDITION)

(8")

Where:	q_P	=	Pressure applied to pipe under installed conditions (psi)
	γ_W	=	Specific Weight of Water = 0.0361 (pci)
	γ_S	=	Specific Weight of Soil (pcf)
	W_c	=	Vertical Soil Load on the pipe per unit length (lb/in)
	L_L	=	Live load as determined from chart

Standard industry vertical soil load (W_c) calculation (lb/in) developed from empirical data:

$$W_c = \gamma_s * H * \left(\frac{D + t}{144} \right)$$

Where: $\gamma_S = 120$ D = 8.4 t = 0.323

$$W_C = \left[120 \right] \left[11.25 \right] \left[\frac{8.4 + 0.323}{144} \right]$$

W_C = 81.78 lb/in

Using the Equation on Pg 114 of Moser, A.P., Buried Pipe Design. 2nd Ed., McGraw-Hill, Pressure Applied to Pipe under installed conditions at its deepest installed depth (Note, hw = 0, therefore Rw = 1) is calculated to be:

$$q_p = \gamma_w h_w + R_w \left(\frac{W_c + L_L}{D} \right)$$

$$q_P = 62.4 \times 0 + 1 \times \frac{90.95}{8.4}$$

q_P = **20.56** **psi**

Note: The Buckling pressure under installed conditions is less than the Allowable Buckling Pressure of the specified pipe, (i.e.. $q_a > q_p$) therefore the design is acceptable for installation.

WALL CRUSHING CALCULATION

(8")

Where:	D_o	=	outside pipe diameter, in. =	8.4 in
	P_c	=	Compressive stress or hydrostatic design basis (HDB). For typical PVC pipe assume 4,000 psi. For any other pipe material the HDB must be supplied by the pipe manufacturer.	
	A	=	surface area of the pipe wall, in.²/ft =	0.323 in.²/ft
	γ_S	=	specific weight of soil, pcf, =	120 pcf
	H	=	Depth of burial (ft) from ground surface to crown of pipe	

Using the Wall Crushing and Wall Thrust equations, as referenced in Plastic Pipe Design Manual published by Vylon Pipe, Pg 14 the Wall Crushing due to compressive stress can be found using the following:

$$P_c = \frac{T}{A} \qquad \text{where T, Thrust, is calculated as} \quad T = \frac{P_y D}{2}$$

Substituting the Thrust equation into the Wall Crushing equation:

$$P_c = \frac{\frac{P_y D}{2}}{A} = \frac{P_y D}{2A}$$

From the Marston Equation determining the Prism Load Calculation (See previous section on Prism Load), substitute the equation for P_y:

$$P_c = \frac{\frac{\gamma_s * H}{144} D}{2A} \qquad \text{Rearranging this equation, it becomes:} \quad 2AP_c = \frac{\gamma_s * H}{144} D$$

And simplifies to: $288AP_c = \gamma_s HD$

Note that the Surface Area of the Pipe Wall, A, is per unit length in inches^2 per foot, a conversion factor (from feet to inches) of 12 must be applied, therefore,

$$24AP_c = \gamma_s HD$$

Solving for H, the equation becomes:

$$H = \frac{24 * P_c * A}{\gamma_s * D_o}$$

(Continued on next page)

Using this equation, and converting all units, solve for “height” of the soil column, or in other words, the depth of burial of the PVC pipe:

$$H = \frac{\left[\,24\,\right]\left[\,4000\,\right]\left[\,0.323 \times 12\,\right]}{120 \asymp 8.4} = \mathbf{369.14}$$

H = 369.14 feet

Note: The resulting Wall Crushing will occur at a greater depth than the deepest burial depth of the proposed SCS lines, therefore pipe design is acceptable.

DEFLECTION ANALYSIS: LEONHARDT'S ZETA FACTOR
(8")

The Leonhardt's Zeta Factor Equation can be calculated using Equation 9 of Buczala and Cassady in Buried Plastic Pipe Technology, Pgs 196-197

Where:	D	=	Pipe Outer Diameter, in	=	8.4
	B	=	Trench Width, in, = 2.7'	=	32.4
	E_b	=	Modulus of soil reaction for the bedding material (psi)		
	E'_n	=	Modulus of soil reaction for the in-situ soil (psi)		

$$zeta = \frac{1.662 + 0.639\left(\frac{B}{D-1}\right)}{\frac{B}{D-1} + \left[1.662 + 0.361\left(\frac{B}{D}\right) - 1\right]\left[\frac{E_b}{E'_n}\right]}$$

The Leonhardt Zeta factor is then determined as:

$$zeta = \frac{1.662 + 0.639 \times \left[\frac{32.4}{7.4}\right]}{\frac{32.4}{7.4}\left[1.662 + 0.361 \times \left[\frac{32.4}{8.4}\right] - 1\right]\left[\frac{1000}{1000}\right]}$$

***Leonhardt's zeta factor* = 0.693**

PIPE STIFFNESS (Figure: 30 TAC §217.53(k)(3))

(8")

Using Equation B.1, as directed in 30 TAC §217.53(k)(3), to Calculate the Pipe Stiffness:

$$PS = C \times RSC \times \left(\frac{8.337}{D}\right)$$

Where:	PS	=	Pipe Stiffness in pounds per square inch (psi)	
	C	=	Conversion factor = 0.8	
	RSC	=	Ring Stiffness Constant	
	D	=	Mean Pipe Diameter, Outer =	8.400 in

The RSC can be supplied by the manufacturer or otherwise calculated using Equation 4 of Resistance to Ring Bending – Pipe Stiffness (PS), Ring Stiffness Constant (RSC) and Flexibility Factor (FF) for Buried Gravity Flow Pipes TN-19/2005, Pg 6 published by the Plastics Pipe Institute:

$$RSC = 6.44 \times \frac{EI}{D^2}$$

And E = 400,000 psi

Solving for the Moment of Inertia:

$$I = \left(\frac{t^3}{12}\right) * \left(\frac{inches^3}{in_{linear}}\right) = 0.003$$

$$\text{RSC} = 6.44 \times \frac{1123.276}{70.560} = 102.521$$

$$\text{PS} = 0.8 \times 102.521 \times \frac{8.337}{8.400}$$

PS = 81.40 psi

PIPE STIFFNESS TO SOIL STIFFNESS FACTOR

(8")

Where:	PS	=	Pipe Stiffness (psi) = 81.40 psi
	E_b	=	Modulus of soil reaction for the bedding material (psi)
	zeta	=	Leonhardt's Zeta factor = 0.693
	SSF	=	Soil stiffness factor ($0.061 \times zeta \times E_b$)

The Soil Stiffness Factor is calculated using Equation 10 referenced by Buczala and Cassady, Buried Plastic Pipe Technology, Pg 198, where:

$$SSF = 0.6 * zeta * E_b$$

Therefore,

$$\frac{PS}{SSF} = \frac{PS}{0.6 * zeta * E_b}$$

$$\frac{\text{PS}}{\text{SSF}} = \frac{81.40}{415.97} = 0.20$$

PREDICTED PIPE DEFLECTION

(8")

Using the Modified Iowa Equation, referenced and published by the Uni-Bell PVC Pipe association and found at http://www.uni-bell.org/faq.html, and Equation 14 of Deflection: The Pipe/Soil Mechanism UNI-TR-1-97, Uni-Bell PVC Pipe Association Pgs 17, the predicted pipe deflection can be calculated.

Where:	%ΔY/D	=	Predicted % vertical deflection under load	
	P	=	Prism Load, psi	
	K	=	Bedding angle constant, Assumed to =	0.110
	W'	=	Live Load, psi, =	0
	DR	=	Dimension Ratio=	26
	E	=	Modulus of tensile elasticity of the pipe material, psi	
	E'	=	Modulus of Soil Reaction, psi	
	D_L	=	Deflection Lag Factor = 1.5	

And using the Modified Iowa Equation:

$$(\%)\frac{\Delta Y}{D} = \frac{(D_L KP + KW')\times 100}{[2E/(3(DR-1)^3)] + 0.061E'}$$

Where, Prism Load, $P = \frac{\gamma_s * H}{144}$

and/or from previous chart, prism load = 9.17 psi

The Predicted Deflection is determined as:

$$(\%)\frac{\Delta Y}{D} = \frac{\left[\left[1.5 \times 1.0087\right] + 0\right] \times 100}{\left[\frac{800000}{46875}\right] + \left[0.061 \times 1000\right]} = 1.94\%$$

NOTE: 1.94% < 5%, therefore pipe design is acceptable

PIPE STRAIN

(8")

Pipe strain is also known as the elongation of the pipe over the original length of the pipe. Under normal loading conditions of the PVC pipe, the variable that affects the elongation or straining of the pipe stems from the either the flexure or deflection (i.e.. bending) of the pipe within the bedding material (i.e. increased or excessive pipe deflection causing the pipe to elongate) or hoop stress within the pipe wall. Please note that pipe strain is not generally known to be the limiting performance factor during pipe failure. For this system, pipe deflection is limited to 5% for a SDR 26 pipe. This 5% deflection value is the industry accepted value placing the pipe within its straining limits. Therefore, as the calculated deflection above is shown to be less than 5%, the pipe and bedding class used in this system is within the acceptable straining limits for this pipe.

However, total Pipe strain is calculated as the combination of the before mentioned hoop stress and the maximum strain due to deflection. Both items are calculated below using Equations 15 and 16 found in Deflection: the Pipe/Soil Mechanism, UNI-TR-1-97, Published by the Uni-Bell PVC Pipe Association (Pgs 28-30):

Where:	$\in_h$	=	Maximum Pipe Strain due to Hoop Stress, in/in
	P	=	Pressure on the pipe (Live + Prism Loads), psi
	E	=	Modulus of Elasticity of the Pipe, psi
	t	=	Pipe Wall thickness, in
	D	=	Pipe Diameter, Average Outer, in

$$\in_h = \frac{PD}{2tE}$$

Using the maximum cover for both live loads and prism loads as well as the previous unit weight of the soil:

$$\in_h = \frac{[\,0.00 + 9.17\,] \times 8.4}{2 \times 0.323 \times 400{,}000} = \textbf{2.981E-04}\ \frac{\text{in}}{\text{in}}$$

(*Continued on following page)*

Where:	$\in_f$	=	Maximum Pipe Strain due to Ring Deflection, in/in
	ΔY	=	Change in vertical pipe diameter under load, in, (numerator in the deflection equation, but in decimal form)
	t	=	Pipe Wall thickness, in
	D	=	Pipe Diameter, Average Outer, in
	DR	=	Dimension Ratio= 26

$$\in_f = \frac{t}{D}\left[\frac{3\Delta Y / D}{1 - 2\Delta Y / D}\right] = \frac{1}{DR}\left[\frac{3\Delta Y}{D - 2\Delta Y}\right]$$

$$\in_f = 0.038 \times \frac{4.539}{8.4 - 3.026} = 0.0325 \frac{\text{in}}{\text{in}}$$

$$\in_{total} = \textbf{3.2785E-02} \frac{\text{in}}{\text{in}}$$

TCEQ PIPE BEDDING AND TRENCHING REQUIREMENTS (30 TAC 217.54)

These notes are provided in the Construction Documents on Sheet 6

a. Pipe Embedment
    1. A rigid pipe must be laid with the adequate bedding, haunching, and initial backfill to support the anticipated load. The bedding classes that are allowed are A, B, or C, as described in American Society for Testing and Materials (ASTM) C 12, American National Standards Institute (ANSI) A 106.2,Water Environment Federation Manual of Practice No. 9 or American Society of Civil Engineers (ASCE) MOP 37.
    2. A flexible pipe must be laid with the adequate bedding, haunching, and initial backfill to support the anticipated load. The bedding classes that are allowed are IA, IB, II, or III, as described in ASTM D-2321 or ANSI K65.171.
    3. Debris, large clods, or stones that are greater than six inches in diameter, organic matter, or other unstable materials are prohibited as bedding, haunching, or initial backfill.
    4. Backfill must not disturb the alignment of a collection system pipe.
    5. If trenching encounters significant fracture, fault zones, caves, or solutional modification to the rock strata, an owner must halt construction until an engineer prepares a written report detailing how construction will accommodate these site conditions.

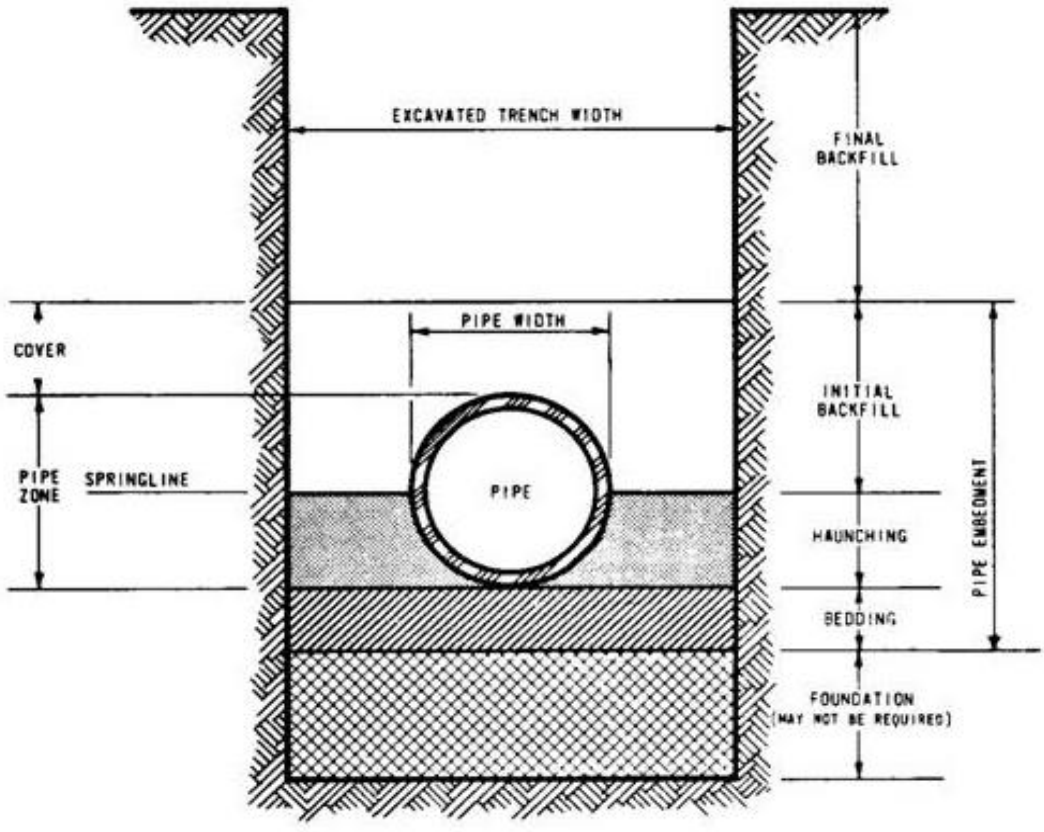
b. Compaction.
    1. Compaction of an embedment envelope must meet the manufacturer's recommendations for the collection system pipe used in a project.
    2. Compaction of an embedment envelope must provide the modulus of soil reaction for the bedding material necessary to ensure a wastewater collection system pipe's structural integrity as required by §217.53 of this title (relating to Pipe Design).
    3. The placement of the backfill above a pipe must not affect the structural integrity of a pipe.

c. Envelope Size.
    1. A minimum clearance of 6.0 inches below and on each side of the bell of all pipes to the trench walls and floor is required.
    2. The embedment material used for haunching and initial backfill must be installed to a minimum depth of 12 inches above the crown of a pipe.

d. Trench Width.

1. The width of a trench must allow a pipe to be laid and jointed properly and must allow the backfill to be placed and compacted as needed.
2. The maximum and minimum trench width needed for safety and a pipe's structural integrity must be included in the report.
3. The width of a trench must be sufficient to properly and safely place and compact haunching materials.
4. The space between a pipe and a trench wall must be wider than the compaction equipment used in the pipe zone.

TRENCH CROSS-SECTION (30 TAC 217.54)



NOTE:

Trenching Details along with 30 TAC 217.54 are annotated in the Construction Documents/Plan Sheets on Sheet 46.

MANHOLE SPECIFICATIONS

30 TAC 217.55 Requirements with design comments:

a. An owner must include manholes in a wastewater collection system at:
    1. All points of change in alignment, grade, or size;
    2. At the intersection of all pipes; and
    3. At the end of all pipes that may be extended at a future date.

b. Manholes placed at the end of a wastewater collection system pipe that may be extended in the future must include pipe stub outs with plugs. (pipe stub-outs with plugs are proposed at the end of each line that will be extended with Phase 2 of Section 19.)

c. A clean-out with watertight plugs may be installed in lieu of a manhole at the end of a wastewater collection system pipe if no extensions are anticipated. **(Self explanatory, clean outs not used in-lieu of manholes)**

d. Cleanout installations must pass all applicable testing requirements outlined for gravity collection pipes in §217.57 of this title (relating to Testing Requirements for Installation of Gravity Collection System Pipes). **(Self explanatory, see Item c above)**

e. A manhole must be made of monolithic, cast-in-place concrete, fiberglass, pre-cast concrete, high-density polyethylene, or equivalent material that provides adequate structural integrity. **See the Pre-Cast Manhole Details following these construction notes)**

f. The use of bricks to adjust a manhole cover to grade or construct a manhole is prohibited. **(Self explanatory, See Details following these notes)**

g. Manholes may be spaced no further apart than the distances specified in the following table for a wastewater collection system with straight alignment and uniform grades, unless a variance based on the availability of cleaning equipment that is capable of servicing greater distances is granted by the executive director. **(Self explanatory and maintained throughout the design of the SCS)**

Table C.2. - Maximum Manhole Spacing

Pipe Diameter	Maximum Manhole
6-15	500
18-30	800
36-48	1000
54 or larger	2000

h. Tunnels are exempt from manhole spacing requirements because of construction constraints. **(Self explanatory and not applicable)**

i. An intersection of three or more collection pipes must have a manhole. **(Self explanatory and maintained throughout the design of the SCS)**

j. A manhole must not be located in the flow path of a watercourse, or in an area where ponding of surface water is probable. **(Self explanatory and maintained throughout the design of the SCS)**

k. The inside diameter of a manhole must be no less than 48 inches. A manhole diameter must be sufficient to allow personnel and equipment to enter, exit, and work in the manhole and to allow proper joining of the collection system pipes in the manhole wall. **(See Manhole Details following these notes)**

l. Manholes must meet the following requirements for covers, inlets, and bases.

1. Manhole Covers

A. A manhole where personnel entry is anticipated requires at least a 30 inch diameter clear opening. (**Covers to have 32" Openings see Manhole Details)**

B. A manhole located within a 100-year flood plain must have a means of preventing inflow. **(Self explanatory and maintained throughout the design of the SCS)**

C. A manhole cover construction must be constructed of impervious material. **(Self explanatory, See Manhole Details following these construction notes)**

D. A manhole cover that is located in a roadway must meet or exceed the American Association of State Highways and Transportation Officials standard M-306 for load bearing. **(Self explanatory, See Manhole Details)**

2. Manhole Inverts

A. The bottom of a manhole must contain a U-shaped channel that is a smooth continuation of the inlet and outlet pipes. **(Self explanatory, see Manhole Details)**

B. 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 **(Self explanatory, see Manhole Details)**

C. A manhole connected to a pipe at least 15 inches in diameter but not more than 24 inches in diameter must have a channel depth equal to at least three-fourths of the largest pipe's diameter **(Self explanatory, but not applicable for this project)**

D. A manhole connected to a pipe greater than 24 inches in diameter must have a channel depth equal to at least the largest pipe's diameter **(Self explanatory, but not applicable for this project)**.

E. A manhole with pipes of different sizes must have the tops of the pipes at the same elevation and flow channels in the invert sloped on an even slope from pipe to pipe. **(Self explanatory and maintained throughout the design of the SCS)**

F. A bench provided above a channel must slope at a minimum of 0.5 inch per foot. **(Self Explanatory)**

G. An invert must be filleted to prevent solids from being deposited if a wastewater collection system pipe enters a manhole higher than 24 inches above a manhole invert. **(Self Explanatory, see manhole details. Not applicable for this site.)**

H. A wastewater collection system pipe entering a manhole more than 24 inches above an invert must have a drop pipe. **(Self Explanatory, see Manhole Details)**

m. The inclusion of steps in a manhole is prohibited. **(Self Explanatory, see Manhole Details)**

n. Connections. A manhole-pipe connection must use watertight, size-on-size resilient connectors that allow for differential settlement and must conform to American Society for Testing and Materials C-923. **(Self Explanatory, see Manhole Details)**

o. Venting. An owner must use an alternate means of venting if manholes are at more than 1,500 foot intervals and gasketed manhole covers are required for more than three manholes in sequence. Vents must meet the following requirements: **(Self Explanatory, but not applicable for this project)**

1. Vent design must minimize inflow;
2. Vents must be located above a 100-year flood event elevation; and
3. Tunnels must be vented in compliance with this subsection.

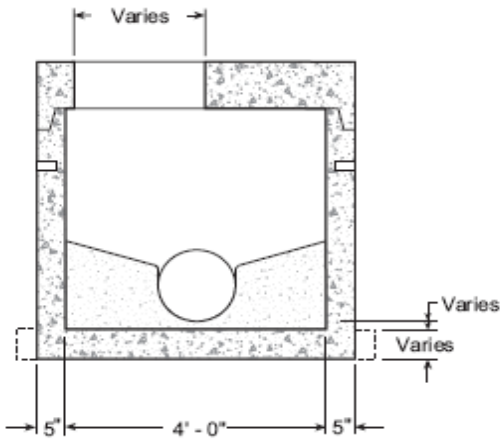
p. Cleanouts. The size of a cleanout must be equal to the size of the wastewater collection system main. **(Self Explanatory)**

Precast Manhole Information:

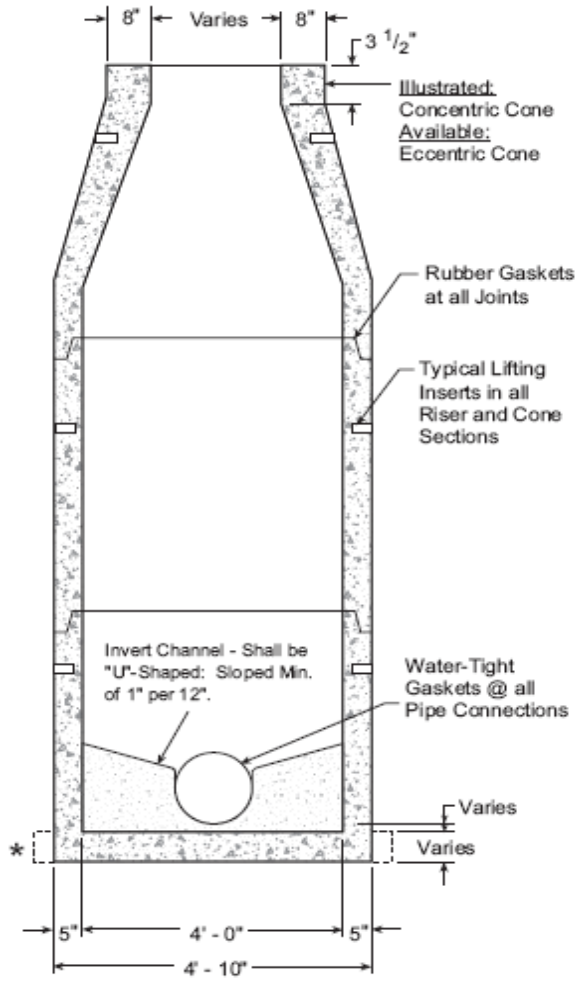
Hanson Pipe and Precast
Hanson Building Products West
300 E John Carpenter Freeway
11th floor
Irving, TX 75062
972.653.5500

San Antonio Metro Area Contact:
210.661.2351
866.426.7661

Precast Manholes



Flattop Illustration
for Shallow Manhole



Section View
4' I.D. Manhole - Regular Base
with Reducing Cone

Materials & Features

HOLES AS SPECIFIED: Max diameter = 32"
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.
Estimated weiight of riser and cone sections = 870 lbs. / vt. ft.

* - Extended base is available to meet local requirements.

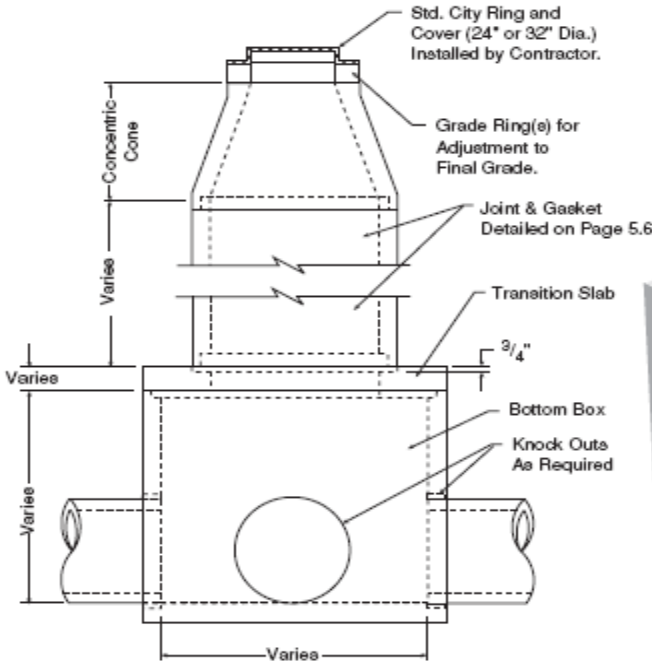
In the event a boot is loose contact your Hanson representative to resolve.

"Manufactured to your specifications."

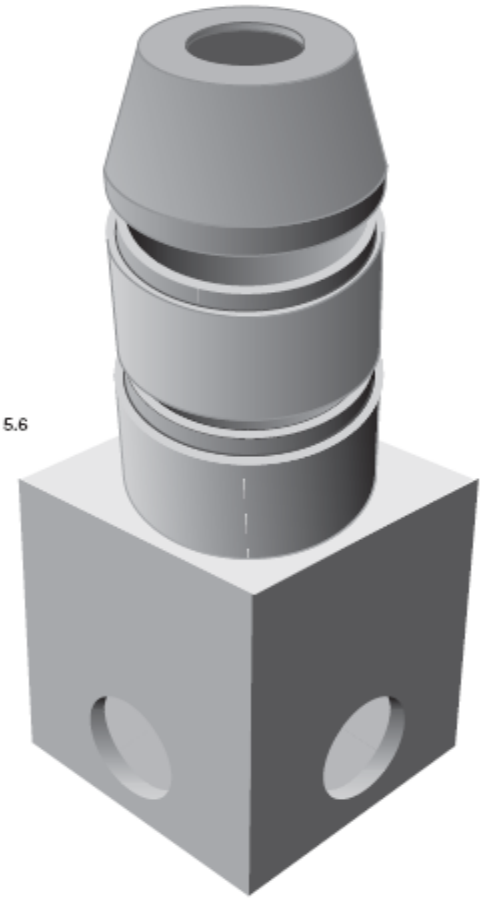
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
4' I.D. Manhole **Regular Base w / Reducing Cone**	All Plants	TX	5.5	07-01-06	Hanson

Precast Manholes



Side View



Isometric View

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

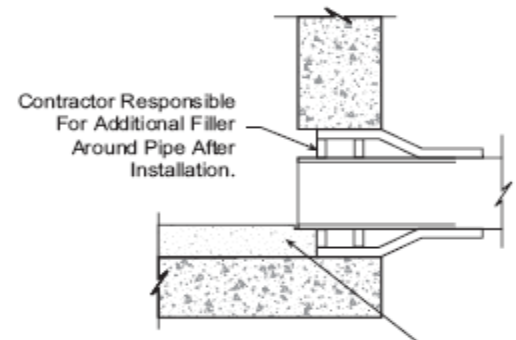
In the event a boot is loose contact your Hanson representative to resolve.

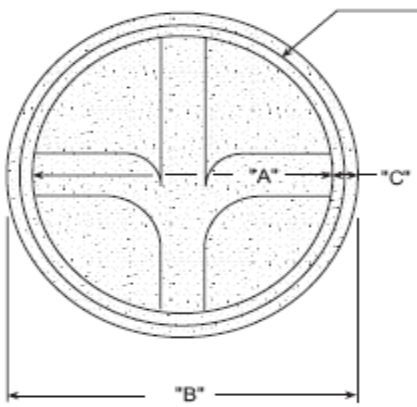
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Type "C" Manhole	Houston San Antonio	TX	5.11	07-01-06	Hanson

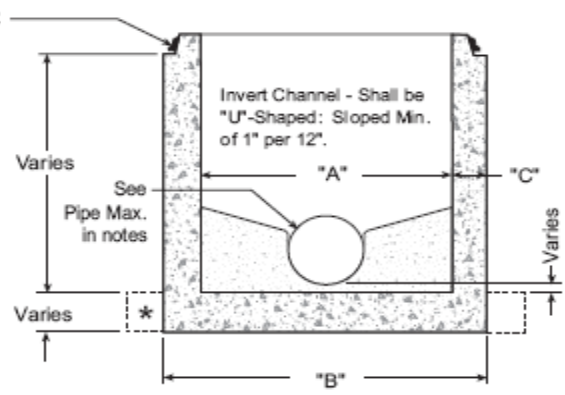
Precast Manholes

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

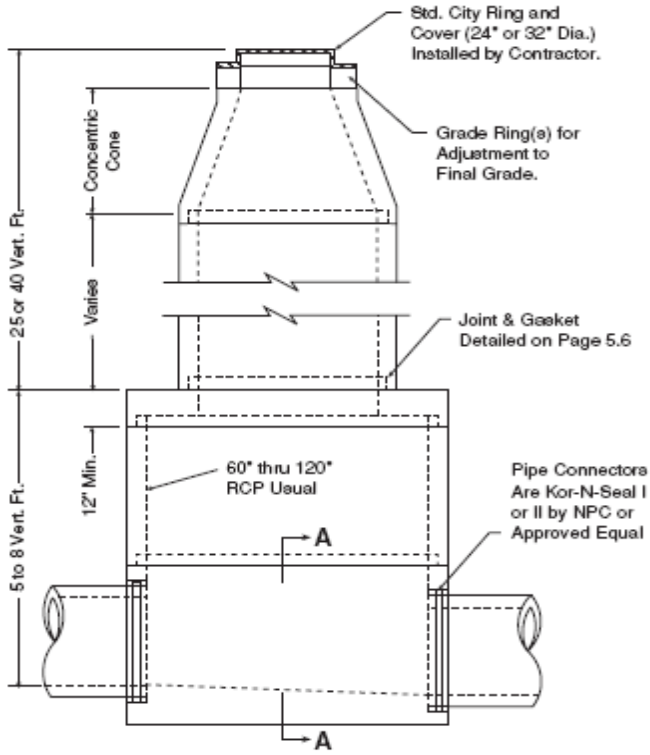
HOLES AS SPECIFIED:
- For 4' I.D. max. diameter = 32"
- For 5' I.D. max. diameter = 40"
- For 6' I.D. max. diameter = 54"

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.

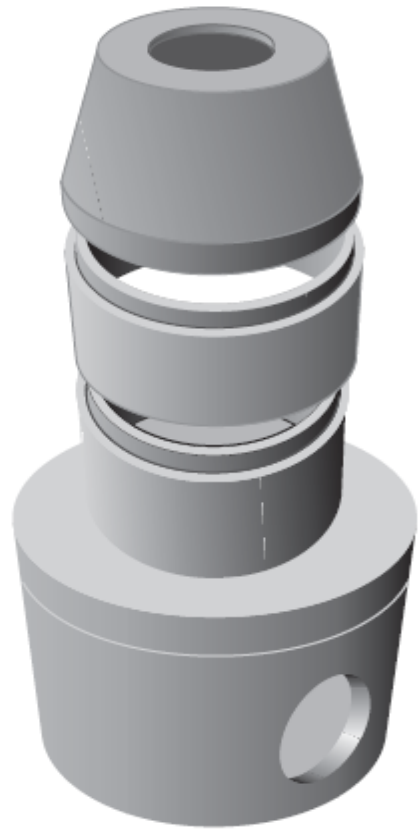
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Details: 4', 5' & 6' I.D. Precast Regular Manhole Base	All Plants	TX	5.7	07-01-06	Hanson

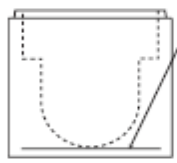
Precast Manholes



w/ Precast Base



Isometric View



Section A-A

Base Slab Reinforcing

30' Deep Structure
60"ø - 6" Thick Slab min. - #5 @ 8" ea.way
72"ø - 8" Thick Slab min. - #5 @ 8" ea.way
84"ø - 8" Thick Slab min. - #5 @ 6" ea.way
96"ø - 10" Thick Slab min. - #5 @ 6" ea.way

45' Deep Structure
60"ø - 8" Thick Slab min. - #5 @ 8" ea.way
72"ø - 8" Thick Slab min. - #5 @ 8" ea.way
84"ø - 10" Thick Slab min. - #5 @ 6" ea.way
96"ø - 12" Thick Slab min. - #5 @ 6" ea.way

All Reinforcing has $1\frac{1}{2}$" cover from top of slab.

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

REINFORCING STEEL: per ASTM A-615, Grade 60.

REINFORCING to meet AASHTO HS 20-44 Loading.

DESIGN EQUAL TO OR EXCEEDS ASTM C-478

In the event a boot is loose contact your Hanson representative to resolve.

Note:

- Inverts shall be specifically sized for connecting pipes; and shall be U-Shaped with the min. depth 3/4 of the largest pipe diameter.

-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
30 & 45 Ft. Depth 60" thru 96"Large Base Manhole	Houston San Antonio	TX	5.10	07-01-06	Hanson

ATTACHMENT A

WASTEWATER / SEWAGE CALCULATIONS

WASTEWATER FLOWS

Project Name: Wolf Ranch Multi-Family
Project Number: 2025-XXX-SDP
Date Prepared: 01/22/2025

Wastewater Line

Line Number	from	to	MF UNITS	CUMULATIVE SF UNITS	Cumulative Population	Cumulative Population (ROUNDED)	Avg. Dry Weather Flow F (gpd)	Avg. Dry Weather Flow F (gpm)	Maximum Flow: Peak Flow Factor PF	Maximum Flow: Max Dry Weather Flow Q_{max} (gpd)	Maximum Flow: Max Dry Weather Flow Q_{max} (gpm)	Minimum Flow: Min Flow Factor MF	Minimum Flow: Min Dry Weather Flow Q_{min} (gpd)	Minimum Flow: Min Dry Weather Flow Q_{min} (gpm)	Area Served A (ac)	Cumul. Area Served A (ac)	Inflow/Infiltration (1000 gal/acre/day) I/I (gpd)	Inflow/Infiltration (1000 gal/acre/day) I/I (gpm)	Peak Wet Weather Flow Qpw (gpd)	Peak Wet Weather Flow Qpw (gpm)
A1	MH0	MH1	0	0	0	**0**	0.00	0.00	4.50	0.00	0.00	0.00	0.00	0.00	0.27	**0.27**	270.00	0.19	270.00	0.19
A2	MH1	MH2	0	0	0	**0**	0.00	0.00	4.50	0.00	0.00	0.00	0.00	0.00	1.43	**1.70**	1,699.30	1.18	1,699.30	1.18
A3	MH2	MH3	0	0	0	**0**	0.00	0.00	4.50	0.00	0.00	0.00	0.00	0.00	0.37	**2.07**	2,069.90	1.44	2,069.90	1.44
A4	MH3	MH4	33	33	165	**165**	8,250.00	5.73	4.22	34,841.20	24.20	0.14	1,154.90	0.80	0.50	**2.57**	2,569.90	1.78	37,411.10	25.98
A5	MH4	MH5	45	78	307.5	**308**	19,500.00	13.54	4.09	79,789.32	55.41	0.16	3,088.86	2.15	0.45	**3.02**	3,018.00	2.10	82,807.32	57.51
A6	MH5	MH6	0	78	195	**195**	19,500.00	13.54	4.09	79,789.32	55.41	0.14	2,821.57	1.96	0.75	**3.77**	3,771.00	2.62	83,560.32	58.03
A7	MH6	MH7	179	257	1090	**1090**	64,250.00	44.62	3.82	245,647.85	170.59	0.20	13,071.14	9.08	0.14	**3.91**	3,907.20	2.71	249,555.05	173.30
B1	MH7	MH8	89	89	445	**445**	22,250.00	15.45	4.07	90,498.85	62.85	0.17	3,790.84	2.63	0.26	**0.26**	260.00	0.18	90,758.85	63.03
B2	MH8	MH9	0	89	222.5	**223**	22,250.00	15.45	4.07	90,498.85	62.85	0.15	3,306.16	2.30	0.25	**0.51**	514.90	0.36	91,013.75	63.20
B3	MH9	MH10	0	89	222.5	**223**	22,250.00	15.45	4.07	90,498.85	62.85	0.15	3,306.16	2.30	0.34	**0.85**	854.70	0.59	91,353.55	63.44
B4	MH10	MH11	30	119	372.5	**373**	29,750.00	20.66	4.01	119,274.21	82.83	0.16	4,894.58	3.40	0.51	**1.37**	1,366.70	0.95	120,640.91	83.78
B5	MH11	MH12	0	119	297.5	**298**	29,750.00	20.66	4.01	119,274.21	82.83	0.16	4,681.79	3.25	0.22	**1.59**	1,587.80	1.10	120,862.01	83.93
B6	MH12	MH13	30	149	447.5	**448**	37,250.00	25.87	3.96	147,503.99	102.43	0.17	6,354.91	4.41	0.22	**1.81**	1,810.90	1.26	149,314.89	103.69
B7	MH13	MH14	0	149	372.5	**373**	37,250.00	25.87	3.96	147,503.99	102.43	0.16	6,128.51	4.26	0.28	**2.09**	2,086.10	1.45	149,590.09	103.88
B8	MH14	CO-2	30	179	522.5	**523**	44,750.00	31.08	3.92	175,267.88	121.71	0.18	7,872.02	5.47	0.71	**2.79**	2,792.70	1.94	178,060.58	123.65
C1	MH8	MH15	63	63	315	**315**	15,750.00	10.94	4.13	65,027.37	45.16	0.16	2,505.97	1.74	0.24	**0.24**	237.40	0.16	65,264.77	45.32
C2	MH15	MH16	0	63	157.5	**158**	15,750.00	10.94	4.13	65,027.37	45.16	0.14	2,185.97	1.52	0.20	**0.44**	441.60	0.31	65,468.97	45.46
C3	MH16	CO-1	26	89	287.5	**288**	22,250.00	15.45	4.07	90,498.85	62.85	0.16	3,477.92	2.42	0.21	**0.65**	651.10	0.45	91,149.95	63.30

Line Number	MAX DRY WEATHER (GPM)	MAX DRY WEATHER (CFS)	MAX WET WEATHER (GPM)	MAX WET WEATHER (CFS)	PIPE SIZE (IN)	PIPE SLOPE FT/100	65% CAPACITY (CFS) (n=0.013)	85% CAPACITY (CFS) (n=0.013)	LENGTH (FT)	PEAK DRY **Q** (CFS)	PEAK **DRY Q** (GPM)	PEAK **DRY VELOCITY** (FPS) FROM FLOWMASTER	PEAK **DRY DEPTH** (FT) FROM FLOWMASTER	PEAK **WET Q** (CFS)	PEAK **WET Q** (GPM)	PEAK **WET VELOCITY** (FPS) FROM FLOWMASTER	PEAK **WET DEPTH** (FT) FROM FLOWMASTER
A1	0.00	0.0000	0.19	0.0004	8	0.068	0.20	0.27	119	0.0000	0.00	0.64	0.003	0.0004	0.19	0.94	0.005
A2	0.00	0.0000	1.18	0.0026	8	0.069	0.21	0.27	475	0.0000	0.00	0.64	0.003	0.0026	1.18	1.64	0.013
A3	0.00	0.0000	1.44	0.0031	8	0.055	0.18	0.24	123	0.0000	0.00	0.61	0.003	0.0031	1.44	1.63	0.015
A4	24.20	0.0530	25.98	0.0569	8	0.005	0.06	0.07	205	0.0530	24.20	1.64	0.099	0.0569	25.98	1.67	0.103
A5	55.41	0.1214	57.51	0.1260	8	0.006	0.06	0.08	142	0.1214	55.41	7.43	0.062	0.1260	57.51	7.53	0.063
A6	55.41	0.1214	58.03	0.1271	8	0.010	0.08	0.10	246	0.1214	55.41	2.66	0.126	0.1271	58.03	2.70	0.128
A7	170.59	0.3738	173.30	0.3797	8	0.025	0.12	0.16	43	0.3738	170.59	5.12	0.175	0.3797	173.30	5.15	0.176
B1	62.85	0.1377	63.03	0.1381	8	0.007	0.07	0.09	103	0.1377	62.85	2.44	0.146	0.1381	63.03	2.44	0.146
B2	62.85	0.1377	63.20	0.1385	8	0.025	0.12	0.16	141	0.1377	62.85	3.82	0.107	0.1385	63.20	3.83	0.107
B3	62.85	0.1377	63.44	0.1390	8	0.041	0.16	0.21	78	0.1377	62.85	4.56	0.094	0.1390	63.44	4.57	0.095
B4	82.83	0.1815	83.78	0.1836	8	0.028	0.13	0.17	307	0.1815	82.83	4.32	0.119	0.1836	83.78	4.33	0.119
B5	82.83	0.1815	83.93	0.1839	8	0.045	0.17	0.22	77	0.1815	82.83	5.10	0.106	0.1839	83.93	5.12	0.106
B6	102.43	0.2244	103.69	0.2272	8	0.028	0.13	0.17	88	0.2244	102.43	4.60	0.132	0.2272	103.69	4.61	0.133
B7	102.43	0.2244	103.88	0.2276	8	0.034	0.15	0.19	50	0.2244	102.43	4.92	0.126	0.2276	103.88	4.95	0.126
B8	121.71	0.2667	123.65	0.2709	6	0.003	0.02	0.03	117	0.2667	121.71	2.18	0.299	0.2709	123.65	2.19	0.302
C1	45.16	0.0989	45.32	0.0993	8	0.019	0.11	0.14	228	0.0989	45.16	3.14	0.097	0.0993	45.32	3.15	0.097
C2	45.16	0.0989	45.46	0.0996	8	0.005	0.06	0.07	62	0.0989	45.16	1.97	0.134	0.0996	45.46	1.97	0.135
C3	62.85	0.1377	63.30	0.1387	6	0.050	0.08	0.11	52	0.1377	62.85	5.05	0.098	0.1387	63.30	5.06	0.099

CTE* : Connect to Existing Wastewater Manhole

ATTACHMENT B
WASTEWATER UTILITY SERVICE AGREEMENT

November 14, 2022

Re: Wastewater Services Availability at the proposed site located at the southeast corner of SW Bypass and Wolf Ranch Pkwy

The property is located at the southeast corner of SW Bypass and Wolf Ranch Pkwy. Pursuant to your request, this letter confirms that the aforementioned site is located within the service area for the City of Georgetown (the "City") wastewater services and that the City can provide retail service to the development in accordance with the City's standard terms and conditions to provide these services.
Note: Any upgrades or new main line connections required to provide adequate service to the property would be at the cost of the developer or owner.

Future On-site and Off-site Improvements
Any utility system and public infrastructure improvements or upgrades required by any potential development at this site are not identified or addressed as part of this letter. All future on-site and off-site improvements needed to serve any future development at this site will be determined by a utility evaluation during the site plan review or platting process. In general, the follow provisions apply to secure capacity for future projects:

1) Extension of utilities to the property is the responsibility of the developer.
2) Water Agreements
3) Platting Requirements
4) Required to tie to existing stubs
5) Exclusive Easements
6) Extend along the ROW to all property boundaries.
7) Additional off-site improvements may be necessary based upon the timing of the City's Capital Improvement Plan (CIP) and developer need.
8) Design and Construction of the facility and utilities must be inspected and approved in accordance with the appropriate City codes and ordinances.
9) Any applicable payment of fees

You may contact me or the Systems Engineering Director at (512)-930-3558, if you have any further questions, regarding the information provided in this letter.

Regards,

Grace Kelly, Engineering Technician
(512) 930-6758
Grace.Kelly@georgetown.org

Cc: David Munk, City of Georgetown
Lua Saluone, City of Georgetown
Wesley Wright, City of Georgetown

300-1 Industrial Ave. | P.O. Box 409 | Georgetown, Texas 78627-0409 |
(512) 930-3558 | (512) 930-3559 (fax) http://www.georgetown.org | gus@georgetown.org

ATTACHMENT C

LOCAL SANITARY SEWER CONSTRUCTION NOTES

PVC PIPE STANDARDS

The American Society for Testing and Materials (ASTM) also known as ASTM International (Reference: www.astm.org) governs the manufacturing specifications for Polyvinyl Chloride (PVC) pipes, including the dimension ratio and water pressure allowable for use of each pipe, through its D-3034 standard. ASTM D-3034 lists its pipe dimensions and pipe classes using the "SDR" mark up, such as SDR-13.5, SDR-21, SDR-26 and SDR-41. The SDR refers to the standard dimension ratio (SDR) of the outside pipe diameter and the wall thickness. This project specifies the use of SDR-26 PVC pipe, and fall in the size category listed below. ASTM D-3034 standards must be meticulously adhered to by all PVC pipe manufacturers and is recognized as the standard during PVC pressure pipe testing and quality checks. ASTM 2241 standards will be applied to all wastewater line - waterline crossings and adhere to a pressure rating of 160 psi. Other in-depth information can be found published in Thermoplastic Pressure Pipe Design and Selection UNI-TR-7, by the Uni-Bell PVC Pipe Association.

SDR 26 Pipe Size Matrix (Per ASTM D-3034)			
Size (in)	**O.D. (in)**	**Avg I.D. (in)**	**Thickness (in)**
4	4.215	3.891	0.162
6	6.275	5.793	0.241
8	8.4	7.754	0.323
10	10.5	9.692	0.404
12	12.5	11.538	0.481
15	15.3	14.124	0.588

Water Pollution Abatement Plan Application

Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b), Effective June 1, 1999

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

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

Signature

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

Print Name of Customer/Agent: Ryan Cunningham, P.E. - Kimley-Horn

Date: 01/21/2025

Signature of Customer/Agent:

Regulated Entity Name: Wolf Ranch Multi-Family

Regulated Entity Information

1. The type of project is:

   ☐ Residential: Number of Lots:
   ☒ Residential: Number of Living Unit Equivalents:257
   ☐ Commercial
   ☐ Industrial
   ☐ Other:_____

2. Total site acreage (size of property): 25.703

3. Estimated projected population:634

4. The amount and type of impervious cover expected after construction are shown below:

Table 1 - Impervious Cover Table

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	99,763	÷ 43,560 =	2.29
Parking	223,104	÷ 43,560 =	5.12
Other paved surfaces	31,214	÷ 43,560 =	0.72
Total Impervious Cover	354,081	÷ 43,560 =	8.12

Total Impervious Cover 8.12 **÷ Total Acreage** 25.703 **X 100 =** 31.59**% Impervious Cover**

5. ☒ **Attachment A - Factors Affecting Surface Water Quality**. A detailed description of all factors that could affect surface water and groundwater quality that addresses ultimate land use is attached.

6. ☒ Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

For Road Projects Only

Complete questions 7 - 12 if this application is exclusively for a road project.

7. Type of project:

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

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

   ☐ Concrete
   ☐ Asphaltic concrete pavement
   ☐ Other: _____

9. Length of Right of Way (R.O.W.): _____ feet.

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

10. Length of pavement area: _____ feet.

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

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

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

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

Stormwater to be generated by the Proposed Project

13. ☒ **Attachment B - Volume and Character of Stormwater**. A detailed description of the volume (quantity) and character (quality) of the stormwater runoff which is expected to occur from the proposed project is attached. The estimates of stormwater runoff quality and quantity are based on the area and type of impervious cover. Include the runoff coefficient of the site for both pre-construction and post-construction conditions.

Wastewater to be generated by the Proposed Project

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

X % Domestic	44,076 Gallons/day
_____% Industrial	_____Gallons/day
_____% Commingled	_____Gallons/day

TOTAL gallons/day 44,076

15. Wastewater will be disposed of by:

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

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

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

☒ Sewage Collection System (Sewer Lines):

☐ Private service laterals from the wastewater generating facilities will be connected to an existing SCS.

☒ Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.

☐ The SCS was previously submitted on_____.

☒ The SCS was submitted with this application.

☐ The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to Executive Director approval.

☒ The sewage collection system will convey the wastewater to the City of Georgetown Wastewater (name) Treatment Plant. The treatment facility is:

☒ Existing.
☐ Proposed.

16. ☒ All private service laterals will be inspected as required in 30 TAC §213.5.

Site Plan Requirements

Items 17 – 28 must be included on the Site Plan.

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

Site Plan Scale: 1" = 100', 60' and 40'.

18. 100-year floodplain boundaries:

☐ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
☒ No part of the project site is located within the 100-year floodplain.
The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s): FEMA FIRM 48491C0275E and 48491C0455E dated 9/26/08

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

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

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

☒ There are 0 (#) 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 §76.

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

21. Geologic or manmade features which are on the site:

☒ All sensitive geologic or manmade features identified in the Geologic Assessment are shown and labeled.
☐ No sensitive geologic or manmade features were identified in the Geologic Assessment.
☐ **Attachment D - Exception to the Required Geologic Assessment**. A request and justification for an exception to a portion of the Geologic Assessment is attached.

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

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

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

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

26. ☒ Surface waters (including wetlands).

☐ N/A

27. ☒ Locations where stormwater discharges to surface water or sensitive features are to occur.

☐ There will be no discharges to surface water or sensitive features.

28. ☒ Legal boundaries of the site are shown.

Administrative Information

29. ☒ 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.

30. ☒ Any modification of this WPAP will require Executive Director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

ATTACHMENT A -- FACTORS AFFECTING WATER QUALITY

Possible factors that could affect surface water and ground water quality are:

- Petroleum drippings from vehicle movement
- Integrated Pest Management
- Landscape Maintenance
- Asphalt and/or Concrete Products
- Soil/Stock Pile
- Paint
- Oils
- Sediment and soil from disturbed areas

ATTACHMENT B -- VOLUME AND CHARACTER OF STORMWATER

EXISTING DRAINAGE CONDITIONS

The natural topography of the site is defined by gently rolling hills. The entire site drains south to a drainage channel that ultimately discharges in the San Gabriel River.

STORM WATER DETENTION AND WATER QUALITY

Detention for this site is not required so only water quality aspects were analyzed.

Water Quality for the site is provided in 1 batch detention water quality ponds, 2 filter strips. Onsite batch detention water quality pond A as well as the 1-filter strips were designed to treat the impervious cover generated onsite.

Water Quality Pond A, the proposed top and bottom elevations of the detention are 818.75 and 819.92, respectively. The proposed top and bottom elevations of the water quality are 815.00 and 818.75, respectively. The following table (Table 1) is a detention routing summary for conveyance of the 2 through 100-year storms.

TABLE 1: WATER QUALITY POND A DETENTION ROUTING SUMMARY		
EVENT (YEAR)	**DETENTION POND PEAK FLOW (CFS)**	**DETENTION POND DESIGN MAX WATER SURFACE ELEVATION**
2	51.93	819.31
10	82.45	819.59
25	102.78	819.72
100	136.49	819.92

Table 2 is the Water Quality Pond A water quality volume summary.

TABLE 2: WATER QUALITY POND A WATER QUALITY VOLUME SUMMARY		
ELEVATION (FT)	**AREA (SF)**	**VOLUME SUM (CF)**
815.00	0	0.00
816.00	13,560	6780.00
817.00	17,442	22281.00
818.00	19,091	40547.50
818.75 (WQE)	20,364	55343.13
819.00	20,796	60488.13
820.00	22,558	82165.13
821.00	24,376	105632.13

Required water quality volume for Water Quality Pond 1 is 49,813.00 CF and the provided water quality volume provided is 55,343.13 CF.

ATTACHMENT C – SUITABILITY LETTER FROM AUTHORIZED AGENT

Attachment C is not applicable for this project. An on-site sewage facility will not be implemented for this development. Proposed private service laterals will be connected to a sewage collection system.

ATTACHMENT D – EXEMPTION TO THE REQUIRED GEOLOGIC ASSESSMENT

Attachment D is not applicable for this project. A geological assessment exemption will not be requested. A copy of the site Geological Assessment performed by Horizon Environmental Services, Inc. has been provided, see Geologic Assessment Form and Attachments.

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: Ryan Cunningham, P.E. - Kimley-Horn

Date: 01/21/2024

Signature of Customer/Agent:

Regulated Entity Name: Wolf Ranch Multi-Family

Project Information

Potential Sources of Contamination

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

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

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

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

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

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

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

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

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

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

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

Sequence of Construction

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

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

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

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

Good Housekeeping and Material Management Practices shall include, but are not limited to the following:

- Neat and orderly storage of any chemicals, pesticides, fertilizers, fuels, etc., that are being stored on site. All storage tanks will be above ground, have a maximum storage capacity of 250 gallons and be stored on site for less than one (1) year. Aboveground Storage Tanks (ASTs) shall comply with Title 30 Texas Administrative Code, Chapter 334, Subchapter F and will be located within the respective phase's Stockpiling Area as illustrated on the Erosion and Sedimentation Control Plans included with this submittal.
- Regular garbage, rubbish, construction waste and sanitary waste disposal.
- Prompt cleanup of any spills that have occurred of liquid or dry materials.
- Cleanup of sediments that have been tracked by vehicles or have been transported by wind or storm water about the site or onto nearby roadways.

In addition to the Good Housekeeping and Material Management Practices, discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean up.

- Manufacturer's recommended methods of spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and the clean up supplies.
- Materials and equipment necessary for spill cleanup will be kept in the materials storage area onsite. Equipment and materials will include but are not limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate State, or Local Government Agency, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from recurring and how to cleanup the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three (3) other

site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

- Reportable quantities of hydrocarbon or hazardous material spills should be reported to the Texas Commissions on Environmental Quality (TCEQ) at the following 24-hour toll free number 1-800-832-8224. The reportable quantity depends on the substance released and where released. Reference the "Spill Reporting" section on the external TCEQ website for a table to use to determine whether the spill should be reported and under what rule.

The Contractor shall notify the agency as soon as possible whenever necessary to provide information that would trigger a change in the response to the spill or discharge. If the discharge or spill creates an imminent health threat, the Contractor shall immediately notify and cooperate with local emergency authorities.

The Contractor will cooperate with the local emergency authority in providing support to implement appropriate notification and response actions. The local emergency authority, as necessary, will implement its emergency management plan, which may include notifying and evacuating affected personnel. In the absence of a local emergency authority, the Contractor shall take reasonable measure to notify potentially affected persons of the imminent health threat.

As soon as possible, but no later than two (2) weeks after discovery of the spill or discharge, the Contractor shall reasonably attempt to notify the Owner (if identifiable) or Occupant of the property upon which the discharge or spill occurred as well as the occupants of any property that the Contractor believes is adversely affected.

ATTACHMENT B -- POTENTIAL SOURCES OF CONTAMINATION

Asphalt products will be used on this project. After placement of asphalt, emulsion, or coatings, the applicant will be responsible for immediate cleanup should an unexpected rain occur. For the duration of the asphalt curing time, the applicant should maintain standby personnel and equipment to contain any asphalt wash-off should an unexpected rain occur.

Sediment and soil from disturbed areas are another potential source of contamination. During activities causing soil disturbance, temporary best management practices outlined in ***Attachment D***, shall be followed to prevent discharge of sediment to South Fork San Gabriel River.

Other potential sources of contamination include hydraulic fluid and diesel fuel from mechanical equipment, as well as paints and chemicals used on site. Any spills shall be handled according to the Spill Response Actions in ***Attachment A***.

ATTACHMENT C – SEQUENCE OF MAJOR ACTIVITIES

Wolf Ranch Multi-Family 1 limits of construction includes a total of approximately 25.69 acres of disturbed area in the Recharge and Zones. The location of the temporary erosion control measures is shown on the Erosion & Sedimentation Control Sheets.

1. Install temporary erosion control measures, stabilized construction entrance, and tree protection according to the plans and specifications prior to any clearing and grubbing, grading, excavating, etc. Notify Construction Inspection Division, when installed. (±0.2 acres)

2. Prior to beginning construction the Owner or his authorized representative shall convene a Pre-Construction Conference between the Texas Commission on Environmental Quality (TCEQ), City of Georgetown, Williamson County, Consulting Engineer, Contractor, and any other affected parties. Notify the TCEQ at least 48 hours prior to the time of the conference and 48 hours prior to the beginning of construction. On-site Pre-Construction meeting should be held with Contractor, TCEQ, Engineer, and Owner.

3. Set up all erosion control devices and temporary Best Management Practices measures. (±25 acres)

4. Clear and Grub for the streets, utilities, and lot grading. (±25 acres)

5. Rough Cut Roadway and perform lot grading. (±25 acres)

6. Begin construction including water, wastewater, paving, dry utilities, drainage, and other related site improvements. Install all utilities to be located under proposed pavement. (±10 acres)

7. Upon completion, restore as much disturbed areas as possible, particularly large open area. (±10 acres)

8. Clean site and re-vegetate all disturbed areas according to the plans and specifications. Disturbed areas of the construction site that will not be re-disturbed for 21 days or more must be stabilized by the 14 th day after the last disturbance. Stabilization measures should include seeding and/or mulching. (±10 acres)

9. Complete permanent erosion control and restoration of site vegetation. (±25 acres)

10. Remove and dispose of temporary erosion/sedimentation control measures.

Complete any necessary final dress up of areas. Conduct a final inspection and complete all punch list items.

ATTACHMENT D -- TEMPORARY BEST MANAGEMENT PRACTICES AND MEASURES

Temporary Best Management Practices (BMPs) and measures will be used during construction to prevent pollution of groundwater, surface water and naturally occurring environmental features. Silt fence, inlet protection, stabilized construction entrance, and construction stockpiling areas will be installed prior to beginning construction and prior to commencement of any of the activities defined in the sequence of construction as ***Attachment C***. Inspection and maintenance of the on-site controls shall be performed during the site clearing and rough grading process. The perimeter fence shall be regularly monitored to ensure that the buffers remain no-construction zones until the site work has been completed and authorization has been granted by the Engineer. Please reference attached copy of the Erosion and Sedimentation Control Plans for specific controls and details.

Best Management Practices and measures will prevent pollution of surface water or groundwater that originates on site or flows off-site, including pollution caused by contaminated stormwater run-off from the site, through the use of silt fences placed immediately downstream of disturbed areas. To minimize destruction to any portion of the Recharge Zone, on-site perimeter silt fence will also be implemented for pertinent areas throughout the entirety of construction. The Contractor is expected to inspect the controls weekly and after significant rainfalls to ensure proper function. When silt accumulates six (6) inches in depth the Contractor shall promptly remove the silt from the controls. As noted earlier, the proposed water quality ponds will be used to treat storm water from the construction of the site. The water quality facility shall be properly inspected throughout construction and restored upon completion of the respective phase.

BMPs and measures will prevent pollutants from entering surface streams or the aquifer by intercepting stormwater potentially carrying sediment and other pollutants. BMPs and measures will implement two (2) stabilized construction entrances and a construction stockpiling/staging area to help minimize pollutant run-off and erosion generated during construction. Paved streets and driveways adjacent to these sites will be cleaned regularly to remove excess mud, dirt or rock tracked from the site. Sedimentation will be concentrated only in these areas for efficient maintenance. Water trucks will be on-site as necessary to aid in controlling dust. No setbacks were proposed for the site; however, BMPs will be implemented to limit/prevent contaminated inflow from entering surface streams or the aquifer. These practices are to include the following measures: the use of silt fence, triangular filter dikes and vegetative buffer zones. The fabricated silt fence barricade, triangular filter dikes and natural living filter vegetative buffer will provide help to reduce the likelihood of contaminated runoff from entering the aquifer. If any sensitive features are identified by
TCEQ inspections, or during excavation or construction, measures appropriate to the sensitivity of the discovered feature will be enacted. No blasting is proposed.

Temporary Erosion and Sedimentation Notes:

1. The Contractor shall maintain, install erosion/sedimentation controls and tree/natural protective fencing prior to any site preparation work (clearing, grubbing or excavation).

2. The placement of erosion/sedimentation controls and tree/natural protective fencing shall be in accordance with Williamson County's current Environmental Protection rules and the approved Erosion and Sedimentation Control Plan. No erosion controls shall be placed beyond the property lines of the site unless written permission has been obtained from adjacent property Owners.

3. A pre-construction conference shall be held on-site with the Contractor, Design Engineer/permit applicant and Environmental Inspector after installation of the erosion/sedimentation and tree/natural area protection measures and prior to beginning any site preparation work. The Contractor shall notify the Environmental Inspector at least three (3) days prior to the meeting date.

4. Any major variation in materials or locations of controls or fences from those shown on the approved plans will require a revision and must be approved by the Reviewing Engineer, Environmental Specialist or City Arborist as appropriate. Minor changes to be made as field revisions to the Erosion and Sedimentation Control Plan may be required by the Environmental Inspector during the course of construction to correct control inadequacies.

5. The Contractor is required to inspect the controls at weekly intervals and after significant rainfall events to ensure that they are functioning properly. The person(s) responsible for maintenance of controls shall immediately make any necessary repairs to damaged areas. Silt accumulation at controls must be removed when the depth reaches six (6) inches.

6. Prior to final acceptance by the City of Georgetown and Williamson County, haul roads and waterway crossing constructed for temporary Contractor access must be removed, accumulated sediment removed from the waterway and the area restored to the original grade and revegetated. All land clearing debris shall be disposed of in approved spoil disposal sites.

7. All work must stop if a void in the rock substrate is discovered, which is one (1) square foot in total area, blows air from within the substrate, and/or consistently received water during any rain event. At this time it is the responsibility of the Project Manager to immediately contact an Environmental Inspector for further investigation.

8. Erosion control measures, site work and restoration work shall be in accordance with the Williamson County Storm Water Management System Requirements.

9. All slopes shall be sodded or seeded with approved grass, grass mixtures or ground cover suitable to the area and season in which they are applied.

10. Silt fences, rock berms, sedimentation basins and similarly recognized techniques and materials shall be employed during construction to prevent point source sedimentation loading of downstream facilities, such installation shall be regularly inspected by Williamson County for effectiveness. Additional measures may be required if, in the opinion of the County Engineer, they are warranted.

11. All temporary erosion control measures shall not be removed until final inspection and approval of the project by the Engineer. It shall be the responsibility of the Contractor to maintain all temporary erosion control structures and to remove each structure as approved by the Engineer.

12. Any dirt, mud, rocks, debris, etc., that is spilled, tracked, or otherwise deposited on any existing paved street shall by cleaned up immediately.

ATTACHMENT E – REQUEST TO SEAL FEATURES

No environmental features are being temporarily sealed. Therefore, this section is not applicable.

ATTACHMENT F – STRUCTURAL PRACTICES

Silt fencing will be placed on the down gradient side of any exposed soils in order to limit the discharge of silt and pollutant form exposed areas of the site. Additionally, triangular filter dikes will be placed down gradient of areas that may require dewatering. Dewatering shall be directed toward the water quality pond and/or filter dikes to limit the discharge of silt and pollutants from exposed areas of the site. Also included are stabilized construction entrances to reduce the amount of mud tracked onto surrounding streets by construction vehicles. Inspection and maintenance of the onsite controls shall be performed during the site clearing and rough grading process.

Additionally, the use of the proposed pond will also protect against contaminated runoff leaving the site. The Contractor will be responsible for proper inlet protection in addition to cleaning out all structures adversely affected by sediment after heavy rainfalls.

ATTACHMENT G – DRAINAGE AREA MAPS

(See Construction Plans)

ATTACHMENT H – TEMPORARY SEDIMENT POND PLANS AND CALCULATIONS

The proposed water quality pond will be used as a sediment basin during construction. Developed Water Quality Area to the Water Quality Pond is approximately 8-acres with no offsite drainage. A surface skimmer will be utilized for dewatering during construction if warranted. Any excess sediment generated during construction will be spoiled in the location outlined in the construction plans. The entire system shall be protected from erosion and maintained throughout the course of construction until final site restoration is complete. The construction plans and design calculations will identify that adequate storage volume will be provided for construction.

ATTACHMENT I – INSPECTION AND MAINTENANCE FOR BEST MANAGEMENT PRACTICES

The following sections address inspection and maintenance taken from the TNRCC Manual, "Complying with Edward Aquifer Rules: Technical Guidance on Best Management Practices."

Silt Fence:

1. Inspection shall be made weekly and after each rainfall event, in accordance with Section 1.4.3 of RG-348.

2. Torn fabric shall be replaced or a second line of fencing parallel to the torn section shall be implemented as needed.

3. Accumulated silt shall be removed when it reaches a depth of six (6) inches. The silt shall be disposed of on an approved site and in such a manner that will not contribute to additional siltation.

4. Silt fence shall be removed when the site is completely stabilized so as not to block or impede storm flow or drainage.

Inlet Protection:

1. Daily inspection shall be made by the Contractor and silt accumulation must be removed when depth reaches 50 millimeters (two (2) inches).

2. Contractor shall monitor the performance of inlet protection during each rainfall event and immediately remove the inlet protections if the storm water begins to overtop the curb.

3. Inlet protections shall be removed as soon as the source of sediment is stabilized.

Stabilized Construction Entrance:

1. The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public roadway. This may require periodic top dressing with additional stone as conditions demand. As well as repair and clean out of any measure device used to trap sediment. All sediments that are spilled, dropped, washed or tracked onto public roadway must be removed immediately.

2. Entrance shall be properly graded to prevent run-off from leaving the construction site.

Concrete Washout Area:

1. Routine inspection in accordance with Section 1.4.18 of RG-348 of the area to insure

that sufficient quantity and volume remain to contain all liquid and concrete waste generated by washout operations.

2. Plastic lining material should be a minimum of 10 millimeters in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

3. When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Sediment Basins

1. Inspection should be made weekly and after each rainfall in accordance to Section 1.4.13 of RG-348.

2. To prevent clogging of the outlet structure of proposed water quality facilities implemented as temporary sediment basins, trash and other debris shall be removed promptly after each rainfall event.

3. Silt accumulation should be removed as well as basin re-graded to original dimensions once the capability of the facility has been reduced to 75% of original storage capacity.

4. Removed sediment should be redistributed in the respective phases' stockpiling area.

Rock Berm

1. Inspection should be made weekly and after each rainfall in accordance to Section 1.4.5 of RG-348. If placed in streambeds, inspection should occur on a daily basis.

2. Accumulated silt shall be removed when it reaches a depth of six (6) inches. The silt shall be disposed of on an approved site and in such a manner that will not contribute to additional siltation.

3. Loose wire sheathing shall be repaired immediately when necessary and the berm shall be reshaped as needed during inspection.

4. Berm shall be replaced if the structure ceases to function as initially intended due to

factors such as silt accumulation, washout, construction traffic damage, etc.

5. When all upstream areas are stabilized and the accumulated silt has been removed, the rock berm should be removed and disposed of.

ATTACHMENT J – SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

Prior to commencing construction, all temporary erosion and sedimentation control measures must be properly selected, installed, and maintained in accordance with the Manufacturer's Specifications And Good Engineering Practices. Controls specified in the Storm Water Pollution Prevention Plan section of the approved Edwards Aquifer Contributing Zone 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.*

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.*

(*see General Notes for Edwards Aquifer Recharge Zone Plan)

Permanent 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)(C), (D)(Ii), (E), and (5), 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 **Permanent Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Ryan Cunningham, P.E. - Kimley-Horn

Date: 01/22/2025

Signature of Customer/Agent

Regulated Entity Name: Wolf Ranch Multi-Family

Permanent Best Management Practices (BMPs)

Permanent best management practices and measures that will be used during and after construction is completed.

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

   ☐ N/A

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

   ☒ The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.

☐ A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is: _____

☐ N/A

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

   ☐ N/A

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

   ☐ The site will be used for low density single-family residential development and has 20% or less impervious cover.
   ☐ The site will be used for low density single-family residential development but has more than 20% impervious cover.
   ☒ The site will not be used for low density single-family residential development.

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

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

6. ☐ **Attachment B - BMPs for Upgradient Stormwater**.

☐ A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is attached.

☒ No surface water, groundwater or stormwater originates upgradient from the site and flows across the site, and an explanation is attached.

☐ Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, and an explanation is attached.

7. ☒ **Attachment C - BMPs for On-site Stormwater**.

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

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

8. ☒ **Attachment D - BMPs for Surface Streams**. A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is attached. Each feature identified in the Geologic Assessment as sensitive has been addressed.

☐ N/A

9. ☒ The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.

☒ The permanent sealing of or diversion of flow from a naturally-occurring sensitive feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed.

☐ **Attachment E - Request to Seal Features**. A request to seal a naturally-occurring sensitive feature, that includes, for each feature, a justification as to why no reasonable and practicable alternative exists, is attached.

10. ☒ **Attachment F - Construction Plans**. All construction plans and design calculations for the proposed permanent BMP(s) and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer, and are signed, sealed, and dated. The plans are attached and, if applicable include:

☒ Design calculations (TSS removal calculations)

☒ TCEQ construction notes

☒ All geologic features

☒ All proposed structural BMP(s) plans and specifications

☐ N/A

11. ☒ **Attachment G - Inspection, Maintenance, Repair and Retrofit Plan**. A plan for the inspection, maintenance, repairs, and, if necessary, retrofit of the permanent BMPs and measures is attached. The plan includes all of the following:

    ☒ Prepared and certified by the engineer designing the permanent BMPs and measures
    ☒ Signed by the owner or responsible party
    ☒ Procedures for documenting inspections, maintenance, repairs, and, if necessary retrofit
    ☒ A discussion of record keeping procedures

    ☐ N/A

12. ☐ **Attachment H - Pilot-Scale Field Testing Plan**. Pilot studies for BMPs that are not recognized by the Executive Director require prior approval from the TCEQ. A plan for pilot-scale field testing is attached.

    ☒ N/A

13. ☐ **Attachment I -Measures for Minimizing Surface Stream Contamination**. A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is attached. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity, which increase erosion that results in water quality degradation.

    ☒ N/A

Responsibility for Maintenance of Permanent BMP(s)

Responsibility for maintenance of best management practices and measures after construction is complete.

14. ☒ The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.

    ☐ N/A

15. ☒ A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.

    ☐ N/A

ATTACHMENT **A** – 20% OR LESS IMPERVIOUS COVER WAIVER

No waiver is being requested because this site will be more than 20% impervious cover. Therefore this section is not applicable to our submittal.

ATTACHMENT **B** – BMPs FOR UPGRADIENT STORM WATER

There is no upgradient storm water for Wolf Ranch Multi-Family. All of the storm water originates onsite and is captured in the proposed storm sewer system and routed to the proposed expanded wet pond.

ATTACHMENT **C** – BMPs FOR ONSITE STORMWATER

Storm water runoff arising from this development will be conveyed through a combination of sheet flow and storm sewer flow to the proposed Batch Water Quality Pond and Vegetative Filter Strips. Ultimately the ponds will discharge into South Fork of the San Gabriel River. See attached plans for the proposed expansion to the water quality pond included with the construction plans under *Attachment F*. See TSS removal calculations under *Attachment I*.

1. Permanent Erosion and Sedimentation Notes:

   All disturbed areas shall be restored as noted below.

   a. A minimum of four inches of top soil shall be placed in all drainage channels (except rock) and between the curb and right-of-way line.

   b. The seeding for permanent erosion control shall be applied over areas disturbed by construction as follows:

      Broadcast seeding:

      i. From September 15 to March 1, seeding shall be with a combination of two (2) pounds per 1,000 square feet of unhulled Bermuda and seven (7) pounds per 1,000 square feet of Winter Rye with a purity of 95% with 90% germination.

      ii. From March 2 to September 14, seeding shall be with hulled Bermuda at a rate of two (2) pounds per 1,000 square feet with a purity of 95% with 85% germination.

      iii. Fertilizer shall be a pelleted or granular slow release with an analysis of 15-15-15 to be applied once at planting and once during the period of establishment at a rate of one (1) pounds per 1,000 square feet.

      iv. Mulch type used shall be hay, straw or mulch applied at a rate of 45 pounds per 1,000 square feet.

      Hydraulic seeding:

      i. From September 15 to March 1, seeding shall be with a combination of one (1) pounds per 1,000 square feet of unhulled Bermuda and seven (7) pounds per 1,000 square feet of Winter Rye with a purity of 95% with 90% germination.

      ii. From March 2 to September 14, seeding shall be with hulled Bermuda at a rate of one (1) pounds per 1,000 square feet with a purity of 95% with 85% germination.

      iii. Fertilizer shall be a water soluble fertilizer with an analysis of 15-15-15 at a rate of 1.5 pounds per 1,000 square feet.

      iv. Mulch type used shall be hay, straw or mulch applied at a rate of 45 pounds per 1,000 square feet, with soil tackifier at a rate of 1.4 pounds per 1,000 square feet.

   c. The planted area shall be irrigated or sprinkled in a manner that will not erode the topsoil, but will sufficiently soak the soil to a depth of six (6) inches. The irrigation shall occur at ten (10)-day intervals during the first two (2) months. Rainfall occurrences of half (½) inch or more shall postpone the watering schedule for one (1) week.

   d. Restoration shall be acceptable when the grass has grown at least one and a half (1½) inches high with 95% coverage, provided no bare spots larger than 16 square feet exist.

   e. When required, native grass seeding shall comply with the requirements of the City of Georgetown.

ATTACHMENT **D** – BMPs FOR SURFACE STREAMS

As described in *Attachments B* and *C*, storm water runoff will be treated and contained within the proposed expanded water quality pond. The permanent water quality ponds are batch detention ponds TSS reduction efficiency of 91%. Please refer to *Attachment I* of this section for the TSS removal calculations.

ATTACHMENT **E** – REQUEST TO SEAL FEATURES

No environmental features are being sealed. Therefore, this section is not applicable.

ATTACHMENT **F** – CONSTRUCTION PLANS

See attached construction plans.

ATTACHMENT **G** – INSPECTION, MAINTENANCE, REPAIR AND RETROFIT PLAN

Inspection, Maintenance, Repair and Retrofit Plan, and Schedule for Batch Detention Water Quality Ponds

PROJECT NAME: Wolf Ranch Multi-Family
ADDRESS: 602 BLUE BLAZE TRAIL
CITY, STATE ZIP: Georgetown, Texas 78626

BATCH DETENTION WATER QUALITY PONDS

Routine Maintenance:

Mowing. The upper stage, side slopes, embankment, and emergency spillway of an extended detention basin must be mowed regularly to discourage woody growth and control weeds. Grass areas in and around basins should be mowed at least twice annually to limit vegetation height to 18 inches. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas. When mowing of grass is performed, a mulching mower should be used, or grass clippings should be caught and removed.

Inspections. Basins should be inspected at least twice a year (once during or immediately following wet weather) to evaluate facility operation. When possible, inspections should be conducted during wet weather to determine if the pond is meeting the target detention times. In particular, the extended detention control device should be regularly inspected for evidence of clogging, or conversely, for too rapid a release. If the design drawdown times are exceeded by more than 24 hours, then repairs should be scheduled immediately. The upper stage pilot channel, if any, and its flow path to the lower stage should be checked for erosion problems. During each inspection, erosion areas inside and downstream of the BMP should be identified and repaired or revegetated immediately.

Debris and Litter Removal. Debris and litter will accumulate near the extended detention control device and should be removed during regular mowing operations and inspections. Particular attention should be paid to floating debris that can eventually clog the control device or riser..

Erosion Control. The pond side slopes, emergency spillway, and embankment all may periodically suffer from slumping and erosion, although this should not occur often if the soils are properly compacted during construction. Regrading and revegetation may be required to correct the problems. Similarly, the channel connecting an upper stage with a lower stage may periodically need to be replaced or repaired. g: Grass areas in and around sand filters must be mowed at least twice annually to limit vegetation height to 18 inches. More frequent mowing to maintain aesthetic appeal may be necessary in landscape areas. Vegetation on the pond embankments should be mowed as appropriate to prevent the establishment of woody vegetation

Nuisance Control. Standing water (not desired in a extended detention basin) or soggy conditions within the lower stage of the basin can create nuisance conditions for nearby residents. Odors, mosquitoes, weeds, and litter are all occasionally perceived to be problems. Most of these problems are generally a sign that regular inspections and maintenance are not being performed (e.g., mowing, debris removal, clearing the outlet control device).

Non-routine maintenance.

Structural Repairs and Replacement. With each inspection, any damage to the structural elements of the system (pipes, concrete drainage structures, retaining walls, etc.) should be identified and repaired immediately. These repairs should include patching of cracked concrete, sealing of voids, and removal of vegetation from cracks and joints. The various inlet/outlet and riser works in a basin will eventually deteriorate and must be replaced. Public works experts have estimated that corrugated metal pipe (CMP) has a useful life of about 25 yr, whereas reinforced concrete barrels and risers may last from 50 to 75 yr.

Sediment Removal. When properly designed, dry extended detention basins will accumulate quantities of sediment over time. Sediment accumulation is a serious maintenance concern in extended detention dry ponds for several reasons. First, the sediment gradually reduces available stormwater management storage capacity within the basin. Second, unlike wet extended detention basins (which have a permanent pool to conceal deposited sediments), sediment accumulation can make dry extended detention basins very unsightly. Third, and perhaps most importantly, sediment tends to accumulate around the control device. Sediment deposition increases the risk that the orifice will become clogged, and gradually reduces storage capacity reserved for pollutant removal. Sediment can also be resuspended if allowed to accumulate over time and escape through the hydraulic control to downstream channels and streams. For these reasons, accumulated sediment needs to be removed from the lower stage when sediment buildup fills 20% of the volume of the basin or at least every 10 years.

An amended copy of this document will be provided to the Texas Commission on Environmental Quality within thirty (30) days of any changes in the following information.

Responsible Party for Maintenance: H4 WR MF-1, LP

Address: 129 CANYON VIEW ROAD

City, State, Zip: Georgetown, Texas 78626

Telephone Number: (804) 290-8870

Signature of Responsible Party: 

ATTACHMENT **H** – PILOT-SCALE FIELD TESTING PLAN

A pilot-scale field testing plan is not applicable for this project.

ATTACHMENT **I** – MEASURES FOR MINIMIZING SURFACE STREAM CONTAMINATION

All flows generated onsite due to this development are conveyed through a combination of sheet flow and storm sewer to the proposed water quality ponds and vegetative filter strips. Ultimately the flows are conveyed to the South Fork of the San Gabriel River.

The TSS removal calculations for the proposed pond are attached.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: **WOLF RANCH MULTIFAMILY**

Date Prepared: **1/2/2025**

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: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	**Williamson**	
Total project area included in plan * =	**25.70**	acres
Predevelopment impervious area within the limits of the plan * =	**0.00**	acres
Total post-development impervious area within the limits of the plan* =	**8.67**	acres
Total post-development impervious cover fraction * =	**0.34**	
P =	**32**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**7546** lbs.	**80% REDUCTION**

*** 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. = **WQ Pond**

Total drainage basin/outfall area =	**13.82**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**8.04**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.58**	
$L_{M\ THIS\ BASIN}$ =	**6998** lbs.	**80% REDUCTION**

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Batch Detention**
Removal efficiency = **91** percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

where:

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

A_C =	**13.82**	acres
A_I =	**8.04**	acres
A_P =	**5.78**	acres
L_R =	**8192**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	**7800**	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 =	**0.41**	
On-site Water Quality Volume =	**53150**	cubic feet

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

Off-site area draining to BMP =		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 =	**10630**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**63780**	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: WOLF RANCH MULTIFAMILY
Date: 1/2/2025

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: $L_M = 27.2(A_N \times P)$

where:
$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Williamson	
Total project area included in plan * =	25.70	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	8.67	acres
Total post-development impervious cover fraction * =	0.34	
P =	32	inches

$L_{M\ TOTAL\ PROJECT}$ = **8026** lbs. **85% REDUCTION PER COG**

*** 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. = WQ Pond

Total drainage basin/outfall area =	13.82	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	8.04	acres
Post-development impervious fraction within drainage basin/outfall area =	0.58	
$L_{M\ THIS\ BASIN}$ =	7443	lbs. **85% REDUCTION PER COG**

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Batch Detention
Removal efficiency = 91 percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: $L_R = (\text{BMP efficiency}) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

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

A_C =	13.82	acres
A_I =	8.04	acres
A_P =	5.78	acres
L_R =	8192	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = 7800 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 =	0.41	
On-site Water Quality Volume =	53150	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 =	10630	
Total Capture Volume (required water quality volume(s) x 1.20) =	63780	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

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

I Fred Balda,
Print Name

President,
Title - Owner/President/Other

of H4 WR MF-1, LP,
Corporation/Partnership/Entity Name

have authorized Ryan Cunningham, P.E.
Print Name of Agent/Engineer

of Kimley-Horn & Associates, 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:

Applicant's Signature

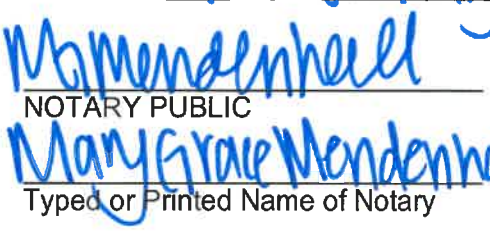
1.27.25
Date

THE STATE OF TX §

County of Dallas §

BEFORE ME, the undersigned authority, on this day personally appeared Fred J. Babb 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 27 day of January 2025.



NOTARY PUBLIC

Mary Grace Mendenhall

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 06/09/2027

Application Fee Form

Texas Commission on Environmental Quality
Name of Proposed Regulated Entity: Wolf Ranch Multi-Family
Regulated Entity Location: FM 2243, GEORGETOWN, TX
Name of Customer: H4 WR MF-1, LP
Contact Person: Ryan Cunningham Phone: 737-787-7192
Customer Reference Number (if issued):CN _____
Regulated Entity Reference Number (if issued):RN _____

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	25.703 Acres	$ 6,500.00
Sewage Collection System	3,134 L.F.	$ 1,567
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: 01/23/2025

Application Fee Schedule

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

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

Organized Sewage Collection Systems and Modifications

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

Underground and Aboveground Storage Tank System Facility Plans and Modifications

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

Exception Requests

Project	*Fee*
Exception Request	$500

Extension of Time Requests

Project	*Fee*
Extension of Time Request	$150

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

1. Reason for Submission (*If other is checked please describe in space provided.*)

☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal *(Core Data Form should be submitted with the renewal form)*

☐ Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	**3. Regulated Entity Reference Number** *(if issued)*
CN		**RN**

SECTION II: Customer Information

4. General Customer Information	**5. Effective Date for Customer Information Updates** (mm/dd/yyyy)	07/06/2022

☒ 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 WR MF-1, LP	

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID** (9 digits)	**10. DUNS Number** *(if applicable)*
32081988050	N/A	263772541	N/A

11. Type of Customer:	☐ Corporation	☐ Individual	Partnership: ☐ General ☒ Limited
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other		☐ Sole Proprietorship	☐ Other:

12. Number of Employees	**13. Independently Owned and Operated?**
☒ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher	☒ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☐ Owner ☐ Operator ☒ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant ☐ Other:

15. Mailing Address:	129 Canyon View Road						
	City	Georgetown	**State**	TX	**ZIP**	78626	**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)*
(713) 314-7037		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Wolf Ranch Multi-Family

23. Street Address of the Regulated Entity: ***(No PO Boxes)***	602 Blue Blaze Trail							
	City	Georgetown	**State**	TX	**ZIP**	78626	**ZIP + 4**	
24. County	Williamson							

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

25. Description to Physical Location:	Southeast corner of Wolf Ranch Parkway and Southwest Bypass

26. Nearest City	**State**	**Nearest ZIP Code**
Georgetown	TX	78626

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	30.625446		**28. Longitude (W) In Decimal:**	-97.718108	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
30	37	54.3504	-97	43	43.0458

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	1611	236116	237310

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

Multi-family Master Planned Communites

34. Mailing Address:	**129 Canyon View Road**							
	City	**Georgetown**	**State**	**TX**	**ZIP**	**78626**	**ZIP + 4**	
35. E-Mail Address:	**duke.kerrigan@hillwood.com**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(713) 314-7037		( ) -

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
		SCS/WPAP		
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Ryan Cunningham, P.E	**41. Title:**	Project Manager

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(737 **)** 787-7192		**( )** -	ryan.cunningham@kimley-horn.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:	KIMLEY-HORN AND ASSOCIATES, INC.	**Job Title:**	Project Manager	
Name *(In Print):*	Ryan Cunningham, P.E		**Phone:**	**(** 737 **)** 787- **7192**
Signature:			**Date:**	1/23/2025

LEGEND

- PROPERTY LINE
- PROPOSED WASTEWATER LINE
- PROPOSED WATER LINE
- PROPOSED WASTEWATER MANHOLE
- PROPOSED WASTEWATER CLEANOUT
- PROPOSED FIRE HYDRANT
- PROPOSED TAPPING SLEEVE & VALVE
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTEWATER MANHOLE
- ADA PATH
- RETAINING WALL
- TREE TO REMAIN
- TREE TO BE REMOVED
- HERITAGE TREE TO REMAIN
- SIDEWALK
- IRON FENCE

GRAPHIC SCALE 100'

NOTES:

1. ALL PARKING SPACES SHALL HAVE MINIMUM 7'-0" VERTICAL CLEARANCE.
2. WARNING SIGNS ARE REQUIRED TO BE PLACED UNDER THE OVERHEAD ELECTRIC LINES TO MAKE ALL PERSONNEL AWARE OF THE ELECTRIC HAZARD.
3. EVERY HANDICAP ACCESSIBLE PARKING SPACE SHALL BE IDENTIFIED BY A SIGN CENTERED 5 FEET ABOVE THE PARKING SURFACE, AT THE HEAD OF THE PARKING SPACE. THE SIGN MUST INCLUDE THE INTERNATIONAL SYMBOL OF ACCESSIBILITY AND STATE RESERVED, OR EQUIVALENT LANGUAGE. SUCH SIGNS SHALL NOT BE OBSCURED BY A VEHICLE PARKED IN THE SPACE AND SHALL MEET THE CRITERIA SET FORTH IN UBC, 3108(c) AND ANSI A1171-1986-4.6.2.
4. CONTRACTOR TO COORDINATE WITH PROJECT ARBORIST TO TRIM TREES TO ENSURE VISIBILITY NEAR PARKING AREAS.
5. CONTRACTOR TO FIELD VERIFY LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
6. CAUTION: DO NOT PLACE THE STAGING AREA IN CLOSE PROXIMITY TO OVERHEAD ELECTRIC LINES.
7. ALL DIMENSIONS ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
8. ALL RADII TO BE 3' UNLESS OTHERWISE NOTED.
9. SLOPES ON ACCESSIBLE ROUTES MAY NOT EXCEED 1:20 UNLESS DESIGNED AS A RAMP.
10. THE MAXIMUM SLOPE OF A RAMP IN NEW CONSTRUCTION IS 1:12. THE MAXIMUM RISE FOR ANY RAMP RUN IS 30 IN.
11. ACCESSIBLE ROUTES MUST HAVE A CROSS-SLOPE NO GREATER THAN 1:50.
12. GROUND SURFACES ALONG ACCESSIBLE ROUTES MUST BE STABLE, FIRM, AND SLIP RESISTANT.
13. REFER TO CITY OF GEORGETOWN ELECTRICAL DEPARTMENT FOR CONSTRUCTION PLANS AND DETAILS.
14. RETAINING WALLS OVER FOUR FEET IN HEIGHT MEASURED FROM THE BOTTOM OF THE FOOTING TO THE TOP OF THE WALL SHALL BE ENGINEERED AND REQUIRE A SEPARATE BUILDING PERMIT. [IBC CODE 105.2]
15. ALL LIGHTING FIXTURES SHALL BE DESIGNATED TO COMPLETELY CONCEAL AND FULLY SHIELD, WITHIN AN OPAQUE HOUSING, THE LIGHT SOURCE FROM VISIBILITY FROM ANY STREET RIGHT-OF-WAY. THE CONE OF LIGHT SHALL NOT CROSS ANY ADJACENT PROPERTY LINE. THE ILLUMINATION SHALL NOT EXCEED 2 FOOT CANDLES AT A HEIGHT OF THREE FEET AT THE PROPERTY LINE. ONLY INCANDESCENT, FLUORESCENT, COLOR-CORRECTED HIGH-PRESSURE SODIUM OR METAL HALIDE MAY BE USED. ALL VEHICLE OR PEDESTRIAN ACCESS SHALL BE SUFFICIENTLY LIGHTED TO ENSURE SECURITY OF PROPERTY AND PERSONS.
16. ALL ROOF, WALL AND GROUND MOUNTED MECHANICAL EQUIPMENT MUST BE SCREENED IN ACCORDANCE WITH CHAPTER 8 OF THE UDC. IF ROOF AND WALL MOUNTED EQUIPMENT OF ANY TYPE INCLUDING DUCT WORK AND LARGE VENTS IS PROPOSED IT SHALL BE SHOWN ON THE SITE PLAN AND SCREENING IDENTIFIED. SCREENING OF MECHANICAL EQUIPMENT SHALL RESULT IN THE MECHANICAL EQUIPMENT BLENDING IN WITH THE PRIMARY BUILDING AND NOT APPEARING SEPARATE FROM THE BUILDING AND SHALL BE SCREENED FROM VIEW OF ANY RIGHTS-OF-WAY OR ADJOINING PROPERTIES.
17. PER CHAPTER 8, THE DUMPSTER ENCLOSURE MUST BE ONE (1) FOOT ABOVE THE HEIGHT OF THE WASTE CONTAINER. USE PROTECTIVE POLES IN CORNERS AND AT IMPACT AREAS. FENCE POSTS OF RUST PROTECTED METAL OR CONCRETE. A MINIMUM 6" SLAB IS REQUIRED AND MUST BE SLOPED TO DRAIN; THE ENCLOSURE MUST HAVE STEEL FRAMED GATES WITH SPRING LOADED HINGES AND FASTENERS TO KEEP CLOSED. SCREENING MUST BE ON ALL FOUR SIDES BY MASONRY WALL OR APPROVED FENCE OR SCREENING WITH OPAQUE GATES.

WOLF RANCH MULTIFAMILY - UNITS

Unit Type	Unit Area (sf)	Number of Units	Total (sf)
A1 (1 BR / BA)	666	50	33,300
A2 (1 BR / 1 BA)	733	94	68,902
B1 (2 BR / 2 BA)	1,015	74	75,110
B2 (2 BR / 2 BA)	1,142	21	23,982
C1 (3 BR / 2 BA)	1,361	18	24,498
Total Building Area (sf)		225,792	
Total Number of Units		257	
Total Number of Buildings		8	

WOLF RANCH MULTIFAMILY - BUILDINGS

Building No.	Building Type	A1	A2	B1	B2	C1	Total Units/ Bldg
1	I	2	16	2	3	3	26
2	II	6	6	12	3	3	30
3	II	6	6	12	3	3	30
4	II	6	6	12	3	3	30
5	III	12	12	6	3	-	33
6	II	6	6	12	3	3	30
7	III	12	12	6	3	-	33
8	IV	-	30	12	-	3	45
Total		50	94	74	21	18	257

WOLF RANCH MULTI-FAMILY SITE TABLE

TOTAL AREA OF SITE (SQFT)	1119609.63
TOTAL AREA OF SITE (ACRE)	25.70
ZONING	PUD
TOTAL GROSS FLOOR AREA (SQFT)	225,792
F.A.R.	0.20
MAXIMUM IMPERVIOUS COVER %	65.00
MAXIMUM IMPERVIOUS COVER AC.	16.71
IMPERVIOUS COVER %	34.16
IMPERVIOUS COVER AC.	8.78
BUILDING COVER %	8.91
BUILDING COVER SQ.FT.	99,763
BUILDING STORIES	3
LANDSCAPE SPACE PROVIDED (SF)	712,687

WOLF RANCH MULTI-FAMILY PARKING TABLE

USE	UNIT/SF	RATIO	NUMBER REQUIRED
1-BR	144	1.5 PER UNIT	216
2-BR	95	2.0 PER UNIT	190
3-BR	18	2.5 PER UNIT	45
VISITOR	-	5% OF TOTAL	23
TOTAL REQUIRED			***474***
PROVIDED OPEN PARKING			424
PROVIDED PARKING WITH GARAGE			39
PROVIDED OPEN H.C. PARKING			11
TOTAL PROVIDED			**474**

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2025 KIMLEY-HORN AND ASSOCIATES, INC.
10814 JOLLYVILLE ROAD, CAMPUS IV, SUITE 200, AUSTIN, TX 78759
PHONE: 512-418-1771 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT 065024400			
DATE	JANUARY 2025		
SCALE:	AS SHOWN		
DESIGNED BY:	RMC	DRAWN BY:	RJ
CHECKED BY:	RMC		

OVERALL SITE PLAN

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
15
OF 52

0 40' 80'
GRAPHIC SCALE 40'

LEGEND

- PROPERTY LINE
- PROPOSED WASTEWATER LINE
- PROPOSED WATER LINE
- PROPOSED PUBLIC WATERLINE EASEMENT
- PROPOSED WASTEWATER MANHOLE
- PROPOSED WASTEWATER CLEANOUT
- PROPOSED FIRE HYDRANT
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- GARAGE PARKING COUNT

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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
144422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

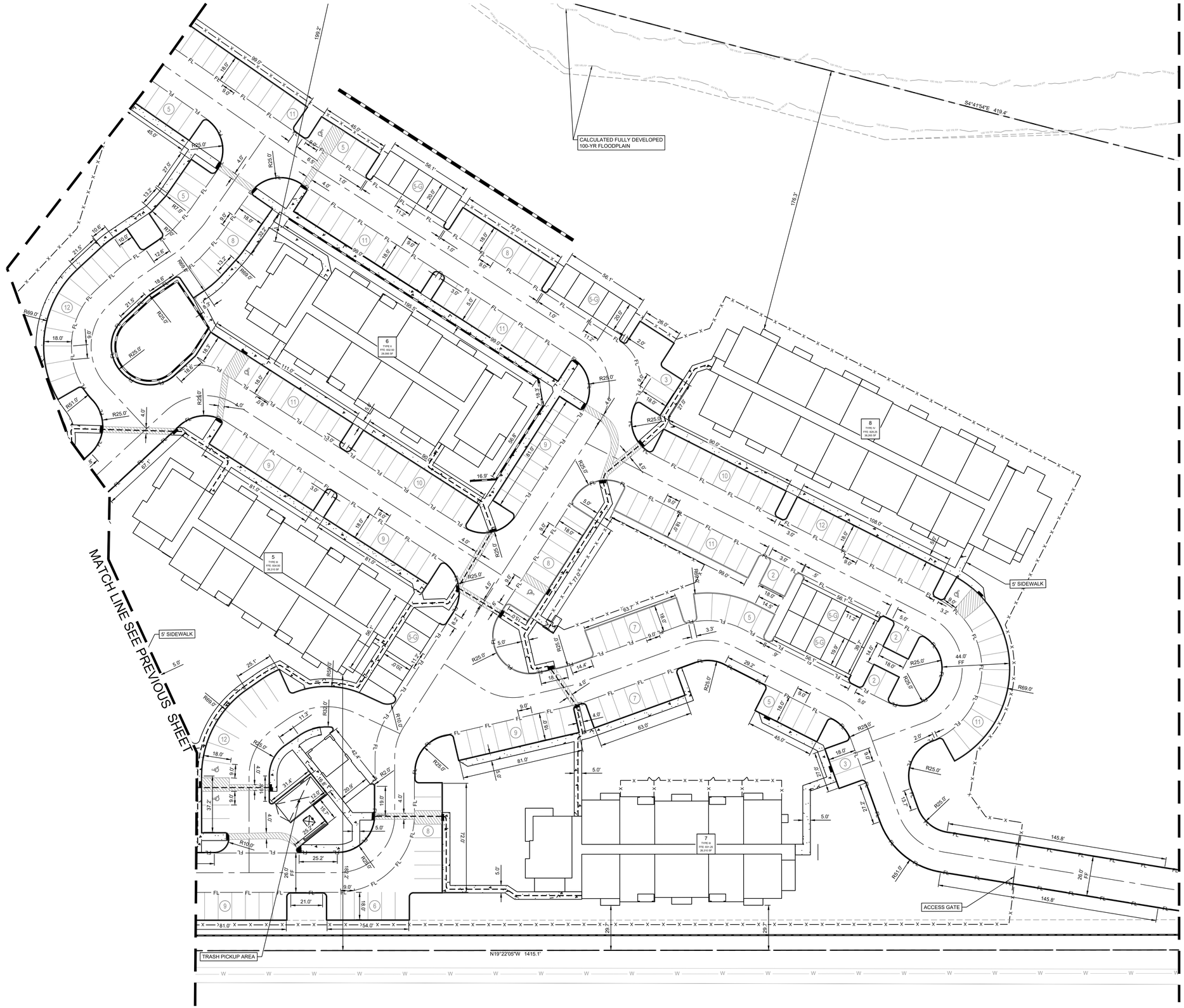
KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

DIMENSION CONTROL PLAN (1 OF 3)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
16
OF 52



0 40' 80'
GRAPHIC SCALE 40'

LEGEND

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RYAN M. CUNNINGHAM
145422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE:	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

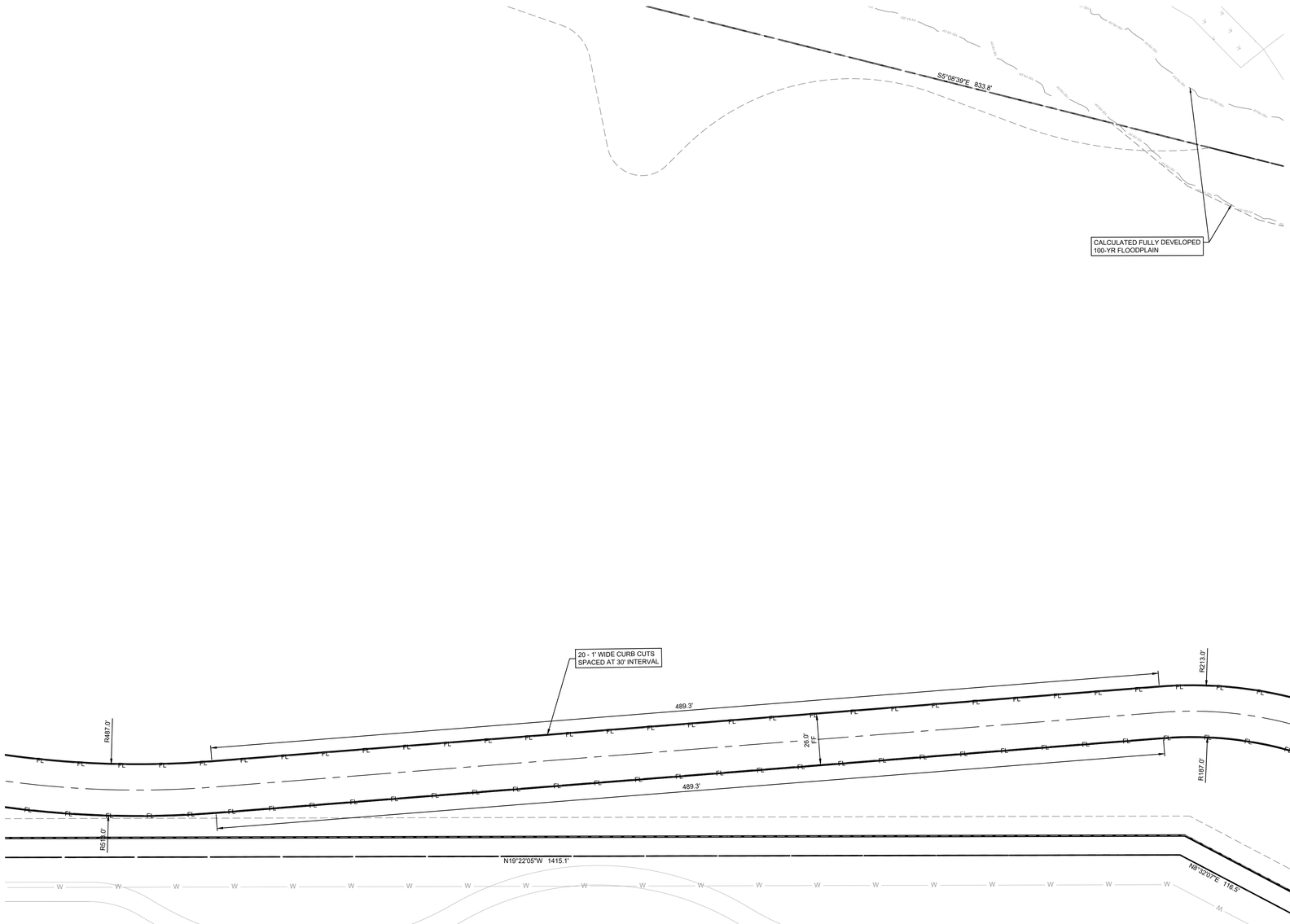
DIMENSION CONTROL PLAN (2 OF 3)

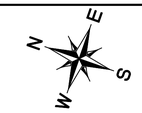
WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
17
OF 52

MATCH LINE SEE PREVIOUS SHEET





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DIMENSION CONTROL PLAN (3 OF 3)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
18
OF 52

LEGEND

— — —	PROPERTY LINE
FFE=XXX.XX	PROPOSED FINISHED FLOOR ELEVATION
XXX.X•	PROPOSED TOP OF PAVEMENT ELEVATION
EX XXX.X •	EXISTING TOP OF PAVEMENT ELEVATION
TG XXX.X •	PROPOSED TOP OF GRATE
TW XXX.X•	PROPOSED GRADE AT TOP OF WALL
BW XXX.X•	PROPOSED GRADE AT BOTTOM OF WALL
EW XXX.X•	PROPOSED GRADE AT END OF WALL
— < — < —	PROPOSED SWALE
- - - -	HIGH POINT
→	FLOW DIRECTION
▬▬	PROPOSED RETAINING WALL
— 555 —	PROPOSED CONTOUR
- - 555 - -	EXISTING CONTOUR
— x — x — x —	IRON FENCE

RETAINING WALL NOTE

FINISHED SURFACE SPOT ELEVATION AT THE TOP AND BOTTOM OF WALL ARE PROVIDED FOR GRADING PURPOSES ONLY. THE WALL, DESIGNED BY A PROFESSIONAL CIVIL/STRUCTURAL ENGINEER, MUST FIT THE FACE AND TOP OF THE WALL WITHIN THE WALL ZONE INDICATED. SELECTION OF RETAINING WALL SYSTEM SHALL BE MADE BY THE OWNER. STRUCTURAL DESIGN AND PERMITTING OF RETAINING WALLS, RAILINGS, AND OTHER SAFETY DEVICES SHALL BE PERFORMED BY A LICENSED CIVIL/STRUCTURAL ENGINEER AND IS NOT PART OF THIS PLAN SET. WALL DESIGN SHALL MEET THE INTENT OF THE GRADING PLAN INCLUDING ANY INFLUENCE ON ADJACENT BUILDING FOUNDATIONS, CONTRACTIBILITY NOTES, OR OTHER ADJACENT ITEMS SUCH AS UTILITIES OR PROPERTY LINES. THE OWNER WILL CAUSE THEIR WALL ENGINEER TO CONSULT ALL SHEETS OF THIS PLAN SET AND THE GEOTECHNICAL REPORT(PREPARED BY OTHERS) FOR POTENTIAL CONFLICTS.

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

Kimley»Horn

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TEXAS REGISTERED ENGINEERING FIRM F-928

STATE OF TEXAS
RYAN M. CUNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

GRADING PLAN (1 OF 3)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
23
OF 52

N E S W

0 30' 60'

GRAPHIC SCALE 30'

LEGEND

PROPERTY LINE	
FFE=XXX.XX	PROPOSED FINISHED FLOOR ELEVATION
XXX.X●	PROPOSED TOP OF PAVEMENT ELEVATION
EX XXX.X +	EXISTING TOP OF PAVEMENT ELEVATION
TG XXX.X●	PROPOSED TOP OF GRATE
TW XXX.X●	PROPOSED GRADE AT TOP OF WALL
BW XXX.X●	PROPOSED GRADE AT BOTTOM OF WALL
EW XXX.X●	PROPOSED GRADE AT END OF WALL
PROPOSED SWALE	
HIGH POINT	
FLOW DIRECTION	
PROPOSED RETAINING WALL	
555 PROPOSED CONTOUR	
555 EXISTING CONTOUR	
IRON FENCE	

RETAINING WALL NOTE

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Texas 811

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BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

Kimley»Horn

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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
144542
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

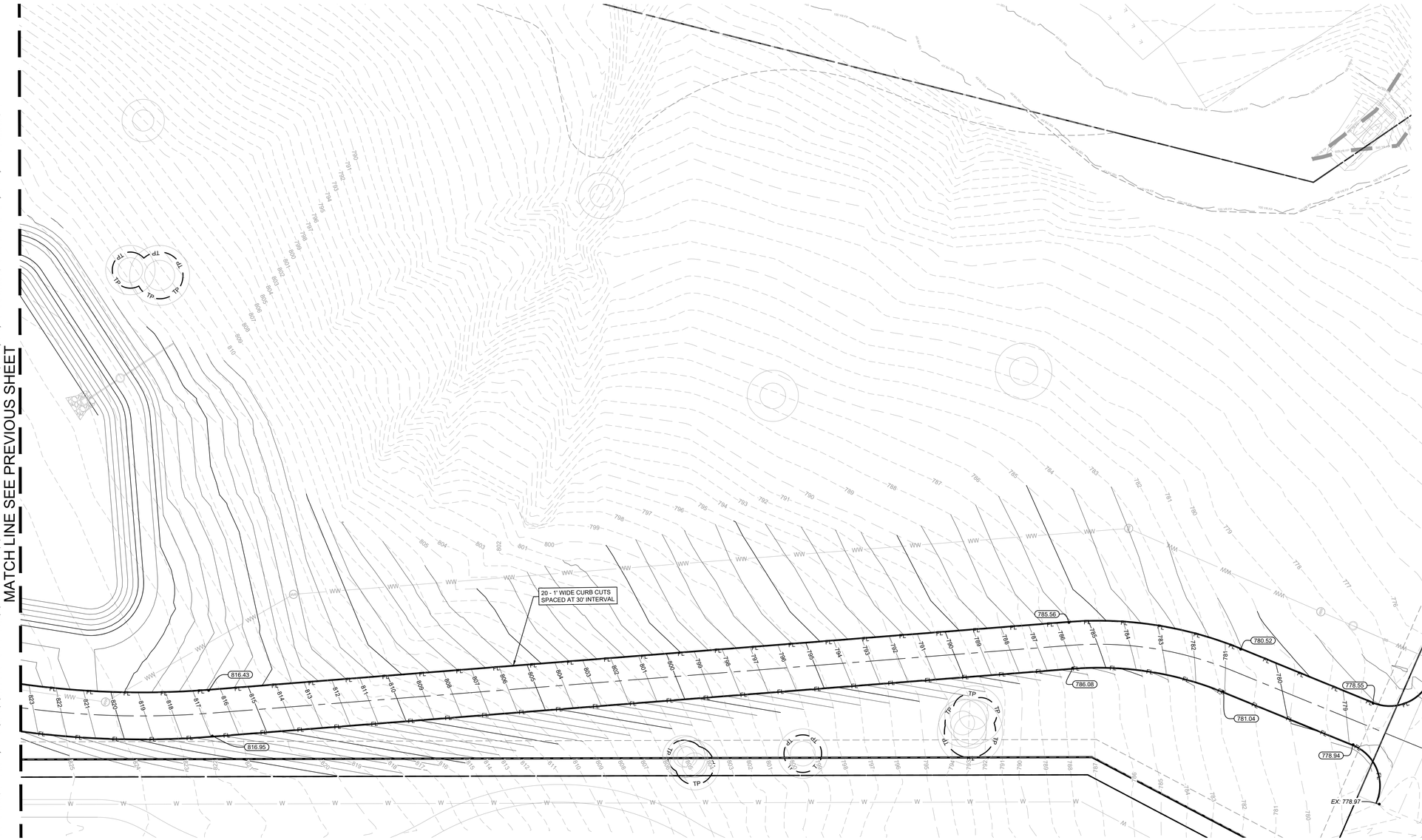
KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

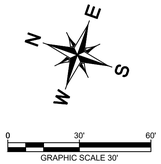
WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

GRADING PLAN (2 OF 3)

SHEET NUMBER
24
OF 52





LEGEND

	PROPERTY LINE
FFE=XXX.XX	PROPOSED FINISHED FLOOR ELEVATION
XXX.X●	PROPOSED TOP OF PAVEMENT ELEVATION
EX XXX.X ●	EXISTING TOP OF PAVEMENT ELEVATION
TG XXX.X ●	PROPOSED TOP OF GRATE
TW XXX.X ●	PROPOSED GRADE AT TOP OF WALL
BW XXX.X ●	PROPOSED GRADE AT BOTTOM OF WALL
EW XXX.X ●	PROPOSED GRADE AT END OF WALL
	PROPOSED SWALE
	HIGH POINT
	FLOW DIRECTION
	PROPOSED RETAINING WALL
555	PROPOSED CONTOUR
555	EXISTING CONTOUR
x x x	IRON FENCE

RETAINING WALL NOTE

FINISHED SURFACE SPOT ELEVATION AT THE TOP AND BOTTOM OF WALL ARE PROVIDED FOR GRADING PURPOSES ONLY. THE WALL, DESIGNED BY A PROFESSIONAL CIVIL/STRUCTURAL ENGINEER, MUST FIT THE FACE AND TOP OF THE WALL WITHIN THE WALL ZONE INDICATED. SELECTION OF RETAINING WALL SYSTEM SHALL BE MADE BY THE OWNER. STRUCTURAL DESIGN AND PERMITTING OF RETAINING WALLS, RAILINGS, AND OTHER SAFETY DEVICES SHALL BE PERFORMED BY A LICENSED CIVIL/STRUCTURAL ENGINEER AND IS NOT PART OF THIS PLAN SET. WALL DESIGN SHALL MEET THE INTENT OF THE GRADING PLAN INCLUDING ANY INFLUENCE ON ADJACENT BUILDING FOUNDATIONS, CONTRACTIBILITY NOTES, OR OTHER ADJACENT ITEMS SUCH AS UTILITIES OR PROPERTY LINES. THE OWNER WILL CAUSE THEIR WALL ENGINEER TO CONSULT ALL SHEETS OF THIS PLAN SET AND THE GEOTECHNICAL REPORT(PREPARED BY OTHERS) FOR POTENTIAL CONFLICTS.

Texas 811

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BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

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RYAN M. CUNNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

GRADING PLAN (3 OF 3)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
25
OF 52

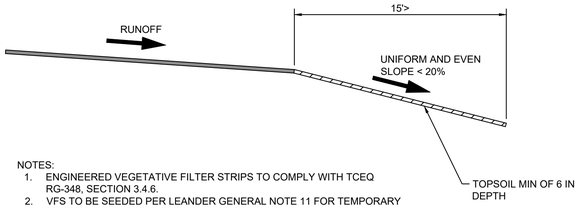
0 80' 160'
GRAPHIC SCALE 80'

LEGEND

- X-1 / 9.9 ac — AREA DESIGNATOR / AREA IN ACRES
- TIME OF CONCENTRATION
- PROPERTY LINE
- PROPOSED STORM DRAIN LINE
- EXISTING STORM DRAIN LINE
- PROPOSED DRAINAGE DIVIDE
- PROPOSED STORM DRAIN INLET
- PROPOSED STORM DRAIN MANHOLE
- PROPOSED STORM DRAIN HEADWALL
- PROPOSED FLOW DIRECTION
- 555 — PROPOSED CONTOUR
- 555 — EXISTING CONTOUR

NOTES:

1. REFER TO WATER QUALITY CALCULATIONS (SHEET 29) FOR BMP BASIN CALCULATIONS.



NOTES:
1. ENGINEERED VEGETATIVE FILTER STRIPS TO COMPLY WITH TCEQ RG-348, SECTION 3.4.6.
2. VFS TO BE SEEDED PER LEANDER GENERAL NOTE 11 FOR TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

ENGINEERED VEGETATIVE FILTER STRIPS
NTS

TSS REMOVAL SUMMARY (CITY OF GEORGETOWN)

	AREA NAME	BMP TYPE	TSS REMOVAL EFFICIENCY	BASIN AREA (AC.)	IMPERVIOUS (AC.)	IMPERVIOUS (%)	REQURED TSS LOAD REMOVAL (LBS.)	PROVIDED TSS LOAD REMOVAL (LBS.)
WOLF RANCH MULTIFAMILY	WQ POND	Batch Detention	91	14.38	8.05	56%	7452	7500
	VFS	Vegetated Filter Strip	85	2.03	0.63	31%	583	613
	Untreated	-	0	0.05	0.00	0%	0	0
TOTALS				**16.46**	**8.68**	**53%**	**8036**	**8113**

TSS REMOVAL SUMMARY (TCEQ)

	AREA NAME	BMP TYPE	TSS REMOVAL EFFICIENCY	BASIN AREA (AC.)	IMPERVIOUS (AC.)	IMPERVIOUS (%)	REQURED TSS LOAD REMOVAL (LBS.)	PROVIDED TSS LOAD REMOVAL (LBS.)
WOLF RANCH MULTIFAMILY	WQ POND	Batch Detention	91	14.38	8.05	56%	7007	7500
	VFS	Vegetated Filter Strip	85	2.03	0.63	31%	548	613
	Untreated	-	0	0.05	0.00	0%	0	0
TOTALS				**16.41**	**8.68**	**53%**	**7555**	**8113**

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

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RYAN M. CUNNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT 065024400
DATE JANUARY 2025
SCALE: AS SHOWN
DESIGNED BY: RMC
DRAWN BY: RJ
CHECKED BY: RMC

WATER QUALITY PLAN

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
28
OF 52

CITY OF GEORGETOWN - WATER QUALITY CALCULATIONS

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: WOLF RANCH MULTIFAMILY
Date: 2/27/2025

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: $L_M = 27.2(A_N \times P)$

where:
$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Williamson	
Total project area included in plan * =	25.70	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	8.68	acres
Total post-development impervious cover fraction * =	0.34	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	8036	lbs. **85% REDUCTION PER COG**

* 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. = WQ Pond

Total drainage basin/outfall area =	14.38	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	8.05	acres
Post-development impervious fraction within drainage basin/outfall area =	0.56	
$L_{M\ THIS\ BASIN}$ =	7452	lbs. **85% REDUCTION PER COG**

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 =	14.38	acres
A_I =	8.05	acres
A_P =	6.33	acres
L_R =	8210	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	7500	lbs.
F =	0.91	

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

Rainfall Depth =	1.80	inches
Post Development Runoff Coefficient =	0.39	
On-site Water Quality Volume =	36920	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 =	7384	
Total Capture Volume (required water quality volume(s) x 1.20) =	44305	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: WOLF RANCH MULTIFAMILY
Date: 2/27/2025

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
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Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:
$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of increased load
A_N = Net increase in impervious area for the project
P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Williamson	
Total project area included in plan * =	25.70	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	8.68	acres
Total post-development impervious cover fraction * =	0.34	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	8036	lbs. **85% REDUCTION PER COG**

* 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. = VFS

Total drainage basin/outfall area =	2.03	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.63	acres
Post-development impervious fraction within drainage basin/outfall area =	0.31	
$L_{M\ THIS\ BASIN}$ =	583	lbs. **85% REDUCTION PER COG**

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Vegetated Filter Strips
Removal efficiency = 85 percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

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 =	2.03	acres
A_I =	0.63	acres
A_P =	1.40	acres
L_R =	613	lbs

16. Vegetated Filter Strips Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

TSS REMOVAL SUMMARY (CITY OF GEORGETOWN)

	AREA NAME	BMP TYPE	TSS REMOVAL EFFICIENCY	BASIN AREA (AC.)	IMPERVIOUS (AC.)	IMPERVIOUS (%)	REQURED TSS LOAD REMOVAL (LBS.)	PROVIDED TSS LOAD REMOVAL (LBS.)
WOLF RANCH MULTIFAMILY	WQ POND	Batch Detention	91	14.38	8.05	56%	7452	7500
	VFS	Vegetated Filter Strip	85	2.03	0.63	31%	583	613
	Untreated	-	0	0.05	0.00	0%	0	0
TOTALS				**16.46**	**8.68**	**53%**	**8036**	**8113**

TCEQ - WATER QUALITY CALCULATIONS

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: WOLF RANCH MULTIFAMILY
Date Prepared: 2/27/2025

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where:
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P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Williamson	
Total project area included in plan * =	25.70	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	8.68	acres
Total post-development impervious cover fraction * =	0.34	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	7555	lbs. **80% REDUCTION**

* 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. = WQ Pond

Total drainage basin/outfall area =	14.38	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	8.05	acres
Post-development impervious fraction within drainage basin/outfall area =	0.56	
$L_{M\ THIS\ BASIN}$ =	7007	lbs. **80% REDUCTION**

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 =	14.38	acres
A_I =	8.05	acres
A_P =	6.33	acres
L_R =	8210	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	7500	lbs.
F =	0.91	

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

Rainfall Depth =	1.80	inches
Post Development Runoff Coefficient =	0.39	
On-site Water Quality Volume =	36920	cubic feet

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

Off-site area draining to BMP =		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 =	7384	
Total Capture Volume (required water quality volume(s) x 1.20) =	44305	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.
The values for BMP Types not selected in cell C45 will show NA.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: WOLF RANCH MULTIFAMILY
Date Prepared: 2/27/2025

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where:
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P = Average annual precipitation, inches

Site Data: Determine Required Load Removal Based on the Entire Project

County =	Williamson	
Total project area included in plan * =	25.70	acres
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Total post-development impervious area within the limits of the plan* =	8.68	acres
Total post-development impervious cover fraction * =	0.34	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	7555	lbs. **80% REDUCTION**

* 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. = VFS

Total drainage basin/outfall area =	2.03	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.63	acres
Post-development impervious fraction within drainage basin/outfall area =	0.31	
$L_{M\ THIS\ BASIN}$ =	548	lbs. **80% REDUCTION**

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = Vegetated Filter Strips
Removal efficiency = 85 percent

Aqualogic Cartridge Filter
Bioretention
Contech StormFilter
Constructed Wetland
Extended Detention
Grassy Swale
Retention / Irrigation
Sand Filter
Stormceptor
Vegetated Filter Strips
Vortechs
Wet Basin
Wet Vault

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 =	2.03	acres
A_I =	0.63	acres
A_P =	1.40	acres
L_R =	613	lbs

16. Vegetated Filter Strips Designed as Required in RG-348 — Pages 3-55 to 3-57

There are no calculations required for determining the load or size of vegetative filter strips.
The 80% removal is provided when the contributing drainage area does not exceed 72 feet (direction of flow) and the sheet flow leaving the impervious cover is directed across 15 feet of engineered filter strips with maximum slope of 20% or across 50 feet of natural vegetation with a maximum slope of 10%. There can be a break in grade as long as no slope exceeds 20%.

If vegetative filter strips are proposed for an interim permanent BMP, they may be sized as described on Page 3-56 of RG-348.

TSS REMOVAL SUMMARY (TCEQ)

	AREA NAME	BMP TYPE	TSS REMOVAL EFFICIENCY	BASIN AREA (AC.)	IMPERVIOUS (AC.)	IMPERVIOUS (%)	REQURED TSS LOAD REMOVAL (LBS.)	PROVIDED TSS LOAD REMOVAL (LBS.)
WOLF RANCH MULTIFAMILY	WQ POND	Batch Detention	91	14.38	8.05	56%	7007	7500
	VFS	Vegetated Filter Strip	85	2.03	0.63	31%	548	613
	Untreated	-	0	0.05	0.00	0%	0	0
TOTALS				**16.41**	**8.68**	**53%**	**7555**	**8113**

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2025 KIMLEY-HORN AND ASSOCIATES, INC.
10814 JOLLYVILLE ROAD, CAMPUS IV, SUITE 200, AUSTIN, TX 78759
PHONE: 512-418-1771 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM — 144542 — LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

WATER QUALITY CALCULATIONS

WOLF RANCH MULTIFAMILY
CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
29
OF 52

LEGEND

- PROPERTY LINE
- PROPOSED WASTEWATER LINE
- PROPOSED WATER LINE
- PROPOSED WASTEWATER MANHOLE
- PROPOSED WASTEWATER CLEANOUT
- WASTEWATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- PROPOSED TAPPING SLEEVE & VALVE
- PROPOSED STORM DRAIN LINE
- PROPOSED STORM DRAIN INLET
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTEWATER MANHOLE

GRAPHIC SCALE 40' (0, 40, 80)

N W E S

BENCHMARKS

1. BM #805644 MAG WITH WASHER "KHA"
ELEVATION=848.42
2. BM #806651 MAG WITH WASHER "KHA"
ELEVATION=851.28

DATUM IS NAVD 88. USING GEOID 12A. BASED ON GPS OBSERVATIONS

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

Texas 811

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

OVERALL WASTEWATER PLAN (1 OF 2)

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

Kimley»Horn

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TEXAS REGISTERED ENGINEERING FIRM F-928

No.	REVISIONS	DATE	BY

SHEET NUMBER
41
OF 52

OWNER: H4 GEORGETOWN, LP
A CALLED 236.714 ACRE TRACT
DOC. NO. 2018054155 (O.P.R.)

MATCH LINE PREVIOUS SHEET

STA. 1+43.62 WW-LAT-2
CLEANOUT
FL 6" OUT(W) 820.98

17 LF OF 6" PVC
@ 8.00%

STA. 12+46.76 WW-A
STA. 1+00.00 WW-LAT-2
4' MANHOLE MH-5
FL 8" OUT(W) 816.64
FL 6" IN(E) 816.91
FL 8" IN(N) 816.74

STA. 8+97.40 WW-A
4' MANHOLE MH-3
RIM: 820.30
FL 8" OUT(SE) 813.85
FL 8" IN(N) 813.95

STA. 7+74.58 WW-A
4' MANHOLE MH-2
(BOLTED AND GASKETED)
RIM: 813.33
FL 8" OUT(SE) 806.99
FL 8" IN(NW) 807.09

STA. 2+99.58 WW-A
4' MANHOLE MH-1
(BOLTED AND GASKETED)
RIM: 783.99
FL 8" OUT(S) 774.27
FL 8" IN(NW) 774.37

STA. 1+80.83 WW-A
4' MANHOLE MH-0
(BOLTED AND GASKETED)
RIM: 779.43
FL 8" OUT(S) 766.09
FL 8" IN(N) 766.19

STA: 1+60.88 WW-A
CONNECTION TO EXISTING
8" WW STUB
t 8" : 765.99 (N)
t 8" : 765.99 (S)

STA. 1+00 WW-A
EXISTING 4' MANHOLE
RIM: 777.17
FL 8" IN(N) 765.69

90 LF OF 6" PVC
@ 7.87%

STA. 1+89.75 WW-LAT-1
CLEANOUT
FL 6" OUT(SE) 825.00

STA. 11+04.73 WW-A
STA. 1+00.00 WW-LAT-1
4' MANHOLE MH-4
FL 8" OUT(S) 815.83
FL 8" IN(E) 815.93
FL 6" IN(NW) 817.93

A CALLED 20.942 ACRE TRACT
OWNER: CITY OF GEORGETOWN
DOC NO.: 2015010273 (O.P.R.)

BLOCK A

GRAPHIC SCALE 40'
0 40' 80'

LEGEND

- PROPERTY LINE
- PROPOSED WASTEWATER LINE
- PROPOSED WATER LINE
- PROPOSED WASTEWATER MANHOLE
- PROPOSED WASTEWATER CLEANOUT
- WASTEWATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- PROPOSED TAPPING SLEEVE & VALVE
- PROPOSED STORM DRAIN LINE
- PROPOSED STORM DRAIN INLET
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING WASTEWATER LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTEWATER MANHOLE

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

1. BM #80543 MAG WITH WASHER "KHA" ELEVATION=866.52'
2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

No.	REVISIONS	DATE	BY

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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
145422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

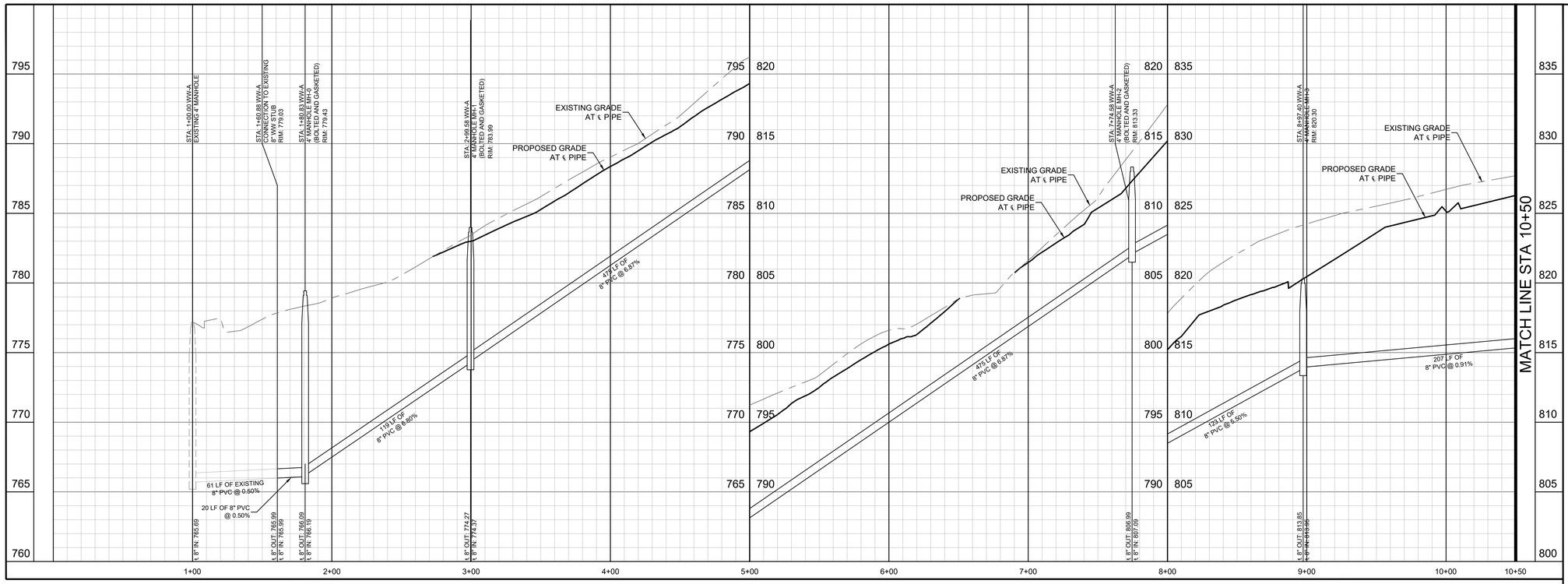
OVERALL WASTEWATER PLAN (2 OF 2)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
42
OF 52

WW-A



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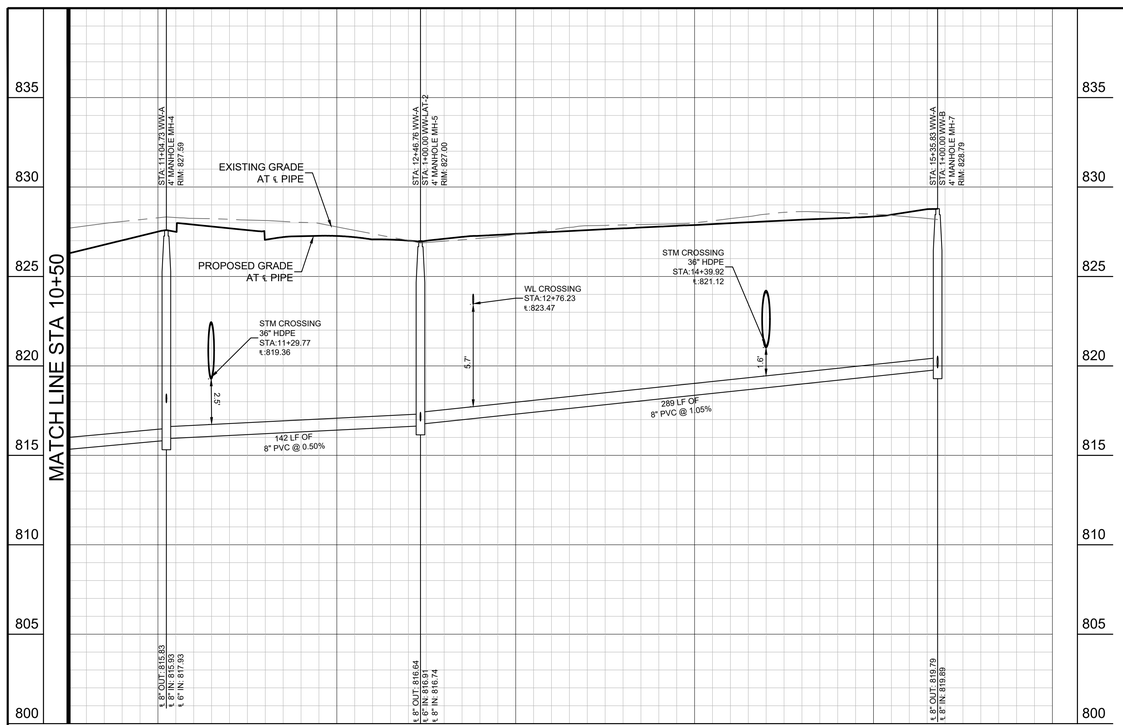

PROFILE SCALE
1" = 40' HORIZONTAL
1" = 4' VERTICAL

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

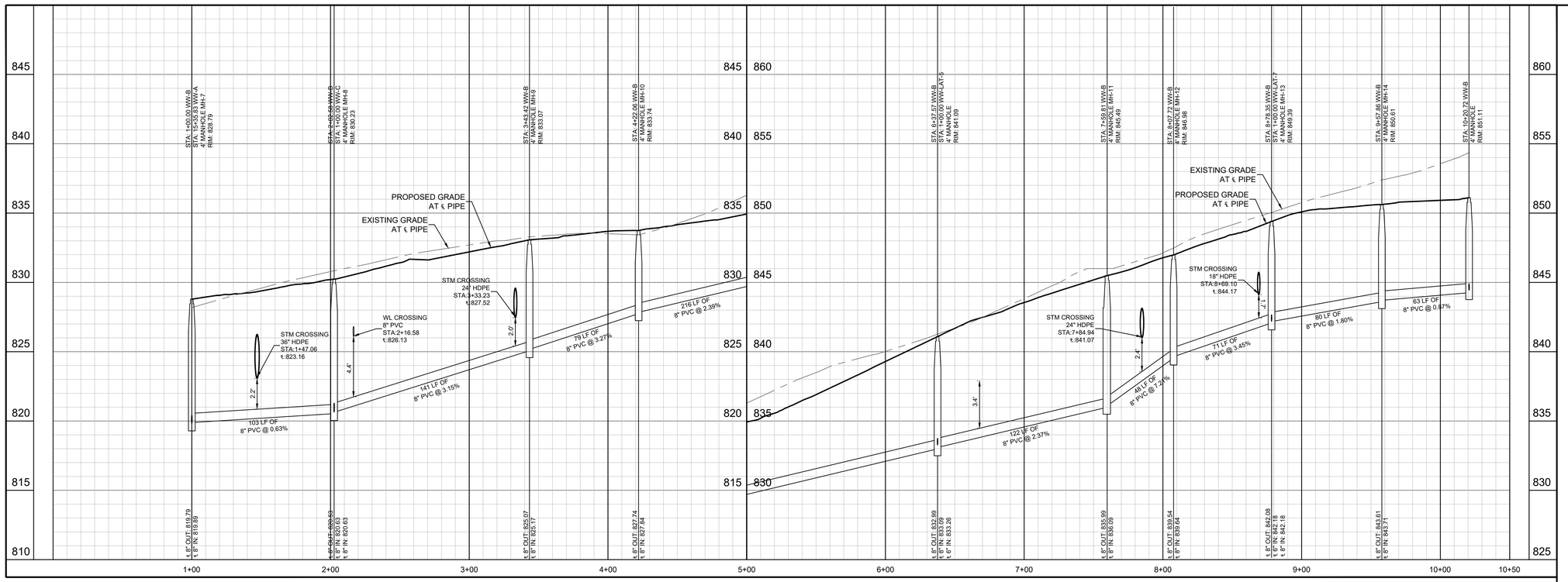
WASTEWATER PROFILE (1 OF 4)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
43
OF 52

WW-B



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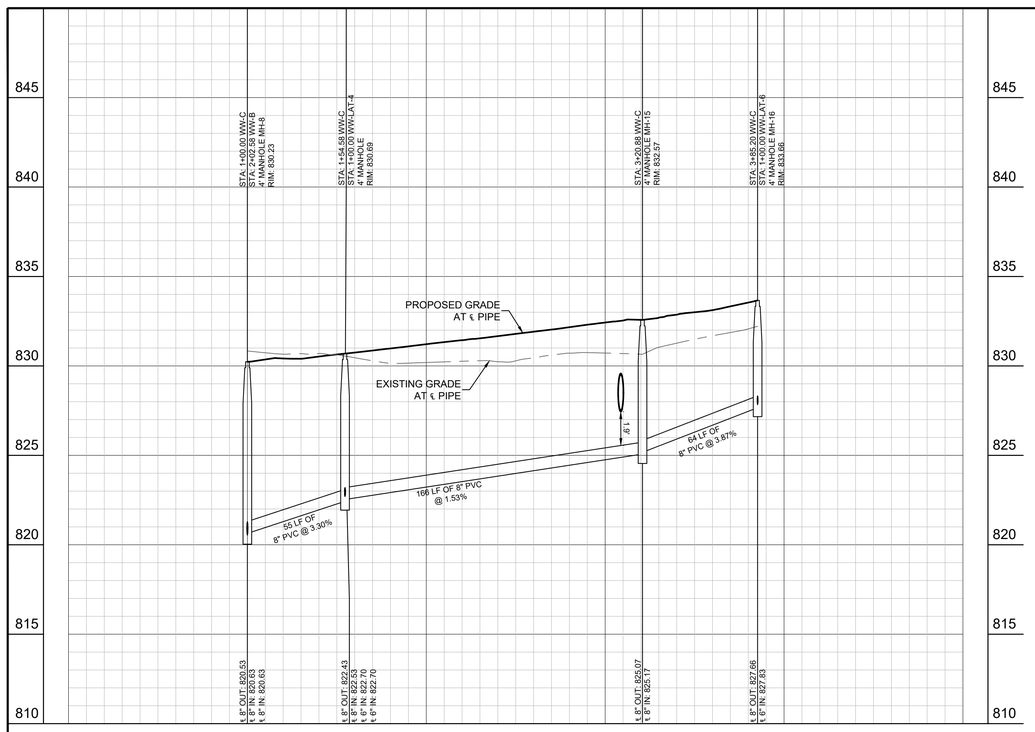

PROFILE SCALE
1" = 40' HORIZONTAL
1" = 4' VERTICAL

BENCHMARKS

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TEXAS REGISTERED ENGINEERING FIRM F-928

STATE OF TEXAS
RYAN M. CUNNINGHAM
145422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT 065024400
DATE: JANUARY 2025
SCALE: AS SHOWN
DESIGNED BY: RMC
DRAWN BY: RJ
CHECKED BY: RMC

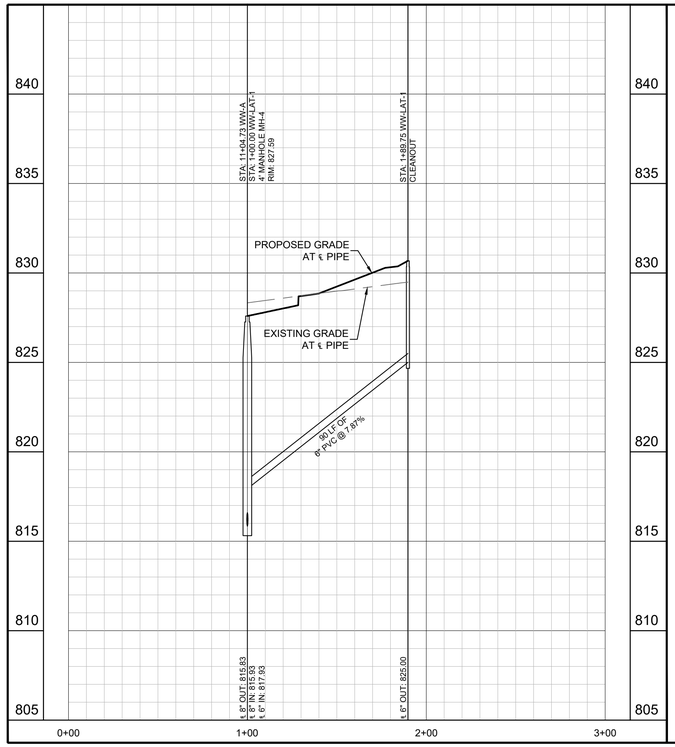
WASTEWATER PROFILE (2 OF 4)

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
44
OF 52

WW-LAT-1



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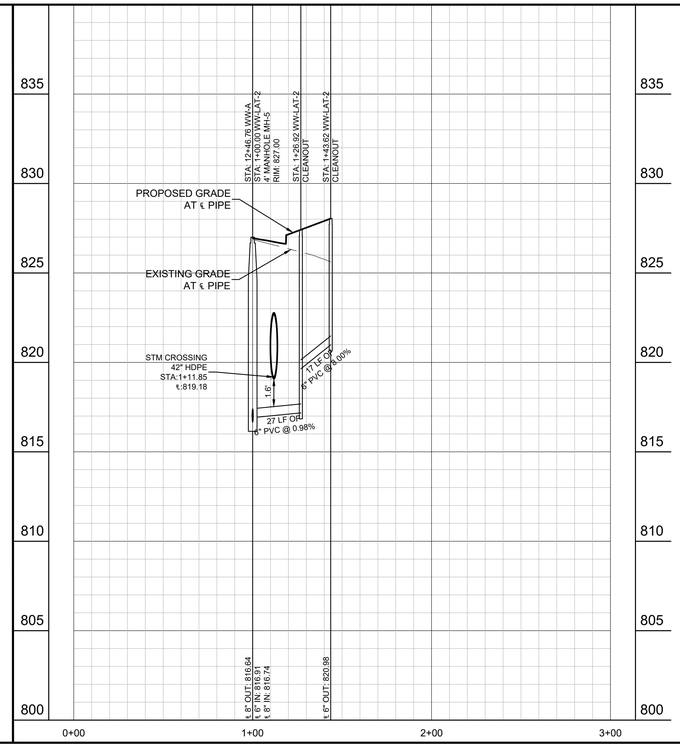

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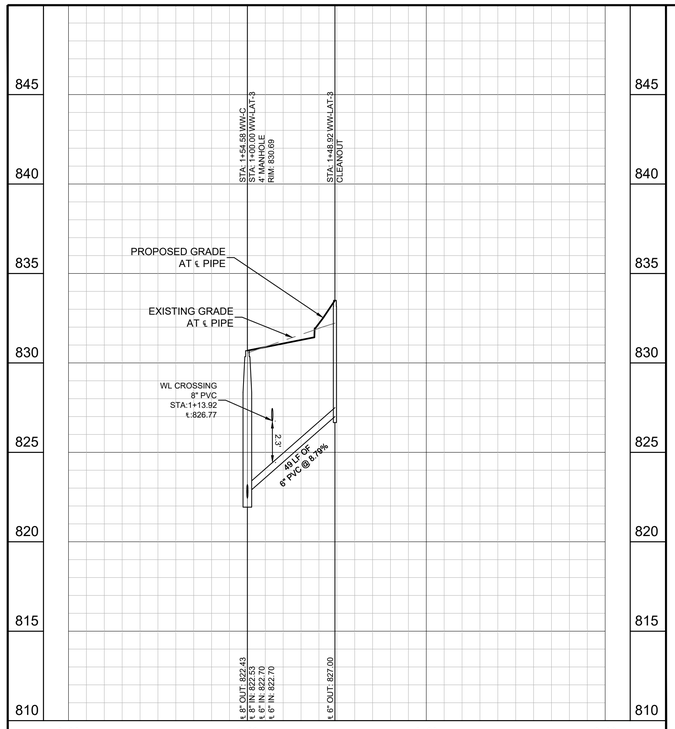

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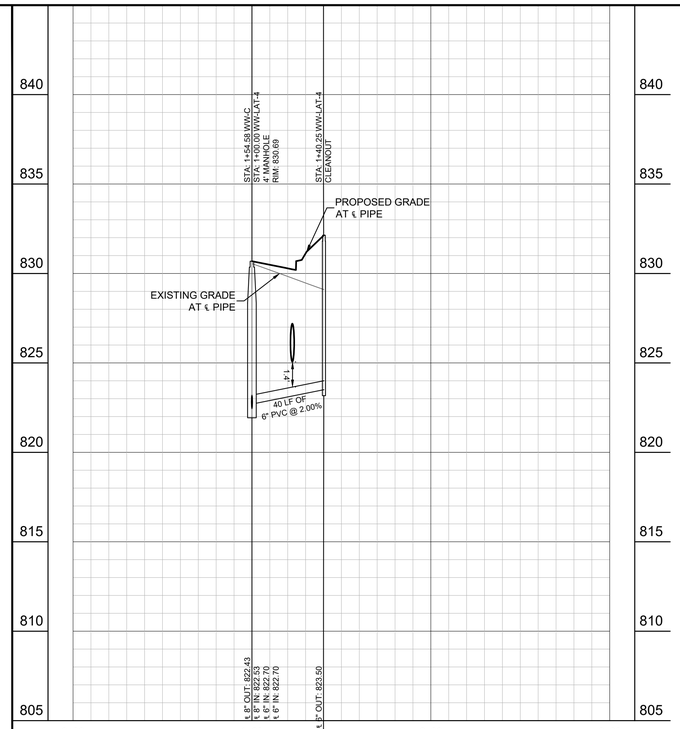

PROFILE SCALE
1" = 40' HORIZONTAL
1" = 4' VERTICAL

Texas 811

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BENCHMARKS

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2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

DATUM IS NAVD '88, USING GEOID 12A, BASED ON GPS OBSERVATIONS.

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RYAN M. CUNNINGHAM
145421
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

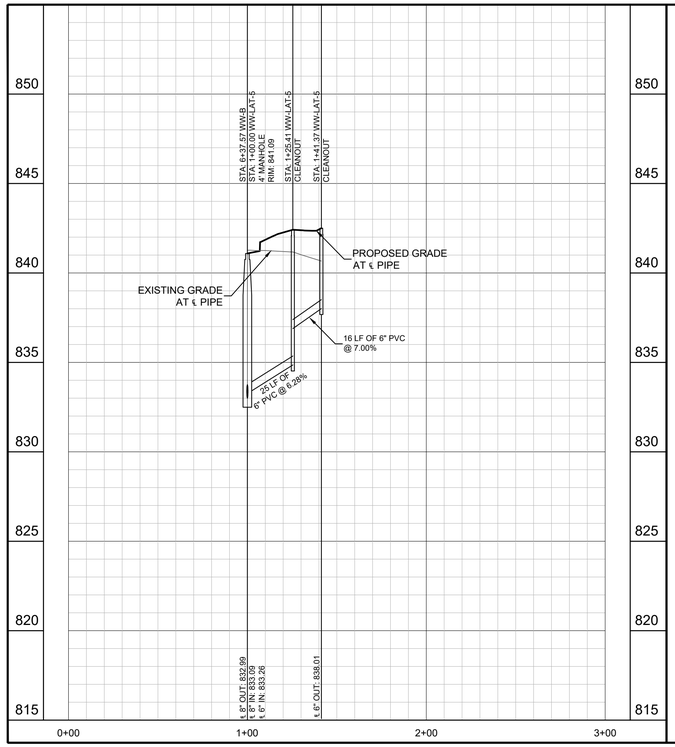
WASTEWATER PROFILE (3 OF 4)

WOLF RANCH MULTIFAMILY

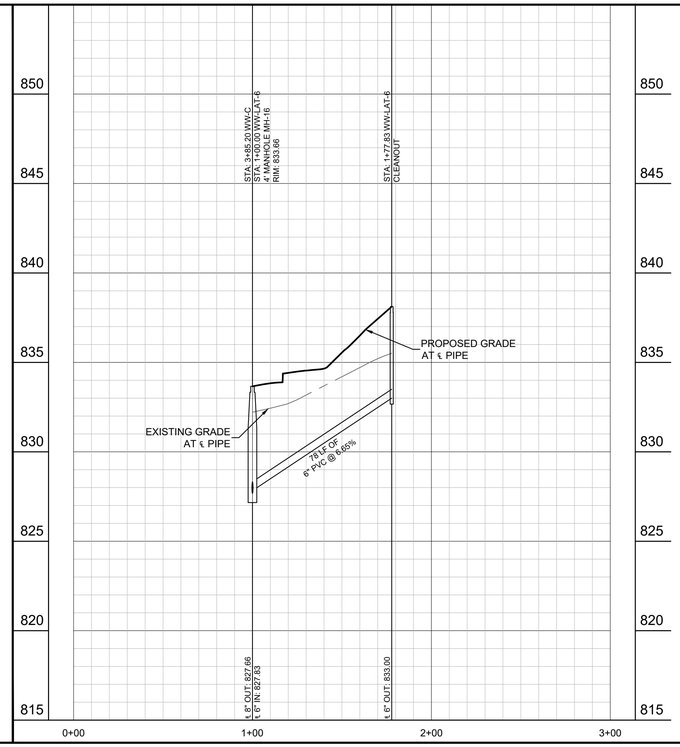
CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
45
OF 52

WW-LAT-5



WW-LAT-6



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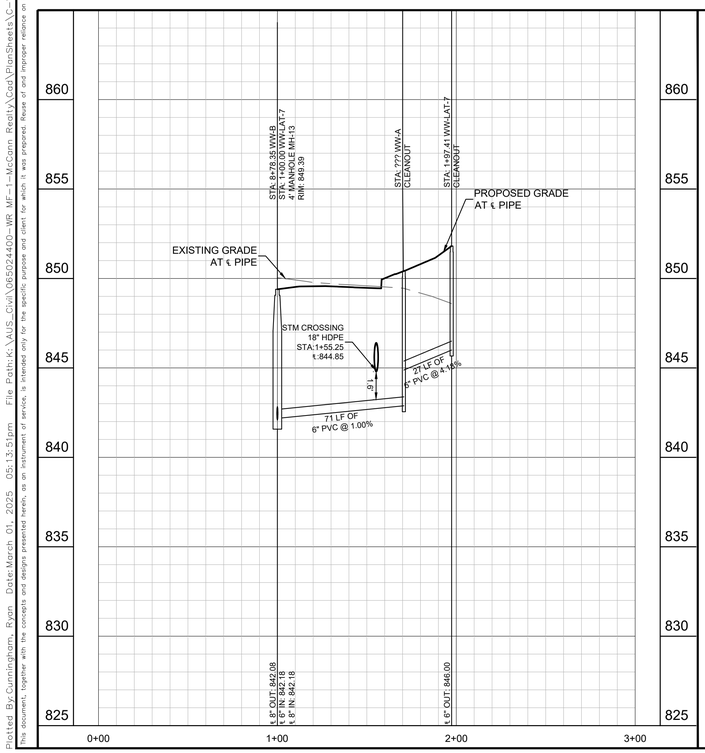

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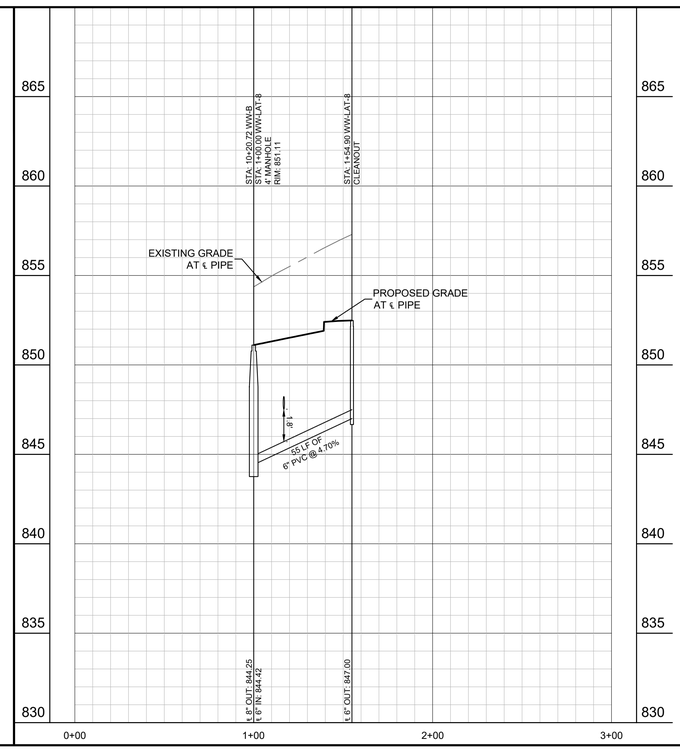

PROFILE SCALE
1" = 40' HORIZONTAL
1" = 4' VERTICAL

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

BENCHMARKS

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2. BM #80651 MAG WITH WASHER "KHA" ELEVATION=851.28'

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RYAN M. CUNINGHAM
145422
LICENSED
PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

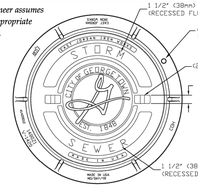
WASTEWATER PROFILE (4 OF 4)

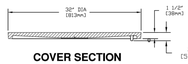
WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

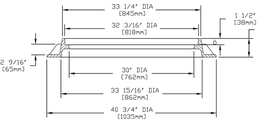
SHEET NUMBER
46
OF 52

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





COVER SECTION

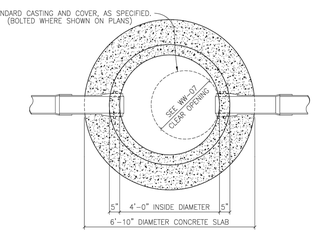


FRAME SECTION

NOTES:
1. STANDARD STORM SEWER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 14804 W-1-420\L14802\1, 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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
STANDARD STORM SEWER MANHOLE SET	DRAWN MGR: SD11
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

STANDARD CASTING AND COVER, AS SPECIFIED. (BOLTED WHERE SHOWN ON PLANS)



MANHOLE PLAN

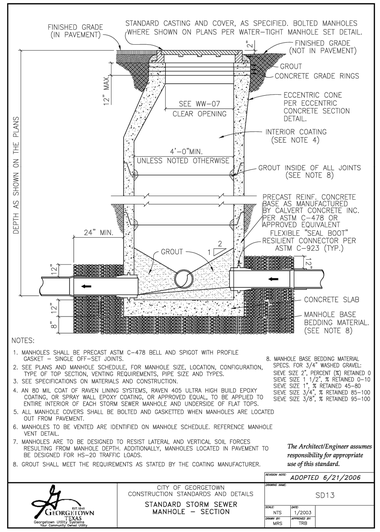
CITY OF GEORGETOWN NOTES:

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

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
STANDARD STORM SEWER MANHOLE PLAN	DRAWN MGR: SD12
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

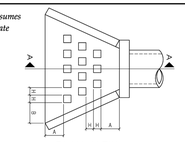


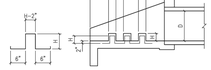
NOTES:
1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET – SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.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

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
STANDARD STORM SEWER MANHOLE – SECTION	DRAWN MGR: SD13
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

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



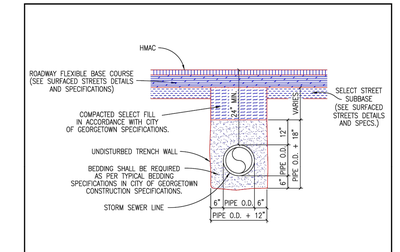


NOTES:
1. USE CLASS "A" CONCRETE, 3,000 PSI AT 28 DAYS, UNLESS NOTED.
2. REINFORCING STEEL – ASTM A615, GRADE 40, UNLESS NOTED.
3. LAP REINFORCING 30 BAR DIAMETERS MIN. AT SPLICES, UNLESS NOTED.
4. CHAMFER EXPOSED EDGES OF CONCRETE 3/4", UNLESS NOTED.
5. PLACE REINFORCING WITH THE CENTER OF THE OUTSIDE 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 5/8
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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
ENERGY DISSIPATER DETAIL	DRAWN MGR: SD20
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

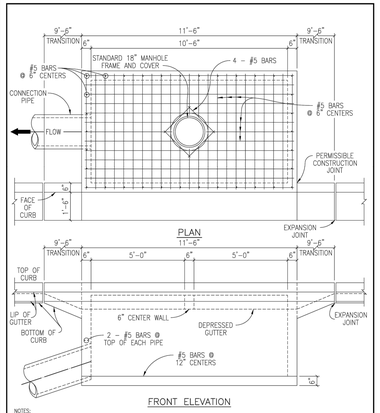


NOTES:
1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

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

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

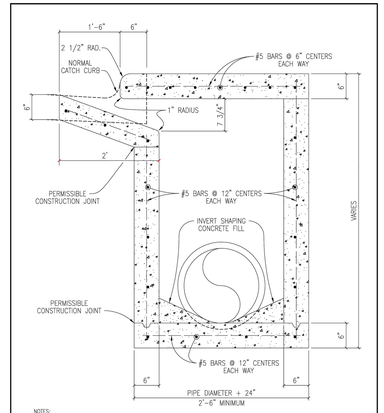
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY FOR STORM SEWER	DRAWN MGR: SD41
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB



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

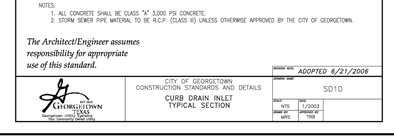
The Architect/Engineer assumes responsibility for appropriate use of this standard.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
TRENCH AND EMBEDMENT DETAIL (PROFILE) FOR STORM SEWER	DRAWN MGR: SD42
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB



NOTE:
1. ROCK RIPRAP SHALL BE SOUND MATERIAL AND GRADED PER REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 591S.
2. ROCK SIZE (D_{50}) AND GRADATION SHALL BE STABLE FOR THE DESIGN HYDRAULIC CONDITIONS AND IN ACCORDANCE WITH THE ECM 1.4.6.D PERMANENT STRUCTURAL PRACTICES, STONE RIPRAP OR OTHER ENGINEERING STANDARD OF PRACTICE FOR SIZING ROCK RIPRAP. ROCK RIPRAP D_{50} AND FILTER TYPE SHALL BE NOTED ON PLANS.
3. GEOTEXTILE FILTER FABRIC SHALL MEET THE REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 6205.
4. AGGREGATE FOR GRANULAR FILTER SHALL MEET THE REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 403. AGGREGATE SIZE CLASSIFICATION/GRADE, NUMBER OF LAYERS AND LAYER THICKNESS SHOULD BE NOTED ON THE PLANS.

CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT	STORMDRAIN OUTFALL PROTECTION PIPE DISCHARGE ON TERRACE/UPLANDS
RECORD COPY SIGNED BY MORGAN BYARS 09/01/2011 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 508S-17 (MODIFIED)



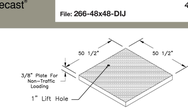
NOTES:
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

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

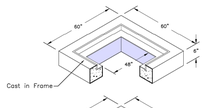
CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
CURB DRAIN INLET TYPICAL SECTION	DRAWN MGR: SD10
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

Oldcastle Precast *JUNCTION BOXES* — *48"x48" Junction Box* — File: **266-48x48-DIJ** — Model: **JB-484848**

Galvanized Drag Off Lid
Traffic Rated Lids Also Available

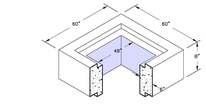


6" Trans. Top W/ Frame
Weight : 675 Lbs.



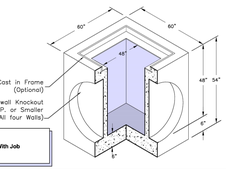
Risers W/ Frame
Weight : Varies

Riser	
B	Weight (Lbs.)
6"	675
12"	1,350



Bottom :
Weight : See Chart

Bottom	
Wall(s)	Weight (Lbs.)
4–Way	4,764



GENERAL NOTES:
1. **Bedding Shall be in Accordance With Job and Plan Specifications.**

Oldcastle Precast
Houston, TX Division
Phone: (713) 991-2400

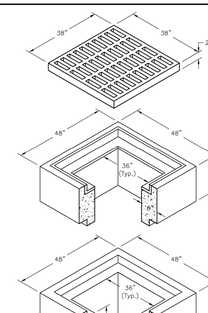
For more information about our products please visit us on the web at: oldcastleprecast.com/houston CB-11 oldcastleprecast.com/brookshire

Oldcastle Precast
Brookshire, TX Division
Phone: (713) 934-7900

C.I. Grate
Weight – 470 Lbs.

C.I. Frame
Weight – 135 Lbs.

Extension
Weight – See Table



Extension	
A	Weight
6"	325 Lbs.
12"	1015 Lbs.

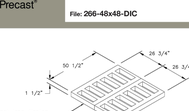
Ext. w/ Frame	
A	Weight
6"	925 Lbs.
12"	1150 Lbs.
24"	2100 Lbs.

Bottom
Weight – 5085 Lbs.

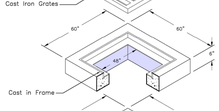
Oldcastle Precast	3636-CB-DIC	36" x 36" I.D. Catch Basin Standard Layout
13600 South Wayside, Houston, Texas 77048 Phone: 713-991-2400 Fax: 713-991-0815	FILE NAME: 2640C3636CB.DWG ISSUE DATE: January,2007 www.oldcastlehouston.com	Copyright © 2007 Oldcastle Precast, Inc.

Oldcastle Precast *CATCH BASINS* — *48"x48" Catch Basin* — File: **266-48x48-DIC** — Model: **CB-484848**

Dual Heavy Duty Grate :
Weight : 800 Lbs.
Open Area 820 Sq. Inches

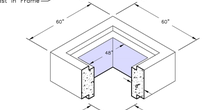


6" Trans. Top W/ Frame
Weight : 695 Lbs.



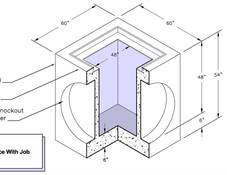
Risers
Weight : Varies

Riser	
B	Weight (Lbs.)
6"	675
12"	1,350



Bottom :
Weight : See Chart

Bottom	
Wall(s)	Weight (Lbs.)
4–Way	4,764



GENERAL NOTES:
1. **Bedding Shall be in Accordance With Job and Plan Specifications.**

Oldcastle Precast
Houston, TX Division
Phone: (713) 991-2400

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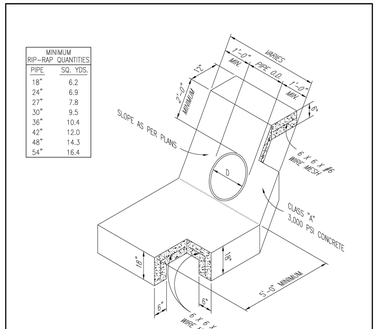
Oldcastle Precast
Brookshire, TX Division
Phone: (713) 934-7900

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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS	DESIGN MGR: ADOPTED 6/21/2006
TYPICAL CONCRETE RIP–RAP AT PIPE	DRAWN MGR: SD19
GEORGETOWN TEXAS Georgetown Utility System Serving Georgetown, Texas	SCALE: NTS DRAWN BY: MPG 1/2003 APPROVED BY: TRB

No.	REVISIONS	DATE	BY

Kimley»Horn

10814 JOLLYVILLE ROAD, CAMPUS IV, SUITE 200, AUSTIN, TX 78759
PHONE: 512-418-1771 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM 146422 LICENSED PROFESSIONAL ENGINEER 03/03/2025

KHA PROJECT 065024400 | DATE JANUARY 2025 | SCALE: AS SHOWN | DESIGNED BY: RMC | DRAWN BY: RJ | CHECKED BY: RMC

STORM DETAILS

WOLF RANCH MULTIFAMILY
CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER 48 OF 52

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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL STREETS, RESIDENTIAL COLLECTORS AND MAJOR COLLECTORS

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W01A | 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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL THRUST BLOCKS FOR WATER AND FORCE MAIN

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W11 | 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 # WD8).
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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL WATER SERVICE–ELEVATION

REVISION NOTE: ADOPTED 01/23/2013 | SHEET NO. W03 | SCALE: NTS | DATE: 1/2013 | DRAWN BY: MRS | APPROVED BY: MH

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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TRACER WIRE INSTALLATION AND TEST STATION LOCATION

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W18 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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. METER BOXES 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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
SINGLE WATER SERVICE PLAN

REVISION NOTE: ADOPTED 01/23/2013 | SHEET NO. W04 | SCALE: NTS | DATE: 1/2013 | DRAWN BY: MH | APPROVED BY: MH

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
FIRE HYDRANT SAMPLING POINT

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W19 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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.

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL VALVE SETTING

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W07 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: 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).

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W22 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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 – B–848
   C. CLOW MEDALLION
6. DOUBLE BLUE REFLECTOR "PIE–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 MIL. POLYETHELENE FILM.

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
TYPICAL FIRE HYDRANT INSTALLATION

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W10 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

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

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
METER BOX (NON–TRAFFIC AREAS)

REVISION NOTE: ADOPTED 6/21/2006 | SHEET NO. W23 | SCALE: NTS | DATE: 1/2003 | DRAWN BY: MRS | APPROVED BY: TRB

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

No.	REVISIONS	DATE	BY

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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNINGHAM
145422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT 065024400
DATE: JANUARY 2025
SCALE: AS SHOWN
DESIGNED BY: RMC
DRAWN BY: RJ
CHECKED BY: RMC

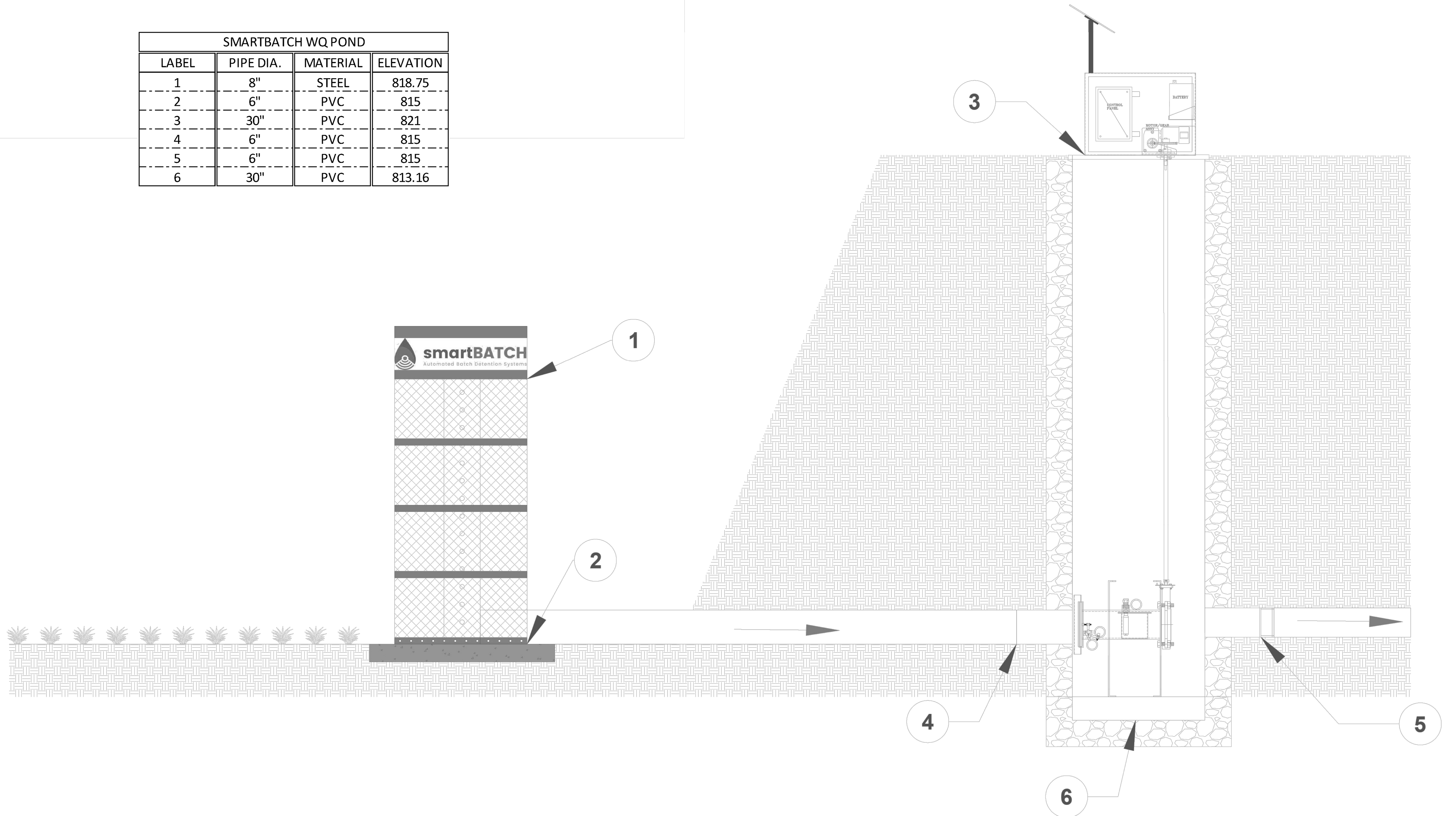
WATER DETAILS

WOLF RANCH MULTIFAMILY

CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
49
OF 52

SMARTBATCH WQ POND			
LABEL	PIPE DIA.	MATERIAL	ELEVATION
1	8"	STEEL	818.75
2	6"	PVC	815
3	30"	PVC	821
4	6"	PVC	815
5	6"	PVC	815
6	30"	PVC	813.16



smartBATCH
Automated Batch Detention Systems

FOR ADDITIONAL INFORMATION PLEASE CONTACT: CONSTRUCTION ECO SERVICES, 832-456-1000, www.ecosvs.com

CONVERGENT WATER TECHNOLOGIES

smartPOND Valve SPECIFICATION

Continuously Monitored Automated Stormwater System with Valve

1. Introduction
The following specifications describe the components, general functions, and applications of a smartPOND Continuously Monitored Automated Stormwater System (C-MASS) with Valve. The system functions as an electronically controlled, solar powered stormwater management device, providing precision management capabilities and real-time data. Using sensors, solar power, an electronic actuator, and an internet-based control interface, the smartPOND valve connects to a specialized perforated riser inside the stormwater impoundment to enable managers to precisely control water retention and detention automatically or in real time.

2. smartPOND Valve Applications in Stormwater Management
The smartPOND valve is a device for active Stormwater management. As opposed to passive devices such as floating skimmers or stationary weirs, active water management dramatically increases the efficiency and effectiveness of a detention or retention pond. Where a passive stormwater detention system allows water to leave immediately upon collection, the smartPOND valve can detain newly caught Stormwater and allow it to settle for a programmed period before automatically dewatering the impoundment completely. For stormwater retention systems, it is possible to manage the treatment volume while maintaining a specified amount of capacity for flood storage or other use.

2.1 Pre-Programmed Control
Many functions can be pre-programmed without any human interactions, leaving the valve to automatically receive commands based on environmental conditions and respond as programmed.

2.1.1 Batch Detention Function for Stormwater Quality
The smartPOND valve meets TCEQ Batch Detention specifications for a 91% Total Suspended Solid removal rate. The function proceeds as follows. With the valve in the closed position and the impoundment dry, the system will stand by and wait for a water collection event. At the first sign of water collection, the unit will begin a 12-hour detention timer. At the end of the 12-hour detention period, the valve will open and release all of the water that has been collected. After the water level drops to 0", the valve will remain open for an additional 2 hours to facilitate final drainage, then return to the closed position to stand by for the next water collection event.

2.1.2 Predevelopment Hydrograph Function for Flood Control
The smartPOND valve predevelopment hydrograph function takes in site specific variables to determine a maximum release rate based on predevelopment conditions. The valve reads water depth in the pond every 15 minutes to determine the maximum release rate desirable to ensure the impoundment neither overtops, nor exceeds its maximum release based on predevelopment flows.

2.1.3 Hazmat Function for Spill Containment
smartPOND when specified for hazmat spill containment can be equipped with pollutant specific sensors that when triggered automatically close the valve until the command is overridden.

2.2 Real Time Monitoring
smartPOND comes standard with telemetry available on each unit and access to the user app available at no additional cost for 1 year. This option allows for real time monitoring of the unit and the data that comes along with it. From the real time monitoring app, a user can:
- Control the valve, either open or close
- See the water level
- See if trash or debris is surrounding the inlet
- Get maintenance alerts (Low Battery, Valve Failure, Etc.)
- Maintain specified water level

3. Components
The smartPOND valve may be implemented either above or below ground, and is comprised of the following components:

3.1 Hardware and Configuration
The standard smartPOND valve features a cast 6" valve. An extended spool and mounting flange on each side of the valve allows it to be attached to the outfall pipe in various configurations. The valve is actuated with an electric motor connected by an extendable drive shaft for underground applications.

For above ground applications, the entire system including all necessary components for operation assemble into one kit and are housed under a single lockable steel enclosure with the solar panel mounted on top. In this configuration, the unit can be installed on a stable, level pad and be bolted onto the back of the outfall pipe with six ¾" bolts and then switched to the "ON" position.

For underground applications, the valve is installed in a vault or concrete encasement as needed. An extended drive shaft connects between the underground valve and the rest of the components, including the motor and all electronics, which are housed in the lockable steel enclosure directly above ground.

3.2 Electronics and Software Specifications
- **Main board** - The main board of the smartPOND valve's electronics box serves as the main connection terminal for all sensors and additional control boards
- **Motor Controller Board -** The motor controller board of the smartPOND valve regulates the connection between the battery and the motor and receives inputs from the main board to control motor direction. It also powers the main board.
- **Motor** - The smartPOND valve's motor operates on 12-volts and has two wires connecting to the motor controller board. It is mounted on a bracket and connects to the directly to the valve with a driveshaft.
- **Battery** - The smartPOND valve is powered by a 12-volt, 30 amp/hour gel battery. Two terminals at the top connect the power wires to the motor controller board and the solar charge controller to the battery.
- **Solar Panel -** The solar panel of the smartPOND valve is 12-volts with 15 watt charging capability. It connects to a solar charge controller which regulates the voltage and current before connecting with two wires to the positive and negative battery terminals.
- **Sensors**
  - *Pressure Transducer* - The water level sensor is a pressure transducer sensor capable of staying submersed in water indefinitely. It mounts on the side of the smartPOND valve's center spool.
  - *Valve position sensor* - A proximity sensor senses the position of the valve's drive shaft in order to control and determine the position of the valve.
- **(Optional)**
  - *Cell data modem* - A cellular data modem will be required for real time control and alert options as well as predevelopment hydrograph functions.
  - *Hydrocarbon Sensor* - This optional sensor may be fitted to the smartPOND valve to perform specific functions based on the presence of hydrocarbon contamination.

4. Real Time Monitoring Interface (optional)
If the real time monitoring option is selected, the smartPOND valve may be monitored in real time through the Autoflow app. Live and historical data from each unit may be viewed in the app, as well as alerts (detailed in section 5).

4.1 Accessing unit data
To access live and historical data in the Autoflow app, select the unit of interest on the home page by clicking on the unit's name. From there, select the "Data" button, and the data page for that unit will be displayed.

4.2 Sending a command
To send a remote-control command to the SmartPOND valve, click the "Send New Command" button on the unit's home page. The unit's current position will be displayed at the top. To change the unit's position, simply select "OPEN" or "CLOSE". Within 1-3 minutes, the unit will move to the new position and update its status in the app.

5. Alerts
The smartPOND valve will indicate the following alerts by illuminating an exteriorly visible red LED light
- Low battery
- Loss of function
- Valve malfunction
- Hydrocarbon contamination (optional)

If the telemetry option is selected, the unit will upload the above alerts to the Autoflow app and notify the operator via text or email.

6. In Case of Failure
To bypass the smartPOND valve's normal automated functions and control the valve position in case of failure:

6.1 Removal of motor and manual direct control
In case of a total electronic or motor failure, the motor and motor bracket can be uninstalled together by removing the two bolts at the bottom of the motor bracket. With the motor and motor bracket removed, the output shaft on the butterfly valve can be manually controlled with a socket wrench, or any other tool that can grip the output shaft.

7. Additional Components List

7.1 Perforated Riser
The smartPOND valve system includes a stackable perforated steel riser which installs on the inlet side of the outfall pipe within the impoundment area. The perforated riser features an 8-inch steel perforated square tube within a 24" round steel mesh tube. At the bottom of the 8-inch square tube, there is a female threaded fitting for a six inch PVC outfall pipe to connect. The steel tube is perforated with 1-inch holes every 4" on center to the height of the impoundment.

7.2 Trash Cage
The trash cage attaches to the perforated riser with a coupling and calder pin. The trash cage will be comprised of steel banding and a 1.5" x 1.5" mesh to prevent floatable's and other contaminants from entering and clogging the perforated riser. The trash cage will sit 0.5" above the bottom of the impoundment to allow the last 0.5" out of the impoundment.

7.3 Valve Stem Extension
The drive shaft/valve stem of the smartPOND system may be extended to any length necessary for instances where the valve will be in an underground vault or manhole. The valve stem will connect the valve to the above ground controls.

8. Maintenance

8.1 Grease
The smartPOND valve includes a grease fitting on the valve itself which should be greased twice per year. It is also recommended that a thick, mildly heat-resistant grease be used to avoid grease melting out of the groove in warmer temperatures.

8.2 Flange Bolts
There are 6 bolts connecting the smartPOND valve's flange to the outfall pipe or fixture. During routine maintenance intervals, these bolts should be checked for tightness. All bolts should be tightened evenly.

8.3 Perforated Riser
Silt, sediment, and debris can build up around the perforated riser with time. An annual inspection of the unit is necessary to ensure that excess debris or sediment has not limited the drainage capacity of the perforated riser. To access the perforated riser for maintenance, lift the trash cage off of the riser, dig out any accumulated sediment, and clear all perforations.

8.4 Trash Cage
As a part of routine maintenance, it is advisable to remove trash and debris that has accumulated on the trash cage and properly dispose.

8.5 Solar Panel
On all inspection visits, it is necessary to confirm that the solar panel is facing south and is well secured. The solar panel is commonly utilized by birds and insects. It is important to keep the surface clean of bird litter, insect nests and debris in order to maintain optimal performance.

8.6 Battery
Over time, battery terminals may corrode. Check annually for corrosion and clean as needed. The battery should be replaced every 4 to 6 years.

8.7 Storage
The smartPOND valve is shipped in a near-fully assembled configuration and should be stored likewise. The systems are transported and stored on pallets and must remain secured via straps or steel bands to said pallet at all times. The solar panel is not installed at times of transport or storage and should not be installed until the unit is ready to begin operation. The battery may be stored inside the electronics box and if removed, should never be stored on a concrete surface.

9. Installation
The smartPOND valve can be installed in a near-completely assembled configuration. Only the solar panel should be removed during the installation process. There are several ways to install the smartPOND valve with the key being structured support.

9.1 Structural Support
If the smartPOND valve is mounted to a steel pipe in an above ground/fully assembled configuration, the weight of the unit may be supported by the steel pipe. For plastic or concrete pipes, it is recommended that the weight of the unit be supported by either a concrete pad or steel frame. For below ground installations, the upper unit (electronics and actuator) should be fastened to the surface of the concrete vault. For vault installations, see design details for standard vault design.

10. Important Safety Information and Warnings:
- Always keep hands clear of the valve and motor when unit is in operation.
- Turn the power switch off when doing any electrical work.
- Do not enter the water when the device is actively draining water
- Always use proper PPE and confined space protocol when servicing a valve beneath ground.

11. PRODUCTS
Manufacturer/Supplier/Reseller shall be an established stormwater company that has at least 5 installations of automated stormwater management devices that have been in use and functional for the past 3 or more years.

A. Acceptable smartPOND Valve
"smartBATCH" Automated Batch Detention System
"smartPOND" Automated Detention System

B. Acceptable System Supplier
Convergent Water Technologies, Inc.
(800)711-5428
www.convergentwater.com

C. Authorized Value Added Reseller
Construction EcoServices
(800)456-1000
www.ecosvs.com

12. Quality Assurance and Performance Specifications
The quality of all system components and all other appurtenances and their assembly process shall be subject to inspection upon delivery of the system to the work site.Installation is to be performed only by skilled work people with satisfactory record of performance on earthworks, pipe, welding, chamber, or pond/landfill construction projects of comparable size and quality.

NOTE: ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.

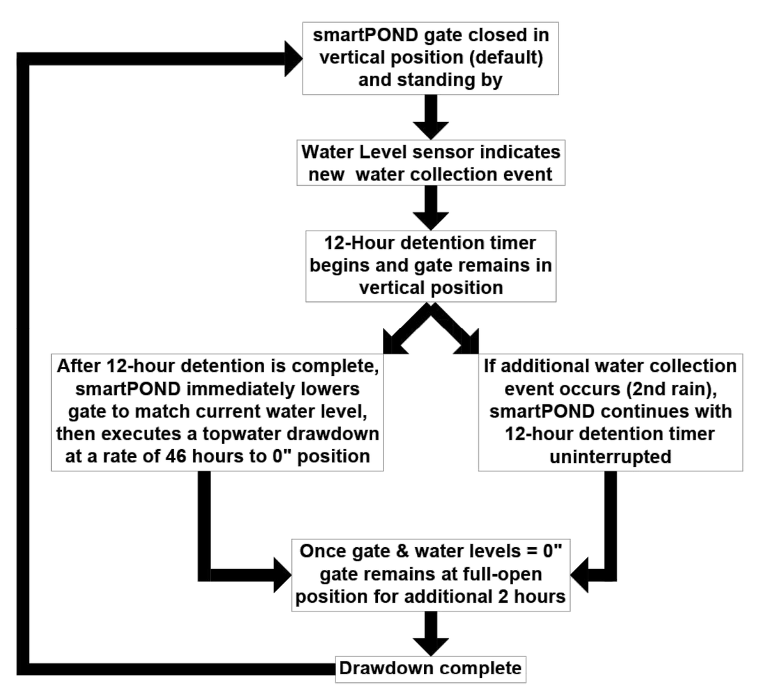
smartPOND Automated Stormwater Control

FOR ADDITIONAL INFORMATION PLEASE CONTACT CONSTRUCTION ECO SERVICES 832-456-1000 www.ecosvs.com

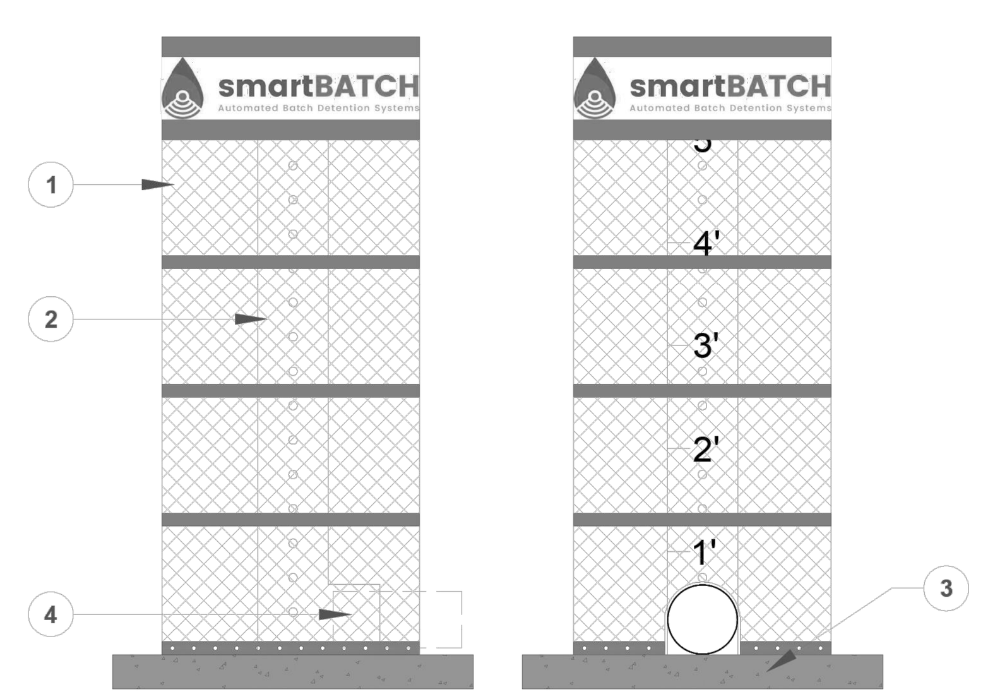
smartPOND Valve
Specifications

REVISION NO. 0
DATE 5/26/2020

PROGRAMMABLE LOGIC FLOW CHART

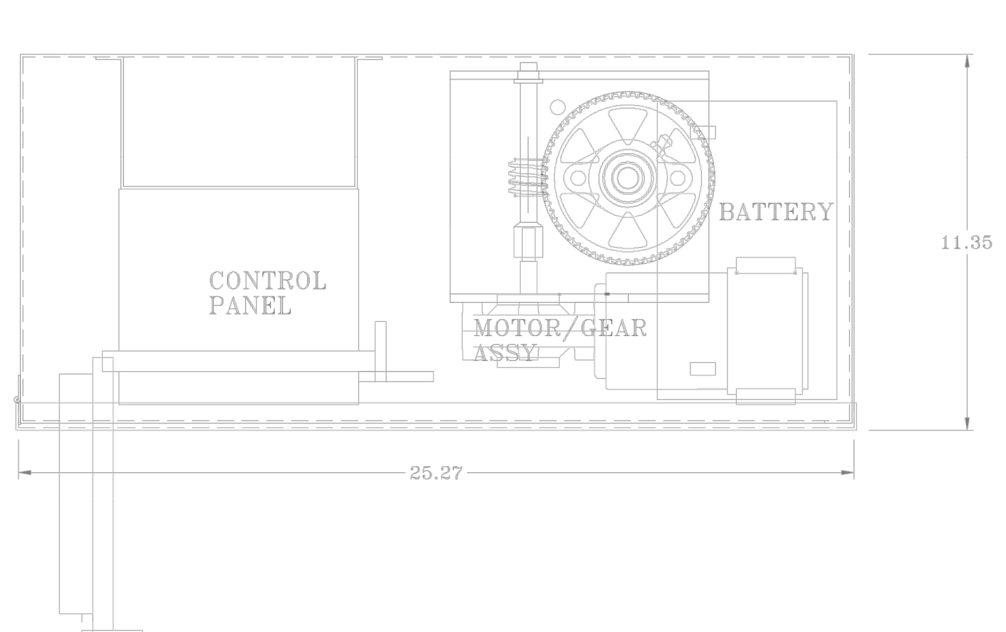


TRASH CAGE WITH PERFORATED RISER PIPE

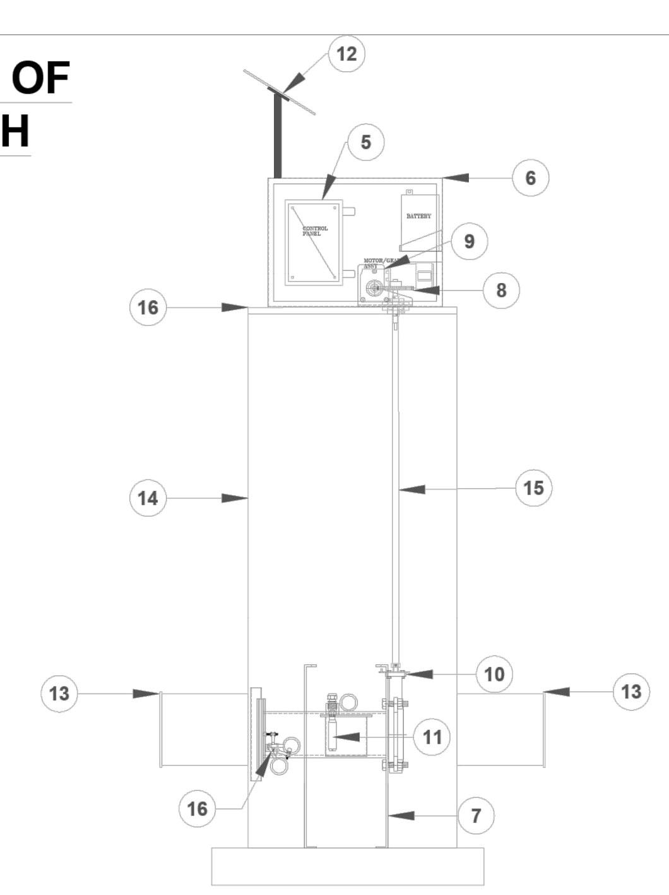


Parts List	
Item	smartPOND Valve Component
1	30" DIAMETER CAGE WITH 1 ½" GALVANIZED MESH SCREEN
2	8" SQUARE PERFORATED TUBING WITH 1" PERFORATION, WITH 4" VERTICAL SPACING ON CENTERS WITH WATER DEPTH MARKER
3	3 ½' X 3 ½' X 4" CONCRETE PAD (BY OTHERS)
4	6" PVC OUTFALL PIPE (BY OTHERS)
5	WEATHERPROOF ELECTRONIC BOX
6	CONTROL BOX
7	PEDESTAL
8	ACTUATOR
9	MOTOR
10	6" VALVE
11	LEVEL TRANSDUCER
12	SOLAR PANEL
13	OUTLET PIPE (BY OTHERS)
14	30" DRAIN BASIN
15	VALVE STEM
16	QUICK DISCONNECT VALVE CONNECTION

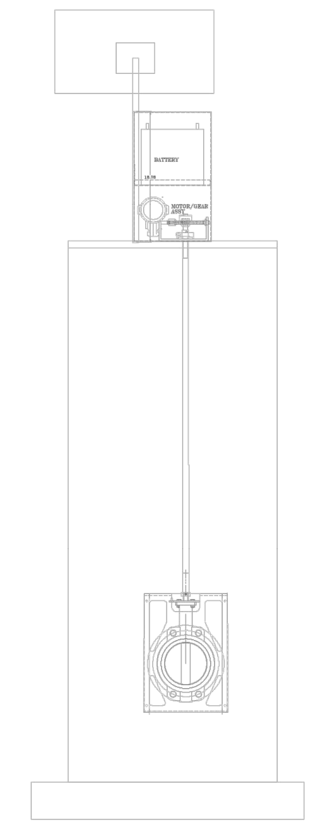
PLAN VIEW OF ENCLOSER



SECTION VIEW OF SMARTBATCH



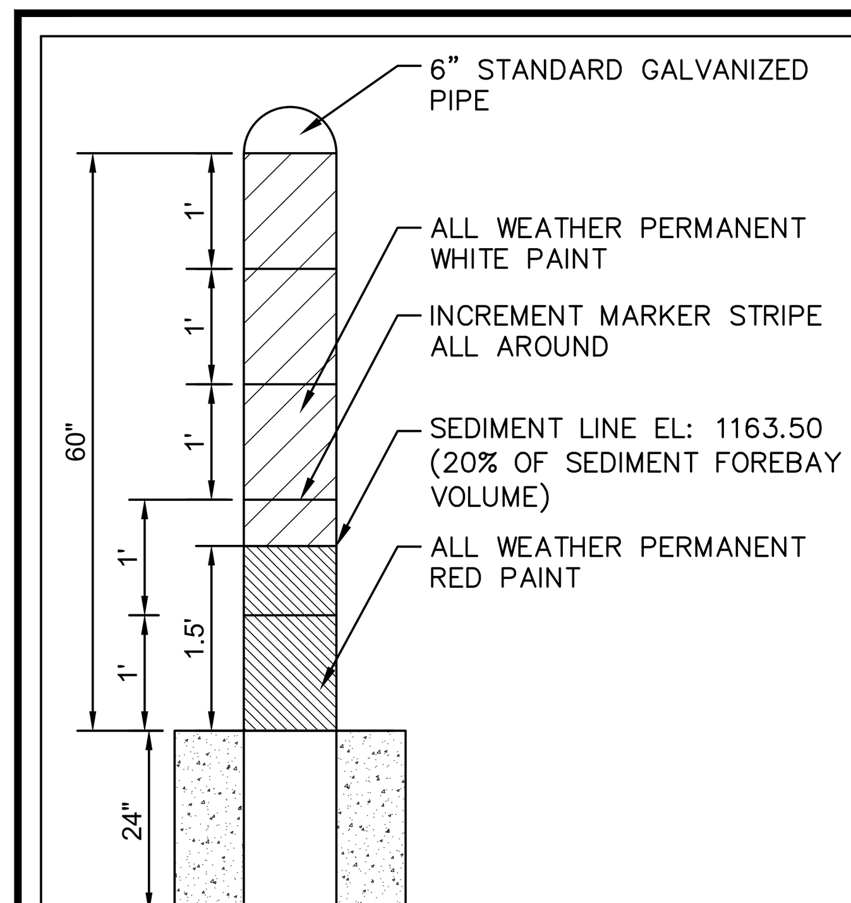
FRONT VIEW OF SMARTBATCH



smartBATCH
Automated Batch Detention Systems

FOR ADDITIONAL INFORMATION PLEASE CONTACT: CONSTRUCTION ECO SERVICES, 832-456-1000, www.ecosvs.com

CONVERGENT WATER TECHNOLOGIES



SEDIMENT MARKER
N.T.S.

Texas811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

No.	REVISIONS	DATE	BY

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WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

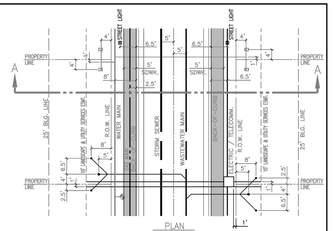
STATE OF TEXAS
RYAN M. CUNINGHAM
145422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT 065024400
DATE JANUARY 2025
SCALE: AS SHOWN
DESIGNED BY: RMC
DRAWN BY: RJ
CHECKED BY: RMC

WATER QUALITY DETAILS

WOLF RANCH MULTIFAMILY
CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
50
OF 52



CLASSIFICATION	ROW	B-B	PVMT.
LOCAL STREET	50'	28'	24'
RESIDENTIAL STREET	60'	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"

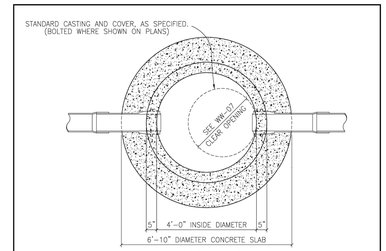
NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC CONDUIT FLOW SHALL BE SEALED WITH 3,000 PSI RED CONCRETE FOR TWO (2) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT CONCRETE ENCASEMENT DETAIL

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

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL STREETS, RESIDENTIAL COLLECTORS AND MAJOR COLLECTORS

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW01A
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB



SEE DETAIL WW-03

MANHOLE PLAN

CITY OF GEORGETOWN NOTES:

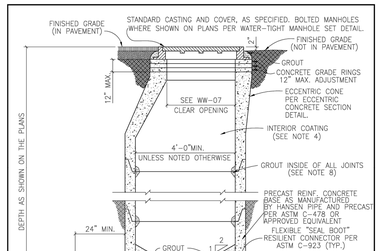
MANHOLE DETAILS SHALL REFLECT THE CITY'S MINIMUM SPECIFICATIONS, AS STATED BELOW:

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.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE – PLAN

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW02
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB

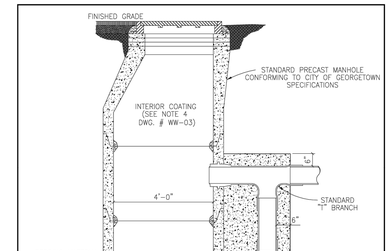


NOTES:
1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET – SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
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.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE – SECTION

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW03
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB

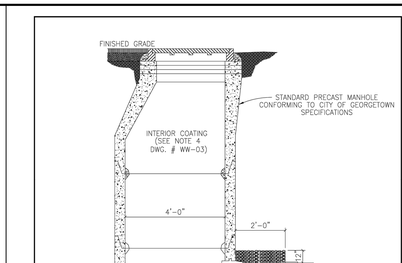


NOTES:
1. CONCRETE ENCASEMENT FOR DROP CONNECTION TO BE POURED INTEGRALLY WITH BOTH MANHOLE SLAB AND WALL.
2. DROP CONNECTIONS SHALL BE REQUIRED WHENEVER AN INFLUENT SEWER IS LOCATED TWO FEET (2') OR MORE ABOVE THE MAIN INVERT CHANNEL.
3. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT 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.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DROP CONNECTION–PRECAST MANHOLE TYPE "A"

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW04
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB

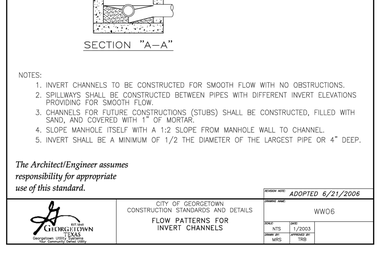


NOTES:
1. TO BE USED WHERE DROP IS SIX INCHES (6") TO TWO FEET (2'-0").
2. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
3. CONSTRUCTION OF DROP SHALL PROVIDE AN OVERSIZED SLAB TO EXTEND UNDER THE DROP CONNECTION.
4. MINIMUM PIPE SIZE FOR DROP IS EIGHT INCHES (8").
5. SEE STANDARD MANHOLE DETAIL (DWG. # WW-03) FOR ADDITIONAL REQUIREMENTS.

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

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DROP CONNECTION–PRECAST MANHOLE TYPE "B"

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW05
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB



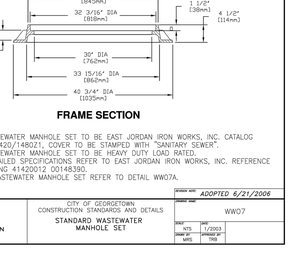
NOTES:
1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOW.
3. CHANNELS FOR FUTURE CONSTRUCTIONS (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND, AND COVERED WITH 1" OF MORTAR.
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.

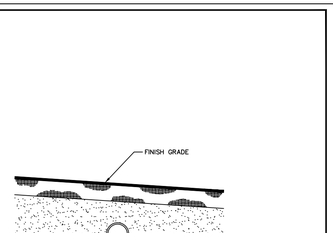
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
FLOW PATTERNS FOR INVERT CHANNELS

REVISION NOTE: ADOPTED 6/21/2006
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.



COVER SECTION

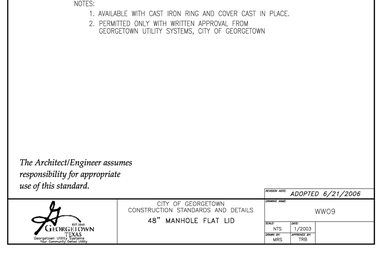


FRAME SECTION

NOTES:
1. STANDARD WASTEWATER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480A V-1420/148021, 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 0014839O.
4. FOR BOLTED WASTEWATER MANHOLE SET REFER TO DETAIL WW07A.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD WASTEWATER MANHOLE SET

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW07
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB

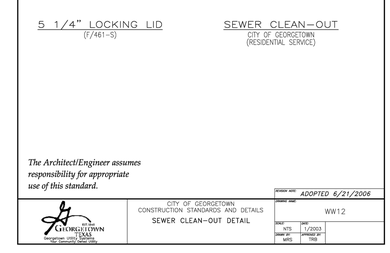


NOTES:
1. AVAILABLE WITH CAST IRON RING AND COVER CAST IN PLACE.
2. PERMITTED ONLY WITH WRITTEN APPROVAL FROM GEORGETOWN UTILITY SYSTEMS, CITY OF GEORGETOWN

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

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
48" MANHOLE FLAT LID

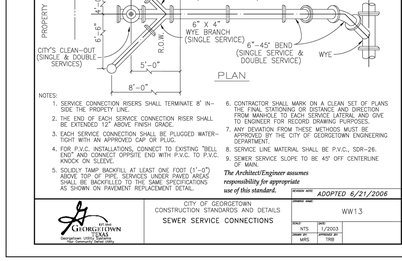
REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW09
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB



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

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEWER CLEAN-OUT DETAIL

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW12
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB



NOTES:
1. SERVICE CONNECTION RISERS SHALL TERMINATE 8' IN-SIDE THE PROPETY 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. ALL REMAINING TRENCH 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.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEWER SERVICE CONNECTIONS

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW13
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.

CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL UNDER PROPOSED ROADWAY

REVISION NOTE: ADOPTED 6/21/2006
DRAWING NAME: WW18
SCALE: NTS | DATE: 1/2003
DRAWN BY: MRS | APPROVED BY: TRB

NOTE:

THE CEMENT STABILIZED SAND SHALL HAVE A MINIMUM OF 10% CEMENT PER CUBIC YARD OF CEMENT STABILIZED SAND MIXTURE, BASED ON LOOSE DRY WEIGHT VOLUME (AT LEAST 2.5 BAGS OF CEMENT PER CUBIC YARD OF MIXTURE). THE CEMENT STABILIZED SAND BEDDING SHALL BE A MINIMUM OF 6" ABOVE AND 4" BELOW THE WASTEWATER MAIN OR LATERAL. THE USE OF BROWN COLORING IN CEMENT STABILIZED SAND FOR WASTEWATER MAIN OR LATERAL BEDDING IS RECOMMENDED FOR THE IDENTIFICATION OF PRESSURE RATED WASTEWATER MAINS DURING FUTURE CONSTRUCTION.

TCEQ NEW WATER/WASTEWATER CROSSING DETAIL
N.T.S.

Texas 811

WARNING: CONTRACTOR IS TO VERIFY PRESENCE AND EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

No.	REVISIONS	DATE	BY

Kimley»Horn
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TEXAS REGISTERED ENGINEERING FIRM F-928

RYAN M. CUNNINGHAM
144422
LICENSED PROFESSIONAL ENGINEER
03/03/2025

KHA PROJECT	065024400
DATE	JANUARY 2025
SCALE:	AS SHOWN
DESIGNED BY:	RMC
DRAWN BY:	RJ
CHECKED BY:	RMC

WASTEWATER DETAILS

WOLF RANCH MULTIFAMILY
CITY OF GEORGETOWN
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
51
OF 52