ORGANIZED SEWAGE COLLECTION SYSTEM

EDGEWOOD PHASE 2, SECTION 2
CR175 AND RR 2243
LEANDER, WILLIAMSON COUNTY, TEXAS

Prepared For:

M/I HOMES OF AUSTIN, LLC
7600 N. Capital of Texas Hwy.; Bldg. C, Suite 250
Austin, TX 78731
512-770-8503

Prepared By:

KIMLEY-HORN AND ASSOCIATES, INC.
501 S. Austin Ave, Suite 1310
Georgetown, Texas 78626
(512) 520-0768

Firm No. 928
KHA Project No. 067783129

November 7th, 2023

11/07/2023

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SECTION 1: EDWARDS AQUIFER APPLICATION COVER PAGE

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: Edgewood Phase 2, Section 2						**2. Regulated Entity No.:** N/A			
3. Customer Name: M/I Homes of Austin, LLC						**4. Customer No.:** 604305250			
5. Project Type: **(Please circle/check one)**	**New**		Modification			Extension		Exception	
6. Plan Type: **(Please circle/check one)**	WPAP	CZP	**SCS**	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: **(Please circle/check one)**	**Residential**		Non-residential			**8. Site (acres):**		45.27	
9. Application Fee:	$4,233.00		**10. Permanent BMP(s):**			Click or tap here to enter text.			
11. SCS (Linear Ft.):	8,466		**12. AST/UST (No. Tanks):**			N/A			
13. County:	Williamson		**14. Watershed:**			Brushy Creek			

Application Distribution

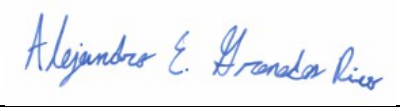
Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which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

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

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

Austin Region			
County:	**Hays**	**Travis**	**Williamson**
Original (1 req.)	___	___	_X_
Region (1 req.)	___	___	_X_
County(ies)	___	___	___
Groundwater Conservation District(s)	___Edwards Aquifer Authority ___Barton Springs/ Edwards Aquifer ___Hays Trinity ___Plum Creek	___Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	___Austin ___Buda ___Dripping Springs ___Kyle ___Mountain City ___San Marcos ___Wimberley ___Woodcreek	___Austin ___Bee Cave ___Pflugerville ___Rollingwood ___Round Rock ___Sunset Valley ___West Lake Hills	___Austin ___Cedar Park ___Florence ___Georgetown ___Jerrell _X_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. Alejandro E. Granados Rico, P.E.
Print Name of Customer/Authorized Agent
 11/7/2023
Signature of Customer/Authorized Agent Date

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

SECTION 2:
GENERAL INFORMATION

General Information Form

Texas Commission on Environmental Quality

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

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

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

Signature

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

Print Name of Customer/Agent: Alejandro E. Granados Rico, P.E.

Date: November 7th, 2023

Signature of Customer/Agent:

_____

Project Information

1. Regulated Entity Name: Edgewood Phase 2, Section 2
2. County: Williamson
3. Stream Basin: Brushy Creek
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: William Peckman
   Entity: M/I Homes of Austin, LLC
   Mailing Address: 7600 N. Capital of Texas Hwy.; Bldg. C, Suite 250
   City, State: Austin, TX Zip: 78731
   Telephone: 512-770-8503 Fax: N/A
   Email Address: kkriegel@mihomes.com

8. Agent/Representative (If any):

   Contact Person: Alejandro E. Granados Rico, P.E.
   Entity: Kimley-Horn
   Mailing Address: 501 S. Austin Ave, Suite 1310
   City, State: Georgetown, Texas Zip: 78626
   Telephone: 512-520-0768 Fax: N/A
   Email Address: alex.granados@kimley-horn.com

9. Project Location:

   ☒ The project site is located inside the city limits of Leander.
   ☐ 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. South of RR 2243 along CR 175

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

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

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

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

    ☒ Survey staking will be completed by this date: 10/31/2023

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:

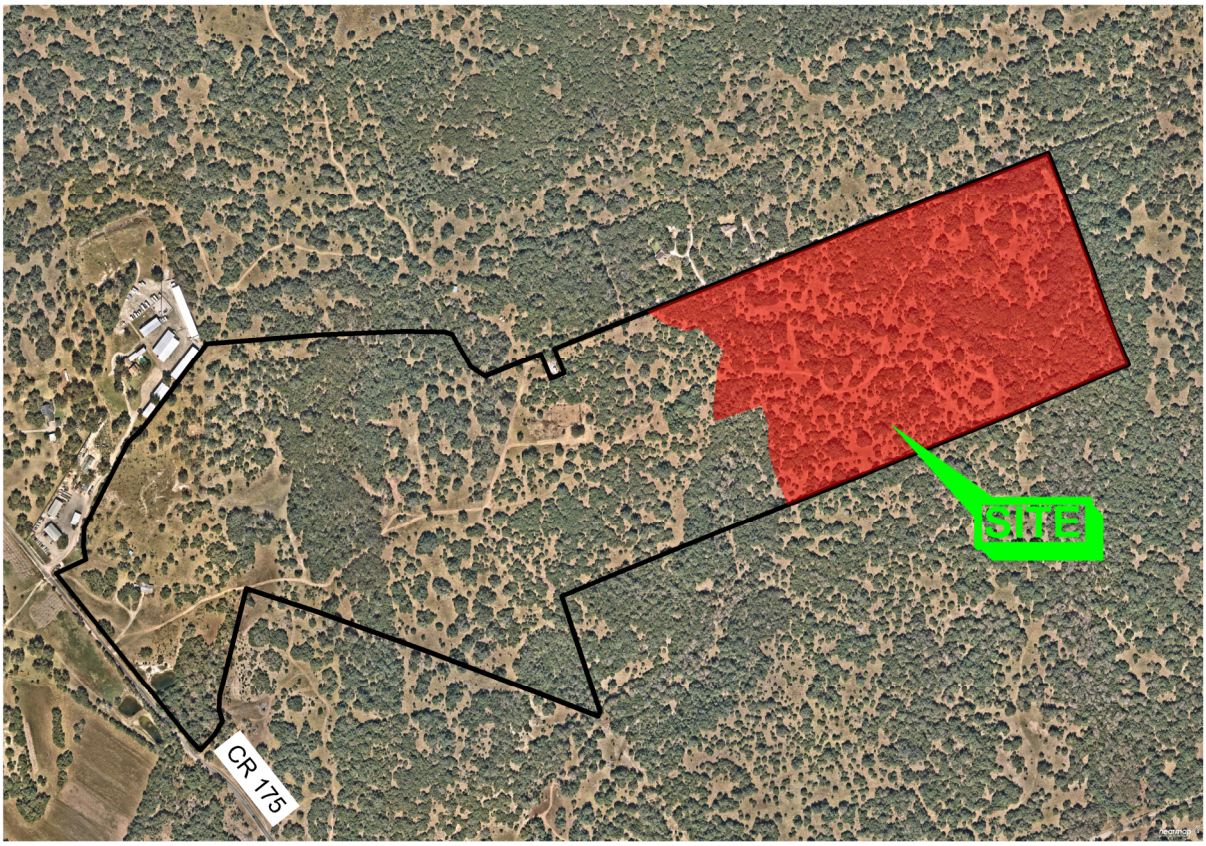
- ☐ TCEQ cashier
- ☒ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- ☐ San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

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.

Kimley»Horn

Road Map



DIRECTIONS FROM TCEQ HEADQUARTERS TO PROJECT SITE

1. HEAD SOUTH ON PARK 35 CIRCLE, TURNING RIGHT ONTO S IH-35 FRONTAGE ROAD
2. MAKE A "U" TURN AT E. BRAKER LN, USE LEFT LANE TO TAKE RAMP ONTO IH-35
3. CONTINUE NORTH ON IH-35
4. TAKE EXIT 256 ONTO NIH-35 FRONTAGE ROAD TOWARDS CEDAR PARK
5. STAY RIGHT TOWARDS UNIVERSITY BLVD AND TURN LEFT ONTO UNIVERSITY BLVD
6. CONTINUE ONTO RANCH RD 1431 W
7. TURN RIGHT ONTO CR 175 / SAM BASS RD
8. CONTINUE ON CR 175
9. SITE IS LOCATED ON THE RIGHT

SHEET

EX A

Scale:	1"=1000'
Designed by:	AMF
Drawn by:	AMF
Checked by:	AEG
Date:	NOVEMBER, 2023
Project No.	067783129

EDGEWOOD PH 2-2
LEANDER, TEXAS

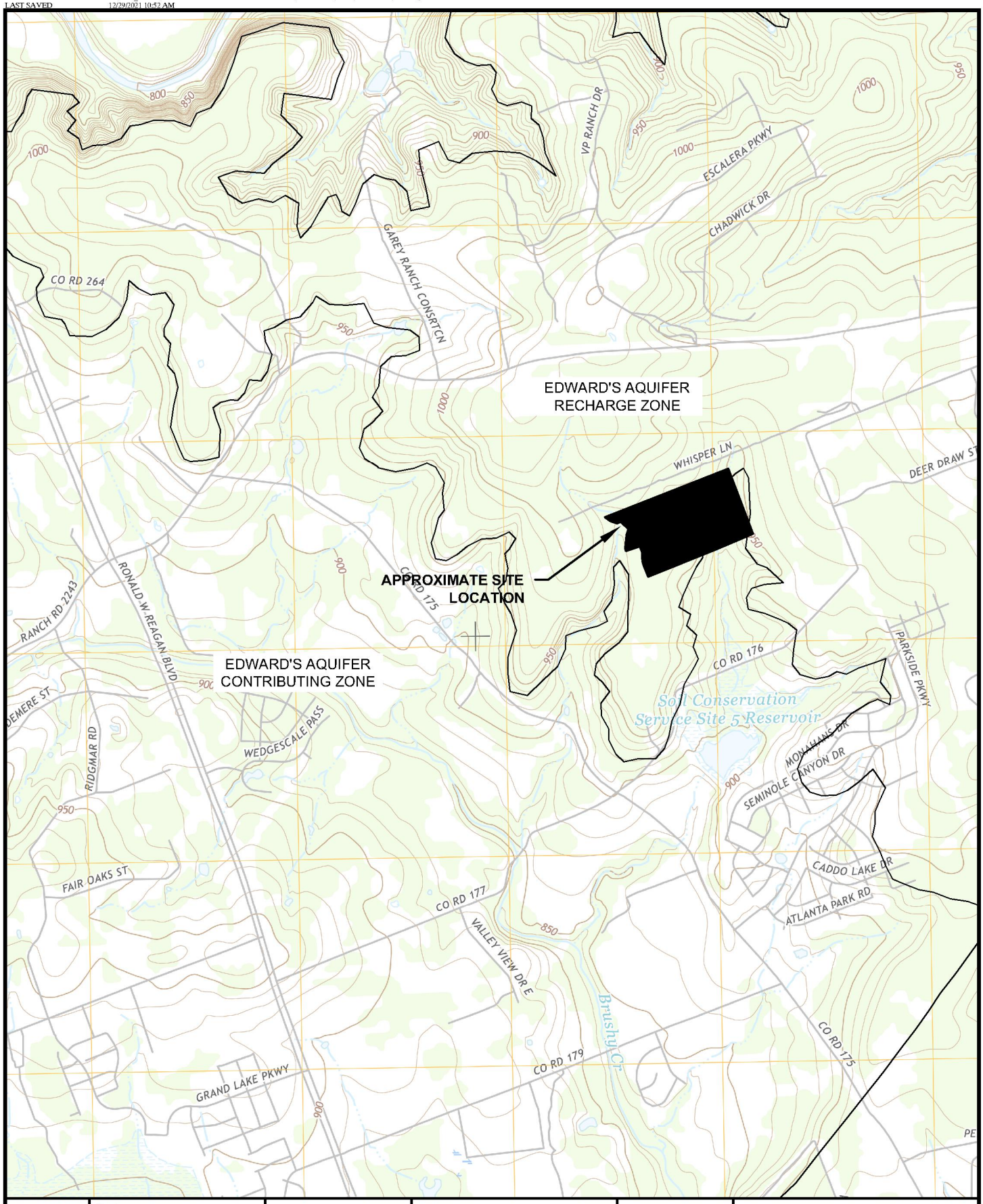
Kimley»Horn
501 S. AUSTIN AVENUE, SUITE 1310 GEORGETOWN, TX 78626
PHONE: 512-520-0768
WWW.KIMLEY-HORN.COM

TBPE Firm No. 928

Kimley»Horn

USGS/Edwards Recharge Zone Map

IMAGES
XREFS XREF QuadxBorder
PLOTTED BY FLYNN, ALYSSA 10/24/2023 3:15 PM
DWG NAME K:\AUS_CIVIL\067783129 - CANNON 140 - MI HOMES\PHASE 2-2\CAD\EXHIBITS\USGS QUADRANGLE MAP.DWG
LAST SAVED 12/29/2021 10:52 AM



SHEET 1 OF 1 SHEETS	Scale: 1:2000 Designed by: AMF Drawn by: AMF Checked by: AEG Date: NOVEMBER, 2023 Project No. 067783129	USGS Quadrangle	Edgewood Ph. 2, Section 2 Leander, Williamson County, Texas	N W E S	Kimley»Horn

Introduction

The subject site is a largely undeveloped 45.27 acre lot located on CR175 and RR 2243 and within the Full Purpose city limits of the City of Leander. The subject property is part of a larger development, Edgewood, which encompasses ±140 acres and will comprise of residential single-family. This is the last phase of the Edgewood Subdivision.

The site is not located in the Federal Emergency Management Agency's 100-year floodplain according to FIRM 48491C0460F, dated December 20, 2019. The site is located within the Edwards Aquifer Contributing and Recharge Zone according to TCEQ Edwards Aquifer Map.

Current Tract Conditions

Legal Description

The legal description is described as 45.27 acres of land out of the John T. Church Survey, Abstract No. 140 and the Milton Hicks Survey, Abstract No. 287 conveyed to Cannon 140 LP by deeds of record in document Nos. 2013049063 of the Official Public Records of Williamson County, Texas.

Land Use

The lot is zoned for Single-Family Compact (SFC), Single-Family Suburban (SFS), and Single-Family Urban (SFU). The site resides within the Full Purpose city limits of the City of Leander in Williamson County, Texas.

Existing Drainage Conditions

Under existing conditions, the site has two ridges to the east and west sending flow to one point at the southern property boundary. This flow then travels within a creek and off the property, eventually discharging into Brushy Creek.

Proposed Development

The proposed Edgewood Phase 2-2 project includes the construction of 114 lots of single-family residential development. Water and wastewater lines will be designed according to City of Leander specifications and connect to City of Leander utility services. Access to the site will be through the proposed Edgewood Phase 2, Section 1 which connects to Edgewood Phase 1-2, and then to Edgewood Phase 1-1, which has two driveways along CR 175. The project proposes 15.02 acres (33.2%) of total impervious cover. Water will be treated according to TCEQ requirements through two on site Batch Detention Ponds and vegetative filter strips. The flow will be discharged to a point south of the site and then flow into Brushy Creek. Proposed flow conditions will not exceed existing conditions.

Drainage and Water Quality Analysis

Floodplain Information

According to the FEMA Flood Insurance Rate Map Panel No. 48491C0460F for Williamson County, effective December, 20, 2019, no portion of the development lies within the 100-yr floodplain (Zone A).

On-Site Drainage

The proposed site will convey runoff through an underground storm pipe system into one Batch detention pond permitted in Phase 2-1 and into two batch detention ponds in Phase 2-2. One pond is permitted and will be built with Phase 2-1. Two ponds will be permitted and built with Edgewood Phase 2-2. Other portions of the site will overland flow over vegetative filter strips. The detention ponds will release the runoff at or below existing condition flow rates onto rock riprap which will then be conveyed south via an existing natural channel. Drainage area maps and calculations are included in the construction set included in the Exhibits Section.

Off-Site Drainage

Under existing conditions, 27.17 acres of offsite water enters the site from the north. The off-site drainage from the north will not be interrupted by development. It will flow through an existing channel through the property and bypass any improvements.

In proposed conditions, once runoff is released from the detention ponds it will enter an existing channel that will eventually outfall into Brushy Creek.

Detention and Water Quality

Water Quality Best Management Practices (BMP) for Edgewood Phase 2-2 will address the water quality requirements for the ultimate area disturbed within this phase. WQP-D (2-2) will be treated by a batch detention pond built with Edgewood Phase 2-1 (Pond B-C) approved with EAPP ID No. 11002983. WQP-C1 will be treated by a batch detention pond (C1) and WQP-C2 will be treated by a batch detention pond (C2). VFS-7, VFS-8, and VFS-9 will be treated by permanent vegetative filter strips. NT-1, NT-2 and NT-3 have a total of 1.70 acres of impervious cover. The NT areas will not be treated by any proposed BMPS. These drainage areas are to meet all water quality requirements per TCEQ requirements. See Permanent Stormwater Section – Attachment C for a breakdown on TSS calculations.

The detention pond requirements used for the purpose of this report are assumed to be based on the requirements outlined by the City of Austin Drainage Criteria Manual. To reduce the flow to pre-developed conditions, two detention ponds (Pond C1 and Pond C2) will be constructed as a part of this development phase to reduce flows to existing conditions.

Erosion and Sedimentation Controls

Temporary erosion and sedimentation controls during construction are proposed on the Erosion Control Plan and include: silt fence, inlet protection, construction staging area, concrete washout, rock berm, and a stabilized construction entrance designed to City of Austin criteria. The land disturbed during construction, including the staging and stockpile areas, will drain into the proposed on-site storm sewer system where it will be conveyed to the proposed detention and water quality ponds located on-site. The detention ponds will discharge onto proposed rock rip rap into an existing drainage channel that cuts through the middle of the site.

Sewage Collection System

The sewage collection system that is within the Edward's Aquifer Recharge Zone will consist of approximately 6,171 LF of 8" SDR 26 ASTM D3034 PVC, 10 LF of 6" SDR 26 ASTM D3034 PVC and 2,285 LF of 4" SDR 26 ASTM D3034 PVC for the force main. All wastewater in Phase 2-2 shall be conveyed via gravity line that ties to a proposed lift station, then pumped via duel 4" force main to the connection point at Phase 2-1. It will then be conveyed via gravity line to a 12" wastewater line built in Fulton Drive and an 8" wastewater line built in Waxahachie Road with the Edgewood Phase 1-2 . The wastewater improvements in Phase 2-2 are designed to convey all LUEs associated with the Edgewood development and future offsite improvements. Please see the attached overall Edgewood Wastewater Exhibit below.

SECTION 3:
GEOLOGIC ASSESSMENT

Horizon™
Environmental Services, Inc.

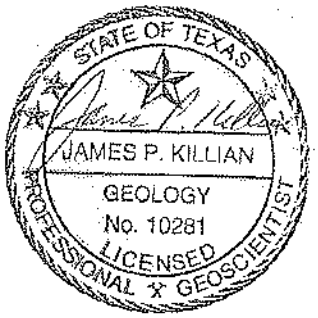
GEOLOGIC ASSESSMENT
FOR THE
APPROXIMATELY 140-ACRE CANNON TRACT PROJECT
731 COUNTY ROAD 175
LEANDER, WILLIAMSON COUNTY, TEXAS
HJN 200183 GA

PREPARED FOR:

M/I HOMES OF AUSTIN
AUSTIN, TEXAS

PREPARED BY:

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



MARCH 2021

CORPORATE HEADQUARTERS
1507 South IH 35 ★ Austin, Texas 78741 ★ 512.328.2430 ★ Fax 512.328.1804 ★ www.horizon-esi.com
An LJA Company

Horizon
Environmental Services, Inc.

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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

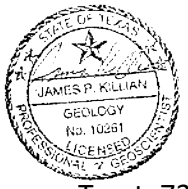
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

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

Date: 2 March 2021 Fax: 512-328-1804

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

Signature of Geologist:



Regulated Entity Name: 140-acre Cannon Tract, 731 County Road 175, Leander, Williamson County, Texas

Project Information

1. Date(s) Geologic Assessment was performed: 9, 12, 21, 22, and 23 December 2020; 22 and 23 February 2021
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)
Eckrant cobbly clay, 1-8% slopes (EaD)	D	0-1.0
Eckrant extremely stony clay, 0-3% slopes (EeB)	D	0-1.0
Fairlie clay, 1-2% slopes (FaB)	D	0-3.8
Georgetown stony clay loam, 1-3% slopes (GsB)	D	0-3.0

** 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" = 900'
   Site Geologic Map Scale: 1" = 900'

Site Soils Map Scale (if more than 1 soil type): 1" = 1000'

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.

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ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Cannon Tract, 731 CR 175, Leander, Williamson County, TX

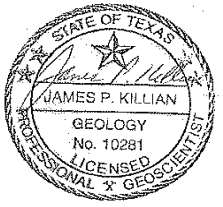
LOCATION			FEATURE CHARACTERISTICS												EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
F-1	30.587195	-97.780976	SH	20	Ked	3	3	1	--	--	--	--	CFO	20	40		X	X		Hillside
F-2	30.587473	-97.783476	SF	20	Ked	5	0.25	2.50	--	--	--	--	CFO	35	55		X	X		Hillside
F-3	30.588734	-97.784373	SC	20	Ked	4	4	4	--	--	--	--	CFO	30	50		X	X		Hillside
F-4	30.587926	-97.785806	SH	20	Ked	1.5	1.5	1	--	--	--	--	CFO	15	35	X		X		Hillside
F-5	30.584272	-97.787132	SH	20	Ked	1.5	1	1	--	--	--	--	CFO	20	40		X	X		Hillside
F-6	30.58507	-97.78948	CD	5	Kc	8	4	0.5	--	--	--	--	CFO	10	15	X		X		Hillside
F-7	30.587841	-97.789237	CD	5	Kc	5	3	0.5	--	--	--	--	CFO	15	20	X		X		Hillside
F-8	30.586939	-97.790117	SC	20	Kc	1.25	0.6	1	--	--	--	--	N	15	35	X		X		Cliff

* 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 : 3 March 2021

Sheet 1 of 1

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

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ATTACHMENT B
STRATIGRAPHIC COLUMN

Geologic Unit	Hydrologic Unit	Approx. Thickness at Project Site (ft)
Edwards Limestone (Ked)	Edwards Aquifer	65
Comanche Peak Limestone (Kc)	Edwards Aquifer	50
Keys Valley Marl (Kkv)	Edwards Aquifer	50

Elevation (ft msl)	Depth (ft)
1000	0
935	65
885	115
835	165

Note: Unit elevation and thickness given with respect to a ground surface elevation of 1000 feet near the southeastern corner of the subject site.

Horizon Environmental Services, Inc.

Date:	03/04/2021
Drawn:	KRS
HJN NO:	200183.001 GA

Attachment B

Stratigraphic Column
140-Acre Cannon Tract
731 County Road 175
Leander, Williamson County, Texas

STATE OF TEXAS
JAMES P. KILLIAN
GEOLOGY
No. 10981
LICENSED
PROFESSIONAL GEOSCIENTIST

200183 - Cannon Tract\Graphics\200183-001GA_05A_Strat.mxd

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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 approximately 140 acres located at 731 County Road 175 in Leander, Williamson County, Texas, was conducted pursuant to Texas rules for regulated activities in the Edwards Aquifer Recharge Zone (EARZ) (30 TAC 213). The subject site consists of undeveloped land and an occupied single-family residence. 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.

Most 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 (TCEQ, 2005). Approximately 30% of the subject site is in the Edwards Aquifer Contributing Zone. The Contributing Zone of the Edwards Aquifer includes all the watersheds that feed runoff into the rivers and streams that flow over the Recharge Zone (TCEQ, 2004). 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.

The subject site is underlain by the Keys Valley Marl (Kkv), Comanche Peak Limestone (Kc), and the Edwards Limestone (Ked) (USGS, 2006).

Eight naturally occurring geologic features and no man-made features were identified at the subject site. The geologic features and their locations are presented in Attachment D. Further details regarding each feature, as well as site photographs, are presented in Attachments A, E, and G.

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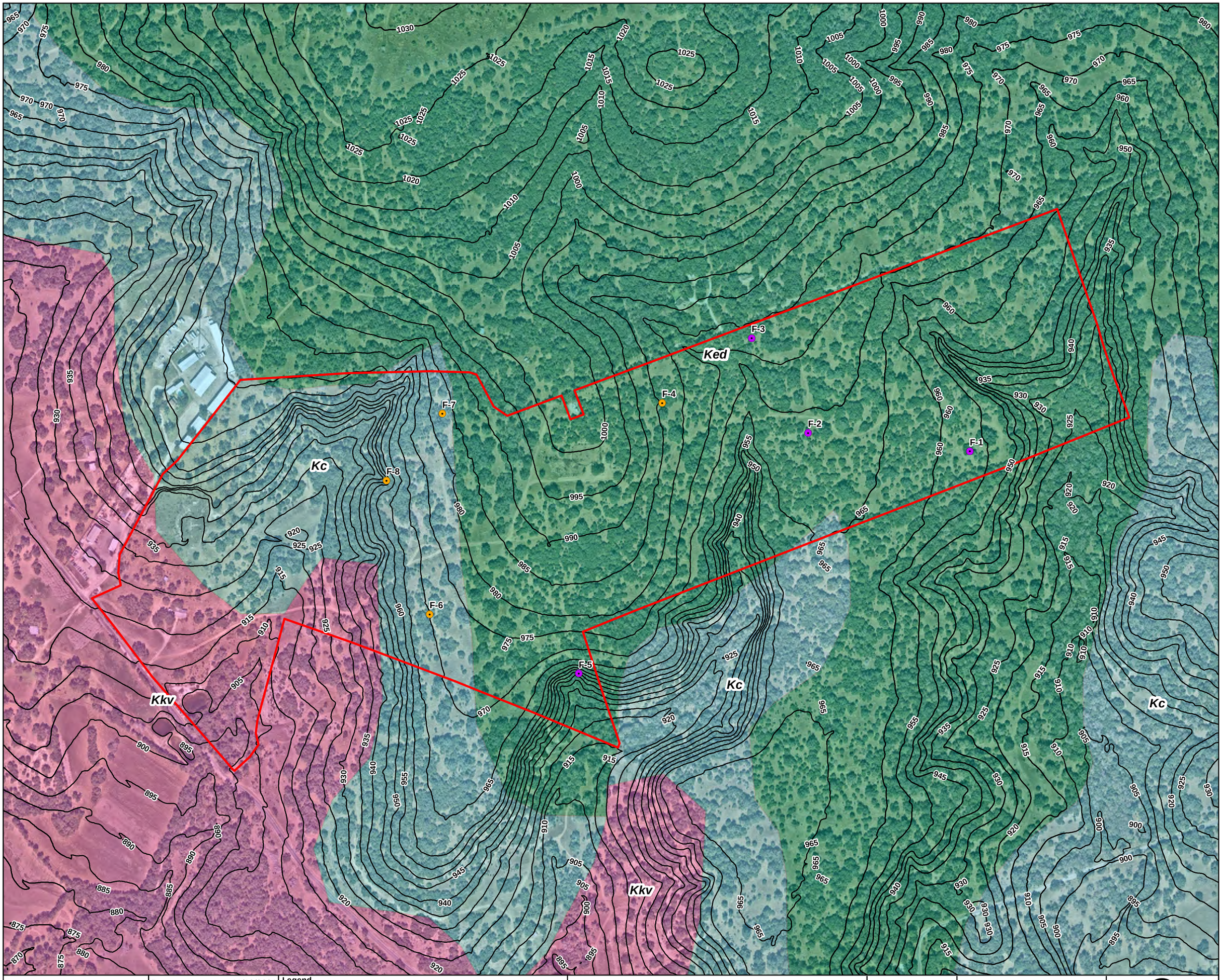
ATTACHMENT D
SITE GEOLOGIC MAP



Date:	11/19/2021
Drawn:	KRS
HJN NO:	200183.001 GA
Source:	CAPCOG, 2007; Nearmap, 2021; UT-BEG, 1995

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Legend

- Non-Sensitive Geologic Feature
- Sensitive Geologic Features
- 5-Foot Contour
- Property
- Edwards Limestone (Ked)
- Comanche Peak Limestone (Kc)
- Keys Valley Marl (Kkv)

Attachment D

Site Geologic Map
140-Acre Cannon Property
731 County Road 175
Leander, Williamson County, Texas

0 200 400
Feet

200183 - Cannon Tract\Graphics\200183-001GA_06A_SGM.mxd

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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, 2005). 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 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 140 acres of mostly undeveloped land located at 731 County Road 175, about 1 mile southeast of the intersection of County Road 175 and State Highway 2243 (Leander Road) in Williamson County, Texas (Appendix F, Figure 1). One single-family residence is located on the subject site, but no other previous use of the site was evident upon Horizon's site investigation.

2.2 LAND USE

The subject site comprised mostly vacant rangeland and woodlands at the time of Horizon's site reconnaissance. One single-family residence is located on the site. County Road 175 borders the site to the west and the rest of the site is bounded by rangeland and woodlands. Surrounding lands are generally used for rural residences, farming, and raising livestock.

2.3 TOPOGRAPHY AND SURFACE WATER

The subject site is situated on gently sloping terrain within the Turkey Creek–Brushy Creek watershed (TPWD, 2021) (Appendix F, Figures 2 and 3). Surface elevations on the subject site vary from a minimum of approximately 895 feet above mean sea level (amsl) near the southwestern site boundary along County Road 175 to a maximum of approximately 1000 feet amsl near the north-central boundary of the subject site (CAPCOG, 2007). Drainage on the site occurs primarily by overland surface flow from northeast to southwest. In addition, 3 ephemeral tributaries bisect the western, central, and eastern portions of the subject site and drain from north to south.

2.4 EDWARDS AQUIFER ZONE

The subject site is found within the Edwards Aquifer Recharge Zone and Edwards Aquifer Contributing Zone (TCEQ, 2021) (Attachment F, Figure 2).

The Recharge Zone is the area where the stratigraphic units constituting the Edwards Aquifer are exposed at the surface and where water may filter into the aquifer through permeable features such as cracks, fissures, caves, and other openings in these layers (TCEQ, 2005). The Recharge Zone includes other geologic formations in proximity to the Edwards Aquifer where such features may create a potential for recharge of surface waters into the Edwards Aquifer.

The Contributing Zone of the Edwards Aquifer includes all the watersheds that feed runoff into the rivers and streams that flow over the Recharge Zone (TCEQ, 2004). Contributing Zones are usually north and west of the Recharge Zone. TCEQ Edwards Aquifer Rules (30 TAC 213) regulate activities within the Recharge and Contributing Zone and areas draining toward it. The TCEQ (and/or local jurisdiction) will require an approved Geologic Assessment as part of a Water Pollution Abatement Plan prior to land disturbance.

2.5 SURFACE SOILS

Four soil units are mapped within the subject site (NRCS, 2021) (Appendix F, Figure 4). The soil units are described in further detail below.

Eckrant cobbly clay, 1 to 8% slopes (EaD) consists of cobbly clay in the upper portion and fractured indurated limestone underneath. This soil is calcareous and moderately alkaline. Eckrant cobbly clay is well-drained with rapid runoff and moderate permeability. Typically, this soil is used as rangeland and suited to urban development due to the firm underlying limestone. Some of the limitations of this soil include the stones and cobbles on the surface and its sticky and slippery surface when wet; additionally, maintaining grass cover can be difficult due to a shallow soil depth (Werchan and Coker, 1983).

Eckrant extremely stony clay, 0 to 3% slopes (EeB) consists of nearly level to gently sloping soils found on broad ridges or shallow valleys in uplands. The upper layer of the soil is typically a very stony clay approximately 11 inches thick. This upper layer is roughly 25% limestone fragments on the surface. Underlying this layer is Indurated limestone. This soil is well-

drained and has rapid surface runoff with moderately slow permeability. The main use of Eckrant extremely stony clay is for rangeland. The soil is suited for development purposes due to the hard underlying limestone which can act as a stable footing for foundations, but blasting and cutting will be needed for construction of underground utility lines, foundations, roads, and streets (Werchan and Coker, 1983).

Fairlie clay, 1 to 2% slopes (FaB) is a gently sloping soil found along broad flats and on the edges of drainageways on uplands. Weakly cemented limestone interbedded with limy material underlies this soil. This soil is calcareous and moderately alkaline. Fairlie clay is moderately well-drained with medium runoff. This soil is known to crack extensively when dry and seal the cracks when wet, which prevents water from entering the soil rapidly. The main uses of this soil are for crops and small portions of tame pasture. Fairlie clay is suitable for urban uses. However, due to its high shrink-swell potential, this soil can cause cracks in paved streets and foundations. Corrosivity of underground steel utility lines is also a hazard associated with this soil (Werchan and Coker, 1983).

Georgetown stony clay loam, 1 to 3% slopes (GsB) is a gently sloping soil typically found on higher parts of uplands. This soil has an upper layer of brown stony clay loam that grades into an underlying layer of subsoil and indurated fractured limestone. This soil is well-drained with medium surface runoff and slow permeability. Georgetown stony clay loam is used as rangeland and is typically desirable for homesites due to the native post oak and high position on the landscape. Some of the limitations associated with this soil include corrosivity of buried pipelines due to the clayey subsoil and construction; installation of foundations and underground utilities can be difficult and costly due to the rock substratum (Werchan and Coker, 1983).

2.6 WATER WELLS

A review of TCEQ and Texas Water Development Board (TWDB) records revealed no water wells on the subject site and 1 well within 0.5 miles of the subject site (TCEQ, 2021; TWDB, 2021). According to TWDB records, off-site well no. 5826301 is reportedly completed in the Trinity Aquifer at a total depth of approximately 400 feet below the surface.

The results of this assessment do not preclude the existence of undocumented/abandoned wells on the site. If a water well or casing is encountered during construction, work should be halted near the feature until the TCEQ is contacted.

2.7 GEOLOGY

Literature Review

The subject site is underlain by Keys Valley Marl (Kkv), Comanche Peak Limestone (Kc), and Edwards Limestone (Ked) (USGS, 2006).

Keys Valley Marl is only present on the western edge of the subject site. This member is predominantly composed of marl with some argillaceous limestone and limestone. Keys Valley is typically a soft white formation with marine megafossils like *Exogyra texana*, *Gryphaea*

mucronata, other pelecypods, ammonites, and gastropods. Keys Valley Marl is part of the Upper Walnut Formation, can be up to 50 feet thick, and begins to thin towards the south by the Williamson/Travis county line (Abbott, 1973; USGS, 2006).

Comanche Peak Limestone consists of both limestone and marl and conformably underlies the Edwards Formation. This formation is known to be nodular, fossiliferous, and thickens towards the north. The contact between the Edwards and the Comanche formations can be distinguished by the change from white nodular marly limestone to the massive carbonate beds of the Edwards. Comanche Peak Limestone is fine to very fine-grained with a light gray color that weathers white. This formation has been extensively burrowed. Large gastropods and pelecypods are common throughout the formation (Abbott, 1973; USGS, 2006).

Edwards Limestone consists of limestone, dolomite, and chert. Edwards Limestone is aphanitic to fine-grained, massive to thin-bedded, hard, brittle, and fossiliferous throughout. The limestone consists in part of rudistid biostromes and much miliod biosparite. This formation is also known to contain oysters and gastropods (Abbott, 1973). The dolomite within Edwards Limestone is fine to very fine-grained, porous, and medium gray to grayish-brown. The chert, with common nodules and plates, varies in amount from bed to bed, has some intervals free of chert, and is mostly white to light gray. In the zone of weathering, the Edwards Limestone is considerably recrystallized, “honeycombed,” and cavernous, forming an aquifer; it forms flat areas and plateaus bordered by scarps.

The site Stratigraphic Column is provided as Attachment B, and the Site Geologic Map is Attachment D.

The subject site is located within the Balcones Fault Zone. According to mapping, no faults are present within the subject site boundaries. Available geologic reports indicate the nearest mapped fault outside of the subject site is located approximately 1 mile to the southeast trending northeast at N47E (USGS, 2006).

Field Assessment

Please see Attachment C for a narrative description of geology observed on the subject site. The Site Geologic Map is provided as Attachment D. Horizon observed no man-made features and 8 naturally occurring geologic features on the subject site that meet the TCEQ definition of a potential recharge feature. The Geologic Assessment Table (Attachment A) describes those features observed on the subject site that meet the TCEQ definition of a potential recharge feature.

Geologic features on the subject site are described as follows:

Geologic feature F-1 is an upland sinkhole located in the southeastern corner of the subject site with a diameter of approximately 3 feet and a depth of 1 foot. F-1 was noted during the site investigation to have no air flow with one small, rock-choked, semi-open portal. This feature has been filled with cobbles, gravel, clay, and loose soil. Water infiltration of this feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-2 is a previously excavated solution-enlarged fracture located in Edwards Limestone and trending N314W. F-2 measures approximately 5 feet long by 0.25 feet wide by 2.5 feet deep. Previous apparent hand excavation dug the feature down to approximately 6 feet below the natural surface. Moderate airflow was noted along the fracture at the time of Horizon's reconnaissance. On 22 and 23 February 2021, the feature was mechanically excavated using a backhoe with hoe ram attachment. The feature was enlarged and dug down 11 feet below the surface. A low bedding plane void was encountered 9 feet below the surface that extended laterally along the eastern and southern walls of the excavation. The eastern portion of the bedding plane extends approximately 16 feet laterally, trending N45E before encountering a bedrock wall, and the southern portion extended toward the southeast for another 8 feet before ending at another bedrock wall. The largest opening was along the southern wall of the excavation, where bedding plane void ceiling heights were approximately 2 feet and lowered to only 0.5 feet to 1 foot in height. The eastern portion of the bedding plane void was less than 0.5 feet high at the back wall. This feature was determined to be a sensitive recharge feature and did not have enough human-sized passageways to be classified as a cave. The water infiltration rate of the feature is intermediate and has an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-3 is a previously excavated solution cavity located near the northern boundary of the middle portion of the subject site. This feature is found in Edwards Limestone and is approximately 4 feet long by 4 feet wide with a depth of 4 feet. Slight air was noted at the opening during Horizon's site reconnaissance. The solution cavity was filled with cobbles, clay, dirt, and loose soil. The feature was noted to have an intermediate water infiltration rate and deemed to be a sensitive recharge feature with an apparent surface runoff catchment of less than 0.4 acres.

Geologic feature F-4 is a very small upland sinkhole that has a diameter of approximately 1.5 feet with negative relief of 1 foot. This feature is located in Edwards Limestone close to the northern site boundary, approximately 500 feet west of F-3. The feature had a small portal with no air flow that could have possibly been burrowed out by an animal. The sinkhole was filled with dirt, clay, gravel, and other material. Based on the infill of material within the sink, lack of air flow from the open portal, and very low water infiltration rate, this feature was deemed to be non-sensitive for groundwater recharge capability and therefore would not require TCEQ protective setback buffers.

Geologic feature F-5 is a small upland sinkhole that measures approximately 1.5 feet long by 1 foot wide by 1 foot deep. A small portal was noted in the floor of the sink with no air flow. The portal was surrounded by cobbles and filled with clay, dirt, and soil. The water infiltration rate of the feature was noted to be low-intermediate. The feature was deemed to be sensitive for groundwater recharge capability and would require TCEQ protective setback buffers.

Geologic feature F-6 is a closed depression that measures approximately 8 feet long by 4 feet wide by 1 foot deep. No open drainage portals or voids were observed along the floor of this feature. The depression has a clay-lined floor, making infiltration very low.

Geologic feature F-7 is a closed depression that measures 5 feet long by 3 feet wide by 1 foot deep. No open drainage portals or voids were observed along the floor of this feature. The depression has a clay-lined floor, making infiltration very low.

Geologic feature F-8 is a solution cavity found within Comanche Peak Limestone. The feature measures approximately 1.25 feet long by 0.6 feet wide by 1 foot deep. The feature is found in the side wall of a small tributary and was noted to have no air flow. The feature has a low infiltration rate due to the clay lining within the solution cavity and has been deemed to be non-sensitive.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Four geologic features (F-1, F-2, F-3, and F-5) were identified at the subject site that would require protection or mitigation pursuant to TCEQ rules for protection of the Edwards Aquifer (30 TAC 213). A sensitive feature would require a TCEQ 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.

Four geologic features (F-4, F-6, F-7, and F-8) have been evaluated as non-sensitive for groundwater recharge capability and would therefore not require TCEQ protective setback buffers. No further action is recommended for these non-sensitive features.

Most of 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 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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(CAPCOG) Capital Area Council of Governments. 5-foot contours, CAPCOG Center for Regional Development, Austin, Texas. 2007.

(Nearmap) Nearmap US PhotoMaps. Created by Nearmap_Engineering. Imagery date 25 February 2021.

(NRCS) Natural Resources Conservation Service (formerly the Soil Conservation Service) US Department of Agriculture, Engineering Division. *Soil Series and Hydrologic Soil Groups of Urban Hydrology for Small Watersheds*, Technical Release No. 55. January 1975.

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(TCEQ) Texas Commission on Environmental Quality. *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones*. Revised October 2004.

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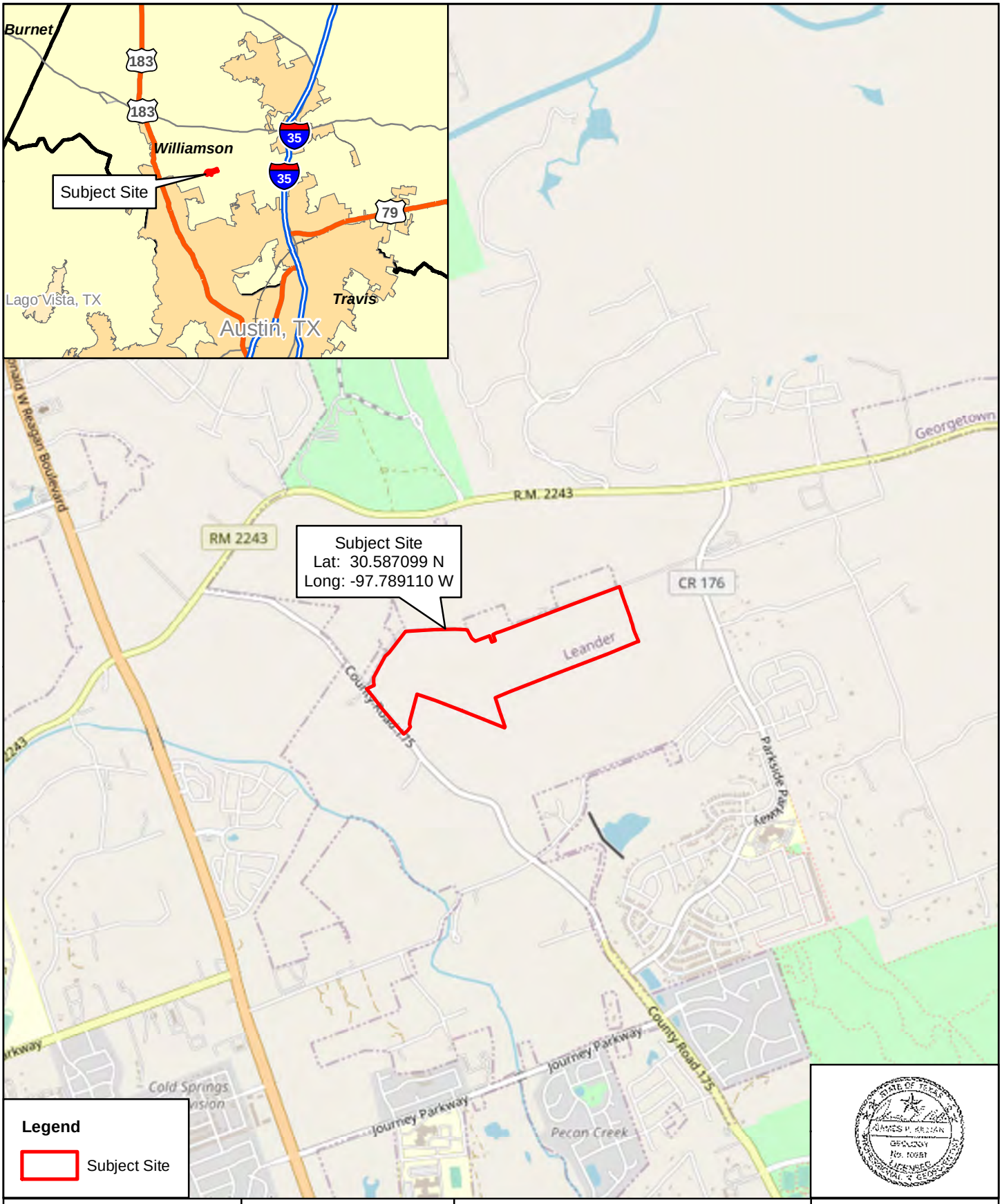
Wechan L.E., and J. L. Coker. Soil survey of Williamson County, Texas. US Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), in cooperation with the Texas Agricultural Experiment Station. 1983.

ATTACHMENT F

ADDITIONAL SITE MAPS



Date:	03/04/2021
Drawn:	KRS
HJN NO:	200183.001 GA
Source:	OSM, 2021

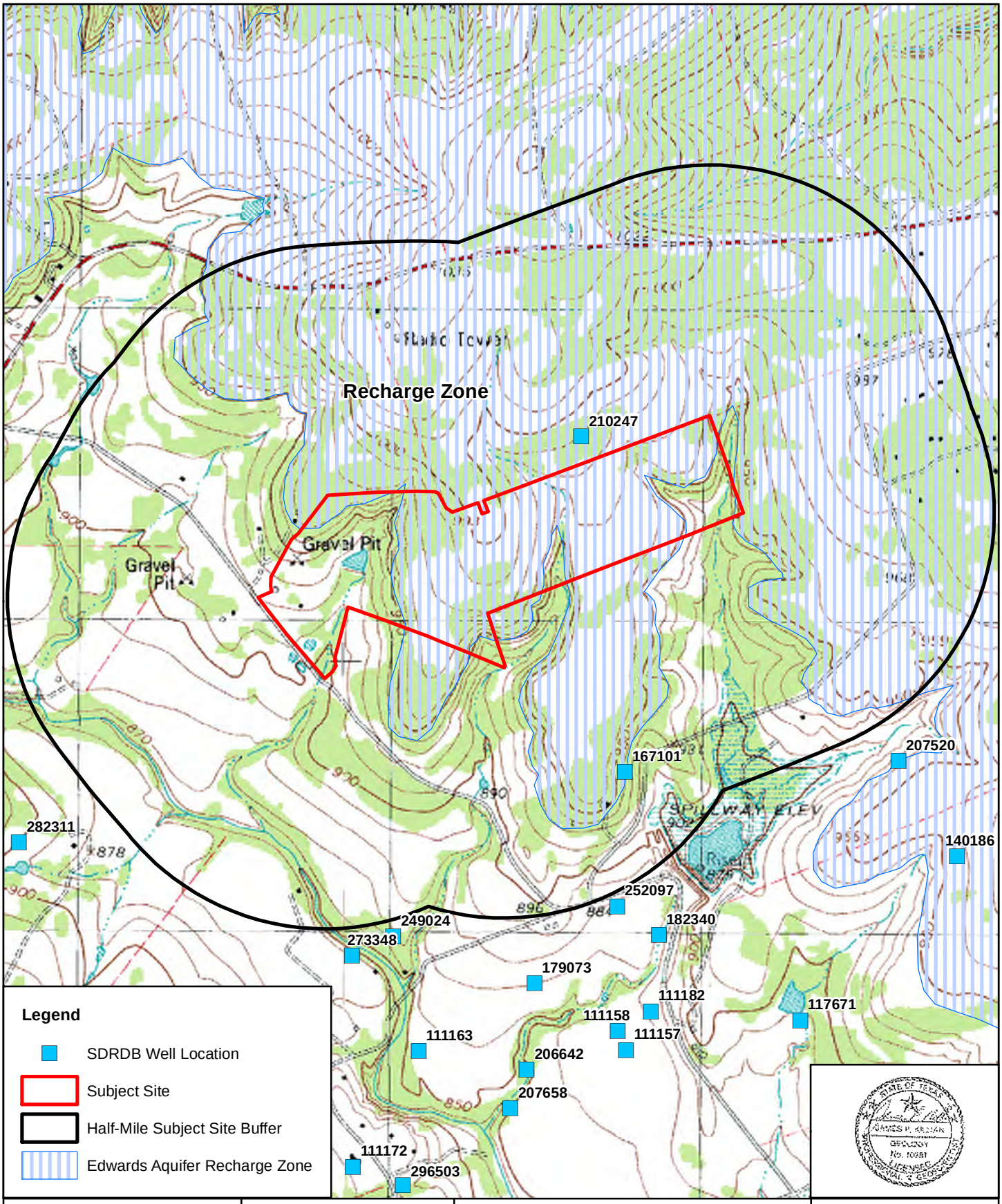
Horizon Environmental Services, Inc.

Attachment F, Figure 1

Vicinity Map
140-Acre Cannon Tract
731 County Road 175
Leander, Williamson County, Texas

0 1,250 2,500
Feet

200183 - Cannon Tract\Graphics\200183-001GA_01A_Vicinity.mxd



Horizon Environmental Services, Inc.

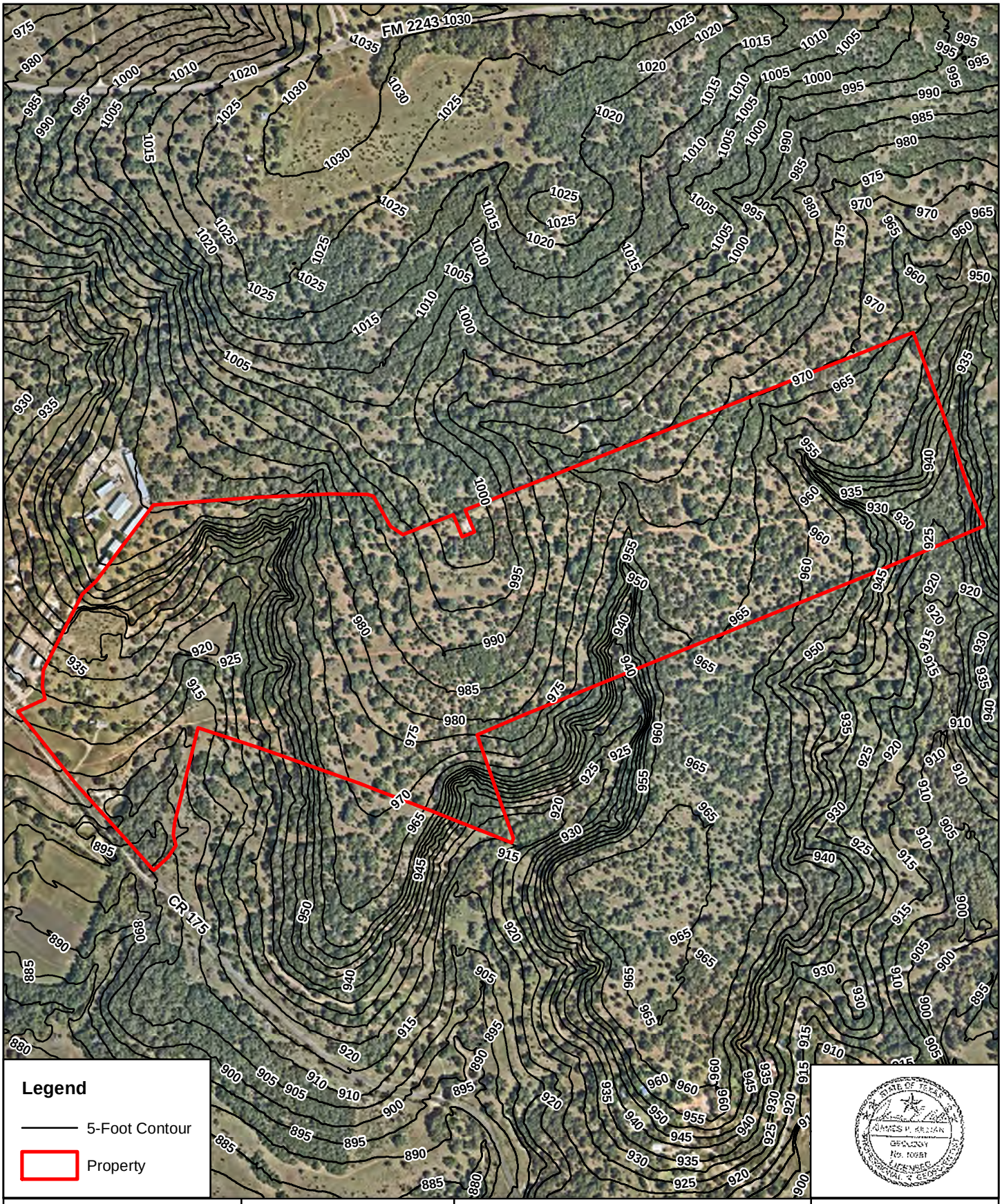
Date:	03/04/2021
Drawn:	KRS
HJN NO:	200183.001 GA
Source:	TCEQ, 2021; TWDB, 2021; USGS, 1987

Attachment F, Figure 2

Topography and Hydrogeology Map
140-Acre Cannon Tract
731 County Road 175
Leander, Williamson County, Texas

0 700 1,400
Feet

200183 - Cannon Tract\Graphics\200183-001GA_02A_Topo_Hydro.mxd



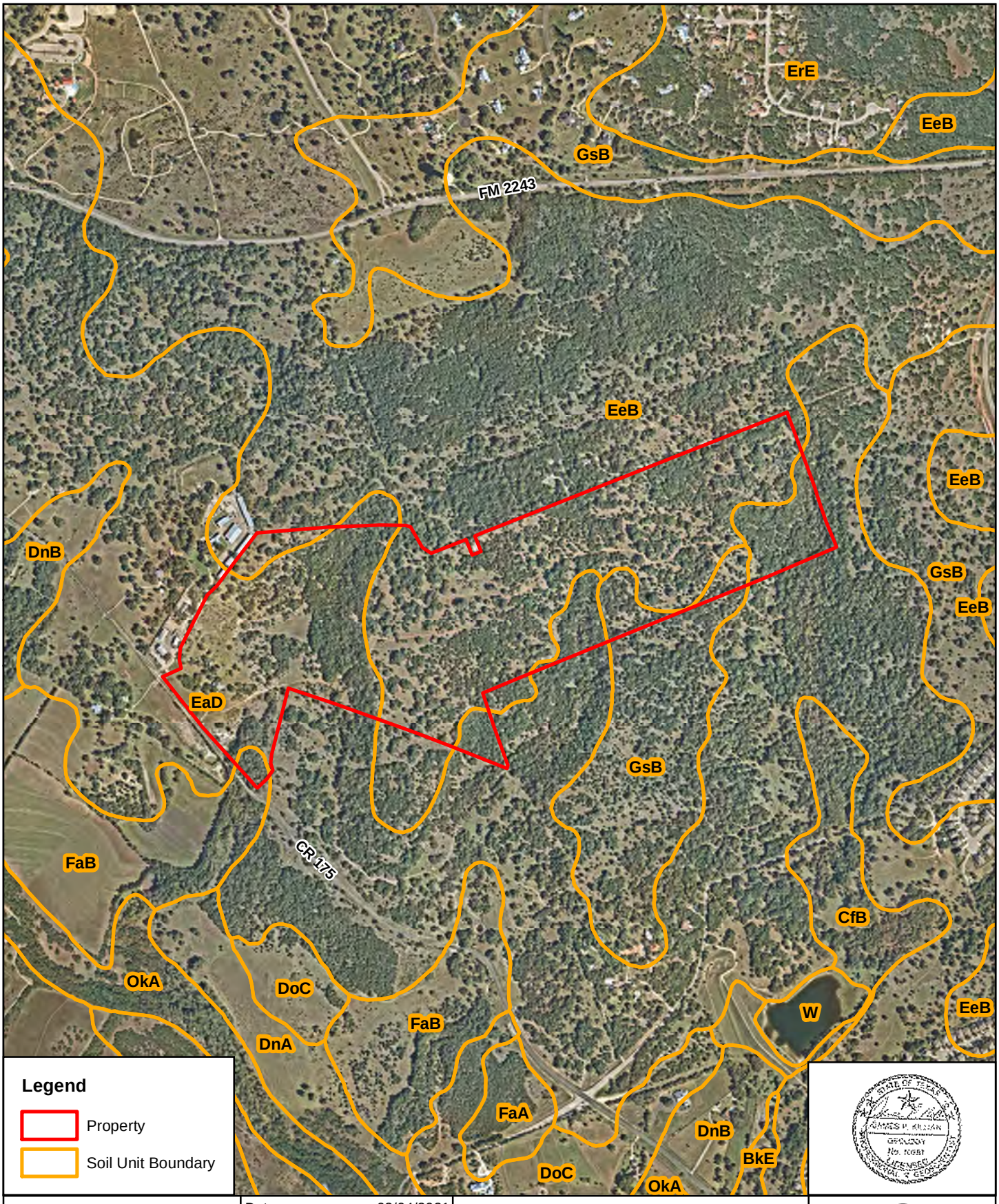
Date:	03/04/2021
Drawn:	KRS
HJN NO:	200183.001GA
Source:	CAPCOG, 2007; Nearmap, 2021

Horizon Environmental Services, Inc.

Attachment F, Figure 3
Site Topography Map
140-Acre Cannon Tract
731 County Road 175
Leander, Williamson County, Texas

0 350 700
Feet

200183 - Cannon Tract\Graphics\200183-001GA_03A_Topo.mxd



Date:	03/04/2021
Drawn:	KRS
HJN NO:	200183.001GA
Source:	Nearmap, 2021; NRCS, 2019

Horizon Environmental Services, Inc.

Attachment F, Figure 4
Surface Soil Map
140-Acre Cannon Tract
731 County Road 175
Leander, Williamson County, Texas

0 500 1,000
Feet

200183 - Cannon Tract\Graphics\200183-001GA_04A_Soil.mxd

Horizon
Environmental Services, Inc.

ATTACHMENT G

SITE PHOTOGRAPHS

Horizon
Environmental Services, Inc.

PHOTO 1
Geologic feature F-1 (upland sinkhole), facing down

PHOTO 2
Closer view of F-1, facing down

PHOTO 3
Geologic feature F-2 (solution-enlarged fracture), previously hand excavated (by others) about 6 feet down

PHOTO 4
View of F-2 after mechanical excavation, facing down

Horizon
Environmental Services, Inc.

PHOTO 5
Geologic feature F-3 (solution cavity) previously excavated (by others) about 4 feet down

PHOTO 6
Closer view of F-3, facing down

PHOTO 9
Geologic feature F-4 (very small upland sinkhole), facing down

PHOTO 10
Geologic feature F-5 (small upland sinkhole), facing down

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PHOTO 11
Geologic feature F-6 (closed depression), facing down

PHOTO 12
Geologic feature F-7 (closed depression), facing down

PHOTO 13
Geologic feature F-8 (solution cavity) within side rock wall of tributary

PHOTO 14
Closer view of F-8

SECTION 4: ORGANIZED SEWAGE COLLECTION SYSTEM

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: Edgewood Phase 2, Section 2

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: Kyle Kriegel
   Entity: M/I Homes of Austin, LLC
   Mailing Address: 7600 N. Capital of Texas Hwy.; Bldg. C, Suite 250
   City, State: Austin, TX Zip: 78731
   Telephone: (512) 770-8524 Fax: N/A
   Email Address: kkriegel@mihomes.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: Alejandro E. Granados Rico, P.E.
   Texas Licensed Professional Engineer's Number: 130084
   Entity: Kimley-Horn
   Mailing Address: 501 S. Austin Ave, Suite 1310
   City, State: Georgetown, Texas Zip: 78626
   Telephone: (512) 520-0768 Fax: N/A
   Email Address: alex.granados@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: 114
   ☐ Multi-family: Number of residential units:
   ☐ Commercial
   ☐ Industrial
   ☐ Off-site system (not associated with any development)
   ☐ Other: _____

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

100 % Domestic	27,930 gallons/day
_____% Industrial	_____ gallons/day
_____% Commingled	_____gallons/day

   Total gallons/day: 27,930

6. Existing and anticipated infiltration/inflow is 0 gallons/day. This will be addressed by: n/a.

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 October 5th 2023, 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	6,171	PVC SDR-26	ASTM D-3034
6 (FM)	10	PVC SDR-26	ASTM D-3034
4 (FM)	2,285	PVC SDR-26	ASTM D-3034

Total Linear Feet: 8,466

(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 Brushy Creek Wastewater (name) Treatment Plant. The treatment facility is:

   ☒ Existing
   ☐ Proposed

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

☒ The City of Leander 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?*
WWL-A	47	1+00.00	Manhole
WWL-A	47	1+16.65	Manhole
WWL-A	47	1+33.52	Manhole
WWL-A	47	2+37.67	Manhole
WWL-A	47	2+80.12	Manhole
WWL-A	47	3+25.46	Manhole
WWL-A	47	5+08.47	Manhole
WWL-A	47	6+12.14	Manhole
WWL-A	47	7+22.84	Manhole
WWL-A	47	8+51.11	Manhole

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
WWL-A	47	9+70.71	Manhole
WWL-A	47	10+42.09	Manhole
WWL-A	48	13+25.67	Manhole
WWL-A	48	15+49.41	Manhole
WWL-A	48	17+06.64	Manhole
WWL-B	49	2+25.91	Manhole
WWL-B	49	3+67.50	Manhole
WWL-B	49	4+34.60	Manhole
WWL-B	49	5+94.48	Manhole
WWL-B	49	8+29.51	Manhole
WWL-B	49	9+61.65	Manhole
WWL-B	50	12+44.05	Manhole
WWL-B	50	13+19.93	Manhole
WWL-B	50	13+95.07	Manhole
WWL-C	50	1+84.70	Manhole
WWL-C	50	2+95.30	Manhole
WWL-C	50	4+49.29	Manhole
WWL-D	51	2+74.97	Manhole
WWL-D	51	3+68.37	Manhole
WWL-D	51	5+35.94	Manhole
WWL-D	51	5+99.81	Manhole
WWL-D	51	7+62.56	Manhole
WWL-D	51	10+19.38	Manhole
WWL-E	52	1+91.88	Manhole
WWL-F	52	1+91.19	Manhole
WWL-F	52	3+84.49	Manhole
WWL-F	53	6+71.99	Manhole
WWL-F	53	9+687.26	Manhole

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
WWL-F	53	11+32.32	Manhole
WWL-G	54	4+04.11	Manhole
WWL-G	54	5+38.94	Manhole
WWL-G	54	6+91.54	Manhole
WWL-G	54	9+03.47	Manhole
WWL-H	55	1+70.56	Manhole
FM-A	56	1+10.00	Cleanout
FM-A	56	1+76.94	Cleanout
FM-A	56	3+88.55	Cleanout
FM-A	56	9+06.73	Cleanout
FM-A	57	12+49.45	Cleanout
FM-B	58	1+07.07	Cleanout
FM-B	58	1+35.46	Cleanout
FM-B	58	1+70.50	Cleanout
FM-B	58	2+41.94	Cleanout
FM-B	58	2+65.68	Cleanout
FM-B	58	3+00.60	Cleanout
FM-B	58	5+27.83	Cleanout
FM-B	58	5+51.13	Cleanout
FM-B	58	6+49.66	Cleanout
FM-B	58	7+48.21	Cleanout
FM-B	58	8+25.37	Cleanout
FM-B	58	8+92.21	Cleanout
FM-B	58	9+48.89	Cleanout
FM-B	58	10+16.49	Cleanout
FM-B	59	11+79.93	Cleanout
FM-B	59	12+44.15	Cleanout

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" = 60'.

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*
n/a	n/a	n/a

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*
n/a	n/a	n/a

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*
WWL-A	9+70.71	CROSSING	N/A	2’
WWL-A	13+51.67	CROSSING	N/A	2.1’
WWL-A	15+75.41	CROSSING	N/A	1.7’
WWL-B	5+67.16	CROSSING	N/A	3.3’
WWL-B	12+70.12	CROSSING	N/A	7.9’
WWL-D	7+88.56	CROSSING	N/A	3.2’
WWL-F	9+94.26	CROSSING	N/A	6.4’
WWL-G	7+17.54	CROSSING	N/A	6.3’
FM-A	2+64.33	CROSSING	N/A	2.3’
FM-A	3+41.89	CROSSING	N/A	2.2’
FM-B	2+59.37	CROSSING	N/A	2.2’
FM-B	3+12.91	CROSSING	N/A	2.1’

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*
n/a	n/a	n/a	n/a

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*
WWL-A	5’	1+16.65	47
WWL-A	5’	1+33.52	47
WWL-A	4’	2+80.12	47
WWL-B	4’	13+19.93	50
WWL-D	5’	2+74.97	51
WWL-F	4’	3+84.49	

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*
n/a	n/a	n/a	n/a	n/a	n/a

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]**	n/a
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) **[Required]**	80
Alternate method of joining lateral to existing SCS line for potential future connections **[Required]**	n/a
Typical trench cross-sections **[Required]**	80
Bolted manholes **[Required]**	n/a
Sewer Service lateral standard details **[Required]**	81
Clean-out at end of line **[Required, if used]**	n/a
Baffles or concrete encasement for shock/erosion protection **[Required, if flow velocity of any section of pipe >10 fps]**	n/a
Detail showing Wastewater Line/Water Line Crossing **[Required, if crossings are proposed]**	47-59
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) **[Required, if Flexible Pipe is used]**	n/a
Drop manholes **[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]**	80

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: 11/30/2023

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

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

Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Organized Sewage Collection System Application** is hereby submitted for TCEQ review and executive director approval. The system was designed in accordance with the requirements of 30 TAC §213.5(c) and 30 TAC §217 and prepared by:

Print Name of Licensed Professional Engineer: Alejandro E. Granados Rico P.E.

Date: 11/07/2023

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)

Kimley»Horn

Engineer's Design Report

This Engineering Design Report has been prepared to comply with the Texas Commission on Environmental Quality Design Criteria for Domestic Wastewater Systems, 30 TAC Chapter 217, including 217.10 of Subchapter A, §§217.51 – 217.70 of Subchapter C, and Subchapter D as applicable. Please note that throughout this application, the more stringent of AWU or TCEQ regulations shall apply.

Project Description

Introduction

Edgewood Phase 2, Section 2 is an undeveloped 45.28 acre property located southeast of the intersection of RR 2243 and CR 175 and within the city limits of the Leander, Texas. The proposed Edgewood Phase 2, Section 2 project includes the construction of 114 single family homes with associated roadway, water, wastewater, and drainage improvements to support the project. This project proposes 14.74 acres (32.6%) of impervious cover.

This project is located within the Brushy Creek Watershed. The site is not located in the Federal Emergency Management Agency's 100-year floodplain according to FIRM 48491C0460F. The site is located within the Edwards Aquifer Recharge Zone and Contributing Zone according to the City of Austin and Edward's Aquifer GIS databases. There are no critical water quality zones and or critical environmental features located on-site. The site consists of 45.28 acres of undeveloped land.

On-site infrastructure is comprised of water, gas, electric, wastewater, and storm sewer lines. The wastewater service outlined in this report will consist of eight (8) lines that will convey wastewater to one lift station, proposed with Edgewood Phase 2 Section 2 and eventually will travel via two (2) duel 4" force mains to connect to a force main built in Phase 2-1. It will then travel via wastewater line through phases 2-1, 1-2, and 1-1 to an existing manhole that is built with an offsite line. The offsite line will gravity flow and be deposited at the Brushy Creek Regional Wastewater Treatment Plant to be treated. A Development Agreement between M/I Homes of Austin, LLC and the City of Leander recognizes the proposed flow from the Edgewood development and that the city will accept to treat it through the Brushy Creek Regional Wastewater Treatment Plant. All lines will consist of single and double service connections to homes that are proposed per this development. All proposed manholes shall be watertight, with watertight rings and covers. All proposed wastewater lines will be installed within the Edwards Aquifer Recharge Zone (EARZ) and Contributing Zone (EACZ).

Pipe Design

Flow Design Basis

Service for the build-out of the 45.28 ac 114 single family homes, Phase 2-2 site, located at RR 2243 and CR 175, will be served by this wastewater system. This is the final phase of the Edgewood Subdivision. The City of Austin Utility Criteria Manual (UCM) was used to determine the parameters for the design of the wastewater line system. See Appendix B for the map illustrating the property to be served by this wastewater line system and Appendix C for the calculations (as approved by the City of Austin).

Gravity Pipe and Joint Materials

The proposed pipe to be used for the 6", 8" and 12" wastewater line will be ASTM D3034 SDR-26 PVC pipe (cell class 12454). The joints for this pipe shall meet the requirements of ASTM D3212. The pipe joints shall have an integral bell and rubber gasket seal with the locked-in type gasket.

Separation Distances for Water and Wastewater

A 26-foot minimum horizontal separation is maintained between all proposed wastewater infrastructure and proposed water lines. There are 12 water line crossings which do not meet the nine-foot minimum vertical separation. Cement-stabilized sand backfill has been provided at these locations. See Table 5 – Water Crossings for all water line crossings. It is not feasible to provide nine-feet of vertical separation at waterline crossings due to depth limitations. In most cases, the crossing water line would need to be above the finished grade, or approximately twenty-feet below grade in order to meet the nine-foot separation requirement.

Service Connections

Service connections have been included for each of the 114 proposed single-family homes.

Boring and Tunneling of Crossings

No boring or tunneling of crossings are proposed for this project.

Corrosion Potential

PVC pipe will be utilized for or all proposed wastewater lines. No deterioration of the proposed pipe or its associated components is anticipated in this application.

Odor Control

All flows contributing to the proposed wastewater lines are from single family developments generating domestic sewage. There is a lift station proposed with this phase of the Edgewood Subdivision. Odor control measures are proposed for this project.

Active Geologic Faults

Per the Geologic Assessment, no active geologic faults were located within the area of the project.

Capacity Analysis

The capacity of each proposed wastewater segment is calculated below based on Manning's Equation. The calculation for each segment is based on the minimum proposed slope.

$$Q = \frac{1.49}{n} * A * R^{0.67} * S^{0.5}$$

Where:

Qfull = flow rate of fluid in pipe at full flow (ft^3/s) (cfs)

Q90%= flow rate of fluid in pipe at 90% full flow (ft^3/s) (cfs)

A = area of pipe (ft^2) = $\frac{\pi * d^2}{4}$

d = internal pipe diameter (ft) = Do – 2t

Do = outside diameter (in)

t = pipe wall thickness (in)

n = Manning's Roughness coefficient = 0.013

Rfull = hydraulic radius of pipe (full flow) = A/P = D/4 (ft)

R90%= hydraulic radius of pipe (90% full flow) = 0.9*A/P = 0.9*D/4 (ft)

P = wetted perimeter of pipe = π *D (ft)

S = slope of energy line

Pipes	Length	Slope	Slope	Diameter		Pipe	Manning's	P	A	Rfull	R90%	Qfull	Q90%	Vfull	V90%
	ft	*%*	*ft/ft*	*in*	*ft*	Material		*ft*	*sf*	*ft*	*ft*	*cfs*	*cfs*	*fps*	*fps*
A-1	17	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-2	17	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-3	104	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-4	42	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-5	45	5.00	0.050	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.69	2.42	7.72	6.94
A-6	183	5.00	0.050	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.69	2.42	7.72	6.94
A-7	104	2.00	0.020	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.70	1.53	4.88	4.39
A-8	111	2.00	0.020	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.70	1.53	4.88	4.39
A-9	128	2.00	0.020	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.70	1.53	4.88	4.39
A-10	120	2.00	0.020	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.70	1.53	4.88	4.39
A-11	71	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-12	284	1.25	0.013	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.35	1.21	3.86	3.47
A-13	224	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
A-14	157	1.00	0.010	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.20	1.08	3.45	3.11
B-1	126	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
B-2	142	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
B-3	67	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
B-4	160	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
B-5	235	0.90	0.009	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.14	1.03	3.27	2.95
B-6	132	0.90	0.009	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.14	1.03	3.27	2.95
B-7	282	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
B-8	76	1.45	0.015	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.45	1.31	4.15	3.74
B-9	75	1.00	0.010	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.20	1.08	3.45	3.11
C-1	85	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
C-2	111	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
C-3	154	1.00	0.010	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.20	1.08	3.45	3.11
D-1	175	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
D-2	93	4.00	0.040	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.41	2.17	6.90	6.21
D-3	168	4.00	0.040	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.41	2.17	6.90	6.21
D-4	64	3.00	0.030	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.09	1.88	5.98	5.38
D-5	163	3.00	0.030	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.09	1.88	5.98	5.38
D-6	257	2.00	0.020	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.70	1.53	4.88	4.39
E-1	92	1.50	0.015	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.48	1.33	4.23	3.80
F-1	91	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
F-2	193	3.04	0.030	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.10	1.89	6.02	5.41
F-3	288	1.50	0.015	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.48	1.33	4.23	3.80
F-4	296	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
F-5	164	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
G-1	304	0.50	0.005	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.85	0.77	2.44	2.20
G-2	135	0.60	0.006	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	0.93	0.84	2.67	2.41
G-3	153	1.50	0.015	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.48	1.33	4.23	3.80
G-4	212	1.25	0.013	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	1.35	1.21	3.86	3.47
H-1	71	3.90	0.039	8.00	0.67	PVC	0.013	2.09	0.35	0.17	0.15	2.38	2.14	6.81	6.13

Pipe Type	Minimum Velocity *fps*	Maximum Velocity *fps*
8" PVC	2.44	7.72

The proposed wastewater line installed at the slope specified provides capacity in excess of the calculated peak wet weather design flows at full flow and 90% full flow conditions.

Structural Analysis

Flexible pipe is proposed on this project. Structural calculations are provided for the flexible pipe to be installed. The proposed collection system piping is designed to have a minimum structural life of 50 years. As previously mentioned, all proposed PVC pipe shall be cell class 12454 with a tensile strength of 7,000 psi.

Live Load Calculations – no significant live loads are anticipated on any segment of this project.

Buckling Pressure - the following equations utilized for the calculation of buckling pressure are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

Pcr = $\frac{2 * E}{(1 - v^2) * (DR - 1)^3}$ *(Equation 7.14)*

Pb = $1.15 * \sqrt{Pcr * E}$ *(Equation 7.18)*

H = (Pb*144)/w *(Equation 6.7)*

Where:

Pcr = critical buckling pressure (psi)

E = modulus of elasticity (psi) = 400,000 psi for PVC

v = Poisson's Ratio = 0.38 for PVC

DR = dimension ratio

Pb = buckling pressure in soil (psi)

E' = modulus of soil reaction (psi) = 2,000 psi for crushed rock compacted to greater than 95% relative density

H = maximum allowable cover height of soil (ft)

w = weight of soil (lbs/ft^3) = 120 lbs/ft^3

8" ASTM D3034 SDR-26

Pcr = $\frac{2 * 400{,}000}{(1 - 0.38^2) * (26 - 1)^3}$

Pcr = 59.84 psi

Pb = $1.15 * \sqrt{59.84 * 2{,}000}$

Pb = 397.84 psi

H = (397.84*144) / 120

H = 477.41 ft height of soil to cause pipe buckling

12" ASTM D3034 SDR-26

Pcr = $\frac{2 * 400{,}000}{(1 - 0.38^2) * (26 - 1)^3}$

Pcr = 59.84 psi

Pb = $1.15 * \sqrt{59.84 * 2{,}000}$

Pb = 397.84 psi

H = (397.84*144) / 120

H = 477.41 ft height of soil to cause pipe buckling

Prism Load Calculations - the following equations utilized for the calculation of prism loads are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

P = H*w *(Equation 6.7)*

Where:

P = prism load pressure due to soil weight (lbs/ft^2)
H = depth of pipe (ft)
w = soil density (lbs/ft^3) = 120 lbs/ft^3

8" ASTM D3034 SDR-26

P = 20 * 120

P = 2,400 lbs/ft^2 or 16.67 psi

12" ASTM D3034 SDR-26

P = 20 * 120

P = 2,400 lbs/ft^2 or 16.67 psi

Long Term Deflection Calculations - the following equations utilized for the calculation of long term deflection are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

$$\Delta Y/D = \frac{DL*K*P+K*W_1}{[2E/(3(DR-1)^3)]+0.061*E'}*100 \qquad \textit{(Equation 7.10)}$$

Where:

ΔY/D = long term deflection (%)
DL = Deflection Lag Factor = 1.0 for prism load calculation
K = bedding constant = 0.096 for 90°
P = prism load pressure due to soil weight (lbs/ft^2)
W_1 = live load (psi) = 0 psi
E = modulus of elasticity (psi) = 400,000 psi for PVC
DR = dimension ratio
E' = modulus of soil reaction (psi) = 2,000 psi for crushed rock bedding compacted to greater than 95% relative density

Note: Leonhardt's Zeta factor is assumed to equal 1, and thus is not required in the calculation. This is a conservative assumption that results in a more conservatively calculated value for long term deflection.

8" ASTM D3034 SDR-26

$$\Delta Y/D = \frac{1.0*0.096*16.67 + 0.096*0}{[2(400{,}000)/(3(26-1)^3)] + 0.061*2{,}000} * 100$$

ΔY/D = 1.15%

12" ASTM D3034 SDR-26

$$\Delta Y/D = \frac{1.0*0.096*16.67 + 0.096*0}{[2(400{,}000)/(3(26-1)^3)] + 0.061*2{,}000} * 100$$

ΔY/D = 1.15%

Wall Crushing Calculations - the following equations utilized for the calculation of wall crushing are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

$$Py = \frac{\Theta c * 2 * A}{D} \qquad \textit{(Equation 7.20)}$$

$$H = Py / w \qquad \textit{(Equation 6.7)}$$

Where:

Py =	pressure due to soil weight (psi)
Θc =	compressive stress (psi) = 4,000 psi for PVC pipe
A=	surface area of the pipe wall (in^2/in)
D =	mean pipe diameter (in) = Do – t
t =	pipe wall thickness (in)
H =	maximum allowable height of cover (ft)
w =	soil density (lbs/ft^3) = 120 lbs/ft^3

8" ASTM D3034 SDR-26

Do = 8.4– 0.323 = 8.077 in, A =3.88 in^2/ft (0.323 in * 12 in/ft)

$$Py = \frac{4{,}000*2*(3.88/12)}{8.077}$$

Py = 320.25 psi

H = (320.25*144) / 120

H = 384.30 ft height of soil to cause wall crushing

12" ASTM D3034 SDR-26

Do = 12.500– 0.481 = 12.019 in, A =5.77 in^2/ft (0.481 in * 12 in/ft)

$$Py = \frac{4{,}000 * 2 * (5.77/12)}{12.019}$$

Py = 320.05 psi

H = (320.05*144) / 120

H = 384.06 ft height of soil to cause wall crushing

Strain Calculations - the following equations utilized for the calculation of strain are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

$$\varepsilon h = \frac{P * D}{2 * t * E} \qquad \textit{(Equation 7.22)}$$

$$\varepsilon f = \frac{t}{D} * \frac{[3 * \Delta Y / D]}{[1 - 2 * \Delta Y / D]} \qquad \textit{(Equation 7.24)}$$

$$\varepsilon = \varepsilon h + \varepsilon f \qquad \textit{(Equation 7.25)}$$

Where:

- εh = maximum strain in the pipe wall due to hoop stress (in/in)
- P = prism load pressure due to soil weight (psi)
- D = mean pipe diameter (in) = Do – t
- t = pipe wall thickness (in)
- E = modulus of elasticity (psi) = 400,000 psi for PVC
- εf = maximum strain in the pipe due to ring deflection or flexure (in/in)
- ΔY/D = long term deflection
- ε = maximum combined strain in pipe wall (in/in)

8" ASTM D3034 SDR-26

$$\varepsilon h = \frac{16.67 * 8.077}{2 * 0.323 * 400{,}000}$$

εh = 0.00052 in/in

$$\varepsilon f = \frac{0.323}{8.077} * \frac{[3 * 0.0115]}{[1 - 2 * 0.0115]}$$

εf = 0.0014 in/in

ε = 0.00035 + 0.0014

ε = 0.00175 in/in

12" ASTM D3034 SDR-26

$$\varepsilon h = \frac{16.67 * 12.019}{2 * 0.481 * 400{,}000}$$

εh = 0.00052 in/in

$$\varepsilon f = \frac{0.481}{12.019} * \frac{[3 * 0.0115]}{[1 - 2 * 0.0115]}$$

εf = 0.00141 in/in

ε = 0.00052 + 0.00141

ε = 0.00193 in/in

Per the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001), deflection test samples have experienced a pipe wall strain of up to 0.025 in/in and have not "showed any failures or cracks". The calculated strains for this project are significantly below this level, so no failure due to strain is anticipated.

Pipe Stiffness Calculation - the following equations utilized for the calculation of pipe stiffness are taken from the *Handbook of PVC Pipe: Design and Construction* (Uni-Bell PVC Pipe Association, 2001).

$$Ps = 4.47 * \frac{E}{(DR-1)^3}$$ *(Equation 7.3)*

Where:

Ps =	pipe stiffness (psi)
DR =	Dimensional Ration = Do / t
Do =	Outside diameter (in)
t =	pipe wall thickness (in)
E =	modulus of elasticity (psi) = 400,000 psi for PVC

8" ASTM D3034 SDR-26

DR = 26

$$Ps = 4.47 * \frac{400{,}000}{(26-1)^3}$$

Ps = 115 psi

12" ASTM D3034 SDR-26

DR = 26

$$Ps = 4.47 * \frac{400{,}000}{(26-1)^3}$$

Ps = 115 psi

Criteria for Laying Pipe

Pipe Embedment

Bedding and initial backfill material selection and installation will be carried out in accordance with applicable governing procedures contained within the *City of Austin Standard Specifications for Pipes and Appurtenances, TCEQ Chapter 217.54(a),* and in accordance with the City of Leander Detail 104-1 on sheet 80. Bedding material shall be in accordance with City of Austin Standard Specification Item 510, Section 510.3(14). Compacted backfill, from a point one (1) foot above the pipe to the finished surface, will be comprised of suitable material removed during excavation, as described in Item 510, Section 510.2(6). Brush, debris, and junk shall not be utilized as a backfilling material.

Compaction

Trench compaction will be carried out in accordance with the *City of Austin Standard Specifications for Pipes and Appurtenances* and *TCEQ Chapter 217.54(b)*. Proper placement of the backfill and compaction per City of Austin requirements will not negatively impact the structural integrity of the pipe.

Envelope Size

Envelope size will be in accordance with *City of Austin Standard Specifications for Pipes and Appurtenances* and *TCEQ Chapter 217.54(c).* Per the City of Leander Detail 104-1 on sheet 81, a minimum of 6-inch and maximum of 12-inch space shall be allowed between the outside diameter of the pipe and the trench wall and floor. In addition, a minimum of 6-inch and maximum of 12-inch space shall be allowed between the outside diameter of the pipe bell and the trench wall. The embedment and initial backfill must be installed to a minimum depth of 12 inches above the crown of the pipe.

Trench Width

Trench width will be in accordance with the City of Leander Detail 104-1 on sheet 80 and *TCEQ Chapter 217.54(d).* Per the City of Leander Detail 104-1 on sheet 80, a minimum of 6-inch and maximum of 12-inch space shall be allowed between the outside diameter of the pipe and the trench wall and floor. In addition, a minimum of 6-inch and maximum of 12-inch space shall be allowed between the outside diameter of the pipe bell and the trench wall. These limits shall be maintained to protect the structural integrity of the pipe and will be sufficient for the placement of materials and use of compaction equipment in the pipe zone.

Manholes and Related Structures

Manhole and Appurtenance Placement

Manholes are located at all points of change in alignment or grade and at the intersection of all pipes for this project.

Manhole Stub Outs

No manholes are being placed at the end of a line that may be extended in the future, so no stub outs are included on this project.

Cleanouts

No dead end lines are included in this project, so no cleanouts are proposed.

Manhole Material

Monolithic or precast manholes are acceptable for the contractor to utilize and are included in the City of Austin Detail 506S-10 on sheet 80. The use of bricks is not acceptable for the manhole or for cover adjustments.

Manhole Spacing

Manhole spacing meets the requirements of Table C.2 in *TCEQ Chapter 217.55*.

Manholes within Waterways

No manholes will be located within flow paths of waterways or in areas where water ponding is probable.

Manhole Covers, Inlets, and Bases

Per the COA detail 506S-10 sheet 80, the manhole covers shall have a 30-inch diameter clear opening. Manhole covers shall be constructed of cast iron and have no openings for water to infiltrate. No proposed manholes are located within the 100-year flood plain. All manholes shall be watertight, with watertight rings and covers, as shown per the City of Leander detail 107-3 on sheet 80.
As shown in the project details, the bottom of the manhole shall have a U-shaped channel to provide smooth continuation between the inlet and outlet pipes. For the proposed pipe, the manhole channel depth shall be equal to at least half the largest pipe diameter. Manholes with different pipe sizes shall have the tops of the pipes at the same elevation and flow channels in the invert sloped evenly from pipe to pipe. A bench will be provided above each manhole channel to slope at a minimum of 0.5 inches per foot.

Manhole Steps

No steps shall be allowed in any proposed manholes.

Manhole Connections

Manhole-pipe connections shall be watertight per City of Austin pipe to manhole connector SPL WW-146D. See detail 506S-10 on Sheet 80.

Manhole Venting

The proposed manholes are spaced at less than 1,500 foot intervals and none are located within the 100-year flood plain. Therefore, no vented manholes are proposed on this project.

Trenchless Pipe Installation

There will be no trenchless pipe installation.

Kimley»Horn

Testing Requirements for Gravity Pipes

Infiltration/Exfiltration and Low Pressure Air Test

All testing will be in compliance with Texas Administrative Code title 30 Part 1 Chapter 217 Subchapter C 217.57 and 217.58. See TCEQ note on Sheet 3.

Infiltration and exfiltration or low pressure air testing in accordance with ASTM C828, C924 or F1417 are required for all proposed gravity wastewater pipe as specified in the project notes, Sheet 3. The requirements specified are in accordance with *TCEQ Chapter 217.57*.

Deflection Testing

For the proposed 8-inch and 12-inch wastewater line, deflection shall be measured with a rigid mandrel per the project detail on Sheet 3. The requirements specified are in accordance with *TCEQ Chapter 217.57*.

Owner Inspection

The Owner shall have an inspector onsite during construction of the project. A professional engineer registered in the state of Texas (Alejandro E. Granados Rico, P.E.) shall be present to witness the testing of the wastewater lines.

Testing Requirements for Manholes

Manhole testing in accordance with *TCEQ Chapter 217.58* is specified in the project notes, sheet 3. Manholes will be tested after assembly and backfilling for leakage by either a hydrostatic test and/or a vacuum test.

For the vacuum test, all lift holes and exterior joints shall be plugged with an approved non-shrink grout and no grout shall be placed in horizontal joints before testing. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole. Stubouts, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn. A minimum 60-inch/lb torque wrench shall be used to tighten the external clamps that secure the test cover to the top of the manhole. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendation. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches of mercury. The manhole shall pass if the time is greater than 2 minutes. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. If the manhole fails a second time, repairs should again be made and the manhole shall be tested by means of a hydrostatic test. If any manhole fails the hydrostatic test, after failing the vacuum test twice, the contractor should consider replacing that manhole. If the contractor chooses to attempt to repair that manhole, the manhole must be retested by means of the hydrostatic test until it passes.

Inspection will be provided during critical phases of construction by a qualified inspector under the direction of a P.E. (Alejandro E. Granados Rico, P.E.). Critical phases of construction are deemed at a minimum to include testing of pipe and manholes for leakage, and testing of flexible pipe for installed deflection.

TCEQ approval letters for plans and specifications review contain the requirement that once the project is completed, a P.E. registered in the state of Texas (Alejandro E. Granados Rico, P.E.) much certify that the construction was performed substantially in accordance with the approved plans and specifications.

Notification and Inspection

TCEQ Chapter 213 requires that the applicant must provide written notification to the Austin regional office at least 48 hours prior to commencing construction on the regulated activity. If any sensitive feature is discovered during construction then the work shall be suspended immediately and the Austin regional office shall be notified to then determine the appropriate course of action. All other notification and inspection requirements identified in *TCEQ Chapter 213.5(c)* shall be met.

SECTION 5: TEMPORARY STORMWATER SECTION

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: Alejandro E. Granados Rico, P.E.

Date: November 7th, 2023

Signature of Customer/Agent:

Regulated Entity Name: Edgewood Phase 2, Section 2

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: N/A

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.

Spill Response Actions

If there is an accidental spill on site, the contractor shall respond with appropriate action. The contractor will be required to contact the owner and in turn the owner will contact the TCEQ in the event of a spill on site. In addition to the following guidance, reference the latest version of TCEQ's Technical Guidance Manual (TGM) RG-348 Section 2.4.16.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

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

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

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

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

- Notify the TCEQ by telephone as soon as possible and within 24 hours at (512)339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
- Notification should first be made by telephone and followed up with a written report.
- The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
- Other agencies which may need to be consulted include, but not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

Potential Sources of Contamination

Potential Source: Oil, grease, fuel, and hydraulic fluid contamination from construction equipment and vehicle dripping.

Preventative Measures: Vehicle maintenance will be performed within the construction staging area or a local maintenance shop.

Potential Source: Miscellaneous trash and litter from construction workers and material wrappings.

Preventative Measures: Trash containers will be placed throughout the site to encourage proper disposal of trash.

Potential Source: Silt leaving the site.

Preventative Measures: Contractor will install all temporary best management practices prior to start of construction including the stabilized construction entrance to prevent tracking onto adjoining streets.

Potential Source: Construction Debris.

Preventative Measures: Construction debris will be monitored daily by contractor. Debris will be collected weekly and placed in disposal bins. Situations requiring immediate attention will be addressed on a case by case basis.

Potential Source: Soil and Mud from Construction Vehicle tires as they leave the site.

Preventative Measures: A stabilized construction exit shall be utilized as vehicles leave the site. Any soil, mud, etc. carried from the project onto public roads shall be cleaned up within 24 hours.

Potential Source: Sediment from soil, sand, gravel and excavated materials stock piled on site.

Preventative Measures: Silt fence shall be installed on the down gradient side of the stock piled materials. Reinforced rock berms shall be installed at all downstream discharge locations.

Potential Source: Portable toilet spill.

Preventative Measures: Toilets on the site will be emptied on a regular basis by the contracted toilet company.

Sequence of Major Activities

The installation of erosion and sedimentation controls shall occur prior to any excavation of materials or major disturbances on the site. The sequence of major construction activities will be as follows. Approximate acreage to be disturbed is listed in parentheses next to each activity.

Intended Schedule or Sequence of Major Activities:

1. Construct Access (0.05 Acres)
2. Installation of Temporary BMPs (45.27 Acres)
3. Initiate Grubbing and Topsoil Stripping of Site (45.27 Acres)
4. Rough Subgrade Preparation (earthwork, grading, street and drainage excavation and embankment) (45.27 Acres)
5. Wet and Dry Utility Construction (6 Acres)
6. Final Subgrade Preparation (6 Acres)
7. Installation of Base Materials (5 Acres)
8. Concrete (foundations, curbs, flatwork) (4 Acres)
9. Building Construction (5 Acres)
10. Paving Activities (3.5 Acres)
11. Topsoil, Irrigation and Landscaping (45.27 Acres)
12. Site cleanup and Removal of Temporary BMPs (45.27 Acres)

Maximum total construction time is not expected to exceed 36 months.

Temporary Best Management Practices and Measures

A. No storm water originates up gradient that impacts the site. An upstream off-site area will bypass through an existing channel.

B. Temporary BMPs will be installed prior to soil disturbing construction activity. Silt fencing will be placed along the down-gradient sides of the property to prevent silt from escaping the construction area. A temporary construction entrance will be placed on site to reduce vehicle "tracking" onto adjoining streets. A concrete washout pit will be used to collect all excess concrete during construction.

BMPs for this project will protect surface water or groundwater from turbid water, phosphorus, sediment, oil, and other contaminants, which may mobilize in storm water flows by slowing the flow of runoff to allow sediment and suspended solids to settle out of the runoff.

Practices may also be implemented on site for interim and permanent stabilization. Stabilization practices may include but are not limited to: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, and other similar measures.

C. There are three sensitive features located in Phase 2-2, as noted in the geologic assessment. A buffer will be provided for 50 feet in all directions. Any excavation within 50 feet of the feature will be avoided. We are not proposing and fill or covering of the sensitive features.

There are no surface streams within the boundaries of the project. The temporary onsite BMPs will be used to treat stormwater runoff before it leaves the project and prevent pollutants from entering into surface streams or any sensitive features down-gradient of the site.

D. The BMPs for this project are designed to allow water to pass through after sedimentation has occurred. Existing flow patterns will be maintained to any naturally occurring sensitive features that are discovered during construction.

Temporary runoff protection measures will be installed according to the recommendations made in Chapter 1 of RG-348. Temporary erosion control will be placed as close to the site of construction soil disturbance as possible to minimize any disturbance with drainage areas. Frequent inspections of erosion controls will be warranted near the environmentally sensitive features, especially after every rainfall.

Request To Temporarily Seal a Feature

The permanent sealing of or diversion of flow from a naturally-occurring “sensitive” or “”possibly sensitive” feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed for any naturally occurring “sensitive” or “possibly sensitive” features on this site.

Structural Practices

Structural BMPs will be used to limit runoff discharge of pollutants from exposed areas of the site. BMPs will be installed prior to soil disturbing construction activity. Silt fencing will be placed along the down-gradient sides of the property to prevent silt from escaping the construction area. A temporary construction entrance will be placed at the site entry/exit point to reduce tracking onto adjoining streets. A construction staging area will be used onsite to perform all vehicle maintenance and for equipment and material storage. A concrete truck washout pit will be placed on site to provide containment and easier cleanup of waste from concrete operations. The location of all structural temporary BMP's are shown on the erosion control plan sheet and details and specifications are provided on the erosion control details sheet which can be found at the end of this report under Section 8.

Description of Temporary BMPs

Temporary Construction Entrance/Exit

The purpose of a temporary gravel construction entrance is to provide a stable entrance/exit condition from the construction site and keep mud and sediment off public roads. A stabilized construction entrance is a stabilized pad of crushed stone located at any point traffic will be entering or leaving the construction site from a public right-of-way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or flowing of sediment onto public rights-of-way. This practice should be used at all points of construction ingress and egress.

Excessive amounts of mud can also present a safety hazard to roadway users. To minimize the amount of sediment loss to nearby roads, access to the construction site should be limited to as few points as possible and vegetation around the perimeter should be protected where access is not necessary. A rock stabilized construction entrance should be used at all designated access points.

Inspection and Maintenance Guidelines:

(1) The entrance should be maintained in a condition, which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment.
(2) All sediment spilled, dropped, washed, or tracked onto public rights-of-way should be removed immediately by contractor.
(3) When necessary, wheels should be cleaned to remove sediment prior to entrance onto public right-of-way.
(4) When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.
(5) All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.

Silt Fence

The purpose of a silt fence is to intercept and detain water-borne sediment from unprotected areas of a limited extent. Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way. If concentrated flow occurs after installation, corrective action must be taken such as placing a rock berm in the areas of concentrated flow.

Silt fencing within the site may be temporarily moved during the day to allow construction activity provided it is replaced and properly anchored to the ground at the end of the day. Silt fences on the perimeter of the site or around drainage ways should not be moved at any time.

Inspection and Maintenance Guidelines:

(1) Inspect all fencing weekly, and after any rainfall.
(2) Remove sediment when buildup reaches 6 inches.
(3) Replace any torn fabric or install a second line of fencing parallel to the torn section.
(4) Replace or repair any sections crushed or collapsed in the course of construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a silt fence at common vehicle access points.
(5) When construction is complete, the sediment should be disposed of in a manner that will not cause additional siltation and the prior location of the silt fence should be revegetated. The fence itself should be disposed of in an approved landfill.

Concrete Washout Area

The purpose of concrete washout areas is to prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employees and subcontractors.
The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
- Locate washout area at least 50 feet from sensitive features, storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
- Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.

Below grade concrete washout facilities are typical. These consist of a lined excavation sufficiently large to hold expected volume of washout material. Above grade facilities are used if excavation is not practical. Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this section, with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

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.

Rock Berm

The purpose of a rock berm is to serve as a check dam in areas of concentrated flow, to intercept sediment-laden runoff, detain the sediment and release the water in sheet flow. The rock berm should be used when the contributing drainage area is less than 5 acres. Rock berms are used in areas where the volume of runoff is too great for a silt fence to contain. They are less effective for sediment removal than silt fences, particularly for fine particles, but are able to withstand higher flows than a silt fence. As such, rock berms are often used in areas of channel flows (ditches, gullies, etc.). Rock berms are most effective at reducing bed load in channels and should not be substituted for other erosion and sediment control measures further up the watershed.

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall by the responsible party. For installations in streambeds, additional daily inspections should be made.
(2) Remove sediment and other debris when buildup reaches 6 inches and dispose of the accumulated silt in an approved manner that will not cause any additional siltation.
(3) Repair any loose wire sheathing.
(4) The berm should be reshaped as needed during inspection.
(5) The berm should be replaced when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.
(6) The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

Inlet Protection

Storm sewers that are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural drainage ways. In case of extreme sediment loading, the storm sewer itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets. The following guidelines for inlet protection are based primarily on recommendations by the Virginia Dept. of Conservation and Recreation (1992) and the North Central Texas Council of Governments (NCTCOG, 1993b).

In developments for which drainage is to be conveyed by underground storm sewers (i.e., streets with curbs and gutters), all inlets that may receive storm runoff from disturbed areas should be protected. Temporary inlet protection is a series of different measures that provide protection against silt transport or accumulation in storm sewer systems. This clogging can greatly reduce or completely stop the flow in the pipes. The different measures are used for different site conditions and inlet types.

Care should be taken when choosing a specific type of inlet protection. Field experience has shown that inlet protection that causes excessive ponding in an area of high construction activity may become so inconvenient that it is removed or bypassed, thus transmitting sediment-laden flows unchecked. In such situations, a structure with an adequate overflow mechanism should be utilized.

It should also be noted that inlet protection devices are designed to be installed on construction sites and not on streets and roads open to the public. When used on public streets these devices will cause ponding of runoff, which can cause minor flooding and can present a traffic hazard. An example of appropriate siting would be a new subdivision where the storm drain system is installed before the area is stabilized and the streets open to the general public. When construction occurs adjacent to active streets, the sediment should be controlled on site and not on public thoroughfares. Occasionally, roadwork or utility installation will occur on public roads. In these cases, inlet protection is an appropriate temporary BMP.

The following inlet protection devices are for drainage areas of one acre or less. Runoff from larger disturbed areas should be routed to a temporary sediment trap or basin.

Filter barrier protection using silt fence is appropriate when the drainage area is less than one acre and the basin slope is less than five percent. This type of protection is not applicable in paved areas.

Block and gravel protection is used when flows exceed 0.5 cubic feet per second and it is necessary to allow for overtopping to prevent flooding. This form of protection is also useful for curb type inlets as it works well in paved areas.

Wire mesh and gravel protection is used when flows exceed 0.5 cubic feet per second and construction traffic may occur over the inlet. This form of protection may be used with both curb and drop inlets.

Excavated impoundment protection around a drop inlet may be used for protection against sediment entering a storm drain inlet. With this method, it is necessary to install weep holes to allow the impoundment to drain completely. If this measure is implemented, the impoundment should be sized such that the volume of excavation is 3,600 cubic feet per acre (equivalent to 1 inch of runoff) of disturbed area entering the inlet.

Inspection and Maintenance Guidelines:

(1) Inspection should be made weekly and after each rainfall. Repair or replacement should be made promptly as needed by the contractor.
(2) Remove sediment when buildup reaches a depth of 3 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode.
(3) Check placement of device to prevent gaps between device and curb.
(4) Inspect filter fabric and patch or replace if torn or missing.
(5) Structures should be removed and the area stabilized only after the remaining drainage area has been properly stabilized.

Drainage Area Map

There are two areas greater than 10 acres within a common drainage area that will be disturbed at one time. WQP-C1 and NT-1 are both greater than 10 acres and will be disturbed. An existing and proposed drainage area map is provided at the end of this report in Section 8 to support the aforementioned requirement.

Temporary Sediment Pond(s) Plans and Calculations

A sedimentation basin is required, where feasible, for a common drainage location that serves an area with ten (10) or more acres disturbed at one time.

A sedimentation basin may be temporary or permanent and must provide sufficient storage to contain a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained. When calculating the volume of runoff from a 2-year, 24-hour storm event, it is not required to include the flows from offsite areas and flow from onsite areas that are either undisturbed or have already undergone permanent stabilization, if these flows are diverted around both the disturbed areas of the site and the sediment basin.

Where rainfall data is not available or a calculation cannot be performed, the sedimentation basin must provide at least 3,600 cubic feet of storage per acre drained until final stabilization of the site.

If a sedimentation basin is not feasible, then the permittee shall provide equivalent control measures until final stabilization of the site. In determining whether installing a sediment basin is feasible, the permittee may consider factors such as site soils, slope, available area, public safety, precipitation patterns, site geometry, site vegetation, infiltration capacity, geotechnical factors, depth to groundwater, and other similar considerations. The permittee shall document the reason that the sediment basins are not feasible, and shall utilize equivalent control measures, which may include a series of smaller sediment basins.

Sites With Drainage Areas Less than Ten Acres

Sediment traps and sediment basins may be used to control solids in storm water runoff for drainage locations serving less than ten (10) acres.

Alternatively, a sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained may be utilized. Where rainfall data is not available or a calculation cannot be performed, a temporary or permanent sediment basin providing 3,600 cubic feet of storage per acre drained may be provided.

Proposed Sedimentation Basin Calculations

For Edgewood Phase 2, Section 2, the proposed onsite batch detention ponds will serve as a storage for on-site and off-site drainage. The basins will be designed to contain the 3,600 cubic feet per acre of disturbed area draining to the pond.

Temporary Sedimentation:

Two batch detention pond will serve as storage for on-site and off-site drainage for Edgewood Phase 2, Section 2 (as shown on sheets 60 & 61 of the construction drawings) during the construction phase. Drainage area C-1 includes 15.72 acres and generates a volume of 55,592 ft^3. The proposed detention pond (C-1) will contain a volume of 272,275 ft^3, thus the constructed detention pond will be adequately sized for sedimentation purposed for drainage area C-1. Drainage area C-2 includes 9.33 acres and generates a volume of 33,588 ft^3. The proposed detention pond (C-2) will contain a volume of 245,708 ft^3, thus the constructed detention pond will be adequately sized for sedimentation purposed for drainage area C-2.

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Inspection and Maintenance for BMPs

Personnel Responsible for Inspections

The agent that performs the inspections should be knowledgeable of this general permit, familiar with the construction site, and knowledgeable of the SWPPP for the site. The contractor is to provide an inspector with a CPESC, CESSWI, or CISEC certification. Documentation of the inspector's qualifications is to be included in the attached Inspector Qualifications Log.

Inspection Schedule

The primary operator is required to choose one of the two inspections listed below.

☐ **Option 1:** Once every seven calendar days. If this alternative schedule is developed, then the inspection must occur regardless of whether or not there has been a rainfall event since the previous inspection.

☐ **Option 2:** Once every 14 calendar days and within 24 hours of the end of a storm event of two inches or greater.

The inspections may occur on either schedule provided that documentation reflects the current schedule and that any changes to the schedule are conducted in accordance with the following provisions: the schedule may be changed a maximum of one time each month, the schedule change must be implemented at the beginning of a calendar month, and the reason for the schedule change must be documented (e.g., end of "dry" season and beginning of "wet" season).

If option 2 is the chosen frequency of inspections a rain gauge must be properly maintained on site or the storm event information from a weather station that is representative of the site location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, proper documentation of the total rainfall measured for that day must be recorded.
Personnel provided by the permittee must inspect:

- disturbed areas of the construction site that have not been finally stabilized;
- areas used for storage of materials that are exposed to precipitation;
- structural controls (for evidence of, or the potential for, pollutants entering the drainage system);
- sediment and erosion control measures identified in the SWP3 (to ensure they are operating correctly); and
- locations where vehicles enter or exit the site (for evidence of off-site sediment tracking).

Reductions in Inspection Frequency

Where sites have been finally or temporarily stabilized or where runoff is unlikely due to winter conditions (e.g. site is covered with snow, ice, or frozen ground exists), inspections must be conducted at least once every month. In arid, semi-arid, or drought-stricken areas, inspections must be conducted at least once every month and within 24 hours after the end of a storm event of 0.5 inches or greater. A record of the total rainfall measured, as well as the approximate beginning and ending dates of winter or drought conditions resulting in monthly frequency of inspections in the attached Rain Gauge Log.

In the event of flooding or other uncontrollable situations which prohibit access to the inspection sites, inspections must be conducted as soon as access is practicable.

Inspection Report Forms

Use the Inspection Report Forms given as a checklist to ensure that all required areas of the construction site are addressed. There is space to document the inspector's name as well as when the inspections regularly take place. The tables will document that the required area was inspected. (If there were any areas of concern, briefly describe them in this space with a more detailed description in the narrative section. Use the last table to document any discharges found during the inspections).

Describe how effective the installed BMPs are performing. Describe any BMP failures that were noted during the investigation and describe any maintenance required due to the failure. If new BMPs are needed as the construction site changes, the inspector can use the space at the bottom of the section to list BMPs to be implemented before the next inspection.

Describe the inspector's qualifications, how the inspection was conducted, and describe any areas of non-compliance in detail. If an inspection report does not identify any incidents of non-compliance, then it must contain a certifying signature stating that the facility or site is in compliance. The report must be signed by a person and in a manner required by 30 TAC 305.128. There is space at the end of the form to allow for this certifying signature.

Whenever an inspection shows that BMP modifications are needed to better control pollutants in runoff, the changes must be completed within seven calendar days following the inspection. If existing BMPs are modified or if additional BMPs are needed, you must describe your implementation schedule, and wherever possible, make the required BMP changes before the next storm event.

The Inspection Report Form functions as the required report and must be signed in accordance with TCEQ rules at 30 TAC 305.128.

Corrective Action

Personnel Responsible for Corrective Actions

Both Primary and Secondary Operators are responsible for maintaining all necessary Corrective Actions. If an individual is specifically identified as the responsible party for modifying the contact information for that individual should be documented in the attached Inspector Qualifications Log.

Corrective Action Forms

The Temporary BMPs must be modified based on the results of inspections, as necessary, to better control pollutants in runoff. Revisions must be completed within seven (7) calendar days following the inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the attached forms and wherever possible those changes implemented before the next storm event. If implementation before the next anticipated storm event is impracticable, these changes must be implemented as soon as practicable. Actions taken as a result of inspections must be properly documented by completing the corrective action forms given.

Schedule of Interim and Permanent Soil Stabilization

Construction practices shall disturb the minimal amount of existing ground cover as required for land clearing, grading, and construction activity for the shortest amount of time possible to minimize the potential of erosion and sedimentation from the site. Existing vegetation shall be maintained and left in place until it is necessary to disturb for construction activity. For this project the following stabilization practices will be implemented:

1. Hydraulic Mulch and Seeding: Disturbed areas subject to erosion shall be stabilized with hydraulic mulch and/or seeded and watered to provide interim stabilization. For areas that are not to be sodded as per the project landscaping plan, a minimum of 85% vegetative cover will be established to provide permanent stabilization.
2. Sodding and Wood Mulch: As per the project landscaping plan, Sodding and wood mulch will be applied to landscaped areas to provide permanent stabilization prior to project completion.

Records of the following shall be maintained:

a) The dates when major grading activities occur;
b) The dates when construction activities temporarily or permanently cease on a portion of the site; and
c) The dates when stabilization measures are initiated.

Stabilization measures must be initiated as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, and except as provided in the following, must be

initiated no more that fourteen (14) days after the construction activity in that portion of the site has temporarily or permanently ceased:

Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practical.

Where construction activity on a portion of the site is temporarily ceased and earth disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures do not have to be initiated on that portion of the site.

In arid areas (areas with an average rainfall of 0-10 inches), semiarid areas (areas with an average annual rainfall of 10 to 20 inches), and areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practical.

Maintenance

Below are some maintenance practices to be used to maintain erosion and sediment controls:

- All measures will be maintained in good working order. The operator should correct any damage or deficiencies as soon as practicable after the inspection, but in no case later than seven (7) calendar days after the inspection.
- BMP Maintenance (as applicable)
- Sediment must be removed from sediment traps and sedimentation ponds no later than the time that design capacity has been reduced by 50%. For perimeter controls such as silt fences, berms, etc., the trapped sediment must be removed before it reaches 50% of the above-ground height.
- Silt fence will be inspected for depth of sediment, tears, to see of the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- Drainage swale will be inspected and repaired as necessary.
- Inlet control will be inspected and repaired as necessary.
- Check dam will be inspected and repaired as necessary.
- Straw bale dike will be inspected and repaired as necessary.
- Diversion dike will be inspected and any breaches promptly repaired.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
- If sediment escapes the site, accumulations must be removed at a frequency that minimizes off-site impacts, and prior to the next rain event, if feasible. If the permittee does not own or operate the off-site conveyance, then the permittee must to work with the owner or operator of the property to remove the sediment.
- Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

To maintain the above practices, the following will be performed:

- Maintenance and repairs will be conducted before the next anticipated storm event or as necessary to maintain the continued effectiveness of storm water controls. Following an inspection, deficiencies should be corrected no later than seven (7) calendar days after the inspection.

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Inspector Qualifications Log*

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

Inspector Name: _____
Qualifications (Check as appropriate and provide description):
□ Training Course _____
□ Supervised Experience _____
□ Other _____

* *The agent that performs the inspections should be knowledgeable of this general permit, familiar with the construction site, and knowledgeable of the SWPPP for the site. The contractor is to provide an inspector with a CPESC, CESSWI, or CISEC certification.*

Kimley»Horn

Amendment Log

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

Kimley»Horn

Construction Activity Sequence Log

Name of Operator	Projected dates Month/year	Activity Disturbing Soil clearing, excavation, etc.	Location on-site where activity will be conducted	Acreage being disturbed

*Construction activity sequences for linear projects may be conducted on a rolling basis. As a result, construction activities may be at different stages at different locations in the project area. The Contractor is required to complete and update the schedule and adjust as necessary.

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Stormwater Control Installation and Removal Log

Stormwater Control	Location On-Site	Installation Date	Removal Date

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Stabilization Activities Log

Date Activity Initiated	Description of Activity	Description of Stabilization Measure and Location	Date Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures Initiated

Stabilization and erosion control practices may include, but are not limited to: establishing temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, and protecting existing trees and vegetation. List practices used where they are located, when they will be implemented, and whether they are temporary (interim) or permanent.

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Inspection Frequency Log

Date	Frequency Schedule and Reason for Change

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Rain Gauge Log

Date	Location of Rain Gauge	Gauge Reading

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General Information					
Name of Project		**Tracking No.**		**Inspection Date**	
Inspector Name, Title & Contact Information					
Present Phase of Construction					
Inspection Location (if multiple inspections are required, specify location where this inspection is being conducted)					

Inspection Frequency

Standard Frequency: ☐ Weekly ☐ Every 14 days and within 24 hours of a 0.25" rain

Increased Frequency: ☐ Every 7 days and within 24 hours of a 0.25" rain

Reduced Frequency:

- ☐ Once per month (for stabilized areas)
- ☐ Once per month and within 24 hours of a 0.25" rain (for arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought)
- ☐ Once per month (for frozen conditions where earth-disturbing activities are being conducted)

Was this inspection triggered by a 0.25" storm event? ☐ Yes ☐ No

If yes, how did you determined whether a 0.25" storm event has occurred?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source:

Total rainfall amount that triggered the inspection (in inches)**:**

Unsafe Conditions for Inspection

Did you determine that any portion of your site was unsafe for inspection? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

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Condition and Effectiveness of Erosion and Sediment (E&S) Controls				
Type/Location of E&S Control	**Repairs or Other Maintenance Needed?**	**Corrective Action Required?**	**Date on Which Maintenance or Corrective Action First Identified?**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

Condition and Effectiveness of Pollution Prevention (P2) Practices				
Type/Location of P2 Practices	**Repairs or Other Maintenance Needed?**	**Corrective Action Required?**	**Identification Date**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

Stabilization of Exposed Soil			
Stabilization Area	**Stabilization Method**	**Have You Initiated Stabilization?**	**Notes**
1.		☐ YES ☐ NO If yes, provide date:	
2.		☐ YES ☐ NO If yes, provide date:	
3.		☐ YES ☐ NO If yes, provide date:	
4.		☐ YES ☐ NO If yes, provide date:	
5.		☐ YES ☐ NO If yes, provide date:	

Description of Discharges	
Was a stormwater discharge or other discharge occurring from any part of your site at the time of the inspection? ☐ Yes ☐ No **If "yes", provide the following information for each point of discharge:**	
Discharge Location	**Observations**
1.	Describe the discharge: At points of discharge and the channels and banks of surface waters in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
2.	Describe the discharge: At points of discharge and the channels and banks of surface waters in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
3.	Describe the discharge: At points of discharge and the channels and banks of surface waters in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:

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Contractor or Subcontractor Certification and Signature
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Contractor or Subcontractor:** _____ **Date:** **Printed Name and Affiliation:** _____
Certification and Signature by Permittee
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Permittee or "Duly Authorized Representative":** _____ **Date:** **Printed Name and Affiliation:** _____

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Section A – Initial Report (Complete this section within 24 hours of discovering the condition that triggered corrective action)					
Name of Project		Tracking No.		Today's Date	
Date Problem First Discovered			Time Problem First Discovered		
Name and Contact Information of Individual Completing this Form					

What site conditions triggered the requirement to conduct corrective action:

☐ A required stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3

☐ The stormwater controls that have been installed and maintained are not effective enough for the discharge to meet applicable water quality standards

☐ A prohibited discharge has occurred or is occurring

Provide a description of the problem:

Deadline for completing corrective action (*Enter date that is either: (1) no more than 7 calendar days after the date you discovered the problem, or (2) if it is infeasible to complete work within the first 7 days, enter the date that is as soon as practicable following the 7th day)*:

If your estimated date of completion falls after the 7-day deadline, explain (1) why you believe it is infeasible to complete work within 7 days, and (2) why the date you have established for making the new or modified stormwater control operational is the soonest practicable timeframe:

Section B – Corrective Action Progress
(Complete this section no later than 7 calendar days after discovering the condition that triggered corrective action)

Section B.1 – Why the Problem Occurred

Cause(s) of Problem (Add an additional sheet if necessary)	How This Was Determined and the Date You Determined the Cause
1.	1.
2.	2.
3.	3.

Section B.2 – Stormwater Control Modifications to be Implemented to Correct the Problem

List of Stormwater Control Modification(s) Needed to Correct Problem (Add an additional sheet if necessary)	Completion Date	SWPPP Update Necessary?	Notes
1.		☐Yes ☐No Date:	
2.		☐Yes ☐No Date:	
3.		☐Yes ☐No Date:	

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Section A – Initial Report (Complete this section within 24 hours of discovering the condition that triggered corrective action)					
Name of Project		Tracking No.		Today's Date	
Date Problem First Discovered			Time Problem First Discovered		
Name and Contact Information of Individual Completing this Form					

What site conditions triggered the requirement to conduct corrective action:

☐ A required stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
☐ The stormwater controls that have been installed and maintained are not effective enough for the discharge to meet applicable water quality standards
☐ A prohibited discharge has occurred or is occurring

Provide a description of the problem:

Deadline for completing corrective action (*Enter date that is either: (1) no more than 7 calendar days after the date you discovered the problem, or (2) if it is infeasible to complete work within the first 7 days, enter the date that is as soon as practicable following the 7th day)*:

If your estimated date of completion falls after the 7-day deadline, explain (1) why you believe it is infeasible to complete work within 7 days, and (2) why the date you have established for making the new or modified stormwater control operational is the soonest practicable timeframe:

Section B – Corrective Action Progress
(Complete this section no later than 7 calendar days after discovering the condition that triggered corrective action)

Section B.1 – Why the Problem Occurred	
Cause(s) of Problem (Add an additional sheet if necessary)	How This Was Determined and the Date You Determined the Cause
1.	1.
2.	2.
3.	3.

Section B.2 – Stormwater Control Modifications to be Implemented to Correct the Problem			
List of Stormwater Control Modification(s) Needed to Correct Problem (Add an additional sheet if necessary)	Completion Date	SWPPP Update Necessary?	Notes
1.		☐Yes ☐No Date:	
2.		☐Yes ☐No Date:	
3.		☐Yes ☐No Date:	

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Contractor or Subcontractor Certification and Signature
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Contractor or Subcontractor:** _____ **Date:** **Printed Name and Affiliation:** _____
Certification and Signature by Permittee
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Permittee or "Duly Authorized Representative":** _____ **Date:** **Printed Name and Affiliation:** _____

SECTION 6:
LIFT STATION/FORCE MAIN

Lift Station/Force Main System Application

Texas Commission on Environmental Quality

for Regulated Activities On the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(c)(3)(B)and(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: Edgewood Phase 2, Section 2

Customer Information

(If different than customer information provided on core data form)

1. The person(s) responsible for providing the engineering certification to the TCEQ pursuant to 30 TAC §213.5(f)(2)(C) during construction and 30 TAC §213.5 (c)(3)(D) upon completion of construction is:

   Contact Person: Kyle Kriegel
   Entity: M/I Homes of Austin, LLC
   Mailing Address: 7600 N. Capital of Texas Hwy.; Bldg. C, Suite 250
   City, State: Austin, Texas Zip: 78731
   Telephone: (512) 779-8524 Fax: N/A
   Email Address: kkriegel@mihomes.com

2. The engineer responsible for the design of this lift station and force main:

   Contact Person: Tara Raoof, P.E.
   Entity: Kimley-Horn and Associates Inc.
   Mailing Address: 10814 Jollyville Road, Campus IV, Suite 200
   City, State: Austin, Texas Zip: 78759
   Telephone: (737) 270 7767 Fax: _____
   Email Address: tara.raoof@kimley-horn.com
   Texas Licensed Professional Engineer's Serial Number: 141851

Project Information

3. This project is for the construction or replacement of:

   ☐ Lift Station only.

☐ Lift Station and Force Main system.
☒ Lift Station, Force Main, and Gravity system.

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

   ☒ Existing
   ☐ Proposed

5. All components of this lift station/force main system will comply with:

   ☒ The City of Leander and Austin standard specifications.
   ☐ Other. Specifications are attached.

Site Plan Requirements

Items 6-14 must be included on the Site Plan.

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

   Site Plan Scale: 1" = 10‘.

7. ☒ Lift station/force main system layout meets all requirements of 30 TAC Chapter 217.

8. Geologic or Manmade Features:

   ☐ No geologic or manmade features were identified in the Geologic Assessment.
   ☒ All geologic or manmade features identified in the Geologic Assessment (caves, solution openings, sinkholes, fractures, joints, porous zones, etc.) which exist at the site of the proposed lift station and along the path(s) or within 50 feet of each side of a proposed force main line are shown on the Site Plan and are listed in the table below. Designs used to protect the integrity of the sewer line crossing each feature are described and labeled on the attached page. A detailed design drawing for each feature is shown on Plan Sheet N/A of N/A.
   ☐ No Geologic Assessment is required for this project.

Table 1 - Geologic or Manmade Features

Line	*Station to Station*	*Type of Feature*
N/A	to	
	to	
	to	
	to	
	to	
	to	
	to	
	to	

9. ☒ Existing topographic contours are shown and labeled. The contour interval is 1 feet. (Contour interval must not be greater than 5 feet).

10. ☒ Finished topographic contours are shown and labeled. The contour interval is 1 feet. (Contour interval must not be greater than 5 feet).

    ☐ Finished topographic contours will not differ from the existing topographic configuration and are not shown.

11. 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 Floodplaon Map Dated December 20th, 2019

12. 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 manmade. (Do not include streets or concrete-lined channels constructed above sewer lines.)
    ☐ After construction is complete, all sections of the force main 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 2 - 5-Year Floodplain

Line	*Sheet*	*Station to Station*
N/A	of	to
	of	to
	of	to
	of	to

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

    If applicable, this must agree with Item No. 15 on the Geologic Assessment Form.
    ☐ 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 plugged.
    ☐ The wells are not in use and will be properly plugged.
    ☐ 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.

14. ☒ Legal boundaries of the site are shown.

Plan and Profile Sheets

The construction drawings and technical specifications will not be considered for review unless they are the final plans and technical specifications which will be used by the contractor for bidding and construction.

Items 15 – 18 must be included on the Plan and Profile sheets.

15. ☒ The equipment installation construction plans must have a minimum scale of 1" = 10'.

    Plan sheet scale: 1" = 10 '.

16. ☒ Locations, descriptions and elevations of all required equipment and piping for the lift station and force main are shown and labeled.

17. ☒ Air Release/Vacuum Valves will be provided at all peaks in elevation of the proposed force main. These locations are listed in the table below and labeled on the appropriate plan and profile sheets.

Table 3 - Air Release/Vacuum Valves

Line	*Station*	*Sheet*
FM-A	5+48.55	56 of 113
FM-B	5+20+00	58 of 113
		of
		of
		of
		of

18. ☒ 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.

19. ☒ Attachment A - Engineering Design Report. An engineering design report with the following required items is attached:

    ☒ The report is dated, signed, and sealed by a Texas Licensed Professional Engineer.
    ☒ Calculations for sizing system.
    ☒ Pump head calculations, including, but not limited to, system head and pump capacity curves, head loss calculations, and minimum and maximum static head C values for normal and peak operational conditions.
    ☒ 100-year and 25-year flood considerations.
    ☒ Total lift station pumping capacity with the largest pump out of service.
    ☐ Type of pumps, including standby units.
    ☒ Type of pump controllers, including standby air supply for bubbler controllers, as applicable.

☒ Pump cycle time.
☒ Type of wet well ventilation; include number of air changes for mechanical ventilation.
☒ Minimum and maximum flow velocities for the force main.
☒ Lift station security.
☒ Lift station emergency provisions and reliability.

Administrative Information

20. ☒ Upon completion of the wet well excavation, a geologist must certify that the excavation was inspected for the presence of sensitive features and submit the signed, sealed, and dated certification to the appropriate regional office.

21. ☒ The TCEQ Lift Stations and Force Mains General Construction Notes (TCEQ-0591) are included on the General Notes Sheet of the Final Construction Plans for this lift station and/or force main system.

22. ☒ 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.

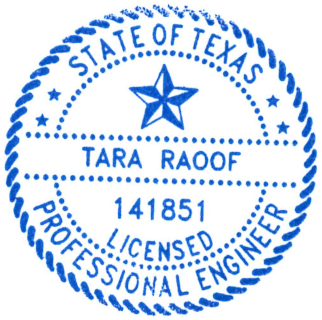
23. ☒ Any modification of this lift station/force main system application will require TCEQ approval, prior to construction, and may require submission of a revised application, with appropriate fees.

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 **Lift Station/Force Main 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)(3)(C) and 30 TAC Chapter 217, and prepared by:

Print Name of Licensed Professional Engineer: Tara Raoof, P.E .

Place engineer's seal here:



Date: 11/16/2023

Signature of Licensed Professional Engineer:

T.R.R. 2023.11.16 16:02:49-06'00'

Section 7: Additional Forms

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

I William Peckman,
Print Name

Area President,
Title - Owner/President/Other

of M/I HOMES OF AUSTIN,
Corporation/Partnership/Entity Name

have authorized Alejandro E. Granados Rico, P.E.
Print Name of Agent/Engineer

of Kimley-Horn and Associates
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

10/30/23
Date

THE STATE OF TEXAS §

County of ~~Williamson~~ TRAVIS §

BEFORE ME, the undersigned authority, on this day personally appeared William Peckman 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 1 day of November.

NOTARY PUBLIC

ALISON MCMANN
Notary Public, State of Texas
Comm. Expires 09-29-2024
Notary ID 130842098

ALISON MCMANN
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 09.29.2024

Owner Authorization Form

Texas Commission on Environmental Quality
for Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

Land Owner Authorization

I, Michael Love of Cannon 140, LP
Land Owner Signatory Name — Land Owner Name (Legal Entity or Individual)

am the owner of the property located at
BEING 45.29 ACRES OF LAND OUT OF THE MILTON HICKS SURVEY AND J.T. CHURCH SURVEY
Legal description of the property referenced in the application

and am duly authorized in accordance with §213.4(c)(2) and §213.4(d)(1) or §213.23(c)(2) and §213.23(d) relating to the right to submit an application, signatory authority, and proof of authorized signatory.

I do hereby authorize M/I Homes of Austin, LLC
Applicant Name (Legal Entity or Individual)

to conduct Installation and maintenance of all improvements associated with Edgewood Phase 2-2 Water Pollution Abatement Plan and Organized Sewage Collection System
Description of the proposed regulated activities

at 0.8 miles southeast of the intersection of RR2243 and CR175.
Precise location of the authorized regulated activities

Land Owner Acknowledgement

I understand that Cannon 140, LP
Land Owner Name (Legal Entity or Individual)

Is ultimately responsible for compliance with the approved or conditionally approved Edwards Aquifer protection plan and any special conditions of the approved plan through all phases of plan implementation even if the responsibility for compliance and the right to possess and control the property referenced in the application has been contractually assumed by another legal entity. I further understand that any failure to comply with any condition of the executive director's approval is a violation is subject to administrative rule or orders and penalties as provided under §213.10 (relating to Enforcement). Such violation may also be subject to civil penalties and injunction.

Land Owner Signature

Land Owner Signature

12/18/23
Date

THE STATE OF § Texas

County of § Harris

BEFORE ME, the undersigned authority, on this day personally appeared Michael Love 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 18th day of December 2023

NOTARY PUBLIC

BRANDON COMPTON
NOTARY PUBLIC · STATE OF TEXAS
ID # 128358766
COMM. EXP. 03-19-2024

Brandon Compton
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 03-19-2024

Attached: (Mark all that apply)

- ☐ Lease Agreement
- ☐ Signed Contract
- ☐ Deed Recorded Easement
- ☐ Other legally binding document

Applicant Acknowledgement

I, William G. Peckman of MI Homes of Austin, LLC

Applicant Signatory Name — Applicant Name (Legal Entity or Individual)

acknowledge that Cannon 140, LP

Land Owner Name (Legal Entity or Individual)

has provided MI Homes of Austin, LLC

Applicant Name (Legal Entity or Individual)

with the right to possess and control the property referenced in the Edwards Aquifer protection plan.

I understand that MI Homes of Austin, LLC

Applicant Name (Legal Entity or Individual)

is contractually responsible for compliance with the approved or conditionally approved Edwards Aquifer protection plan and any special conditions of the approved plan through all phases of plan implementation. I further understand that failure to comply with any condition of the executive director's approval is a violation is subject to administrative rule or orders and penalties as provided under §213.10 (relating to Enforcement). Such violation may also be subject to civil penalties and injunction.

Applicant Signature

Applicant Signature — Date: 12/19/2023

THE STATE OF § TEXAS

County of § TRAVIS

BEFORE ME, the undersigned authority, on this day personally appeared WILLIAM G. PECKMAN 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 19 day of DECEMBER, 2023

NOTARY PUBLIC

ALISON MCMANN

Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 09.29.24

ALISON MCMANN
Notary Public, State of Texas
Comm. Expires 09-29-2024
Notary ID 130842098

Application Fee Form

Texas Commission on Environmental Quality
Name of Proposed Regulated Entity: Edgewood Phase 2, Section 2
Regulated Entity Location: CR175 and RR 2243
Name of Customer: M/I Homes of Austin, LLC
Contact Person: William Peckman Phone: 512-770-8503
Customer Reference Number (if issued): 604305250
Regulated Entity Reference Number (if issued):N/A

Austin Regional Office (3373)

☐ Hays ☐ Travis ☒ Williamson

San Antonio Regional Office (3362)

☐ Bexar ☐ Medina ☐ Uvalde
☐ Comal ☐ Kinney

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

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

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

Site Location (Check All That Apply):

☒ Recharge Zone ☒ Contributing Zone ☐ Transition Zone

Type of Plan	***Size***	***Fee Due***
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	
Sewage Collection System	8,466 LF	$4,233
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: Alejandro E. Granados Rios Date: November 7th, 2023

Application Fee Schedule

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

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

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

Organized Sewage Collection Systems and Modifications

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

Underground and Aboveground Storage Tank System Facility Plans and Modifications

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

Exception Requests

Project	*Fee*
Exception Request	$500

Extension of Time Requests

Project	*Fee*
Extension of Time Request	$150

Kimley»Horn

Core Data Form

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

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

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

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

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 604305250		RN

SECTION II: Customer Information

4. General Customer Information | **5. Effective Date for Customer Information Updates** (mm/dd/yyyy): 11/7/2023

☐ 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:*

M/I Homes of Austin, LLC

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
0801672376	32049298139		

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

12. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ Yes ☒ No

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

☐ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address: 7600 N. Capital of Texas Hwy.; Bldg. C, Suite 250

City	State	ZIP	ZIP + 4
Austin	TX	78731	

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

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(512) 770-8503		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (*If 'New Regulated Entity" is selected below this form should be accompanied by a permit application*)

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

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

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

Edgewood Phase 2, Section 2

23. Street Address of the Regulated Entity: *(No PO Boxes)*	CR 175 and RR 2243							
	City	Leander	**State**	TX	**ZIP**	78660	**ZIP + 4**	
24. County	Williamson							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	Southeast of the intersection of RR 2243 and CR 175				
26. Nearest City			**State**	**Nearest ZIP Code**	
Leander			TX	78660	
27. Latitude (N) In Decimal:	30.585446	**28. Longitude (W) In Decimal:**	-97.787923		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
30	35	7.98	-97	47	16.85

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)
6552		237210	

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

Single Family Homes

34. Mailing Address:	**7600 N. Capital of Texas Hwy., Bldg. C, Suite 250**							
	City	**Austin**	**State**	**TX**	**ZIP**	**78731**	**ZIP + 4**	

35. E-Mail Address:	**aevetts@mihomes.com**		
36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*	
(512) 770-8503		**( ) -**	

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

☐ Dam Safety	☐ Districts	☒ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Alejandro E. Granados Rico	**41. Title:**	Project Manager

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(512) 782-0602		( ) -	alex.granados@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:	M/I Homes of Austin, LLC	**Job Title:**	Area President
Name *(In Print):*	William L Peckham	**Phone:**	(512)770-8524
Signature:		**Date:**	10/30/23

Section 8: Exhibits

EDGEWOOD

PHASE 2, SECTION 2

PUBLIC IMPROVEMENT CONSTRUCTION PLANS
PROJECT #PICP-23-0105

APPROVED BY:

ROBIN M. GRIFFIN, AICP, EXECUTIVE DIRECTOR OF DEVELOPMENT SERVICES — DATE

EMILY TRUMAN, P.E., CITY ENGINEER — DATE

GINA ELLISON, P.E., PUBLIC WORKS DIRECTOR — DATE

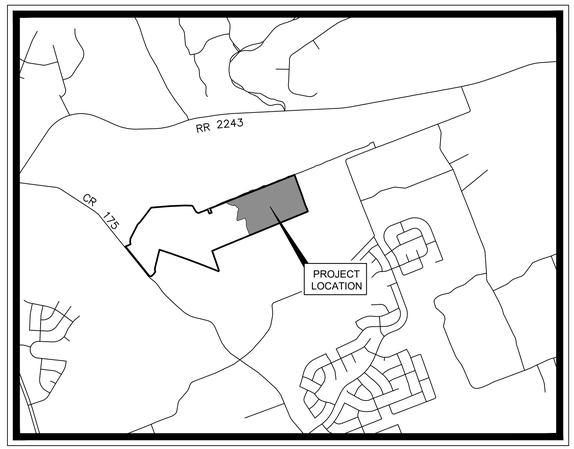
MARK TUMMONS, CPRP, DIRECTOR OF PARKS AND RECREATION — DATE

CHIEF JOSHUA DAVIS, FIRE MARSHAL — DATE

THE ENGINEER OF RECORD IS SOLELY RESPONSIBLE FOR THE COMPLETENESS, ACCURACY, REGULATORY COMPLIANCE, AND ADEQUACY OF THESE PLANS AND/OR SPECIFICATIONS WHETHER OR NOT THE PLANS AND/OR SPECIFICATIONS WERE REVIEWED BY THE CITY ENGINEER(S).

PLAN SUBMITTAL/REVIEW LOG

1ST SUBMITTAL TO CITY	11/7/2023



VICINITY MAP

SCALE: 1" = 2,000'

NOVEMBER 2023

LEGAL DESCRIPTION

BEING 45.28 ACRES OF LAND OUT OF THE JOHN T. CHURCH SURVEY, ABSTRACT NO. 140 AND THE MILTON HICKS SURVEY, ABSTRACT 287 IN WILLIAMSON COUNTY, TEXAS BEING THOSE CERTAIN TRACTS OF LAND CONVEYED TO CANNON 140 LP BY DEEDS OF RECORD IN DOCUMENT NOS. 2013049063 AND 2013049270 OF THE OFFICIAL PUBLIC RECORDS OF WILLIAMSON COUNTY, TEXAS.

WATERSHED STATUS

THIS SITE IS LOCATED IN THE SOUTH BRUSHY CREEK OF THE BRUSHY CREEK WATERSHED.
THIS SITE IS LOCATED IN THE EDWARDS AQUIFER RECHARGE ZONE.

FLOODPLAIN INFORMATION

A PORTION OF THIS TRACT IS WITHIN A FLOOD HAZARD AREA AS SHOWN ON THE FLOOD INSURANCE RATE MAP PANEL #48491C0460F FOR WILLIAMSON CO., EFFECTIVE DECEMBER 20, 2019.

DISTURBED ACREAGE INFORMATION

EDGEWOOD, PHASE 2, SECTION 2 DISTURBED ACREAGE APPROX.= 35.24 ACRES

GENERAL NOTES

1. ALL PUBLIC IMPROVEMENTS INCLUDING WATER AND WASTEWATER WITHIN DEDICATED RIGHT OF WAY AND PUBLIC UTILITY EASEMENTS TO BE OWNED AND MAINTAINED BY THE CITY OF LEANDER.
2. ALL WATER QUALITY IMPROVEMENTS, EXCLUDING THE BATCH DETENTION POND, ARE TO BE DEDICATED, OWNED AND MAINTAINED BY THE CITY OF LEANDER. THE BATCH DETENTION POND WILL BE DEDICATED, OWNED, AND OPERATED BY THE HOA. HOA WILL MOW AND MAINTAIN THE LANDSCAPING IN THE OPEN CHANNELS, DETENTION, AND WATER QUALITY AREAS.
3. THE ENGINEER OF RECORD IS SOLELY RESPONSIBLE FOR THE COMPLETENESS, ACCURACY, REGULATORY COMPLIANCE, AND ADEQUACY OF THESE PLANS AND/OR SPECIFICATIONS WHETHER OR NOT THE PLANS AND/OR SPECIFICATIONS WERE REVIEWED BY THE CITY ENGINEER(S).

SHEET INDEX

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

Know what's below. Call before you dig.

ENGINEER

Kimley»Horn
501 SOUTH AUSTIN AVENUE, SUITE 1310
GEORGETOWN, TEXAS 78626
CERTIFICATE OF REGISTRATION #928
Tel. No. (512) 418-1771
Fax No. (512) 418-1791
CONTACT: ALEJANDRO E. GRANADOS RICO

OWNER/DEVELOPER

OWNER:	DEVELOPER:
CANNON 140, LP	M/I HOMES OF AUSTIN, LLC
11914 LAURIE LANE	7600 N. CAPITAL OF TEXAS HWY.
HOUSTON, TX 77024	BLDG. C, SUITE 250
TEL: (713) 816-5053	AUSTIN, TX 78731
CONTACT: MIKE LOVE	TEL: (512) 770-8524
	CONTACT: KYLE KRIEGEL

REVISIONS

REVISION #	DESCRIPTION	APPROVAL

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: DPD
CHECKED BY: AEG

COVER SHEET

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER 1 OF 112

EDGEWOOD - PHASE 2 SECTION 2
PROJECT NO. 067783129
KHA PROJECT
CIVIL CONSTRUCTION PLANS

CITY CONTACTS:

ENGINEERING MAIN LINE:	512-528-2721
PLANNING DEPARTMENT:	512-528-2750
PUBLIC WORKS MAIN LINE:	512-259-2640
STORMWATER INSPECTIONS:	512-285-0055
UTILITIES MAIN LINE:	512-259-1142
UTILITIES ON-CALL:	512-690-4760

GENERAL NOTES:

REVISED MARCH 27, 2023

1. CONTRACTORS SHALL HAVE AN APPROVED SET OF PLANS WITH APPROVED REVISIONS ON SITE AT ALL TIMES. FAILURE TO HAVE APPROVED PLANS ON SITE MAY RESULTS IN ISSUANCE OF WORK STOPPAGE.
2. CONTACT 811 SYSTEM FOR EXISTING WATER AND WASTEWATER LOCATIONS 48 HOURS PRIOR TO CONSTRUCTION
   a. **REFRESH ALL LOCATES *BEFORE* 14 DAYS** - LOCATE REFRESH REQUESTS MUST INCLUDE A COPY OF YOUR 811 TICKET. TEXAS PIPELINE DAMAGE PREVENTION LAWS REQUIRE THAT A LOCATE REFRESH REQUEST BE SUBMITTED BEFORE 14 DAYS, OR IF LOCATION MARKERS ARE NO LONGER VISIBLE.
   b. **REPORT PIPELINE DAMAGE IMMEDIATELY** - IF YOU WITNESS OR EXPERIENCE PIPELINE EXCAVATION DAMAGE, PLEASE CONTACT THE CITY OF LEANDER BY PHONE AT 512-259-2640
3. THE CONTRACTORS SHALL CONTACT THE CITY INSPECTOR 48 HOURS BEFORE
   a. BEGINNING EACH PHASE OF CONSTRUCTION. CONTACT ASSIGNED CITY INSPECTOR.
   b. ANY TESTING. CONTRACTORS SHALL PROVIDE QUALITY TESTING FOR ALL INFRASTRUCTURES TO BE ACCEPTED AND MAINTAINED BY THE CITY OF LEANDER AFTER COMPLETION.
   c. PROOF ROLLING SUB-GRADE AND EVERY LIFT OF ROADWAY EMBANKMENT, IN-PLACE DENSITY TESTING OF EVERY BASE COURSE, AND ASPHALT CORES. ALL OF THIS TESTING MUST BE WITNESSED BY A CITY OF LEANDER REPRESENTATIVE.
   d. CONNECTING TO THE EXISTING WATER LINES
   e. THE INSTALLATION OF ANY DRAINAGE FACILITY WITHIN A DRAINAGE EASEMENT OR STREET ROW. THE METHOD OF PLACEMENT AND COMPACTION OF BACKFILL IN THE CITY'S ROW MUST BE APPROVED PRIOR TO THE START OF BACKFILL OPERATIONS
4. ALL RESPONSIBILITILY FOR THE ACCURACY OF THESE PLANS REMAINS WITH THE ENGINEER OF RECORD WHO PREPARED THEM. IN REVIEWING THESE PLANS, THE CITY MUST RELY ON THE ADEQUACY OF THE WORK OF THE ENGINEER OF RECORD.
5. **EXCESS SOIL SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE. NOTIFY THE CITY OF LEANDER IF THE DISPOSAL SITE IS INSIDE THE CITY'S JURISDICTIONAL BOUNDARIES.**
6. BURNING IS PROHIBITED
7. NO WORK IS TO BE PERFORMED BETWEEN THE HOURS OF 9:00 P.M. AND 7:00 A.M. OR WEEKENDS. THE CITY INSPECTOR RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO UNCOVER ALL WORK PERFORMED WITHOUT INSPECTION.
8. CONTRACT THE CITY INSPECTOR 4 DAYS PRIOR TO WORK FOR APPROVAL TO SCHEDULE ANY INSPECTIONS ON WEEKENDS OR CITY HOLIDAYS.
9. NO BLASTING IS ALLOWED.
10. ANY CHANGES OR REVISIONS TO THESE PLANS MUST FIRST BE SUBMITTED TO THE CITY BY THE DESIGN ENGINEER FOR REVIEW AND WRITTEN APPROVAL PRIOR TO CONSTRUCTION OF THE REVISION. ALL CHANGES AND REVISIONS SHALL USE REVISION CLOUDS TO HIGHLIGHT ALL REVISIONS AND CHANGES WITH EACH SUBMITTAL. REVISION TRIANGLE MARKERS AND NUMBERS SHALL BE USED TO MARK REVISIONS. ALL CLOUDS AND TRIANGLE MARKERS FROM PREVIOUS REVISIONS MUST BE REMOVED. REVISION INFORMATION SHALL BE UPDATED ON COVER SHEET AND AFFECTED PLAN SHEET TITLE BLOCK. THE CONTRACTOR SHALL GIVE THE CITY OF LEANDER 48 HOURS NOTICE BEFORE BEGINNING EACH PHASE OF CONSTRUCTION. CONTACT ASSIGNED CITY INSPECTOR.
11. THE CONTRACTOR AND ENGINEER SHALL KEEP ACCURATE RECORDS OF ALL CONSTRUCTION THAT DEVIATES FROM THE PLANS. THE ENGINEER SHALL FURNISH THE CITY OF LEANDER ACCURATE "RECORD DRAWINGS" FOLLOWING THE COMPLETION OF ALL CONSTRUCTION. THESE "RECORD DRAWINGS" SHALL MEET THE SATISFACTION OF THE ENGINEERING DEPARTMENTS PRIOR TO FINAL ACCEPTANCE.
12. THE CONTRACTOR WILL REIMBURSE THE CITY FOR ALL REPAIR AND/OR COST INCURRED AS A RESULT OF ANY DAMAGE TO ANY PUBLIC INFRASTRUCTURE WITHIN CITY EASEMENT OR PUBLIC RIGHT-OF-WAY, REGARDLESS OF THESE PLANS.
13. WHEN CONSTRUCTION IS BEING CARRIED OUT WITHIN EASEMENTS, THE CONTRACTOR SHALL CONFINE HIS WORK TO WITHIN THE PERMANENT AND TEMPORARY EASEMENTS. PRIOR TO ACCEPTANCE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL TRASH AND DEBRIS WITHIN THE PERMANENT EASEMENTS. CLEANUP SHALL BE TO THE SATISFACTION OF THE ENGINEER OF RECORD AND CITY.
14. CONTRACTOR TO LOCATE, PROTECT, AND MAINTAIN BENCHMARKS, MONUMENTS, CONTROL POINTS AND PROJECT ENGINEERING REFERENCE POINTS. RE-ESTABLISH DISTURBED OR DESTROYED ITEMS BY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF TEXAS, AT NO ADDITIONAL COST TO THE PROPERTY OWNER.
15. ALL CONSTRUCTION OPERATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH APPLICABLE REGULATIONS OF THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA). OSHA STANDARDS MAY BE PURCHASED FROM THE GOVERNMENT PRINTING OFFICE; INFORMATION AND RELATED REFERENCE MATERIALS MAY BE PURCHASED FROM OSHA, 1033 LA POSADA DR. SUITE 375, AUSTIN, TEXAS 78752-3832.
16. ALL MANHOLE FRAMES/COVERS AND WATER VALVE/METER BOXES MUST BE ADJUSTED TO FINISHED GRADE AT THE OWNER'S EXPENSE BY THE CONTRACTOR FOR CITY CONSTRUCTION INSPECTOR INSPECTION. ALL UTILITY ADJUSTMENTS SHALL BE COMPLETED PRIOR TO FINAL PAVING. CONTRACTOR SHALL BACKFILL AROUND MANHOLES AND VALVE BOXES WITH CLASS A CONCRETE.
17. ALL MATERIALS AND CONSTRUCTION PROCEDURES WITHIN THE SCOPE OF THIS CONTRACT WHERE NOT SPECIFICALLY COVERED IN THE PROJECT SPECIFICATIONS SHALL CONFORM TO ALL CITY OF LEANDER DETAILS AND CITY OF AUSTIN STANDARD SPECIFICATIONS.
18. PROJECT SPECIFICATIONS TAKE PRECEDENCE OVER PLANS AND SPECIAL CONDITIONS GOVERN OVER TECHNICAL SPECIFICATIONS.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACQUIRING ALL PERMITS, TESTS, APPROVALS AND ACCEPTANCES REQUIRED TO COMPLETE CONSTRUCTION OF THIS PROJECT.
20. THE CONTRACTOR MUST OBTAIN A CONSTRUCTION WATER METER FOR ALL WATER USED DURING CONSTRUCTION. A COPY OF THIS PERMIT MUST BE CARRIED AT ALL TIMES BY ALL WHO USE WATER.
21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING ROADS AND DRIVES ADJACENT TO AND NEAR THE SITE FREE FROM SOIL, SEDIMENT AND DEBRIS. CONTRACTOR WILL NOT REMOVE SOIL, SEDIMENT OR DEBRIS FROM ANY AREA OR VEHICLE BY MEANS OF WATER. ONLY SHOVELING AND SWEEPING WILL BE ALLOWED. THE CONTRACTOR WILL BE RESPONSIBLE FOR DUST CONTROL FROM THE SITE. THE CONTRACTOR SHALL KEEP THE SITE AREA CLEAN AND MAINTAINED AT ALL TIMES, TO THE SATISFACTION OF THE CITY. THE SUBDIVISION (OR SITE) WILL NOT BE ACCEPTED (OR CERTIFICATE OF OCCUPANCY ISSUED) UNTIL THE SITE HAS BEEN CLEANED TO THE SATISFACTION OF THE CITY.
22. TREES IN EXISTING ROW SHOULD BE PROTECTED OR NOTED IN THE PLANS TO BE REMOVED.

CONSTRUCTION SEQUENCING PER PHASE:

1. REACH OUT TO THE CITY FOR PRE-CONSTRUCTION MEETING AND CONSTRUCTION PERMIT.
2. SET-UP E/S CONTROLS AND TREE PROTECTION AND REACH OUT TO CITY FOR INSPECTION.
3. SET UP TEMPORARY TRAFFIC CONTROLS.
4. CONSTRUCT THE DRAINAGE PONDS AND STORM WATER FEATURES.
5. BEGIN SITE CLEARING.
6. CLEAR AND GRUB AND STRIP TOPSOIL. STOCKPILE TOPSOIL FOR LATER USE.
7. ROUGH SUBGRADE SITE IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.
8. CONSTRUCT WET AND DRY UTILITIES.
9. FINAL SUBGRADE PREPARATION.
10. INSTALL BASE MATERIALS.
11. INSTALL CONCRETE (FOUNDATIONS, CURBS, FLATWORK).
12. CONSTRUCT BUILDINGS.
13. INSTALL PAVEMENTS.
14. TOPSOIL, IRRIGATION, AND LANDSCAPING.
15. PROJECT ENGINEER INSPECTS JOB AND SUBMITS THE ENGINEER'S CONCURRENCE LETTER.
16. CITY VISITS SITE AND ISSUES CERTIFICATE OF ACCEPTANCE ONLY IF ALL CONSTRUCTION IS IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
17. SITE CLEANUP AND REMOVAL OF TEMPORARY BMP'S.
18. FOLLOWING THE COMPLETION OF THE PROJECT THE CONTRACTOR SHALL REMOVE ANY SEDIMENT BUILDUP IN THE WET POND FROM CONSTRUCTION ACTIVITIES.
19. REQUEST FINAL WALKTHROUGH AND CONDUCT WALKTHROUGH WITH ENGINEER OF RECORD AND CITY DEPARTMENT.
20. ENGINEER OF RECORD IS RESPONSIBLE TO PREPARE AND SUBMIT CLOSEOUT DOCUMENTS FOR PROJECT CLOSEOUT.

EROSION CONTROL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSPECT THE CONTROLS AND FENCES AT WEEKLY INTERVALS AND AFTER SIGNIFICANT RAINFALL EVENTS TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF CONTROLS AND FENCES AND SHALL IMMEDIATELY MAKE ANY NECESSARY REPAIRS TO DAMAGED AREAS. SILT ACCUMULATION AT CONTROLS MUST BE REMOVED WHEN THE DEPTH REACHES SIX (6) INCHES
2. THE TEMPORARY SPOILS DISPOSAL SITE IS TO BE SHOWN IN THE EROSION CONTROL MAP.
3. ANY ON-SITE SPOILS DISPOSAL SHALL BE REMOVED PRIOR TO ACCEPTANCE UNLESS SPECIFICALLY SHOWN ON THE PLANS. THE DEPTH OF SPOIL SHALL NOT EXCEED 10 FEET IN ANY AREA.
4. ALL AREAS DISTURBED OR EXPOSED DURING CONSTRUCTION SHALL BE RESTORED WITH A MINIMUM OF 6 INCHES OF TOPSOIL AND COMPOST BLEND. TOPSOIL ON SINGLE FAMILY LOTS MAY BE INSTALLED WITH HOME CONSTRUCTION. THE TOPSOIL AND COMPOST BLEND SHALL CONSIST OF 75% TOPSOIL AND 25% COMPOST.
5. SEEDING FOR REESTABLISHING VEGETATION SHALL COMPLY WITH THE AUSTIN GROW GREEN GUIDE OR WILLIAMSON COUNTY'S PROTOCOL FOR SUSTAINABLE ROADSIDES (SPEC 164--WC001 SEEDING FOR EROSION CONTROL). RESEEDING VARIETIES OF BERMUDA SHALL NOT BE USED.
6. STABILIZED CONSTRUCTION ENTRANCE IS REQUIRED AT ALL POINTS WHERE CONSTRUCTION TRAFFIC IS EXITING THE PROJECT ONTO EXISTING PAVEMENT. LINEAR CONSTRUCTION PROJECTS MAY REQUIRE SPECIAL CONSIDERATION. ROADWAYS SHALL REMAIN CLEAR OF SILT AND MUD.
7. TEMPORARY STOP SIGNS SHOULD BE INSTALLED AT ALL CONSTRUCTION ENTRANCES WHERE A STOP CONDITION DOES NOT ALREADY EXIST.
8. IN THE EVENT OF INCLEMENT WEATHER THAT MAY RESULT IN A FLOODING SITUATION, THE CONTRACTOR SHALL REMOVE INLET PROTECTION MEASURES UNTIL SUCH TIME AS THE WEATHER EVENT HAS PASSED.

TREE PROTECTION NOTES:

1. ALL TREES AND NATURAL AREAS SHOWN ON PLAN TO BE PRESERVED SHALL BE PROTECTED DURING CONSTRUCTION WITH TEMPORARY FENCING.
2. PROTECTIVE FENCES SHALL BE ERECTED ACCORDING TO CITY OF LEANDER STANDARDS FOR TREE PROTECTION.
3. PROTECTIVE FENCES SHALL BE INSTALLED PRIOR TO THE START OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING, OR GRADING), AND SHALL BE MAINTAINED THROUGHOUT ALL PHASES OF THE CONSTRUCTION PROJECTS.
4. EROSION AND SEDIMENTATION CONTROL BARRIERS SHALL BE INSTALLED OR MAINTAINED IN A MANNER WHICH DOES NOT RESULT IN SOIL BUILD UP WITHIN TREE DRIP LINES.
5. PROTECTIVE FENCES SHALL SURROUND THE TREES OR GROUP OF TREES, AND WILL BE LOCATED AT THE OUTERMOST LIMITS OF BRANCHES (DRIP LINE), FOR NATURAL AREAS, PROTECTIVE FENCES SHALL FOLLOW THE LIMIT OF CONSTRUCTION LINE, IN ORDER TO PREVENT THE FOLLOWING:
   A. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC OR STORAGE OF EQUIPMENT OF MATERIALS;
   B. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN 6 INCHES CUT OR FILL), OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE CITY ARBORIST;
   C. WOUNDS TO EXPOSED ROOTS, TRUNK OR LIMBS BY MECHANICAL EQUIPMENT;
   D. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CHEMICAL STORAGE, CEMENT TRUCK CLEANING, AND FIRES.
6. EXCEPTIONS TO INSTALLING FENCES AT TREE DRIP LINES MAY BE PERMITTED IN THE FOLLOWING CASE:
   A. WHERE THERE IS TO BE AN APPROVED GRADE CHANGE, IMPERMEABLE PAVING SURFACE, TREE WELL, OR OTHER SUCH SITE DEVELOPMENT, ERECT THE FENCE APPROXIMATELY 2 TO 4 FEET BEYOND THE AREA DISTURBED;
   B. WHERE PERMEABLE PAVING IS TO BE INSTALLED WITHIN A TREE'S DRIP LINE, ERECT THE FENCE AT THE OUTER LIMITS OF THE PERMEABLE PAVING AREA (PRIOR TO SITE GRADING SO THAT THIS AREA IS GRADED SEPARATELY PRIOR TO PAVING INSTALLATION TO MINIMIZE ROOT DAMAGE);
   C. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE TO ALLOW 6 TO 10 FEET OF WORK SPACE BETWEEN THE FENCE AND THE BUILDING;
   D. WHERE THERE ARE SEVERE SPACE CONSTRAINTS DUE TO TRACT SIZE, OR OTHER SPECIAL REQUIREMENTS, CONTACT THE CITY ARBORIST AT 974-1876 TO DISCUSS ALTERNATIVES. SPECIAL NOTE: FOR THE PROTECTION OF NATURAL AREAS, NO EXCEPTIONS TO INSTALLING FENCES AT THE LIMIT OF CONSTRUCTION LINE WILL BE PERMITTED.
7. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN A FENCE BEING CLOSER THAN 4 FEET TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF 8 FT (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE REDUCED FENCING PROVIDED.
8. TREES APPROVED FOR REMOVAL SHALL BE REMOVED IN A MANNER WHICH DOES NOT IMPACT TREES TO BE SAVED.
9. ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOP SOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN 2 DAYS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
10. ANY TRENCHING REQUIRED FOR THE INSTALLATION OF LANDSCAPE IRRIGATION SHALL BE PLACED AS FAR FROM EXISTING TREE TRUNKS AS POSSIBLE.
11. NO LANDSCAPE TOPSOIL DRESSING GREATER THAN 4 INCHES SHALL BE PERMITTED WITHIN THE DRIP LINE OF TREES. NO SOIL IS PERMITTED ON THE ROOT FLARE OF ANY TREE.
12. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC AND EQUIPMENT SHALL TAKE PLACE BEFORE DAMAGE OCCURS (RIPPING OF BRANCHES, ETC..).
13. ALL FINISHED PRUNING SHALL BE DONE ACCORDING TO RECOGNIZED, APPROVED STANDARDS OF THE INDUSTRY (REFERENCE THE NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES AVAILABLE ON REQUEST FROM THE CITY ARBORIST).
14. DEVIATIONS FROM THE ABOVE NOTES MAY BE CONSIDERED ORDINANCE VIOLATIONS IF THERE IS SUBSTANTIAL NONCOMPLIANCE OR IF A TREE SUSTAINS DAMAGE AS A RESULT.

TRENCH SAFETY NOTES:

1. TRENCH SAFETY SYSTEMS TO BE UTILIZED FOR THIS PROJECT ARE DESCRIBED IN ITEM 509S "TRENCH SAFETY SYSTEMS" OF THE CITY OF AUSTIN STANDARD SPECIFICATIONS AND SHALL BE IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS AND THE U.S. OCCUPATION SAFETY AND HEALTH ADMINISTRATION REGULATIONS.

WATER AND WASTEWATER GENERAL NOTES:

1. ALL NEWLY INSTALLED PIPES AND RELATED PRODUCTS MUST CONFORM TO AMERICAN NATIONAL STANDARDS INSTITUTE/NATIONAL SANITATION FOUNDATION (ANSI/NSF) STANDARD 61 AND MUST BE CERTIFIED BY AND ORGANIZATION ACCREDITED BY ANSI.
2. ALL WATER SERVICE, WASTEWATER SERVICE AND VALVE LOCATIONS SHALL BE APPROPRIATELY STAMPED AS FOLLOWS:
   WATER SERVICE "W" ON TOP OF CURB
   WASTEWATER SERVICE "S" ON TOP OF CURB
   VALVE "V" ON TOP OF CURB
3. OPEN UTILITIES SHALL NOT BE PERMITTED ACROSS THE EXISTING PAVED SURFACES. WATER AND WASTEWATER LINES ACROSS THE EXISTING PAVED SURFACES SHALL BE BORED AND INSTALLED IN STEEL ENCASEMENT PIPES. BELL RESTRAINTS SHALL BE PROVIDED AT JOINTS.
4. INTERIOR SURFACES OF ALL DUCTILE IRON POTABLE OR RECLAIMED WATER PIPE SHALL BE CEMENT-MORTAR LINED AND SEAL COATED AS REQUIRED BY AWWA C104.
5. SAND, AS DESCRIBED IN AUSTIN SPECIFICATION ITEM 510 PIPE, SHALL NOT BE USED AS BEDDING FOR WATER AND WASTEWATER LINES. ACCEPTABLE BEDDING MATERIALS ARE PIPE BEDDING STONE, PEA GRAVEL AND IN LIEU OF SAND, A NATURALLY OCCURRING OR MANUFACTURED STONE MATERIAL CONFORMING TO ASTM C33 FOR STONE QUALITY AND MEETING THE FOLLOWING GRADATION SPECIFICATION:

SIEVE SIZE	PERCENT RETAINED BY WEIGHT
1/2"	0
3/8"	0-2
#4	40-85
#10	95-100

6. DENSITY TESTING FOR TRENCH BACKFILL SHALL BE DONE IN MAXIMUM 12" LIFTS.

WATER NOTES:

1. SAMPLING TAPS SHALL BE BROUGHT UP TO 3 FEET ABOVE GRADE AND SHALL BE EASILY ACCESSIBLE FOR CITY PERSONNEL. AT THE CONTRACTORS' REQUEST, AND IN HIS PRESENCE, SAMPLES FOR BACTERIOLOGICAL TESTING WILL BE COLLECTED BY THE CITY OF LEANDER NOT LESS THAN 24 HOURS AFTER THE TREATED LINE HAS BEEN FLUSHED OF THE CONCENTRATED CHLORINE SOLUTION AND CHARGED WITH WATER APPROVED BY THE CITY.
2. CITY PERSONNEL WILL OPERATE OR AUTHORIZE THE CONTRACTOR TO OPERATE ALL WATER VALVES THAT WILL PASS THROUGH THE CITY'S POTABLE WATER. THE CONTRACTOR MAY BE FINED $500 OR MORE, INCLUDING ADDITIONAL THEFT OF WATER FINES, IF A WATER VALVE IS OPERATED IN AN UNAUTHORIZED MANNER, REGARDLESS OF WHO OPERATED THE VALVE.
3. THE CONTRACTOR IS HEREBY NOTIFIED THAT CONNECTING TO, SHUTTING DOWN, OR TERMINATING EXISTING UTILITY LINES MAY HAVE TO OCCUR AT OFF-PEAK HOURS. SUCH HOURS ARE USUALLY OUTSIDE NORMAL WORKING HOURS AND POSSIBLY BETWEEN 12 AM AND 6 AM AFTER COORDINATING WITH CITY CONSTRUCTION INSPECTORS AND INFORMING AFFECTED PROPERTIES
4. PRESSURE TAPS OR HOT TAPS SHALL BE IN ACCORDANCE WITH CITY OF LEANDER STANDARD SPECIFICATIONS. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION AND SHALL FURNISH, INSTALL AND AIR TEST THE SLEEVE AND VALVE. A CITY OF LEANDER INSPECTOR MUST BE PRESENT WHEN THE CONTRACTOR MAKES A TAP, AND/OR ASSOCIATED TESTS. A MINIMUM OF TWO (2) WORKING DAYS NOTICE IS REQUIRED. "SIZE ON SIZE" TAPS SHALL NOT BE PERMITTED UNLESS MADE BY THE USE OF AN APPROVED FULL-CIRCLE GASKETED TAPPING SLEEVE. CONCRETE THRUST BLOCKS SHALL BE PLACED BEHIND AND UNDER ALL TAP SLEEVES A MINIMUM OF 24 HOURS PRIOR TO THE BRANCH BEING PLACED INTO SERVICE. THRUST BLOCKS SHALL BE INSPECTED PRIOR TO BACKFILL.
5. FIRE HYDRANTS ON MAINS UNDER CONSTRUCTION SHALL BE SECURELY WRAPPED WITH A BLACK POLY WRAP BAG AND TAPED INTO PLACE. THE POLY WRAP SHALL BE REMOVED WHEN THE MAINS ARE ACCEPTED AND PLACED INTO SERVICE.
6. THRUST BLOCKS OR RESTRAINTS SHALL BE IN ACCORDANCE WITH THE CITY OF LEANDER STANDARD SPECIFICATIONS AND REQUIRED AT ALL FITTINGS PER DETAIL OR MANUFACTURER'S RECOMMENDATION. ALL FITTINGS SHALL HAVE BOTH THRUST BLOCKS AND RESTRAINTS.
7. ALL DEAD END WATER MAINS SHALL HAVE "FIRE HYDRANT ASSEMBLY" OR "BLOW-OFF VALVE AND THRUST BLOCK" OR "BLOW-OFF VALVE AND THRUST RESTRAINTS". THRUST RESTRAINTS SHALL BE INSTALLED ON THE MINIMUM LAST THREE PIPE LENGTHS (STANDARD 20' LAYING LENGTH). ADDITIONAL THRUST RESTRAINTS MAY BE REQUIRED BASED UPON THE MANUFACTURERS RECOMMENDATION AND/OR ENGINEER'S DESIGN.
8. PIPE MATERIAL FOR PUBLIC WATER MAINS SHALL BE PVC (AWWA C900-DR14 MIN. 305 PSI PRESSURE RATING). WATER SERVICES (2" OR LESS) SHALL BE POLYETHYLENE TUBING (BLACK, 200PSI, AND SDR-(9)). COPPER PIPES AND FITTINGS ARE NOT ALLOWED IN THE PUBLIC RIGHT OF WAY. ALL PLASTIC PIPES FOR USE IN PUBLIC WATER SYSTEMS MUST BEAR THE NATIONAL SANITATION FOUNDATION SEAL OF APPROVAL (NSF-PW).
9. ALL FIRE HYDRANT LEADS SHALL BE DUCTILE IRON PIPE (AWWA C115/C151 PRESSURE CLASS 350).
10. ALL IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH MINIMUM 8-MIL POLYETHYLENE.
11. LINE FLUSHING OR ANY ACTIVITY USING A LARGE QUANTITY OF WATER MUST BE COORDINATED WITH THE PUBLIC WORKS DEPARTMENT.
12. ALL WATER METER BOXES SHALL BE:
    a. SINGLE, 1" METER AND BELOW DFW37F-12-1CA, OR EQUAL
    b. DUAL, 1" METERS AND BELOW DFW39F-12-1CA, OR EQUAL
    c. 1.5" SINGLE METER DFW65C-14-1CA, OR EQUAL
    d. 2" SINGLE METER DFW1730F-12-1CA, OR EQUAL
13. ALL WATER VALVE COVERS ARE TO BE PAINTED BLUE.

WASTEWATER NOTES:

1. CURVILINEAR WASTEWATER DESIGN LAYOUT IS NOT PERMITTED.
2. MANDREL TESTING SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.
3. MANHOLES SHALL BE COATED PER CITY OF AUSTIN SPL WW-511 (RAVEN 405 OR SPRAYWALL). PENETRATIONS TO EXISTING WASTEWATER MANHOLES REQUIRE THE CONTRACTOR TO RECOAT THE ENTIRE MANHOLE IN ACCORDANCE WITH CITY OF AUSTIN STANDARD SPECIFICATIONS SECTION NO. 506.5.
4. RECLAIMED AND RECYCLED WATER LINE SHALL BE CONSTRUCTED OF "PURPLE PIPE." ALL RECLAIMED AND RECYCLED WATER VALVE COVERS SHALL BE SQUARE AND PAINTED PURPLE.
5. FORCE MAIN PIPES NEED TO HAVE SWEEPING WYES FOR JOINTS.

STREET AND DRAINAGE NOTES:

1. THE CITY OF LEANDER HAS NOT REVIEWED THESE PLANS FOR COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA). IT IS THE RESPONSIBILITY OF THE OWNER TO PROVIDE COMPLIANCE WITH ALL LEGISTATION RELATED TO ACCESSIBLITY WITHIN THE LIMITS OF CONSTRUCTION SHOWN IN THESE PLANS. ALL SIDEWALKS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT AND TEXAS ACCESSIBILITY STANDARS (TAS).
2. BACKFILL BEHIND THE CURB SHALL BE COMPACTED TO OBTAIN A MINIMUM OF 95% MAXIMUM DENSITY TO WITHIN 6" OF TOP OF CURB. MATERIAL USED SHALL BE PRIMARILY GRANULAR WITH NO ROCKS LARGER THAN 6" IN THE GREATEST DIMENSION. THE REMAINING 6" SHALL BE CLEAN TOPSOIL FREE FROM ALL CLODS AND SUITABLE FOR SUSTAINING PLANT LIFE.
3. A MINIMUM OF 6" OF TOPSOIL SHALL BE PLACED BETWEEN THE CURB AND RIGHT-OF-WAY AND IN ALL DRAINAGE CHANNELS EXCEPT CHANNELS CUT IN STABLE ROCK.
4. DEPTH OF COVER FOR ALL CROSSINGS UNDER PAVEMENT, INCLUDING GAS, ELECTRIC, TELEPHONE, CABLE TV, ETC., SHALL BE A MINIMUM OF 36" BELOW SUBGRADE.
5. STREET RIGHT-OF-WAY SHALL BE GRADED AT A SLOPE OF ¼" PER FOOT TOWARD THE CURB UNLESS OTHERWISE INDICATED.
6. ALL DRAINAGE PIPE IN PUBLIC RIGHT OF WAY OR EASEMENTS SHALL BE REINFORCED CONCRETE PIPE MINIMUM CLASS III OF TONGUE AND GROOVE OR O-RING JOINT DESIGN. CORRUGATED METAL PIPE IS NOT ALLOWED IN PUBLIC RIGHT OR WAY OR EASEMENTS.
7. THE CONTRACTOR MUST PROVIDE A PNEUMATIC TRUCK PER TXDOT SPEC FOR PROOF ROLLING.
8. ALL STRIPING, WITH THE EXCEPTION OF STOP BARS, CROSS WALKS, WORDS AND ARROWS, IS TO BE TYPE II (WATER BASED). STOP BARS, CROSS WALKS, WORDS AND ARROWS REQUIRE TYPE I THERMOPLASTIC.
9. MANHOLE FRAMES, COVERS, VALVES, CLEAN-OUTS, ETC. SHALL BE RAISED TO GRADE PRIOR TO FINAL PAVEMENT CONSTRUCTION.
10. A STOP BAR SHALL BE PLACED AT ALL STOP SIGN LOCATIONS.
11. THE GEOTECHNICAL ENGINEER SHALL INSPECT THE SUBGRADE FOR COMPLIANCE WITH THE DESIGN ASSUMPTIONS MADE DURING PREPARATION OF THE SOILS REPORT. ANY ADJUSTMENTS THAT ARE REQUIRED SHALL BE MADE THROUGH REVISIONS OF THE APPROVED CONSTRUCTION PLANS.
12. GEOTECHNICAL INVESTIGATION INFORMATION AND PAVEMENT RECOMMENDATIONS WERE PROVIDED BY MLA GEOTECHNICAL ON 10/26/2023.
13. A TRAFFIC CONTROL PLAN, IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, CITY OF AUSTIN TRANSPORATION CRITERIA MANUAL, CITY OF LEANDER STANDARD DETAILS AND TEXAS DEPARTMENT OF TRANSPORTATION CRITERIA, SHALL BE SUBMITTED TO THE CITY OF LEANDER FOR REVIEW AND APPROVAL PRIOR TO ANY PARTIAL OR COMPLETE ROADWAY CLOSURES. TRAFFIC CONTROL PLANS MUST BE SITE SPECIFIC AND SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
14. ALL LANE CLOSURES SHALL OCCUR ONLY BETWEEN THE HOURS OF 9 AM AND 4 PM UNLESS OTHERWISE NOTED ON THE PLANS. ANY NIGHT TIME LANE CLOSURES REQUIRE APPROVAL OF THE CITY ENGINEER AND SHALL OCCUR BETWEEN THE HOURS OF 8 PM AND 6 AM. LANE CLOSURES OBSERVED BY THE CITY DURING PEAK HOURS OF 6 AM TO 9 AM OR 4 PM TO 8 PM WILL BE SUBJECT TO A FINE AND/OR SUBSEQUENT ISSUANCE OF WORK STOPPAGE.
15. TEMPORARY ROCK CRUSHING IS NOT ALLOWED. ALL SOURCES OF FLEXIBLE BASE MATERIAL ARE REQUIRED TO BE APPROVED BY THE CITY. PRIOR TO BASE PLACEMENT ALL CURRENT TRIAXIAL TEST REPORTS FOR PROPOSED STOCK PILES ARE TO BE SUBMITTED TO THE CITY CONSTRUCTION INSPECTOR FOR REVIEW AND APPROVAL.
16. AT ROAD INTERSECTIONS THAT HAVE A VALLEY GUTTER, THE CROWN TO THE INTERSECTING ROAD WILL BE CULMINATED AT A DISTANCE OF 40 FEET FROM THE INTERSECTING CURB LINE UNLESS OTHERWISE NOTED.
17. NO PONDING OF WATER SHALL BE ALLOWED TO COLLECT ON OR NEAR THE INTERSECTION OF PRIVATE DRIVEWAYS AND PUBLIC STREETS. RECONSTRUCTION OF THE DRIVEWAY APPROACH SHALL BE AT THE CONTRACTOR'S EXPENSE.
18. ALL DRIVEWAY APPROACHES SHALL HAVE A UNIFORM TWO PERCENT SLOPE WITHIN THE PUBLIC RIGHT OF WAY UNLESS APPROVED IN WRITING BY THE ENGINEERING DEPARTMENT.
19. IMPROVEMENTS THAT INCLUDE RECONSTRUCTION OF AN EXISTING TYPE II DRIVEWAY SHALL BE DONE IN A MANNER WHICH RETAINS OPERATIONS OF NOT LESS THAN HALF OF THE DRVIEWAY TO REMAIN OPEN AT ALL TIMES. FULL CLOSURE OF SUCH DRIVEWAY CAN BE CONSIDERED WITH WRITTEN AUTHORIZATION OBTAINED BY THE CONTRACTOR FROM ALL PROPERTY OWNERS AND ACCESS EASEMENT RIGHT HOLDERS ALLOWING THE FULL CLOSURE OF THE DRIVEWAY.
20. CONTRACTOR MUST CLEAR FIVE (5) FEET BEYOND ALL PUBLIC RIGHT OF WAY TO PREVENT FUTURE VEGETATIVE GROWTH INTO THE SIDEWALK AREAS.
21. SLOPE OF NATURAL GROUND ADJACENT TO THE PUBLIC RIGHT OF WAY SHALL NOT EXCEED 3:1 SLOPE. IF A 3:1 SLOPE IS NOT POSSIBLE, SLOPE PROTECTION OR RETAINING WALL MUST BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL PRIOR TO FINAL ACCEPTANCE.
22. THERE SHALL BE NO WATER, WASTEWATER OR DRAINAGE APPURTENANCES, INCLUDING BUT NOT LIMITED TO VALVES, FITTINGS, METERS, CLEAN-OUTS, MANHOLES, OR VAULTS IN ANY DRIVEWAY, SIDEWALK, TRAFFIC OR PEDESTRIAN AREA.
23. PUBLIC SIDEWALKS SHALL NOT USE CURB INLETS AS PARTIAL WALKING SURFACE. SIDEWALKS SHALL NOT USE TRAFFIC CONTROL BOXES, METERS, CHECK VALVE VAULTS, COMMUNICATION VAULTS, OR OTHER BURIED OR PARTIALLY BURIED INFRASTRUCTURE AS A VEHICULAR OR PEDESTRIAN SURFACE.
24. ALL WET UTILITIES SHALL BE INSTALLED AND ALL DENSITIES MUST HAVE PASSED INSPECTION(S) PRIOR TO THE INSTALLATION OF DRY UTILITIES.
25. DRY UTILITIES SHALL BE INSTALLED AFTER SUBGRADE IS CUT AND BEFORE THE FIRST COURSE OF BASE. NO TRENCHING COMPACTED BASE. IF NECESSARY DRY UTILITIES INSTALLED AFTER FIRST COURSE BASE SHALL BE BORED ACROSS THE FULL WIDTH OF THE PUBLIC RIGHT-OF-WAY.
26. A MINIMUM OF SEVEN (7) DAYS OF CURE TIME IS REQUIRED FOR HMAC PRIOR TO THE INTRODUCTION OF VEHICULAR TRAFFIC TO ALL STREETS.

GRADING NOTES:

1. POSITIVE DRAINAGE SHALL BE MAINTAINED ON ALL SURFACE AREAS WITHIN THE SCOPE OF THIS PROJECT. CONTRACTOR SHOULD TAKE PRECAUTIONS NOT TO ALLOW ANY PONDING OF WATER.
2. THE CONTRACTOR SHALL CONSTRUCT EARTHEN EMBANKMENTS WITH SLOPES NO STEEPER THAN 3:1 AND COMPACT SOIL TO 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CITY OF AUSTIN STANDARD SPECIFICATIONS.
3. AREAS OF SOIL DISTURBANCE ARE LIMITED TO GRADING AND IMPROVEMENTS SHOWN. ALL OTHER AREAS WILL NOT BE DISTURBED.

BENCHMARK NOTES:

THE CONTOUR INTERVAL IS 1 FOOT. ALL ELEVATIONS SHOWN HEREON ARE TIED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88), GEOID 12B BASED ON GPS OBSERVATIONS. BENCHMARKS ARE AS FOLLOWS:

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTEMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.

BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)

BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

BENCHMARKS

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No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: DPD
CHECKED BY: AEG

CITY OF LEANDER
GENERAL NOTES

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER POLLUTION ABATEMENT PLAN GENERAL CONSTRUCTION NOTES:

1. A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
   - -THE NAME OF THE APPROVED PROJECT;
   - -THE ACTIVITY START DATE; AND
   - -THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.
2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE WATER POLLUTION ABATEMENT PLAN (WPAP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.
3. IF ANY SENSITIVE FEATURE(S) (CAVES, SOLUTION CAVITY, SINK HOLE, ETC.) IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. CONSTRUCTION ACTIVITIES MAY NOT BE RESUMED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE APPROPRIATE PROTECTIVE MEASURES IN ORDER TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.
4. NO TEMPORARY OR PERMANENT HAZARDOUS SUBSTANCE STORAGE TANK SHALL BE INSTALLED WITHIN 150 FEET OF A WATER SUPPLY SOURCE, DISTRIBUTION SYSTEM, WELL, OR SENSITIVE FEATURE.
5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND MANUFACTURERS SPECIFICATIONS. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
6. ANY SEDIMENT THAT ESCAPES THE CONSTRUCTION SITE MUST BE COLLECTED AND PROPERLY DISPOSED OF BEFORE THE NEXT RAIN EVENT TO ENSURE IT IS NOT WASHED INTO SURFACE STREAMS, SENSITIVE FEATURES, ETC.
7. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION BASINS NOT LATER THAN WHEN IT OCCUPIES 50% OF THE BASIN'S DESIGN CAPACITY.
8. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BEING DISCHARGED OFFSITE.
9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON-SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.
10. IF PORTIONS OF THE SITE WILL HAVE A TEMPORARY OR PERMANENT CEASE IN CONSTRUCTION ACTIVITY LASTING LONGER THAN 14 DAYS, SOIL STABILIZATION IN THOSE AREAS SHALL BE INITIATED AS SOON AS POSSIBLE PRIOR TO THE 14TH DAY OF INACTIVITY. IF ACTIVITY WILL RESUME PRIOR TO THE 21ST DAY, STABILIZATION MEASURES ARE NOT REQUIRED. IF DROUGHT CONDITIONS OR INCLEMENT WEATHER PREVENT ACTION BY THE 14TH DAY, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE.
11. THE FOLLOWING RECORDS SHALL BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON REQUEST:
   - -THE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR;
   - -THE DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   - -THE DATES WHEN STABILIZATION MEASURES ARE INITIATED.
12. THE HOLDER OF ANY APPROVED EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
   - A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;
   - B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;
   - C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

TCEQ REGION 11 OFFICE
12100 PARK 35 CIRCLE,
BUILDING A, RM 179
AUSTIN, TEXAS 78753-3795
PHONE: (512) 339-2929
FAX: (512) 339-3795

TCEQ - SEWAGE COLLECTION SYSTEM PLAN NOTES

1. THIS ORGANIZED SEWAGE COLLECTION SYSTEM (SCS) MUST BE CONSTRUCTED IN ACCORDANCE WITH 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S (TCEQ) EDWARDS AQUIFER RULES AND ANY LOCAL GOVERNMENT STANDARD SPECIFICATIONS.
2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROPOSED REGULATED PROJECT MUST BE PROVIDED WITH COPIES OF THE SCS PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS MUST BE REQUIRED TO KEEP ON-SITE COPIES OF THE PLAN AND THE APPROVAL LETTER.
3. A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE PRESIDING TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
   - -THE NAME OF THE APPROVED PROJECT;
   - -THE ACTIVITY START DATE; AND
   - -THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.
4. ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED SCS APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF AN SCS APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.
5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
6. IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPLICANT MUST IMMEDIATELY NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TCEQ OF THE FEATURE DISCOVERED. A GEOLOGIST'S ASSESSMENT OF THE LOCATION AND EXTENT OF THE FEATURE DISCOVERED MUST BE REPORTED TO THAT REGIONAL OFFICE IN WRITING AND THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR FOR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.
7. SEWER LINES LOCATED WITHIN OR CROSSING THE 5-YEAR FLOODPLAIN OF A DRAINAGE WAY WILL BE PROTECTED FROM INUNDATION AND STREAM VELOCITIES WHICH COULD CAUSE EROSION AND SCOURING OF BACKFILL. THE TRENCH MUST BE CAPPED WITH CONCRETE TO PREVENT SCOURING OF BACKFILL, OR THE SEWER LINES MUST BE ENCASED IN CONCRETE. ALL CONCRETE SHALL HAVE A MINIMUM THICKNESS OF 6 INCHES.
8. BLASTING PROCEDURES FOR PROTECTION OF EXISTING SEWER LINES AND OTHER UTILITIES WILL BE IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA. SAND IS NOT ALLOWED AS BEDDING OR BACKFILL IN TRENCHES THAT HAVE BEEN BLASTED. IF ANY EXISTING SEWER LINES ARE DAMAGED, THE LINES MUST BE REPAIRED AND RETESTED.
9. ALL MANHOLES CONSTRUCTED OR REHABILITATED ON THIS PROJECT MUST HAVE WATERTIGHT SIZE ON SIZE RESILIENT CONNECTORS ALLOWING FOR DIFFERENTIAL SETTLEMENT. IF MANHOLES ARE CONSTRUCTED WITHIN THE 100-YEAR FLOODPLAIN, THE COVER MUST HAVE A GASKET AND BE BOLTED TO THE RING. WHERE GASKETED MANHOLE COVERS ARE REQUIRED FOR MORE THAN THREE MANHOLES IN SEQUENCE OR FOR MORE THAN 1500 FEET, ALTERNATE MEANS OF VENTING WILL BE PROVIDED. BRICKS ARE NOT AN ACCEPTABLE CONSTRUCTION MATERIAL FOR ANY PORTION OF THE MANHOLE.

   THE DIAMETER OF THE MANHOLES MUST BE A MINIMUM OF FOUR FEET AND THE MANHOLE FOR ENTRY MUST HAVE A MINIMUM CLEAR OPENING DIAMETER OF 30 INCHES. THESE DIMENSIONS AND OTHER DETAILS SHOWING COMPLIANCE WITH THE COMMISSION'S RULES CONCERNING MANHOLES AND SEWER LINE/MANHOLE INVERTS DESCRIBED IN 30 TAC §217.55 ARE INCLUDED ON PLAN SHEET 109 OF 112.

   IT IS SUGGESTED THAT ENTRANCE INTO MANHOLES IN EXCESS OF FOUR FEET DEEP BE ACCOMPLISHED BY MEANS OF A PORTABLE LADDER. THE INCLUSION OF STEPS IN A MANHOLE IS PROHIBITED.
10. WHERE WATER LINES AND NEW SEWER LINE ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN NINE FEET (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES) THE INSTALLATION MUST MEET THE REQUIREMENTS OF 30 TAC §217.53(D) (PIPE DESIGN) AND 30 TAC §290.44(E) (WATER DISTRIBUTION).
11. WHERE SEWERS LINES DEVIATE FROM STRAIGHT ALIGNMENT AND UNIFORM GRADE ALL CURVATURE OF SEWER PIPE MUST BE ACHIEVED BY THE FOLLOWING PROCEDURE WHICH IS RECOMMENDED BY THE PIPE MANUFACTURER: NONE

   IF PIPE FLEXURE IS PROPOSED, THE FOLLOWING METHOD OF PREVENTING DEFLECTION OF THE JOINT MUST BE USED: NO FLEXURE PROPOSED

   SPECIFIC CARE MUST BE TAKEN TO ENSURE THAT THE JOINT IS PLACED IN THE CENTER OF THE TRENCH AND PROPERLY BEDDED IN ACCORDANCE WITH 30 TAC §217.54.
12. NEW SEWAGE COLLECTION SYSTEM LINES MUST BE CONSTRUCTED WITH STUB OUTS FOR THE CONNECTION OF ANTICIPATED EXTENSIONS. THE LOCATION OF SUCH STUB OUTS MUST BE MARKED ON THE GROUND SUCH THAT THEIR LOCATION CAN BE EASILY DETERMINED AT THE TIME OF CONNECTION OF THE EXTENSIONS. SUCH STUB OUTS MUST BE MANUFACTURED WYES OR TEES THAT ARE COMPATIBLE IN SIZE AND MATERIAL WITH BOTH THE SEWER LINE AND THE EXTENSION. AT THE TIME OF ORIGINAL CONSTRUCTION, NEW STUB-OUTS MUST BE CONSTRUCTED SUFFICIENTLY TO EXTEND BEYOND THE END OF THE STREET PAVEMENT. ALL STUB-OUTS MUST BE SEALED WITH A MANUFACTURED CAP TO PREVENT LEAKAGE. EXTENSIONS THAT WERE NOT ANTICIPATED AT THE TIME OF ORIGINAL CONSTRUCTION OR THAT ARE TO BE CONNECTED TO AN EXISTING SEWER LINE NOT FURNISHED WITH STUB OUTS MUST BE CONNECTED USING A MANUFACTURED SADDLE AND IN ACCORDANCE WITH ACCEPTED PLUMBING TECHNIQUES.

    IF NO STUB-OUT IS PRESENT AN ALTERNATE METHOD OF JOINING LATERALS IS SHOWN IN THE DETAIL ON PLAN SHEET N/A OF N/A. (FOR POTENTIAL FUTURE LATERALS).

    THE PRIVATE SERVICE LATERAL STUB-OUTS MUST BE INSTALLED AS SHOWN ON THE PLAN AND PROFILE SHEETS ON PLAN SHEET N/A OF N/A AND MARKED AFTER BACKFILLING AS SHOWN IN THE DETAIL ON PLAN SHEET N/A OF N/A.
13. TRENCHING, BEDDING AND BACKFILL MUST CONFORM WITH 30 TAC §217.54. THE BEDDING AND BACKFILL FOR FLEXIBLE PIPE MUST COMPLY WITH THE STANDARDS OF ASTM D-2321, CLASSES IA, IB, II OR III. RIGID PIPE BEDDING MUST COMPLY WITH THE REQUIREMENTS OF ASTM C 12 (ANSI A 106.2) CLASSES A, B OR C.
14. SEWER LINES MUST BE TESTED FROM MANHOLE TO MANHOLE. WHEN A NEW SEWER LINE IS CONNECTED TO AN EXISTING STUB OR CLEAN-OUT, IT MUST BE TESTED FROM EXISTING MANHOLE TO NEW MANHOLE. IF A STUB OR CLEAN-OUT IS USED AT THE END OF THE PROPOSED SEWER LINE, NO PRIVATE SERVICE ATTACHMENTS MAY BE CONNECTED BETWEEN THE LAST MANHOLE AND THE CLEANOUT UNLESS IT CAN BE CERTIFIED AS CONFORMING WITH THE PROVISIONS OF 30 TAC §213.5(C)(3)(E).
15. ALL SEWER LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.57. THE ENGINEER MUST RETAIN COPIES OF ALL TEST RESULTS WHICH MUST BE MADE AVAILABLE TO THE EXECUTIVE DIRECTOR UPON REQUEST. THE ENGINEER MUST CERTIFY IN WRITING THAT ALL WASTEWATER LINES HAVE PASSED ALL REQUIRED TESTING TO THE APPROPRIATE REGIONAL OFFICE WITHIN 30 DAYS OF TEST COMPLETION AND PRIOR TO USE OF THE NEW COLLECTION SYSTEM. TESTING METHOD WILL BE:

(A) FOR A COLLECTION SYSTEM PIPE THAT WILL TRANSPORT WASTEWATER BY GRAVITY FLOW, THE DESIGN MUST SPECIFY AN INFILTRATION AND EXFILTRATION TEST OR A LOW-PRESSURE AIR TEST. A TEST MUST CONFORM TO THE FOLLOWING REQUIREMENTS:
(1) LOW PRESSURE AIR TEST.
(A) A LOW PRESSURE AIR TEST MUST FOLLOW THE PROCEDURES DESCRIBED IN AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C-828, ASTM C-924, OR ASTM F-1417 OR OTHER PROCEDURE APPROVED BY THE EXECUTIVE DIRECTOR, EXCEPT AS TO TESTING TIMES AS REQUIRED IN TABLE C.3 IN SUBPARAGRAPH (C) OF THIS PARAGRAPH OR EQUATION C.3 IN SUBPARAGRAPH (B)(II) OF THIS PARAGRAPH.
(B) FOR SECTIONS OF COLLECTION SYSTEM PIPE LESS THAN 36 INCH AVERAGE INSIDE DIAMETER, THE FOLLOWING PROCEDURE MUST APPLY, UNLESS A PIPE IS TO BE TESTED AS REQUIRED BY PARAGRAPH (2) OF THIS SUBSECTION.
(i) A PIPE MUST BE PRESSURIZED TO 3.5 POUNDS PER SQUARE INCH (PSI) GREATER THAN THE PRESSURE EXERTED BY GROUNDWATER ABOVE THE PIPE.
(ii) ONCE THE PRESSURE IS STABILIZED, THE MINIMUM TIME ALLOWABLE FOR THE PRESSURE TO DROP FROM 3.5 PSI GAUGE TO 2.5 PSI GAUGE IS COMPUTED FROM THE FOLLOWING EQUATION:

EQUATION C.3

$$T = (0.085 * D * K) / Q$$

WHERE:

T = TIME FOR PRESSURE TO DROP 1.0 POUND PER SQUARE INCH GAUGE IN SECONDS
K = 0.000419 X D X L, BUT NOT LESS THAN 1.0
D = AVERAGE INSIDE PIPE DIAMETER IN INCHES
L = LENGTH OF LINE OF SAME SIZE BEING TESTED, IN FEET
L = LENGTH OF LINE OF SAME SIZE BEING TESTED, IN FEET
Q = RATE OF LOSS, 0.0015 CUBIC FEET PER MINUTE PER SQUARE FOOT INTERNAL SURFACE

(C) SINCE A K VALUE OF LESS THAN 1.0 MAY NOT BE USED, THE MINIMUM TESTING TIME FOR EACH PIPE DIAMETER IS SHOWN IN THE FOLLOWING TABLE C.3:

PIPE DIAMETER (IN)	MINIMUM TIME (SEC)	MAXIMUM LENGTH FOR MINIMUM TIME (FT)	TIME FOR LONGER LENGTH (SEC/FT)
6	340	398	0.8550
8	454	298	1.5200
10	567	239	2.3740
12	680	199	3.4190
15	850	159	5.3420
18	1020	133	7.6930
21	1190	114	10.4710
24	1360	100	13.6760
27	1530	88	17.3090
30	1700	80	21.3690
33	1870	72	25.8560

(D) AN OWNER MAY STOP A TEST IF NO PRESSURE LOSS HAS OCCURRED DURING THE FIRST 25% OF THE CALCULATED TESTING TIME.
(E) IF ANY PRESSURE LOSS OR LEAKAGE HAS OCCURRED DURING THE FIRST 25% OF TESTING PERIOD, THEN THE TEST MUST CONTINUE FOR THE ENTIRE TEST DURATION AS OUTLINED ABOVE OR UNTIL FAILURE.

(F) WASTEWATER COLLECTION SYSTEM PIPES WITH A 27 INCH OR LARGER AVERAGE INSIDE DIAMETER MAY BE AIR TESTED AT EACH JOINT INSTEAD OF FOLLOWING THE PROCEDURE OUTLINED IN THIS SECTION.
(G) A TESTING PROCEDURE FOR PIPE WITH AN INSIDE DIAMETER GREATER THAN 33 INCHES MUST BE APPROVED BY THE EXECUTIVE DIRECTOR.
(2) INFILTRATION/EXFILTRATION TEST.
(A) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF 2.0 FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE.
(B) AN OWNER SHALL USE AN INFILTRATION TEST IN LIEU OF AN EXFILTRATION TEST WHEN PIPES ARE INSTALLED BELOW THE GROUNDWATER LEVEL.
(C) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE, OR AT LEAST TWO FEET ABOVE EXISTING GROUNDWATER LEVEL, WHICHEVER IS GREATER.
(D) FOR CONSTRUCTION WITHIN A 25-YEAR FLOOD PLAIN, THE INFILTRATION OR EXFILTRATION MUST NOT EXCEED 10 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT THE SAME MINIMUM TEST HEAD AS IN SUBPARAGRAPH (C) OF THIS PARAGRAPH.
(E) IF THE QUANTITY OF INFILTRATION OR EXFILTRATION EXCEEDS THE MAXIMUM QUANTITY SPECIFIED, AN OWNER SHALL UNDERTAKE REMEDIAL ACTION IN ORDER TO REDUCE THE INFILTRATION OR EXFILTRATION TO AN AMOUNT WITHIN THE LIMITS SPECIFIED. AN OWNER SHALL RETEST A PIPE FOLLOWING A REMEDIATION ACTION.
(B) IF A GRAVITY COLLECTION PIPE IS COMPOSED OF FLEXIBLE PIPE, DEFLECTION TESTING IS ALSO REQUIRED. THE FOLLOWING PROCEDURES MUST BE FOLLOWED:
(1) FOR A COLLECTION PIPE WITH INSIDE DIAMETER LESS THAN 27 INCHES, DEFLECTION MEASUREMENT REQUIRES A RIGID MANDREL.
(A) MANDREL SIZING.
(I) A RIGID MANDREL MUST HAVE AN OUTSIDE DIAMETER (OD) NOT LESS THAN 95% OF THE BASE INSIDE DIAMETER (ID) OR AVERAGE ID OF A PIPE, AS SPECIFIED IN THE APPROPRIATE STANDARD BY THE ASTMS, AMERICAN WATER WORKS ASSOCIATION, UNI-BELL, OR AMERICAN NATIONAL STANDARDS INSTITUTE, OR ANY RELATED APPENDIX.
(II) IF A MANDREL SIZING DIAMETER IS NOT SPECIFIED IN THE APPROPRIATE STANDARD, THE MANDREL MUST HAVE AN OD EQUAL TO 95% OF THE ID OF A PIPE. IN THIS CASE, THE ID OF THE PIPE, FOR THE PURPOSE OF DETERMINING THE OD OF THE MANDREL, MUST EQUAL BE THE AVERAGE OUTSIDE DIAMETER MINUS TWO MINIMUM WALL THICKNESSES FOR OD CONTROLLED PIPE AND THE AVERAGE INSIDE DIAMETER FOR ID CONTROLLED PIPE.
(III) ALL DIMENSIONS MUST MEET THE APPROPRIATE STANDARD.
(B) MANDREL DESIGN.
(I) A RIGID MANDREL MUST BE CONSTRUCTED OF A METAL OR A RIGID PLASTIC MATERIAL THAT CAN WITHSTAND 200 PSI WITHOUT BEING DEFORMED.
(II) A MANDREL MUST HAVE NINE OR MORE ODD NUMBER OF RUNNERS OR LEGS.
(III) A BARREL SECTION LENGTH MUST EQUAL AT LEAST 75% OF THE INSIDE DIAMETER OF A PIPE.
(IV) EACH SIZE MANDREL MUST USE A SEPARATE PROVING RING.
(C) METHOD OPTIONS.
(I) AN ADJUSTABLE OR FLEXIBLE MANDREL IS PROHIBITED.
(II) A TEST MAY NOT USE TELEVISION INSPECTION AS A SUBSTITUTE FOR A DEFLECTION TEST.
(III) IF REQUESTED, THE EXECUTIVE DIRECTOR MAY APPROVE THE USE OF A DEFLECTOMETER OR A MANDREL WITH REMOVABLE LEGS OR RUNNERS ON A CASE-BY-CASE BASIS.
(2) FOR A GRAVITY COLLECTION SYSTEM PIPE WITH AN INSIDE DIAMETER 27 INCHES AND GREATER, OTHER TEST METHODS MAY BE USED TO DETERMINE VERTICAL DEFLECTION.
(3) A DEFLECTION TEST METHOD MUST BE ACCURATE TO WITHIN PLUS OR MINUS 0.2% DEFLECTION.
(4) AN OWNER SHALL NOT CONDUCT A DEFLECTION TEST UNTIL AT LEAST 30 DAYS AFTER THE FINAL BACKFILL.
(5) GRAVITY COLLECTION SYSTEM PIPE DEFLECTION MUST NOT EXCEED FIVE PERCENT (5%).
(6) IF A PIPE SECTION FAILS A DEFLECTION TEST, AN OWNER SHALL CORRECT THE PROBLEM AND CONDUCT A SECOND TEST AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.

16. ALL MANHOLES MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC §217.58.

(A) ALL MANHOLES MUST PASS A LEAKAGE TEST.
(B) AN OWNER SHALL TEST EACH MANHOLE (AFTER ASSEMBLY AND BACKFILLING) FOR LEAKAGE, SEPARATE AND INDEPENDENT OF THE COLLECTION SYSTEM PIPES, BY HYDROSTATIC EXFILTRATION TESTING, VACUUM TESTING, OR OTHER METHOD APPROVED BY THE EXECUTIVE DIRECTOR.
(1) HYDROSTATIC TESTING.
(A) THE MAXIMUM LEAKAGE FOR HYDROSTATIC TESTING OR ANY ALTERNATIVE TEST METHODS IS 0.025 GALLONS PER FOOT DIAMETER PER FOOT OF MANHOLE DEPTH PER HOUR.
(B) TO PERFORM A HYDROSTATIC EXFILTRATION TEST, AN OWNER SHALL SEAL ALL WASTEWATER PIPES COMING INTO A MANHOLE WITH AN INTERNAL PIPE PLUG, FILL THE MANHOLE WITH WATER, AND MAINTAIN THE TEST FOR AT LEAST ONE HOUR.
(C) A TEST FOR CONCRETE MANHOLES MAY USE A 24-HOUR WETTING PERIOD BEFORE TESTING TO ALLOW SATURATION OF THE CONCRETE.
(2) VACUUM TESTING.
(A) TO PERFORM A VACUUM TEST, AN OWNER SHALL PLUG ALL LIFT HOLES AND EXTERIOR JOINTS WITH A NON-SHRINK GROUT AND PLUG ALL PIPES ENTERING A MANHOLE.
(B) NO GROUT MUST BE PLACED IN HORIZONTAL JOINTS BEFORE TESTING.
(C) STUB-OUTS, MANHOLE BOOTS, AND PIPE PLUGS MUST BE SECURED TO PREVENT MOVEMENT WHILE A VACUUM IS DRAWN.
(D) AN OWNER SHALL USE A MINIMUM 60 INCH/LB TORQUE WRENCH TO TIGHTEN THE EXTERNAL CLAMPS THAT SECURE A TEST COVER TO THE TOP OF A MANHOLE.
(E) A TEST HEAD MUST BE PLACED AT THE INSIDE OF THE TOP OF A CONE SECTION, AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
(F) THERE MUST BE A VACUUM OF 10 INCHES OF MERCURY INSIDE A MANHOLE TO PERFORM A VALID TEST.
(G) A TEST DOES NOT BEGIN UNTIL AFTER THE VACUUM PUMP IS OFF.
(H) A MANHOLE PASSES THE TEST IF AFTER 2.0 MINUTES AND WITH ALL VALVES CLOSED, THE VACUUM IS AT LEAST 9.0 INCHES OF MERCURY.

17. ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(3)(I). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY INSPECTOR MUST VISUALLY INSPECT THE PRIVATE SERVICE LATERAL AND THE CONNECTION TO THE SEWAGE COLLECTION SYSTEM, AND CERTIFY THAT IT IS CONSTRUCTED IN CONFORMITY WITH THE APPLICABLE PROVISIONS OF THIS SECTION. THE OWNER OF THE COLLECTION SYSTEM MUST MAINTAIN SUCH CERTIFICATIONS FOR FIVE YEARS AND FORWARD COPIES TO THE APPROPRIATE REGIONAL OFFICE UPON REQUEST. CONNECTIONS MAY ONLY BE MADE TO AN APPROVED SEWAGE COLLECTION SYSTEM.

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

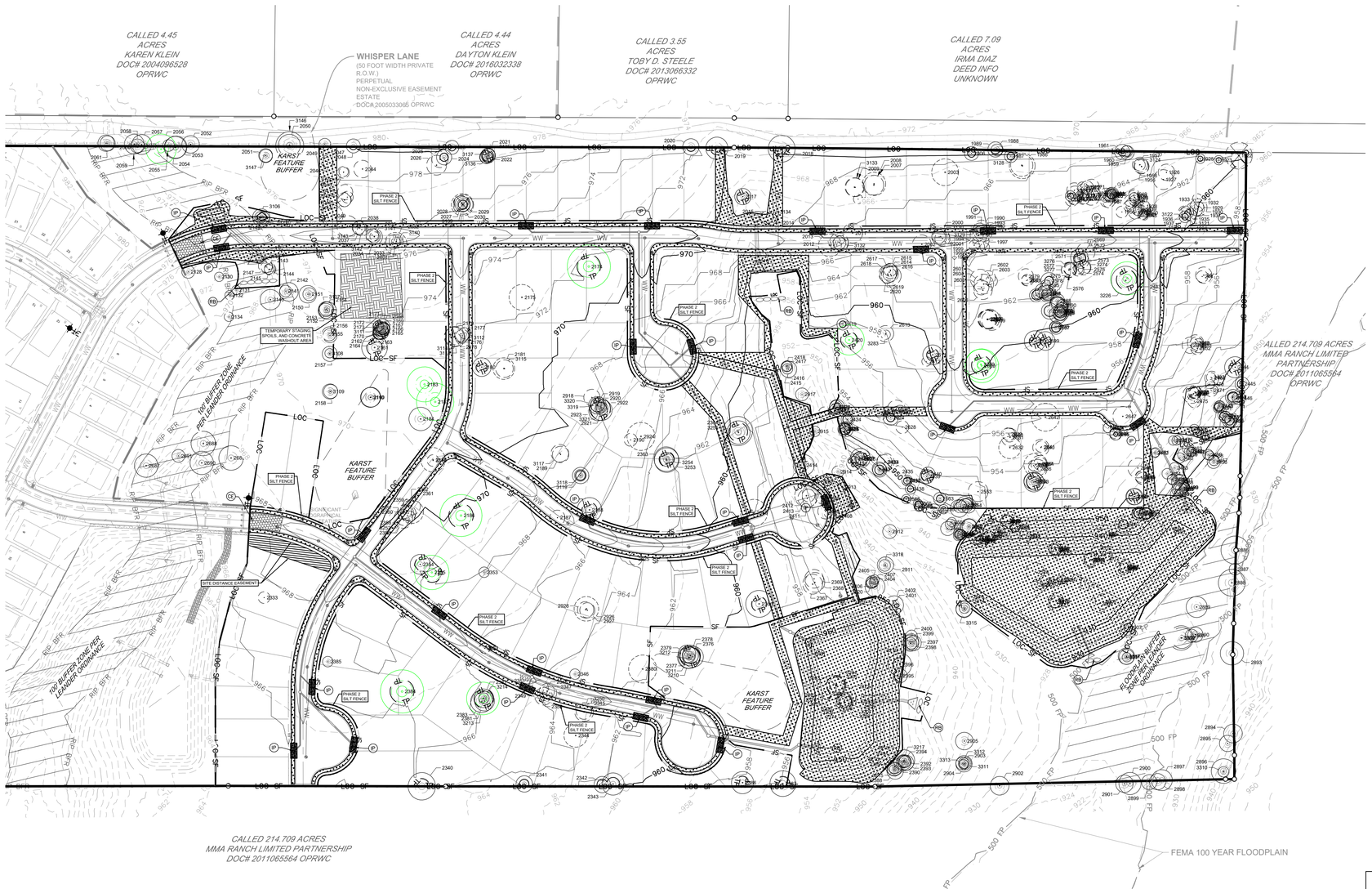
Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

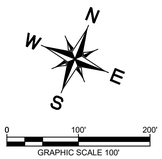
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: DPD
CHECKED BY: AEG

TCEQ GENERAL NOTES

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS





EROSION CONTROL LEGEND

- PROPERTY LINE
- 632 — PROPOSED CONTOUR
- 632 — EXISTING CONTOUR
- SF — SILT FENCE
- CE — STABALIZED CONSTRUCTION ENTRANCE/EXIT
- IP — INLET PROTECTION
- DI — DIVERSION
- RB — ROCK BERM
- LOC — LIMITS OF CONSTRUCTION
- ORANGE SAFETY FENCE
- LIMITS OF REVEGETATION

NOTES:

1. ALL EROSION SEDIMENTATION CONTROLS CALLED OUT AS "PHASE 2" ARE TO BE INSTALLED AFTER THE APPLICABLE IMPROVEMENT IS INSTALLED AND NOT WITH THE INITIAL EROSION SEDIMENTATION CONTROLS
2. GRADED AREAS MUST BE STABILIZED PRIOR TO ACCEPTANCE OR EROSION CONTROLS MUST BE IN PLACE TO PREVENT SEDIMENT FROM ENTERING THE ROADWAYS
3. NO LOTS SHOULD BE CLEARED OUTSIDE LIMITS OF CONSTRUCTION
4. THE CITY OF LEANDER ENVIRONMENTAL INSPECTOR HAS THE AUTHORITY TO ADD OR MODIFY EROSION/SEDIMENT CONTROLS ON SITE THROUGHOUT THE DURATION OF THE PROJECT
5. STOCKPILE TO BE REMOVED PRIOR TO ACCEPTANCE.
6. PONDS SHALL BE CLEARED FROM POLLUTION FROM CONSTRUCTION SEDIMENT FLOW BEFORE FINAL WALKTHROUGH.
7. CONTRACTOR SHALL NOTIFY ENGINEER IF A CREEK BED CONTAINS A BASE FLOW THAT AFFECTS THE CONSTRUCTION SEQUENCE OR SCHEDULE. THE CONTRACTOR SHALL NOT OBSTRUCT THE NATURAL FLOW OF WATER IN THE CREEK BED AND SHALL BE RESPONSIBLE FOR CONTAINING ALL SEDIMENT WITHIN THE LIMITS OF CLEARING. IF CREEK BASE FLOW IS PRESENT, THE CONTRACTOR SHALL REQUEST A DIVERSION PLAN FROM THE ENGINEER. THE ENGINEER SHALL PROVIDE A DIVERSION PLAN TO THE CONTRACTOR BEFORE CONSTRUCTION WITHIN CREEK LIMITS COMMENCES.

BENCHMARKS

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E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

TREE LEGEND

- CRZ — EXISTING DEAD/SICK TREE (REMOVED)
- 0.5 CRZ / CRZ — EXISTING HERITAGE TREE (REMOVED)
- 0.5 CRZ / CRZ — EXISTING PROTECTED TREE (REMOVED)
- 0.5 CRZ / CRZ — EXISTING UNPROTECTED TREE (REMOVED)
- 0.5 CRZ / CRZ — EXISTING HERITAGE TREE TO REMAIN
- 0.5 CRZ / CRZ — EXISTING PROTECTED TREE TO REMAIN
- 0.5 CRZ / CRZ — EXISTING UNPROTECTED TREE TO REMAIN

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Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

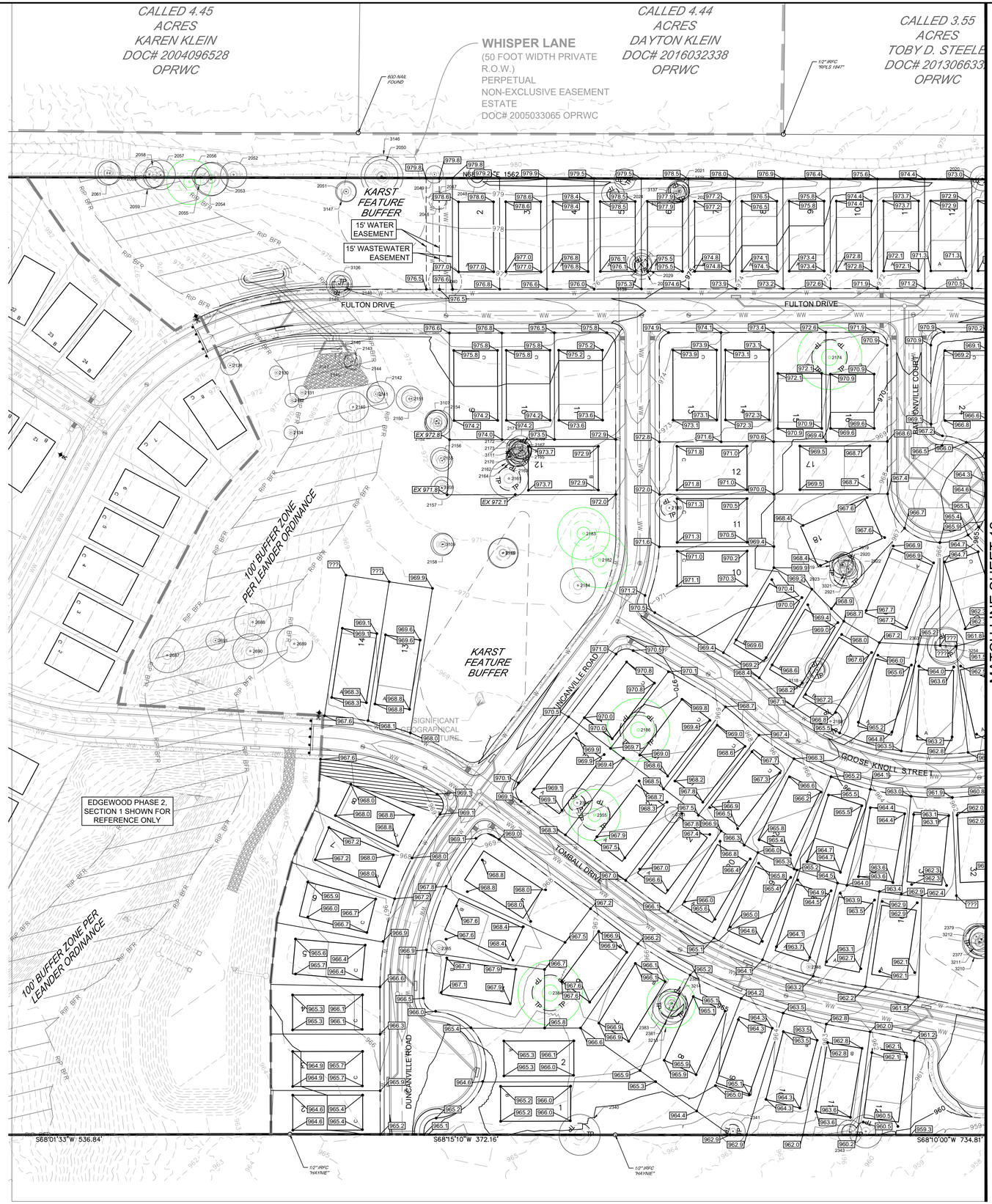
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130584
LICENSED
PROFESSIONAL ENGINEER

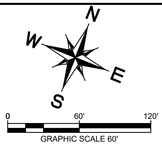
KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

EROSION CONTROL PLAN

SHEET NUMBER
OF 10 112



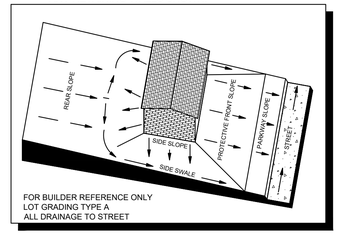


LEGEND

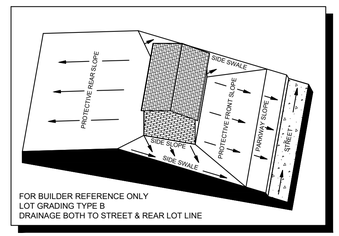
- PROPERTY LINE
- 555 PROPOSED CONTOUR
- 555 EXISTING CONTOUR
- PROPOSED RETAINING WALL
- PROPOSED SWALE
- LOT DRAINAGE FLOW DIRECTION
- STREET DRAINAGE FLOW DIRECTION
- EXISTING TREE TO REMAIN

NOTES:

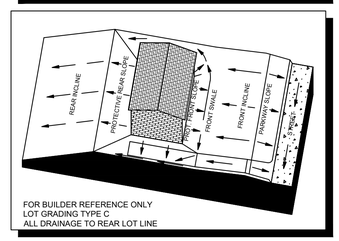
1. FINISHED LOT ELEVATIONS AT THE STREET R.O.W. SHALL BE GRADED UP FROM THE TOP OF CURB IN CONFORMANCE WITH THE STREET CROSS-SECTIONS SHOWN ON PAVING DETAIL SHEET.
2. ALL BLOCK GRADING SHALL BE A MINIMUM OF 1.50% GRADE.
3. ALL SLOPES TO BE 3:1 OR FLATTER.
4. CONTRACTOR TO PROVIDE STRUCTURAL DESIGN FOR ANY RETAINING WALLS SHOWN.



FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE A
ALL DRAINAGE TO STREET



FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE B
DRAINAGE BOTH TO STREET & REAR LOT LINE



FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE C
ALL DRAINAGE TO REAR LOT LINE

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175, OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
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TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130584
LICENSED
PROFESSIONAL ENGINEER

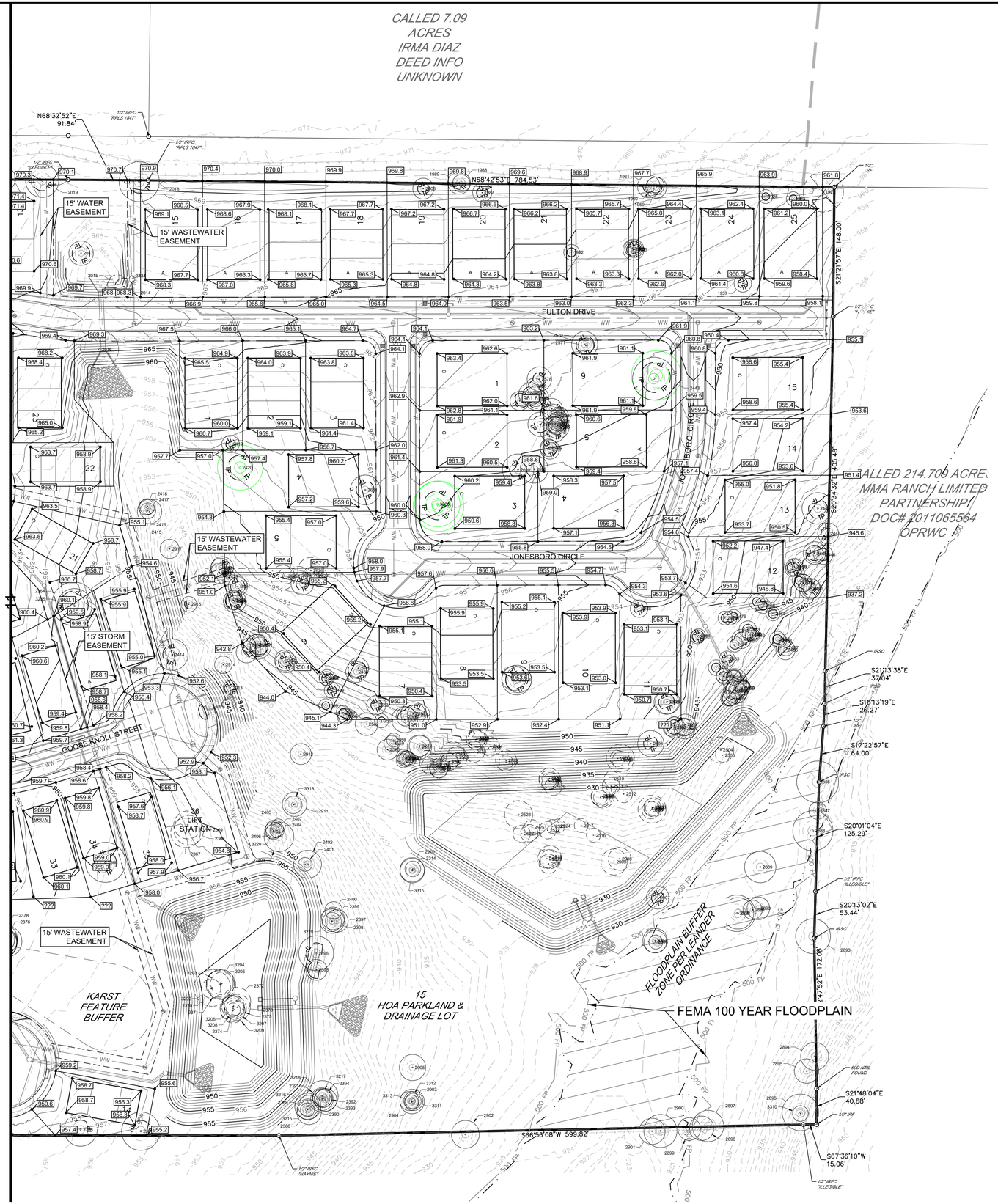
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

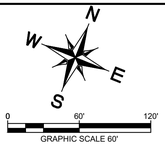
GRADING PLAN (SHEET 1 OF 2)

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 11 112





LEGEND

- PROPERTY LINE
- 555 PROPOSED CONTOUR
- 555 EXISTING CONTOUR
- PROPOSED RETAINING WALL
- PROPOSED SWALE
- LOT DRAINAGE FLOW DIRECTION
- STREET DRAINAGE FLOW DIRECTION
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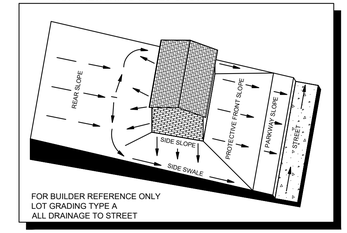
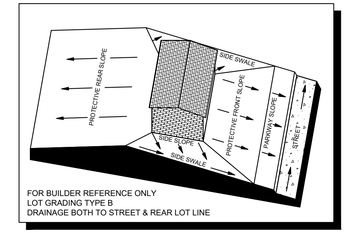
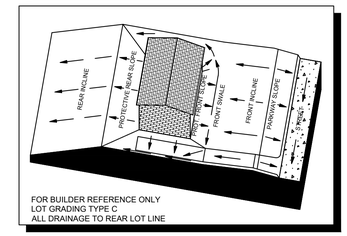


FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE A
ALL DRAINAGE TO STREET



FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE B
DRAINAGE BOTH TO STREET & REAR LOT LINE



FOR BUILDER REFERENCE ONLY
LOT GRADING TYPE C
ALL DRAINAGE TO REAR LOT LINE

BENCHMARKS

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12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
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PROFESSIONAL ENGINEER

KHA PROJECT 067783129			
DATE	DECEMBER 2023		
SCALE:	AS SHOWN		
DESIGNED BY:	DPD	DRAWN BY:	AJD
CHECKED BY:	AEG		

GRADING PLAN (SHEET 2 OF 2)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 12 112

N
W E
S

0 300' 600'
GRAPHIC SCALE 300'

LEGEND

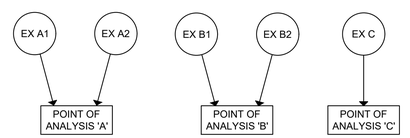
- POINT OF ANALYSIS
- X-1 / 9.9 ac — AREA DESIGNATOR / AREA IN ACRES
- A-1 — INLET NUMBER
- PROPERTY LINE
- PROPOSED STORM SEWER LINE
- EXISTING STORM SEWER LINE
- PROPOSED DRAINAGE DIVIDE
- PROPOSED STORM SEWER INLET
- PROPOSED STORM SEWER MANHOLE
- PROPOSED STORM SEWER HEADWALL
- PROPOSED FLOW DIRECTION
- 555 — PROPOSED CONTOUR
- 555 — EXISTING CONTOUR
- TIME OF CONCENTRATION PATH
- FEMA 100-YR FLOODPLAIN
- CALCULATED FULLY DEVELOPED 100-YR FLOODPLAIN

PROPOSED DRAINAGE CALCULATIONS - SCS METHOD*
(WITH PROPOSED DETENTION)
*Note: SCS Method was used for these areas to size required detention ponds

EXISTING CONDITIONS

Point of Analysis	Total Drainage Area (Acres)	Total Impervious Cover Area (acres)	Impervious Area (%)	Storm Event	Existing Runoff (cfs)
A	105.55	0.54	0.51%	2	179.10
				10	342.28
				25	456.23
				100	650.95
B	119.82	0.53	0.45%	2	208.04
				10	402.63
				25	535.94
				100	770.89
C	62.91	0.68	1.09%	2	124.77
				10	237.24
				25	316.90
				100	452.82
EX OFFSITE (FOR OFFSITE ANALYSIS ONLY)	9.82	0.15	1.53%	2	22.54
				10	43.58
				25	58.50
				100	83.99

EXISTING



BENCHMARKS

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E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

Edgewood-Existing
Drainage Calculations - SCS Method

DRAINAGE AREA	AREA (sf)	AREA (Ac.)	IMPERVIOUS COVER (Ac.)	IMPERVIOUS COVER %	PERVIOUS CURVE NO. Cn*	WEIGHTED CURVE NO. Cn*	SHEET FLOW N	SHEET FLOW L (ft)	P-2yr24hr 3.92 IN S (ft/ft)	SHEET FLOW Tt(min)	SHALLOW CONCENTRATED FLOW L (ft)	SHALLOW CONCENTRATED FLOW V (fps)	SHALLOW CONCENTRATED FLOW S (ft/ft)	SHALLOW CONCENTRATED FLOW Tt(min)	CHANNEL FLOW L (ft)	CHANNEL FLOW V (fps)	CHANNEL FLOW n	CHANNEL FLOW S (ft/ft)	CHANNEL FLOW Tt(min)	CHANNEL FLOW 2 L (ft)	CHANNEL FLOW 2 V (fps)	CHANNEL FLOW 2 n	CHANNEL FLOW 2 S (ft/ft)	CHANNEL FLOW 2 Tt(min)	TOTAL Tc** (min)	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
EX-A1	2,932,459	67.54	0.03	0.05	80.65	80.65	0.15	100	0.008	**12.77**	2485	3.35	0.043	**12.38**	369	3.9	0.040	0.019	**1.58**	-	-	0.040	0.019	**0.00**	**26.73**	**121.36**	**232.48**	**310.03**	**442.45**
EX-A2	1,685,336	38.01	0.51	1.34	81.16	81.16	0.15	100	0.020	**8.85**	1837	3.64	0.051	**8.40**	182	3.9	0.040	0.019	**0.78**	-	-	0.040	0.019	**0.00**	**18.03**	**87.02**	**163.43**	**217.09**	**308.69**
EX-B1	3,560,159	81.73	0.00	0.00	78.00	81.71	0.15	90	0.017	**8.68**	1869	2.50	0.024	**12.46**	1997	5.1	0.035	0.025	**6.53**	-	-	0.035	-	**0.00**	**27.67**	**150.45**	**283.51**	**375.91**	**533.37**
EX-B2	1,659,200	38.09	0.53	1.40	78.00	81.07	0.15	90	0.019	**8.31**	1089	2.60	0.026	**6.98**	465	5.5	0.035	0.021	**1.41**	-	-	0.035	0.032	**0.00**	**16.69**	**92.21**	**174.65**	**231.85**	**329.18**
EX-C	2,740,219	62.91	0.68	1.09	78.00	80.53	0.15	100	0.030	**7.53**	2646	3.03	0.035	**14.57**	-	-	0.035	-	**0.00**	-	-	0.035	-	**0.00**	**22.10**	**124.77**	**237.24**	**316.9**	**452.82**

Proposed Condition:

**The minimum Tc is 6 minutes per the TR-55.

No.	REVISIONS	DATE	BY

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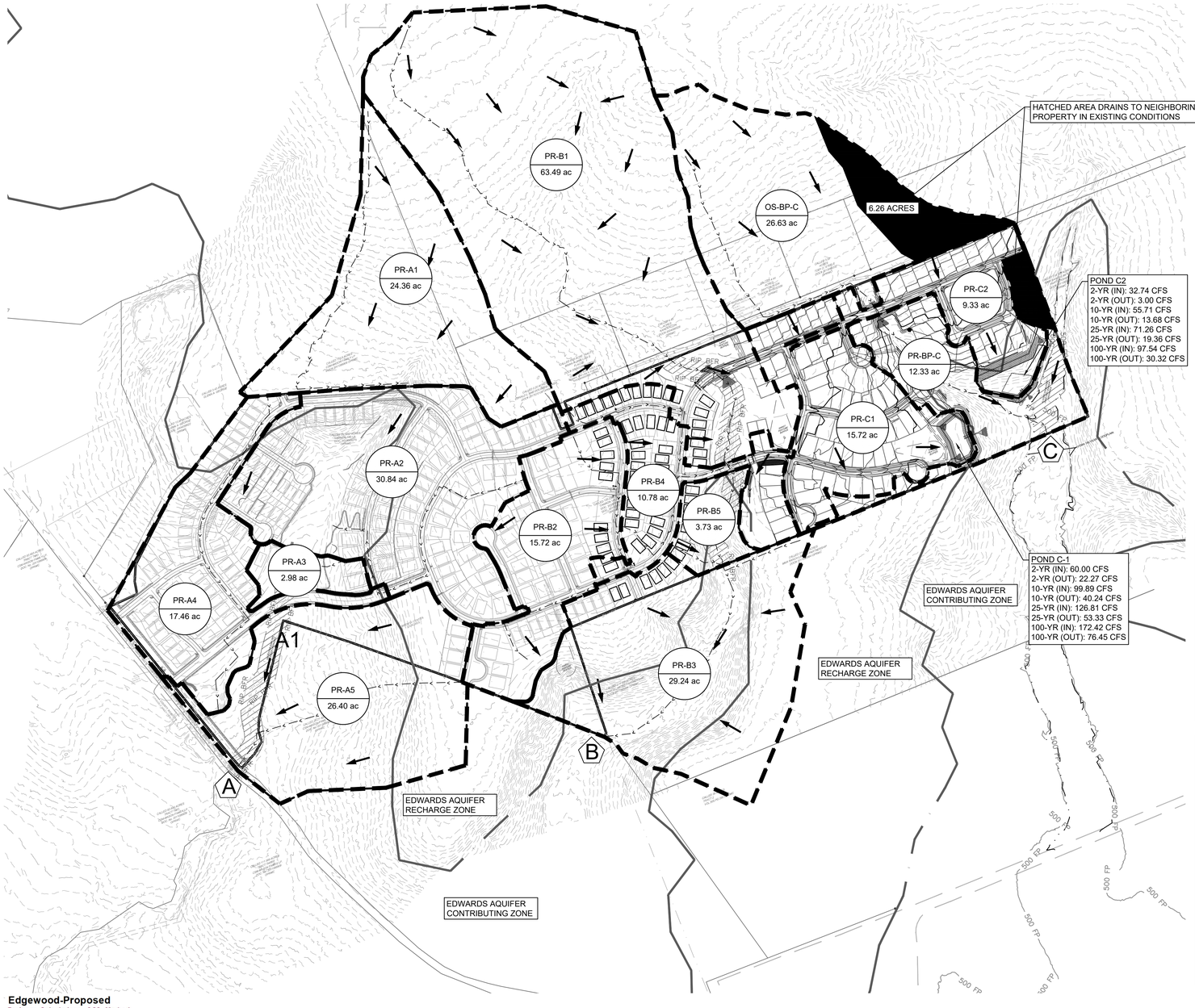
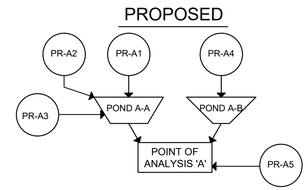
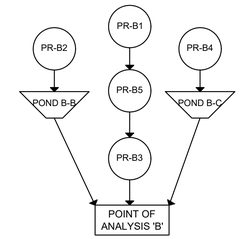
EXISTING DRAINAGE AREA MAP

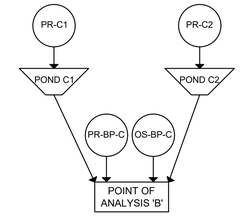
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 21 112









LEGEND

- POINT OF ANALYSIS
- X-1 / 9.9 ac — AREA DESIGNATOR / AREA IN ACRES
- A-1 — INLET NUMBER
- PROPERTY LINE
- PROPOSED STORM SEWER LINE
- EXISTING STORM SEWER LINE
- PROPOSED DRAINAGE DIVIDE
- PROPOSED STORM SEWER INLET
- PROPOSED STORM SEWER MANHOLE
- PROPOSED STORM SEWER HEADWALL
- PROPOSED FLOW DIRECTION
- 555 — PROPOSED CONTOUR
- 555 — EXISTING CONTOUR
- TIME OF CONCENTRATION PATH
- FEMA 100-YR FLOODPLAIN
- CALCULATED FULLY DEVELOPED 100-YR FLOODPLAIN

PROPOSED DRAINAGE CALCULATIONS - SCS METHOD* (WITH PROPOSED DETENTION)
*Note: SCS Method was used for these areas to size required detention ponds

PROPOSED CONDITIONS

Point of Analysis	Total Drainage Area (Acres)	Total Impervious Cover Area (acres)	Impervious Area (%)	Storm Event	Developed Runoff (With Detention) (cfs)
A	101.98	20.28	19.89%	2	172.98
				10	329.63
				25	438.20
				100	632.19
B	123.41	15.28	12.38%	2	180.64
				10	379.63
				25	515.60
				100	745.57
C	64.01	14.34	22.40%	2	113.30
				10	220.16
				25	299.28
				100	429.53
PR OFFSITE (FOR OFFSITE ANALYSIS ONLY)	6.26	0.56	8.95%	2	15.84
				10	30.30
				25	40.49
				100	57.95

PROPOSED VS. EXISTING COMPARISON

Point of Analysis	Storm Event	Existing Runoff (cfs)	Developed Runoff (cfs)	Runoff Difference at Point of Analysis (cfs)	Is Developed ≤ Existing?
A	2	179.10	172.98	(6.12)	YES
	10	342.28	329.63	(12.65)	YES
	25	456.23	438.20	(18.03)	YES
	100	650.95	632.19	(18.76)	YES
B	2	208.04	180.64	(27.40)	YES
	10	402.63	379.63	(23.00)	YES
	25	535.94	515.60	(20.34)	YES
	100	770.89	745.57	(25.32)	YES
C	2	124.77	113.30	(11.47)	YES
	10	237.24	220.16	(17.08)	YES
	25	316.90	299.28	(17.62)	YES
	100	452.82	429.53	(23.29)	YES
OFFSITE	2	22.54	15.84	(6.70)	YES
	10	43.58	30.30	(13.28)	YES
	25	58.50	40.49	(18.01)	YES
	100	83.99	57.95	(26.04)	YES

Note: All detention runoff calculations were analyzed using the Soil Conservation Services Method as documented in the Technical Release 55. Pond Pack V8i was used to calculate the runoff and design the pond volume and outlet structure.

BENCHMARKS

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Edgewood-Proposed

Drainage Calculations - SCS Method

DRAINAGE AREA	AREA (sf)	AREA (Ac.)	IMPERVIOUS COVER (Ac.)	IMPERVIOUS COVER %	PERVIOUS CURVE NO. Cn*	WEIGHTED CURVE NO. Cn*	SHEET FLOW				SHALLOW CONCENTRATED FLOW				CHANNEL FLOW										TOTAL Tc** (min)	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
							P-2yr24hr 3.92 IN				Grass Surface				Channel Flow				Pipe Flow										
							N	L (ft)	S (ft/ft)	Tt(min)	L (ft)	V (fps)	S (ft/ft)	Tt(min)	L (ft)	V (fps)	n	S (ft/ft)	Tt(min)	L (ft)	V (fps)	n	S (ft/ft)	Tt(min)					
PR-A1	1,059,815	24.33	0.00	0.00%	80.00	80.65	0.15	100	0.008	**12.77**	1530	2.98	0.034	**8.57**	576	5.0	0.035	0.036	**1.92**	0	8.0	0.013	0.010	**0.00**	**23.26**	**47.03**	**90.17**	**120.28**	**171.63**
PR-A2	1,342,084	30.81	12.30	39.92%	80.00	87.19	0.15	100	0.030	**7.53**	352	2.60	0.026	**2.26**	0	5.0	0.035	0.012	**0.00**	1352	8.0	0.013	0.010	**2.82**	**12.60**	**77.43**	**135.58**	**175.11**	**241.92**
PR-A3	129,809	2.98	0.28	9.40%	80.00	81.69	0.15	100	0.070	**5.36**	376	3.23	0.040	**1.94**	0	5.1	0.035	0.010	**0.00**	-	-	-	-	-	**7.31**	**9.21**	**17.59**	**23.49**	**33.57**
PR-A4	760,558	17.46	7.16	41.01%	80.65	87.77	0.15	100	0.047	**6.29**	0	16.70	1.071	**0.00**	0	5.1	0.035	0.010	**0.00**	1542	8.0	0.013	0.010	**3.21**	**9.50**	**65.16**	**110.55**	**141.26**	**193.24**
PR-A5	1,149,984	26.40	0.54	2.05%	81.71	82.04	0.15	100	0.015	**9.93**	1217	3.95	0.060	**5.13**	0	5.1	0.035	0.010	**0.00**	0	8.0	0.013	0.010	**0.00**	**15.06**	**62.81**	**119.76**	**159.36**	**226.81**
PR-B1	2,785,226	63.94	1.20	1.88%	80.00	80.34	0.15	90	0.017	**8.68**	1869	2.50	0.024	**12.46**	1424	5.5	0.035	0.021	**4.32**	-	-	-	-	-	**25.46**	**116.52**	**224.63**	**300.2**	**429.3**
PR-B2	684,763	15.72	7.98	50.76%	80.00	89.14	0.15	100	0.025	**8.10**	242	2.93	0.033	**1.38**	50	6.0	0.16	0.027	**0.14**	1416	8.0	0.013	0.010	**2.95**	**12.56**	**56.56**	**92.98**	**117.54**	**159.11**
PR-B3	1,273,694	29.24	0.71	2.43%	80.00	80.44	0.15	100	0.010	**11.68**	321	4.84	0.090	**1.11**	1126	5.5	0.035	0.021	**3.41**	-	-	-	-	-	**16.20**	**66.38**	**126.97**	**169.33**	**242.4**
PR-B4	469,577	10.78	4.88	45.27%	81.07	88.73	0.15	100	0.020	**8.85**	0	3.02	0.035	**0.00**	165	6.0	0.035	0.010	**0.46**	1389	8.0	0.0	0.0	**2.89**	**12.21**	**36.25**	**60.57**	**77.08**	**105**
PR-B5	162,479	3.73	0.51	13.67%	80.53	82.92	0.15	100	0.038	**6.85**	100	5.00	0.096	**0.33**	213	5.1	0.035	0.010	**0.70**	-	-	-	-	-	**7.88**	**13.26**	**23.66**	**30.78**	**42.85**
PR-C1	684,763	15.72	7.93	50.45%	80.00	89.08	0.15	100	0.034	**7.16**	38	2.60	0.026	**0.24**	74	5.0	0.035	0.019	**0.25**	1139	8.0	0.013	0.020	**2.37**	**10.02**	**54.02**	**88.91**	**112.44**	**152.34**
PR-C2	406,415	9.33	3.94	41.16%	80.00	87.41	0.15	100	0.020	**8.85**	41	2.98	0.034	**0.23**	39	5.0	0.035	0.024	**0.13**	863	8.0	0.013	0.020	**1.80**	**11.01**	**35.25**	**57.92**	**73.21**	**99.1**
PR-BP-C	537,095	12.33	1.89	15.33%	80.53	83.21	0.15	100	0.025	**8.10**	106	6.45	0.160	**0.27**	928	7.0	0.035	0.028	**2.21**	-	-	-	-	-	**10.58**	**45.68**	**80.7**	**104.55**	**144.93**
OS-BP-C	1,160,003	26.63	0.68	2.55%	80.53	80.98	0.15	100	0.030	**7.53**	967	3.10	0.037	**5.19**	1810	8.5	0.035	0.032	**3.55**	-	-	-	-	-	**16.27**	**64.59**	**122.52**	**162.74**	**231.19**

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

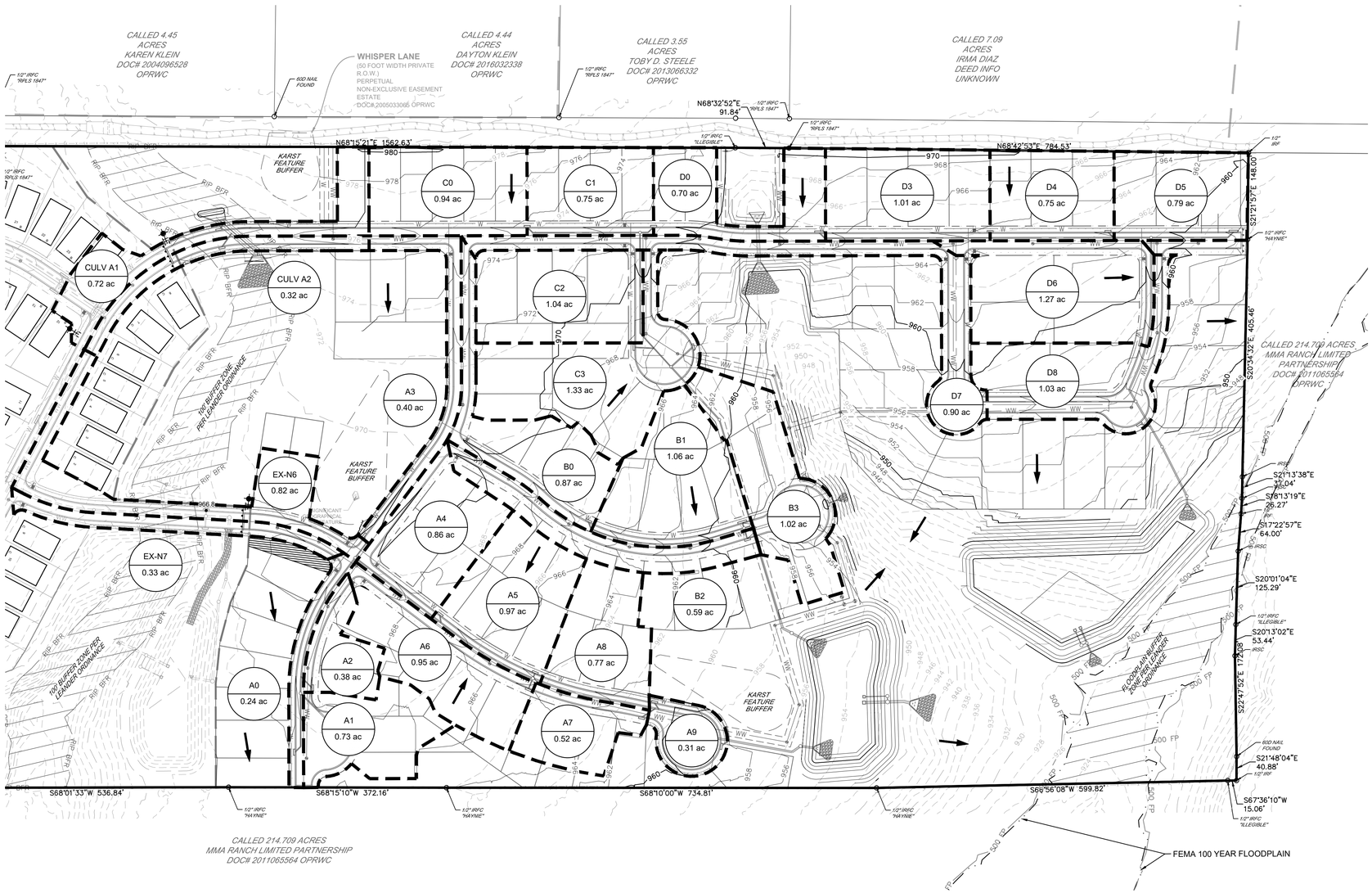
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	DPD
CHECKED BY:	AEG

PROPOSED DRAINAGE AREA MAP

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 22 112



LEGEND

X-1 / 9.9 ac	AREA DESIGNATOR / AREA IN ACRES
A-1	INLET NUMBER
	PROPERTY LINE
	PROPOSED STORM SEWER LINE
	EXISTING STORM SEWER LINE
	PROPOSED DRAINAGE DIVIDE
	PROPOSED STORM SEWER INLET
	PROPOSED STORM SEWER MANHOLE
	PROPOSED STORM SEWER HEADWALL
	PROPOSED FLOW DIRECTION
555	PROPOSED CONTOUR
555	EXISTING CONTOUR
	100-YR ATLAS-14 FLOODPLAIN

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

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INLET DRAINAGE AREA MAP

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 23

112

Edgewood Phase 2 Section 2

Proposed Inlet Runoff (Q) Calculations

D.A. Number	Drainage Area (Ac)	TOTAL I.C. (%)	Comp. C_{25}	Comp. C_{100}	TOTAL T_c (Min.)	i_{25} (in/hr)	i_{100} (in/hr)	Q_{25} (cfs)	Q_{100} (cfs)
EX-N6	0.82	70%	0.73	0.81	10.74	8.86	11.74	5.30	7.83
EX-N7	0.33	80%	0.78	0.87	5.00	11.30	15.00	2.91	4.28
A0	0.24	75%	0.76	0.84	5.00	11.30	15.00	2.09	3.09
A1	0.73	61%	0.69	0.77	10.96	8.79	11.65	4.44	6.58
A2	0.38	90%	0.83	0.92	11.20	8.71	11.55	2.75	4.03
A3	0.40	81%	0.79	0.88	5.00	11.30	15.00	3.59	5.28
A4	0.86	61%	0.69	0.77	13.30	8.11	10.76	4.82	7.15
A5	0.97	62%	0.70	0.78	13.61	8.03	10.65	5.42	8.04
A6	0.95	53%	0.65	0.73	12.83	8.24	10.93	5.11	7.61
A7	0.52	66%	0.71	0.80	12.43	8.35	11.07	3.07	4.55
A8	0.77	66%	0.72	0.80	12.81	8.25	10.93	4.53	6.71
A9	0.31	95%	0.85	0.94	5.00	11.30	15.00	3.02	4.42
B0	0.87	63%	0.70	0.78	12.18	8.42	11.17	5.08	7.54
B1	1.06	52%	0.64	0.72	12.47	8.34	11.06	5.71	8.52
B2	0.59	44%	0.60	0.68	5.73	10.91	14.47	3.90	5.85
B3	1.02	61%	0.69	0.77	12.12	8.44	11.19	5.91	8.77
C0	0.94	58%	0.67	0.76	10.10	9.07	12.02	5.74	8.53
C1	0.75	58%	0.68	0.76	9.72	9.20	12.20	4.64	6.89
C2	1.04	57%	0.67	0.75	11.66	8.57	11.37	5.94	8.83
C3	1.33	61%	0.69	0.77	13.37	8.10	10.74	7.43	11.02
D0	0.70	61%	0.69	0.77	9.98	9.11	12.08	4.37	6.48
D2	0.46	78%	0.77	0.86	5.00	11.30	15.00	4.03	5.94
D3	1.01	30%	0.54	0.61	13.35	8.10	10.75	4.40	6.66
D4	0.75	62%	0.69	0.77	9.91	9.13	12.11	4.72	6.99
D5	0.79	59%	0.68	0.76	9.54	9.27	12.28	4.97	7.38
D6	1.29	56%	0.66	0.74	12.12	8.44	11.19	7.20	10.71
D7	0.43	85%	0.80	0.89	5.00	11.30	15.00	3.90	5.74
D8	1.03	67%	0.72	0.80	11.09	8.75	11.60	6.49	9.61
CULV A1	0.72	63%	0.70	0.78	10.15	9.05	12.00	4.54	6.72
CULV A2	0.32	80%	0.78	0.87	5.00	11.30	15.00	2.81	4.13

Edgewood Phase 2 Section 2

Time of Concentration

DRAINAGE AREA	SHEET FLOW (P-2yr24hr 3.92 IN) N	L (ft)	S (ft/ft)	Tt(min)	SHALLOW CONCENTRATED FLOW (Grass Surface) L (ft)	V (fps)	S (ft/ft)	Tt(min)	CHANNEL FLOW (Channel Flow (PAVEMENT)) L (ft)	V (fps)	a (ft^2)	Pw (ft)	r	n	S (ft/ft)	Tt(min)	TOTAL Tc** (min)
EX-N6	0.15	100	0.014	10.210	12	2.3	0.020	0.088	81	3.1	3.8	15.5	0.245	0.016	0.007	0.44	10.74
EX-N7	0.01	15	0.025	0.219	0	3.0	0.035	0.000	330	3.1	3.8	15.5	0.245	0.016	0.007	1.80	5.00
A0	0.01	20	0.020	0.302	0	2.7	0.028	0.000	328	2.8	3.8	15.5	0.245	0.016	0.006	1.93	5.00
A1	0.15	100	0.013	10.517	60	2.3	0.020	0.438	0	2.8	3.8	15.5	0.245	0.016	0.006	0.00	10.96
A2	0.15	100	0.013	10.517	10	2.3	0.020	0.073	103	2.8	3.8	15.5	0.245	0.016	0.006	0.61	11.20
A3	0.01	15	0.020	0.240	0	2.8	0.030	0.000	674	2.8	3.8	15.5	0.245	0.016	0.006	3.98	5.00
A4	0.15	100	0.010	11.681	115	1.6	0.010	1.188	116	4.5	3.8	15.5	0.245	0.016	0.015	0.43	13.30
A5	0.15	100	0.010	11.681	135	1.6	0.010	1.395	144	4.5	3.8	15.5	0.245	0.016	0.015	0.54	13.61
A6	0.15	100	0.010	11.681	67	2.3	0.020	0.489	178	4.5	3.8	15.5	0.245	0.016	0.015	0.66	12.83
A7	0.15	100	0.010	11.681	14	2.3	0.020	0.102	174	4.5	3.8	15.5	0.245	0.016	0.015	0.65	12.43
A8	0.15	100	0.010	11.681	126	3.9	0.058	0.540	157	4.5	3.8	15.5	0.245	0.016	0.015	0.59	12.81
A9	0.01	0	0.020	0.000	0	3.5	0.047	0.000	204	4.5	3.8	15.5	0.245	0.016	0.015	0.76	5.00
B0	0.15	100	0.010	11.681	18	2.3	0.020	0.131	128	5.8	3.8	15.5	0.245	0.016	0.025	0.37	12.18
B1	0.15	100	0.010	11.681	22	2.3	0.020	0.161	217	5.8	3.8	15.5	0.245	0.016	0.025	0.63	12.47
B2	0.15	40	0.020	4.253	0	3.9	0.058	0.000	510	5.8	3.8	15.5	0.245	0.016	0.025	1.47	5.73
B3	0.15	100	0.010	11.681	38	2.8	0.030	0.227	106	8.2	3.8	15.5	0.245	0.016	0.051	0.21	12.12
C0	0.15	100	0.020	8.853	35	2.6	0.025	0.229	254	4.2	3.8	15.5	0.245	0.016	0.013	1.02	10.10
C1	0.15	100	0.020	8.853	14	2.6	0.025	0.091	194	4.2	3.8	15.5	0.245	0.016	0.013	0.78	9.72
C2	0.15	100	0.016	9.679	263	2.3	0.020	1.921	19	5.2	3.8	15.5	0.245	0.016	0.020	0.06	11.66
C3	0.15	100	0.010	11.681	173	2.4	0.023	1.178	159	5.2	3.8	15.5	0.245	0.016	0.020	0.51	13.37
D0	0.15	100	0.020	8.853	44	2.3	0.020	0.321	251	5.2	3.8	15.5	0.245	0.016	0.020	0.81	9.98
D2	0.01	20	0.020	0.302	0	1.6	0.010	0.000	744	3.1	3.8	15.5	0.245	0.016	0.007	4.06	5.00
D3	0.15	100	0.010	11.681	44	2.3	0.020	0.321	246	3.1	3.8	15.5	0.245	0.016	0.007	1.34	13.35
D4	0.15	100	0.020	8.853	45	2.3	0.020	0.329	183	4.2	3.8	15.5	0.245	0.016	0.013	0.73	9.91
D5	0.15	100	0.020	8.853	45	2.3	0.020	0.329	180	8.3	3.8	15.5	0.245	0.016	0.052	0.36	9.54
D6	0.15	100	0.015	9.932	205	1.8	0.012	1.933	108	7.2	3.8	15.5	0.245	0.016	0.039	0.25	12.12
D7	0.01	20	0.020	0.302	0	5.1	0.100	0.000	235	7.3	3.8	15.5	0.245	0.016	0.040	0.54	5.00
D8	0.15	100	0.017	9.447	275	2.8	0.030	1.640	0	5.2	3.8	15.5	0.245	0.016	0.020	0.00	11.09
CULV A1	0.15	100	0.020	8.853	42	2.6	0.025	0.274	200	3.3	3.8	15.5	0.245	0.016	0.008	1.02	10.15
CULV A2	0.01	20	0.020	0.302	0	1.6	0.010	0.000	211	3.3	3.8	15.5	0.245	0.016	0.008	1.08	5.00

**The minimum Tc is 5 minutes per the City of Austin DCM.

25-Year Street Capacity & Inlet Design Calculations

Project: Edgewood Phase 2-2
Location: Leander, TX
Date: 10/19/2023

Inlet No.	Inlet Type	Inlet Condition (Sag or On-Grade)	Area No.	Areas (acres)	25 YR Runoff "c"	Conc. Time (min.)	25-year Intensity (in/hr)	25-year Runoff (cfs)	25-year Carryover Flow (cfs)	25-year Total Gutter Q (cfs)	Sag Inlet Percentage of flow from: Lower Station	Higher Station	Sag Inlet Split 25-year Runoff (cfs) from: Lower Station	Higher Station	"S_L" Street Longitudinal Slope (%) On-Grade/Lower Station for Sag	Higher Station for Sag	Street Section (Type)	Roadway Cross Slope "S_x" (%)	Manning's Coefficient for Pavement "n"	Street Capacity (cfs)	Right-of-Way Capacity (cfs) On-Grade/Lower Station for Sag	Higher Station for Sag	25-year Depth of Flow (ft) On-Grade/Lower Station for Sag	Higher Station for Sag	25-year Spread of Flow "T" (ft) On-Grade/Lower Station for Sag	Higher Station for Sag	Gutter Cross Slope "S_w" (%)	Width of Depressed Gutter "W"	25-year Ratio of Flow "E_0"	Gutter Depression Depth "a" (ft)	Equivalent Cross Slope "S_e" (%)	25-year Required Length "L_T"	Length Provided "L" (ft)	Inlet Efficiency "E"	25-year Inlet Capacity (cfs)	25-year Carryover Flow "q" (cfs)	Target Inlet No.			
1	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
EX-N6	Curb	Sag	EX-N6	0.82	0.73	10.7	8.86	5.30	0.00	5.30	50%	50%	2.65	2.65	0.70%	0.70%	Type F	3.57%	0.0175	7.91	20.50	20.50	0.40	0.40	11.20	11.20	27.78%	1.50	N/A	0.42	N/A	2.04	10	1.00	5.30	0.00	N/A	EX-N6	0.82	0.00
EX-N7	Curb	Sag	EX-N7	0.33	0.78	5.0	11.30	2.91	0.00	2.91	50%	50%	1.46	1.46	0.70%	0.70%	Type F	4.22%	0.0175	7.91	20.50	20.50	0.34	0.34	8.14	8.14	27.78%	1.50	N/A	0.42	N/A	1.19	10	1.00	2.91	0.00	N/A	EX-N7	0.33	0.00
A0	Curb	On-Grade	A0	0.24	0.76	5.0	11.30	2.09	0.00	2.09	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	3.78%	0.0175	7.32	18.98	N/A	0.39	N/A	10.20	N/A	27.78%	1.50	0.52	0.42	18.16%	5.56	10	1.00	2.09	0.00	N/A	A0	0.24	0.00
A1	Curb	Sag	A1	0.73	0.69	11.0	8.79	4.44	0.00	4.44	50%	50%	2.22	2.22	1.60%	1.00%	Type F	4.21%	0.0175	11.96	31.00	24.51	0.34	0.37	8.18	9.20	27.78%	1.50	N/A	0.42	N/A	1.81	10	1.00	4.44	0.00	N/A	A1	0.73	0.00
A2	Curb	On-Grade	A2	0.38	0.83	11.2	8.71	2.75	0.00	2.75	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	3.39%	0.0175	7.32	18.98	N/A	0.41	N/A	12.04	N/A	27.78%	1.50	0.46	0.42	16.06%	6.71	10	1.00	2.75	0.00	A1	A2	0.38	0.00
A3	Curb	On-Grade	A3	0.40	0.79	5.0	11.30	3.59	0.00	3.59	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	2.98%	0.0175	7.32	18.98	N/A	0.42	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	8.04	10	1.00	3.59	0.00	EX-N6	A3	0.40	0.00
A4	Curb	On-Grade	A4	0.86	0.69	13.3	8.11	4.82	0.00	4.82	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	3.20%	0.0175	11.58	30.02	N/A	0.41	N/A	12.95	N/A	27.78%	1.50	0.43	0.42	15.20%	11.56	10	0.97	4.69	0.13	A5	A4	0.84	0.02
A5	Curb	On-Grade	A5	0.97	0.70	13.6	8.03	5.42	0.13	5.55	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	2.98%	0.0175	11.58	30.02	N/A	0.42	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	12.72	10	0.94	5.21	0.34	A8	A5	0.93	0.04
A6	Curb	On-Grade	A6	0.95	0.65	12.8	8.24	5.11	0.00	5.11	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	3.07%	0.0175	11.58	30.02	N/A	0.42	N/A	13.56	N/A	27.78%	1.50	0.42	0.42	14.67%	12.10	10	0.96	4.89	0.22	N/A	A6	0.91	0.04
A7	Curb	On-Grade	A7	0.52	0.71	12.4	8.35	3.07	0.00	3.07	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	3.33%	0.0175	7.91	20.50	N/A	0.41	N/A	12.31	N/A	27.78%	1.50	0.45	0.42	15.79%	7.44	10	1.00	3.07	0.00	A9	A7	0.51	0.00
A8	Curb	On-Grade	A8	0.77	0.72	12.8	8.25	4.53	0.34	4.87	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.44	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	9.58	10	1.00	4.87	0.00	A9	A8	0.83	-0.06
A9	Curb	Sag	A9	0.31	0.85	5.0	11.30	3.02	0.00	3.02	50%	50%	1.51	1.51	1.45%	1.00%	Type F	4.46%	0.0175	11.38	29.51	24.51	0.31	0.33	7.00	7.62	27.78%	1.50	N/A	0.42	N/A	1.28	10	1.00	3.02	0.00	N/A	A9	0.31	0.00
B0	Curb	On-Grade	B0	0.87	0.70	12.2	8.42	5.08	0.00	5.08	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	3.55%	0.0175	14.95	38.75	N/A	0.40	N/A	11.30	N/A	27.78%	1.50	0.48	0.42	16.85%	12.95	10	0.93	4.73	0.35	B1	B0	0.81	0.06
B1	Curb	On-Grade	B1	1.06	0.64	12.5	8.34	5.71	0.35	6.06	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	3.25%	0.0175	14.95	38.75	N/A	0.41	N/A	12.69	N/A	27.78%	1.50	0.44	0.42	15.43%	14.70	15	1.00	6.06	0.00	B3	B1	1.13	-0.07
B2	Curb	On-Grade	B2	0.59	0.60	5.7	10.91	3.90	0.00	3.90	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	3.89%	0.0175	14.95	38.75	N/A	0.38	N/A	9.72	N/A	27.78%	1.50	0.54	0.42	18.81%	10.85	10	0.99	3.86	0.04	B3	B2	0.59	0.01
B3	Curb	Sag	B3	1.02	0.69	12.1	8.44	5.91	0.04	5.95	65%	35%	3.87	2.08	5.03%	4.83%	Type F	4.23%	0.0175	21.20	54.96	53.86	0.34	0.29	8.11	6.18	27.78%	1.50	N/A	0.42	N/A	2.61	10	1.00	5.95	0.00	N/A	B3	1.03	-0.01
C0	Curb	On-Grade	C0	0.94	0.67	10.1	9.07	5.74	0.00	5.74	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	12.21	10	0.95	5.48	0.26	C1	C0	0.90	0.04
C1	Curb	On-Grade	C1	0.75	0.68	9.7	9.20	4.64	0.26	4.90	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.42	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	11.42	10	0.98	4.78	0.12	D0	C1	0.77	-0.02
C2	Curb	On-Grade	C2	1.04	0.67	11.7	8.57	5.94	0.00	5.94	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	12.39	10	0.95	5.63	0.31	C3	C2	0.98	0.05
C3	Curb	Sag	C3	1.33	0.69	13.4	8.10	7.43	0.31	7.74	15%	85%	1.16	6.58	4.41%	2.02%	Type F	4.90%	0.0175	19.85	51.47	34.83	0.24	0.42	4.93	14.00	27.78%	1.50	N/A	0.42	N/A	3.62	10	1.00	7.74	0.00	N/A	C3	1.39	-0.06
D0	Curb	On-Grade	D0	0.70	0.69	10.0	9.11	4.37	0.12	4.49	N/A	N/A	N/A	N/A	2.00%	N/A	Type F	3.57%	0.0175	13.37	34.66	N/A	0.40	N/A	11.21	N/A	27.78%	1.50	0.48	0.42	16.95%	11.46	15	1.00	4.49	0.00	D3	D0	0.72	-0.02
D2	Curb	On-Grade	D2	0.46	0.77	5.0	11.30	4.03	0.00	4.03	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	8.84	10	1.00	4.03	0.00	D6	D2	0.46	0.00
D3	Curb	On-Grade	D3	1.01	0.54	13.3	8.10	4.40	0.00	4.40	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	9.18	10	1.00	4.40	0.00	D4	D3	1.01	0.00
D4	Curb	On-Grade	D4	0.75	0.69	9.9	9.13	4.72	0.00	4.72	N/A	N/A	N/A	N/A	1.33%	N/A	Type F	3.12%	0.0175	10.90	28.26	N/A	0.42	N/A	13.34	N/A	27.78%	1.50	0.42	0.42	14.85%	11.21	10	0.98	4.63	0.09	D5	D4	0.73	0.01
D5	Curb	On-Grade	D5	0.79	0.68	9.5	9.27	4.97	0.09	5.06	N/A	N/A	N/A	N/A	5.24%	N/A	Type F	4.00%	0.0175	21.64	56.10	N/A	0.37	N/A	9.18	N/A	27.78%	1.50	0.56	0.42	19.58%	14.75	15	1.00	5.06	0.00	N/A	D5	0.80	-0.01
D6	Curb	On-Grade	D6	1.29	0.66	12.1	8.44	7.20	0.00	7.20	N/A	N/A	N/A	N/A	3.90%	N/A	Type F	3.34%	0.0175	18.67	48.40	N/A	0.41	N/A	12.26	N/A	27.78%	1.50	0.45	0.42	15.85%	17.77	15	0.96	6.95	0.25	D8	D6	1.24	0.04
D7	Curb	Sag	D7	0.43	0.80	5.0	11.30	3.90	0.00	3.90	10%	90%	0.39	3.51	2.00%	4.30%	Type F	5.15%	0.0175	19.60	34.66	50.82	0.19	0.34	3.72	8.04	27.78%	1.50	N/A	0.42	N/A	1.98	10	1.00	3.90	0.00	N/A	D7	0.43	0.00
D8	Curb	Sag	D8	1.03	0.72	11.1	8.75	6.49	0.25	6.74	10%	90%	0.67	6.07	2.00%	2.00%	Type F	4.96%	0.0175	13.37	34.66	34.66	0.23	0.42	4.63	13.88	27.78%	1.50	N/A	0.42	N/A	3.22	10	1.00	6.74	0.00	N/A	D8	1.07	-0.04
CULV A1	Curb	Sag	CULV A1	0.72	0.70	10.1	9.05	4.54	0.00	4.54	50%	50%	2.27	2.27	0.75%	1.85%	Type F	3.82%	0.0175	12.86	21.22	33.33	0.38	0.34	10.04	7.98	27.78%	1.50	N/A	0.42	N/A	1.86	10	1.00	4.54	0.00	N/A	CULV A1	0.72	0.00
CULV A2	Curb	Sag	CULV A2	0.32	0.78	5.0	11.30	2.81	0.00	2.81	50%	50%	1.41	1.41	1.85%	0.75%	Type F	4.59%	0.0175	12.86	33.33	21.22	0.29	0.34	6.42	7.88	27.78%	1.50	N/A	0.42	N/A	1.22	10	1.00	2.81	0.00	N/A	CULV A2	0.32	0.00

100-Year Street Capacity & Inlet Design Calculations

Project: Edgewood Phase 2-2
Location: Leander, TX
Date: 10/19/2023

Inlet No.	Inlet Type	Inlet Condition (Sag or On-Grade)	Area No.	Areas (acres)	100 YR Runoff "c"	Conc. Time (min.)	100-year Intensity (in/hr)	100-year Runoff (cfs)	100-year Carryover Flow (cfs)	100-year Total Gutter Q (cfs)	Sag Inlet Percentage of flow from: Lower Station	Higher Station	Sag Inlet Split 100-year Runoff (cfs) from: Lower Station	Higher Station	"S_L" Street Longitudinal Slope (%) On-Grade/Lower Station for Sag	Higher Station for Sag	Street Section (Type)	Roadway Cross Slope "S_x" (%)	Manning's Coefficient for Pavement "n"	Street Capacity (cfs)	Right-of-Way Capacity (cfs) On-Grade/Lower Station for Sag	Higher Station for Sag	100-year Depth of Flow (ft) On-Grade/Lower Station for Sag	Higher Station for Sag	100-year Spread of Flow "T" (ft) On-Grade/Lower Station for Sag	Higher Station for Sag	Gutter Cross Slope "S_w" (%)	Width of Depressed Gutter "W"	100-year Ratio of Flow "E0"	Gutter Depression Depth "a" (ft)	Equivalent Cross Slope "S_e" (%)	100-year Required Length "LT"	Length Provided "L" (ft)	Inlet Efficiency "E"	100-year Inlet Capacity (cfs)	100-year Carryover Flow "q" (cfs)	Target Inlet No.			
1	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
EX-N6	Curb	Sag	EX-N6	0.82	0.81	10.7	11.74	7.83	0.00	7.83	50%	50%	3.92	3.92	0.70%	0.70%	Type F	2.98%	0.0175	7.91	20.50	20.50	0.42	0.42	14.00	14.00	27.78%	1.50	N/A	0.42	N/A	2.94	10	1.00	7.83	0.00	N/A	EX-N6	0.82	0.00
EX-N7	Curb	Sag	EX-N7	0.33	0.87	5.0	15.00	4.28	0.00	4.28	50%	50%	2.14	2.14	0.70%	0.70%	Type F	3.84%	0.0175	7.91	20.50	20.50	0.38	0.38	9.91	9.91	27.78%	1.50	N/A	0.42	N/A	1.68	10	1.00	4.28	0.00	N/A	EX-N7	0.33	0.00
A0	Curb	On-Grade	A0	0.24	0.84	5.0	15.00	3.09	0.00	3.09	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	3.17%	0.0175	7.32	18.98	N/A	0.41	N/A	13.08	N/A	27.78%	1.50	0.43	0.42	15.08%	7.32	10	1.00	3.09	0.00	N/A	A0	0.25	0.00
A1	Curb	Sag	A1	0.73	0.77	11.0	11.65	6.58	0.00	6.58	50%	50%	3.29	3.29	1.60%	1.00%	Type F	3.82%	0.0175	11.96	31.00	24.51	0.38	0.40	10.00	11.46	27.78%	1.50	N/A	0.42	N/A	2.57	10	1.00	6.58	0.00	N/A	A1	0.73	0.00
A2	Curb	On-Grade	A2	0.38	0.92	11.2	11.55	4.03	0.00	4.03	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	2.98%	0.0175	7.32	18.98	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	8.44	10	1.00	4.03	0.00	A1	A2	0.38	0.00
A3	Curb	On-Grade	A3	0.40	0.88	5.0	15.00	5.28	0.00	5.28	N/A	N/A	N/A	N/A	0.60%	N/A	Type F	2.98%	0.0175	7.32	18.98	N/A	0.46	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	9.46	10	1.00	5.28	0.00	EX-N6	A3	0.40	0.00
A4	Curb	On-Grade	A4	0.86	0.77	13.3	10.76	7.15	0.00	7.15	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	2.98%	0.0175	11.58	30.02	N/A	0.44	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	14.14	10	0.89	6.37	0.78	A5	A4	0.77	0.09
A5	Curb	On-Grade	A5	0.97	0.78	13.6	10.65	8.04	0.78	8.82	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	2.98%	0.0175	11.58	30.02	N/A	0.47	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	15.45	10	0.85	7.47	1.35	A8	A5	0.90	0.07
A6	Curb	On-Grade	A6	0.95	0.73	12.8	10.93	7.61	0.00	7.61	N/A	N/A	N/A	N/A	1.50%	N/A	Type F	2.98%	0.0175	11.58	30.02	N/A	0.45	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	14.52	10	0.88	6.68	0.93	N/A	A6	0.83	0.12
A7	Curb	On-Grade	A7	0.52	0.80	12.4	11.07	4.55	0.00	4.55	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.44	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	9.31	10	1.00	4.55	0.00	A9	A7	0.52	0.00
A8	Curb	On-Grade	A8	0.77	0.80	12.8	10.93	6.71	1.35	8.06	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.50	N/A	14.22	N/A	27.78%	1.50	0.40	0.42	14.12%	11.93	10	0.96	7.76	0.30	A9	A8	0.89	-0.12
A9	Curb	Sag	A9	0.31	0.94	5.0	15.00	4.42	0.30	4.72	50%	50%	2.36	2.36	1.45%	1.00%	Type F	4.11%	0.0175	11.38	29.51	24.51	0.36	0.37	8.63	9.49	27.78%	1.50	N/A	0.42	N/A	1.90	10	1.00	4.72	0.00	N/A	A9	0.33	-0.02
B0	Curb	On-Grade	B0	0.87	0.78	12.2	11.17	7.54	0.00	7.54	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	2.98%	0.0175	14.95	38.75	N/A	0.42	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	16.86	10	0.80	6.05	1.49	B1	B0	0.69	0.17
B1	Curb	On-Grade	B1	1.06	0.72	12.5	11.06	8.52	1.49	10.01	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	2.98%	0.0175	14.95	38.75	N/A	0.45	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	18.99	15	0.94	9.41	0.60	B3	B1	1.17	-0.11
B2	Curb	On-Grade	B2	0.59	0.68	5.7	14.47	5.85	0.00	5.85	N/A	N/A	N/A	N/A	2.50%	N/A	Type F	3.32%	0.0175	14.95	38.75	N/A	0.41	N/A	12.38	N/A	27.78%	1.50	0.45	0.42	15.72%	14.32	10	0.88	5.17	0.68	B3	B2	0.52	0.07
B3	Curb	Sag	B3	1.02	0.77	12.1	11.19	8.77	1.28	10.05	65%	35%	6.53	3.52	5.03%	4.83%	Type F	3.69%	0.0175	21.20	54.96	53.86	0.39	0.34	10.66	7.83	27.78%	1.50	N/A	0.42	N/A	4.15	10	1.00	10.05	0.00	N/A	B3	1.17	-0.15
C0	Curb	On-Grade	C0	0.94	0.76	10.1	12.02	8.53	0.00	8.53	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.47	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	14.42	10	0.88	7.51	1.02	C1	C0	0.83	0.11
C1	Curb	On-Grade	C1	0.75	0.76	9.7	12.20	6.89	1.02	7.91	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.46	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	13.97	10	0.90	7.09	0.82	D0	C1	0.77	-0.02
C2	Curb	On-Grade	C2	1.04	0.75	11.7	11.37	8.83	0.00	8.83	N/A	N/A	N/A	N/A	1.25%	N/A	Type F	2.98%	0.0175	10.57	27.40	N/A	0.48	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	14.63	10	0.87	7.72	1.11	C3	C2	0.91	0.13
C3	Curb	Sag	C3	1.33	0.77	13.4	10.74	11.02	1.11	12.13	15%	85%	1.82	10.31	4.41%	2.02%	Type F	4.69%	0.0175	19.85	51.47	34.83	0.28	0.47	5.94	14.00	27.78%	1.50	N/A	0.42	N/A	5.39	10	1.00	12.13	0.00	N/A	C3	1.47	-0.13
D0	Curb	On-Grade	D0	0.70	0.77	10.0	12.08	6.48	0.82	7.30	N/A	N/A	N/A	N/A	2.00%	N/A	Type F	2.98%	0.0175	13.37	34.66	N/A	0.43	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	15.55	15	1.00	7.28	0.02	D3	D0	0.78	-0.09
D2	Curb	On-Grade	D2	0.46	0.86	5.0	15.00	5.94	0.00	5.94	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.46	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	10.41	10	1.00	5.92	0.02	D6	D2	0.46	0.00
D3	Curb	On-Grade	D3	1.01	0.61	13.3	10.75	6.66	0.02	6.68	N/A	N/A	N/A	N/A	0.70%	N/A	Type F	2.98%	0.0175	7.91	20.50	N/A	0.48	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	10.94	10	0.99	6.60	0.08	D4	D3	1.00	0.01
D4	Curb	On-Grade	D4	0.75	0.77	9.9	12.11	6.99	0.08	7.07	N/A	N/A	N/A	N/A	1.33%	N/A	Type F	2.98%	0.0175	10.90	28.26	N/A	0.45	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	13.58	10	0.91	6.43	0.64	D5	D4	0.69	0.06
D5	Curb	On-Grade	D5	0.79	0.76	9.5	12.28	7.38	0.64	8.02	N/A	N/A	N/A	N/A	5.24%	N/A	Type F	3.42%	0.0175	21.64	56.10	N/A	0.41	N/A	11.93	N/A	27.78%	1.50	0.46	0.42	16.17%	20.07	15	0.92	7.35	0.67	N/A	D5	0.79	0.00
D6	Curb	On-Grade	D6	1.29	0.74	12.1	11.19	10.71	0.02	10.73	N/A	N/A	N/A	N/A	3.90%	N/A	Type F	2.98%	0.0175	18.67	48.40	N/A	0.44	N/A	14.00	N/A	27.78%	1.50	0.41	0.42	14.31%	22.34	15	0.87	9.28	1.45	D8	D6	1.11	0.17
D7	Curb	Sag	D7	0.43	0.89	5.0	15.00	5.74	0.00	5.74	10%	90%	0.57	5.17	2.00%	4.30%	Type F	5.02%	0.0175	19.60	34.66	50.82	0.22	0.38	4.34	9.77	27.78%	1.50	N/A	0.42	N/A	2.79	10	1.00	5.74	0.00	N/A	D7	0.43	0.00
D8	Curb	Sag	D8	1.03	0.80	11.1	11.60	9.61	1.45	11.06	10%	90%	1.11	9.95	2.00%	2.00%	Type F	4.74%	0.0175	13.37	34.66	34.66	0.27	0.46	5.69	14.00	27.78%	1.50	N/A	0.42	N/A	4.97	10	1.00	11.06	0.00	N/A	D8	1.19	-0.16
CULV A1	Curb	Sag	CULV A1	0.72	0.78	10.1	12.00	6.72	0.00	6.72	50%	50%	3.36	3.36	0.75%	1.85%	Type F	3.23%	0.0175	12.86	21.22	33.33	0.41	0.38	12.81	9.73	27.78%	1.50	N/A	0.42	N/A	2.64	10	1.00	6.72	0.00	N/A	CULV A1	0.72	0.00
CULV A2	Curb	Sag	CULV A2	0.32	0.87	5.0	15.00	4.13	0.00	4.13	50%	50%	2.07	2.07	1.85%	0.75%	Type F	4.33%	0.0175	12.86	33.33	21.22	0.33	0.37	7.64	9.54	27.78%	1.50	N/A	0.42	N/A	1.71	10	1.00	4.13	0.00	N/A	CULV A2	0.32	0.00

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn

© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

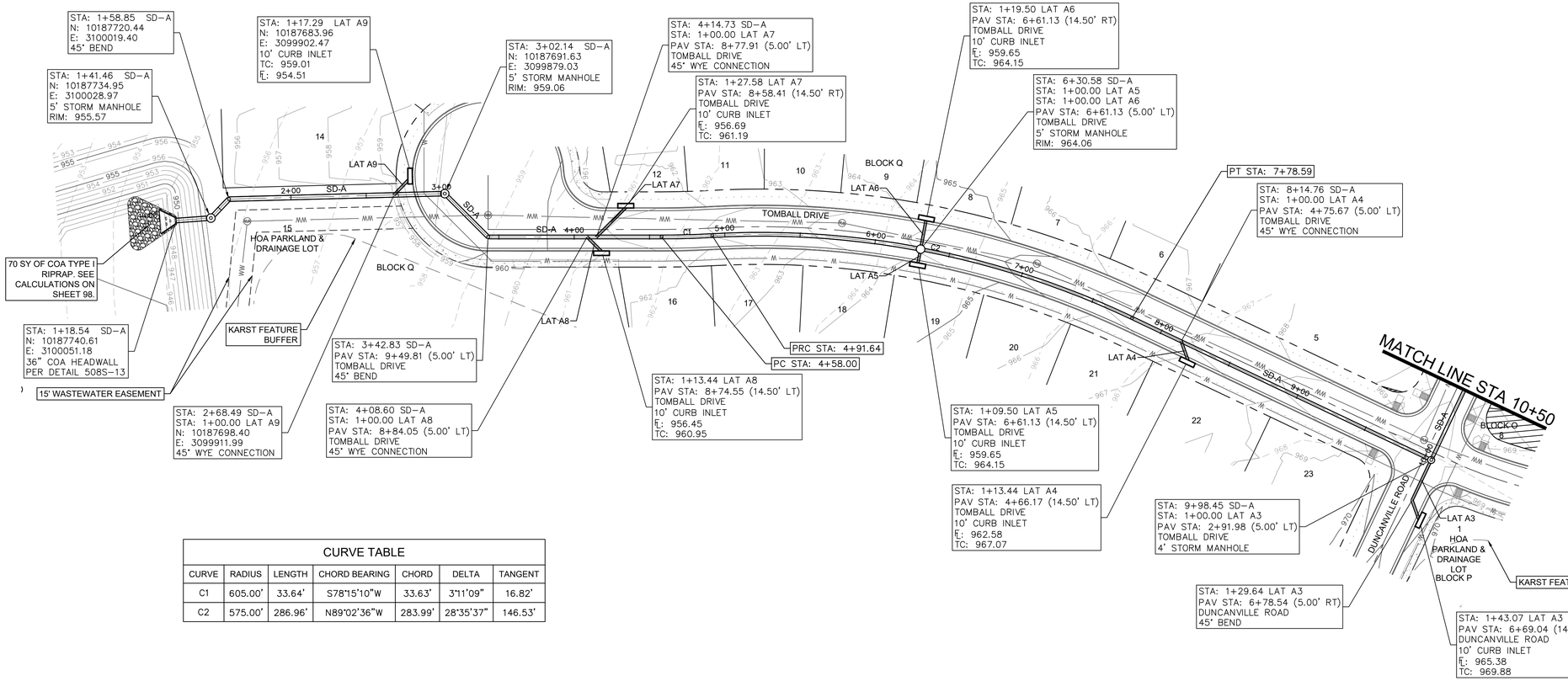
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: DPD
CHECKED BY: AEG

DRAINAGE CALCULATIONS

EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
24 OF 112



CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C1	605.00'	33.64'	S78°15'10"W	33.63'	3°11'09"	16.82'
C2	575.00'	286.96'	N89°02'36"W	283.99'	28°35'37"	146.53'

LEGEND

- W — EXISTING WATER LINE
- UFO — EXISTING UNDERGROUND FIBER OPTIC LINE
- UGT — EXISTING UNDERGROUND TELEPHONE LINE
- GAS — EXISTING GAS LINE
- OHE — EXISTING OVERHEAD ELECTRIC LINE
- PROPOSED FIRE HYDRANT
- W — PROPOSED WATER LINE
- WW — PROPOSED SANITARY SEWER LINE
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STORM NOTES

1. ALL DIMENSIONS ARE TO CENTERLINE OF PIPE UNLESS NOTED OTHERWISE.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTACT ENGINEER IF FIELD CONDITIONS VARY.
3. CONTRACTOR TO PROVIDE CL IV RCP AT ALL LOCATIONS WITH LESS THAN 2.0' OF COVERAGE.
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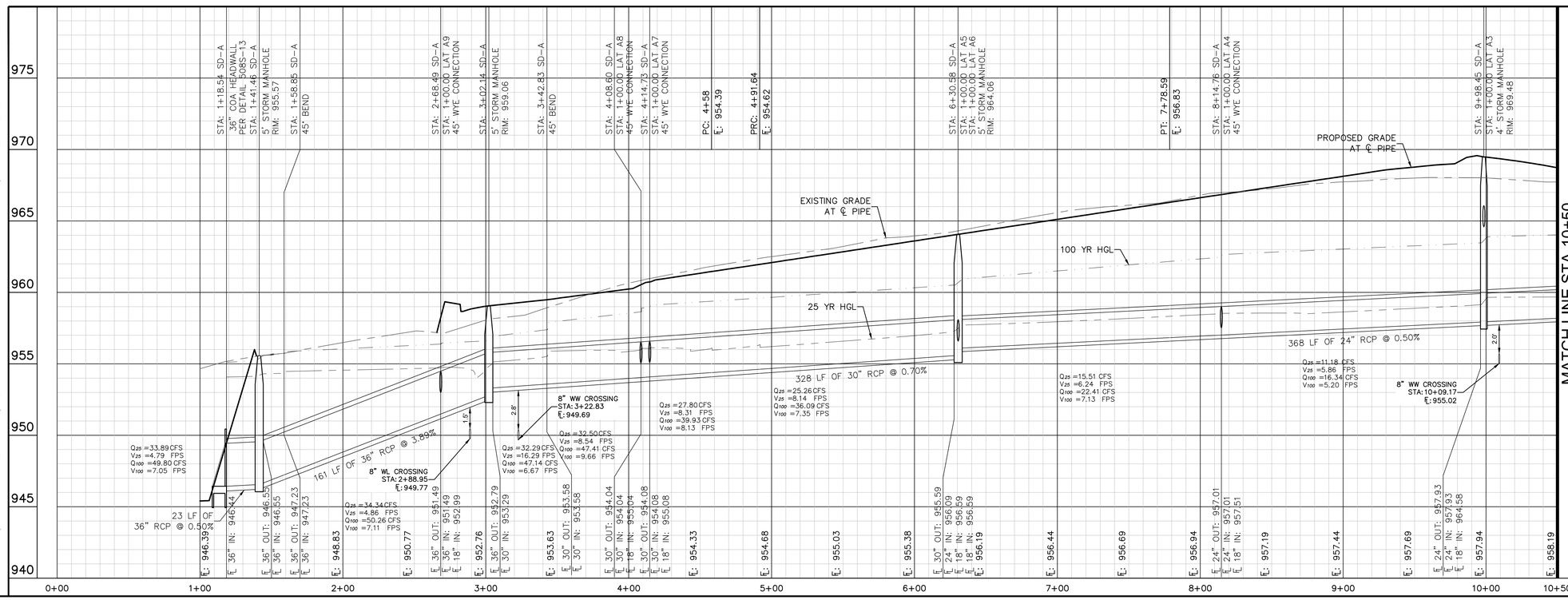
SD-A



PROFILE SCALE

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

BENCHMARKS

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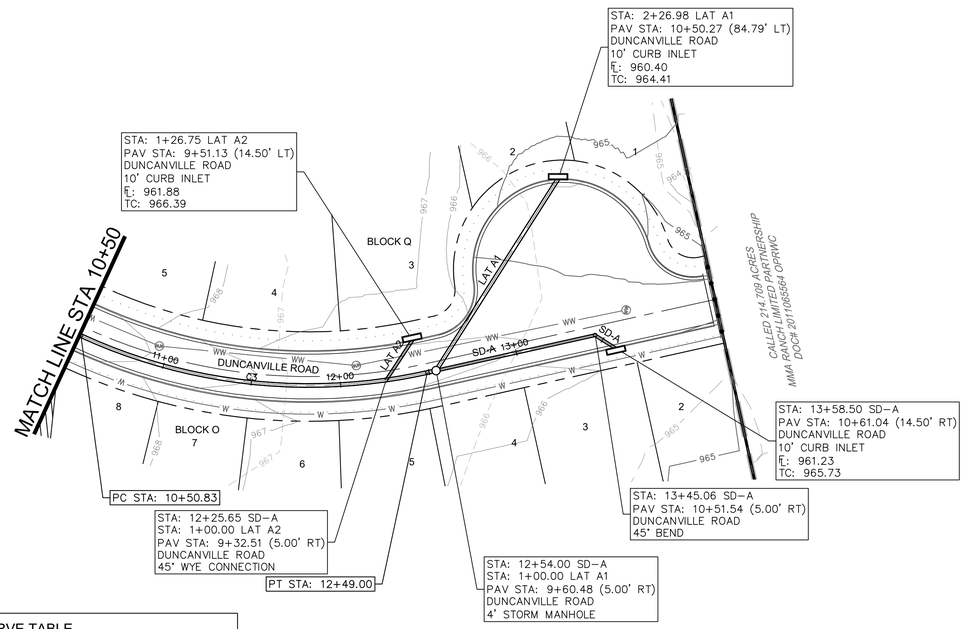
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

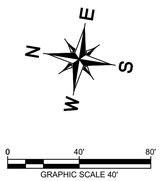
STORM PLAN & PROFILE - SD-A STA 1+00 - 10+50

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 25 112



CURVE TABLE						
CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C3	305.00'	198.17'	S3°21'36"E	194.70'	37°13'37"	102.72'



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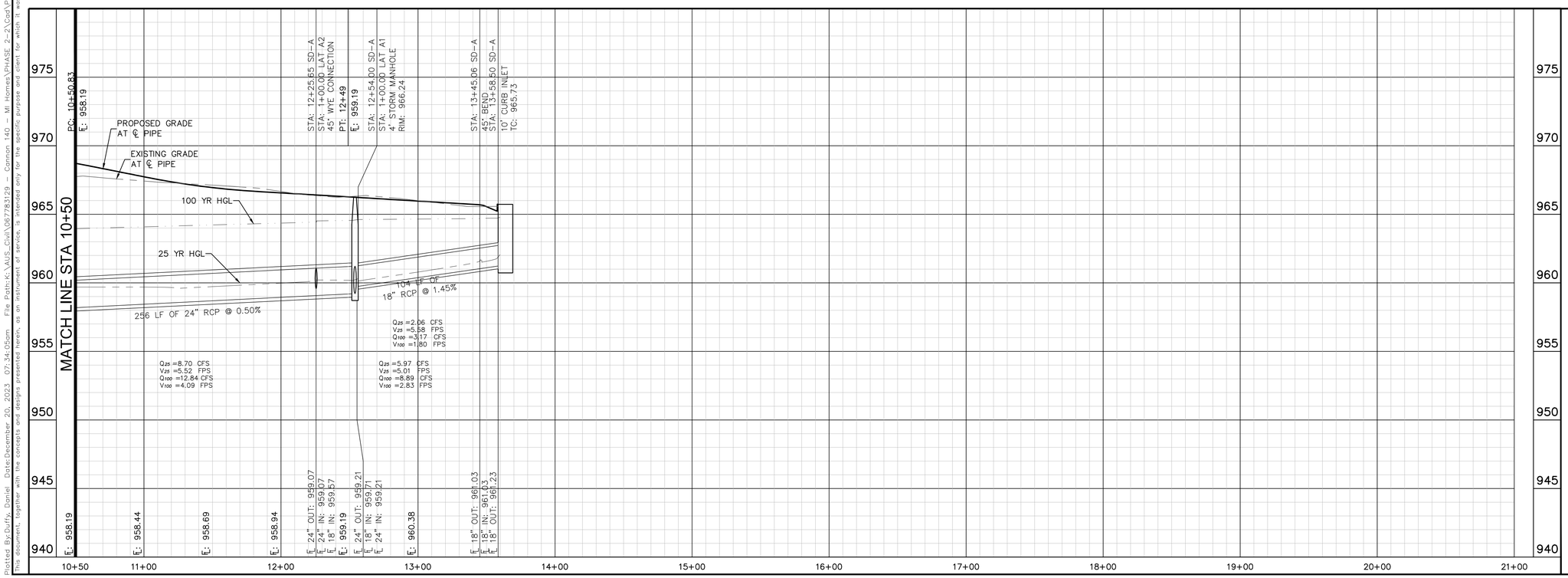
SD–A



PROFILE SCALE
1" = 40' HORIZONTAL
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BENCHMARKS

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TEXAS REGISTERED ENGINEERING FIRM F-928

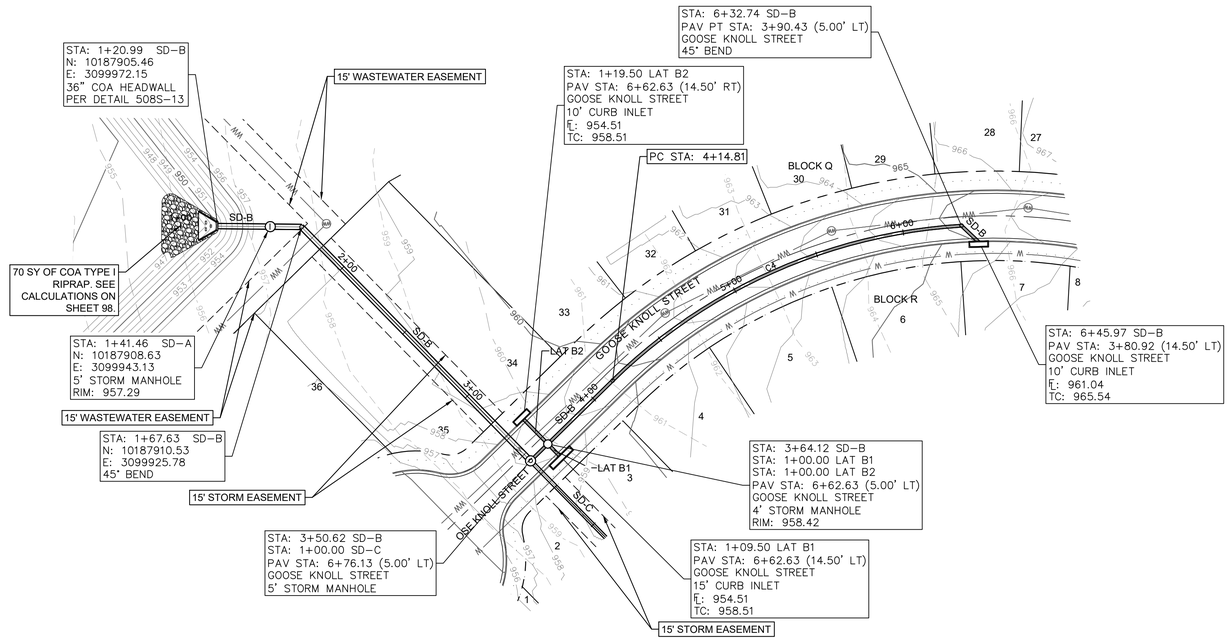
12/06/2023

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE: AS SHOWN	
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

STORM PLAN & PROFILE - SD-A STA 10+50 - END

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 26 112



CURVE TABLE						
CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C4	305.00'	217.93'	S71°42'41"W	213.32'	40°56'22"	113.85'

S
W
E
N

0 40' 80'
GRAPHIC SCALE 40'

LEGEND

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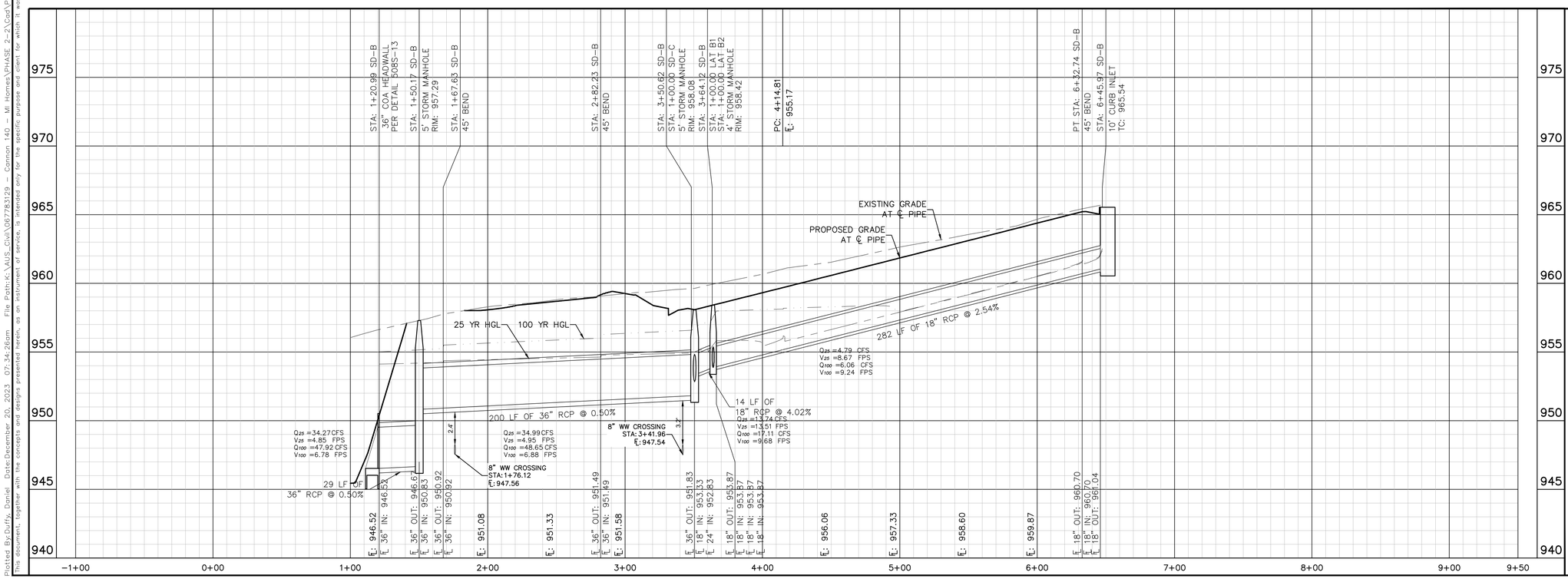
SD-B



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PHONE: 512-520-0788 FAX: 512-418-1791
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TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

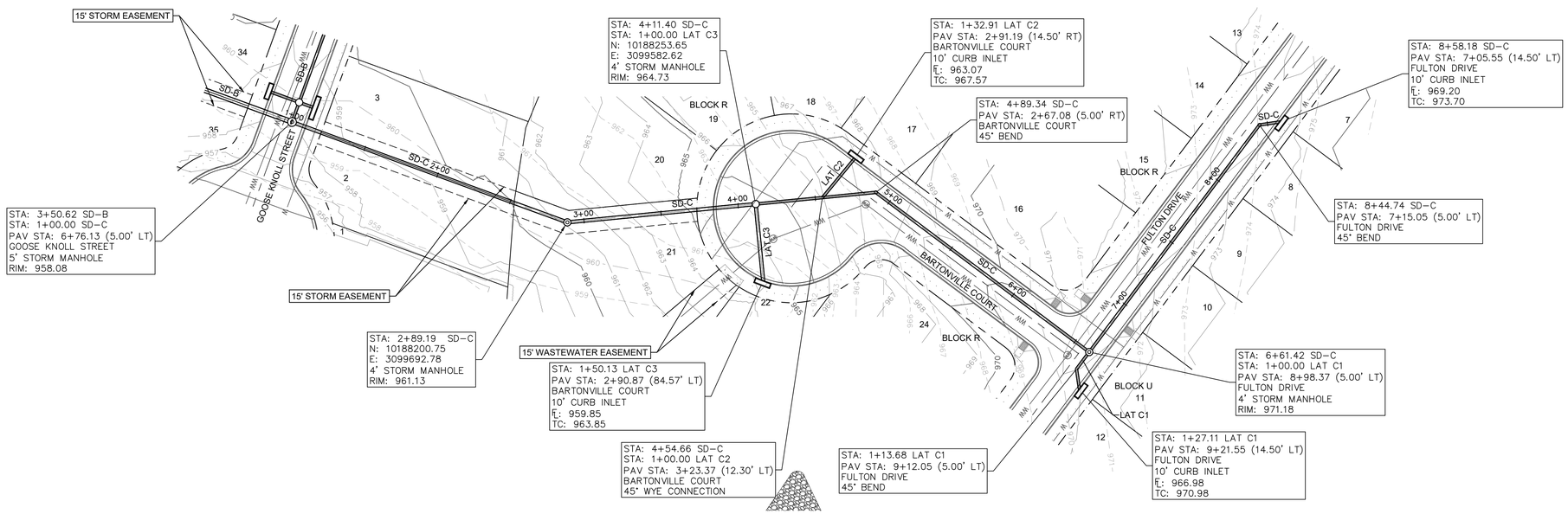
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

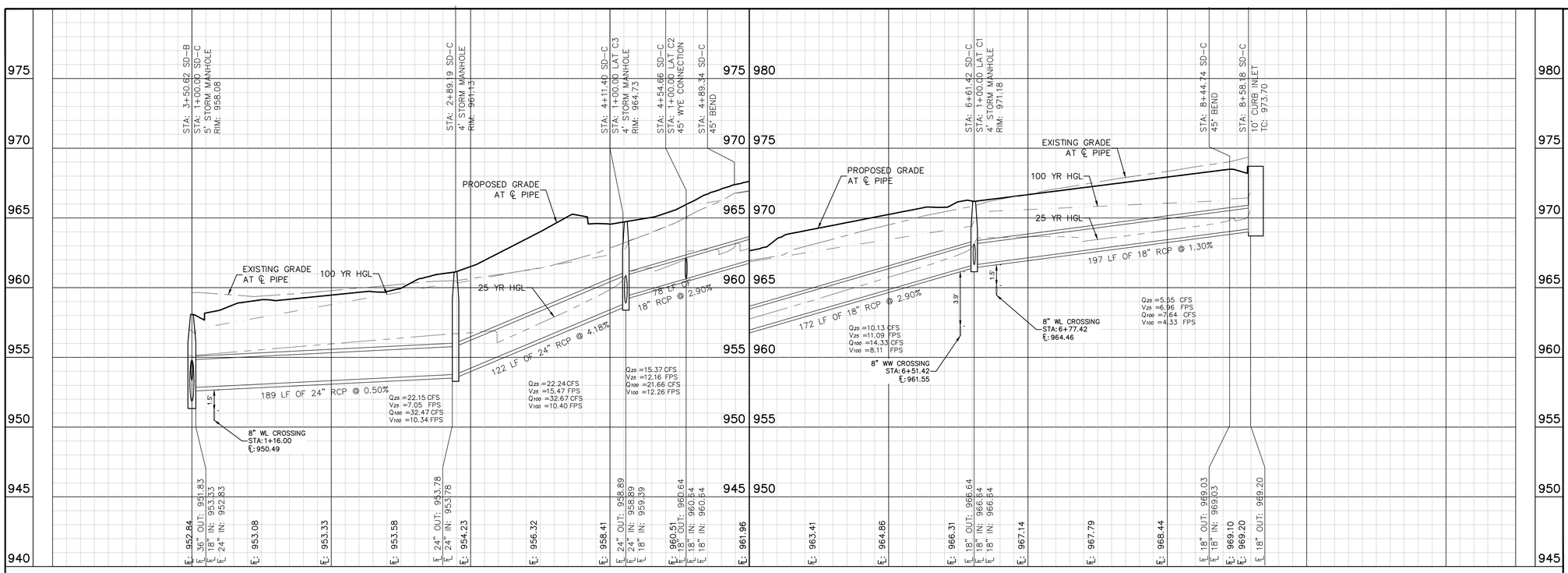
STORM PLAN & PROFILE - SD-B

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 27 112





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0 40' 80'
GRAPHIC SCALE 40'

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STORM NOTES

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12/06/2023

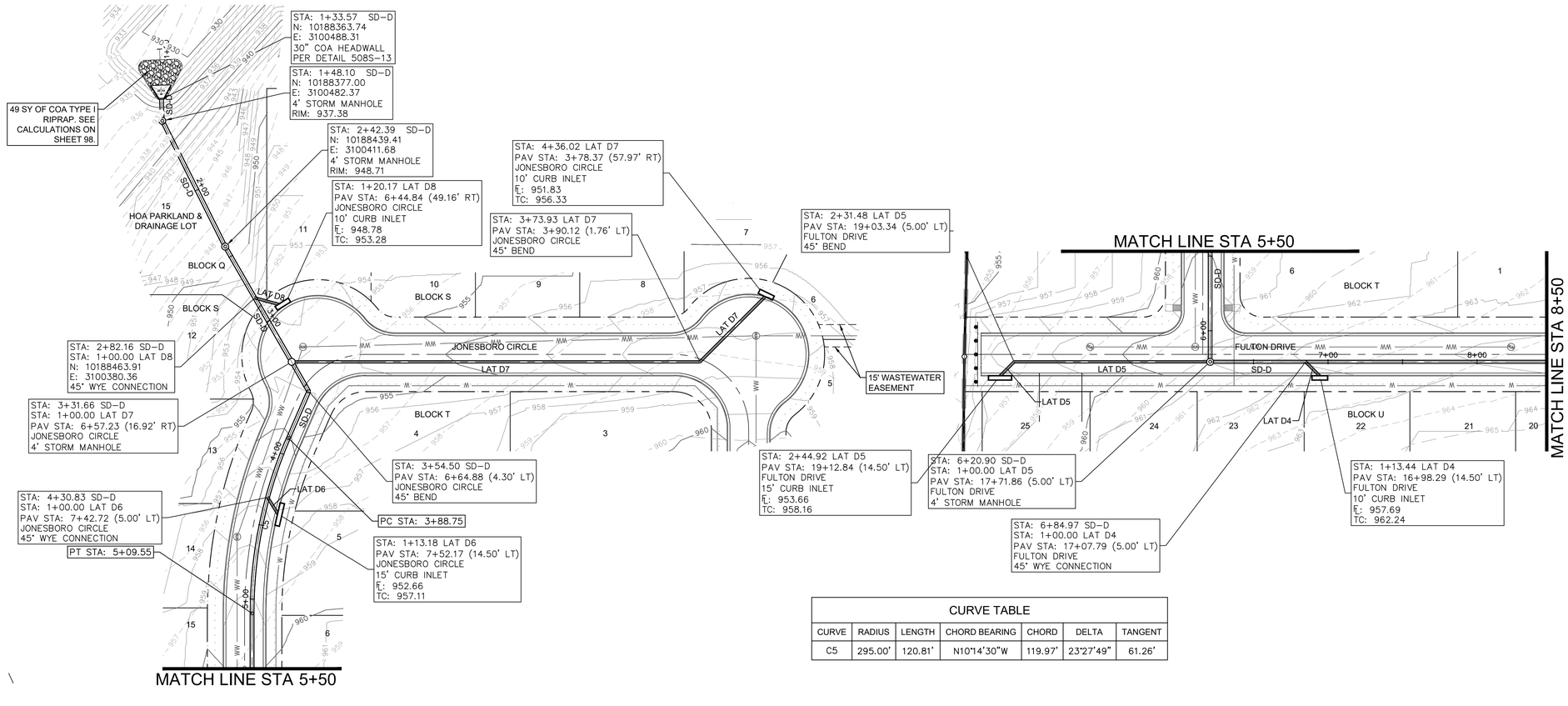
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE: AS SHOWN	
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

STORM PLAN & PROFILE - SD-C

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 28 112



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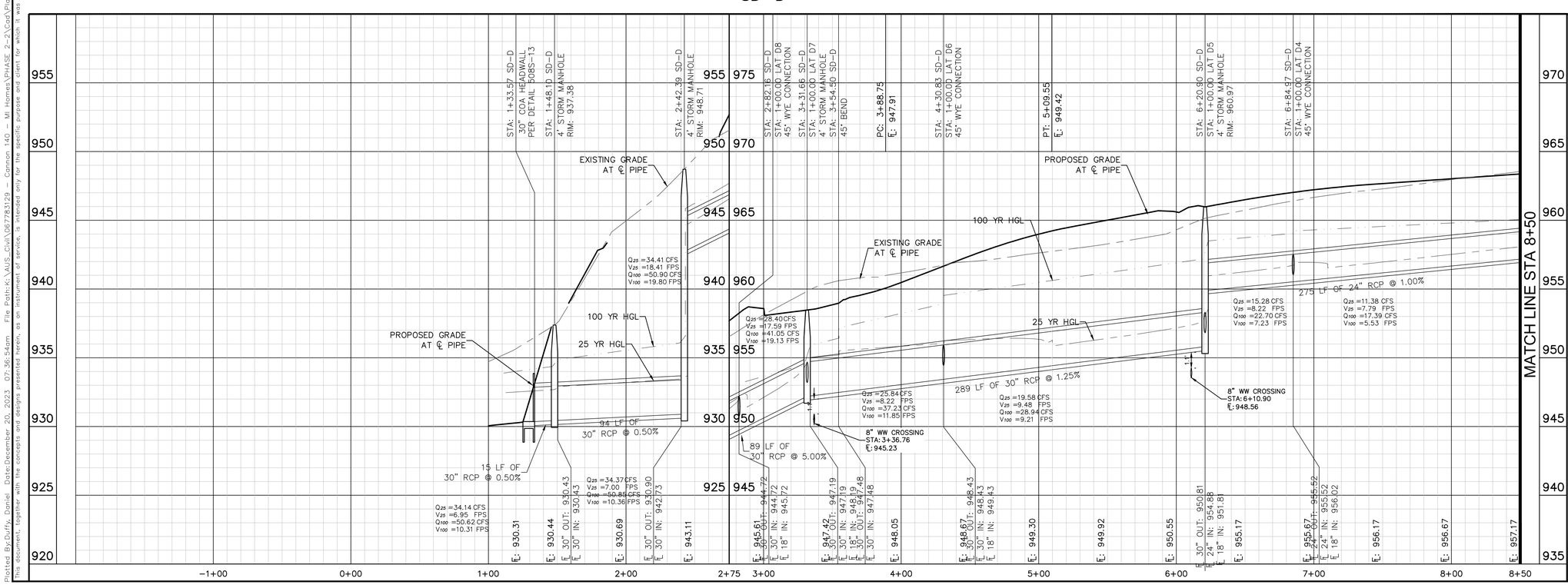
CURVE TABLE						
CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C5	295.00'	120.81'	N10°14'30"W	119.97'	23°27'49"	61.26'

SD-D



PROFILE SCALE

1" = 40' HORIZONTAL
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No.	REVISIONS	DATE	BY

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12/06/2023
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DATE DECEMBER 2023
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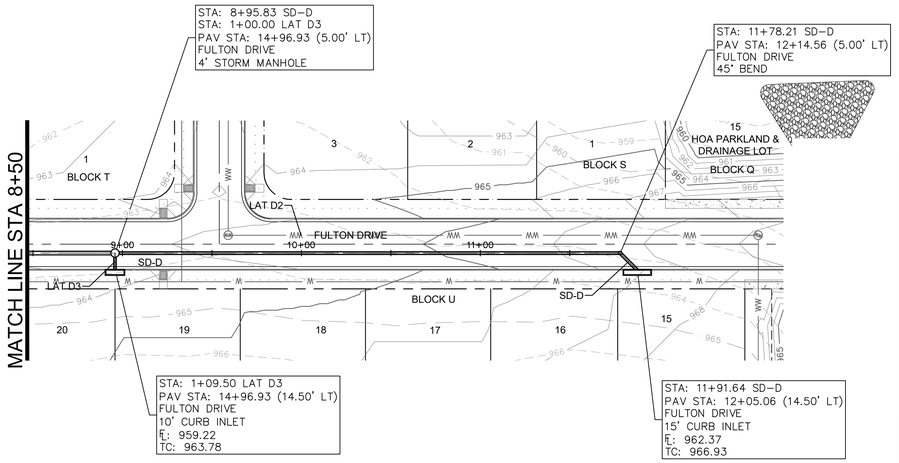
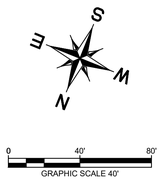
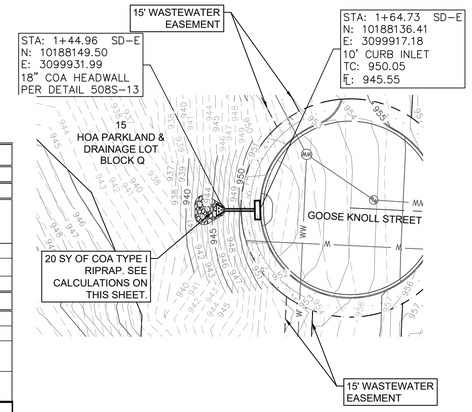
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

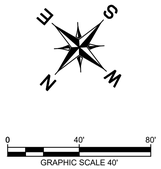
STORM PLAN & PROFILE - SD-D STA 1+00 - 10+50

SHEET NUMBER
OF 29 112









LEGEND

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- EXISTING GAS LINE
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- MATCH LINE
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4. DEFLECTED PIPES SHALL BE PER AMERICAN CONCRETE PIPE ASSOCIATION DESIGN DATA 21 SPEC OR APPROVED EQUAL.

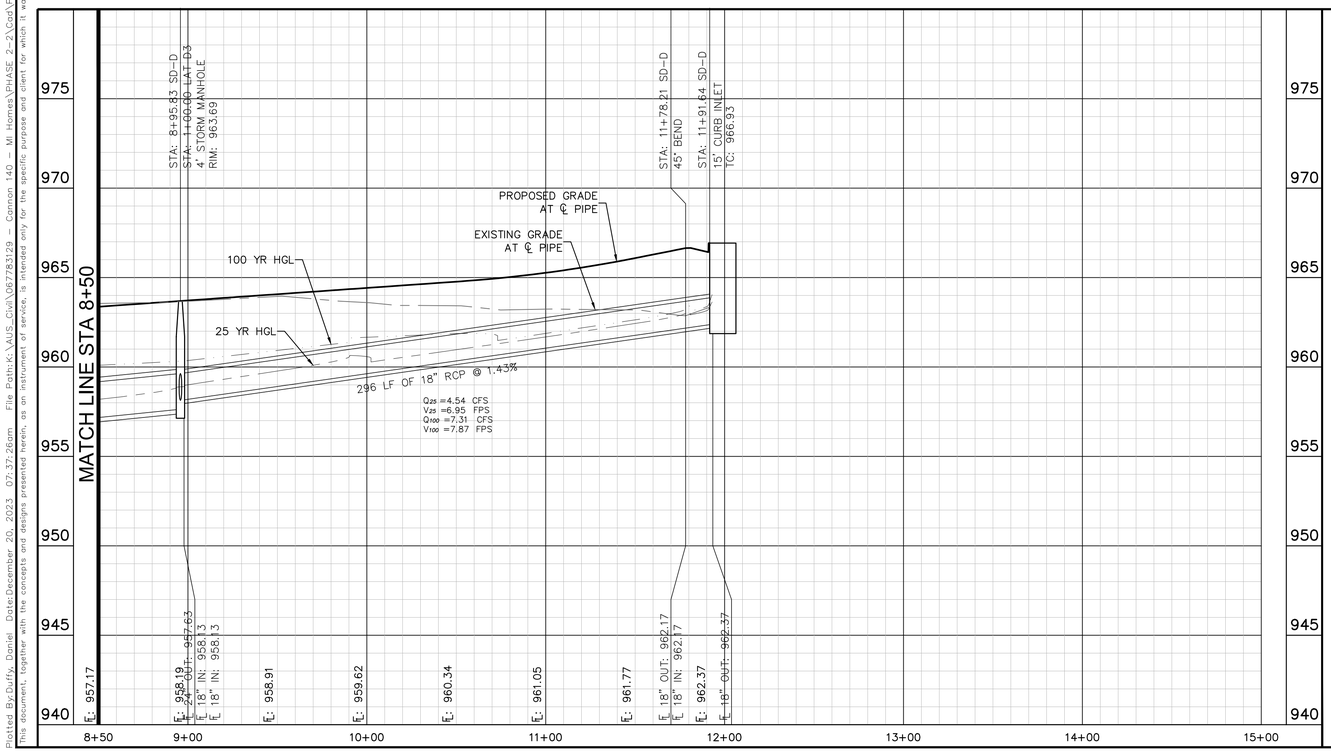
STORM OUTFALL DESIGN - SD-E

Edgewood Phase 2-2

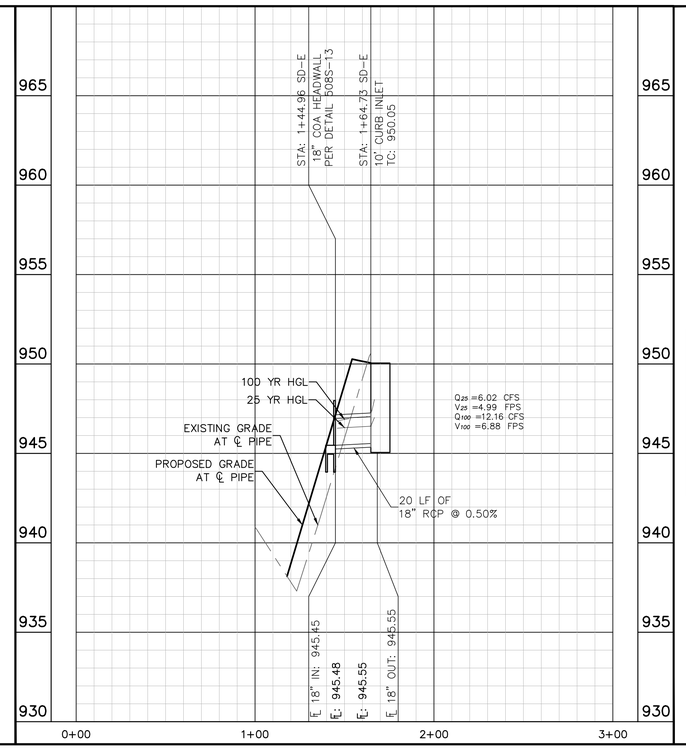
INPUT VALUES	Storm Line SD-E	Unit	Source
Discharge (Q) =	12.16	cfs	StormCAD Model
Velocity at Outfall (V_1) =	6.88	ft/s	StormCAD Model
Outlet Pipe Diameter (D) =	1.5	ft	Required Size for Conveyance
HEADWALL[1]			
Headwall Length (L) =	4.50	ft	COA Detail 508S-13, Based on Outlet Diameter
Headwall Width (C) =	7.5	ft	COA Detail 508S-13, Based on Outlet Diameter
Depth of Flow at End of Headwall (d) =	0.40	ft	Based on Manning's Equation, using Goal Seek in Excel to solve for depth
Velocity at End of Headwall (V_2) =	4.10	ft/sec	$V = \frac{Q}{A}, \quad where\ A = Cd$
RIPRAP			
Riprap Size (D_{50}) =	0.19	ft	$D_{50} = 0.0105V_2^{2.06}$ (ECM 1.4.6.D.5)
	6.00	in	Rounded up to Nearest Diameter Size in City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Riprap Classification =	I	---	Based on City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Apron Width =	9.50	ft	Apron Width $= C + 2$
Apron Length =	16.50	ft	Apron Length $= 3D_{50}$ + La (10*D) (508S-20)
Apron Depth =	1.50	ft	Apron Depth $= 3D_{50}$ (508S-20)

[1]For additional headwall geometry, refer to COA Standard Detail 508S-13

SD–D



SD–E



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

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
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E= 3095953.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

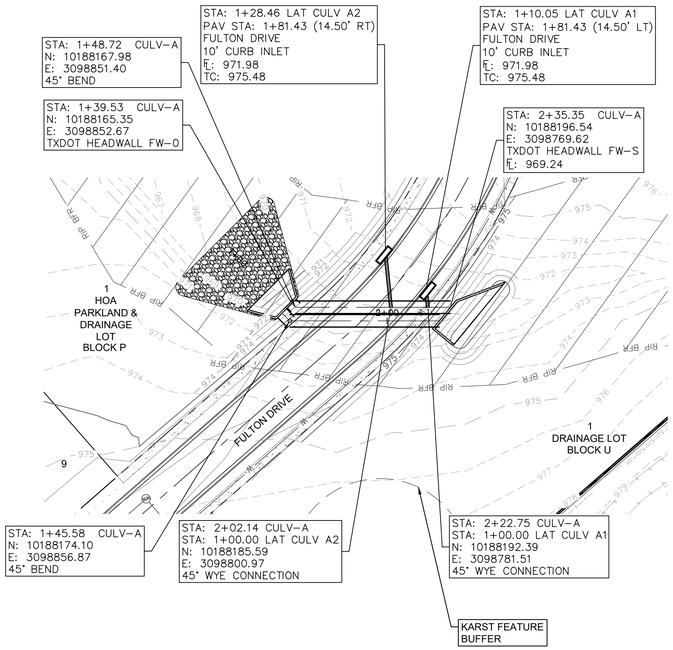
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

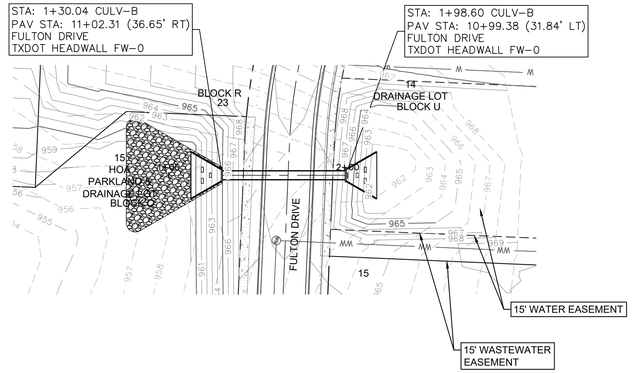
STORM PLAN & PROFILE - SD-D STA 10+50 - END

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 30 112





LEGEND

- W — EXISTING WATER LINE
- UFO — EXISTING UNDERGROUND FIBER OPTIC LINE
- UGT — EXISTING UNDERGROUND TELEPHONE LINE
- GAS — EXISTING GAS LINE
- OHE — EXISTING OVERHEAD ELECTRIC LINE
- PROPOSED FIRE HYDRANT
- W — PROPOSED WATER LINE
- WW — PROPOSED SANITARY SEWER LINE
- PROPOSED STORM SEWER LINE
- DOUBLE SANITARY SEWER SERVICE
- SINGLE SANITARY SEWER SERVICE

STORM NOTES

1. ALL DIMENSIONS ARE TO CENTERLINE OF PIPE UNLESS NOTED OTHERWISE.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTACT ENGINEER IF FIELD CONDITIONS VARY.
3. CONTRACTOR TO PROVIDE CL IV RCP AT ALL LOCATIONS WITH LESS THAN 2.0' OF COVERAGE.
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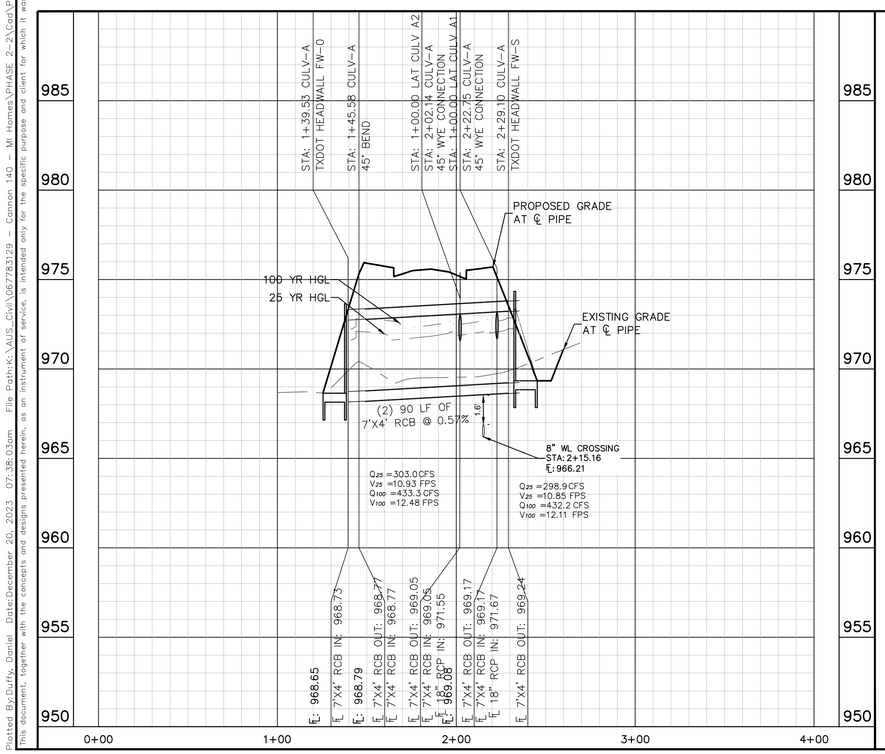
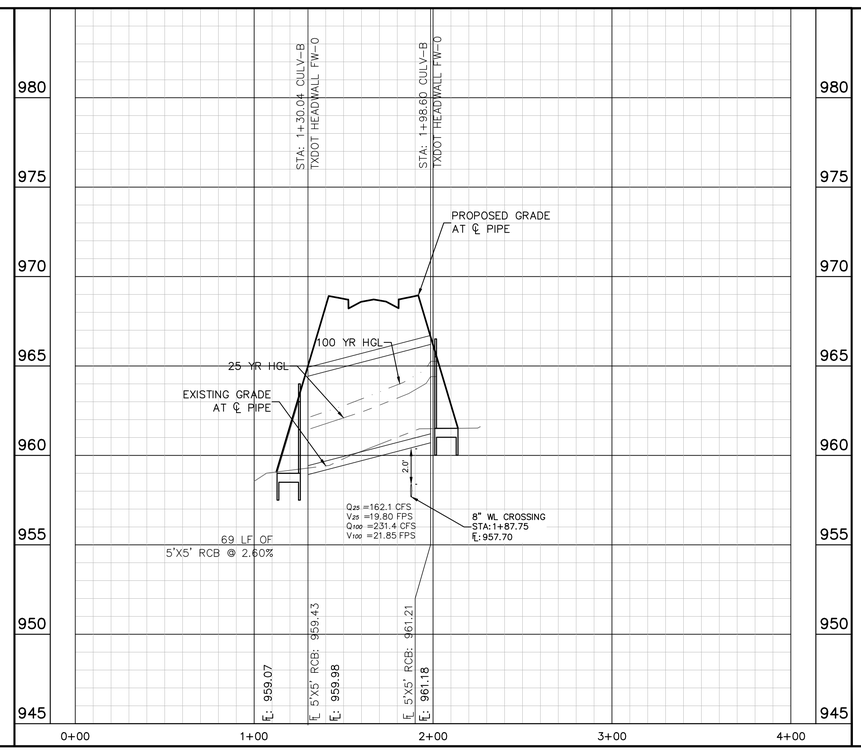
CULV-A



CULV-B



PROFILE SCALE

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

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TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

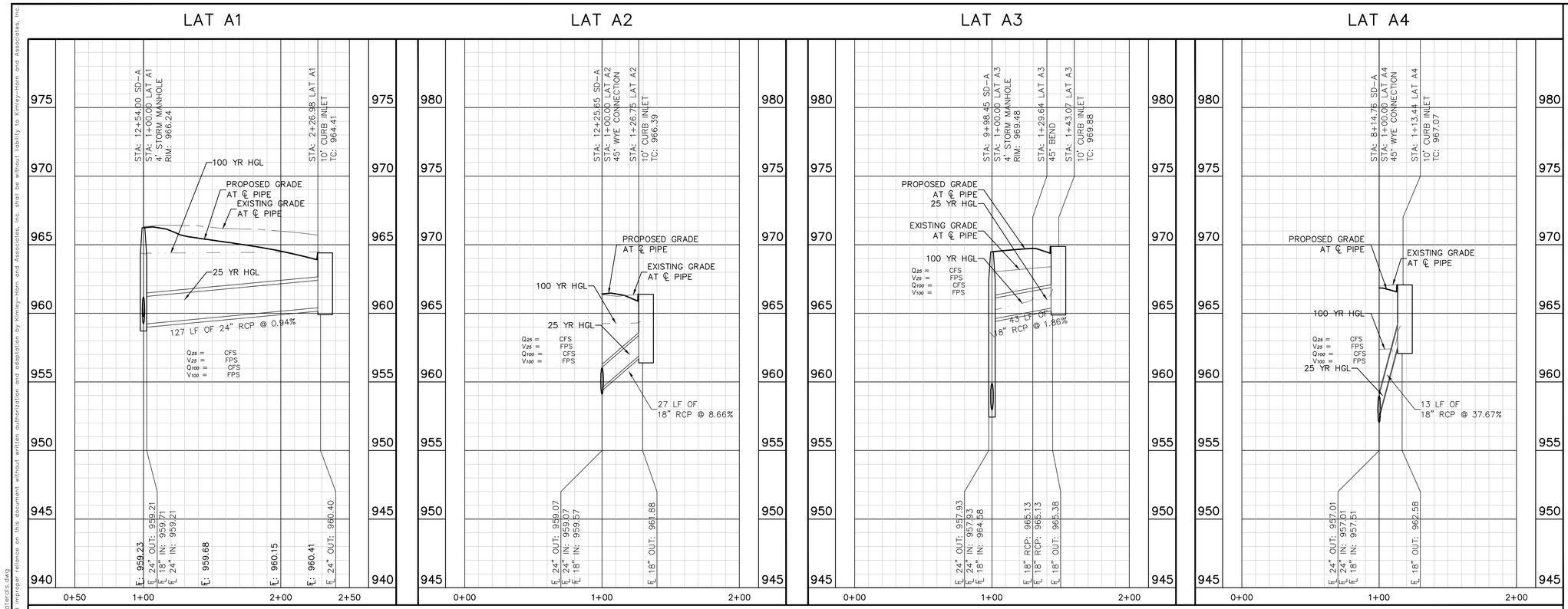
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

STORM PLAN & PROFILE - CULV-A & CULV-B

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 31 112



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12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

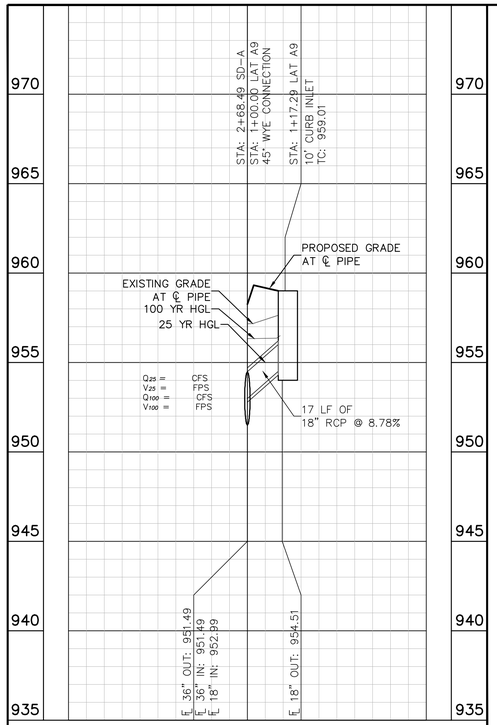
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

STORM LATERAL PROFILES (SHEET 1 OF 3)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 32 112

LAT A9



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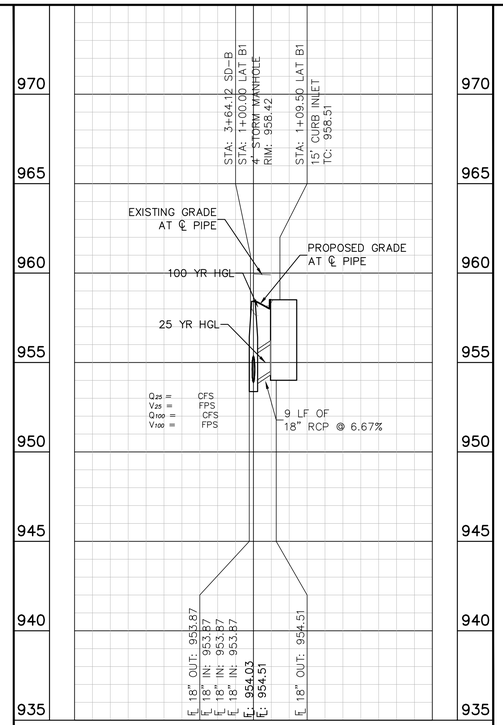

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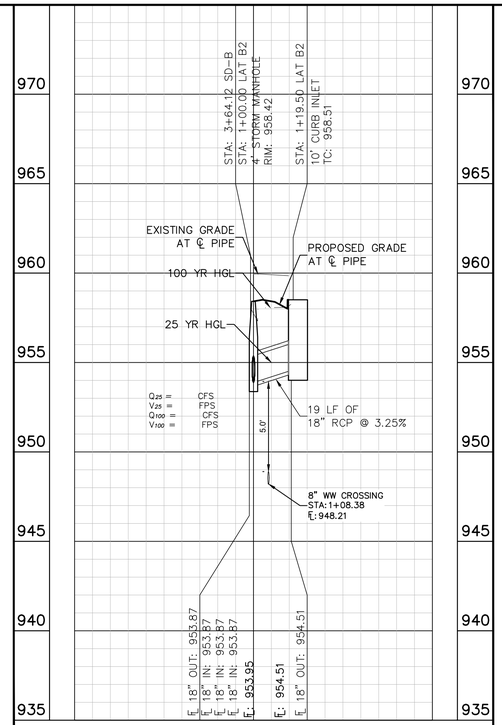

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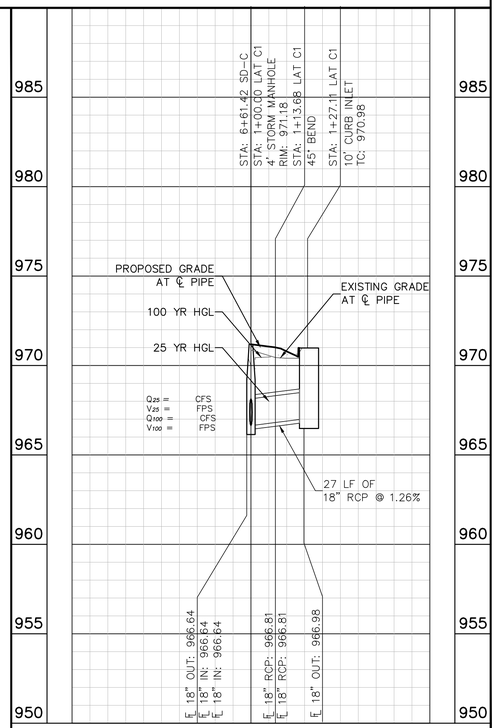

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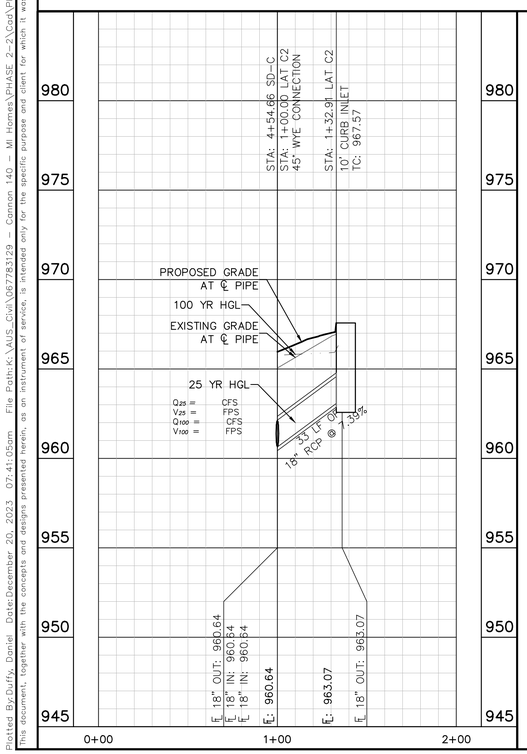
LAT C2



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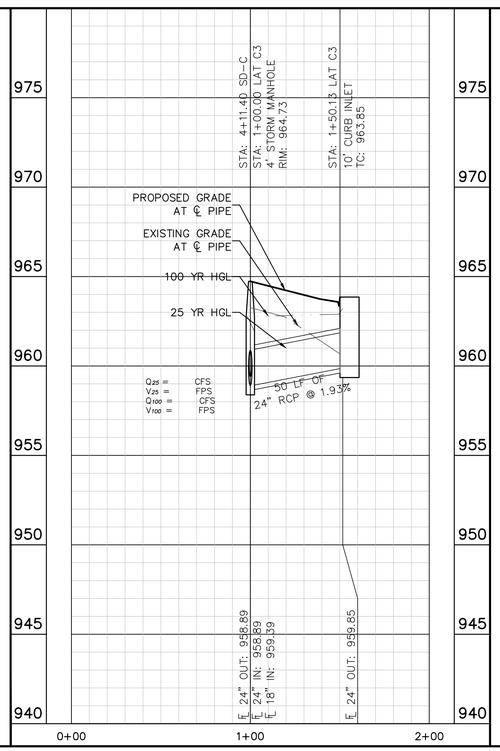

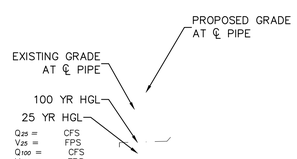

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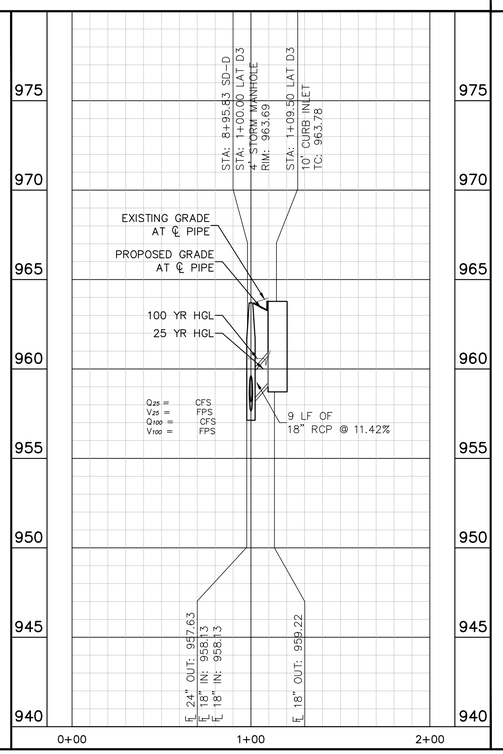

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TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
LEONARDO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

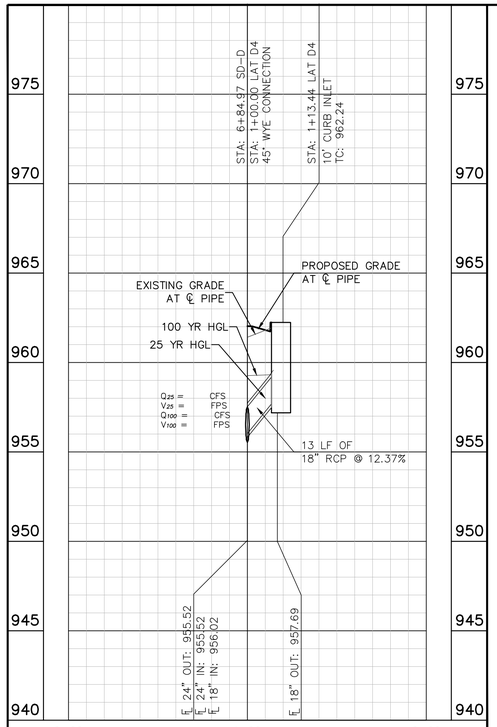
KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

STORM LATERAL PROFILES (SHEET 2 OF 3)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 33 112

LAT D4



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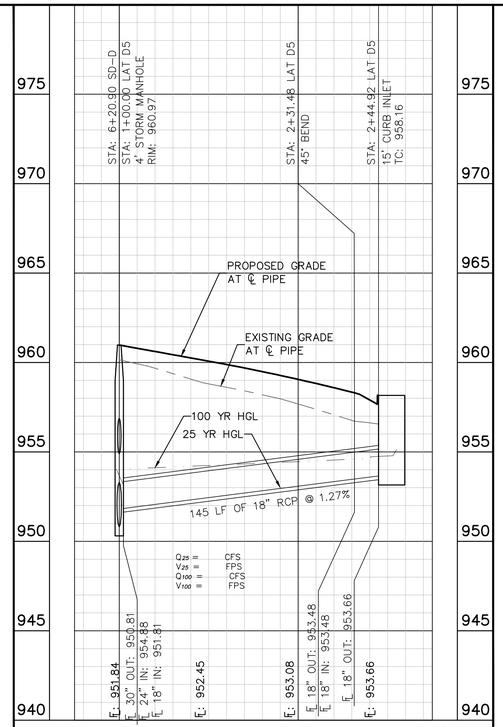

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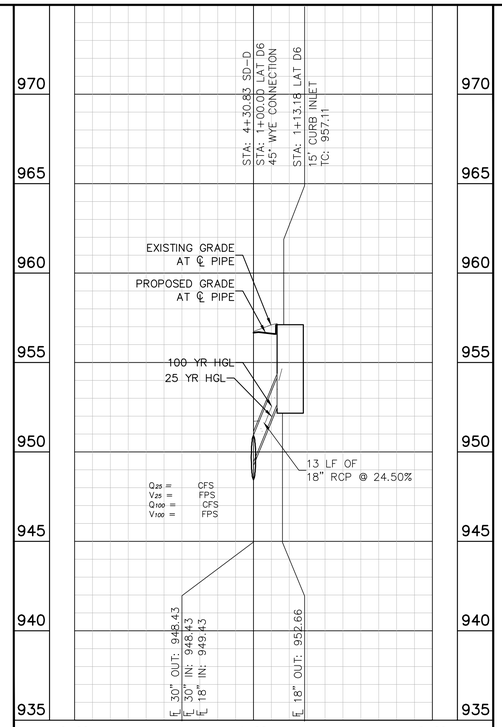

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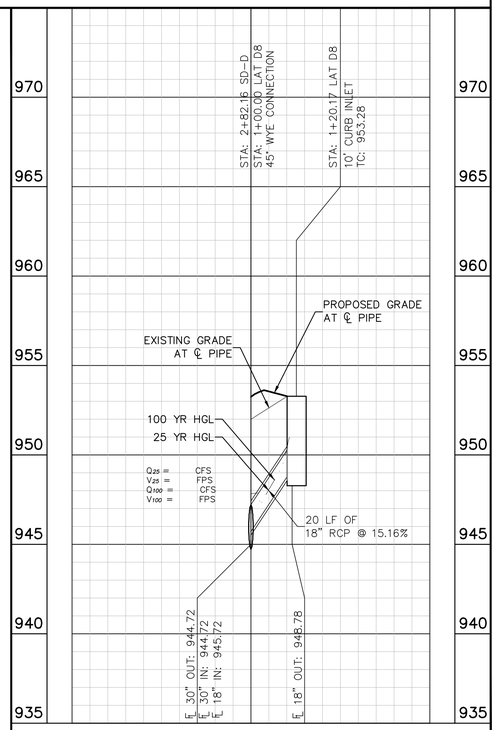

PROFILE SCALE
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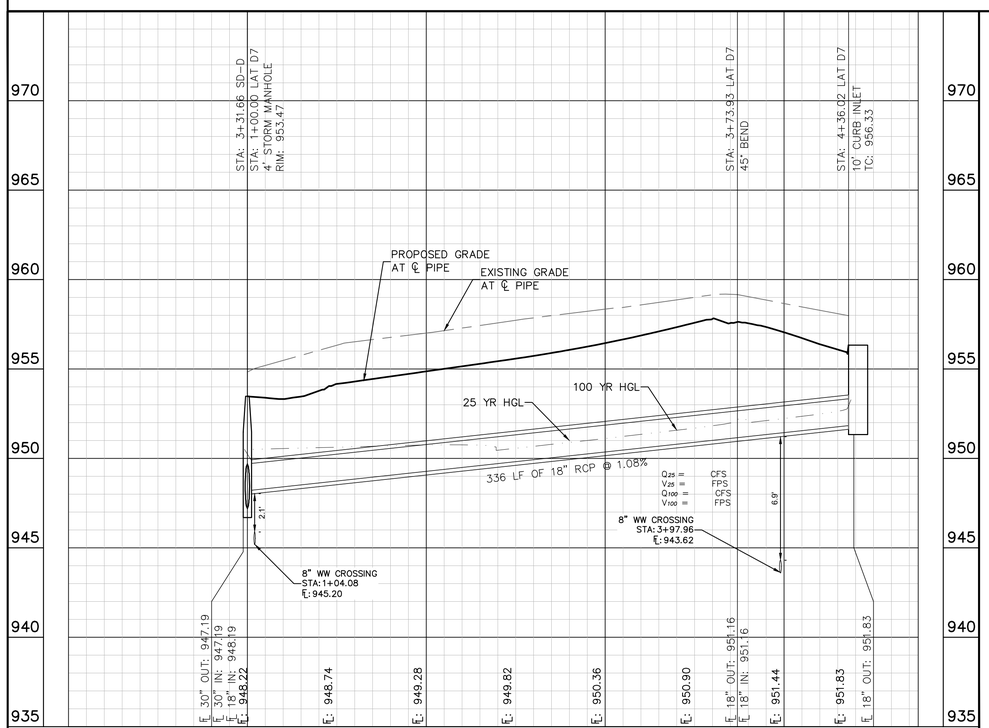
1" = 4' VERTICAL

LAT D7



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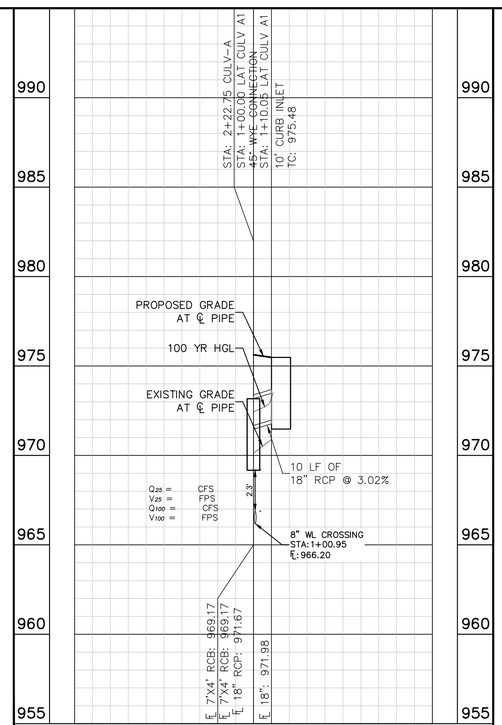

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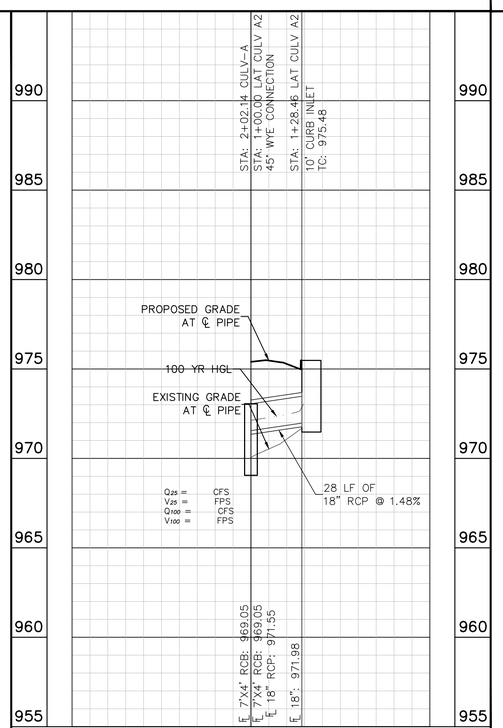

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12/06/2023

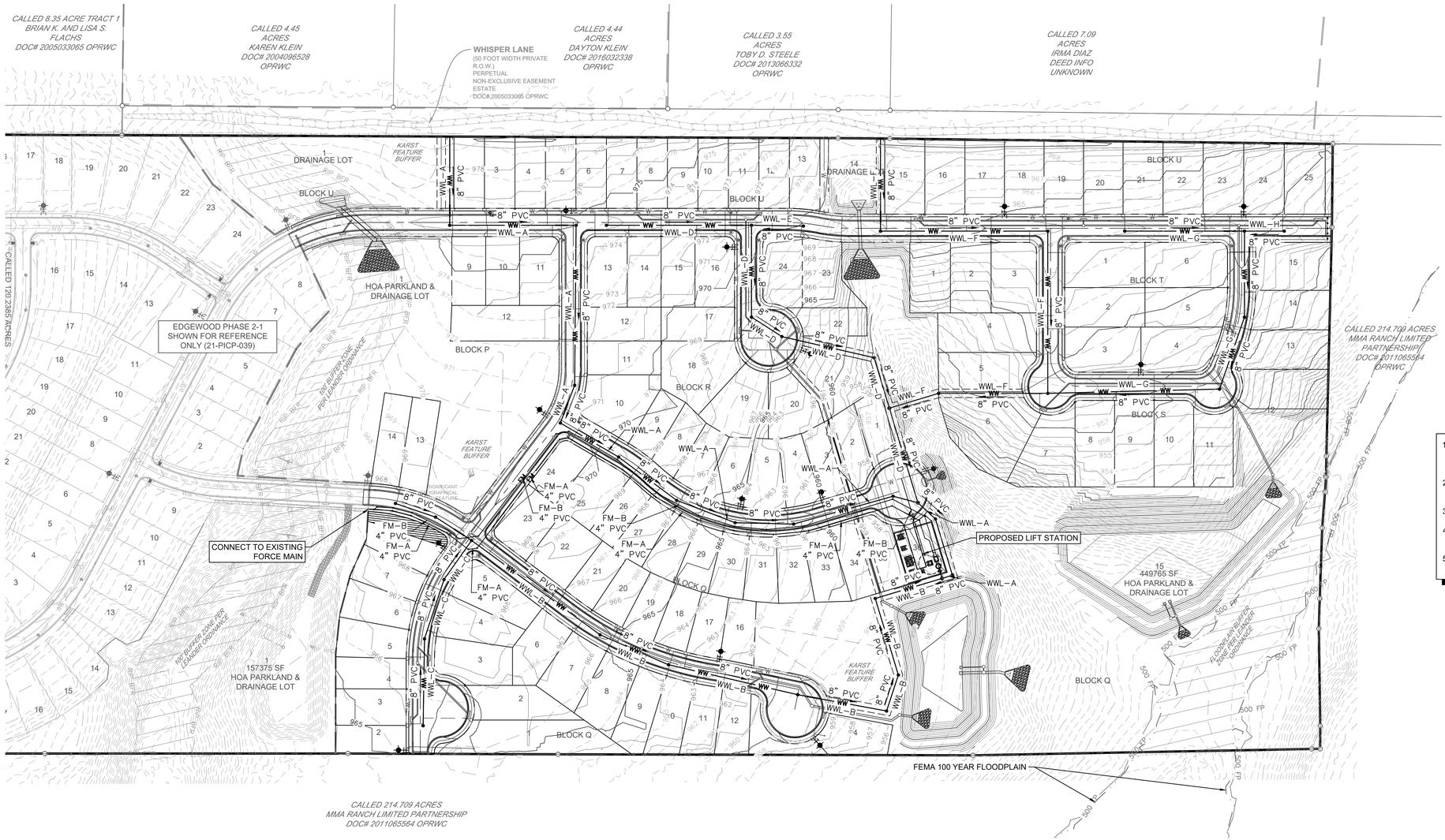
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

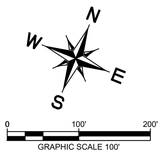
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

STORM LATERAL PROFILES (SHEET 3 OF 3)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 34 112

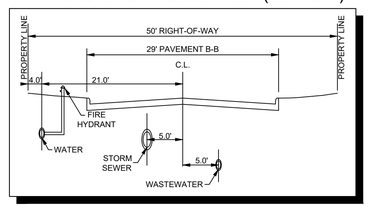




UTILITY LEGEND

- PROPERTY LINE
- WW — PROPOSED WASTE WATER LINE
- W — PROPOSED WATER LINE
- FM — PROPOSED FORCE MAIN LINE
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- OHP — EXISTING OVERHEAD POWER LINE
- W — EXISTING WATER LINE
- WW — EXISTING WASTE WATER LINE
- FM — EXISTING FORCE MAIN LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTE WATER MANHOLE

TYPICAL UTILITY LOCATION (50' ROW)



WASTEWATER GENERAL NOTES

1. WATER AND WASTEWATER SEPARATION (VERTICAL AND HORIZONTAL) SHALL BE MAINTAINED IN ACCORDANCE WITH TCEQ REQUIREMENTS.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. ALL WASTEWATER LINES ARE 8" UNLESS OTHERWISE NOTED.
4. ALL STORM SEWER SHOWN IN PROFILES ARE PARALLEL FROM WASTEWATER UNLESS OTHERWISE NOTED (E.G. CROSSINGS)
5. ALL WASTEWATER SERVICES ARE DUAL SERVICE UNLESS OTHERWISE NOTED. SINGLE SERVICES = ★

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LICENSED
PROFESSIONAL ENGINEER

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DESIGNED BY:	DPD	DRAWN BY:	AJD
CHECKED BY:	AEG		

OVERALL WASTEWATER PLAN

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 45 112

EDGEWOOD PHASE 2, SECTION 2 SANITARY SEWER CALCULATIONS

LINE A MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
A0	0	483	1690.5	82.18	299.20	3.28	333.80	3.38	0.50
A1/B1	0	483	1690.5	82.18	299.20	3.28	333.80	3.38	0.50
A2	0	453	1585.5	77.07	282.21	3.22	314.65	3.32	0.50
A3/D0	7	453	1585.5	77.07	282.21	7.79	314.65	8.02	6.00
A4	4	301	1053.5	51.21	193.83	4.73	215.39	4.89	2.00
A5	4	297	1039.5	50.53	191.45	4.71	212.72	4.87	2.00
A6	4	293	1025.5	49.85	189.06	4.69	210.05	4.85	2.00
A7	2	289	1011.5	49.17	186.67	4.68	207.37	4.84	2.00
A8	0	287	1004.5	48.83	185.47	2.86	206.03	2.94	0.50
A9	4	287	1004.5	48.83	185.47	3.96	206.03	4.08	1.25
A10	7	283	990.5	48.15	183.08	2.85	203.35	2.93	0.50
A11	0	276	966	46.96	178.88	3.62	198.64	3.72	1.00

LINE B MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
B0/A1	0	30	105	5.10	21.63	1.69	23.78	1.75	0.70
B1	0	30	105	5.10	21.63	1.69	23.78	1.75	0.70
B2	1	30	105	5.10	21.63	1.69	23.78	1.75	0.70
B3	6	29	101.5	4.93	20.93	1.81	23.01	1.88	0.90
B4	4	23	80.5	3.91	16.70	1.73	18.35	1.76	0.90
B5	5	19	66.5	3.23	13.86	1.32	15.22	1.34	0.50
B6/C0	0	14	49	2.38	10.28	1.24	11.28	1.26	0.50
B7	2	2	7	0.34	1.51	1.22	1.65	1.22	1.00

LINE C MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
C0/B6	2	12	42	2.04	8.84	1.19	9.70	1.22	0.50
C1	4	10	35	1.70	7.39	1.14	8.11	1.17	0.50
C2	6	6	21	1.02	4.47	0.95	4.90	0.99	0.50

LINE D MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
D0/A3	0	145	507.5	24.67	97.95	2.31	108.34	2.38	0.50
D1/F0	0	145	507.5	24.67	97.95	4.77	108.34	4.94	3.85
D2	5	20	70	3.40	14.57	2.85	16.01	2.95	4.00
D3	1	15	52.5	2.55	11.00	2.11	12.07	2.18	2.12
D4/E0	10	14	49	2.38	10.28	2.05	11.28	2.12	2.12

LINE E MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
E0/D4	4	4	14	0.68	2.99	1.72	3.28	1.72	2.00

LINE F MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
F0/D1	0	125	437.5	21.27	85.13	2.23	94.09	2.28	0.50
F1	2	125	437.5	21.27	85.13	4.21	94.09	4.36	3.04
F2/G0	5	123	430.5	20.93	83.84	3.29	92.65	3.38	1.50
F3	8	101	353.5	17.18	69.54	2.10	76.77	2.16	0.50
F4	0	93	325.5	15.82	64.29	2.05	70.95	2.11	0.50

LINE G MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
G0/F2	4	17	59.5	2.89	12.43	1.29	13.65	1.31	0.50
G2	4	13	45.5	2.21	9.56	1.30	10.49	1.33	0.60
G3	3	9	31.5	1.53	6.66	1.55	7.31	1.62	1.50
G4/H0	4	6	21	1.02	4.47	1.36	4.90	1.36	1.25

LINE H MH#	Area LUE	LUE Total	Population	F (gpm)	DRY Q (gpm)	DRY V (fps)	WET Q (gpm)	WET V (fps)	Slope (%)
H0/G4	2	2	7	0.34	1.51	2.40	1.65	2.40	3.90

Edgewood Phase 2-2

WASTEWATER CAPACITY CALCULATIONS

Design Criteria

Project Data

Development Size = 45.28 Acres
Units = 114 Units
LUE/Unit= 1
Amenity LUEs -

Population:

	LUEs	People per LUE	Total Pop.
SF	114.00	3.5	399.00
Amenity	-		
Total	114.00		399.00

Data from City of Austin Utility Criteria Manual

Wastewater Generation = 70 Gal/Person/Day
Inflow and Infiltration = 750 Gal/Acre/Day

Calculations

Total Avg Dry Weather Flow (F) - 27,930 Gal/day or 19.40 gpm

Peaking Factor (Mp =) 4.02 Unitless

$$Mp = \frac{18 + (0.0206 * F)^{0.5}}{4 + (0.0206 * F)^{0.5}}$$

Min. Flow Factor (Mm =) 0.16 Unitless

$$Mm = 0.2 * (0.0144 * F)^{0.198}$$

Minimum Dry Weather Flow - 4,339.33 Gal/day or 3.01 gpm = 0.01 cfs

Peak Dry Weather Flow - 112,345 Gal/day or 78.02 gpm = 0.17 cfs

I&I Contribution - 33,960 Gal/Day or 23.58 gpm = 0.05 cfs

Total Peak Wet Weather Flow* - 146,305 Gal/ Day or 101.60 gpm = 0.23 cfs

8" PVC Max flow at 0.5% * 719,872 Gal/ Day or 499.91 gpm = 1.11 cfs

BENCHMARKS

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ELEVATION: 1002.490' (NAVD '88)

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12/06/2023

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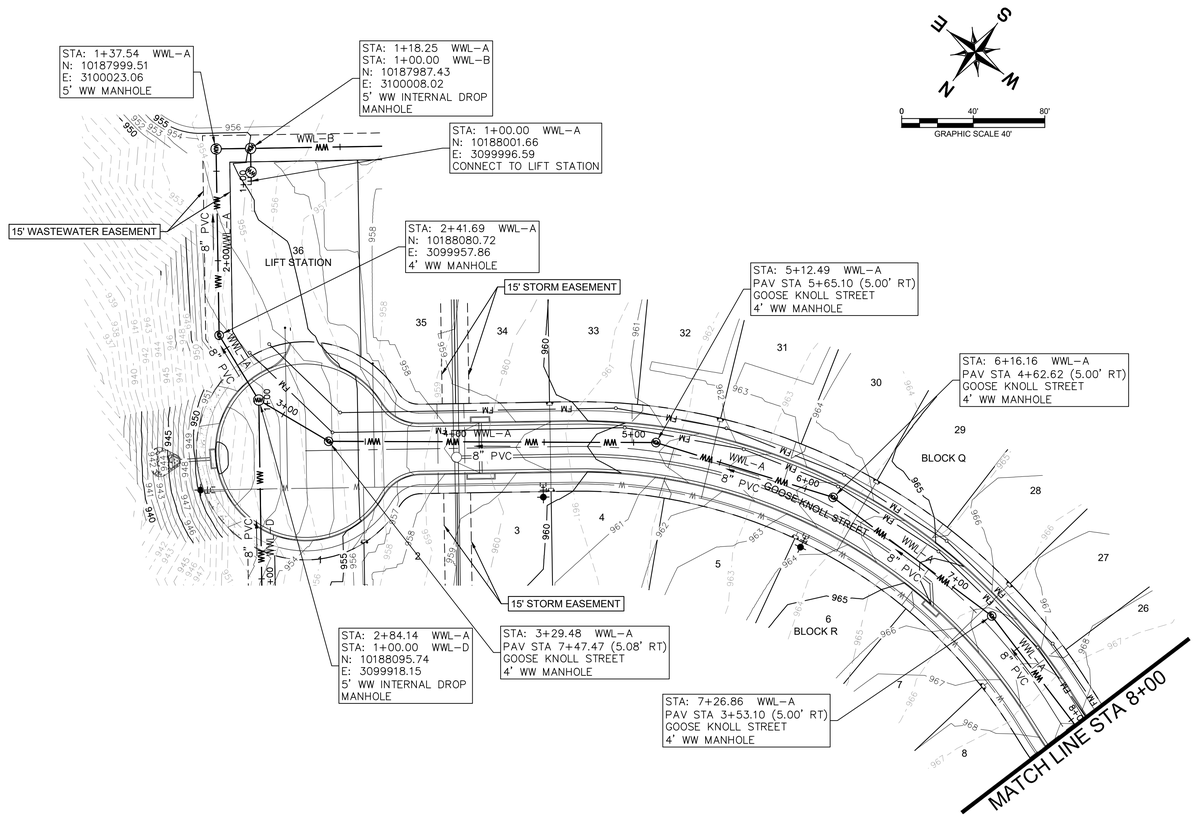
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

WASTEWATER CALCULATIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 46 112



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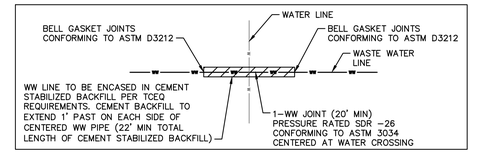

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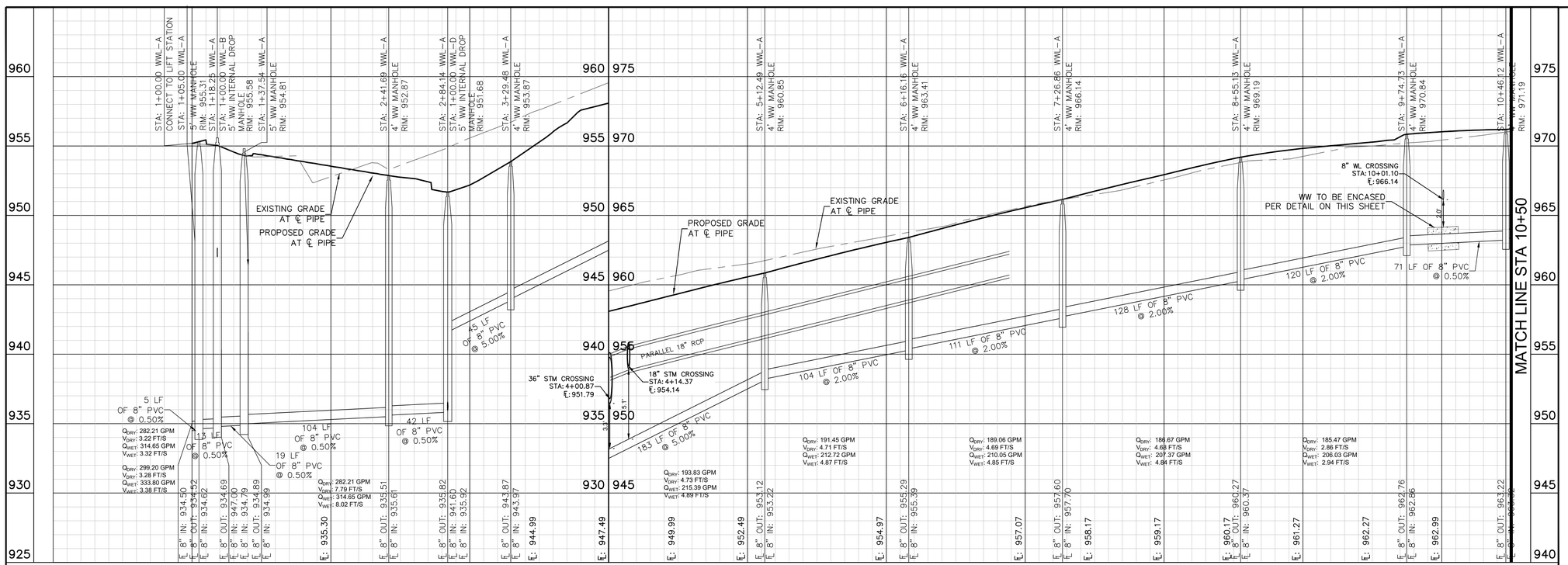

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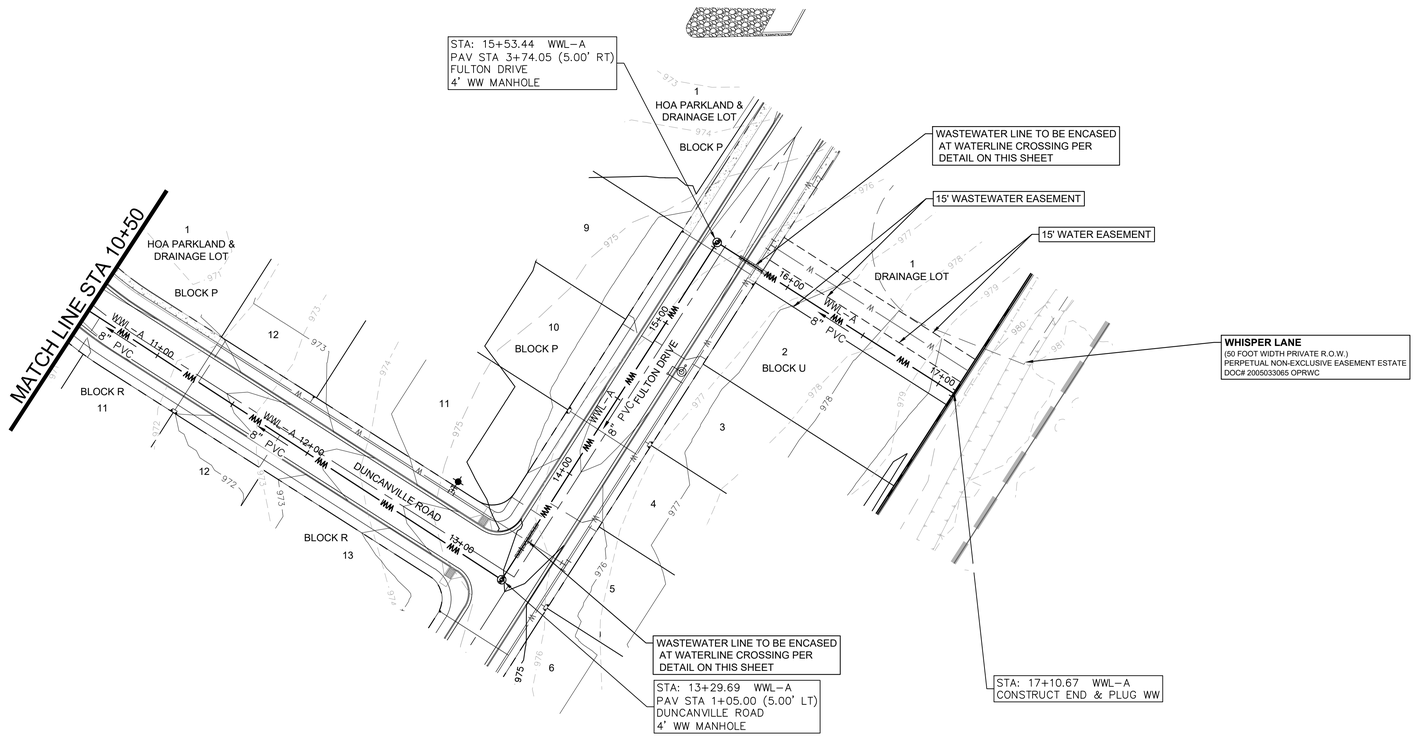
CHECKED BY: AEG

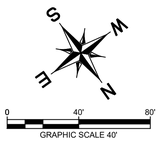
WASTEWATER PLAN & PROFILE - WWL-A STA 1+00 - 10+50

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 47 112





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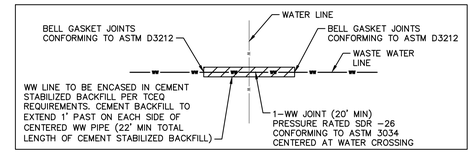

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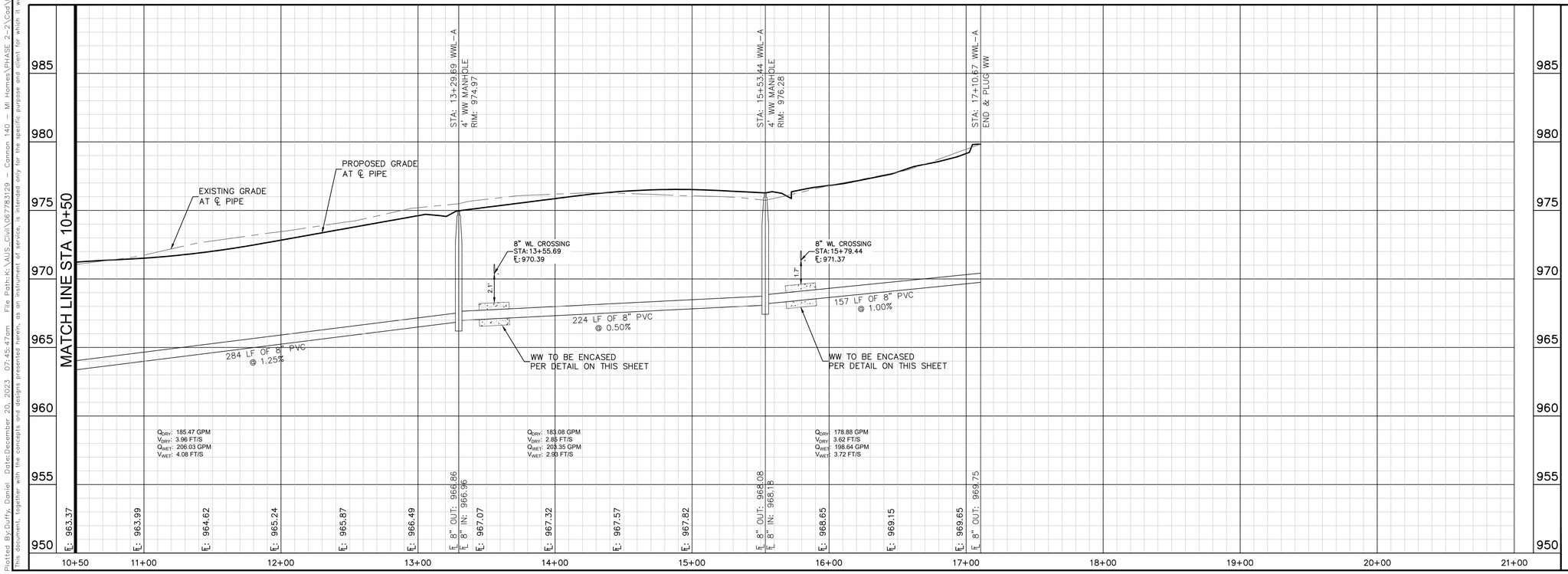

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CHECKED BY:	AEG

WASTEWATER PLAN & PROFILE - WWL-A STA 10+50 - END

EDGEWOOD
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CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

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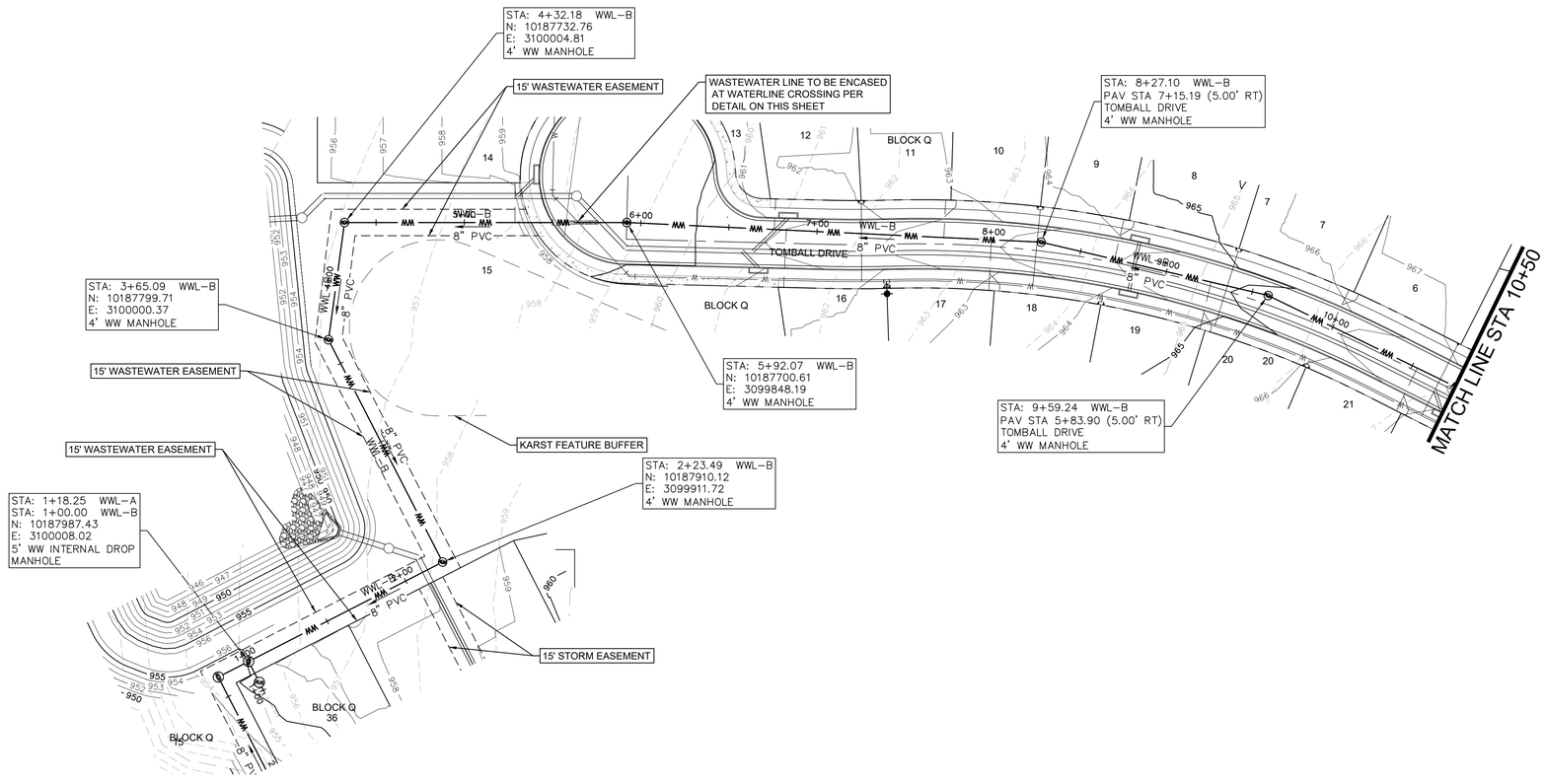

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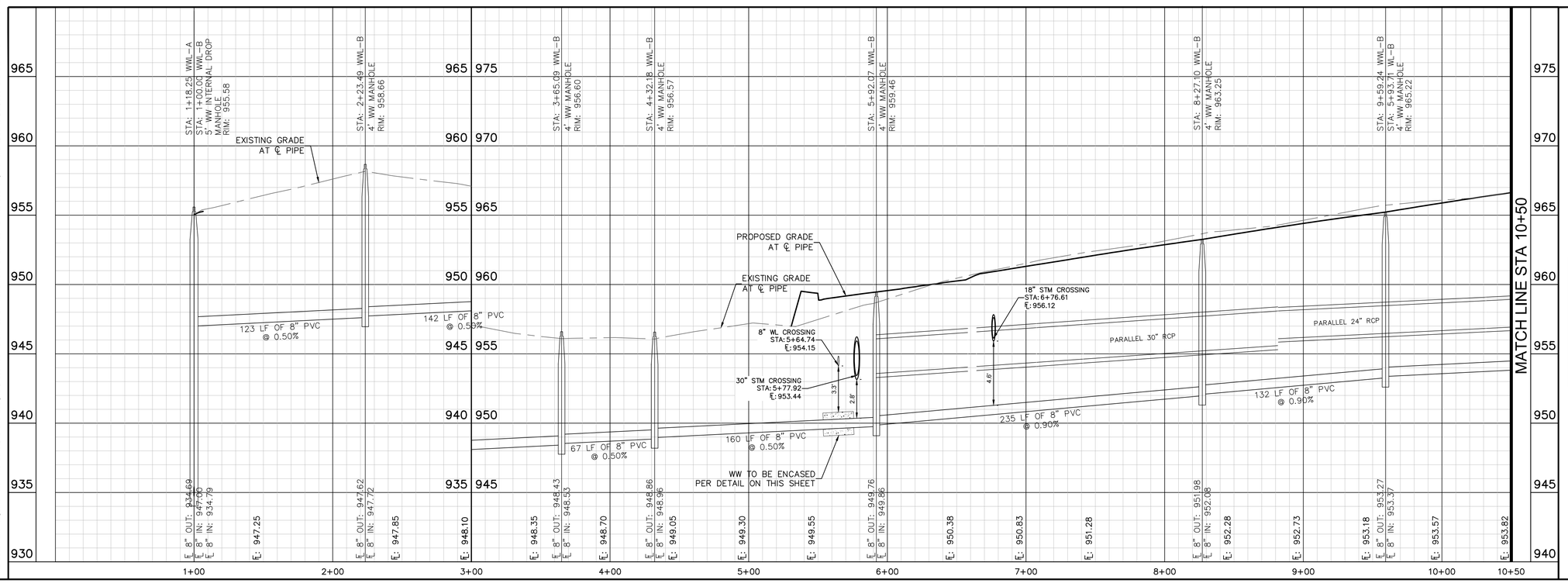

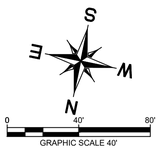

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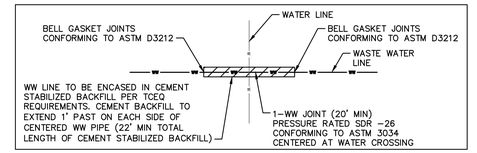

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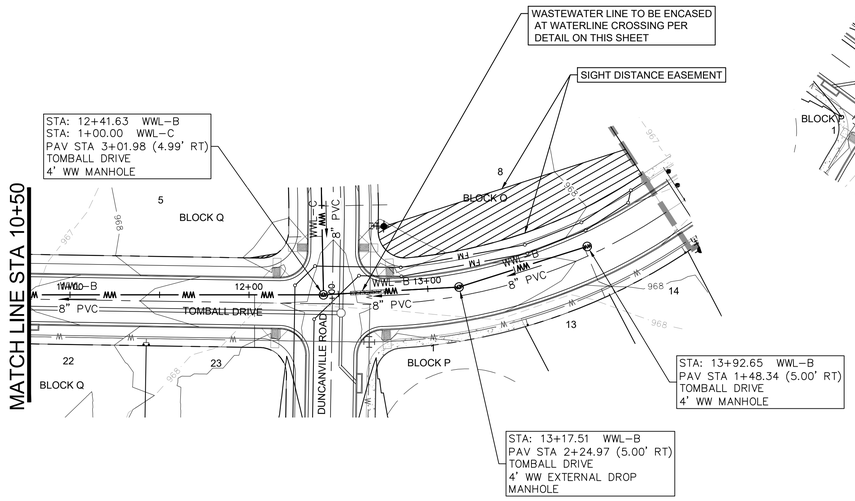

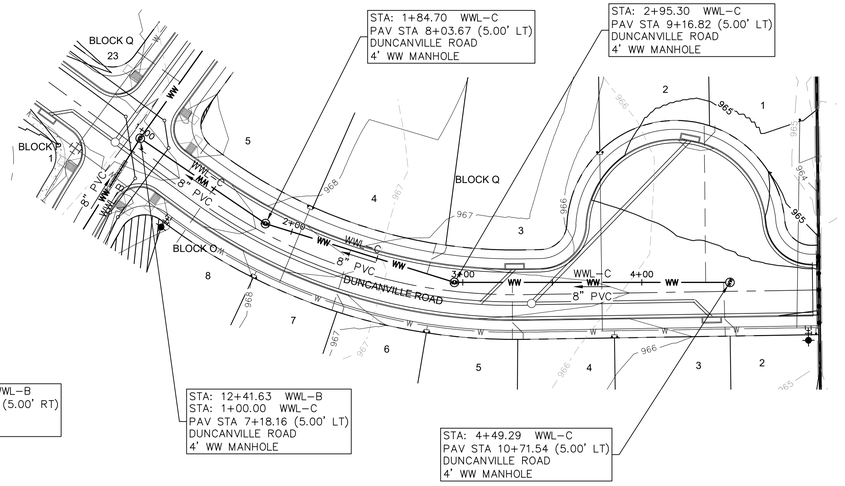

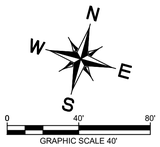

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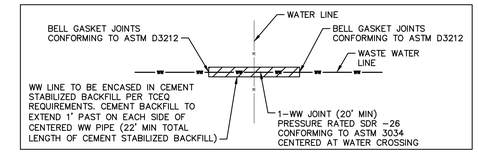

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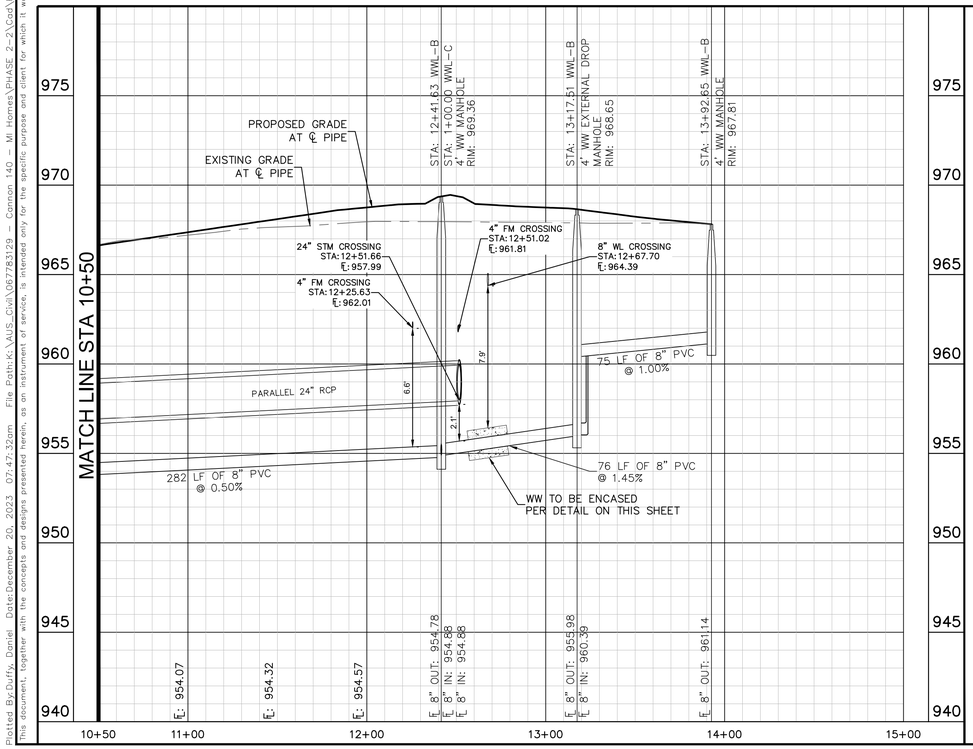

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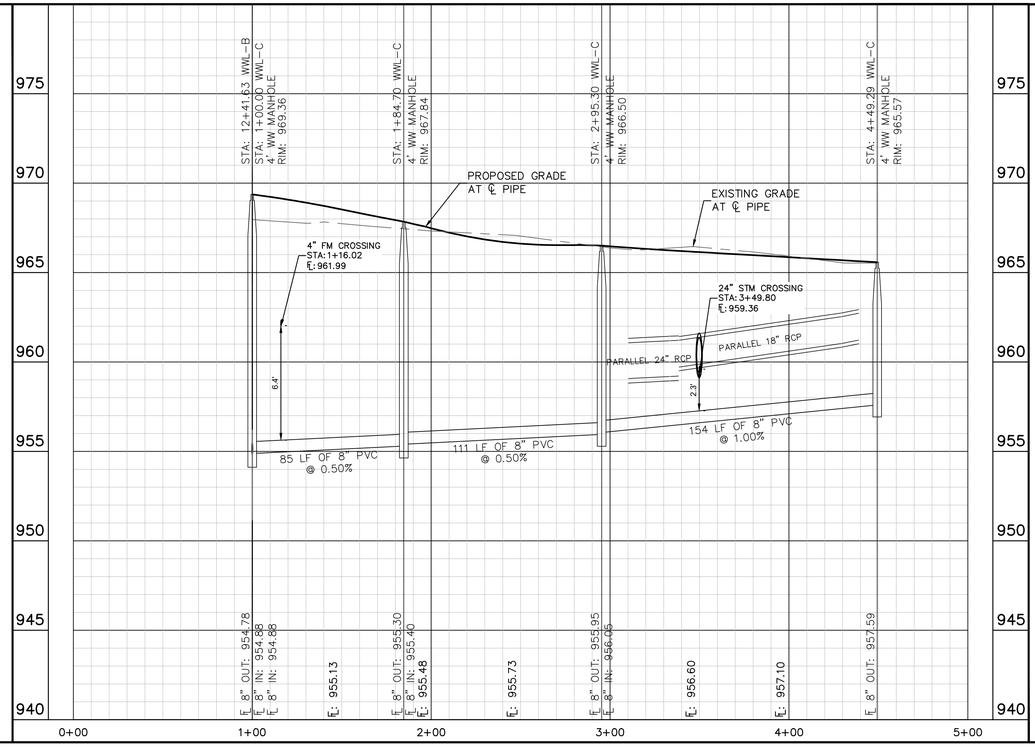

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512–520–0788 FAX: 512–418–1791
WWW.KIMLEY–HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F–928

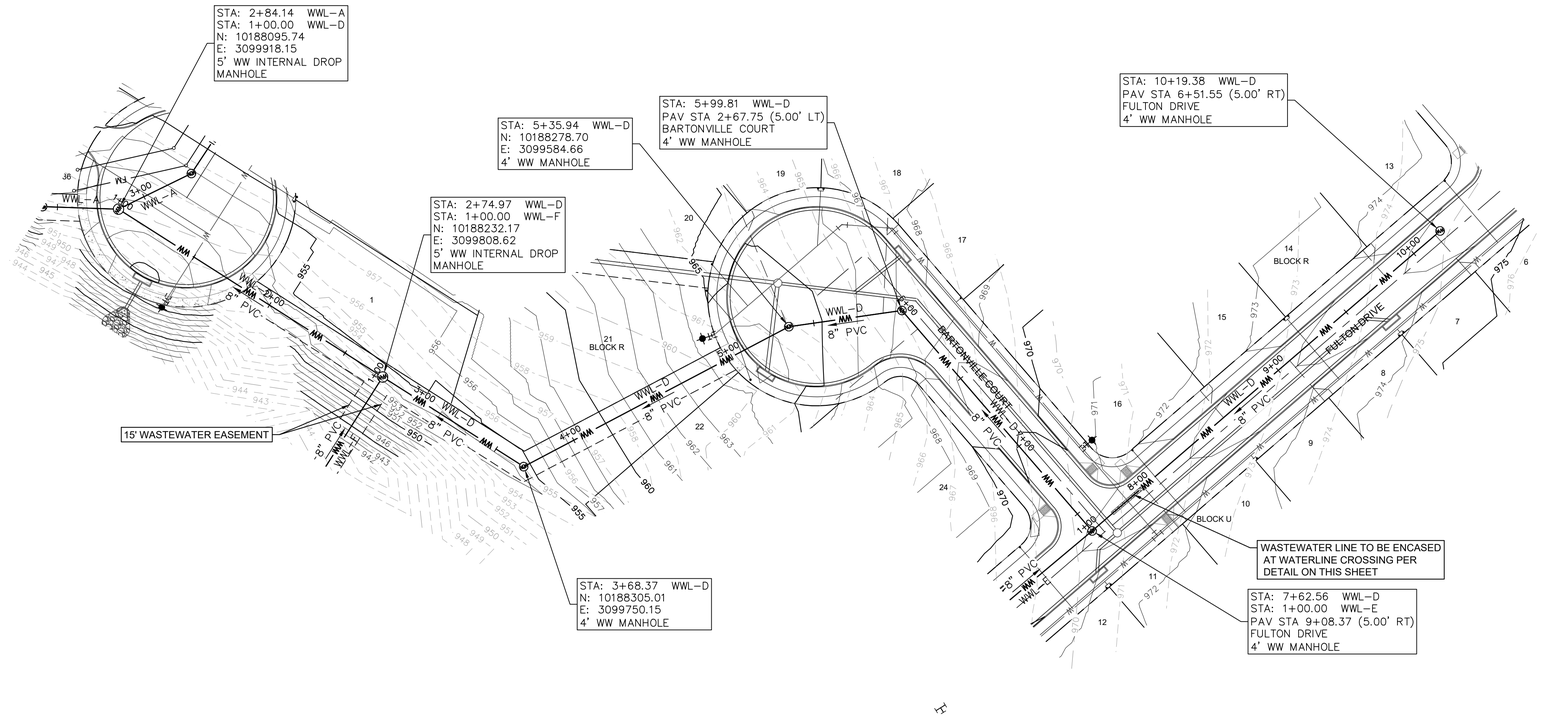
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

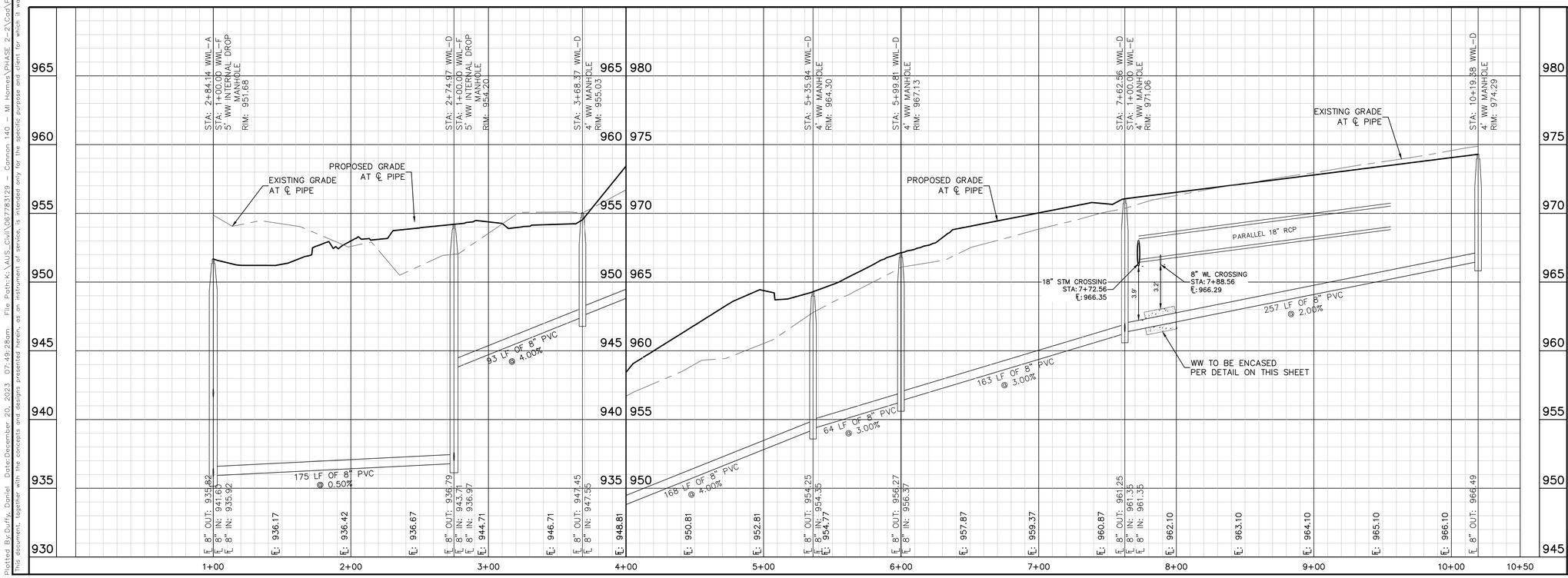
KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AJD
CHECKED BY:	AEG

WASTEWATER PLAN & PROFILE - WWL-B 10+50 - END & WWL-C

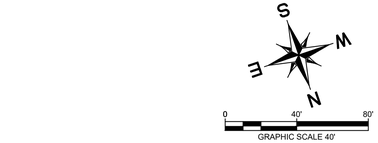
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 50 112





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



UTILITY LEGEND

- PROPERTY LINE
- PROPOSED WASTE WATER LINE
- PROPOSED WATER LINE
- PROPOSED FORCE MAIN LINE
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING WASTE WATER LINE
- EXISTING FORCE MAIN LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTE WATER MANHOLE

WASTEWATER GENERAL NOTES

1. WATER AND WASTEWATER SEPARATION (VERTICAL AND HORIZONTAL) SHALL BE MAINTAINED IN ACCORDANCE WITH TCEQ REQUIREMENTS.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
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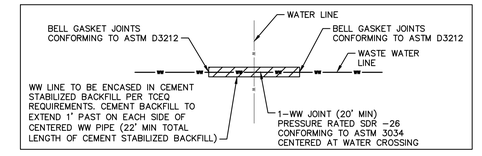
4. ALL STORM SEWER SHOWN IN PROFILES ARE PARALLEL FROM WASTEWATER UNLESS OTHERWISE NOTED (E.G. CROSSINGS)
5. MANHOLES OUTSIDE OF PAVEMENT TO BE 0.5' ABOVE PROPOSED GRADE.



BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
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E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097908.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

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TEXAS REGISTERED ENGINEERING FIRM F-928

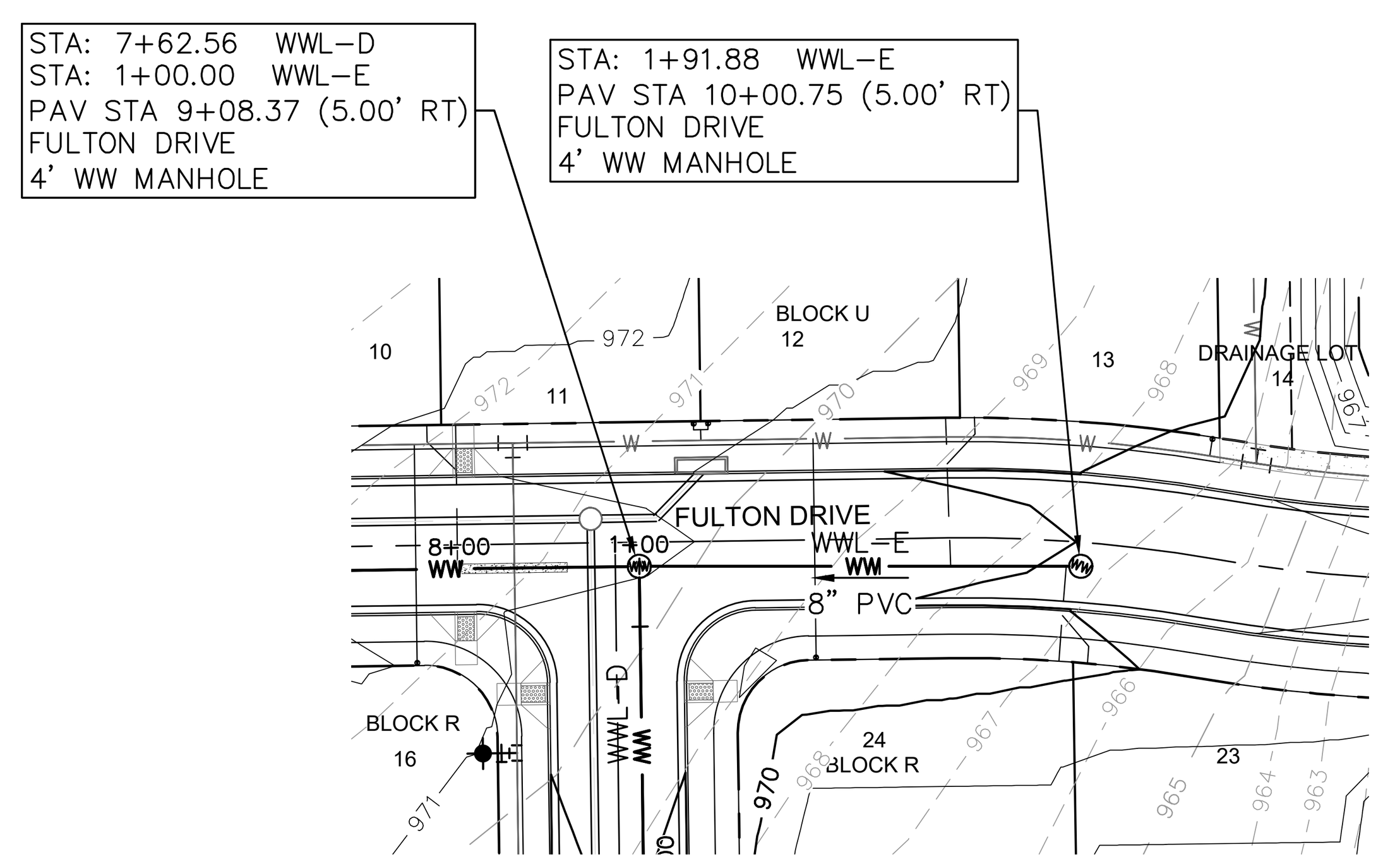
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130584
LICENSED
PROFESSIONAL ENGINEER
Alejandro E. Granados Rico

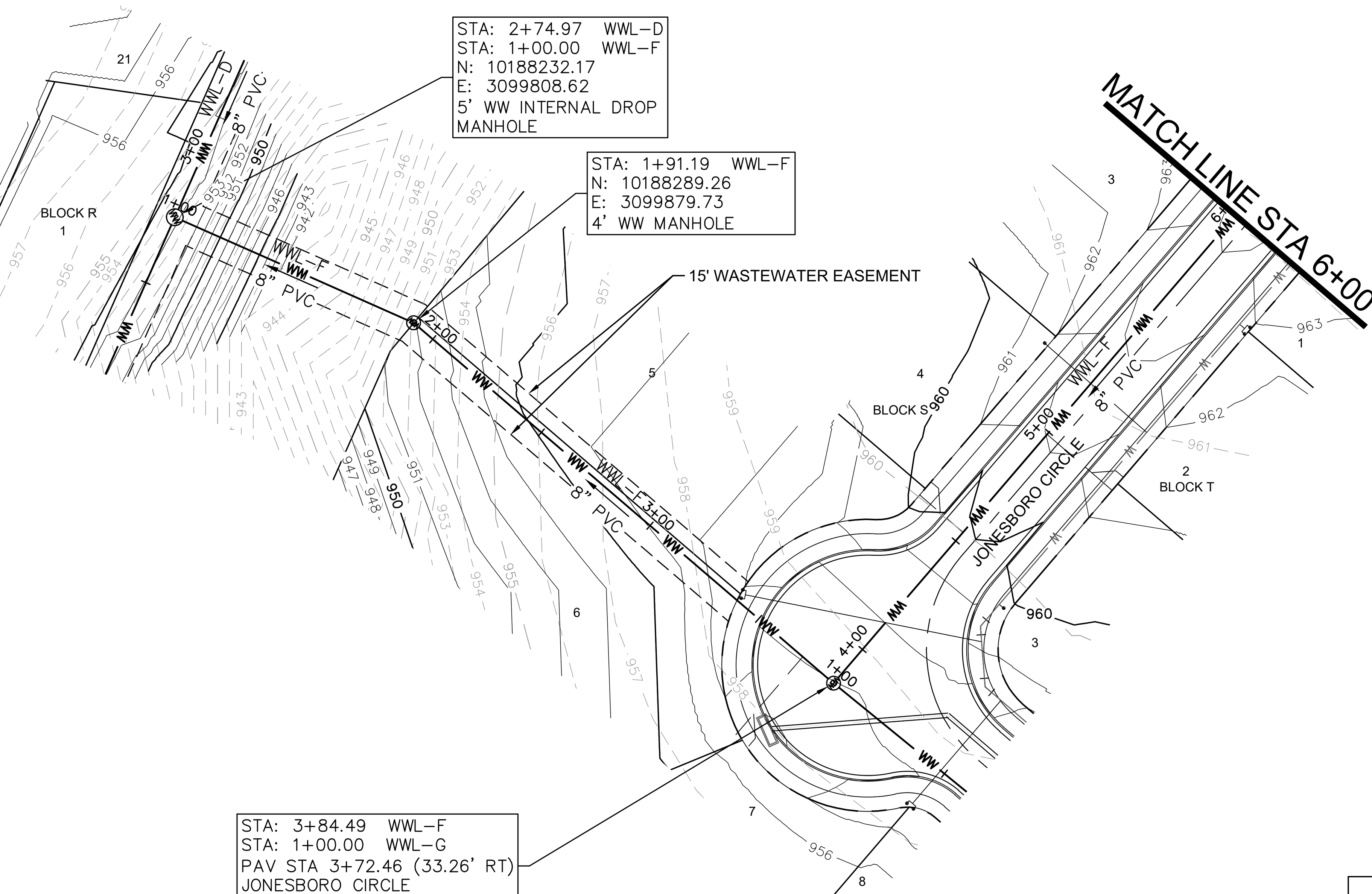
KHA PROJECT 067783129	DATE DECEMBER 2023	SCALE AS SHOWN	DESIGNED BY: DPD	DRAWN BY: AJD	CHECKED BY: AEG

WASTEWATER PLAN & PROFILE - WWL-D

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 51 112





UTILITY LEGEND

	PROPERTY LINE
	PROPOSED WASTE WATER LINE
	PROPOSED WATER LINE
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	PROPOSED WASTE WATER MANHOLE
	WASTE WATER FLOW DIRECTION
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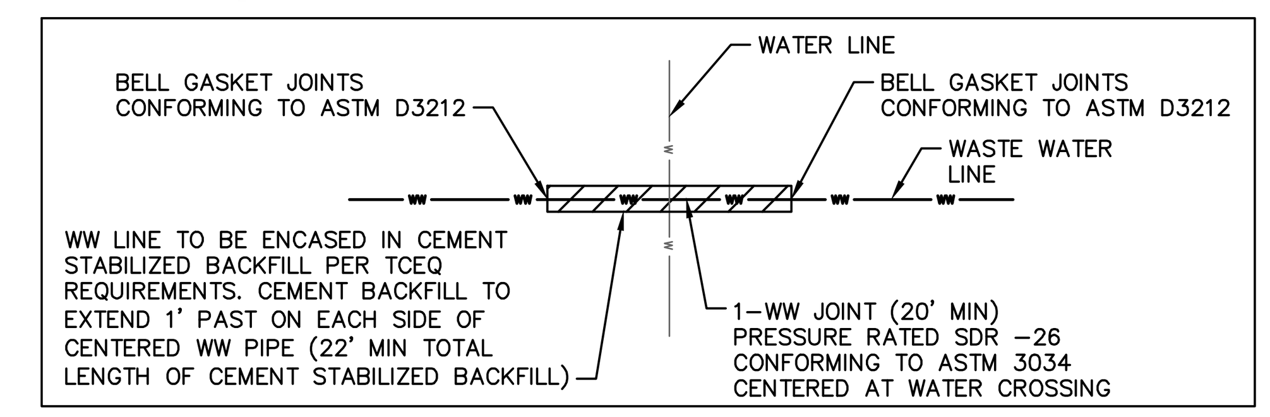
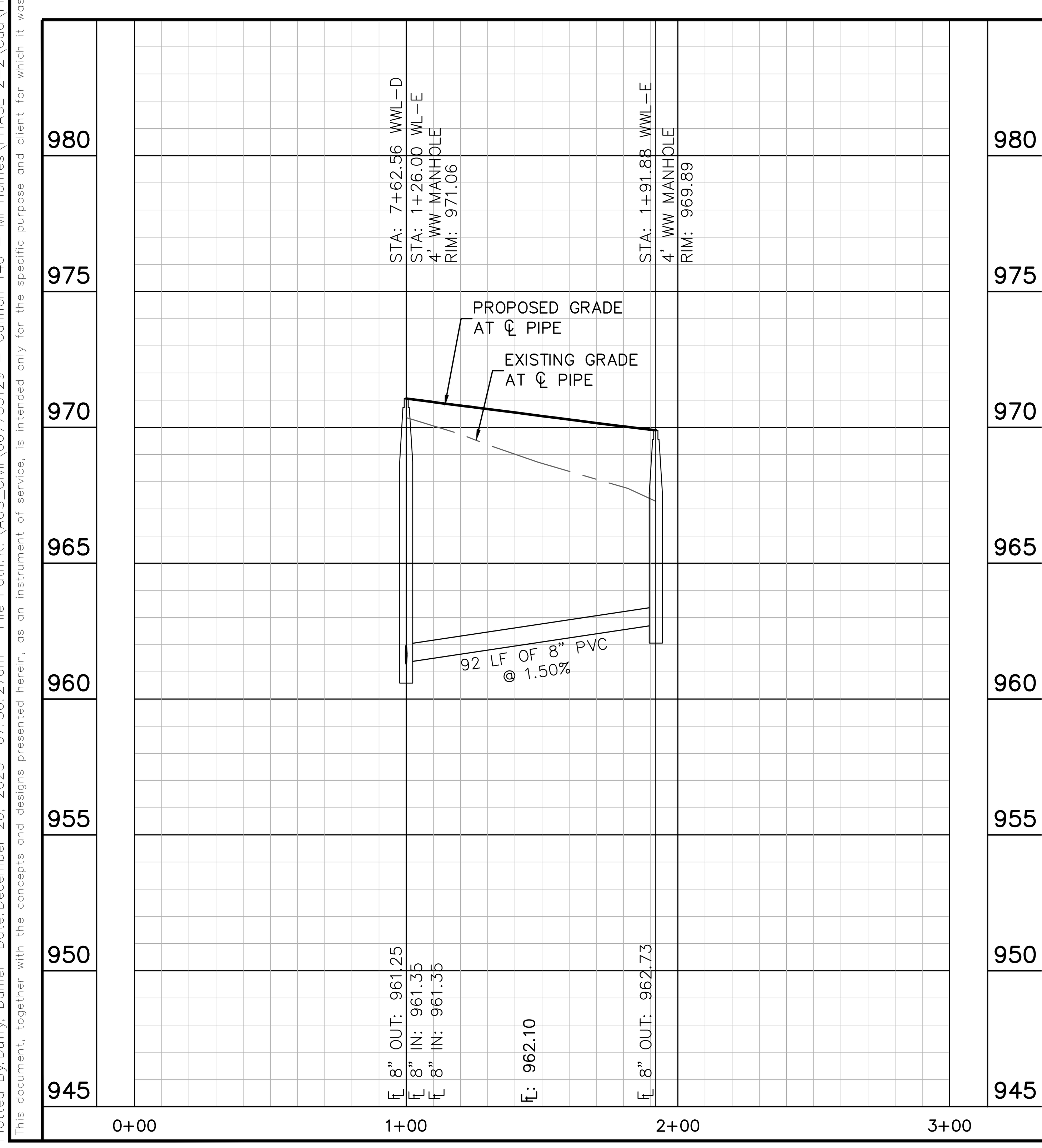
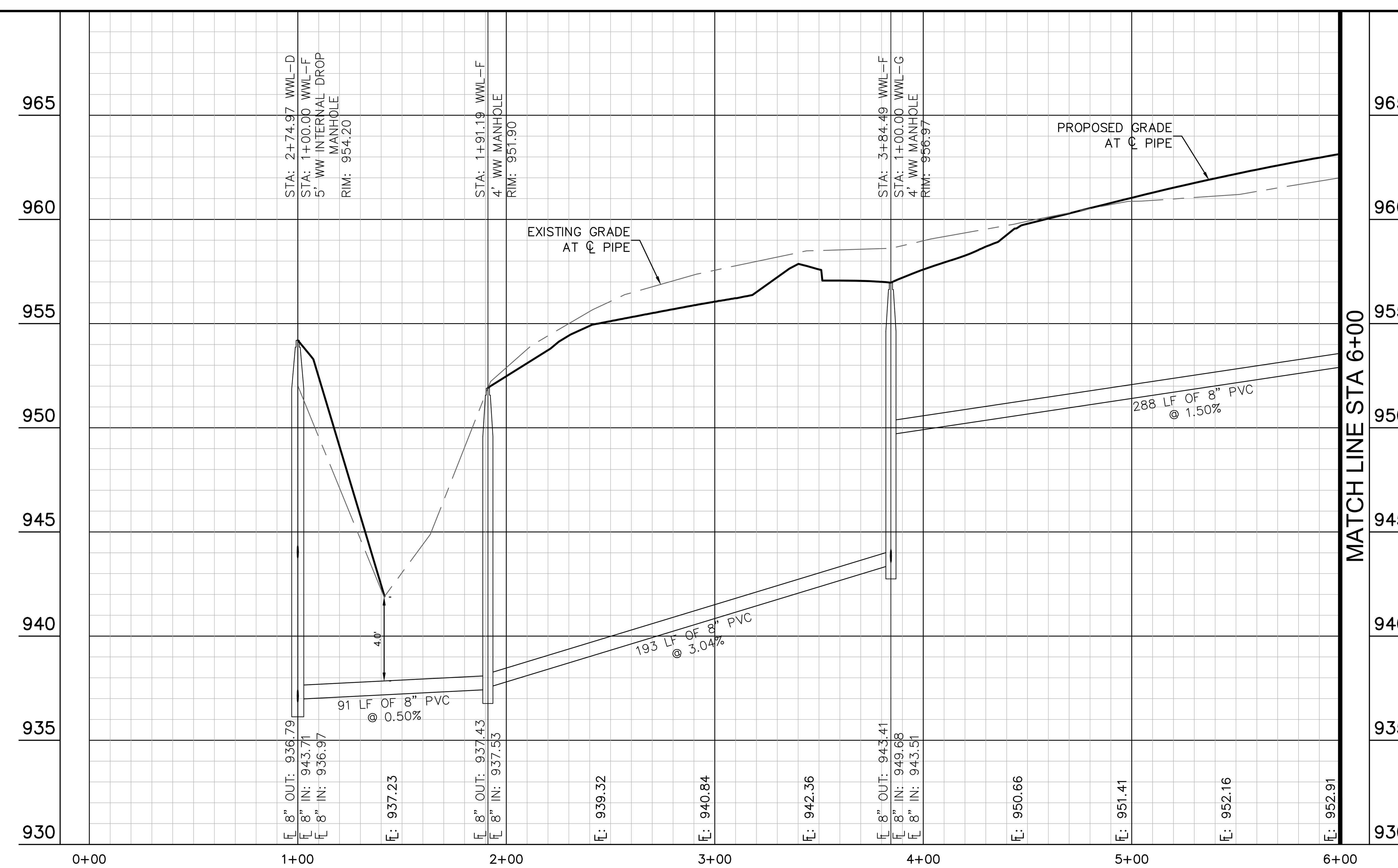


WWL-E



WWL-F



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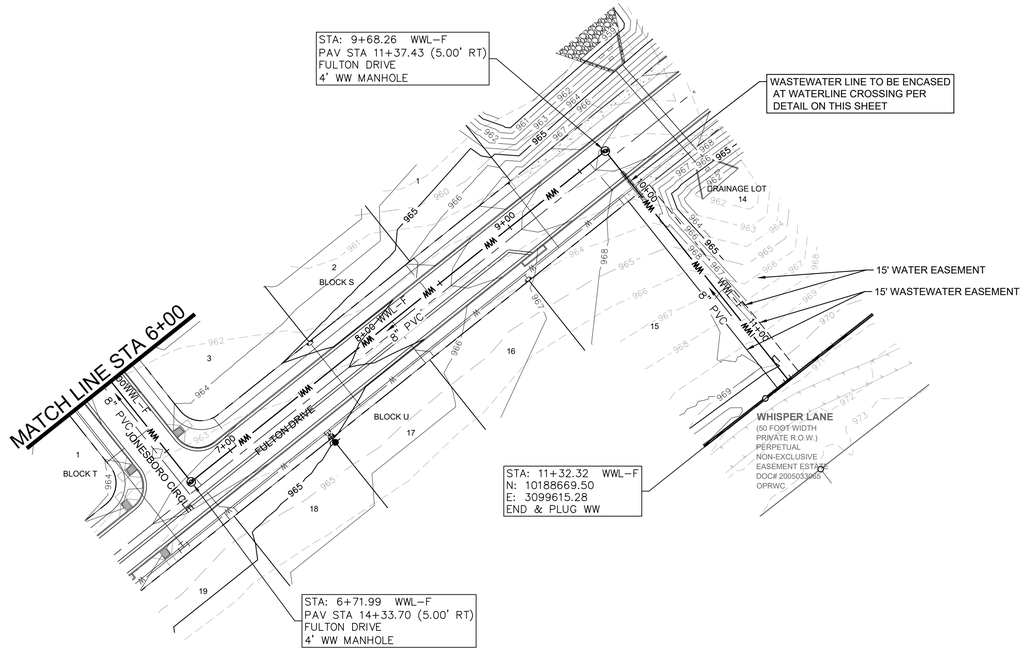
LICENSED PROFESSIONAL ENGINEER

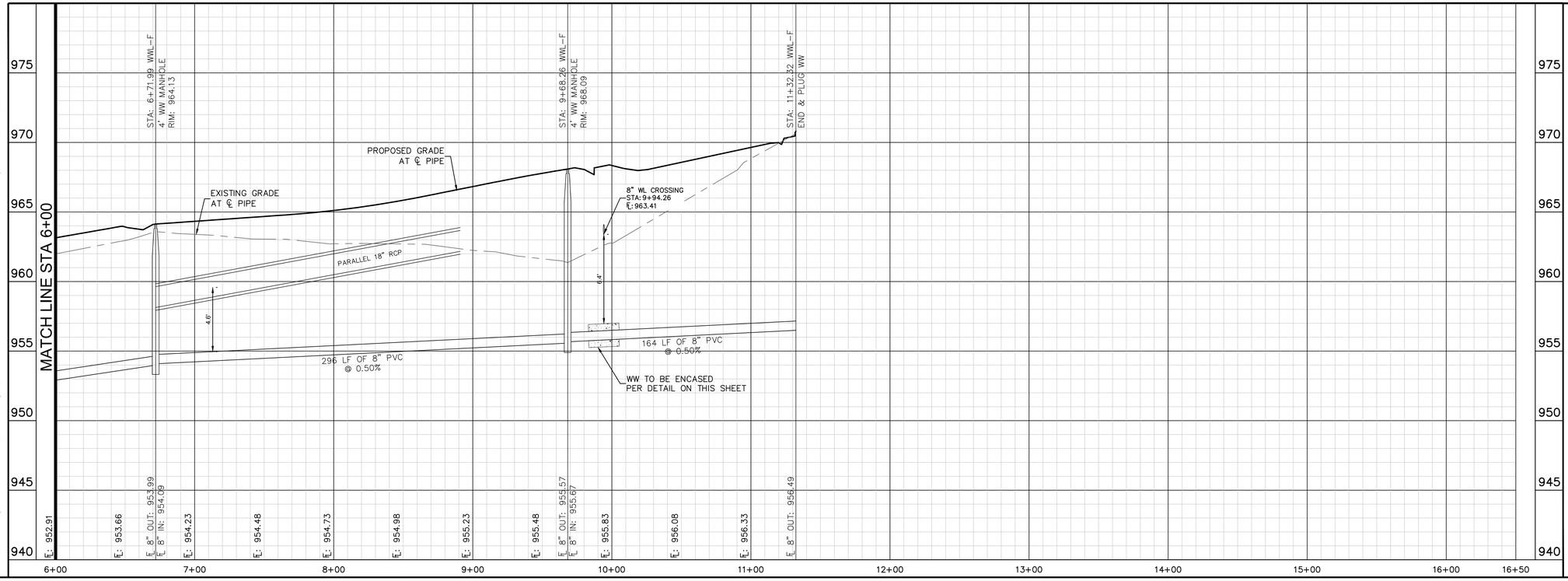
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

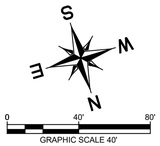
WASTEWATER PLAN & PROFILE - WWL-E & WWL-F STA 1+00 - 10+50

EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
52
OF 112







UTILITY LEGEND

- PROPERTY LINE
- WW — PROPOSED WASTE WATER LINE
- W — PROPOSED WATER LINE
- FM — PROPOSED FORCE MAIN LINE
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- OHP — EXISTING OVERHEAD POWER LINE
- W — EXISTING WATER LINE
- WW — EXISTING WASTE WATER LINE
- FM — EXISTING FORCE MAIN LINE
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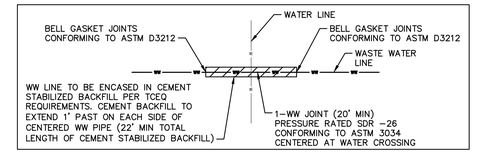

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12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
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KHA PROJECT 067783129
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SCALE: AS SHOWN
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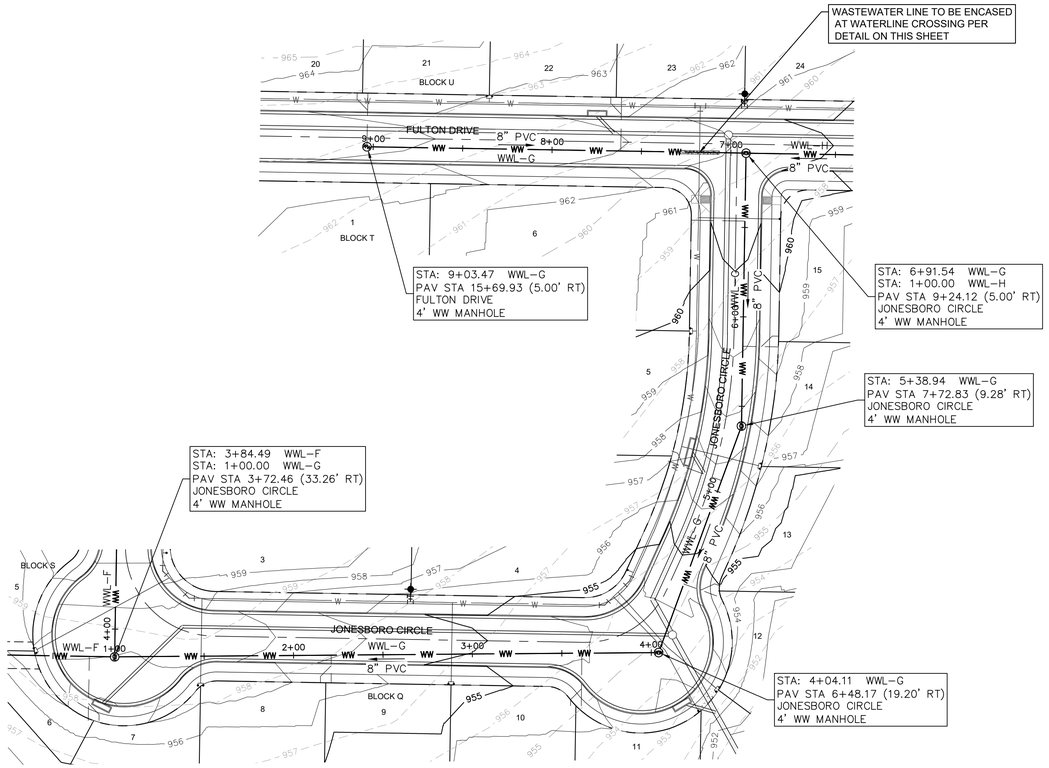
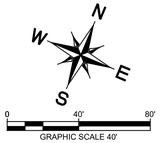
CHECKED BY: AEG

WASTEWATER PLAN & PROFILE - WWL-F STA 10+50 - END

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 53 112





UTILITY LEGEND

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- W — PROPOSED WATER LINE
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- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- OHP — EXISTING OVERHEAD POWER LINE
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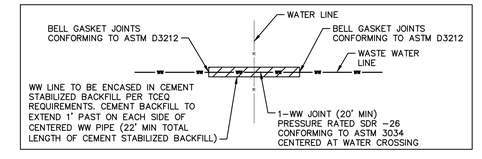
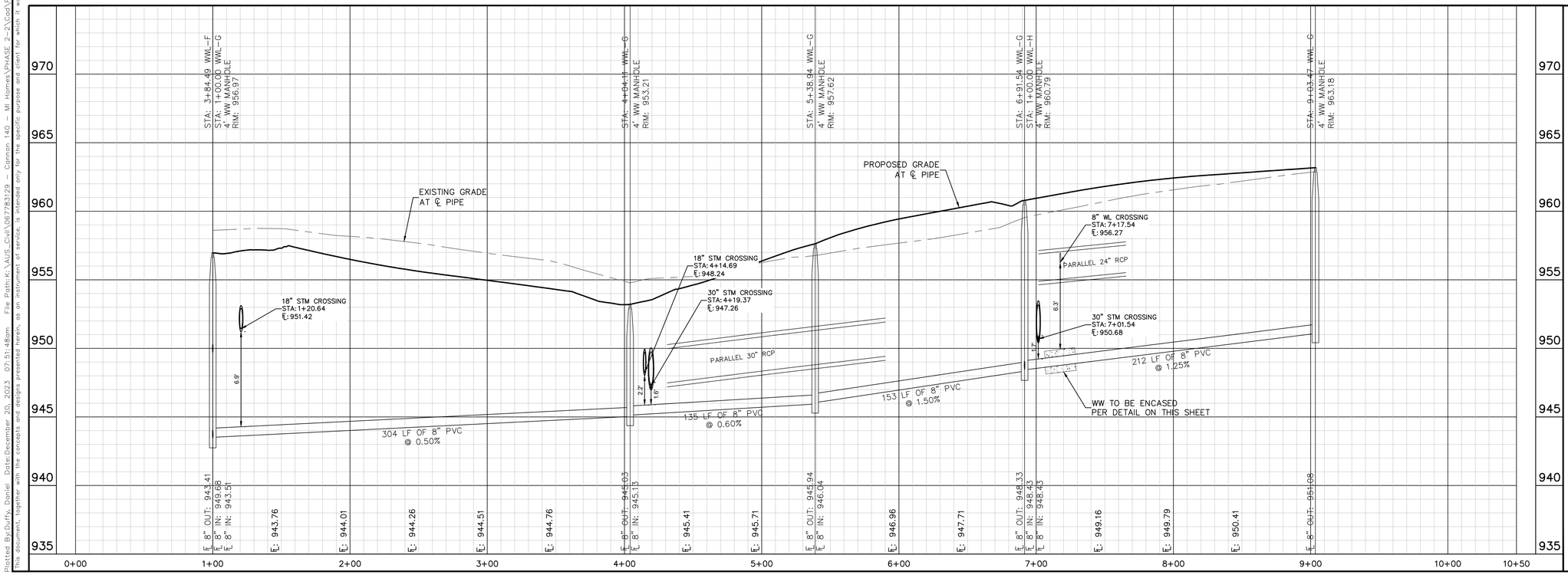


WWL–G



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12/06/2023

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KHA PROJECT 067783129
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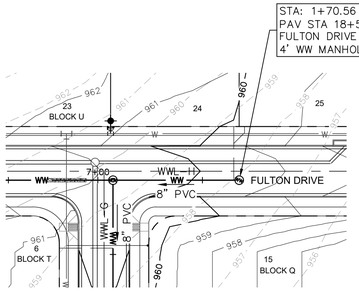
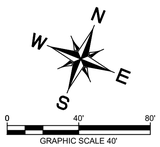
WASTEWATER PLAN & PROFILE - WWL-G

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 54 112





UTILITY LEGEND

- PROPERTY LINE
- PROPOSED WASTE WATER LINE (WW)
- PROPOSED WATER LINE (W)
- PROPOSED FORCE MAIN LINE (FM)
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- EXISTING OVERHEAD POWER LINE (OHP)
- EXISTING WATER LINE (W)
- EXISTING WASTE WATER LINE (WW)
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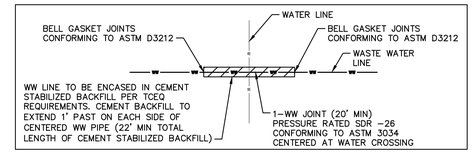
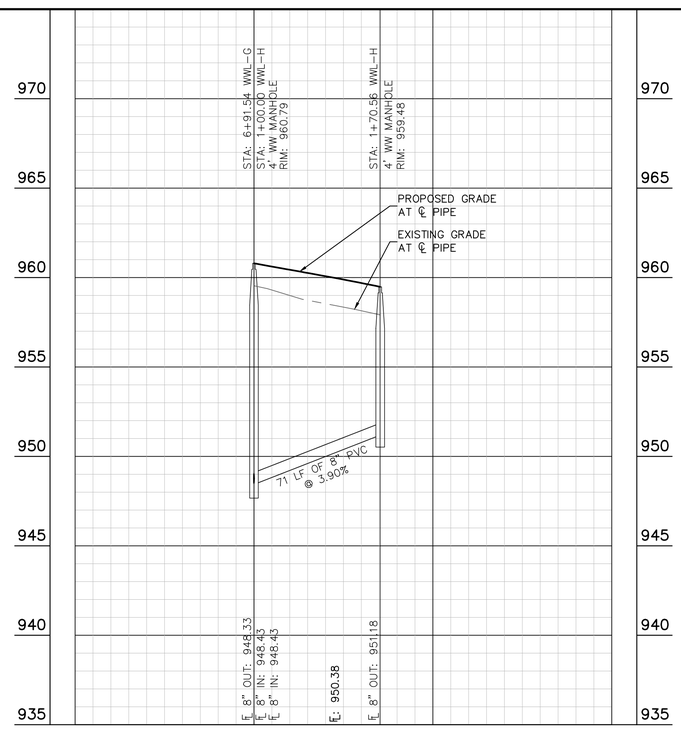


WWL-H



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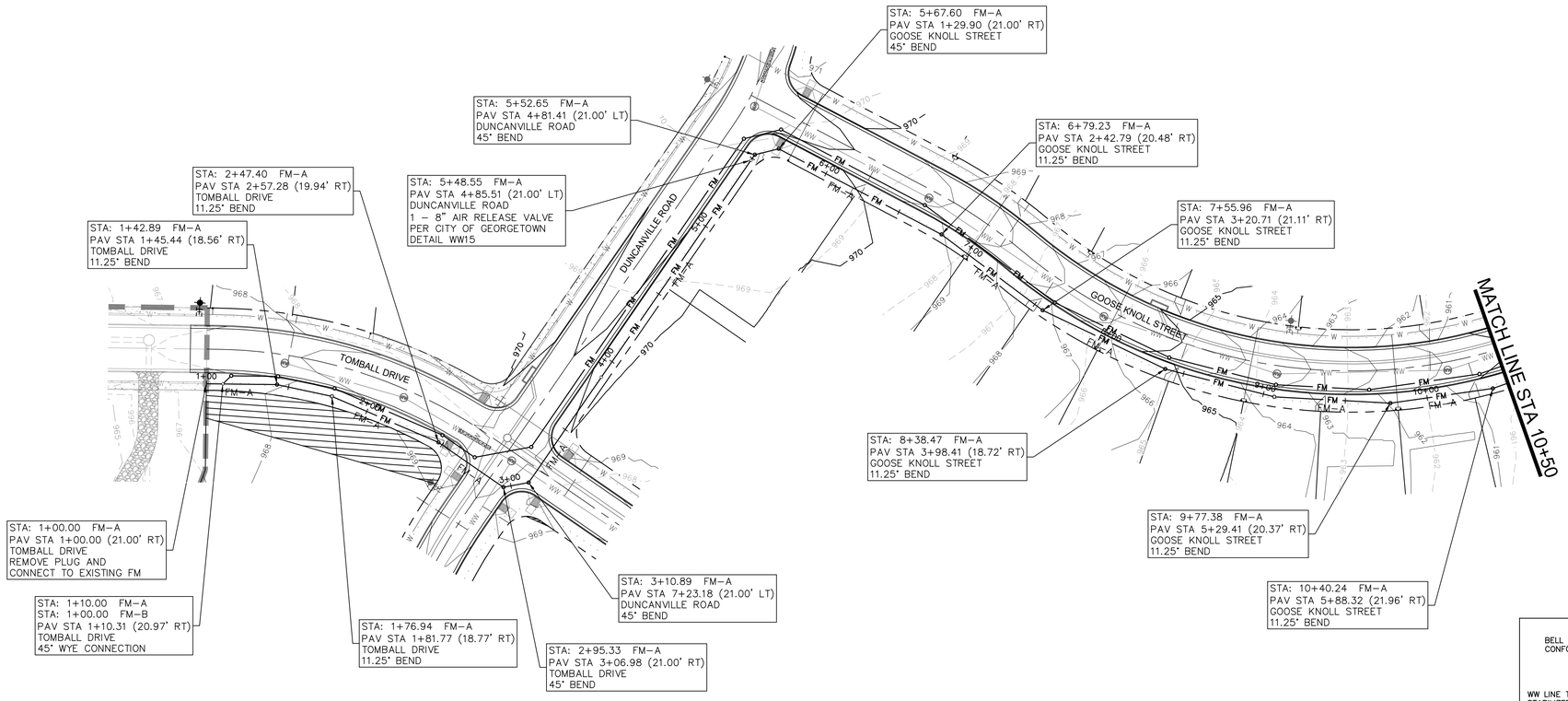

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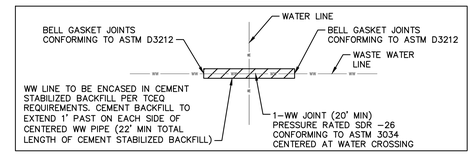
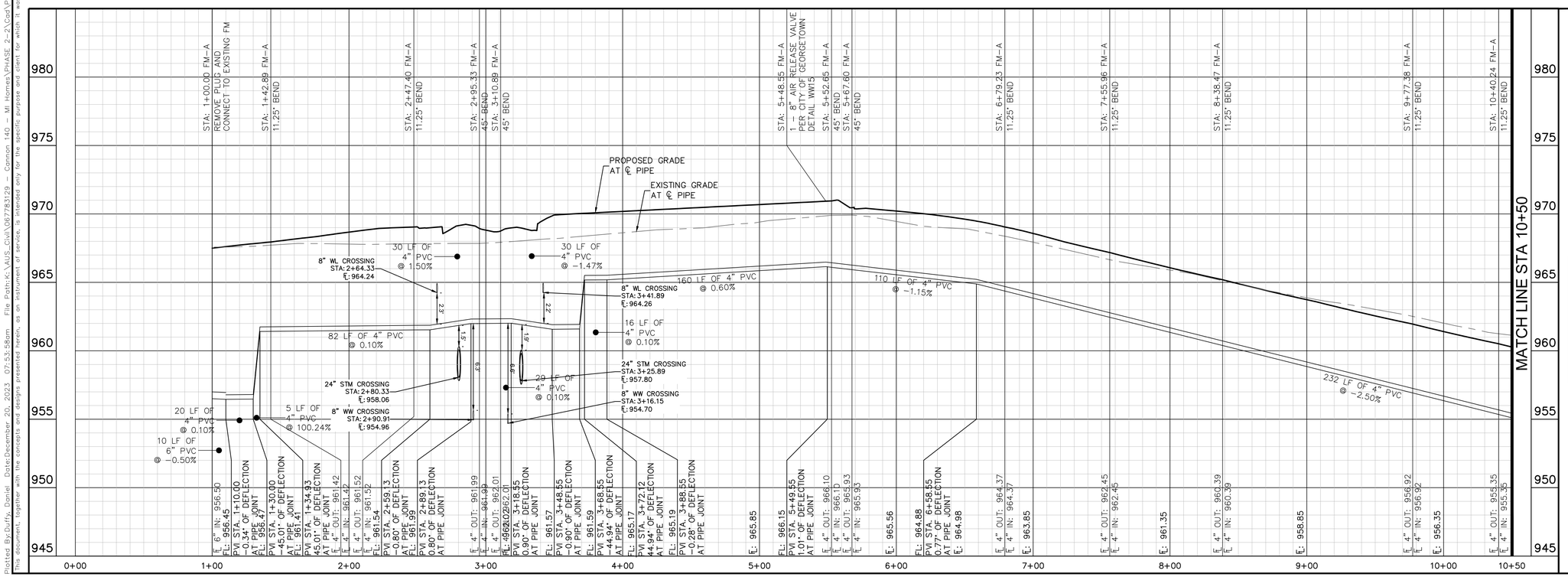


FM–A



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BENCHMARKS

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E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
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N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY–HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512–520–0788 FAX: 512–418–1791
WWW.KIMLEY–HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F–928

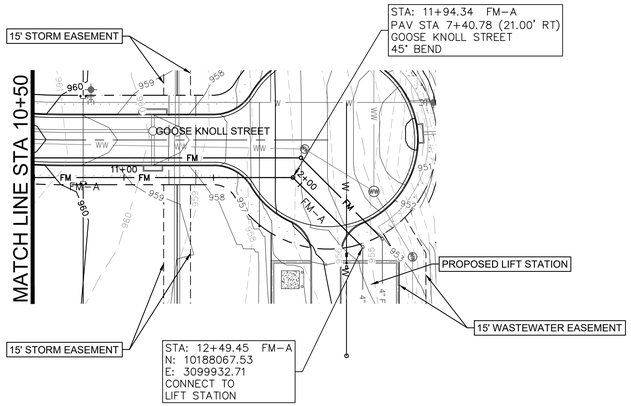
12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

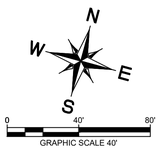
KHA PROJECT 067783129	DATE DECEMBER 2023	SCALE: AS SHOWN	DESIGNED BY: DPD	DRAWN BY: AJD	CHECKED BY: AEG

FORCE MAIN PLAN & PROFILE - FM-A STA 1+00 - 10+50

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 56 112



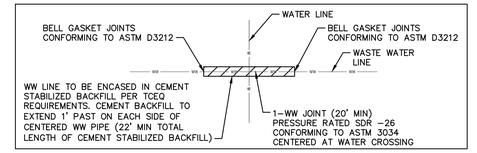


UTILITY LEGEND

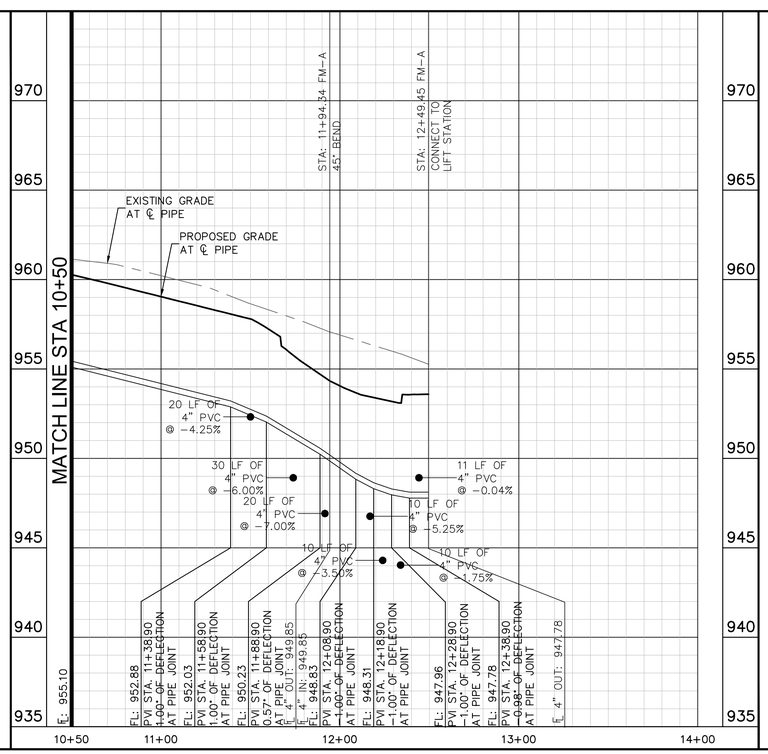
- PROPERTY LINE
- PROPOSED WASTE WATER LINE
- PROPOSED WATER LINE
- PROPOSED FORCE MAIN LINE
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
- PROPOSED FIRE HYDRANT
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING WASTE WATER LINE
- EXISTING FORCE MAIN LINE
- EXISTING STORM SEWER LINE
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING WASTE WATER MANHOLE

WASTEWATER GENERAL NOTES

1. WATER AND WASTEWATER SEPARATION (VERTICAL AND HORIZONTAL) SHALL BE MAINTAINED IN ACCORDANCE WITH TCEQ REQUIREMENTS.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. ALL WASTEWATER LINES ARE 8" UNLESS OTHERWISE NOTED.
4. ALL STORM SEWER SHOWN IN PROFILES ARE PARALLEL FROM WASTEWATER UNLESS OTHERWISE NOTED (E.G. CROSSINGS)
5. MANHOLES OUTSIDE OF PAVEMENT TO BE 0.5' ABOVE PROPOSED GRADE.



FM-A



PROFILE SCALE
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DRAWN BY:	AJD
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FORCE MAIN PLAN & PROFILE - FM-A 10+50 - END

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WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
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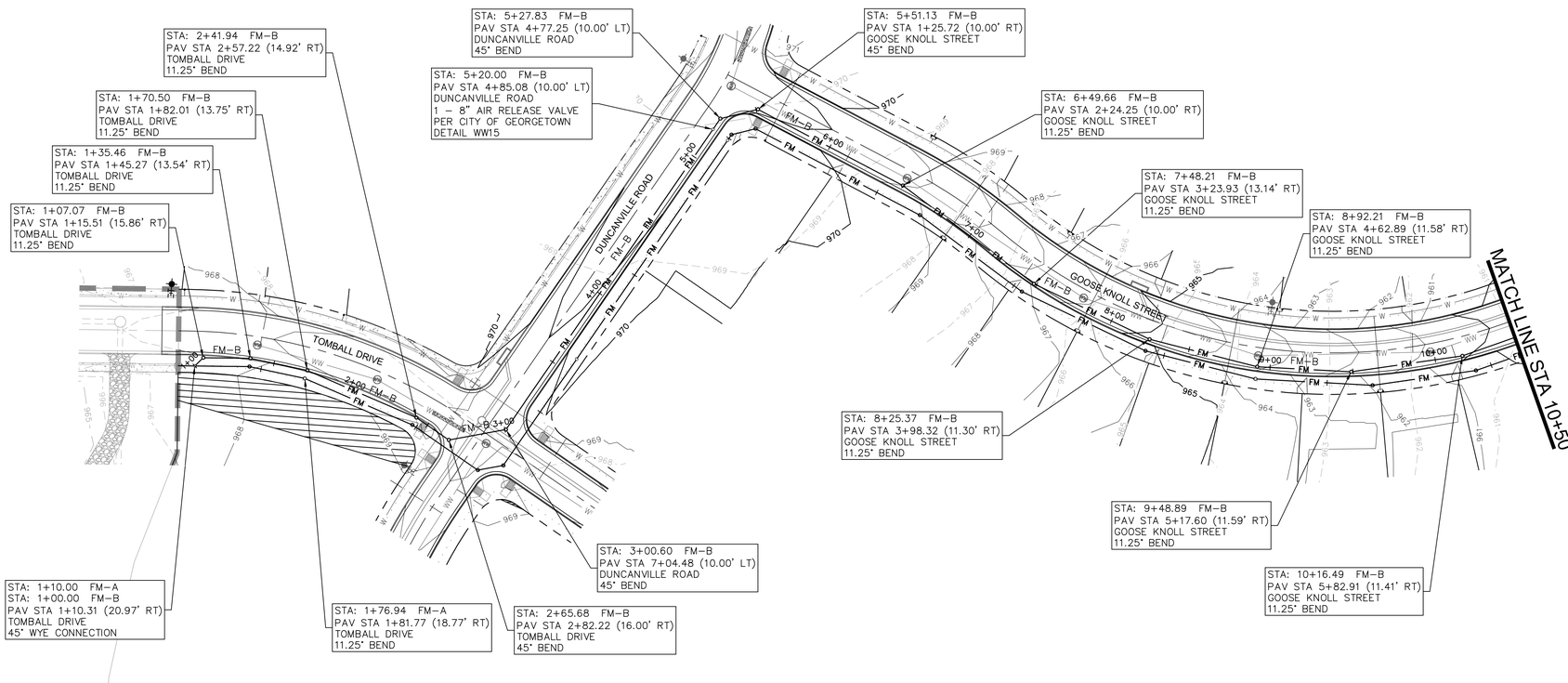

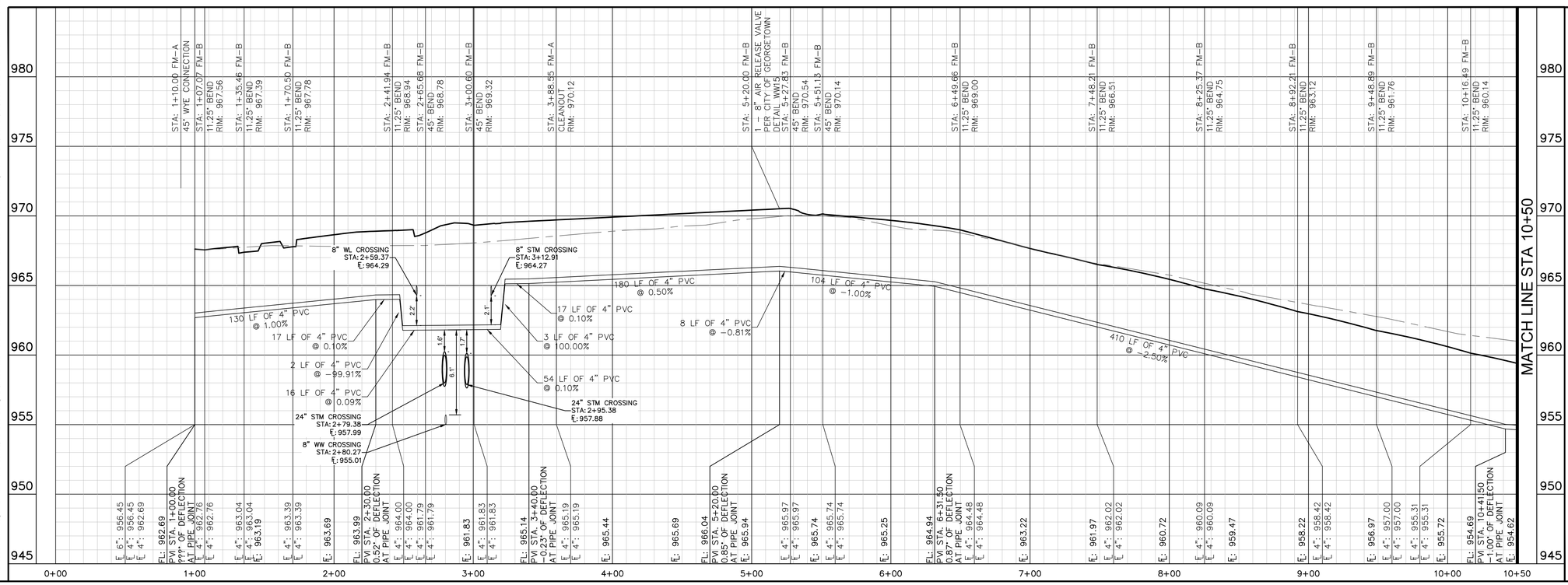

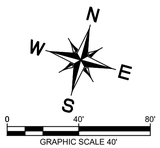

UTILITY LEGEND

- PROPERTY LINE
- PROPOSED WASTE WATER LINE
- PROPOSED WATER LINE
- PROPOSED FORCE MAIN LINE
- PROPOSED WASTE WATER MANHOLE
- WASTE WATER FLOW DIRECTION
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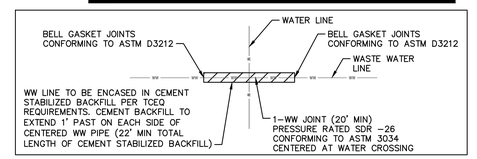

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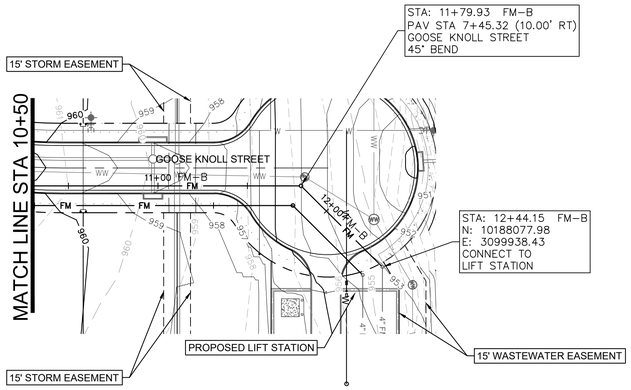

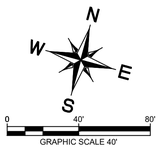

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- FM — PROPOSED FORCE MAIN LINE
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- PROPOSED FIRE HYDRANT
- OHP — EXISTING OVERHEAD POWER LINE
- W — EXISTING WATER LINE
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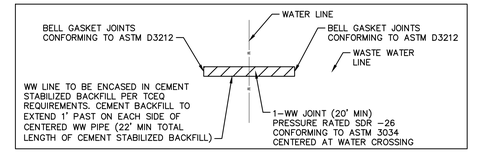

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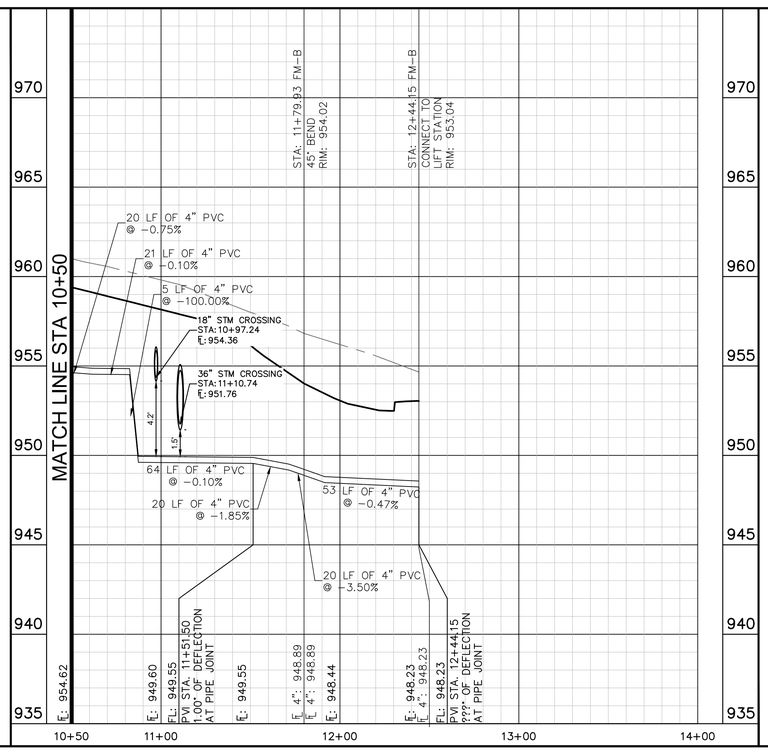

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SHEET NUMBER
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PIPE AND FITTINGS

1. FORCE MAIN
   1.1. 4" PVC DR11 FORCE MAIN SHALL BE USED.

1. LIFT STATION PIPING
   1.1. DIP PIPE SHALL BE IN ACCORDANCE WITH AWWA C111 AND AWWA C150.
   1.2. FITTINGS AND PIPE SHALL BE FLANGED.
      1.2.1. FITTINGS IN ACCORDANCE WITH AWWA C153 AND AWWA C110.
      1.2.2. FLANGES: AWWA/ANSI C115/A21.15, ASME B16.1, CLASS 125
      1.2.3. BOLTS AND NUTS SHALL BE 316 STAINLESS.
   1.3. PIPE AND FITTINGS SHALL BE LINED WITH PROTECTO 401.
   1.4. PROVIDE POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH AWWA FOR BURIED DIP.

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OF THE NECESSARY WASTEWATER CONNECTIONS TO THE SITE. CONTRACTOR SHALL NOTIFY THE UTILITY AUTHORITIES INSPECTORS 72 HOURS PRIOR TO CONNECTING TO ANY EXISTING LINE. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REPAIRS TO EXISTING UTILITIES DUE TO DAMAGE INCURRED DURING CONSTRUCTION.
2. CONTRACTOR SHALL CONSTRUCT LIFT STATION AND FORCE MAIN IN ACCORDANCE WITH THE CITY OF LEANDER UTILITY CRITERIA MANUAL, CITY OF AUSTIN UTILITY CRITERIA MANUAL, AND 2012 UNIFORM PLUMBING CODE.
3. A SIGN SHALL BE POSTED IN A VISIBLE LOCATION AT THE LIFT STATION TO INDICATE A PHONE NUMBER TO CALL IN CASE OF AN EMERGENCY. SIGN SHALL BE 24 INCHES BY 36 INCHES, CONSTRUCTED OF ¼" THINK ALUMINUM. THE SIGN SHALL BE FASTENED TO THE FENCE WHERE DIRECTED BY OWNER USING A MINIMUM OF FOUR STAINLESS STEEL FASTENERS. THE SIGN SHALL INCLUDE THE NAME OF THE OWNER OF THE LIFT STATION AND EMERGENCY CONTACT INFORMATION.

1. CONTRACTOR SHALL USE DEZURIK PEC ECCENTRIC PLUG VALVES OR APPROVED EQUAL IN ACCORDANCE WITH AWWA C517.
2. CONTRACTOR SHALL USE VAL-MATIC SWING-FLEX CHECK VALVE OR APPROVED EQUAL IN ACCORDANCE WITH AWWA C508. CHECK VALVES SHOULD BE SUITABLE FOR DIRECT BURY.
3. A CHECK VALVE MUST BE A SWING TYPE VALVE WITH AN EXTERNAL LEVER OR EXTERNAL POSITION INDICATOR TO SHOW ITS OPEN AND CLOSED POSITIONS.
4. AN ISOLATION VALVE MUST INCLUDE AN EXTERNAL POSITION INDICATOR TO SHOW ITS OPEN AND CLOSED POSITIONS, UNLESS A FULL-CLOSING VALVE IS A RISING-STEM GATE VALVE.
5. CONTRACTOR SHALL USE ARI D-020 COMBINATION AIR VALVE OR APPROVED EQUAL.

LIFT STATION GENERAL NOTES

1. CONFIGURATIONS AND DIMENSIONS SHOWN ARE BASED ON THE EQUIPMENT SPECIFIED. THE CONTRACTOR SHALL VERIFY THE LAYOUT AND ALL DIMENSIONS PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE STRUCTURAL DESIGN FOR BRACING THE J-VENT SYSTEM.
3. A SCREEN SHALL BE INSTALLED ON THE VENT PIPE. THE SCREEN SHALL BE 304 STAINLESS STEEL-16 MESH.
4. ALL PENETRATIONS SHALL BE SEALED WATER AND GAS TIGHT PER APPROVED METHODS.
5. INSTALL ISOLATION KITS BETWEEN DISSIMILAR METAL PIPING.
6. ALL EXPOSED METAL WITHIN THE WET WELL SHALL BE GRADE 316 STAINLESS STEEL.
7. CONTRACTOR SHALL FOLLOW THE INSTALLATION INSTRUCTIONS PROVIDED BY THE SUPPLIER/MANUFACTURER.
8. UPON RECEIPT OF THE LIFT STATION SHIPMENT, INSPECT THE ENTIRE SHIPMENT FOR DAMAGE BEFORE THE LIFT STATION IS TAKEN OFF THE TRUCK. IF THERE IS DAMAGE, NOTE AS SPECIFICALLY AS POSSIBLE INCLUDING CLEAR PHOTOS OF DAMAGE ON THE BILL OF LADING AS TO ANY DAMAGE, THEN OFFLOAD. CONTACT THE SHIPPER AT ONCE AND HAVE THE BILL OF LADING WITH YOU.
9. PROPOSED CHECK VALVE, COUPLING, GATE VALVE AND AIR RELEASE VALVES (BALL VALVES MAY BE USED DEPENDING ON TYPE OF PROPOSED PUMPS).
10. PROPOSED PUMPS TO BE SELECTED BASED ON APPLICATION, FLOW, AND HEAD CONDITIONS OF FORCE MAIN.
11. CONCRETE SHALL BE 1500 psi COVERING THE ANTI-FLOATATION RING AS SHOWN.
12. SELECT BACKFILL MATERIAL FREE OF VOIDS, SHARP OBJECTS, OR OTHER DEBRIS IN ACCORDANCE WITH 510S-5-SM AND THE STRUCTURAL SHEETS PROVIDED.

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR LIFT STATION EQUIPMENT, PIPING AND APPURTENANCES. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE OWNER FOR REVIEW PRIOR TO INSTALLATION, ALLOWING SUFFICIENT TIME FOR THE OWNER'S REVIEW AND RESPONSE.
2. CONTRACTOR SHALL SUBMIT DIMENSIONAL LAYOUT DRAWINGS AND PRODUCT DATA, CERTIFIED CORRECT FOR CONSTRUCTION, FOR REVIEW BY THE OWNER.
3. THE CONTRACTOR WILL MAKE SPECIFIC MENTION OF THOSE ITEMS THAT VARY FROM THE REQUIREMENTS OF THE CONTRACT DOCUMENTS IN THE LETTER OF TRANSMITTAL.
4. THE CONTRACTOR WILL ASSIGN A SEQUENTIAL NUMBER TO EACH SUBMITTAL (1, 2, 3, ETC.). RE-SUBMITTALS WILL BE IDENTIFIED WITH THEIR ORIGINAL NUMBER FOLLOWED BY A SEQUENTIAL LETTER (A, B, C, ETC.). FOR EXAMPLE, SUBMITTAL 12-C IS THE THIRD RE-SUBMITTAL OF THE OF THE TWELFTH ITEM FOR THE PROJECT.
5. THE CONTRACTOR WILL NOT DELIVER TO THE SITE, STORE, OR INCORPORATE INTO THE WORK, ANY MATERIALS OR EQUIPMENT FOR WHICH APPROVED SUBMITTALS HAVE NOT BEEN OBTAINED.
6. OWNER'S REVIEW, APPROVAL, OR OTHER APPROPRIATE ACTION REGARDING CONTRACTOR'S SUBMISSIONS WILL BE ONLY TO CHECK CONFORMITY WITH THE DESIGN CONCEPT OF THE PROJECT AND FOR COMPLIANCE WITH THE INFORMATION CONTAINED IN THE CONTRACT DOCUMENTS AND SHALL NOT EXTEND TO MEANS, METHODS, TECHNIQUES, DEQUENCES OR PROCEDURES OF CONSTRUCTION (EXCEPT WHERE A SPECIFIC MEANS, METHOD, TECHNIQUE, SEQUENCE OR PROCEDURE OF CONSTRUCTION IS INDICATED IN OR REQUIRED BY THE CONTRACT DOCUMENTS) OR TO SAFETY PRECAUTIONS OR PROGRAMS INCIDENT THERETO. THE REVIEW AND APPROVAL OF A SEPARATE COMPONENT ITEM WILL NOT INDICATE APPROVAL OF THE ASSEMBLY INTO WHICH THE ITEM IS FUNCTIONALLY INTEGRATED. CONTRACTOR SHALL MAKE CORRECTIONS REQUIRED BY OWNER, AND SHALL RETURN THE REQUIRED NUMBER OF CORRECTED COPIES OF SHOP DRAWINGS TO THE OWNER. CONTRACTOR MAY BE REQUIRED TO RESUBMIT AS REQUIRED REVISED SHOP DRAWINGS OR SAMPLES FOR FURTHER REVIEW AND APPROVAL. CONTRACTOR SHALL DIRECT SPECIFIC ATTENTION IN WRITING TO ANY NEW REVISIONS NOT SPECIFIED BY CONTRACTOR ON PREVIEW CONTRACTOR SUBMISSIONS.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
LIFT STATION AND FORCE MAIN
GENERAL CONSTRUCTION NOTES

THE FOLLOWING/LISTED "CONSTRUCTION NOTES" ARE INTENDED TO BE ADVISORY IN NATURE ONLY AND DO NOT CONSTITUTE AN APPROVAL OR CONDITIONAL APPROVAL BY THE EXECUTIVE DIRECTOR (ED), NOR DO THEY CONSTITUTE A COMPREHENSIVE LISTING OF RULES OR CONDITIONS TO BE FOLLOWED DURING CONSTRUCTION.
FURTHER ACTIONS MAY BE REQUIRED TO ACHIEVE COMPLIANCE WITH TCEQ REGULATIONS FOUND IN TITLE 30, TEXAS ADMINISTRATIVE CODE (TAC), CHAPTERS 213 AND 217, AS WELL AS LOCAL ORDINANCES AND REGULATIONS PROVIDING FOR THE PROTECTION OF WATER QUALITY. ADDITIONALLY, NOTHING CONTAINED IN THE FOLLOWING/LISTED "CONSTRUCTION NOTES" RESTRICTS THE POWERS OF THE ED, THE COMMISSION OR ANY OTHER GOVERNMENTAL ENTITY TO PREVENT, CORRECT, OR CURTAIL ACTIVITIES THAT RESULT OR MAY RESULT IN POLLUTION OF THE EDWARDS AQUIFER OR HYDROLOGICALLY CONNECTED SURFACE WATERS.
THE HOLDER OF ANY EDWARDS AQUIFER PROTECTION PLAN CONTAINING "CONSTRUCTION NOTES" IS STILL RESPONSIBLE FOR COMPLIANCE WITH TITLE 30, TAC, CHAPTERS 213 OR ANY OTHER APPLICABLE TCEQ REGULATION, AS WELL AS ALL CONDITIONS OF AN EDWARDS AQUIFER PROTECTION PLAN THROUGH ALL PHASES OF PLAN IMPLEMENTATION. FAILURE TO COMPLY WITH ANY CONDITION OF THE ED'S APPROVAL, WHETHER OR NOT IN CONTRADICTION OF ANY "CONSTRUCTION NOTES," IS A VIOLATION OF TCEQ REGULATIONS AND ANY VIOLATION IS SUBJECT TO ADMINISTRATIVE RULES, ORDERS, AND PENALTIES AS PROVIDED UNDER TITLE 30, TAC § 213.10 (RELATING TO ENFORCEMENT). SUCH VIOLATIONS MAY ALSO BE SUBJECT TO CIVIL PENALTIES AND INJUNCTION. THE FOLLOWING/LISTED "CONSTRUCTION NOTES" IN NO WAY REPRESENT AN APPROVED EXCEPTION BY THE ED TO ANY PART OF TITLE 30 TAC, CHAPTERS 213 AND 217, OR ANY OTHER TCEQ
APPLICABLE REGULATION

1. THIS LIFT STATION AND/OR FORCE MAIN MUST BE CONSTRUCTED IN ACCORDANCE WITH 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) EDWARDS AQUIFER RULES, AND ANY LOCAL GOVERNMENT STANDARD SPECIFICATIONS.
2. ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED LIFT STATION/FORCE MAIN (LSFM)
   SYSTEM APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF A LSFM SYSTEM APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.
3. A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE PRESIDING TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
   - THE NAME OF THE APPROVED PROJECT;
   - THE ACTIVITY START DATE; AND
   - THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.
4. UPON COMPLETION OF ANY LIFT STATION EXCAVATION, A GEOLOGIST MUST CERTIFY THAT THE EXCAVATION HAS BEEN INSPECTED FOR THE PRESENCE OF SENSITIVE FEATURES. THE CERTIFICATION MUST BE SIGNED, SEALED, AND DATED BY THE GEOLOGIST PREPARING THE CERTIFICATION. CERTIFICATION THAT THE EXCAVATION HAS BEEN INSPECTED MUST BE SUBMITTED TO THE APPROPRIATE REGIONAL OFFICE.
   - IF SENSITIVE FEATURE(S) ARE IDENTIFIED, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY AND MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY FROM THE LIFT STATION. - CONSTRUCTION MAY CONTINUE IF THE GEOLOGIST CERTIFIES THAT NO SENSITIVE FEATURE OR FEATURES WERE PRESENT.
5. IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPLICANT MUST IMMEDIATELY NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TCEQ OF THE FEATURE DISCOVERY.
   A GEOLOGIST'S ASSESSMENT OF THE LOCATION AND EXTENT OF THE FEATURE DISCOVERED MUST BE REPORTED TO THAT REGIONAL OFFICE IN WRITING WITHIN TWO WORKING DAYS. THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR FOR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY TCEQ-0591 (REV. 2-26-2016) PAGE 2 OF 2 ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.
6. ALL FORCE MAIN LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.68. TESTING METHOD WILL BE:
   - A PRESSURE TEST MUST USE 50 POUNDS PER SQUARE INCH ABOVE THE NORMAL OPERATING PRESSURE OF A FORCE MAIN.
   - A TEMPORARY VALVE FOR PRESSURE TESTING MAY BE INSTALLED NEAR THE DISCHARGE POINT OF A FORCE MAIN AND REMOVED AFTER A TEST IS SUCCESSFULLY COMPLETED.
   - A PUMP ISOLATION VALVE MAY BE USED AS AN OPPOSITE TERMINATION POINT.
   - A TEST MUST INVOLVE FILLING A FORCE MAIN WITH WATER.
   - A PIPE MUST HOLD THE DESIGNATED TEST PRESSURE FOR A MINIMUM OF 4.0 HOURS.
   - THE LEAKAGE RATE MUST NOT EXCEED 10.0 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER DAY.

Austin Regional Office 12100 Park 35 Circle, Building A Austin, Texas 78753-1808 Phone (512) 339-2929 Fax (512) 339-3795	San Antonio Regional Office 14250 Judson Road San Antonio, Texas 78233-4480 Phone (210) 490-3096 Fax (210) 545-4329

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

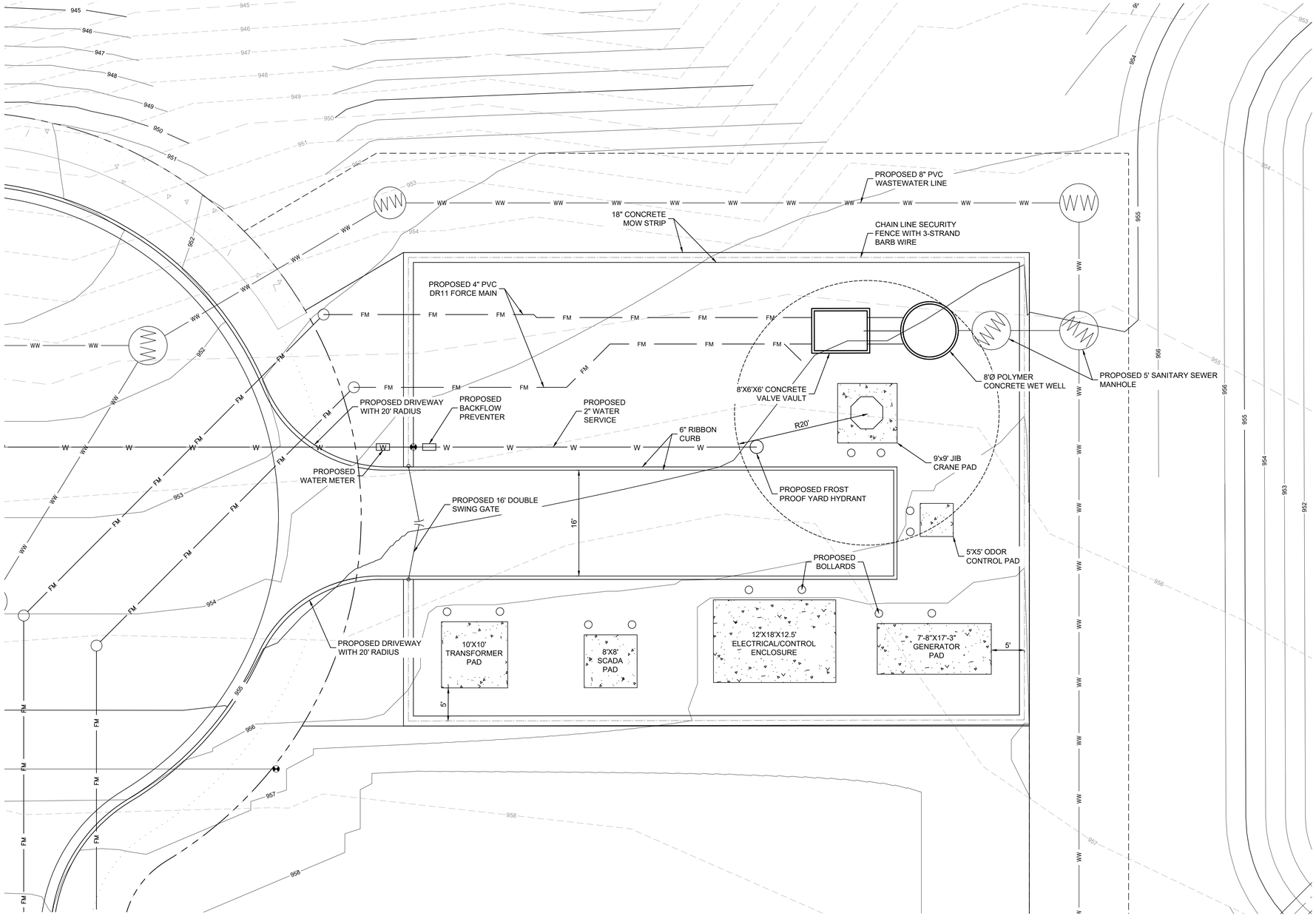
11/16/23
STATE OF TEXAS
TARA R. RAOOF
141851
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE OCTOBER 2023
SCALE: AS SHOWN
DESIGNED BY: RAK
DRAWN BY: NAN
CHECKED BY: TRR

LIFT STATION NOTES

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
60



0 10' 20'
GRAPHIC SCALE 10'

N E S W

LEGEND

4" FM	PROPOSED 4" FORCE MAIN
WW	PROPOSED WASTEWATER LINE
900	PROPOSED CONTOUR
900	EXISTING CONTOUR
	PROPOSED CONCRETE SLAB

NOTES

1. ALL MECHANICAL JOINTS SHALL HAVE MEGA LUG THRUST RESTRAINTS.
2. FOR ALL ELECTRICAL WORK REFER TO ELECTRICAL SHEETS.
3. BURIED DUCTILE IRON PIPES, VALVES, AND FITTINGS SHALL BE ENCASED WITH POLYETHYLENE WRAP 8 MILS THICK.
4. THE CONTRACTOR SHALL MAINTAIN ADEQUATE DRAINAGE AT ALL TIMES AND PROVIDE AND MAINTAIN EROSION PROTECTION IN AND ADJACENT TO THE CONSTRUCTION LIMITS.
5. ALL STRUCTURES HAVE MIN. 6" OF CLEARANCE BETWEEN TOP OF SLAB AND PROPOSED NATURAL GROUND.
6. CONTRACTOR SHALL GRADE THE SITE TO PROVIDE POSITIVE DRAINAGE AROUND ALL STRUCTURES AND SLABS.
7. CONTRACTOR SHALL INCLUDE IDENTIFICATION SIGN WITH LIFT STATION NAME AND EMERGENCY CONTACT INFORMATION. THE CONTRACTOR SHALL COORDINATE WITH THE CITY OF LEANDER FOR INFORMATION AND SUBMIT SHOP DRAWINGS FOR THE SIGN DETAILS FOR APPROVAL.
8. LIFT STATION DESIGN SHALL BE IN ACCORDANCE WITH THE ENCLOSED CITY OF LEANDER AND CITY OF AUSTIN LIFT STATION SPECIFICATIONS.
9. ALL UNPAVED AREAS OF SITE WITHIN FENCED BOUNDARIES SHALL BE COVERED WITH WEED BARRIER AND A 6" LAYER OF TxDOT GRADE 1 CRUSHED STONE COARSE AGGREGATE.

No.	REVISIONS	DATE	BY

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WWW.KIMLEY-HORN.COM
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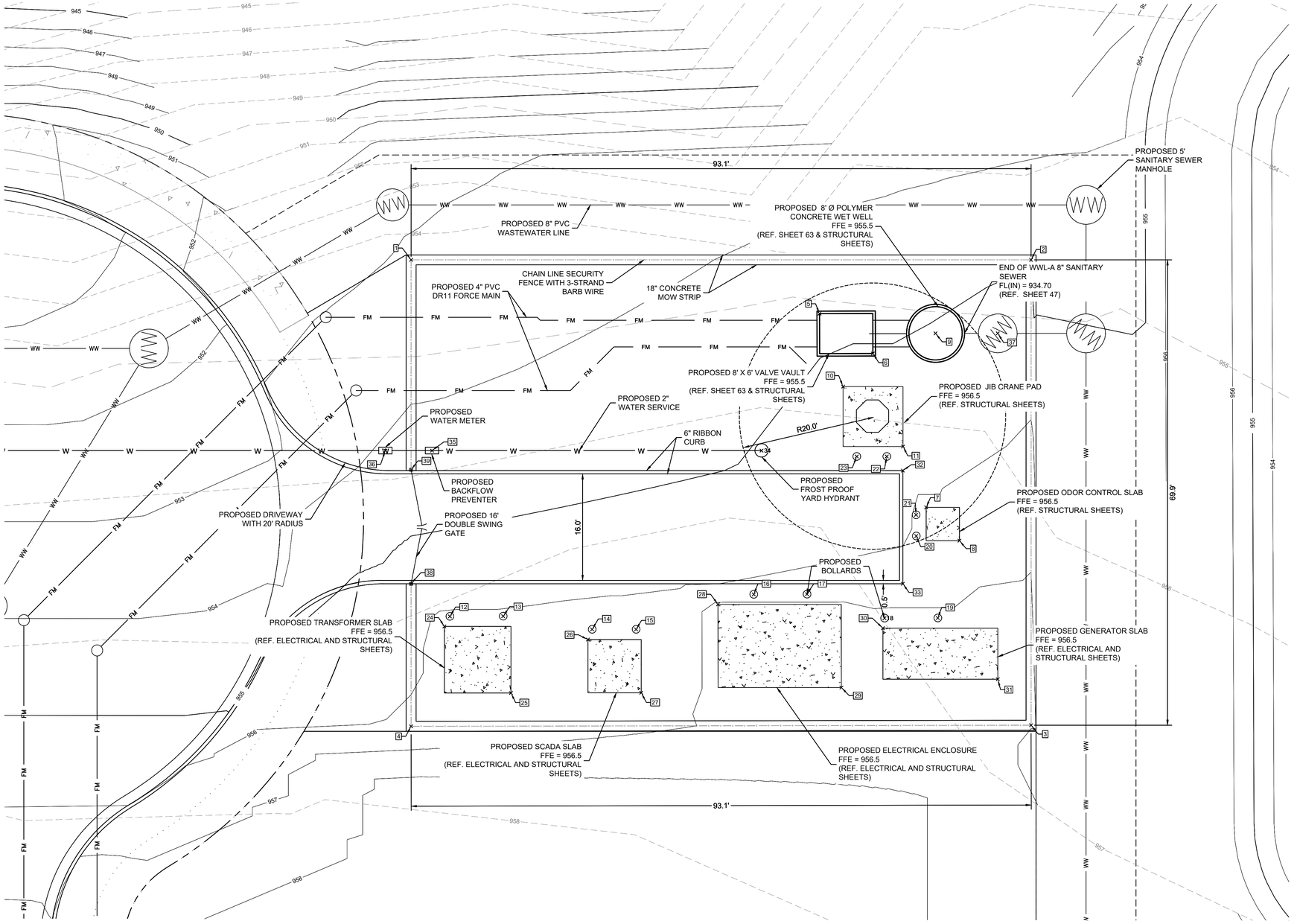
STATE OF TEXAS
TARA R. RAOOF
141851
LICENSED PROFESSIONAL ENGINEER
11/16/23

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	RAK
DRAWN BY:	NAN
CHECKED BY:	TRR

LIFT STATION SITE PLAN

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
61



0 10' 20'
GRAPHIC SCALE 10'

N E S W

LEGEND

4" FM	PROPOSED 4" FORCE MAIN
WW	PROPOSED WASTEWATER LINE
900	PROPOSED CONTOUR
900	EXISTING CONTOUR
	PROPOSED CONCRETE SLAB

Point Table

Point #	Northing	Easting	Description
1	10188073.38	3099953.18	FENCE CORNER
2	10188000.78	3100011.46	FENCE CORNER
3	10187957.02	3099956.96	FENCE CORNER
4	10188029.52	3099898.54	FENCE CORNER
5	10188020.49	3099985.27	VALVE VAULT CORNER
6	10188010.49	3099985.62	VALVE VAULT CORNER
7	10187989.79	3099972.62	ODOR CONTROL SLAB CORNER
8	10187982.76	3099971.85	ODOR CONTROL SLAB CORNER
9	10188005.05	3099993.87	CENTER OF WET WELL
10	10188010.87	3099978.94	JIB CRANE PAD CORNER
11	10187998.22	3099977.56	JIB CRANE PAD CORNER
12	10188035.30	3099915.07	BOLLARD
13	10188029.08	3099920.10	BOLLARD
14	10188017.43	3099926.92	BOLLARD
15	10188012.29	3099931.05	BOLLARD
16	10188001.80	3099946.21	BOLLARD
17	10187995.58	3099951.24	BOLLARD
18	10187984.24	3099955.72	BOLLARD
19	10187978.02	3099960.75	BOLLARD
20	10187988.26	3099968.31	BOLLARD
21	10187990.28	3099970.79	BOLLARD
22	10187999.19	3099974.86	BOLLARD
23	10188002.70	3099972.04	BOLLARD
24	10188035.01	3099913.38	TRANSFORMER SLAB CORNER
25	10188020.96	3099911.84	TRANSFORMER SLAB CORNER
26	10188016.97	3099925.33	SCADA SLAB CORNER
27	10188005.72	3099924.10	SCADA SLAB CORNER
28	10188005.05	3099941.68	ELECTRICAL SLAB CORNER
29	10187982.78	3099943.53	ELECTRICAL SLAB CORNER
30	10187983.50	3099954.40	GENERATOR SLAB CORNER
31	10187965.24	3099959.22	GENERATOR SLAB CORNER
32	10187995.98	3099974.73	EDGE OF DRIVEWAY
33	10187985.33	3099961.47	EDGE OF DRIVEWAY
34	10188014.40	3099963.78	YARD HYDRANT
35	10188052.99	3099932.80	BACKFLOW PREVENTER
36	10188058.45	3099928.42	WATER METER
37	10187997.76	3099999.72	CENTER OF MANHOLE
38	10188042.92	3099915.24	FENCE CORNER
39	10188053.63	3099928.58	FENCE CORNER

NOTES

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/16/23
STATE OF TEXAS
TARA R. RAGOE
141851
LICENSED PROFESSIONAL ENGINEER

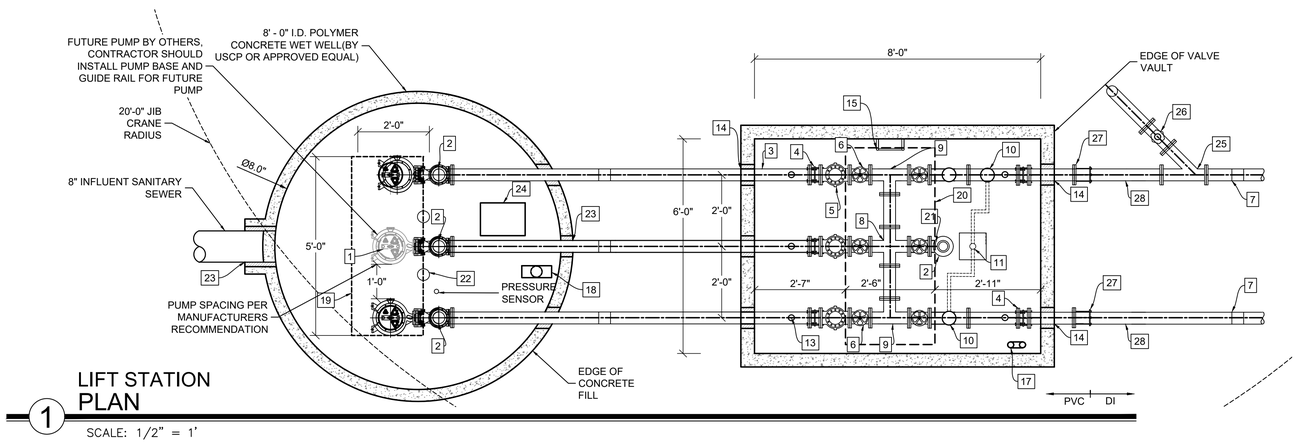
KHA PROJECT 067783129	DATE OCTOBER 2023	SCALE: AS SHOWN	DESIGNED BY: RAK
			DRAWN BY: NAN
			CHECKED BY: TRR

LIFT STATION DIMENSION CONTROL PLAN

EDGEWOOD PHASE 2, SECTION 2

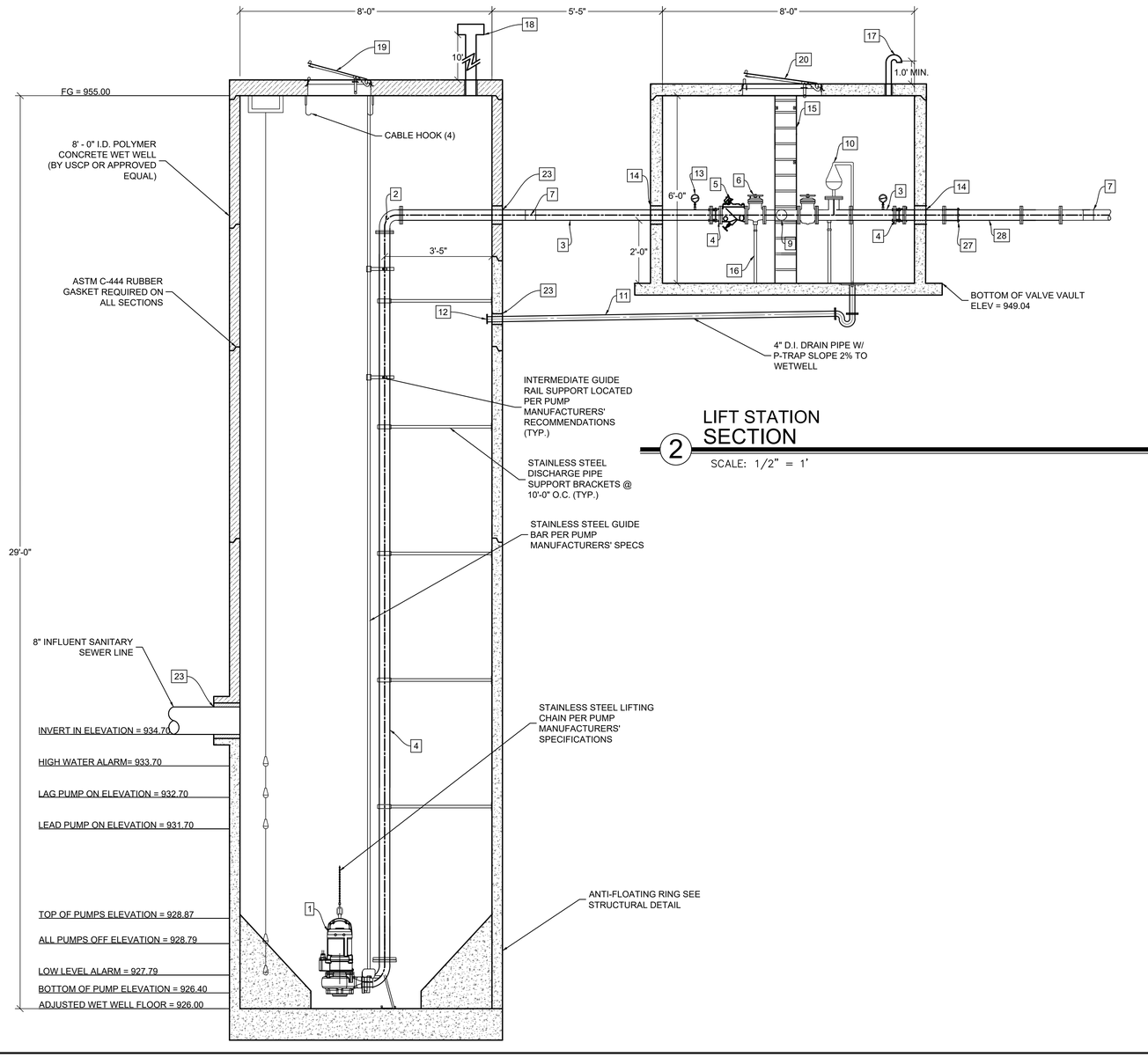
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
62



LIFT STATION PLAN

1 SCALE: 1/2" = 1'



LIFT STATION SECTION

2 SCALE: 1/2" = 1'

MATERIAL LIST	
1	PUMP - SEE "PUMP PERFORMANCE DATA", THIS SHEET
2	4" 90° BEND FLANGED
3	4" DI. PIPE
4	4" RESTRAINED DISMANTLING JOINT WITH S.S. HARDWARE
5	4" CHECK VALVE W/ VISUAL INDICATOR AND BACKFLOW ACTUATOR
6	4" FLANGED ECCENTRIC PLUG VALVE WITH HANDWHEEL OPERATOR
7	4" SOLID SLEEVE MECHANICAL JOINT (RESTRAINED)
8	4" X 4" CROSS FLANGED
9	4" X 4" TEE FLANGED
10	2" VENTED COMBINATION AIR RELEASE VALVE (ARI D-025L OR EQUAL)
11	4" FLOOR DRAIN
12	4" CORROSION RESISTANT FLAP VALVE (STAINLESS STEEL, RUBBER, OR EQUAL)
13	1/4" BRASS BALL VALVE & PRESSURE GAUGE, SEE DETAIL 6, SHEET C4.
14	A-LOK WATER-STOP CONNECTOR OR APPROVED EQUAL. INSTALL GROUT PER MANUFACTURER'S RECOMMENDATIONS
15	ALUMINUM LADDER WITH RETRACTABLE HAND RAIL.
16	PIPE SUPPORT, SEE DETAIL 5, SHEET C4.
17	4" STAINLESS STEEL GOOSE NECK VENT WITH 304 STAINLESS STEEL SCREENS
18	4" DIA. STAINLESS STEEL TEE VENT WITH 304 STAINLESS STEEL SCREENS
19	48"X120" WET WELL ALUMINUM ACCESS COVER WITH THREE DOORS INCLUDING SAFE HATCH, H-20 LOAD RATING (FLYGT OR EJIW)
20	60"X120" VALVE VAULT ALUMINUM ACCESS COVER WITH THREE DOORS INCLUDING SAFE HATCH, H-20 LOAD RATING (FLYGT OR EJIW)
21	4" FEMALE CAMLOCK QUICK CONNECTION
22	ODOR CONTROL AERATOR (WET WELL WIZARD OR SOLAR BEE)
23	WET WELL PENETRATION SEE DETAIL 3, SHEET C4
24	ODOR CONTROL AERATOR BLOWER AND COVER RE:ELECTRICAL
25	4" X 4" WYE, MJ
26	4" ECCENTRIC PLUG VALVE, MJ
27	4" RESTRAINED COUPLING ADAPTER, FL
28	4" PVC. DR11 PIPE

PUMP PERFORMANCE DATA	
PUMP SELECTION	AMAREX D-MAX 80-170/068F2YSG2, OR APPROVED EQUAL
NUMBER OF PUMPS	2
MOTOR HORSE POWER	9 HP
IMPELLER DIA.	5.7 IN
PUMP MOTOR VOLTAGE	60 Hz, 3 Phase, 460 Volts
FLOW @ OPERATING POINT	200.10 GPM
TOTAL HEAD @ OPERATING POINT	93.10' TDH
EFFICIENCY @ OPERATING POINT	57%

PUMP LEVEL SETTINGS	
PIPE INVERT	934.7'
HIGH WATER ALARM	933.70'
LAG PUMP ON	932.70'
LEAD PUMP ON	931.70'
TOP OF PUMP	928.87'
ALL PUMPS OFF	928.79'
LOW LEVEL ALARM	928.79
BOTTOM OF PUMP	926.40'
ADJUSTED WET WELL FLOOR	926.00'

KEYNOTES:

1. PUMP SUPPLIER SHALL PROVIDE DIMENSIONS OF THE GUIDE RAILS TO ENSURE COMPATIBILITY WITH SUPPLIED EQUIPMENT. THE PUMP SHALL BE EASILY REMOVED FOR INSPECTION OR SERVICE. PERSONNEL SHALL HAVE NO REASON TO ENTER THE WET WELL. GUIDE RAILS SHALL BE SUPPORTED EVERY 10 FEET WITH STAINLESS STEEL SUPPORTS.
2. THE GUIDE BRACKETS SHALL BE CONSTURCTED OF 316 STAINLESS STEEL. GUIDE BRACKETS FOR EACH PUMP MUST BE SUPPLIED BY THE PUMP MANUFACTURER TO ENSURE COMPATIBILITY WITH SUPPLIED EQUIPMENT.
3. EACH PUMPING UNIT SHALL BE PROVIDED WITH A STAINLESS STEEL LIFTING CHAIN OR CABLE. LIFTING CHAIN SHALL EXTEND AT LEAST 3-4 FEET ABOVE WET WELL.
4. ALL HARDWARE IN THE WET WELL SHALL BE 316 STAINLESS STEEL.
5. PUMP DISCHARGE LINES SHALL HAVE 1/4 INCH TAPS WITH STAINLESS STEEL OR BRONZE BALL VALVES.
6. ALL DISCHARGE LINES SHALL HAVE ADEQUATE THRUST SUPPORT MEMBERS AT EACH FITTING. WHERE POSSIBLE, LONG RADIUS 90 DEGREE BENDS SHALL BE USED.
7. THE DISCHARGE LINE FROM EACH PUMP SHALL BE FITTED WITH A CHECK VALVE AND A ECCENTRIC PLUG VALVE, WITH THE CHECK VALVE ON THE PUMP SIDE OF THE ECCENTRIC PLUG VALVE. WHEN NECESSARY, AIR RELEASE VALVE(S) SHALL BE INSTALLED DOWNSTREAM OF THE ECCENTRIC PLUG VALVES.
8. THE VALVE VAULT SHALL BE SIZED LARGE ENOUGH TO PROVIDE AT LEAST 1 FOOT OF CLEARANCE AROUND ALL VALVES AND ALL FLANGES. THE LID OF THE VAULT SHALL BE A MINIMUM OF 42 INCHES BY 42 INCHES AND SHALL BE ABLE TO BE PADLOCKED. THE VAULT SHALL BE INTERNALLY COATED WITH SPL WW-511 COATING, AND EXTERNALLY COATED WITH A COAL TAR EPOXY.
9. THE VALVE VAULT SHALL HAVE A DRAIN TO THE WET WELL. THE DRAIN SHALL HAVE A 4 INCH MINIMUM DIAMETER AND BE FITTED WITH A FLAP VALVE OR BACK-FLOW PREVENTER AND A TRAP TO PREVENT GASES OR WATER FROM ENTERING THE VALVE VAULT. THE OPENING TO THE DRAIN SHALL BE COVERED WITH A STAINLESS STEEL SCREEN.
10. ALL VENTS SHALL BE COATED INSIDE AND OUT PER CITY OF AUSTIN STANDARD SPECIFICATIONS. THE WET WELL VENT SHALL BE A TEE FITTED WITH STAINLESS STEEL SCREENS 10 FEET ABOVE WET WELL COVER.

GENERAL NOTES

1. THE WORK PERFORMED UNDER THIS CONTRACT SHALL COMPLY WITH THE CITY OF AUSTIN SUBMERSIBLE LIFT STATION SPECIFICATIONS.
2. CONFIGURATIONS AND DIMENSIONS SHOWN ARE BASED ON THE EQUIPMENTS SPECIFIED. THE CONTRACTOR SHALL VERIFY THE LAYOUT AND ALL DIMENSIONS PRIOR TO FABRICATION.
3. ALL COUPLINGS SHALL BE EPOXY COATED STEEL AND SHALL BE DRESSER, SMITH-BLAIR, OR EQUAL. COUPLINGS SHALL BE RESTRAINED WITH A THRUST HARNESS DESIGNED IN ACCORDANCE WITH AWWA M-11.
4. CONTRACTOR SHALL COORDINATE VALVE VAULT ACCESS HATCH LOCATION WITH LADDER MANUFACTURER PRIOR TO FABRICATION.
5. CONTRACTOR SHALL VERIFY WETWELL ACCESS HATCH LOCATION AND DIMENSION WITH PUMP MANUFACTURER PRIOR TO FABRICATION.
6. PROVIDE 316 STAINLESS STEEL ANCHOR BOLTS FOR PUMP BASE MOUNTING TO SLAB.
7. INSTALL ISOLATION KITS BETWEEN DISSIMILAR METAL PIPING.
8. ALL PIPING WITHIN WET WELL AND VALVE VAULT SHALL BE SPECIAL THICKNESS CLASS 53 EPOXY LINED (PROTECTO 401) DUCTILE IRON PIPE. SEE CITY OF AUSTIN SPL WW-534.
9. ALL BURIED PIPE SHALL BE POLYWRAPPED DUCTILE IRON PRESSURE CLASS 350 PUSH JOINT PIPE WITH JOINT RESTRAINT GASKETS (SEE CITY OF AUSTIN SPL WW-27G).
10. ALL METALS WITHIN THE WET WELL, INCLUDING FLANGE BOLTS, SHALL BE STAINLESS STEEL, UNLESS OTHERWISE INDICATED.
11. CONCRETE FOR FOUNDATION SHALL BE CLASS S. CONCRETE SHALL HAVE A MIN COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
12. THE EDGE OF EXPOSED CONCRETE SLABS SHALL RECEIVE A 3/4" CHAMFER.
13. REINFORCED STEEL SHALL BE GRADE 60.
14. ALL VENTS SHALL HAVE SCREENS INSTALLED OVER OPENINGS AND SHALL BE 304 STAINLESS STEEL - 16 MESH. OPENINGS SHALL BE A MINIMUM OF 12" ABOVE THE SLAB.
15. THE HIGH LEVEL ALARM SHALL ACTIVATE A FLASHING RED LIGHT TO BE MOUNTED ON THE ROOF OF THE ELECTRICAL SHELTER. THE CONTRACTOR SHALL INSTALL METAL INFORMATION SIGN AT OR NEAR THE LIFT STATION ENTRY GATE, VISIBLE TO THE PUBLIC.
16. ALL PENETRATIONS SHALL BE SEALED WATER AND GAS TIGHT PER APPROVED METHODS.
17. ALL SUBMITTALS TO BE SUBMITTED TO THE CITY OF BUDA FOR APPROVAL.
18. BACK FILLING OF THE WET WELL SHALL COMPLY WITH CITY OF AUSTIN STANDARD SPECIFICATIONS, ITEM NO. 401.
19. SHOP DRAWING AND STRUCTURAL CALCULATIONS FOR THE CAST IN PLACE CONCRETE WET WELL SHALL BE SIGNED AND SEALED BY AN ENGINEER LICENSED IN THE STATE OF TEXAS AND SUBMITTED FOR REVIEW BY THE OWNER AND ENGINEER

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
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11/16/23
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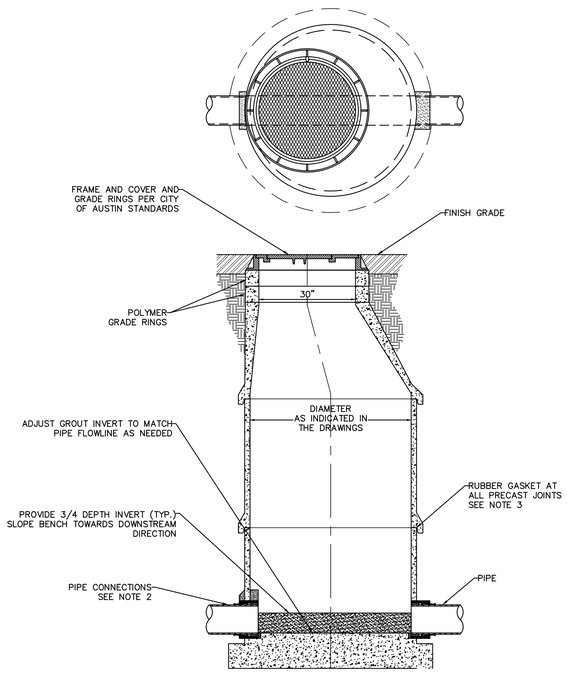
LICENSED PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE OCTOBER 2023
SCALE: AS SHOWN
DESIGNED BY: RAK
DRAWN BY: NAN
CHECKED BY: TRR

LIFT STATION PLAN AND SECTION

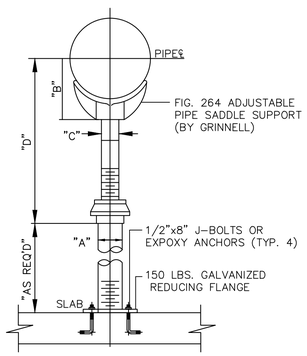
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
63



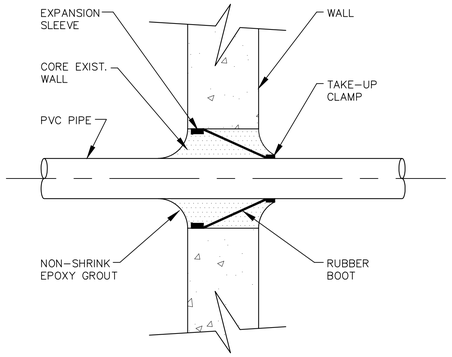
NOTES:
1. POLYMER CONCRETE MANHOLES SHALL BE MANUFACTURED BY U.S. COMPOSITE PIPE, INC.,A DIVISION OF THOMPSON PIPE GROUP, OR PRE-APPROVED EQUAL..
2. PIPES SHALL BE DIRECTLY CONNECTED TO ALL STRUCTURES USING RESILIENT FLEXIBLE PIPE TO MANHOLE CONNECTOR PER ASTM C923.
3. ROUND MANHOLE COMPONENTS SHALL BE CONNECTED WITH AN ELASTOMERIC SEALING GASKET AS THE SOLE MEANS TO MAINTAIN JOINT WATER-TIGHTNESS AND BOTH THE GASKET MATERIAL AND THE MANHOLE JOINT SHALL MEET THE REQUIREMENTS OF ASTM C443. ROUND MANHOLES SHALL UTILIZE SPIGOT AND BELL TYPE JOINTS INCORPORATING EITHER A CONFINED O-RING OR SINGLE STEP PROFILE JOINT.

1 POLYMER CONCRETE MANHOLE DETAIL
N.T.S.

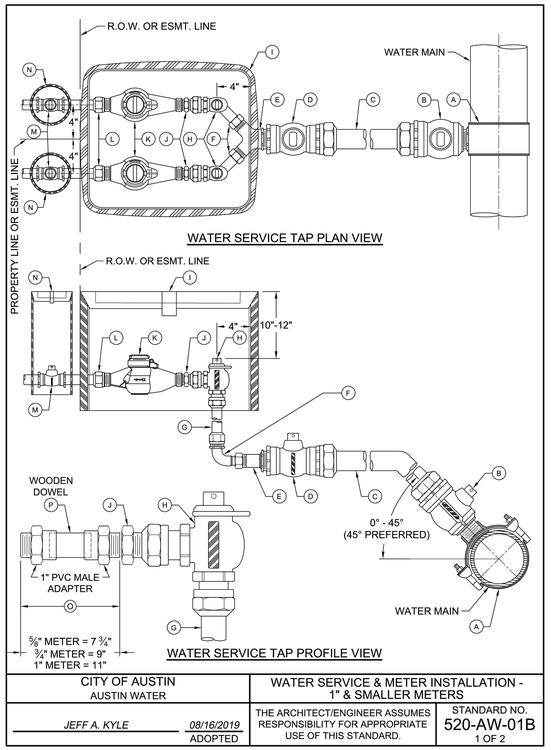


WGT	APPROX. LBS EACH					D	
PIPE SIZE	COMPLETE	SADDLE ONLY	A	A	A	MINIMUM	MAXIMUM
2 1/2	9.0	4.8	2 1/2	3 1/2	1 1/2	8	13
3	9.2	5.0	2 1/2	3 3/4	1 1/2	8 1/4	13 1/4
3 1/2	9.4	5.2	2 1/2	4	1 1/2	8 1/2	13 1/2
4	15.0	7.6	3	4 1/4	2 1/2	9 1/4	14
5	16.7	8.3	3	4 7/8	2 1/2	10	14 3/4
6	17.7	10.3	3	5 1/2	2 1/2	10 1/2	15 1/4
8	20.2	12.8	3	6 7/8	2 1/2	11 3/4	16 1/2
10	25.2	17.8	3	5 1/2	2 1/2	13 1/2	18 1/4
12	29.0	21.6	3	9 15/16	2 1/2	15	19 3/4
14	49.2	38.0	4	10 15/16	3	16 1/4	20 3/4
16	53.2	42.0	4	12 3/8	3	17 3/4	22 1/4
18	70.8	51.0	6	13 7/8	3 1/2	19 1/2	24
20	104.8	85.0	6	15 3/8	3 1/2	21	25 1/2
24	137.0	110.0	6	17 15/16	4	23 3/4	28 1/2
30	170.0	150.0	6	21 5/16	4	27	31 1/2
32	181.0	161.1	6	22 1/2	4	28 1/8	32 3/4
36	249.0	229.0	6	24 1/4	4	30 1/4	34 3/4

5 ADJUSTABLE PIPE SUPPORT DETAIL
N.T.S.

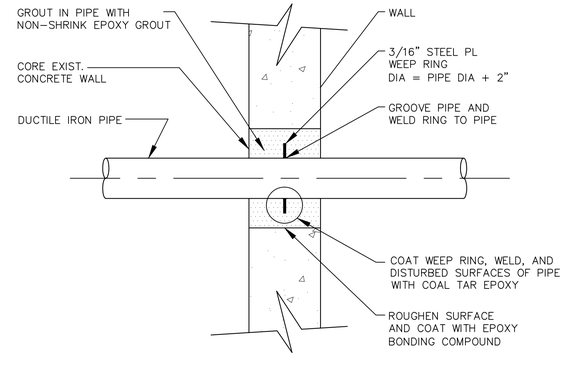


2 COA WW-146-D WET WELL PENETRATION DETAIL
N.T.S.

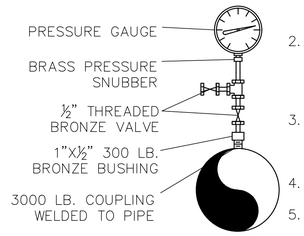


CITY OF AUSTIN AUSTIN WATER	WATER SERVICE & METER INSTALLATION - 1" & SMALLER METERS	
JEFF A. KYLE 08/16/2019 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 520-AW-01B 1 OF 2

6 WATER SERVICE METER DETAIL
N.T.S.



3 VAULT PENETRATION DETAIL
N.T.S.



NOTES:
1. PRESSURE GAUGES SHALL HAVE 4-INCH DIAMETER FACES AND BE CALIBRATED FROM 0 TO 150 PSI.
2. GAUGE SHALL BE FILLED WITH GLYCOL AND INSTALLED WITH A PRESSURE SNUBBER AND SHALL BE OF STAINLESS STEEL CONSTRUCTION.
3. INSTALL GAUGE WITH A 0.25-INCH NPT CONNECTION AND INCLUDE A CORPORATION STOP AND AIR BLEED.
4. VALVES TO BE RATED AT 200 PSI MIN..
5. ALL WELDED COUPLINGS SHALL BE RATED FOR 3000 LBS.
6. GAUAGE SHALL BE TRERICE MANUFACTURED OR APPROVED EQUAL.

4 PRESSURE GAUGE DETAIL
N.T.S.

No.	REVISIONS	DATE	BY

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

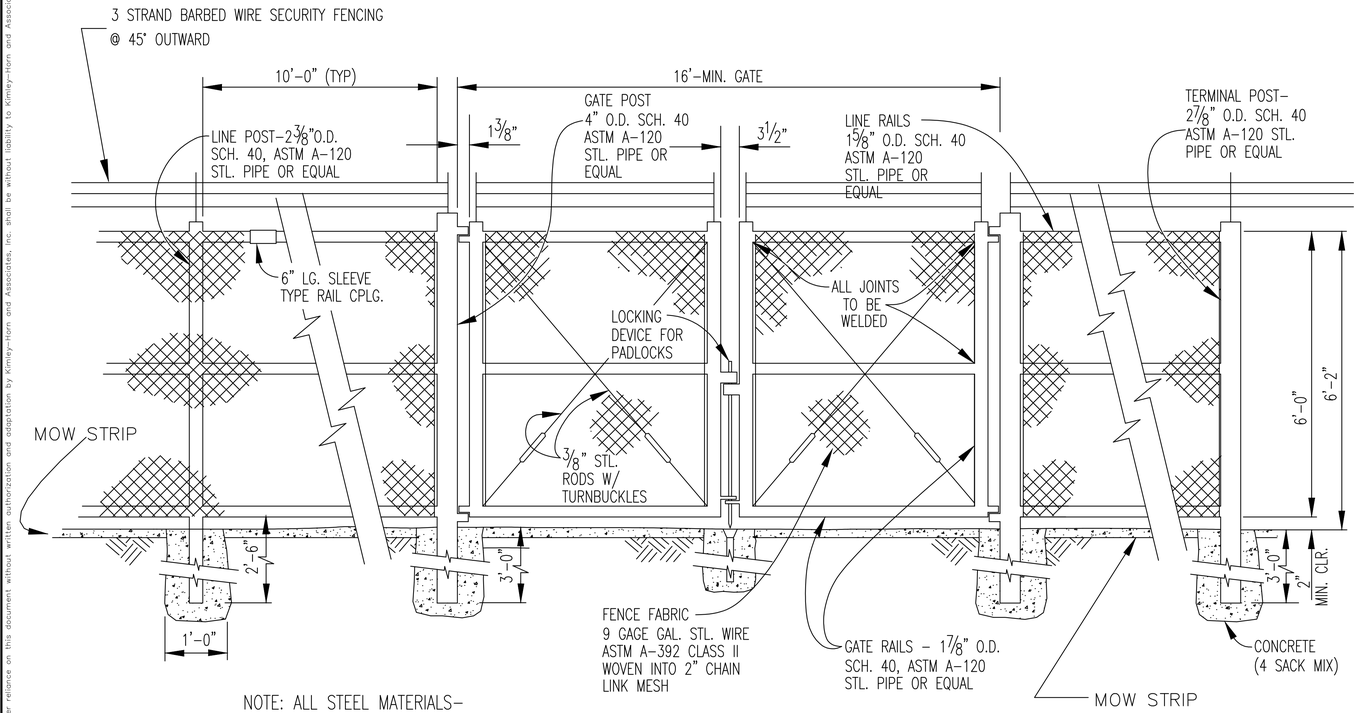
11/16/23
STATE OF TEXAS
TARA R. RAGOE
141857
LICENSED PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE OCTOBER 2023
SCALE: AS SHOWN
DESIGNED BY: RAK
DRAWN BY: NAN
CHECKED BY: TRR

LIFT STATION DETAILS (SHEET 1 OF 4)

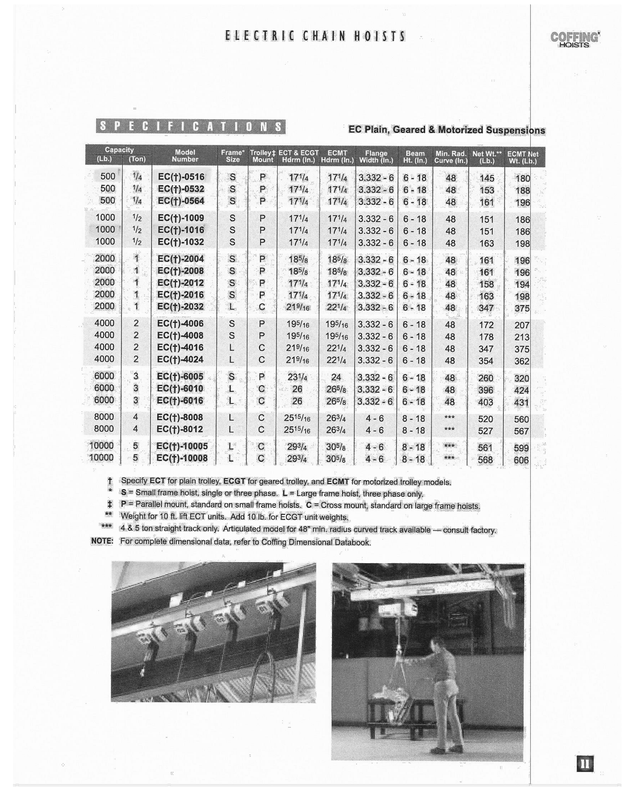
EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
64



NOTE: ALL STEEL MATERIALS-
FABRIC, PIPE, & FITTINGS
TO BE HOT DIP GALVANIZED

1 FENCE/GATE DETAIL
N.T.S.



ELECTRIC CHAIN HOISTS — COFFING HOISTS

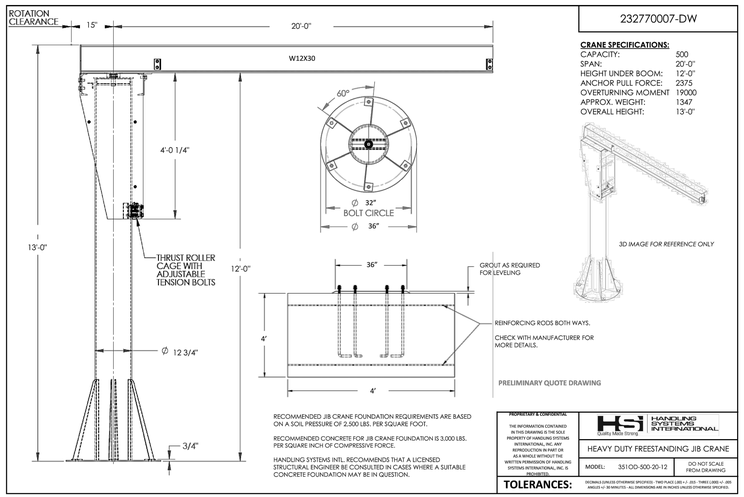
SPECIFICATIONS — **EC Plain, Geared & Motorized Suspensions**

Capacity (Lb.)	Capacity (Ton)	Model Number	Frame* Size	Trolley‡ Mount	ECT & ECGT Hdrm (In.)	ECMT Hdrm (In.)	Flange Width (In.)	Beam Ht. (In.)	Min. Rad. Curve (In.)	Net Wt.** (Lb.)	ECMT Net Wt. (Lb.)
500	1/4	EC(†)-0516	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	145	180
500	1/4	EC(†)-0532	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	153	188
500	1/4	EC(†)-0564	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	161	196
1000	1/2	EC(†)-1009	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	151	186
1000	1/2	EC(†)-1016	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	151	186
1000	1/2	EC(†)-1032	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	163	198
2000	1	EC(†)-2004	S	P	18 5/8	18 5/8	3.332 - 6	6 - 18	48	161	196
2000	1	EC(†)-2008	S	P	18 5/8	18 5/8	3.332 - 6	6 - 18	48	161	196
2000	1	EC(†)-2012	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	158	194
2000	1	EC(†)-2016	S	P	17 1/4	17 1/4	3.332 - 6	6 - 18	48	163	198
2000	1	EC(†)-2032	L	C	21 9/16	22 1/4	3.332 - 6	6 - 18	48	347	375
4000	2	EC(†)-4006	S	P	19 5/16	19 5/16	3.332 - 6	6 - 18	48	172	207
4000	2	EC(†)-4008	S	P	19 5/16	19 5/16	3.332 - 6	6 - 18	48	178	213
4000	2	EC(†)-4016	L	C	21 9/16	22 1/4	3.332 - 6	6 - 18	48	347	375
4000	2	EC(†)-4024	L	C	21 9/16	22 1/4	3.332 - 6	6 - 18	48	354	362
6000	3	EC(†)-6005	S	P	23 1/4	24	3.332 - 6	6 - 18	48	260	320
6000	3	EC(†)-6010	L	C	26	26 5/8	3.332 - 6	6 - 18	48	396	424
6000	3	EC(†)-6016	L	C	26	26 5/8	3.332 - 6	6 - 18	48	403	431
8000	4	EC(†)-8008	L	C	25 15/16	26 3/4	4 - 6	8 - 18	***	520	560
8000	4	EC(†)-8012	L	C	25 15/16	26 3/4	4 - 6	8 - 18	***	527	567
10000	5	EC(†)-10005	L	C	29 3/4	30 5/8	4 - 6	8 - 18	***	561	599
10000	5	EC(†)-10008	L	C	29 3/4	30 5/8	4 - 6	8 - 18	***	568	606

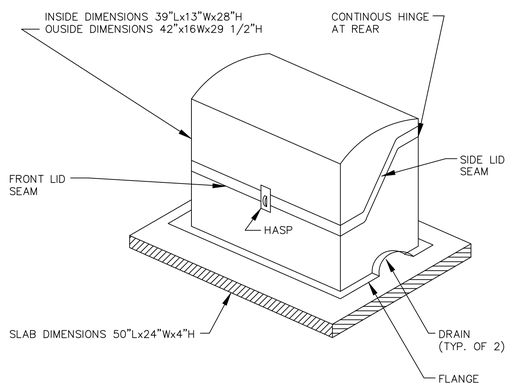
† Specify **ECT** for plain trolley, **ECGT** for geared trolley, and **ECMT** for motorized trolley models.
* S = Small frame hoist, single or three phase. L = Large frame hoist, three phase only.
‡ P = Parallel mount, standard on small frame hoists. C = Cross mount, standard on large frame hoists.
** Weight for 10 ft. lift ECT units. Add 10 lb. for ECGT unit weights.
*** 4 & 5 ton straight track only. Articulated model for 48" min. radius curved track available — consult factory.
NOTE: For complete dimensional data, refer to Coffing Dimensional Databook.

11

2 CRANE SPECIFICATION DETAIL
N.T.S.

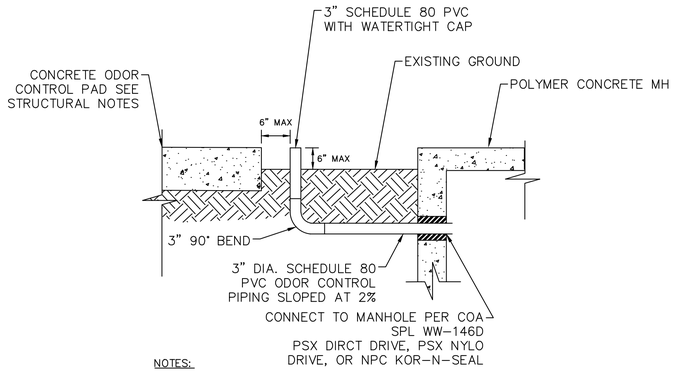


3 CRANE DETAIL
N.T.S.



("HOT BOX" ENCLOSURE; WWW.HOT-BOX, COM, OR APPROVED EQUAL)

4 PRZ BACKFLOW PREVENTOR DETAIL
N.T.S.



NOTES:
1. BURIED ODOR CONTROL PIPING SHALL HAVE A MINIMUM 2' OF COVER.

5 ODOR CONTROL PIPING DETAIL
N.T.S.

No.	REVISIONS	DATE	BY

Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/16/23
STATE OF TEXAS
TARA R. RAGOE
141851
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE OCTOBER 2023
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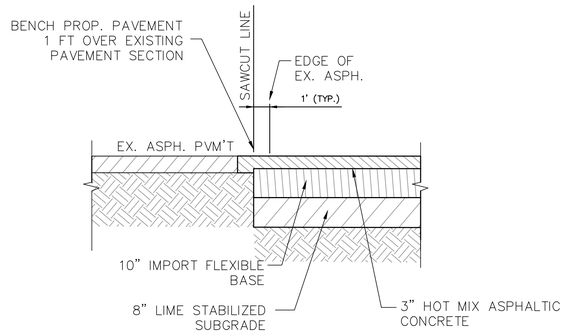
DRAWN BY: NAN
CHECKED BY: TRR

LIFT STATION DETAILS (SHEET 2 OF 4)

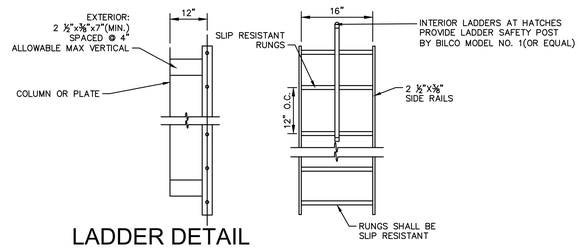
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
65



ASPHALT PAVEMENT CONNECTION DETAIL
1 N.T.S.

NOTES:
1. CONTRACTOR TO VERIFY ALL LENGTHS AND DIMENSIONS PRIOR TO FABRICATION TO INSURE 12" MIN. TOE CLEARANCE FROM CENTER OF RUNGS TO VAULT WALL.
2. THE FIRST RUNG OFF THE VAULT FLOOR SHALL BE INSTALLED 12" (FROM CENTER OF RUNG) ABOVE THE FINISHED FLOOR ELEVATION.
3. LADDERS WITHIN VAULTS SHALL HAVE BILCO MODEL NO. 1 (OR EQUAL) LADDER UP SAFETY POST AT HATCH OPENING.



LADDER DETAIL DETAIL
2 N.T.S.

Motor type **682YSG**

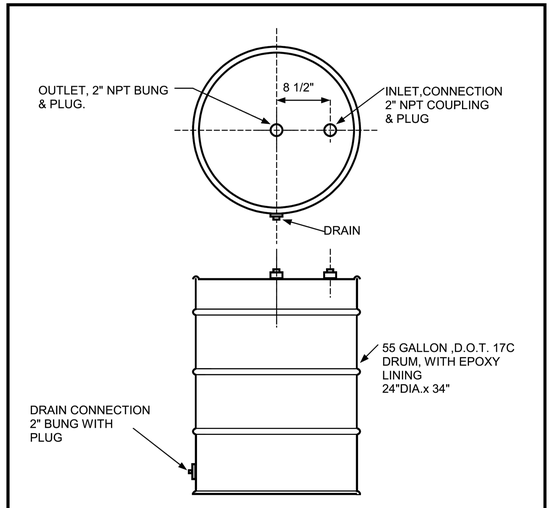
Motor manufacturer	KSB SE & Co. KGaA	Rated voltage	460	V
Design acc. standard	-	Rated frequency	60	Hz
Degree of protection	IP68	Rated HP (D.O.L) or VFD	9.12	hp
Insulation class		Rated current	11.7	A
Coolant temperature	< / = 104 °F (40 °C)	Nominal speed	3,452	rpm
Starting mode	Direct starting	Starting to rated current	9.7	
No. starts / h	30	Starting current	113.5	A
		Max. voltage	483	V
		Min. voltage	437	V
Discharge cover	Grey cast iron EN-GJL-250 (A 48 Class 35B)			
Explosion protection	Class I, Div. 1, Groups C&D T4			
Pump type	Amarex D-max 80-170/068F2YSG2			

PUMP MOTOR DATA DETAIL
3 N.T.S.

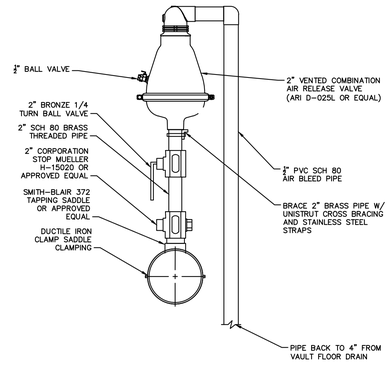
Operating data

Flow	200	US g.p.m.	Fluid	01	Water, clean water
Head	93.1	ft	Density of fluid	62.3	lb/ft³
Operating speed	3,473	rpm	Viscosity	1.08E-5	ft²/s
Shaft power	7.94	hp	Temperature	68	°F
Efficiency	59.2	%	Hydraulic acceptance acc.		
Required pump NPSH		ft			
Head H(Q=0)	121	ft			
Application range	Head		Flow		
From	121	ft	82.6	US g.p.m.	
To	13	ft	409	US g.p.m.	

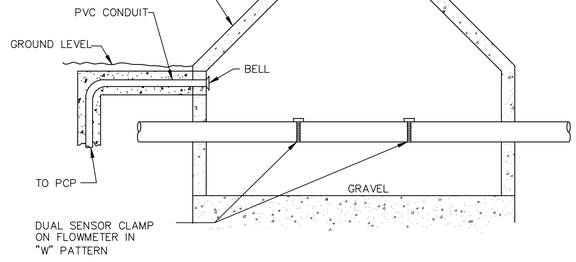
PUMP OPERATING DATA DETAIL
4 N.T.S.



ODOR CONTROL DETAIL
5 N.T.S.



AIR RELEASE VALVE DETAIL
6 N.T.S.



FLOW METER VAULT DETAIL
7 N.T.S.

No.	REVISIONS	DATE	BY

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PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
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11/16/23
STATE OF TEXAS
TARA R. RAODE
141851
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	RAK
DRAWN BY:	NAN
CHECKED BY:	TRR

LIFT STATION DETAILS (SHEET 3 OF 4)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

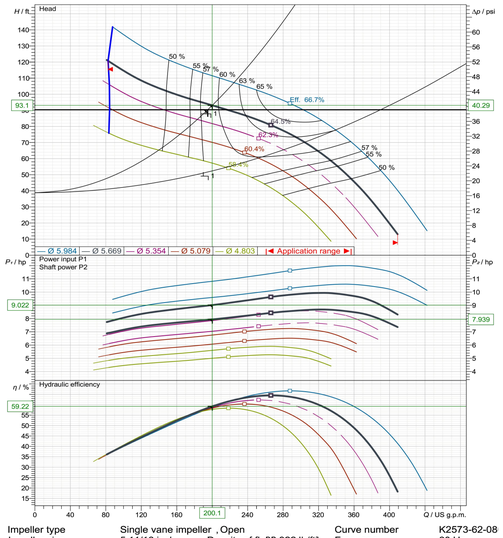
SHEET NUMBER
66

Project	**Edgewood Lift Station - 11.2.23**
Project ID	**PSI - CADEN KOZIK**
Created by	
Pos.no	**1**
Customer Pos. No.	

Created 2023-11-02
Update 2023-11-02

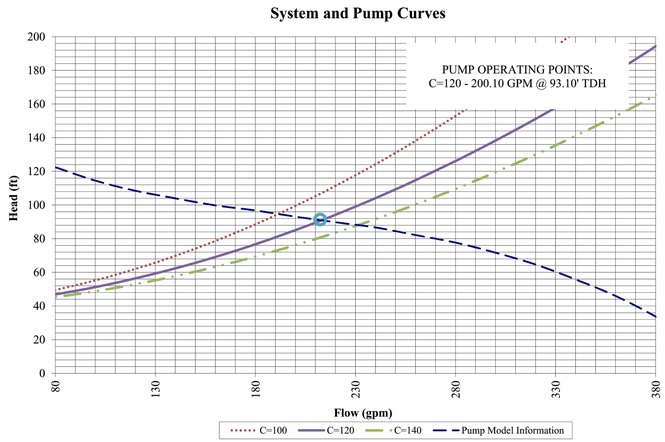
Performance curve

Pump type **Amarex D-max 80-170/068F2YSG2**



Impeller type	Single vane impeller , Open	Curve number	K2573-62-08
Impeller size	5 11/16 inch	Density of fluid	62.322 lb/ft³
		Viscosity	1.082E-5 ft²/s
		Frequency	60 Hz
		Speed	3,472.9 1/mir

PUMP PERFORMANCE CURVE DETAIL
1 N.T.S.



SYSTEM AND PUMP CURVE DETAIL
2 N.T.S.

No.	REVISIONS	DATE	BY

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
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LIFT STATION DETAILS
(SHEET 4 OF 4)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
67

ELECTRICAL SYMBOL LEGEND

NOT ALL SYMBOLS SHOWN MAY BE USED

PLAN LEGEND

SYMBOL	DESCRIPTION
J	JUNCTION BOX
	DISCONNECT SWITCH
	MOTOR STARTER OR LIGHTING CONTACTOR, SURFACE MOUNTED
	COMBINATION MOTOR STARTER, AND DISCONNECT SWITCH, SURFACE MOUNTED
1 M	MANHOLE, NUMBER OF MANHOLE SHOWN NEXT TO SYMBOL
1 C	COMMUNICATIONS MANHOLE, NUMBER OF MANHOLE SHOWN NEXT TO SYMBOL
MH 23A T	TELECOMMUNICATIONS MANHOLE, NUMBER OF MANHOLE SHOWN NEXT TO SYMBOL
W	KEYED NOTE, NUMBER IN POSITION "W" MATCHES NOTE NUMBER
$	SWITCH, TOGGLE, WALL MOUNTED, (SINGLE POLE THROW) MOUNT 48" AFF, UON
$3	SWITCH, TOGGLE, WALL MOUNTED, THREE WAY, (SINGLE POLE DOUBLE THROW) MOUNT 48" AFF, UON
$EP	EXPLOSION PROOF SWITCH, TOGGLE, WALL MOUNTED, (SINGLE POLE THROW) MOUNT 48" AFF, UON
$M	SWITCH, MOTOR RATED, WITH THERMAL OVERLOADS
	TERMINAL BOARD
	TELEPHONE OUTLET, PRIVATE, MOUNTED 12" AFF, UON
WH	WATTHOUR METER
	POLE
	TRANSFORMER, PAD MOUNTED, KVA RATING MAY BE DISPLAYED NEXT TO SYMBOL
T	TRANSFORMER, DRY TYPE, KVA RATING MAY BE DISPLAYED INSIDE OF SYMBOL
	ANTENNA
W-X, Y, Z	CONDUIT AND/OR WIRING HOMERUN TO PANEL. TERMINAL BOARD, OR CONTROLLER, USED WITH THE FOUR PRECEDING SYMBOLS. DESTINATION EQUIPMENT IDENTIFIER SHOWN IN POSITION "W" CIRCUIT NUMBER SHOWN IN POSITIONS "X", "Y", OR "Z". THESE CIRCUITS MAY ONLY SHOW ONE CIRCUIT NUMBER
	WIRING CONTINUATION
	FLEXIBLE CONDUIT
	HOMERUN
	CONDUIT CAPPED FOR FUTURE USE
	CONDUIT GOING DOWN
	CONDUIT GOING UP
	CONDUIT RUN UNDERGROUND OR CONCEALED
	CONDUIT RUN EXPOSED
	120V RECEPTACLE FLUSH MOUNTED
	250V RECEPTACLE FLUSH MOUNTED
	WELDING OUTLET
T	THERMOSTAT
	PANELBOARD SURFACE MOUNTED

GROUNDING LEGEND

SYMBOL	DESCRIPTION
A OR B	GROUNDING RECEPTACLE = A, GROUND TEST WELL = B
—B—	CONDUCTOR BARE UON
	GROUNDING CONNECTION
—G—	GROUND BUS BAR LENGTH AS SHOWN BY SYMBOL LENGTH UON
	COPPERCLAD GROUND ROD

SYMBOL	MODIFIERS
(E)	EXISTING
WP	WEATHERPROOF
EP	EXPLOSION PROOF
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
T	TELEPHONE
P	POWER
F	FIRE ALARM
VT	VAPORTIGHT
WT	WATERTIGHT
PT	PAINTTIGHT
P	PRIMARY
O	OVERHEAD
U	UNDERGROUND
S	SECONDARY
FT	FIXED TEMPERATURE
R	RECESSED
G	GROUNDED
UNG	UNGROUNDED

ONE LINE AND CONTROL SCHEMATIC LEGEND

SYMBOL	DESCRIPTION
	GROUNDING CONNECTION, WHEN USED WITH TRANSFORMER SYMBOL IT DENOTES A NEUTRAL GROUNDING CONNECTION
	GROUNDED WYE WINDING CONNECTION
	DELTA WINDING CONNECTION
	RELAY OR CONTACTOR CONTACTS
	SEPARABLE CONNECTOR OR CONNECTION FOR DRAWOUT ASSEMBLIES
	CONDUCTOR CONNECTION
	CIRCUIT BREAKER, MOLDED CASE, TRIP CURRENT AND QUANTITY OF POLES (P) SHOWN NEXT TO SYMBOL
	SWITCH, DISCONNECT, NON-FUSED, LOAD BREAK, CONTINUOUS CURRENT RATING AND QUANTITY OF POLES SHOWN NEXT TO SYMBOL
	SWITCH, DISCONNECT, FUSED, LOAD BREAK, FUSED AMPERE RATING AND FUSE TYPE SHOWN NEXT TO SYMBOL
	FUSE, AMPERE RATING AND FUSE TYPE SHOWN NEXT TO SYMBOL
	MOTOR THERMAL OVERLOAD PROTECTOR
M	MOTOR STARTER MAIN CONTACTOR
CR	CONTACTOR OR RELAY COIL, LETTER(S) INSIDE OF SYMBOL MATCH CONTACTS CONTROLLED
PT	PRESSURE TRANSMITTER
	EQUIPMENT ENCLOSURE
VS	VOLTMETER SWITCH
AS	AMMETER SWITCH
A	AMMETER
V	VOLTMETER
	CURRENT TRANSFORMER WITH RATIO SHOWN
10	MOTOR, 10 HORSEPOWER SHOWN
	LIMIT SWITCH NORMALLY CLOSED
	LIMIT SWITCH NORMALLY OPEN
	MOTOR OPERATED VALVE GEARED LIMIT SWITCH
	PRESSURE SWITCH NORMALLY CLOSED OPENS ON INCREASING PRESSURE
	PRESSURE SWITCH NORMALLY OPEN CLOSES ON INCREASING PRESSURE
	LEVEL SWITCH NORMALLY CLOSED OPENS ON INCREASING LEVEL
	LEVEL SWITCH NORMALLY OPEN CLOSES ON INCREASING LEVEL
	FLOW SWITCH NORMALLY CLOSED OPENS WITH FLOW
	FLOW SWITCH NORMALLY OPEN CLOSES ON LOSS OF FLOW
	SPACE HEATER
PF	PHASE FAILURE RELAY
	DRAW-OUT CIRCUIT BREAKER
50 51	INSTANTANEOUS/TIME OVERCURRENT RELAY
51N	NEUTRAL TIME OVERCURRENT RELAY
	CABLE TERMINATOR
27 47	UNDERVOLTAGE/PHASE-SEQUENCE RELAY
86	LOCKOUT RELAY
DO	DESOLVED OXYGEN SENSOR
FS	FLOW SWITCH
AI	ANALYTIC INDICATOR
LT	LEVEL TRANSDUCER
FM	FLOW METER

ONE LINE AND CONTROL SCHEMATIC LEGEND (CONT'D)

SYMBOL	DESCRIPTION
	INSTRUMENT TRANSFORMER PT-POTENTIAL TRANSFORMER
480V 120V	CONTROL POWER TRANSFORMER. VOLTAGE AS SHOWN
	LIGHTNING ARRESTOR
	SWITCH
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
	MOMENTARY PUSHBUTTON
HAND OFF AUTO	THREE POSITION MAINTAINED CONTACT SWITCH
MOV	MOTOR OPERATED VALVE
	SOLENOID VALVE
ETM	ELAPSED TIME METER
TD 0-10 MIN. TOE	TIME DELAY RELAY. TIMES OUT AFTER ENERGIZATION
TD 0-10 MIN. TOD	TIME DELAY RELAY. TIMES OUT AFTER DENERGIZATION
R	PILOT LIGHT R=RED B=BLUE G=GREEN A=AMBER Y=YELLOW
LSHH	HIGH LEVEL FLOAT SWITCH
LSLL	LOW LEVEL CUTOFF FLOAT SWITCH
MCP SIZE 1 FVNR	MOTOR STARTER FVNR=FULL VOLTAGE NON-REVERSING VFD=VARIABLE FREQUENCY DRIVE WITH BYPASS SOFT START=ELECTRONIC SOFT START RVNR=REDUCED VOLTAGE NON-REVERSING FVR=FULL VOLTAGE REVERSING MCP=MOTOR CIRCUIT PROTECTOR SIZE=NEMA STARTER SIZE
STE	LEVEL SENSOR TERMINATION ENCLOSURE
TS	TEMPERATURE SWITCH
MP	MOISTURE PROBE
SOV	SOLENOID VALVE
LS	LIMIT SWITCH
AS	AMMETER SWITCH
VS	VOLTMETER SWITCH
PS	PRESSURE SWITCH
LC	LIGHTING CONTACTOR

2 working days Call before you Dig. CALL 811

CONDUIT AND WIRING LEGEND

	NEW
— — — — — — — —	EXISTING TO BE REMOVED
	EXISTING TO REMAIN
— — — — UE — — — — UE — —	UNDERGROUND ELECTRICAL
— — — — UF — — — — UF — —	UNDERGROUND FIBER OPTIC
— — — — UT — — — — UT — —	UNDERGROUND TELEPHONE
— — — — UG — — — — UG — —	UNDERGROUND GROUNDING
— — OE — — OE — — OE — —	OVERHEAD ELECTRICAL

ELECTRICAL DRAWING INDEX

ABBREVIATIONS

A	AMPERES OR TRIP AMPERES
AC	ALTERNATING CURRENT
ACT	ABOVE COUNTER TOP
A/C	AIR CONDITIONING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	SYMMETRICAL AMPS INTERRUPTING CAPACITY
AWG	AMERICAN WIRE GAGE
BD	BOARD
BLDG	BUILDING
C	CONDUIT
CAB	CABINET
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CL	CURRENT LIMITING
CONN	CONNECT OR CONNECTION
CONT'D	CONTINUED
CONTR	CONTRACTOR
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DBL	DOUBLE
DIM	DIMENSION
DISC SW	DISCONNECT SWITCH
DC	DIRECT CURRENT
EA	EACH
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
ELEC	ELECTRICAL
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EQUIP	EQUIPMENT
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE CONDUIT
FIX	FIXTURE
GC	GENERAL CONTRACTOR
GALV	GALVANIZED
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
HT	HEIGHT
HTR	HEATER
HZ	HERTZ
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILLS
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWH	KILOWATT HOURS
LA	LIGHTNING ARRESTOR
L-L	LINE TO LINE
L-N	LINE TO NEUTRAL
LTG	LIGHT OR LIGHTING
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER

ABBREVIATIONS (CONT'D)

MCP	MOTOR CIRCUIT PROTECTOR
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MSB	MAIN SWITCH BOARD
MTD	MOUNTED
MTG	MOUNTING
N.C.	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEUT	NEUTRAL
NIC	NOT IN THIS CONTRACT
N.O.	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OH	OVERHEAD
OL	OVERLOAD
ø	PHASE
P	POLE
PC	PHOTOELECTRIC
PEN	PENDANT
PNL	PANELBOARD
PRV	PRESSURE REDUCING VALVE
PVC	POLYVINYL CHLORIDE
R	RELOCATED
RECP	RECEPTACLE
REQ'D	REQUIRED
REQ'MTS	REQUIREMENTS
RM	ROOM
SCH	SCHEDULE
SE	SERVICE ENTRANCE
SM	SURFACE MOUNT
SN	SOLID NEUTRAL
SOV	SOLENOID OPERATED VALVE
SPACE	SPACES(S) ONLY (NO BREAKER OR DEVICE)
SPARE	SPARE BREAKER OR DEVICE
SPD	SURGE PROTECTIVE DEVICE
SPECS	CONTRACT SPECIFICATIONS
SS	STAINLESS STEEL HARDWARE
SWBD	SWITCHBOARD
SW	SWITCH
SWGR	SWITCH GEAR
TB	TELEPHONE BACKBOARD
TTB	TELEPHONE TERMINAL BOARD
TYP	TYPICAL
UE	UNDERGROUND ELECTRIC
UL	UNDERWRITERS LABORATORIES
UON	UNLESS OTHERWISE NOTED
UT	UNDERGROUND TELEPHONE
VA	VOLT AMPERES
W	WATTS
W/	WITH
WH	WATER HEATER
WP	WEATHER PROOF
XFMR	TRANSFORMER
XMTR	TRANSMITTER
1/C	SINGLE CONDUCTOR CABLE
3/C	THREE CONDUCTOR CABLE

GENERAL NOTES: (APPLICABLE TO ALL ELECTRICAL SHEETS)

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ALL CITY, COUNTY, AND STATE REGULATIONS, NFPA, ANSI, UL, IEEE, AND THE LOCAL CODE AUTHORITY HAVING JURISDICTION. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND INSPECTIONS.
2. ALL ELECTRICIANS SHALL BE LICENSED BY THE APPROPRIATE CITY, STATE, OR LOCAL CODE AUTHORITY HAVING JURISDICTION.
3. THE ELECTRICAL CONTRACTOR SHALL FOLLOW ALL OSHA AND OWNER SAFETY RULES AS REQUIRED TO WORK ON THIS SITE.
4. ALL INSTALLATIONS SHALL BE DONE IN A NEAT AND WORKMAN LIKE MANNER.
5. ALL POWER OUTAGES SHALL BE PERFORMED DURING NON-BUSINESS HOURS. COORDINATE ALL POWER OUTAGES WITH THE OWNER. NOTIFY THE OWNER IN WRITING 10 DAYS PRIOR TO SCHEDULING ANY POWER OUTAGES.
6. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL TEMPORARY ELECTRICAL POWER AND LIGHTING REQUIRED FOR THIS PROJECT.
7. THE DEMOLITION DRAWINGS (IF APPLICABLE) ARE DIAGRAMMATIC IN NATURE. THE ELECTRICAL CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH THE PROJECT SCOPE OF WORK PRIOR TO SUBMITTING THEIR BID.
8. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE ELECTRICAL REQUIREMENTS OF ALL OWNER PROVIDED EQUIPMENT AND SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
9. ALL WORK SHOWN ON DRAWINGS IS NEW UNLESS OTHERWISE NOTED.
10. ALL GROUNDING SHALL BE PER NEC AND LOCAL CODES.
11. ALL ELECTRICAL CONSTRUCTION ON THE PROJECT SHALL CONFORM TO THE NEC AND ALL OTHER AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED AND PAY ALL FEES.
12. ALL WIRING SHALL BE FREE OF SHORTS AND GROUNDS. NO CIRCUIT WIRING SHALL BE LOADED BEYOND THE PERMITTED AMPACITIES ALLOWED BY THE NEC. ALL WIRE SIZES ARE FOR COPPER.
13. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND DIMENSIONS PRIOR TO SUBMITTING BID.
14. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND MATERIALS NECESSARY TO MAKE A COMPLETE AND WORKABLE JOB INCLUDING FINAL HOOK-UP OF ALL EQUIPMENT.
15. FIRE STOP SHALL BE PROVIDED AT ALL LOCATIONS WHERE ELECTRICAL EQUIPMENT OR SYSTEMS PENETRATE FIRE RATED WALLS. SEE ARCHITECTURAL PLANS FOR RATED WALL LOCATIONS. CONTROL WIRING TO MECHANICAL EQUIPMENT IS NOT SHOWN ON THESE SHEETS.
16. RISER AND ONE-LINE DIAGRAMS ARE MEANT TO SHOW ONLY VERTICAL AND ELECTRICAL RELATIONSHIPS AND THEREFORE MAY NOT INCLUDE ALL REQUIRED EQUIPMENT, DEVICES AND ACCESSORIES.
17. EQUIPMENT INTERRUPTING CAPACITIES SPECIFIED IN THE CONTRACT DOCUMENTS ARE BASED UPON EQUIPMENT CHARACTERISTICS AND IMPEDANCES SHOWN ON THE DRAWINGS. IF ACTUAL INSTALLED EQUIPMENT DEVIATES FROM THESE CHARACTERISTICS OR HAS LOWER IMPEDANCES THE CONTRACTOR SHALL INCREASE THE INTERRUPTING CAPACITIES OF ALL ITEMS ON THE LOAD SIDE OF THE DEVIANT EQUIPMENT IN DIRECT PROPORTION TO THE CHANGED CHARACTERISTICS. INTERRUPTING CAPACITIES SHALL NOT BE REDUCED TO VALUES LESS THAN THOSE REQUIRED BY THE CONTRACT DOCUMENTS.
18. EQUIPMENT SIZES ARE AS DESIGNED. CIRCUIT BREAKERS, CONDUIT, MOTOR STARTERS, DISCONNECT SWITCHES, PLUG-IN'S, ETC., SHALL BE ADJUSTED TO THE EQUIPMENT SUBMITTED AND APPROVED FOR INSTALLATION ON THIS PROJECT.
19. REFER TO ARCHITECTURAL OR CIVIL DRAWINGS FOR SITE INFORMATION.
20. LIGHT FIXTURE MOUNTING HEIGHTS ARE MEASURED BETWEEN THE FLOOR AND THE BOTTOM OF THE FIXTURE.

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623

STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	CC
DRAWN BY:	AH
CHECKED BY:	SK

ELECTRICAL
NOTES, SYMBOLS & ABBREVIATIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
68

E1.0

ELECTRICAL SPECIFICATIONS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. ELECTRICAL SYSTEMS

1.02 RELATED WORK

A. THE WORK COVERED BY THIS SPECIFICATION CONSISTS OF FURNISHING ALL LABOR, SUPPLIES AND MATERIALS, SHOP DRAWINGS AND A LIST OF MAKE AND CATALOG NUMBERS OF ALL EQUIPMENT AND MATERIALS TO BE INSTALLED AND PERFORMING ALL OPERATIONS, INCLUDING INSTALLATION OF LIGHTING FIXTURES, ELECTRICAL EQUIPMENT, CUTTING AND PATCHING, COORDINATION WITH OTHER TRADES ON THE JOB, ETC., NECESSARY FOR THE INSTALLATION OF COMPLETE ELECTRICAL SYSTEMS AS SHOWN ON THE DRAWINGS AND HEREINAFTER SPECIFIED. THESE SPECIFICATIONS SUPPLEMENT THE GENERAL CONDITIONS AND SPECIFICATIONS.

B. EXAMINATION OF SITE: THE CONTRACTOR SHALL THOROUGHLY EXAMINE SITE AND SATISFY HIMSELF AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED. THE CONTRACTOR SHALL VERIFY AT THE SITE ALL MEASUREMENTS AFFECTING HIS WORK AND SHALL BE RESPONSIBLE FOR THE CORRECTNESS OF THE SAME. NO EXTRA COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR EXPENSES DUE TO HIS NEGLECT TO EXAMINE OR FAILURE TO DISCOVER CONDITIONS WHICH AFFECT HIS WORK. NO EXTRA COMPENSATION WILL BE ALLOWED ON ACCOUNT OF DIFFERENCES BETWEEN ACTUAL DIMENSIONS AND THOSE INDICATED ON THE DRAWINGS.

C. THE AGREEMENT FORMS, GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS OF THE SPECIFICATIONS SHALL APPLY TO THE WORK SPECIFIED IN DIVISION 26.

1.03 DEFINITION

A. "WIRING": WIRE OR CABLE, INSTALLED IN RACEWAY WITH ALL REQUIRED BOXES, FITTINGS, CONNECTORS AND ACCESSORIES, COMPLETELY INSTALLED.

B. "FEEDER": WIRING TO ANY DEVICE OR EQUIPMENT IN WHICH NUMBER SIX AWG COPPER (#6 CU) OR LARGER CONDUCTORS ARE USED.

C. "POWER WIRING": WIRING TO ANY DEVICE OR EQUIPMENT SERVED BY A MULTI-POLE BREAKER.

1.04 QUALITY ASSURANCE

A. CODES: COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) AND ANY OTHER AUTHORITIES HAVING JURISDICTION OVER THE WORK.

B. PERMITS AND INSPECTIONS: PROVIDE ALL PERMITS REQUIRED AND OBTAIN FINAL INSPECTION AND APPROVAL FROM THE INSPECTION DEPARTMENT HAVING JURISDICTION.

C. WHERE DIFFERENT SECTIONS OF ANY APPLICABLE CODES SPECIFY DIFFERENT MATERIALS, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE SHALL GOVERN.

D. STANDARDS FOR MATERIAL AND WORKMANSHIP: USE MATERIALS THAT ARE NEW AND LISTED AND LABELED BY UNDERWRITERS LABORATORIES (UL) AS CONFORMING TO ITS STANDARDS, WHERE SUCH A STANDARD HAS BEEN ESTABLISHED FOR THE PARTICULAR TYPE OF MATERIAL IN QUESTION. EXECUTE WORK IN A WORKMAN LIKE MANNER, TO PRESENT A NEAT AND MECHANICAL APPEARANCE WHEN COMPLETED.

1.05 SUBSTITUTION OF MATERIALS

A. NO SUBSTITUTION OF MATERIAL IS ALLOWED WITHOUT WRITTEN PRIOR AUTHORIZATION FROM THE ENGINEER AND OWNER. DETERMINATION OF WHAT IS CONSIDERED EQUAL IS AT THE SOLE DISCRETION OF THE ENGINEER AND OWNER.

B. INCLUDE SUFFICIENT DESCRIPTIVE INFORMATION, INCLUDING MANUFACTURER'S PUBLISHED DATA TO ESTABLISH CONTRACT COMPLIANCE. SUBMIT SAMPLES IF REQUESTED BY ARCHITECT/ENGINEER.

1.06 DRAWINGS AND SPECIFICATIONS

A. THE WIRING LAYOUTS ARE SCHEMATIC AND DO NOT NECESSARILY SHOW THE EXACT LOCATION OF RACEWAYS, OUTLETS, ETC. REFER TO THE ARCHITECTURAL DRAWINGS FOR ACTUAL DIMENSIONS. FIT WORK TO CONFORM TO THE DETAILS OF BUILDING CONSTRUCTION. COORDINATE ALL WORK TO ASSURE PROPER CLEARANCE.

1.07 AS-BUILT DRAWINGS

A. AS WORK PROGRESSES, RECORD ON ONE (1) SET OF ELECTRICAL PRINTS ALL CHANGES AND DEVIATIONS FROM THE CONTRACT DOCUMENTS IN SIZE, LOCATIONS AND TYPES OF ALL MATERIALS AND EQUIPMENT. RECORD FINAL LOCATION OF OUTLETS, SWITCHES, STARTERS, UNDERGROUND AND EXPOSED CONDUITS, ETC. TO INDICATE THE FINAL INSTALLATION. MAKE SUFFICIENT MEASUREMENTS TO LOCATE ALL EQUIPMENT AND CONDUITS. PROVIDE AS-BUILT DRAWINGS.

B. THE CONTRACTOR SHALL PREPARE A TYPED PANEL DIRECTORY FOR EACH PANEL UTILIZED FOR THIS PROJECT. THIS DIRECTORY SHALL IDENTIFY THE CIRCUIT NUMBER, DEVICES SERVED, AND LOCATION OF DEVICES BY ROOM NUMBER. HE SHALL FILE THEM WITH THE BUILDING MANAGER WHEN THE WORK IS COMPLETE.

1.08 MAINTENANCE DATA

A. FURNISH AND DELIVER TO THE ARCHITECT/ENGINEER TWO (2) COMPLETE COPIES OF ALL DATA PREPARED BY MANUFACTURERS, DETAILING OPERATION AND MAINTENANCE INSTRUCTION FOR ALL EQUIPMENT.

1.09 PENETRATIONS, CUTTING, AND PATCHING

A. PERFORM CUTTING AND PATCHING IN ACCORDANCE WITH THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THE CONTRACT.

B. PROVIDE ALL SLEEVES REQUIRED FOR PROPER INSTALLATION OF WORK INCLUDED IN THIS SECTION.

C. MAKE ALL PENETRATIONS THROUGH WALLS AT 90 DEGREE ANGLES. SEAL ALL PENETRATIONS AT FIRE AND SMOKE PARTITIONS WITH FIRE SAFING MATERIAL. SEAL ALL PENETRATIONS AT SOUND WALLS WITH SOUNDPROOFING MATERIAL.

1.10 SUBMITTALS

A. SHOP DRAWINGS AND MATERIAL BROCHURES: FURNISH AN ELECTRONIC SET OF SHOP DRAWINGS AND PRODUCT DATA IN PDF FORMAT TO THE ARCHITECT/ENGINEER ON THE FOLLOWING MATERIALS:

1. LIGHTING FIXTURES
2. DISCONNECT SWITCHES
3. TRANSFORMERS
4. RACEWAYS
5. CONDUCTORS
6. MOTOR CONTROLLERS
7. SWITCHGEAR, PANELBOARDS
8. CONTROL PANELS
9. INSTRUMENTATION
10. GENERATOR & ATS
11. SCADA

1.11 COOPERATION

A. THE CONTRACTOR SHALL SCHEDULE HIS WORK, AND IN EVERY WAY POSSIBLE, COOPERATE WITH ALL OTHER TRADES IN THE JOB TO AVOID DELAYS, INTERFERENCES AND UNNECESSARY WORK. HE SHALL COOPERATE WITH THEM IN PROVIDING FOR THE INSTALLATION OF THIS WORK AND COORDINATE WITH WORK OF OTHER TRADES TO ASSURE PROPER CLEARANCE OF PIPING, DUCTWORK, CONDUIT, ETC. WHEN SUCH IS REQUIRED.

1.12 WIRING WORKMANSHIP

A. RUN WIRING IN ALL BRANCH CIRCUIT PANELBOARDS AND TERMINAL CABINETS PARALLEL OR AT RIGHT ANGLES TO THE SIDES OR TOP OF THE EQUIPMENT HOUSING.

B. GROUP AND HARNESS CONDUCTORS TOGETHER USING LOCKING TYPE CABLE TIES. CABLE TIES: AS MANUFACTURED BY THE PANDUIT CORPORATION OR THOMAS AND BETTS.

1.13 STORAGE MATERIALS

A. KEEP THE BUILDING AND PREMISES CLEAN AND CLEAR OF SCRAP MATERIALS AT ALL TIMES. STORE MATERIALS AND EQUIPMENT IN DESIGNATED STORAGE AREAS.

1.14 ORDERING OF MATERIALS

A. ORDER MATERIALS AND EQUIPMENT SO AS NOT TO JEOPARDIZE PROGRESS OF CONSTRUCTION OR COMPLETION DATE.

1.15 SAFETY PRECAUTIONS AND PROGRAMS

A. IT SHALL BE THE DUTY AND RESPONSIBILITY OF THE CONTRACTOR AND ALL OF ITS SUBCONTRACTORS TO BE FAMILIAR AND COMPLY WITH ALL REQUIREMENTS OF PUBLIC LAW 91-96, 29 U.S.C. SECS. 651 ET. SEQ., THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 (OSHA), AND ALL AMENDMENTS THERETO AND TO ENFORCE AND COMPLY WITH ALL OF THE PROVISIONS OF THIS ACT. IN ADDITION, ON PROJECTS IN WHICH TRENCH EXCAVATION WILL EXCEED A DEPTH OF FIVE FEET (5'), THE CONTRACTOR AND ALL OF ITS SUBCONTRACTORS SHALL COMPLY WITH ALL REQUIREMENTS OF 29 C.F.R., SECS. 1926.652 AND 1926.653, OSHA SAFETY AND HEALTH STANDARDS.

1.16 WARRANTY

A. GUARANTEE ALL WORK UNDER THIS SECTION FOR WORKMANSHIP, LABOR AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER OR HIS AUTHORIZED REPRESENTATIVE.

PART 2 – PRODUCTS AND EXECUTION

2.01 CONDUIT

A. EXCEPT AS OTHERWISE NOTED, SPECIFIED OR REQUIRED, INSTALL ALL WIRES USED IN THIS PROJECT IN CONDUIT AS HEREINAFTER SPECIFIED:

BELOW GRADE: SCHEDULE 40 PVC
ABOVE GRADE (OUTSIDE): ALUMINUM RIGID
ABOVE GRADE (INSIDE): ALUMINUM RIGID
ELBOWS: PVC COATED RIGID STEEL

B. INSTALL CONDUITS CONTINUOUS FROM OUTLET TO OUTLET, FROM OUTLET TO CABINET, JUNCTION BOX AND PULL BOX. SECURE CONDUITS TO ALL BOXES, ETC., IN SUCH A MANNER THAT EACH SYSTEM WILL BE ELECTRICALLY CONTINUOUS FROM SERVICE TO ALL OUTLETS. TERMINATE ALL CONDUIT RUNS FROM CABINETS AND JUNCTION BOXES IN APPROVED OUTLET BOXES. INSTALL CONDUITS AS HIGH AS POSSIBLE UP AGAINST STRUCTURE ABOVE. AVOID ROUTING CONFLICTS WITH HVAC EQUIPMENT/DUCTWORK, SANITARY WASTE, VENT PIPING, AND DOMESTIC WATER PIPING.

C. INSTALL A NYLON PULL WIRE (200 LB. TEST) AND TIE ENDS IN ALL CONDUIT LINES LEFT EMPTY FOR FUTURE USE.

D. TRAPPED OR INACCESSIBLE JUNCTION BOXES, OUTLETS, ETC. ARE NOT ALLOWED.

E. GENERALLY, CONCEAL ALL CONDUITS UNLESS OTHERWISE DIRECTED OR INDICATED ON THE DRAWINGS.

F. NO BENDS PERMITTED WITH A RADIUS LESS THAN SIX (6) TIMES THE DIAMETER OF THE CONDUIT OR MORE THAN 900.

G. PROVIDE JUNCTION BOXES OR PULL BOXES TO AVOID EXCESSIVE RUNS OR TOO MANY BENDS BETWEEN OUTLETS.

H. INCREASE CONDUIT SIZES SHOWN ON THE PLANS AS REQUIRED FACILITATING PULLING OF CONDUCTORS.

I. RUN ALL CONDUITS PARALLEL TO OR AT RIGHT ANGLES TO THE BUILDING WALLS AND SUPPORT FROM WALLS OR CEILINGS AT INTERVALS REQUIRED BY CODE WITH APPROVED CLAMPS OR HANGERS.

J. INSTALL APPROVED APPLETON, CROUSE HINDS, OR O.Z. MANUFACTURING CO. EXPANSION FITTINGS IN ALL EMT RUNS WHICH PASS THROUGH EXPANSION JOINTS IN THE BUILDING. OTHER METHODS TO PROVIDE FOR THIS EXPANSION MUST BE APPROVED BY THE ARCHITECT/ENGINEER.

2.02 WIRING

A. INSTALL WIRING AS FOLLOWS:

1. FEEDERS AND POWER WIRING: CONDUCTORS IN RIGID ALUMINUM RIGID CONDUIT WHEN INSTALLED IN DRY LOCATION ABOVE GRADE. SCHEDULE 40 PVC WHEN INSTALLED BELOW GRADE. USE PVC COATED RIGID ELBOWS.
2. BRANCH CIRCUITS: INSTALL CONDUCTORS IN ALUMINUM RIGID CONDUIT.
3. INSTALL ALL WIRING IN CONDUIT. USE ONLY UL LISTED LUBRICANTS IN PULLING THE CONDUCTORS.
4. INSTALL CONDUCTORS CONTINUOUS FROM OUTLET TO OUTLET AND FROM OUTLET TO JUNCTION BOX OR PULL BOX. INSTALL SPLICES AND JOINTS CAREFULLY AND SECURELY TO BE MECHANICALLY AND ELECTRICALLY SOLID WITH PRESSURE TYPE CONNECTORS. USE 3M "SCOTCHLOCK" OR IDEAL "WING NUT" OR EQUAL TWIST-ON CONNECTORS FOR #10 AND SMALLER CONDUCTORS.
5. CONNECT CONDUCTORS FOR LIGHTING AND RECEPTACLE CIRCUITS TO THE PANEL AS DETAILED WITH COLOR CODED JACKET. COLOR CODE ALL WIRES WITH THE TYPE, SIZE, MAKE AND VOLTAGE MARKED ON IT. COLOR CODE WIRING WITH THE SAME COLOR BEING USED WITH ITS RESPECTIVE PHASE AS FOLLOWS, UNLESS OTHERWISE REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION.

	120/240 VOLT DELTA	120/208 VOLT WYE	480/277 VOLT WYE
PHASE A	RED	RED	BROWN
PHASE B	ORANGE	BLACK	YELLOW
PHASE C	BLACK	BLUE	PURPLE
NEUTRAL	WHITE	WHITE	GRAY
GROUND	GREEN	GREEN	GREEN

6. BRANCH CIRCUIT CONDUCTORS SHALL NOT BE SMALLER THAN NO. 12 AWG. INCREASE THE WIRE SIZES UP ONE (1) SIZE WHEREVER THE RUN DISTANCE EXCEEDS 200 FEET.
7. ALL WIRING AND CABLE INCLUDING FIBER OPTIC, ELECTRICAL, DATA, TELECOMMUNICATIONS, TEMPERATURE CONTROLS, SECURITY, FIRE PROTECTION, ETC. SHALL BE RUN IN CONDUIT.
8. ELECTRICAL CONTRACTOR MAY GROUP WIRES WITH SAME VOLTAGE FOR FIELD DEVICES IN CONDUIT AS HE DEEMS BEST APPROPRIATE.
9. ANALOG AND LOW VOLTAGE SIGNALS SHALL NOT RUN IN SAME CONDUIT AS 120VAC AND 480VAC CIRCUITS.

2.03 CONDUCTORS

A. COPPER OF 98% CONDUCTIVITY.

B. NO. 10 AND SMALLER: SOLID TYPE SIMPULL XHHW-2, EXCEPT AS OTHERWISE NOTED.

C. NO. 8 AND LARGER: STRANDED, TYPE SIMPULL XHHW-2, EXCEPT AS OTHERWISE NOTED.

D. MINIMUM SIZE CONDUCTORS USED SHALL BE NO. 12 AWG FOR ALL APPLICATIONS EXCEPT WHERE SPECIFICALLY NOTED OTHERWISE (A.C. CONTROLS, ETC.).

E. USE WIRE AND CABLE FROM ONE (1) MANUFACTURER. DELIVER IN THE ORIGINAL WRAPPING BEARING THE UNDERWRITERS LABORATORIES (UL) LABEL.

2.04 OUTLETS

A. USE GALVANIZED STEEL OR CAST TYPE BOXES AT ALL OUTLETS FOR LIGHTING FIXTURES, WALL SWITCHES, WALL RECEPTACLES, ETC.

B. SECURELY ATTACH OUTLET BOXES FOR FIXTURES AND DEVICES TO THE BUILDING CONSTRUCTION WITH EXPANSION BOLTS.

C. FLUSH MOUNT ALL OUTLET BOXES, REGARDLESS OF WALL OR CEILING CONSTRUCTION, UNLESS THEY ARE SPECIFICALLY SHOWN AS BEING USED WITH EXPOSED CONDUIT. IF SURFACE MOUNTED, USE CAST TYPE AS SPECIFIED ABOVE. UTILITY BOXES ARE NOT ALLOWED.

2.05 INSTALLATION

A. INSTALL RACEWAYS EXPOSED. SUPPORT EXPOSED RACEWAYS AT INTERVALS NOT EXCEEDING TEN FEET (10') WITH MACHINE SCREWS FOR METAL CONSTRUCTION AND EXPANSION BOLTS FOR CONCRETE CONSTRUCTION.

B. INSTALL THE EDGES OF ALL OUTLET BOXES FLUSH WITH THE SURFACE IN WHICH THEY ARE RECESSED. SCREW ATTACH INTERNAL DEVICES BEFORE ATTACHING COVERPLATE. DO NOT USE COVERPLATES AS A MEANS OF TIGHTENING THE DEVICES IN PLACE.

2.06 DISCONNECT AND FEEDER SWITCHES

A. FEEDER SWITCHES AND DISCONNECT SWITCHES: HEAVY DUTY, EXCEPT AS OTHERWISE NOTED. IN DAMP LOCATIONS OR EXPOSED TO THE WEATHER, USE NEMA 3R, RAINTIGHT.

B. DISCONNECT SWITCHES: FACTORY INSTALLED PROVISION FOR PADLOCKING IN EITHER THE "ON" OR "OFF" POSITION.

2.07 FUSES

A. FUSES: BUSSMANN OR APPROVED EQUAL.

2.08 LABELING

A. LABEL ALL PANELS, CONTROL POINTS, SWITCHES, AND MOTORS, AS DIRECTED. IDENTIFY PANELS BY PANEL NUMBER. LABEL SWITCHES, INDICATING THE EQUIPMENT WHICH THEY CONTROL. ALL LABELS SHALL BE ENGRAVED. PANEL DIRECTORIES TO BE TYPED. COORDINATE ALL EQUIPMENT NUMBERING WITH MECHANICAL CONTRACTOR.

B. INSTALL ARC FLASH HAZARD LABELS ON ALL NEW SWITCHBOARDS, PANELBOARDS, INDUSTRIAL CONTROL PANELS, METER SOCKET ENCLOSURES AND MOTOR CONTROL CENTERS PER NEC 110.16. PANDUIT #PPSO305W2100 OR EQUAL.

2.09 GROUNDING

A. PROVIDE GROUNDING FOR ELECTRICAL SYSTEM IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC)

2.10 COVERPLATES

A. WHERE WIRING DEVICES ARE FLUSH MOUNTED, INSTALL STAINLESS STEEL COVERPLATES.

B. WHERE WIRING DEVICES ARE SURFACE MOUNTED, INSTALL FORMED STEEL COVERPLATES WITH CADMIUM PLATING.

C. WHERE WEATHERPROOF COVERPLATES ARE REQUIRED, MEET UL "WET LOCATION COVER CLOSED" REQUIREMENTS. USE COVERPLATES THAT ARE HINGED AND GASKETED WITH SPRING LOADED CLOSER.

D. INSTALL FINISHED COVERPLATES ON ALL JUNCTION BOXES, OUTLET BOXES, SECTIONAL SWITCH BOXES, UTILITY BOXES, ETC.

E. WHERE MORE THAN ONE (1) DEVICE IS INDICATED AT A LOCATION, MOUNT DEVICES IN COMBINED SECTION GANG BOXES, COVERED BY A COMMON PLATE.

2.11 RECEPTACLES

A. DUPLEX RECEPTACLES: 20 AMPERE, 125 VOLT, SELF OR AUTOMATIC GROUNDING, GFCI.

B. SPECIAL MOUNTING HEIGHTS ARE NOTED ON THE ARCHITECTURAL DRAWINGS. UNLESS OTHERWISE INDICATED ON THE ELECTRICAL DRAWINGS, MOUNT DEVICES AT THE FOLLOWING HEIGHTS ABOVE FINISHED FLOOR:

1. DUPLEX RECEPTACLE	18"
2. WALL SWITCHES	48"
3. VOICE & VOICE/DATA OUTLETS	18"
4. WALL TELEPHONE OUTLETS	48"

2.12 SWITCHES

A. PROVIDE HEAVY-DUTY, AC, QUIET SWITCHES. THE SWITCHES SHALL BE HUBBELL 1221 OR EQUAL, 120-277 VOLT, 20 AMPERES, SPECIFICATION GRADE. SWITCHES SHALL BE SINGLE POLE, DOUBLE POLE, THREE WAY, FOUR WAY, OR KEY OPERATED AS SCHEDULED ON THE DRAWINGS AND SHALL BE THE SELF GROUNDING TYPE. COLOR SHALL BE IVORY.

2.13 LIGHTING FIXTURES

A. PROVIDE ALL LIGHTING FIXTURES, AS SCHEDULED ON DRAWINGS, COMPLETE WITH LAMPS AND HARDWARE. INSTALL COMPLETELY WIRED, CONNECTED AND IN OPERATING ORDER.

B. CONFIRM ALL CEILING CONDITIONS, CLEARANCES AND OPERATING VOLTAGES BEFORE ORDERING LIGHTING FIXTURES.

C. SUBMIT SHOP DRAWINGS.

2.13.1 LAMPS

A. INSTALL SCHEDULED LAMPS MANUFACTURED BY GENERAL ELECTRIC, PHILLIPS, OR APPROVED EQUAL.

2.13.2 FIXTURES

A. PROVIDE LIGHTING FIXTURES WHICH HAVE BEEN TESTED AND CERTIFIED FOR PROPER OPERATION BY THE FIXTURE'S MANUFACTURER.

B. PROVIDE LIGHTING FIXTURES WITH TRIM COMPATIBLE WITH CEILING OR SURFACE ON OR IN WHICH INSTALLED.

C. EACH LUMINAIRE SHALL HAVE TWO SUPPORT WIRES INSTALLED, ONE ON EACH END, AT DIAGONAL CORNERS. LUMINAIRES IN FIRE RATED CEILINGS SHALL BE SUPPORTED ON ALL FOUR CORNERS.

D. SUPPORT AND SECURELY ATTACH WITH GALVANIZED FASTENERS IN A LEVEL POSITION.

E. INSTALL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

F. FIRE RATED ASSEMBLIES, COMPLY WITH DETAILS OF LISTED ASSEMBLY.

2.14 TEMPORARY POWER

A. PROVIDE TEMPORARY POWER (SMALL TOOL) AND LIGHTING PER OSHA REQUIREMENTS.

3.00 ELECTRICAL STUDIES

A. THE ELECTRICAL CONTRACTOR SHALL SUBMIT A POWER SYSTEM STUDY CONTAINING THE FOLLOWING: SHORT CIRCUIT ANALYSIS, PROTECTIVE COORDINATION ANALYSIS, HARMONIC ANALYSIS, AND ARC FLASH ANALYSIS OF ALL BUSES AND PROTECTIVE DEVICES. CONTRACTOR TO SUBMIT FOR REVIEW PRIOR TO EQUIPMENT SUBMITTALS, IN ORDER TO VERIFY RATINGS OF ALL EQUIPMENT.

ELECTRICAL STUDIES SHALL BE PERFORMED BY APPROVED THIRD PARTY, SUCH AS AMPSAFE, 2722 W. BITTERS RD, SUITE 125, SAN ANTONIO, TX 78248. CONTACT: CHRISTOPHER HERZING, PHONE: 210-465-7180, EXT. 2. EMAIL: CHRISTOPHER.HERZING@AMPSAFE.COM.

S. Kanetzky
Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

E1.1

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
7/18/23

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	CC
DRAWN BY:	AH
CHECKED BY:	SK

ELECTRICAL SPECIFICATIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
69

PACKAGE DIESEL GENERATOR 40 KW

1 GENERAL

1.1 REFERENCES AND STANDARDS

THE GENERATOR SET COVERED BY THESE SPECIFICATIONS SHALL BE DESIGNED, TESTED, RATED, ASSEMBLED AND INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE STANDARDS BELOW:

- CSA C22.2 NO14
- CSA 282
- CSA 100
- EN61000-6
- EN55011
- FCC PART 15 SUBPART B
- ISO8528
- IEC61000
- UL508
- UL2200
- UL142
- DESIGNED TO ALLOW FOR INSTALLED COMPLIANCE TO NFPA 70, NFPA99 AND NFPA 110

1.2 RELATED SECTIONS

1.2.1 DIVISION 3 – STRUCTURAL CONCRETE

1.2.2 DIVISION 15 – MECHANICAL

1.3 WORK INCLUDED

1.3.1 INSTALLATION

THE WORK INCLUDES SUPPLYING AND INSTALLING A COMPLETE INTEGRATED GENERATOR SYSTEM. THE SYSTEM CONSISTS OF A DIESEL GENERATOR SET WITH RELATED COMPONENT ACCESSORIES AND AUTOMATIC TRANSFER SWITCH(ES) SPECIFIED UNDER A SEPARATE SECTION.

1.3.2 FUEL SYSTEM

THE CONTRACTOR SHALL PROVIDE A FULL TANK OF DIESEL FUEL AFTER THE COMPLETION OF ALL TESTING.

1.3.3 SYSTEM TEST

A COMPLETE SYSTEM LOAD TEST SHALL BE PERFORMED AFTER ALL EQUIPMENT IS INSTALLED. GUIDELINES IN THE START-UP SECTION.

1.3.4 REQUIREMENTS, CODES AND REGULATIONS

THE EQUIPMENT SUPPLIED AND INSTALLED SHALL MEET THE REQUIREMENTS OF THE NEC AND ALL APPLICABLE LOCAL CODES AND REGULATIONS. ALL EQUIPMENT SHALL BE OF NEW AND CURRENT PRODUCTION BY A MANUFACTURER WHO HAS 25 YEARS OF EXPERIENCE BUILDING THIS TYPE OF EQUIPMENT. MANUFACTURER SHALL BE ISO9001 CERTIFIED.

1.3.5 APPROVED MANUFACTURES

THE STANDBY DIESEL GENERATOR SHALL BE SUPPLIED BY:

- SOUTHERN PLAINS – CUMMINS®
- HOLT – CAT®
- LOFTIN – KOHLER POWER SYSTEMS®

OR BY ALTERNATE MANUFACTURES WHO SHALL SUBMIT A REQUEST TWO WEEKS PRIOR TO BID AND INCLUDE A WRITTEN LIST OF DEVIATIONS FROM THIS SPECIFICATION TO BE CONSIDERED FOR APPROVAL.

1.4 SUBSTITUTION

PROPOSED DEVIATIONS FROM THE SPECIFICATIONS SHALL BE TREATED AS FOLLOWS:

1.4.1 SUBSTITUTION TIME REQUIREMENT

REQUESTS FOR SUBSTITUTIONS SHALL BE MADE A MINIMUM OF TWO WEEKS PRIOR TO BID DATE. MANUFACTURERS CATALOG DATA SHALL ACCOMPANY EACH REQUEST AND AUTHORIZED ACCEPTANCE SHALL BE ADDENDA ONLY.

1.4.2 SUBSTITUTION RESPONSIBILITY

THE POWER SYSTEM HAS BEEN DESIGNED TO SOUTHERN PLAINS/CUMMINS ELECTRICAL AND PHYSICAL CHARACTERISTICS. THE EQUIPMENT SIZING, SPACING, AMOUNTS, ELECTRICAL WIRING, VENTILATION EQUIPMENT, FUEL AND EXHAUST COMPONENTS HAVE ALL BEEN SIZED AND DESIGNED AROUND SOUTHERN PLAINS/CUMMINS SUPPLIED EQUIPMENT. SHOULD ANY OF THE OTHER APPROVED MANUFACTURER SUBSTITUTIONS BE MADE, THE CONTRACTOR SHALL BEAR RESPONSIBILITY FOR THE INSTALLATION, COORDINATION AND OPERATION OF THE SYSTEM AS WELL AS ANY ENGINEERING AND REDESIGN COSTS, WHICH MAY RESULT FROM SUCH SUBSTITUTIONS.

1.5 SUBMITTALS

ENGINE-GENERATOR SUBMITTALS SHALL INCLUDE THE FOLLOWING INFORMATION:

1. FACTORY PUBLISHED SPECIFICATION SHEET.
2. MANUFACTURER'S CATALOG CUT SHEETS OF ALL AUXILIARY COMPONENTS SUCH AS BATTERY CHARGER, CONTROL PANEL, ENCLOSURE, ETC.
3. DIMENSIONAL ELEVATION AND LAYOUT DRAWINGS OF THE GENERATOR SET, ENCLOSURE AND TRANSFER SWITCHGEAR AND RELATED ACCESSORIES.
4. WEIGHTS OF ALL EQUIPMENT.
5. CONCRETE PAD RECOMMENDATION, LAYOUT AND STUB-UP LOCATIONS OF ELECTRICAL AND FUEL SYSTEMS.
6. INTERCONNECT WIRING DIAGRAM OF COMPLETE EMERGENCY SYSTEM, INCLUDING GENERATOR, SWITCHGEAR, DAY TANK, REMOTE PUMPS, BATTERY CHARGER, CONTROL PANEL, AND REMOTE ALARM INDICATIONS.
7. ENGINE MECHANICAL DATA, INCLUDING HEAT REJECTION, EXHAUST GAS FLOWS, COMBUSTION AIR AND VENTILATION AIR FLOWS, FUEL CONSUMPTION, ETC.
8. GENERATOR ELECTRICAL DATA INCLUDING TEMPERATURE AND INSULATION DATA, COOLING REQUIREMENTS, EXCITATION RATINGS, VOLTAGE REGULATION, VOLTAGE REGULATOR, EFFICIENCIES, WAVEFORM DISTORTION AND TELEPHONE INFLUENCE FACTOR.
9. GENERATOR RESISTANCES, REACTANCES AND TIME CONSTANTS.
10. GENERATOR LOCKED ROTOR MOTOR STARTING CURVES.
11. MANUFACTURER'S DOCUMENTATION SHOWING MAXIMUM EXPECTED TRANSIENT VOLTAGE AND FREQUENCY DIPS, AND RECOVERY TIME DURING OPERATION OF THE GENERATOR SET AT THE SPECIFIED SITE CONDITIONS WITH THE SPECIFIED LOADS.
12. MANUFACTURER'S AND DEALER'S WRITTEN WARRANTY.

1.7 SYSTEM RESPONSIBILITY

1.7.1 GENERATOR SET DISTRIBUTOR

THE COMPLETED ENGINE GENERATOR SET SHALL BE SUPPLIED BY THE MANUFACTURER'S AUTHORIZED DISTRIBUTOR ONLY.

- SOUTHERN PLAINS – CUMMINS®
- HOLT – CAT®
- LOFTIN – KOHLER POWER SYSTEMS®

1.7.2 REQUIREMENTS, CODES AND REGULATIONS

THE EQUIPMENT SUPPLIED AND INSTALLED SHALL MEET THE REQUIREMENTS OF NEC AND ALL-APPLICABLE LOCAL CODES AND REGULATIONS. ALL EQUIPMENT SHALL BE NEW, OF CURRENT PRODUCTION. THERE SHALL BE ONE SOURCE RESPONSIBILITY FOR WARRANTY; PARTS AND SERVICE THROUGH A LOCAL REPRESENTATIVE WITH FACTORY TRAINED SERVICE PERSONNEL.

1.7.3 AUTOMATIC TRANSFER SWITCH(ES)

THE AUTOMATIC TRANSFER SWITCH(ES) SPECIFIED IN ANOTHER SECTION SHALL BE SUPPLIED BY THE GENERATOR SET MANUFACTURER IN ORDER TO ESTABLISH AND MAINTAIN A SINGLE SOURCE OF SYSTEM RESPONSIBILITY AND COORDINATION.

1.8 WARRANTY

1.8.1 TWO YEAR STANDBY (ISO 8528-1: ESP) GENERATOR SET WARRANTY

THE MANUFACTURER'S STANDARD WARRANTY SHALL IN NO EVENT BE FOR A PERIOD OF LESS THAN TWO (2) YEARS FROM DATE OF INITIAL START-UP OF THE SYSTEM AND SHALL INCLUDE REPAIR PARTS, LABOR, REASONABLE TRAVEL EXPENSE NECESSARY FOR REPAIRS AT THE JOB SITE, AND EXPENDABLES (LUBRICATING OIL, FILTERS, ANTIFREEZE, AND OTHER SERVICE ITEMS MADE UNUSABLE BY THE DEFECT) USED DURING THE COURSE OF REPAIR. RUNNING HOURS SHALL BE LIMITED TO 500 HOURS ANNUALLY FOR THE SYSTEM WARRANTY BY BOTH THE MANUFACTURER AND SERVICING DISTRIBUTOR. SUBMITTALS RECEIVED WITHOUT WRITTEN WARRANTIES AS SPECIFIED WILL BE REJECTED IN THEIR ENTIRETY.

1.9 PARTS AND SERVICE QUALIFICATIONS

1.9.1 SERVICE FACILITY

THE ENGINE-GENERATOR SUPPLIER SHALL MAINTAIN 24 HOUR PARTS AND SERVICE CAPABILITY WITHIN 100 MILES OF THE PROJECT SITE. THE DISTRIBUTOR SHALL STOCK PARTS AS NEEDED TO SUPPORT THE GENERATOR SET PACKAGE FOR THIS SPECIFIC PROJECT. THE SUPPLIER MUST CARRY SUFFICIENT INVENTORY TO COVER NO LESS THAN 80% PARTS SERVICE WITHIN 24 HOURS AND 95% WITHIN 48 HOURS.

1.9.2 SERVICE PERSONNEL

THE DEALER SHALL MAINTAIN QUALIFIED FACTORY TRAINED SERVICE PERSONNEL.

2 PRODUCT SPECIFICATIONS

2.1 GENERAL REQUIREMENTS

2.1.1 GENSET REQUIREMENTS

THE GENERATOR SET SHALL BE STANDBY DUTY RATED AT 40.0 KW, 50 KVA, 1800 RPM, 0.8 POWER FACTOR, 480/277 V, 3-PHASE, 60 HERTZ, INCLUDING RADIATOR FAN AND ALL PARASITIC LOADS. GENERATOR SET SHALL BE SIZED TO OPERATE AT THE SPECIFIED LOAD AT A MAXIMUM AMBIENT OF 115F (46.1C) AND ALTITUDE OF 1,000.0 FEET (304.8 M).

STANDBY RATING AS DEFINED BY THE FOLLOWING:
TYPICAL LOAD FACTOR = 70% OR LESS WITH VARIABLE LOAD
TYPICAL HOURS PER YEAR = 200 HOURS
MAXIMUM EXPECTED USAGE = 500 HOURS/YEAR
TYPICAL APPLICATION = STANDBY
TYPICAL PEAK DEMAND = 80% OF ESP RATED KW WITH 100% OF RATING AVAILABLE FOR THE DURATION OF AN EMERGENCY OUTAGE

2.1.2 MATERIAL AND PARTS

ALL MATERIALS AND PARTS COMPRISING THE UNIT SHALL BE NEW AND UNUSED.

2.1.3 ENGINE

THE ENGINE SHALL BE DIESEL FUELED, FOUR (4) CYCLE, WATER-COOLED, WHILE OPERATING WITH NOMINAL SPEED NOT EXCEEDING 1800 RPM. THE ENGINE WILL UTILIZE IN-CYLINDER COMBUSTION TECHNOLOGY, AS REQUIRED, TO MEET APPLICABLE EPA NON-ROAD MOBILE REGULATIONS AND/OR THE EPA NSPS RULE FOR STATIONARY RECIPROCATING COMPRESSION IGNITION ENGINES. ADDITIONALLY, THE ENGINE SHALL COMPLY WITH THE STATE EMISSION REGULATIONS AT THE TIME OF INSTALLATION/COMMISSIONING. ACTUAL ENGINE EMISSIONS VALUES MUST BE IN COMPLIANCE WITH APPLICABLE EPA EMISSIONS STANDARDS PER ISO 8178 – D2 EMISSIONS CYCLE AT SPECIFIED EKW / BHP RATING. UTILIZATION OF THE "TRANSITION PROGRAM FOR EQUIPMENT MANUFACTURERS" (ALSO KNOWN AS "FLEX CREDITS") TO ACHIEVE EPA CERTIFICATION IS NOT ACCEPTABLE. THE IN-CYLINDER ENGINE TECHNOLOGY MUST NOT PERMIT UNFILTERED EXHAUST GAS TO BE INTRODUCED INTO THE COMBUSTION CYLINDER. EMISSIONS REQUIREMENTS / CERTIFICATIONS OF THIS PACKAGE: EPA TIER 3

2.1.3.1 ENGINE GOVERNING

THE ENGINE WILL BE EQUIPPED WITH AN ISOCHRONOUS ELECTRONIC GOVERNOR TO MAINTAIN +/- 0.25% STEADY STATE FREQUENCY VARIATION FROM STEADY STATE NO LOAD TO STEADY STATE FULL LOAD.

2.2 GENERATOR

2.2.1 GENERATOR SPECIFICATIONS

THE SYNCHRONOUS THREE PHASE GENERATOR SHALL BE A SINGLE BEARING, SELF-VENTILATED, DRIP-PROOF DESIGN IN ACCORDANCE WITH NEMA MG 1 AND DIRECTLY CONNECTED TO THE ENGINE FLYWHEEL HOUSING WITH A FLEX COUPLING. THE GENERATOR SHALL MEET PERFORMANCE CLASS G2 OF ISO 8528. THE EXCITATION SYSTEM SHALL ENABLE THE ALTERNATOR TO SUSTAIN 300% (250% FOR 50HZ) OF RATED CURRENT BASED ON THE 125C (CLASS H) OR 105C (CLASS F) RISE RATING FOR TEN SECONDS DURING A FAULT CONDITION AND SHALL IMPROVE THE IMMUNITY OF THE VOLTAGE REGULATOR TO NON-LINEAR DISTORTING LOADS. THE EXCITATION SYSTEM SHALL BE OF BRUSHLESS CONSTRUCTION AND BE INDEPENDENT OF MAIN STATOR WINDINGS, PERMANENT MAGNET.

2.2.2 VOLTAGE REGULATOR

2.2.2.1 AUTOMATIC VOLTAGE REGULATOR

THE AUTOMATIC VOLTAGE REGULATOR (AVR) SHALL MAINTAIN GENERATOR OUTPUT VOLTAGE WITHIN +/- 0.5% FOR ANY CONSTANT LOAD BETWEEN NO LOAD AND FULL LOAD. THE REGULATOR SHALL BE A TOTALLY SOLID STATE DESIGN, WHICH INCLUDES ELECTRONIC VOLTAGE BUILDUP, VOLTS PER HERTZ REGULATION, OVER-EXCITATION PROTECTION, SHALL LIMIT VOLTAGE OVERSHOOT ON STARTUP, AND SHALL BE ENVIRONMENTALLY SEALED.

2.2.3 MOTOR STARTING

PROVIDE LOCKED ROTOR MOTOR STARTING CAPABILITY OF 133 SKVA AT 20% INSTANTANEOUS VOLTAGE DIP AS DEFINED PER NEMA MG 1. SUSTAINED VOLTAGE DIP DATA IS NOT ACCEPTABLE.

2.3 CIRCUIT BREAKER

2.3.1 CIRCUIT BREAKER SPECIFICATIONS

PROVIDE A GENERATOR MOUNTED 100% CIRCUIT BREAKER, MOLDED CASE, QTY. (1) 100 AMP TRIP, 3 POLE, NEMA 1/IP22. BREAKER SHALL UTILIZE A SOLID STATE TRIP UNIT. THE BREAKER SHALL BE UL/CSA LISTED OF IEC CONSTRUCTION AND CONNECTED TO ENGINE/GENERATOR SAFETY SHUTDOWNS. BREAKER SHALL BE HOUSED IN AN EXTENSION TERMINAL BOX WHICH IS ISOLATED FROM VIBRATIONS INDUCED BY THE GENERATOR SET. MECHANICAL TYPE LUGS, SIZED FOR THE CIRCUIT BREAKER FEEDERS SHOWN ON DRAWING, SHALL BE SUPPLIED ON THE LOAD SIDE OF BREAKER.

2.4 CONTROLS – GENERATOR SET MOUNTED

PROVIDE A FULLY SOLID-STATE, MICROPROCESSOR BASED, GENERATOR SET CONTROL. THE CONTROL PANEL SHALL BE DESIGNED AND BUILT BY THE ENGINE MANUFACTURER. THE CONTROL SHALL PROVIDE ALL OPERATING, MONITORING, AND CONTROL FUNCTIONS FOR THE GENERATOR SET. THE CONTROL PANEL SHALL PROVIDE REAL TIME DIGITAL COMMUNICATIONS TO ALL ENGINE AND REGULATOR CONTROLS.

2.4.1 ENVIRONMENTAL

THE GENERATOR SET CONTROL SHALL BE TESTED AND CERTIFIED TO THE FOLLOWING ENVIRONMENTAL CONDITIONS.

1. -40°C TO +70C OPERATING RANGE
2. 95% HUMIDITY NON-CONDENSING, 30C TO 60C
3. IP22 PROTECTION FOR REAR OF CONTROLLER; IP55 WHEN INSTALLED IN CONTROL PANEL
4. 5% SALT SPRAY, 48 HOURS, +38C, 36.8V SYSTEM VOLTAGE
5. SINUSOIDAL VIBRATION 4.3G'S RMS, 24-1000HZ
6. ELECTROMAGNETIC CAPABILITY (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)
7. SHOCK: WITHSTAND 15G

2.4.2 FUNCTIONAL REQUIREMENTS

THE FOLLOWING FUNCTIONALITY SHALL BE INTEGRAL TO THE CONTROL PANEL.

1. THE CONTROL SHALL INCLUDE A 33 X 132 PIXEL, 24MM X 95MM, POSITIVE IMAGE, TRANSFLECTIVE LCD DISPLAY WITH TEXT BASED ALARM/EVENT DESCRIPTIONS.
2. AUDIBLE HORN FOR ALARM AND SHUTDOWN WITH HORN SILENCE SWITCH
3. STANDARD ISO LABELING
4. MULTIPLE LANGUAGE CAPABILITY
5. REMOTE START/STOP CONTROL
6. LOCAL RUN/OFF/AUTO CONTROL INTEGRAL TO SYSTEM MICROPROCESSOR
7. COOLDOWN TIMER
8. SPEED ADJUST
9. LAMP TEST
10. PUSH BUTTON EMERGENCY STOP BUTTON
11. PASSWORD PROTECTED SYSTEM PROGRAMMING

2.4.3 DIGITAL MONITORING CAPABILITY

THE CONTROLS SHALL PROVIDE THE FOLLOWING DIGITAL READOUTS FOR THE ENGINE AND GENERATOR.
ALL READINGS SHALL BE INDICATED IN EITHER METRIC OR ENGLISH UNITS

ENGINE

1. ENGINE OIL PRESSURE
2. ENGINE OIL TEMPERATURE
3. ENGINE COOLANT TEMPERATURE
4. ENGINE RPM
5. BATTERY VOLTS

GENERATOR

1. GENERATOR AC VOLTS (LINE TO LINE, LINE TO NEUTRAL AND AVERAGE)
2. GENERATOR AC CURRENT (AVG AND PER PHASE)
3. GENERATOR AC FREQUENCY
4. GENERATOR KW (TOTAL AND PER PHASE)
5. GENERATOR KVA (TOTAL AND PER PHASE)
6. GENERATOR KVAR (TOTAL AND PER PHASE)
7. POWER FACTOR (AVG AND PER PHASE)
8. TOTAL KW-HR
9. TOTAL KVAR-HR
10. % KW
11. % KVA
12. % KVAR

2.4.4 ALARMS AND SHUTDOWNS

THE CONTROL SHALL MONITOR AND PROVIDE ALARM INDICATION AND SUBSEQUENT SHUTDOWN FOR THE FOLLOWING CONDITIONS. ALL ALARMS AND SHUTDOWNS ARE ACCOMPANIED BY A TIME, DATE, AND ENGINE HOUR STAMP THAT ARE STORED BY THE CONTROL PANEL FOR FIRST AND LAST OCCURRENCE:

ENGINE ALARM/SHUTDOWN

1. LOW OIL PRESSURE ALARM/SHUTDOWN
2. HIGH COOLANT TEMPERATURE ALARM/SHUTDOWN
3. LOSS OF COOLANT SHUTDOWN
4. OVERSPEED SHUTDOWN
5. OVERCRANK SHUTDOWN
6. LOW COOLANT LEVEL ALARM
7. LOW FUEL LEVEL ALARM
8. EMERGENCY STOP DEPRESSED SHUTDOWN
9. LOW COOLANT TEMPERATURE ALARM
10. LOW BATTERY VOLTAGE ALARM
11. HIGH BATTERY VOLTAGE ALARM
12. CONTROL SWITCH NOT IN AUTO POSITION ALARM
13. BATTERY CHARGER FAILURE ALARM

GENERATOR ALARM/SHUTDOWN

1. GENERATOR OVER VOLTAGE
2. GENERATOR UNDER VOLTAGE
3. GENERATOR OVER FREQUENCY
4. GENERATOR UNDER FREQUENCY
5. GENERATOR REVERSE POWER
6. GENERATOR OVERCURRENT

2.4.5 INPUTS AND OUTPUTS

PROGRAMMABLE DIGITAL INPUTS
THE CONTROLLER SHALL INCLUDE THE ABILITY TO ACCEPT SIX (6) DIGITAL INPUT SIGNALS. THE SIGNALS MAY BE PROGRAMMED FOR EITHER HIGH OR LOW ACTIVATION USING PROGRAMMABLE NORMALLY OPEN OR NORMALLY CLOSED CONTACTS.

DIGITAL OUTPUTS
THE CONTROL SHALL INCLUDE THE ABILITY TO OPERATE SIX (6) PROGRAMMABLE RELAY OUTPUT SIGNALS, INTEGRAL TO THE CONTROLLER. THE OUTPUT RELAYS SHALL BE RATED FOR 2A @ 30VDC.

DISCRETE OUTPUTS
THE CONTROL SHALL INCLUDE THE ABILITY TO OPERATE ONE (1) DISCRETE OUTPUTS, INTEGRAL TO THE CONTROLLER, WHICH ARE CAPABLE OF SINKING UP TO 300MA.

2.4.6 MAINTENANCE

ALL ENGINE, VOLTAGE REGULATOR, CONTROL PANEL AND ACCESSORY UNITS SHALL BE ACCESSIBLE THROUGH A SINGLE ELECTRONIC SERVICE TOOL. THE FOLLOWING MAINTENANCE FUNCTIONALITY SHALL BE INTEGRAL TO THE GENERATOR SET CONTROL:

1. ENGINE RUNNING HOURS DISPLAY
2. SERVICE MAINTENANCE INTERVAL (RUNNING HOURS OR CALENDAR DAYS)
3. ENGINE CRANK ATTEMPT COUNTER
4. ENGINE SUCCESSFUL STARTS COUNTER
5. 20 EVENTS ARE STORED IN CONTROL PANEL MEMORY
6. PROGRAMMABLE CYCLE TIMER THAT STARTS AND RUNS THE GENERATOR FOR A PREDETERMINED TIME. THE TIMER SHALL USE 14 USER-PROGRAMMABLE SEQUENCES THAT ARE REPEATED IN A 7-DAY CYCLE. EACH SEQUENCE SHALL HAVE THE FOLLOWING PROGRAMMABLE SET POINTS:
   A. DAY OF WEEK
   B. TIME OF DAY TO START
   C. DURATION OF CYCLE

2.4.7 REMOTE COMMUNICATIONS

REMOTE COMMUNICATIONS
THE CONTROL SHALL INCLUDE MODBUS RTU COMMUNICATIONS AS STANDARD VIA RS-485 HALF DUPLEX WITH CONFIGURABLE BAUD RATES FROM 2.4K TO 57.6K.

REMOTE ANNUNCIATOR (NFPA 99/110, CSA 282)
PROVIDE A REMOTE ANNUNCIATOR TO MEET THE REQUIREMENTS OF NFPA 110, LEVEL 1.

1. THE ANNUNCIATOR SHALL PROVIDE REMOTE ANNUNCIATION OF ALL POINTS STATED ABOVE AND SHALL INCORPORATE RING-BACK CAPABILITY SO THAT AFTER SILENCING THE INITIAL ALARM, ANY SUBSEQUENT ALARMS WILL SOUND THE HORN.
2. ABILITY TO BE LOCATED UP TO 800 FT FROM THE GENERATOR SET

REMOTE MONITORING SOFTWARE
THE CONTROL SHALL PROVIDE MONITORING SOFTWARE WITH THE FOLLOWING FUNCTIONALITY:

1. PROVIDE ACCESS TO ALL DATE AND EVENTS ON GENERATOR SET COMMUNICATIONS NETWORK
2. PROVIDE REMOTE CONTROL CAPABILITY FOR THE GENERATOR SET
3. ABILITY TO MONITOR UP TO 12 GENERATOR SETS
4. ABILITY TO COMMUNICATE VIA MODBUS RTU OR REMOTE MODEM

2.5 COOLING SYSTEM

THE GENERATOR SET SHALL BE EQUIPPED WITH A RAIL-MOUNTED, ENGINE-DRIVEN RADIATOR WITH BLOWER FAN AND ALL ACCESSORIES. THE COOLING SYSTEM SHALL BE SIZED TO OPERATE AT FULL LOAD CONDITIONS AND 110 F° AMBIENT AIR ENTERING THE ROOM OR ENCLOSURE (IF AN ENCLOSURE IS SPECIFIED). THE GENERATOR SET SUPPLIER IS RESPONSIBLE FOR PROVIDING A PROPERLY SIZED COOLING SYSTEM BASED ON THE ENCLOSURE STATIC PRESSURE RESTRICTION.

2.6 FUEL SYSTEM

2.6.1 FUEL SYSTEM

THE FUEL SYSTEM SHALL BE INTEGRAL WITH THE ENGINE. IN ADDITION TO THE STANDARD FUEL FILTERS PROVIDED BY THE ENGINE MANUFACTURER, THERE SHALL ALSO BE INSTALLED A PRIMARY FUEL FILTER/WATER SEPARATOR IN THE FUEL INLET LINE TO THE ENGINE. ALL FUEL PIPING SHALL BE BLACK IRON OR FLEXIBLE FUEL HOSE RATED FOR THIS SERVICE. NO GALVANIZED PIPING WILL BE PERMITTED. FLEXIBLE FUEL LINES SHALL BE MINIMALLY RATED FOR 300 DEGREES F AND 100 PSI.

2.6.2 FUEL SUB BASE TANK

PROVIDE A DOUBLE WALL SUB-BASE TANK CONSTRUCTED TO MEET ALL LOCAL CODES AND REQUIREMENTS. A FUEL TANK BASE OF 48 HOUR CAPACITY SHALL BE PROVIDED AS AN INTEGRAL PART OF THE ENCLOSURE. IT SHALL BE CONTAINED IN A RUPTURE BASIN WITH 110% CAPACITY. THE TANK SHALL MEET UL142 STANDARDS. A LOCKING FILL CAP, A MECHANICAL READING FUEL LEVEL GAUGE, LOW FUEL LEVEL ALARM CONTACT, AND FUEL TANK RUPTURE ALARM CONTACT SHALL BE PROVIDED.

2.7 EXHAUST SYSTEM

2.7.1 SILENCER

A CRITICAL GRADE SILENCER, COMPANION FLANGES, AND FLEXIBLE EXHAUST FITTING PROPERLY SIZED SHALL BE FURNISHED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION. MOUNTING SHALL BE PROVIDED BY THE CONTRACTOR AS SHOWN ON THE DRAWINGS (INDOOR INSTALLATIONS ONLY). THE SILENCER SHALL BE MOUNTED SO THAT ITS WEIGHT IS NOT SUPPORTED BY THE ENGINE NOR WILL EXHAUST SYSTEM GROWTH DUE TO THERMAL EXPANSION BE IMPOSED ON THE ENGINE. EXHAUST PIPE SIZE SHALL BE SUFFICIENT TO ENSURE THAT EXHAUST BACKPRESSURE DOES NOT EXCEED THE MAXIMUM LIMITATIONS SPECIFIED BY THE ENGINE MANUFACTURER.

2.8 STARTING SYSTEM

2.8.1 STARTING MOTOR

A DC ELECTRIC STARTING SYSTEM WITH POSITIVE ENGAGEMENT SHALL BE FURNISHED. THE MOTOR VOLTAGE SHALL BE AS RECOMMENDED BY THE ENGINE MANUFACTURER.

2.8.2 JACKET WATER HEATER

JACKET WATER HEATER SHALL BE PROVIDED AND SHALL BE SIZED TO INSURE THAT GENSET WILL START WITHIN THE SPECIFIED TIME PERIOD AND AMBIENT CONDITIONS.

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

E1.2

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
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WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
70

2.8.3 BATTERIES

BATTERIES – A LEAD–ACID STORAGE BATTERY SET OF THE HEAVY–DUTY STARTING TYPE SHALL BE PROVIDED. BATTERY VOLTAGE SHALL BE COMPATIBLE WITH THE STARTING SYSTEM. THE BATTERIES SUPPLIED SHALL MEET NFPA 110 CRANKING REQUIREMENTS OF 90 SECONDS MINIMUM OF TOTAL CRANKING TIME. BATTERY SPECIFICATIONS (TYPE, AMP–HOUR RATING, COLD CRANKING AMPS) TO BE PROVIDED IN THE SUBMITTAL.

2.8.4 BATTERY CHARGER

BATTERY CHARGER – A CURRENT LIMITING BATTERY CHARGER SHALL BE FURNISHED TO AUTOMATICALLY RECHARGE BATTERIES. THE CHARGER SHALL BE DUAL CHARGE RATE WITH AUTOMATIC SWITCHING TO THE BOOST RATE WHEN REQUIRED. THE BATTERY CHARGER SHALL BE MOUNTED ON THE GENSET PACKAGE OR INSIDE THE GENSET ENCLOSURE/ROOM.

2.9 ENCLOSURE

2.9.1 SOUND ATTENUATED ENCLOSURE

THE COMPLETE DIESEL ENGINE GENERATOR SET, INCLUDING GENERATOR CONTROL PANEL, ENGINE STARTING BATTERIES AND FUEL OIL TANK, SHALL BE ENCLOSED IN A FACTORY ASSEMBLED, SOUND ATTENUATED ENCLOSURE MOUNTED ON THE FUEL TANK BASE.

1. A WEATHER RESISTANT, SOUND ATTENUATED ENCLOSURE OF STEEL WITH ELECTROSTATICALLY APPLIED POWDER COATED BAKED POLYESTER PAINT. THE ENCLOSURE SHALL HAVE A RESULTING SOUND LEVEL OF 75 DBA @ 23 FT WITH THE GENSET RUNNING UNDER FULL LOAD. IT SHALL CONSIST OF A ROOF, SIDE WALLS, AND END WALLS. FASTENERS SHALL BE EITHER ZINC PLATED OR STAINLESS STEEL.
2. ENCLOSURE SOUND ATTENUATION: ACOUSTICAL FOAM SHALL BE PROVIDED BETWEEN ALL SUPPORTS AND INSIDE DOORS AND SOUND BAFFLES ON AIR INTAKE AND AIR DISCHARGE.

3 EXECUTION

3.1 INSTALLATION

INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, THE PROJECT DRAWINGS AND SPECIFICATIONS, AND ALL APPLICABLE CODES.

3.2 START–UP AND TESTING

COORDINATE ALL START–UP AND TESTING ACTIVITIES WITH THE ENGINEER AND OWNER. AFTER INSTALLATION IS COMPLETE AND NORMAL POWER IS AVAILABLE, THE MANUFACTURER'S LOCAL DEALER SHALL PERFORM THE FOLLOWING:

NFPA 110 LOAD TEST REQS

1. VERIFY THAT THE EQUIPMENT IS INSTALLED PROPERLY.
2. CHECK ALL AUXILIARY DEVICES FOR PROPER OPERATION, INCLUDING BATTERY CHARGER, JACKET WATER HEATER(S), GENERATOR SPACE HEATER, REMOTE ANNUNCIATOR, ETC.
3. TEST ALL ALARMS AND SAFETY SHUTDOWN DEVICES FOR PROPER OPERATION AND ANNUNCIATION.
4. CHECK ALL FLUID LEVELS.
5. START ENGINE AND CHECK FOR EXHAUST, OIL, FUEL LEAKS, VIBRATIONS, ETC.
6. VERIFY PROPER VOLTAGE AND PHASE ROTATION AT THE TRANSFER SWITCH BEFORE CONNECTING TO THE LOAD.
7. CONNECT THE GENERATOR TO BUILDING LOAD AND VERIFY THAT THE GENERATOR WILL START AND RUN ALL DESIGNATED LOADS.
8. THE SYSTEM SHALL BE TESTED UNDER FULL LOAD AND MONITOR THE FOLLOWING READINGS:

OIL PRESSURE
COOLANT TEMPERATURE
BATTERY CHARGE RATE
AC VOLTS
AC AMPERES– ALL PHASES
FREQUENCY
KILOWATTS
AMBIENT TEMPERATURE

3.3 OPERATION AND MAINTENANCE MANUALS

PROVIDE TWO (2) SETS OF OPERATION AND MAINTENANCE MANUALS COVERING THE GENERATOR, SWITCHGEAR, AND AUXILIARY COMPONENTS. INCLUDE FINAL AS–BUILT WIRING INTERCONNECT DIAGRAMS AND RECOMMENDED PREVENTATIVE MAINTENANCE SCHEDULES.

3.4 TRAINING

3.4.1 ON–SITE TRAINING

PROVIDE ON–SITE TRAINING TO INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT. REVIEW OPERATION AND MAINTENANCE MANUALS, PARTS MANUALS, AND EMERGENCY SERVICE PROCEDURES.

AUTOMATIC TRANSFER SWITCH 100 AMP, 4 POLE, NEMA 4XSS

1 GENERAL

1.1 SCOPE

A. IT IS THE INTENT OF THIS SPECIFICATION TO SECURE A TRANSFER SWITCH THAT HAS BEEN PROTOTYPE TESTED, FACTORY BUILT, PRODUCTION TESTED AND SITE TESTED. A TRANSFER SWITCH WITH THE NUMBER OF POLES, VOLTAGE AND CURRENT RATINGS SHOWN ON THE PLANS AND SPECIFIED HEREIN SHALL BE PROVIDED.

1.2 CODES AND STANDARDS

A. THE AUTOMATIC TRANSFER SWITCH SHALL CONFORM TO THE REQUIREMENTS OF:

1. UL 1008: UNDERWRITERS LABORATORIES STANDARD FOR AUTOMATIC TRANSFER SWITCHES
2. CSA: C22.2 NO. 178 CERTIFIED
3. IEC: 947–6–1 CERTIFIED AT 480 VAC
4. NFPA 70: NATIONAL ELECTRICAL CODE INCLUDING USE IN EMERGENCY AND STANDBY SYSTEMS IN ACCORDANCE WITH ARTICLES 517, 700, 701, 702
5. NFPA 99: ESSENTIAL ELECTRICAL SYSTEMS FOR HEALTH CARE FACILITIES
6. NFPA 101: LIFE SAFETY CODE
7. NFPA 110: STANDARD FOR EMERGENCY AND STANDBY POWER SYSTEMS
8. IEEE 241: I.E.E.E. RECOMMENDED PRACTICE FOR ELECTRICAL POWER SYSTEMS IN COMMERCIAL BUILDINGS
9. IEEE 446: I.E.E.E. RECOMMENDED PRACTICE FOR EMERGENCY AND STANDBY POWER SYSTEMS
10. NEMA ICS10: AC AUTOMATIC TRANSFER SWITCH EQUIPMENT
11. UL 50/508: ENCLOSURES
12. ICS 6: ENCLOSURES
13. ANSI C33.76: ENCLOSURES
14. NEMA 250: ENCLOSURES
15. IEEE 472: (ANSI C37.90A): RINGING WAVE IMMUNITY
16. EN55022 (CISPR11): CONDUCTED AND RADIATED EMISSIONS (EXCEEDS EN55011 & MILSTD 461 CLASS 3)
17. EN61000–4–2: (LEVEL 4): ESD IMMUNITY TEST CLASS B:
18. EN61000–4–3: (ENV50140): RADIATED RF, ELECTROMAGNETIC FIELD IMMUNITY
19. EN61000–4–4: ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST
20. EN61000–4–5: IEEE C62.41: SURGE IMMUNITY TEST (1.2 X 50___S, 5 & 8 KV)
21. EN61000–4–6: (ENV50141): CONDUCTED IMMUNITY TEST
22. EN61000–4–11: VOLTAGE DIPS AND INTERRUPTION IMMUNITY
23. IEC–693–2005: SEISMIC CERTIFIED AT HIGH LEVEL WITH 2.5 AMPLIFICATION FACTOR
24. IBC–2003: AT IP=1.5 FOR Z/H LESS THAN OR EQUAL TO (IN ACCORDANCE WITH ICC–ES–AC156)

1.3 APPROVED MANUFACTURES

A. THE AUTOMATIC TRANSFER SWITCH SHALL BE SUPPLIED BY:

- ASCO®
- RUSSELECTRIC®
- ABB–ZENITH®

OR BY ALTERNATE MANUFACTURES WHO SHALL SUBMIT A REQUEST ONE WEEK PRIOR TO BID AND INCLUDE A WRITTEN LIST OF DEVIATIONS FROM THIS SPECIFICATION TO BE CONSIDERED FOR APPROVAL.

2 PRODUCTS

2.1 PERFORMANCE AND CONSTRUCTION

A. THE AUTOMATIC TRANSFER SWITCH SHALL BE OF DOUBLE THROW CONSTRUCTION OPERATED BY A RELIABLE SOLENOID DRIVEN MECHANISM. THERE SHALL BE A DIRECT MECHANICAL COUPLING TO FACILITATE TRANSFER IN 6 CYCLES OR LESS.

B. THE TRANSFER SWITCH SHALL INCORPORATE A TIMED, CENTER–OFF OR NEUTRAL POSITION FOR MOTOR AND INDUCTIVE LOAD DECAY. TRANSFER TIME SHALL BE ADJUSTABLE FROM 0–10 MINUTES TO EITHER SOURCE. A MECHANICAL INTERLOCK SHALL BE PROVIDED TO ENSURE THAT BOTH SETS OF CONTACTS CANNOT BE CLOSED AT THE SAME TIME.

C. FOR SWITCHES INSTALLED IN SYSTEMS HAVING GROUND FAULT PROTECTIVE DEVICES, AND/OR WIRED SO AS TO BE DESIGNATED A SEPARATELY DERIVED SYSTEM BY THE NEC, A 4TH POLE SHALL BE PROVIDED. THIS ADDITIONAL POLE SHALL ISOLATE THE NORMAL AND EMERGENCY NEUTRALS. THE NEUTRAL POLE SHALL HAVE THE SAME WITHSTAND AND OPERATIONAL RATINGS AS THE OTHER POLES AND SHALL BE ARRANGED TO BREAK LAST AND MAKE FIRST TO MINIMIZE NEUTRAL SWITCHING TRANSIENTS. ADD–ON OR ACCESSORY POLES THAT ARE NOT OF IDENTICAL CONSTRUCTION AND WITHSTAND CAPABILITY WILL NOT BE CONSIDERED.

D. THE CONTACT STRUCTURE SHALL CONSIST OF A MAIN CURRENT CARRYING CONTACT, WHICH IS A SILVER ALLOY WITH A MINIMUM OF 50% SILVER CONTENT. THE CURRENT CARRYING CONTACTS SHALL BE PROTECTED BY SILVER TUNGSTEN ARCING CONTACTS ON ALL SIZES ABOVE 400 AMPS.

E. THE TRANSFER SWITCH MANUFACTURER SHALL SUBMIT TEST DATA FOR EACH SIZE SWITCH, SHOWING IT CAN WITHSTAND FAULT CURRENTS OF THE MAGNITUDE AND THE DURATION NECESSARY TO MAINTAIN THE SYSTEM INTEGRITY. MINIMUM UL LISTED WITHSTAND AND CLOSE INTO FAULT RATINGS SHALL BE AS FOLLOWS:

SIZE (AMPS)	COORDINATED BREAKER	CURRENT LIMITING FUSE
40 – 600	50,000	200,000
800	65,000	200,000
1000 – 1200	85,000	200,000
1600 – 3000	100,000	200,000

F. A DIELECTRIC TEST AT THE CONCLUSION OF THE WITHSTAND AND CLOSING TESTS SHALL BE PERFORMED.

G. THE AUTOMATIC TRANSFER SWITCH MANUFACTURER SHALL CERTIFY SUFFICIENT ARC INTERRUPTING CAPABILITIES FOR 50 CYCLES OF OPERATION BETWEEN A NORMAL AND EMERGENCY SOURCE THAT ARE 120 DEGREES OUT OF PHASE AT 480 VOLTS, 600% OF RATED CURRENT AT .50 POWER FACTOR. THIS CERTIFICATION IS TO ENSURE THAT THERE WILL BE NO CURRENT FLOW BETWEEN THE TWO ISOLATED SOURCES DURING SWITCHING.

H. ALL RELAYS SHALL BE CONTINUOUS DUTY INDUSTRIAL TYPE WITH WIPING CONTACTS. COILS, RELAYS, TIMERS AND ACCESSORIES SHALL BE READILY FRONT ACCESSIBLE. THE CONTROL PANEL AND POWER SECTION SHALL BE INTERCONNECTED WITH A HARNESS AND KEYED DISCONNECT PLUGS FOR MAINTENANCE.

I. MAIN AND ARCING CONTACTS SHALL BE VISIBLE WITHOUT MAJOR DISASSEMBLY TO FACILITATE INSPECTION AND MAINTENANCE.

J. A MANUAL HANDLE SHALL BE PROVIDED FOR MAINTENANCE PURPOSES WITH THE SWITCH DE–ENERGIZED. AN OPERATOR DISCONNECT SWITCH SHALL BE PROVIDED TO DEFEAT AUTOMATIC OPERATION DURING MAINTENANCE, INSPECTION OR MANUAL OPERATION.

K. SWITCHES COMPOSED OF MOLDED CASE BREAKERS, LIGHTING CONTACTORS OR COMPONENTS THEREOF WILL NOT BE ACCEPTABLE.

L. THE CURRENT RATING SHALL BE A CONTINUOUS RATING WHEN THE SWITCH IS INSTALLED IN AN ENCLOSURE, AND SHALL CONFORM TO NEMA TEMPERATURE RISE STANDARDS.

M. THE UNIT SHALL BE RATED BASED ON ALL CLASSES OF LOADS, I.E., RESISTIVE, TUNGSTEN, BALLAST AND INDUCTIVE LOADS. SWITCHES RATED 400 AMPERES OR LESS SHALL BE UL LISTED FOR 100% TUNGSTEN LAMP LOAD.

N. TEMPERATURE RISE TESTS IN ACCORDANCE WITH UL 1008 SHALL HAVE BEEN CONDUCTED AFTER THE OVERLOAD AND ENDURANCE TESTS TO CONFIRM THE ABILITY OF THE UNITS TO CARRY THEIR RATED CURRENTS WITHIN THE ALLOWABLE TEMPERATURE LIMITS.

O. UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS, THE SWITCH SHALL BE MOUNTED IN A NEMA 4XSS ENCLOSURE.

2.2 CONTROL

A. THE CONTROL PANEL SHALL BE OPTO–ISOLATED FROM ELECTRICAL NOISE AND PROVIDED WITH THE FOLLOWING INHERENT CONTROL FUNCTIONS AND CAPABILITIES:

1. EASY–TO–VIEW 4X20 LCD DISPLAY WITH LONG LASTING LED INDICATORS.
2. CONTROL PANEL SHALL DISPLAY VOLTAGE AND FREQUENCY OF BOTH SOURCES.
3. THE USER SHALL BE ABLE TO VIEW THE LAST 16 RECORDED EVENTS.
4. CAPABILITY FOR EXTERNAL COMMUNICATION AND NETWORK INTERFACE.
5. ADJUSTMENTS TO ALL SETTINGS SHALL BE MADE FROM THE FRONT OF THE PANEL WITHOUT OPENING THE DOOR.

B. THE TRANSFER SWITCH SHALL BE EQUIPPED WITH A MICROPROCESSOR BASED CONTROL PANEL. THE CONTROL PANEL SHALL PERFORM THE OPERATIONAL AND DISPLAY FUNCTIONS OF THE TRANSFER SWITCH. THE DISPLAY FUNCTIONS OF THE CONTROL PANEL SHALL INCLUDE ATS POSITION, SOURCE AVAILABILITY, SEQUENCE INDICATION AND DIAGNOSTICS.

C. ALL PROGRAMMABLE AND CONTROL FUNCTIONS SHALL BE PASS CODE PROTECTED AND ACCESSIBLE THROUGH THE KEYPAD.

D. THE CONTROL PANEL SHALL BE PROVIDED WITH A SIMPLE USER INTERFACE FOR TRANSFER SWITCH MONITORING, CONTROL AND FIELD CHANGEABLE FUNCTIONS AND SETTINGS.

E. TOUCH PAD TEST SWITCH WITH FAST TEST/LOAD/NO LOAD SELECTION CAPABILITY TO SIMULATE A NORMAL SOURCE FAILURE.

F. THE CONTROLLER SHALL PROVIDE DIGITAL TIMER ADJUSTMENTS WITH 1–SECOND RESOLUTION. VOLTAGE AND FREQUENCY SHALL BE ADJUSTABLE TO 1% RESOLUTION TO FACILITATE ACCURATE TRANSFER.

G. TO ENSURE RELIABLE AND CONSISTENT USER OPERATION THE CONTROLS MUST BE EQUIPPED WITH NONVOLATILE MEMORY AND ALLOW AUTOMATIC DAYLIGHT SAVINGS TIME ADJUSTMENT.

3 OPERATION

3.1 SEQUENCE OF OPERATION

A. THE ATS SHALL INCORPORATE ADJUSTABLE THREE PHASE UNDER VOLTAGE SENSING ON THE NORMAL SOURCE.

B. WHEN THE VOLTAGE OF ANY PHASE OF THE NORMAL SOURCE IS REDUCED TO 80% OF NOMINAL VOLTAGE, FOR A PERIOD OF 0–10 SECONDS (PROGRAMMABLE) A PILOT CONTACT SHALL CLOSE TO INITIATE STARTING OF THE ENGINE GENERATOR.

C. THE ATS SHALL INCORPORATE ADJUSTABLE UNDER VOLTAGE AND UNDER FREQUENCY SENSING ON THE EMERGENCY SOURCE. IN ADDITION, THE SWITCH WILL BE PROVIDED WITH A CENTER–OFF OR NEUTRAL POSITION

D. WHEN THE EMERGENCY SOURCE HAS REACHED A VOLTAGE VALUE OF 90% NOMINAL, ACHIEVED FREQUENCY WITHIN 95% OF THE RATED VALUE AND HAS REACHED THE END OF THE ADJUSTABLE DELAY, THE LOAD SHALL BE TRANSFERRED TO THE NEUTRAL POSITION FOR AN ADJUSTABLE TIME PERIOD OF 0–10 MINUTES. UPON COMPLETION OF THIS NEUTRAL TIME DELAY THE SWITCH SHALL BE TRANSFERRED TO THE EMERGENCY SOURCE.

E. WHEN THE NORMAL SOURCE HAS BEEN RESTORED TO NOT LESS THAN 90% OF RATED VOLTAGE ON ALL PHASES AND THE TIME DELAY TRANSFER TO NORMAL HAS EXPIRED, THE LOAD SHALL BE RETRANSFERRED TO THE NEUTRAL POSITION FOR AN ADJUSTABLE TIME PERIOD OF 0–10 MINUTES. AFTER WHICH THE SWITCH SHALL BE CONNECTED TO THE NORMAL SOURCE. THE GENERATOR SHALL RUN UNLOADED FOR 5 MINUTES (PROGRAMMABLE) AND THEN AUTOMATICALLY SHUT DOWN. THE GENERATOR SHALL BE READY FOR AUTOMATIC OPERATION UPON THE NEXT FAILURE OF THE NORMAL SOURCE.

F. IF THE ENGINE GENERATOR SHOULD FAIL WHILE CARRYING THE LOAD, RETRANSFER TO THE NORMAL SOURCE SHALL BE MADE INSTANTANEOUSLY UPON RESTORATION OF PROPER VOLTAGE (90%) ON THE NORMAL SOURCE.

G. INSPECTION AND OPERATIONAL TESTING/DEMONSTRATION OF THE ATS SHALL BE CONDUCTED IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE TO INDICATE THE ATS SATISFIES THESE SPECIFICATIONS.

3.2 STANDARD ACCESSORIES

A. ADJUSTABLE TIME DELAY TO OVERRIDE MOMENTARY NORMAL SOURCE FAILURE PRIOR TO ENGINE START. FIELD PROGRAMMABLE 0–10 SECONDS FACTORY SET AT 3 SECONDS.

B. ADJUSTABLE TIME DELAY ON RETRANSFER TO NORMAL SOURCE, PROGRAMMABLE 0–60 MINUTES FACTORY SET AT 30 MINUTES. IF THE EMERGENCY SOURCE FAILS DURING THE RETRANSFER TIME DELAY, THE TRANSFER SWITCH CONTROLS SHALL AUTOMATICALLY BYPASS THE TIME DELAY AND IMMEDIATELY RETRANSFER TO THE NORMAL POSITION.

C. A TIME DELAY ON TRANSFER TO EMERGENCY, PROGRAMMABLE 0–5 MINUTES, FACTORY SET AT 1 SECOND.

D. A TIME DELAY AND CONTROL PANEL DISPLAY ON TRANSFER TO EITHER SOURCE WITH A CENTER–OFF POSITION, PROGRAMMABLE 0–10 MINUTES, AND FACTORY SET AT 5 SECONDS.

E. AN IN–PHASE MONITOR SHALL BE PROVIDED. THE MONITOR SHALL COMPARE THE PHASE ANGLE DIFFERENCE BETWEEN THE NORMAL AND EMERGENCY SOURCES AND BE PROGRAMMED TO ANTICIPATE THE ZERO CROSSING POINT TO MINIMIZE SWITCHING TRANSIENTS.

F. AN EXERCISER TIMER WITH MOMENTARY TEST PUSHBUTTON SHALL BE INCORPORATED WITHIN THE MICROPROCESSOR AND SHALL BE CAPABLE OF STARTING THE ENGINE GENERATOR SET AND TRANSFERRING THE LOAD (WHEN SELECTED) FOR EXERCISE PURPOSES ON A DAILY, WEEKLY OR MONTHLY BASIS. THE EXERCISER SHALL CONTAIN A BATTERY FOR MEMORY RETENTION DURING AN OUTAGE.

G. PROVIDE A MOMENTARY PUSHBUTTON TO BYPASS THE TIME DELAYS ON TRANSFER AND RETRANSFER AND PROGRAMMABLE COMMIT/NO COMMIT CONTROL LOGIC.

H. THE CONTROLLER SHALL ACCEPT A REMOTE PEAK SHAVE OR TEST INPUT TO SIGNAL THE TRANSFER SWITCH TO THE EMERGENCY POSITION.

I. A SET OF CUSTOMER CONTACTS SHALL BE PROVIDED TO INDICATE BOTH EMERGENCY AND NORMAL SOURCE POSITION.

J. ADDITIONAL AUXILIARY CONTACTS (A3) – CLOSED WHEN THE TRANSFER SWITCH IS IN SOURCE 2 POSITION.

K. ADDITIONAL AUXILIARY CONTACTS (A4) – CLOSED WHEN THE TRANSFER SWITCH IS IN SOURCE 1 POSITION.

4 EXECUTION

4.1 GENERAL

A. THE TRANSFER SWITCH SHALL BE INSTALLED AS SHOWN ON THE PLANS, IN ACCORDANCE WITH THE MANUFACTURE'S RECOMMENDATIONS AND ALL APPLICABLE CODES.

4.2 FACTORY TESTS

A. THE TRANSFER SWITCH MANUFACTURER SHALL PERFORM A COMPLETE FUNCTIONAL TEST ON THE SWITCH, CONTROLLER AND ACCESSORIES PRIOR TO SHIPPING FROM THE FACTORY. A CERTIFIED TEST REPORT SHALL BE AVAILABLE UPON REQUEST.

4.3 SERVICE

A. THE MANUFACTURER SHALL MAINTAIN A NATIONAL SERVICE ORGANIZATION THAT IS FACTORY TRAINED AND CERTIFIED FOR TRANSFER SWITCH EQUIPMENT. IN ADDITION, THE SERVICE ORGANIZATION SHALL BE AVAILABLE 24 HOURS PER DAY, 365 DAYS PER YEAR.

4.4 WARRANTY

A. THE AUTOMATIC TRANSFER SWITCH SHALL BE WARRANTED AGAINST DEFECTIVE WORKMANSHIP FOR A PERIOD OF TWO YEARS.

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

E1.3

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY–HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512–520–0788 FAX: 512–418–1791
WWW.KIMLEY–HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F–928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED
PROFESSIONAL ENGINEER
7/18/23

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE	AS SHOWN
DESIGNED BY	CC
DRAWN BY	AH
CHECKED BY	SK

ELECTRICAL
GENERATOR AND ATS SPECIFICATIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
71

SCADA SYSTEM – GENERAL PROVISIONS

PART 1: GENERAL

1.01 SCOPE OF WORK:

A. THE PROJECT SHALL CONSIST OF A COMPLETE AND OPERATING SCADA SYSTEM FOR THE FOLLOWING SITES:

- EDGEWOOD LIFT STATION

THE COMPLETE SYSTEM SHALL INCLUDED BUT NOT LIMITED TO ALL HARDWARE, SOFTWARE, LABOR, ANTENNA BASE, ANTENNA TOWER, COAX CABLE AND ANTENNA AS LISTED IN THIS PERFORMANCE SPECIFICATION. THE CONTRACTOR SHALL VISIT EACH SITE PRIOR TO SUBMITTING THEIR BID.

B. A SINGLE PRE-APPROVED SCADA SYSTEM INTEGRATOR (SSI) SHALL FURNISH ALL SERVICES AND EQUIPMENT DEFINED HEREIN AND IN OTHER SPECIFICATION SECTIONS AS REQUIRED TO PROVIDE A FULLY-FUNCTIONAL SCADA SYSTEM.

PRE-APPROVED SSI'S

1. BLOCKDESIGN-BUILD, LLC (903-247-9444)
2. TRAC-N-TROL (512-930-5721)
3. TEI CONTROLS (512-259-2977)
4. ALTERMAN ELECTRIC, INC. (512-836-3950)
5. CONTROL PANELS USA, INC. (512-863-3224)

C. THE SSI SHALL PROVIDE ALL MATERIALS, EQUIPMENT, LABOR, AND SERVICES REQUIRED TO ACHIEVE A FULLY INTEGRATED AND OPERATIONAL SCADA SYSTEM. THE SSI SHALL DESIGN AND COORDINATE THE CONTROL SYSTEM FOR PROPER OPERATION WITH RELATED EQUIPMENT AND MATERIALS FURNISHED BY OTHER SUPPLIERS UNDER OTHER SECTIONS OF THESE SPECIFICATIONS AND WITH RELATED EXISTING EQUIPMENT. THE SSI SHALL PROVIDE A TURNKEY SCADA SYSTEM INCLUDING ALL REQUIRED ELECTRICAL CONDUIT AND WIRE UNLESS OTHERWISE SPECIFIED.

D. TO FACILITATE THE OWNER'S FUTURE CONSTRUCTION, OPERATION, AND MAINTENANCE, PRODUCTS SHALL BE BY A MAJOR INSTRUMENTATION AND SCADA EQUIPMENT MANUFACTURERS, WITH PANEL MOUNTED DEVICES OF THE SAME TYPE AND MODEL AS FAR AS POSSIBLE.

E. ALL MATERIALS, EQUIPMENT, LABOR, AND SERVICES NECESSARY TO ACHIEVE THE MONITORING AND CONTROL FUNCTIONS DESCRIBED HEREIN SHALL BE PROVIDED IN A TIMELY MANNER SUCH THAT THE MONITORING AND CONTROL FUNCTIONS ARE AVAILABLE WHEN THE EQUIPMENT IS READY TO BE PLACED INTO SERVICE.

F. A MANDATORY PRE-BID WALK-THROUGH SHALL BE SCHEDULED FOR ALL PLAN HOLDERS BIDDING ON THE SCADA PORTION OF THIS PROJECT.

1.02 QUALIFICATIONS AND REQUIREMENTS:

A. IN ORDER TO ENSURE A COMPLETE AND SUCCESSFUL PROJECT, THE SSI'S MUST DEMONSTRATE A HISTORY OF SUCCESSFUL REFERENCES AND FINANCIAL STABILITY, AND FIVE YEARS OF SUSTAINED BUSINESS ACTIVITY IN THE SCADA INDUSTRY SERVING WATER AND WASTEWATER UTILITIES IN TEXAS.

B. IN ORDER TO ENSURE QUALITY CONTROL AND COMPATIBILITY WITH EXISTING OPERATIONS, THE INDIVIDUAL INTEGRATOR(S) TO COMPLETE THE WORK MUST BE SPECIFIED IN THE PROPOSAL AND THEIR EXPERIENCE MUST BE ACCEPTABLE, WITHOUT LIMITATION, IN THE FOLLOWING AREAS:

LIST SPECIFIC QUALIFICATIONS INCLUDING:

1. INTEGRATION EXPERIENCE OF WATER UTILITIES SERVING SIMILAR GEOGRAPHICAL OR COUNTY-WIDE AREAS OF AT LEAST TEN PROJECTS OF SUCCESSFUL REFERENCE FOR RADIO TELEMETRY SCADA WITHIN THE STATE OF TEXAS.

C. IN ORDER TO ENSURE ADEQUATE RESPONSE TO EMERGENCIES AND SERVICE NEEDS, THE SSI MUST HAVE A SERVICE FACILITY WITHIN A 150 MILE RADIUS OF THE WATER TREATMENT PLANT.

D. THE ATTACHED "SCOPE OF PROJECT AND EQUIPMENT SPECIFICATIONS' WILL BE REQUIRED AS PRESENTED. SEE SECTION ON 'SUBSTITUTE EQUIPMENT'.

E. THE SSI WILL SPECIFY EQUIPMENT, SIZES AND QUANTITIES WHICH ARE PROPOSED TO BE USED FOR THE PROJECT. ALL EQUIPMENT SPECIFIED SHALL BE NON-PROPRIETARY AND UNIVERSALLY AVAILABLE TO ALL SSI'S. ALL COMPUTER AND COMPUTER RELATED EQUIPMENT SHALL BE COMPLIANT FOR DATE-BASED FUNCTIONALITY. A COMPLIANCE CERTIFICATE SHALL BE REQUIRED FROM THE SSI STATING COMPLIANCE WITH THESE REQUIREMENTS.

F. THE SSI SHALL PROVIDE A SCHEDULE OF THE WARRANTY PROVIDED FOR WORK COMPLETED UNDER THIS PROPOSAL AND NON-WARRANTY SERVICE SCHEDULE WITH PRICING AND TERMS BEYOND THE WARRANTY PERIOD AS A PART OF ITS PROPOSAL.

G. THE SSI SHALL BE A "SYSTEMS HOUSE" REGULARLY ENGAGED IN THE DESIGN AND THE INSTALLATION OF COMPUTER SYSTEMS AND THEIR ASSOCIATED SUBSYSTEM AS THEY ARE APPLIED TO THE RETAIL PUBLIC WATER UTILITY INDUSTRY. FOR THE PURPOSES OF THIS SPECIFICATIONS SECTION, A "SYSTEMS HOUSE" SHALL BE INTERPRETED TO MEAN AN ORGANIZATION THAT COMPLIES WITH ALL OF THE FOLLOWING CRITERIA:

1. EMPLOYS DESIGN AND TECHNICAL PERSONNEL ON THIS PROJECT WHO HAVE SUCCESSFULLY COMPLETED A MANUFACTURER'S TRAINING COURSE ON THE CONFIGURATION AND IMPLEMENTATION OF THE SPECIFIC HARDWARE AND SOFTWARE FOR THIS PROJECT.

H. THE SSI SHALL MAINTAIN A FULLY EQUIPPED OFFICE/PRODUCTION FACILITY WITH FULL TIME EMPLOYEES CAPABLE OF, CONFIGURING, INSTALLING, CALIBRATING, TROUBLESHOOTING, AND TESTING THE SYSTEM SPECIFIED HEREIN.

I. LISTED SSI'S SHALL NOT BE REQUIRED TO SUBMIT A QUALIFICATION PROPOSAL. SSI'S INTERESTED IN BEING LISTED AS AN EQUAL SHALL SUBMIT THREE (3) COPIES OF A QUALIFICATIONS PROPOSAL, AS REQUIRED HEREIN, TO THE ENGINEER NO LATER THAN TEN (10) DAYS BEFORE THE BID OPENING DATE. A LIST OF APPROVED EQUALS WILL BE ISSUED NO LATER FIVE (5) DAYS BEFORE THE BID OPENING DATE BY ADDENDUM.

1. THE QUALIFICATIONS PROPOSAL SHALL PROVIDE DETAILS AND A DESCRIPTION OF HOW THE SSI PROPOSES TO FULFILL THE REQUIREMENTS SET FORTH IN THIS SPECIFICATION. THE SSI SHALL ALSO BE CAPABLE OF SATISFYING THE OWNER'S FUTURE NEEDS WITH REGARD TO A FULLY FUNCTIONAL SCADA SYSTEM. THE SSI SHALL PRESENT THE PROPOSAL IN SUFFICIENT DETAIL SO THAT PROPER EVALUATION REGARDING THE EXPERIENCE AND CAPABILITIES OF THE SSI CAN BE PERFORMED. ALL ITEMS LISTED AS QUALIFICATION REQUIREMENTS SET FORTH IN THIS SECTION MUST BE PROVIDED FOR PROPER EVALUATION. FAILURE TO PROVIDE SUCH DOCUMENTATION WILL DISQUALIFY THE APPLICANT.

2. THE PROPOSAL SHALL CONTAIN EVIDENCE THAT THE SSI HAS SUFFICIENT FINANCIAL RESOURCES TO MEET THE OBLIGATIONS INCIDENTAL TO THE PERFORMANCE OF THE WORK INCLUDING BONDING. (THIS REQUIREMENT MAY BE PROVIDED IN THE FORM OF A VERIFIABLE OR CERTIFIED FINANCIAL REPORT FOR THE COMPANY'S LATEST FISCAL YEAR).

3. THE PROPOSAL SHALL CONTAIN A LIST OF PERSONNEL AVAILABLE FOR ASSIGNMENT TO THE RESPONSIBLE POSITIONS OF PROJECT MANAGER, PROJECT ENGINEER, LEAD PROGRAMMER, INSTALLATION SUPERVISOR, AND AREA SERVICE REPRESENTATIVE. ALSO, INCLUDE A CONCISE RESUME OF EACH INDIVIDUAL'S EDUCATION, TRAINING, WORK EXPERIENCE, AND ACCOMPLISHMENTS.

4. THE PROPOSAL SHALL CONTAIN THE FOLLOWING SPECIFIC INFORMATION:

A. LOCATION OF SERVICE CENTER IN RELATION TO THE OWNER'S OFFICE.
B. TECHNICAL VALIDATION SAMPLES OF RECENTLY COMPLETED AND SIMILAR SCOPE PROJECTS.
C. A DESCRIPTION OF HOW THE SUPPLIER PLANS TO EXECUTE THE VARIOUS FUNCTIONS AND LOCATIONS WHERE THE VARIOUS WORK CAN BE PERFORMED, INCLUDING EXISTING LOCATIONS TO INTEGRATE INTO THE FUTURE PROJECTS AS DESIGNATED BY THE OWNER.

5. THE SSI SHALL BE REQUIRED TO PROVIDE A REFERENCE LIST OF A MINIMUM OF FIVE (5) YEARS RECENT PAST EXPERIENCE IN THE DESIGN, ASSEMBLY, AND COMMISSIONING OF INSTRUMENTATION AND CONTROL SYSTEMS OF COMPARABLE SIZE, TYPE, AND COMPLEXITY TO THE PROPOSED PROJECT. THE SSI SHALL BE REQUIRED TO HAVE HIS/HER OWN IN-HOUSE CAPABILITY TO HANDLE COMPLETE SYSTEM ENGINEERING, FABRICATION, AND TESTING.

6. THE SSI SHALL INDICATE THAT HE/SHE HAS IN HIS/HER EMPLOY CAPABLE PERSONNEL FOR DETAILED ENGINEERING, COORDINATION, DRAFTING, PROCUREMENT AND EXPEDITING, SCHEDULING, CONSTRUCTING, TESTING, INSPECTION, INSTALLATION, TRAINING, AND START-UP SERVICE FOR CALIBRATION AND COMMISSIONING AND WARRANTY COMPLIANCE FOR THE PERIOD SPECIFIED.

PART 2: SCADA SYSTEM

2.01 SCOPE OF PROJECT AND EQUIPMENT SPECIFICATIONS

A. THE SCADA SYSTEM SHALL BE A MICRO-PROCESSOR BASED MONITORING AND CONTROL-SYSTEM READY FOR COMMUNICATION WITH A MASTER TERMINAL UNIT (MTU) COMMUNICATING WITH OTHER REMOTE TERMINAL UNITS (RTU'S) VIA RADIO TELEMETRY OR OTHER SPECIFIED COMMUNICATION TECHNOLOGIES. RTU'S HEREIN SPECIFIED SHALL ALSO BE REQUIRED TO COMMUNICATE WITH OTHER RTU'S IN A PEER-TO-PEER MANNER FOR THE PURPOSE OF MEETING REGIONAL OR PRESSURE-PLANE-SPECIFIC REQUIREMENTS. PEER-TO-PEER COMMUNICATIONS BETWEEN RTU'S SHALL NOT REQUIRE PROGRAMMING AT EACH LOCATION. EACH MONITORING AND CONTROL SITE AT WHICH COMMANDS WILL BE EXECUTED SHALL BE LOCALLY CONTROLLED UTILIZING A LOGIC CONTROLLER WHICH SHALL BE PROGRAMMED ACCORDING TO IEC 61131 STANDARDS. RADIO-BASED RTU'S SHALL REPORT BY POLLING AND/OR BY EXCEPTION THE SCADA SYSTEM SHALL BE FULLY EXPANDABLE UP TO 500 I/O POINTS IN ORDER TO MEET FUTURE NEEDS WITHOUT LOSS OF INVESTMENT IN EQUIPMENT TO BE INSTALLED UNDER THIS PROPOSAL. WHENEVER THE RADIO SYSTEM DESIGNED IS 900 MHZ SPREAD SPECTRUM, THE SSI SHALL PROVIDE A FUNCTIONAL RADIO TELEMETRY SYSTEM IN ACCORDANCE WITH PROPER PRE-DESIGN ANALYSIS, RADIO PATH ANALYSIS, AND FIELD SIGNAL STRENGTH MEASUREMENTS. INSTALLED 900 MHZ SPREAD SPECTRUM SYSTEM MUST YIELD THE USER A SYSTEM COMPARABLE TO A HIGHER POWER VHF/UHF OR 902/928 MHZ RADIO TELEMETRY SYSTEM WITH TRANSMISSIONS EXCEEDING 98.0% RELIABILITY BETWEEN ALL LOCATIONS.

B. SYSTEM EQUIPMENT SPECIFICATIONS:

1. EXISTING MASTER TERMINAL UNIT (MTU): THE MTU IS A CONTROLLER/INTERPRETER WHICH IS INSTALLED AT THE WATER TREATMENT PLANT AND SHALL BE MODIFIED/EXPANDED AS NECESSARY TO ACHIEVE THE MONITORING AND CONTROL FUNCTIONS DESCRIBED HEREINAFTER. THE MTU SHALL COMMUNICATE WITH AN OPERATOR INTERFACE TERMINAL (OIT) CONTAINING THE HUMAN MACHINE INTERFACE (HMI) SOFTWARE (VTS SCADA). THE MTU SHALL INCLUDE THE REQUIRED NUMBER OF OPERATOR INTERFACE TERMINALS ALONG WITH WHATEVER IS NECESSARY IN ORDER TO EFFECT GOOD COMMUNICATIONS, DATA ACQUISITION AND SUPERVISORY CONTROL TO AND WITH THE RTU'S. THE MTU SHALL INCLUDE SCADA ALARM SOFTWARE THAT WILL PROVIDE ALARM DIALING CAPABILITY AND AN INSQL HISTORIAN WITH REPORTING CAPABILITY. THE MTU SHALL BE CAPABLE OF RECEIVING THE FOLLOWING SITES:

- EDGEWOOD LIFT STATION

2. REMOTE TERMINAL UNIT (RTU): THE RTU IS A LOGIC CONTROLLER INSTALLED AT EACH REMOTE WELL SITE FOR THE CONTROL OF THE LOCAL EQUIPMENT AND THE MONITORING OF OPERATING PARAMETERS OF EACH SITE. EACH RTU SHALL CONTAIN A LOGIC CONTROLLER, RADIO, MODEM, POWER SUPPLIES, RELAYS, WIRING, CONDUIT, ANTENNA, CABLING, POWER/SURGE SUPPRESSION PROTECTION, BACKUP BATTERY/UPS AND NEMA 3R RATED ENCLOSURES.

3. ENCLOSURES W/BACK PANELS: NEMA 3R RATED ELECTRICAL AND INSTRUMENTATION ENCLOSURES TO HOUSE ELECTRONIC SCADA EQUIPMENT, CONTROL AND INSTRUMENTATION DEVICES PER THE CONSULTING ENGINEERS REQUIREMENTS SHALL BE PROVIDED. THE SSI SHALL INSTALL THE SCADA RTU EQUIPMENT PER THE PLANS. THE RTU SHALL BE SUFFICIENTLY SIZED TO INCORPORATE THE SCADA HARDWARE HARDWARE. THE RTU ENCLOSURE SHALL HAVE 25% SPARE CAPACITY.

4. LOGIC CONTROLLER (LC): AN LC IS A MICRO-PROCESSOR INSTALLED AT THE MTU AND/OR EACH RTU SCADA SITE TO INTERPRET INFORMATION REGARDING THE OPERATION AT THE SITE AND TO EXECUTE LOCAL COMMANDS OR COMMANDS SENT FROM OTHER SCADA SITES.

AS SPECIFIED:
ALLEN-BRADLEY MICROLOGIX 1400 OR APPROVED EQUAL
NOTE: WHEREVER POSSIBLE, ALL LOGIC CONTROLLERS SHALL BE OF THE SAME MODEL AND CONFIGURATION FOR ALL SITES IN ORDER TO PROVIDE THE OWNER WITH STANDARD PARTS FOR SERVICE CONTINUITY.

5. RADIO TRANSCEIVER: A RADIO TRANSCEIVER SENDS COMMANDS AND MONITORING INFORMATION BETWEEN THE SCADA SITES VIA RADIO FREQUENCY WAVES AS REQUIRED. THE RADIO WAVES ARE RECEIVED THROUGH A RADIO ANTENNA MOUNTED AT EACH SITE. A MODEM ALLOWS FOR RADIO TO CONTROLLER COMMUNICATION. THE TELEMETRY SIGNALS SHALL BE TRANSMITTED/RECEIVED OVER A RADIO SYSTEM OPERATING IN A HALF-DUPLEX MODE ON A SPREAD SPECTRUM FM RADIO TRANSCEIVER. THE RADIO EQUIPMENT SHALL BE CAPABLE OF OPERATING IN THE 902/928 MHZ UNLICENSED AREA OF THE RADIO SPECTRUM. SYSTEM SHALL USE A SINGLE OR DUAL FREQUENCY AS REQUIRED AND BE CAPABLE OF EITHER POINT TO POINT OR POINT TO MULTIPOINT MODES OF OPERATION. THE SSI SHALL PROVIDE A FIELD-BASED RADIO PATH SURVEY AND DESIGN THE SYSTEM FOR AT LEAST 98.0% RELIABILITY. THE SCADA RADIO MANUFACTURER SHALL DETERMINE THE OPTIMUM LOCATION FOR THE 900 MHZ OMNI DIRECTIONAL ANTENNA AND SHALL PROVIDE THE ANTENNA, MAST MOUNT AND COAXIAL CABLE REQUIRED. THE CONTRACTOR SHALL FURNISH AND INSTALL THE REQUIRED MAST USING TOWERS OR ANTENNA MASTS AGREED UPON BY OWNER AND OWNER'S ENGINEER. ANTENNA HEIGHT SHALL BE 15' MAXIMUM. A REPEATER SITE SHALL BE INSTALLED IF ESTIMATED MAST HEIGHT DETERMINED BY RADIO PATH STUDY EXCEEDS 15'.

AS SPECIFIED: PER SITE. FREEWAVE FGR2-PE WIRELESS DATA TRANSCEIVER SPREAD SPECTRUM TRANSCEIVER
NOTE: THE RADIO TRANSCEIVER SHALL BE EXTERNAL TO THE LOGIC CONTROLLER IN ORDER TO PROVIDE A SEPARATION OF MODULES IN THE EVENT OF DAMAGE TO EITHER UNIT. THE RADIO SHALL WORK WITH STANDARD ETHERNET 10BASE-T HARDWARE, INCLUDING CONTROLLERS, RTU'S, AND VIDEO SURVEILLANCE EQUIPMENT. REQUIRED CONDUIT RUNS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.

a) RADIO COMPONENTS
   1. EXTRUDED ALUMINUM, POWDER COATED 3.75"X 4.25"X 1.72" ENCLOSURE
   2. DATA INTERFACE: 10BASE-T, RJ45
   3. CONFIGURATION INTERFACE: RS-232, 9600 BAUD, DB9F
   4. LED INDICATORS: POWER, LINK, WANTX, WANRX, LANTX, LANRX, RSSI
   5. ANTENNA CONNECTOR: REVERSE GENDER TNC
b) RADIO FUNCTIONALITY
   1. FREQUENCY-HOPPING DATA RADIO
   2. VERY HIGH INTERFERENCE AND NOISE REJECTION ALLOWING RELIABLE COMMUNICATION IN HIGH POWER CELLULAR AND PAGING ENVIRONMENTS
   3. LICENSE-FREE OPERATION IN THE 902 – 928 MHZ ISM BAND
   4. INDUSTRIAL TEMPERATURE SPECIFICATION
   5. SUPPORTS POINT-TO-POINT, POINT-TO-MULTIPOINT, REPEATER AND REMOTE DIAGNOSTICS MODES
   6. IEEE 802.3 COMPLIANT
   7. CONVENIENT AND EASY-TO-USE CONFIGURATION MENU IS PROVIDED THROUGH A SEPARATE SERIAL PORT
   8. THE WIRELESS ETHERNET BRIDGE SHALL SUPPORT REMOTE CONFIGURATION
   9. INTERNAL CRC AND AUTO RE-TRANSMIT ENSURES RELIABLE TRANSMISSION
   10. APPROVALS – FCC PART 15.247, IC RSS210
   11. APPLICABLE STANDARDS – IEEE 802.3 COMPLIANT
c) ETHERNET RADIO
   1. RF POWER OUTPUT: THE UNIT MUST HAVE ADJUSTABLE RF POWER OUTPUT BETWEEN 1 MW AND 1000 MW
   2. SPREADING CODE: FREQUENCY HOPPING
   3. RECEIVER SENSITIVITY: AT LEAST -108 DBM
   4. DATA THROUGHPUT: (115/276) KBPS UNCOMPRESSED
   5. REJECTION: 70DB OUT OF BAND; 60DB IN BAND; 50 DB ADJACENT CHANNEL
   6. BUFFER CAPACITY: 256 FRAMES
   7. HOPPING PATTERNS: 64 USER SELECTABLE
   8. LAN ADDRESS MEMORY: UP TO 10,000 ADDRESSES
   9. DIAGNOSTICS: REMOTE CONTROL, STATISTICS, DIAGNOSTICS (UNITS MUST BE CAPABLE OF PROGRAMMING, DIAGNOSING AND CONTROLLING OTHER REMOTE RADIOS OVER THE AIRWAVES)
   10. ERROR DETECTION: 64 BITS OF CRC WITH OPTIONAL FEC
   11. POWER SUPPLY: UNIT MUST BE CAPABLE OF OPERATING ON A POWER SOURCE OF 10 TO 30 VDC
   12. POWER CONSUMPTION: 500MA MAX AT 12V AND 1W TX POWER; 300MA TYPICAL AT 12V AND 1W TX POWER
   13. OPERATING TEMPERATURE: -40 TO +75 C
   14. OPERATING MODES: POINT-TO-POINT, POINT-TO-MULTIPOINT, STORE AND FORWARD
   15. REPEATER: REPEATER SHALL HAVE ABILITY TO STORE AND FORWARD DATA UTILIZING 1 STAND ALONE RADIO
   16. SYSTEM SHALL BE CAPABLE OF HAVING UP TO 65535 SLAVES OR REPEATERS IN THE SAME NETWORK
   17. UNIT MUST HAVE ROAMING MASTER CAPABILITY (ROAMING MASTER SHALL SYNCHRONIZE WITH ANY MASTER IN THE SYSTEM AUTOMATICALLY)
   18. RSSI LEVELS SHALL BE READABLE FROM THE FRONT PANEL OF THE UNIT AT EVERY REMOTE SITE UTILIZING LED'S
   19. PROTOCOL: IMBEDDED MODBUS MASTER OR SLAVE
   20. ON-BOARD I/O: 1AI/1AO/2DI/2DO
   SPREAD SPECTRUM RADIO TRANSCEIVERS PROVIDED SHALL BE PER HT PLUS AS MANUFACTURED BY FREEWAVE TECHNOLOGY.

6. ANTENNA: AN ANTENNA MAY BE REQUIRED TO CONVEY RADIO COMMUNICATIONS BETWEEN RTU'S AND THE MTU AND IS DEPENDENT UPON COMPLETION OF A RADIO SURVEY.

A. ANTENNA, CABLE, MASTS AND POLES
THE SSI SHALL PROVIDE THE ANTENNA FOR EACH SITE AS REQUIRED ACHIEVING THE OVERALL COMMUNICATIONS REQUIREMENTS OF THE SYSTEM. ANTENNAS SHALL BE DIRECTIONAL AND/OR OMNI-DIRECTIONAL AS REQUIRED AND SUITABLE FOR OUTDOOR ENVIRONMENTS. THE OMNI DIRECTIONAL ANTENNAS SHALL BE OF ALL FIBERGLASS CONSTRUCTION AND RATED TO WITHSTAND AS LEAST 100 MPH WINDS WITH 1/2 INCH RADIAL ICE.

ADEQUATE LENGTHS OF 7/8" CABLE (ANDREW #LDF5-50A) SHALL BE SUPPLIED FOR CABLE RUNS OVER 150FT AND 5/8" CABLE (ANDREW #LDF4.5-50) SHALL BE SUPPLIED FOR CABLE RUNS UNDER 150FT SUPERFLEX COAXIAL CABLE, AS MANUFACTURED BY ANDREWS CORPORATION, SHALL BE PROVIDED FOR CONNECTION OF THE ANTENNA TO THE RADIO TRANSCEIVER AT EACH SITE. THE TRANSMISSION LINE SHALL BE TERMINATED ONLY IN CONNECTORS RATED FOR THE REQUIRED SERVICE. A LIGHTNING ARRESTOR (POLYPHASER #IS-B50LN-C2) SHALL BE PLACED BETWEEN THE TRANSCEIVER AND COAXIAL CABLE. A GROUNDING KIT SHALL BE USED TO GROUND THE COAXIAL CABLE SHIELD (ANDREW #SGL5-06B2-IP AND #SGL45-06B2-IP).

UNLESS SPECIFICALLY STATED, THE ANTENNAS SHALL BE ATTACHED TO EXISTING STRUCTURES, SUCH AS TANKS OR BUILDINGS. PARTICULAR ATTENTION SHALL BE GIVEN TO THE CORRECT INSTALLATION OF THE ANTENNAS TO GIVE ADEQUATE PROTECTION FROM NEARBY LIGHTNING STRIKES BY PROVIDING A LOW RESISTANCE DC PATH TO GROUND. INSTRUCTIONS FOR INSTALLING THESE ANTENNAS SHALL BE GIVEN TO THE CONTRACTOR SO AS TO INSURE RELIABLE OPERATION.

CONTRACTOR SHALL FURNISH ALL MOUNTING MASTS OR POLES AS REQUIRED TO SUPPORT THE ANTENNAS AT THE ELEVATIONS AND ORIENTATIONS REQUIRED. MASTS AND POLES SHALL BE SUITABLE FOR OUTDOOR ENVIRONMENTAL CONDITIONS, PROVIDE ADEQUATE SUPPORT AND PROTECTION FOR TRANSMISSION LINES AND BE PROVIDED COMPLETE WITH ALL NECESSARY MOUNTING ACCESSORIES. MINIMUM ACCEPTABLE TECHNICAL AND PHYSICAL SPECIFICATIONS OF THE ANTENNA SHALL BE AS FOLLOWS:

AS SPECIFIED: YAGI DIRECTIONAL ANTENNA
TYPE: ALUMINUM
GAIN: 9 DBD
LIGHTNING PROTECTION: DC GROUND THROUGH ALL METAL SUPPORT PIPE
SPECIFIC FREQUENCY: 896-970 MHZ
MAXIMUM POWER: 300 WATTS
VSWR: 1.5:1
BOOM LENGTH: 27 3/4"
BOOM DIAMETER: 7/8"
ELEMENTS: 6 GOLD ANODIZED
F/B RATIO: 16 DB
IMPEDANCE: 50 OHMS
MOUNTING: HEAVY-DUTY CAST-MOUNTING BRACKET, INCLUDED, UP TO 1 5/8" MAST VERTICAL OR HORIZONTAL POLARIZATION
TUNING: PRE-TUNED TO CENTER OF BANDWIDTH
ELEMENTS MATERIAL: 3/8" DIAMETER SOLID 6061-T6 ALUMINUM
BOOM MATERIAL: HEAT TREATED 6061 ALUMINUM TUBE
FINISH: PROTECTIVE GOLD
ASSEMBLY: FULLY ASSEMBLED ONE-PIECE UNIT
TERMINATION TYPE: N FEMALE

ANTENNAS SHALL BE MODEL Y8966 AS MANUFACTURED BY ANTENEX, AND SHALL BE PROVIDED BY THE SSI.

7. POWER SUPPLY: EACH RTU/MTU REQUIRES ALTERNATING CURRENT CONVERSION TO DIRECT CURRENT FOR OPERATIONS OF ITS COMPONENTS. A BATTERY PACK ALLOWS FOR DIRECT CURRENT FEED IN THE EVENT OF A POWER FAILURE. THIS BATTERY PACK WILL ENSURE CONTINUED OPERATION AND FLOW OF INFORMATION FROM THE RADIO AND LOGIC CONTROLLERS AT SCADA SITES DURING SHORT TERM POWER OUTAGES AND ENSURE MTU COMPUTER POWER SUPPLY BACKUP DURING SHORT- TERM POWER OUTAGES.

E1.4

S. Kanetzky
Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

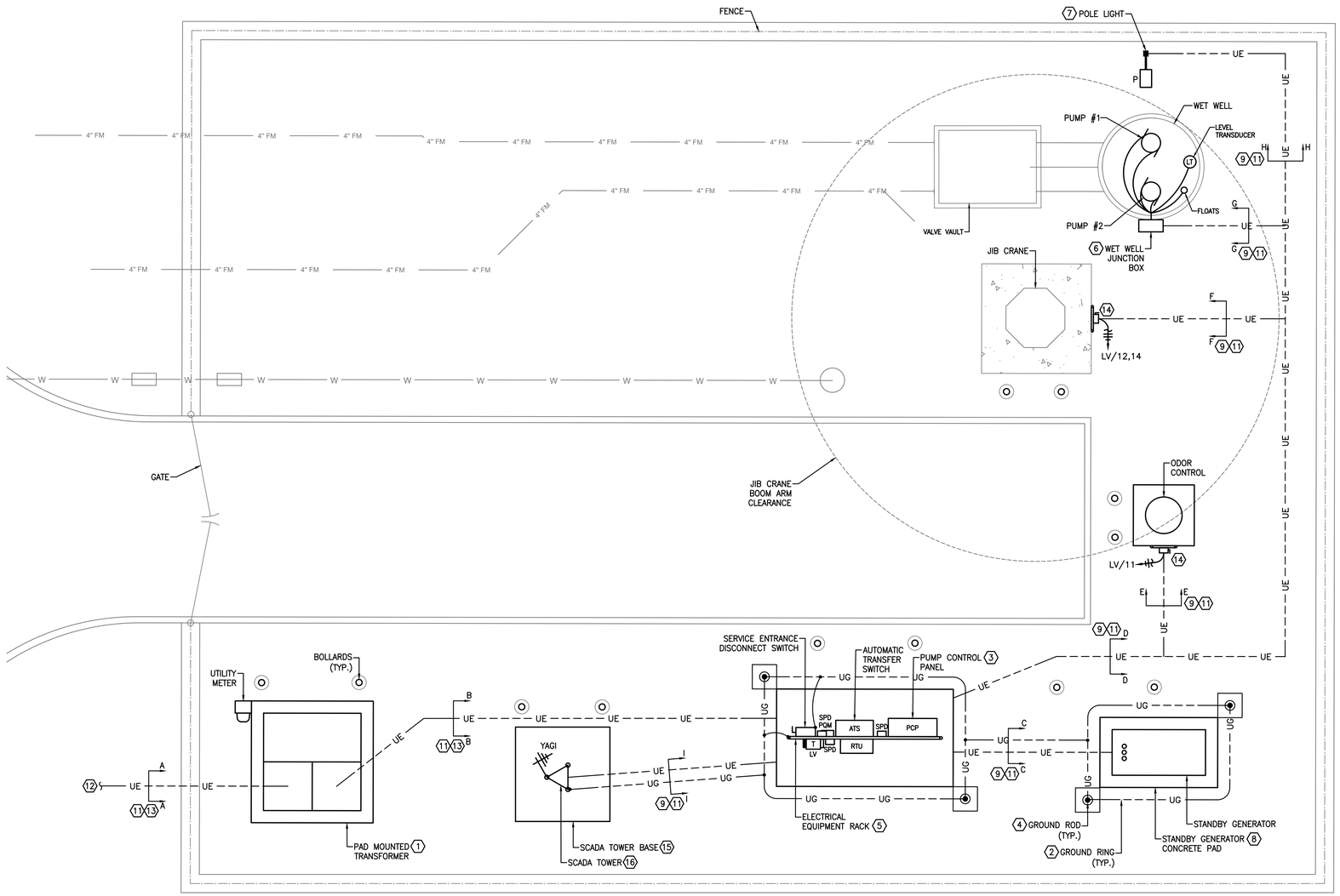
No.	REVISIONS	DATE	BY

KHA PROJECT 067783129
DATE OCTOBER 2023
SCALE: AS SHOWN
DESIGNED BY: CC
DRAWN BY: AH
CHECKED BY: SK

ELECTRICAL
SCADA SPECIFICATIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
72



1 E2.0 **ELECTRICAL SITE PLAN**
SCALE: 1" = 5'-0"

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

0 5' 10'
GRAPHIC SCALE (FEET)

REFERENCE NOTES

1. INSTALL NEW 100A, 277/480V, 3 PHASE 4 WIRE ELECTRIC SERVICE. CONTRACTOR TO COORDINATE WITH PERDENALES ELECTRIC COOPERATIVE, WWW.PEC.COOP (888) 554-4732. PROVIDE PULL STRING IN EACH CONDUIT. VERIFY EXACT LOCATION OF TRANSFORMER PRIOR TO INSTALLATION.
2. PROVIDE AND INSTALL #3/0 BARE COPPER GROUNDING RING. BOND EQUIPMENT RACKS, SCADA TOWER, AND GENERATOR SKID TO GROUNDING ELECTRODE SYSTEM VIA EXOTHERMIC WELD.
3. PROVIDE AND INSTALL PUMP CONTROL PANEL. REFER TO SHEET E5.0 & E5.1.
4. PROVIDE AND INSTALL GROUND RODS. REFER TO DETAIL 6/E4.0.
5. PROVIDE AND INSTALL EQUIPMENT RACK PER DETAILS 1/E4.1 & 2/E4.1.
6. PROVIDE AND INSTALL WET WELL JUNCTION BOX. REFER TO DETAIL 9/E4.0.
7. PROVIDE AND INSTALL POLE LIGHT. REFER TO DETAIL 3/E4.0.
8. PROVIDE AND INSTALL CONCRETE GENERATOR PAD FOR NEW STANDBY EMERGENCY GENERATOR. EXACT DIMENSIONS MAY VARY DEPENDING ON SELECTED MANUFACTURER.
9. REFER TO TRENCH SECTION DETAIL 1/E4.4 FOR CONSTRUCTION INFORMATION.
10. REFER TO ONCOR ELECTRIC CONDUIT ARRANGEMENT DETAILS ON SHEET E4.2.
11. REFER TO "CIRCUIT SCHEDULE" ON SHEET E3.0 FOR ADDITIONAL INFORMATION.
12. ELECTRICAL CONTRACTOR SHALL STUB OUT ELECTRICAL PRIMARY FEEDER 10' FROM SERVICE ENTRANCE TRANSFORMER. COORDINATE EXACT LOCATION AND CONNECTION WITH ELECTRICAL UTILITY AS REQUIRED.
13. REFER TO DUCTBANK SECTION DETAIL 2/E4.4 FOR CONSTRUCTION INFORMATION.
14. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL 30A/2P/NF/N4XSS/600V DISCONNECT SWITCH TYPE SQUARE D OR EQUAL FOR ODOR CONTROL AND JIB CRANE AS REQUIRED. TYPICAL.
15. ELECTRICAL CONTRACTOR SHALL PROVIDE NEW ANTENNA TOWER, ROHN #25G AND CONCRETE BASE. USE 2" CONDUIT AND SWEEPING ELBOW TO RUN CABLE. SIZE TO BE BASED ON RADIO SYSTEM STUDY PROVIDED BY SCADA CONTRACTOR.
16. RTU, TOWER, ANTENNA AND COAX CABLE TO BE PROVIDED AND INSTALLED BY SCADA CONTRACTOR. ENCLOSURE, CONDUIT, AND WIRE PULLING BY ELECTRICAL CONTRACTOR. INSTALL CONDUITS AND WIRE AS REQUIRED PER CIRCUIT SCHEDULE.

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-418-1791 FAX: 512-520-0768
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
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KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE	AS SHOWN
DESIGNED BY:	CC
DRAWN BY:	AH
CHECKED BY:	SK

ELECTRICAL SITE PLAN

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
73

E2.0

CIRCUIT SCHEDULE

TAG	CONDUIT	CONDUCTORS	FROM	TO	EQUIPMENT/FUNCTION
PF-100-01	2-4"C	PULL STRING	UTILITY	TRANSFORMER	POWER FEEDER
PF-100-02A	2"C	4#1	TRANSFORMER	SERVICE ENTRANCE DISCONNECT SWITCH	POWER FEEDER
PF-100-02B	2"C	PULL STRING	TRANSFORMER	SERVICE ENTRANCE DISCONNECT SWITCH	SPARE
PF-100-03	2"C	4#1, 1#6GND	SERVICE ENTRANCE DISCONNECT SWITCH	AUTOMATIC TRANSFER SWITCH	POWER FEEDER
PF-100-04	2"C	4#1, 1#6GND	AUTOMATIC TRANSFER SWITCH	PUMP CONTROL PANEL	POWER FEEDER
PF-101-01	1"C	2#12, 1#12GND	GENERATOR	PANEL LV	POWER FEEDER
PF-101-02	1"C	2#12, 1#12GND	GENERATOR	PANEL LV	POWER FEEDER
PF-102-01	2"C	4#1, 1#6GND	AUTOMATIC TRANSFER SWITCH	GENERATOR	POWER FEEDER
PF-102-02	2"C	PULL STRING	AUTOMATIC TRANSFER SWITCH	GENERATOR	SPARE
PF-103-01	1"C	5#6	SERVICE ENTRANCE DISCONNECT SWITCH	SURGE PROTECTION DEVICE	SURGE PROTECTION
PF-104-01	3/4"C	2#12, 1#12GND	POWER QUALITY METER	PANEL LV	POWER FEEDER
PF-200-01	1"C	3#10, 1#10GND	PUMP CONTROL PANEL	PUMP #1	POWER FEEDER
PF-200-02	1"C	3#10, 1#10GND	PUMP CONTROL PANEL	PUMP #2	POWER FEEDER
PF-200-03	2"C	PULL STRING	PUMP CONTROL PANEL	WET WELL J-BOX	SPARE
PF-300-01	1"C	2#8, 1#10GND	PUMP CONTROL PANEL	PANEL LV	POWER FEEDER
PF-300-02	3/4"C	4#10	PANEL LV	SURGE PROTECTION DEVICE	SURGE PROTECTION
PF-500-01	1"C	5#6	PUMP CONTROL PANEL	SURGE PROTECTION DEVICE	SURGE PROTECTION
PF-600-01	1"C	2#12, 1#12GND	PUMP CONTROL PANEL	SITE LIGHT	POWER FEEDER
PF-600-02	1"C	2#12, 1#12GND	PANEL LV	HOT BOX	POWER FEEDER
PF-600-03	1"C	2#10, 1#10GND	PANEL LV	JIB CRANE	POWER FEEDER
PF-600-04	1"C	2#10, 1#10GND	PANEL LV	ODOR CONTROL	POWER FEEDER
PF-600-05	3/4"C	2#12, 1#12GND	PANEL LV	RTU	POWER FEEDER
CC-101-01	1"C	8#14, 1#12 GND	GENERATOR	RTU	ALARMS/STATUS
CC-102-01	1"C	8#14	AUTOMATIC TRANSFER SWITCH	GENERATOR	CONTROLS CIRCUIT
CC-103-01	3/4"C	CT CONDUCTORS	AUTOMATIC TRANSFER SWITCH	POWER QUALITY METER	INSTRUMENTS
CC-103-02	1"C	1-CAT6	POWER QUALITY METER	SCADA RTU	COMMUNICATION
CC-200-01	1"C	8#14	PUMP CONTROL PANEL	PUMP OVER TEMP & SEAL FAIL	CONTROLS CIRCUIT
IC-200-01	1"C	STP CABLE AS REQUIRED	PUMP CONTROL PANEL	LEVEL TRANSDUCER	INSTRUMENTATION CIRCUIT
IC-200-02	1"C	10#14	PUMP CONTROL PANEL	WET WELL FLOATS	INSTRUMENTATION CIRCUIT
IC-200-03	2"C	COAX	SCADA RTU	SCADA ANTENNA	SCADA COMMUNICATION

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOG NO.	LAMP			FIX. WATTS	VOLTS	MOUNTING	REMARKS
			TYPE	LUMENS	COLOR TEMP				
A	LITHONIA	FEM L48 4000LM IMAFD MD MVOLT GZ10 40K 80CRI	LED	4,000	4000K	23.8	120	SURFACE	HIGH-EFFICIENCY LED. SUITABLE FOR WET, DAMP, AND/OR COLD LOCATIONS
P	LITHONIA	CSX1 LED 60C 700 40K TFTM MVOLT RPA PER DDBXD	LED	16,710	4000K	134	120	POLE	LED FULL CUTOFF #RSA-16-4-C-DM19AS-FBC-VD-DDB (16' ROUND ALUMINUM POLE)

PANEL LV

AMPS: 60A PRIMARY MCB /70A SECONDARY MCB — **PHASE:** 1 — **MOUNTING:** SURFACE
VOLTAGE: 240/120V — **WIRE:** 3 — **MINIMUM AIC RATING:** 10 KAIC
LOCATION: LIFT STATION — **BUSSING:** COPPER
FED FROM: 15 KVA XFMR — **NEMA:** 4X SS 316 STAINLESS STEEL

CKT. NO.	SERVICE DESCRIPTION	WIRE	BKR	POLES	KVA	A	B	KVA	POLES	BKR	WIRE	SERVICE DESCRIPTION	CKT. NO.
1	RECEPTACLE	12	20	1	0.5	1.0		0.5	1	20	12	POLE LIGHT	2
3	LIGHTS	12	20	1	1.0		1.0	0.0	2	30	10	SPD	4
5	POWER QUALITY METER	12	20	1	0.5	0.5		0.0				|	6
7	RTU	12	20	1	0.5		1.5	1.0	1	20	10	GEN. BATT. CHARGER	8
9	HOT BOX	12	20	1	0.5	2.0		1.5	1	20	10	GEN. BLOCK HEATER	10
11	ODOR CONTROL	12	20	1	1.0		2.5	1.5	2	30	10	JIB CRANE	12
13	SPARE		20	1	0.0	1.5		1.5				|	14
15	SPARE		20	1	0.0		0.0	0.0	1	20		SPARE	16
17	SPARE		20	1	0.0	0.0		0.0	1	20		SPARE	18
19	SPARE		20	1	0.0		0.0	0.0	1	20		SPARE	20
21	SPARE		20	1	0.0	0.0		0.0	1	20		SPARE	22
23	SPARE		20	1	0.0		0.0	0.0	1	20		SPARE	24
					PHASE LOAD IN KVA:	5.0	5.0						
					PHASE LOAD IN AMPS:	42	42						

NOTE: EATON D MINI POWER-CENTER 15KVA/480-120-240V

EDGEWOOD LOAD CALCULATION

	UTILITY			GENERATOR	
	HP	AMPS	KVA	STARTING	STEP
MISC. LIGHTS, CONTROLS, MISC. 120V		31	15	N/A	1
MOTORS					
PUMP #1	9	11.7	9.7	FVNR	2
PUMP #2	9	11.7	9.7	FVNR	3
25% OF LARGEST MOTOR		3	2		
25% SPARE		14	9		
DESIGN KVA TOTAL			45		
DESIGN AMPS @ 277/480 VOLTS, 3 PHASE		71			

NOTE: THE ELECTRICAL SERVICE IS DESIGNED TO RUN TWO 9 HP PUMPS AND ALL MISC. LOADS.

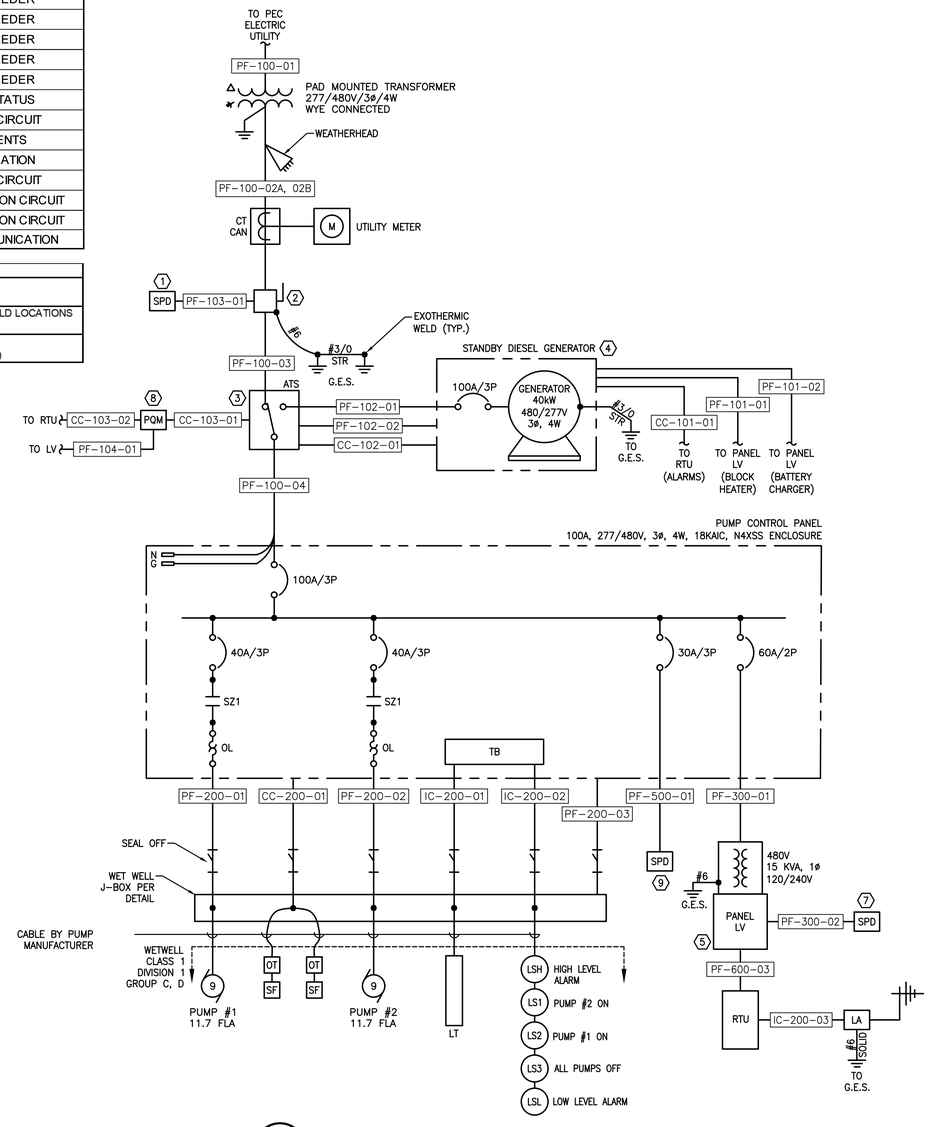
SHORT CIRCUIT CURRENT CALCULATION:
ASSUMPTION: 1-75KVA PAD MOUNTED TRANSFORMER

FULL LOAD AMPS:
FLA=(1*75)=75KVA
(75000)/(480*1.73) = 91A FLA

INFINITE BUS SHORT CIRCUIT CURRENT CALCULATION:

ASSUMPTION: %Z=1.8

SCCR = (100 / %Z) * FLA
(100/1.8) * 91 = 5,055 A



1 E3.0 **LIFT STATION ONE-LINE DIAGRAM** 6
SCALE: NTS

REFERENCE NOTES

1. PROVIDE AND INSTALL SPD, EATON SPD-200-480Y-3-P OR EQUAL IN A NEMA 4XSS STAINLESS STEEL ENCLOSURE. CONNECT TO LOAD SIDE.
2. PROVIDE AND INSTALL MAIN DISCONNECT SWITCH 100A/3P/100AF/N4XSS/600V/SN/SE SQUARE D OR EQUAL. USE BUSSMANN #FRS-R-100 OR EQUAL WITH FACTORY NEUTRAL KIT AND GROUND BAR.
3. PROVIDE AND INSTALL AUTOMATIC TRANSFER SWITCH, 100 AMP, 4 POLE, 600V, NEMA 4XSS ASCO OR EQUAL.
4. PROVIDE AND INSTALL STANDBY GENERATOR 40 KW, 277/480V, 3 PHASE, 4-WIRE.
5. PROVIDE AND INSTALL MINI POWER CENTER AS PANEL "LV", EATON OR EQUAL. REFER TO PANEL LV SCHEDULE THIS SHEET.
6. ALL ELECTRICAL EQUIPMENT ENCLOSURES SHALL BE NEMA 4XSS.
7. PROVIDE AND INSTALL SPD, EATON SPD-050-240S-3-P OR EQUAL IN A NEMA 4XSS ENCLOSURE. CONNECT TO LOAD SIDE.
8. PROVIDE AND INSTALL POWER QUALITY METER EATON 2280 OR EQUAL. REFER TO 2/E4.0 FOR ADDITIONAL INFORMATION.
9. PROVIDE AND INSTALL SPD, EATON SPD-100-480Y-3-P OR EQUAL IN A NEMA 4XSS ENCLOSURE. CONNECT TO LOAD SIDE.

No.	REVISIONS	DATE	BY

Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

KHA PROJECT 067783129	DATE OCTOBER 2023	SCALE: AS SHOWN	DESIGNED BY: CC	DRAWN BY: AH	CHECKED BY: SK

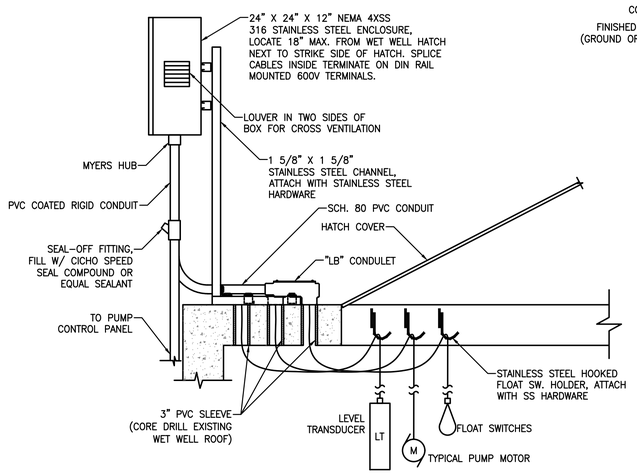
ELECTRICAL ONE-LINE AND SCHEDULES

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

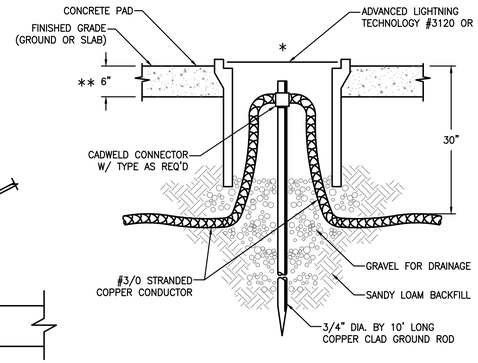
SHEET NUMBER
74

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

E3.0



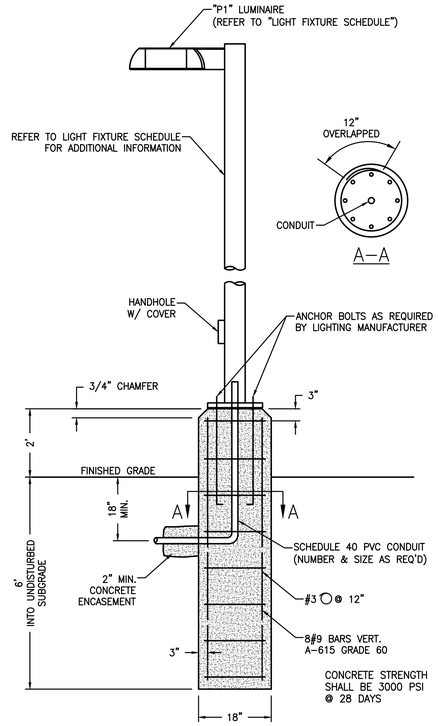
9 E4.0 DETAIL - WET WELL JUNCTION BOX (1)
SCALE: NTS



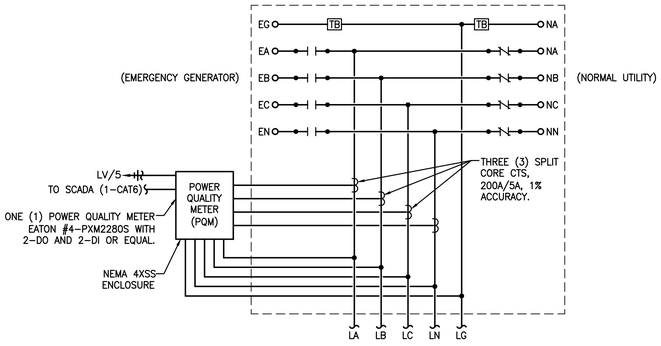
* INSTALL GROUND RODS AWAY FROM HEAVY TRAFFIC AREAS AND SIDEWALKS. COORDINATE EXACT LOCATION WITH CIVIL DRAWINGS.

** INSTALL 2'X2'X6" CONCRETE PAD.

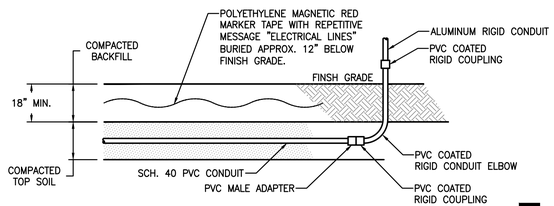
6 E4.0 DETAIL - 3/4" X 10' GROUND ROD
SCALE: NTS



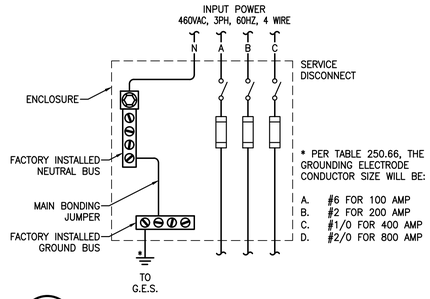
3 E4.0 DETAIL - POLE MOUNTED LIGHTING FIXTURE
SCALE: NTS



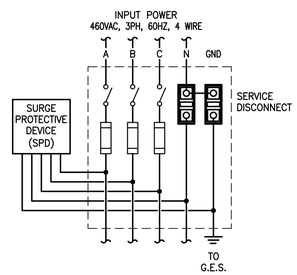
2 E4.0 DETAIL - POWER QUALITY METER (PQM)
SCALE: NTS



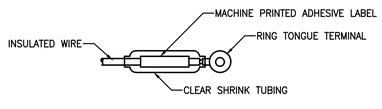
1 E4.0 DETAIL - TYPICAL UNDERGROUND CONDUIT RUN
SCALE: NTS



8 E4.0 DETAIL - GROUNDING SERVICE DISCONNECT
SCALE: NTS

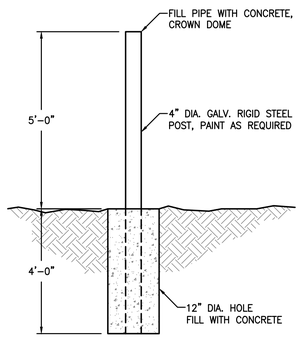


5 E4.0 DETAIL - SURGE PROTECTION DEVICE (SPD)
SCALE: NTS



WHERE POSSIBLE RING TERMINALS SHALL BE USED. ONE OF THE ABOVE METHODS MUST BE USED ON ALL WIRE #8 AWG & SMALLER. THE SAME MUST ALSO BE USED ON LARGER WIRE UNLESS AN ALTERNATE METHOD IS SUBMITTED & APPROVED.

7 E4.0 DETAIL - WIRE TERMINATION AND MARKING
SCALE: NTS



4 E4.0 DETAIL - BOLLARD (2)
SCALE: NTS

REFERENCE NOTES

(1) COORDINATE INSTALLATION OF WET WELL JUNCTION BOX WITH SITE CONDITIONS AND SHEET E2.0

(2) BOLLARD SHALL BE PAINTED YELLOW, TYPICAL.

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
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KHA PROJECT 067783129
DATE OCTOBER 2023
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DESIGNED BY: CC
DRAWN BY: AH
CHECKED BY: SK

ELECTRICAL DETAILS

SKE
S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
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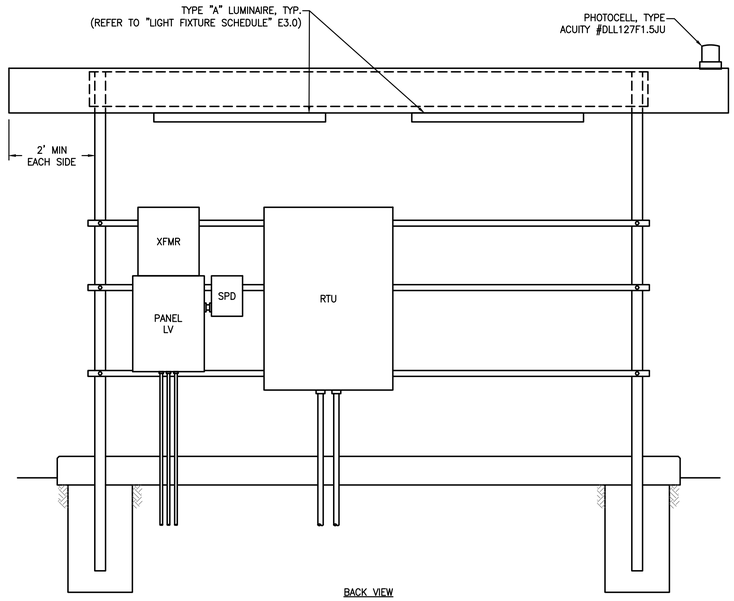
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
75

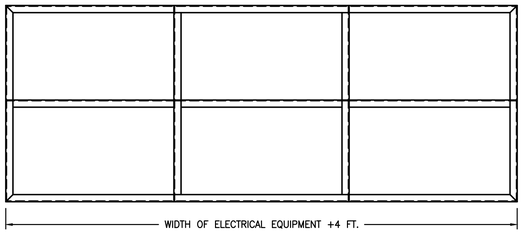
E4.0

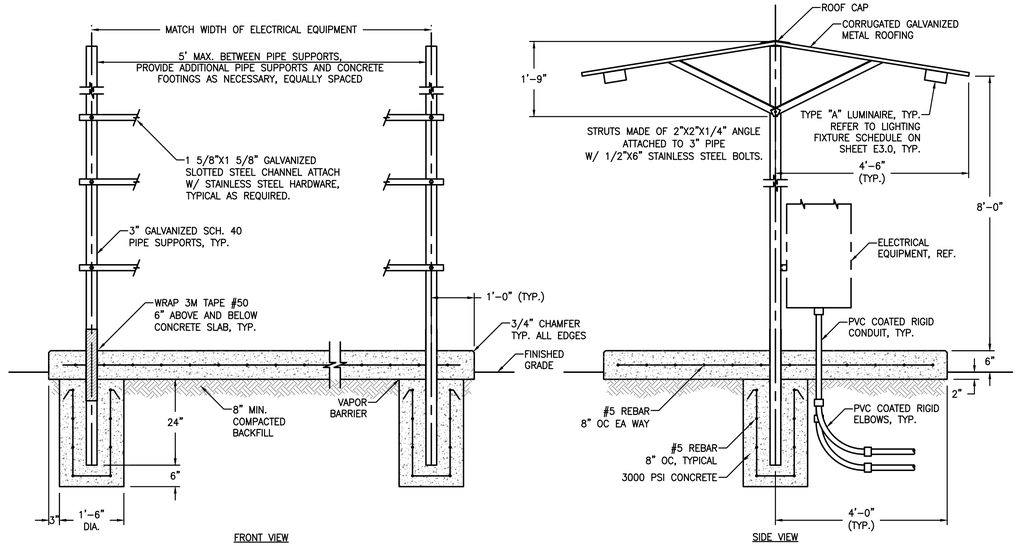
REFERENCE NOTES

1. ELECTRICAL CONTRACTOR SHALL CONNECT PHOTOCELL TO THE SITE LIGHT FIXTURE THOUGH SWITCH LOCATED ON RACK.



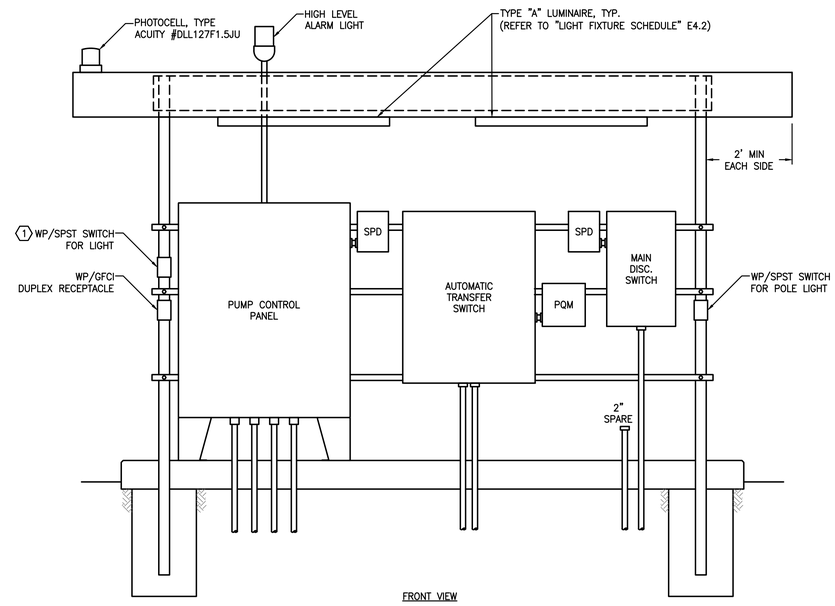
BACK VIEW





NOTE:
ALL FABRICATED STEEL COMPONENTS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION. ALL FASTENERS SHALL BE STAINLESS STEEL.

1 DETAIL - TYPICAL RACK SUPPORT AND ROOFING
E4.1 SCALE: NTS



FRONT VIEW

2 DETAIL - TYPICAL ELECTRICAL EQUIPMENT INSTALLATION
E4.1 SCALE: NTS

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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
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S. Kanetzky
Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
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ELECTRICAL DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
76

E4.1

TRENCH SPECIFICATIONS:

Installation of conduit:

1. Minimum cover to be 30" from the top of primary conduit to sub-grade.
2. Bottom of trench shall be sanded to provide smooth, even support for conduits.
3. Sand to be placed directly around conduits for initial backfill.
4. There is to be a minimum of 12" separation between electrical conduits and all other utilities' conduits.
5. Warning tape to be a minimum of 12" above electrical conduits.
6. Concrete or flowable fill to be poured around all conduit crossings and 90-degree bends. On conduit bends of other angles, concrete or flowable fill may be required upon inspection.
7. Trench may be used jointly if adequate separation is provided. (See drawings 510-014, 510-022, 510-023, 510-024 and 510-025).
8. Conduit may be under pavement if a depth of 30" cover to sub-grade is maintained.
9. Trench may be on property if adequate depth is maintained. "Adequate depth" is defined as 30" below the lowest point between the edge of pavement and property line.

Inspection schedule:

1. After primary conduit installation.
2. After initial backfill.
3. After secondary conduit installation.
4. After remainder of initial backfill and warning tape.
5. After secondary backfill (rock-free dirt).

Failure to receive inspection will require removal of the backfill to allow inspection.

DEVELOPER/CONTRACTOR CONTRIBUTION:

1. Payment to PEC for materials per the Line Extension Policy.
2. Trench.
3. Conduit:
   a. 3" conduit Schedule 40, conduit bends Schedule 80 with 3", 36" minimum radius and accessories.
   b. 4" conduit Schedule 40, conduit bends Schedule 80 with 4", 48" minimum radius and accessories.
   c. Conduit for service will be sized as needed.
   d. 2" conduit for controls or temporary service only.
   e. Conduit bends with a 24" radius may be used only for secondary.

   NOTE: Contractor may be required to pull a mandrel, of a diameter not less than 80% of the inside diameter of the conduit through all conduits, under the supervision of a PEC representative.
4. Conduit spacers.
5. Transformer pads.
6. Meter pedestal pads.
7. Underground secondary enclosures and extensions.
8. Ground rods and clamps.
9. Polyester pulling tape (2,500-pound tensile strength) in all conduit. No knots to be tied in the mule tape. It must be a continuous run.
10. Sand for initial backfill.
11. Rock-free dirt over initial backfill.
12. 1/2" to 3/4" gravel for the bottom of vaults and secondary enclosures.
13. Concrete or flowable fill where required. Flowable fill is NOT allowed as a substitute for concrete for PEC equipment pads. Flowable fill may be used as backfill in situations where trench settling may be an issue or anywhere that does not require structural strength. The 28-day compressive strength range when tested must be a minimum of 300-psi. Flowable fill is NOT a substitute for concrete except where explicitly listed in the Underground Installation Specifications.
14. Install meter socket when metering on building.
15. Furnish and install any gang-type meter sockets.
16. Primary enclosures and extensions (if applicable).
17. Meter sockets (PEC will provide pedestal-mounted sockets only).
18. Switchgear (if applicable).
19. Bollards, if deemed necessary by PEC to protect electrical equipment. Design must be approved by PEC prior to installation.

MEMBER'S RESPONSIBILITY:

Meter pedestals are approved by PEC. In situations where meter pedestals are used, the following conditions will apply:

1. Purchase and install circuit breaker in box. Circuit breakers are the bolt-in type. The box will accommodate 150 and 200 amp breakers. The breaker must have an interrupting capacity of 10,000 amps rated at 240 volts. GE Cat. No. TQD22 (amp needed) WL and Eaton Cuttler-Hammer FD2200 or equal (old Westinghouse # CA2200W).
2. Install insulated jumpers from bottom of meter socket to top of breakers.
3. Install galvanized rigid conduit, Schedule 40 PVC or an approved equal from pedestal pad to bottom of box.
4. Member will be responsible for the installation of underground cable from the meter pedestal to the house and the connections to the bottom of the circuit breakers. The underground cable used from the meter pedestal to the house shall be an approved type for underground installation (USE or UF type). Conductor size will be based on member load, location of meter and National Electrical Code for size of conduit.

Refer to applicable drawings within these specifications.

REV	B	DATE	07/09/2020	REVISION	ADD 2" CONDUIT AND FLOWABLE FILL NOTES	BY	RWC	CHK	SSS	APR	MMG

UNDERGROUND INSTALLATION SPECIFICATIONS

DEVELOPER/MEMBER/PEC SUPPLIED MATERIAL
PAGE 1 OF 2

drawn:	approved:	date:	
RWC	MMG	07/09/2020	500-100

MEMBER'S RESPONSIBILITY CONTINUED:

5. Underground conductor from secondary enclosure/transformer to meter shall have 24" of cover. This depth may be reduced to 18" when a 2" supplemental protective covering of concrete or flowable fill is provided. If rigid conduit is used, the depth can be reduced by 6". Red electric warning tape is also required in the ditch.
6. Apply and receive all applicable inspections.
7. When all work is completed according to specifications, notify PEC you are ready for electric service. PEC will make the connect and set the meter on a routine connect order.
8. For commercial and residential applications, the member shall supply the CT enclosure (if needed) and all secondary cable in accordance with the National Electrical Code.

PEC CONTRIBUTION PAID FOR BY DEVELOPER/MEMBER AS INDICATED ON THE LINE EXTENSION POLICY:

1. Primary conductors.
2. Secondary conductors.
3. Cable terminations.
4. Transformers.
5. Meter pedestals.
6. Switchgear.
7. Secondary GelPort connectors.
8. Meter socket combo.

PEC RESPONSIBILITY:

1. Furnish and install meter pedestal.
2. Furnish and install combination meter socket and breaker box.
3. Install jumper wires from top of meter socket to pedestal connector and set meter on connect order after all work has been completed.

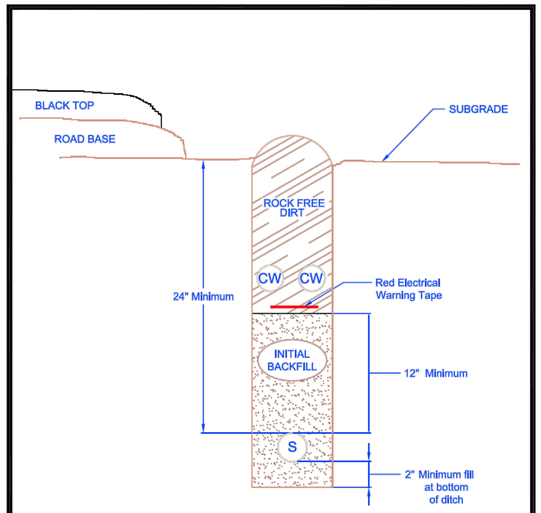
Refer to applicable drawings within these specifications.

REV	B	DATE	07/09/2020	REVISION	ADD 2" CONDUIT AND FLOWABLE FILL NOTES	BY	RWC	CHK	SSS	APR	SSS

UNDERGROUND INSTALLATION SPECIFICATIONS

DEVELOPER/MEMBER/PEC SUPPLIED MATERIAL
PAGE 2 OF 2

drawn:	approved:	date:	
RWC	MMG	07/09/2020	500-100



Reference Drawing
510-009-0911 for
Typical Trench Details

PEDERNALES ELECTRIC COOPERATIVE, INC.
URD DEVELOPER'S SPECIFICATIONS

1Ø Conduit Arrangement for Service 0 to 600 Volts

drawn:	approved	date:	drawing number:
JBS	MJB	December 12, 2011	510-016-0911

Typical for All Pads

1. Require 3" conduit (unless otherwise specified by PEC) with bell-end fittings to extend 1 1/2" to 2" above pad.
2. Pads must extend a minimum of 4" above final grade and 1 1/2" below final grade. All pads must be placed on a slope less than or equal to 3:1. If greater than 3:1, contractor must bring slope to required grade.
3. All disturbed soil underneath pad must be replaced by concrete.
4. All ground rods shall be 3/4" X 10' copper-clad with clamp and must extend 3" above top of pad.
5. Wood float finish leaving pad square and level with no dips or crown.
6. **Contact PEC before pouring concrete and comply with the following instructions:**
   - Pre-pour inspection: Check framing and layout of pad and conduit components.
   - Final inspection: Overall review of pad and conduits. Ensure bell ends are on conduit.

Typical for Single-Phase Transformer, Combination, Sectionalizer, and Secondary Pads

7. Concrete to have minimum strength of 3,000 PSI.
8. Steel reinforcing shall be 6" X 6" No. 10 wire mesh or 3/8" re-bar on 12" center to stop 1" from the sides.

Typical for Three-Phase Transformer Pads

9. Concrete testing, 4,000 PSI; 4%-6% entrained air, 3/4" maximum-size aggregate.
10. Steel reinforcement shall be 3/8" re-bar on 12" center to stop 1" from sides.
11. Minimum concrete cover over reinforcing steel 2" unless noted.

Typical Trench Details

12. Schedule 40 electrical-grade PVC conduit. Schedule 80 electrical-grade conduit can be used in place of sand in secondary-only trenches.
13. Initial backfill shall be manufactured or commercial sand. Minimum 3/8" pea gravel may be used for initial backfill in flood-prone areas.
14. With PEC approval, minimum cover requirements may be reduced by six inches with every two inches of 3,000 PSI concrete poured directly onto conduit. ***Contact PEC before pouring concrete.***
15. If any type of vault or pedestal for the underground electric is planned, then all other utilities should be routed around these facilities.
16. For 2" and **smaller** waterlines, special permission must be granted by PEC. Water lines larger than 2" will not be allowed in PEC trench.
17. Refer to drawings 510-023 and 510-025 for PEC specifications and trench details on gas joint trench installations.

Conduit Legend
Typical in All Drawings

(P) Primary Conduit (S) Secondary Conduit (CW) Communications or Water (G) Gas Line (AS) Alternate Secondary Conduit

Primary Phasing Legend

Phasing for three-phase primary applications: pad-mounted enclosures, combination pads, three-phase transformers, and three-phase risers.

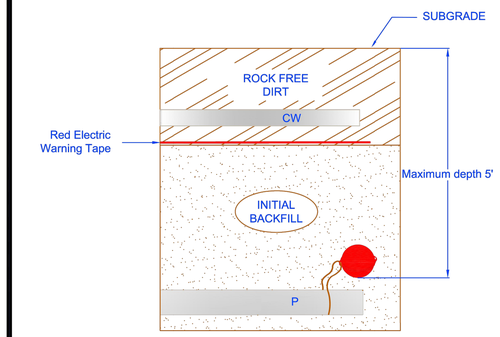
R (P) Red = Phase A B (P) Blue = Phase B Y (P) Yellow = Phase C

REV	C	DATE	09/01/2023	REVISION	ADDED PRIMARY PHASING LEGEND	BY	RWC	CHK	SSS	APR	MMG

UNDERGROUND INSTALLATION SPECIFICATIONS

TYPICAL NOTES REFERENCE PAGE

drawn:	approved:	date:	
RWC	MMG	09/01/2023	510-009



Model Number # 1402-XR

Stock # 80611161144

NOTES:

1) 3M Electronic Marking System Extended Range Ball Marker's are required at locations deemed necessary by PEC.
2) PEC inspector will deliver marker balls to developer's contractor for installation.
3) Ball markers must be tied to the conduit ends using the tie down tabs provided.
4) The XR Ball Marker cannot reliably re-radiate the locator's signal at a depth greater than 5 feet, this is the maximum allowable distance between ball marker and subgrade.
5) Hand fill at least 6 inches of soil over the marker to prevent movement or damage during backfill.

PEDERNALES ELECTRIC COOPERATIVE, INC.
URD DEVELOPER'S SPECIFICATIONS

3M Electronic Marking System Extended Range Ball Marker

drawn:	approved	date:	drawing number:
DBS	MJB	July 18, 2016	580-010-0911

No.	REVISIONS	DATE	BY

Kimley»Horn

501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623

STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
1/18/23

KHA PROJECT 067783129	DESIGNED BY:	CC
DATE OCTOBER 2023	DRAWN BY:	AH
SCALE: AS SHOWN	CHECKED BY:	SK

ELECTRICAL DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

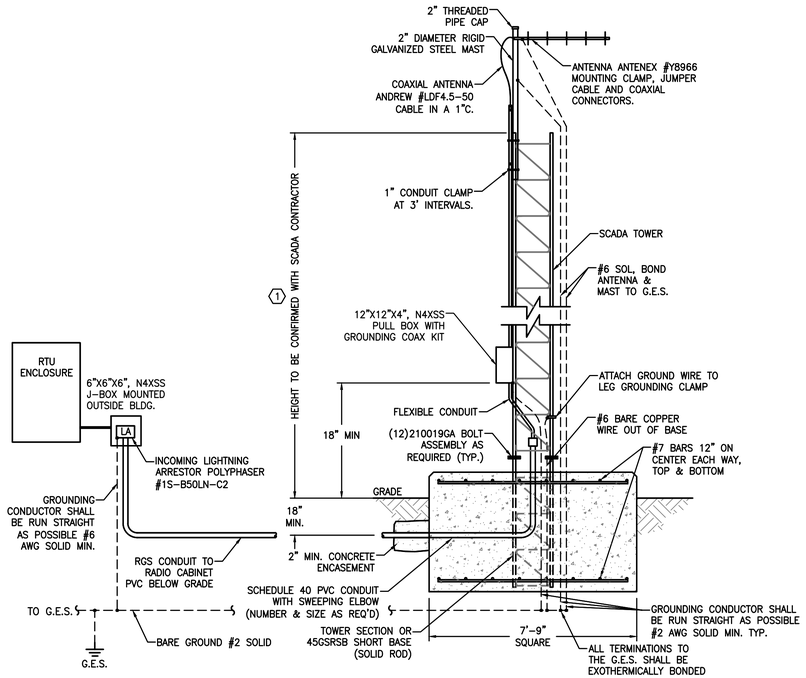
SHEET NUMBER
77

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

E4.2

REFERENCE NOTES

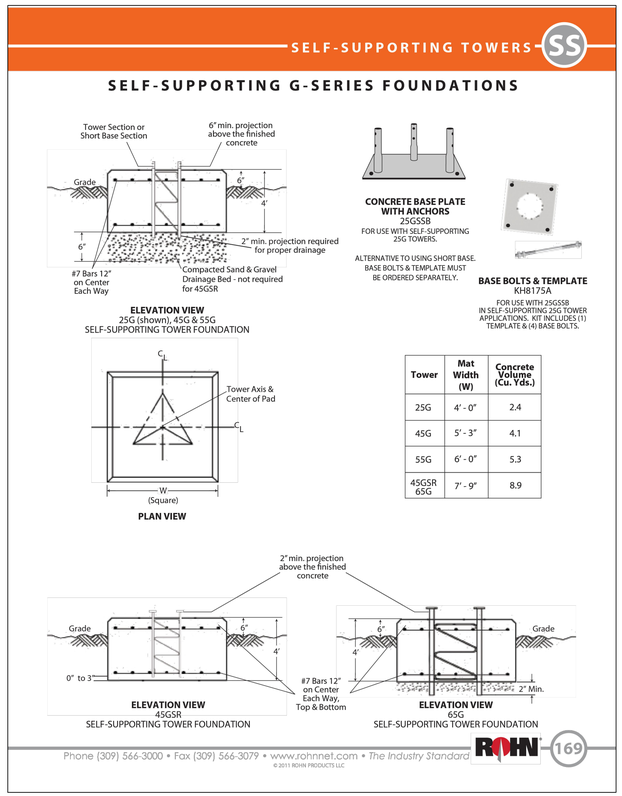
1. SCADA CONTRACTOR SHALL DETERMINE THE FINAL HEIGHT AFTER CONDUCTING A LINE OF SITE STUDY.



NOTE: CONCRETE STRENGTH SHALL BE A MIN. OF 4500 PSI @ 28 DAYS

1 / E4.3 DETAIL - SCADA TOWER BASE MOUNTING

SCALE: NTS



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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
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ELECTRICAL DETAILS

SKE
S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
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EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
78

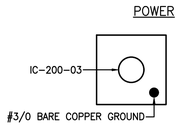
E4.3

REFERENCE NOTES

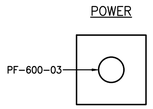
1. REFER TO CIRCUIT SCHEDULE ON SHEET E3.0 FOR MORE INFORMATION.
2. SEE DETAIL 2/E4.4 FOR DUCTBANK CONSTRUCTION DETAIL.
3. SEE DETAIL 1/E4.4 FOR TRENCH CONSTRUCTION DETAIL.

GENERAL NOTE

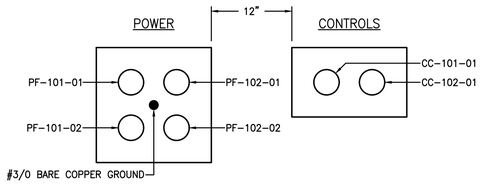
1. IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROVIDE AND INSTALL ALL RACEWAYS AND CONDUCTORS CUMULATIVELY BETWEEN THE DUCT BANK DETAILS, PANEL SCHEDULE, I/O SCHEDULE, AND CIRCUIT SCHEDULE.
   THE CIRCUIT SCHEDULE, I/O SCHEDULE AND PANEL SCHEDULES TAKE PRECEDENCE OVER THE DUCTBANK DETAILS.



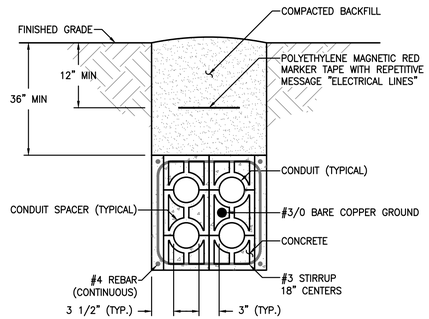
11 / E4.4 DETAIL - TRENCH SECTION I-I (1)(3)
SCALE: NTS



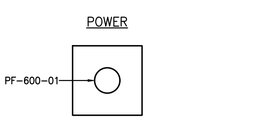
8 / E4.4 DETAIL - TRENCH SECTION F-F (1)(3)
SCALE: NTS



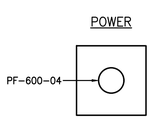
5 / E4.4 DETAIL - TRENCH SECTION C-C (1)(3)
SCALE: NTS



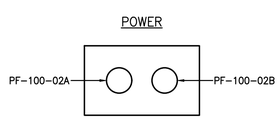
2 / E4.4 DETAIL - DUCTBANK SECTION CONSTRUCTION (TYPICAL)
SCALE: NTS



10 / E4.4 DETAIL - TRENCH SECTION H-H (1)(3)
SCALE: NTS



7 / E4.4 DETAIL - TRENCH SECTION E-E (1)(3)
SCALE: NTS



4 / E4.4 DETAIL - DUCTBANK SECTION B-B (1)(2)
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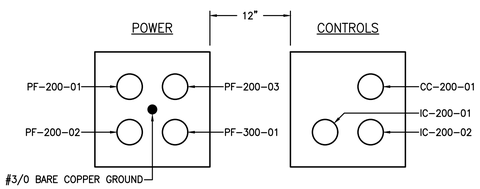
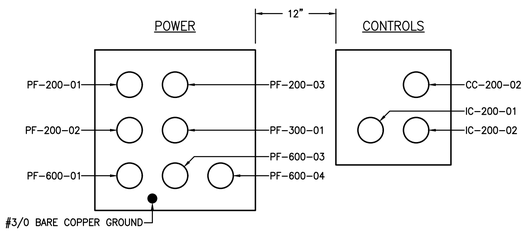
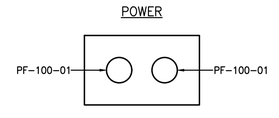


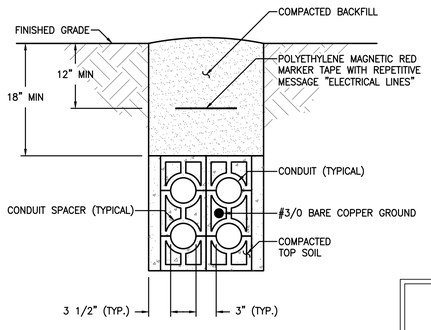
9 / E4.4 DETAIL - TRENCH SECTION G-G (1)(3)
SCALE: NTS



6 / E4.4 DETAIL - TRENCH SECTION D-D (1)(3)
SCALE: NTS



3 / E4.4 DETAIL - DUCTBANK SECTION A-A (1)(2)
SCALE: NTS



1 / E4.4 DETAIL - TRENCH SECTION CONSTRUCTION (TYPICAL)
SCALE: NTS

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

No.	REVISIONS	DATE	BY

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

KHA PROJECT 067783129
DATE OCTOBER 2023
SCALE: AS SHOWN
DESIGNED BY: CC
DRAWN BY: AH
CHECKED BY: SK

ELECTRICAL DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

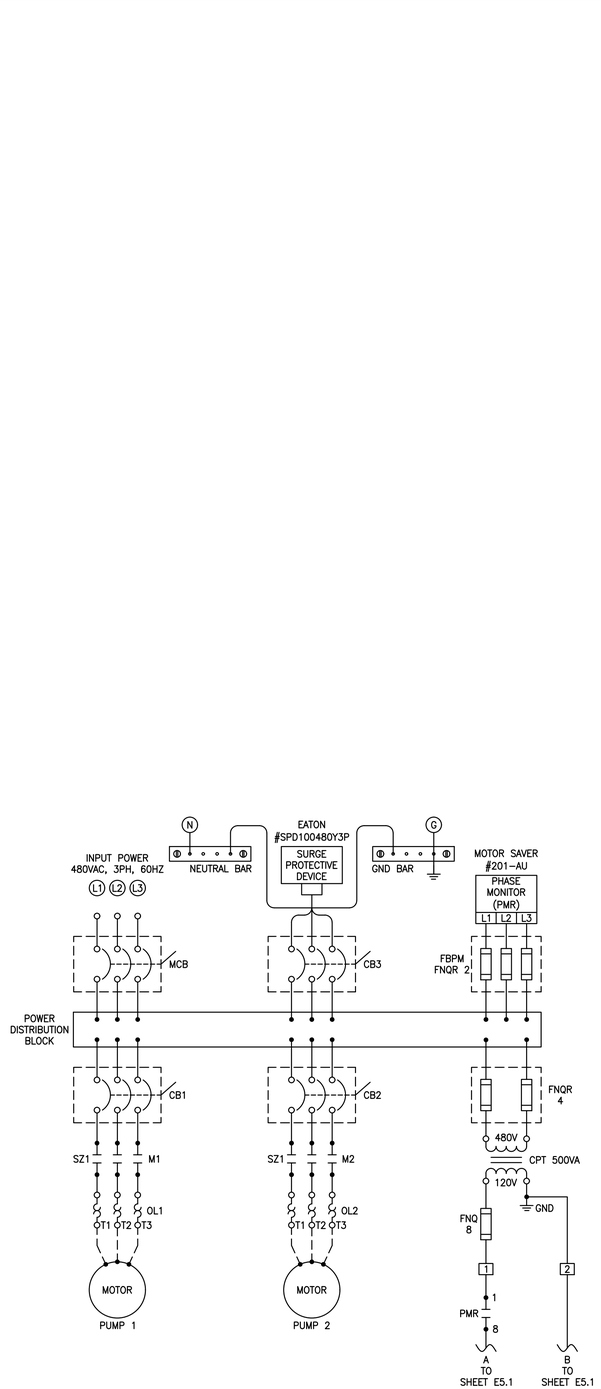
SHEET NUMBER
79

SKE
S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

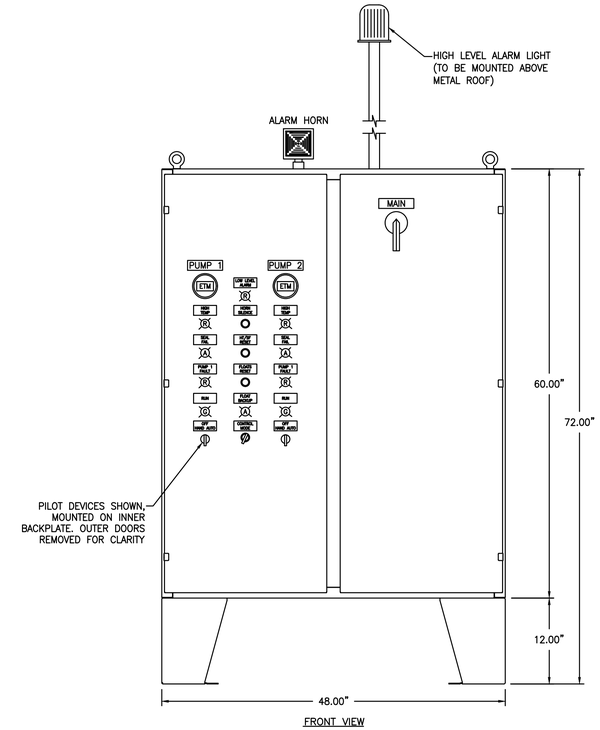
E4.4

REFERENCE NOTES

1. PUMP CONTROL PANEL WIRING IS TYPICAL. FINAL HARDWARE CONFIGURATION WILL VARY ACCORDING TO PUMP CONTROL PANEL SPECIFICATIONS.
2. DUPLEX PUMP CONTROL PANEL, 480V, 3 PHASE, UL805A LABELED. VERIFY EXACT PUMP SIZES AND SIZE CIRCUIT BREAKERS AND OVERLOADS ACCORDINGLY. THE PUMP CONTROL PANEL SHALL BE MANUFACTURED BY 5 STAR ELECTRIC, SAN ANTONIO, TEXAS 1(800) 229-8965, CONTROL PANELS USA, INC. (512) 863-3224) OR APPROVED EQUAL.
3. PROVIDE AND INSTALL NEMA RATED CLASS 8536 STARTERS.



2 PUMP CONTROL PANEL WIRING DIAGRAM (1)(2)(3)
E6.0 SCALE: NTS



FRONT VIEW

NOTE:
ENCLOSURE, NEMA 4X 316 STAINLESS STEEL
DEAD FRONT W/ INNER BACKPLATE

1 PUMP CONTROL PANEL ENCLOSURE
E5.0 SCALE: NTS

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

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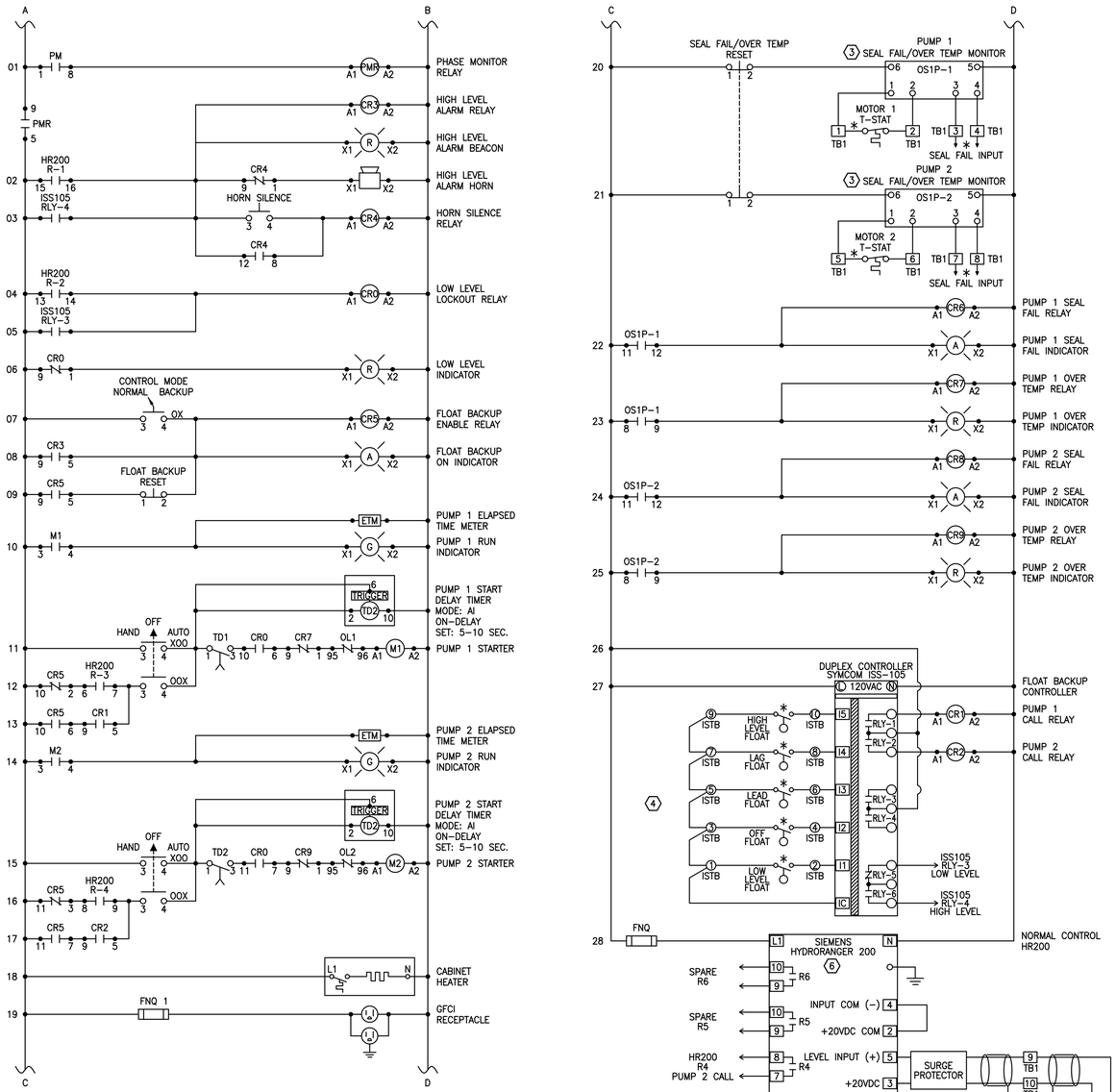
PUMP CONTROL PANEL DETAILS

SKE
S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
80

E5.0



* = FIELD WIRED BY CONTRACTOR.

1 CONTROLS SCHEMATIC 1 2

E5.1 SCALE: NTS

REFERENCE NOTES

1. PUMP CONTROL PANEL WIRING DIAGRAM IS TYPICAL. FINAL HARDWARE CONFIGURATION WILL VARY ACCORDING TO PUMP CONTROL PANEL SPECIFICATIONS FOR THE SUBMERSIBLE PUMPS.
2. PROVIDE STARTUP AND MINIMUM 4 HOURS TRAINING FOR OPERATOR PERSONNEL. SUBMIT STARTUP REPORT TO ENGINEER.
3. MOISTURE/OVER TEMPERATURE MONITOR RELAY SHALL BE INTEGRATED TO THE CONTROL LOGIC TO PROVIDE FAIL SAFE OPERATION. THUS, WHEN THE MOISTURE/OVER TEMPERATURE MONITOR RELAY IS REMOVED FROM THE CONTROL CIRCUIT OR FAILS, THE CORRESPONDING PUMP WILL BE LOCKED OUT.
4. ALL SEALED FLOAT SWITCHES SHALL BE CONNECTED TO THE CONTROL LOGIC VIA INTRINSICALLY SAFE RELAYS.
5. PROVIDE AND INSTALL RADAR SENSOR TYPE VEGAPULS 61 PS61.XXANPHKJXX.
6. PROVIDE AND INSTALL PRIMARY PUMP CONTROLLER TYPE SIEMENS HYDRORANGER 200.

SEQUENCE OF OPERATION:

LEVEL CONTROL OPERATION:

THE PUMP CONTROL PANEL SHALL UTILIZE ONE (1) LEVEL SENSOR TO CONTROL THE LEVEL IN THE WET WELL. ON SUMP LEVEL RISE TO 1ST PUMP TURN-ON LEVEL SETTING, THE CONTROLLER SHALL START THE 1ST PUMP. IF THE LEVEL CONTINUES TO RISE TO THE 2ND PUMP TURN-ON LEVEL SETTING, THE CONTROLLER SHALL START THE 2ND PUMP. SUMP LEVEL SHALL LOWER TO LOW LEVEL TURN-OFF SETTING AND ALL PUMPS SHALL STOP. ALTERNATING RELAY SHALL INDEX ON STOPPING OF PUMP SO THAT 2ND PUMP WILL START ON NEXT OPERATION AND SO FORWARD. IF LEVEL CONTINUES TO RISE AND HIGH LEVEL SETTING IS REACHED, THE CONTROLLER SHALL TRIGGER THE HIGH LEVEL ALARM. ALARM SHALL BE MANUAL RESET. LEVELS SHALL BE SET AS INDICATED IN THE SPECIFICATIONS AND SHOWN ON THE CIVIL PLANS. AN AUTOMATIC BACKUP LEVEL FLOATS SYSTEM SHALL BE PROVIDED. IF ONE PUMP SHOULD FAIL FOR ANY REASON, THE SECOND PUMP SHALL OPERATE ON THE CONTROLLER OVERRIDE SIGNAL. ALL LEVEL SETTINGS SHALL BE ADJUSTABLE FROM THE CONTROLLER SELECTABLE MENU/SCREEN. WITH THE PUMP OPERATING, THE SUMP FLUID LEVEL SHALL LOWER. WHEN THE LOW LEVEL TURN-OFF SETTING IS REACHED THE PUMP RUNNING WILL THEN CEASE TO OPERATE.

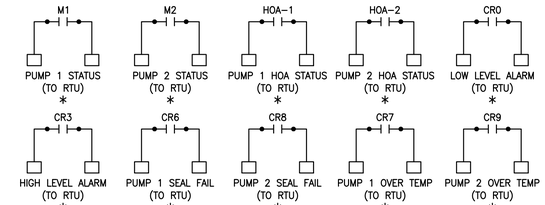
AUTOMATIC BACKUP LEVEL FLOATS OPERATION:

WHEN THE RADAR SENSOR FAILS THE PUMP CONTROL PANEL SHALL AUTOMATICALLY OPERATE BY THE LEVEL FLOATS ACCORDING TO THE FOLLOWING ORDER.

ON SUMP LEVEL RISE, LOWER (OFF) FLOAT SWITCH SHALL FIRST BE ENERGIZED. WHEN THE LEVEL RISES FURTHER, THE 1ST PUMP (LEAD PUMP) LEVEL SWITCH SHALL NEXT ENERGIZE AND START 1ST PUMP. IF THE LEVEL CONTINUES TO RISE THE 2ND PUMP (LAG PUMP) LEVEL SWITCH SHALL NEXT ENERGIZE AND START THE 2ND PUMP WITH 1ST AND 2ND PUMPS OPERATING, SUMP LEVEL SHALL LOWER TO LOW SWITCH TURN-OFF SETTING AND BOTH PUMPS SHALL STOP. ALTERNATING RELAY SHALL INDEX ON STOPPING OF PUMP SO THAT 2ND PUMP WILL START ON NEXT OPERATION. IF LEVEL CONTINUES TO RISE, ALARM SWITCH SHALL ENERGIZE AND SIGNAL THE ALARM. IF ONE PUMP SHOULD FAIL FOR ANY REASON, THE SECOND PUMP SHALL OPERATE ON THE OVERRIDE CONTROL AND IF LEVEL RISES ABOVE OVERRIDE CONTROL, ALARM SHALL SIGNAL. ALL LEVEL SWITCHES SHALL BE ADJUSTABLE FOR LEVEL SETTINGS FROM THE SURFACE. WITH THE PUMP OPERATING, THE SUMP FLUID LEVEL SHALL LOWER. WHEN THE LEVEL CAUSES THE LOWER (OFF) MERCURY FLOAT SWITCH TO TILT BACK TOWARD HANGING VERTICAL, ITS CONTACT SHALL OPEN CAUSING THE MOTOR CONTACTOR TO LOSE POWER TO THE COIL AND THUS OPEN THE CIRCUIT TO THE PUMP MOTOR. THE PUMP OR PUMPS RUNNING WILL THEN CEASE TO OPERATE.

IF THE HIGH LEVEL FLOAT IS ACTIVATED ALL PUMPS SHALL BE CALLED TO RUN AT 100% FLOW CAPACITY.

PUMPS SHALL ALTERNATE TO MAINTAIN EQUAL RUN TIMES AND SHALL START WITH TIME DELAY TO ASSIST THE GENERATOR STARTING.



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Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
7/18/23

KHA PROJECT 067783129	DATE OCTOBER 2023	SCALE: AS SHOWN	DESIGNED BY: CC	DRAWN BY: AH	CHECKED BY: SK

PUMP CONTROL DETAILS

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER 81

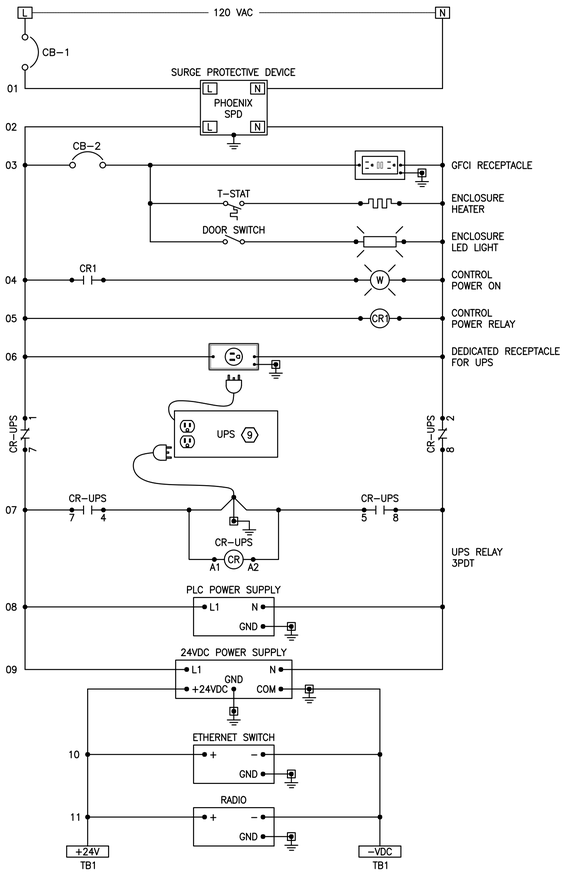
E5.1

LIFT STATION I/O LIST

ITEM	DESCRIPTION	TYP.	CONDUCTOR	REMARKS
1	UTILITY POWER STATUS	DI	2#14	
2	ATS IN EMERGENCY	DI	2#14	
3	GENERATOR FAIL	DI	2#14	
4	GENERATOR LOW FUEL	DI	2#14	
5	GENERATOR COMMON ALARM	DI	2#14	
6	PHASE MONITOR ALARM	DI	2#14	
7	WET WELL - HIGH LEVEL	DI	2#14	
8	WET WELL - LOW LEVEL	DI	2#14	
9	PUMP #1 RUN STATUS	DI	2#14	
10	PUMP #2 RUN STATUS	DI	2#14	
11	PUMP #1 HOA STATUS	DI	2#14	
12	PUMP #2 HOA STATUS	DI	2#14	
13	PUMP #1 OVER TEMP	DI	2#14	
14	PUMP #1 SEAL FAIL	DI	2#14	
15	PUMP #2 OVER TEMP	DI	2#14	
16	PUMP #2 SEAL FAIL	DI	2#14	
17	SPARE	DI		
18	SPARE	DI		
19	SPARE	DI		
20	SPARE	DI		
21	RADAR LEVEL SENSOR	AI	1#18TSP	
22	SPARE	AI		
23	SPARE	AI		
24	SPARE	AI		
25	SPARE	AI		
26	SPARE	AI		
27	POWER QUALITY METER	E	1-CAT6	

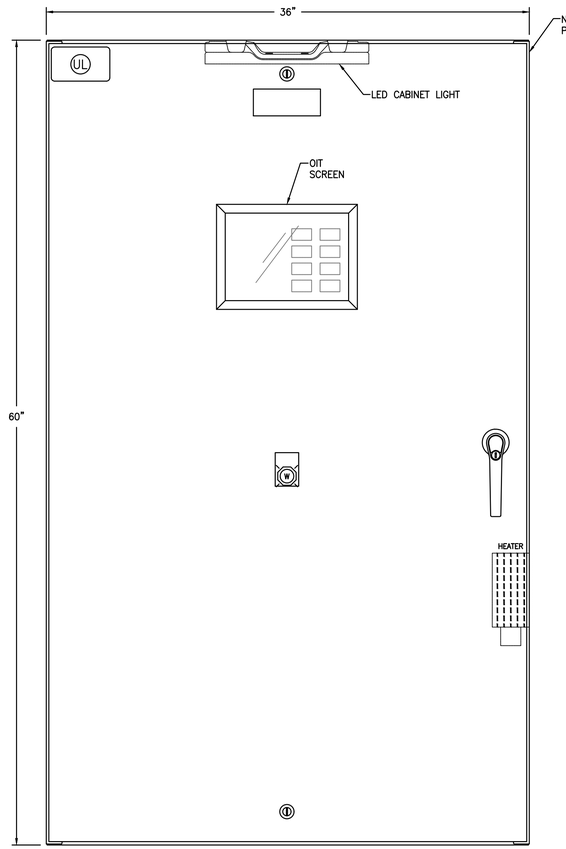
REFERENCE NOTES

1. RTU PANEL SCHEMATIC AND WIRING DIAGRAM IS TYPICAL IN NATURE. FINAL HARDWARE CONFIGURATION MAY VARY.
2. PROVIDE FACTORY AUTHORIZED STARTUP AND MINIMUM 4 HOURS TRAINING FOR OPERATOR PERSONNEL.
3. THE LIFT STATION SCADA SYSTEM SHALL OPERATE PER THE SEQUENCE OF OPERATIONS PROVIDED BY THE CIVIL ENGINEER.
4. ALL CONDUITS AND WIRING PROVIDED, INSTALLED BY THE ELECTRICAL CONTRACTOR AND TERMINATED BY THE SCADA CONTRACTOR.
5. ELECTRICAL CONTRACTOR MAY GROUP WIRES WITH SAME VOLTAGE FOR FIELD DEVICES IN CONDUIT AS HE DEEMS BEST APPROPRIATE.
6. ANALOG AND LOW VOLTAGE SIGNALS SHALL NOT BE RUN IN SAME CONDUIT AS 120VAC AND 480VAC CIRCUITS.
7. QUANTITY OF CONDUCTORS SHOWN ARE FOR REFERENCE ONLY. VERIFY EXACT WIRING REQUIREMENTS TO FIELD DEVICES PER INFORMATION PROVIDED BY THE EQUIPMENT VENDOR PRIOR TO INSTALLATION.
8. USE SHIELDED TWISTED PAIR (STP) CABLE BELDEN #5341FE OR EQUAL.
9. PROVIDE AND INSTALL SCHNEIDER ELECTRIC APC DIN RAIL – PANEL MOUNTED UPS WITH STANDARD BATTERY 500VA 120V TYPE SUA500PDR–S.
10. PROVIDE AND INSTALL ALLEN BRADLEY MICROLOGIX 1400 PLC WITH I/O AS SHOWN ON SCHEDULE THIS SHEET.

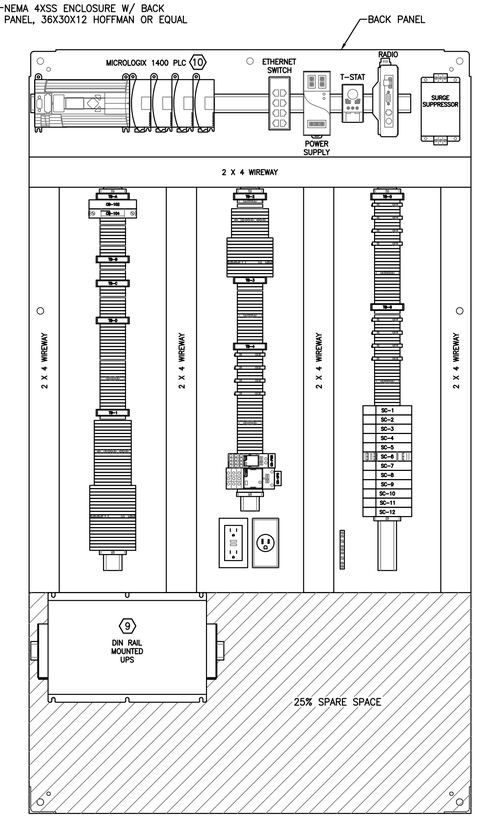


* INDICATES FIELD WIRING REQUIRED BY CONTRACTOR

2 RTU SCHEMATIC (E6.0) SCALE: NTS



FRONT VIEW (EXTERIOR)



FRONT VIEW (INTERIOR)

1 SCADA RTU ENCLOSURE (E6.0) SCALE: NTS (1 2 3 4 5 6 7 8)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY–HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512–520–0768 FAX: 512–418–1791
WWW.KIMLEY–HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F–928

3950623
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
10/18/23

KHA PROJECT	067783129
DATE	OCTOBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	CC
DRAWN BY:	AH
CHECKED BY:	SK

ELECTRICAL SCADA

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 3950623

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
82

E6.0

STRUCTURAL DESIGN CRITERIA AND CODES

D-1 THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE, 2015.

D-2 WIND DESIGN IS BASED ON THE ANSI/ASCE 7-10 MINIMUM DESIGN MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES. ALL PRIMARY FRAMING AND EXTERIOR ENVELOPE COMPONENTS AND CLADDING SHALL BE DESIGNED TO RESIST THE LOADS AND FORCES DERIVED FROM THIS STANDARD.

D-3 SEE SHEET 84 FOR SPECIAL INSPECTIONS

D-4 WIND DESIGN CRITERIA:

BASE DESIGN WIND SPEED:	120 MPH (3 SECOND GUST)
EXPOSURE:	C
RISK CATEGORY:	IV
COASTAL PROXIMITY:	INLAND

D-5 SEISMIC DESIGN CRITERIA:

SEISMIC IMPORTANCE FACTOR, I_e:	1.5
MAPPED SPECTRAL RESPONSE PARAMETERS:	S_s = 0.062 S_1 = 0.034
SITE CLASS:	D
DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS:	S_{DS} = 0.065 S_{D1} = 0.055
SEISMIC DESIGN CATEGORY	A
BASIC FORCE RESISTING SYSTEM:	FLAT-BOTTOM GROUND-SUPPORTED TANKS: REINFORCED NON-SLIDING BASE
DESIGN BASE SHEAR:	VARIES
SEISMIC RESPONSE COEFFICIENT, C_S:	0.042
RESPONSE MODIFICATION COEFFICIENT, R:	3
ANALYSIS PROCEDURE:	EQUIVALENT LATERAL FORCE

D-6 THE SCHEDULE BELOW INDICATES THE DESIGN LOADS USED FOR SLABS ON GRADE. LOADS LISTED ARE THE MAXIMUM ALLOWABLE SUPERIMPOSED UNIFORM LOADS STATED BELOW (IBC SEE D-1):

DEAD LOAD:
SEE SHEET 90 - 91 FOR EQUIPMENT WEIGHTS

LIVE LOAD:
SLABS ON GRADE = 100 PSF (PEDESTRIAN IBC TABLE 1607.1)
VAULT PLATFORM = 50 PSF (PLATFORM IBC TABLE 1607.1)
LIFT STATION TOP SLAB = 100 PSF (PEDESTRIAN IBC TABLE 1607.1)

D-7 CANOPY NOTES (IBC SEE D-1):
THE CANOPY SHALL BE DESIGNED PER THE FOLLOWING DESIGN CRITERIA BY SPECIALTY ENGINEER:

ROOF LIVE LOAD:
CANOPY = 20 PSF

ROOF DEAD LOAD:
MISCELLANEOUS = 5 PSF

WIND LOAD:
SEE SECTION D-4

THE CANOPY MANUFACTURER SHALL SUBMIT FOR REVIEW SHOP DRAWINGS AND CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL IN THE STATE OF TEXAS.

THE MINIMUM NUMBER OF CANOPY BUILDING FRAMES SHALL BE CONSTRUCTED AT GRID LINES 1 AND 2.

VARIATION IN CANOPY FORCES SHOWN SHALL BE NOTED AND PRESENTED BY MANUFACTURER. FOUNDATION SIZE IS SUBJECT TO CHANGE AND ARE CURRENTLY BASED ON LOADS SHOWN.

SOILS & FOUNDATIONS

SF-1 FOUNDATIONS HAVE BEEN DESIGNED USING CONSERVATIVE VALUES FOUND IN TABLE 1806.2. IN THE INTERNATIONAL BUILDING CODE, 2018. SEE VALUES BELOW:

a. SHALLOW FOUNDATIONS HAVE BEEN DESIGNED AND PROPORTIONED FOR A MAXIMUM SAFE SOIL BEARING PRESSURE OF 2,000 PSF.

b. MAT FOUNDATIONS HAVE BEEN DESIGNED AND PROPORTIONED FOR A MAXIMUM SAFE SOIL BEARING PRESSURE OF 2,000 PSF.

SF-2 FOUNDATION WALLS ARE DESIGNED FOR AN EQUIVALENT FLUID PRESSURE (UNDRAINED CONDITION) OF 95 PSF/FT.

SF-3 SEE SHEET 88 FOR LIFT STATION BACKFILL AND COMPACTION REQUIREMENTS.

REINFORCED CONCRETE

RC-1 CONCRETE DESIGN AND PLACEMENT SHALL BE IN STRICT ACCORDANCE WITH ACI 318-14 / ACI 350-R06, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".

RC-2 STRUCTURAL CONCRETE SHALL CONFORM TO ACI 301 SPECIFICATIONS, AND SHALL DEVELOP THE FOLLOWING MINIMUM COMPRESSIVE STRENGTHS AT 28 DAYS, AS WELL AS OTHER PROPERTIES SPECIFIED IN THESE DOCUMENTS. SEE SPECIFICATIONS FOR DESIGN MIX REQUIREMENTS.

FOUNDATIONS: 5,000 PSI

ELEVATED SLABS / SLABS ON GRADE: 5,000 PSI

MEMBERS EXPOSED TO WEATHER: 5,000 PSI

WALLS: 5,000 PSI

RC-3 CONCRETE SHALL BE READY-MIX, REGULAR WEIGHT FOR ALL STRUCTURAL USES, WITH MINIMUM DRY DENSITY OF 140 LBS. PER CUBIC FOOT.

RC-4 CHAMFER ALL EXPOSED CONCRETE EDGES, INCLUDING THOSE TO RECEIVE STUCCO FINISH - 3/4" - UNLESS NOTED OTHERWISE.

RC-5 REINFORCING STEEL SHALL BE DETAILED, FABRICATED AND INSTALLED IN ACCORDANCE WITH ACI 318-14 AND ACI DETAILING MANUAL, ACI 315.

RC-6 REINFORCING STEEL SHALL BE NEW, DEFORMED BARS, FREE OF RUST, SCALE AND OIL, CONFORMING TO ASTM A-615, GRADE 60 WITH A MINIMUM YIELDS STRENGTH = 60,000 PSI.

RC-7 PROVIDE CONTINUOUS REINFORCEMENT WITH ACI CLASS "B" LAP SPLICES, OR AS NOTED OTHERWISE. IN BEAMS, LAP CONTINUOUS BOTTOM STEEL OVER SUPPORTS AND CONTINUOUS TOP STEEL AT MIDSPAN, UNLESS NOTED OTHERWISE.

RC-8 WELDED WIRE FABRIC REINFORCING SHALL CONFORM TO ASTM A-185. PROVIDE MINIMUM 6 INCH LAPS, TYPICAL. PROVIDE ADEQUATE SUPPORTS AND BOLSTERING TO PRESERVE THE SPECIFIED POSITION OF THE MESH DURING CONCRETE PLACEMENT AND FINISHING.

RC-9 TERMINATE ALL DISCONTINUOUS ENDS OF TOP BARS WITH STANDARDS ACI HOOKS. TURN HOOKS UP OR DOWN INTO SUPPORTING STRUCTURE. CORNER BARS SHALL BE SUPPLIED AND PLACED IN ADDITION TO HOOKED ENDS, PER THE DETAILS IN THESE DOCUMENTS.

RC-10 PROVIDE THE FOLLOWING MINIMUM CONCRETE COVERAGE OVER REINFORCING UNLESS NOTED OTHERWISE:

FOUNDATIONS, BOTTOM AND TOP:	3"
FOUNDATIONS, SIDES:	2"
ELEVATED SLABS / SLABS ON GRADE, BOTTOM:	3"
ELEVATED SLABS / SLABS ON GRADE, TOP AND SIDES:	2"
WALLS, INTERIOR FACE:	3"
WALLS, EXTERIOR FACE:	3"

RC-11 PROVIDE REINFORCEMENT SPLICES AS INDICATED BELOW IN CONFORMANCE WITH AN ACI CLASS B TENSION SPLICE. (ACI 318-14 AND 350-R06 CODE). NO REDUCTION SHALL BE PERMITTED DUE TO BAR SPACING:

CLASS B SPLICES FOR REINFORCEMENT, OTHER THAN TOP BARS:

BAR SIZE	3,000 PSI	4,000 PSI	5,000 PSI
#3	22"	19"	17"
#4	29"	25"	23"
#5	36"	31"	28"
#6	43"	37"	34"
#7	63"	54"	49"
#8	72"	62"	56"
#9	81"	70"	63"
#10	91"	79"	71"
#11	101"	87"	78"

CLASS B SPLICES FOR REINFORCEMENT AS TOP BARS:

BAR SIZE	3,000 PSI	4,000 PSI	5,000 PSI
#3	28"	25"	22"
#4	38"	33"	29"
#5	47"	41"	36"
#6	56"	49"	44"
#7	81"	71"	63"
#8	93"	81"	72"
#9	105"	91"	81"
#10	118"	102"	92"
#11	131"	114"	102"

RC-12 PENETRATIONS THROUGH SLABS, BEAMS OR FOOTINGS SHALL BE SLEEVED INDIVIDUALLY. CORE DRILLING OF EXISTING CONCRETE MEMBERS WILL NOT BE PERMITTED, UNLESS NOTED ON PLANS. SUBMIT LOCATIONS AND SIZES OF ALL SLEEVES FOR ARCHITECT/ENGINEER APPROVAL PRIOR TO CASTING.

RC-13 NO REINFORCING BARS SHALL BE CUT OR OTHERWISE MODIFIED IN THE FIELD. REINFORCING BARS SHALL NOT BE DISPLACED PRIOR TO OR DURING CASTING TO ACCOMMODATE ANCHORS, EMBEDS OR OTHER ITEMS.

RC-14 WHERE WALLS, BEAMS AND FOOTINGS CHANGE DIRECTION, PROVIDE CORNER BARS OF SAME SIZE AND QUANTITY AS THE SPECIFIED LONGITUDINAL STEEL. SEE DETAIL 3/ADS3.1

RC-15 EMBEDDED ITEMS SHALL BE SECURELY FIXED AND MAINTAINED IN POSITION PRIOR TO AND DURING CONCRETE PLACEMENT.

STRUCTURAL STEEL

S-1 SUBMIT STRUCTURAL STEEL AND MISCELLANEOUS FABRICATIONS SHOP AND ERECTION DRAWINGS FOR REVIEW BY THE ENGINEER. ANY SPLICES OR CONNECTIONS NOT FULLY PROVIDED IN THESE PLANS SHALL BE DESIGNED BY A DELEGATED ENGINEER WHO OVERSEES THE DETAILING OF THE STEEL SHOP AND ERECTION DRAWINGS, AND BEAR THE SEAL OF THAT INDIVIDUAL, BEING A REGISTERED PROFESSIONAL ENGINEER. PROVIDE SEALED ENGINEERING CALCULATIONS FOR ANY SPECIAL MOMENT SPLICE DESIGNS.

FORMWORK AND CONCRETE SHORING

F-1 PROVIDE, AS A PACKAGE, SHORING DRAWINGS PREPARED BY OR UNDER THE DIRECT SUPERVISION OF A DELEGATED ENGINEER.

F-2 FORMS SHALL CONFORM TO THE SHAPE, LINES AND DIMENSIONS OF THE MEMBERS AS CALLED FOR IN THE PLANS, AND SHALL BE SUBSTANTIAL AND SUFFICIENTLY TIGHT TO PREVENT LEAKAGE OF MORTAR. THEY SHALL BE PROPERLY BRACED OR TIED TOGETHER SO AS TO MAINTAIN POSITION AND SHAPE.

F-3 DESIGN FORMS AND SHORES FOR HORIZONTAL CONCRETE MEMBERS FOR ALL IMPOSED DEAD AND LIVE LOADS, BUT NOT LESS THAN DEAD LOAD (INCLUDING FILL HEIGHTS IF APPLICABLE). PLUS APPLICABLE CONSTRUCTION LIVE LOAD.

F-4 REMOVAL OF FORMWORK IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR, HOWEVER SIDE AND NON-STRUCTURAL FORMS SHALL NOT BE REMOVED LESS THAN 72 HOURS AFTER CONCRETE PLACEMENT. REMOVE FORMS IN SUCH A MANNER AS TO INSURE JOB SAFETY AND TO PREVENT DAMAGE TO AND CREEP/DEFLECTION OF THE STRUCTURE.

F-5 THE SHORING IS TO BE INSPECTED BY THE DELEGATED ENGINEER OR HIS AUTHORIZED REPRESENTATIVE PRIOR TO EACH CONCRETE POUR. HE SHALL SUBMIT A WRITTEN INSPECTION REPORT TO THE SPECIAL INSPECTOR AND CONTRACTOR STATING THAT THE WORK IS IN GENERAL COMPLIANCE WITH THE SHORING DRAWINGS. THE FIELD REPORTS SHALL BE SIGNED BY THE INDIVIDUAL CONDUCTING THE INSPECTION. COPIES OF THE FIELD REPORTS SHALL BE SUBMITTED EVERY WEEK TO THE ENGINEER, SPECIAL INSPECTOR AND BUILDING OFFICIAL UNDER A COVER LETTER SIGNED, SEALED AND DATED BY THE DELEGATED ENGINEER.

F-6 THE SHORING REPORT SHALL CONTAIN, AS A MINIMUM, THE FOLLOWING:

a. NAME AND LOCATION OF PROJECT, NAME OF DELEGATED ENGINEER AND FIELD REPRESENTATIVE, PERMIT NUMBER, DATE, TIME OF DAY, WORKING CONDITIONS (INCLUDING WEATHER AND TEMPERATURE).

b. ITEMS REQUIRING CORRECTIONS.

c. ACCEPTED DEVIATIONS FROM SHORING DRAWINGS.

d. AREAS ACCEPTED AND RELEASED FOR CONCRETE POURS.

F-7 AS SOON AS FORMS ARE REMOVED, ALL IRREGULAR PROJECTIONS SHALL BE CHIPPED OFF FLUSH WITH THE CONCRETE SURFACES. ALL VOIDS OR HONEYCOMBING SHALL BE POINTED UP WITH GROUT AND TROWELED FLUSH WITH THE CONCRETE SURFACE. ALL FORM TIES SHALL BE REMOVED TO A DEPTH OF 1-1/2 INCHES
MINIMUM AND GROUTED FLUSH WITH THE CONCRETE SURFACE.

SUBMITTALS REQUIRING ENGINEER INPUT BY DELEGATED (SPECIALTY) ENGINEER

S-1 DELEGATED ENGINEER:

a. DEFINITION - A TEXAS PROFESSIONAL ENGINEER WHO UNDERTAKES A SPECIALTY SERVICE AND PROVIDES SERVICES OR CREATIVE WORK (DELEGATED ENGINEERING DOCUMENT) REGARDING A PORTION OF THE ENGINEERING PROJECT. THE DELEGATED ENGINEER IS THE ENGINEER OF RECORD FOR THAT PORTION OF THE ENGINEERING PROJECT.
b. SHALL BE: (1) AN INDEPENDENT CONSULTANT, (2) AN EMPLOYEE OR OFFICER OF AN ENTITY SUPPLYING COMPONENTS TO A FABRICATOR OR CONTRACTOR, SO LONG AS THE ENGINEER ACTS AS AN INDEPENDENT CONSULTANT OR THROUGH A DULY QUALIFIED ENGINEERING CORPORATION, OR (3) AN EMPLOYEE OR OFFICER OF A FABRICATOR OR CONTRACTOR, SO LONG AS THE ENGINEER ACTS AS AN INDEPENDENT CONSULTANT OR THROUGH A DULY QUALIFIED ENGINEERING CORPORATION.

S-2 SUBMITTALS FOR CUSTOM DESIGNED, MANUFACTURED OR FABRICATED LOAD-CARRYING ITEMS AND CUSTOM FABRICATED ITEMS WHICH ARE REQUIRED BY CODES OR STANDARDS TO RESIST FORCES AND STRESSES, INCLUDING THEIR CONNECTIONS, ANCHORAGES AND ATTACHMENTS REQUIRE A DELEGATED ENGINEER.

S-3 AS A MINIMUM, THE FOLLOWING SYSTEMS AND COMPONENTS REQUIRE FABRICATION AND ERECTION DRAWINGS WITH INPUT BY A DELEGATED ENGINEER:

a. TEMPORARY SHORING AND FORMWORK.
b. TEMPORARY RETAINING WALLS OR COFFERDAM DESIGN AND CALCULATIONS.
c. ALL TEMPORARY ELEMENTS ASSOCIATED WITH THE WET WELL COFFERDAM INCLUDING BUT NOT LIMITED TO, ALL WALERS, BRACES, CONNECTION, STRUTS, AND ALL SEALS ASSOCIATED WITH THE COFFERDAM.
d. PRECAST CONCRETE SYSTEMS.
e. CANOPY STRUCTURE

S-4 FOR EACH CATEGORY OF SUBMITTALS REQUIRING INPUT FROM A DELEGATED ENGINEER, THE CONTRACTOR SHALL ATTACH TO THE FIRST SUBMITTAL A SIGNED AND SEALED LETTER FROM THE RESPONSIBLE DELEGATED ENGINEER STATING "I CERTIFY THAT THE DESIGN AND DRAFTING OF THE SHOP DRAWINGS WHICH ARE SIGNED AND SEALED BY ME WERE PREPARED UNDER MY DIRECT SUPERVISION AND CONTROL, AND TO THE BEST OF MY KNOWLEDGE, THE SHOP DRAWINGS COMPLY WITH THE APPLICABLE MINIMUM BUILDING CODES AND THE CONTRACT DOCUMENTS."

S-5 SUBMITTALS SHALL CLEARLY IDENTIFY THE SPECIFIC PROJECT AND APPLICABLE CODES, LIST THE DESIGN CRITERIA, AND SHOW ALL DETAILS AND PLANS NECESSARY FOR PROPER FABRICATION AND INSTALLATION. CALCULATIONS AND SHOP DRAWINGS SHALL IDENTIFY SPECIFIC PRODUCTS UTILIZED. GENERIC PRODUCTS WILL NOT BE ACCEPTED.

S-6 SHOP DRAWINGS AND CALCULATIONS REQUIRE THE SEAL, DATE AND SIGNATURE OF THE DELEGATED ENGINEER. COMPUTER PRINTOUTS ARE AN ACCEPTABLE SUBSTITUTE FOR MANUAL COMPUTATIONS PROVIDED THEY ARE ACCOMPANIED BY SUFFICIENT DESCRIPTIVE INFORMATION TO PERMIT THEIR PROPER EVALUATION. SUCH DESCRIPTIVE INFORMATION SHALL BEAR THE SEAL AND SIGNATURE OF THE DELEGATED ENGINEER AS AN INDICATION THAT HE HAS ACCEPTED RESPONSIBILITY FOR THE RESULTS. THE ENGINEER WILL RETAIN 2 SIGNED AND SEALED PRINTS FOR HIS RECORDS.

S-7 CALCULATIONS ARE THE SOLE RESPONSIBILITY OF THE DELEGATED ENGINEER. CALCULATIONS ARE SUBMITTED TO THE ENGINEER FOR HIS RECORDS.

S-8 CATALOG INFORMATION ON STANDARD PRODUCTS (I.E. "CUT SHEETS") DOES NOT REQUIRE THE SEAL OF A DELEGATED ENGINEER.

S-9 REVIEW BY THE PROJECT ENGINEER OF RECORD OF SUBMITTALS IS LIMITED TO VERIFYING THE FOLLOWING:

a. THAT THE SPECIFIED STRUCTURAL SUBMITTALS HAVE BEEN FURNISHED.
b. THAT THE STRUCTURAL SUBMITTALS HAVE BEEN SIGNED AND SEALED BY THE DELEGATED ENGINEER.
c. THAT THE DELEGATED ENGINEER HAS UNDERSTOOD THE DESIGN INTENT AND HAS USED THE SPECIFIED STRUCTURAL CRITERIA. (NO DETAILED CHECK OF CALCULATIONS WILL BE MADE.)
d. THAT THE CONFIGURATION SET FORTH IN THE STRUCTURAL SUBMITTALS IS CONSISTENT WITH THE CONTRACT DOCUMENTS. (NO DETAILED CHECK OF DIMENSIONS OR QUANTITIES WILL BE MADE.)

S-10 SUBMITTALS NOT MEETING THE ABOVE CRITERIA, OR SUBMITTED AFTER FABRICATION, WILL NOT BE REVIEWED.

PERMIT SUBMITTAL

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/20/2023

STATE OF TEXAS
JON CASEY LONG
94119
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	NOVEMBER 2023
SCALE:	AS SHOWN
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DRAWN BY:	ALB
CHECKED BY:	JCL

STRUCTURAL NOTES

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
83

SPECIAL INSPECTIONS

SI-1 THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE (RDPIRC) FOR THIS PROJECT IS THE ARCHITECT. SUBMIT ALL INSPECTION REPORTS DIRECTLY TO THE RDPIRC FOR REVIEW. ALSO, SUBMIT THE STRUCTURALLY RELATED INSPECTION REPORTS TO THE STRUCTURAL ENGINEER FOR SPECIAL REVIEW.

SI-2 THE RDPIRC CONTRACTS WITH OR IS EMPLOYED BY THE OWNER. IN ORDER TO COMPLY WITH THE CODE REQUIREMENTS, THE RDPIRC AND THE SPECIAL INSPECTORS AND TESTING TECHNICIANS MAY NOT BE IN THE EMPLOY OF THE GENERAL CONTRACTOR (GC), SUB-CONTRACTORS OR MATERIAL SUPPLIERS. IN THE CASE OF AN OWNER / CONTRACTOR, THE BUILDING OFFICIAL SHALL SPECIFY WHO EMPLOYS THE RDPIRC, SPECIAL INSPECTORS AND TESTING TECHNICIANS.

SI-3 THESE INSPECTIONS LISTED BELOW ARE IN ADDITION TO THE INSPECTIONS SPECIFIED IN SECTION 110 OF THE IBC. REFER TO THE BUILDING CODE, AND ANY AMENDMENTS TO THE BUILDING CODE FOR THIS JURISDICTION, TO DETERMINE ALL THE REQUIRED INSPECTIONS IN ADDITION TO THE SPECIAL INSPECTIONS LISTED BELOW.

SI-4 INSPECTION OF FABRICATORS - FABRICATOR SHALL SUBMIT TO THE RDPIRC, WITH A COPY TO THE OWNER AND THE GC, A CERTIFICATE OF COMPLIANCE STATING THAT HE FABRICATED HIS WORK UNDER THE INSPECTIONS SERVICES OF A SPECIAL INSPECTOR OR UNDER THE INSPECTION SERVICES OF A NATIONALLY RECOGNIZED TRADE ORGANIZATION THAT REQUIRES QUALITY CONTROL INSPECTION. THE FOLLOWING SPECIAL INSPECTIONS IN TABLE FORM ARE REQUIRED ONLY IF MARKED BY A 'X', 'C' OR 'P'.
X - DENOTES THAT THE INSPECTION IS REQUIRED, ONE TIME OCCURRENCE.
C - DENOTES THAT THE INSPECTION IS REQUIRED AND SHALL BE CONTINUOUS.
P - DENOTES THAT THE INSPECTION IS REQUIRED AND SHALL BE PERIODIC.
R - DENOTES THAT INSPECTION/TESTING IS REQUIRED AND SHALL BE PERFORMED WITH APPLICABLE STANDARDS.
" - " - OBSERVE OR PERFORM IN ACCORDANCE WITH APPLICABLE STANDARDS.
N/A - DENOTES THAT THE SECTION IS NOT APPLICABLE.

SI-5 GENERAL (PER IBC TABLE 1705.1.1) SHALL APPLY AS FOLLOWS:

VERIFICATION AND INSPECTION	REFERENCED STANDARD	CHECK IF REQ'D	CONT./ PERIODIC "C" OR "P"	RDP "A" OR "E"
CONSTRUCTION MATERIALS AND SYSTEMS THAT ARE ALTERNATIVES TO MATERIALS AND SYSTEMS PRESCIBED BY THE IBC	_____	X	P	E
UNUSUAL DESIGN APPLICATIONS OF MATERIALS DESCRIBED IN THIS CODE	_____	X	P	E
MATERIALS AND SYSTEMS REQUIRED TO BE INSTALLED IN ACCORDANCE WITH ADDITIONAL MANUFACTURER'S INSTRUCTIONS THAT PRESCIBE REQUIREMENTS NOT CONTAINED IN THE IBC OR IN STANDARDS REFERENCED BY THE IBC	_____	X	P	E

SI-6 OPEN WEB STEEL JOISTS & JOIST GIRDERS (PER IBC 2018 TABLE 1705.2.3) DOES NOT APPLY TO THIS PROJECT.

SI-7 STEEL CONSTRUCTION - SECTION 1705.2 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-8 CONCRETE CONSTRUCTION (PER IBC TABLE 1705.3) SHALL APPLY AS FOLLOWS:

VERIFICATION AND INSPECTION	REFERENCED STANDARD	CHECK IF REQ'D	CONT./ PERIODIC "C" OR "P"	RDP "A" OR "E"
INSPECT REINFORCEMENT, INCLUDING PRESSTRESSING TENDONS, AND VERIFY PLACEMENT	ACI 318 CH. 20, 25.2, 25.3, 26.6.6-26.6.3	X	P	E
REINFORCING BAR WELDING:				
A. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706;	AWS D1.4; ACI 318: 26.6.4	N/A	P	E
B. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16" AND	AWS D1.4; ACI 318: 26.6.4	N/A	P	E
C. INSPECT ALL OTHER WELDS.	AWS D1.4; ACI 318: 26.6.4	N/A	C	E
INSPECT ANCHORS CAST IN CONCRETE	ACI 318: 17.8.2	X	P	E
INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS:				
A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INLCINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS	ACI 318: 17.8.2.4	X	C	E
B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 11.A	ACI 318: 17.8.2	X	P	E
VERIFY USE OF REQUIRED DESIGN MIX	ACI 318: CH. 19, 26.4.3, 1904.2 IBC 1904.1, 1904.2	X	P	E
PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TEST, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	ASTM C172; ASTM C31; ACI 318: 26.5, 26.12	X	C	E
INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	ACI 318: 26.5	X	C	E
VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES	ACI 318: 26.5.3-26.5.5	X	P	E
INSPECT PRE-STRESSED CONCRETE FOR:				
A. APPLICATION OF PRE-STRESSING FORCES; AND	ACI 318: 26.10	N/A	C	
B. GROUTING OF BONDED PRE-STRESSING TENDONS	ACI 318: 26.10	X	C	E
INSPECT ERECTION OF PRECASE CONCRETE MEMBERS	ACI 318: CH. 26.9	X	P	E
VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS	ACI 318: 26.11.2	N/A	P	
INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	ACI 318: 26.11.1.2(b)	X	P	E
NOTE EXCEPTIONS 1, 2, 3, 4, AND 5 IN SECTION 1705.3 DISCUSSING FOOTINGS FOR BUILDINGS THREE STORIES OR LESS, NONSTRUCTURAL SLABS, FOUNDATIONS AND CERTAIN EXTERIOR CONCRETE FEATURES WHEN PLACED ON GRADE. CHECK HERE IF SPECIAL INSPECTION FOR CONCRETE NOT REQUIRED DUE TO EXCEPTIONS.		NOT REQ'D	-	-
CONCRETE NOTE : SPECIFY REQUIREMENTS FOR SPECIAL INSPECTION SHALL BE INCLUDED IN THE RESEARCH REPORT FOR THE ANCHOR ISSUED BY AN APPROVED SOURCE IN ACCORDANCE WITH 17.8.2 IN ACI 318, OR OTHER QUALIFICATION PROCEDURES. WHERE SPECIFIC REQUIREMENTS ARE NOT PROVIDED, SPECIAL INSPECTION REQUIREMENTS SHALL BE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL AND SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF THE WORK.				

SI-9 MASONRY CONSTRUCTION - SECTION 1705.4 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-10 WOOD CONSTRUCTION - SECTION 1705.5 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-11 SOILS (PER IBC TABLE 1705.6) SHALL APPLY AS FOLLOWS:

VERIFICATION AND INSPECTION	REFERENCED STANDARD	CHECK IF REQ'D	CONT./ PERIODIC "C" OR "P"	RDP "A" OR "E"
SOILS - SECTION 1705.6				
VERIFY MATERIALS BELOW SHALLOW FOUNDATION ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	----------	X	P	
VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL	----------	X	P	
PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS	----------	X	P	
DURING FILL PLACEMENT, VERIFY USE OF PROPER MATERIALS AND PROCEDURES IN ACCORDANCE WITH THE PROVISIONS OF THE APPROVED GEOTECHNICAL REPORT. VERIFY DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	----------	X	C	
PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY	----------	X	P	

SI-12 DRIVEN DEEP FOUNDATIONS - SECTION 1705.7 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-13 CAST IN PLACE DEEP FOUNDATIONS - SECTION 1705.8 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-14 HELICAL PILE FOUNDATIONS - SECTION 1705.9 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-15 STRUCTURAL INTEGRITY OF DEEP FOUNDATION ELEMENTS - SECTION 1705.10 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-16 FABRICATED ITEMS - SECTION 1705.11 SHALL OBTAIN APPROVAL BY DESIGN PROFESSIONAL AND BUILDING OFFICIAL WITH RESPECT TO INSPECTION REQUIREMENTS PRIOR TO FABRICATION FOR THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-17 SPECIAL INSPECTIONS FOR WIND RESISTANCE - SECTION 1705.12 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-18 SPECIAL INSPECTIONS FOR WIND RESISTANCE - SECTION 1705.13 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S0.01 TO S6.01).

SI-19 SPECIAL INSPECTIONS FOR WIND RESISTANCE - SECTION 1705.14 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-20 SPECIAL INSPECTIONS FOR WIND RESISTANCE - SECTION 1705.15 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-21 MASTIC AND IN TUMESCENT FIRE-RESISTANT COATING - SECTION 1705.16 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-22 EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) - SECTION 1705.17 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-23 FIRE RESISTANCE JOINT PENETRATIONS AND JOINTS - SECTION 1705.18 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-24 TESTING FOR SMOKE CONTROL - SECTION 1705.19 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

SI-25 SEALING OF MASS TIMBER - SECTION 1705.20 DOES NOT APPLY TO THIS PORTION OF THE PROJECT (SHEETS S-001 TO S-201).

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No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/20/2023

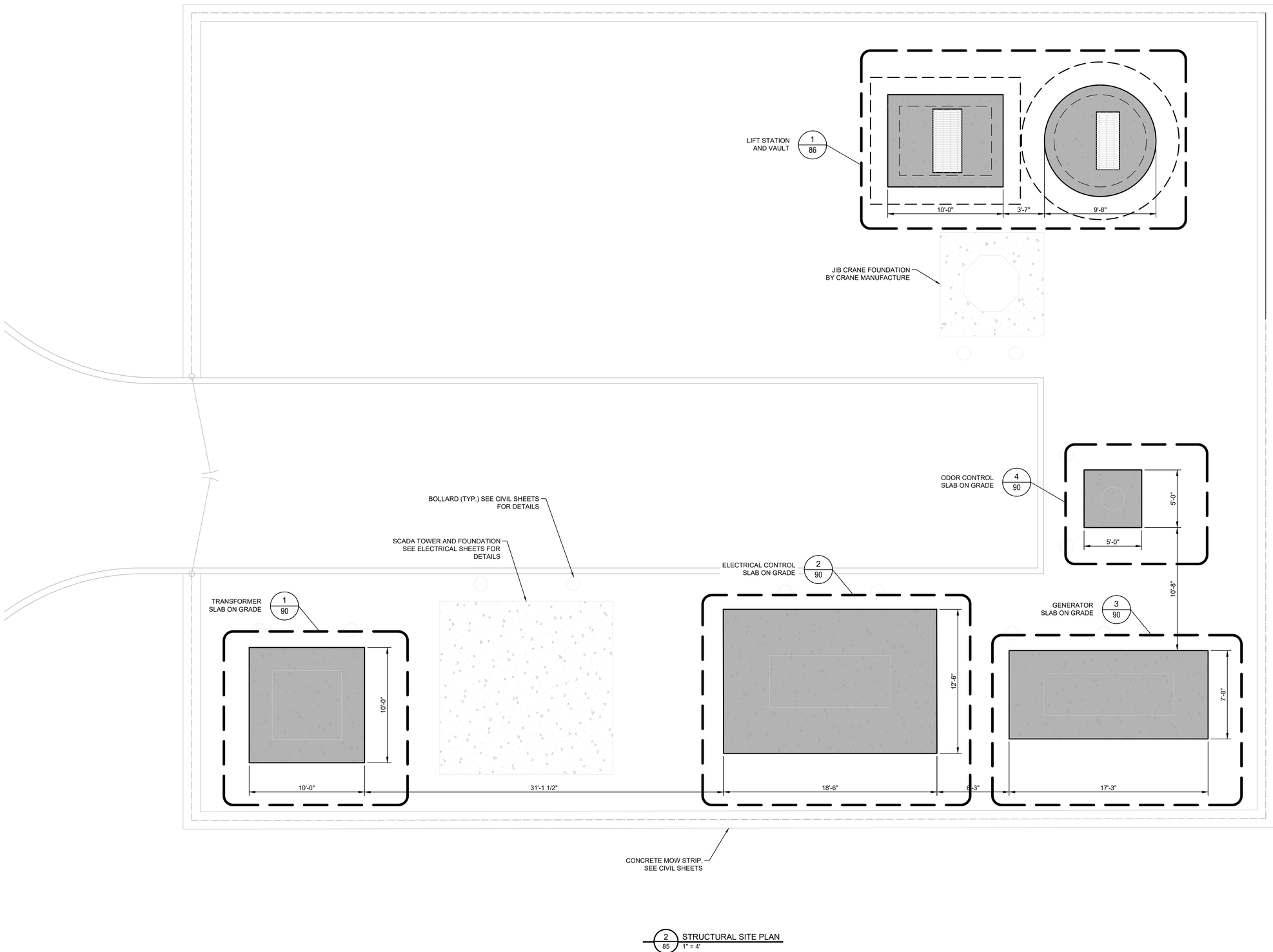
STATE OF TEXAS
JON CASEY LONG
94119
LICENSED PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE NOVEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: GNH
DRAWN BY: ALB
CHECKED BY: JCL

SPECIAL INSPECTIONS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
84



2 / 85 STRUCTURAL SITE PLAN
1" = 4'

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Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
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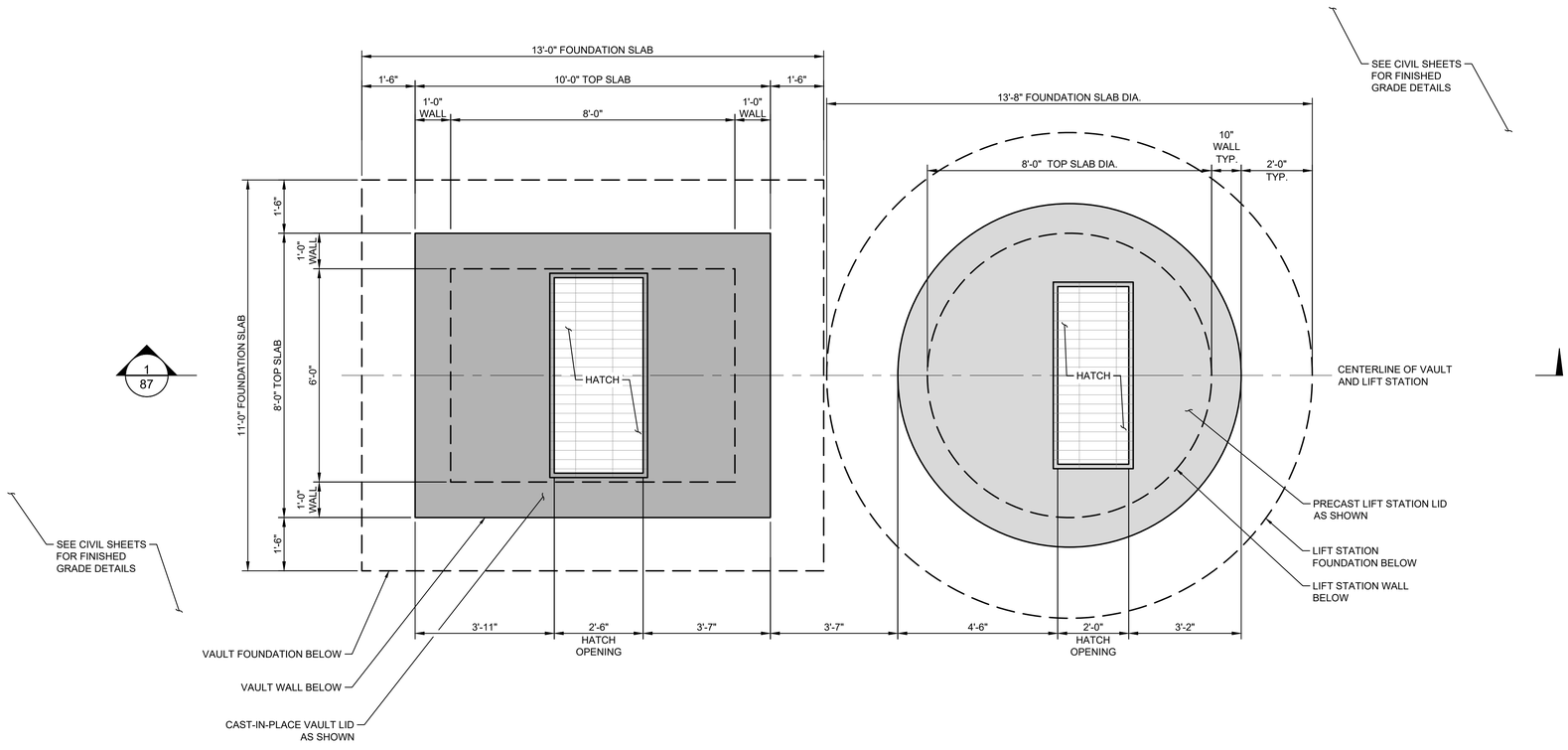
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

STRUCTURAL SITE PLAN

SHEET NUMBER
85



1 / 86 ENLARGED LIFT STATION AND VAULT PLAN

1/2" = 1'

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Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
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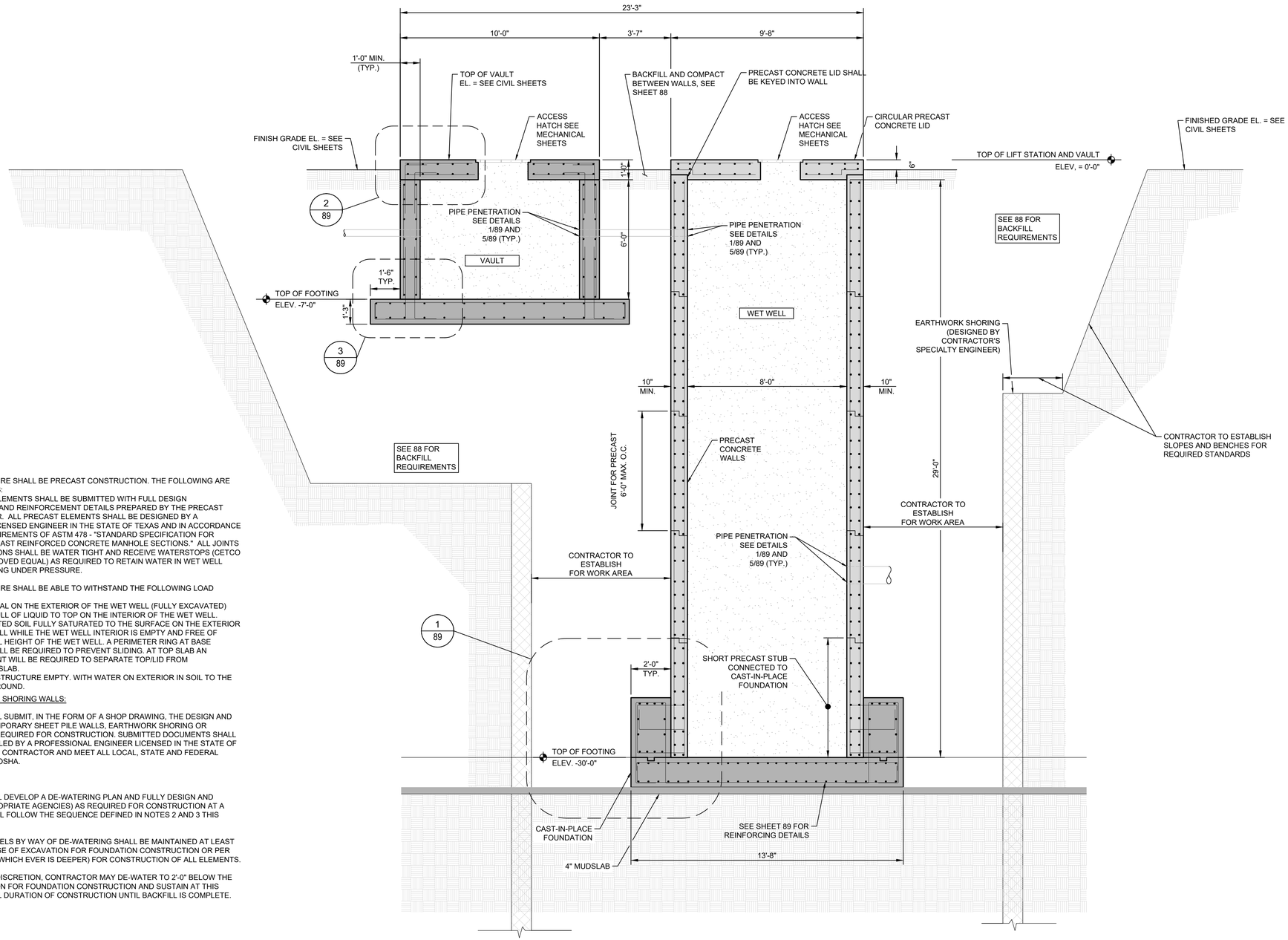
LIFT STATION AND VAULT PLAN

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
86



1 / 87 LIFT STATION AND VAULT SECTION
3/8" = 1'-0"

NOTE:
ELEVATIONS SHOWN ARE RELATIVE AND FOR REFERENCE ONLY. COORDINATE ACTUAL ELEVATIONS FOR TOP SLAB AT SURFACE WITH CIVIL DRAWINGS.

WET WELL NOTES:

1. WET WELL STRUCTURE SHALL BE PRECAST CONSTRUCTION. THE FOLLOWING ARE THE REQUIREMENTS:
   - ALL PRECAST ELEMENTS SHALL BE SUBMITTED WITH FULL DESIGN CALCULATIONS AND REINFORCEMENT DETAILS PREPARED BY THE PRECAST MANUFACTURER. ALL PRECAST ELEMENTS SHALL BE DESIGNED BY A REGISTERED/LICENSED ENGINEER IN THE STATE OF TEXAS AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM 478 - "STANDARD SPECIFICATION FOR CIRCULAR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS." ALL JOINTS AND CONNECTIONS SHALL BE WATER TIGHT AND RECEIVE WATERSTOPS (CETCO RX101 OR APPROVED EQUAL) AS REQUIRED TO RETAIN WATER IN WET WELL WITHOUT LEAKING UNDER PRESSURE.
2. WET WELL STRUCTURE SHALL BE ABLE TO WITHSTAND THE FOLLOWING LOAD CONDITIONS:
   - NO SOIL MATERIAL ON THE EXTERIOR OF THE WET WELL (FULLY EXCAVATED) WHILE BEING FULL OF LIQUID TO TOP ON THE INTERIOR OF THE WET WELL.
   - FULLY COMPACTED SOIL FULLY SATURATED TO THE SURFACE ON THE EXTERIOR OF THE WET WELL WHILE THE WET WELL INTERIOR IS EMPTY AND FREE OF LIQUID FOR FULL HEIGHT OF THE WET WELL. A PERIMETER RING AT BASE FOUNDATION WILL BE REQUIRED TO PREVENT SLIDING. AT TOP SLAB AN EXPANSION JOINT WILL BE REQUIRED TO SEPARATE TOP/LID FROM CAST-IN-PLACE SLAB.
   - BUOYANCY OF STRUCTURE EMPTY. WITH WATER ON EXTERIOR IN SOIL TO THE SURFACE OF GROUND.

TEMPORARY EARTHWORK SHORING WALLS:

1. CONTRACTOR SHALL SUBMIT, IN THE FORM OF A SHOP DRAWING, THE DESIGN AND LAYOUT OF ANY TEMPORARY SHEET PILE WALLS, EARTHWORK SHORING OR EXCAVATION PLAN REQUIRED FOR CONSTRUCTION. SUBMITTED DOCUMENTS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS RETAINED BY CONTRACTOR AND MEET ALL LOCAL, STATE AND FEDERAL CODES, INCLUDING OSHA.

DEWATERING:

1. CONTRACTOR SHALL DEVELOP A DE-WATERING PLAN AND FULLY DESIGN AND PERMIT (WITH APPROPRIATE AGENCIES) AS REQUIRED FOR CONSTRUCTION AT A MINIMUM PLAN SHALL FOLLOW THE SEQUENCE DEFINED IN NOTES 2 AND 3 THIS SECTION.
2. GROUNDWATER LEVELS BY WAY OF DE-WATERING SHALL BE MAINTAINED AT LEAST 2'-0" BELOW THE BASE OF EXCAVATION FOR FOUNDATION CONSTRUCTION OR PER GEOTECH REPORT (WHICH EVER IS DEEPER) FOR CONSTRUCTION OF ALL ELEMENTS.
3. AT CONTRACTORS DISCRETION, CONTRACTOR MAY DE-WATER TO 2'-0" BELOW THE BASE OF EXCAVATION FOR FOUNDATION CONSTRUCTION AND SUSTAIN AT THIS LEVEL FOR THE FULL DURATION OF CONSTRUCTION UNTIL BACKFILL IS COMPLETE.

PERMIT SUBMITTAL

No.	REVISIONS	DATE	BY

Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/20/2023

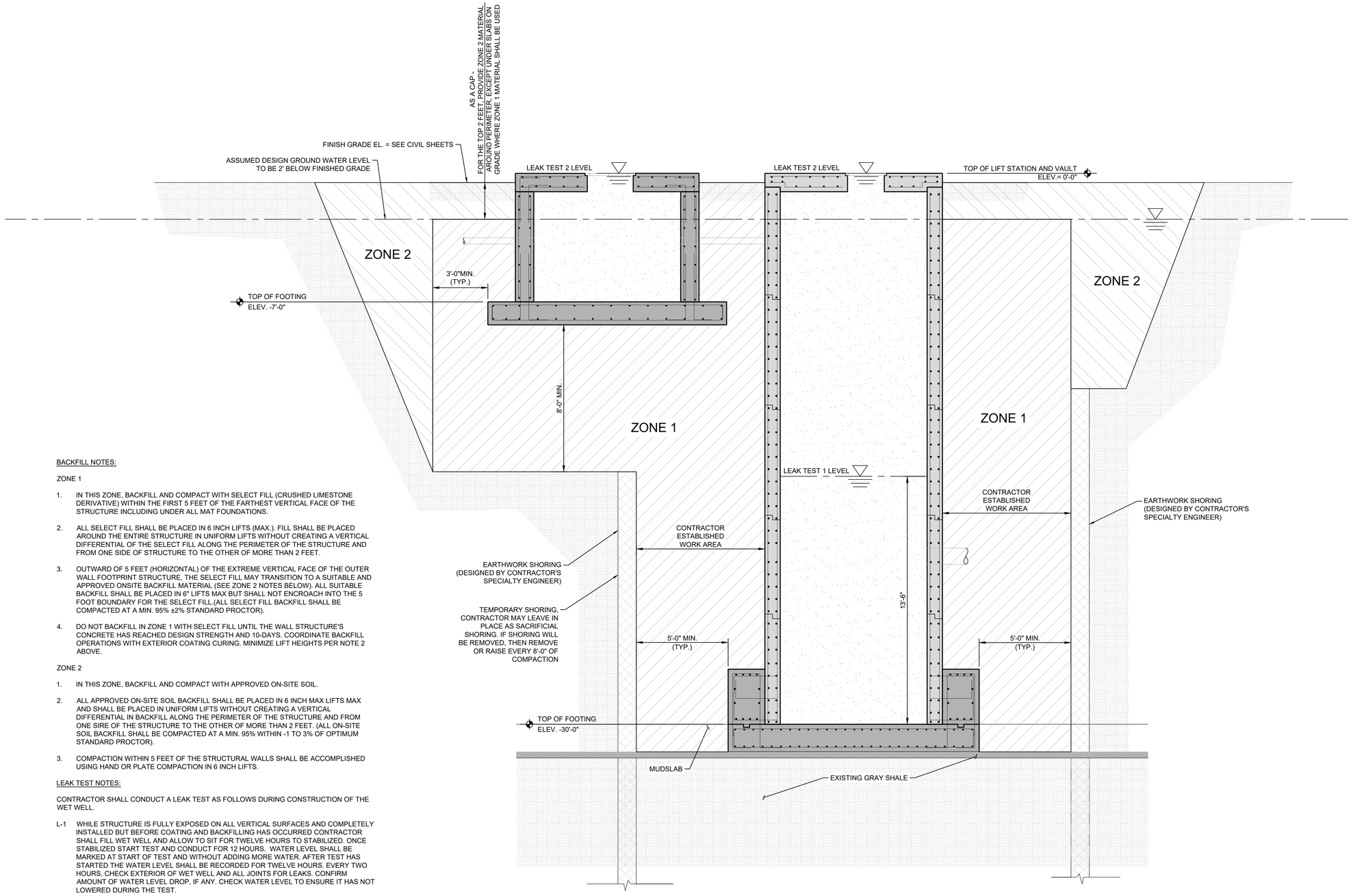
STATE OF TEXAS
JON CASEY LONG
94119
LICENSED PROFESSIONAL ENGINEER

KHA PROJECT 067783129
DATE NOVEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: GNH
DRAWN BY: ALB
CHECKED BY: JCL

LIFT STATION AND VAULT SECTION

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
87



1 BACKFILL AND LEAK TEST SECTION
88 3/8" = 1'-0"

NOTE:
ELEVATIONS SHOWN ARE RELATIVE AND FOR REFERENCE ONLY. COORDINATE ACTUAL ELEVATIONS FOR TOP SLAB AT SURFACE WITH CIVIL DRAWINGS.

BACKFILL NOTES:

ZONE 1

1. IN THIS ZONE, BACKFILL AND COMPACT WITH SELECT FILL (CRUSHED LIMESTONE DERIVATIVE) WITHIN THE FIRST 5 FEET OF THE FARTHEST VERTICAL FACE OF THE STRUCTURE INCLUDING UNDER ALL MAT FOUNDATIONS.
2. ALL SELECT FILL SHALL BE PLACED IN 6 INCH LIFTS (MAX.). FILL SHALL BE PLACED AROUND THE ENTIRE STRUCTURE IN UNIFORM LIFTS WITHOUT CREATING A VERTICAL DIFFERENTIAL OF THE SELECT FILL ALONG THE PERIMETER OF THE STRUCTURE AND FROM ONE SIDE OF STRUCTURE TO THE OTHER OF MORE THAN 2 FEET.
3. OUTWARD OF 5 FEET (HORIZONTAL) OF THE EXTREME VERTICAL FACE OF THE OUTER WALL FOOTPRINT STRUCTURE, THE SELECT FILL MAY TRANSITION TO A SUITABLE AND APPROVED ONSITE BACKFILL MATERIAL (SEE ZONE 2 NOTES BELOW). ALL SUITABLE BACKFILL SHALL BE PLACED IN 6" LIFTS MAX BUT SHALL NOT ENCROACH INTO THE 5 FOOT BOUNDARY FOR THE SELECT FILL.(ALL SELECT FILL BACKFILL SHALL BE COMPACTED AT A MIN. 95% ±2% STANDARD PROCTOR).
4. DO NOT BACKFILL IN ZONE 1 WITH SELECT FILL UNTIL THE WALL STRUCTURE'S CONCRETE HAS REACHED DESIGN STRENGTH AND 10-DAYS. COORDINATE BACKFILL OPERATIONS WITH EXTERIOR COATING CURING. MINIMIZE LIFT HEIGHTS PER NOTE 2 ABOVE.

ZONE 2

1. IN THIS ZONE, BACKFILL AND COMPACT WITH APPROVED ON-SITE SOIL.
2. ALL APPROVED ON-SITE SOIL BACKFILL SHALL BE PLACED IN 6 INCH MAX LIFTS MAX AND SHALL BE PLACED IN UNIFORM LIFTS WITHOUT CREATING A VERTICAL DIFFERENTIAL IN BACKFILL ALONG THE PERIMETER OF THE STRUCTURE AND FROM ONE SIRE OF THE STRUCTURE TO THE OTHER OF MORE THAN 2 FEET. (ALL ON-SITE SOIL BACKFILL SHALL BE COMPACTED AT A MIN. 95% WITHIN -1 TO 3% OF OPTIMUM STANDARD PROCTOR).
3. COMPACTION WITHIN 5 FEET OF THE STRUCTURAL WALLS SHALL BE ACCOMPLISHED USING HAND OR PLATE COMPACTION IN 6 INCH LIFTS.

LEAK TEST NOTES:

CONTRACTOR SHALL CONDUCT A LEAK TEST AS FOLLOWS DURING CONSTRUCTION OF THE WET WELL.

L-1 WHILE STRUCTURE IS FULLY EXPOSED ON ALL VERTICAL SURFACES AND COMPLETELY INSTALLED BUT BEFORE COATING AND BACKFILLING HAS OCCURRED CONTRACTOR SHALL FILL WET WELL AND ALLOW TO SIT FOR TWELVE HOURS TO STABILIZED. ONCE STABILIZED START TEST AND CONDUCT FOR 12 HOURS. WATER LEVEL SHALL BE MARKED AT START OF TEST AND WITHOUT ADDING MORE WATER. AFTER TEST HAS STARTED THE WATER LEVEL SHALL BE RECORDED FOR TWELVE HOURS. EVERY TWO HOURS, CHECK EXTERIOR OF WET WELL AND ALL JOINTS FOR LEAKS. CONFIRM AMOUNT OF WATER LEVEL DROP, IF ANY. CHECK WATER LEVEL TO ENSURE IT HAS NOT LOWERED DURING THE TEST.

L-2 ONCE STRUCTURE EXTERIOR HAS RECEIVED BACKFILL AND BEEN FULLY COMPACTED CONTRACTOR SHALL FILL WET WELL TO TOP OF WET WELL AND HOLD FOR TWO HOURS AFTER LEVEL HAS STABILIZED FOR 12 HOURS. WATER LEVEL SHALL BE MARKED AT START OF TEST AND WITHOUT ADDING MORE WATER AFTER TEST HAS STARTED THE WATER LEVEL SHALL BE RECORDED FOR TWELVE HOURS. EVERY TWO HOURS, CHECK EXTERIOR OF WET WELL AND ALL JOINTS FOR LEAKS. CONFIRM AMOUNT OF WATER LEVEL DROP, IF ANY. CHECK WATER LEVEL TO ENSURE IT HAS NOT LOWERED DURING THE TEST. SEE MECHANICAL SHEETS FOR WATER LEVEL PASS/FAIL CRITERIA.

L-3 ONCE ALL BACKFILL HAS REACHED FINISHED GRADE AND BEEN FULLY COMPACTED CONTRACTOR SHALL FILL WET WELL TO TOP OF WET WELL CONDUCT THE OFFICIAL EXFILTRATION TEST AS SPECIFICALLY IDENTIFIED ON THE MECHANICAL PLANS.

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Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
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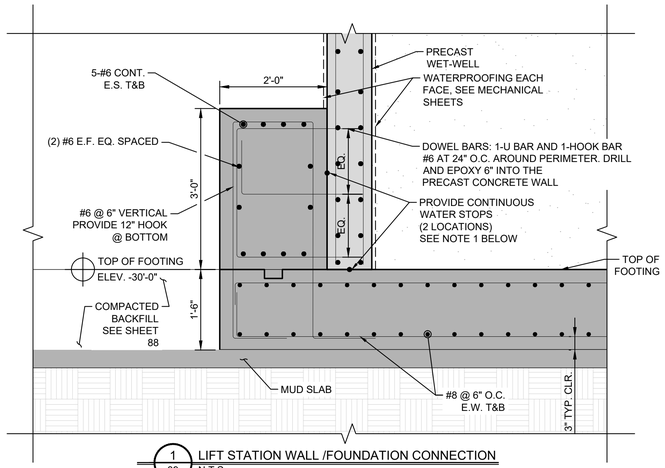
KHA PROJECT 067783129
DATE NOVEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: GNH
DRAWN BY: ALB
CHECKED BY: JCL

LIFT STATION AND VAULT BACKFILL AND LEAK TEST SECTION

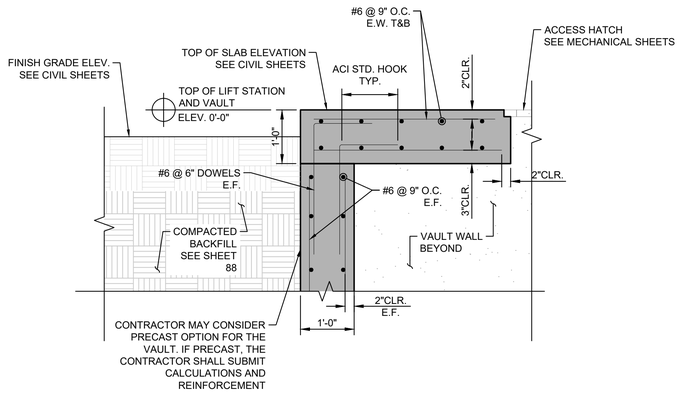
EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

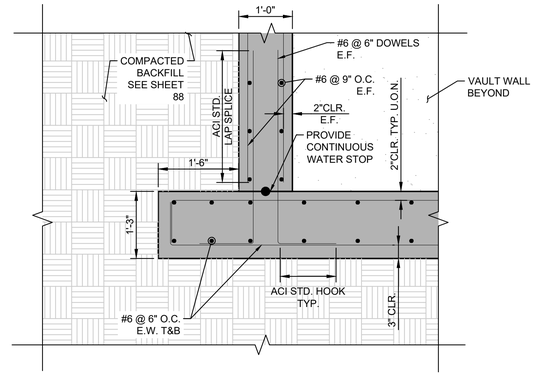
SHEET NUMBER
88



1 89 LIFT STATION WALL /FOUNDATION CONNECTION
N.T.S.



2 89 VAULT TOP OF WALL DETAIL
N.T.S.



3 89 VAULT WALL /FOUNDATION CONNECTION
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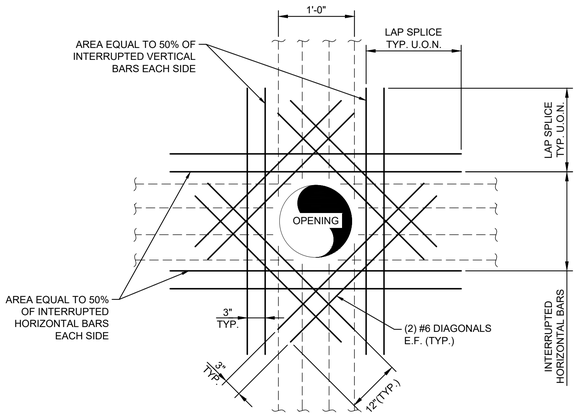
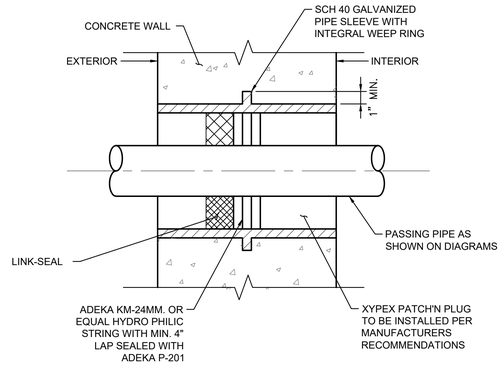


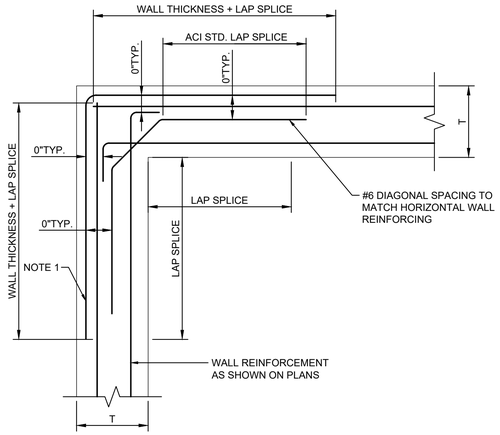
4 89 PIPE PENETRATION DETAIL
N.T.S.



5 89 LINK-SEAL DETAIL
N.T.S.

LINK-SEAL NOTES:

1. INSIDE DIAMETER OF EACH WALL OPENING SHALL BE OF THE SIZE RECOMMENDED BY MANUFACTURER TO FIT THE PIPE OR CONDUIT AND THE LINK-SEAL WALL SEAL ASSEMBLY TO ASSURE WATER-TIGHT JOINT.
2. PIPE TO WALL PENETRATION CLOSURES SHALL BE OF THE MODULAR MECHANICAL TYPE, CONSISTING OF INTERLOCKING SYNTHETIC RUBBER LINKS SHAPED TO FILL THE ANNULAR SPACE BETWEEN THE PIPE AND WALL OPENING. A PRESSURE PLATE SHALL BE PROVIDED UNDER EACH BOLT HEAD AND NUT, WITH THE SEAL CONSTRUCTED TO PROVIDE ELECTRICAL INSULATION BETWEEN PIPE AND WALL.
3. WALL SEAL ASSEMBLY SHALL BE "LINK SEAL" AS MFG. BY THUNDERLINE CORP., WAYNE, MICHIGAN OR EQUAL.
4. PROVIDE ESCUTCHEONS IN FINISHED SPACES.
5. CONTRACTOR SHALL COORDINATE ALL MATERIAL TYPES, MATERIAL COMPATIBILITY, SIZES, GAPS, AND CONNECTIONS WITH LINK-SEAL MANUFACTURER TO ENSURE A WATER TIGHT CONNECTION.



6 89 TYPICAL WALL CORNER REINFORCEMENT DETAIL
N.T.S.

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Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

11/20/2023

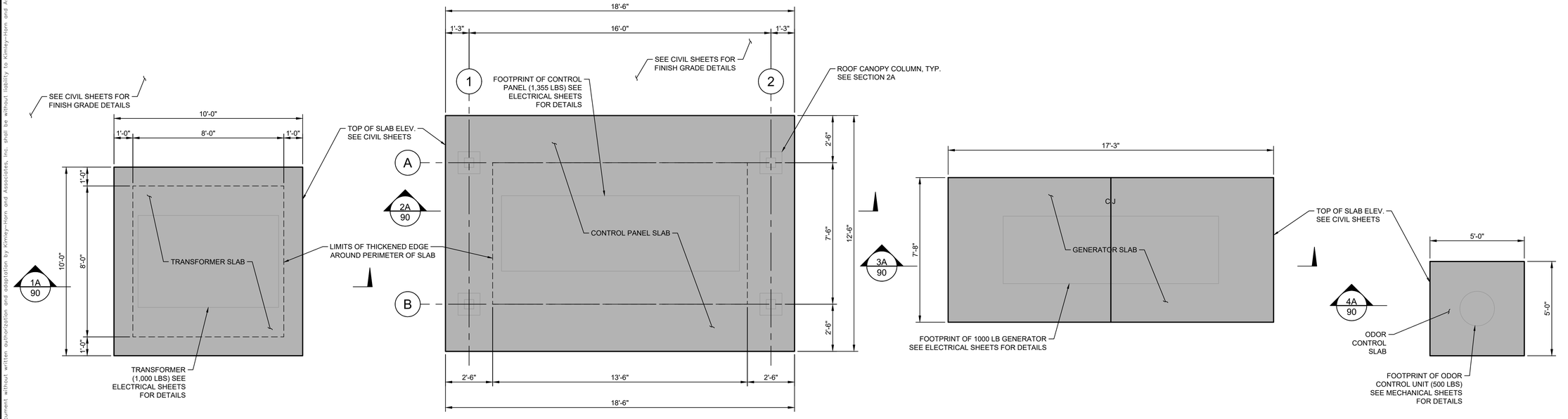
STATE OF TEXAS
JON CASEY LONG
94119
LICENSED PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	NOVEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	GNH
DRAWN BY:	ALB
CHECKED BY:	JCL

LIFT STATION AND VAULT SECTIONS AND DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
89

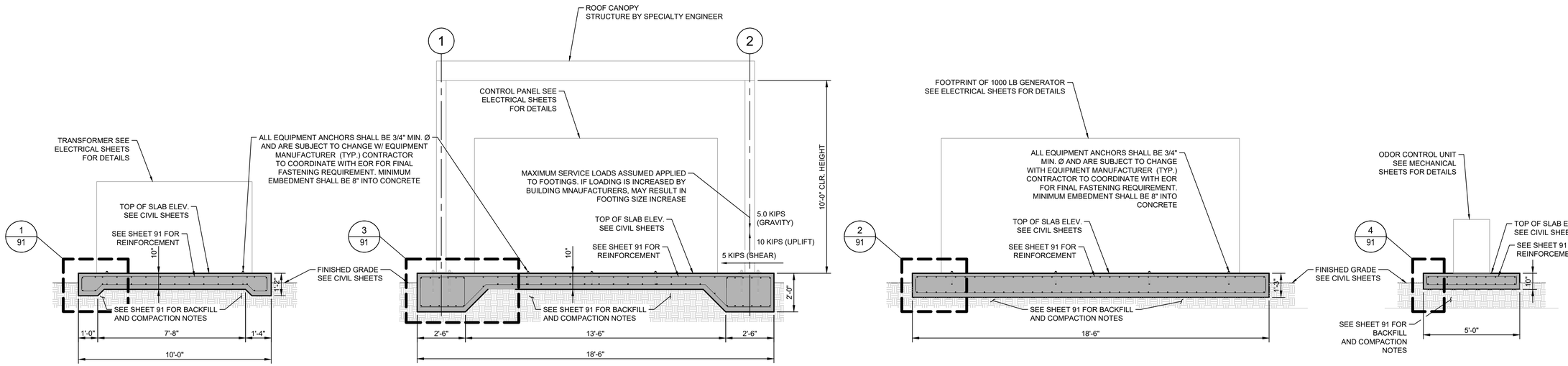


1 / 90 TRANSFORMER SLAB ON GRADE PLAN
N.T.S.

2 / 90 ELECTRICAL CONTROL SLAB ON GRADE PLAN
N.T.S.

3 / 90 GENERATOR SLAB ON GADE PLAN
N.T.S.

4 / 90 ODOR CONTROL SLAB ON PLAN
N.T.S.



1A / 91 TRANSFORMER SLAB ON GRADE SECTION
N.T.S.

2A / 90 ELECTRICAL CONTROL PANEL SLAB ON GRADE SECTION
N.T.S.

3A / 90 GENERATOR SLAB ON GADE SECTION
N.T.S.

4A / 90 ODOR CONTROL SLAB ON GRADE
N.T.S.

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Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
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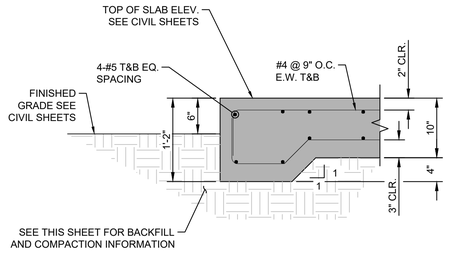
SLAB ON GRADE

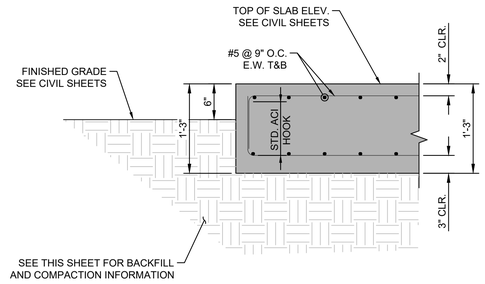
EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

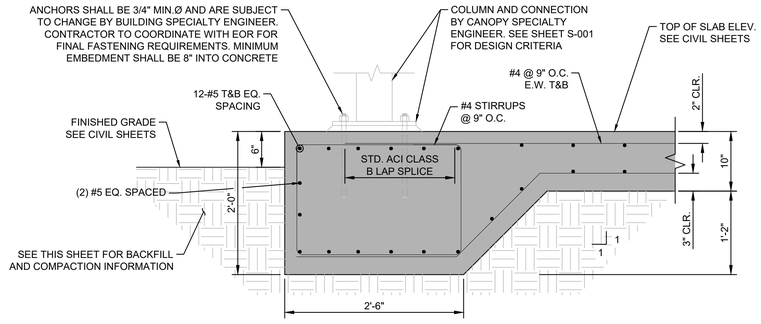
SHEET NUMBER
90



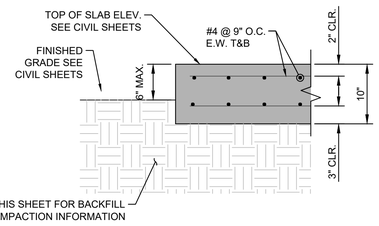
1 91 TRANSFORMER THICKENED EDGE
N.T.S.



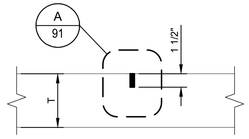
2 91 GENERATOR SLAB
N.T.S.



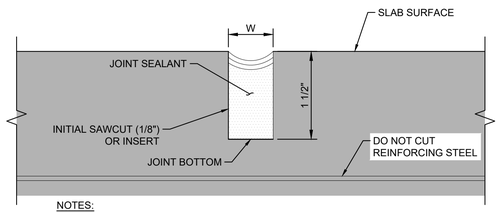
3 91 ELECTRICAL CONTROL PANEL THICKENED EDGE AT COLUMN
N.T.S.



4 91 ODOR CONTROL SLAB
N.T.S.



5 91 TYP. CONTROL JOINT (CJ) DETAIL AND ENLARGEMENT
N.T.S.



NOTES:

1. WIDTH (W) OF SEALANT RESERVOIR IS 1/2" MIN. TO 5/8" MAX.
2. DEPTH OF INITIAL SAWCUT (SC) OR INSERT TYPE JOINT FORMER (CONTROL JOINT), 1/4 THICKNESS OF SLAB.
3. TOP OF SEALANT WILL BE 1/8" BELOW TOP OF SLAB.
4. JOINT SEALANT SHALL BE SIKAFLEX PRO-3 OR APPROVED EQUIVALENT. INSTALL PER MANUFACTURER'S REQUIREMENTS.

A 91 CONTROL JOINT (CJ) ENLARGEMENT
N.T.S.

BACKFILL AND COMPACTION NOTES:

1. CONTRACTOR SHALL PREPARE SUBGRADE IN ACCORDANCE WITH THE REFERENCED GEOTECH REPORT, AT A MINIMUM, EXISTING GRADE SHALL BE CUT TO EXACT BOTTOM OF FOUNDATION TO A CONSISTENT ELEVATION AT BOTTOM OF FOUNDATION THROUGHOUT IF WEATHERED ROCK IS ENCOUNTERED.
2. IF WEATHERED ROCK IS NOT ENCOUNTERED AT BOTTOM OF FOOTING ELEVATION THEN CONTRACTOR SHALL EXCAVATE TO WEATHERED ROCK AND THEN BACKFILL FROM WEATHERED ROCK TO BOTTOM OF FOUNDATION WITH SELECT FILL TO ESTABLISH FOUNDATION SUBGRADE FOR CONSTRUCTION.

PERMIT SUBMITTAL

No.	REVISIONS	DATE	BY

Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
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11/20/2023

STATE OF TEXAS
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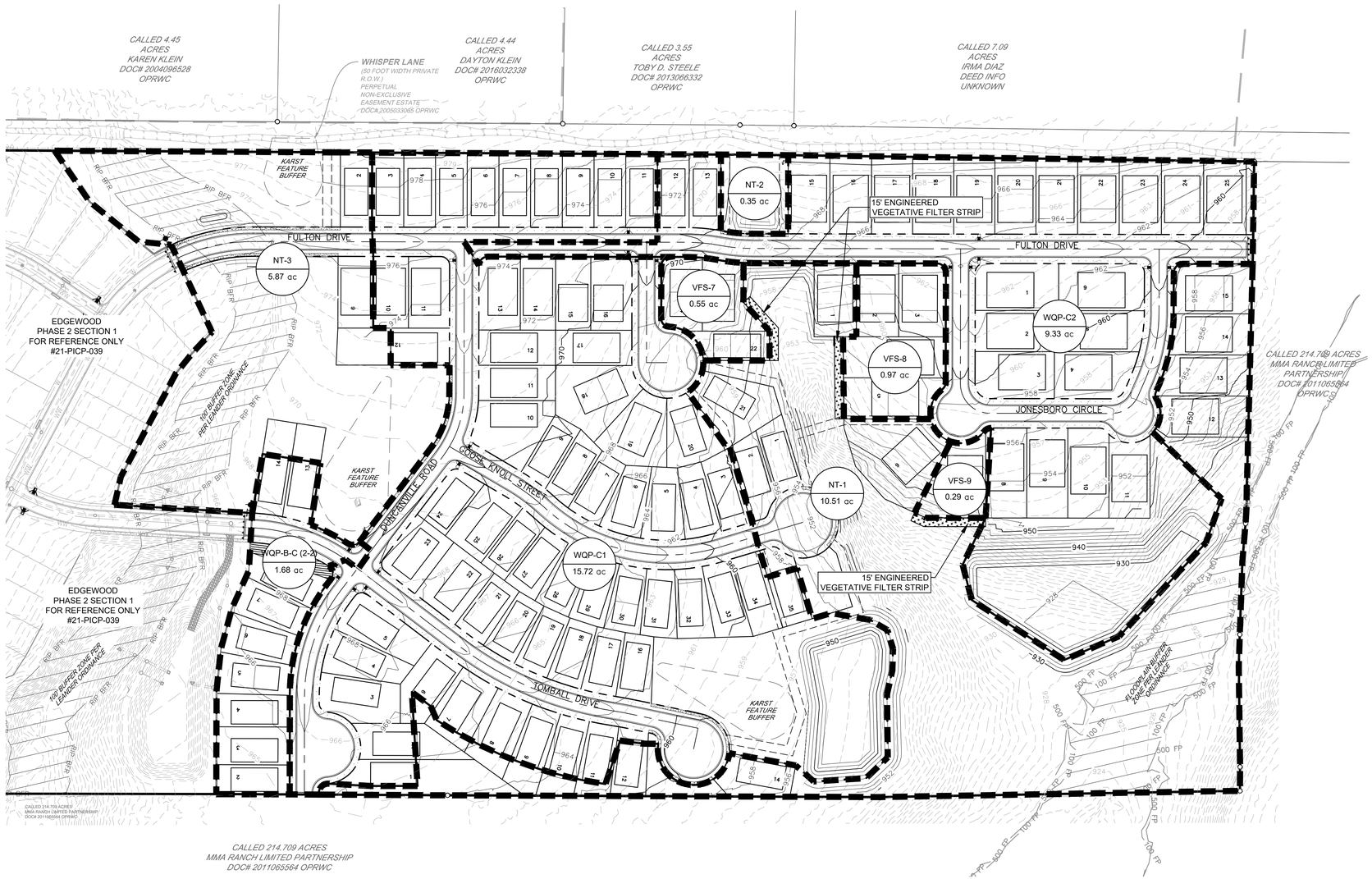
KHA PROJECT 067783129
DATE NOVEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: GNH
DRAWN BY: ALB
CHECKED BY: JCL

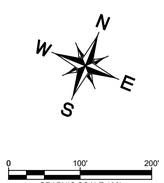
SLAB ON GRADE TYPICAL DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
91

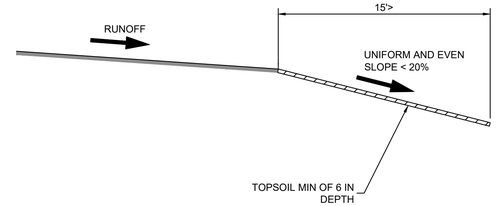
TCEQ Water Quality Drainage Basins					
	Proposed Area (AC)	Proposed Impervious Cover (AC)	% Impervious Cover	REQUIRED TSS REMOVAL	PROPOSED TSS REMOVAL
WQP-C1	15.72	7.93	50%	6902	7825
WQP-C2	9.33	3.84	41%	3342	3925
WQP-B-C (2-2)	1.68	0.91	54%	792	960
VFS-7	0.55	0.24	44%	209	209
VFS-8	0.97	0.31	32%	270	270
VFS-9	0.29	0.09	31%	78	78
NOT TREATED (NT-1-3)	16.73	1.70	10%	1480	0
TOTAL ONSITE	**45.27**	**15.02**	33%	**13073**	**13267**





LEGEND

- X-1 / 9.9 ac — AREA DESIGNATOR / AREA IN ACRES
- PROPERTY LINE
- EXISTING STORM DRAIN LINE
- PROPOSED DRAINAGE DIVIDE
- PROPOSED FLOW DIRECTION
- VEGETATIVE FILTER STRIP



NOTES:
1. ENGINEERED VEGETATIVE FILTER STRIPS TO COMPLY WITH TCEQ RG-348, SECTION 3.4.6.
2. VFS TO BE SEEDED PER LEANDER EROSION CONTROL NOTE 5 ON SHEET 2 FOR TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

ENGINEERED VEGETATIVE FILTER STRIPS
NTS

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175, OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

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PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

KHA PROJECT 067783129	DATE DECEMBER 2023	SCALE AS SHOWN	DESIGNED BY: DPD	DRAWN BY: AMF	CHECKED BY: AEG

WATER QUALITY PLAN

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
92
OF 112

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Edgewood 2-2
Date Prepared: 9/25/2023

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 * =	**45.27**	acres
Predevelopment impervious area within the limits of the plan * =	**0.00**	acres
Total post-development impervious area within the limits of the plan* =	**15.02**	acres
Total post-development impervious cover fraction * =	**0.33**	
P =	**32**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**13073**	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **4**

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

Drainage Basin/Outfall Area No. = WQP-C1

Total drainage basin/outfall area =	**15.72**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**7.93**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.50**	
$L_{M\ THIS\ BASIN}$ =	**6902**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Batch Extended 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 =	**15.72**	acres
A_I =	**7.93**	acres
A_P =	**7.79**	acres
L_R =	**8112**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = **7825** lbs.

F = **0.96**

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 =	**2.80**	inches
Post Development Runoff Coefficient =	**0.36**	
On-site Water Quality Volume =	**57514**	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 =	**11503**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**69017**	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: Edgewood 2-2
Date Prepared: 9/25/2023

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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Characters shown in red are data entry fields.
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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 * =	**45.27**	acres
Predevelopment impervious area within the limits of the plan * =	**0.00**	acres
Total post-development impervious area within the limits of the plan* =	**15.02**	acres
Total post-development impervious cover fraction * =	**0.33**	
P =	**32**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**13073**	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **4**

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

Drainage Basin/Outfall Area No. = WQP-C2

Total drainage basin/outfall area =	**9.33**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**3.84**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.41**	
$L_{M\ THIS\ BASIN}$ =	**3342**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Batch Extended 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 =	**9.33**	acres
A_I =	**3.84**	acres
A_P =	**5.49**	acres
L_R =	**3955**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = **3925** lbs.

F = **0.99**

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

Rainfall Depth =	**3.66**	inches
Post Development Runoff Coefficient =	**0.31**	
On-site Water Quality Volume =	**38730**	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 =	**7746**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**46476**	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: Edgewood 2-2
Date Prepared: 10/11/2023

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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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 * =	**45.27**	acres
Predevelopment impervious area within the limits of the plan * =	**0.00**	acres
Total post-development impervious area within the limits of the plan* =	**15.02**	acres
Total post-development impervious cover fraction * =	**0.33**	
P =	**32**	inches
$L_{M\ TOTAL\ PROJECT}$ =	**13073**	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **7**

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

Drainage Basin/Outfall Area No. = WQP-B-C (2-2)

Total drainage basin/outfall area =	**1.68**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**0.91**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.54**	
$L_{M\ THIS\ BASIN}$ =	**792**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Batch Extended 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 =	**1.68**	acres
A_I =	**0.91**	acres
A_P =	**0.77**	acres
L_R =	**929**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = **930** lbs.

F = **1.00**

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 =	**4.00**	inches
Post Development Runoff Coefficient =	**0.38**	
On-site Water Quality Volume =	**9309**	cubic feet

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

Off-site area draining to BMP =	**3.81**	acres
Off-site Impervious cover draining to BMP =	**0.02**	acres
Impervious fraction of off-site area =	**0.01**	
Off-site Runoff Coefficient =	**0.03**	
Off-site Water Quality Volume =	**1461**	cubic feet
Storage for Sediment =	**2154**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**12923**	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.

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175, OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AME
CHECKED BY:	AEG

WATER QUALITY CALCULATIONS (SHEET 1 OF 2)

EDGEWOOD PHASE 2, SECTION 2

CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 93 112

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Edgewood 2-2
Date Prepared: 10/11/2023

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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 * =	45.27	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	15.02	acres
Total post-development impervious cover fraction * =	0.33	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	13073	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 7

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

Drainage Basin/Outfall Area No. = VFS-7

Total drainage basin/outfall area =	0.55	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.24	acres
Post-development impervious fraction within drainage basin/outfall area =	0.44	
$L_{M\ THIS\ BASIN}$ =	209	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

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

A_C =	0.55	acres
A_I =	0.24	acres
A_P =	0.31	acres
L_R =	230	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = 209 lbs.

F = 0.91

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.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Edgewood 2-2
Date Prepared: 10/11/2023

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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 * =	45.27	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	15.02	acres
Total post-development impervious cover fraction * =	0.33	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	13073	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 7

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

Drainage Basin/Outfall Area No. = VFS-8

Total drainage basin/outfall area =	0.97	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.31	acres
Post-development impervious fraction within drainage basin/outfall area =	0.32	
$L_{M\ THIS\ BASIN}$ =	270	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

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

A_C =	0.97	acres
A_I =	0.31	acres
A_P =	0.66	acres
L_R =	301	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = 270 lbs.

F = 0.90

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.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Edgewood 2-2
Date Prepared: 10/11/2023

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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 * =	45.27	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	15.02	acres
Total post-development impervious cover fraction * =	0.33	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	13073	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 7

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

Drainage Basin/Outfall Area No. = VFS-9

Total drainage basin/outfall area =	0.29	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.09	acres
Post-development impervious fraction within drainage basin/outfall area =	0.31	
$L_{M\ THIS\ BASIN}$ =	78	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP = **Vegetated Filter Strips**
Removal efficiency = 85 percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

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

A_C =	0.29	acres
A_I =	0.09	acres
A_P =	0.20	acres
L_R =	88	lbs

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

Desired $L_{M\ THIS\ BASIN}$ = 78 lbs.

F = 0.89

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.

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: Edgewood 2-2
Date Prepared: 10/11/2023

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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 * =	45.27	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	15.02	acres
Total post-development impervious cover fraction * =	0.33	
P =	32	inches
$L_{M\ TOTAL\ PROJECT}$ =	13073	lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 7

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

Drainage Basin/Outfall Area No. = NT

Total drainage basin/outfall area =	16.73	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	1.70	acres
Post-development impervious fraction within drainage basin/outfall area =	0.10	
$L_{M\ THIS\ BASIN}$ =	1480	lbs.

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175, OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX. 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER

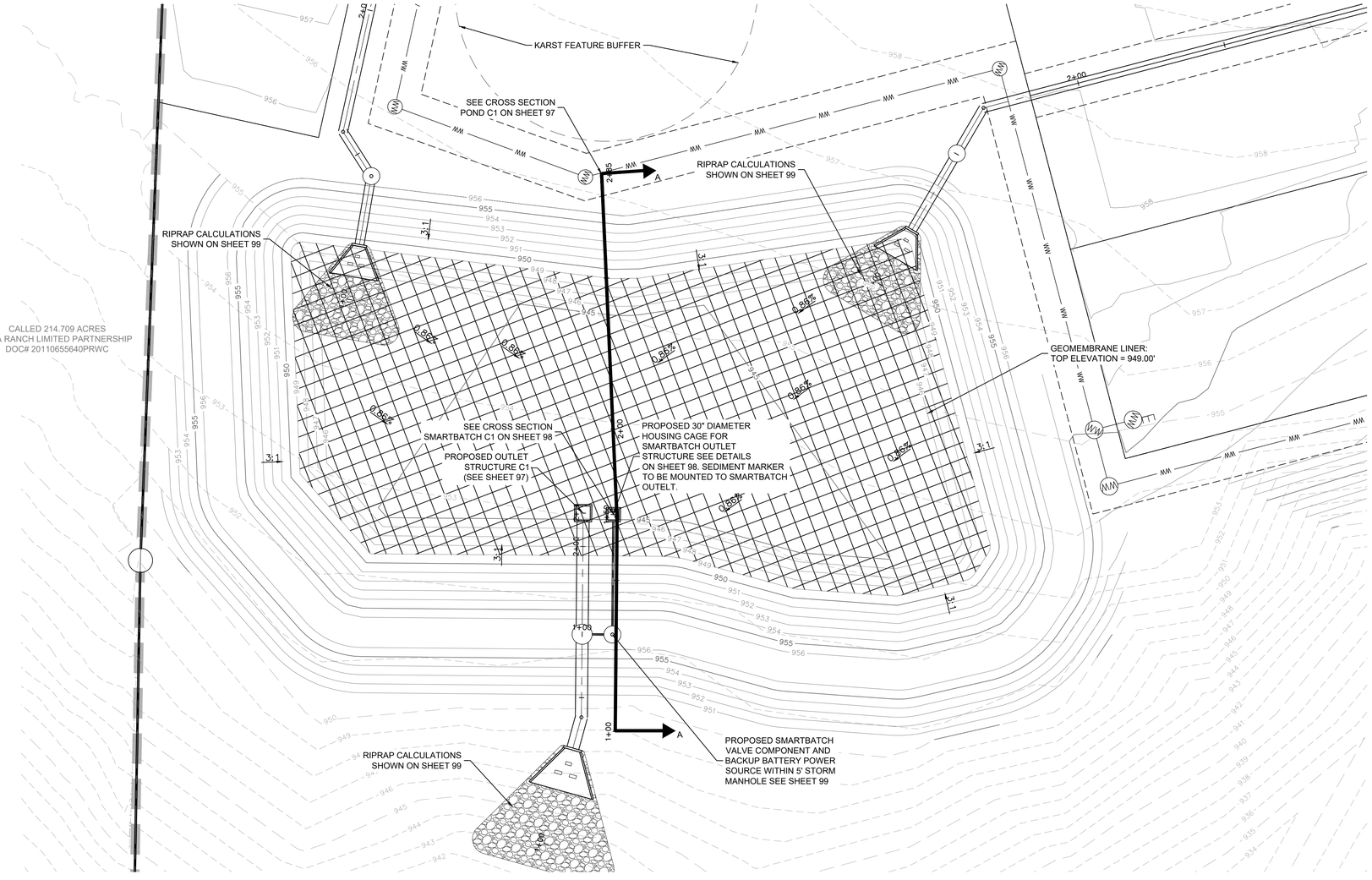
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AME
CHECKED BY: AEG

WATER QUALITY CALCULATIONS (SHEET 2 OF 2)

EDGEWOOD PHASE 2, SECTION 2

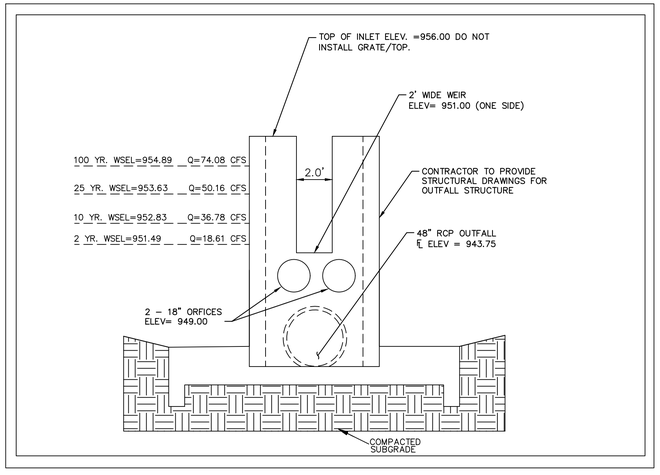
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 94 112



Detention Pond C-1:							Rating Table
Stage (FT MSL)	Area (SF)	Area (AC)	Storage (CF)	Cumm. Storage (CF)	Cumm. Storage (AC-FT)	Flow (CFS)	
945.00	8296	0.190	-	-	-	0.00	
946.00	16,403	0.377	12,350	12,350	0.28	0.00	
947.00	18,150	0.417	17,277	29,626	0.68	0.00	
948.00	19,965	0.458	19,058	48,684	1.12	1.00	
949.00	**21,838**	**0.501**	**20,902**	**69,585**	**1.60**	**0.00**	**WATER QUALITY ELEVATION**
950.00	23,768	0.546	22,803	92,388	2.12	0.00	
951.00	25,754	0.591	24,761	117,149	2.69	0.00	
952.00	27,797	0.638	26,776	143,925	3.30	0.00	
953.00	29,894	0.686	28,846	172,770	3.97	4.24	
954.00	32,049	0.736	30,972	203,742	4.68	22.04	
955.00	34,259	0.786	33,154	236,896	5.44	47.44	
956.00	36,500	0.838	35,380	272,275	6.25	78.55	

WSE	Pond C-1
2-YR WSE	951.49
10-YR WSE	952.83
25-YR WSE	953.63
100-YR WSE	954.89



COMPOSITE OUTLET STRUCTURE DETAIL
N.T.S.

0 20' 40'
GRAPHIC SCALE 20'

LEGEND

	PROPERTY LINE
55.55•	PROPOSED SPOT ELEVATION
EX 55.5 •	EXISTING SPOT ELEVATION
→	STREET DRAINAGE FLOW DIRECTION
555	PROPOSED CONTOUR
555	EXISTING CONTOUR

BATCH DETENTION POND REVEGETATION PLAN

1. IMMEDIATELY FOLLOWING COMPLETION OF CONSTRUCTION, EXCESS SPOIL AND DEBRIS SHALL BE REMOVED AND THE CONSTRUCTION AREA SHALL BE GRADED TO THE CONTOURS AS SHOWN ON THE PLANS. THE SURFACE OF THE GROUND SHOULD BE SMOOTH WITH NO LARGE ROCKS, STUMPS, OR OTHER DEBRIS. TOPSOIL OF SANDY LOAM, LOAM, CLAY LOAM OR EQUIVALENT AND FREE OF TREE ROOTS, ROCKS GREATER THAN 2 INCHES IN DIAMETER AND OTHER DEBRIS SHALL THEN BE UNIFORMLY SPREAD OVER ALL DISTURBED AREAS TO A MINIMUM DEPTH OF 6 INCHES. THE TOPSOIL SHOULD BE COMPACTED BY TRACKING A BULLDOZER WITH CLEATED TREADS VERTICALLY ON THE SLOPES TO CREATE HORIZONTAL EROSION CHECKS IN THE SURFACE.

2. RE-SEEDING SHALL IMMEDIATELY FOLLOW TOPSOILING WITH THE FOLLOWING MIXTURE OF GRASSES.
BROADCAST SEEDING:
A. FROM SEPTEMBER 15 TO MARCH 1, SEEDING SHALL BE WITH A COMBINATION OF 2 POUNDS PER 1000 SF OF UNHULLED TYPE 7 (SPECIAL PROVISION 164-WC 001) -
STANDARD SHORT NATIVE GRASS SEED MIX AND 7 POUNDS PER 1000 SF OF WINTER RYE WITH A PURITY OF 95% WITH 90% GERMINATION.
B. FROM MARCH 2 TO SEPTEMBER 14, SEEDING SHALL BE WITH HULLED TYPE 7 (SPECIAL PROVISION 164-WC 001) -
STANDARD SHORT NATIVE GRASS SEED MIX AT A RATE OF 2 POUNDS PER 1000 SF WITH A PURITY OF OF 95% WITH 85% GERMINATION.

C. 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 1 POUND PER 1000 SF.

3. THE SEEDED AREA SHALL BE IRRIGATED OR SPRINKLED IN A MANNER THAT WILL NOT ERODE THE TOPSOIL, AT 10-DAY INTERVALS DURING THE FIRST TWO MONTHS FOLLOWING PLANTING AT A RATE SUFFICIENT TO THOROUGHLY SOAK THE SOIL TO A DEPTH OF 6 INCHES. RAINFALL OCCURRENCES OF ONE-HALF INCH OR GREATER SHALL POSTPONE THE WATERING SCHEDULE 10 DAYS. RESTORATION SHALL BE ACCEPTABLE WHEN THE GRASS HAS GROWN AT LEAST 1-1/2 INCHES HIGH WITH 95% COVERAGE AND NO BARE SPOT LARGER THAN 16 SQUARE FEET EXIST.

NOTES:

1. BOTTOM OF SEDIMENTATION AND DETENTION BASINS SHALL BE GRASS LINED.
2. BARRIER FENCE SHALL BE INSTALLED ON ANY WALLS IN EXCESS OF 30" TALL.
3. ALL POND BOTTOMS, SIDE SLOPES, AND EARTHEN EMBANKMENTS SHALL BE COMPACTED TO 95% MAXIMUM DENSITY PER GEOTECH REPORT.
4. EXPANSION JOINTS ON FREE STANDING WALLS SHALL HAVE WATER TIGHT SEALS AS NEEDED.
5. ALL EXPOSED CONCRETE THAT IS VISIBLE IS REQUIRED TO BE MADE OF STONE OR CLAD IN STONE INCLUDING BUT NOT LIMITED TO LEDGESTONE, FIELDSTONE, CAST STONE, OR OTHER DECORATIVE MATERIALS SUCH AS STAMPED AND TINTED CONCRETE THAT RESEMBLES STONE OR BRICK AS APPROVED BY THE DIRECTOR OF PLANNING. ALL OTHER EXPOSED CONCRETE IS REQUIRED TO BE MADE OF STONE OR CLAD IN STONE AS LISTED ABOVE OR TEXTURED AND TINTED IN EARTHERN COLORS. IN THE EVENT THAT THE DRAINAGE FACILITY IS BELOW GRADE, CONCRETE IS PERMITTED INSTEAD OF NATIVE STONE AND SCREENING REQUIREMENTS ARTICLE VI, SEC. 1 (D) OF THIS ORDINANCE SHALL APPLY.
6. CONTRACTOR SHALL SUBMIT STRUCTURAL DESIGN TO THE CITY FOR APPROVAL PRIOR TO CONSTRUCTION ON THIS STRUCTURE.

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 3095953.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023

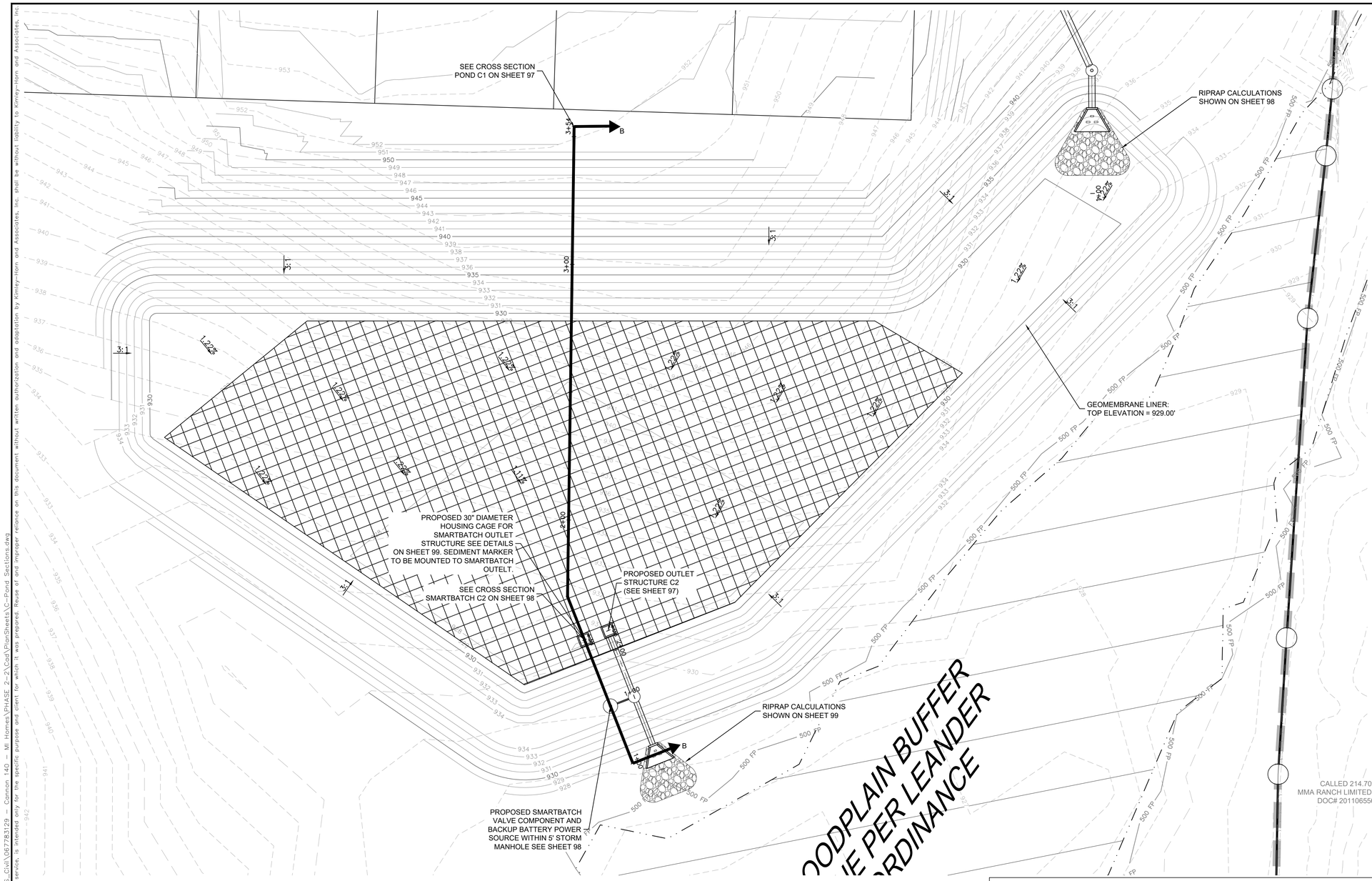
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130564
LICENSED
PROFESSIONAL ENGINEER

KHA PROJECT	067783129
DATE	DECEMBER 2023
SCALE:	AS SHOWN
DESIGNED BY:	DPD
DRAWN BY:	AMF
CHECKED BY:	AEG

POND C1

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
95
OF 112



LEGEND

	PROPERTY LINE
55.55•	PROPOSED SPOT ELEVATION
EX 55.5 +	EXISTING SPOT ELEVATION
	STREET DRAINAGE FLOW DIRECTION
555	PROPOSED CONTOUR
555	EXISTING CONTOUR

BATCH DETENTION POND REVEGETATION PLAN

1. IMMEDIATELY FOLLOWING COMPLETION OF CONSTRUCTION, EXCESS SPOIL AND DEBRIS SHALL BE REMOVED AND THE CONSTRUCTION AREA SHALL BE GRADED TO THE CONTOURS AS SHOWN ON THE PLANS. THE SURFACE OF THE GROUND SHOULD BE SMOOTH WITH NO LARGE ROCKS, STUMPS, OR OTHER DEBRIS. TOPSOIL OF SANDY LOAM, LOAM, CLAY LOAM OR EQUIVALENT AND FREE OF TREE ROOTS, ROCKS GREATER THAN 2 INCHES IN DIAMETER AND OTHER DEBRIS SHALL THEN BE UNIFORMLY SPREAD OVER ALL DISTURBED AREAS TO A MINIMUM DEPTH OF 6 INCHES. THE TOPSOIL SHOULD BE COMPACTED BY TRACKING A BULLDOZER WITH CLEATED TREADS VERTICALLY ON THE SLOPES TO CREATE HORIZONTAL EROSION CHECKS IN THE SURFACE.

2. RE-SEEDING SHALL IMMEDIATELY FOLLOW TOPSOILING WITH THE FOLLOWING MIXTURE OF GRASSES.
BROADCAST SEEDING:
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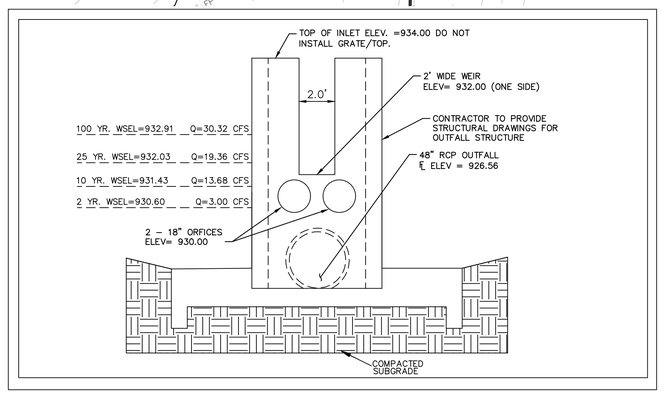
Detention Pond C-2 :

Stage	Area	Area	Storage	Cumm. Storage	Cumm. Storage	Flow	Rating Table
(FT MSL)	(SF)	(AC)	(CF)	(CF)	(AC-FT)	(CFS)	
927.00	9304	0.214	-	-	-	0.00	
928.00	27,106	0.622	18,205	18,205	0.42	0.00	
929.00	**32,157**	**0.738**	**29,632**	**47,837**	**1.10**	**0.00**	**WATER QUALITY ELEVATION**
930.00	35,057	0.805	33,607	81,444	1.87	0.00	
931.00	38,013	0.873	36,535	117,979	2.71	0.00	
932.00	41,025	0.942	39,519	157,498	3.62	1.00	
933.00	44,091	1.012	42,558	200,056	4.59	0.00	
934.00	47,213	1.084	45,652	245,708	5.64	0.00	

WSE	Pond C-2
2-YR WSE	930.60
10-YR WSE	931.43
25-YR WSE	932.03
100-YR WSE	932.91



COMPOSITE OUTLET STRUCTURE DETAIL
N.T.S.

BENCHMARKS

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ELEVATION: 915.036' (NAVD '88)
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E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

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TEXAS REGISTERED ENGINEERING FIRM F-928

12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER
Alejandro E. Granados Rico

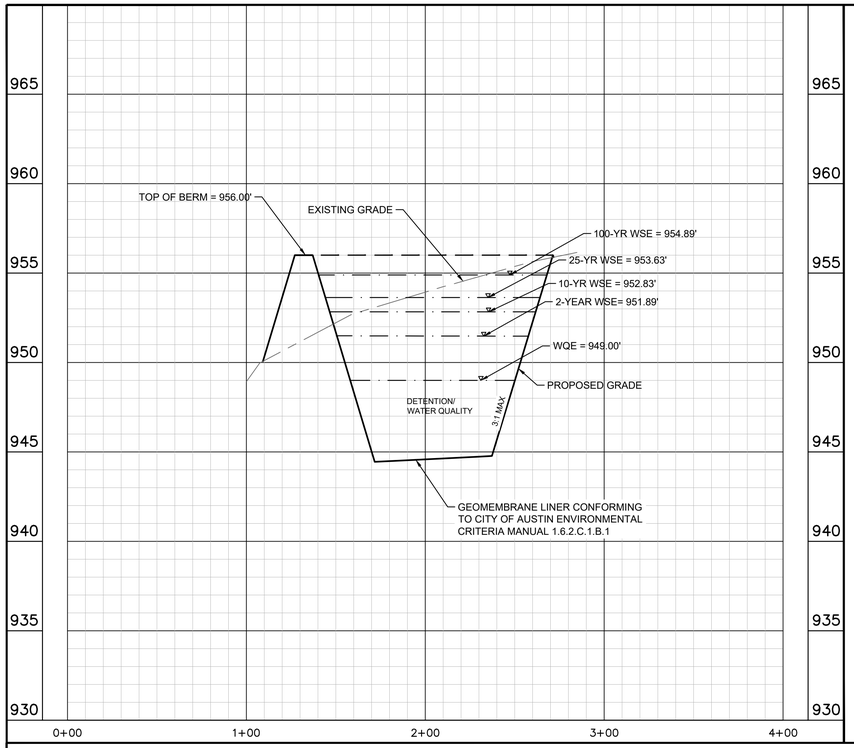
KHA PROJECT
067783129
DATE
DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AMF
CHECKED BY: AEG

POND C2

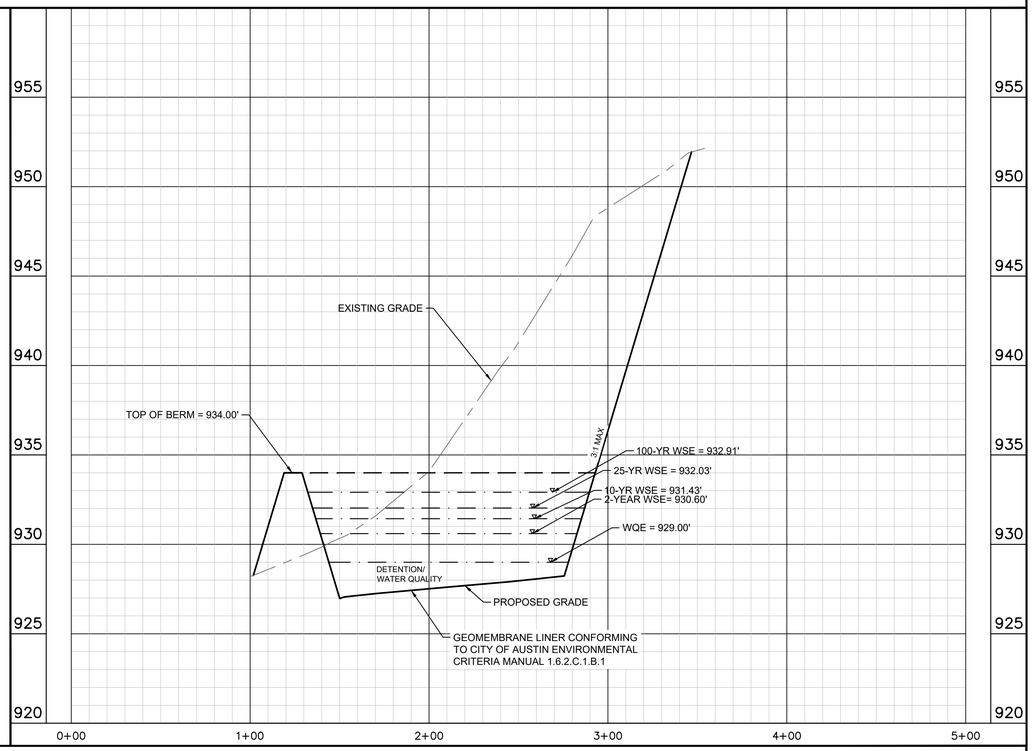
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
96
OF 112

POND C1

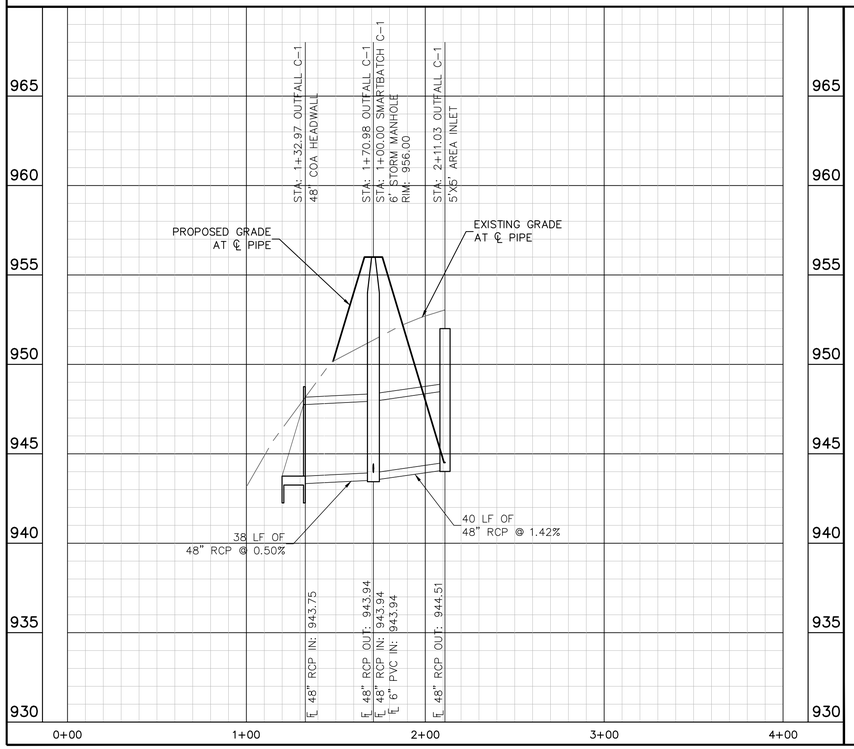


POND C2

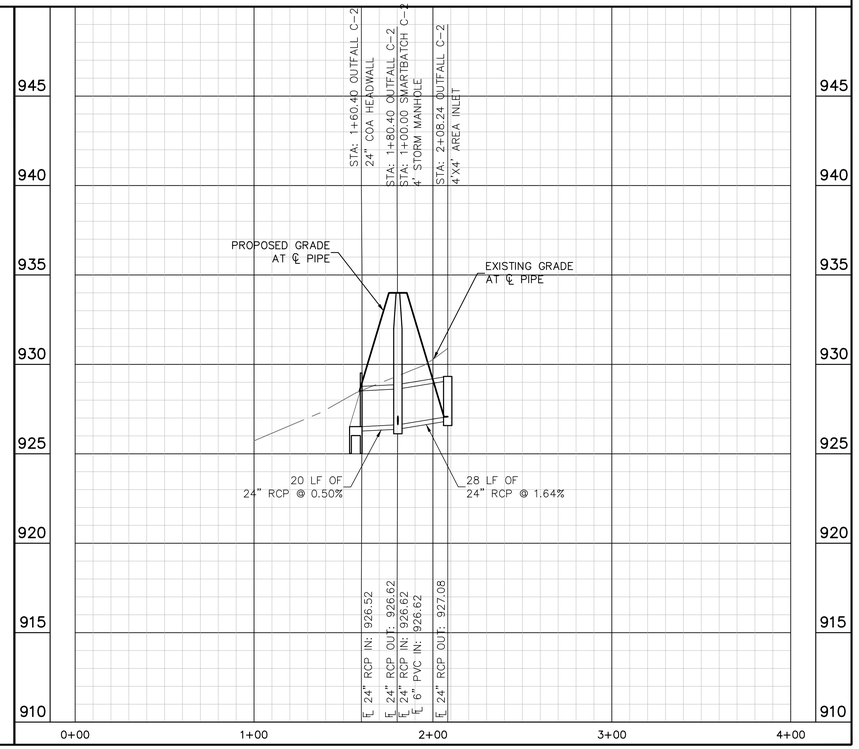


PROFILE SCALE
1" = 40' HORIZONTAL
1" = 4' VERTICAL

OUTFALL C-1



OUTFALL C-2



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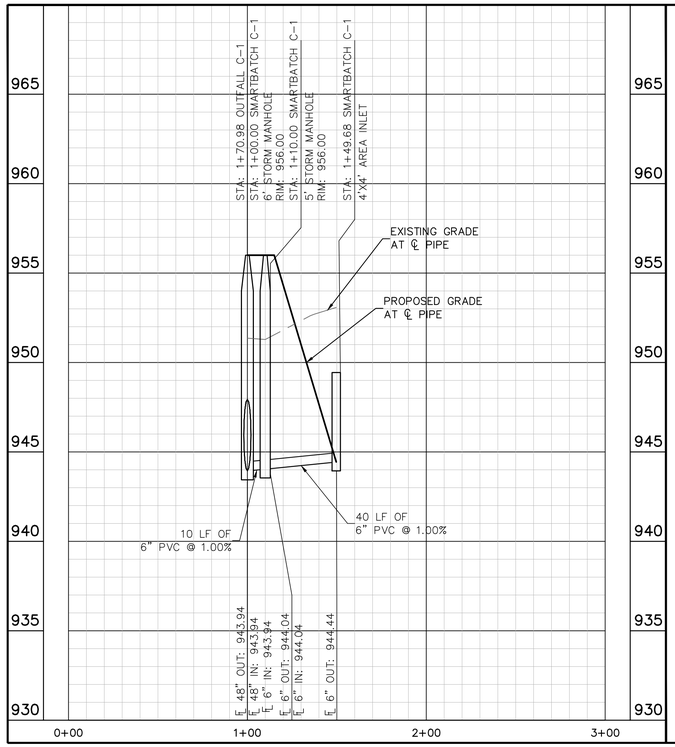
POND CROSS SECTIONS

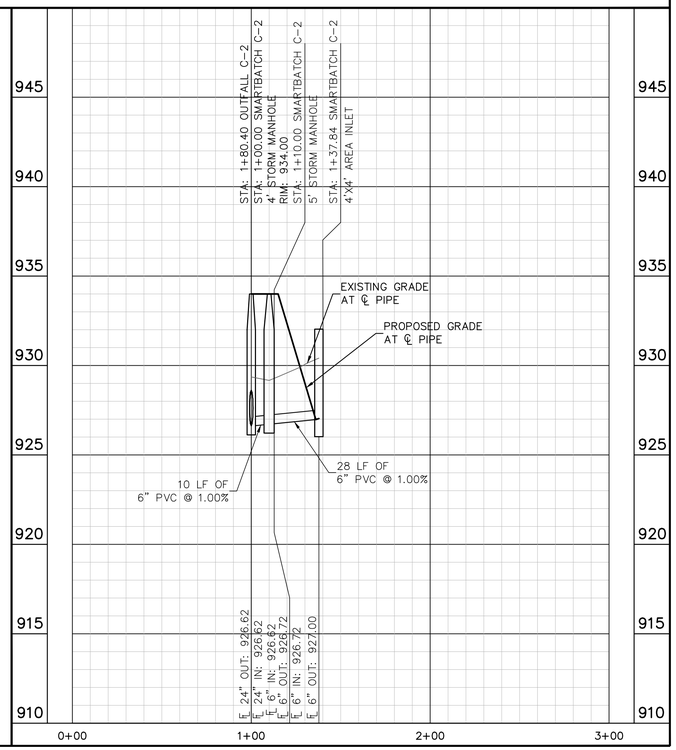
EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
97
OF 112

SMARTBATCH C-1



SMARTBATCH C-2



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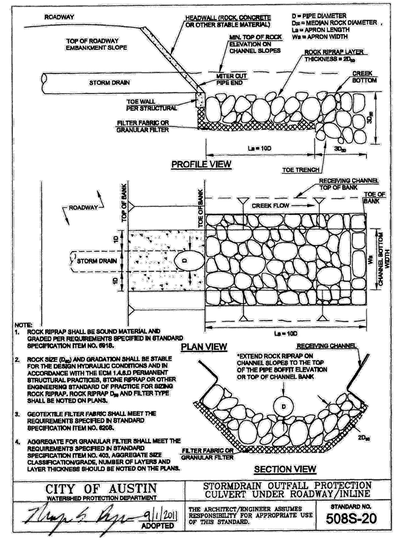


NOTE:
1. ROCK RIPRAP SHALL BE SOUND MATERIAL AND GRADED PER REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 6918.
2. ROCK SIZE (D_{50}) AND GRADATION SHALL BE STABLE FOR THE DESIGN HYDRAULIC CONDITIONS AND IN ACCORDANCE WITH THE ECM 1.4.6.D PERMANENT STRUCTURAL PRACTICES, STONE RIPRAP OR OTHER 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. 6208.
4. AGGREGATE FOR GRANULAR FILTER SHALL MEET THE REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 6216. APPROPRIATE SIEVE CLASSIFICATION/GRADE, NUMBER OF LAYERS AND LAYER THICKNESS SHOULD BE NOTED ON THE PLANS.

CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT	STORMDRAIN OUTFALL PROTECTION CULVERT UNDER ROADWAY/INLINE
4/1/2011 ADOPTED	THE ARCHITECT/ENGINEERS ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD. STANDARD NO. 508S-20

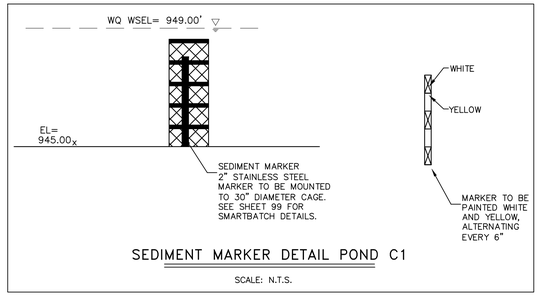
STORM OUTFALL DESIGN - POND C-1

Edgewood Phase 2-2

INPUT VALUES

	Storm Line SD-A	Storm Line SD-B	Unit	Source
Discharge (Q) =	49.80	47.92	cfs	StormCAD Model
Velocity at Outfall (V_1) =	7.05	6.78	ft/s	StormCAD Model
Outlet Pipe Diameter (D) =	3.0	3.0	ft	Required Size for Conveyance
HEADWALL[1]				
Headwall Length (L) =	9.00	9.00	ft	COA Detail 508S-13, Based on Outlet Diameter
Headwall Width (C) =	15	15	ft	COA Detail 508S-13, Based on Outlet Diameter
Depth of Flow at End of Headwall (d) =	0.56	0.55	ft	Based on Manning's Equation, using Goal Seek in Excel to solve for depth
Velocity at End of Headwall (V_2) =	5.95	5.84	ft/sec	$V = \frac{Q}{A}, \quad where\ A = Cd$
RIPRAP				
Riprap Size (D_{50}) =	0.41	0.40	ft	$D_{50} = 0.0105V_2^{2.06}$ (ECM 1.4.6.D.5)
	6.00	6.00	in	Rounded up to Nearest Diameter Size in City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Riprap Classification =	I	I	---	Based on City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Apron Width =	17.00	17.00	ft	Apron Width $= C + 2$
Apron Length =	31.50	31.50	ft	Apron Length $= 3D_{50}$ + La (10*D) (508S-20)
Apron Depth =	1.50	1.50	ft	Apron Depth $= 3D_{50}$ (508S-20)

[1]For additional headwall geometry, refer to COA Standard Detail 508S-13



SEDIMENT MARKER DETAIL POND C1

SCALE: N.T.S.

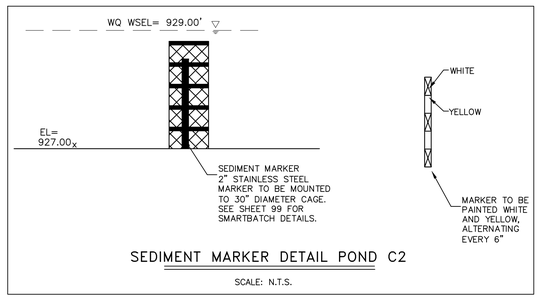
STORM OUTFALL DESIGN - POND C-1 Outlet

Edgewood 2-2

INPUT VALUES

	Storm Line SD-D	Unit	Source
Discharge (Q) =	76.45	cfs	StormCAD Model
Velocity at Outfall (V_1) =	8.9	ft/s	StormCAD Model
Outlet Pipe Diameter (D) =	4.0	ft	Required Size for Conveyance
HEADWALL[1]			
Headwall Length (L) =	12.00	ft	COA Detail 508S-13, Based on Outlet Diameter
Headwall Width (C) =	20	ft	COA Detail 508S-13, Based on Outlet Diameter
Depth of Flow at End of Headwall (d) =	0.62	ft	Based on Manning's Equation, using Goal Seek in Excel to solve for depth
Velocity at End of Headwall (V_2) =	6.13	ft/sec	$V = \frac{Q}{A}, \quad where\ A = Cd$
RIPRAP			
Riprap Size (D_{50}) =	0.44	ft	$D_{50} = 0.0105V_2^{2.06}$ (ECM 1.4.6.D.5)
	6.00	in	Rounded up to Nearest Diameter Size in City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Riprap Classification =	I	---	Based on City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Apron Width =	22.00	ft	Apron Width $= C + 2$
Apron Length =	41.50	ft	Apron Length $= 3D_{50}$ + La (10*D) (508S-20)
Apron Depth =	1.50	ft	Apron Depth $= 3D_{50}$ (508S-20)

[1]For additional headwall geometry, refer to COA Standard Detail 508S-13



SEDIMENT MARKER DETAIL POND C2

SCALE: N.T.S.

STORM OUTFALL DESIGN - POND C-2

Edgewood 2-2

INPUT VALUES

	Storm Line SD-D	Unit	Source
Discharge (Q) =	50.62	cfs	StormCAD Model
Velocity at Outfall (V_1) =	10.31	ft/s	StormCAD Model
Outlet Pipe Diameter (D) =	2.5	ft	Required Size for Conveyance
HEADWALL[1]			
Headwall Length (L) =	7.50	ft	COA Detail 508S-13, Based on Outlet Diameter
Headwall Width (C) =	12.5	ft	COA Detail 508S-13, Based on Outlet Diameter
Depth of Flow at End of Headwall (d) =	0.62	ft	Based on Manning's Equation, using Goal Seek in Excel to solve for depth
Velocity at End of Headwall (V_2) =	6.50	ft/sec	$V = \frac{Q}{A}, \quad where\ A = Cd$
RIPRAP			
Riprap Size (D_{50}) =	0.50	ft	$D_{50} = 0.0105V_2^{2.06}$ (ECM 1.4.6.D.5)
	6.00	in	Rounded up to Nearest Diameter Size in City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Riprap Classification =	I	---	Based on City of Austin ECM, 591S.3 Rock Riprap Gradation Table
Apron Width =	14.50	ft	Apron Width $= C + 2$
Apron Length =	26.50	ft	Apron Length $= 3D_{50}$ + La (10*D) (508S-20)
Apron Depth =	1.50	ft	Apron Depth $= 3D_{50}$ (508S-20)

[1]For additional headwall geometry, refer to COA Standard Detail 508S-13

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KHA PROJECT 067783129	DATE DECEMBER 2023	SCALE: AS SHOWN	DESIGNED BY: DPD	DRAWN BY: AMF	CHECKED BY: AEG

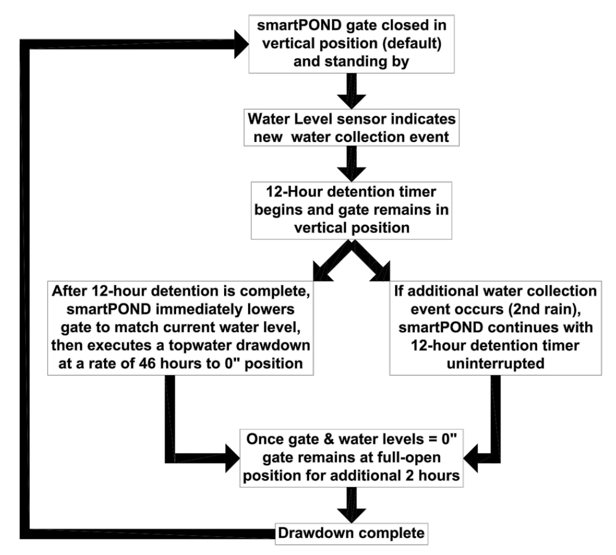
POND CROSS SECTIONS & WATER QUALITY DETAILS

EDGEWOOD PHASE 2, SECTION 2

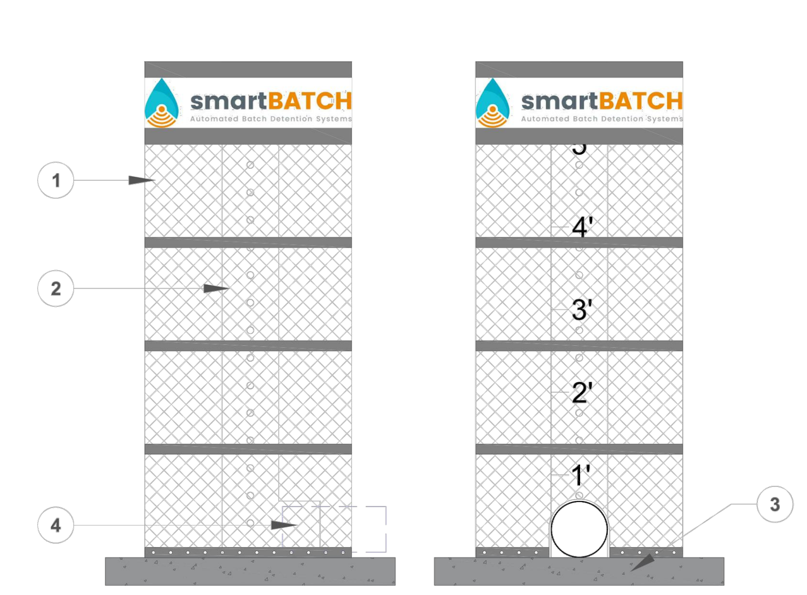
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
98
OF 112

PROGRAMMABLE LOGIC FLOW CHART

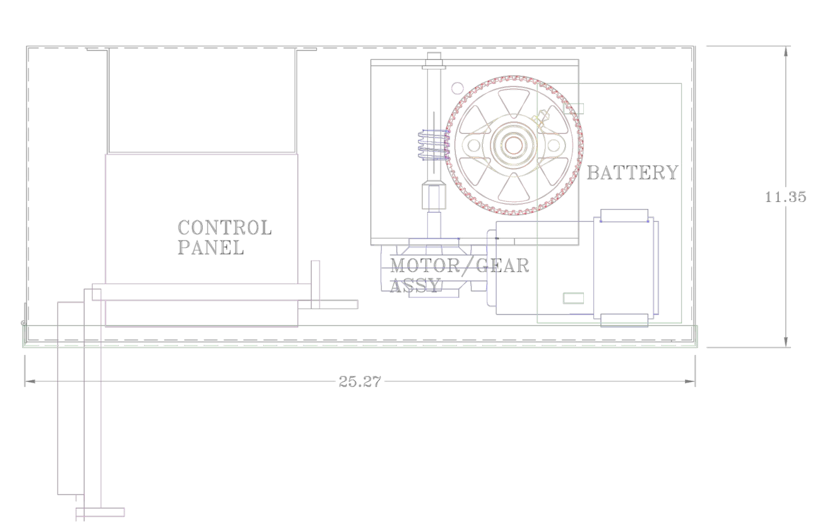


TRASH CAGE WITH PERFORATED RISER PIPE

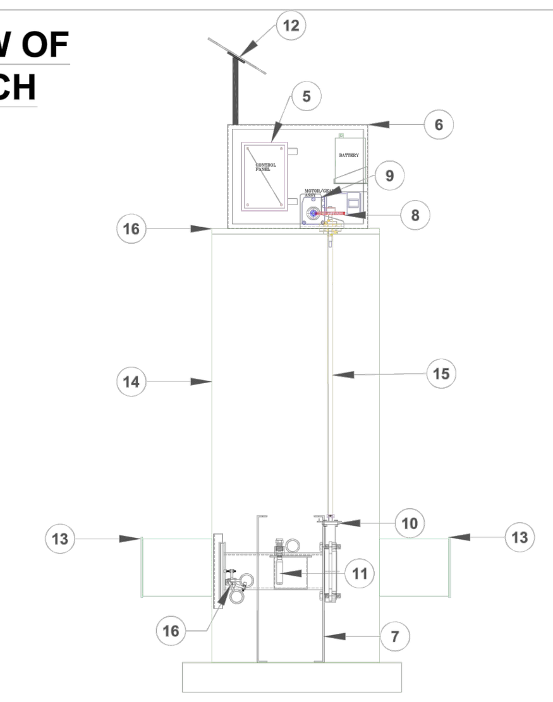


Parts List	
Item	smartPOND Valve Component
1	30" DIAMETER CAGE WITH 1 ½" GALVANIZED MESH SCREEN
2	8" SQUARE PERFORATED TUBING WITH 1" PERFORATION, WITH 4" VERTICAL SPACING ON CENTERS WITH WATER DEPTH MARKER
3	3 ½' X 3 ½' X 4" CONCRETE PAD (BY OTHERS)
4	6" PVC OUTFALL PIPE (BY OTHERS)
5	WEATHERPROOF ELECTRONIC 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

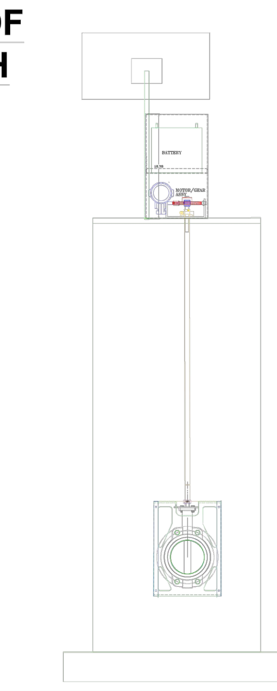
PLAN VIEW OF ENCLOSER



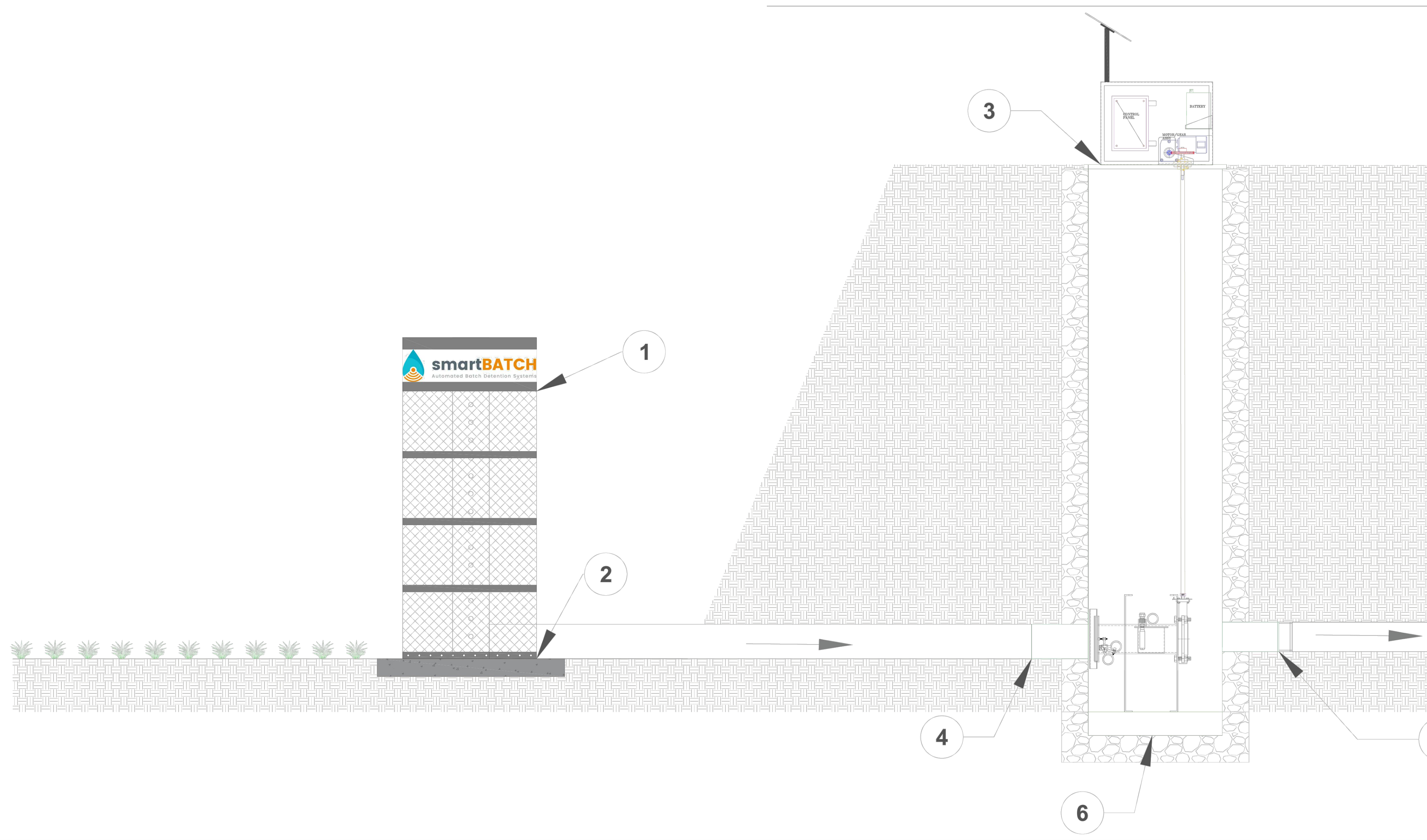
SECTION VIEW OF SMARTBATCH



FRONT VIEW OF SMARTBATCH



smartBATCH
Automated Batch Detention Systems
CONVERGENT WATER TECHNOLOGIES
FOR ADDITIONAL INFORMATION PLEASE CONTACT: CONSTRUCTION ECO SERVICES, 832-456-1000, www.ecosvs.com



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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

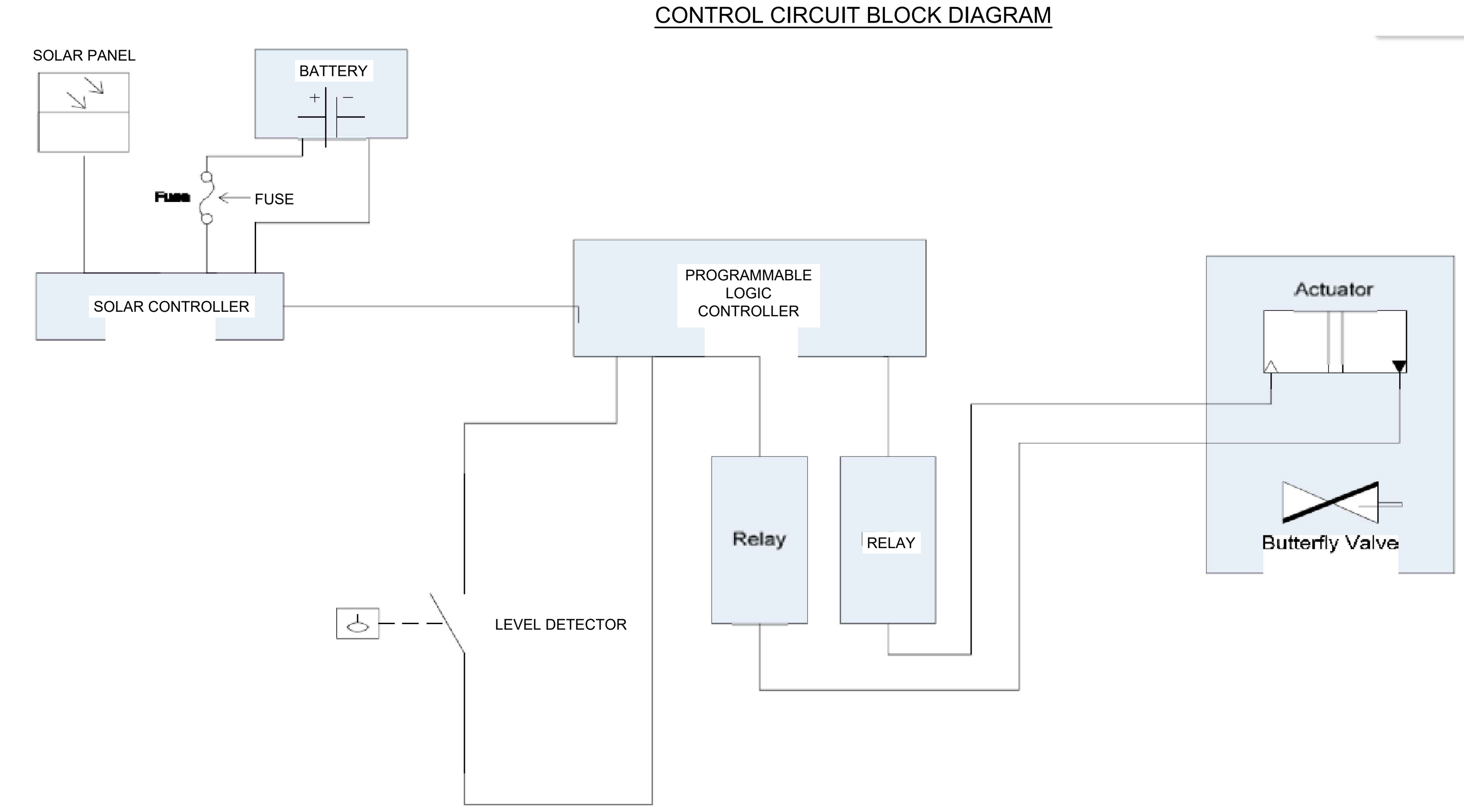
C. Authorized Value Added Reseller
Construction EcoServices
(800)456-1000
www.ecosvs.com

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
smartPOND Valve Specifications
Revision 0
5/26/2020

CONTROL CIRCUIT BLOCK DIAGRAM



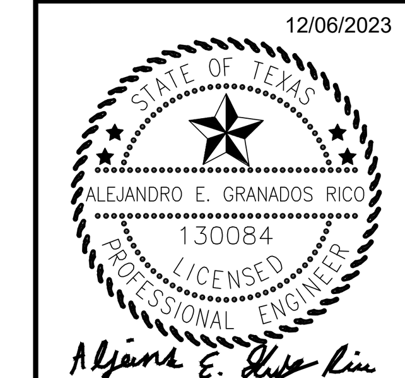
NOTE:
CONTRACTOR TO PROVIDE SHOP DRAWING SHOWING ELEVATIONS OF ALL PROPOSED SMARTBATCH VALVE PIPING PRIOR TO FABRICATION.

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-920-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

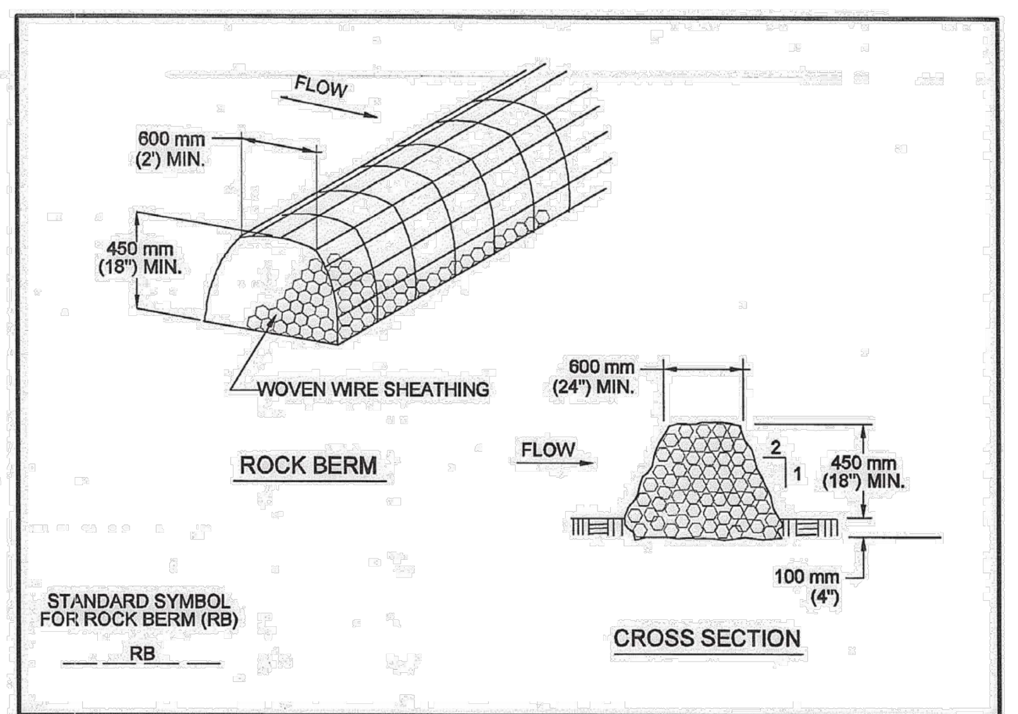
12/06/2023


KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AMF
CHECKED BY: AEG

WATER QUALITY DETAILS

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

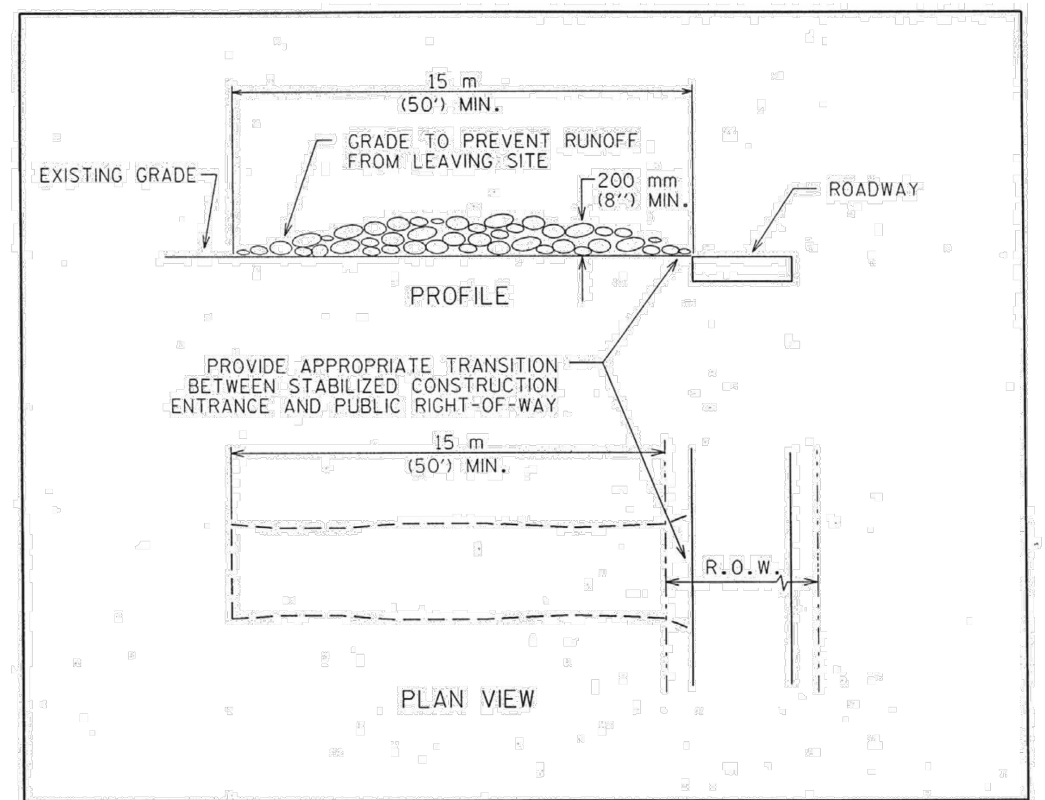
SHEET NUMBER
99
OF 112



NOTES:

1. USE ONLY OPEN GRADED ROCK 75 to 125 mm (3 to 5") DIAMETER FOR ALL CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM 25 mm (1") OPENING AND MINIMUM WIRE DIAMETER OF 12.9 mm (20 GAUGE).
3. THE ROCK BERM SHALL BE INSPECTED DAILY OR AFTER EACH RAIN, AND THE STONE AND/OR FABRIC CORE-WOVEN SHEATHING SHALL BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED, DUE TO SEDIMENT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. IF SEDIMENT REACHES A DEPTH EQUAL TO ONE-THIRD THE HEIGHT OF THE BERM OR 150 mm (6"), WHICHEVER IS LESS, THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF ON AN APPROVED SITE AND IN A MANNER THAT WILL NOT CREATE A SEDIMENTION PROBLEM.
5. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

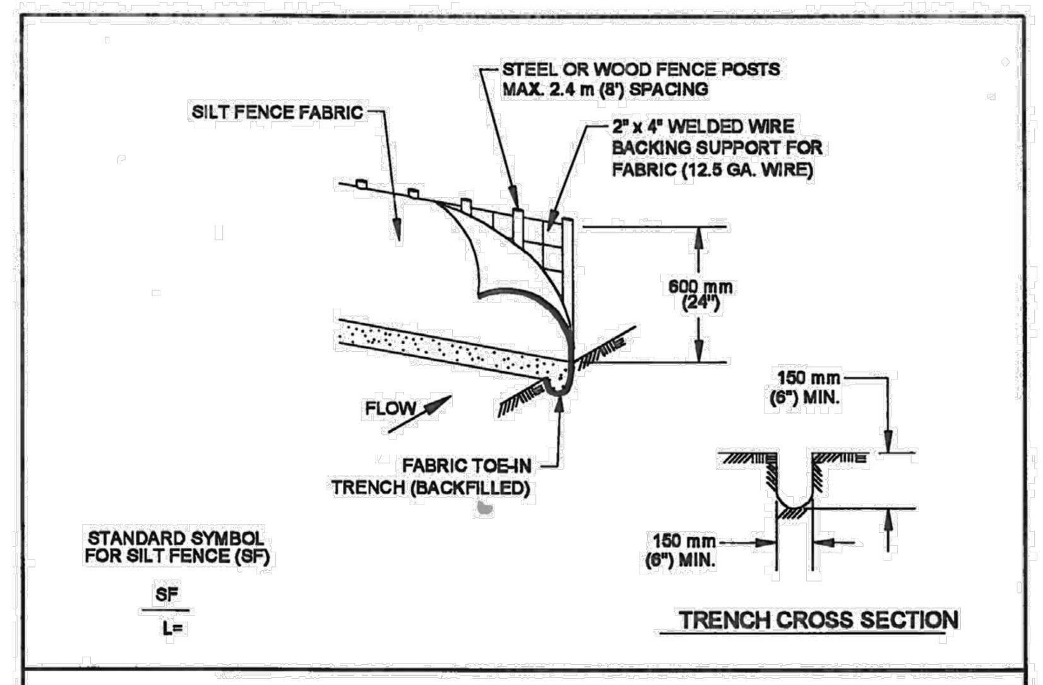
CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT	ROCK BERM	
8/24/2010 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 639S-1



NOTES:

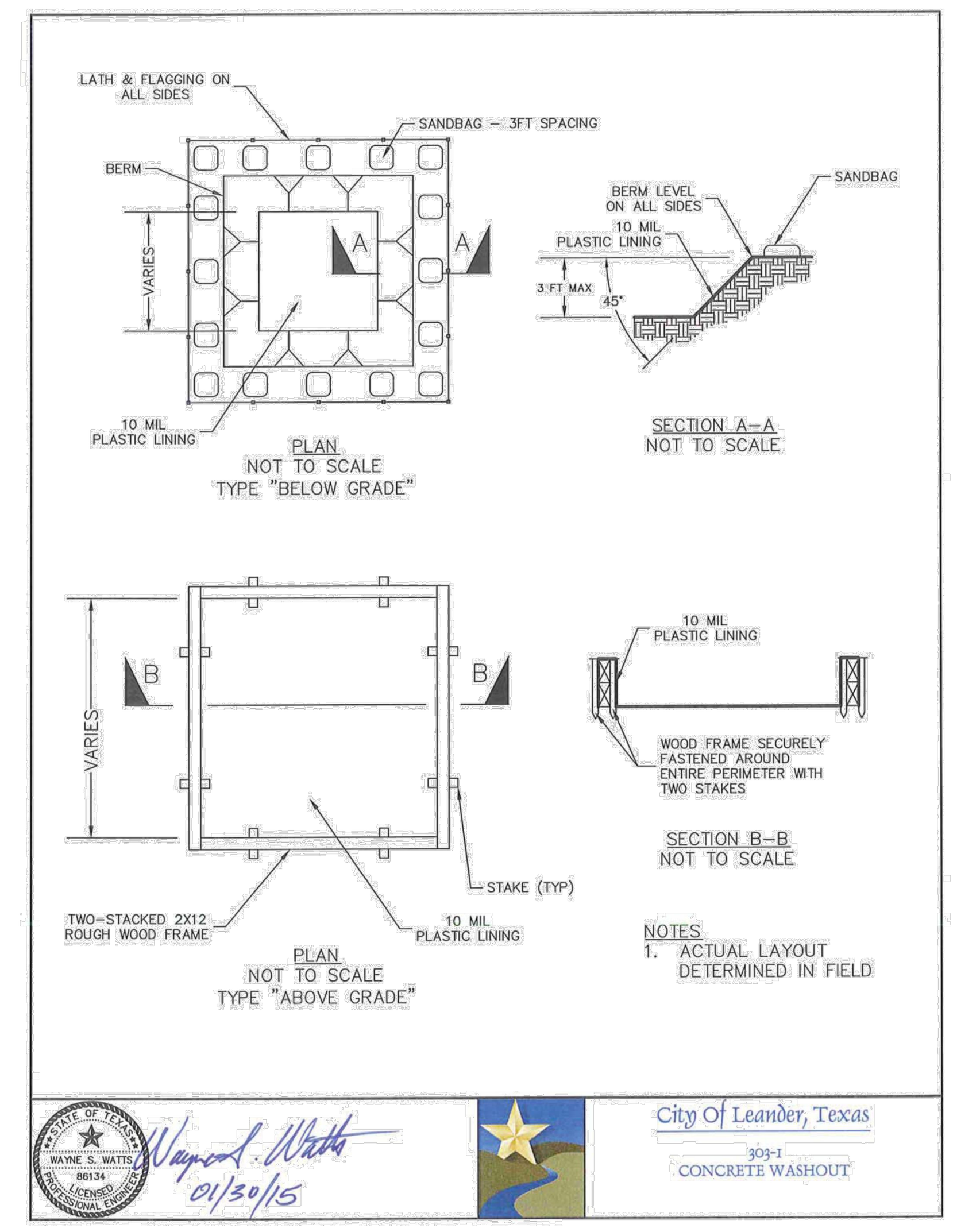
1. STONE SIZE: 75-125 mm (3-5") OPEN GRADED ROCK.
2. LENGTH: AS EFFECTIVE BUT NOT LESS THAN 15 m (50').
3. THICKNESS: NOT LESS THAN 200 mm (8").
4. WIDTH: NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS/EGRESS.
5. WASHING: WHEN NECESSARY, VEHICLE WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE AND DRAINS INTO AN APPROVED TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.
6. MAINTENANCE: 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 DEVICES USED TO TRAP SEDIMENT. ALL SEDIMENTS THAT IS SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY.
7. DRAINAGE: ENTRANCE MUST BE PROPERLY GRADED OR INCORPORATE A DRAINAGE SWALE TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.

CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT	STABILIZED CONSTRUCTION ENTRANCE	
5/23/00 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 641S-1



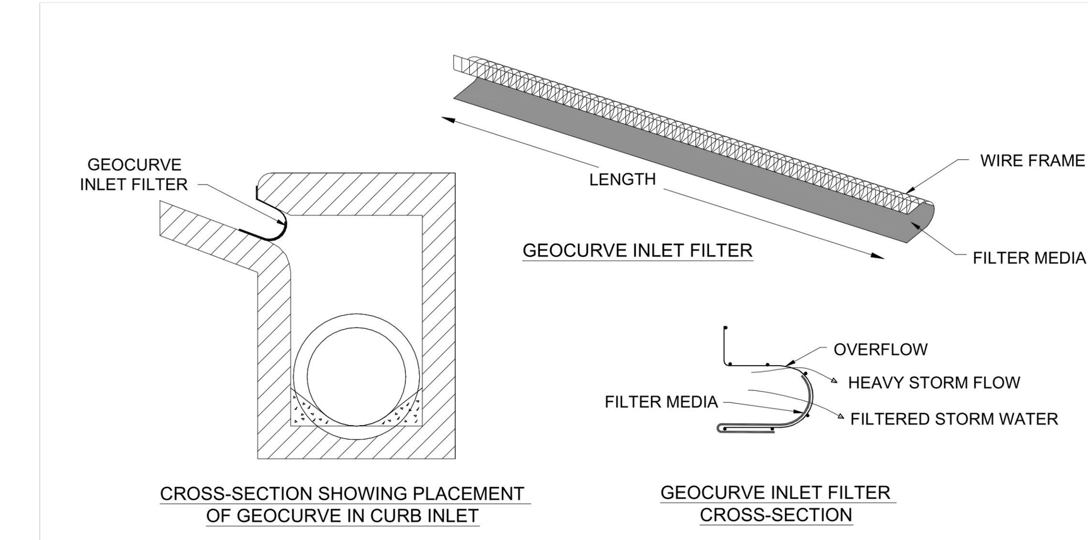
1. STEEL OR WOOD POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF 300 mm (12 INCHES). IF WOOD POSTS CANNOT ACHIEVE 300 mm (12 inches) DEPTH, USE STEEL POSTS.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW.
3. THE TRENCH MUST BE A MINIMUM OF 150 mm (6 inches) DEEP AND 150 mm (6 inches) WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE FABRIC SHOULD BE SECURELY FASTENED TO EACH STEEL OR WOOD SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL OR WOOD FENCE POST.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 150 mm (6 inches). THE SILT SHALL BE DISPOSED OF ON AN APPROVED SITE AND IN SUCH A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.

CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT	SILT FENCE	
9/1/2011 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 642S-1



GeoSolutions, Inc. — Product Data Sheet
GeoCurve Inlet Filter

The GeoCurve Inlet Filter is a stormwater filter for placement into a stormwater curb inlet for the purpose of capturing debris and sediment that is transported by stormwater runoff. The device is comprised of a filter media (woven monofilament filter fabric) affixed to the lower portion of a "C" shaped 12 gauge welded wire frame (2" x 4" openings) with an upper retention flange. The device effectively filters stormwater, can easily be removed for maintenance and cleaning and incorporates an overflow window for heavy storm events.

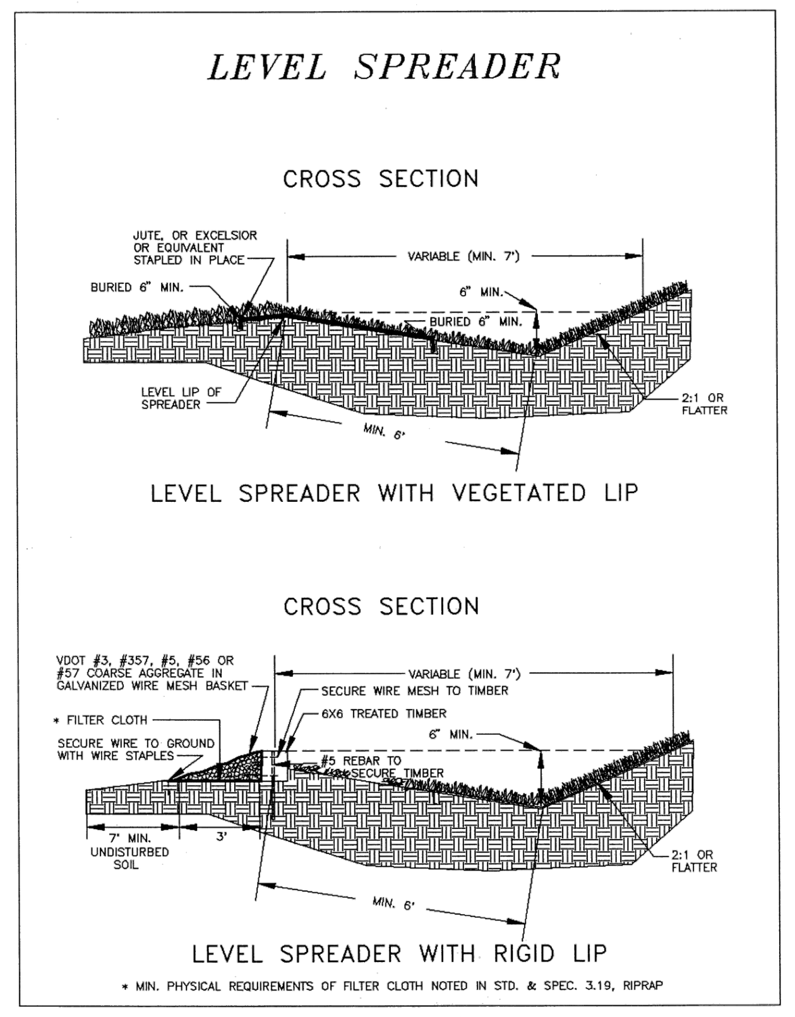


FILTER MEDIA PROPERTIES: Mono-filament Woven Filter Fabric

PROPERTY	ASTM TEST METHOD	VALUE	C.O.A. REQ'T
Fabric Weight	D 3776	4.5 oz/sy	3 oz/sy
Grab Tensile Strength	D 4632	170 lbs	----
Mullen Burst Strength	D 3786	410 lbs/sq in	120 lbs/sq in
UV Stability	D 4355	80 %	70 %
Water Flow Rate	D 4491	325 gal/min/sf	275 gal/min/sf

GeoSolutions, Inc. 4417 Burleson Road Austin, Texas 78744 512-330-0796

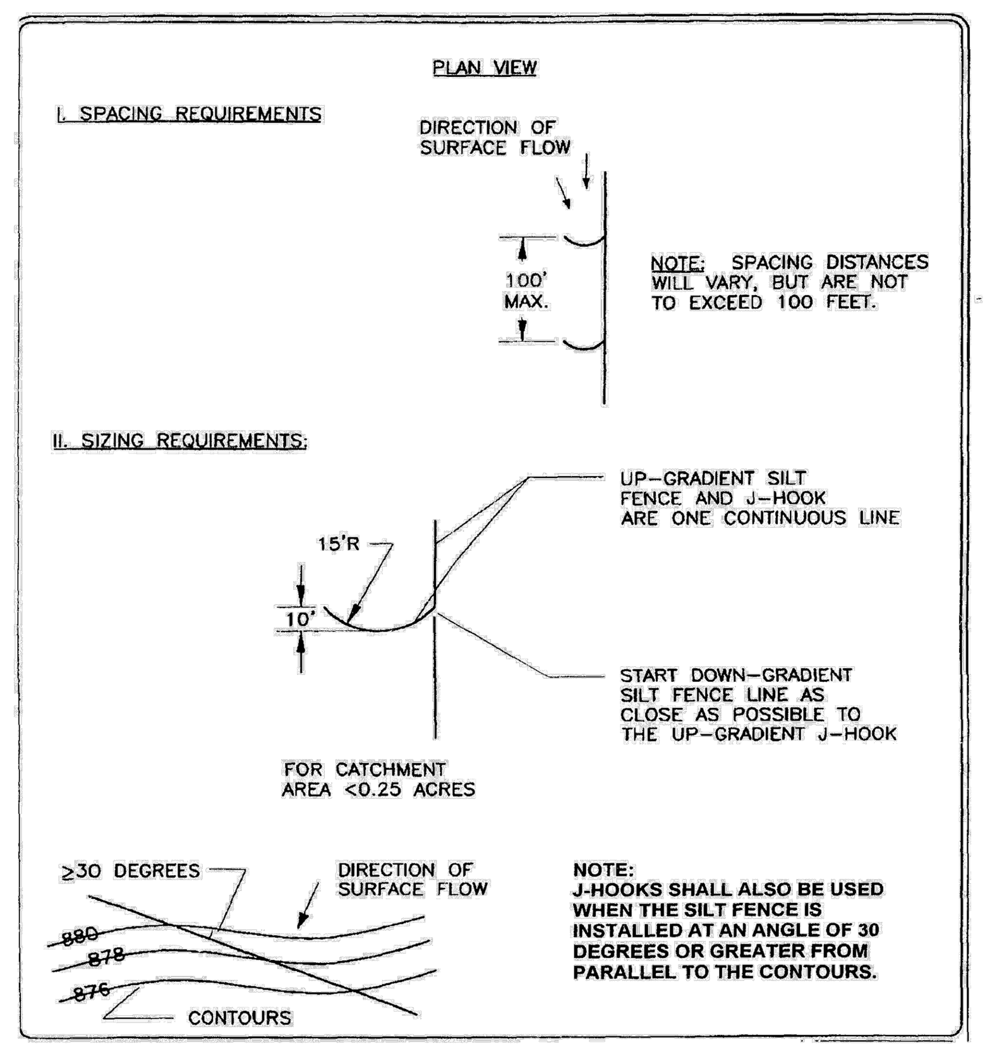
1992 3.21

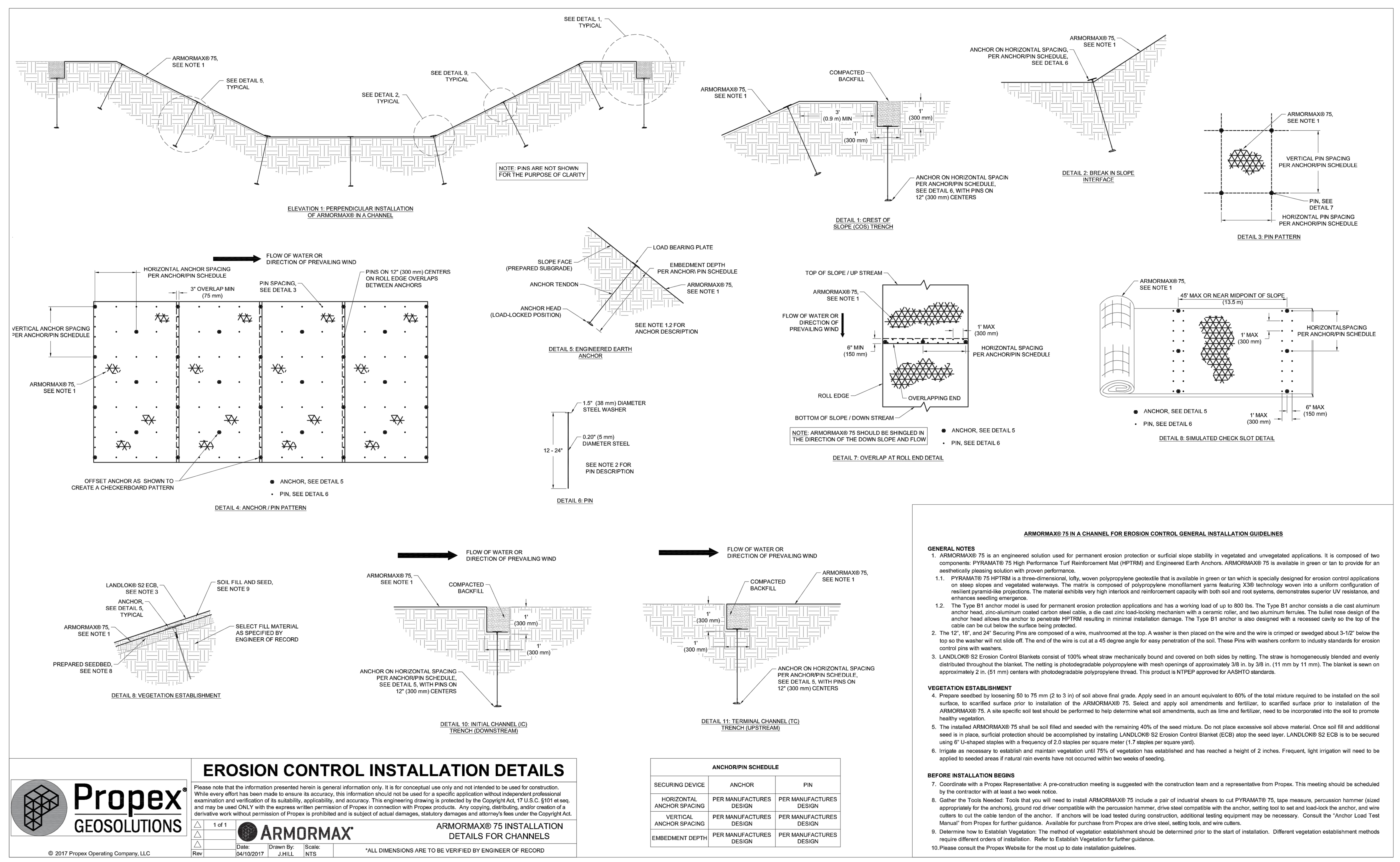


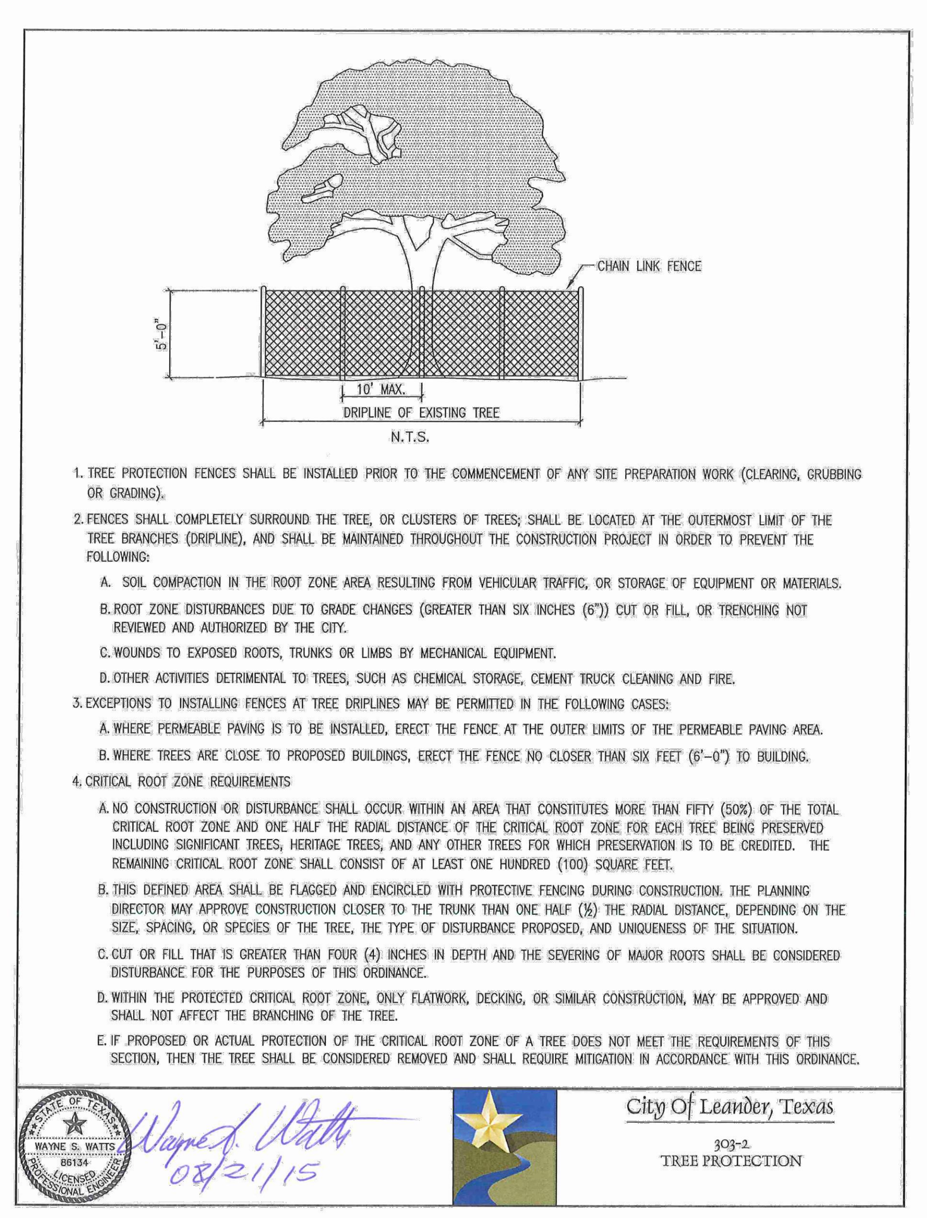
Source: Va. DSWC and N.C. Erosion and Sediment Control Planning and Design Manual

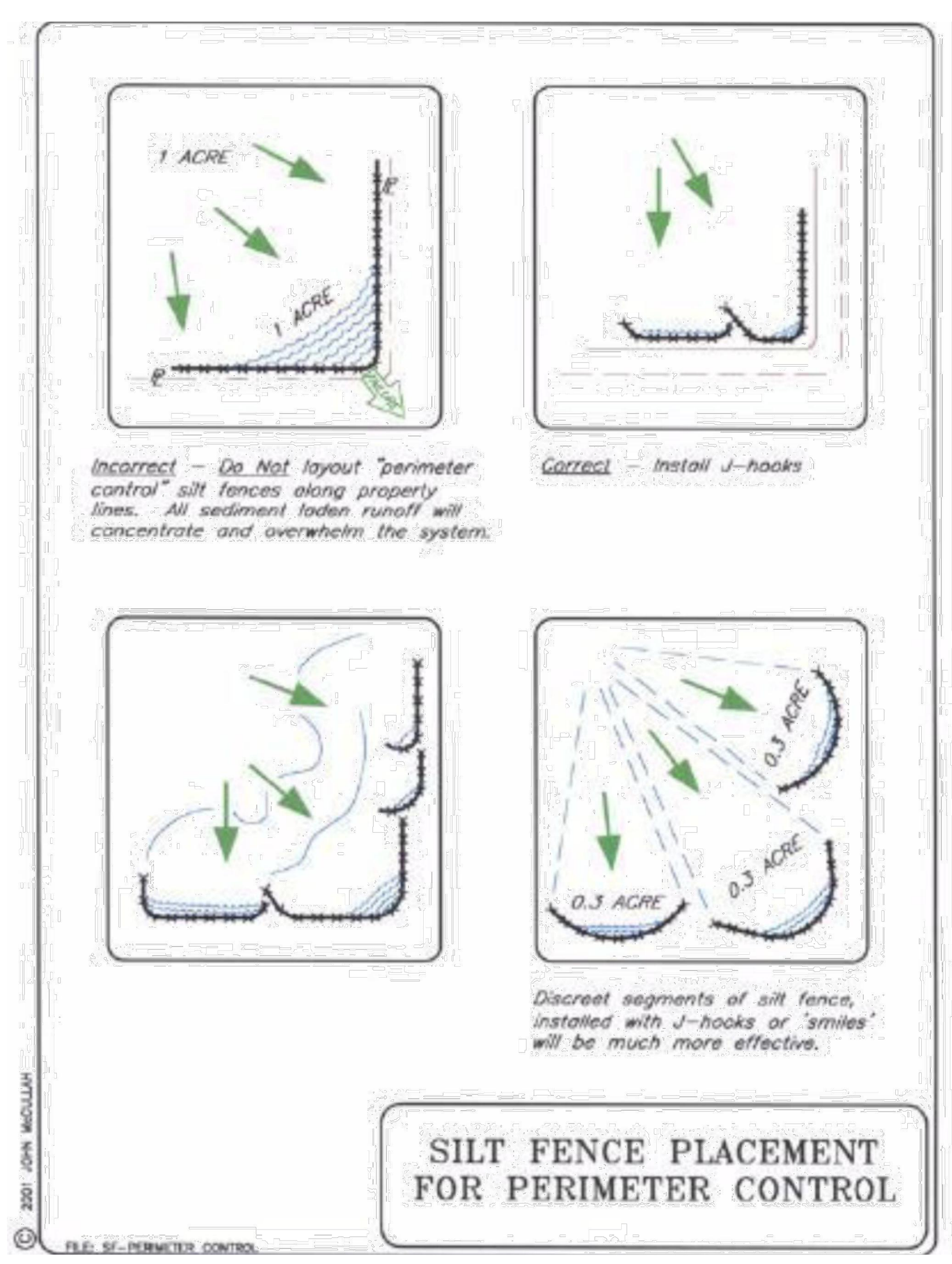
Plate 3.21-2

III - 195









BENCHMARKS

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N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn

501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

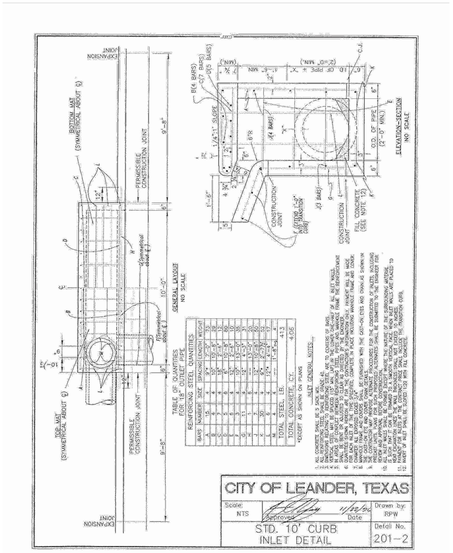
12/06/2023
STATE OF TEXAS — ALEJANDRO E. GRANADOS RICO — 130084 — LICENSED PROFESSIONAL ENGINEER

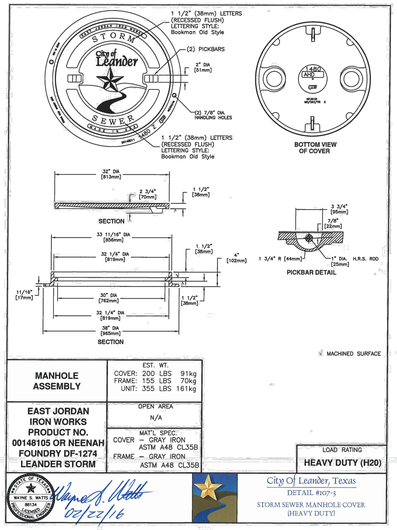
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

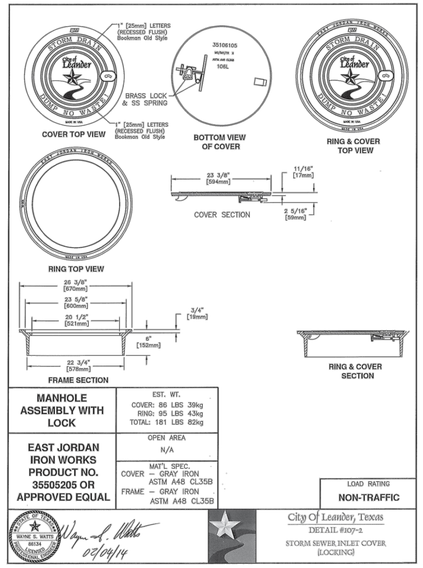
EROSION CONTROL DETAILS

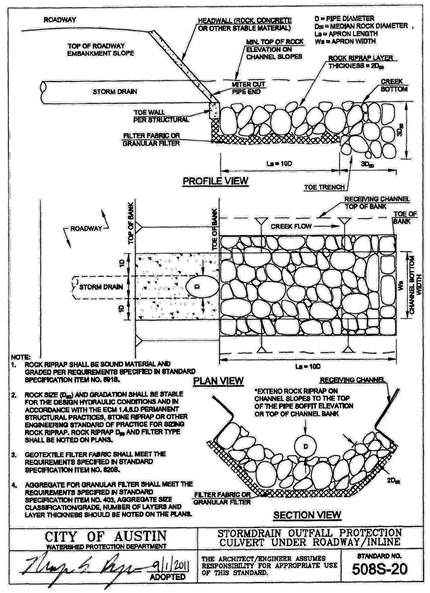
EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
106
OF 112









NOTES:
1. INSTALL 4" DIAMETER STAINLESS STEEL "NO DUMPING – DRAINS TO CREEK" MARKER, FACTORY PAINTED BLUE AS SHOWN, 2" ABOVE VERTICAL FACE OF INLET AT MIDPOINT OF ALL INLETS.
2. MARKER SHALL BE AFFIXED TO SURFACE WITH ADHESIVE PER MANUFACTURER'S RECOMMENDATIONS.
3. MARKER SHALL BE MANUFACTURED BY ALMATEK INDUSTRIES OR APPROVED EQUAL:
ALMATEK INDUSTRIES, INC.
2 JOY DRIVE
HACKETTSTOWN, NJ 07840
(800) 248-2080
WWW.ALMATEK.COM

06/20/18
City Of Leander, Texas
DETAIL #909-3
STORM DRAIN MARKERS

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

Kimley»Horn
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501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0788 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

No.	REVISIONS	DATE	BY

12/06/2023
STATE OF TEXAS
ALEJANDRO E. GRANADOS RICO
130084
LICENSED
PROFESSIONAL ENGINEER
ALEJANDRO E. GRANADOS RICO

KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

STORM DRAIN DETAILS (SHEET 1 OF 2)

EDGEWOOD
PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
OF 107 112

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing length (2~wings) (3) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C – 0.250'
A = (Hw – 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

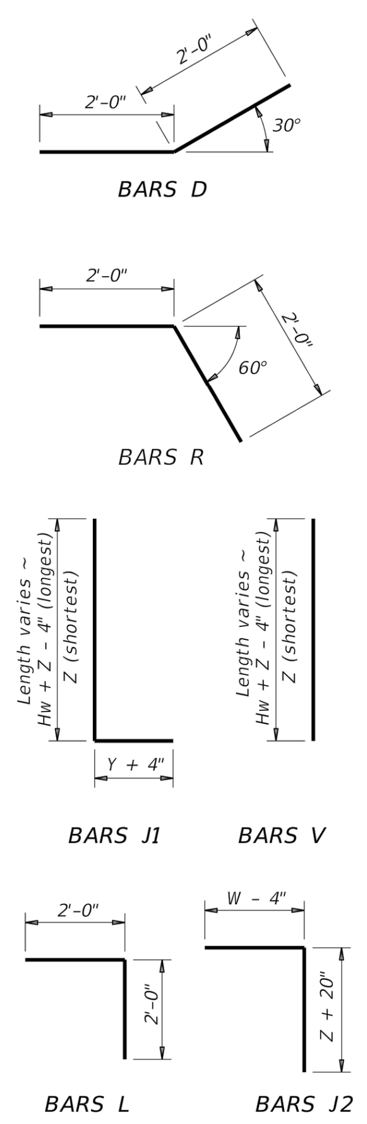
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

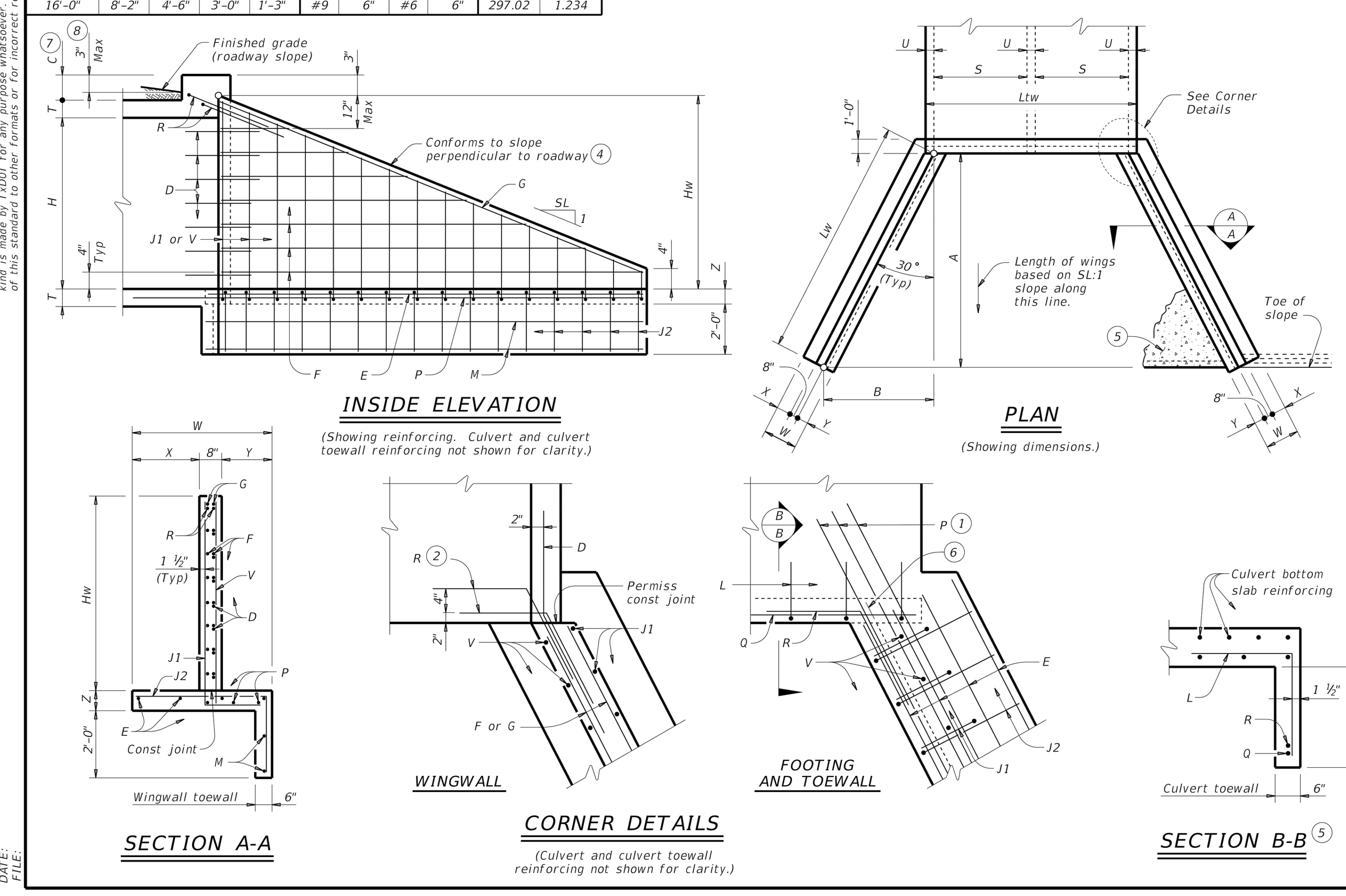
For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.





INSIDE ELEVATION
(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

PLAN
(Showing dimensions.)

SECTION A-A

WINGWALL

CORNER DETAILS
(Culvert and culvert toewall reinforcing not shown for clarity.)

FOOTING AND TOEWALL

SECTION B-B (5)

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

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

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

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

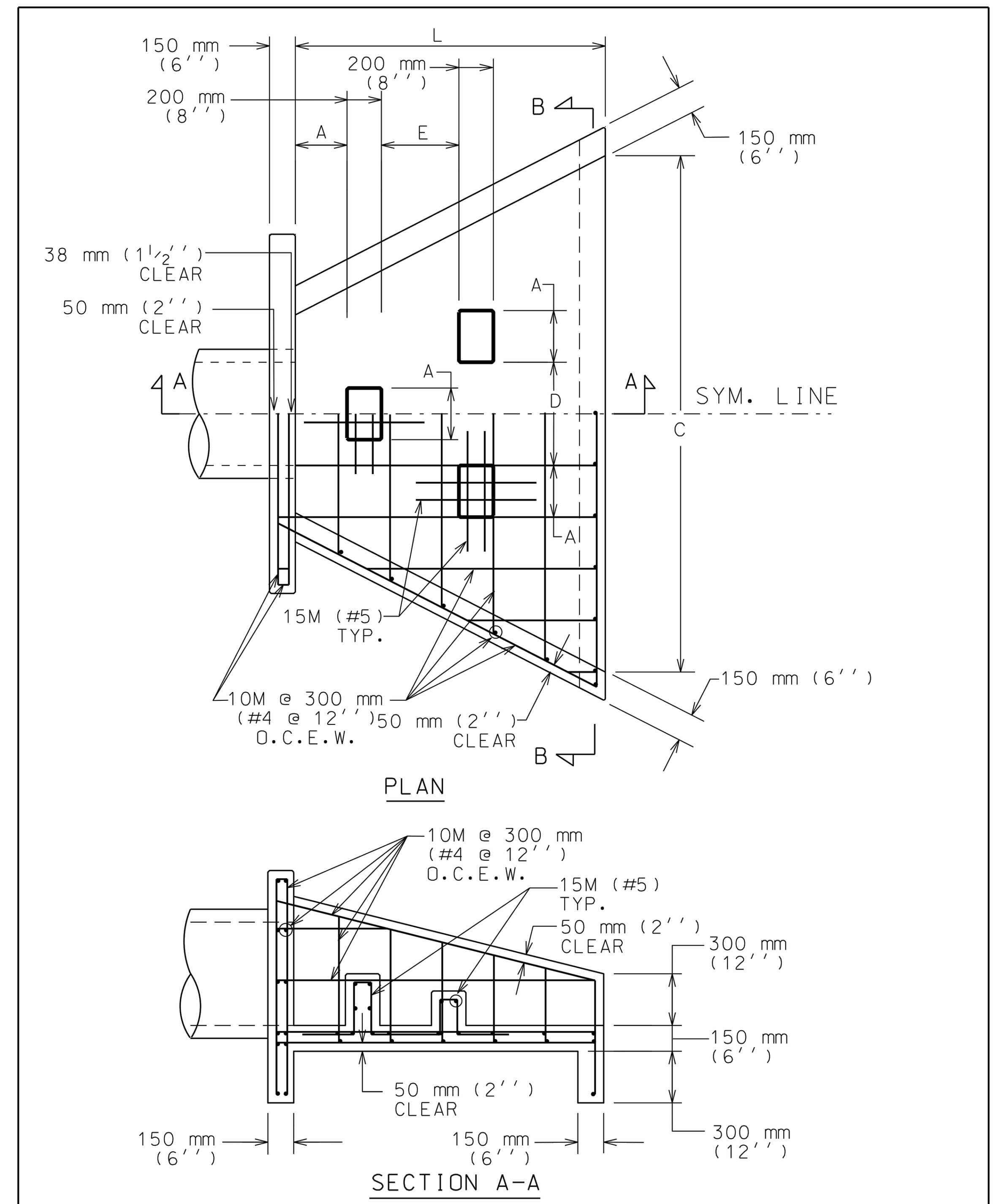
GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0



PLAN

SECTION A-A

STANDARD HEADWALL AND ENERGY DISSIPATORS

CITY OF AUSTIN
DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW

RECORD COPY SIGNED BY BILL GARDNER — 08/20/07 ADOPTED

THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.

STANDARD NO. 508S-13 — 1 OF 2

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing (2~wings) (4) Reinf (Lb/Ft)	Conc (CY/Ft)	Estimated Quantities per ft of Toewall (1~toewall) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"

WING DIMENSION FORMULAS:
(All values are in feet.)

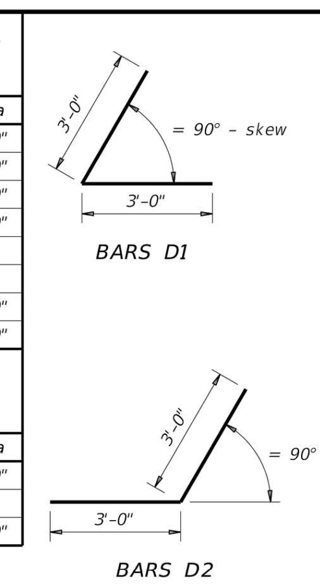
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

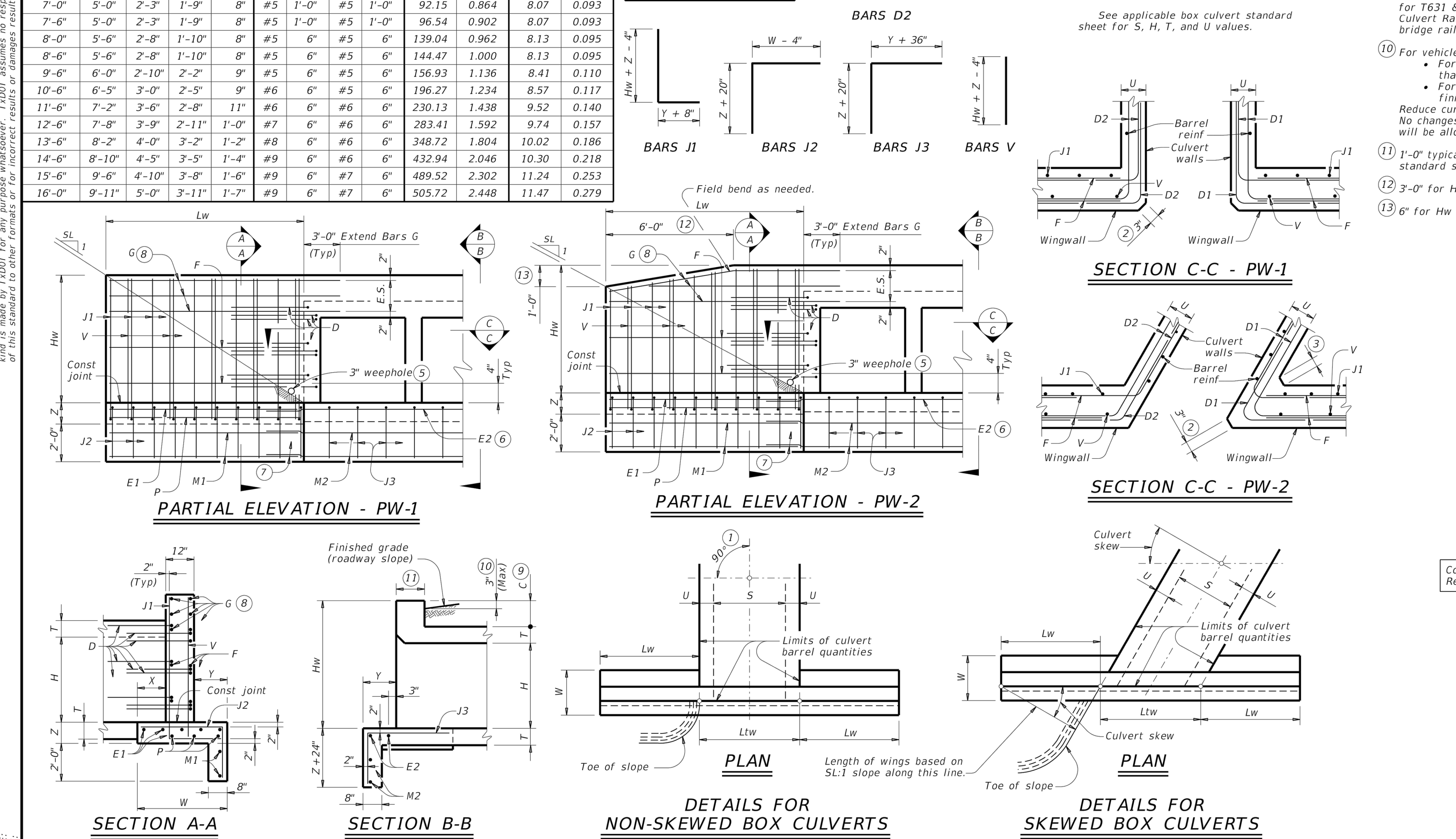
For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) – 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

See applicable box culvert standard sheet for S, H, T, and U values.





BARS D1 — BARS D2 — BARS J1 — BARS J2 — BARS J3 — BARS V

SECTION C-C - PW-1

SECTION C-C - PW-2

PARTIAL ELEVATION - PW-1

PARTIAL ELEVATION - PW-2

SECTION A-A
(Showing wing reinforcement.)

SECTION B-B
(Showing wing reinforcement.)

DETAILS FOR NON-SKEWED BOX CULVERTS

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

(1) Skew = 0°

(2) At discharge end, chamfer may be ¾" minimum.

(3) For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"

(4) Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.

(5) Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.

(6) Extend Bars E2 1'-6" minimum into the wingwall footing.

(7) Lap Bars M1 1'-6" minimum with Bars M2.

(8) Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.

(9) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

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

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

(11) 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.

(12) 3'-0" for Hw < 4'.

(13) 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

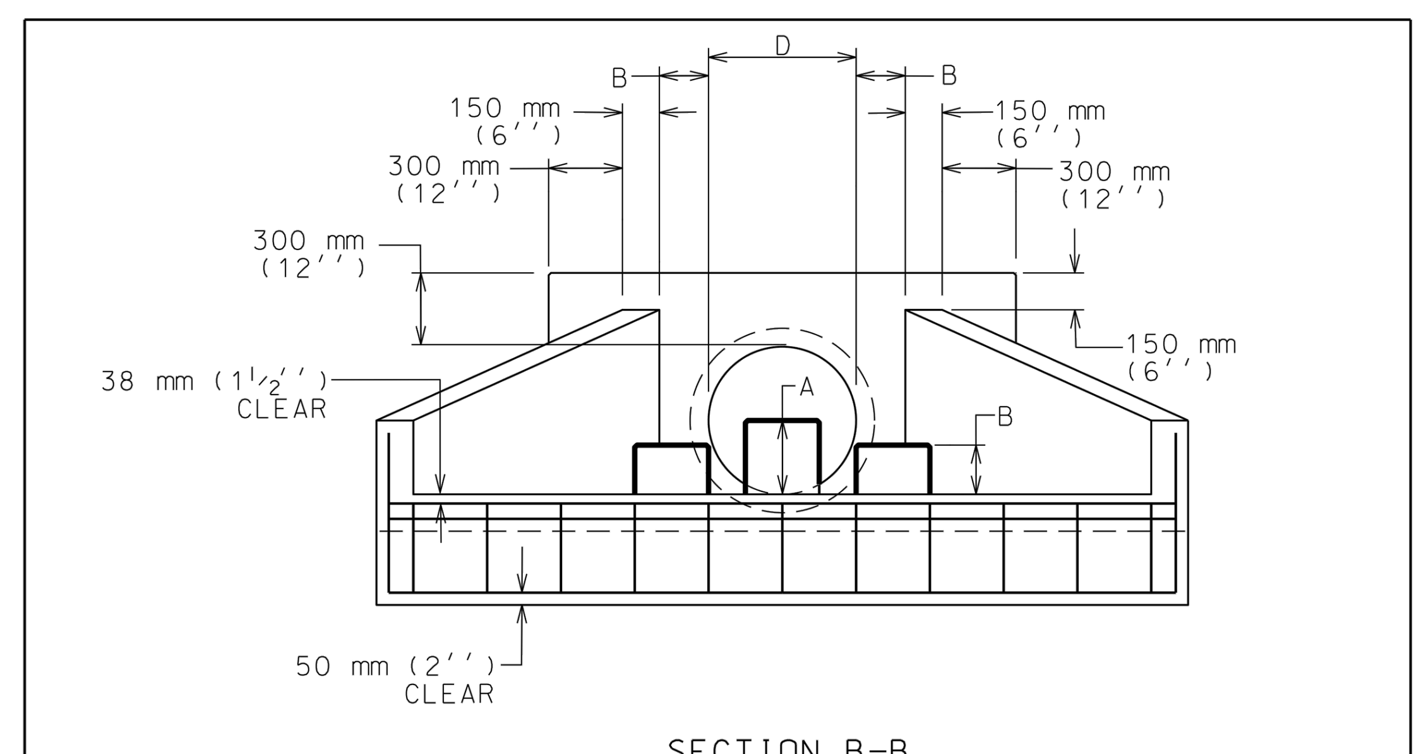
GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW



SECTION B-B

NOTES:

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

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

DIMENSIONS IN MILLIMETERS, METERS AND (INCHES).

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

CITY OF AUSTIN
DEPARTMENT OF WATERSHED PROTECTION AND DEVELOPMENT REVIEW

STANDARD HEADWALL AND ENERGY DISSIPATORS

RECORD COPY SIGNED BY BILL GARDNER — 08/20/07 ADOPTED

THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.

STANDARD NO. 508S-13 — 2 OF 2

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
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ELEVATION: 915.036' (NAVD '88)
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E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

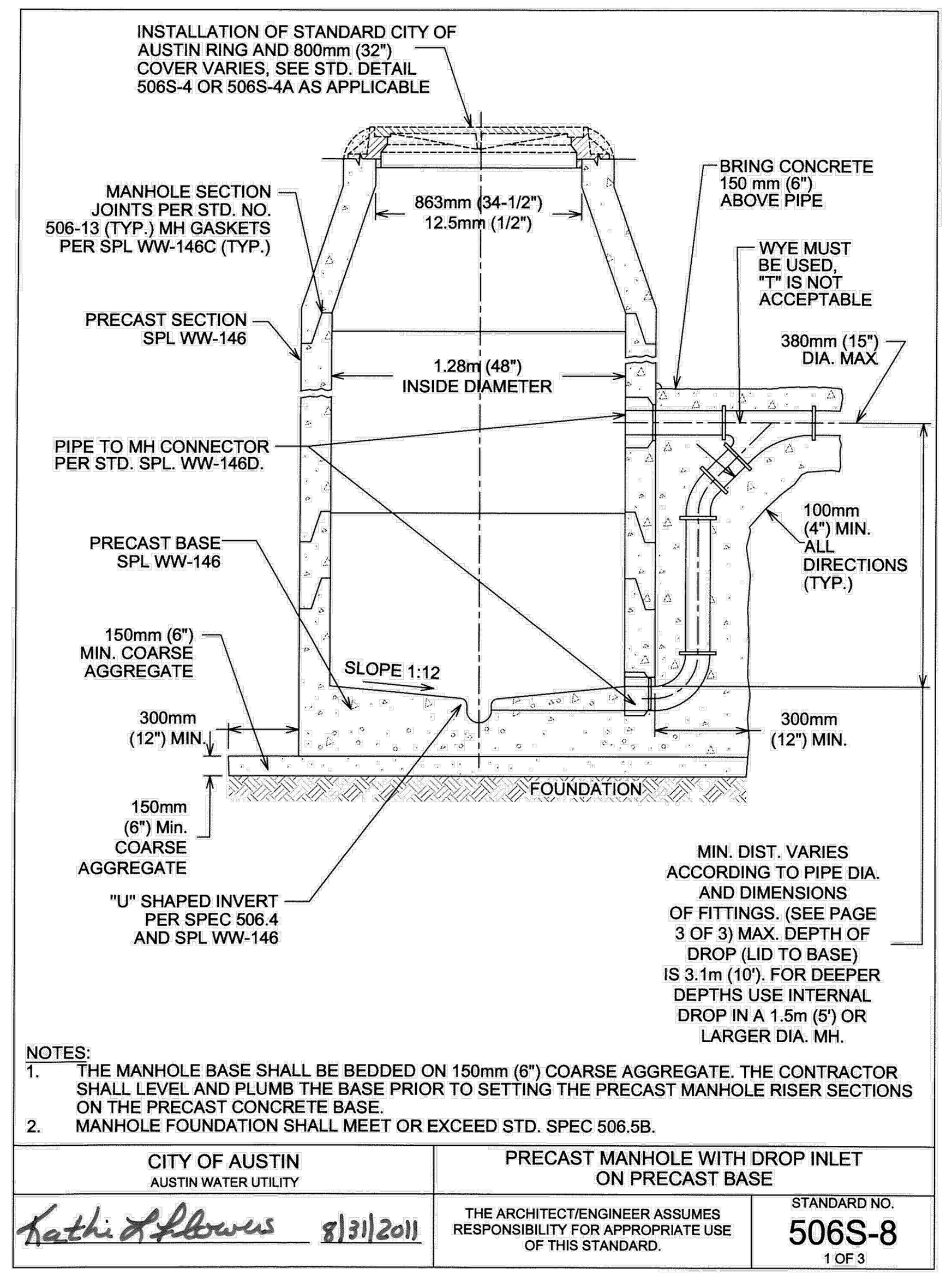
Kimley»Horn
© 2023 KIMLEY-HORN AND ASSOCIATES, INC.
501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

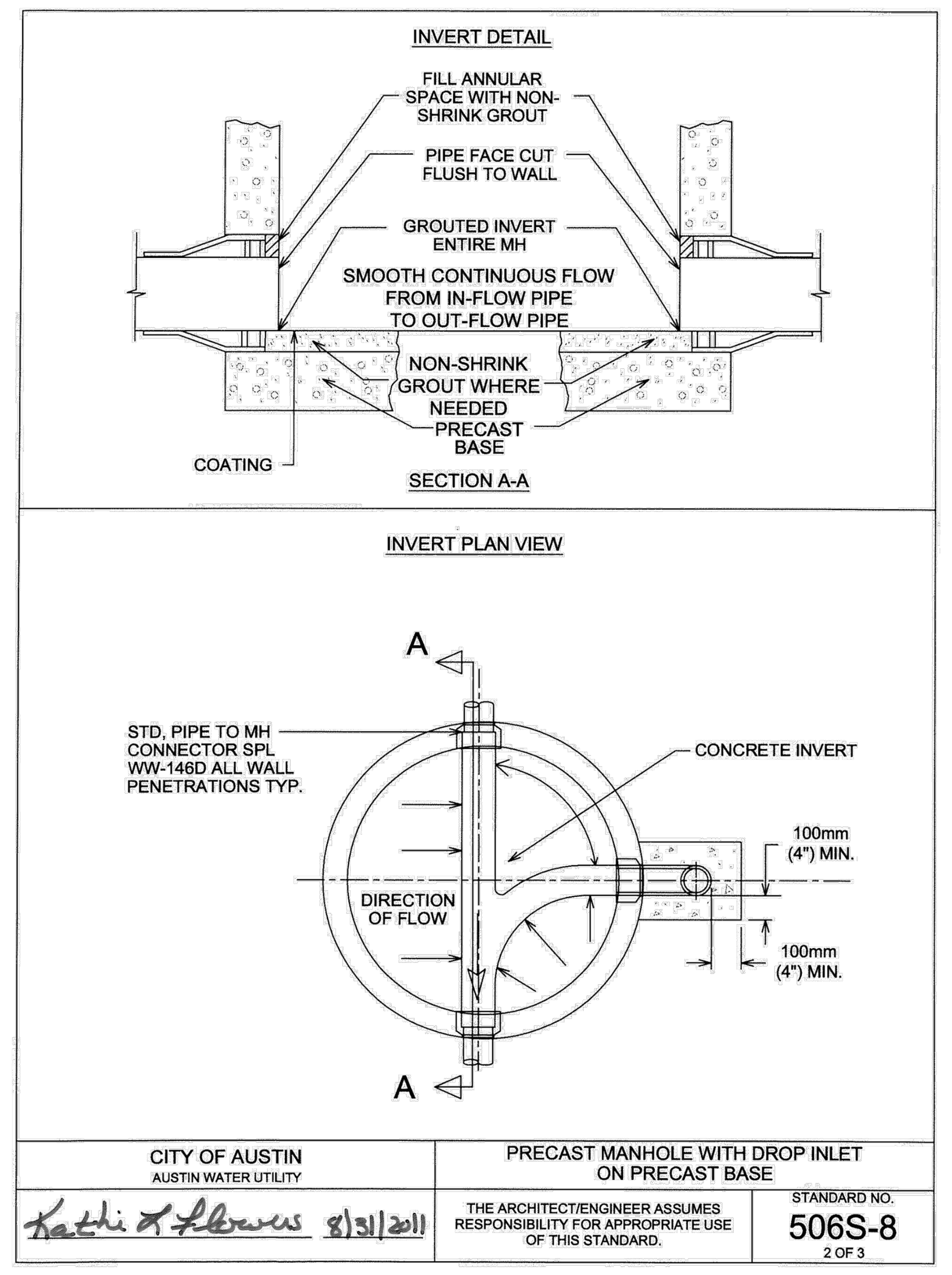
12/06/2023
STATE OF TEXAS — ALEJANDRO E. GRANADOS RICO — 130084 — LICENSED PROFESSIONAL ENGINEER

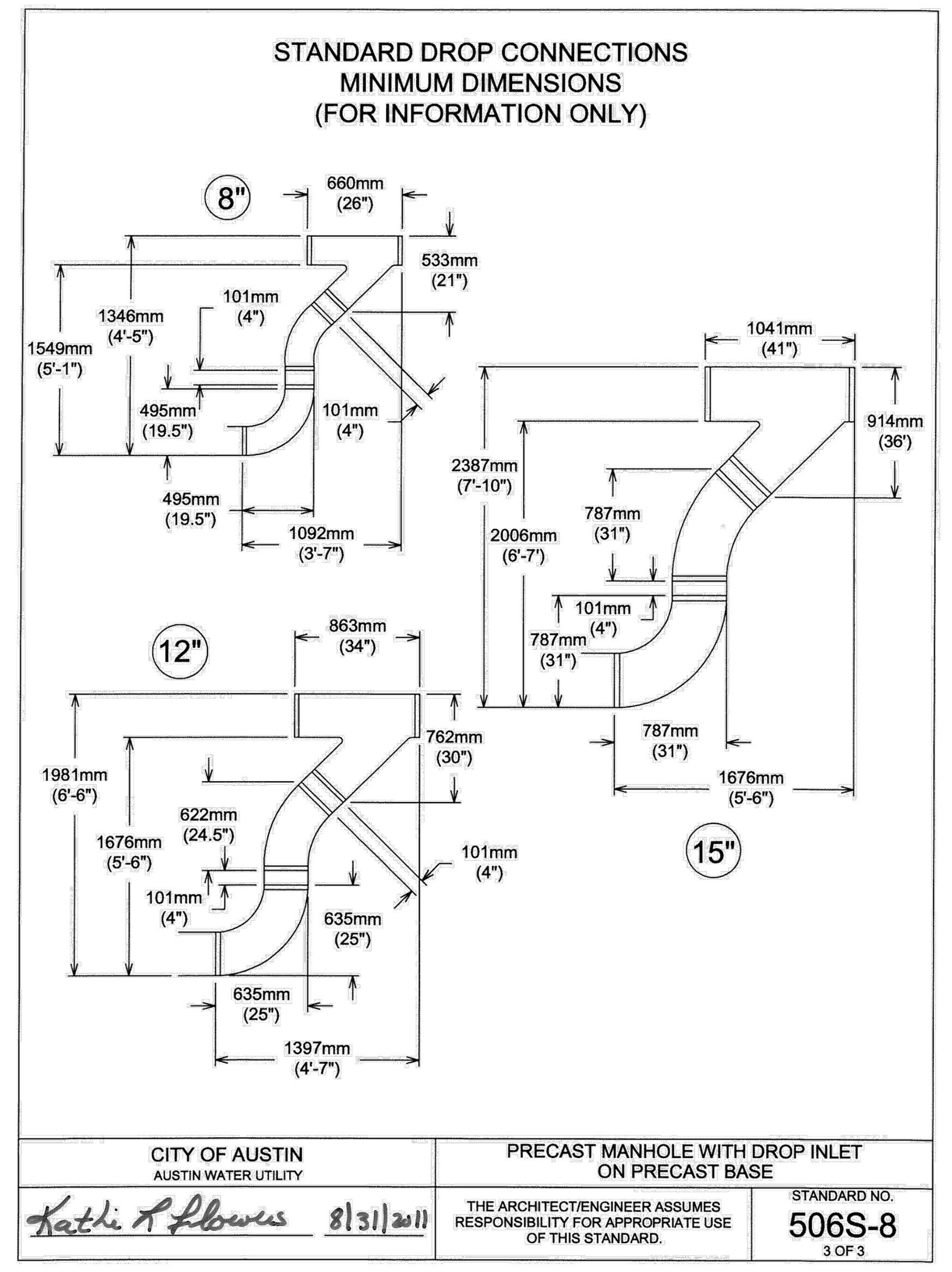
KHA PROJECT 067783129
DATE DECEMBER 2023
SCALE: AS SHOWN
DESIGNED BY: DPD
DRAWN BY: AJD
CHECKED BY: AEG

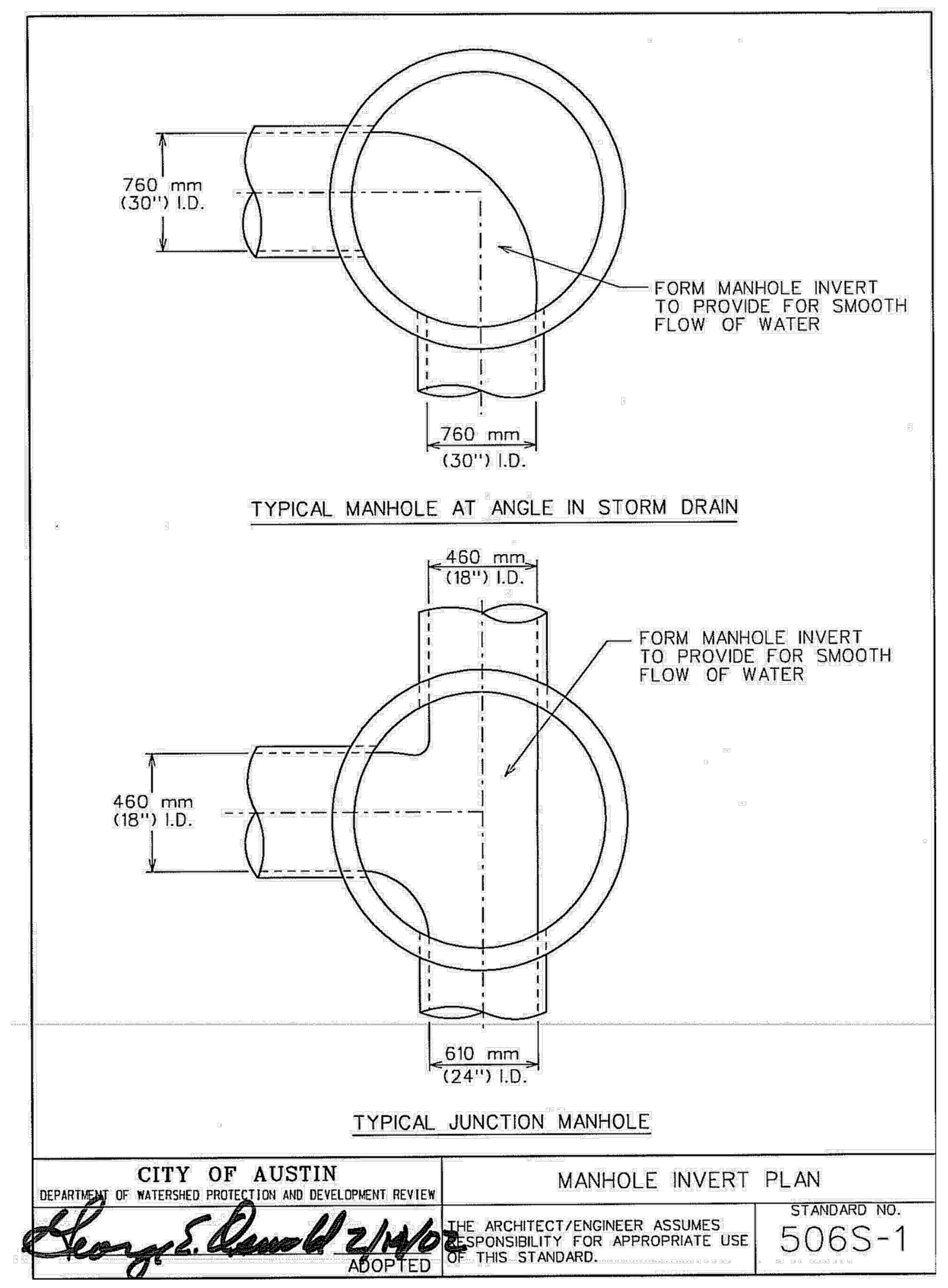
STORM DRAIN DETAILS (SHEET 2 OF 2)

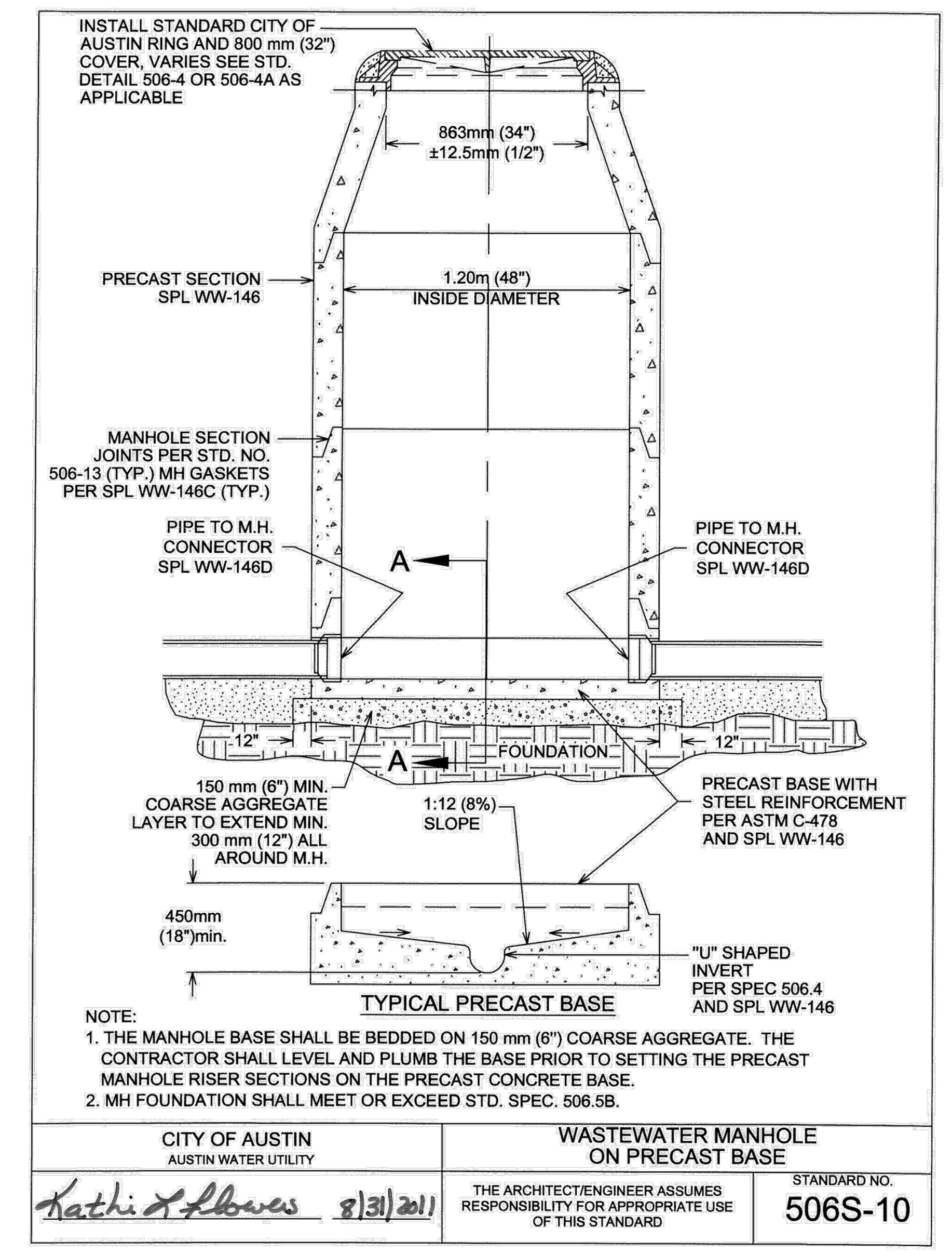
EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

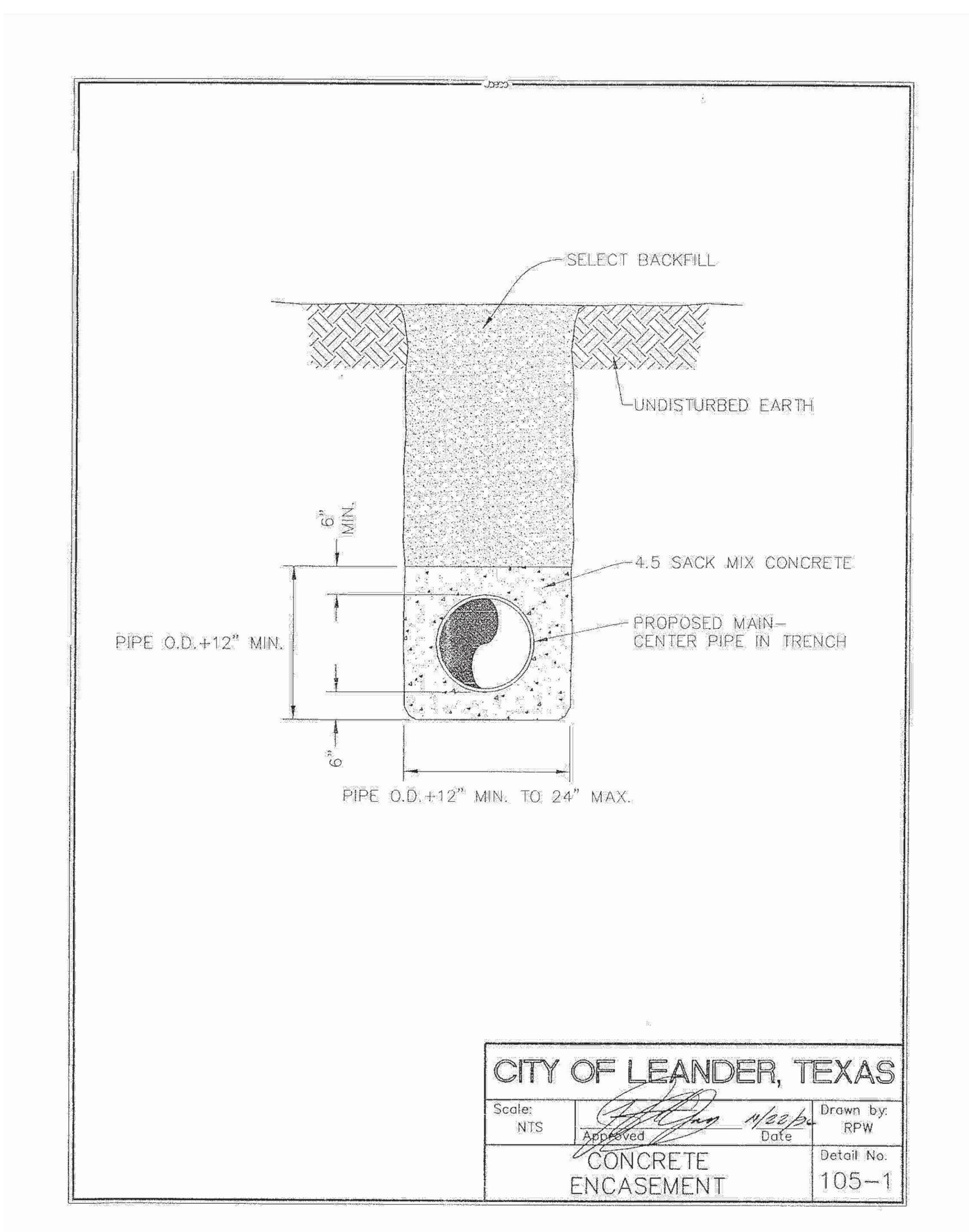


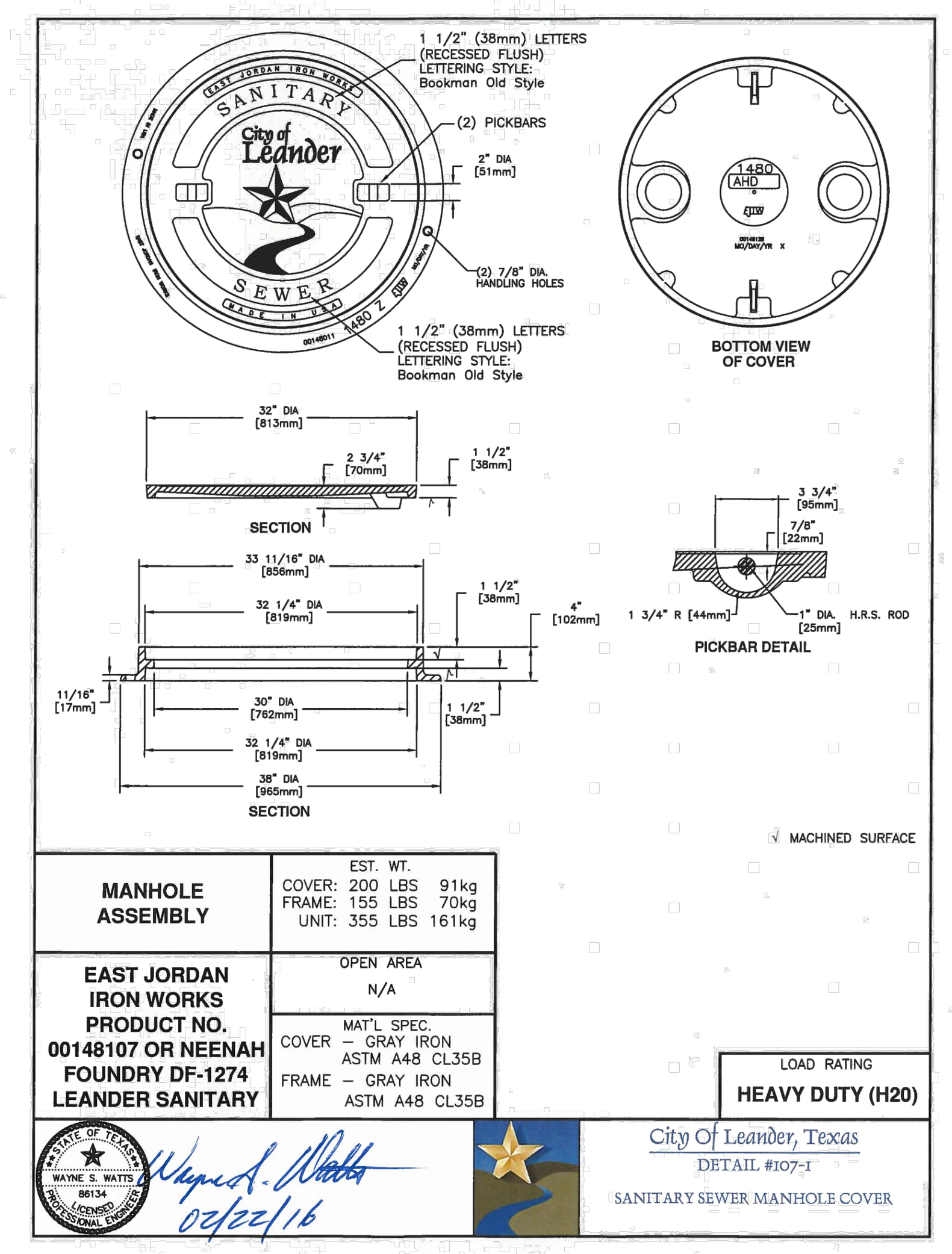


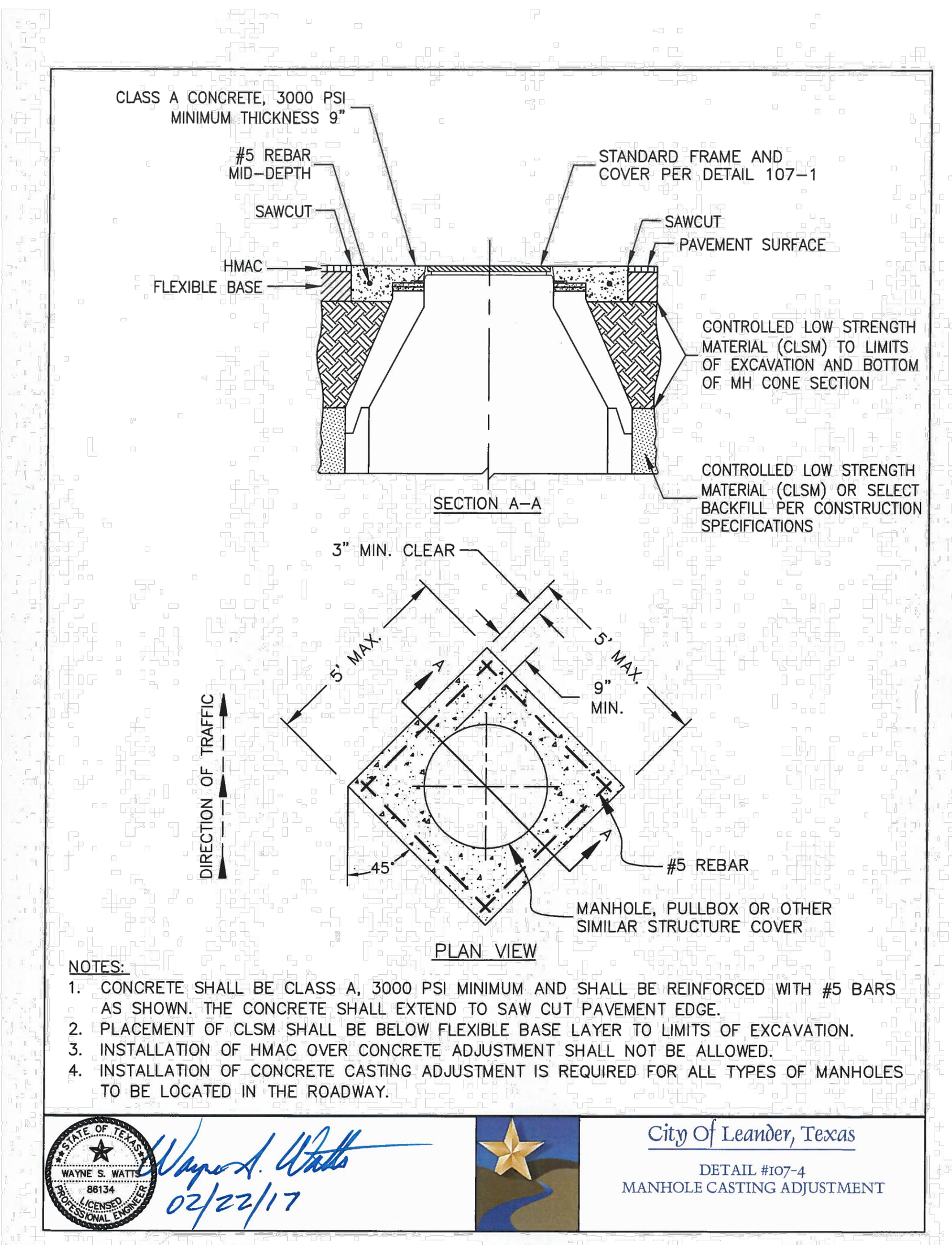


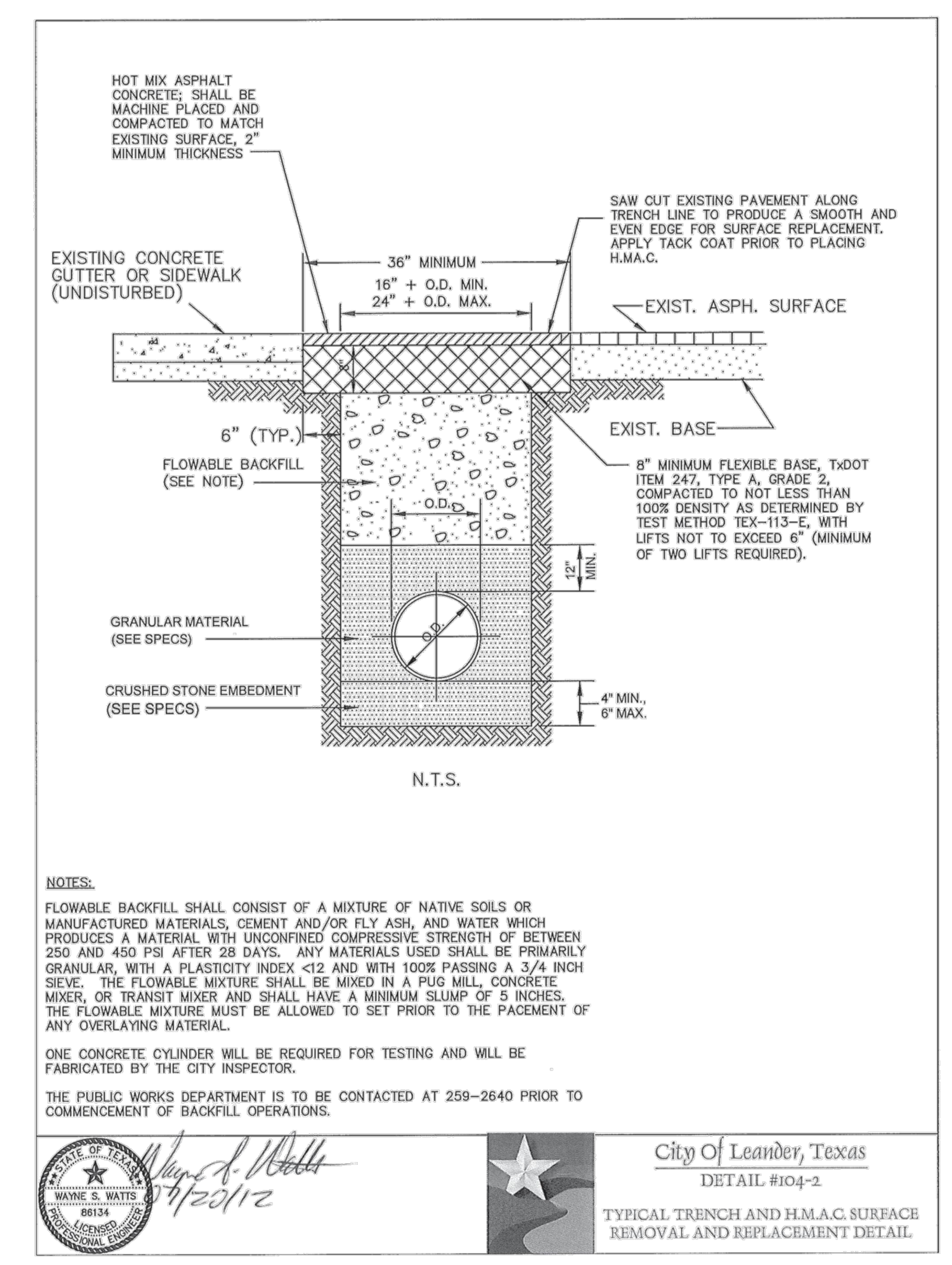


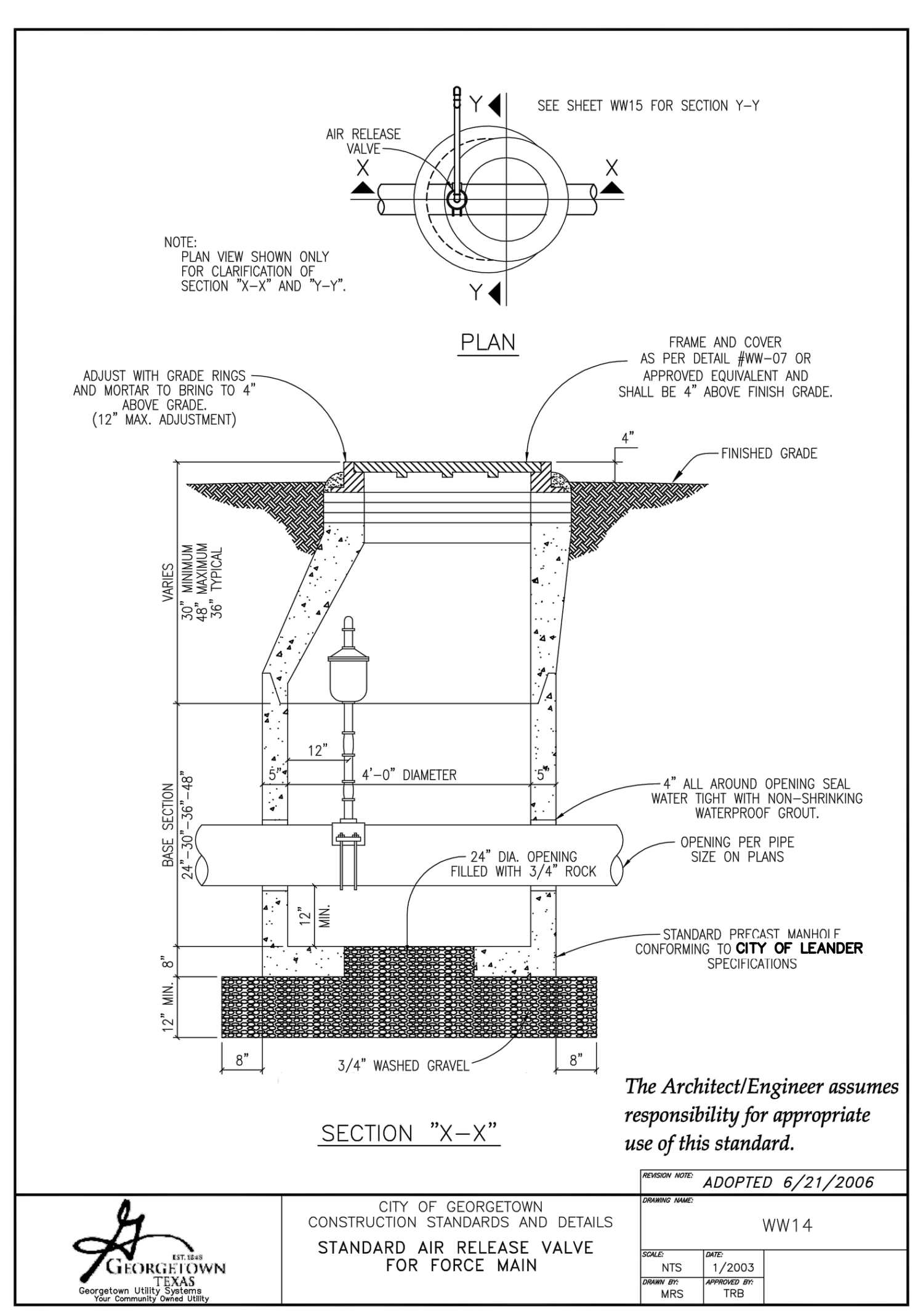


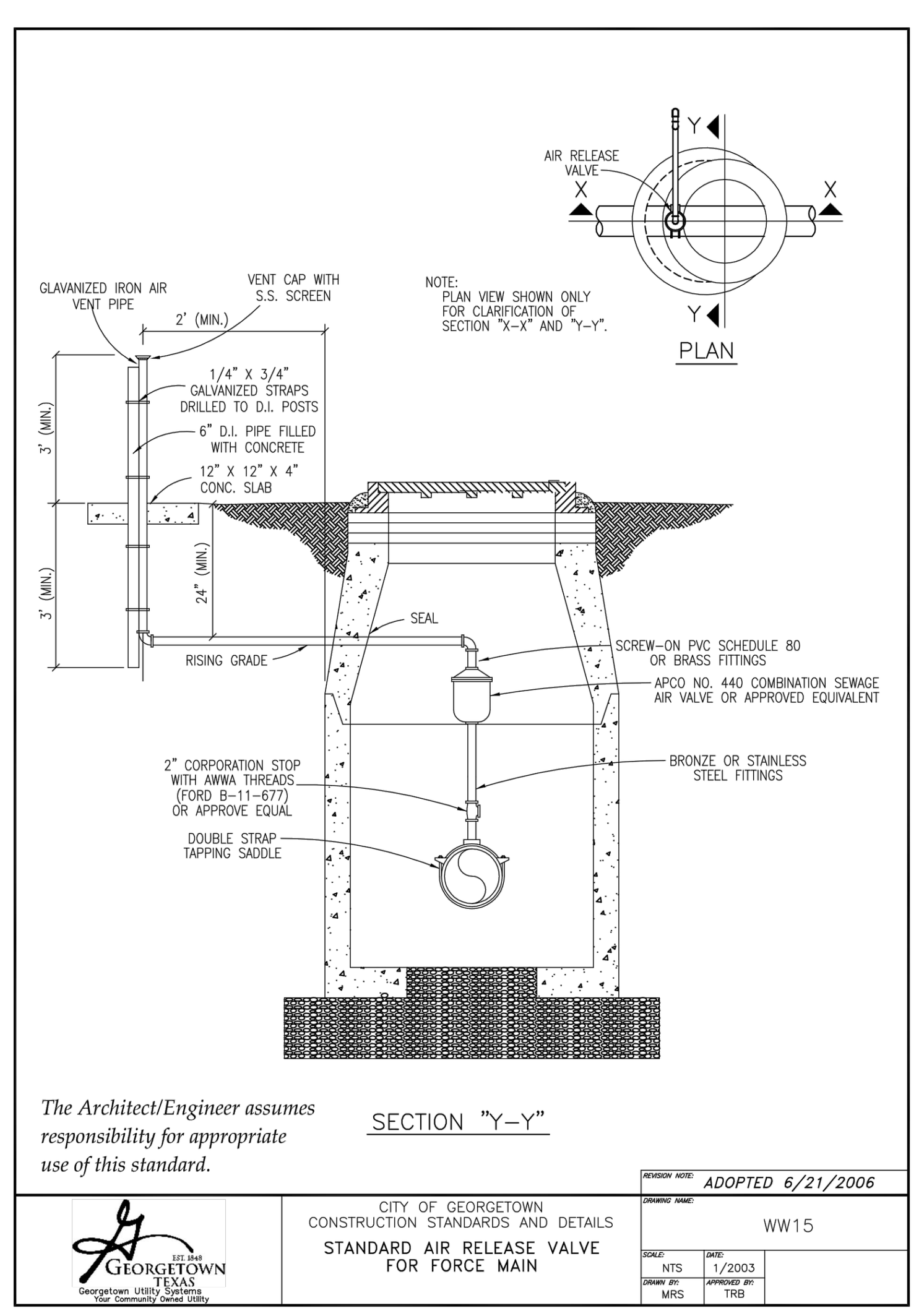












BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

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STATE OF TEXAS
ALEJANDRO E. GRANADOS RIOS
130084
LICENSED PROFESSIONAL ENGINEER
12/06/2023

KHA PROJECT 067783129
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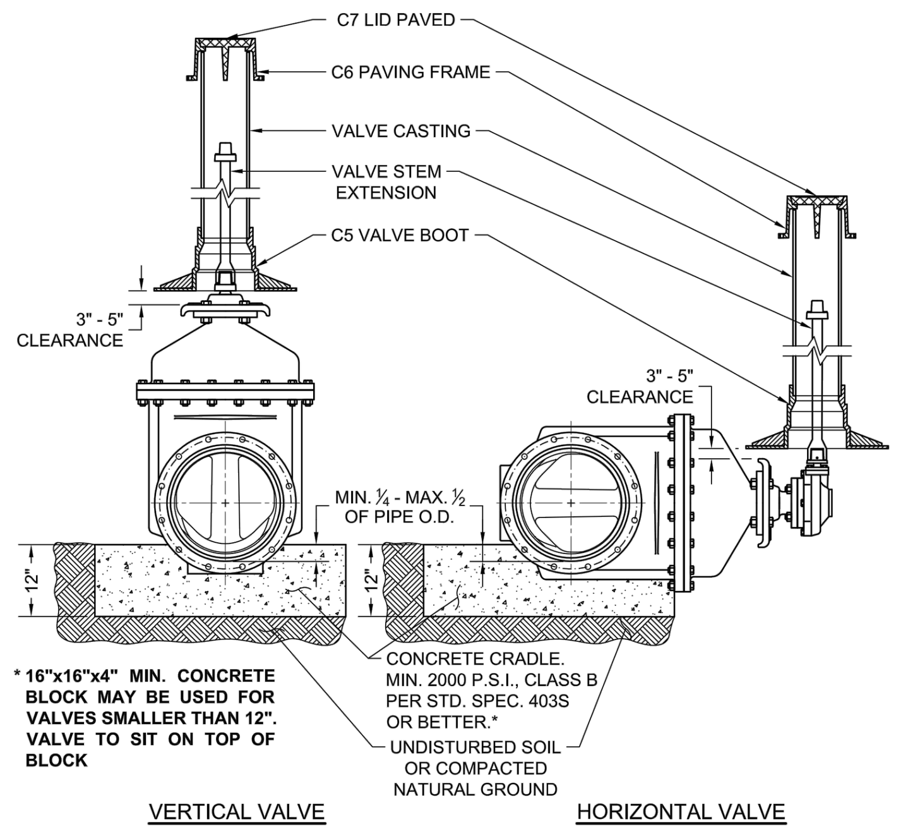
WATER & WASTEWATER NOTES & DETAILS (SHEET 1 OF 2)

EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
109 OF 112

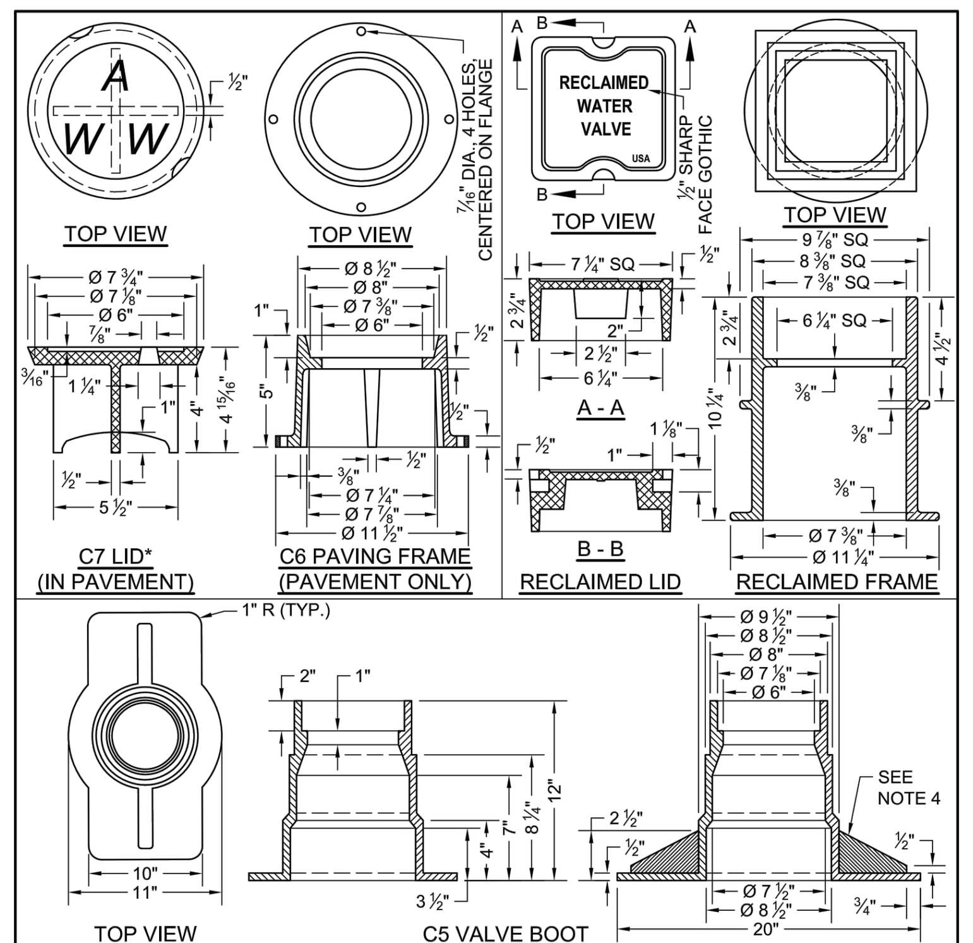


NOTES:

1. WELD SOCKET 2½" x 2" DEEP TO 1" SCH. 40 CARBON STEEL ROUND STEM EXTENSION, FITTED ON OPERATING NUT, [SCH. 80 FOR LENGTHS OVER 10'.]
2. VALVE CASTING SHALL BE 6" DI PIPE WITH BELL OR COLLAR CENTERED OVER VALVE BOOT.
3. NUT AT TOP OF VALVE EXTENSION ROD SHALL BE SQUARE 2" LONG WELDED TO TOP OF ROD.
4. VALVE STEM EXTENSIONS ARE REQUIRED ON ALL VALVES THAT EXCEED 3' DEEP FROM FINISHED GRADE. VALVE EXTENSIONS SHALL BE PLACED SUCH THAT THE EXTENSION NUT IS BETWEEN 12" AND 18" FROM FINISHED GRADE.

RECLAIMED WATER: ALL RECLAIMED PVC PIPE SHALL BE MANUFACTURED PURPLE PIPE. HDPE PIPE SHALL BE MANUFACTURED WITH PURPLE STRIPES. ALL OTHER PIPE AND APPURTENANCES SHALL BE MANUFACTURED PURPLE IF AVAILABLE. ALL PIPE AND FITTINGS THAT ARE NOT AVAILABLE FROM THE MANUFACTURER IN PURPLE SHALL BE PAINTED PURPLE PER SPL WW-3C. ALL BURIED DI AND CI PIPE AND FITTINGS SHALL ALSO BE WRAPPED IN PURPLE POLYETHYLENE PER SPL WW-27D. ALL COVERS SHALL HAVE **"RECLAIMED WATER"** CAST INTO THEM.

CITY OF AUSTIN AUSTIN WATER	TYPICAL GATE VALVE 4" - 16"	
RECORD COPY SIGNED BY KATHI L FLOWERS 05/18/2016 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 511-AW-01 1 OF 4



NOTES:

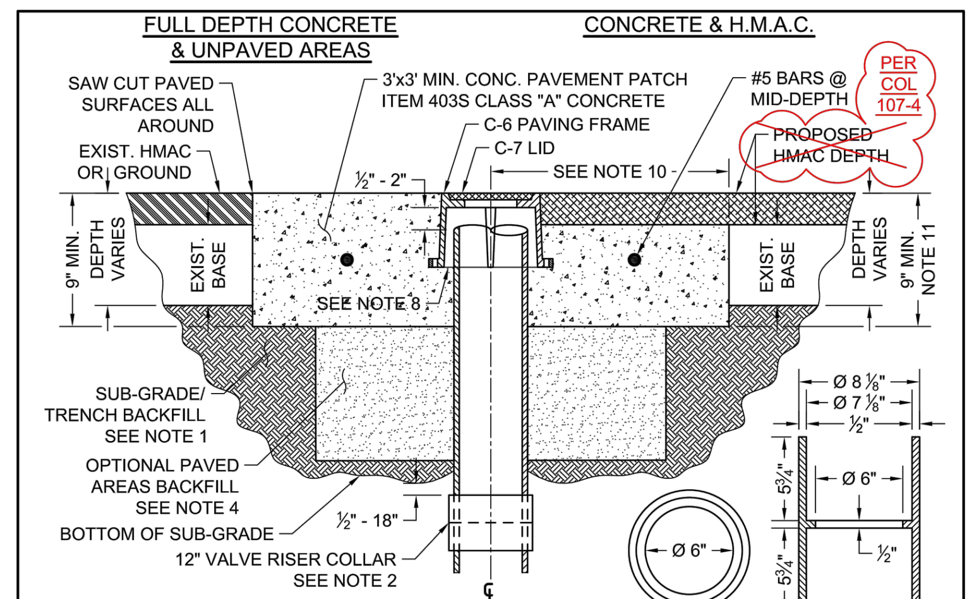
1. MATERIAL SHALL BE GRAY CAST IRON, ASTM A48, GRADE 30B.
2. THE MANUFACTURER'S IDENTIFICATION AND CASTING NUMBER, AND THE COUNTRY WHERE CAST, SHALL BE DISTINCTLY CAST ONTO EACH LID, FRAME, COLLAR AND BASE.
3. DRAFT AND SHRINKAGE ALLOWANCE SHALL BE IN ACCORDANCE WITH NORMAL FOUNDRY PRACTICE.
4. CASTING FINISH BY MANUFACTURER SHALL INCLUDE REMOVAL OF FINS AND FLASHING, AND PAINT WITH BLACK ASPHALT COATING.

WEIGHTS:

C7 LID: 13 LBS
RECLAIMED LID: 15 LBS
C6 FRAME: 23 LBS
RECLAIMED FRAME: 33 LBS
C5 BASE: 78 LBS

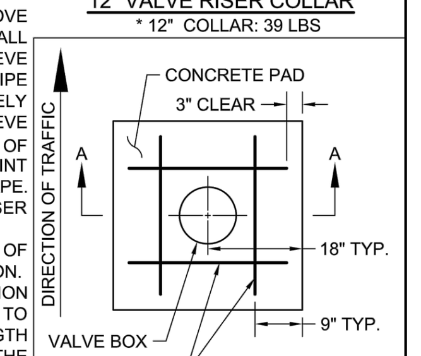
* LETTERING SHALL BE 1½" 2 PICK BAR SLOTS REQUIRED

CITY OF AUSTIN AUSTIN WATER	TYPICAL GATE VALVE 4" - 16"	
RECORD COPY SIGNED BY KATHI L FLOWERS 05/18/2016 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 511-AW-01 2 OF 4



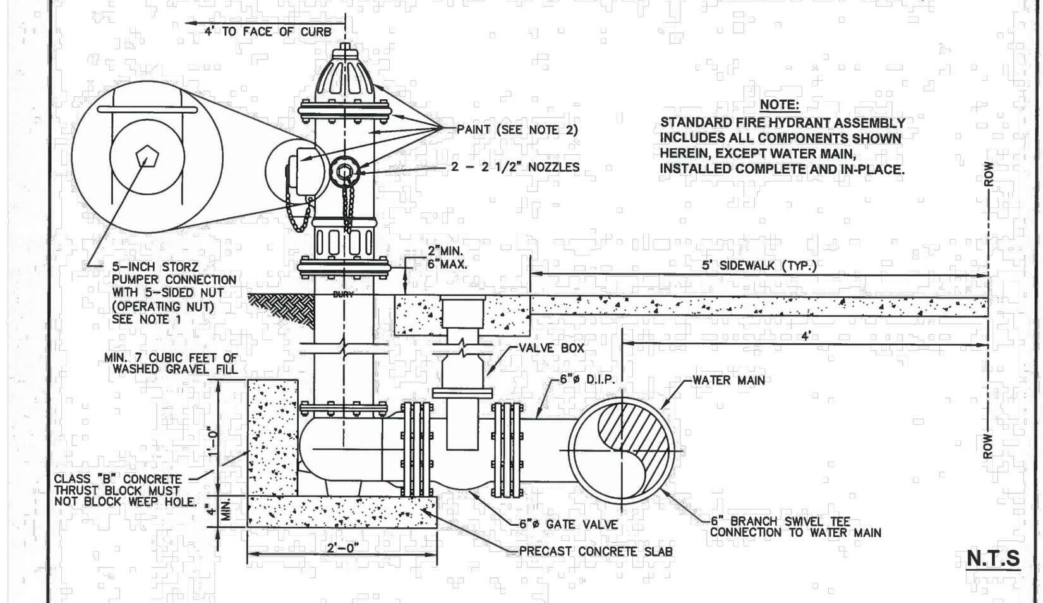
NOTES:

1. SUB-GRADE/TRENCH BACKFILL SHALL BE COMPACTED AS PER ITEM 201S, SUB-GRADE PREPARATION.
2. TO ADJUST VALVE CASTINGS TO FINAL GRADE, REMOVE RISER PIPE BELOW SUB-GRADE AND INSTALL APPROPRIATE LENGTH OF NEW RISER PIPE TO ACHIEVE FINAL GRADE. CONNECT THE TWO PIECES OF RISER PIPE WITH A 6" COLLAR MIN. 12" LENGTH APPROXIMATELY CENTERED ON THE JOINT WITH THE TOP OF SLEEVE LOCATED ½" - 18" BELOW SUB-GRADE. THE INSIDE "LIP" OF COLLAR TO BE PAINTED WITH FLUORESCENT WHITE PAINT OR COVERED WITH FLUORESCENT WHITE TAPE. ALTERNATE: FOR OPTIONAL SINGLE PIECE RISER INSTALLATION SEE SHEET 4 OF 4.
3. CLEAN VALVE BOX OF ALL DEBRIS DOWN TO THE NUT OF THE VALVE; NUT SHALL OPERATE WITH NO OBSTRUCTION.
4. WHERE CASTINGS TO BE REMOVED REQUIRE EXCAVATION GREATER THAN 20" DEEP, CONTRACTOR MAY ELECT TO FILL EXCAVATION WITH CONTROLLED LOW STRENGTH MATERIAL (SPEC. ITEM 402S) TO THE UNDERSIDE OF THE CONCRETE. PAVEMENT PATCH IN LIEU OF COMPACTED BACKFILL.
5. REINFORCING STEEL SHALL MEET SPEC. ITEM 406S.7.
6. NO MORE THAN 2 SECTIONS OF PIPE SHALL BE USED FROM VALVE TO FINAL GRADE.
7. BELL AND SPIGOT IS ACCEPTABLE FOR DEPTH OVER 18'.



CITY OF AUSTIN AUSTIN WATER	TYPICAL GATE VALVE 4" - 16"	
RECORD COPY SIGNED BY KATHI L FLOWERS 05/18/2016 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 511-AW-01 3 OF 4

FIRE HYDRANTS LACKING INTEGRAL STORZ CONNECTOR SHALL BE REJECTED (NO STORZ ADAPTERS ALLOWED)



NOTES:

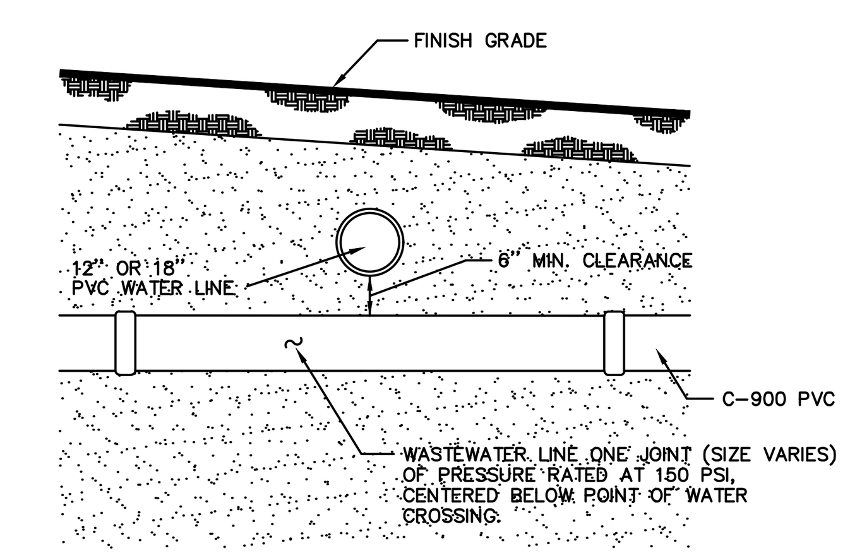
1. FIRE HYDRANT SHALL BE CLOW MEDALLION F2545, AMERICAN DARLING B-84-B-5, MUELLER SUPER CENTURION, EJ 5CD250 WATERMASTER, KENNEDY K81D GUARDIAN, AVK 2780, OR APPROVED EQUAL VIA SUBMITTAL PROCESS. THE PRIMARY FEATURES REQUIRED INCLUDE: FACTORY INSTALLED INTEGRAL 5-INCH STORZ PUMPER NOZZLE; 1.5-INCH PENT OPERATING NUT ON NOZZLE CAP; OPEN LEFT; FACTORY PAINTED.
2. HYDRANTS SHALL BE FACTORY PAINTED WITH FLYNT ALUMINUM SILVER PAINT OR SHERWIN WILLIAMS SILVER B59S11. HYDRANTS WILL NOT BE ACCEPTED IF PAINTED AFTER DELIVERY OR IF PAINT IS FLAT IN APPEARANCE.
3. ALL DUCTILE OR CAST IRON FITTINGS AND/OR PIPE SHALL BE POLYWRAPPED.
4. ALL HYDRANTS SHALL BE EQUIPPED WITH A BREAKAWAY FLANGE. ALL FITTINGS SHALL BE EQUIPPED WITH JOINT RESTRAINT "MEGALUG" OR APPROVED EQUAL. ALL ANCHOR FITTING TO BE CONCRETE THRUST BLOCKED.
5. BLUE, BI-DIRECTIONAL REFLECTIVE PAVEMENT MARKER, ULTIMATE WET NIGHT VISIBILITY SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATION AT THE CORRESPONDING ROADWAY STATION OFFSET 6" (SIX INCHES) FROM CENTER OF STREET TO THE SIDE HYDRANT IS LOCATED. AT INTERSECTIONS, MARKERS SHALL BE PLACED ON BOTH ROADWAYS ADJACENT TO HYDRANT.

LOCATION:

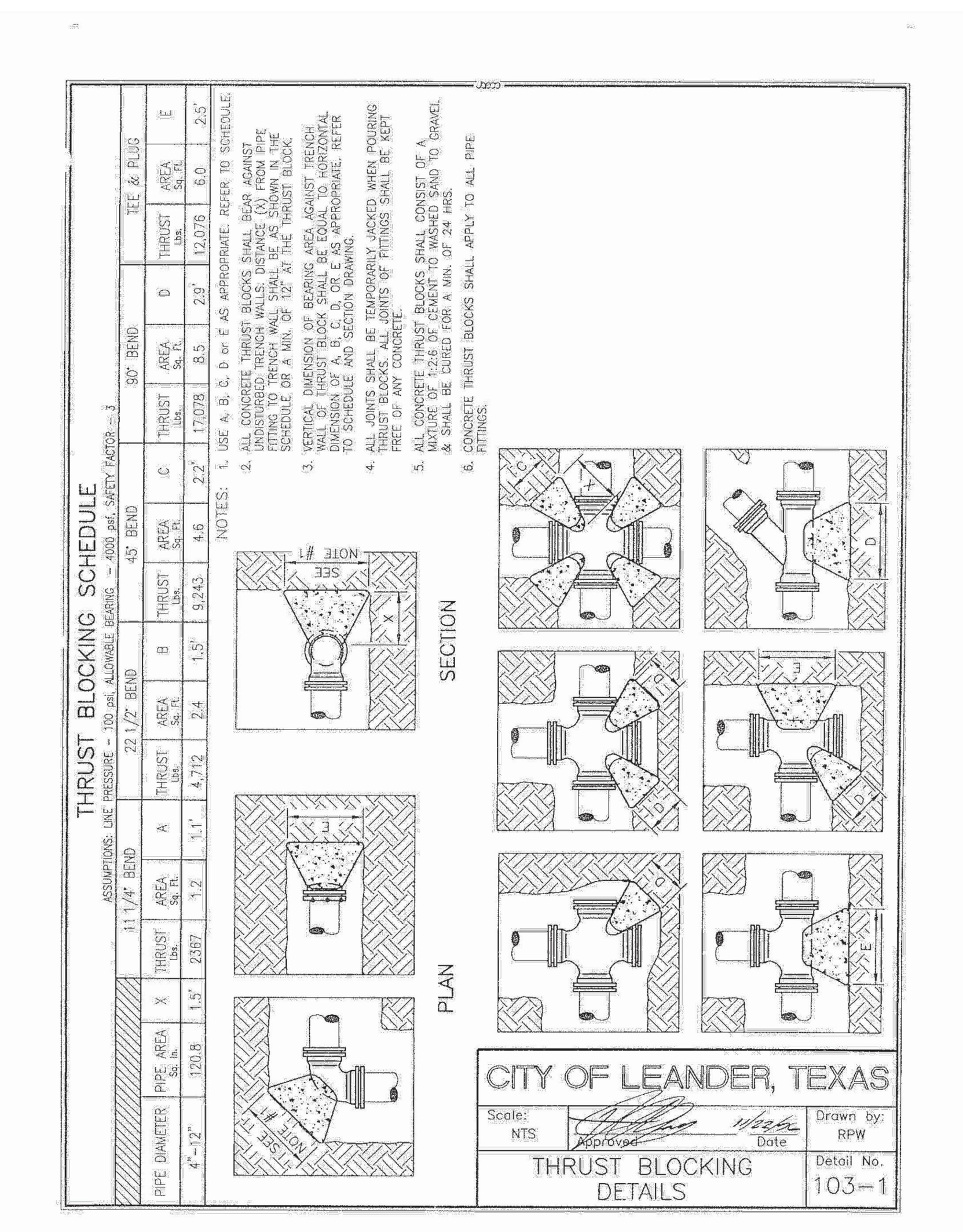
6. SET F.H. ON LOT LINE (EXTENDED WHEN POSSIBLE)
7. F.H. LOCATED AT STREET INTERSECTIONS SHALL BE PLACED A MINIMUM OF TEN FEET (10') FROM RADIUS TANGENT POINT
8. NO OBSTRUCTIONS SHALL BE PERMITTED WITHIN THREE FEET (3') IN ALL DIRECTIONS FROM F.H.
9. 5-INCH STORZ PUMPER NOZZLE SHALL FACE THE FIRE LANE OR TRAVEL WAY UNLESS OTHERWISE NOTED.

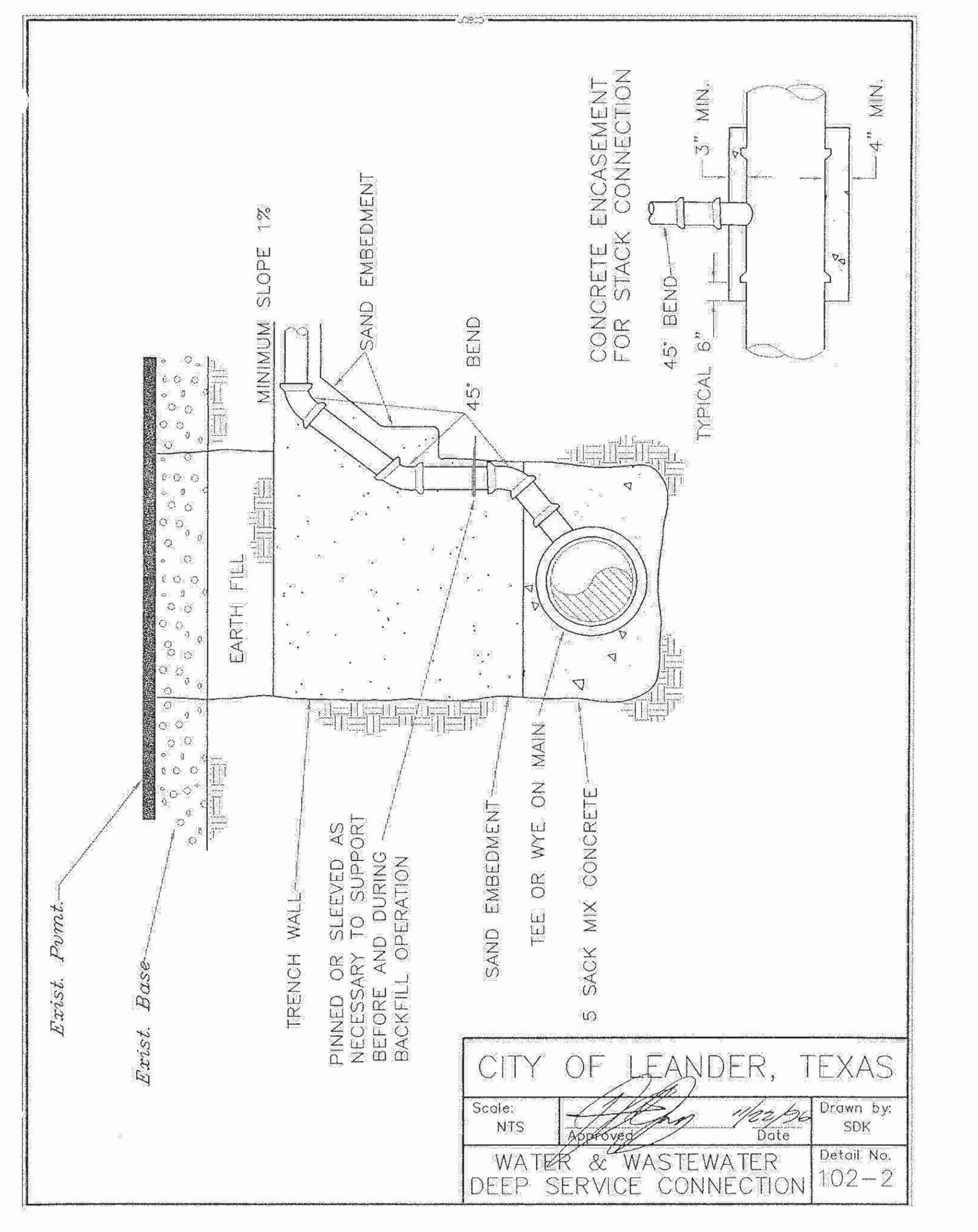
STATE OF TEXAS WAYNE S. WATTS 86134 LICENSED PROFESSIONAL ENGINEER — 02/05/19

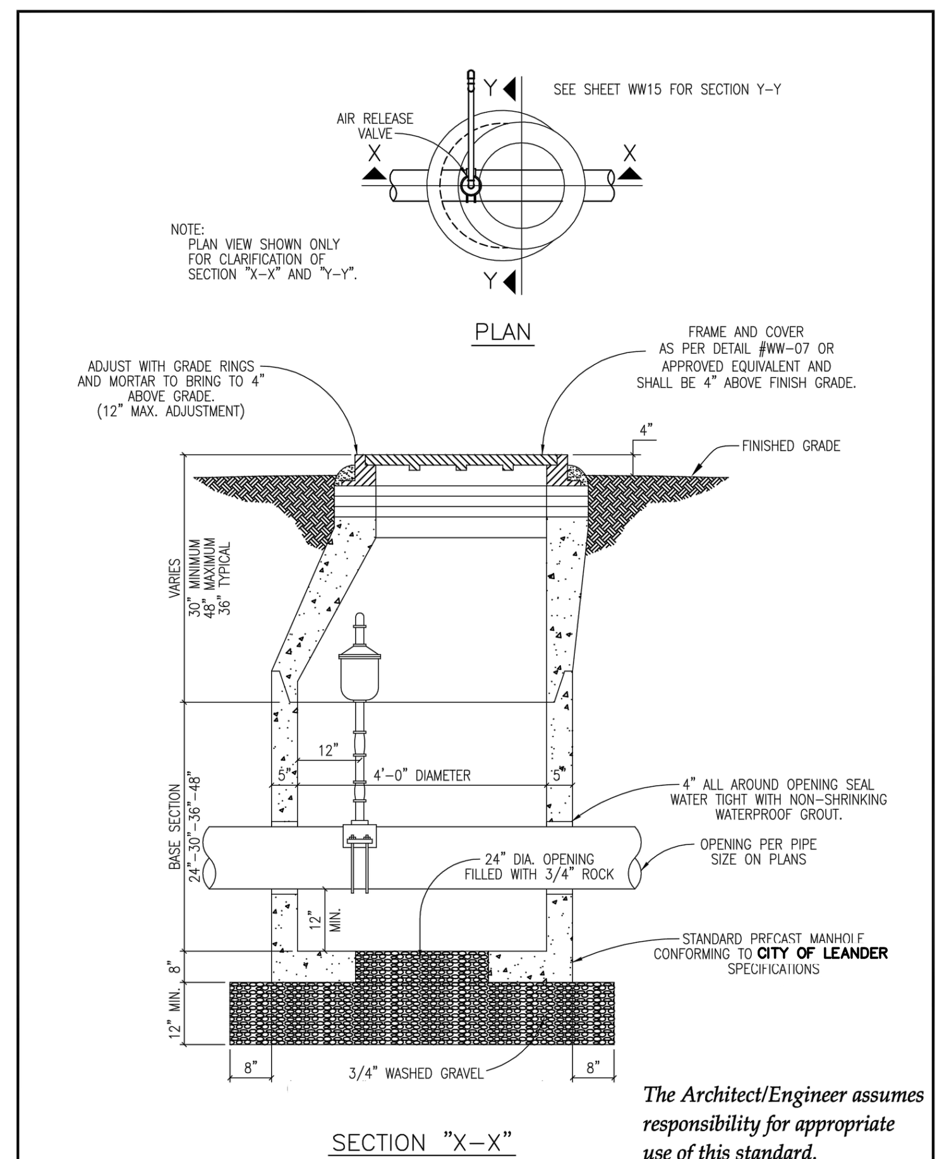
City Of Leander, Texas
DETAIL #101-4
STANDARD FIRE HYDRANT ASSEMBLY



1 UTILITY CROSSING DETAIL
NOT TO SCALE



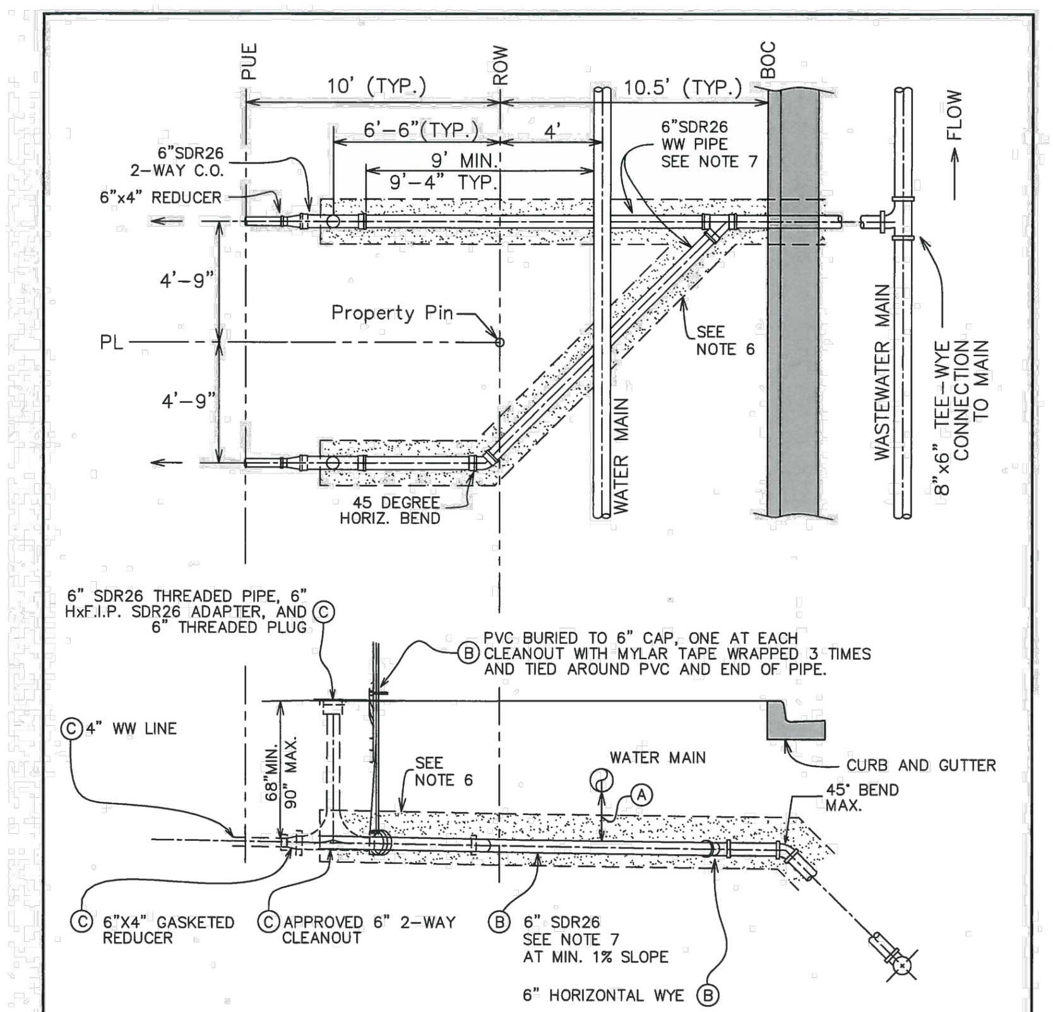




The Architect/Engineer assumes responsibility for appropriate use of this standard.

ADOPTED 6/21/2006

CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS
STANDARD AIR RELEASE VALVE FOR FORCE MAIN
WW14
NTS 1/2003 MRS TRB



NOTES:

Ⓐ WATER MAIN SHALL CROSS ABOVE 6" WASTEWATER SERVICE, TWO-FOOT (2') MINIMUM VERTICAL SEPARATION.

Ⓑ TO BE INSTALLED AND INSPECTED DURING SUBDIVISION CONSTRUCTION. UTILITY CONTRACTOR INSTALLS SERVICE STUB WITH PLUG OR CAP.

Ⓒ 2-WAY CLEANOUTS, 6" HxF.I.P. ADAPTER, REDUCER, AND 4" SERVICE LINE INSTALLED BY BLDG. PLUMBER. PERMITS DEPARTMENT SHALL INSPECT CUSTOMER'S WASTEWATER LINE AND ALL APPURTENANCES INSTALLED BY BUILDING PLUMBER.

STATE OF TEXAS WAYNE S. WATTS 86134 LICENSED PROFESSIONAL ENGINEER — 09/26/18

City Of Leander, Texas
DETAIL #101-2
1 OF 2
WASTEWATER SERVICE CONNECTIONS

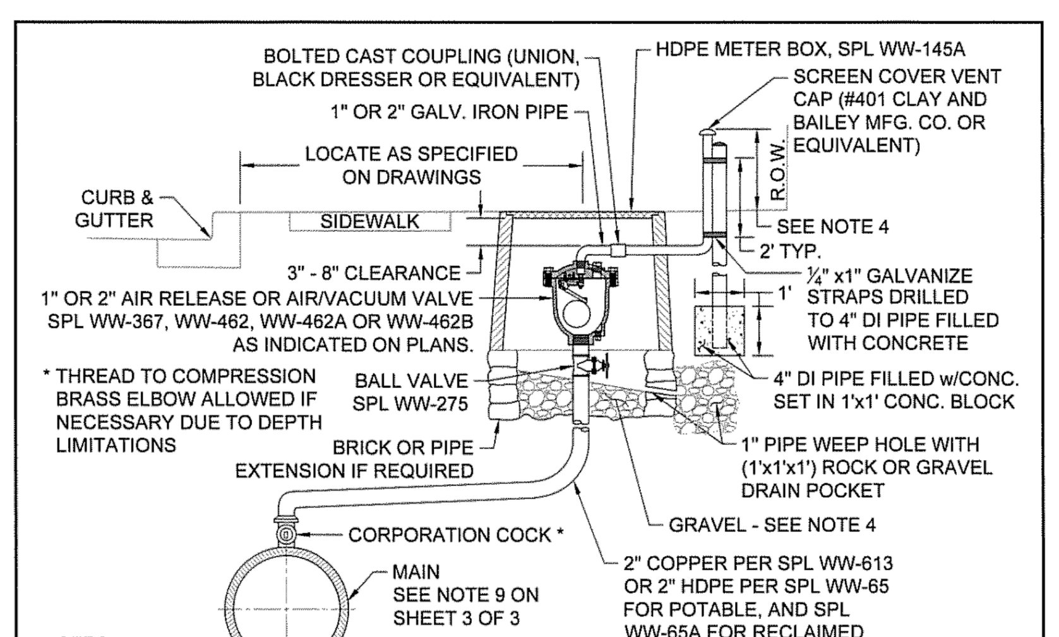
NOTES

1. DURING SUBDIVISION CONSTRUCTION, UTILITY CONTRACTOR INSTALLS WASTEWATER CONNECTION TO MAIN, 6" HORIZONTAL WYE FOR DOUBLE SERVICES, 6" SERVICE BRANCH, AND PLUG(S) FOR 6" SERVICE BRANCH STUB. CONTRACTOR TIES MYLAR TAPE TO END OF 6" STUB, WRAPS 3 TIMES AROUND LENGTH OF PVC BURIED TO THE DEPTH OF THE 6" STUB AND TIES TO TOP OF PVC EXTENDING A MINIMUM OF 2 FEET ABOVE GROUND.

   ALL WASTEWATER PIPING SHALL HAVE ELASTOMERIC GASKET TYPE JOINTS AND SHALL SLOPE DOWNWARD TO MAIN 1% (1/8" PER FOOT) MINIMUM TO 45° MAXIMUM. DEPTH OF SERVICE STUB AT PROPERTY LINE WILL BE SHOWN ON PLANS BY ENGINEER. IF GREATER THAN 8', OTHERWISE THE INSTALLED DEPTH WILL TYPICALLY BE 6' TO 8'. IF WASTEWATER SERVICE LINE TO MAIN REQUIRES DEFLECTION EXCEEDING 45°, REFER TO DETAIL 520-6. ALL INSTALLATIONS SHALL BE MADE IN ACCORDANCE WITH INFORMATION SHOWN ON APPLICABLE STANDARD DRAWINGS AND WILL BE INSPECTED BY CITY OF LEANDER CONSTRUCTION INSPECTION PERSONNEL.
2. CUSTOMER REMOVES PLUG FROM 6" SERVICE LINE STUB, INSTALLS 6" 2-WAY CLEANOUT, 6" BY 4" REDUCER, RISER FOR CLEANOUT, 6" HxF.I.P. ADAPTER, 6" THREADED PLUG, AND 4" SERVICE LINE TO STRUCTURE. IF WASTEWATER WILL NOT SATISFACTORILY FLOW BY GRAVITY FROM STRUCTURE TO SEWER SERVICE STUB & WASTEWATER MAIN, PUMP EQUIPMENT MUST BE PROVIDED BY THE CUSTOMER AS PART OF CUSTOMER'S WASTEWATER SYSTEM.
3. CUSTOMER IS RESPONSIBLE FOR PUBLIC PIPING SYSTEM UNTIL WASTEWATER IS CONNECTED. ANY MISSING OR DAMAGED PARTS SHALL BE REINSTALLED BY CUSTOMER WHO SHALL GUARANTEE, FOR A PERIOD OF TWO (2) YEARS FROM DATE OF ACCEPTANCE, THAT CONNECTIONS TO CITY SYSTEMS ARE FREE FROM DEFECTS IN WORKMANSHIP OR MATERIAL. CUSTOMER ALSO HAS THE RESPONSIBILITY TO ASSURE THAT ALL 2-WAY-CLEANOUTS REMAIN CLEAR OF SIDEWALKS AND OTHER OBSTRUCTIONS.
4. CITY OF LEANDER ACTIVITY IS LIMITED TO INSPECTION OF CONNECTIONS TO THE CITY'S WASTEWATER SYSTEM. FOR MAINTENANCE PURPOSES, THE CITY'S RESPONSIBILITY ENDS AT THE CUSTOMER'S WASTEWATER CONNECTION TO THE 2-WAY-CLEANOUT.
5. PIPING AND TUBING IN STREET RIGHT-OF-WAY AND IN EASEMENT AREA SHALL BE BEDDED IN GRANULAR MATERIALS AS REQUIRED BY CITY OF AUSTIN STANDARD SPECIFICATION SECTION 510.3 (14) UNLESS OTHERWISE NOTED ON THIS DETAIL; MATERIALS SHALL BE AS SPECIFIED IN 510.2 (2)(A) AND (3)(B); BACKFILL ABOVE THE GRANULAR BEDDING SHALL BE AS REQUIRED BY SECTION 510.3 (25). SERVICE LINES IN THESE AREAS SHALL HAVE A MINIMUM COVER BELOW FINAL STREET GRADE OF 42". ANY EXCEPTION MUST BE SPECIFICALLY APPROVED BY THE ENGINEER.
6. ALL SANITARY SEWER PIPE WITHIN 9' OF WATER MAINS SHALL BE BEDDED IN CEMENT STABILIZED SAND PER TCEQ CHAPTER 217 & 290 REQUIREMENTS. BEDDING SHALL EXTEND A MINIMUM OF 12" ABOVE PIPE, 4" BELOW PIPE, AND 12" BEYOND JOINTS AT EACH END.
7. PIPE MATERIAL FOR WASTEWATER SERVICES SHALL BE 6" SDR-26 PVC D2241 160 PSI RATED.
8. NO METER BOX OR CLEAN OUT SHALL BE SET IN SIDEWALK OR DRIVEWAY AREA WITHOUT WRITTEN APPROVAL FROM THE CITY ENGINEERING DEPT.
9. NO JOINTS SHALL BE PERMITTED BETWEEN THE 6"x6" HORIZONTAL WYE AND THE 6" 2-WAY CLEANOUT EXCEPT FOR THE 6" 45-DEGREE BEND REQUIRED FOR DOUBLE SERVICES.

STATE OF TEXAS WAYNE S. WATTS 86134 LICENSED PROFESSIONAL ENGINEER — 09/26/18

City Of Leander, Texas
DETAIL #101-2
2 OF 2
WASTEWATER SERVICE CONNECTIONS



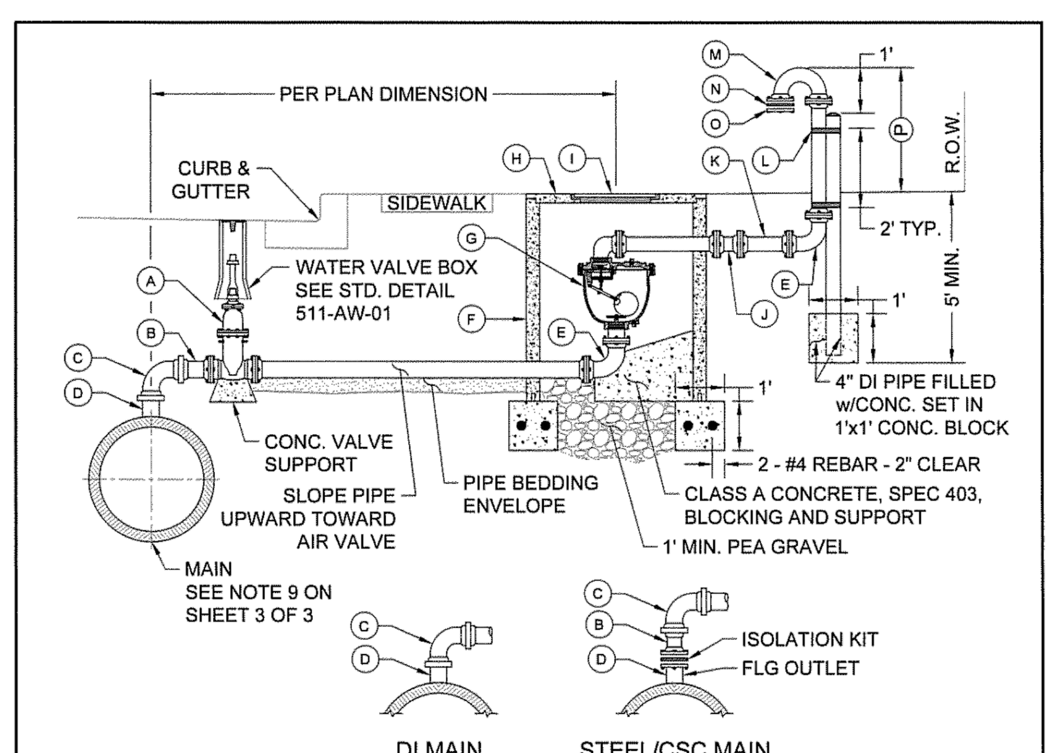
NOTES:

1. EXTERIOR SURFACES OF EXPOSED AIR VENT PIPE AND DI SUPPORT PIPE SHALL BE PAINTED PER SPL WW-3C. POTABLE WATER PIPE SHALL BE PAINTED SAFETY BLUE.
2. AIR VENT PIPE INSTALLATION SHALL BE AS NEAR AS PRACTICAL TO RIGHT-OF-WAY LINE WITH MINIMUM CLEARANCE OF 18" FROM ANY OBSTACLE.
3. HDPE METER BOX PENETRATION SHALL BE CORE BIT DRILLED. VOID SHALL BE FILLED WITH LINKSEAL LS 300 OR APPROVED EQUAL.
4. COMPACTED COARSE GRAVEL OR BROKEN STONE MIXED WITH SAND SLOPED TO DRAIN.
5. IN UNDEVELOPED AREAS, THE AIR VENT PIPE SHALL BE 4' MIN. IN HEIGHT SUPPORTED BY A 4" DIA. DI PIPE WHICH HAS BEEN FILLED WITH CONCRETE (SUPPORT PIPE SHALL BE 6' LONG, BURIED IN CLASS A CONCRETE OR CLSM 3' BELOW FINAL GRADE AND EXTENDING 3' ABOVE FINAL GRADE). INSTALL ONE DELINEATOR STAKE WITHIN 3' OF THE VAULT ON THE VEHICULAR ACCESS SIDE OF VAULT OR AS DIRECTED BY AUSTIN WATER. DELINEATOR SHALL BE BLUE FOR POTABLE WATER AND SHALL EXTEND AT LEAST 60" ABOVE GROUND. DELINEATORS SHALL HAVE 2" WIDE, WHITE IN COLOR, TYPE I REFLECTIVE TAPE MOUNTED DIAGONALLY AT 12" SPACING ON BOTH SIDES. IN DEVELOPED AREAS, THE AIR VENT PIPE SHALL BE 8" - 12" IN HEIGHT AND LOCATED NOT TO CONFLICT WITH SIDEWALK, DRIVEWAY, OR OTHER PEDESTRIAN TRAFFIC.
6. THE AIR VALVE AND ASSOCIATED PIPING SHALL BE INSTALLED ABOVE THE HIGHEST ELEVATION OF THE WATER MAIN. AIR VALVE PIPING, FROM THE WATER MAIN TO THE AIR VALVE, SHALL MAINTAIN A CONSTANT RISE, WITH NO DIPS, TO THE TOP OF THE GROUND.

1" - 2" AIR RELEASE OR AIR/VACUUM VALVE INSTALLATION - TYPE I

RECLAIMED WATER: ALL RECLAIMED PVC PIPE SHALL BE MANUFACTURED PURPLE PIPE. HDPE PIPE SHALL BE MANUFACTURED WITH PURPLE STRIPES. ALL OTHER PIPE AND APPURTENANCES SHALL BE MANUFACTURED PURPLE IF AVAILABLE. ALL PIPE AND FITTINGS THAT ARE NOT AVAILABLE FROM THE MANUFACTURER IN PURPLE SHALL BE PAINTED PURPLE PER SPL WW-3C. ALL BURIED DI AND CI PIPE AND FITTINGS SHALL ALSO BE WRAPPED IN PURPLE POLYETHYLENE PER SPL WW-27D. ALL COVERS SHALL HAVE "RECLAIMED WATER" CAST INTO THEM.

CITY OF AUSTIN AUSTIN WATER	AIR RELEASE AND AIR/VACUUM VALVE	
Kathi L. Flowers 05/18/2016 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 511-AW-04 1 OF 3



A. GATE VALVE (FLG x FLG). GATE VALVE SHALL NOT BE INSTALLED DIRECTLY ABOVE WATER MAIN.
B. PIPE FLG x FACTORY RESTRAINED JOINT SPIGOT END.
C. 90° BEND w/FACTORY RESTRAINED JOINT BELL ENDS, SPL WW-27F.
D. FOR DI MAIN: WELDED-ON OUTLET w/FACTORY RESTRAINED JOINT SPIGOT END. FOR STEEL/CSC MAIN: WELDED-ON FLANGED OUTLET w/ISOLATION KIT AND FLG x FACTORY RESTRAINED SPIGOT END.
E. 90° BEND (FLG x FLG).
F. CLASS III RCP VAULT 60" MIN. I.D.
G. AIR RELEASE VALVE w/GOOSENECK PER AIR RELEASE VALVES FOR WATER SPL WW-367 OR AIR RELEASE/VACUUM RELIEF VALVES FOR POTABLE WATER SPL WW-462A OR AIR RELEASE/VACUUM RELIEF VALVES FOR RECLAIMED WATER SPL WW-462B OR AIR RELEASE/AIR VACUUM VALVE FOR WASTEWATER SPL WW-462B.
H. REINFORCED PRECAST CONCRETE LID (AASHTO H-20 LOADING).
I. COA FRAME AND 32" COVER WITH LETTERING MODIFIED FOR WATER.
J. BOLTED CAST COUPLING (SMITH-BLAIR 441 OMNI CAST COUPLING OR APPROVED EQUAL).
K. AIR VENT PIPE, 3" PIPE - GALVANIZED IRON, 4" AND LARGER PIPE - DI ONLY.
L. ¼" x1" GALVANIZE STRAPS DRILLED TO 4" DI PIPE FILLED w/CONCRETE (SEE NOTE 7).
M. RETURN BEND (FLG x FLG).
N. No. 16 MESH BRASS CLOTH
O. COMPANION FLANGE (SEE NOTE 5).
P. 4' MIN. - UNDEVELOPED AREAS.

3" OR LARGER AIR/VACUUM VALVE INSTALLATION - TYPE II

CITY OF AUSTIN AUSTIN WATER	AIR RELEASE AND AIR/VACUUM VALVE	
Kathi L. Flowers 05/18/2016 ADOPTED	THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. 511-AW-04 2 OF 3

NOTES:

1. ON 10" AND LARGER TWO PIECE COMBINATION AIR VALVES, THE OUTLET PIPING OF THE SMALL VALVE SHALL BE VENTED WITHIN THE VAULT INTO THE LARGER VENT PIPE
2. AIR VENT PIPE 6" AND LARGER SHALL BE DI (CLASS 350 MIN.) PIPE FLANGE FITTINGS AND EXTERIOR SURFACES OF ALL EXPOSED PIPE SHALL BE PAINTED PER SPL WW-3C. POTABLE WATER PIPE SHALL BE PAINTED SAFETY BLUE. SURFACE PREPARATION SHALL BE PER PAINT MANUFACTURER'S REQUIREMENTS.
3. ENTIRE AIR VENT ASSEMBLY SHALL BE LOCATED WITHIN EASEMENT OR R.O.W.
4. CONCRETE PIPE PENETRATIONS SHALL BE CORE BIT DRILLED. VOID SHALL BE SEALED w/LINKSEAL LS 300 OR APPROVED EQUAL.
5. CROSS SECTIONAL AREA OF OPENING TO BE EQUAL TO OR GREATER THAN CROSS SECTIONAL AREA OF AIR VENT PIPE.
6. AIR/VACUUM VALVE SHALL BE INSTALLED IN A MANNER WHICH WILL ALLOW REMOVAL OF ASSEMBLY WITHOUT REMOVAL OF PRECAST CONCRETE LID.
7. IN UNDEVELOPED AREAS, THE AIR VENT PIPE SHALL BE 4' MIN. IN HEIGHT SUPPORTED BY A 4" DIA. DI PIPE WHICH HAS BEEN FILLED WITH CONCRETE (SUPPORT PIPE SHALL BE 6' LONG, BURIED IN CLASS A CONCRETE OR CLSM 3' BELOW FINAL GRADE AND EXTENDING 3' ABOVE FINAL GRADE). INSTALL ONE DELINEATOR STAKE WITHIN 3' OF THE VAULT ON THE VEHICULAR ACCESS SIDE OF VAULT OR AS DIRECTED BY AUSTIN WATER. DELINEATOR SHALL BE BLUE FOR POTABLE WATER AND SHALL EXTEND AT LEAST 60" ABOVE GROUND. DELINEATORS SHALL HAVE 2" WIDE, WHITE IN COLOR, TYPE I REFLECTIVE TAPE MOUNTED DIAGONALLY AT 12" SPACING ON BOTH SIDES. IN DEVELOPED AREAS, THE AIR VENT PIPE SHALL BE LOCATED NOT TO CONFLICT WITH SIDEWALK, DRIVEWAY, OR OTHER PEDESTRIAN TRAFFIC.
8. GATE VALVE, PIPE, AND FITTINGS FROM MAIN TO ARV SHALL BE OF EQUAL DIAMETER AS THE AIR VALVE EXCEPT 3" ARV SHALL HAVE 4" FITTINGS AND A 4"x3" REDUCER AT THE ARV, AND ALL PIPE AND FITTINGS ON THE OUTLET SIDE OF THE ARV SHALL BE EQUAL TO THE SIZE OF THE OUTLET OF THE ARV. VAULTS SHALL BE 5' DIAMETER FOR 3" VALVE; 6' DIAMETER FOR 4", 6", AND 8" VALVES; AND 7' DIAMETER FOR 10" AND 12" VALVES.
9. FOR 24" AND LARGER MAINS, AN 18" OUTLET WITH BLIND FLANGE SHALL BE INSTALLED AT CONNECTION OF ARV.

3" OR LARGER AIR/VACUUM VALVE INSTALLATION - TYPE II

RECLAIMED WATER: ALL RECLAIMED PVC PIPE SHALL BE MANUFACTURED PURPLE PIPE. HDPE PIPE SHALL BE MANUFACTURED WITH PURPLE STRIPES. ALL OTHER PIPE AND APPURTENANCES SHALL BE MANUFACTURED PURPLE IF AVAILABLE. ALL PIPE AND FITTINGS THAT ARE NOT AVAILABLE FROM THE MANUFACTURER IN PURPLE SHALL BE PAINTED PURPLE PER SPL WW-3C. ALL BURIED DI AND CI PIPE AND FITTINGS SHALL ALSO BE WRAPPED IN PURPLE POLYETHYLENE PER SPL WW-27D. ALL COVERS SHALL HAVE "RECLAIMED WATER" CAST INTO THEM.

CITY OF AUSTIN AUSTIN WATER	AIR RELEASE AND AIR/VACUUM VALVE	
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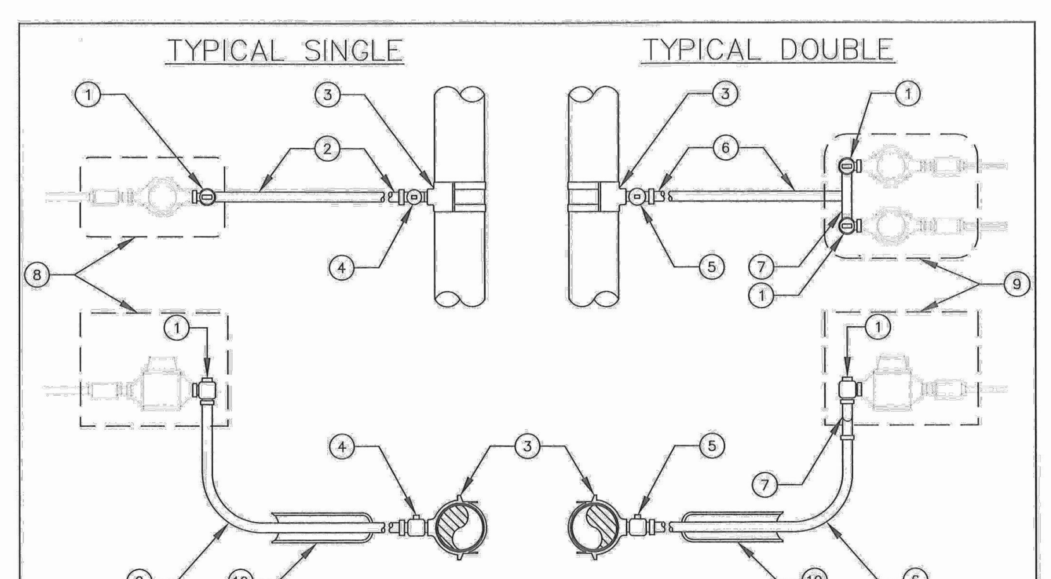

ITEM	SIZE & DESCRIPTION	SPEC. OR EQUAL
1	1" X 1" ANGLE METER STOP, LOCKING	AS APPROVED
2	1" SDR9 POLYETHYLENE TUBING	CLASS 250
3	EPOXY COATED DUCTILE IRON TAPPING SADDLE	AS APPROVED
4	1" CORPORATION STOP	AS APPROVED
5	1 1/2" CORPORATION STOP	AS APPROVED
6	1 1/2" SDR9 POLYETHYLENE TUBING	CLASS 250
7	BRASS U-BRANCH, 1 1/2" X 1"	FORD, OR EQUAL
8	METER BOX, SINGLE	DFW37F-12-1CA, OR EQUAL
9	METER BOX, DOUBLE	DFW39F-12-1CA, OR EQUAL
10	3" SCH. 40 PVC SLEEVE FOR LONG SIDE SERVICES (TYP.)	

NOTES:

1. SERVICE SADDLE SHALL BE WRAPPED COMPLETELY WITH 8 MIL POLYETHYLENE FILM.
2. PIPING AND TUBING IN STREET RIGHT-OF-WAY SHALL BE BEDDED IN GRANULAR MATERIALS.
3. BRANCH CONNECTION AND BOTH ANGLE METER STOPS SHALL BE INSTALLED PRIOR TO FIRST METER INSTALLATION.
4. SLEEVES FOR LONG-SIDE SERVICE TO BEGIN AND TERMINATE 6" BEHIND BACK OF CURB.
5. TOP OF METER BOXES SHOULD BE 1" ABOVE GROUND.
6. METER BOX SHALL BE BEHIND CURB AT ROW/PROPERTY LINE OR EASEMENT. METER BOX SHALL NOT BE INSTALLED IN SIDEWALK, DRIVEWAY OR VEHICULAR TRAVEL AREA.
7. 1" X 3/4" BRASS METER BUSHING REQUIRED FOR 5/8" AND 3/4" METERS.
8. AXIS OF METER ASSEMBLY (LINE THROUGH METER STOP, METER, CHECK VALVE, PIPING AND OWNER'S CUTOFF) SHALL BE 11" BELOW TOP OF BOX. METER BOXES ARE SIZED TO ACCOMMODATE METER STOP, WATER METER AND CHECK VALVE.

STATE OF TEXAS WAYNE S. WATTS 86134 LICENSED PROFESSIONAL ENGINEER — 10/29/15

City Of Leander, Texas
DETAIL #101-1
WATER SERVICE CONNECTIONS

BENCHMARKS

ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAM DATUM 1988 (NAVD) UTILIZING WESTERN DATA SYSTMS CONTINUALLY OPERATING REFERENCE STATION (CORS) NETWORK.
BM-101: "X" CUT IN CONCRETE ON NORTHWEST SIDE OF ENTRANCE OF SUBJECT 120.2358 ACRE TRACT FROM C.R. 175. OUTSIDE GATE, NEAR KEYPAD.
N= 10186642.4550
E= 30959353.6490
ELEVATION: 915.036' (NAVD '88)
BM-103: 5/8 ROD SET IN CONCRETE NEAR GRAVEL ROAD AND THE SOUTHWEST CORNER OF THE 0.20 ACRE TRACT TO DONALD AND DOLORES GISH.
N= 10187908.0080
E= 3097998.0100
ELEVATION: 1002.490' (NAVD '88)

No.	REVISIONS	DATE	BY

Kimley»Horn

501 S. AUSTIN AVENUE, SUITE 1310, GEORGETOWN, TX 78626
PHONE: 512-520-0768 FAX: 512-418-1791
WWW.KIMLEY-HORN.COM
TEXAS REGISTERED ENGINEERING FIRM F-928

STATE OF TEXAS — ALEJANDRO E. GRANADOS RICO — 130084 — LICENSED PROFESSIONAL ENGINEER — 12/06/2023

KHA PROJECT 067783129	DATE DECEMBER 2023	SCALE: AS SHOWN	DESIGNED BY: DPD	DRAWN BY: AJD	CHECKED BY: AEG

WATER & WASTEWATER NOTES & DETAILS (SHEET 2 OF 2)

EDGEWOOD PHASE 2, SECTION 2
CITY OF LEANDER
WILLIAMSON COUNTY, TEXAS

SHEET NUMBER
110
OF 112