

**VERAMENDI WORK PKWY  
PHASE 3, PRECINCT 4, AND  
PRECINCT 18 UNIT 1  
Water Pollution Abatement Plan**

**November 2023**



# VERAMENDI WORD PKWY PHASE 3, PRECINCT 4, AND PRECINCT 18 UNIT 1 Water Pollution Abatement Plan

November 2023



11/30/23

A handwritten signature in blue ink that reads "Jocelyn Perez".

November 17, 2023

Ms. Lillian Butler  
Texas Commission on Environmental Quality  
Region 13  
14250 Judson Road  
San Antonio, Texas 78233-4480

Re: Veramendi Word Pkwy Phase 3, Precinct 4, and Precinct 18 Unit 1  
Water Pollution Abatement Plan

Dear Ms. Butler:

Please find included herein the Veramendi Word Pkwy Phase 3, Precinct 4, and Precinct 18 Unit 1 Water Pollution Abatement Plan Application. This Water Pollution Abatement Plan Application has been prepared to be consistent with the regulations of the Texas Administrative Code (30 TAC 213) and current policies for development over the Edwards Aquifer Recharge Zone.

This Water Pollution Abatement Plan applies to 121.98-acre site as identified by the project limits. Please review the plan information for the items it is intended to address. If acceptable, provide a written approval of the plan in order that construction may begin at the earliest opportunity.

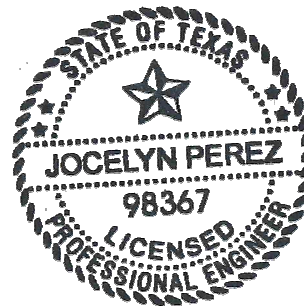
Appropriate review fee (\$8,000) and fee application form are included. If you have questions or require additional information, please do not hesitate to contact me at your earliest convenience.

Sincerely,  
Pape-Dawson Consulting Engineers, LLC

Jocelyn Perez, P.E.  
Vice President

Attachments

P:\300\01\45\Word\Reports\WPAP\2023 - WPAP Cover Letter.Docx



11/30/23

**EDWARDS AQUIFER  
APPLICATION COVER PAGE  
(TCEQ-20705)**

# 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.

<b>1. Regulated Entity Name:</b> Veramendi Word Pkwy Ph 3, P18 Unit 1, P4 Unit 1,2,3				<b>2. Regulated Entity No.:</b>					
<b>3. Customer Name:</b> Veramendi PE - Emerald, LLC				<b>4. Customer No.:</b> 60612370					
<b>5. Project Type:</b> (Please circle/check one)	<input checked="" type="radio"/> New	Modification		Extension		Exception			
<b>6. Plan Type:</b> (Please circle/check one)	<input checked="" type="radio"/> WPA	<input type="radio"/> CZP	<input type="radio"/> SCS	<input type="radio"/> UST	<input type="radio"/> AST	<input type="radio"/> EXP	<input type="radio"/> EXT	Technical Clarification	Optional Enhanced Measures
<b>7. Land Use:</b> (Please circle/check one)	<input checked="" type="radio"/> Residential		Non-residential		<b>8. Site (acres):</b>		121.98		
<b>9. Application Fee:</b>	\$8,000		<b>10. Permanent BMP(s):</b>			4 batch detention, 2 Jellyfish filter, VFS			
<b>11. SCS (Linear Ft.):</b>			<b>12. AST/UST (No. Tanks):</b>						
<b>13. County:</b>	Comal		<b>14. Watershed:</b>			Blieders 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](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.

<b>Austin Region</b>			
<b>County:</b>	<b>Hays</b>	<b>Travis</b>	<b>Williamson</b>
Original (1 req.)	—	—	—
Region (1 req.)	—	—	—
County(ies)	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Barton Springs/ Edwards Aquifer <input type="checkbox"/> Hays Trinity <input type="checkbox"/> Plum Creek	<input type="checkbox"/> Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	<input type="checkbox"/> Austin <input type="checkbox"/> Buda <input type="checkbox"/> Dripping Springs <input type="checkbox"/> Kyle <input type="checkbox"/> Mountain City <input type="checkbox"/> San Marcos <input type="checkbox"/> Wimberley <input type="checkbox"/> Woodcreek	<input type="checkbox"/> Austin <input type="checkbox"/> Bee Cave <input type="checkbox"/> Pflugerville <input type="checkbox"/> Rollingwood <input type="checkbox"/> Round Rock <input type="checkbox"/> Sunset Valley <input type="checkbox"/> West Lake Hills	<input type="checkbox"/> Austin <input type="checkbox"/> Cedar Park <input type="checkbox"/> Florence <input type="checkbox"/> Georgetown <input type="checkbox"/> Jerrell <input type="checkbox"/> Leander <input type="checkbox"/> Liberty Hill <input type="checkbox"/> Pflugerville <input type="checkbox"/> Round Rock

<b>San Antonio Region</b>					
<b>County:</b>	<b>Bexar</b>	<b>Comal</b>	<b>Kinney</b>	<b>Medina</b>	<b>Uvalde</b>
Original (1 req.)	—	✓	—	—	—
Region (1 req.)	—	✓	—	—	—
County(ies)	—	✓	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Trinity-Glen Rose	<input checked="" type="checkbox"/> Edwards Aquifer Authority	<input type="checkbox"/> Kinney	<input type="checkbox"/> EAA <input type="checkbox"/> Medina	<input type="checkbox"/> EAA <input type="checkbox"/> Uvalde
City(ies) Jurisdiction	<input type="checkbox"/> Castle Hills <input type="checkbox"/> Fair Oaks Ranch <input type="checkbox"/> Helotes <input type="checkbox"/> Hill Country Village <input type="checkbox"/> Hollywood Park <input type="checkbox"/> San Antonio (SAWS) <input type="checkbox"/> Shavano Park	<input type="checkbox"/> Bulverde <input type="checkbox"/> Fair Oaks Ranch <input type="checkbox"/> Garden Ridge <input checked="" type="checkbox"/> New Braunfels <input type="checkbox"/> Schertz	NA	<input type="checkbox"/> 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.

Jocelyn Perez, P.E.

Print Name of Customer/Authorized Agent

*Jocelyn Perez*

11/30/23

Signature of Customer/Authorized Agent

Date

**\*\*FOR TCEQ INTERNAL USE ONLY\*\***

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



**GENERAL INFORMATION  
FORM (TCEQ-0587)**

# 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: Jocelyn Perez, P.E.

Date: 11/30/23

Signature of Customer/Agent:



## Project Information

1. Regulated Entity Name: Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3
2. County: Comal
3. Stream Basin: Blieders Creek
4. Groundwater Conservation District (If applicable): Edwards Aquifer Authority
5. Edwards Aquifer Zone:
  - Recharge Zone
  - Transition Zone
6. Plan Type:
  - WPAP
  - SCS
  - Modification
  - AST

UST

Exception Request

7. Customer (Applicant):

Contact Person: Garrett Mechler

Entity: Veramendi PE - Emerald, LLC

Mailing Address: PO Box 310699

City, State: New Braunfels, Texas

Zip: 78131

Telephone: (830) 643-1338

FAX: \_\_\_\_\_

Email Address: garrett.mechler@asaproperties.us.com

8. Agent/Representative (If any):

Contact Person: Jocelyn Perez, P.E.

Entity: Pape-Dawson Engineers, Inc.

Mailing Address: 1672 Independence Dr, Ste 102

City, State: New Braunfels, Texas

Zip: 78213

Telephone: (210) 375-9000

FAX: (210) 375-9010

Email Address: jperez@pape-dawson.com

9. Project Location:

The project site is located inside the city limits of \_\_\_\_\_.

The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of New Braunfels.

The project site is not located within any city's limits or ETJ.

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

From TCEQ's regional office, turn left and proceed approximately 1.5 miles to IH-35 north and turn left. Travel approximately 14.5 miles to exit 184 toward TX-337 and turn left. Proceed approximately 3.5 miles to TX-46 and stay left. Travel approximately 1.46 miles on TX-46/TX-337 to Word Pkwy. The project site is located approximately 0.3 miles Northwest of TX-46/TX-337 and Word Pkwy intersection.

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: once advised by TCEQ staff of inspection

14.  **Attachment C – Project Description.** Attached at the end of this form is a detailed narrative description of the proposed project. The project description is consistent throughout the application and contains, at a minimum, the following details:

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

15. Existing project site conditions are noted below:

- Existing commercial site
- Existing industrial site
- Existing residential site
- Existing paved and/or unpaved roads
- Undeveloped (Cleared)
- Undeveloped (Undisturbed/Uncleared)
- Other: \_\_\_\_\_

### ***Prohibited Activities***

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

- (1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
- (2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
- (3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;
- (4) The use of sewage holding tanks as parts of organized collection systems; and
- (5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).
- (6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

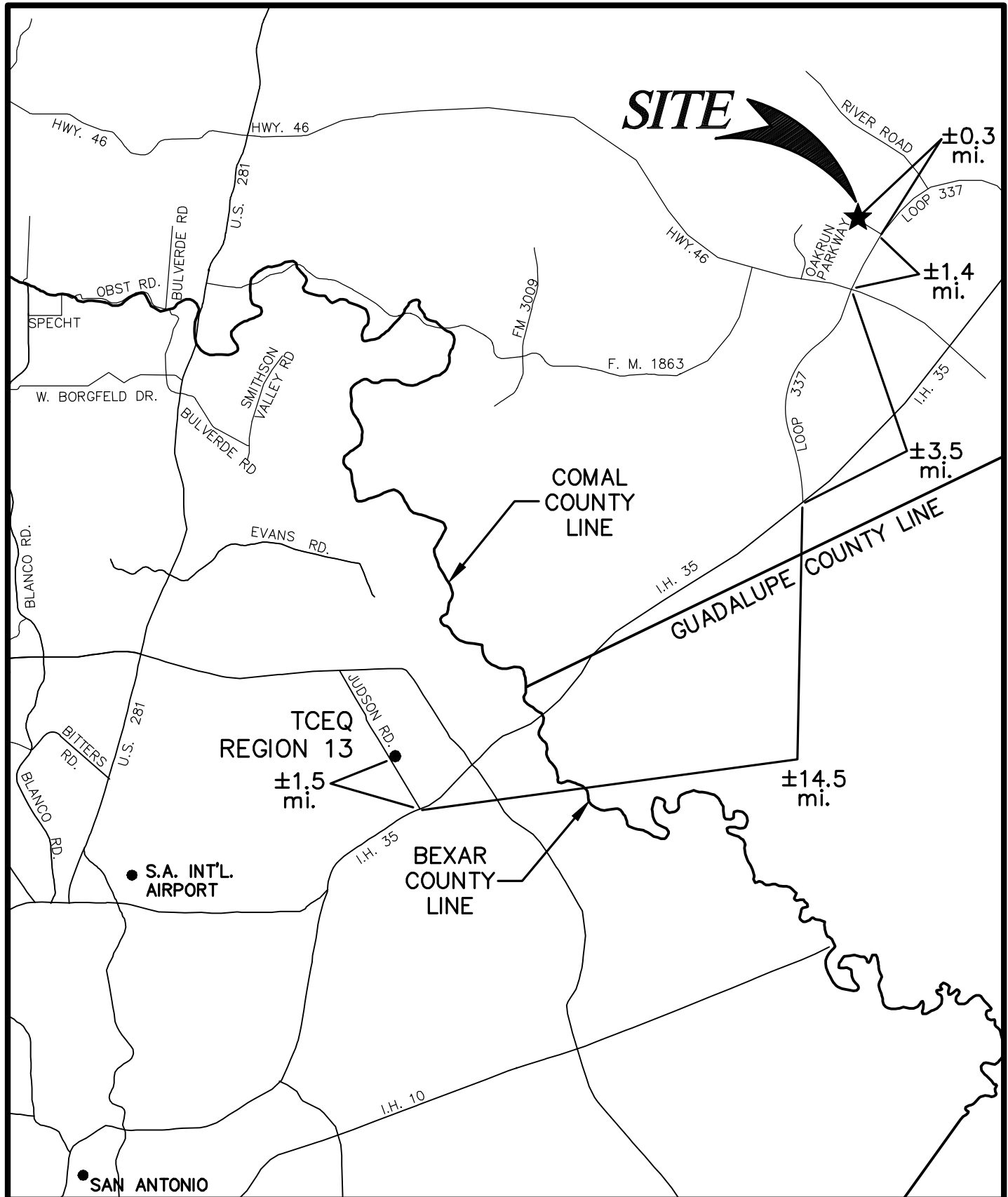
17.  I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:
- (1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
  - (2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and
  - (3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

### ***Administrative Information***

18. The fee for the plan(s) is based on:
- For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
  - For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
  - For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
  - A request for an exception to any substantive portion of the regulations related to the protection of water quality.
  - A request for an extension to a previously approved plan.
19.  Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:
- TCEQ cashier
  - Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
  - San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)
20.  Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
21.  No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

**ATTACHMENT A**

**VERAMENDI - WORD PKWY PHASE 3, PRECINCT 18  
UNIT 1 AND PRECINCT 4 UNITS 1, 2, & 3  
New Braunfels, Texas  
Water Pollution Abatement Plan**

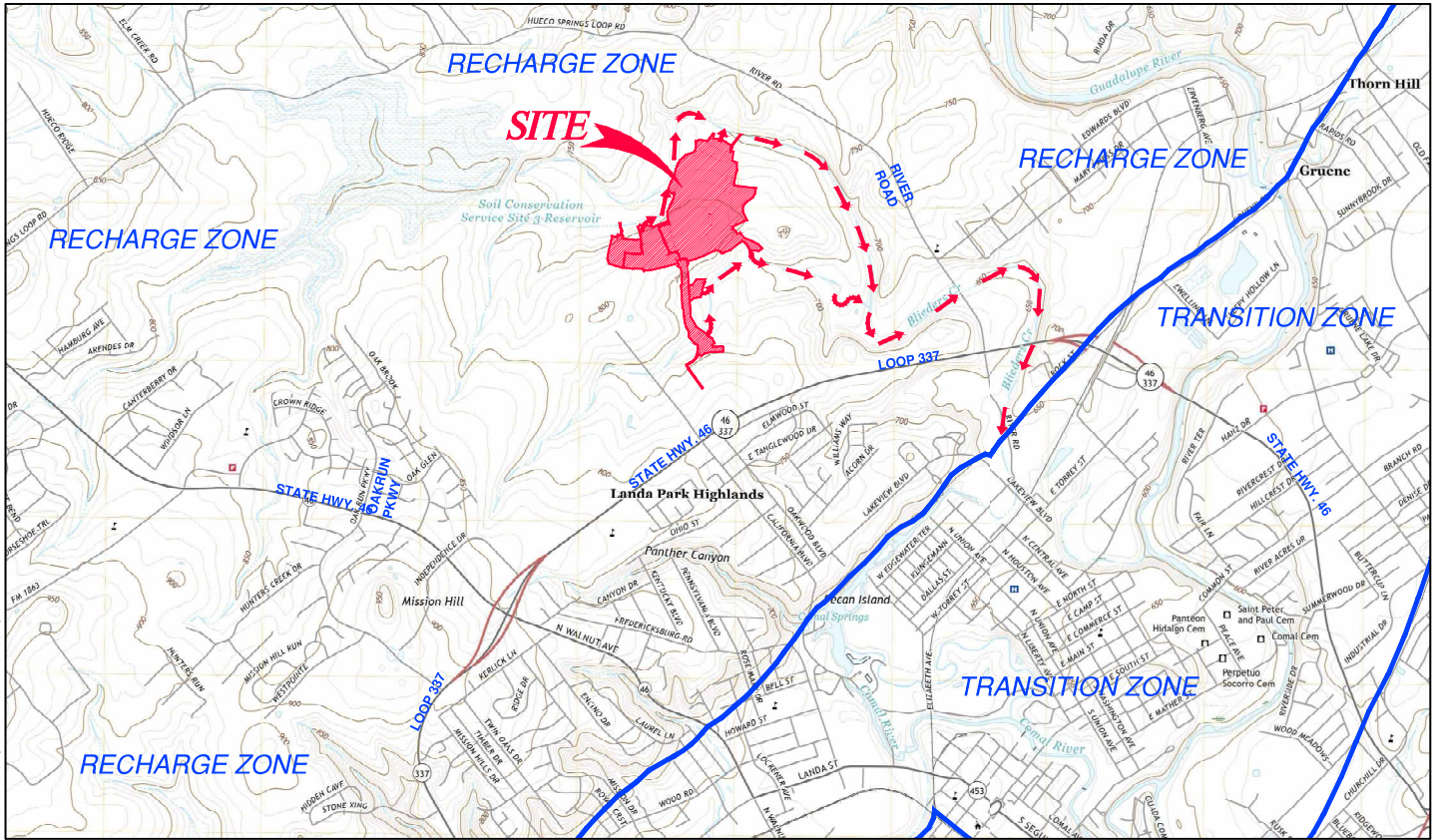


**ATTACHMENT B**



**VERAMENDI - WORD PKWY PHASE 3, PRECINCT  
18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3  
New Braunfels, Texas  
Water Pollution Abatement Plan**

  
SCALE: 1" = 2000'



Date: Dec 14, 2015, 8:15 am, User: G. Brown  
 File: N:\330\10451\Drawings\Water\10451\_0101\_01.dwg  
 Plot: N:\330\10451\Drawings\Water\10451\_0101\_01.dwg

GENERAL LOCATION MAP - NEW BRAUNFELS WEST, TX QUAD;  
NEW BRAUNFELS EAST, TX QUAD  
DRAINAGE FLOW → → →  
Pape-Dawson Engineers, Inc.

USGS/EDWARDS RECHARGE ZONE MAP

**ATTACHMENT C**

# **VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan**

## **Attachment C – Project Description**

Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3 is a proposed 4-lane arterial road and 320 single family residential development comprised of four units. This 121.98-acre project site is located approximately 0.3 miles northwest of TX-46/TX-337 and Word Pkwy intersection within the Extra-Territorial Jurisdiction of the City of New Braunfels in Comal County, TX. It is located entirely over the Edwards Aquifer Recharge Zone, lies within the Bleiders Creek watershed, and contains 100-year floodplain within its limits. There is one man-made (S-51) and no naturally occurring sensitive features identified in the Geological Assessment.

Regulated activities include clearing, mass grading with stockpiles, grading, excavation, installation of utilities and drainage improvements, construction of four (4) batch detention basins, two (2) Jellyfish Filter Vaults, a 4-lane arterial roadway, 320 single family residential homes with associated streets, hardscapes, landscape, and site clean-up. Approximately 52.24 acres of impervious cover, or 42.83% of the 121.98-acre project limits, are proposed for construction in this WPAP. Four (4) proposed batch detention basins, two (2) Jellyfish Filter Vaults, and three (3) vegetative filter strips are the PBMPs for this development. Please see treatment summary table included for additional details. All PBMPs have been designed in accordance with the TCEQ'S Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in TSS from the site.

This project will result in 320 LUEs for the single-family residential development. Approximately 67,200 gpd average flow is anticipated for this development based on 210 gpd/LUE. The sewage flow will be disposed of by conveyance to the existing Gruene Wastewater Treatment Center operated by New Braunfels Utilities (NBU).

**GEOLOGIC ASSESSMENT FORM**  
**(TCEQ-0585)**

***Geologic Site Assessment (WPAP)  
for Regulated Activities / Development  
on the Edwards Aquifer Recharge / Transition Zone***

***The Veramendi Subdivision  
+/- 2,400 Acres  
New Braunfels, Texas***

***FROST GEOSCIENCES CONTROL # FGS-E10139***

***May 9, 2017***

---

***Prepared exclusively for***

***ASA Properties, LLC  
2021 SH 46, Suite 101  
New Braunfels, Texas 78132***

***Frost GeoSciences***

***Geotechnical ▪ Construction Materials  
Forensics ▪ Environmental***

***13402 Western Oak • Helotes, Texas 78023 • Phone: (210) 372-1315 • Fax: (210) 372-1318***

# Frost GeoSciences

Geotechnical • Construction Materials  
Forensics • Environmental

13402 Western Oak  
Helotes, Texas 78023  
Phone (210) 372-1315  
Fax (210) 372-1318

[www.frostgeosciences.com](http://www.frostgeosciences.com)  
TBPE Firm Registration # F-9227  
TBPE Firm Registration # 50040

May 9, 2017

ASA Properties, LLC  
2021 SH 46, Suite 101  
New Braunfels, Texas 78132

Attn: Mr. Max Hartford

Re: Geologic Site Assessment (WPAP)  
for Regulated Activities / Development on the  
Edwards Aquifer Recharge / Transition Zone  
The Veramendi Subdivision  
+/- 2,400 Acres  
New Braunfels, Texas

Frost GeoSciences, Inc. Control # FGS-EI0139

Dear Sir:

Attached is a copy of the Geologic Assessment Report completed for the above referenced project site as it relates to 30 TAC §213.5(b)(3), effective June 1, 1999. Our investigation was conducted and this report was prepared in general accordance with the "Instructions to Geologists", TCEQ-0585-Instructions (Rev. 10-1-04). The results of our investigation, along with any recommendations for Best Management Practices (BMP's), are provided in the following report.

If you have any questions regarding this report, or if Frost GeoSciences, Inc. may be of additional assistance to you on this project, please feel free to call our office. It has been a pleasure to work with you and we wish to thank you for the opportunity to be of service to you on this project. We look forward to being of continued service.



Sincerely,  
Frost GeoSciences, Inc.

Steve Frost, C.P.G., P.G.  
President, Senior Geologist

Distribution: (1) ASA Properties, LLC  
(5) Pape Dawson Engineers

**Table of Contents**

GEOLOGIC ASSESSMENT FORM ..... 1

STRATIGRAPHIC COLUMN ..... 4

GEOLOGIC ASSESSMENT TABLE ..... 5

LOCATION ..... 12

METHODOLOGY ..... 12

RESEARCH & OBSERVATIONS ..... 13

    7.5 Minute Quadrangle Map Review ..... 13

    Recharge/Transition Zone ..... 13

    100-Year Floodplain ..... 14

    Soils ..... 15

    Narrative Description of the Site Geology ..... 18

BEST MANAGEMENT PRACTICES ..... 24

DISCLAIMER ..... 25

REFERENCES ..... 25

APPENDIX

A: Plate 1: Site Plan

    Plate 2: Street Map

    Plate 3: USGS Topographic Map

    Plate 4: Official Edwards Aquifer Recharge Zone Map

    Plate 5: FEMA Flood Map

    Plate 6: 1973 Aerial Photograph, 1"=2000'

    Plate 7: Geologic Map

    Plate 8: 2010 Aerial Photograph, 1"=2000'

    Plate 9: 2010 Aerial Photograph with PRF's, 1"=500M

B: Site Photographs

C: Site Geologic Map

# 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

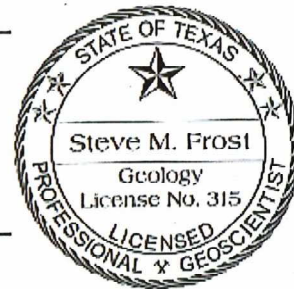
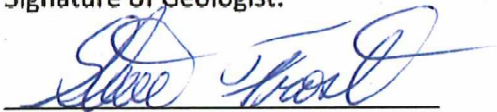
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Steve Frost, C.P.G., P.G. Telephone: (210) 372-1315

Date: May 9, 2017 Fax: (210) 372-1318

Representing: Frost GeoSciences, Inc.

Signature of Geologist:



Regulated Entity Name: The Veramendi Subdivision

### Project Information

1. Date(s) Geologic Assessment was performed: June 16 through November 23, 2010

2. Type of Project:

WPAP

AST

SCS

UST

3. Location of Project:

Recharge Zone

Transition Zone

Contributing Zone within the Transition Zone

1 of 3

TCEQ-0585 (Rev.02-11-15)

May 9, 2017  
The Veramendi Subdivision  
Page 1



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)
Rumple-Comfort Association Undulating (RUD)	C/D	1 to 2
Comfort Rock Outcrop Complex Undulating (CrD)	D/D	0 to 2
Brackett-Rock Outcrop-Comfort Complex Undulating (R/D)	C/D/D	0 to 2
Lewisville Silty Clay, 1 to 3 Percent Slopes (LeB)	B	2+
Medlin-Eckman Assoc. (MED/AIEC)	D	1-2
Orin Soils Frequently Flooded (Or)	A	2+

*\* Soil Group Definitions (Abbreviated)*

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

6.  **Attachment B – Stratigraphic Column.** A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.
7.  **Attachment C – Site Geology.** A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.
8.  **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1" = 400'
 

Applicant's Site Plan Scale: 1" = 400 '

Site Geologic Map Scale: 1" = 400 '

Site Soils Map Scale (if more than 1 soil type): 1" = 2000 '
9. Method of collecting positional data:
  - Global Positioning System (GPS) technology.
  - Other method(s). Please describe method of data collection: 2010 Aerial Photograph
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 9 (#) 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.

## Stratigraphic Column

[Hydrogeologic subdivisions modified from Maclay and Small (1976); groups, formations, and members modified from Rose (1972); lithology modified from Dunham (1962); and porosity type modified from Choquette and Pray (1970). CU, confining unit; AQ, aquifer]

Hydrogeologic subdivision	Group, formation, or member	Hydro-logic function	Thickness (feet)	Lithology	Field identification	Cavern development	Porosity/permeability type				
Upper Cretaceous	Upper confining units	Eagle Ford Group	CU	30 – 50	Brown, flaggy shale and argillaceous limestone	Thin flagstones; petroliferous	None	Primary porosity lost/ low permeability			
		Buda Limestone	CU	40 – 50	Buff, light gray, dense mudstone	Porcelaneous limestone with calcite-filled veins	Minor surface karst	Low porosity/low permeability			
		Del Rio Clay	CU	40 – 50	Blue-green to yellow-brown clay	Fossiliferous; <i>Ilymatogyra arletina</i>	None	None/primary upper confining unit			
Lower Cretaceous	Edwards aquifer	Edwards Group	Person Formation	I	Georgetown Formation	Karst AQ; not karst CU	2 – 20	Reddish-brown, gray to light tan marly limestone	Marker fossil; <i>Waconella wacoensis</i>	None	Low porosity/low permeability
				II	Cyclic and marine members, undivided	AQ	80 – 90	Mudstone to packstone; <i>mitolid</i> grainstone; chert	Thin graded cycles; massive beds to relatively thin beds; crossbeds	Many subsurface; might be associated with earlier karst development	Laterally extensive; both fabric and not fabric/water-yielding
				III	Leached and collapsed members, undivided	AQ	70 – 90	Crystalline limestone, mudstone to grainstone; chert; collapsed breccia	Bioturbated iron-stained beds separated by massive limestone beds; stromatolitic limestone	Extensive lateral development; large rooms	Majority not fabric/one of the most permeable
				IV	Regional dense member	CU	20 – 24	Dense, argillaceous mudstone	Wispy iron-oxide stains	Very few; only vertical fracture enlargement	Not fabric/low permeability; vertical barrier
				V	Grainstone member	AQ	50 – 60	<i>Mitolid</i> grainstone; mudstone to wackestone; chert	White crossbedded grainstone	Few	Not fabric/ recrystallization reduces permeability
				VI	Kirschberg evaporite member	AQ	50 – 60	Highly altered crystalline limestone; chalky mudstone; chert	Boxwork voids, with neospar and travertine frame	Probably extensive cave development	Majority fabric/one of the most permeable
				VII	Dolomitic member	AQ	110 – 130	Mudstone to grainstone; crystalline limestone; chert	Massively bedded light gray, <i>Toucasia</i> abundant	Caves related to structure or bedding planes	Mostly not fabric; some bedding plane-fabric/water-yielding
				VIII	Basal nodular member	Karst AQ; not karst CU	50 – 60	Shaly, nodular limestone; mudstone and <i>mitolid</i> grainstone	Massive, nodular and mottled, <i>Exogyra texana</i>	Large lateral caves at surface; a few caves near Cibolo Creek	Fabric; stratigraphically controlled/large conduit flow at surface; no permeability in subsurface
				Lower confining unit	Upper member of the Glen Rose Limestone	CU; evaporite beds AQ	350 – 500	Yellowish tan, thinly bedded limestone and marl	Stair-step topography; alternating limestone and marl	Some surface cave development	Some water production at evaporite beds/relatively impermeable

**GEOLOGIC ASSESSMENT TABLE**      **PROJECT NAME:** The Veramendi Subdivision      **FGS-EI0139**

1	LOCATION		FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING		
	2*	3*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11	12
FEATURE	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NOFT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY	CATCHMENT AREA (ACRES)	TOPOGRAPHY
						X	Y	Z		10					< 40	> 40	< 1.6	> 1.6
S-1	29° 43.144'	98° 09.282'	CD	5	Kep	25	60	1.5	-	-	-	-	F	10	15	15	X	Hillside
S-2	29° 43.193'	98° 09.291'	CD	5	Kep	20	20	1	-	-	-	-	F	10	15	15	X	Hillside
S-3	29° 43.218'	98° 09.362'	SC	20	Kep	2	3	2	-	-	-	-	F	12	32	32	X	Hillside
S-4	29° 43.253'	98° 09.412'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-5	29° 43.635'	98° 08.837'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Drainage
S-6	29° 43.650'	98° 08.902'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Drainage
S-7	29° 43.660'	98° 08.978'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Drainage
S-8	29° 43.600'	98° 09.153'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-9	29° 43.497'	98° 08.917'	CD	5	Kep	65	200	6+	-	-	-	-	F	10	15	15	X	Hillside
S-10	29° 43.610'	98° 08.893'	CD	5	Kep	4	4	2	-	-	-	-	F	10	15	15	X	Hillside
S-11	29° 43.545'	98° 09.052'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-12	29° 43.298'	98° 09.381'	SC	20	Kep	2	2.5	1.5	-	-	-	-	O/F	12	32	32	X	Hillside
S-13	29° 43.539'	98° 09.168'	SC	20	Kep	0.25	1	1.5	-	-	-	-	O/F	10	30	30	X	Hillside
S-14	29° 43.500'	98° 09.079'	CD	5	Kep	4	4	2	-	-	-	-	X	10	15	15	X	Hillside
S-15	29° 43.497'	98° 09.096'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-16	29° 43.464'	98° 09.138'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-17	29° 43.440'	98° 09.174'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-18	29° 43.424'	98° 09.245'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-19	29° 43.371'	98° 09.270'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-20	29° 43.339'	98° 09.324'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-21	29° 43.298'	98° 09.381'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-22	29° 43.708'	98° 09.881'	CD	5	Kep	40	50	1.5	-	-	-	-	C/F	10	15	15	X	Hillside
S-23	29° 43.750'	98° 09.884'	SC	20	Kep	1.5	2	2	-	-	-	-	O/F	12	32	32	X	Hillside
S-24	29° 44.199'	98° 09.510'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-25	29° 44.247'	98° 09.560'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain

\* DATUM      1927 North American Datum (NAD27)      Date      May 9, 2017      Sheet      1      of      7

**GEOLOGIC ASSESSMENT TABLE**      **PROJECT NAME:** The Veramendi Subdivision      **FGS-EI0139**

LOCATION		FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING			
1	2*	3*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11	12
FEATURE	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
S-26	29° 44.148'	98° 09.382'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-27	29° 43.909'	98° 09.970'	SC	20	Kep	0.5	1	3	-	-	-	-	O/F	12	32	32	X	Hillside
S-28	29° 44.178'	98° 09.317'	MB	30	Kep	0.3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-29	29° 44.163'	98° 09.493'	MB	30	Kep	0.75	0.75	?	-	-	-	-	N	35	65	65	X	Hillside
S-30	29° 44.160'	98° 09.483'	CD	5	Kep	55	55	4	-	-	-	-	O/F	10	15	15	X	Hillside
S-31	29° 43.939'	98° 10.082'	SC	20	Kep	2	3	3.5	-	-	-	-	O/F	12	32	32	X	Hillside
S-32	29° 44.000'	98° 10.049'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-33	29° 44.056'	98° 09.963'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-34	29° 44.107'	98° 09.888'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-35	29° 44.147'	98° 09.825'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-36	29° 44.184'	98° 09.671'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-37	29° 44.118'	98° 09.782'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-38	29° 44.222'	98° 09.450'	SCZ	30	Kep	500	800	-	-	-	-	-	N/C	20	50	50	X	Floodplain
S-39	29° 44.121'	98° 09.285'	MB	30	Kep	150	225	-	-	-	-	-	N	4	34	34	X	Hillside
S-40	29° 43.882'	98° 09.046'	MB	30	Kep	0.75	0.75	?	-	-	-	-	N	35	65	65	X	Hilltop
S-41	29° 43.857'	98° 08.925'	MB	30	Kep	0.75	0.75	?	-	-	-	-	N	35	65	65	X	Hillside
S-42	29° 43.845'	98° 08.907'	CD	5	Kep	100	140	5	-	-	-	-	F	10	15	15	X	Hillside
S-43	29° 43.657'	98° 08.735'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-44	29° 43.656'	98° 08.736'	SC	20	Kep	1	1	2	-	-	-	-	O/F	12	32	32	X	Hillside
S-45	29° 43.680'	98° 08.719'	MB	30	Kep	30	75	-	-	-	-	-	C	7	37	37	X	Hillside
S-46	29° 43.693'	98° 08.7138'	MB	30	Kep	20	20	-	-	-	-	-	F	7	37	37	X	Hillside
S-47	29° 43.692'	98° 08.737'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Hillside
S-48	29° 43.718'	98° 08.743'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Drainage
S-49	29° 43.766'	98° 08.678'	O <sub>PR</sub>	5	Kep	10	20	-	N 40°	10	1 / 2	0.08	C/F	20	35	35	X	Drainage
S-50	29° 43.770'	98° 08.672'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Drainage

\* DATUM 1927 North American Datum (NAD27)      Date May 9, 2017      Sheet 2 of 7

GEOLOGIC ASSESSMENT TABLE		FEATURE CHARACTERISTICS													EVALUATION			PHYSICAL SETTING	
LOCATION		FEATURE CHARACTERISTICS													EVALUATION			PHYSICAL SETTING	
1	2*	3*	2A	2B	3	4	5	5A	6	7	8A	8B	9	10	11	12			
FEATURE	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								< 40	<1.6				
S-51	29° 43.771'	98° 08.654'	MB	30	Kep	3 20 3		10			C	25	55	55	X	Drainage			
S-52	29° 43.773'	98° 08.625'	O <sup>FR</sup>	5	Kep	10 15	N 115°		1 / 1.5	0.08	C/F	25	30	30	X	Drainage			
S-53	29° 43.775'	98° 08.617'	MB	30	Kep	3 3 7					X	7	37	37	X	Drainage			
S-54	29° 43.818'	98° 08.588'	SCZ	30	Kep	10 100					O/F	7	37	37	X	Hillside			
S-55	29° 43.883'	98° 08.597'	MB	30	Kep	3 3 7					X	7	37	37	X	Drainage			
S-56	29° 43.937'	98° 08.605'	MB	30	Kep	3 3 7					X	7	37	37	X	Drainage			
S-57	29° 43.925'	98° 08.452'	CD	5	Kep	10 15 1.5					F	10	15	15	X	Hillside			
S-58	29° 43.939'	98° 08.372'	CD	5	Kep	30 40 2					F	10	15	15	X	Hillside			
S-59	29° 43.975'	98° 08.580'	MB	30	Kep	3 3 7					X	7	37	37	X	Drainage			
S-60	29° 44.029'	98° 08.493'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-61	29° 44.044'	98° 08.428'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-62	29° 44.005'	98° 08.297'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-63	29° 44.012'	98° 08.195'	MB	30	Kep	3 3 7					X	7	37	37	X	Floodplain			
S-64	29° 43.956'	98° 08.983'	C	30	Kep	2 3 5+					N	30	60	60	X	Hillside			
S-65	29° 43.958'	98° 08.095'	MB	30	Kep	3 3 7					X	7	37	37	X	Floodplain			
S-66	29° 43.897'	98° 08.002'	MB	30	Kep	3 3 7					X	7	37	37	X	Floodplain			
S-67	29° 43.882'	98° 07.978'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-68	29° 43.818'	98° 07.985'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-69	29° 43.768'	98° 07.996'	SC	20	Kep	10+ 20 0.75					N	9	29	29	X	Floodplain			
S-70	29° 43.775'	98° 07.961'	O <sup>VR</sup>	5	Kep	3 15 2			3 / 1	0.06	N	9	14	14	X	Floodplain			
S-71	29° 43.758'	98° 07.937'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-72	29° 43.782'	98° 07.870'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			
S-73	29° 43.755'	98° 07.905'	SC	20	Kep	1 1.5 6+					N	9	29	29	X	Cliff			
S-74	29° 43.782'	98° 07.855'	SCZ	30	Kep	30 600					N/O/F	9	39	39	X	Floodplain			
S-75	29° 43.830'	98° 07.785'	MB	30	Kep	3 3 7					X	7	37	37	X	Streambed			

\* DATUM 1927 North American Datum (NAD27) Date May 9, 2017 Sheet 3 of 7

**GEOLOGIC ASSESSMENT TABLE**      **PROJECT NAME:** The Veramendi Subdivision      **FGS-EI0139**

1	LOCATION			FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING	
	2*	3*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11	12
	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
S-76	29° 43.882'	98° 07.978'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	<1.6	Streambed
S-77	29° 43.748'	98° 08.053'	CZ/SHZ	30	Kep	100	100	-	-	-	-	-	O/F	35	65	65	X	Hilltop
S-78	29° 43.876'	98° 08.041'	MB	30	Kep	0.75	0.75	?	-	-	-	-	N	35	65	65	X	Hillside
S-79	29° 43.868'	98° 08.030'	CD	5	Kep	100	100	4	-	-	-	-	F	10	15	15	X	Hillside
S-80	29° 44.001'	98° 07.965'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-81	29° 44.079'	98° 07.992'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-82	29° 44.158'	98° 08.022'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-83	29° 44.232'	98° 08.069'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-84	29° 44.305'	98° 08.113'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-85	29° 44.385'	98° 08.165'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Streambed
S-86	29° 44.434'	98° 08.303'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-87	29° 43.614'	98° 08.322'	CD	5	Kep	5	8	1	-	-	-	-	F	10	15	15	X	Hillside
S-88	29° 43.943'	98° 08.271'	SC	20	Kep	2	2.5	1	-	-	-	-	F	12	32	32	X	Hillside
S-89	29° 43.964'	98° 08.235'	SCZ	20	Kep	30	120	-	-	-	-	-	N/O	10	30	30	X	Hillside
S-90	29° 44.160'	98° 08.185'	CD	5	Kep	4	6	1	-	-	-	-	F	10	15	15	X	Hillside
S-91	29° 44.009'	98° 08.301'	O <sup>FR</sup>	5	Kep	12	150	-	N 140°	-	1/2	0.08	C/F	25	30	30	X	Floodplain
S-92	29° 44.060'	98° 08.378'	SH	20	Kep	30	60	3	-	-	-	-	F	19	39	39	X	Hillside
S-93	29° 44.217'	98° 07.989'	CD	5	Kep	2	2.5	0.5	-	-	-	-	F	10	15	15	X	Hillside
S-94	29° 44.051'	98° 07.985'	CD	5	Kep	50	150	5	-	-	-	-	N/F	10	15	15	X	Floodplain
S-95	29° 44.456'	98° 08.434'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-96	29° 44.476'	98° 08.563'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-97	29° 44.538'	98° 08.649'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Floodplain
S-98	29° 44.540'	98° 08.710'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Streambed
S-99	29° 44.506'	98° 08.731'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Streambed
S-100	29° 44.416'	98° 08.732'	MB	30	Kep	3	3	?	-	-	-	-	X	7	37	37	X	Streambed

\* DATUM 1927 North American Datum (NAD27)      Date May 9, 2017      Sheet 4 of 7

**GEOLOGIC ASSESSMENT TABLE**      **PROJECT NAME:** The Veramendi Subdivision      **FGS-EI0139**

1	LOCATION			FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING	
	2*	3*	2A	2B	3	4			5	5A	6	7	8A	8B	TOTAL	SENSITIVITY	CATCHMENT AREA (ACRES)	TOPOGRAPHY
	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE				
FEATURE						X	Y	Z		10					< 40	> 40	< 1.6	> 1.6
S-101	29° 44.416'	98° 08.732'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-102	29° 44.230'	98° 08.773'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-103	29° 44.188'	98° 08.802'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-104	29° 44.167'	98° 08.857'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-105	29° 44.162'	98° 08.946'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-106	29° 44.156'	98° 09.033'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-107	29° 44.152'	98° 09.118'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-108	29° 44.185'	98° 09.217'	MB	30	Kep	3	3	?	-	-	-	-	-	7	37	37	X	Sireambed
S-109	29° 44.449'	98° 09.285'	SH	20	Kep	5	10	1	-	-	-	-	-	12	32	32	X	Hillside
S-110	29° 44.393'	98° 09.229'	O <sup>FR</sup>	5	Kep	20	40	-	N 45°	10	1 / 1	0.08	N/C	25	40	40	X	Sireambed
S-111	29° 44.391'	98° 09.183'	O <sup>FR</sup>	5	Kep	20	150	-	N 40°	10	1 / 1	0.08	N/C	25	40	40	X	Sireambed
S-112	29° 44.388'	98° 09.129'	O <sup>FR</sup>	5	Kep	4	300	-	-	-	3 / 1	0.06	N/C	20	25	25	X	Floodplain
S-113	29° 44.425'	98° 09.202'	SC	20	Kep	0.75	1	2.5	-	-	-	-	O/F	15	35	35	X	Hillside
S-114	29° 44.409'	98° 08.986'	SH	20	Kep	10	12	1	-	-	-	-	F	12	32	32	X	Hillside
S-115	29° 44.570'	98° 09.098'	MB	30	Kep	0.75	0.75	?	-	-	-	-	N	35	65	65	X	Hillside
S-116	29° 44.270'	98° 09.232'	SC <sup>H</sup>	20	Kep	1	1	3	-	-	-	-	F	12	32	32	X	Hillside
S-117	29° 44.351'	98° 09.339'	MB	30	Kep	30	50	6	-	-	-	-	N	15	45	45	X	Sireambed
S-118	29° 44.265'	98° 09.030'	CDZ	5	Kep	300	1000	-	-	-	-	-	F	10	15	15	X	Floodplain
S-119	29° 44.168'	98° 09.619'	MB	30	Kep	3	75	3	-	-	-	-	C	15	45	45	X	Sireambed
S-120	29° 44.242'	98° 08.913'	O <sup>FR</sup>	5	Kep	40	350	-	N 50°	10	1 / 2	0.08	C	25	40	40	X	Sireambed
S-121	29° 44.629'	98° 09.090'	SC	20	Kep	2	2	1.5	-	-	-	-	F	12	32	32	X	Hillside
S-122	29° 44.743'	98° 08.887'	CD	5	Kep	30	70	4	-	-	-	-	F	10	15	15	X	Drainage
S-123	29° 44.660'	98° 08.712'	O <sup>FR</sup>	5	Kep	50	150	-	N 70°	-	1 / 2	0.08	F	20	25	25	X	Sireambed
S-124	29° 44.675'	98° 08.695'	CD	5	Kep	80	170	8	-	-	-	-	F	10	15	15	X	Hillside
S-125	29° 44.127'	98° 09.046'	SC	20	Kep	2	3	1	-	-	-	-	F	12	32	32	X	Floodplain

\* DATUM      1927 North American Datum (NAD27)      Date      May 9, 2017      Sheet      5      of      7



**GEOLOGIC ASSESSMENT TABLE**      **PROJECT NAME:** The Veramendi Subdivision      **FGS-EI0139**

FEATURE	LOCATION			FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING		
	2*	3*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11	12	
	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	
S-126	29° 44.557'	98° 08.645'	SCZ	20	KeP	30	600	-	-	-	-	-	C/N	15	35	35	<1.6	X	Floodplain
S-127	29° 44.821'	98° 08.588'	MB	30	KeP	0.75	0.75	?	-	-	-	-	N	35	65	65	X	X	Hilltop
S-128	29° 44.670'	98° 08.013'	CD	5	KeP	60	65	4	-	-	-	-	F	10	15	15	X	X	Hillside
S-129	29° 44.659'	98° 07.996'	MB	30	KeP	0.75	0.75	?	-	-	-	-	N	35	65	65	X	X	Hilltop
S-130	29° 44.656'	98° 07.991'	MB	30	KeP	0.75	0.75	?	-	-	-	-	N	35	65	65	X	X	Hilltop
S-131	29° 44.338'	98° 07.805'	CD	5	KeP	70	90	3	-	-	-	-	F	10	15	15	X	X	Hillside
S-132	29° 44.382'	98° 07.502'	CD	5	KeP	20	70	3	-	-	-	-	F	10	15	15	X	X	Hillside
S-133	29° 45.186'	98° 08.255'	O <sup>PR</sup>	5	KeP	40	100	-	N 65°	-	1 / 2	0.08	N	20	25	25	X	X	Drainage
S-134	29° 44.881'	98° 07.761'	O <sup>PR</sup>	5	KeP	30	100	-	N 40°	10	1 / 2	0.08	N	20	35	35	X	X	Drainage
S-135	29° 44.916'	98° 07.704'	O <sup>PR</sup>	5	KeP	40	60	-	N 140°	-	1 / 2	0.08	N	20	25	25	X	X	Drainage
S-136	29° 44.560'	98° 07.125'	O <sup>PR</sup>	5	KeP	15	20	-	N 7°	-	1 / 2	0.08	N	20	25	25	X	X	Drainage
S-137	29° 44.336'	98° 07.793'	MB	30	KeP	0.75	0.75	?	-	-	-	-	N	35	65	65	X	X	Hillside

\* DATUM 1927 North American Datum (NAD27)

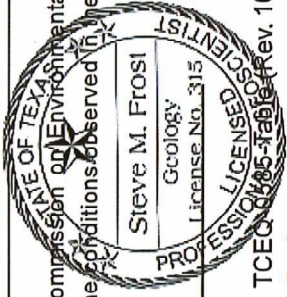
2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution Cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow Hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

N	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 213.

Signature 



Date May 9, 2017 Sheet 6 of 7

**Frost Geosciences**

Geotechnical • Construction Materials • Forensics • Environmental

**GEOLOGIC ASSESSMENT TABLE** PROJECT NAME: The Veramendi Subdivision FGS-E10139

1	LOCATION		FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING	
	2*	3*	2A	2B	3	4		5	5A	6	7	8A	8B	9	10	11	12
FEATURE	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							< 40	< 1.6	
S-138	29° 44.382'	98° 07.687'	SH	20	Kep	30	40	2	-	-	-	F	15	35	35	X	Hillside
S-139	29° 44.661'	98° 07.779'	O <sup>FR</sup>	5	Kep	B	10	-	N 70°	1 / 2	0.08	C/F	15	20	20	X	Hillside
S-140	29° 45.001'	98° 08.094'	SC	20	Kep	2	4	2	-	-	-	O/F	12	32	32	X	Hillside
S-141	29° 45.176'	98° 08.164'	SC	20	Kep	0.25	2.5	2	-	-	-	O/F	12	32	32	X	Hillside
S-142	29° 43.319'	98° 09.171'	SH	20	Kep	100	150	4	-	-	-	F	15	35	35	X	Hillside
S-143	29° 44.622'	98° 07.369'	SCZ	20	Kep	30	2.800	-	-	-	-	N/O	12	32	32	X	Cliff
S-144	29° 45.163'	98° 08.014'	SCZ	20	Kep	30	3.600	-	-	-	-	N/O	12	32	32	X	Cliff
S-145	29° 44.287'	98° 09.495'	CDZ	30	Kep	600	1,000	-	-	-	-	O/F	30	60	60	X	Streambed
S-146	29° 44.969'	98° 08.534'	F	20	Kep	-	-	-	N 55°	-	-	-	15	35	35	X	Hillside
S-147	29° 45.017'	98° 08.031'	F	20	Kep	-	-	-	N 45°	-	-	-	15	35	35	X	Hillside
S-148	29° 43.175'	98° 09.430'	MB	30	Kep	3	3	?	-	-	-	X	7	37	37	X	Hillside

\* DATUM 1927 North American Datum (NAD27)

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

8A INFILLING

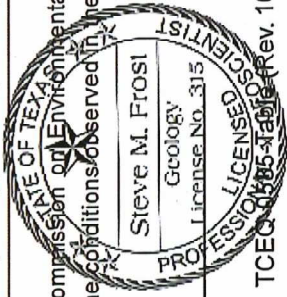
N None, exposed bedrock  
 C Coarse - cobbles, breakdown, sand, gravel  
 O Loose or soft mud or soil, organics, leaves, sticks, dark colors  
 F Fines, compacted clay-rich sediment, soil profile, gray or red colors  
 V Vegetation. Give details in narrative description  
 FS Flowstone, cements, cave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

12 TOPOGRAPHY

Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understand 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 213.

*Steve M. Prosi*



Signature Steve M. Prosi Date May 9, 2017 Sheet 7 of 7

## LOCATION

The project site consists of approximately 2,400 acres of land located along and north of Loop 337 and east and west of River Road in New Braunfels, Texas. An overall view of the area is shown on copies of the site plan, a street map, the USGS Topographic Map, the Edwards Aquifer Recharge Zone Map, the Flood Insurance Rate Map (FIRM), a 1973 aerial photograph from the USDA at a scale of 1"=2000', a geologic map, a 2010 aerial photograph at a scale of 1"=2000', and a 2010 aerial photograph at a scale of 1"=500M, Plates 1 through 9 in Appendix A.

## METHODOLOGY

The Geologic Assessment was performed by Mr. Steve Frost, C.P.G., President and Senior Geologist with Frost GeoSciences, Inc and several employees of Frost GeoSciences, Inc. including Ms. TG Bey, Biologist, Mr. Reza Eshmaly, Geologist, James Akers, and Spencer Templen. Mr. Frost is a Licensed Professional Geoscientist in the State of Texas (License # 315) and is a Certified Professional Geologist with the American Institute of Professional Geologist (Certification # 10176).

Frost GeoSciences, Inc. researched the geology of the area in the immediate vicinity of the project site. The research included, but was not limited to, the Geologic Atlas of Texas, San Antonio Sheet, FIRM maps, Edwards Aquifer Recharge Zone Maps, USGS 7.5 Minute Quadrangle Maps, the Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle, the USGS Water-Resources Investigations Report 94-4117, and the USDA Soil Survey of Comal & Hays County, Texas.

After reviewing the available information, a field investigation was performed to identify any geologic or man-made potential recharge features. A transect spacing of approximately 50 feet or less, depending on vegetation thickness, was used to inspect the project site. A 2010 aerial photograph, in conjunction with a hand held Garmin eTrex Summit Global Positioning System with an Estimated Potential Error ranging from 7 to 12 feet, was used to navigate around the property and identify the locations of potential recharge features, as recommended in the "Instructions to Geologists", TCEQ-0585-Instructions (Rev. 10-1-04). The locations of any potential

May 9, 2017

The Veramendi Subdivision  
Page 12

recharge features noted in the field were identified on the Site Geologic Map in Appendix C of this report. A copy of a 2010 aerial photograph at an approximate scale of 1"=500M, indicating the locations of the potential recharge features, is included on Plate 9 in Appendix A. The Geologic Assessment Form (Rev. 2-11-15), Stratigraphic Column, and the Geologic Assessment Table have been filled with the appropriate information for this project site and are included on pages 1-11 of this report.

## **RESEARCH & OBSERVATIONS**

### **7.5 Minute Quadrangle Map Review**

According to the USGS 7.5 Minute Quadrangle Maps, New Braunfels West, Texas Sheet (1988), New Braunfels East, Texas Sheet (1994), Sattler, Texas Sheet (1994), and Hunter, Texas Sheet (1994), the elevation of the project site ranges from 630 feet at the eastern corner of the project site within the River Pasture along the Guadalupe River to 845 feet along the western property lines of Pastures 1 and 3. These elevations are calculated above mean sea level (AMSL). A landing strip and a stock pond are noted within Pasture 1. A residential structure and several associated barns and sheds are visible near the northern limits of Pasture 1. Two stock ponds were noted within Pasture 2. One stock pond and a spillway for a flood control dam was noted within Pasture 3. The surface runoff from the project site flows into unnamed tributaries of Blieders Creek, Blieders Creek, unnamed tributaries of the Guadalupe River, and the Guadalupe River. State Highway 46 (Loop 337) is located immediately south of the project site. River Road separates Pastures 2 and 4 to the west from the River Pasture to the east. A copy of the above referenced USGS 7.5 Minute Quadrangle Map, indicating the location of the project site, is included in this report on Plate 3 in Appendix A.

### **Recharge / Transition Zone**

According to Official Edwards Aquifer Recharge Zone Map, New Braunfels West, Texas Sheet, New Braunfels East, Texas Sheet, Sattler, Texas Sheet, and Hunter, Texas Sheet, (1996),

*May 9, 2017*

*The Veramendi Subdivision  
page 13*

the project site is located within the Recharge Zone of the Edwards Aquifer. A copy of the Official Edwards Aquifer Recharge Zone Map, indicating the location of the project site, is included on Plate 4 in Appendix A.

### 100-Year Floodplain

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for Comal County, Texas, Community Panel Numbers 48091C0270F, 48091C0290F, 48091C0435F, & 48029C0455F (Revised 9/02/09) were reviewed to determine if the project site is located in areas prone to flooding. A review of the above-mentioned panels indicate that portions of the project site is located within the 100 year floodplain. The project site is located within Zone AE, Zone A, Zone X Shaded, and Zone X.

According to the panel legend, Zone AE represents areas within the 100 year floodplain where base flood elevations have been determined. The areas of the property within Zone AE are generally located along Blieders Creek and the Guadalupe River.

Zone A represents areas within the 100 year floodplain where base flood elevations have not been determined. The areas of the property within Zone A are generally areas along tributaries immediately upgradient of areas determined to be within Zone AE.

Zone X shaded represents areas of 0.2% annual chance of flooding, areas of 1% annual chance of flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1% annual chance of flooding. The areas of the property with Zone X Shaded are generally narrow bands located immediately adjacent to areas determined to be within Zone AE.

Zone X represents areas determined to be outside the 0.2% annual chance floodplain. A copy of the Comal County, Texas, FIRM maps, indicating the location of the project site, is included in this report on Plate 5 in Appendix A.

## Soils

According to the United States Department of Agriculture, Soil Conservation Service, Soil Survey of Comal & Hays County, Texas (1982), the project site is located on the Rumble-Comfort Association (RUD), the Comfort - Rock Outcrop Complex, Undulating (CrD), the Brackett - Rock Outcrop - Comfort Complex, Undulating (BtD), the Lewisville Silty Clay, 1 to 3 percent slopes (LeB), the Medlin-Eckrant Association (MEC/MED), and the Orif Soils, Frequently Flooded (Or). A copy of the 1973 aerial photograph (approximate scale: 1"=2000') from the USDA Soil Survey of Comal & Hays County, Texas (1982) indicating the location of the project site and the soil types is included on Plate 6 in Appendix A.

The Rumble-Comfort Association (RuD) consists of shallow and moderately deep soils on uplands in the Edwards Plateau Land Resource Area. The surface layer of the Rumble Soil is dark reddish brown very cherty clay loam about 10 inches thick. Rounded chert and limestone cobbles and gravel cover about 20 percent of the surface. The subsoil to a depth of 14 inches is dark reddish-brown very cherty clay, and to a depth of 28 inches it is dark reddish-brown extremely stony clay. The underlying material is indurated fractured limestone. The Comfort Soil is dark brown, neutral, extremely stony clay about 7 inches thick. The subsoil to a depth of 12 inches is dark reddish-brown, mildly alkaline, extremely stony clay. The underlying material is indurated fractured limestone. The soil is noncalcareous throughout. The soils in this association are well drained. Surface runoff is medium, but varies due to the occurrence of caves, fracture zones, and sinks. Permeability is moderately slow. Water erosion is a moderate hazard.

The Comfort-Rock Outcrop Complex consists of shallow, clayey soils and Rock Outcrop on side slopes and on hilltops and ridgetops on uplands in the Edwards Plateau Land Resource Area. The Comfort Extremely Stony Clay makes up 49 to more than 95 percent of the complex, but on the average it makes up 70 percent. Rock Outcrop and areas of soil less than 4 inches deep make up 5 to 36 percent, but the average is 15 percent. Typically, the surface layer of the Comfort soil is dark brown extremely stony clay about 6 inches thick. Cobbles and stones as much as 4 feet across cover about 45 percent of the surface. The subsoil extends to a depth of 13

inches. It is dark reddish brown extremely stony clay. The underlying material is indurated fractured limestone. The soil is mildly alkaline and noncalcareous throughout. The Comfort Soil is well drained. Surface runoff is slow to medium. Permeability is slow, and the available water capacity is very low. Water erosion is a slight hazard. This soil has a USDA Texture Classification of extremely stony clay, stony clay, very stony clay, and weathered bedrock. The Unified Classification is CH, GC, CL, or SC. The AASHTO Classification is A-2-7, and A-7-6. This soil has an average permeability from 0.6 to 0.2 inches/hour.

The Brackett-Rock Outcrop-Comfort Complex consists of shallow, loamy and clayey soils and rock outcrops on uplands in the Edwards Plateau Land Resource Area. The Brackett Soil makes up 30 to 60 percent of the complex, but on the average it makes up 50 percent. Rock Outcrops make up 10 to 40 percent of the complex, but the average is 20 percent. The Comfort Soil makes up 10 to 20 percent, but the average is 15 percent. Typically, the surface layer of the Brackett Soil is grayish brown gravelly clay loam about 6 inches thick. The subsoil extends to a depth of 17 inches. It is very pale brown and pale yellow gravelly clay loam. The underlying material is weakly cemented limestone interbedded with thin layers of indurated limestone. The soil is moderately alkaline and calcareous throughout. Typically, the areas of Rock Outcrop consist of exposures of limestone bedrock. There is some soil material in the narrow fractures in the rock. In some areas, however, the rock is flat and is covered by soil material as much as 3 inches thick. Typically, the surface layer of the Comfort Soil is dark brown extremely stony clay about 4 inches thick. The subsoil extends to a depth of 11 inches. It is dark reddish brown extremely stony clay. The underlying material is indurated fractured limestone. The soil is moderately alkaline and noncalcareous throughout. The soils in this complex are well drained. Surface runoff is medium to rapid. Permeability is moderately slow in the Brackett Soil and slow in the Comfort Soil. The available water capacity is very low. Water erosion is a severe hazard.

The Lewisville Silty Clay consists of deep, gently sloping soil on stream terraces. Typically, the surface layer is dark grayish brown silty clay about 15 inches thick. The subsoil to a depth of 33 inches

May 9, 2017

The Veramendi Subdivision  
page 16

is light brown silty clay, and to a depth of 63 inches is reddish yellow silty clay. The soil is moderately alkaline and calcareous throughout. This soil is well drained, surface runoff is medium, and permeability is moderate.

The Medlin-Eckrant Association consists of very shallow to shallow and deep soils on uplands in the Edwards Plateau Land Resource Area. There are narrow limestone ledges at the top of some slopes. The Medlin and Eckrant soils each make up 20 to 80 of a mapped area. Together, on the average, they make up about 95 percent of the mapped area. A typical area is 50 percent Medlin soil and 45 percent Eckrant soil. Typically, the Medlin soil has a grayish brown surface layer about 11 inches thick that is stony clay in the upper part and clay in the lower part. The subsoil, from 11 to 50 inches, is light yellowish brown clay that has yellowish brown and olive yellow mottles. The underlying material to a depth of 80 inches is light gray shaly clay that has yellow and olive yellow mottles. The soil is moderately alkaline and calcareous throughout. The Medlin soils is well drained. Surface runoff is rapid. Permeability is very slow. Water enters rapidly when the soil is dry and cracked and very slow when it is wet. Water erosion is a severe hazard. Typically, the surface layer of the Eckrant soil is very dark gray extremely stony clay about 16 inches thick. The underlying material is fractured limestone bedrock. The soil is moderately alkaline and noncalcareous throughout. The Eckrant soil is well drained. Surface runoff is rapid. Permeability is moderately slow. Water erosion is a severe hazard.

The Orif Soils, Frequently Flooded consist of deep nearly level soils on flood plains of large creeks and rivers. These soils are adjacent to the stream channels. Typically, the surface layer is grayish brown moderately alkaline gravelly loamy sand about 20 inches thick. The underlying layer to a depth of 60 inches is very gravelly loamy sand stratified with very gravelly sand, very gravelly sandy loam, and loam. These soils are well drained. Flooding occurs several times in most years and is of very brief duration. Floodwaters are swift and destructive. Surface runoff is slow, permeability is rapid.



## Narrative Description of the Site Geology

The project site consists of approximately 2,400 acres of land located along and north of Loop 337 and east and west of River Road in New Braunfels, Texas. An overall view of the area is shown on Plates 1 through 9 in Appendix A. The project site exists as ranch land used to graze cattle and is the main ranching operation for the Word-Borchers Ranch. The project site has a very well developed soil layer on the property giving way to relatively few rock outcrops and dense stands of native grasses. Frost GeoSciences, Inc. after finding large piles of bulldozed rubble within 40 year old stands of trees, researched historic aerial photography and made note that the property appears to have undergone numerous episodes of land clearing dating back at least 40 to 50 years. These historic land clearing operations appear to have culled much of the rock rubble from the surface. The majority (80+% ) of the 2,400 acre ranch appears to have been bulldozed at some point with many areas having been cleared repeatedly. This clearing process has produced many small non karst closed depressions resulting from pulling trees out and plucking boulders. There are so many of these across the property that it is not practical to itemize them within this report. The areas that have not been cleared historically appear to be along steep slopes and cliffs, and within major drainage areas. The majority of the site appears to support a thick soil cover and as a result very few potential recharge features were encountered when compared to the size of the property.

The variations in the vegetative cover across the project site are visible in the 2010 aerial photographs on Plates 8 and 9 in Appendix A and in the site visit photographs included in Appendix B. One hundred and forty eight Potential Recharge Features (PRF's) were identified during our site inspection. Nineteen of these are considered sensitive by Frost GeoSciences, Inc. The sensitive features are highlighted on the Geologic Assessment Tables on pages 4 through 10.

### **Non-Karst Closed Depressions (CD)**

Potential Recharge Features S-1, S-2, S-10, S-14, S-22, S-57, S-58, S-87, S-90, S-93, and S-118, consist of notable non-karst closed depressions created by historic bulldozing on the property. These

features are typical of the thousands of similar features and appear to have been created by either the removal of trees or the plucking of boulders. Typically these feature are relatively small (less than 10 feet in any dimension and usually only a foot or two deep. Potential Recharge Features S-9, S-30, S-42, S-79, S-122, S-124, S-128, S-131, and S-132 are non-karst closed depressions consisting of excavated stock ponds used to water livestock, These features vary greatly in both size and shape, however, all of these features show evidence of ponding water for prolonged periods of time. PRF's S-9 and S-124 were holding water at the time of our site inspections. Potential Recharge Feature S-94 is a non-karst closed depression consisting of a stream scour adjacent to Blieders Creek. The bottoms of all of these features are lined with clay and show evidence of holding water. These 22 features are not considered sensitive by FGS. These features score a 15 on the Geologic Assessment Table.

Potential Recharge Feature S-145 consists of large non-karst closed depression created behind the Flood Control Dam within Pasture 3. This non-karst closed depression showed evidence of rapid infiltration into the subsurface after several heavy rainfall events during June and September. Due to the overall size of this feature and the rate that the feature drains into the subsurface, additional points were added for a ZONE rating. This feature is considered sensitive by FGS. This feature scores a 60 on the Geologic Assessment Table.

#### **Manmade Features in Bedrock (MB)**

Potential Recharge Features S-4 through S-8, S-11, S-15 through S-21, S-24 through S-26, S-28, S-32 through S-37, S-43, S-47, S-48, S-50, S-53, S-55, S-56, S-59 through S-63, S-65 through S-68, S-71, S-72, S-75, S-76, S-80 through S-86, S-95 through S-108, and S-148 are manmade features in bedrock consisting of sanitary sewer manholes along two sewer outfall lines. The two sewer outfall lines combine within Blieders Creek at Potential Recharge Feature S-67. These 64 features are not considered sensitive by FGS. These features score a 37 on the Geologic Assessment Table.

Potential Recharge Features S-29, S-40, S-41, S-78, S-115, S-127, S-129, S-130, and S-137

consist of existing or recently drilled water wells. PRF's S-40 and S-127 are operational and in use at this time. PRF's S-29, S-78, and S-129 are wells associated with old windmills and do not appear to be operational at this time. The remaining PRF's are recently drilled wells consisting of open holes with no casing. These appear to be associated with either testing the groundwater availability or are planned as future water supply wells for livestock. These 9 features are considered sensitive by FGS. These features score a 65 on the Geologic Assessment Table.

Potential Recharge Feature S-39 consists of an area that had been excavated down to bedrock and used as quarry materials for roads on the ranch. This feature is not considered sensitive by FGS. This feature scores a 34 on the Geologic Assessment Table.

Potential Recharge Feature S-45 consists of an area of limestone cobbles and boulders. It is believed that the cobbles and boulders were the left over spoils from the excavation of a nearby sanitary sewer lift station. This feature is not considered sensitive by FGS. This feature scores a 37 on the Geologic Assessment Table.

Potential Recharge Feature S-46 consists of an old abandoned sanitary sewer lift station. The lift station was abandoned after the remaining sewer outfall line was constructed. This feature is not considered sensitive by FGS. This feature scores a 37 on the Geologic Assessment Table.

Potential Recharge Features S-51 and S-119 consist of areas along existing sewer lines that occur within stream channels where the scour of the stream has eroded compacted material out of the sewer trench. The scour at PRF S-51 also occurs in conjunction with an area of highly weathered and altered limestone increasing the probability of rapid infiltration into the subsurface. These 2 features are considered sensitive by FGS. These features score a 45 and 55 respectively on the Geologic Assessment Table.

Potential Recharge Feature S-117 consists of a large erosion scour located at the discharge pipe for the flood control dam along Blieders Creek. This feature was inspected after heavy rains in September and did not show evidence of standing water. This feature is considered sensitive by FGS. This feature scores a 45 on the Geologic Assessment Table.

**Cave (C)**

Potential Recharge Feature S-64 consists of a relatively small cave located near a hilltop in Pasture 2. The cave opening is approximately 2 feet wide and 3 feet long and has an initial drop of approximately 5 feet. An area of stressed vegetation around the cave opening indicated that the air inside the cave may not be suitable for long term or even short term occupation so no attempt was made to investigate the interior of the cave beyond what could be seen from the surface. A deflated area approximately 30 feet wide, 50 feet long and 3 feet deep was noted around the cave entrance. This is likely the result of soil erosion into the cave. This feature is considered sensitive by FGS. This feature scores a 60 on the Geologic Assessment Table.

**Solution Cavity (SC)**

Potential Recharge Features S-3, S-12, S-13, S-23, S-27, S-31, S-44, S-69, S-73, S-74, S-88, S-113, S-116, S-121, S-125, S-140, and S-141 consist of solution cavities of various dimensions. A machete was used to probe the depth of the features and determine the nature of the infilling. These cavities all contained a hard clay plug preventing rapid infiltration of water into the subsurface. This was somewhat expected given the extensive soil development across the property. These 17 features are not considered sensitive by FGS. These features score a 29 to 35 on the Geologic Assessment Table.

Potential Recharge Feature S-38 consists of an area of dissolved and scoured limestone outcrop associated with the spillway for the flood control dam. Some of the scours and dissolved limestone extended 3 to 4 feet down and none were noted holding water, even after periods of heavy rains, indicating rapid infiltration into the subsurface. This feature is considered sensitive by FGS. This feature scores a 50 on the Geologic Assessment Table.

Potential Recharge Features S-54, S-126, S-143, and S-144 consists of zones of solution cavities within cliff faces. These represent horizontal features that trend upgradient as they extend into the bedrock cliff. FGS is of the opinion that these features represent discharge features associated with the outlets of subsurface bedding plain features. These 4 features are not considered sensitive by FGS. These features score between a 32 and 37 on the Geologic Assessment Table.

**Sinkhole (SH)**

Potential Recharge Features S-77 consists of three small closed depressions (sinkholes) likely resulting from soil deflation within a 100 X 100 foot area and two caves approximately 100 feet apart within the same area. The depressions were infilled with loose soil and leaves, rock rubble and some hard packed clay in areas. Evidence of rapid infiltration into the subsurface was noted in some areas. These features are considered sensitive by FGS. These features score a 65 on the Geologic Assessment Table.

Potential Recharge Features S-92, S-109, S-114, S-138, and S-142 consists of areas believed to be the result of soil deflation into the subsurface creating karst formed closed depressions or sinkholes. For these purposes, it is not believed by FGS that these are sinkholes in the classic sense that a collapse has occurred creating a depression. Rather, FGS believes these features are purely the result of erosion of surface soils into subsurface features. These features all contained small areas in the bottoms with no grasses indicating that water ponds for prolonged periods of time. As a result, it did not appear that these features provide rapid infiltration into the subsurface. These 5 features are not considered sensitive by FGS. These features score a 32 to 39 on the Geologic Assessment Table.

**Fault (F)**

Potential Recharge Features S-146 and S-147 consist of faults noted on the Bureau of Economic Geology, Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle (2000). Evidence of PRF S-146 was somewhat confirmed in the field with fractures noted at PRF S-133, however, the bearings of the fractures were not the same as the strike of the proposed fault. No fractures or other field evidence associated with PRF S-147 were noted in the field at the time of the on-site inspection. These 2 features are not considered sensitive by FGS. These features score a 35 on the Geologic Assessment Table.

**Other Natural Bedrock Feature (O)**

Potential Recharge Features S-49, S-52, S-70, S-91, S-112, S-123, S-133, S-134, S-135, S-136, and S-139 consist of natural rock outcrops with either vuggy limestone (O<sup>VR</sup>) or fractured bedrock (O<sup>FR</sup>). The

sizes of these outcrops and the strike of the fractures varied greatly. These 11 features are not considered sensitive by FGS. These features score a 14 to 35 on the Geologic Assessment Table.

Potential Recharge Features S-110, S-111, and S-120 consist of natural rock outcrops with fractured bedrock (O<sup>FR</sup>). The sizes of these outcrops and the strike of the fractures varied greatly. These 3 features are considered sensitive by FGS. These features score a 40 on the Geologic Assessment Table.

According to the USGS 7.5 Minute Quadrangle Maps, New Braunfels West, Texas Sheet (1988), New Braunfels East, Texas Sheet (1994), Sattler, Texas Sheet (1994), and Hunter, Texas Sheet (1994), the elevation of the project site ranges from 630 feet at the eastern corner of the project site within the River Pasture along the Guadalupe River to 845 feet along the western property lines of Pastures 1 and 3. These elevations are calculated above mean sea level (AMSL). According to topographic data obtained from Pape Dawson Engineers, the elevations on the project site range from 625 feet at the eastern corner of the project site to 845 feet along the western property lines of Pastures 1 and 3. A copy of the site plan, indicating the boundary of the project site and the elevations, is included on Plate I in Appendix A and on the Site Geologic Map in Appendix C of this report.

According to the Bureau of Economic Geology, Geologic Map of the New Braunfels, Texas 30 X 60 Minute Quadrangle (2000), the project site is covered by the Cretaceous Edwards Person Limestone.

The Cyclic and Marine Member of the Cretaceous Edwards Person Limestone consists of mudstone to packstone and miliolid grainstone with chert. The member is characterized by massive beds of limestone to relatively thin beds of limestone with some crossbedding. The Cyclic and Marine Member forms a few caves some that are laterally extensive. Overall thickness ranges from 80 to 90 feet thick.

The Leached and Collapsed Member of the Edwards Person Limestone consists of crystalline limestone, mudstone to grainstone with chert, and collapsed breccia. This member



**WATER POLLUTION  
ABATEMENT PLAN  
APPLICATION FORM (TCEQ-  
0584)**



# Water Pollution Abatement Plan Application

Texas Commission on Environmental Quality

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

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

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

## Signature

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

Print Name of Customer/Agent: Jocelyn Perez, P.E.

Date: 11/30/23

Signature of Customer/Agent:

  
\_\_\_\_\_

**Regulated Entity Name:** Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3

## Regulated Entity Information

1. The type of project is:

- Residential: Number of Lots:320
- Residential: Number of Living Unit Equivalents: \_\_\_\_\_
- Commercial
- Industrial
- Other:Roadway

2. Total site acreage (size of property):121.98

3. Estimated projected population:1280 (based on 4 persons per home)

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

**Table 1 - Impervious Cover Table**

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	1,193,544	÷ 43,560 =	27.40
Parking	158,558	÷ 43,560 =	3.64
Other paved surfaces	923,428	÷ 43,560 =	21.20
Total Impervious Cover	2,275,530	÷ 43,560 =	52.24

**Total Impervious Cover 52.24 ÷ Total Acreage 121.98 X 100 = 42.83% Impervious Cover**

5.  **Attachment A - Factors Affecting Surface Water Quality.** A detailed description of all factors that could affect surface water and groundwater quality that addresses ultimate land use is attached.
6.  Only inert materials as defined by 30 TAC §330.2 will be used as fill material.

***For Road Projects Only***

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

7. Type of project:

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

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

- Concrete
- Asphaltic concrete pavement
- Other: \_\_\_\_\_

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

Width of R.O.W.: \_\_\_\_\_ feet.

L x W = \_\_\_\_\_ Ft<sup>2</sup> ÷ 43,560 Ft<sup>2</sup>/Acre = \_\_\_\_\_ acres.

10. Length of pavement area: \_\_\_\_\_ feet.

Width of pavement area: \_\_\_\_\_ feet.

L x W = \_\_\_\_\_ Ft<sup>2</sup> ÷ 43,560 Ft<sup>2</sup>/Acre = \_\_\_\_\_ acres.

Pavement area \_\_\_\_\_ acres ÷ R.O.W. area \_\_\_\_\_ acres x 100 = \_\_\_\_\_ % impervious cover.

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

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

### ***Stormwater to be generated by the Proposed Project***

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

### ***Wastewater to be generated by the Proposed Project***

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

<u>100</u> % Domestic	<u>67,200</u> Gallons/day
<u>      </u> % Industrial	<u>      </u> Gallons/day
<u>      </u> % Commingled	<u>      </u> Gallons/day
TOTAL gallons/day <u>67,200 gpd avg (based on 320 homes x 1 LUE/home x 210 gpd/LUE)</u>	

15. Wastewater will be disposed of by:

- On-Site Sewage Facility (OSSF/Septic Tank):
- Attachment C - Suitability Letter from Authorized Agent.** An on-site sewage facility will be used to treat and dispose of the wastewater from this site. The appropriate licensing authority's (authorized agent) written approval is attached. It states that the land is suitable for the use of private sewage facilities and will meet or exceed the requirements for on-site sewage facilities as specified under 30 TAC Chapter 285 relating to On-site Sewage Facilities.
- Each lot in this project/development is at least one (1) acre (43,560 square feet) in size. The system will be designed by a licensed professional engineer or registered sanitarian and installed by a licensed installer in compliance with 30 TAC Chapter 285.
- Sewage Collection System (Sewer Lines):
- Private service laterals from the wastewater generating facilities will be connected to an existing SCS.
- Private service laterals from the wastewater generating facilities will be connected to a proposed SCS.
- The SCS was previously submitted on CONCURRENTLY.
- The SCS was submitted with this application.
- The SCS will be submitted at a later date. The owner is aware that the SCS may not be installed prior to Executive Director approval.

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

- Existing.  
 Proposed.

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

## **Site Plan Requirements**

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

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

Site Plan Scale: 1" = 400'.

18. 100-year floodplain boundaries:

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

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

The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s): DFIRM Panel No. 48091C0435F, Dated 09/02/2009

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

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

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

There are \_\_\_\_\_ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply)

The wells are not in use and have been properly abandoned.

The wells are not in use and will be properly abandoned.

The wells are in use and comply with 16 TAC §76.

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

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

All sensitive geologic or manmade features identified in the Geologic Assessment are shown and labeled.

No sensitive geologic or manmade features were identified in the Geologic Assessment.

**Attachment D - Exception to the Required Geologic Assessment.** A request and justification for an exception to a portion of the Geologic Assessment is attached.

- 22.  The drainage patterns and approximate slopes anticipated after major grading activities.
- 23.  Areas of soil disturbance and areas which will not be disturbed.
- 24.  Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.
- 25.  Locations where soil stabilization practices are expected to occur.
- 26.  Surface waters (including wetlands).
  - N/A
- 27.  Locations where stormwater discharges to surface water or sensitive features are to occur.
  - There will be no discharges to surface water or sensitive features.
- 28.  Legal boundaries of the site are shown.

### ***Administrative Information***

- 29.  Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
- 30.  Any modification of this WPAP will require Executive Director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

**ATTACHMENT A**

# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

## Attachment A – Factors Affecting Water Quality

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site during construction include:

- Soil erosion due to the clearing of the site;
- Oil, grease, fuel and hydraulic fluid contamination from construction equipment and vehicle drippings;
- Hydrocarbons from asphalt paving operations;
- Miscellaneous trash and litter from construction workers and material wrappings;
- Concrete truck washout.
- Potential overflow/spills from portable toilets

Potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the site after development include:

- Oil, grease, fuel and hydraulic fluid contamination from vehicle drippings;
- Dirt and dust which may fall off vehicles; and
- Miscellaneous trash and litter.

**ATTACHMENT B**



**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment B – Volume and Character of Stormwater**

Stormwater runoff will increase as a result of this development. For a 25-year storm event, the overall project will generate approximately 646 cfs an increase from 453 cfs before development. The runoff coefficient for the site changes from approximately 0.42 before development to 0.56 after development. Values are based on the Rational Method using runoff coefficients per the City of New Braunfels Drainage Manual.

**TEMPORARY STORMWATER  
SECTION (TCEQ-0602)**

# 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: Jocelyn Perez, P.E.

Date: 11/30/23

Signature of Customer/Agent:

 \_\_\_\_\_

**Regulated Entity Name:** Veranendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3

## 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: Construction staging area

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: Bleiders Creek

### ***Temporary Best Management Practices (TBMPs)***

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

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

- A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.
  - A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.
  - A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.
  - A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.
8.  The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.
- Attachment E - Request to Temporarily Seal a Feature.** A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.
  - There will be no temporary sealing of naturally-occurring sensitive features on the site.
9.  **Attachment F - Structural Practices.** A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided.
10.  **Attachment G - Drainage Area Map.** A drainage area map supporting the following requirements is attached:
- For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.
  - For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.
  - For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.
  - There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

- There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.
11.  **Attachment H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.
- N/A
12.  **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.
13.  All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.
14.  If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).
15.  Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.
16.  Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

### ***Soil Stabilization Practices***

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

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

18.  Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
19.  Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

### ***Administrative Information***

20.  All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
21.  If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.
22.  Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

**ATTACHMENT A**



# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

## Attachment A – Spill Response Actions

In the event of an accidental leak or spill:

- Spill must be contained and cleaned up immediately.
- Spills will not be merely buried or washed with water.
- Contractor shall take action to contain spill. Contractor may use sand or other absorbent material stockpiled on site to absorb spill. Absorbent material should be spread over the spill area to absorb the spilled product.
- In the event of an uncontained discharge the contractor shall utilize onsite equipment to construct berms downgradient of the spill with sand or other absorbent material to contain and absorb the spilled product.
- Spill containment/absorbent materials along with impacted media must be collected and stored in such a way so as not to continue to affect additional media (soil/water). Once the spill has been contained, collected material should be placed on poly or plastic sheeting until removed from the site. The impacted media and cleanup materials should be covered with plastic sheeting and the edges weighed down with paving bricks or other similarly dense objects as the material is being accumulated. This will prevent the impacted media and cleanup materials from becoming airborne in windy conditions or impacting runoff during a rain event. The stockpiled materials should not be located within an area of concentrated runoff such as along a curb line or within a swale.
- Contaminated soils and cleanup materials will be sampled for waste characterization. When the analysis results are known the contaminated soils and cleanup materials will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.
- The contractor will be required to notify the owner, who will in turn contact TCEQ to notify them in the event of a significant hazardous/reportable quantity spill. Additional notifications as required by the type and amount of spill will be conducted by owner or owner's representative.

In the event of an accidental significant or hazardous spill:

The contractor will be required to report significant or hazardous spills in reportable quantities to:

- 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. [https://www.tceq.texas.gov/response/spills/spill\\_rq.html](https://www.tceq.texas.gov/response/spills/spill_rq.html)
- 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.

# **VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan**

- 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 are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.
- Contaminated soils will be sampled for waste characterization. When the analysis results are known the contaminated soils will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.

Additional guidance can be obtained from TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) Section 1.4.16. Contractor shall review this section.

**ATTACHMENT B**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment B – Potential Sources of Contamination**

Other potential sources of contamination during construction include:

- |                      |   |  |
|----------------------|---|--|
| Potential Source     | ● | Asphalt products used on this project.   |
| Preventative Measure | ■ | After placement of asphalt, emulsion or coatings, the contractor will be responsible for immediate cleanup should an unexpected rain occur. For the duration of the asphalt product curing time, the contractor will maintain standby personnel and equipment to contain any asphalt wash-off should an unexpected rain occur. The contractor will be instructed not to place asphalt products on the ground within 48 hours of a forecasted rain. |
| Potential Source     | ● | Oil, grease, fuel and hydraulic fluid contamination from construction equipment and vehicle dripping.  |
| Preventative Measure | ■ | Vehicle maintenance when possible will be performed within the construction staging area.  |
|                      | ■ | Construction vehicles and equipment shall be checked regularly for leaks and repaired immediately.   |
| Potential Source     | ● | Accidental leaks or spills of oil, petroleum products and substances listed under 40 CFR parts 110, 117, and 302 used or stored temporarily on site.   |
| Preventative Measure | ■ | Contractor to incorporate into regular safety meetings, a discussion of spill prevention and appropriate disposal procedures.  |
|                      | ■ | Contractor’s superintendent or representative overseer shall enforce proper spill prevention and control measures.   |
|                      | ■ | Hazardous materials and wastes shall be stored in covered containers and protected from vandalism.   |
|                      | ■ | A stockpile of spill cleanup materials shall be stored on site where it will be readily accessible.  |
| Potential Source     | ● | Miscellaneous trash and litter from construction workers and material wrappings.   |
| Preventive Measure   | ■ | Trash containers will be placed throughout the site to encourage proper trash disposal.  |
| Potential Source     | ● | Construction debris.   |
| Preventive Measure   | ■ | Construction debris will be monitored daily by contractor. Debris will be collected weekly and placed in disposal bins. Situations requiring   |

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

immediate attention will be addressed on a case by case basis.

- |                      |   |   |
|----------------------|---|---|
| Potential Source     | ● | Spills/Overflow of waste from portable toilets  |
| Preventative Measure | ■ | Portable toilets will be placed away from high traffic vehicular areas and storm drain inlets.  |
|                      | ■ | Portable toilets will be placed on a level ground surface.  |
|                      | ■ | Portable toilets will be inspected regularly for leaks and will be serviced and sanitized at time intervals that will maintain sanitary conditions. |

**ATTACHMENT C**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment C – Sequence of Major Activities**

The sequence of major activities which disturb soil during construction on this site will be divided into two stages. The first is site preparation that will include installation of TBMPs as illustrated on Exhibit 1, clearing and grubbing of vegetation where applicable, and mass grading and stockpiling of soils. This will disturb approximately 121.98 acres. The second is construction that will include construction of 320 single-family homes with associated streets, one (1) 4-lane arterial roadway, four (4) batch detention basins, construction of new pavement area (sidewalks and driveways), utilities, landscaping, and site cleanup. This will disturb approximately 121.98 acres.

**ATTACHMENT D**



**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment D – Temporary Best Management Practices and Measures**

- a. 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.

***Due to the surrounding topography, upgradient water will cross the site from the undeveloped adjacent area within the overall Veramendi development. All TBMPs are adequate for the drainage areas they serve.***

- b. 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.

***Site preparation, which is the initiation of all activity on the project, will disturb the largest amount of soil. Therefore, before any of this work can begin, the clearing and grading contractor will be responsible for the installation of all on-site control measures. The methodology for pollution prevention of on-site stormwater will include: (1) erection of silt fences along the downgradient boundary of construction activities for temporary erosion and sedimentation controls, (2) installation of rock berms with silt fencing downgradient from areas of concentrated stormwater flow for temporary erosion control, (3) Installation of gravel bags and drain inlet protection at inlets and downgradient areas of construction activities for sediment control (4) installation of stabilized construction entrance/exit(s) to reduce the dispersion of sediment from the site, and (5) installation of construction staging area(s).***

***Prior to the initiation of construction, all previously installed control measures will be repaired or reestablished for their designed or intended purpose. This work, which is the remainder of all activity on the project, may also disturb additional soil. The construction contractor will be responsible for the installation of all remaining on-site control measures that includes installation of the concrete truck washout pit(s), as construction phasing warrants.***

***Temporary measures are intended to provide a method of slowing the flow of runoff from the construction site in order to allow sediment and suspended solids to settle out of the runoff. By containing the sediment and solids within the site, they will not enter surface streams and/or sensitive features.***

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

***There are no surface streams on or near the project limits. Temporary measures are intended to provide a method of slowing the flow of runoff from the construction site in order to allow sediment and suspended solids to settle out of the runoff. By containing the sediment and solids within the site, they will not enter surface streams and/or sensitive features.***

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

- d. 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.

*There are no naturally-occurring sensitive features on or adjacent to the project limits. BMP measures utilized in this plan are intended to allow stormwater to continue downstream after passing through the BMPs. This will allow stormwater runoff to continue downgradient to streams or features that may exist downstream of the site.*

**ATTACHMENT F**

# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

## Attachment F – Structural Practices

The following structural measures will be installed prior to the initiation of site preparation activities:

- Erection of silt fences along the downgradient boundary of construction activities and rock berms with silt fence for secondary protection, as located on Exhibit 1 and illustrated in Exhibit 2.
- Installation of gravel bags and drain inlet protection at inlets and downgradient areas of construction activities, as located on Exhibit 1 and illustrated in Exhibit 2.
- Installation of stabilized construction entrance/exit(s) and construction staging area(s), as located on Exhibit 1, and illustrated on Exhibit 2.

The following structural measures will be installed at the initiation of construction activities or as appropriate based on the construction sequencing:

- Installation of concrete truck washout pit(s), as required and located on Exhibit 1 and illustrated on Exhibit 2.

**ATTACHMENT G**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment G – Drainage Area Map**

More than ten (10) acres will be disturbed within a common drainage area at one time, therefore, a small sediment trap will be provided within the basin locations. A combination of other TBMPs will be utilized and are adequate for the drainage areas served.

**ATTACHMENT I**

# **VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan**

## **INSPECTIONS**

Designated and qualified person(s) shall inspect Pollution Control Measures weekly and within 24 hours after a storm event. An inspection report that summarizes the scope of the inspection, names and qualifications of personnel conducting the inspection, date of the inspection, major observations, and actions taken as a result of the inspection shall be recorded and maintained as part of Storm Water TPDES data for a period of three years after the Notice of Termination (NOT) has been filed. A copy of the Inspection Report Form is provided in this Storm Water Pollution Prevention Plan.

As a minimum, the inspector shall observe: (1) significant disturbed areas for evidence of erosion, (2) storage areas for evidence of leakage from the exposed stored materials, (3) structural controls (rock berm outlets, silt fences, drainage swales, etc.) for evidence of failure or excess siltation (over 6 inches deep), (4) vehicle exit point for evidence of off-site sediment tracking, (5) vehicle storage areas for signs of leaking equipment or spills, (6) concrete truck rinse-out pit for signs of potential failure, (7) embankment, spillways, and outlet of sediment basin (where applicable) for erosion damage, and (8) sediment basins (where applicable) for evidence that basin has accumulated 50% of its volume in silt. Deficiencies noted during the inspection will be corrected and documented within seven calendar days following the inspection or before the next anticipated storm event if practicable.

Contractor shall review Sections 1.3 and 1.4 of TCEQ's Technical Guidance Manual for additional BMP inspection and maintenance requirements.



**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

Pollution Prevention Measure	Inspected in Compliance	Corrective Action Required	
		Description (use additional sheet if necessary)	Date Completed
<b>Best Management Practices</b>			
Natural vegetation buffer strips			
Temporary vegetation			
Permanent vegetation			
Sediment control basin			
Silt fences			
Rock berms			
Gravel filter bags			
Drain inlet protection			
Other structural controls			
Vehicle exits (off-site tracking)			
Material storage areas (leakage)			
Equipment areas (leaks, spills)			
Concrete washout pit (leaks, failure)			
General site cleanliness			
Trash receptacles			
<b>Evidence of Erosion</b>			
Site preparation			
Roadway or parking lot construction			
Utility construction			
Drainage construction			
Building construction			
<b>Major Observations</b>			
Sediment discharges from site			
BMPs requiring maintenance			
BMPs requiring modification			
Additional BMPs required			

\_\_\_\_\_ A brief statement describing the qualifications of the inspector is included in this SWP3.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

"I further certify I am an authorized signatory in accordance with the provisions of 30 TAC §305.128."

\_\_\_\_\_

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

Inspector's Name

Inspector's Signature

Date

**PROJECT MILESTONE DATES**

Date when major site grading activities begin:

<u>Construction Activity</u>	<u>Date</u>
Installation of BMPs	
_____	_____
_____	_____
_____	_____
_____	_____

Dates when construction activities temporarily or permanently cease on all or a portion of the project:

<u>Construction Activity</u>	<u>Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

Dates when stabilization measures are initiated:

<u>Stabilization Activity</u>	<u>Date</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Removal of BMPs	
_____	_____

**ATTACHMENT J**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices**

Interim on-site stabilization measures, which are continuous, will include minimizing soil disturbances by exposing the smallest practical area of land required for the shortest period of time and maximizing use of natural vegetation. As soon as practical, all disturbed soil will be stabilized as per project specifications in accordance with pages 1-35 to 1-60 of TCEQ's Technical Guidance Manual (TGM) RG-348 (2005). Mulching, netting, erosion blankets and seeding are acceptable.

Stabilization measures will be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and except as provided below, will be initiated no more than fourteen (14) days after the construction activity in that portion of the site has temporarily or permanently ceased. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within twenty-one (21) days, temporary stabilization measures do not have to be initiated on that portion of site. In areas experiencing droughts where the initiation of stabilization measures by the 14<sup>th</sup> day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practicable.

**PERMANENT STORMWATER  
SECTION (TCEQ-0600)**

# Permanent Stormwater Section

## Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(C), (D)(li), (E), and (5), Effective June 1, 1999

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

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

## Signature

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

Print Name of Customer/Agent: Jocelyn Perez, P.E.

Date: 11/30/23

Signature of Customer/Agent



---

**Regulated Entity Name:** Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3

## Permanent Best Management Practices (BMPs)

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

- Permanent BMPs and measures must be implemented to control the discharge of pollution from regulated activities after the completion of construction.  
 N/A
- These practices and measures have been designed, and will be constructed, operated, and maintained to insure that 80% of the incremental increase in the annual mass loading of total suspended solids (TSS) from the site caused by the regulated activity is removed. These quantities have been calculated in accordance with technical guidance prepared or accepted by the executive director.

- The TCEQ Technical Guidance Manual (TGM) was used to design permanent BMPs and measures for this site.
- A technical guidance other than the TCEQ TGM was used to design permanent BMPs and measures for this site. The complete citation for the technical guidance that was used is: \_\_\_\_\_
- N/A
3.  Owners must insure that permanent BMPs and measures are constructed and function as designed. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the appropriate regional office within 30 days of site completion.
- N/A
4. Where a site is used for low density single-family residential development and has 20 % or less impervious cover, other permanent BMPs are not required. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.
- The site will be used for low density single-family residential development and has 20% or less impervious cover.
- The site will be used for low density single-family residential development but has more than 20% impervious cover.
- The site will not be used for low density single-family residential development.
5. The executive director may waive the requirement for other permanent BMPs for multi-family residential developments, schools, or small business sites where 20% or less impervious cover is used at the site. This exemption from permanent BMPs must be recorded in the county deed records, with a notice that if the percent impervious cover increases above 20% or land use changes, the exemption for the whole site as described in the property boundaries required by 30 TAC §213.4(g) (relating to Application Processing and Approval), may no longer apply and the property owner must notify the appropriate regional office of these changes.
- Attachment A - 20% or Less Impervious Cover Waiver.** The site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is attached.
- The site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.
- The site will not be used for multi-family residential developments, schools, or small business sites.
6.  **Attachment B - BMPs for Upgradient Stormwater.**

- A description of the BMPs and measures that will be used to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site is attached.
  - No surface water, groundwater or stormwater originates upgradient from the site and flows across the site, and an explanation is attached.
  - Permanent BMPs or measures are not required to prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site, and an explanation is attached.
7.  **Attachment C - BMPs for On-site Stormwater.**
- A description of the BMPs and measures that will be used to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff from the site is attached.
  - Permanent BMPs or measures are not required to prevent pollution of surface water or groundwater that originates on-site or flows off the site, including pollution caused by contaminated stormwater runoff, and an explanation is attached.
8.  **Attachment D - BMPs for Surface Streams.** A description of the BMPs and measures that prevent pollutants from entering surface streams, sensitive features, or the aquifer is attached. Each feature identified in the Geologic Assessment as sensitive has been addressed.
- N/A
9.  The applicant understands that to the extent practicable, BMPs and measures must maintain flow to naturally occurring sensitive features identified in either the geologic assessment, executive director review, or during excavation, blasting, or construction.
- The permanent sealing of or diversion of flow from a naturally-occurring sensitive feature that accepts recharge to the Edwards Aquifer as a permanent pollution abatement measure has not been proposed.
  - Attachment E - Request to Seal Features.** A request to seal a naturally-occurring sensitive feature, that includes, for each feature, a justification as to why no reasonable and practicable alternative exists, is attached.
10.  **Attachment F - Construction Plans.** All construction plans and design calculations for the proposed permanent BMP(s) and measures have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer, and are signed, sealed, and dated. The plans are attached and, if applicable include:
- Design calculations (TSS removal calculations)
  - TCEQ construction notes
  - All geologic features
  - All proposed structural BMP(s) plans and specifications
- N/A



11.  **Attachment G - Inspection, Maintenance, Repair and Retrofit Plan.** A plan for the inspection, maintenance, repairs, and, if necessary, retrofit of the permanent BMPs and measures is attached. The plan includes all of the following:
- Prepared and certified by the engineer designing the permanent BMPs and measures
  - Signed by the owner or responsible party
  - Procedures for documenting inspections, maintenance, repairs, and, if necessary retrofit
  - A discussion of record keeping procedures
- N/A
12.  **Attachment H - Pilot-Scale Field Testing Plan.** Pilot studies for BMPs that are not recognized by the Executive Director require prior approval from the TCEQ. A plan for pilot-scale field testing is attached.
- N/A
13.  **Attachment I - Measures for Minimizing Surface Stream Contamination.** A description of the measures that will be used to avoid or minimize surface stream contamination and changes in the way in which water enters a stream as a result of the construction and development is attached. The measures address increased stream flashing, the creation of stronger flows and in-stream velocities, and other in-stream effects caused by the regulated activity, which increase erosion that results in water quality degradation.
- N/A

### ***Responsibility for Maintenance of Permanent BMP(s)***

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

14.  The applicant is responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. Such entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred.
- N/A
15.  A copy of the transfer of responsibility must be filed with the executive director at the appropriate regional office within 30 days of the transfer if the site is for use as a multiple single-family residential development, a multi-family residential development, or a non-residential development such as commercial, industrial, institutional, schools, and other sites where regulated activities occur.
- N/A

**ATTACHMENT B**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment B – BMPs for Upgradient Stormwater**

Due to the surrounding topography, upgradient water will cross the project limits from the undeveloped adjacent property.

The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are four (4) batch detention basins, two (2) Jellyfish filter Vaults, and three (3) fifteen-foot (15') vegetative filter strips which are designed in accordance with the TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in Total Suspended Solids (TSS) from the site.

**ATTACHMENT C**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment C – BMPs for On-Site Stormwater**

The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are four (4) batch detention basins, two (2) Jellyfish filter vaults and three (3) fifteen-foot (15') vegetative filter strips which are designed in accordance with the TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in Total Suspended Solids (TSS) from the site.

**ATTACHMENT D**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment D – BMPs for Surface Streams**

There are no surface streams on, or near, the project site. The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are four (4) batch detention basins, two (2) Jellyfish filter vault, and three (3) fifteen-foot (15') vegetative filter strips which are designed in accordance with the TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in Total Suspended Solids (TSS) from the site.

**ATTACHMENT F**



**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment F – Construction Plans**

Please refer to the Exhibits Section of this application for the Water Pollution Abatement Site Plans.

**ATTACHMENT G**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**PERMANENT POLLUTION ABATEMENT MEASURES  
MAINTENANCE SCHEDULE AND MAINTENANCE PROCEDURES**

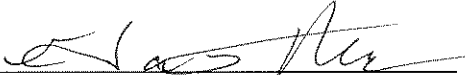
This document has been prepared to provide a description and schedule for the performance of maintenance on permanent pollution abatement measures. Maintenance measures to be performed will be dependent on what permanent pollution abatement measures are incorporated into the project. The project specific water pollution abatement plan should be reviewed to determine what permanent pollution abatement measures are incorporated into a project.

It should also be noted that the timing and procedures presented herein are general guidelines, adjustment to the timing and procedures may have to be made depending on project specific characteristics as well as weather related conditions but may not be altered without TCEQ approval.

Where a project is occupied by the owner, the owner may provide for maintenance with his own skilled forces or contract for recommended maintenance of Permanent Best Management Practices. Where a project is occupied or leased by a tenant, the owner shall require tenants to contract for such maintenance services either through a lease agreement, property owners association covenants, or other binding document.

I understand that I am responsible for maintenance of the Permanent Pollution Abatement Measures included in this project until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property or ownership is transferred.

I, the owner, have read and understand the requirements of the attached Maintenance Plan and Schedule.

  
\_\_\_\_\_  
Garrett Mechler – VP, Operations  
Veramendi PE – Emerald, LLC

11/10/2023  
Date

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**INSPECTION AND MAINTENANCE SCHEDULE  
FOR  
PERMANENT POLLUTION ABATEMENT MEASURES**

Recommended Frequency	Task to be Performed												
	1	2	3	4	5	6	7	8	9	10	11	12	13
After Rainfall	√							√			√		√
Biannually*	√	√	√	√	√	√	√	√	√	√	√	√	√

*\*At least one biannual inspection must occur during or immediately after a rainfall event.  
√Indicates maintenance procedure that applies to this specific site.*

See description of maintenance task to be performed on the following pages. Frequency of maintenance tasks may vary depending on amount of rainfall and other weather-related conditions but may not be altered without TCEQ approval.

*A written record should be kept of inspection results and maintenance performed.*

<b><i>Task No. &amp; Description</i></b>	<b><i>Included in this project</i></b>	
1. Mowing	Yes	No
2. Litter and Debris Removal	Yes	No
3. Erosion Control	Yes	<del>No</del>
4. Level Sensor	Yes	<del>No</del>
5. Nuisance Control	Yes	<del>No</del>
6. Structural Repairs and Replacement	Yes	<del>No</del>
7. Discharge Pipe	Yes	<del>No</del>
8. Detention and Drawdown Time	Yes	<del>No</del>
9. Sediment Removal	Yes	<del>No</del>
10. Logic Controller	Yes	<del>No</del>
11. Vegetated Filter Strips	Yes	<del>No</del>
12. Visually Inspect Security Fencing for Damage or Breach	Yes	<del>No</del>
13. Recordkeeping for Inspections, Maintenance, and Repairs	Yes	<del>No</del>

# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

## MAINTENANCE PROCEDURES FOR PERMANENT POLLUTION ABATEMENT MEASURES

**Note: Additional guidance can be obtained from TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) Section 3.5.**

Inspections. Inspections should take place a minimum of twice a year. One inspection should take place during wet weather to determine if the basin is meeting the target detention time of 12 hours and a drawdown time of no more than 48 hours. The remaining inspections should occur between storm events so that manual operation of the valve and controller can be verified. The level sensor in the basin should be inspected and any debris or sediment in the area should be removed. The outlet structure and the trash screen should be inspected for signs of clogging. Debris and sediment should be removed from the orifice and outlet(s) as described in previous sections. Debris obstructing the valve should be removed. During each inspection, erosion areas inside and downstream of this BMP should be identified and repaired/revegetated immediately. *A written record should be kept of inspection results and corrective measures taken*

1. Mowing. The basin, basin side-slopes, and embankment of the basin must be mowed to prevent woody growth and control weeds. A mulching mower should be used, or the grass clippings should be caught and removed. Mowing should take place at least twice a year, or more frequently if vegetation exceeds 18 inches in height. More frequent mowing to maintain aesthetic appeal may be necessary in landscaped areas.
2. Litter and Debris Removal. Litter and debris removal should take place at least twice a year, as part of the periodic mowing operations and inspections. Debris and litter should be removed from the surface of the basin. Particular attention should be paid to floatable debris around the outlet structure. The outlet should be checked for possible clogging or obstructions and any debris removed.
3. Erosion control. The basin side slopes and embankment all may periodically suffer from slumping and erosion. To correct these problems, corrective action, such as regrading and revegetation, may be necessary. Correction of erosion control should take place whenever required based on the periodic inspections.
4. Level Sensor. The level sensor in the basin should be inspected and any debris or sediment in the area should be removed. Litter and debris removal should take place at least twice a year, as part of the periodic mowing operations and inspections. Debris and litter should be removed from the surface of the basin.
5. Nuisance Control. Standing water or soggy conditions may occur in the basin. Some standing water may occur after a storm event since the valve may close with 2 to 3 inches of water in the basin. Some flow into the basin may also occur between storms due to spring flow and residential water use that enters the storm sewer system. Twice a year, the facility should be evaluated in terms of nuisance control (insects, weeds, odors, algae, etc.).

# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

6. Structural Repairs and Replacement. With each inspection, any damage to structural elements of the basin (pipes, concrete drainage structures, retaining walls, etc.) should be identified and repaired immediately. An example of this type of repair can include patching of cracked concrete, sealing of voids, removal of vegetation from cracks and joints. The various inlet/outlet structures in a basin will eventually deteriorate and must be replaced. *A written record should be kept of inspection results and corrective measures taken*
7. Discharge Pipe. The basin discharge pipe shall be checked for accumulation of silt, debris or other obstructions which could block flow. Soil accumulations, vegetative overgrowth and other blockages should be cleared from the pipe discharge point. Erosion at the point of discharge shall be monitored. If erosion occurs, the addition of rock rubble to disperse the flow should be accomplished. *A written record should be kept of inspection results and corrective measures taken*
8. Detention and Drawdown Time. One inspection should take place during wet weather to determine if the basin is meeting the target detention time of 12 hours and a drawdown time of no more than 48 hours. This characteristic can be a sign of the need for maintenance. The minimum drawdown time is 24 hours. If drawdown time is less than 24 hours, the actuator valve shall be checked and partially closed to limit the drawdown time. Extensive drawdown time greater than 48 hours may indicate blockage of the discharge pipe. Corrective actions should be performed and completed within 15 working days. *A written record of the inspection findings and corrective actions performed should be made.*
9. Sediment Removal. A properly designed batch detention basin will accumulate quantities of sediment over time. The accumulated sediment can detract from the appearance of the facility and reduce the pollutant removal performance of the facility. The sediment also tends to accumulate near the outlet structure and can interfere with the level sensor operation. Sediment shall be removed from the basin at least every 5 years, when sediment depth exceeds 6 inches, when the sediment interferes with the level sensor or when the basin does not drain within 48 hours. Care should be taken not to compromise the basin lining during maintenance.
10. Logic Controller. The Logic Controller should be inspected as part of the twice-yearly investigations. Verify that the external indicators (active, cycle in progress) are operating properly by turning the controller off and on, and by initiating a cycle by triggering the level sensor in the basin. The valve should be manually opened and closed using the open/close switch to verify valve operation and to assist in inspecting the valve for debris. The solar panel should be inspected and any dust or debris on the panel should be carefully removed. The controller and all other circuitry and wiring should be inspected for signs of corrosion, damage from insects, water leaks, or other damage. At the end of the inspection, the controller should be reset.
11. Vegetated Filter Strips. Vegetation height for native grasses shall be limited to no more than 18-inches. When vegetation exceeds that height, the filter strip shall be cut to a height of approximately 4 inches. Turf grass shall be limited to a height of 4-inches with regular maintenance that utilizes a mulching mower. Trash and debris shall be removed from filter strip

# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

prior to cutting. Check filter strip for signs of concentrated flow and erosion. Areas of filter strip showing signs of erosion shall be repaired by scarifying the eroded area, reshaping, regrading, and placement of solid block sod over the affected area. *A written record of the inspection findings and corrective actions performed should be made*

12. Visually Inspect Security Fencing for Damage or Breach. Check maintenance access gates for proper operation. Damage to fencing or gates shall be repaired within 5 working days. *A written record should be kept of inspection results and maintenance performed.*
13. Recordkeeping Procedures for Inspections, Maintenance, Repairs, and Retrofits.
  - Written records shall be kept by the party responsible for maintenance or a designated representative.
  - Written records shall be retained for a minimum of five years.

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**INSPECTION AND MAINTENANCE SCHEDULE  
FOR  
PERMANENT POLLUTION ABATEMENT MEASURES**

<i>Recommended Frequency</i>	<i>Task to be Performed</i>		
	<b>1</b>	<b>2</b>	<b>3</b>
<b>Annually*</b>	√	√	√

*\*Inspections to occur quarterly during the first year of operation.  
√Indicates maintenance procedure that applies to this specific site.*

See description of maintenance task to be performed on the following pages. Frequency of maintenance tasks may vary depending on amount of rainfall and other weather-related conditions but may not be altered without TCEQ approval. Inspection frequency in subsequent years is based on the maintenance plan developed in the first year but must occur annually at a minimum.

*A written record will be kept of inspection results and maintenance performed.*

<b><i>Task No. &amp; Description</i></b>	<b><i>Included in this project</i></b>	
1. Cleaning	Yes	<del>No</del>
2. Manual Backflush / Flow Rate Test	Yes	<del>No</del>
3. External Rinsing	Yes	<del>No</del>



# VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND PRECINCT 4 UNITS 1, 2, & 3 Water Pollution Abatement Plan

## MAINTENANCE PROCEDURES FOR PERMANENT POLLUTION ABATEMENT MEASURES (Jellyfish)

**Note: Additional guidance can be obtained from the TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) Addendum, Section 3.2.22, as well as the Jellyfish® Filter Owner's Manual provided by Imbrium® Systems.**

1. Cleaning. Removal and appropriate disposal of all water, sediment, oil and grease, and debris that has accumulated within the unit will be performed. The Jellyfish® Filter will be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. Since some of the maintenance procedures require manned entry into the Jellyfish structure, only professional maintenance service providers trained in confined space entry procedures should enter the vessel. *A written record will be kept of inspection results and maintenance performed.*
2. Manual Backflush / Flow Rate Test. A manual backflush must be performed on a single draindown cartridge using a Jellyfish Cartridge Backflush Pipe (described in the Jellyfish® Filter Owner's Manual). If the time required to drain 14 gallons of backflush water from the Backflush Pipe (from top of pipe to the top of the open flapper valve) exceeds 15 seconds, it is recommended to perform a manual backflush on each of the cartridges. After the manual backflush, the draindown test should be repeated on a single cartridge to determine if the cartridge can drain 14 gallons of water in 15 seconds. If the cartridge still does not achieve the design flow rate, it must be replaced. Filter cartridges should be tested for adequate flow rate, every 12 months and cleaned and re-commissioned, or replaced if necessary. *Written record will be kept of inspection results and maintenance performed.*
3. External Rinsing. If external rinsing is performed within the structure, the cartridge or individual filtration tentacles should be rinsed while safely suspended over the maintenance access wall opening in the cartridge deck, such that rinsate flows into the lower chamber of the Jellyfish® Filter. If the rinsing procedure is performed outside the structure, the cartridge or individual filtration tentacles should be rinsed in a suitable basin such as a plastic barrel or tub, and rinsate subsequently poured into the maintenance access wall opening in the cartridge deck. Sediment is subsequently removed from the lower chamber by standard vacuum service. *Written record will be kept of inspection results and maintenance performed.*
4. Hazardous Material Spill. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site and may be required in the event of a chemical spill or due to excessive sediment loading. In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and appropriate regulatory agencies immediately. Maintenance should be performed by a licensed liquid waste hauler. Cartridge replacement may also be required in the event of an accidental significant or hazardous spill. Industrial and hazardous waste materials will be disposed of in accordance with TCEQ rules in 30 Texas Administration Code (TAC) Sections (§§)335.501-.521 (subchapter R). If class I or II non-hazardous or hazardous wastes are generated, a third-party disposal contractor will manage the wastes. *Written record will be kept of inspection results and maintenance performed.*

**ATTACHMENT I**

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, AND  
PRECINCT 4 UNITS 1, 2, & 3  
Water Pollution Abatement Plan**

**Attachment I – Measures for Minimizing Surface Stream Contamination**

Any points where discharge from the site is concentrated and erosive velocities exist will include appropriately sized energy dissipators to reduce velocities to non-erosive levels.

**AGENT AUTHORIZATION FORM  
(TCEQ-0599)**

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

I \_\_\_\_\_ Garrett Mechler \_\_\_\_\_  
Print Name

\_\_\_\_\_ VP, Operations \_\_\_\_\_  
Title - Owner/President/Other

of \_\_\_\_\_ Veramendi PE – Emerald, LLC \_\_\_\_\_  
Corporation/Partnership/Entity Name

have authorized \_\_\_\_\_ Pape-Dawson Engineers, Inc. \_\_\_\_\_  
Print Name of Agent/Engineer

of \_\_\_\_\_ Pape-Dawson Engineers, Inc. \_\_\_\_\_  
Print Name of Firm

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

I also understand that:

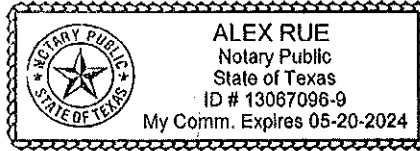
1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.
3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.
4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.
5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

[Handwritten Signature]  
Applicant's Signature

11/10/2023  
Date

THE STATE OF Texas §  
County of Comal §



BEFORE ME, the undersigned authority, on this day personally appeared Garrett Mechtler 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 10 day of November, 2023

[Handwritten Signature]  
NOTARY PUBLIC

Alex Rue  
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 5/20/2024

**APPLICATION FEE FORM  
(TCEQ-0574)**

# Application Fee Form

## Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3

Regulated Entity Location: Approximately 0.3 miles Northwest of TX-46/TX-337 and Word Pkwy intersection New Braunfels, TX

Name of Customer: Veramendi PE - Emerald, LLC

Contact Person: Garrett Mechler

Phone: 830-643-1338

Customer Reference Number (if issued): CN 606123701

Regulated Entity Reference Number (if issued): RN \_\_\_\_\_

### Austin Regional Office (3373)

Hays

Travis

Williamson

### San Antonio Regional Office (3362)

Bexar

Medina

Uvalde

Comal

Kinney

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

Austin Regional Office

San Antonio Regional Office

Mailed to: TCEQ - Cashier

Overnight Delivery to: TCEQ - Cashier

Revenues Section

12100 Park 35 Circle

Mail Code 214

Building A, 3rd Floor

P.O. Box 13088

Austin, TX 78753

Austin, TX 78711-3088

(512)239-0357

### Site Location (Check All That Apply):

Recharge Zone

Contributing Zone

Transition Zone

<i>Type of Plan</i>	<i>Size</i>	<i>Fee Due</i>
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	121.98 Acres	\$ 8,000
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	\$
Sewage Collection System	L.F.	\$
Lift Stations without sewer lines	Acres	\$
Underground or Aboveground Storage Tank Facility	Tanks	\$
Piping System(s)(only)	Each	\$
Exception	Each	\$
Extension of Time	Each	\$



Signature: 

Date: 11/30/23

## 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**

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

#### **Organized Sewage Collection Systems and Modifications**

<i>Project</i>	<i>Cost per Linear Foot</i>	<i>Minimum Fee- Maximum Fee</i>
Sewage Collection Systems	\$0.50	\$650 - \$6,500

#### **Underground and Aboveground Storage Tank System Facility Plans and Modifications**

<i>Project</i>	<i>Cost per Tank or Piping System</i>	<i>Minimum Fee- Maximum Fee</i>
Underground and Aboveground Storage Tank Facility	\$650	\$650 - \$6,500

#### **Exception Requests**

<i>Project</i>	<i>Fee</i>
Exception Request	\$500

***Extension of Time Requests***

<b><i>Project</i></b>	<b><i>Fee</i></b>
Extension of Time Request	\$150

**CORE DATA FORM  
(TCEQ-10400)**



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

<b>1. Reason for Submission</b> (If other is checked please describe in space provided.)		
<input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
<b>2. Customer Reference Number</b> (if issued)	<a href="#">Follow this link to search for CN or RN numbers in Central Registry**</a>	<b>3. Regulated Entity Reference Number</b> (if issued)
CN 606123701		RN

## SECTION II: Customer Information

<b>4. General Customer Information</b>		<b>5. Effective Date for Customer Information Updates</b> (mm/dd/yyyy)	
<input type="checkbox"/> New Customer		<input type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		<input type="checkbox"/> Change in Regulated Entity Ownership	
<b>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).</b>			
<b>6. Customer Legal Name</b> (If an individual, print last name first: eg: Doe, John)		If new Customer, enter previous Customer below:	
Veramendi PE - Emerald, LLC			
<b>7. TX SOS/CPA Filing Number</b>	<b>8. TX State Tax ID</b> (11 digits)	<b>9. Federal Tax ID</b> (9 digits)	<b>10. DUNS Number</b> (if applicable)
0803277761	32070223675	87-1034195	
<b>11. Type of Customer:</b>	<input checked="" type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
<b>12. Number of Employees</b>		<b>13. Independently Owned and Operated?</b>	
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>14. Customer Role</b> (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator			
<input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> Voluntary Cleanup Applicant <input type="checkbox"/> Other:			
<b>15. Mailing Address:</b>			
	City	State	ZIP
<b>16. Country Mailing Information</b> (if outside USA)		<b>17. E-Mail Address</b> (if applicable)	
		garrett.mechler@asaproperties.us.com	
<b>18. Telephone Number</b>	<b>19. Extension or Code</b>	<b>20. Fax Number</b> (if applicable)	
( 830 ) 643-1338		( ) -	

## SECTION III: Regulated Entity Information

<b>21. General Regulated Entity Information</b> (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)
<input checked="" type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information
<b>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).</b>
<b>22. Regulated Entity Name</b> (Enter name of the site where the regulated action is taking place.)
Veramendi Word Pkwy Phase 3, Precinct 18 Unit 1, and Precinct 4 Units 1, 2, & 3

23. Street Address of the Regulated Entity: <i>(No PO Boxes)</i>							
	City		State		ZIP		ZIP + 4
24. County	Comal						

**Enter Physical Location Description if no street address is provided.**

25. Description to Physical Location:	Approximately 0.3 miles Northwest of TX-46/TX-337 and Word Pkwy intersection						
26. Nearest City					State	Nearest ZIP Code	
New Braunfels					TX	78130	
27. Latitude (N) In Decimal:	29.7293			28. Longitude (W) In Decimal:	-98.1436		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		
29	43	45.6	98	08	37.0		
29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)		31. Primary NAICS Code (5 or 6 digits)		32. Secondary NAICS Code (5 or 6 digits)		
1521	1623		236115		237110		
33. What is the Primary Business of this entity? <i>(Do not repeat the SIC or NAICS description.)</i>							
Single-family residential							
34. Mailing Address:	PO Box 310699						
	City	New Braunfels	State	TX	ZIP	78131	ZIP + 4
35. E-Mail Address:	garrett.mechler@asaproperties.us.com						
36. Telephone Number	37. Extension or Code			38. Fax Number <i>(if applicable)</i>			
( 830 ) 643-1338				( ) -			

**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.


<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input checked="" type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input type="checkbox"/> New Source Review Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS
<input type="checkbox"/> Sludge	<input type="checkbox"/> Storm Water	<input type="checkbox"/> Title V Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

**SECTION IV: Preparer Information**

40. Name:	Greg Latimer, P.E.		41. Title:	Project Manager	
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address		
( 830 ) 632-5633		( ) -	glatimer@pape-dawson.com		

**SECTION V: Authorized Signature**

**46.** By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Pape-Dawson Engineers		Job Title:	Vice President	
Name <i>(In Print)</i> :	Jocelyn Perez, P.E.			Phone:	( 830 ) 632- 5633
Signature:				Date:	11/30/23

# **POLLUTANT LOAD AND REMOVAL CALCULATIONS**

**VERAMENDI WORD PKWY PHASE 3/PRECINCT 18 UNIT 1/ PRECINCT 4 UNITS 1,2,&3**

**Treatment Summary by Watershed**

Watershed	Total Watershed Area (ac.)	Proposed Impervious Cover to Treat (ac.)	PBMP	Required TSS Removal Annually (lbs)	TSS Removed Annually (lbs)
A	63.41	10.93	Proposed Batch Detention Basin Word Pkwy Phase 3	9,811	10,940
B	4.72	2.29	Proposed Batch Detention Basin P4 Unit 1	2,056	2,144
C	44.71	21.55	Proposed Batch Detention Basin P18 Unit 1 (North)	19,343	20,350
D	23.55	6.84	Proposed Batch Detention Basin P18 Unit 1 (South)	6,140	6,549
E	5.70	1.37	Proposed Jellyfish Filter Word Pkwy Phase 3	1,230	1,230
F	1.39	0.94	Vegatitive Filter Strip	844	927
G	8.07	4.48	Proposed Jellyfish Filter P4	4,021	4,021
H	4.43	3.18	Vegatitive Filter Strip	2,854	3,105
I	0.46	0.36	Vegatitive Filter Strip	323	351
J	6.00	-	Grading and SCS Installation	-	-
Uncaptured	0.46	0.30	Overtreatment	269	-
<b>TOTAL</b>	162.90	<b>52.24</b>	---	46,891	<b>49,617</b>

**Water Quality Basin Summary**

Basin	Designed Capture Volume (cf)	Required Volume (cf)	Excess Volume Capacity (cf)
Proposed Batch Detention Basin Word Pkwy Phase 3	93,609	<b>85,598</b>	8,011
Proposed Batch Detention Basin Precinct 4 Unit 1	12,013	<b>11,496</b>	517
Proposed Batch Detention Basin Precinct 18 Unit 1 (North)	155,388	<b>108,412</b>	46,976
Proposed Batch Detention Basin Precinct 18 Unit 1 (South)	59,311	<b>41,559</b>	17,752

# **EXHIBITS**



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

Site Data: Determine Required Load Removal Based on the Entire Project  
County = **Comal**  
Total project area included in plan = **121.98** acres  
Predevelopment impervious area within the limits of the plan = **0.00** acres  
Total post-development impervious area within the limits of the plan = **52.20** acres  
Total post-development impervious cover fraction = **0.43**  
 $P$  = **33** inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **Vord Pkwy Ph 3**

Total drainage basin/outfall area = **63.41** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **10.93** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.17**  
 $L_M \text{ THIS BASIN}$  = **9811** lbs.

**3. Indicate the proposed BMP Code for this basin**

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

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

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

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

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

$A_C$  = **63.41** acres  
 $A_I$  = **10.93** acres  
 $A_P$  = **52.48** acres  
 $L_R$  = **12208** lbs

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

Desired  $L_M \text{ THIS BASIN}$  = **10940** lbs.

$F$  = **0.90**

**6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall are;**

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **1.70** inches  
Post Development Runoff Coefficient = **0.18**  
On-site Water Quality Volume = **71332** 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 = **14266**  
Total Capture Volume (required water quality volume(s) x 1.20) = **85598** cubic feet



11/30/23

*Jocelyn Perez*

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

Site Data: Determine Required Load Removal Based on the Entire Project  
County = **Comal**  
Total project area included in plan = **121.98** acres  
Predevelopment impervious area within the limits of the plan = **0.00** acres  
Total post-development impervious area within the limits of the plan = **52.20** acres  
Total post-development impervious cover fraction = **0.43**  
 $P$  = **33** inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **P4-U1 BASIN**

Total drainage basin/outfall area = **4.72** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **2.29** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.49**  
 $L_M$  THIS BASIN = **2056** lbs.

**3. Indicate the proposed BMP Code for this basin**

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

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

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

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

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

$A_C$  = **4.72** acres  
 $A_I$  = **2.29** acres  
 $A_P$  = **2.43** acres  
 $L_R$  = **2419** lbs

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

Desired  $L_M$  THIS BASIN = **2144** lbs.

$F$  = **0.89**

**6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall are;**

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **1.60** inches  
Post Development Runoff Coefficient = **0.35**  
On-site Water Quality Volume = **9580** 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 = **1916**  
Total Capture Volume (required water quality volume(s) x 1.20) = **11496** cubic feet



11/30/23

*Jocelyn Perez*

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

Site Data: Determine Required Load Removal Based on the Entire Project  
County = **Comal**  
Total project area included in plan = **121.98** acres  
Predevelopment impervious area within the limits of the plan = **0.00** acres  
Total post-development impervious area within the limits of the plan = **52.20** acres  
Total post-development impervious cover fraction = **0.43**  
 $P$  = **33** inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **P18-U1(N)**

Total drainage basin/outfall area = **44.71** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **21.55** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.48**  
 $L_M$  THIS BASIN = **19343** lbs.

**3. Indicate the proposed BMP Code for this basin**

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

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

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

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

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

$A_C$  = **44.71** acres  
 $A_I$  = **21.55** acres  
 $A_P$  = **23.16** acres  
 $L_R$  = **22767** lbs

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

Desired  $L_M$  THIS BASIN = **20350** lbs.

$F$  = **0.89**

**6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall are;**

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **1.60** inches  
Post Development Runoff Coefficient = **0.35**  
On-site Water Quality Volume = **90311** 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 = **18062**  
Total Capture Volume (required water quality volume(s) x 1.20) = **108374** cubic feet

85598



11/30/23

*Jocelyn Perez*

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

Site Data: Determine Required Load Removal Based on the Entire Project  
County = **Comal**  
Total project area included in plan = **121.98** acres  
Predevelopment impervious area within the limits of the plan = **0.00** acres  
Total post-development impervious area within the limits of the plan = **52.20** acres  
Total post-development impervious cover fraction = **0.43**  
 $P$  = **33** inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **P18-U1(S)**

Total drainage basin/outfall area = **23.55** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **6.84** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.29**  
 $L_M \text{ THIS BASIN}$  = **6140** lbs.

**3. Indicate the proposed BMP Code for this basin**

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

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

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

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

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

$A_C$  = **23.55** acres  
 $A_I$  = **6.84** acres  
 $A_P$  = **16.71** acres  
 $L_R$  = **7378** lbs

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

Desired  $L_M \text{ THIS BASIN}$  = **6549** lbs.

$F$  = **0.89**

**6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area:**

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **1.60** inches  
Post Development Runoff Coefficient = **0.25**  
On-site Water Quality Volume = **34633** 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 = **6927**  
Total Capture Volume (required water quality volume(s) x 1.20) = **41559** cubic feet



11/30/23

*Jocelyn Perez*

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:

$L_{M \text{ TOTAL PROJECT}}$  = 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 =	<b>Comal</b>	
Total project area included in plan =	<b>121.98</b>	acres
Predevelopment impervious area within the limits of the plan =	<b>0.00</b>	acres
Total post-development impervious area within the limits of the plan =	<b>52.20</b>	acres
Total post-development impervious cover fraction =	<b>0.43</b>	
P =	<b>33</b>	inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **F**

Total drainage basin/outfall area =	<b>1.39</b>	acres
Predevelopment impervious area within drainage basin/outfall area =	<b>0.00</b>	acres
Post-development impervious area within drainage basin/outfall area =	<b>0.94</b>	acres
Post-development impervious fraction within drainage basin/outfall area =	<b>0.68</b>	
$L_M \text{ THIS BASIN}$ =	<b>844</b>	lbs.

**3. Indicate the proposed BMP Code for this basin**

Proposed BMP = **Vegetated Filter Strips**  
Removal efficiency = **85** percent

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

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

RG-348 Page 3-33 Equation 3.7:  $L_R = (\text{BMP efficiency}) \times P \times (A_1 \times 34.6 + A_p \times 0.54)$

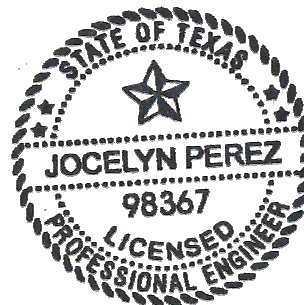
where:

$A_C$  = Total On-Site drainage area in the BMP catchment area  
 $A_1$  = 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

$A_C$ =	<b>1.39</b>	acres
$A_1$ =	<b>0.94</b>	acres
$A_p$ =	<b>0.94</b>	acres
$L_R$ =	<b>927</b>	lbs

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

Desired  $L_M \text{ THIS BASIN}$  = **927** lbs.



11/30/23

*Jocelyn Perez*

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:  $L_{M \text{ TOTAL PROJECT}}$  = 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 =	<b>Comal</b>	
Total project area included in plan =	<b>121.98</b>	acres
Predevelopment impervious area within the limits of the plan =	<b>0.00</b>	acres
Total post-development impervious area within the limits of the plan =	<b>52.20</b>	acres
Total post-development impervious cover fraction =	<b>0.43</b>	
P =	<b>33</b>	inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **H**

Total drainage basin/outfall area =	<b>4.43</b>	acres
Predevelopment impervious area within drainage basin/outfall area =	<b>0.00</b>	acres
Post-development impervious area within drainage basin/outfall area =	<b>3.18</b>	acres
Post-development impervious fraction within drainage basin/outfall area =	<b>0.72</b>	
$L_M \text{ THIS BASIN}$ =	<b>2854</b>	lbs.

**3. Indicate the proposed BMP Code for this basin**

Proposed BMP = **Vegetated Filter Strips**  
Removal efficiency = **85** percent

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

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

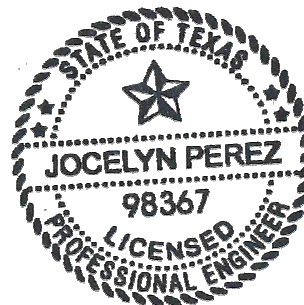
RG-348 Page 3-33 Equation 3.7:  $L_R = (\text{BMP efficiency}) \times P \times (A_i \times 34.6 + A_p \times 0.54)$

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

$A_C$ =	<b>4.43</b>	acres
$A_I$ =	<b>3.18</b>	acres
$A_P$ =	<b>1.25</b>	acres
$L_R$ =	<b>3105</b>	lbs

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

Desired  $L_M \text{ THIS BASIN}$  = **3105** lbs.



11/30/23

*Jocelyn Perez*

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

Site Data: Determine Required Load Removal Based on the Entire Project  
County = **Comal**  
Total project area included in plan = **121.98** acres  
Predevelopment impervious area within the limits of the plan = **0.00** acres  
Total post-development impervious area within the limits of the plan = **52.20** acres  
Total post-development impervious cover fraction = **0.43**  
 $P$  = **33** inches

$L_{M \text{ TOTAL PROJECT}}$  = **46855** 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. = **1**  
Total drainage basin/outfall area = **0.46** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **0.36** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.78**  
 $L_{M \text{ THIS BASIN}}$  = **323** lbs.

**3. Indicate the proposed BMP Code for this basin**

Proposed BMP = **Vegetated Filter Strips**  
Removal efficiency = **85** percent

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

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

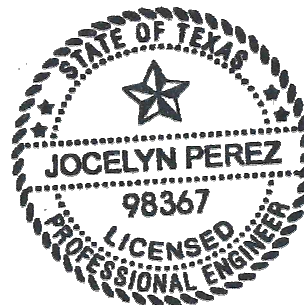
RG-348 Page 3-33 Equation 3.7:  $L_R = (\text{BMP efficiency}) \times P \times (A_1 \times 34.6 + A_p \times 0.54)$

where:  $A_C$  = Total On-Site drainage area in the BMP catchment area  
 $A_1$  = 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

$A_C$  = **0.46** acres  
 $A_1$  = **0.36** acres  
 $A_p$  = **0.10** acres  
 $L_R$  = **351** lbs

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

Desired  $L_{M \text{ THIS BASIN}}$  = **351** lbs.



11/30/23

*Jocelyn Perez*

**Contech Engineered Solutions Calculations for Texas Commission on Environmental Quality  
TSS Removal Calculations**

**Project Name:** Veramendi Precinct 4 - Unit 3  
**Date Prepared:** 11/17/2023

**1. The Required Load Reduction for the total project:**

Calculations from RG-348 Page 3-29 Equation 3.3:  $L_M = 27.2(A_N \times P)$   
Pages 3-27 to 3-30

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

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

County =	Comal	
Total project area included in plan * =	121.98	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	52.24	acres
Total post-development impervious cover fraction * =	0.43	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	46891	lbs.

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

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

Drainage Basin/Outfall Area No. =	1	
Total drainage basin/outfall area =	8.07	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	4.48	acres
Post-development impervious fraction within drainage basin/outfall area =	0.56	
$L_{M\ THIS\ BASIN}$ =	4021	lbs.

**3. Indicate the proposed BMP Code for this basin.**

Proposed BMP =	JF	abbreviation
Removal efficiency =	86	percent

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

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

$A_C$  = 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

$A_C$ =	8.07	acres
$A_I$ =	4.48	acres
$A_P$ =	3.59	acres
$L_R$ =	4454	lbs.

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

Desired $L_{M\ THIS\ BASIN}$ =	4021	lbs.
F =	0.90	

**6. Calculate Treated Flow required by the BMP Type for this drainage basin / outfall area.**

Offsite area draining to BMP =	0.00	acres
Offsite impervious cover draining to BMP =	0.00	acres

Calculations from RG-348  
Pages Section 3.2.22

Rainfall Intensity =	1.10	inches per hour
Effective Area =	4.14	acres
Cartridge Length =	54	inches

**Peak Treatment Flow Required = 4.59 cubic feet per second**

**7. Jellyfish**

Designed as Required in RG-348  
Section 3.2.22

<b>Flow Through Jellyfish Size</b>	
Jellyfish Size for Flow-Based Configuration =	JFPD0816-24-5
Jellyfish Treatment Flow Rate =	4.72 cfs



12/1/23

*Jocelyn Perez*



**Contech Engineered Solutions Calculations for Texas Commission on Environmental Quality  
TSS Removal Calculations**

**Project Name:** Veramendi Word Pkwy Phase 3  
**Date Prepared:** 11/17/2023

**1. The Required Load Reduction for the total project:**

Calculations from RG-348 Page 3-29 Equation 3.3:  $L_M = 27.2(A_N \times P)$   
Pages 3-27 to 3-30

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

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

County =	Comal	
Total project area included in plan * =	121.98	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	52.24	acres
Total post-development impervious cover fraction * =	0.43	
P =	33	inches
$L_{M\ TOTAL\ PROJECT}$ =	46891	lbs.

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

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

<b>Drainage Basin/Outfall Area No. =</b>	1	
Total drainage basin/outfall area =	3.85	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	1.37	acres
Post-development impervious fraction within drainage basin/outfall area =	0.36	
$L_{M\ THIS\ BASIN}$ =	1230	lbs.

**3. Indicate the proposed BMP Code for this basin.**

Proposed BMP =	JF	abbreviation
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:  
 $LR = (BMP\ efficiency) \times P \times (A_I \times 34.6 + A_P \times 0.54)$

$A_C$  = 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

$A_C$ =	3.85	acres
$A_I$ =	1.37	acres
$A_P$ =	2.48	acres
$L_R$ =	1367	lbs.

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

Desired $L_{M\ THIS\ BASIN}$ =	1230	lbs.
F =	0.90	

**6. Calculate Treated Flow required by the BMP Type for this drainage basin / outfall area.**

Offsite area draining to BMP =	0.00	acres
Offsite impervious cover draining to BMP =	0.00	acres

Calculations from RG-348  
Pages Section 3.2.22

Rainfall Intensity =	1.10	inches per hour
Effective Area =	1.31	acres
Cartridge Length =	54	inches

**Peak Treatment Flow Required = 1.45 cubic feet per second**

**7. Jellyfish**

Designed as Required in RG-348  
Section 3.2.22

**Flow Through Jellyfish Size**

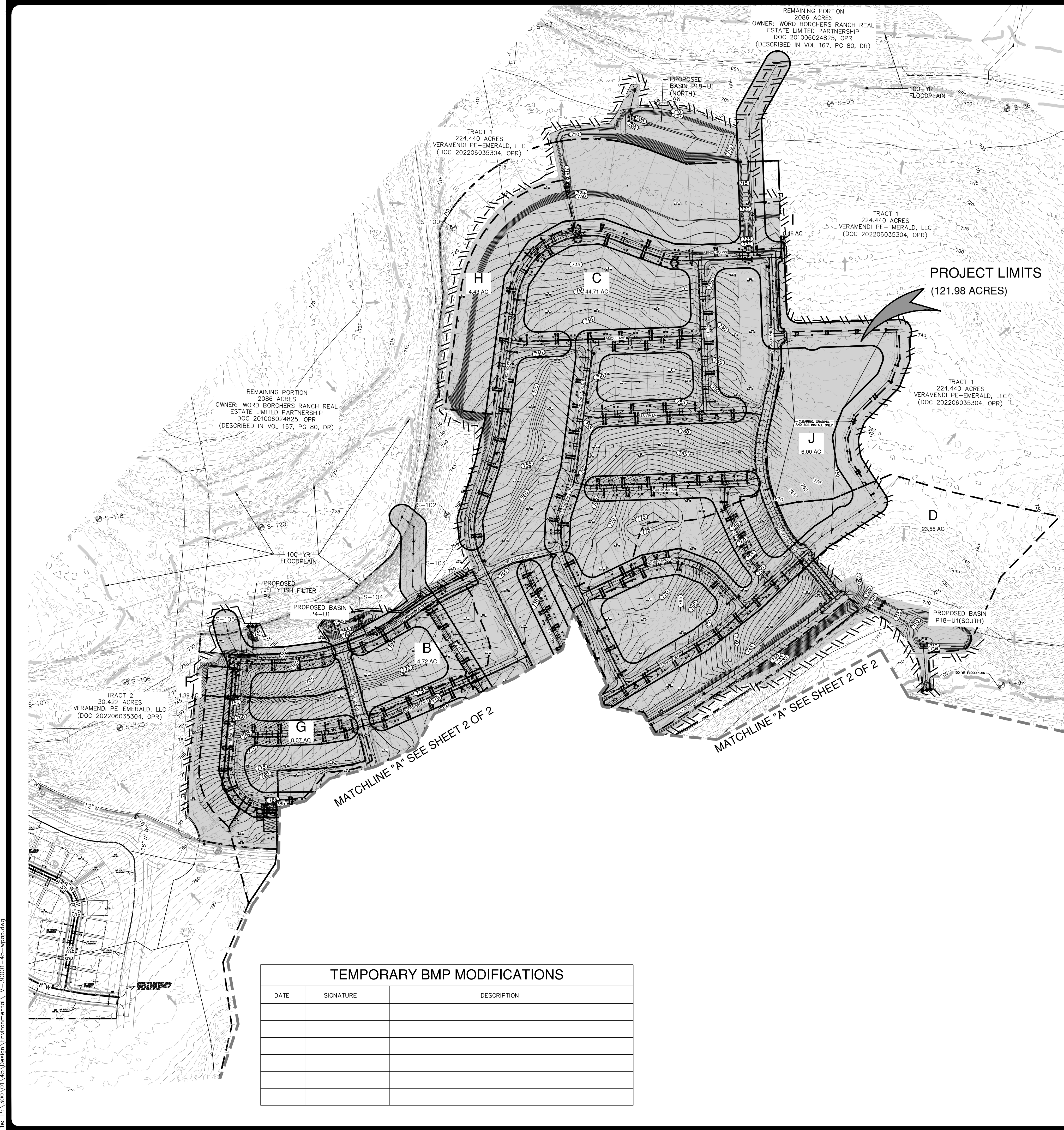
Jellyfish Size for Flow-Based Configuration = **JFPD00808-8-2**  
Jellyfish Treatment Flow Rate = **1.60** cfs



12/1/23

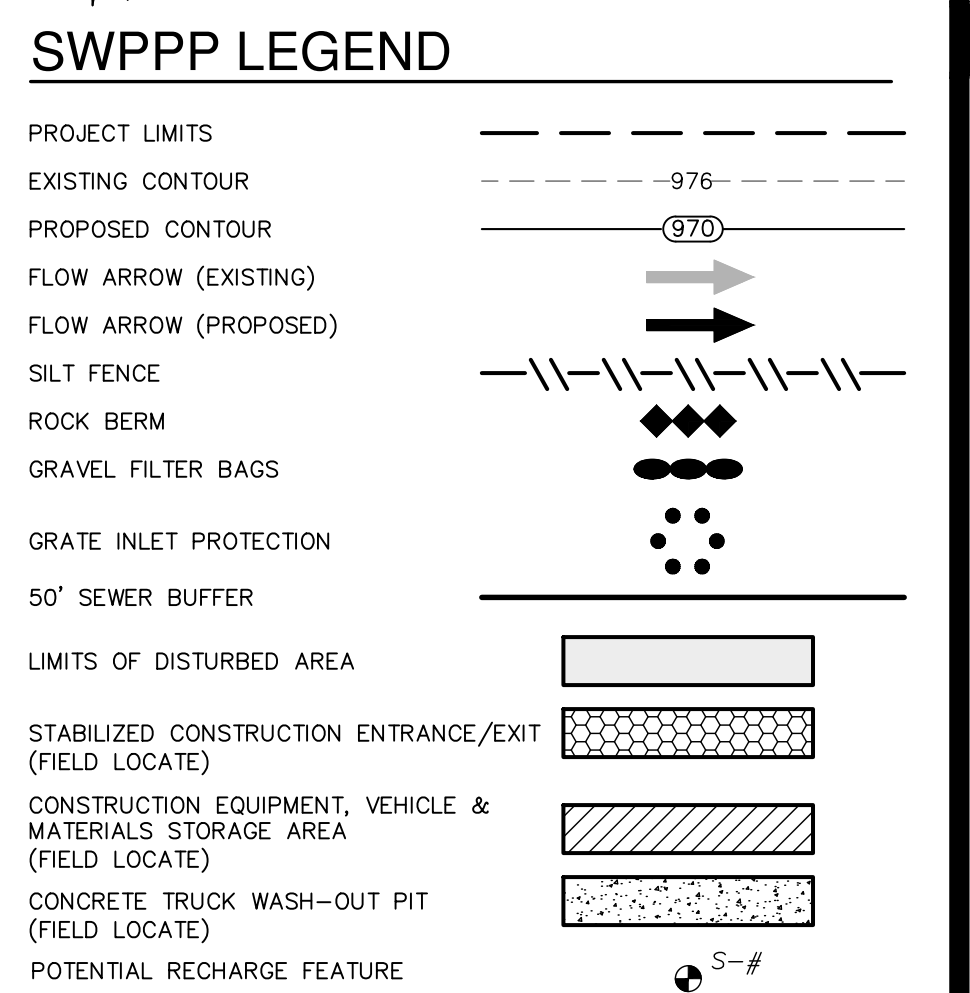
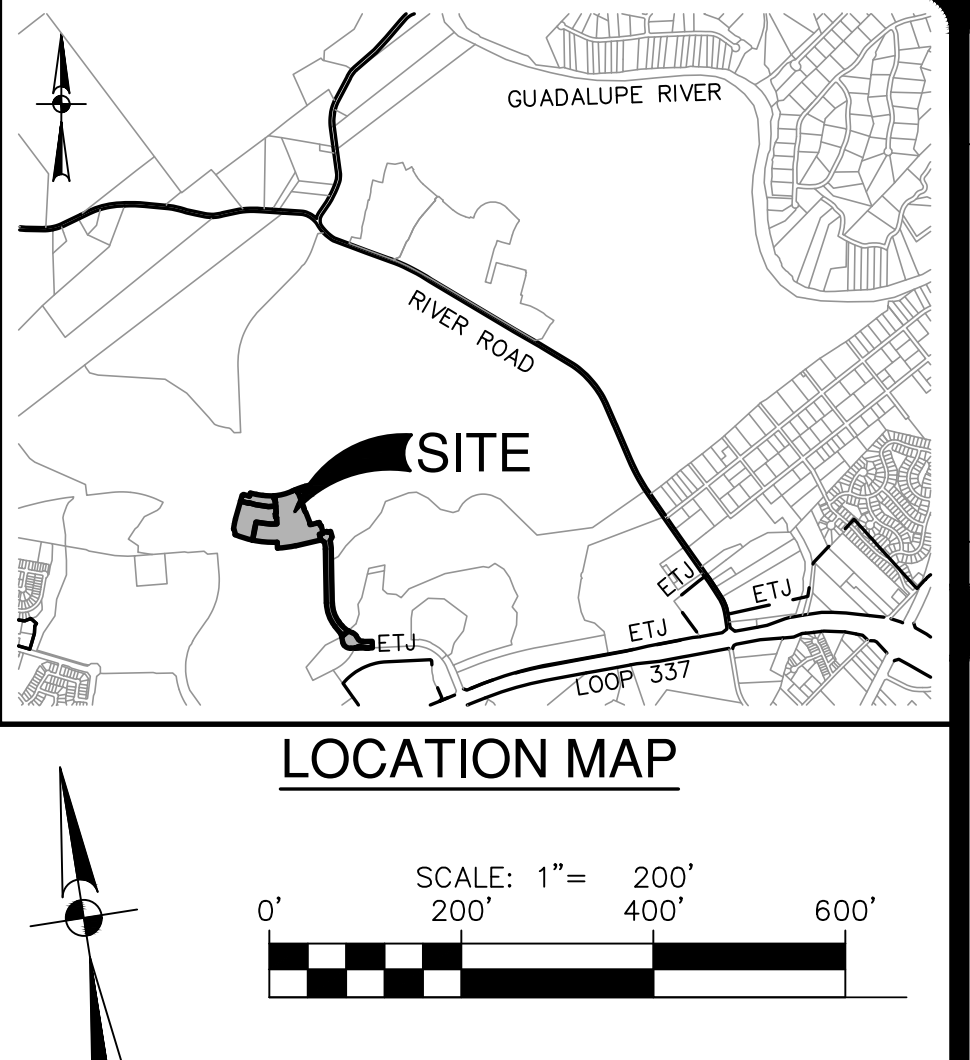
*Jocelyn Perez*

Date: Nov 17, 2023, 9:27am User: D:\pwrch  
 File: P:\300\01\43\Design\Environmental\11-30001-45-wp3p.dwg



### TCEQ WATER POLLUTION ABATEMENT PLAN GENERAL CONSTRUCTION NOTES

- A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION 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.
  - ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN (WPAP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.
  - 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.
  - 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.
  - 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 THE SITE SITUATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
  - 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.
  - SEDIMENT MUST BE REMOVED FROM THE SEDIMENT TRAPS OR SEDIMENT BASINS NOT LATER THAN WHEN IT OCCUPIES 50% OF THE BASIN'S DESIGN CAPACITY.
  - LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BEING DISCHARGED OFFSITE. CHROME
  - 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.
  - 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.
  - 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.
  - THE HOLDER OF ANY APPROVED EDWARDS AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
    - 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;
    - 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;
    - ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.
- SAN ANTONIO REGIONAL OFFICE  
 14250 JUDSON ROAD  
 SAN ANTONIO TEXAS 78233-4480  
 PHONE (210) 490-3096  
 FAX (210) 545-4329



#### GENERAL NOTES

- DO NOT DISTURB VEGETATED AREAS (TREES, GRASS, WEEDS, BRUSH, ETC.) ANY MORE THAN NECESSARY FOR CONSTRUCTION.
- CONSTRUCTION ENTRANCE/EXIT LOCATION, CONCRETE WASH-OUT PIT, AND CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARD TO BE DETERMINED IN THE FIELD.
- STORM WATER POLLUTION PREVENTION CONTROLS MAY NEED TO BE MODIFIED IN THE FIELD TO ACCOMPLISH THE DESIRED EFFECT. ALL MODIFICATIONS ARE TO BE NOTED ON THIS EXHIBIT AND SIGNED AND DATED BY THE RESPONSIBLE PARTY.
- RESTRICT ENTRY/EXIT TO THE PROJECT SITE TO DESIGNATED LOCATIONS BY USE OF ADEQUATE FENCING, IF NECESSARY.
- ALL STORM WATER POLLUTION PREVENTION CONTROLS ARE TO BE MAINTAINED AND IN WORKING CONDITIONS AT ALL TIMES.
- FOR A COMPLETE LISTING OF TEMPORARY STORM WATER POLLUTION PREVENTION CONTROLS REFER TO THE TPDES STORM WATER POLLUTION PREVENTION PLAN.
- STORM WATER POLLUTION PREVENTION STRUCTURES SHOULD BE CONSTRUCTED WITHIN THE SITE BOUNDARIES. SOME OF THESE FEATURES MAY BE SHOWN OUTSIDE THE SITE BOUNDARIES ON THIS PLAN FOR VISUAL CLARITY.
- AS SOON AS PRACTICAL, ALL DISTURBED SOIL THAT WILL NOT BE COVERED BY IMPERVIOUS COVER SUCH AS PARKWAY AREAS, EASEMENT AREAS, EMBANKMENT SLOPES, ETC. WILL BE STABILIZED PER APPLICABLE PROJECT SPECIFICATIONS.
- BEST MANAGEMENT PRACTICES MAY BE INSTALLED IN STAGES TO COINCIDE WITH THE DISTURBANCE OF UPGRADE AREAS.
- BEST MANAGEMENT PRACTICES MAY BE REMOVED IN STAGES ONCE THE WATERSHED FOR THAT PORTION CONTROLLED BY THE BEST MANAGEMENT PRACTICES HAS BEEN STABILIZED IN ACCORDANCE WITH TPDES REQUIREMENTS.
- UPON COMPLETION OF THE PROJECT, INCLUDING SITE STABILIZATION, AND BEFORE FINAL PAYMENT IS ISSUED, CONTRACTOR SHALL REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES, PAYING SPECIAL ATTENTION TO ROCK BERMS IN DRAINAGE FEATURES.
- WHERE VEGETATED FILTER STRIPS ARE INDICATED, CONTRACTOR SHALL VERIFY THAT SUFFICIENT VEGETATION EXISTS, OTHERWISE CONTRACTOR SHALL PLACE SILT FENCING IN LIEU OF VEGETATED FILTER STRIP.
- SHADED AREA ▭ DENOTES LIMITS OF DISTURBED AREAS. OTHER AREAS WITHIN THE PROJECT LIMITS, WITH THE EXCEPTION OF A CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARD, ARE NOT A PART OF THIS TPDES STORM WATER POLLUTION PREVENTION PLAN (SWP3) AND WILL NOT BE DISTURBED BY CIVIL CONSTRUCTION ACTIVITIES.
- PRIOR TO BEGINNING CONSTRUCTION, CONTRACTOR SHALL COORDINATE PLACEMENT OF TEMPORARY BEST MANAGEMENT PRACTICES WITHIN TXDOT RIGHT-OF-WAY WITH TXDOT.
- NBU WILL FUNCTION AS A SECONDARY OPERATOR ON THIS PROJECT AND WILL BE INSTALLING ELECTRIC UTILITIES FOR ON-SITE CONSTRUCTION AND OFF-SITE FEED TO THE PROJECT.
- PER TPDES REQUIREMENTS, DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITIES HAVE CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITY RESUMES WITHIN 21 DAYS. SEEDING DOES NOT CONSTITUTE AS STABILIZATION.

DATE	SIGNATURE	DESCRIPTION

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE WATER POLLUTION ABATEMENT PLANS (WPAP) REGULATIONS.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF THE WPAP ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 1**

DATE	
NO.	
REVISION	

11-17-2023

JOCELYN PEREZ  
 98367  
 PROFESSIONAL ENGINEER

*J. P. Dawson*

**PAPE-DAWSON ENGINEERS**

NEW BRUNNELS | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
 1075 INDEPENDENCE DR. STE 102 | NEW BRUNNELS, TX 78132 | 800.652.5653  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008880

**VERAMENDI WORD PKWY PHASE 3,  
 PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3  
 WATER POLLUTION ABATEMENT PLAN  
 TEMPORARY POLLUTION ABATEMENT PLAN**

PLAT NO.  

JOB NO. 30001-45

DATE SEPTEMBER 2023

DESIGNER GDL

CHECKED DRAWN

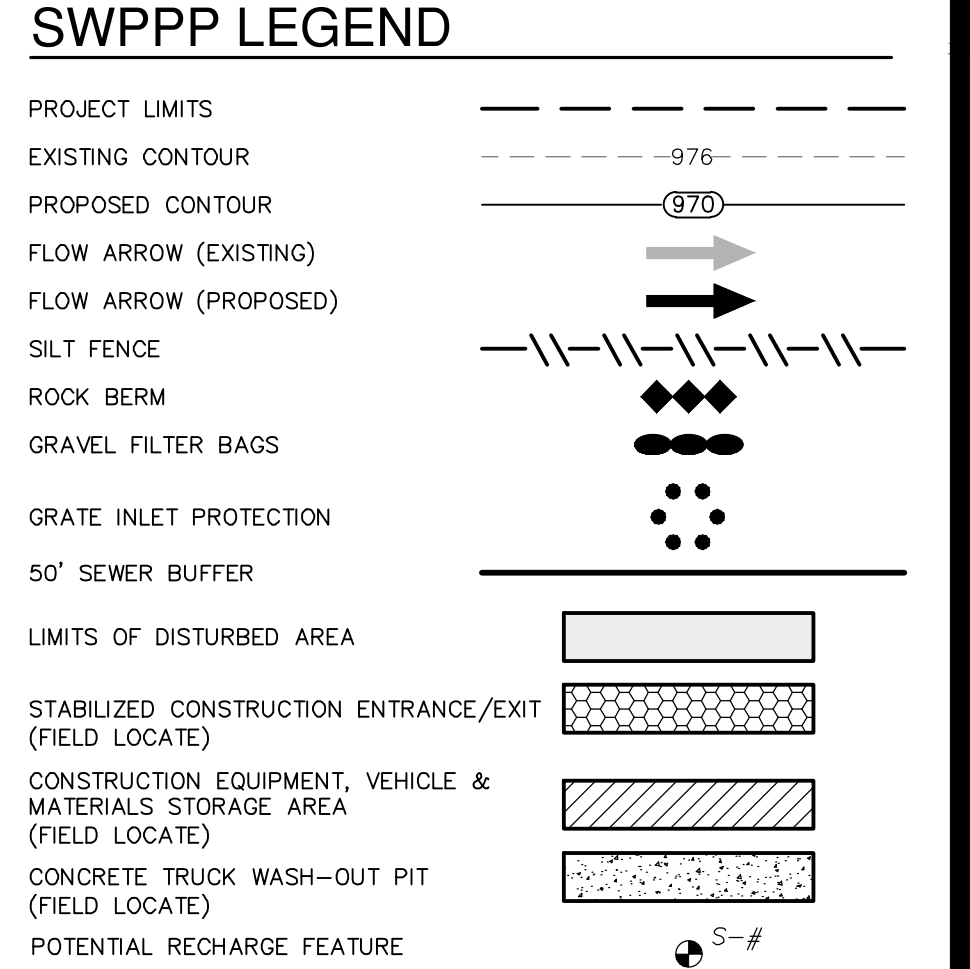
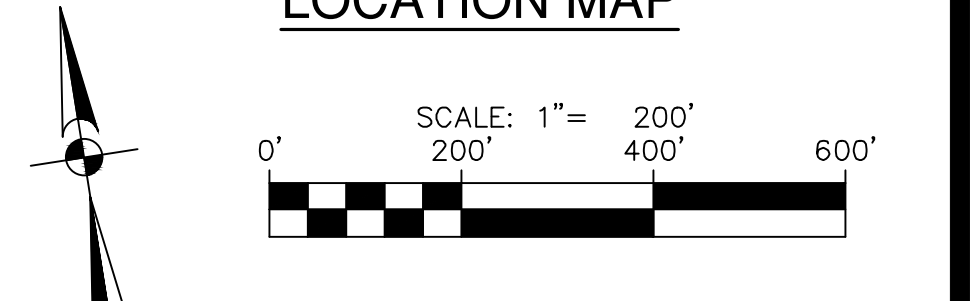
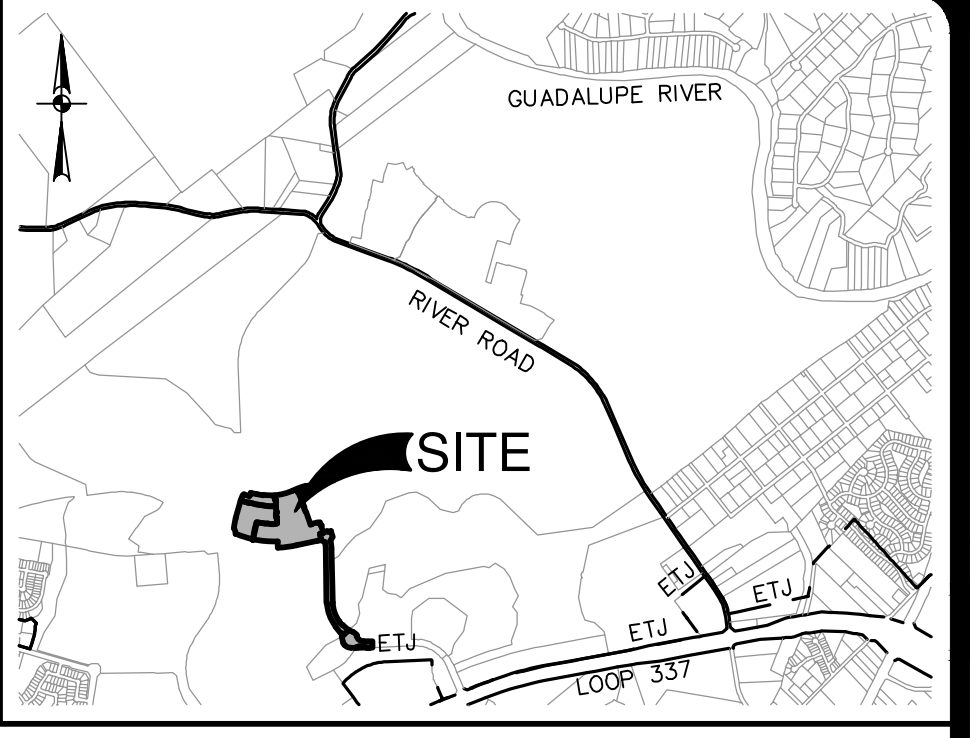
SHEET 1 OF 2

FOR PERMIT

**TCEQ 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 CONSTRUCTION OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
  - THE NAME OF THE APPROVED PROJECT;
  - THE ACTIVITY START DATE; AND
  - THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.
2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN (WPAP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.
3. IF ANY SENSITIVE FEATURE(S) (CAVES, SOLUTION CAVITY, SINK HOLE, ETC.) IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. CONSTRUCTION ACTIVITIES MAY NOT BE RESUMED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE APPROPRIATE PROTECTIVE MEASURES IN ORDER TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.
4. NO TEMPORARY OR PERMANENT HAZAROUS 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 THE SITE SITUATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
6. ANY SEDIMENT THAT ESCAPES THE CONSTRUCTION SITE MUST BE COLLECTED AND PROPERLY DISPOSED OF BEFORE THE NEXT RAIN EVENT TO ENSURE IT IS NOT WASHED INTO SURFACE STREAMS, SENSITIVE FEATURES, ETC.
7. SEDIMENT MUST BE REMOVED FROM THE SEDIMENT TRAPS OR SEDIMENT 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. CHROME
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 EDWARDS AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
  - A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;
  - B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;
  - C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

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



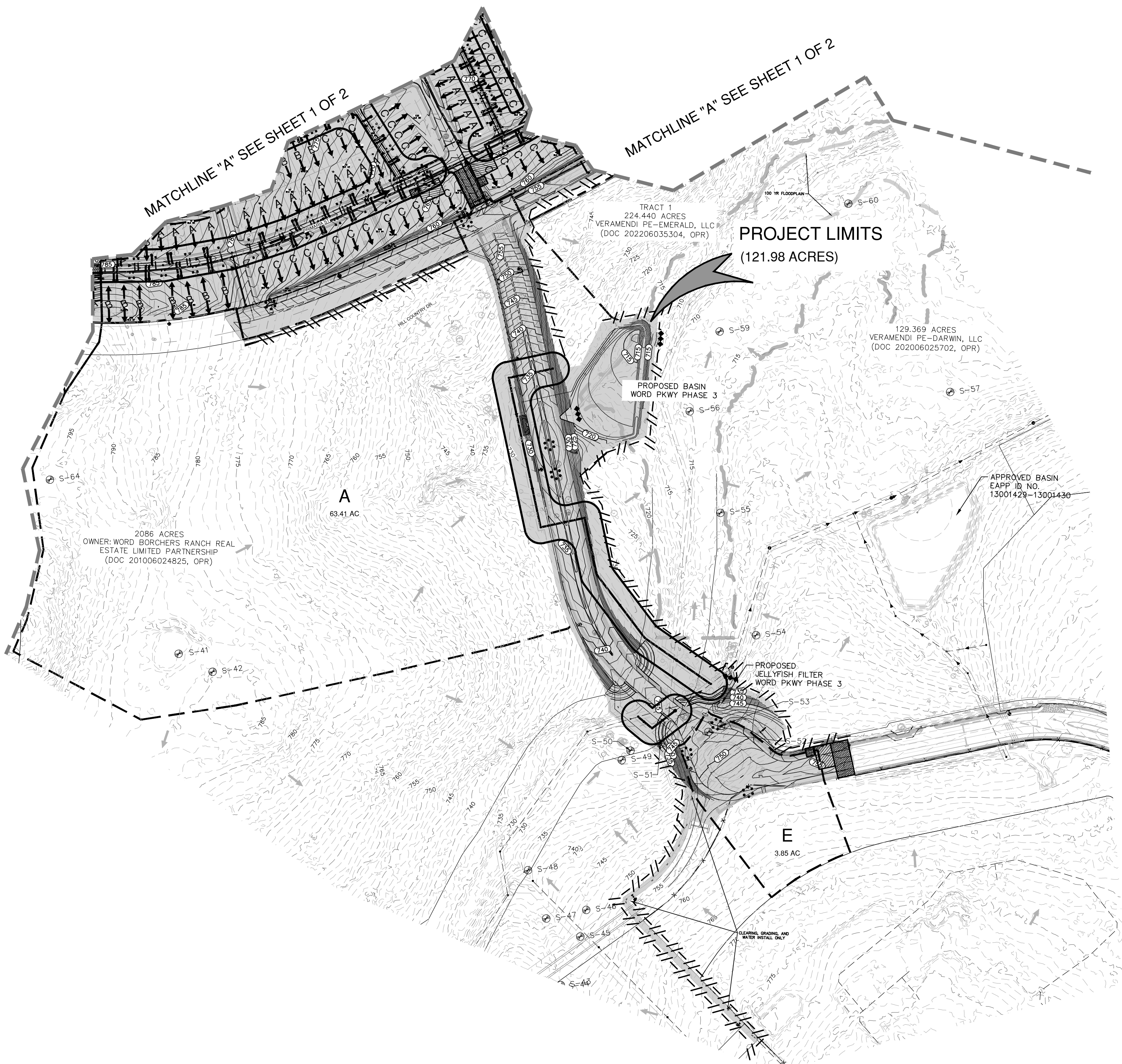
**GENERAL NOTES**

1. DO NOT DISTURB VEGETATED AREAS (TREES, GRASS, WEEDS, BRUSH, ETC.) ANY MORE THAN NECESSARY FOR CONSTRUCTION.
2. CONSTRUCTION ENTRANCE/EXIT LOCATION, CONCRETE WASH-OUT PIT, AND CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARD TO BE DETERMINED IN THE FIELD.
3. STORM WATER POLLUTION PREVENTION CONTROLS MAY NEED TO BE MODIFIED IN THE FIELD TO ACCOMPLISH THE DESIRED EFFECT. ALL MODIFICATIONS ARE TO BE NOTED ON THIS EXHIBIT AND SIGNED AND DATED BY THE RESPONSIBLE PARTY.
4. RESTRICT ENTRY/EXIT TO THE PROJECT SITE TO DESIGNATED LOCATIONS BY USE OF ADEQUATE FENCING, IF NECESSARY.
5. ALL STORM WATER POLLUTION PREVENTION CONTROLS ARE TO BE MAINTAINED AND IN WORKING CONDITIONS AT ALL TIMES.
6. FOR A COMPLETE LISTING OF TEMPORARY STORM WATER POLLUTION PREVENTION CONTROLS REFER TO THE TPDES STORM WATER POLLUTION PREVENTION PLAN.
7. STORM WATER POLLUTION PREVENTION STRUCTURES SHOULD BE CONSTRUCTED WITHIN THE SITE BOUNDARIES. SOME OF THESE FEATURES MAY BE SHOWN OUTSIDE THE SITE BOUNDARIES ON THIS PLAN FOR VISUAL CLARITY.
8. AS SOON AS PRACTICAL, ALL DISTURBED SOIL THAT WILL NOT BE COVERED BY IMPROVED VEGETATION, PARKWAY AREAS, EASEMENT AREAS, EMBANKMENT SLOPES, ETC. WILL BE STABILIZED PER APPLICABLE PROJECT SPECIFICATIONS.
9. BEST MANAGEMENT PRACTICES MAY BE INSTALLED IN STAGES TO COINCIDE WITH THE DISTURBANCE OF UPGRADE AREAS.
10. BEST MANAGEMENT PRACTICES MAY BE REMOVED IN STAGES ONCE THE WATERSHED FOR THAT PORTION CONTROLLED BY THE BEST MANAGEMENT PRACTICES HAS BEEN STABILIZED IN ACCORDANCE WITH TPDES REQUIREMENTS.
11. UPON COMPLETION OF THE PROJECT, INCLUDING SITE STABILIZATION, AND BEFORE FINAL PAYMENT IS ISSUED, CONTRACTOR SHALL REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES, PAYING SPECIAL ATTENTION TO ROCK BERMS IN DRAINAGE FEATURES.
12. WHERE VEGETATED FILTER STRIPS ARE INDICATED, CONTRACTOR SHALL VERIFY THAT SUFFICIENT VEGETATION EXISTS, OTHERWISE CONTRACTOR SHALL PLACE SILT FENCING IN LIEU OF VEGETATED FILTER STRIP.
13. SHADED AREA [ ] DENOTES LIMITS OF DISTURBED AREAS. OTHER AREAS WITHIN THE PROJECT LIMITS, WITH THE EXCEPTION OF A CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARD, ARE NOT A PART OF THIS TPDES STORM WATER POLLUTION PREVENTION PLAN (SWP3) AND WILL NOT BE DISTURBED BY CIVIL CONSTRUCTION ACTIVITIES.
14. PRIOR TO BEGINNING CONSTRUCTION, CONTRACTOR SHALL COORDINATE PLACEMENT OF TEMPORARY BEST MANAGEMENT PRACTICES WITHIN TxDOT RIGHT-OF-WAY WITH TxDOT.
15. NBVI WILL FUNCTION AS A SECONDARY OPERATOR ON THIS PROJECT AND WILL BE INSTALLING ELECTRIC UTILITIES FOR ON-SITE CONSTRUCTION AND OFF-SITE FEED TO THE PROJECT.
16. PER TPDES REQUIREMENTS, DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITIES HAVE CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITY RESUMES WITHIN 21 DAYS. SEEDING DOES NOT CONSTITUTE AS STABILIZATION.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE WATER POLLUTION ABATEMENT PLANS (WPAP) REGULATIONS.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF THE WPAP ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 1**



**TEMPORARY BMP MODIFICATIONS**

DATE	SIGNATURE	DESCRIPTION

DATE: \_\_\_\_\_

NO. REVISION: \_\_\_\_\_

11-17-2023

JOCelyn PEREZ  
 98367  
 LICENSED PROFESSIONAL ENGINEER

*Jocelyn Perez*

**PAPE-DAWSON ENGINEERS**

NEW BRAUNFELS | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
 1075 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78102 | 800.652.5683  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008860

**VERAMENDI WORD PKWY PHASE 3,  
 PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3  
 WATER POLLUTION ABATEMENT PLAN  
 TEMPORARY POLLUTION ABATEMENT PLAN**

PLAT NO. \_\_\_\_\_

JOB NO. 30001-45

DATE SEPTEMBER 2023

DESIGNER \_\_\_\_\_

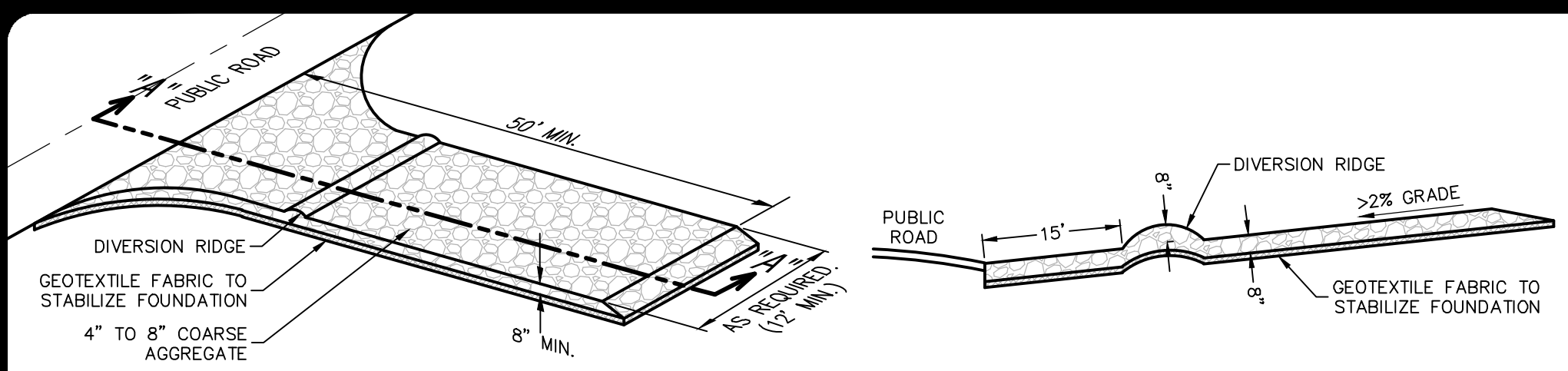
CHECKED DRAWN \_\_\_\_\_

SHEET 2 OF 2

**FOR PERMIT**

Doc: 11-17-2023, 8:33am, User: D:\jpc\ch...  
 File: P:\30001\01\45\Design\Environmental\11-17-2023-30001-45-wp3p.dwg

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthographic Program, USDA Farm Service Agency.



**SCHEMATIC OF TEMPORARY CONSTRUCTION ENTRANCE/EXIT**

**MATERIALS**

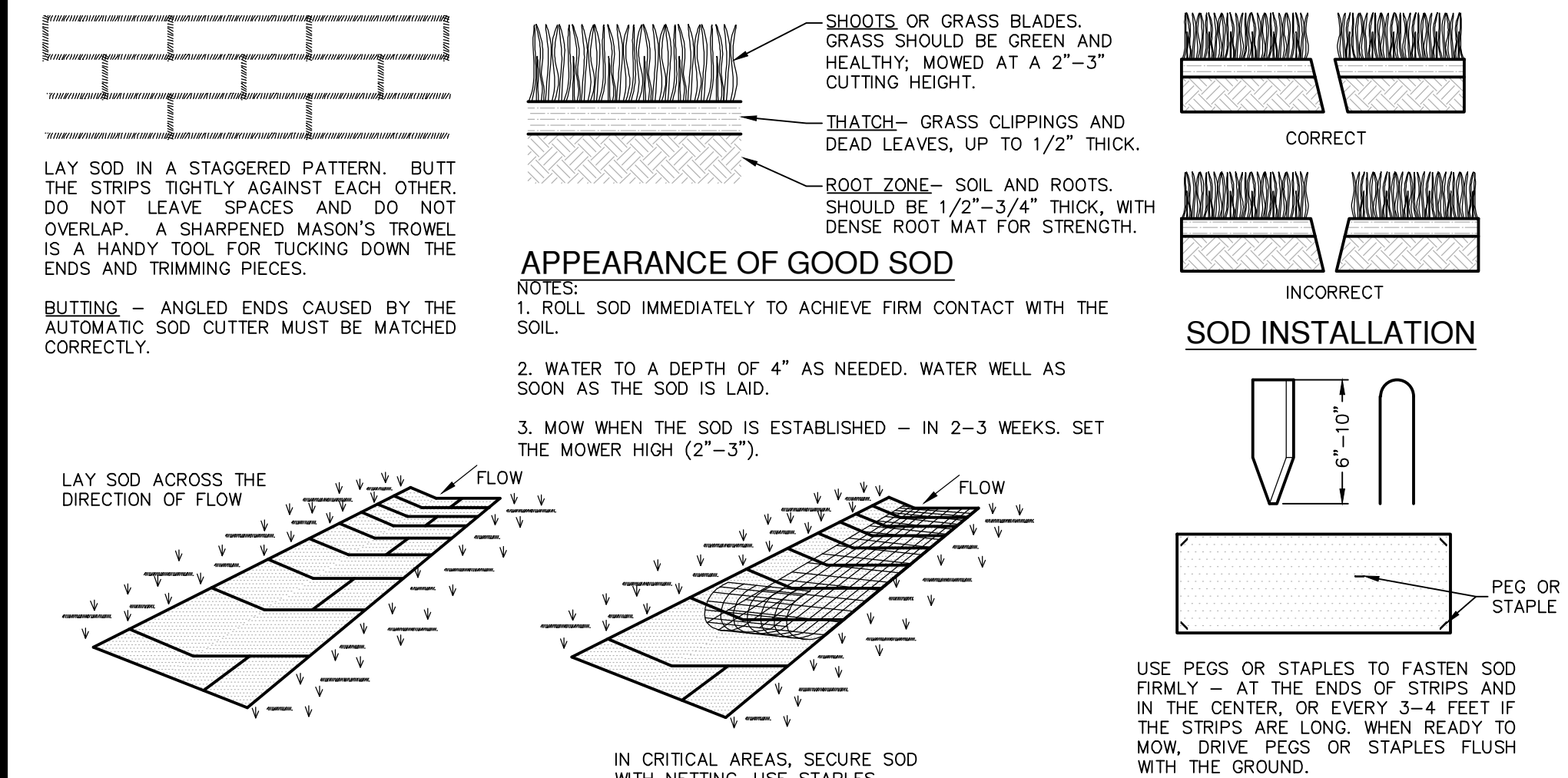
1. THE AGGREGATE SHOULD CONSIST OF 4-INCH TO 8-INCH WASHED STONE OVER A STABLE FOUNDATION AS SPECIFIED IN THE PLAN.
2. THE AGGREGATE SHOULD BE PLACED WITH A MINIMUM THICKNESS OF 8-INCHES.
3. THE GEOTEXTILE FABRIC SHOULD BE DESIGNED SPECIFICALLY FOR USE AS A SOIL FILTRATION MEDIA WITH AN APPROXIMATE WEIGHT OF 6 OZ/YD<sup>2</sup>, A MULLEN BURST RATING OF 140 LB/IN<sup>2</sup>, AND AN EQUIVALENT OPENING SIZE GREATER THAN A NUMBER 50 SIEVE.
4. IF A WASHING FACILITY IS REQUIRED, A LEVEL AREA WITH A MINIMUM OF 4-INCH DIAMETER WASHED STONE OR COMMERCIAL ROCK SHOULD BE INCLUDED IN THE PLANS. DIVERT WASTEWATER TO A SEDIMENT TRAP OR BASIN.

**INSTALLATION**

1. AVOID CURVES ON PUBLIC ROADS AND STEEP SLOPES. REMOVE VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA. GRADE CROWN FOUNDATION FOR POSITIVE DRAINAGE.
2. THE MINIMUM WIDTH OF THE ENTRANCE/EXIT SHOULD BE 12 FEET OR THE FULL WIDTH OF EXIT ROADWAY, WHICHEVER IS GREATER.
3. THE CONSTRUCTION ENTRANCE SHOULD BE AT LEAST 50 FEET LONG.
4. IF THE SLOPE TOWARD THE ROAD EXCEEDS 2%, CONSTRUCT A RIDGE, 6-INCHES TO 8-INCHES HIGH WITH 3:1 (H:V) SIDE SLOPES, ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE ENTRANCE TO DIVERT RUNOFF AWAY FROM THE PUBLIC ROAD.
5. PLACE GEOTEXTILE FABRIC AND GRADE FOUNDATION TO IMPROVE STABILITY, ESPECIALLY WHERE WET CONDITIONS ARE ANTICIPATED.
6. PLACE STONE TO DIMENSIONS AND GRADE SHOWN ON PLANS. LEAVE SURFACE SMOOTH AND SLOPE FOR DRAINAGE.
7. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE STONE PAD TO A SEDIMENT TRAP OR BASIN.
8. INSTALL PIPE UNDER PAD AS NEEDED TO MAINTAIN PROPER PUBLIC ROAD DRAINAGE.

**STABILIZED CONSTRUCTION ENTRANCE/EXIT DETAIL**

NOT-TO-SCALE



**APPEARANCE OF GOOD SOD**

- NOTES:
1. ROLL SOD IMMEDIATELY TO ACHIEVE FIRM CONTACT WITH THE SOIL.
  2. WATER TO A DEPTH OF 4" AS NEEDED. WATER WELL AS SOON AS THE SOD IS LAID.
  3. MOW WHEN THE SOD IS ESTABLISHED - IN 2-3 WEEKS. SET THE MOWER HIGH (2"-3").

**MATERIALS**

1. SOD SHOULD BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF 3/4" INCH (± 1/4" INCH) AT THE TIME OF CUTTING. THIS THICKNESS SHOULD EXCLUDE SHOOT GROWTH AND THATCH.
2. PIECES OF SOD SHOULD BE CUT TO THE SUPPLIER'S STANDARD WIDTH AND LENGTH, WITH A MAXIMUM ALLOWABLE DEVIATION IN ANY DIMENSION OF 5%. TORN OR UNEVEN PADS SHOULD NOT BE ACCEPTABLE.
3. STANDARD SIZE SECTIONS OF SOD SHOULD BE STRONG ENOUGH TO SUPPORT THEIR OWN WEIGHT AND THEIR SIZE AND SHAPE WHEN SUSPENDED FROM A FIRM GRASP ON ONE END OF THE SECTION.
4. SOD SHOULD BE HARVESTED, DELIVERED, AND INSTALLED WITHIN A PERIOD OF 36 HOURS.

**SITE PREPARATION**

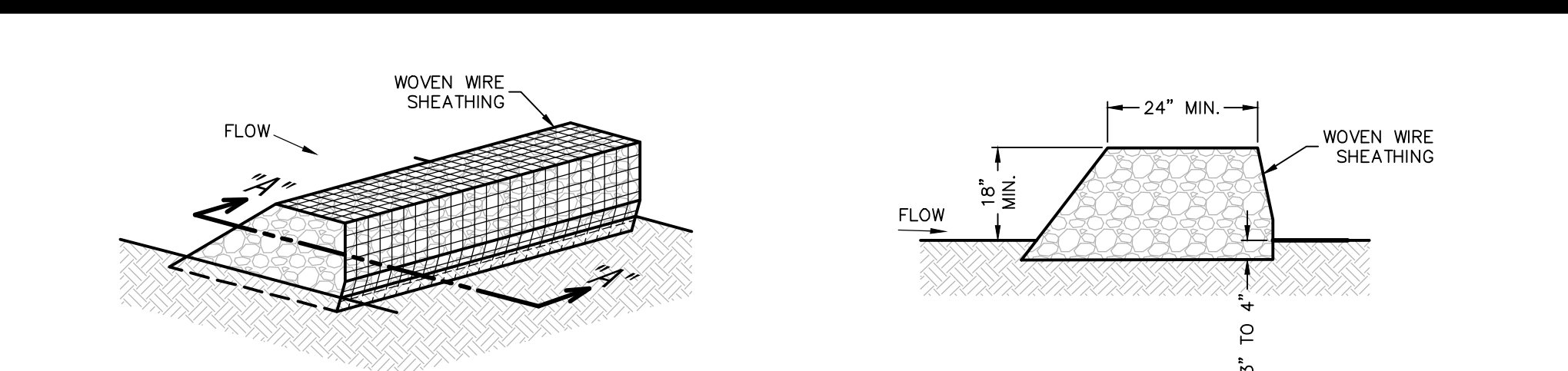
1. PRIOR TO SOD PREPARATION, AREAS TO BE SODDED SHOULD BE BROUGHT TO FINAL GRADE IN ACCORDANCE WITH THE APPROVED PLAN.
2. THE SURFACE SHOULD BE CLEARED OF ALL TRASH, DEBRIS AND OF ALL ROOTS, BRUSH, WIRE GRADE STAKES AND OTHER OBJECTS THAT WOULD INTERFERE WITH PLANTING, FERTILIZING OR MAINTENANCE OPERATIONS.
3. FERTILIZE ACCORDING TO SOIL TESTS. FERTILIZER NEEDS CAN BE DETERMINED BY A SOIL TESTING LABORATORY OR REGIONAL RECOMMENDATIONS CAN BE MADE BY COUNTY AGRICULTURAL EXTENSION AGENTS. FERTILIZER SHOULD BE WORKED INTO THE SOIL TO A DEPTH OF 3 INCHES WITH A DISC, SPRINGTOOTH HARROW OR OTHER SUITABLE EQUIPMENT. ON SLOPING LAND, THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE CONTOUR.

**INSTALLATION IN CHANNELS**

1. SOD STRIPS IN WATERWAYS SHOULD BE LAID PERPENDICULAR TO THE DIRECTION OF FLOW. CARE SHOULD BE TAKEN TO BUTT ENDS OF STRIPS TIGHTLY (SEE FIGURE ABOVE).
2. AFTER ROLLING OR TAMPING, SOD SHOULD BE PEGGED OR STAPLED TO RESIST WASHOUT DURING THE ESTABLISHMENT PERIOD. MESH OR OTHER NETTING MAY BE PEGGED OVER THE SOD FOR EXTRA PROTECTION IN CRITICAL AREAS.

**SOD INSTALLATION DETAIL**

NOT-TO-SCALE



**ISOMETRIC PLAN VIEW**

**ROCK BERMS**

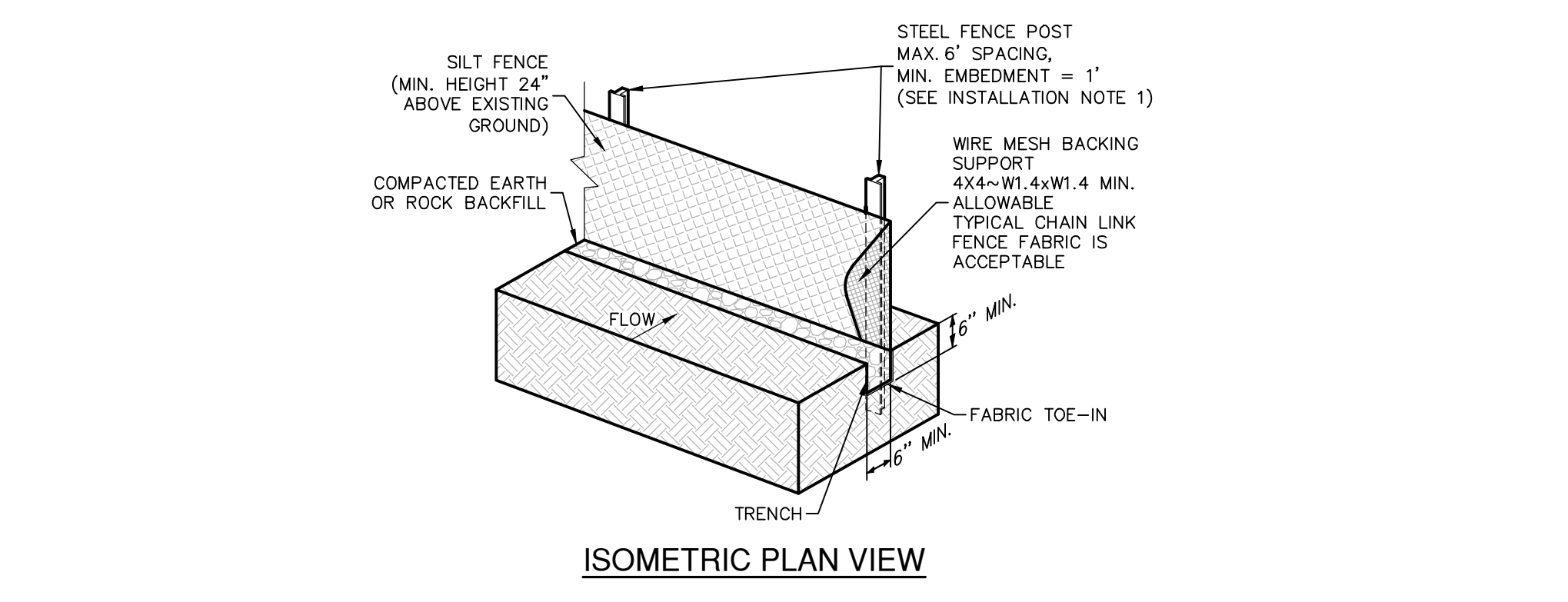
THE PURPOSE OF A ROCK BERM IS TO SERVE AS A CHECK DAM IN AREAS OF CONCENTRATED FLOW, TO INTERCEPT SEDIMENT-LADEN RUNOFF, DETAIN THE SEDIMENT AND RELEASE THE WATER IN SHEET FLOW. THE ROCK BERM SHOULD BE USED WHEN THE CONTRIBUTING DRAINAGE AREA IS LESS THAN 5 ACRES. ROCK BERMS ARE USED IN AREAS WHERE THE 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 BERM 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.

**ROCK BERM DETAIL**

NOT-TO-SCALE



**ISOMETRIC PLAN VIEW**

**SILT FENCE**

A SILT FENCE IS A BARRIER CONSISTING OF GEOTEXTILE FABRIC SUPPORTED BY METAL POSTS TO PREVENT SOIL AND SEDIMENT LOSS FROM A SITE. WHEN PROPERLY USED, SILT FENCES CAN BE HIGHLY EFFECTIVE AT CONTROLLING SEDIMENT FROM DISTURBED AREAS. THEY CAUSE RUNOFF TO POND, ALLOWING HEAVIER SOLIDS TO SETTLE OUT. IF NOT PROPERLY INSTALLED, SILT FENCES ARE NOT LIKELY TO BE EFFECTIVE.

THE PURPOSE OF A SILT FENCE IS TO INTERCEPT AND DETAIN WATER-BORN 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.

**MATERIALS**

1. SILT FENCE MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE WOVEN OR NONWOVEN FABRIC. THE FABRIC SHOULD BE 36 INCHES, WITH A MINIMUM UNIT WEIGHT OF 4.5 OZ/YD, MULLEN BURST STRENGTH EXCEEDING 190 LB/IN<sup>2</sup>, ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NUMBER 30.

2. FENCE POSTS SHOULD BE MADE OF HOT ROLLED STEEL, AT LEAST 4 FEET LONG WITH TEE OR Y-BAR CROSS SECTION, SURFACE PAINTED OR GALVANIZED, MINIMUM WEIGHT 1.25 LB/FT, AND BRINDELL HARDNESS EXCEEDING 140.

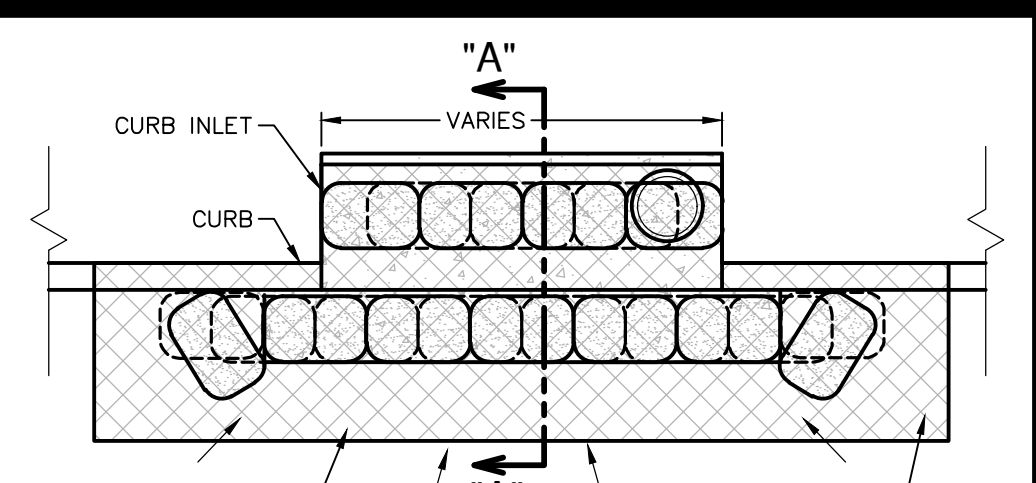
3. WOVEN WIRE BACKING TO SUPPORT THE FABRIC SHOULD BE GALVANIZED 2" X 4" WELDED WIRE, 12 GAUGE MINIMUM.

**INSTALLATION**

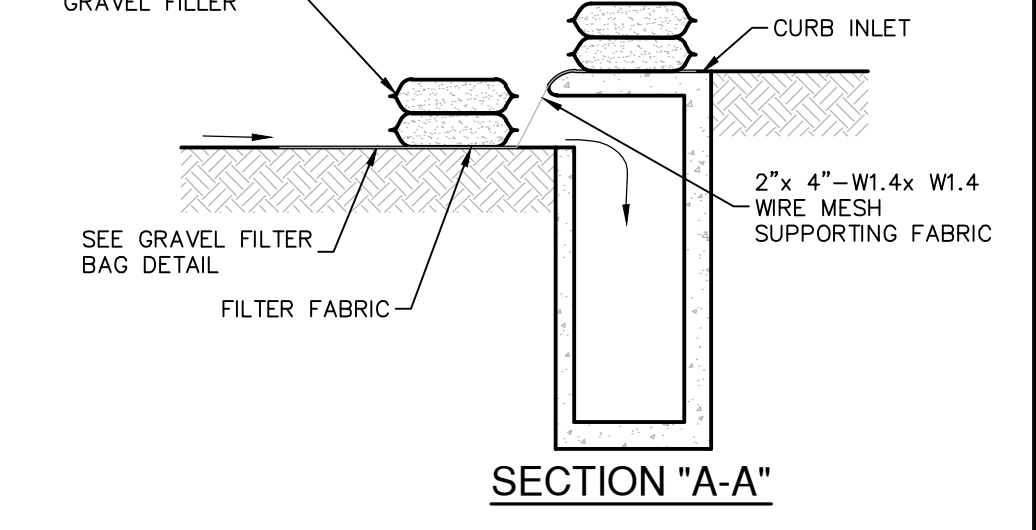
1. STEEL POSTS, WHICH SUPPORT THE SILT FENCE, SHOULD BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF 1-FOOT DEEP AND SPACED NOT MORE THAN 8 FEET ON CENTER. WHERE WATER CONCENTRATES, THE MAXIMUM SPACING SHOULD BE 6 FEET.
2. LAY OUT FENCING DOWN-SLOPE OF DISTURBED AREA, FOLLOWING THE CONTOUR AS CLOSELY AS POSSIBLE. THE FENCE SHOULD BE SITED SO THAT THE MAXIMUM DRAINAGE AREA IS 1/4 ACRE/100 FEET OF FENCE.

**SILT FENCE DETAIL**

NOT-TO-SCALE



**PLAN VIEW**



**SECTION "A-A"**

**GENERAL NOTES**

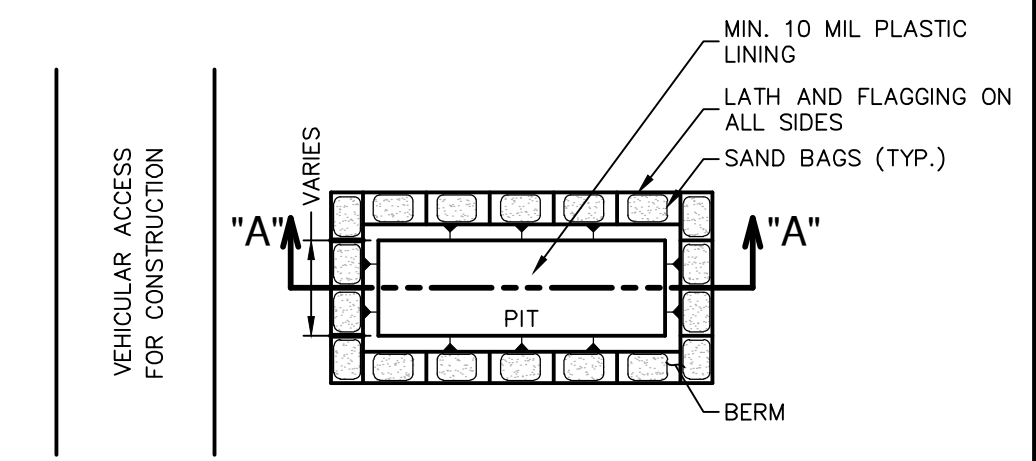
1. CONTRACTOR TO INSTALL 2"x4"-W1.4xW1.4 WIRE MESH SUPPORTING FILTER FABRIC OVER THE INLET OPENING. FABRIC MUST BE SECURED TO WIRE BACKING WITH CLIPS OR WIRE TIES AT THIS LOCATION. SAND BAGS FILLED WITH WASHED PEA GRAVEL SHOULD BE PLACED ON TOP OF WIRE MESH ON TOP OF THE INLET AS SHOWN ON THIS DETAIL TO HOLD WIRE MESH IN PLACE. SANDBAGS FILLED WITH WASHED PEA GRAVEL SHOULD ALSO BE PLACED ALONG THE CUTTER AS SHOWN ON THIS DETAIL TO HOLD WIRE MESH IN PLACE. SAND BAGS TO BE STACKED TO FORM A CONTINUOUS BARRIER AROUND INLETS.
2. THE BAGS SHOULD BE TIGHTLY ABUTTED AGAINST EACH OTHER TO PREVENT RUNOFF FROM FLOWING BETWEEN THE BAGS.

**INSPECTION AND MAINTENANCE GUIDELINES**

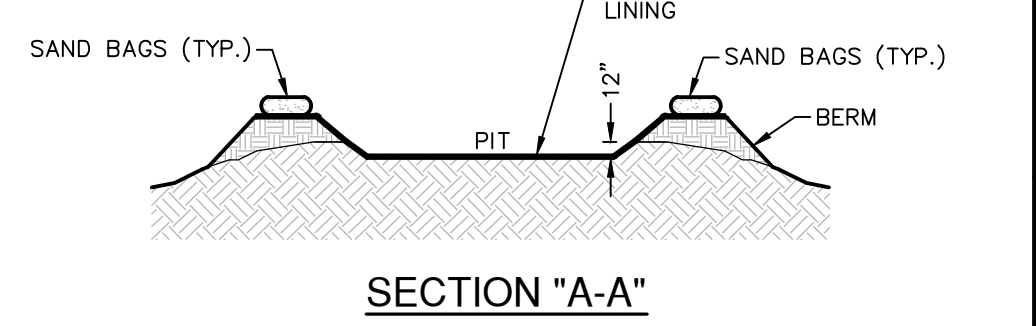
1. INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
2. REMOVE SEDIMENT WHEN BUILDUP REACHES A DEPTH OF 3 INCHES. REMOVED SEDIMENT SHOULD BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
3. 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.

**BAGGED GRAVEL CURB INLET PROTECTION DETAIL**

NOT-TO-SCALE



**PLAN VIEW**



**SECTION "A-A"**

**GENERAL NOTES**

1. DETAIL ABOVE ILLUSTRATES MINIMUM DIMENSIONS. PIT CAN BE INCREASED IN SIZE DEPENDING ON EXPECTED FREQUENCY OF USE.
2. WASHOUT PIT SHALL BE LOCATED IN AN AREA EASILY ACCESSIBLE TO CONSTRUCTION TRAFFIC.
3. WASHOUT PIT SHALL NOT BE LOCATED IN AREAS SUBJECT TO INUNDATION FROM STORM WATER RUNOFF.
4. LOCATE WASHOUT AREA AT LEAST 50 FEET FROM SENSITIVE FEATURES, STORM DRAINS, OPEN DITCHES OR WATER BODIES.
5. TEMPORARY CONCRETE WASHOUT FACILITY SHOULD BE CONSTRUCTED WITH SUFFICIENT QUANTITY AND VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.

**MATERIALS**

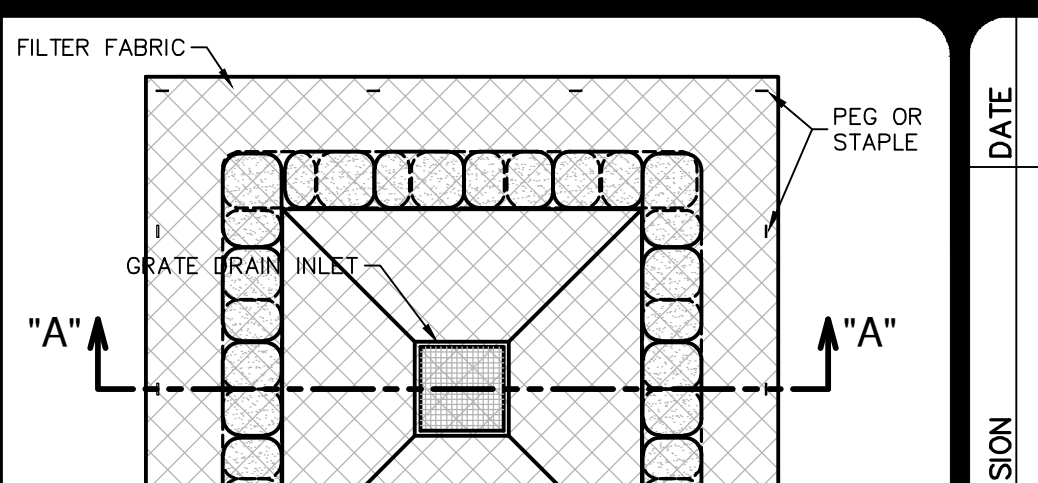
PLASTIC LINING MATERIAL SHOULD BE A MINIMUM OF 10 MIL IN POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL.

**MAINTENANCE**

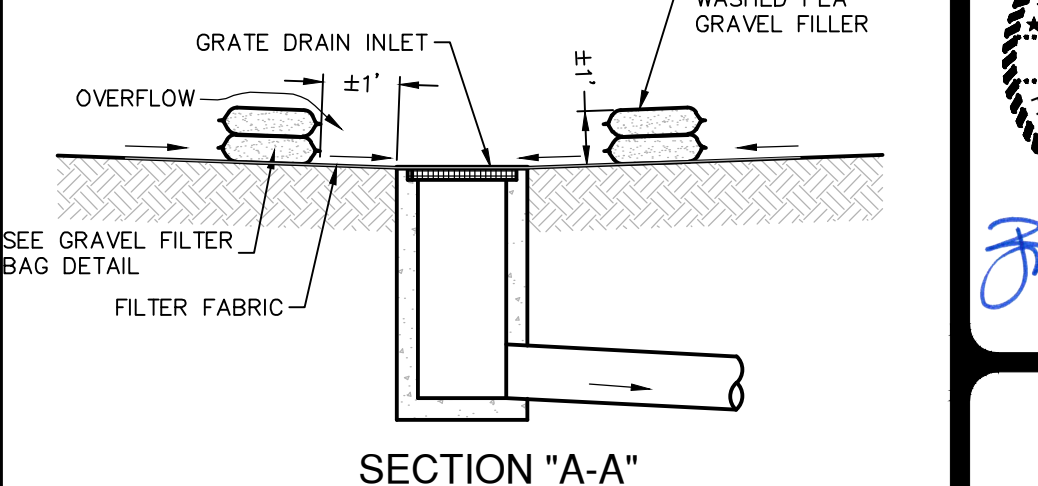
1. WHEN TEMPORARY CONCRETE WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR THE WORK, THE HARDENED CONCRETE SHOULD BE REMOVED AND DISPOSED OF.
2. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE REMOVED FROM THE SITE OF THE WORK AND DISPOSED OF.
3. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCES CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE BACKFILLED AND REPAIRED.

**CONCRETE TRUCK WASHOUT PIT DETAIL**

NOT-TO-SCALE



**PLAN VIEW**



**SECTION "A-A"**

**GENERAL NOTES**

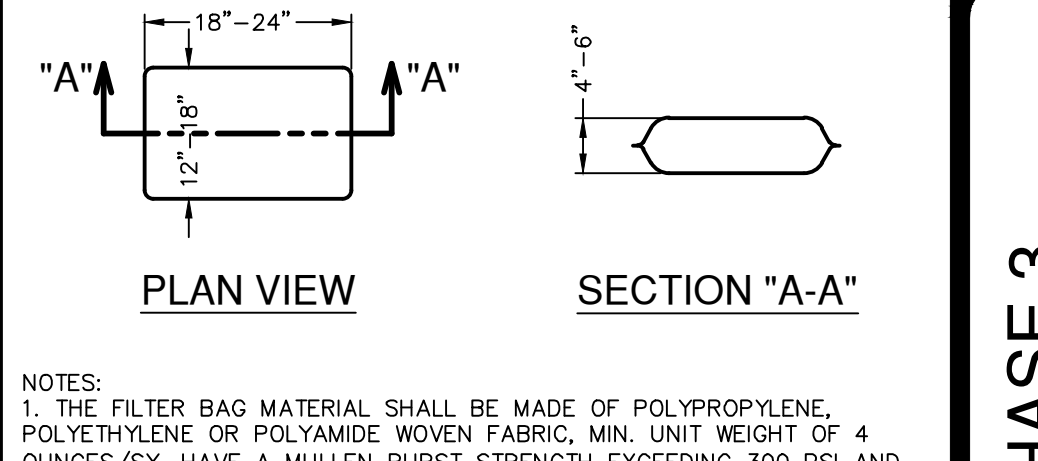
1. THE SANDBAGS SHOULD BE FILLED WITH WASHED PEA GRAVEL AND STACKED TO FORM A CONTINUOUS BARRIER ABOUT 1 FOOT HIGH AROUND INLETS.
2. THE BAGS SHOULD BE TIGHTLY ABUTTED AGAINST EACH OTHER TO PREVENT RUNOFF FROM FLOWING BETWEEN THE BAGS.

**INSPECTION AND MAINTENANCE GUIDELINES**

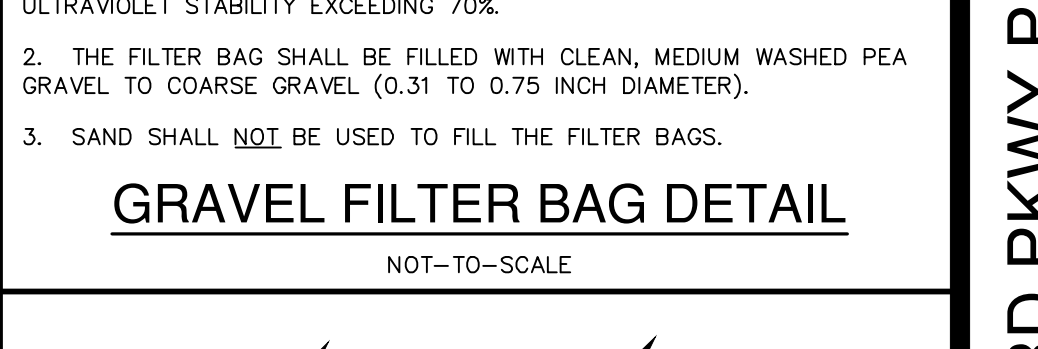
1. INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
2. REMOVE SEDIMENT WHEN BUILDUP REACHES A DEPTH OF 3 INCHES. REMOVED SEDIMENT SHOULD BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
3. 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.

**BAGGED GRAVEL GRATE INLET PROTECTION DETAIL**

NOT-TO-SCALE



**PLAN VIEW**



**SECTION "A-A"**

**GENERAL NOTES**

1. THE FILTER BAG MATERIAL SHALL BE MADE OF POLYPROPYLENE, POLYETHYLENE OR POLYAMIDE WOVEN FABRIC, MIN. UNIT WEIGHT OF 4 OUNCES/SY, HAVE A MULLEN BURST STRENGTH EXCEEDING 300 PSI AND ULTRAVIOLET STABILITY EXCEEDING 70%.
2. THE FILTER BAG SHALL BE FILLED WITH CLEAN, MEDIUM WASHED PEA GRAVEL TO COARSE GRAVEL (0.31 TO 0.75 INCH DIAMETER).
3. SAND SHALL NOT BE USED TO FILL THE FILTER BAGS.

**CONSTRUCTION STAGING AREA**

NOT-TO-SCALE

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF THE SWP3 ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

DATE	
NO.	
REVISION	



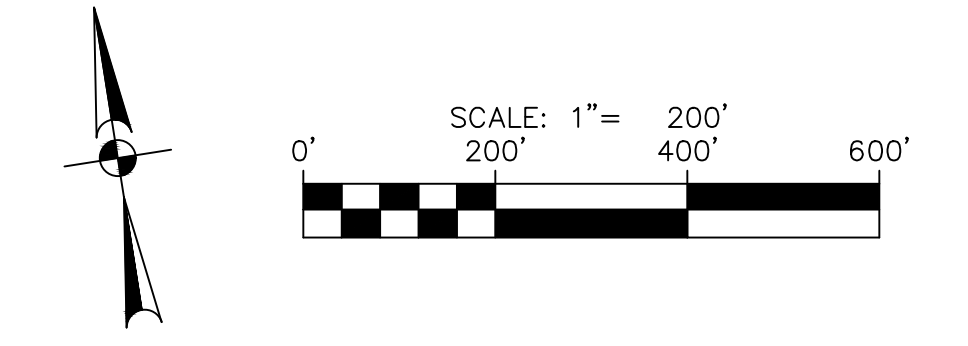
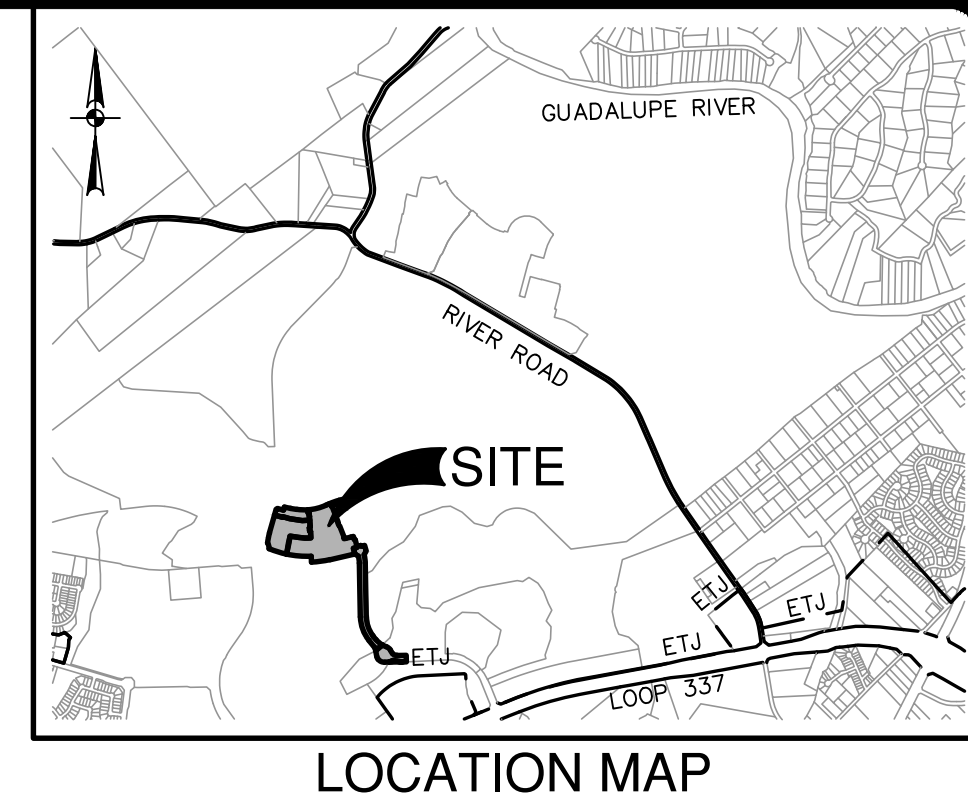
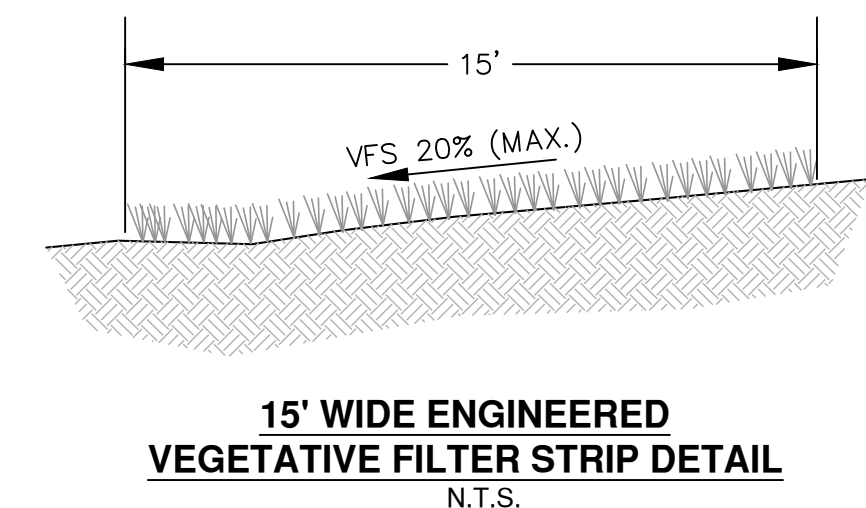
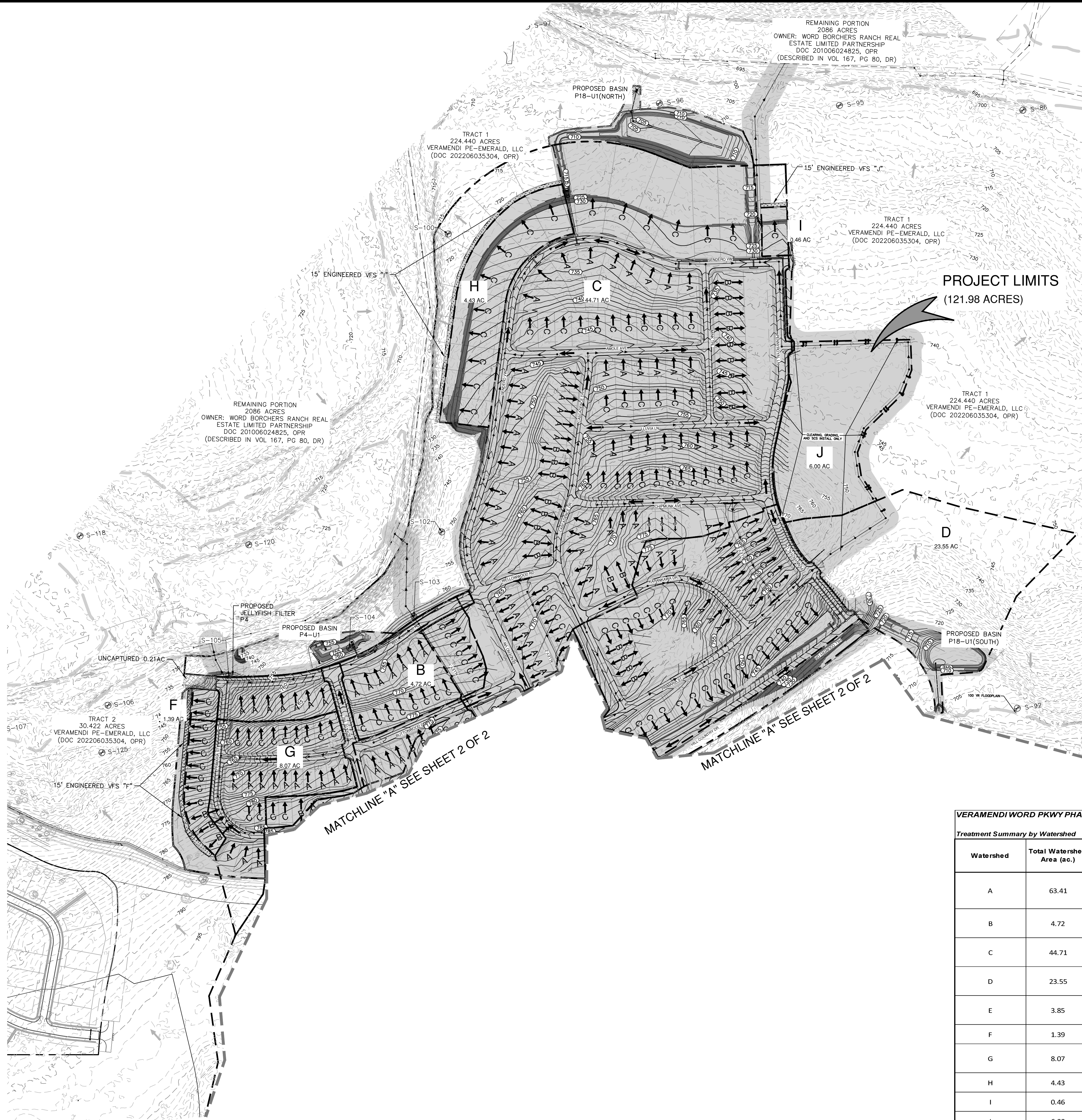
**PAPE-DAWSON ENGINEERS**

NEW BRUNSWICK | SAN ANTONIO | AUSTIN | HOUSTON | FT. WORTH | DALLAS  
 1675 INDEPENDENCE DR. STE. 102 | NEW BRUNSWICK, TX 78102 | 800.632.5983  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008860

**VERAMENDI WORD PKWY PHASE 3,  
 PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3  
 WATER POLLUTION ABATEMENT PLAN DETAILS**

PLAT NO.	30001-45
JOB NO.	30001-45
DATE	SEPTEMBER 2023
DESIGNER	GDL
CHECKED	DRAWN
SHEET	1 OF 2

FOR PERMIT



**LEGEND**

DISTURBED AREA	[Symbol]
EXISTING CONTOUR	[Symbol]
PROPOSED CONTOUR	[Symbol]
100 YR FLOODPLAIN	[Symbol]
DRAINAGE AREA BOUNDARY	[Symbol]
FHA LOT GRADING TYPE	[Symbol]
DIRECTION OF FLOW	[Symbol]
WATERSHED	[Symbol]
VEGETATIVE FILTER STRIPS	[Symbol]
UNCAPTURED IMPERVIOUS COVER	[Symbol]
POTENTIAL RECHARGE FEATURE	[Symbol]

**SUMMARY OF PERMANENT POLLUTION ABATEMENT MEASURES**

- TEMPORARY BMP'S WILL BE MAINTAINED UNTIL THE SITE IMPROVEMENTS ARE COMPLETED AND THE SITE HAS BEEN STABILIZED, INCLUDING SUFFICIENT VEGETATION BEING ESTABLISHED.
- DURING CONSTRUCTION, TO THE EXTENT PRACTICAL, CONTRACTOR SHALL MINIMIZE THE AREA OF SOIL DISTURBANCE. AREAS OF DISTURBED SOIL SHALL BE REVEGETATED TO STABILIZE SOIL USING SOLID SOD IN A STAGGERED PATTERN. SEE DETAIL ON TEMPORARY POLLUTION ABATEMENT DETAIL SHEET AND REFER TO SECTION 1.3.11 IN TCEQ'S TECHNICAL GUIDANCE MANUAL RG-348 (2005). SOD SHOULD BE USED IN CHANNELS AND ON SLOPES > 15%. THE CONTRACTOR MAY SUBSTITUTE THE USE OF SOD WITH THE PLACEMENT OF TOP SOIL AND A FRIABLE SEED BED WITH A PROTECTIVE MATTING OR HYDRAULIC MULCH ALONG WITH WATERING UNTIL VEGETATION IS ESTABLISHED. APPLICATIONS AND PRODUCTS SHALL BE THOSE APPROVED BY TxDOT AS OF FEBRUARY 2001 AND IN COMPLIANCE WITH THE TGM RG-348 (2005). SEED MIXTURE AND/OR GRASS TYPE TO BE DETERMINED BY OWNER AND SHOULD BE IN COMPLIANCE WITH TGM RG-348 (2005) GUIDELINES. IRRIGATION MAY BE REQUIRED IN ORDER TO ESTABLISH SUFFICIENT VEGETATION.
- FOR DISTURBED AREAS WHERE INSUFFICIENT SOIL EXISTS TO ESTABLISH VEGETATION, CONTRACTOR SHALL PLACE A MINIMUM OF 6" OF TOPSOIL PRIOR TO REVEGETATION.
- PERMANENT BMP'S FOR THIS SITE INCLUDE BATCH DETENTION BASINS, JELLYFISH FILTER VAULTS, AND VEGETATIVE FILTER STRIPS (VFS). THESE PERMANENT BMP'S HAVE BEEN DESIGNED TO REMOVE AT LEAST 80% OF THE INCREASED TOTAL SUSPENDED SOLIDS (TSS) FOR THE SITE IN ACCORDANCE WITH THE TCEQ'S TECHNICAL GUIDANCE MANUAL (TGM) RG-348 (2005).

**PERMANENT POLLUTION ABATEMENT MEASURES**

- SILT FENCING AND ROCK BERMS, WHERE APPROPRIATE, WILL BE MAINTAINED UNTIL THE ROADWAY, UTILITY, DRAINAGE IMPROVEMENTS, AND BUILDING CONSTRUCTION ARE COMPLETED.
- BATCH DETENTION BASINS, JELLYFISH FILTER VAULTS, AND VEGETATIVE FILTER STRIPS (VFS) WILL SERVE AS THE PERMANENT BEST MANAGEMENT PRACTICE (BMP) FOR THE AREA.
- ENERGY DISSIPATORS (TO HELP REDUCE EROSION) WILL BE PROVIDED AT POINTS OF CONCENTRATED DISCHARGE WHERE EXCESSIVE VELOCITIES MAY BE ENCOUNTERED.

**NOTES:**

- CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION FOR SOIL STABILIZATION PRIOR TO SITE CLOSURE.
- ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSES OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

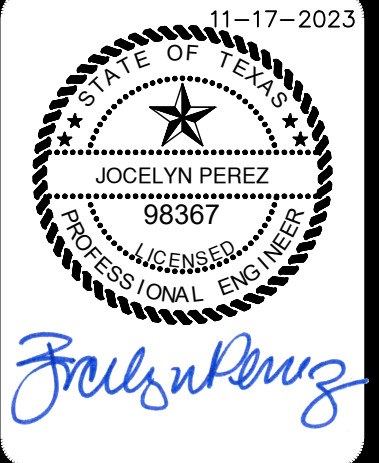
THIS SHEET HAS BEEN PREPARED FOR THE PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**VERAMENDI WORD PKWY PHASE 3/PRECINCT 18 UNIT 1/ PRECINCT 4 UNITS 1,2,&3**

Treatment Summary by Watershed					
Watershed	Total Watershed Area (ac.)	Proposed Impervious Cover to Treat (ac.)	PBMP	Required TSS Removal Annually (lbs)	TSS Removed Annually (lbs)
A	63.41	10.93	Proposed Batch Detention Basin Word Pkwy Phase 3	9,811	10,940
B	4.72	2.29	Proposed Batch Detention Basin P4 Unit 1	2,056	2,144
C	44.71	21.55	Proposed Batch Detention Basin P18 Unit 1 (North)	19,343	20,350
D	23.55	6.84	Proposed Batch Detention Basin P18 Unit 1 (South)	6,140	6,549
E	3.85	1.37	Proposed Jellyfish Filter Word Pkwy Phase 3	1,230	1,230
F	1.39	0.94	Proposed Vegetative Filter Strip	844	927
G	8.07	4.48	Proposed Jellyfish Filter P4	4,021	4,021
H	4.43	3.18	Proposed Vegetative Filter Strip	2,854	3,105
I	0.46	0.36	Proposed Vegetative Filter Strip	323	351
J	6.00	-	Grading and SCS Installation	-	-
Uncaptured	0.46	0.30	Overtreatment	269	-
<b>TOTAL</b>	<b>161.05</b>	<b>62.24</b>		<b>46,891</b>	<b>49,617</b>

**EXHIBIT 3**

DATE	
NO.	
REVISION	



**PAPE-DAWSON ENGINEERS**

NEW BRUNSWICK, SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
 1075 INDEPENDENCE DR, STE 102 | NEW BRUNSWICK, TX 78132 | 800.852.5653  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008880

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3**

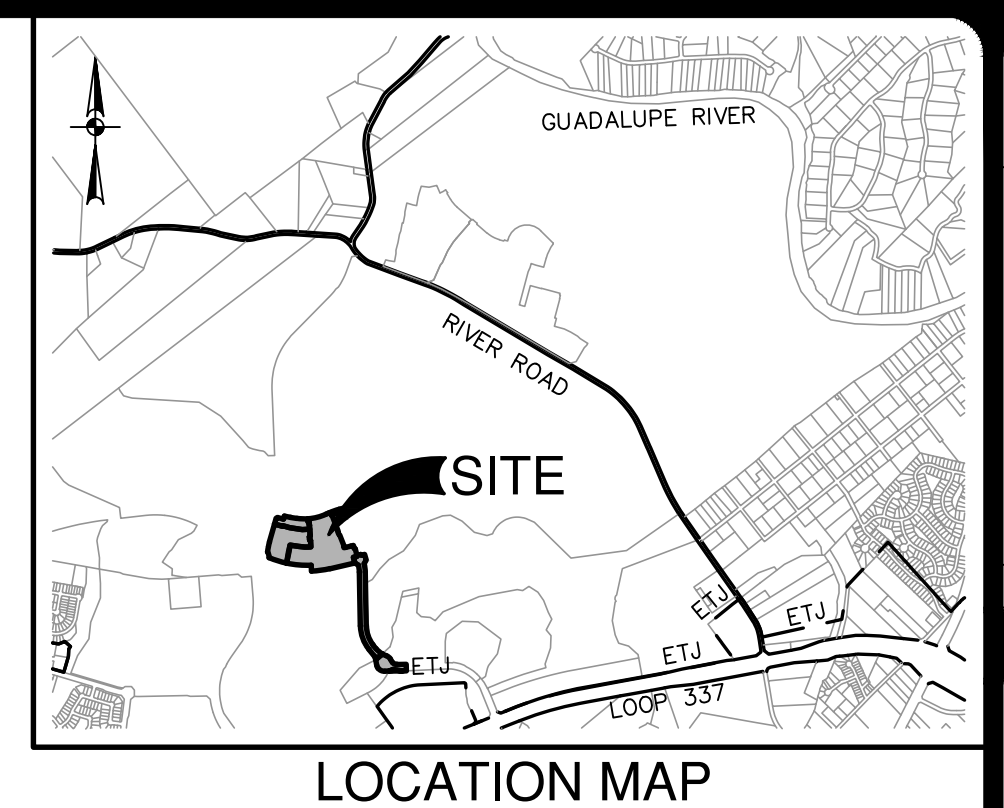
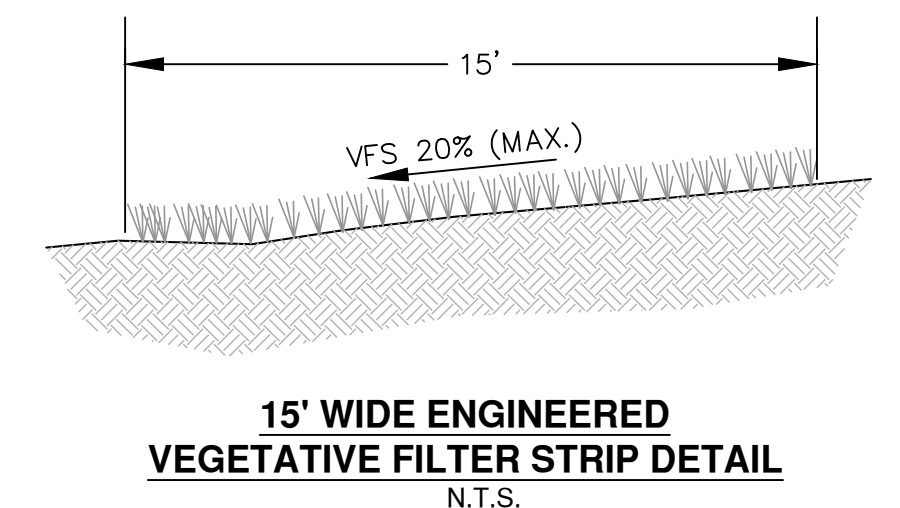
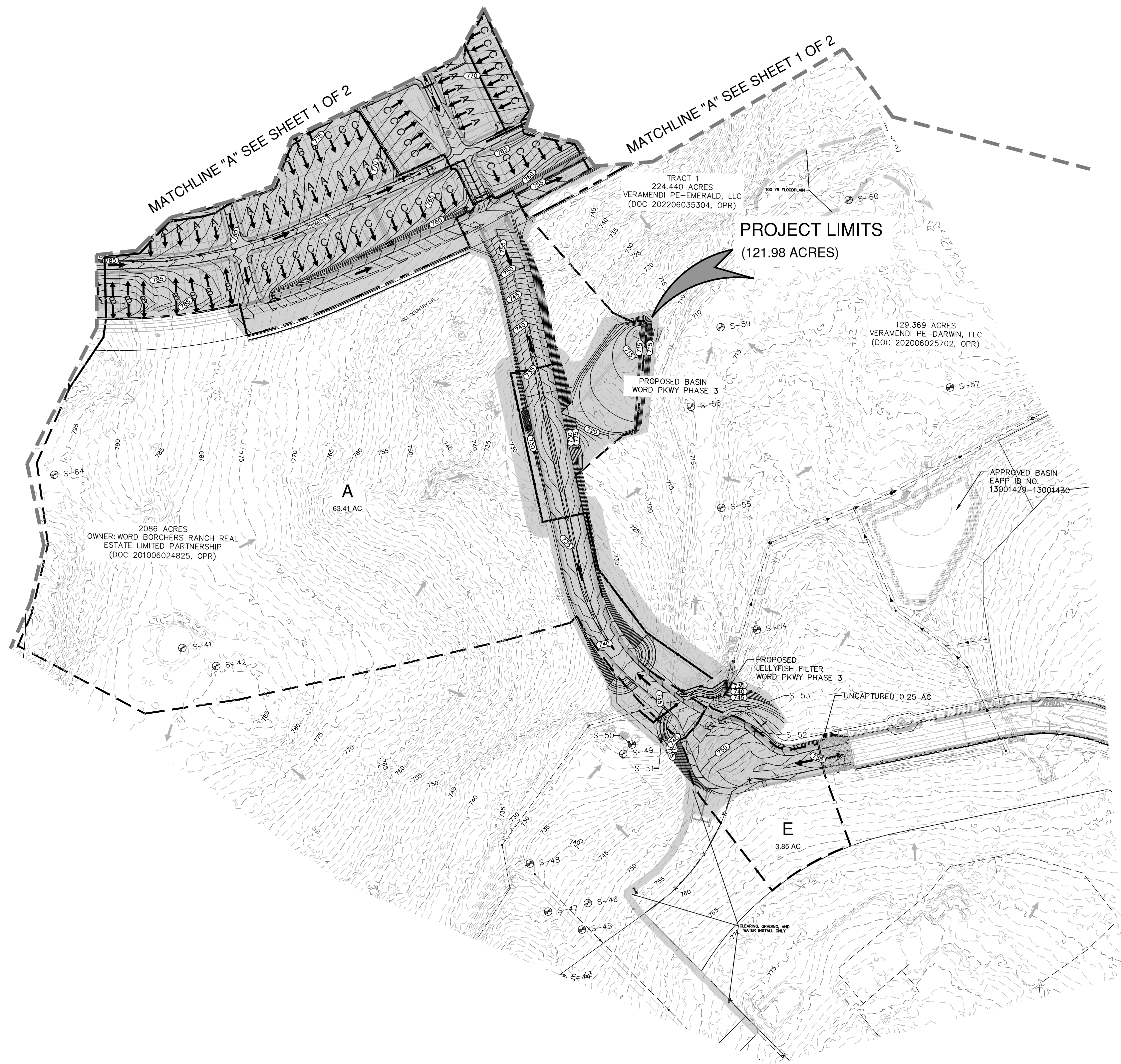
**WATER POLLUTION ABATEMENT PLAN**

**PERMANENT WATER POLLUTION ABATEMENT PLAN**

PLAT NO.	
JOB NO.	30001-45
DATE	SEPTEMBER 2023
DESIGNER	GDL
CHECKED	DRAWN
SHEET	1 OF 2

**FOR PERMIT**

DATE: Nov 17, 2023, 8:12am, User: dlw, File: P:\300\01\45\Design\Environmental\Plan\30001-45-wp20.dwg  
 THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthology Program, USDA Farm Service Agency.



**LEGEND**

DISTURBED AREA	690
EXISTING CONTOUR	970
100 YR FLOODPLAIN	---
DRAINAGE AREA BOUNDARY	---
FHA LOT GRADING TYPE	A, B, C
DIRECTION OF FLOW	→
WATERSHED	A
VEGETATIVE FILTER STRIPS	---•---
UNCAPTURED IMPERVIOUS COVER	---#---
POTENTIAL RECHARGE FEATURE	S-#

**SUMMARY OF PERMANENT POLLUTION ABATEMENT MEASURES**

- TEMPORARY BMP'S WILL BE MAINTAINED UNTIL THE SITE IMPROVEMENTS ARE COMPLETED AND THE SITE HAS BEEN STABILIZED, INCLUDING SUFFICIENT VEGETATION BEING ESTABLISHED.
- DURING CONSTRUCTION, TO THE EXTENT PRACTICAL, CONTRACTOR SHALL MINIMIZE THE AREA OF SOIL DISTURBANCE. AREAS OF DISTURBED SOIL SHALL BE REVEGETATED TO STABILIZE SOIL USING SOLID SOD IN A STAGGERED PATTERN. SEE DETAIL ON TEMPORARY POLLUTION ABATEMENT DETAIL SHEET AND REFER TO SECTION 1.3.11 IN TCEQ'S TECHNICAL GUIDANCE MANUAL RG-348 (2005). SOD SHOULD BE USED IN CHANNELS AND ON SLOPES > 15%. THE CONTRACTOR MAY SUBSTITUTE THE USE OF SOD WITH THE PLACEMENT OF TOP SOIL AND A FRIABLE SEED BED WITH A PROTECTIVE MATTING OR HYDRAULIC MULCH ALONG WITH WATERING UNTIL VEGETATION IS ESTABLISHED. APPLICATIONS AND PRODUCTS SHALL BE THOSE APPROVED BY TxDOT AS OF FEBRUARY 2001 AND IN COMPLIANCE WITH THE TGM RG-348 (2005). SEED MIXTURE AND/OR GRASS TYPE TO BE DETERMINED BY OWNER AND SHOULD BE IN COMPLIANCE WITH TGM RG-348 (2005) GUIDELINES. IRRIGATION MAY BE REQUIRED IN ORDER TO ESTABLISH SUFFICIENT VEGETATION.
- FOR DISTURBED AREAS WHERE INSUFFICIENT SOIL EXISTS TO ESTABLISH VEGETATION, CONTRACTOR SHALL PLACE A MINIMUM OF 6" OF TOPSOIL PRIOR TO REVEGETATION.
- PERMANENT BMP'S FOR THIS SITE INCLUDE BATCH DETENTION BASINS, JELLYFISH FILTER VAULTS, AND VEGETATIVE FILTER STRIPS (VFS). THESE PERMANENT BMP'S HAVE BEEN DESIGNED TO REMOVE AT LEAST 80% OF THE INCREASED TOTAL SUSPENDED SOLIDS (TSS) FOR THE SITE IN ACCORDANCE WITH THE TCEQ'S TECHNICAL GUIDANCE MANUAL (TGM) RG-348 (2005).

**PERMANENT POLLUTION ABATEMENT MEASURES**

- SILT FENCING AND ROCK BERMS, WHERE APPROPRIATE, WILL BE MAINTAINED UNTIL THE ROADWAY, UTILITY, DRAINAGE IMPROVEMENTS, AND BUILDING CONSTRUCTION ARE COMPLETED.
- BATCH DETENTION BASINS, JELLYFISH FILTER VAULTS, AND VEGETATIVE FILTER STRIPS (VFS) WILL SERVE AS THE PERMANENT BEST MANAGEMENT PRACTICE (BMP) FOR THE AREA.
- ENERGY DISSIPATORS (TO HELP REDUCE EROSION) WILL BE PROVIDED AT POINTS OF CONCENTRATED DISCHARGE WHERE EXCESSIVE VELOCITIES MAY BE ENCOUNTERED.

**NOTES:**

- CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION FOR SOIL STABILIZATION PRIOR TO SITE CLOSURE.
- ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSES OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

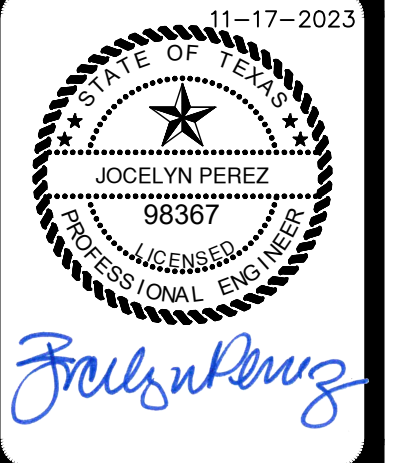
**VERAMENDI WORD PKWY PHASE 3/PRECINCT 18 UNIT 1/ PRECINCT 4 UNITS 1,2,&3**

*Treatment Summary by Watershed*

Watershed	Total Watershed Area (ac.)	Proposed Impervious Cover to Treat (ac.)	PBMP	Required TSS Removal Annually (lbs)	TSS Removed Annually (lbs)
A	63.41	10.93	Proposed Batch Detention Basin Word Pkwy Phase 3	9,811	10,940
B	4.72	2.29	Proposed Batch Detention Basin P4 Unit 1	2,056	2,144
C	44.71	21.55	Proposed Batch Detention Basin P18 Unit 1 (North)	19,343	20,350
D	23.55	6.84	Proposed Batch Detention Basin P18 Unit 1 (South)	6,140	6,549
E	3.85	1.37	Proposed Jellyfish Filter Word Pkwy Phase 3	1,230	1,230
F	1.39	0.94	Vegetative Filter Strip	844	927
G	8.07	4.48	Proposed Jellyfish Filter P4	4,021	4,021
H	4.43	3.18	Vegetative Filter Strip	2,854	3,105
I	0.46	0.36	Vegetative Filter Strip	323	351
J	6.00	-	Grading and SCS Installation	-	-
Uncaptured	0.46	0.30	Overtreatment	269	-
<b>TOTAL</b>	<b>161.05</b>	<b>62.24</b>		<b>46,891</b>	<b>49,617</b>

**EXHIBIT 3**

DATE	
NO.	
REVISION	



**PAPE-DAWSON ENGINEERS**

NEW BRUNSWICK | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
1075 INDEPENDENCE DR. SUITE 102 | NEW BRUNSWICK, TX 78132 | 800.852.5653  
TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #10088800

**VERAMENDI WORD PKWY PHASE 3, PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3 WATER POLLUTION ABATEMENT PLAN PERMANENT WATER POLLUTION ABATEMENT PLAN**

PLAT NO.	
JOB NO.	30001-45
DATE	SEPTEMBER 2023
DESIGNER	
CHECKED	DRAWN
SHEET	2 OF 2

**FOR PERMIT**

DATE: Nov 17, 2023, 8:13am, User: DJ, File: E:\300\01\45\Design\Environmental\Plan\30001-45-wp2p.dwg

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthology Program, USDA Farm Service Agency.

**DRAINAGE & GRADING NOTES:**

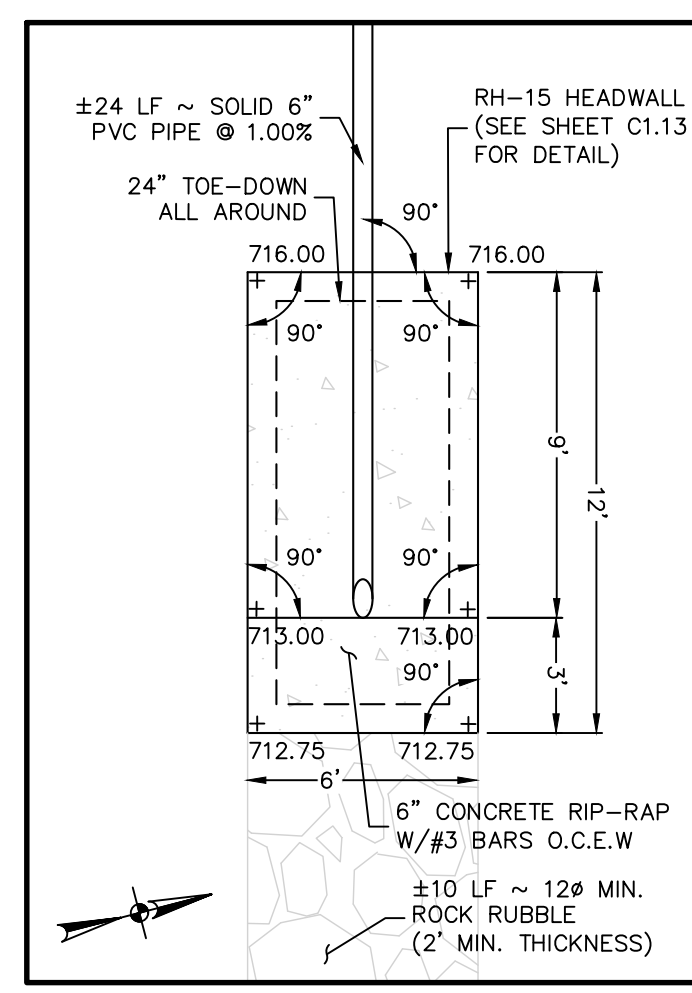
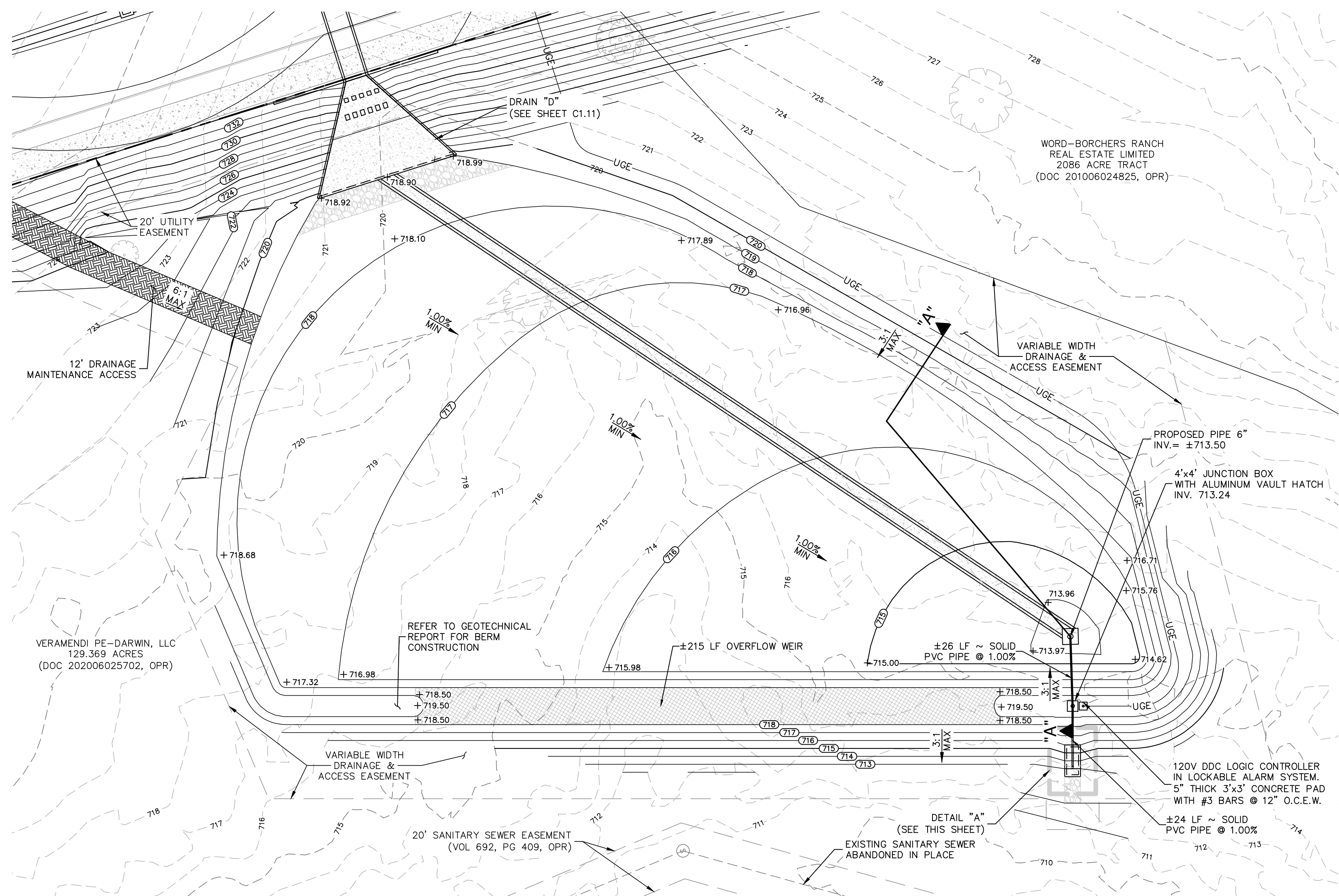
1. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATIONS FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE.
2. ALL CONCRETE FOR TxDOT DRAINAGE STRUCTURES SHALL MEET TxDOT SPECIFICATIONS. ALL OTHER CONCRETE SHALL BE CLASS "A" 3000 PSI CYLINDER STRENGTH IN 28 DAYS.
3. REFERENCE DRAINAGE DETAILS FOR PIPE TRENCH DETAILS, BOX CULVERT, HEADWALL, AND WINGWALL CONSTRUCTION DETAILS, AND BOX CULVERT BEDDING AND EXCAVATION LIMITS.
4. CONTRACTOR SHALL GROUT ALL CURB INLETS AND JUNCTION BOXES TO PROVIDE FOR POSITIVE DRAINAGE.
5. EARTHEN CHANNELS WILL BE VEGETATED BY SEEDING OR SODDING. 85% OF THE CHANNEL SURFACE MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF NEW BRAUNFELS WILL ACCEPT.
6. CONTRACTOR SHALL MATCH TOP OF CHANNEL TO NATURAL GROUND AND MAINTAIN A MINIMUM CHANNEL DEPTH OF "D" AS SHOWN IN THE PROFILE.
7. ALL RCP SHALL BE AASHTO M170 CLASS III RCP.

**CAUTION!!**

CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT "TEXAS 811" A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

**TRENCH EXCAVATION SAFETY PROTECTION:**

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN / GEOTECHNICAL / SAFETY EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS, AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.



**DRAINAGE LEGEND**

- PROJECT LIMITS  
100 YR FLOODPLAIN  
EXISTING CONTOUR  
PROPOSED CONTOUR  
EXISTING WATER  
EXISTING UNDERGROUND ELECTRIC  
EXISTING GAS  
EXISTING SEWER  
PROPOSED SEWER  
PROPOSED WATER  
PROPOSED STORM DRAIN  
FLOW ARROW  
CURLEX SINGLE NET EROSION CONTROL BLANKETS  
PROPOSED GAS  
PROPOSED UNDERGROUND ELECTRIC  
LANDLOK 450 (HP-TRM) EROSION CONTROL MAT  
BASIN FENCE  
DRAINAGE MAINTENANCE ACCESS  
WALL (BY OTHERS)

**OVERFLOW WEIR CALCULATIONS**

$$Q_{25} = (C_w)(L)(h)^{3/2}$$

$$Q_{25} = 393 \text{ cfs}$$

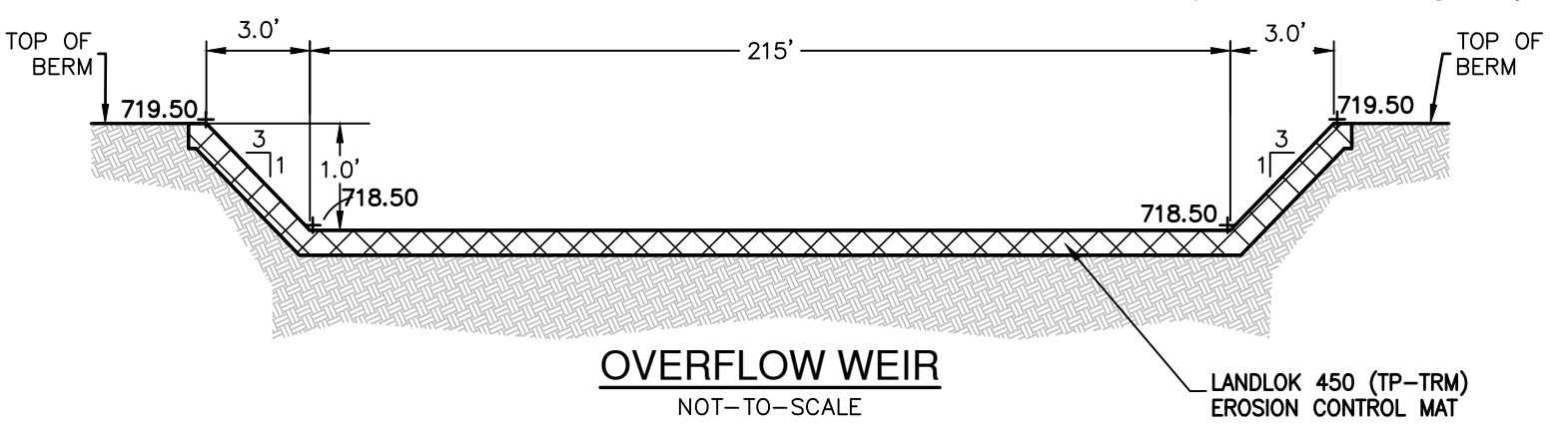
$$C = 2.60$$

$$L = 215 \text{ ft}$$

$$393 = (2.60)(215)(h)^{3/2}$$

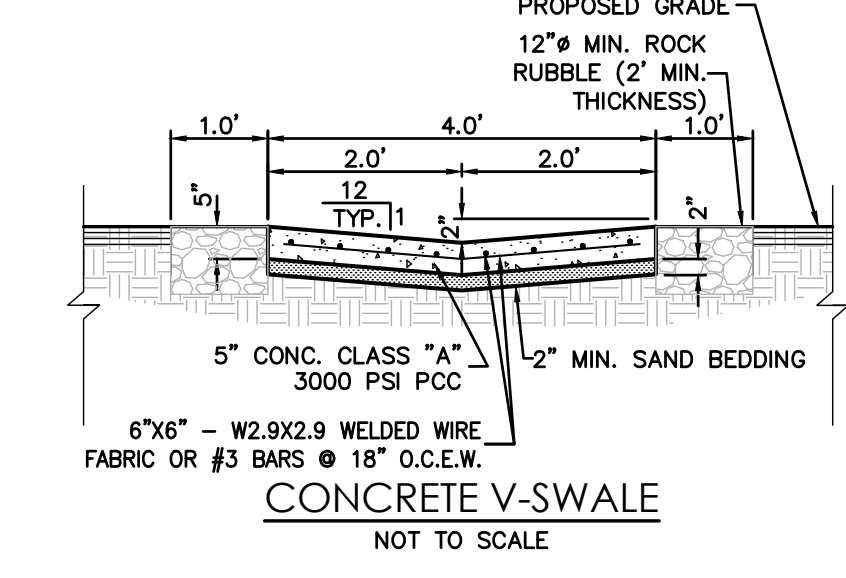
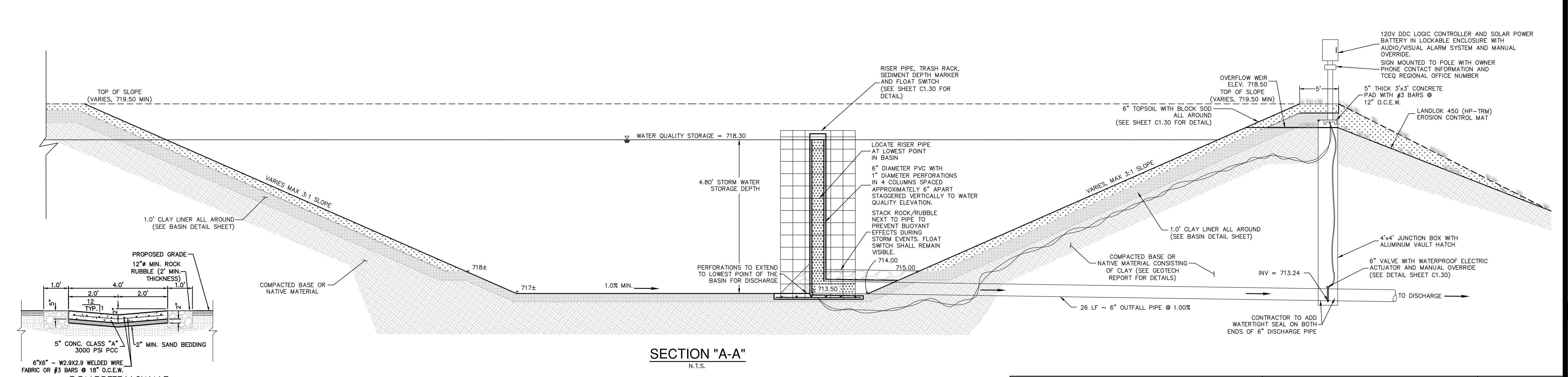
$$h = 0.79 \text{ ft}$$

M.A.S. NOTE:  
STAGING AREA REQUIREMENT (800 SQ.FT.) IS SATISFIED BY UTILIZING THE PRIVATE AREA ADJACENT TO THE BASIN AS DESIGNATED IN THE PLAN VIEW ABOVE.



**BASIN DESIGN DATA**

BASIN WATERSHED AREA	= 2,762,240 SF (63.41AC.)
RUN OFF DEPTH	= 1.60 IN
REQUIRED CAPTURE VOLUME	= 85,598 CF
BASIN STORM WATER DEPTH	= 4.80 FT
BASIN CAPTURE VOLUME	= 93,609 CF



THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 5**

DATE: \_\_\_\_\_

NO. REVISION: \_\_\_\_\_

11-17-2023

STATE OF TEXAS  
JOCELYN PEREZ  
98367  
LICENSED PROFESSIONAL ENGINEER

**PAPE-PAWSON ENGINEERS**

NEW BRAUNFELS | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
1075 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5653  
TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008860

**VERAMENDI - WORD PKWY PHASE 3**  
NEW BRAUNFELS, TEXAS

**BASIN PLAN**

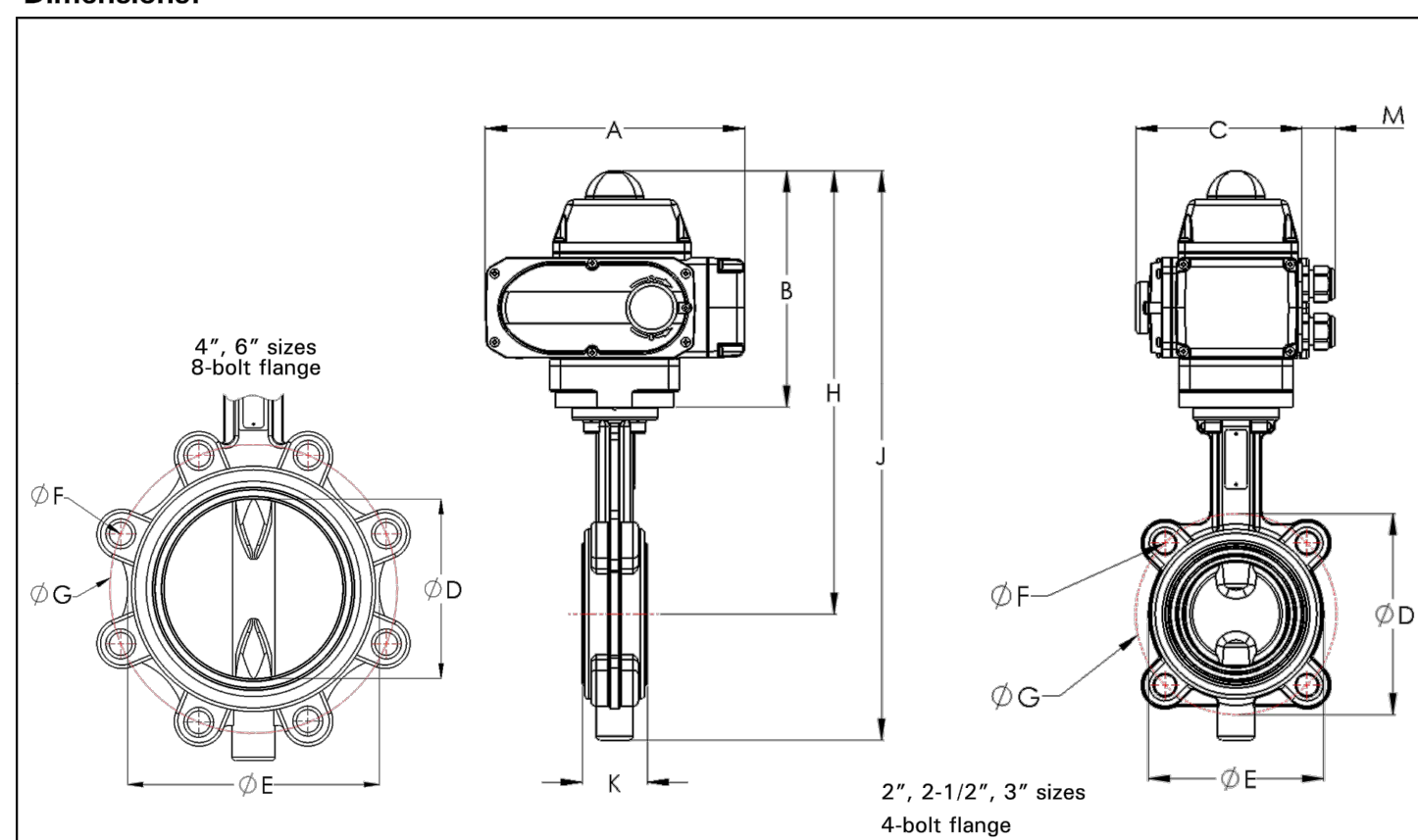
PLAT NO. \_\_\_\_\_  
JOB NO. 30001-45  
DATE 09-05-2023  
DESIGNER GDL  
CHECKED DRAWN CA  
SHEET C1.20

Date: Nov 17, 2023, 4:51pm, User: D:\jwp, File: P:\3001\01\45\Design\Civil\BA-3001-45.dwg

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthology Program, USDA Farm Service Agency.

**FOR PERMIT**

Dimensions:

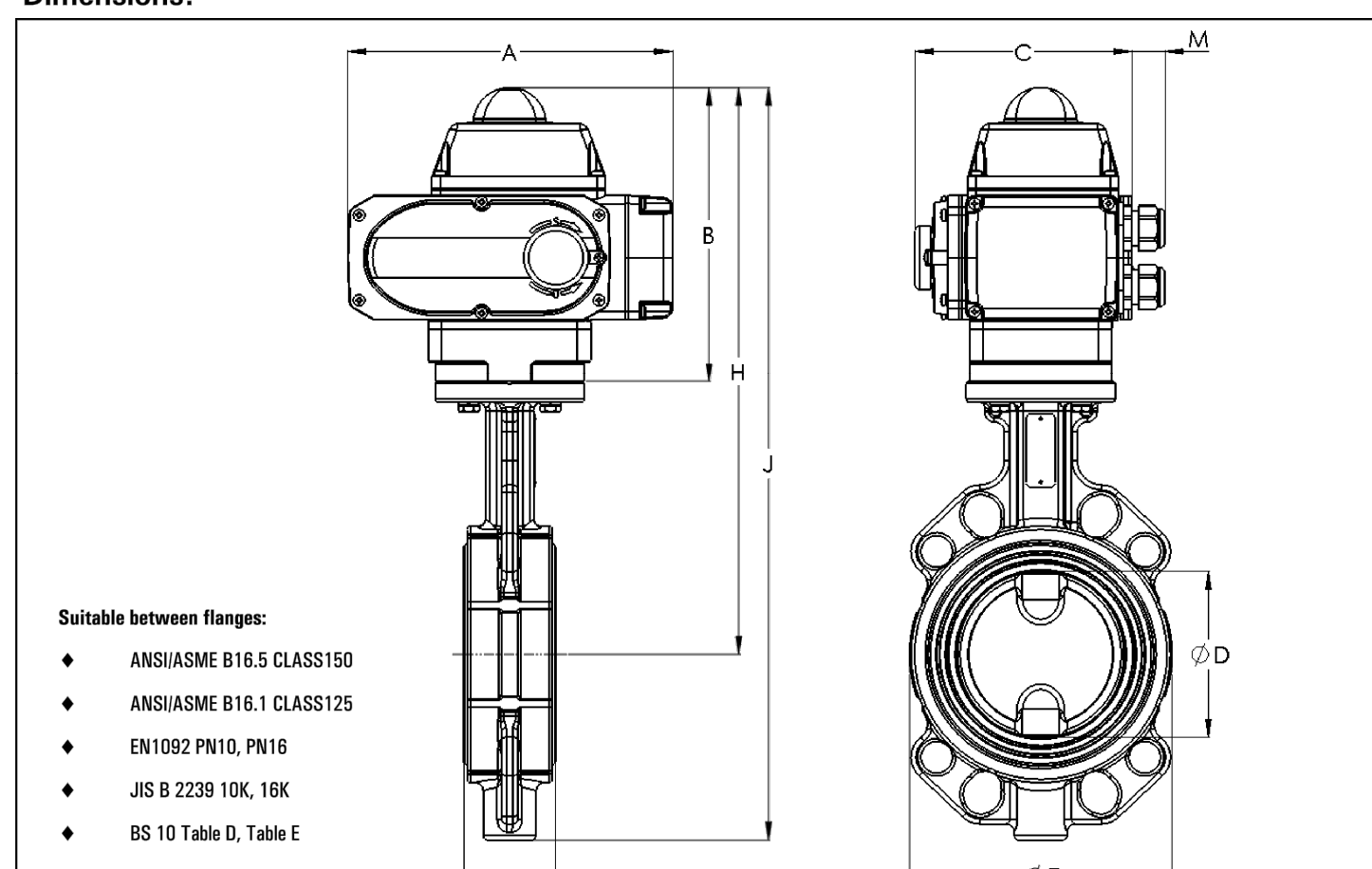


- Suitable between flanges:
- ANSI ASME B16.5 CLASS 150
  - ANSI ASME B16.1 CLASS 125

Pipe Size		A	B	C	D	E	F	G	H	J	K	M	ISO	Weight (AC/DI)	
2	inch	6.34	7.09	4.65	1.97	3.74	4.1	5.18	11	4.74	12.05	15.04	1.81	0.98	12.7 / 13.3 lb
	mm	161	180	118	50	95	—	120.5	306	382	46	25			5.8 / 6.0 kg
2-1/2	inch	6.34	7.09	4.65	2.56	4.13	4.1	5.18	11	5.50	12.36	15.59	1.93	0.98	14.5 / 15.0 lb
	mm	161	180	118	65	105	—	139.7	314	396	49	25			6.6 / 6.8 kg
3	inch	6.34	7.09	4.65	3.15	4.72	4.1	5.18	11	6.00	13.27	17.03	1.93	0.98	17.3 / 17.8 lb
	mm	161	180	118	80	120	—	152.4	337	432.5	49	25			7.8 / 8.1 kg
4	inch	6.34	7.09	4.65	3.94	5.79	8.1	5.18	11	7.50	11.97	16.46	2.20	0.98	22.1 / 22.6 lb
	mm	161	180	118	100	147	—	190.5	394	418	56	25			10.0 / 10.3 kg
6	inch	10.08	8.50	6.30	5.91	8.07	8.1	3.14	10	9.50	16.50	22.24	2.32	0.98	50.0 / 51.0 lb
	mm	256	216	160	150	205	—	241.3	418	565	59	25			22.7 / 23.1 kg

Doc: 5673.0118 Cornelius, N.C. • USA www.valworx.com

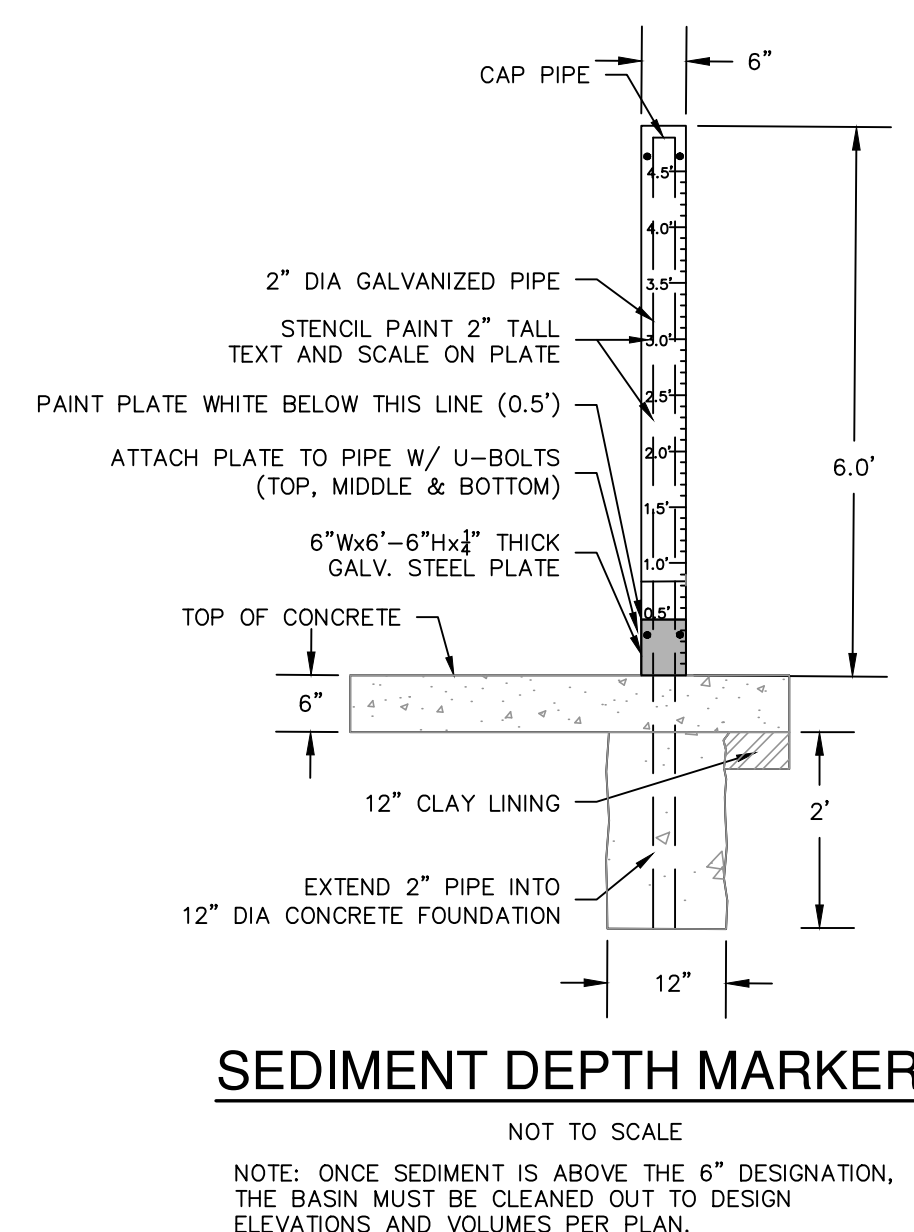
Dimensions:



- Suitable between flanges:
- ANSI ASME B16.5 CLASS 150
  - ANSI ASME B16.1 CLASS 125
  - EN 1092 PN10, PN16
  - JIS B 2238 10K, 16K
  - BS 10 Table D, Table E

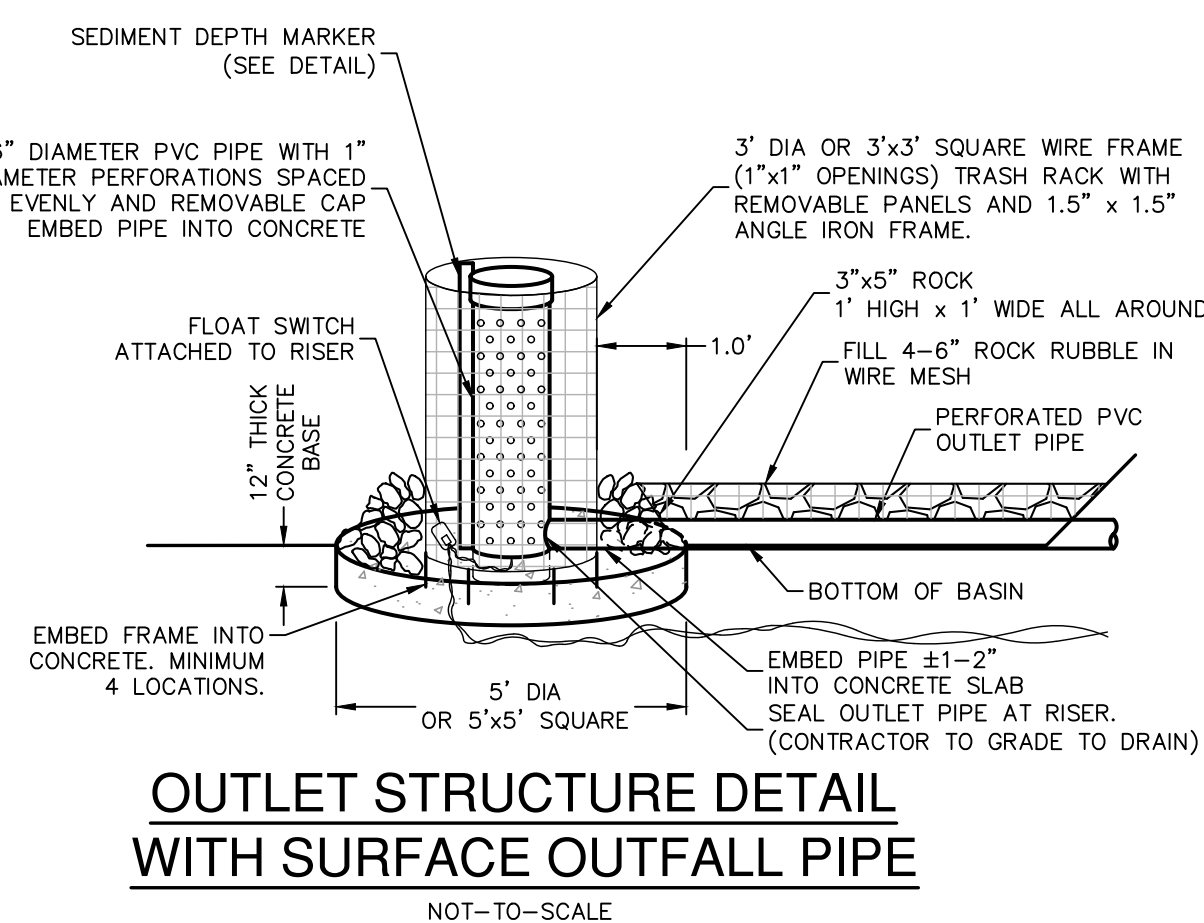
Pipe Size		A	B	C	D	E	H	J	K	M	Weight (AC/DI)
2	inch	6.34	7.09	4.65	1.97	3.90	12.05	15.04	1.81	0.98	10.5/9.3 lb
	mm	161	180	118	50	99	306	382	46	25	4.8/4.3 kg
2-1/2	inch	6.34	7.09	4.65	2.56	4.48	12.36	15.59	1.93	0.98	11.8/10.6 lb
	mm	161	180	118	65	113	314	396	49	25	5.3/4.8 kg
3	inch	6.34	7.09	4.65	3.15	5.07	13.27	17.03	1.93	0.98	13.4/12.4 lb
	mm	161	180	118	80	129	337	432.5	49	25	6.1/5.6 kg
4	inch	6.34	7.09	4.65	3.94	6.17	13.66	18.54	2.20	0.98	17.0/16.0 lb
	mm	161	180	118	100	157	347	471	56	25	7.7/7.3 kg
6	inch	10.08	8.50	6.30	5.91	8.39	16.50	22.24	2.32	0.98	37.2/38.2 lb
	mm	256	216	160	150	213	419	565	59	25	16.9/17.3 kg
8	inch	10.08	8.50	6.30	7.87	10.67	17.48	24.25	2.36	0.98	48.9 lb
	mm	256	216	160	200	271	444	616	60	25	22.2 kg
12	inch	10.08	8.50	6.30	11.81	15.0	19.9	29.4	3.07	0.98	79.4 lb
	mm	256	216	160	300	381	505	747	78	25	36 kg

Doc: 5670.1219 Cornelius, N.C. • USA www.valworx.com



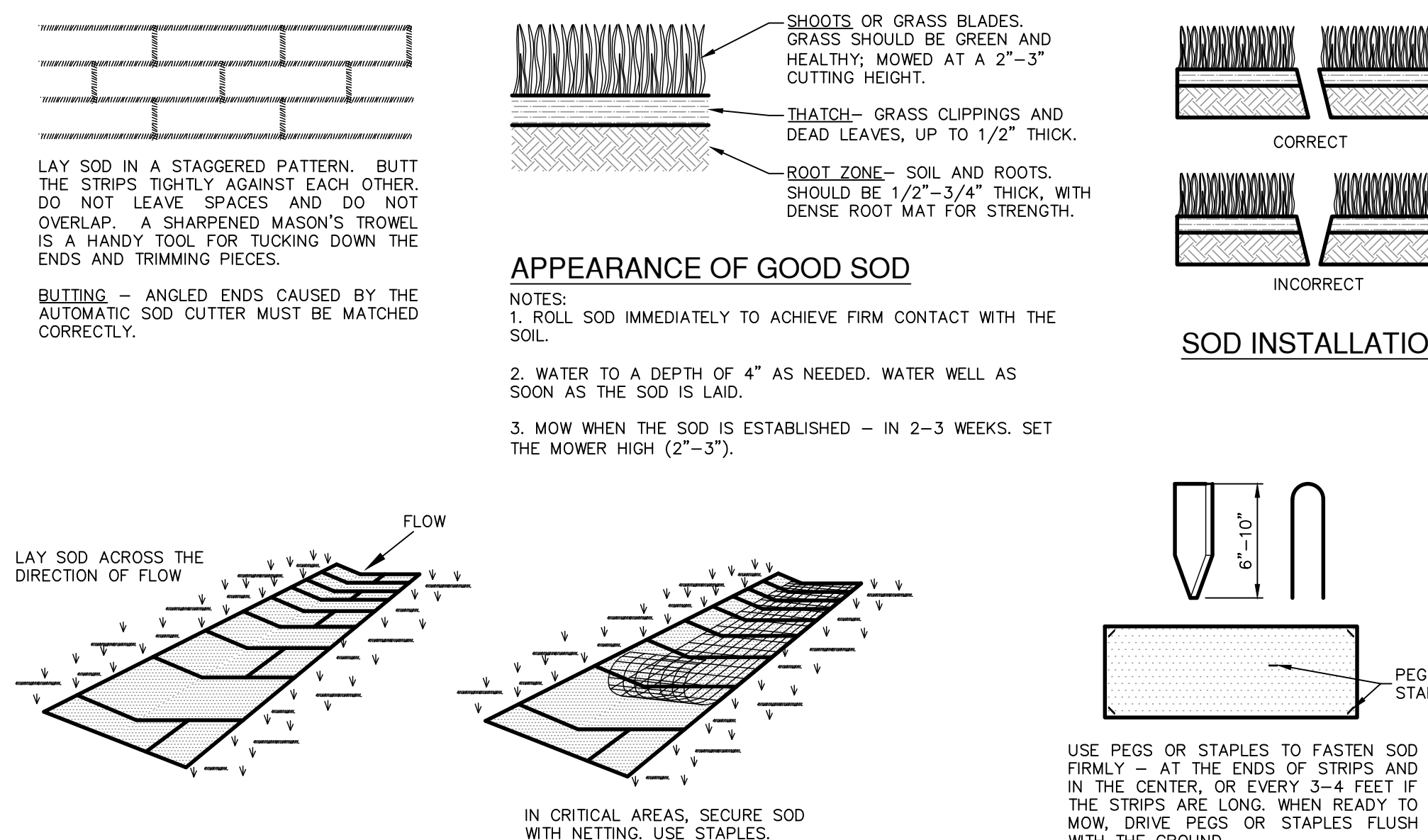
SEDIMENT DEPTH MARKER

NOTE: ONCE SEDIMENT IS ABOVE THE 6" DESIGNATION, THE BASIN MUST BE CLEANED OUT TO DESIGN ELEVATIONS AND VOLUMES PER PLAN.



OUTLET STRUCTURE DETAIL WITH SURFACE OUTFALL PIPE

NOT-TO-SCALE



APPEARANCE OF GOOD SOD

- NOTES:
- ROLL SOD IMMEDIATELY TO ACHIEVE FIRM CONTACT WITH THE SOIL.
  - WATER TO A DEPTH OF 4" AS NEEDED. WATER WELL AS SOON AS THE SOD IS LAID.
  - MOW WHEN THE SOD IS ESTABLISHED - IN 2-3 WEEKS. SET THE MOWER HIGH (2"-3").

SOD INSTALLATION

GENERAL INSTALLATION (VA. DEPT. OF CONSERVATION, 1992)

SITE PREPARATION

- PRIOR TO SOD PREPARATION, AREAS TO BE SODDED SHOULD BE BROUGHT TO FINAL GRADE IN ACCORDANCE WITH THE APPROVED PLAN.
- THE SURFACE SHOULD BE CLEARED OF ALL TRASH, DEBRIS AND OF ALL ROOTS, BRUSH, WIRE, GRADE STAKES AND OTHER OBJECTS THAT WOULD INTERFERE WITH PLANTING, FERTILIZING OR MAINTENANCE OPERATIONS.
- FERTILIZE ACCORDING TO SOIL TESTS. FERTILIZER NEEDS CAN BE DETERMINED BY A SOIL TESTING LABORATORY OR REGIONAL RECOMMENDATIONS CAN BE MADE BY COUNTY AGRICULTURAL EXTENSION AGENTS. FERTILIZER SHOULD BE WORKED INTO THE SOIL TO A DEPTH OF 3 INCHES WITH A DISC, SPRINGTOOTH HARROW OR OTHER SUITABLE EQUIPMENT ON SLOPING LAND, THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE CONTOUR.

INSTALLATION IN CHANNELS

- SOD STRIPS IN WATERWAYS SHOULD BE LAID PERPENDICULAR TO THE DIRECTION OF FLOW. CARE SHOULD BE TAKEN TO BUTT ENDS OF STRIPS TIGHTLY (SEE FIGURE ABOVE).
- AFTER ROLLING OR TAMPING, SOD SHOULD BE PEGGED OR STAPLED TO RESIST WASHOUT DURING THE ESTABLISHMENT PERIOD. MESH OR OTHER NETTING MAY BE PEGGED OVER THE SOD FOR EXTRA PROTECTION IN CRITICAL AREAS.

INSPECTION AND MAINTENANCE GUIDELINES

- SOD SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAIN EVENT TO LOCATE AND REPAIR ANY DAMAGE.
- DAMAGE FROM STORMS OR NORMAL CONSTRUCTION ACTIVITIES SUCH AS TIRE RUTS OR DISTURBANCE OF SWALE STABILIZATION SHOULD BE REPAIRED AS SOON AS PRACTICAL.

SOD INSTALLATION DETAIL

NOT-TO-SCALE

NOTES:

- CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION IN BASINS PER BASIN DETAIL SHEET PRIOR TO SITE CLOSEOUT.
- UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S (FILTERSTRIPS AND BASINS) MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
- ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASINS SHALL BE REVEGETATED PRIOR TO COMPLETION.

SEQUENCE OF OPERATION

- UPON ACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #1.
- DETENTION TIMER #1 TO BE MANUALLY SET TO 12 HOURS AND TO BE USER ADJUSTABLE VALUE.
- WHEN DETENTION TIMER #1 HAS ELAPSED, A 6" BUTTERFLY VALVE IS TO OPEN AND RELEASE DETAINED WATER BASIN.
- UPON DEACTIVATION OF FLOAT SWITCH, DDC CONTROL TO START DETENTION TIMER #2.
- DETENTION TIMER #2 TO BE MANUALLY SET TO 19-48 HOURS AND TO BE USER ADJUSTABLE.
- WHEN DETENTION TIMER #2 HAS ELAPSED, THE 6" BUTTERFLY VALVE IS TO CLOSE.
- VALVE TO BE ACTUATED PERIODICALLY TO SHOW ACTIVE REGARDLESS OF FLOAT SWITCH OPERATION.

NOTES TO CONTRACTOR

(EACH PHASE OF BASIN CONSTRUCTION)

- CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR PRIOR APPROVAL.
- CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN BASIN CONSTRUCTION HAS PROCEEDED TO THE FOLLOWING MILESTONES:
  - REINFORCING STEEL FOR BASIN OVERFLOW WALL OR RIPRAP PILOT CHANNEL HAS BEEN SET. CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE AND RISER PIPE IS IN PLACE. CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE RISER PIPE HAS BEEN SET AT PROPER ELEVATION AND GRADE.
  - BASIN HAS BEEN COMPLETELY FINISHED INCLUDING SOD OR SEED PLACEMENT ON SIDE SLOPES (WHERE APPLICABLE).
- WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.
- UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:
  - TOP OF BANKWALL AT EACH CORNER OF BASIN
  - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
  - SPLASH PAD/INLET PIPES
  - OVERFLOW WEIRS

BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.

CLAY LINER SPECIFICATIONS

PROPERTY	TEST METHOD	SPECIFICATION
PERMEABILITY (CM/SEC)	ASTM D 2434	1 x 10 <sup>-6</sup>
PLASTICITY INDEX OF CLAY (%)	ASTM D 423/D 424	NOT LESS THAN 15
LIQUID LIMIT OF CLAY (%)	ASTM D 2216	NOT LESS THAN 30
CLAY PARTICLES PASSING (%)	ASTM D 422	NOT LESS THAN 30
CLAY COMPACTION (%)	ASTM D 2216	95% OF STANDARD PROCTOR DENSITY

NOTES:

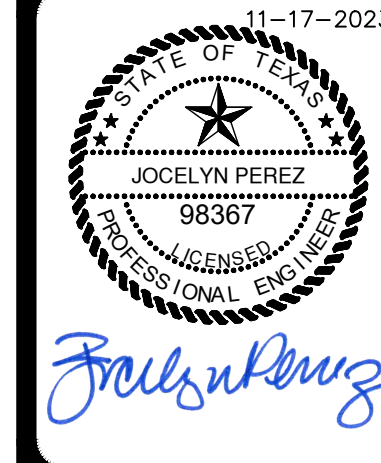
- THE CLAY LINER SHALL HAVE A MINIMUM THICKNESS OF TWELVE (12) INCHES.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

EXHIBIT 5

NO.	REVISION	DATE



**PAPE-DAWSON ENGINEERS**  
 NEW BRAUNFELS | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
 1075 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78121 | 800.632.5653  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008880

**VERAMENDI - WORD PKWY PHASE 3**  
 NEW BRAUNFELS, TEXAS  
 BASIN DETAILS

PLAT NO.	30001-45
JOB NO.	09-05-2023
DESIGNER	CHECKED DRAWN CA
CHECKED	SHEET
	C1.30

Date: Nov 17, 2023, 4:51pm User: D:\mch File: E:\300\01\45\Design\Civil\BND1-30001-45.dwg

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPCO/2016 Digital Globe, Texas Orthographic Program, USDA Farm Service Agency.

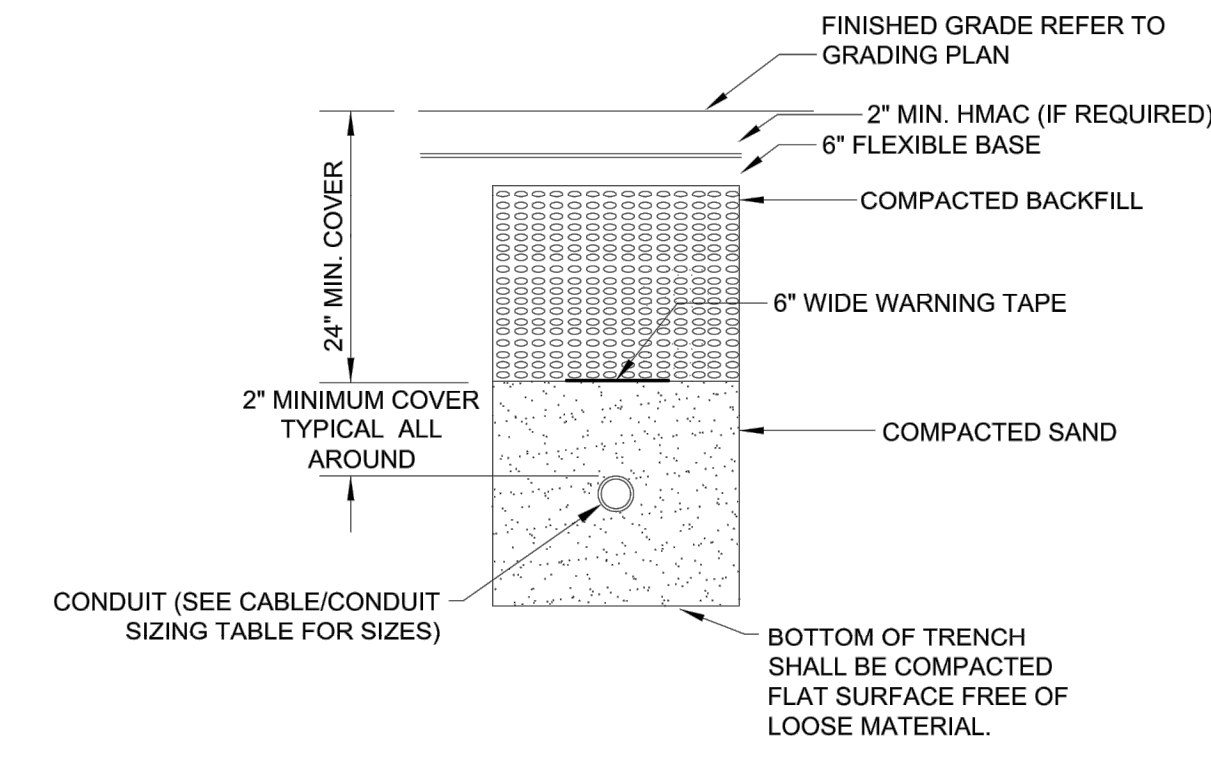
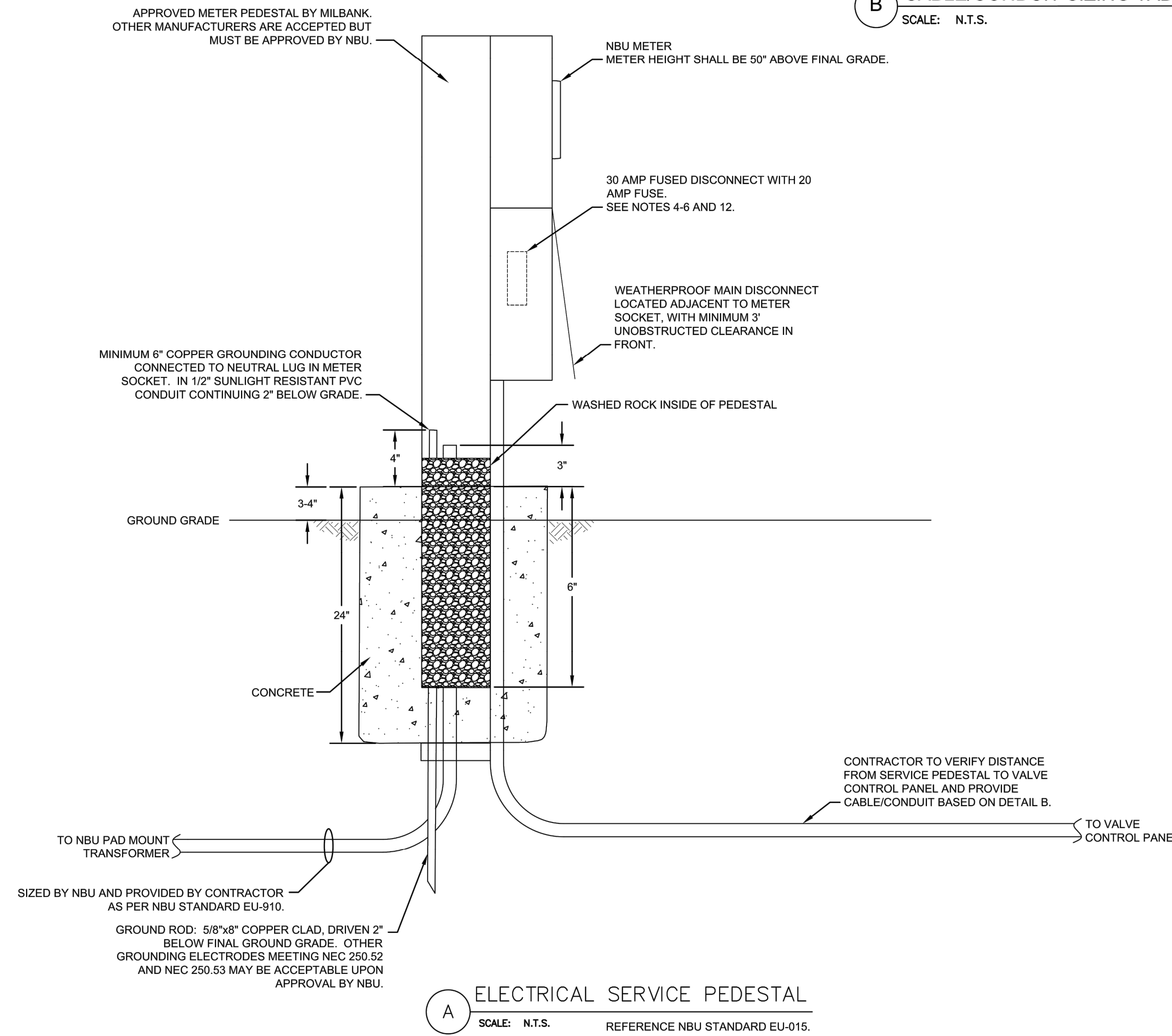


**NOTES:**

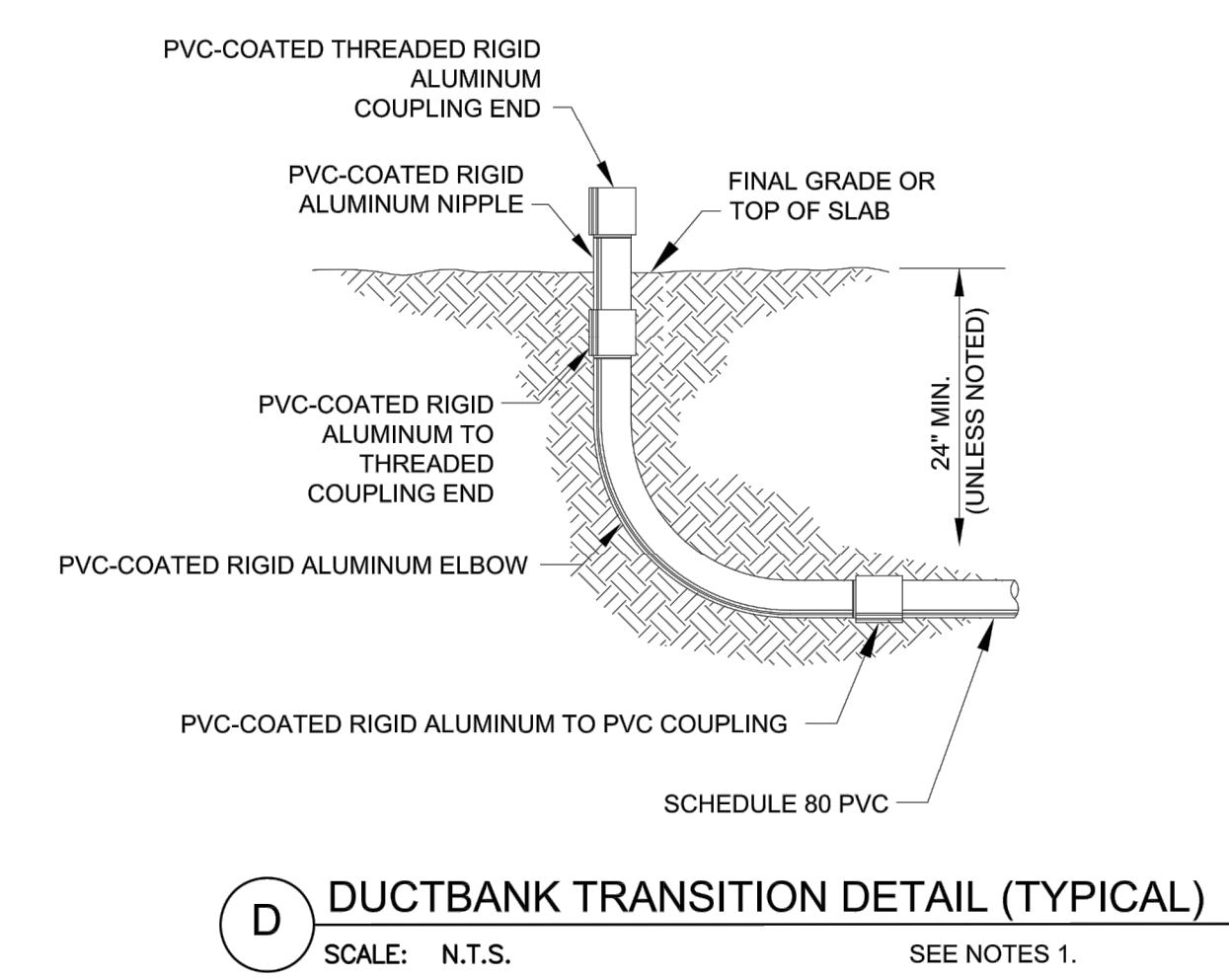
1. ALL ELECTRIC CONDUIT SHALL BE DIRECT BURIED 24 INCHES BELOW GRADE. SEE DETAILS C AND D FOR DUCTBANK, CABLE AND CONDUIT DETAILS.
2. ABOVE GROUND CONDUIT SHALL BE RIGID ALUMINUM. ALL-WEATHER CORROSION PROTECTION TAPE SHALL BE PROVIDED ON AREAS WHERE CONCRETE COMES IN CONTACT WITH ALUMINUM CONDUIT.
3. UNDER GROUND CONDUIT SHALL BE PVC SCHEDULE 80 CONDUIT.
4. ALL ENCLOSURES AND DISCONNECTS MUST BE PAD-LOCKABLE.
5. ALL PANELS, ENCLOSURES AND DISCONNECTS SHALL BE NEMA 3R, 304 STAINLESS STEEL.
6. ALL MOUNTING HARDWARE, FITTINGS AND STRUT CHANNEL SHALL BE 316 STAINLESS STEEL.
7. CONTRACTOR SHALL FOLLOW NBU STANDARDS FOR SERVICE POLE RACK INSTALLATION.
8. TOP PENETRATIONS ON PANELS ARE NOT ALLOWED. CONDUIT DRAWN FOR DIAGRAMMATIC PURPOSES ONLY.
9. DIELECTRIC COUPLINGS SHALL BE INSTALLED BETWEEN DISSIMILAR METALS IN ALL CASES.
10. CONDUCTORS TO BE UNSPLICED FROM TRANSFORMER TO METER SOCKET, AND THEN FROM METER SOCKET TO MAIN DISCONNECT. NEUTRAL MARKED WITH WHITE TAPE IN THE METER SOCKET. ENCLOSURE BONDING SHALL BE IN ACCORDANCE WITH NEC 250.92.
11. PROVIDE SURGE PROTECTIVE DEVICE ON LOAD SIDE OF FUSED DISCONNECT PER SPECIFICATION 16010.

LOAD (VA)	CONDUIT (INCHES)	CABLE# (THWN)	DISTANCE (FEET)	GND# (THWN)
500VA	1" C	2#10	100'	1#12
500VA	1" C	2#10	150'	1#12
500VA	1" C	2#10	200'	1#12
500VA	1" C	2#10	250'	1#12
500VA	1" C	2#10	300'	1#12
500VA	1" C	2#8	350'	1#10
500VA	1" C	2#8	400'	1#10

**B CABLE/CONDUIT SIZING TABLE**  
SCALE: N.T.S.

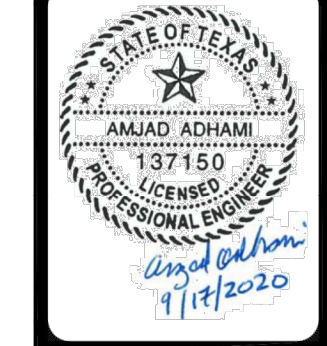


**C LOW VOLTAGE DUCTBANK SECTION (TYPICAL)**  
SCALE: N.T.S. SEE NOTES 1 & 10.



**D DUCTBANK TRANSITION DETAIL (TYPICAL)**  
SCALE: N.T.S. SEE NOTES 1.

NO.	REVISION	DATE

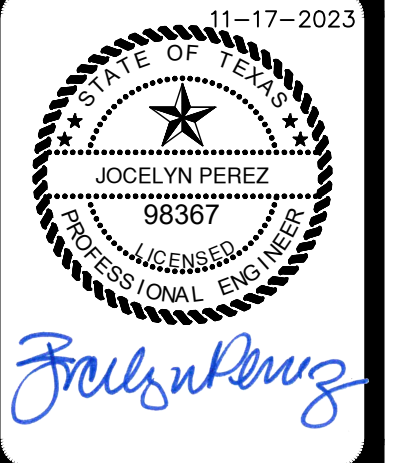


**GRUBB ENGINEERING, INC.**  
ELECTRICAL POWER SYSTEMS DESIGN & TESTING  
TYPE FIRM REGISTRATION #3904

**VERAMENDI BASIN ELECTRICAL PLAN**  
NEW BRAUNFELS, TEXAS  
SERVICE RACK DETAILS

PLAT NO. \_\_\_\_\_  
JOB NO. \_\_\_\_\_  
DATE \_\_\_\_\_  
DESIGNER AA  
CHECKED AA DRAWN SG  
SHEET E1

NO.	REVISION	DATE



**PAPE-DAWSON ENGINEERS**  
NEW BRAUNFELS | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
1675 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 833.632.5633  
TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008860

**VERAMENDI - WORD PKWY PHASE 3**  
NEW BRAUNFELS, TEXAS  
BASIN DETAILS

PLAT NO. \_\_\_\_\_  
JOB NO. 30001-45  
DATE 09-05-2023  
DESIGNER \_\_\_\_\_  
CHECKED DRAWN CA  
SHEET C1.31

**DRAINAGE & GRADING NOTES:**

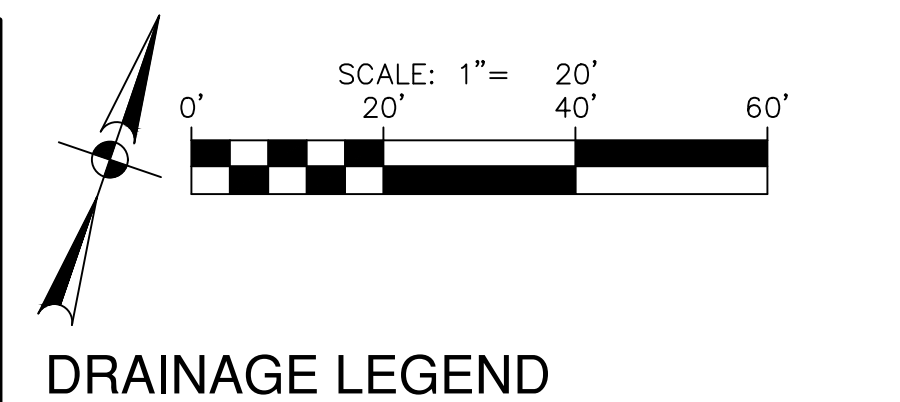
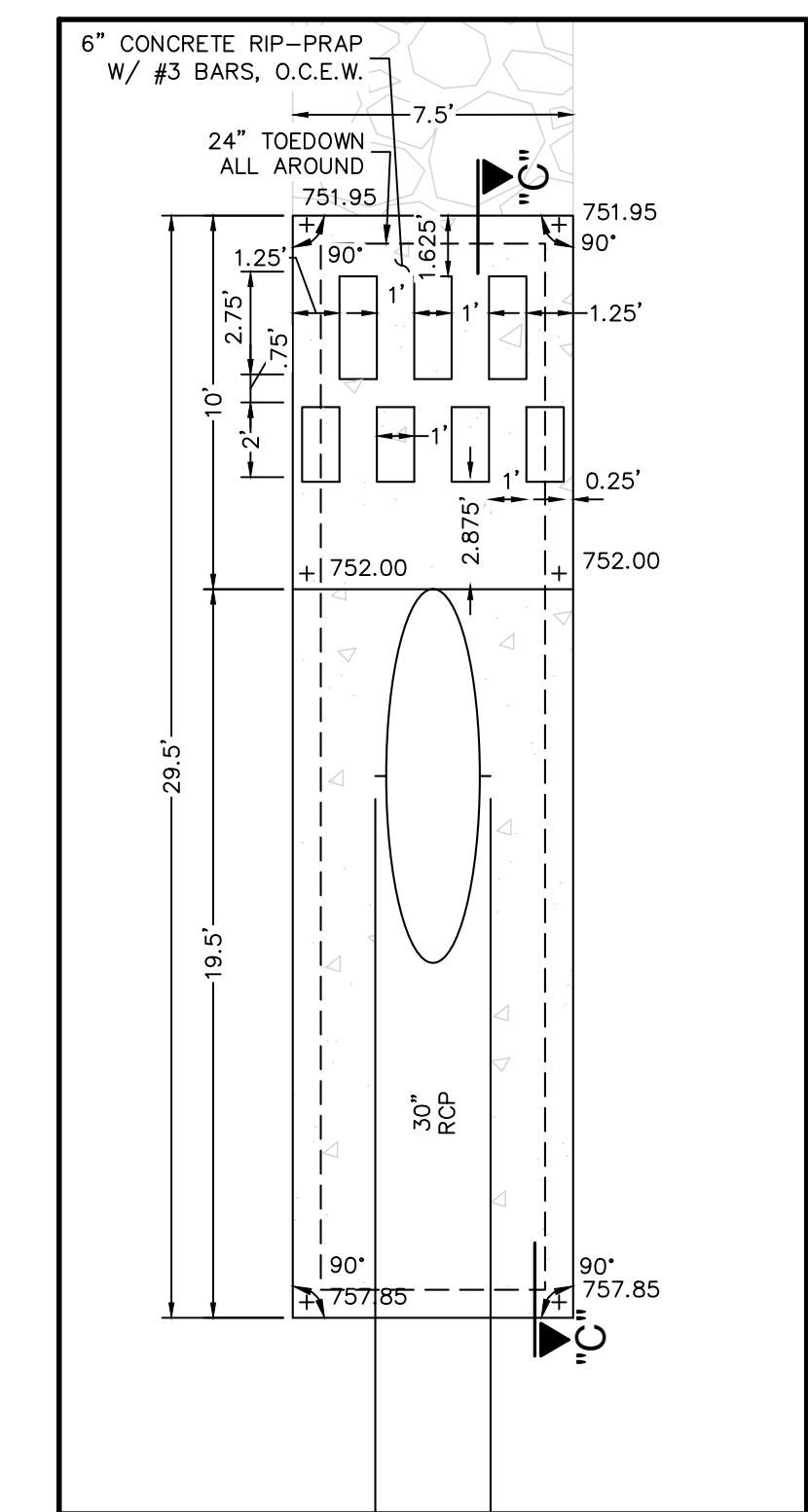
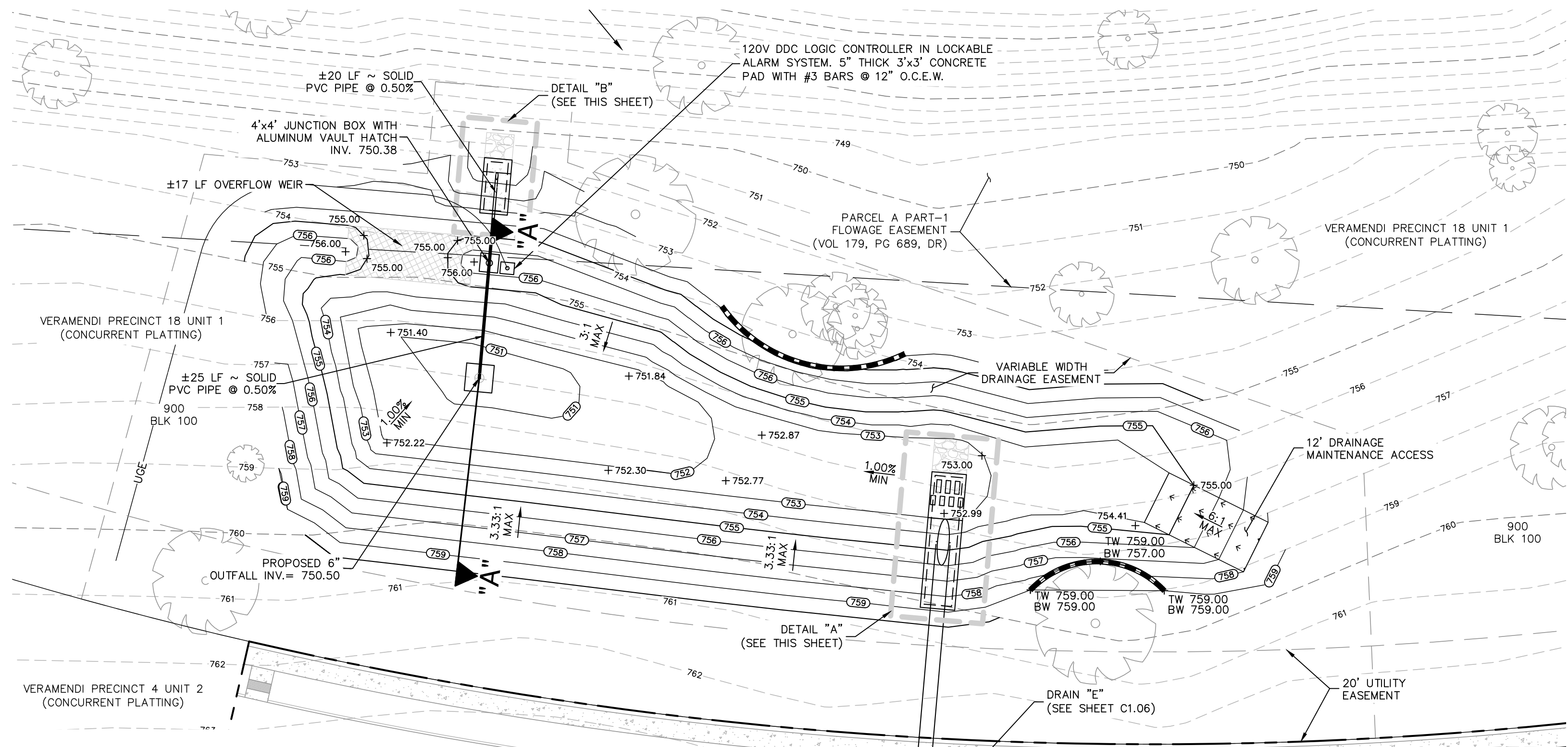
1. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATIONS FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE.
2. ALL CONCRETE FOR TxDOT DRAINAGE STRUCTURES SHALL MEET TxDOT SPECIFICATIONS. ALL OTHER CONCRETE SHALL BE CLASS "A" 3000 PSI CYLINDER STRENGTH IN 28 DAYS.
3. REFERENCE DRAINAGE DETAILS FOR PIPE TRENCH DETAILS, BOX CULVERT, HEADWALL, AND WINGWALL CONSTRUCTION DETAILS, AND BOX CULVERT BEDDING AND EXCAVATION LIMITS.
4. CONTRACTOR SHALL GROUT ALL CURB INLETS AND JUNCTION BOXES TO PROVIDE FOR POSITIVE DRAINAGE.
5. EARTHEN CHANNELS WILL BE VEGETATED BY SEEDING OR SODDING. 85% OF THE CHANNEL SURFACE MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF NEW BRAUNFELS WILL ACCEPT.
6. CONTRACTOR SHALL MATCH TOP OF CHANNEL TO NATURAL GROUND AND MAINTAIN A MINIMUM CHANNEL DEPTH OF "D" AS SHOWN IN THE PROFILE.
7. ALL RCP SHALL BE AASHTO M170 CLASS III RCP.

**CAUTION!!**

CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT "TEXAS 811" A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

**TRENCH EXCAVATION SAFETY PROTECTION:**

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN / GEOTECHNICAL / SAFETY EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND /OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.



**DRAINAGE LEGEND**

PROJECT LIMITS: ---

100 YR FLOODPLAIN: ---

EXISTING CONTOUR: ---

PROPOSED CONTOUR: ---

EXISTING WATER: ---

EXISTING UNDERGROUND ELECTRIC: ---

EXISTING GAS: ---

EXISTING SEWER: ---

PROPOSED SEWER: ---

PROPOSED WATER: ---

PROPOSED STORM DRAIN: ---

FLOW ARROW: →

CURLIX SINGLE NET EROSION CONTROL BLANKETS: [Symbol]

PROPOSED GAS: ---

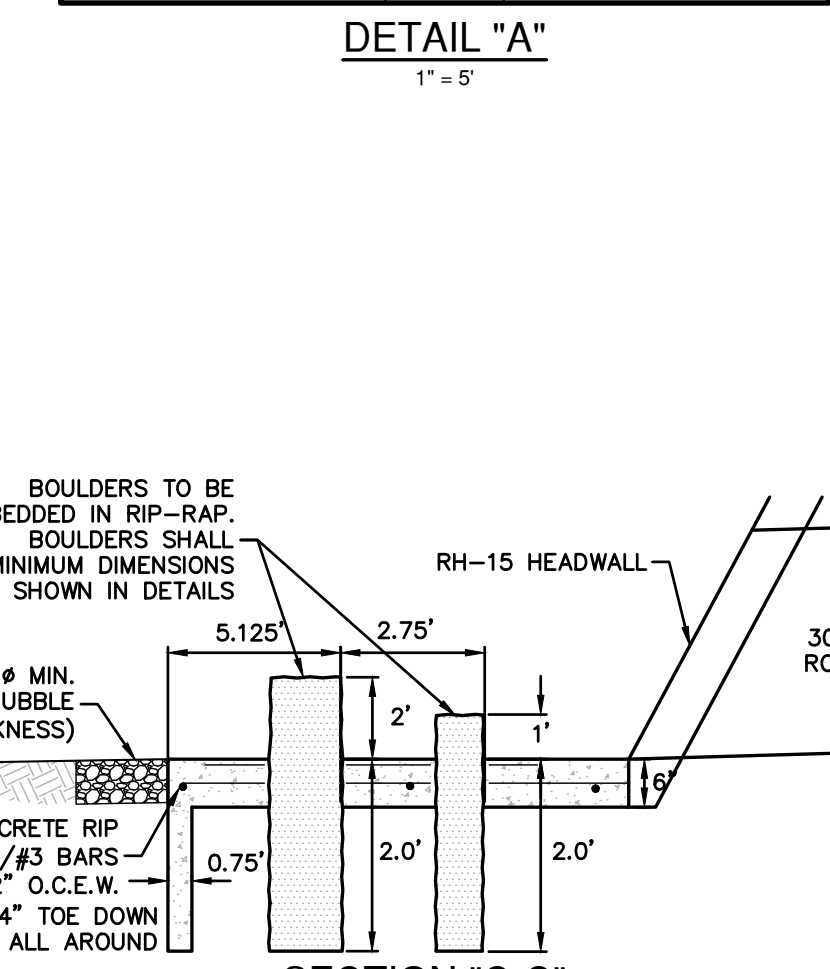
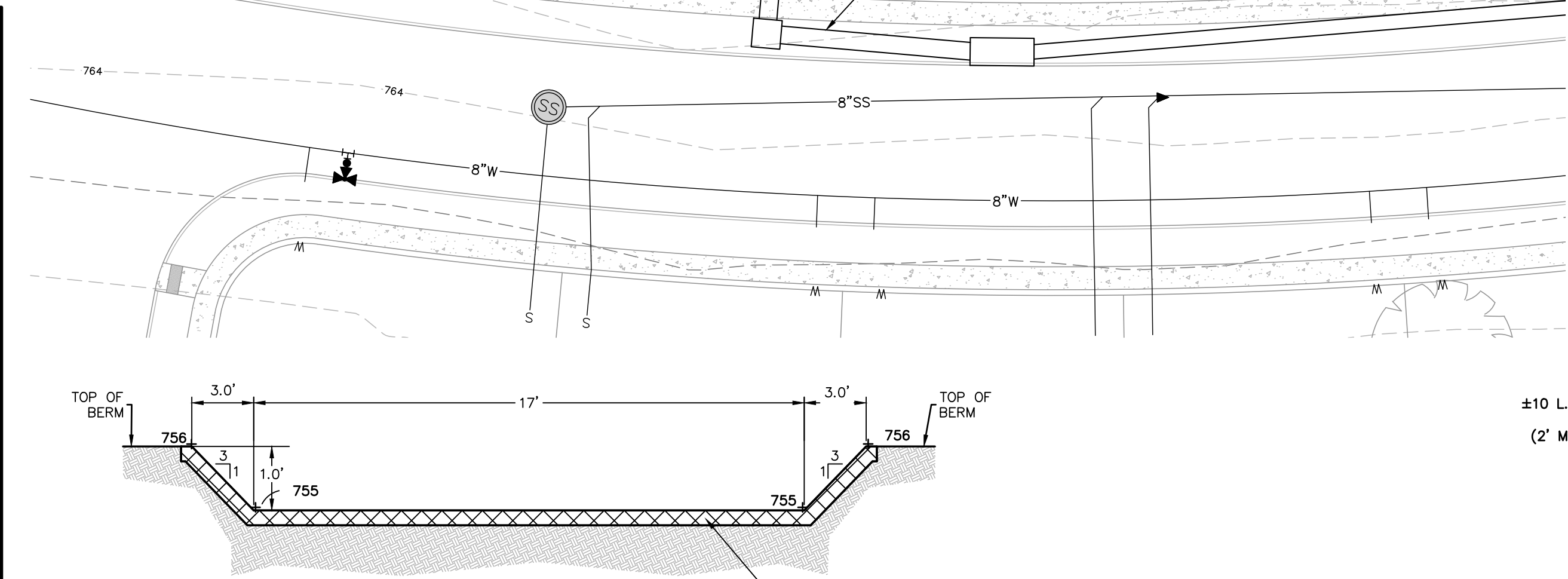
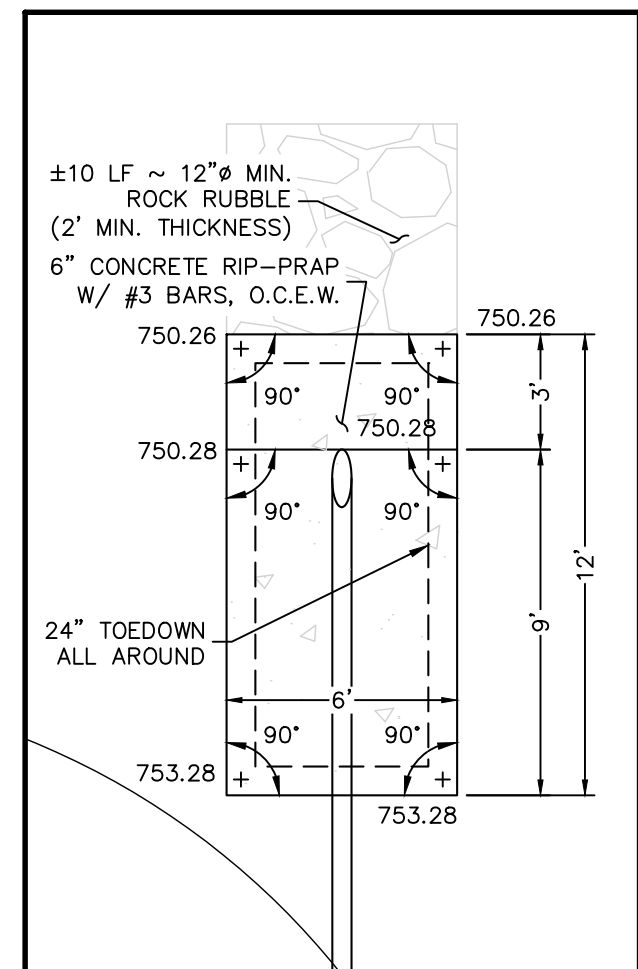
PROPOSED UNDERGROUND ELECTRIC: ---

LANDLOK 450 (HP-TRM) EROSION CONTROL MAT: [Symbol]

BASIN FENCE: ---

DRAINAGE MAINTENANCE ACCESS: ---

RETAINING WALL (DESIGNED BY OTHERS): ---



**OVERFLOW WEIR CALCULATIONS**

$$Q_{25} = (C_w)(L)(h)^{3/2}$$

$$Q_{25} = 28 \text{ cfs}$$

$$C = 2.60$$

$$L = 17 \text{ ft}$$

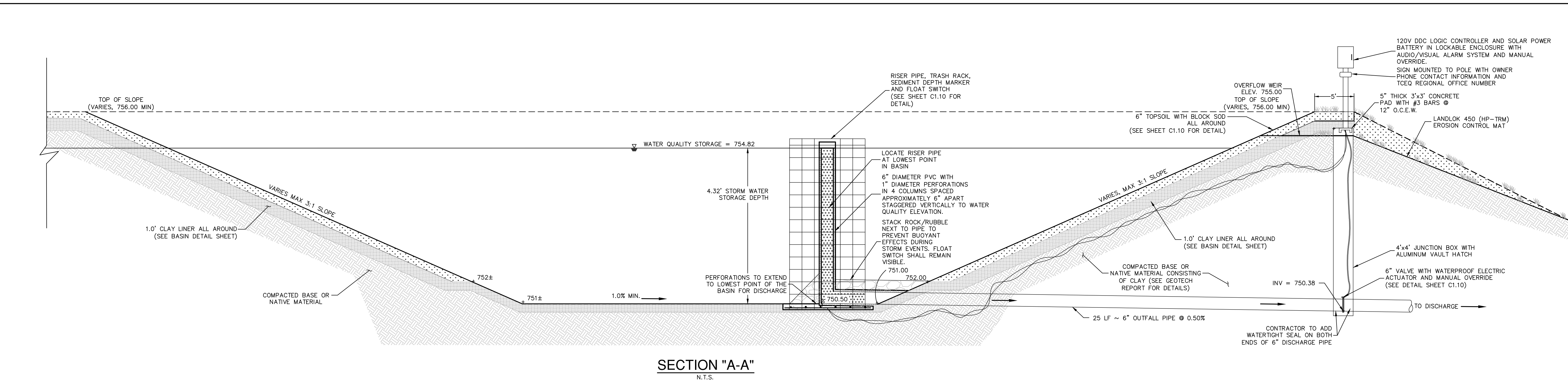
$$28 = (2.60)(17)(h)^{3/2}$$

$$h = 0.74 \text{ ft}$$

**BASIN DESIGN DATA**

BASIN WATERSHED AREA	= 205,603 SF (4.72 AC.)
RUN OFF DEPTH	= 1.60 IN
REQUIRED CAPTURE VOLUME	= 11,496 CF
BASIN STORM WATER DEPTH	= 4.32 FT
BASIN CAPTURE VOLUME	= 12,013 CF

M.A.S. NOTE:  
STAGING AREA REQUIREMENT (800 SQ.FT.) IS SATISFIED BY UTILIZING THE PRIVATE AREA ADJACENT TO THE BASIN AS DESIGNATED IN THE PLAN VIEW ABOVE.



Date: March 8, 2023, 1:47 PM - User ID: DLynch  
File: P:\300\01\65\Design\Civil\4 U1\BA-30001-65.dwg

DATE: \_\_\_\_\_

NO. REVISION: \_\_\_\_\_

11-17-2023

STATE OF TEXAS  
JOCELYN PEREZ  
98367  
PROFESSIONAL ENGINEER

**PAPE-DAWSON ENGINEERS**  
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 800.632.5653  
TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #10028800

**VERAMENDI PRECINCT 4 UNIT 1**  
NEW BRAUNFELS, TEXAS

**WATER QUALITY BASIN PLAN**

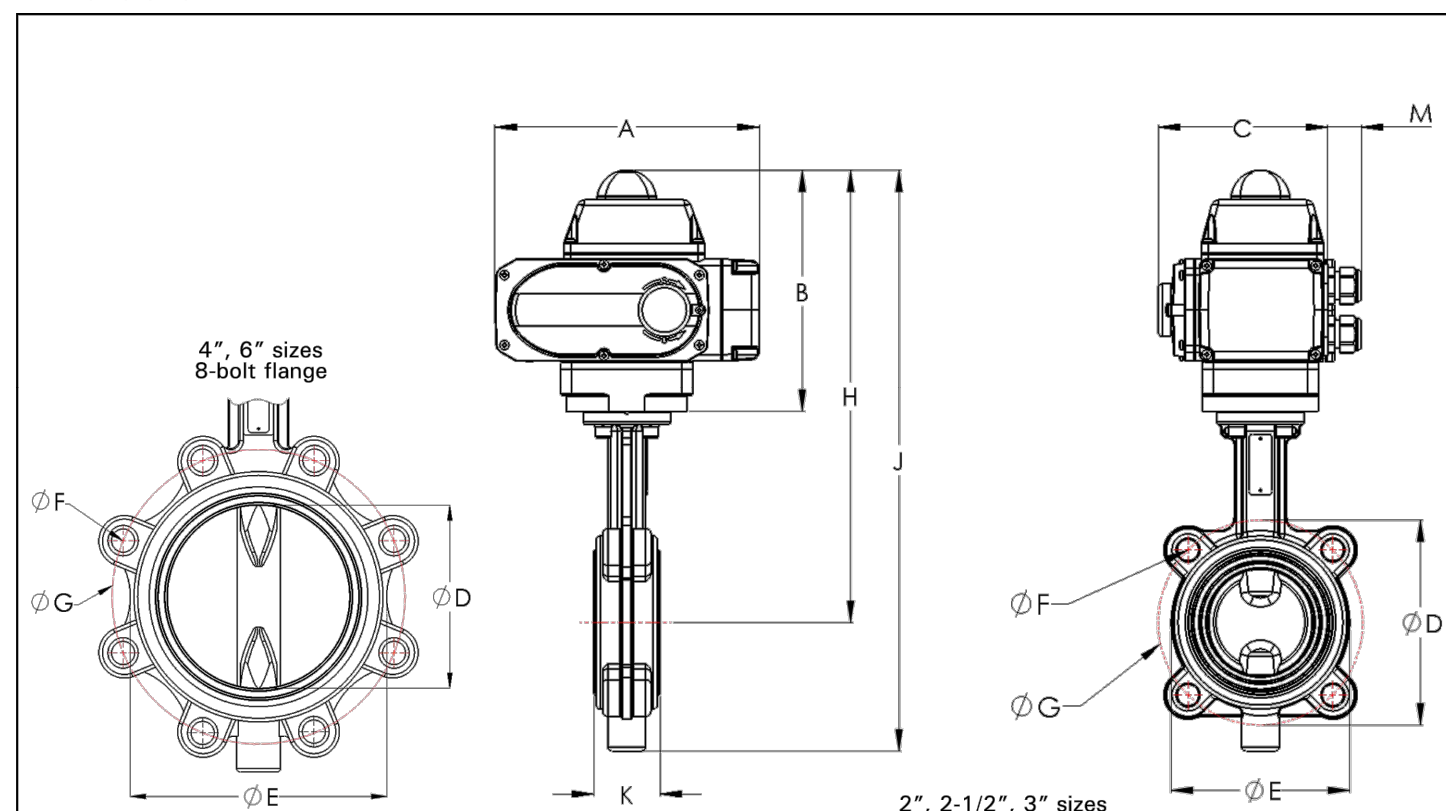
PLAT NO. \_\_\_\_\_  
JOB NO. 30001-65  
DATE 09-05-2023  
DESIGNER GDL  
CHECKED DRAWN CA  
SHEET C1.08

**EXHIBIT 5**

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthology Program, USDA Farm Service Agency.

FOR PERMIT

Dimensions:

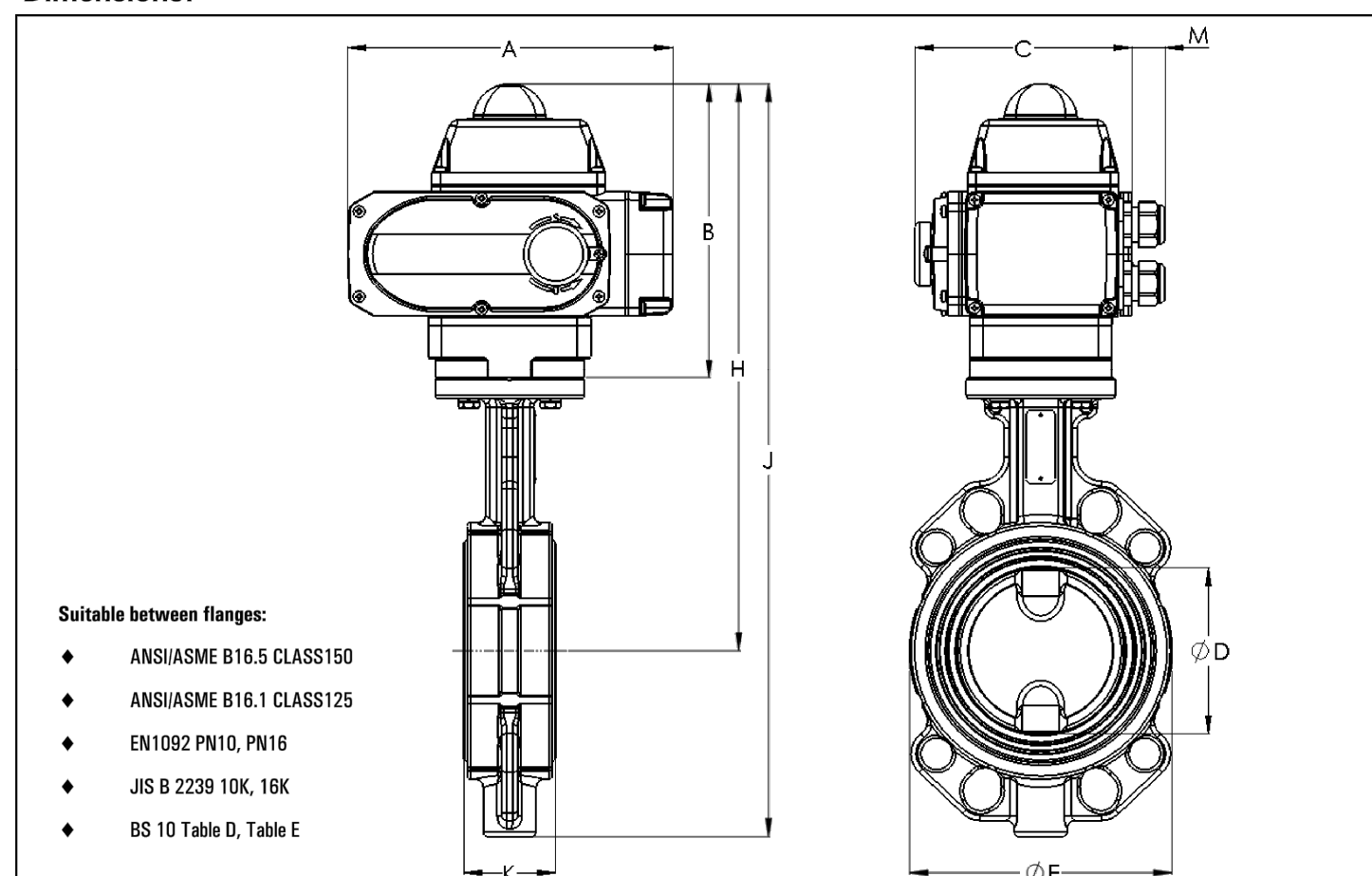


- Suitable between flanges:
- ANSI ASME B16.5 CLASS150
  - ANSI ASME B16.1 CLASS125

Pipe Size	A	B	C	D	E	F	G	H	J	K	M	ISO	Weight (AC/D)	
2	inch	6.34	7.09	4.65	1.97	3.74	4i 5i8-11	4.74	12.05	15.04	1.81	0.98	F05	12.7 / 13.3 lb
	mm	161	180	118	50	95	--	120.5	306	382	46	25		
2-1/2	inch	6.34	7.09	4.65	2.56	4.13	4i 5i8-11	5.50	12.36	15.59	1.93	0.98	F05	14.5 / 15.0 lb
	mm	161	180	118	65	105	--	139.7	314	396	49	25		
3	inch	6.34	7.09	4.65	3.15	4.72	4i 5i8-11	6.00	13.27	17.03	1.93	0.98	F05	17.3 / 17.8 lb
	mm	161	180	118	80	120	--	152.4	337	432.5	49	25		
4	inch	6.34	7.09	4.65	3.94	5.79	8i 5i8-11	7.50	11.97	16.46	2.20	0.98	F05/F07	22.1 / 22.6 lb
	mm	161	180	118	100	147	--	190.5	304	418	56	25		
6	inch	10.08	8.50	6.30	5.91	8.07	8i 3i4-10	9.50	16.50	22.24	2.32	0.98	F07	50.0 / 51.0 lb
	mm	256	216	160	150	205	--	241.3	419	565	59	25		

Doc: 5673.0118 Cornelius, N.C. • USA www.valworx.com

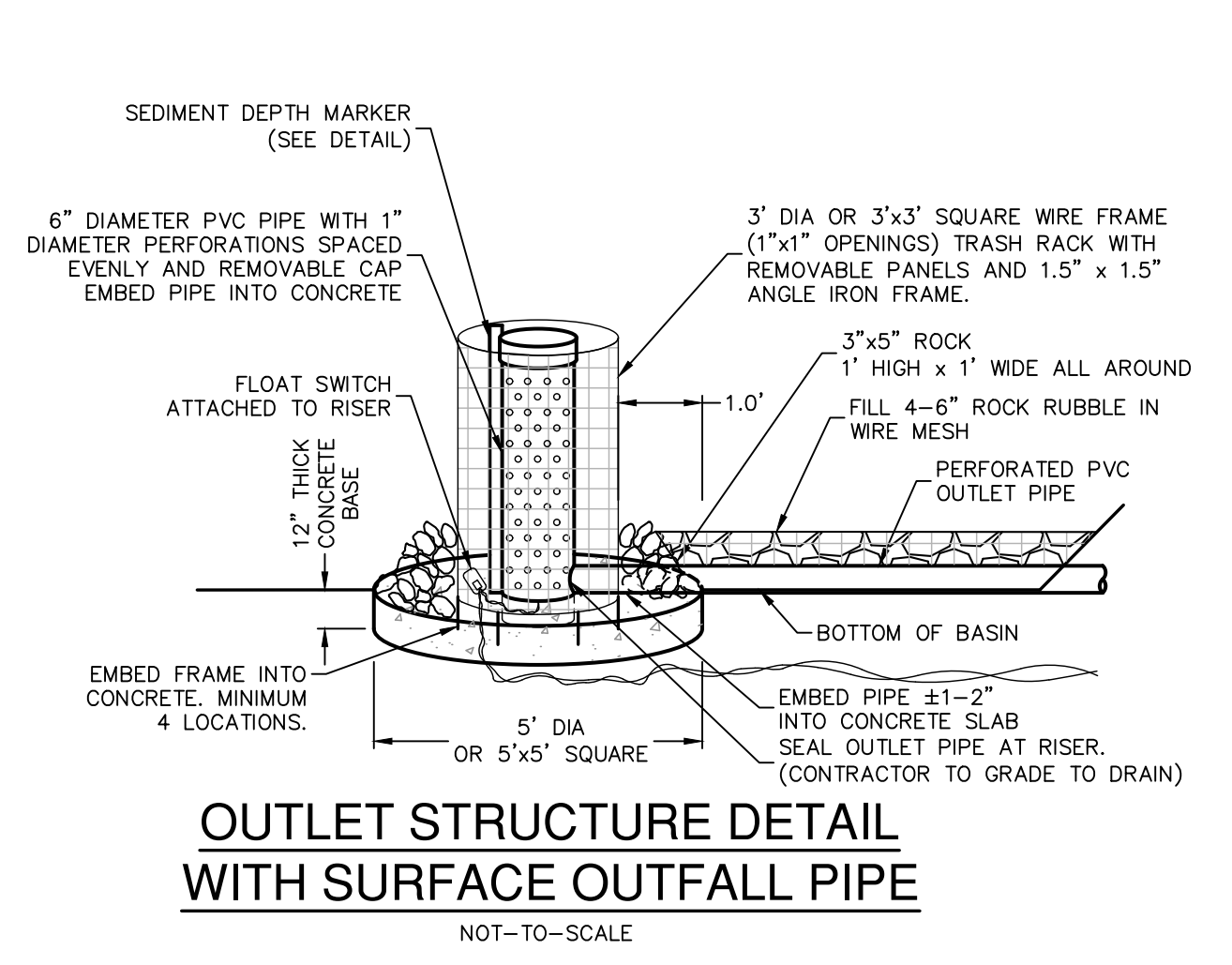
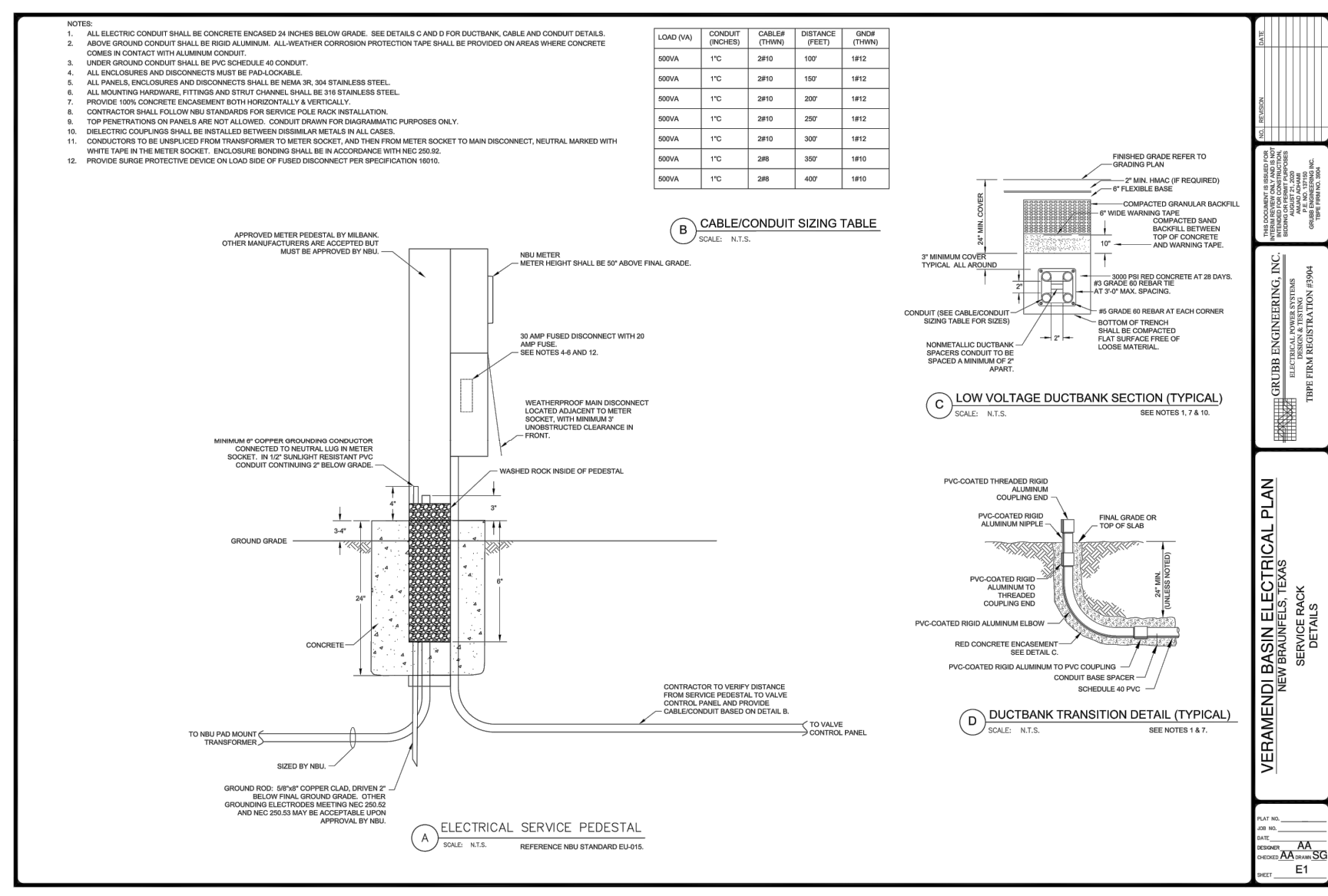
Dimensions:



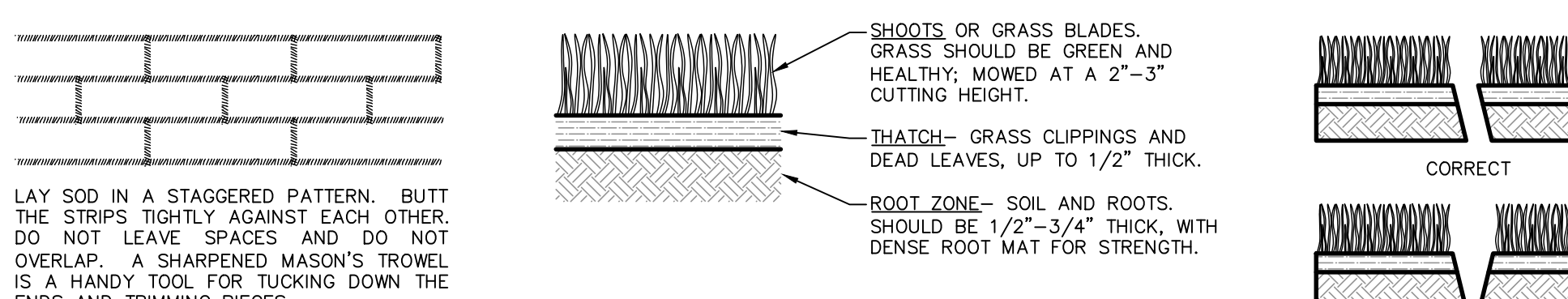
- Suitable between flanges:
- ANSI ASME B16.5 CLASS150
  - ANSI ASME B16.1 CLASS125
  - EN1092 PN10, PN16
  - JIS B 2238 10K, 16K
  - BS 10 Table D, Table E

Pipe Size	A	B	C	D	E	H	J	K	M	Weight (AC/D)	
2	inch	6.34	7.09	4.65	1.97	3.90	12.05	15.04	1.81	0.98	10.5/9.3 lb
DN50	mm	161	180	118	50	99	306	382	46	25	4.8/4.3 kg
2-1/2	inch	6.34	7.09	4.65	2.56	4.48	12.36	15.59	1.93	0.98	11.8/10.6 lb
DN65	mm	161	180	118	65	113	314	396	49	25	5.3/4.8 kg
3	inch	6.34	7.09	4.65	3.15	5.07	13.27	17.03	1.93	0.98	13.4/12.4 lb
DN80	mm	161	180	118	80	129	337	432.5	49	25	6.1/5.6 kg
4	inch	6.34	7.09	4.65	3.94	6.17	13.66	18.54	2.20	0.98	17.0/16.0 lb
DN100	mm	161	180	118	100	157	347	471	56	25	7.7/7.3 kg
6	inch	10.08	8.50	6.30	5.91	8.39	16.50	22.24	2.32	0.98	37.2/38.2 lb
DN150	mm	256	216	160	150	213	419	565	59	25	16.9/17.3 kg
8	inch	10.08	8.50	6.30	7.87	10.67	17.48	24.25	2.36	0.98	48.9 lb
DN200	mm	256	216	160	200	271	444	616	60	25	22.2 kg
12	inch	10.08	8.50	6.30	11.81	15.0	19.9	29.4	3.07	0.98	79.4 lb
DN300	mm	256	216	160	300	381	505	747	78	25	36 kg

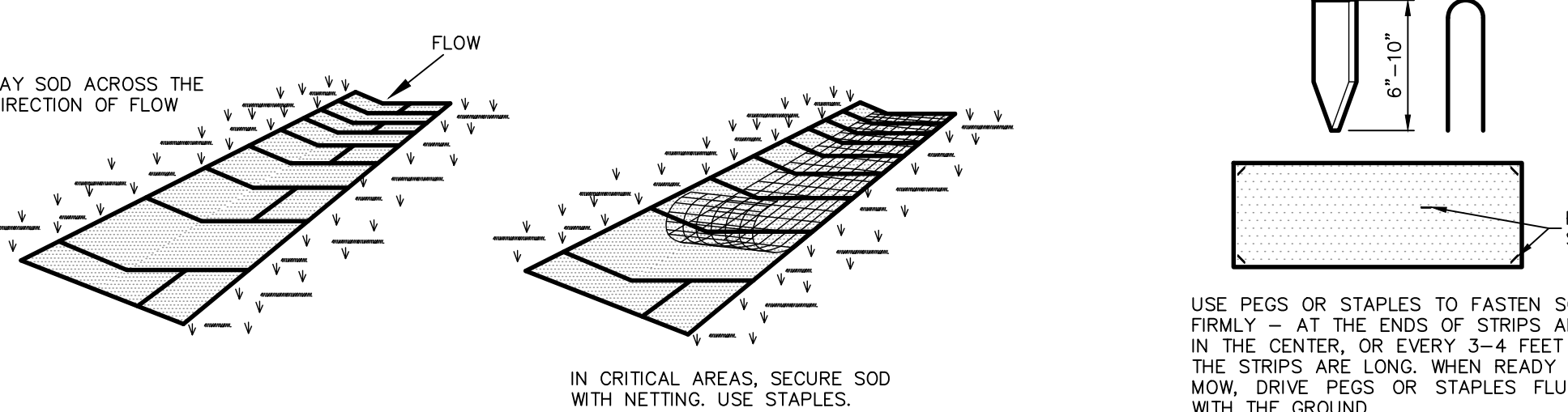
Doc: 5670.1219 Cornelius, N.C. • USA www.valworx.com



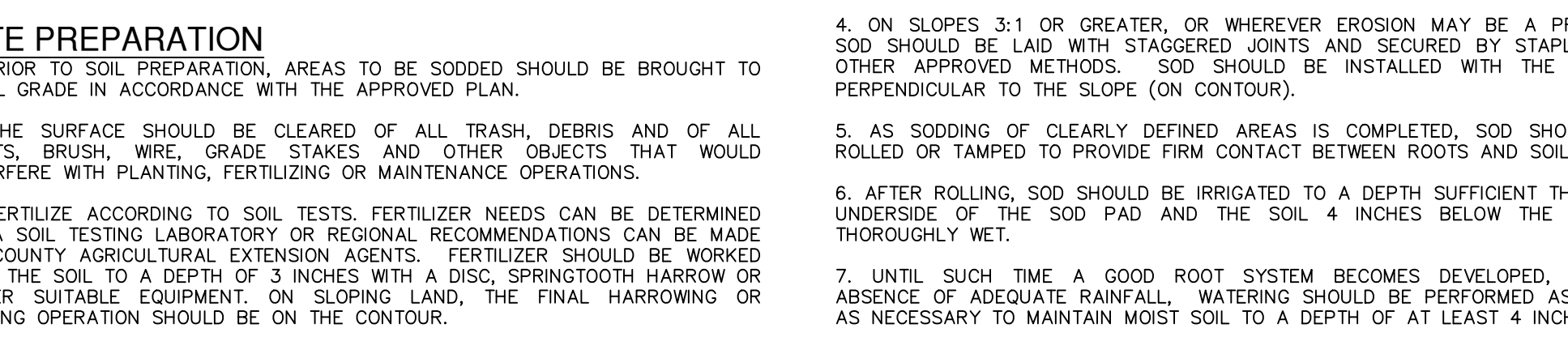
OUTLET STRUCTURE DETAIL WITH SURFACE OUTFALL PIPE NOT-TO-SCALE



APPEARANCE OF GOOD SOD  
 1. SOD SHOULD BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF 3/4" INCH (± 1/4" INCH) AT THE TIME OF CUTTING. THIS THICKNESS SHOULD EXCLUDE SHOOT GROWTH AND THATCH.  
 2. PIECES OF SOD SHOULD BE CUT TO THE SUPPLIER'S STANDARD WIDTH AND LENGTH, WITH A MAXIMUM ALLOWABLE DEVIATION IN ANY DIMENSION OF 5% TORN OR UNEVEN PADS SHOULD NOT BE ACCEPTABLE.  
 3. STANDARD SIZE SECTIONS OF SOD SHOULD BE STRONG ENOUGH TO SUPPORT THEIR OWN WEIGHT AND RETAIN THEIR SIZE AND SHAPE WHEN SUSPENDED FROM A FIRM GRASP ON ONE END OF THE SECTION.  
 4. SOD SHOULD BE HARVESTED, DELIVERED, AND INSTALLED WITHIN A PERIOD OF 36 HOURS.



GENERAL INSTALLATION (VA. DEPT. OF CONSERVATION, 1992)  
 1. SOD SHOULD NOT BE CUT OR LAID IN EXCESSIVELY WET OR DRY WETTER. SOD ALSO SHOULD NOT BE LAID ON SOIL SURFACES THAT ARE FROZEN.  
 2. DURING PERIODS OF HIGH TEMPERATURE, THE SOIL SHOULD BE LIGHTLY IRRIGATED IMMEDIATELY PRIOR TO LAYING THE SOD, TO COOL THE SOIL AND REDUCE ROOT BURNING AND DIEBACK.  
 3. THE FIRST ROW OF SOD SHOULD BE LAID IN A STRAIGHT LINE WITH SUBSEQUENT ROWS PLACED PARALLEL TO AND BUTTING TIGHTLY AGAINST EACH OTHER. LATERAL JOINTS SHOULD BE STAGGERED TO PROMOTE MORE UNIFORM GROWTH AND STRENGTH. CARE SHOULD BE EXERCISED TO ENSURE THAT SOD IS NOT STRETCHED OR OVERLAPPED AND THAT ALL JOINTS ARE BUTTED TIGHT IN ORDER TO PREVENT VOIDS WHICH WOULD CAUSE DRYING OF THE ROOTS (SEE FIGURE ABOVE).  
 4. ON SLOPES 3:1 OR GREATER, OR WHEREVER EROSION MAY BE A PROBLEM, SOD SHOULD BE LAID WITH STAGGERED JOINTS AND SECURED BY STAPLING OR OTHER APPROVED METHODS. SOD SHOULD BE INSTALLED WITH THE LENGTH PERPENDICULAR TO THE SLOPE (ON CONTOUR).  
 5. AS SODDING OF CLEARLY DEFINED AREAS IS COMPLETED, SOD SHOULD BE ROLLED OR TAMPED TO PROVIDE FIRM CONTACT BETWEEN ROOTS AND SOIL.  
 6. AFTER ROLLING, SOD SHOULD BE IRRIGATED TO A DEPTH SUFFICIENT THAT THE UNDERSIDE OF THE SOD PAD AND THE SOIL 4 INCHES BELOW THE SOD IS THOROUGHLY WET.  
 7. UNTIL SUCH TIME A GOOD ROOT SYSTEM BECOMES DEVELOPED, IN THE ABSENCE OF ADEQUATE RAINFALL, WATERING SHOULD BE PERFORMED AS OFTEN AS NECESSARY TO MAINTAIN MOIST SOIL TO A DEPTH OF AT LEAST 4 INCHES.  
 8. THE FIRST MOWING SHOULD NOT BE ATTEMPTED UNTIL THE SOD IS FIRMLY ROOTED, USUALLY 2-3 WEEKS. NOT MORE THAN ONE THIRD OF THE GRASS LEAF SHOULD BE REMOVED AT ANY ONE CUTTING.



SEDIMENT DEPTH MARKER NOT TO SCALE

NOTES:  
 1. CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION IN BASINS PER BASIN DETAIL SHEET PRIOR TO SITE CLOSEOUT.  
 2. UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S (FILTERSTRIPS AND BASINS) MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.  
 3. ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASINS SHALL BE REVEGETATED PRIOR TO COMPLETION.

VERAMENDI BASIN ELECTRICAL PLAN REFERENCE DETAILS

NOTES:  
 1. CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION IN BASINS PER BASIN DETAIL SHEET PRIOR TO SITE CLOSEOUT.  
 2. UPON COMPLETION OF CONSTRUCTION, AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S (FILTERSTRIPS AND BASINS) MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.  
 3. ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASINS SHALL BE REVEGETATED PRIOR TO COMPLETION.

SEQUENCE OF OPERATION  
 1. UPON ACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #1.  
 2. DETENTION TIMER #1 TO BE MANUALLY SET TO 12 HOURS AND TO BE USER ADJUSTABLE.  
 3. WHEN DETENTION TIMER #1 HAS ELAPSED, A 6" BUTTERFLY VALVE IS TO OPEN AND RELEASE DETAINED WATER BASIN.  
 4. UPON DEACTIVATION OF FLOAT SWITCH, DDC CONTROL TO START DETENTION TIMER #2.  
 5. DETENTION TIMER #2 TO BE MANUALLY SET TO 19-48 HOURS AND TO BE USER ADJUSTABLE.  
 6. WHEN DETENTION TIMER #2 HAS ELAPSED, THE 6" BUTTERFLY VALVE IS TO CLOSE.  
 7. VALVE TO BE ACTUATED PERIODICALLY TO SHOW ACTIVE REGARDLESS OF FLOAT SWITCH OPERATION.

NOTES TO CONTRACTOR (EACH PHASE OF BASIN CONSTRUCTION)  
 1. CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR PRIOR APPROVAL.

2. CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN BASIN CONSTRUCTION HAS PROCEEDED TO THE FOLLOWING MILESTONES:  
 a. REINFORCING STEEL FOR BASIN OVERFLOW WALL OR RIPRAP PILOT CHANNEL HAS BEEN SET. CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE AND RISER PIPE IS IN PLACE. CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE RISER PIPE HAS BEEN SET AT PROPER ELEVATION AND GRADE.  
 b. BASIN HAS BEEN COMPLETELY FINISHED INCLUDING SOD OR SEED PLACEMENT ON SIDE SLOPES (WHERE APPLICABLE).  
 3. WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.  
 4. UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:  
 - TOP OF BANKWALL AT EACH CORNER OF BASIN  
 - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)  
 - SPLASH PAD/INLET PIPES  
 - OVERFLOW WEIRS  
 BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.  
 THE MINIMUM DRAIN TIME FOR A FULL BASIN IS 24.1 HOURS. CONTRACTOR TO SET BUTTERFLY VALVE TO FULLY OPEN TO BE CONTROLLED DDC CONTROLLER.

CLAY LINER SPECIFICATIONS

PROPERTY	TEST METHOD	SPECIFICATION
PERMEABILITY (CM/SEC)	ASTM D 2434	1 X 10 <sup>-6</sup>
PLASTICITY INDEX OF CLAY (%)	ASTM D 423/D 424	NOT LESS THAN 15
LIQUID LIMIT OF CLAY (%)	ASTM D 2216	NOT LESS THAN 30
CLAY PARTICLES PASSING (%)	ASTM D 422	NOT LESS THAN 30
CLAY COMPACTION (%)	ASTM D 2216	95% OF STANDARD PROCTOR DENSITY

NOTES:  
 1. THE CLAY LINER SHALL HAVE A MINIMUM THICKNESS OF TWELVE (12) INCHES.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.  
 THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

DATE: \_\_\_\_\_

NO. REVISION: \_\_\_\_\_

11-17-2023

STATE OF TEXAS  
 JOCELYN PEREZ  
 98367  
 PROFESSIONAL ENGINEER

VERAMENDI PRECINCT 4 UNIT 1  
 NEW BRAUNFELS, TEXAS

WATER QUALITY BASIN DETAILS

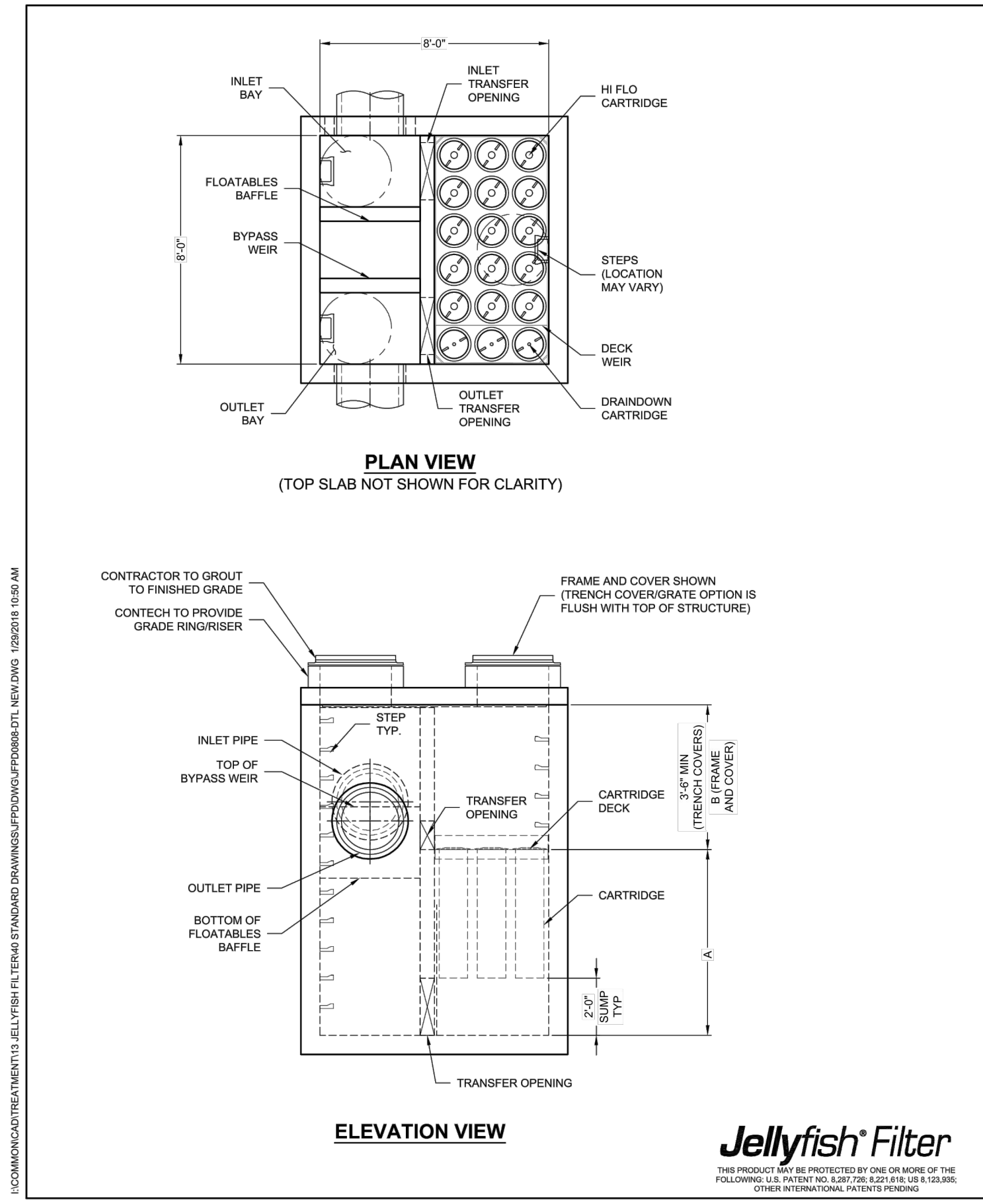
PLAT NO. 30001-65  
 JOB NO. 09-05-2023  
 DATE 09-05-2023  
 DESIGNER GDL  
 CHECKED DRAWN CA  
 SHEET C1.10

EXHIBIT 5

FOR PERMIT

Date: March 8, 2023, 1:47 PM - User ID: DLynch  
 File: P:\300\01\65\Design\Civil\p4\_U1\B4D1-3000-65.dwg

Date: 09-01-2023, 9:26am, User: D:\jwch, File: P:\300\01\45\Design\Environmental\JF-30001-45-DT.dwg



### JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-4"	5'-4"	4'-3"	3'-3"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	2.84	2.21	1.47	0.81
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00

PIPE DATA	I.E.	MATL.	DIA.	SLOPE %	HGL.
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT

\* PER ENGINEER OF RECORD

### JELLYFISH JFPD0808 STANDARD DETAIL PEAK DIVERSION CONFIGURATION

CONTRACTOR TO GROUT TO FINISHED GRADE  
CONTECH TO PROVIDE GRADE RINGRISER

FRAME AND COVER SHOWN (TRENCH COVER/GRATE OPTION IS FLUSH WITH TOP OF STRUCTURE)

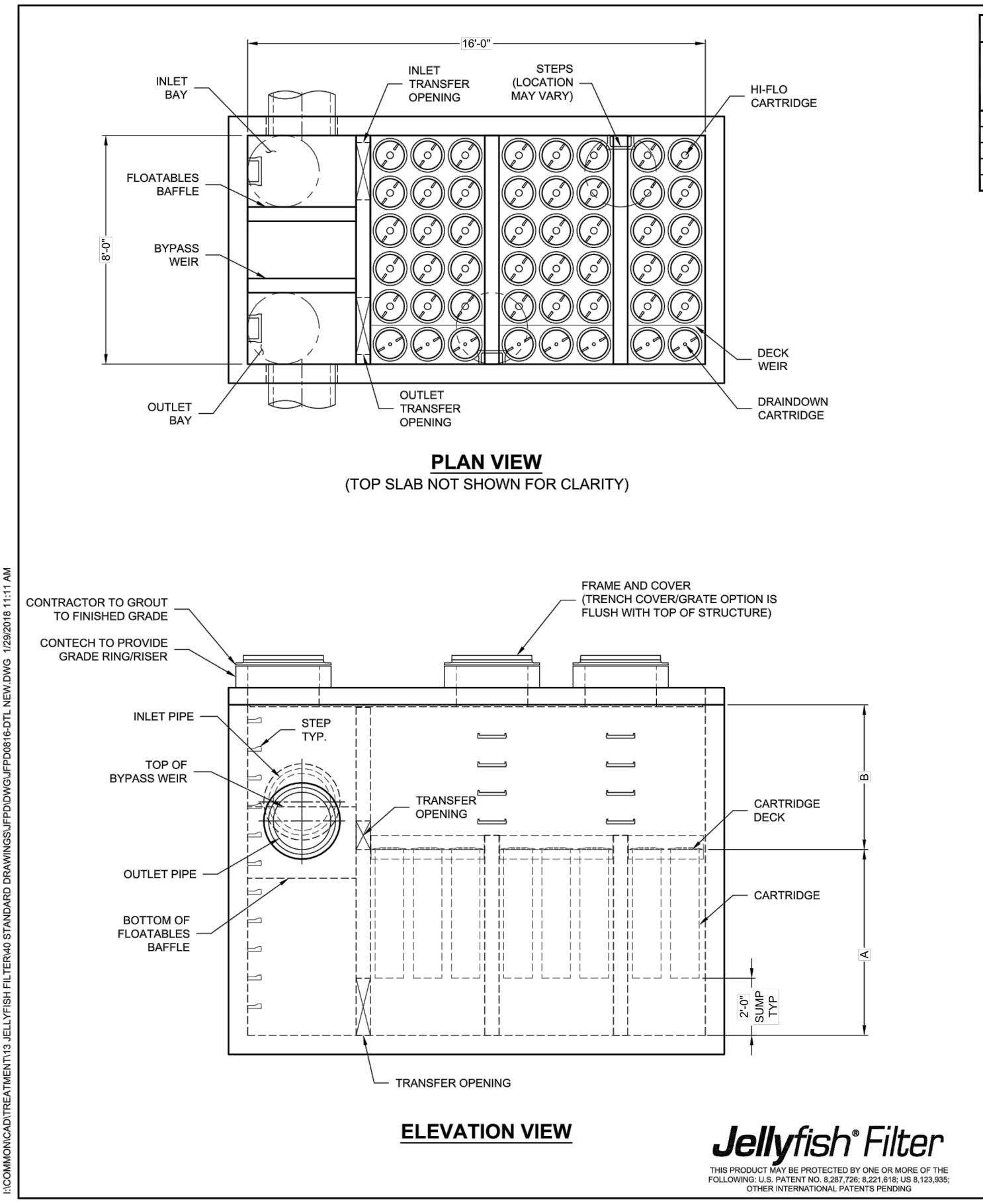
24" TRENCH COVER (LENGTH VARIES) N.T.S.

GENERAL NOTES:  
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.  
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. www.ContechES.com  
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.  
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 1'-10" AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M200 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.  
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.  
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.  
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.  
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES:  
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.  
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE.  
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).  
D. CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

CONTECH ENGINEERED SOLUTIONS LLC  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45399  
800-338-1122 513-645-7000 513-645-7993 FAX

**WORD PKWY PHASE 3  
JELLYFISH FILTER DETAIL**  
NOT-TO-SCALE



### JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.

CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	6'-4"	5'-4"	4'-3"	3'-3"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	2.84	2.21	1.47	0.81
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00

PIPE DATA	I.E.	MATL.	DIA.	SLOPE %	HGL.
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

SEE GENERAL NOTES 6-7 FOR INLET AND OUTLET HYDRAULIC AND SIZING REQUIREMENTS.

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT

\* PER ENGINEER OF RECORD

### JELLYFISH JFPD0816 STANDARD DETAIL PEAK DIVERSION CONFIGURATION

CONTRACTOR TO GROUT TO FINISHED GRADE  
CONTECH TO PROVIDE GRADE RINGRISER

FRAME AND COVER SHOWN (TRENCH COVER/GRATE OPTION IS FLUSH WITH TOP OF STRUCTURE)

24" TRENCH COVER (LENGTH VARIES) N.T.S.

GENERAL NOTES:  
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.  
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. www.ContechES.com  
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.  
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 1'-10" AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M200 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.  
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.  
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.  
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.  
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES:  
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.  
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE.  
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).  
D. CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

CONTECH ENGINEERED SOLUTIONS LLC  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45399  
800-338-1122 513-645-7000 513-645-7993 FAX

**PRECINCT 4  
JELLYFISH FILTER DETAIL**  
NOT-TO-SCALE

DATE: \_\_\_\_\_  
NO. REVISION: \_\_\_\_\_

Jocelyn Perez  
Professional Engineer

**PAPE-DAWSON ENGINEERS**  
NEW BRAUNfels | SAN ANTONIO | AUSTIN | HOUSTON | FT WORTH | DALLAS  
1075 INDEPENDENCE DR. STE 102 | NEW BRAUNfels, TX 78121 | 800.652.5583  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10088600

**VERAMENDI WORD PKWY PHASE 3,  
PRECINCT 18 UNIT 1, PRECINCT 4 UNIT 1, 2, & 3  
WATER POLLUTION ABATEMENT PLAN  
JELLYFISH FILTER DETAILS**

PLAT NO. \_\_\_\_\_  
JOB NO. 30001-45  
DATE SEPTEMBER 2023  
DESIGNER GDL  
CHECKED DRAWN  
SHEET 1 OF 1

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE TPDES-STORM WATER POLLUTION PREVENTION PLAN (SWP3) REGULATIONS.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF THE SWP3 ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 4**

**FOR PERMIT**

**DRAINAGE & GRADING NOTES:**

- THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATIONS FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE.
- ALL CONCRETE FOR TxDOT DRAINAGE STRUCTURES SHALL MEET TxDOT SPECIFICATIONS. ALL OTHER CONCRETE SHALL BE CLASS "A" 3000 PSI CYLINDER STRENGTH IN 28 DAYS.
- REFERENCE DRAINAGE DETAILS FOR PIPE TRENCH DETAILS, BOX CULVERT, HEADWALL, AND WINGWALL CONSTRUCTION DETAILS, AND BOX CULVERT BEDDING AND EXCAVATION LIMITS.
- CONTRACTOR SHALL GROUT ALL CURB INLETS AND JUNCTION BOXES TO PROVIDE FOR POSITIVE DRAINAGE.
- EARTHEN CHANNELS WILL BE VEGETATED BY SEEDING OR SODDING. 85% OF THE CHANNEL SURFACE MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF NEW BRAUNFELS WILL ACCEPT.
- CONTRACTOR SHALL MATCH TOP OF CHANNEL TO NATURAL GROUND AND MAINTAIN A MINIMUM CHANNEL DEPTH OF "D" AS SHOWN IN THE PROFILE.
- ALL RCP SHALL BE AASHTO M170 CLASS III RCP.

**CAUTION!!**

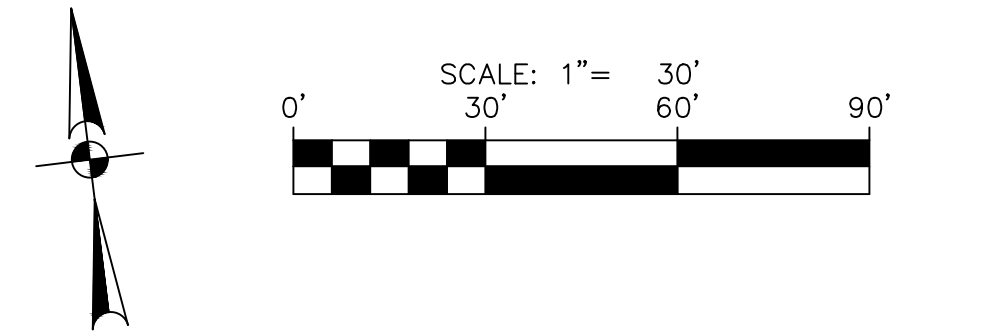
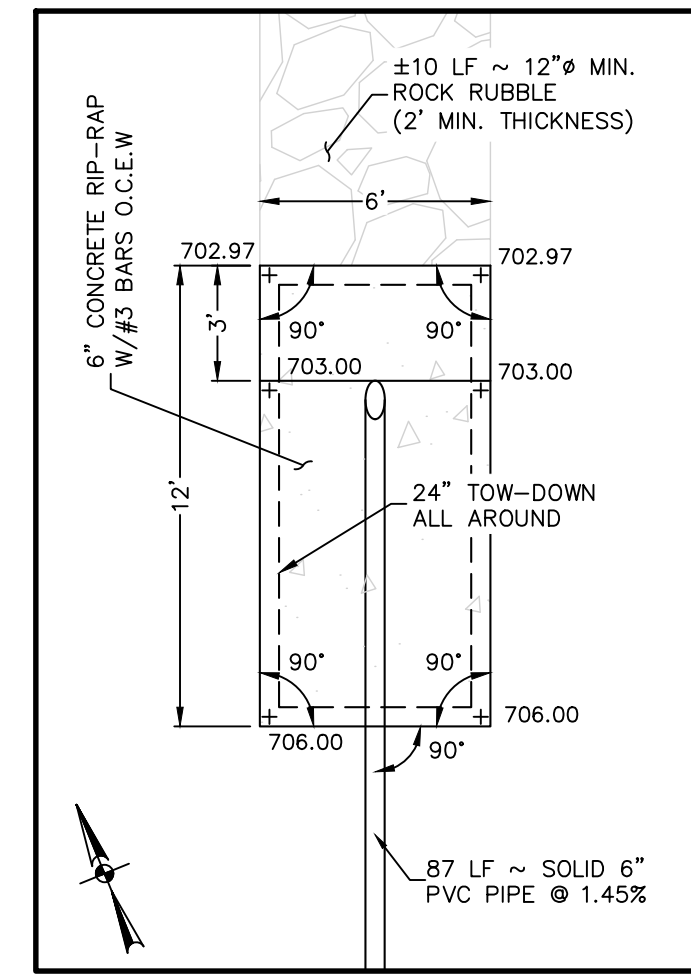
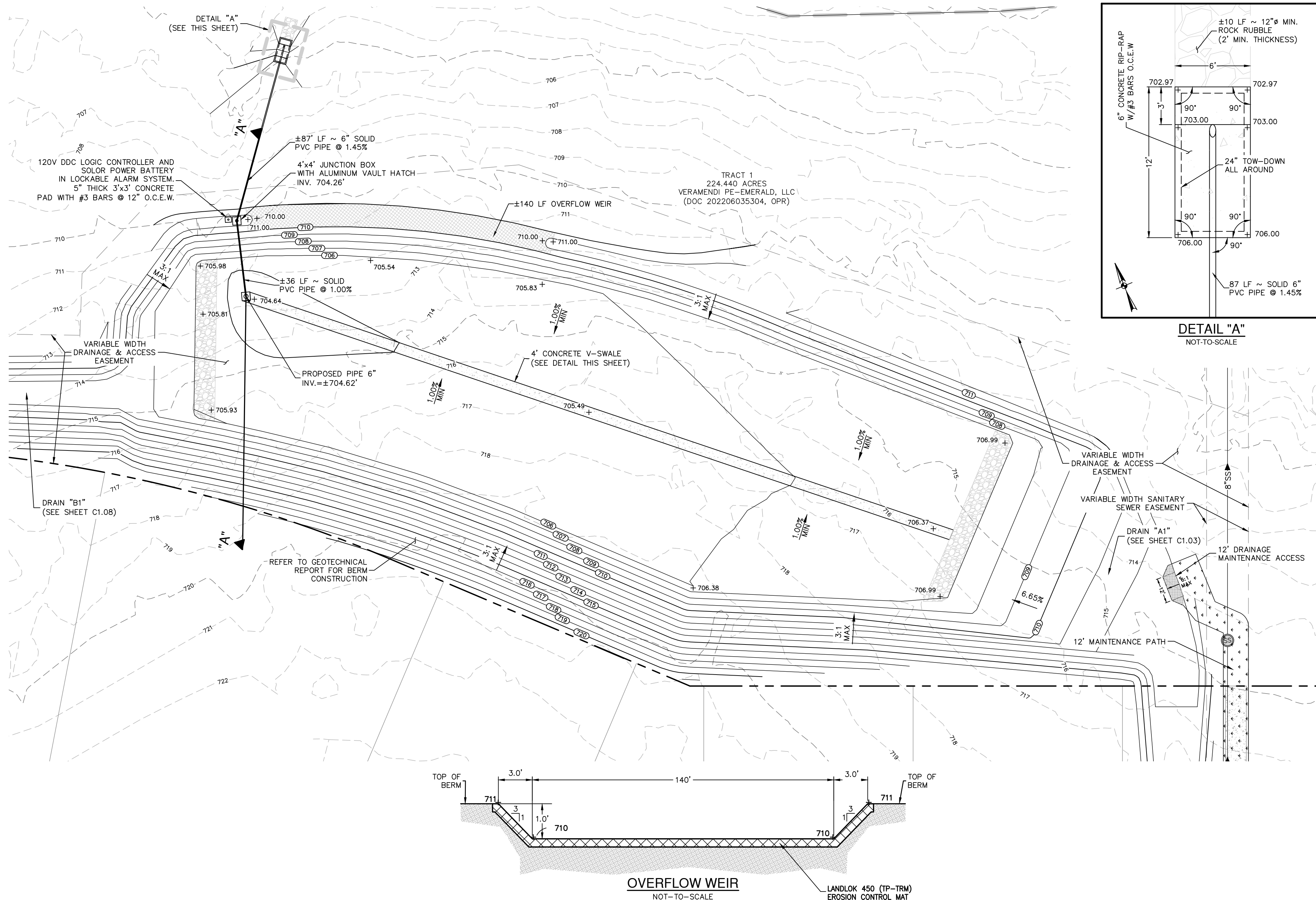
CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT "TEXAS 811" A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

**TRENCH EXCAVATION SAFETY PROTECTION:**

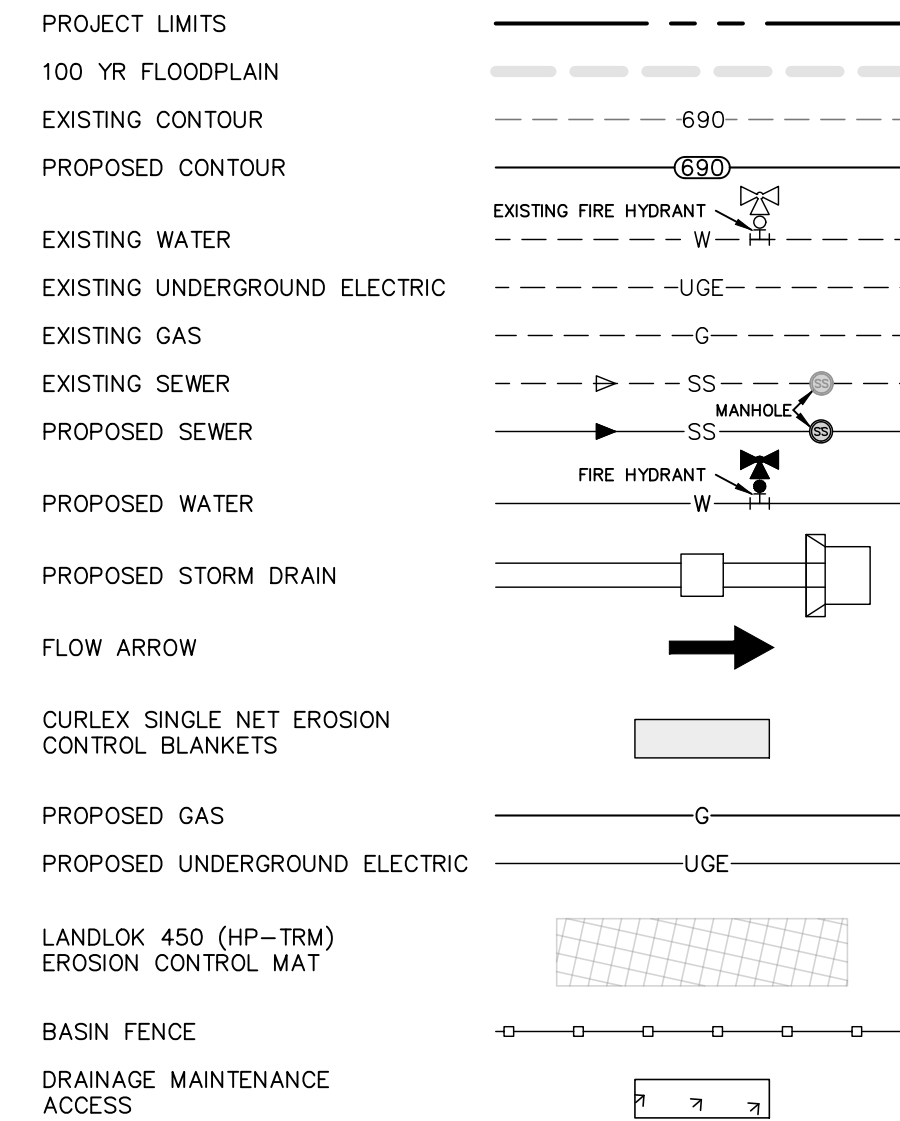
CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN / GEOTECHNICAL / SAFETY EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND /OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

**BASIN DESIGN DATA**

BASIN WATERSHED AREA	= 1,950,181 SF (44.77 AC.)
RUN OFF DEPTH	= 1.6 IN
REQUIRED CAPTURE VOLUME	= 108,412 CF
BASIN STORM WATER DEPTH	= 4.33 FT
BASIN CAPTURE VOLUME	= 155,388 CF



**DRAINAGE LEGEND**



**OVERFLOW WEIR CALCULATIONS**

$$Q_{25} = (C_w)(L)(h)^{3/2}$$

$$Q_{25} = 252 \text{ cfs}$$

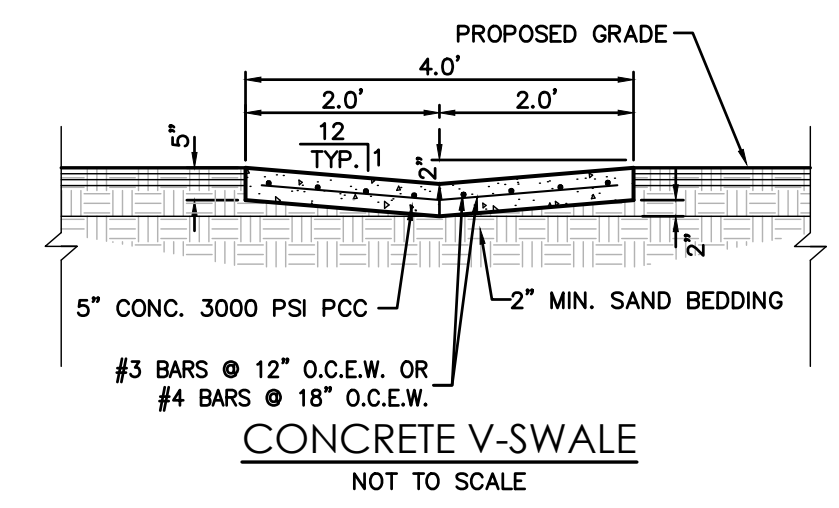
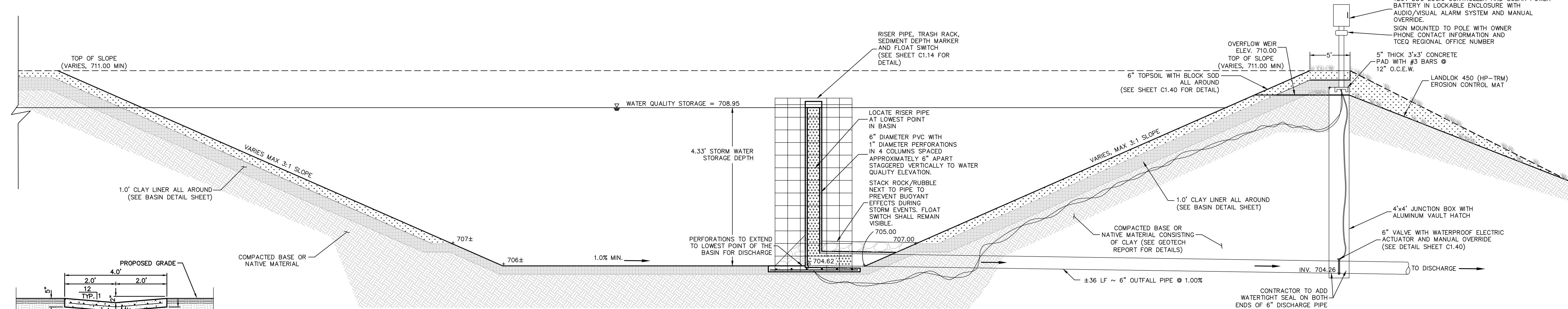
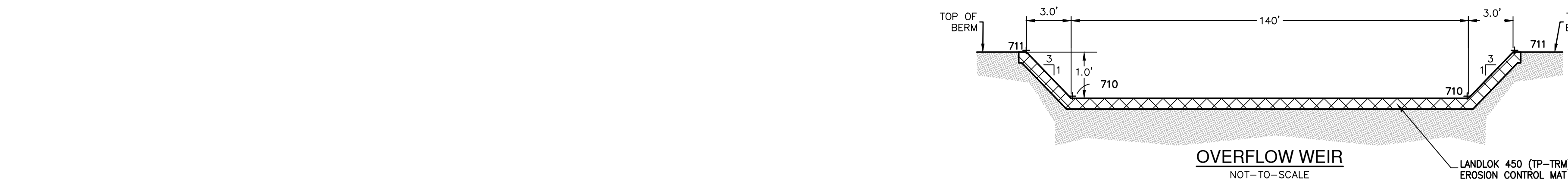
$$C = 2.60$$

$$L = 140 \text{ ft}$$

$$252 = (2.60)(140)(h)^{3/2}$$

$$h = 0.78 \text{ ft}$$

M.A.S. NOTE:  
STAGING AREA REQUIREMENT (800 SQ.FT.) IS SATISFIED BY UTILIZING THE PRIVATE AREA ADJACENT TO THE BASIN AS DESIGNATED IN THE PLAN VIEW ABOVE.



THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 5**

DATE: \_\_\_\_\_

NO. REVISION: \_\_\_\_\_

11-17-2023

JOCELYN PEREZ  
98367  
LICENSED PROFESSIONAL ENGINEER

**PAPE-DAWSON ENGINEERS**  
1672 INDEPENDENCE DR, STE 102 | NEW BRAUNFELS, TX 78132 | 800.632.5653  
TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008800

**VERAMENDI PRECINCT 18 UNIT 1**  
NEW BRAUNFELS, TEXAS  
NORTH BASIN PLAN

PLAT NO. \_\_\_\_\_  
JOB NO. 30001-66  
DATE 07-03-2023  
DESIGNER GDL  
CHECKED DRAWN CA  
SHEET C1.20

Date: Nov 17, 2023, 1:55pm User ID: Dlynch  
File: P:\3001\01\66\Design\Civil\BN-NORTH-30001-66.dwg

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE/UNLESS OTHERWISE NOTED. Imagery © 2016, CAPOCO, Digital Globe, Texas Orthology Program, USDA Farm Service Agency.

**FOR PERMIT**

**DRAINAGE & GRADING NOTES:**

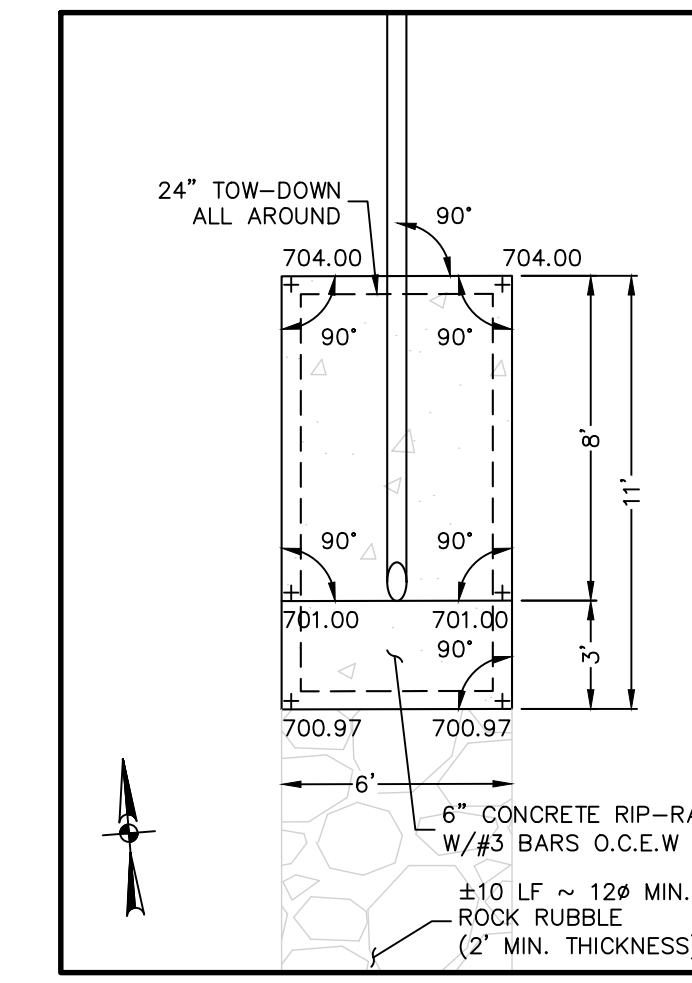
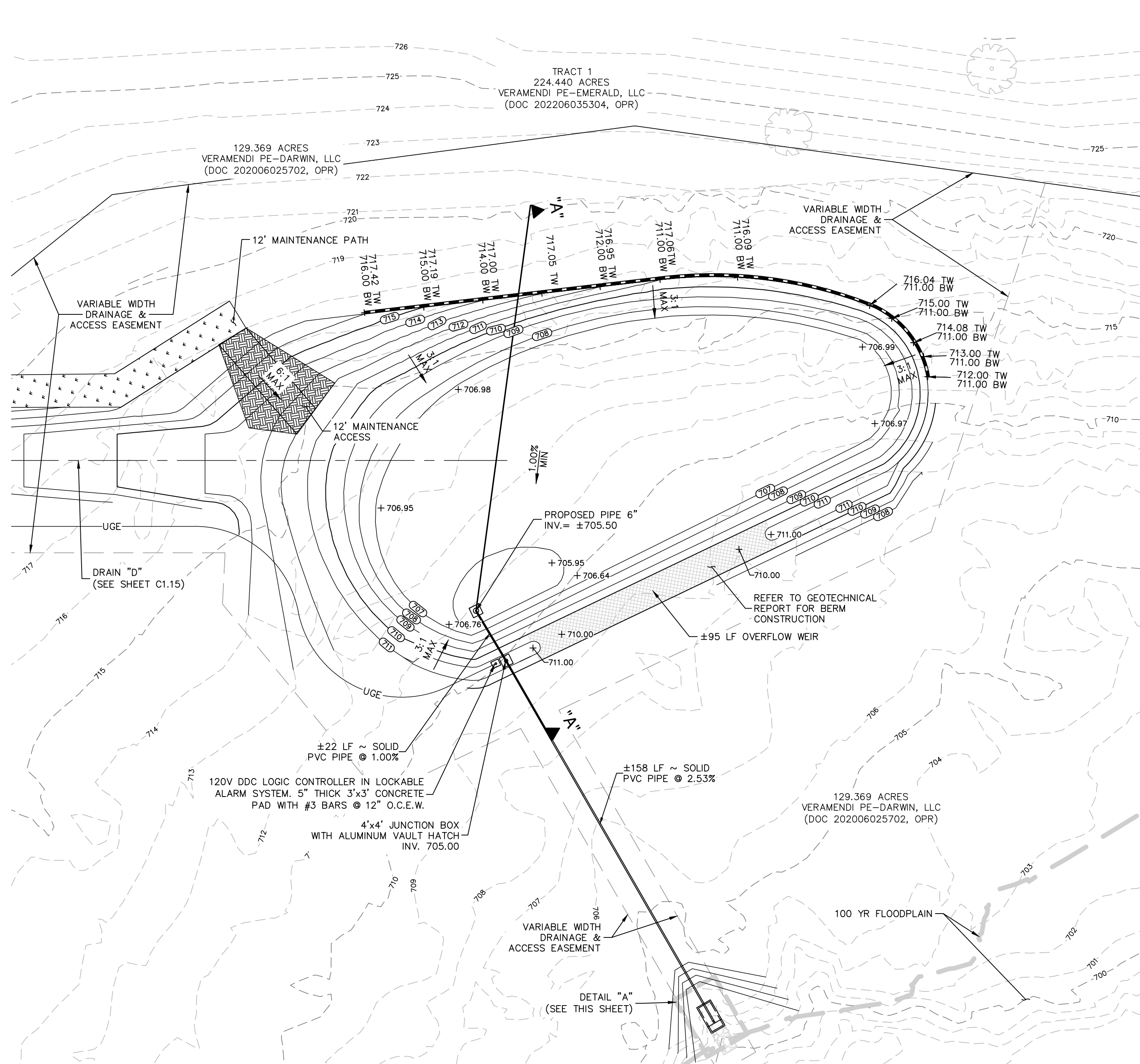
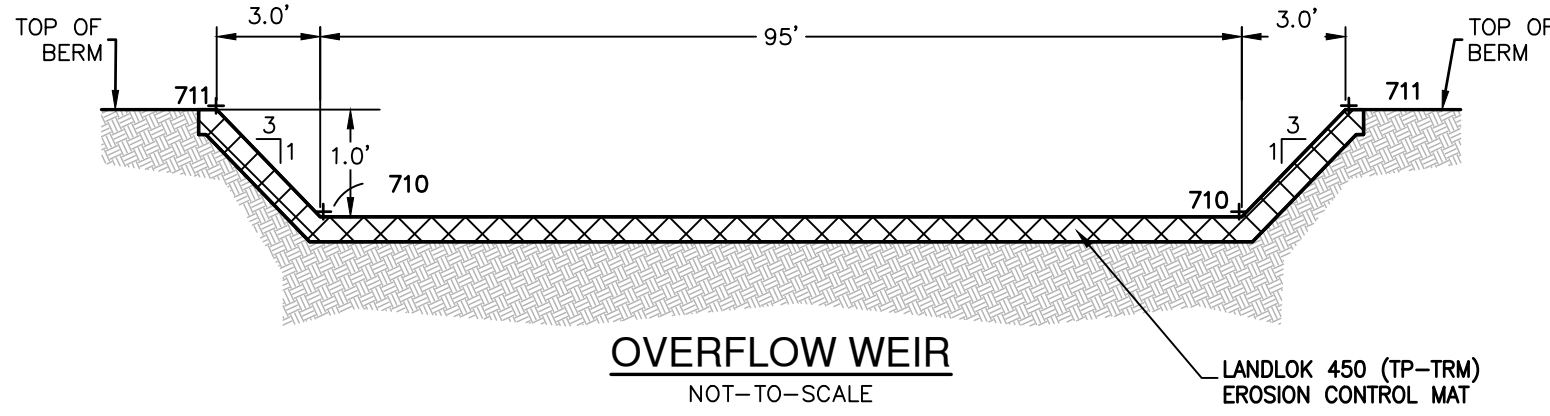
1. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATIONS FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE.
2. ALL CONCRETE FOR TxDOT DRAINAGE STRUCTURES SHALL MEET TxDOT SPECIFICATIONS. ALL OTHER CONCRETE SHALL BE CLASS "A" 3000 PSI CYLINDER STRENGTH IN 28 DAYS.
3. REFERENCE DRAINAGE DETAILS FOR PIPE TRENCH DETAILS, BOX CULVERT, HEADWALL, AND WINGWALL CONSTRUCTION DETAILS, AND BOX CULVERT BEDDING AND EXCAVATION LIMITS.
4. CONTRACTOR SHALL GROUT ALL CURB INLETS AND JUNCTION BOXES TO PROVIDE FOR POSITIVE DRAINAGE.
5. EARTHEN CHANNELS WILL BE VEGETATED BY SEEDING OR SODDING. 85% OF THE CHANNEL SURFACE MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF NEW BRAUNFELS WILL ACCEPT.
6. CONTRACTOR SHALL MATCH TOP OF CHANNEL TO NATURAL GROUND AND MAINTAIN A MINIMUM CHANNEL DEPTH OF "D" AS SHOWN IN THE PROFILE.
7. ALL RCP SHALL BE AASHTO M170 CLASS III RCP.

**CAUTION!!**

CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT "TEXAS 811" A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

**TRENCH EXCAVATION SAFETY PROTECTION:**

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN / GEOTECHNICAL / SAFETY EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND /OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

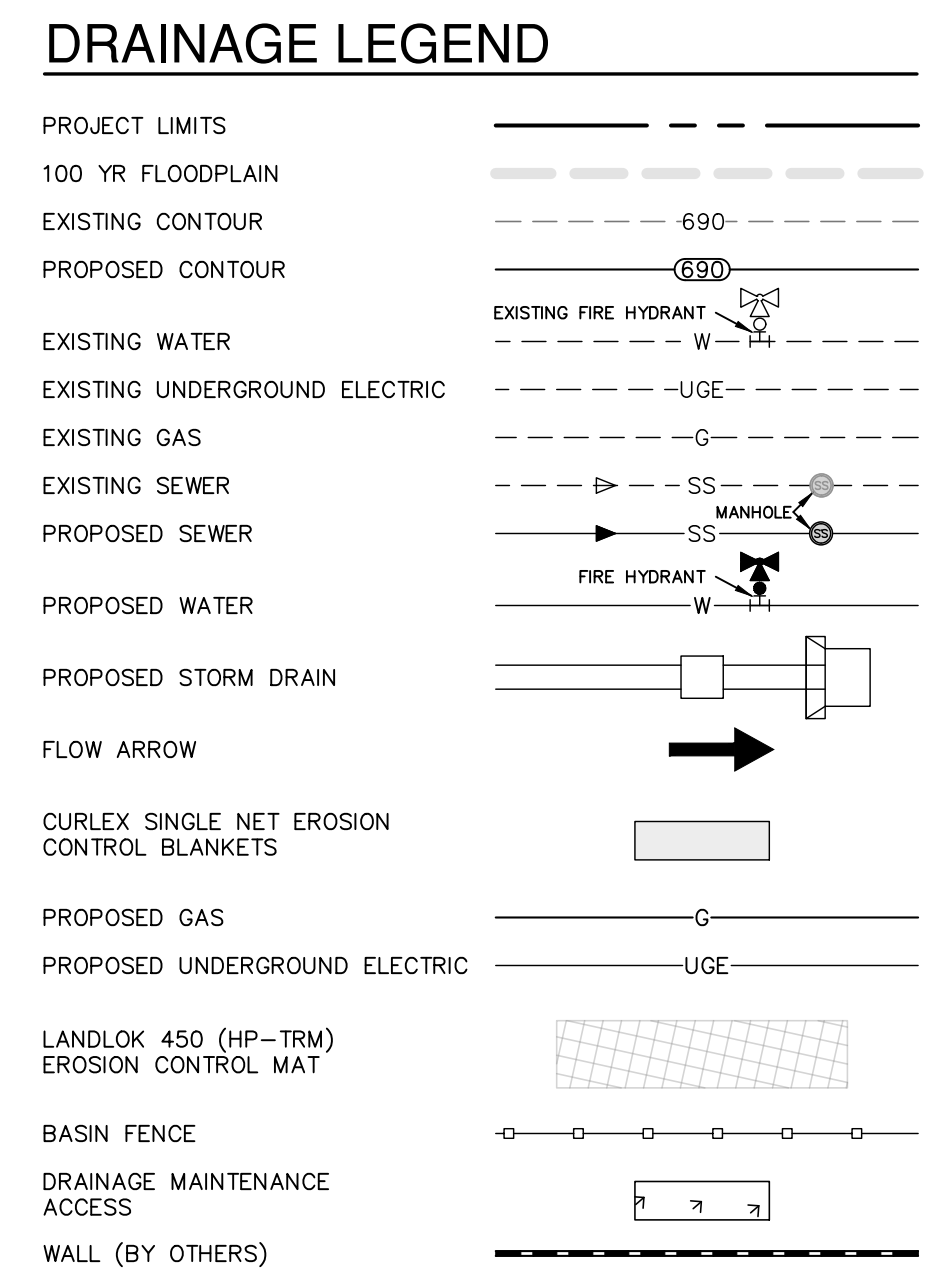


**BASIN DESIGN DATA**

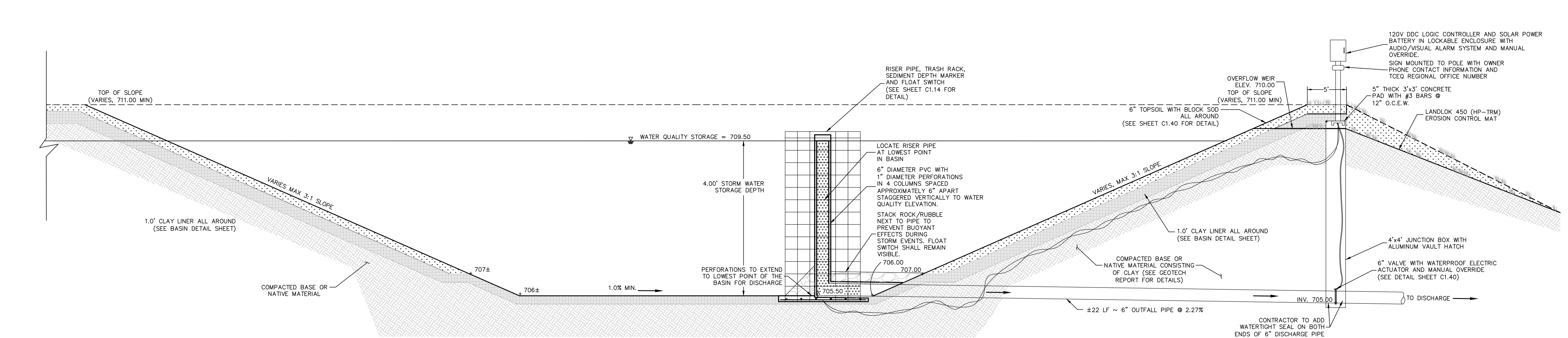
BASIN WATERSHED AREA	= 1,025,838 SF (23.55 AC.)
RUN OFF DEPTH	= 1.60 IN
REQUIRED CAPTURE VOLUME	= 41559 CF
BASIN STORM WATER DEPTH	= 4.50 FT
BASIN CAPTURE VOLUME	= 59,311 CF

**OVERFLOW WEIR CALCULATIONS**

$Q_{25}$	= $(C_w)(L)(h)^{3/2}$
$Q_{25}$	= 105 cfs
C	= 2.60
L	= 95 ft
105	= $(2.60)(95)(h)^{3/2}$
h	= 0.56 ft

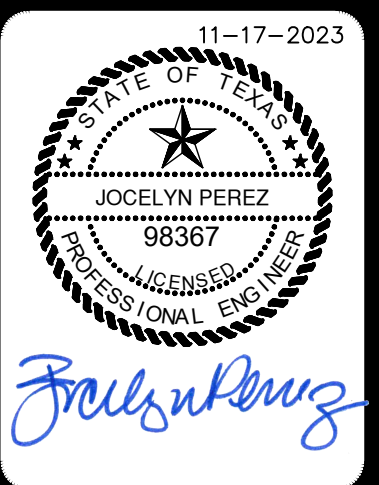


M.A.S. NOTE:  
STAGING AREA REQUIREMENT (800 SQ.FT.) IS SATISFIED BY UTILIZING THE PRIVATE AREA ADJACENT TO THE BASIN AS DESIGNATED IN THE PLAN VIEW ABOVE.



Date: Nov 17, 2023, 1:56pm User ID: Dlynch File: P:\3001\01\66\Design\Civil\BN-SOUTH-30001-66.dwg

NO.	REVISION	DATE



**PAPE-DAWSON ENGINEERS**  
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 800.632.5683  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1008800

**VERAMENDI PRECINCT 18 UNIT 1**  
NEW BRAUNFELS, TEXAS  
**SOUTH BASIN PLAN**

PLAT NO.	
JOB NO.	30001-66
DATE	07-03-2023
DESIGNER	GDL
CHECKED	DRAWN CA
SHEET	C1.30

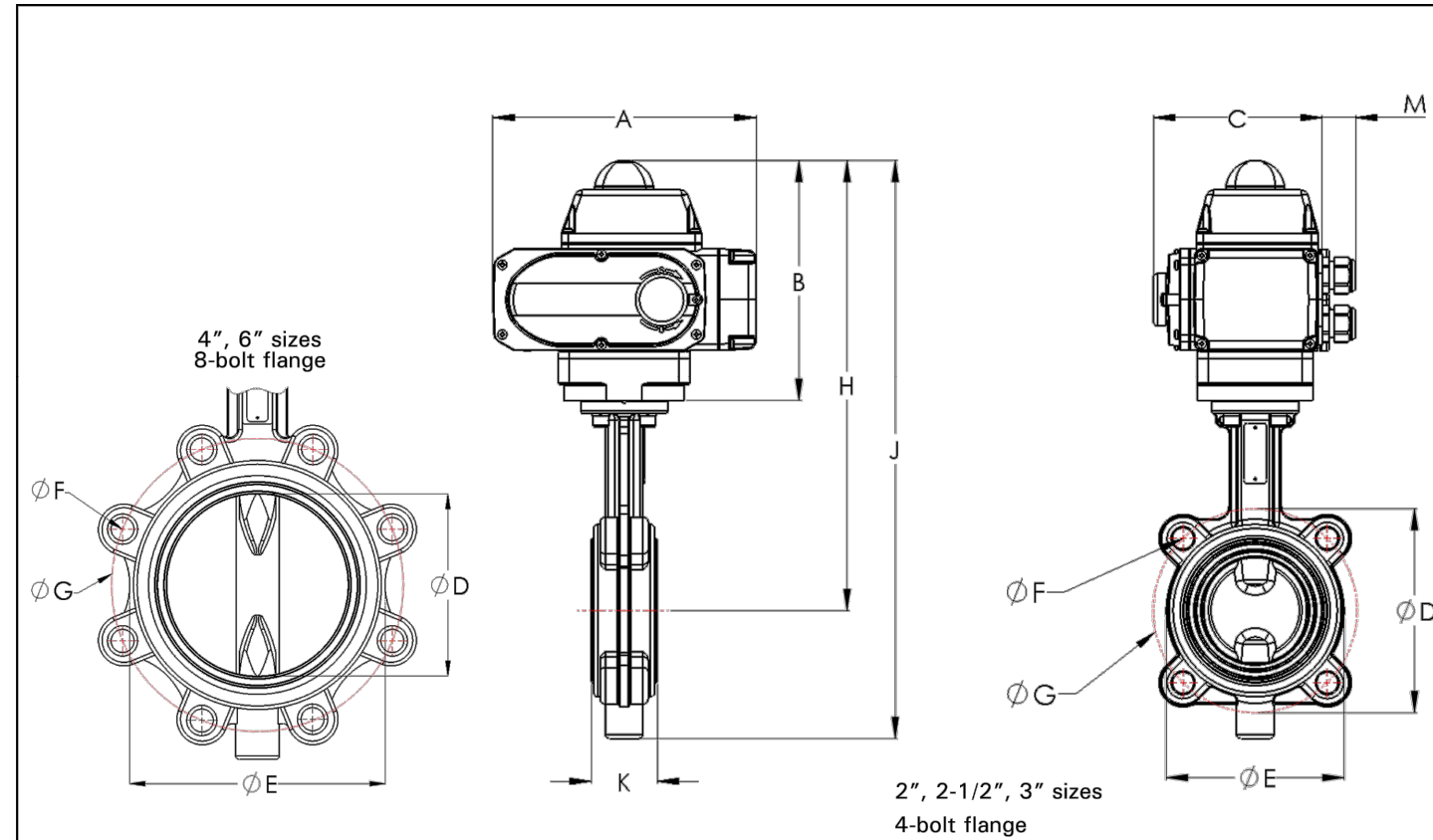
**EXHIBIT 5**

**FOR PERMIT**

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

Dimensions:

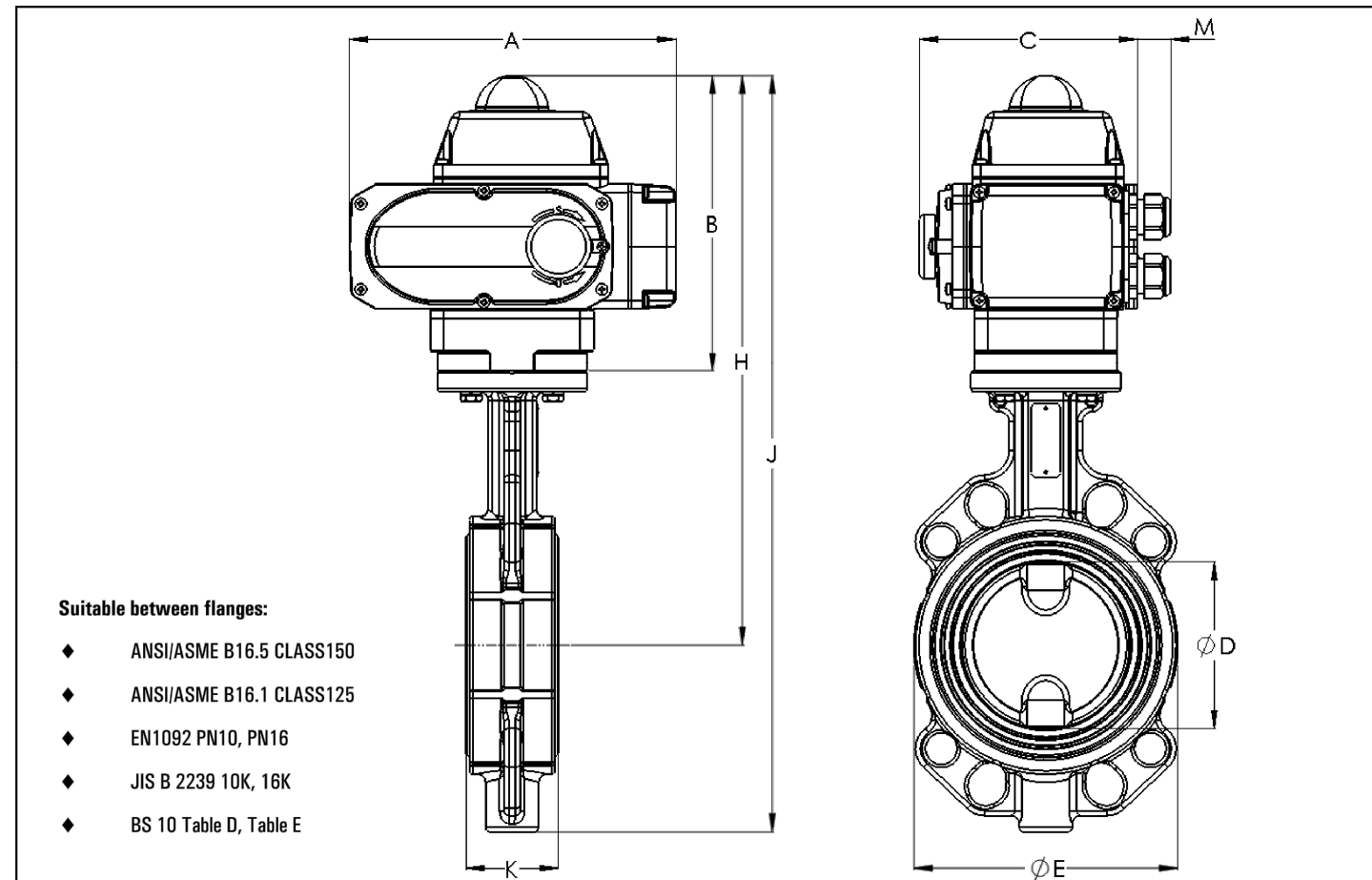


- Suitable between flanges:
- ANSI ASME B16.5 CLASS 150
  - ANSI ASME B16.1 CLASS 125

Pipe Size		A	B	C	D	E	F	G	H	J	K	M	ISO	Weight (AC/DI)
2	inch	6.34	7.09	4.65	1.97	3.74	4i 5/8-11	4.74	12.05	15.04	1.81	0.98	F05	12.7 / 13.3 lb
	mm	161	180	118	50	95	—	120.5	306	382	46	25		5.8 / 6.0 kg
2-1/2	inch	6.34	7.09	4.65	2.56	4.13	4i 5/8-11	6.00	13.27	15.59	1.93	0.98	F05	14.5 / 15.0 lb
	mm	161	180	118	65	105	—	139.7	314	396	49	25		6.6 / 6.8 kg
3	inch	6.34	7.09	4.65	3.15	4.72	4i 5/8-11	6.00	13.27	17.03	1.93	0.98	F05	17.3 / 17.8 lb
	mm	161	180	118	80	120	—	152.4	337	432.5	49	25		7.8 / 8.1 kg
4	inch	6.34	7.09	4.65	3.94	5.79	8i 5/8-11	7.50	11.97	16.46	2.20	0.98	F05/F07	22.1 / 22.6 lb
	mm	161	180	118	100	147	—	190.5	304	418	56	25		10.0 / 10.3 kg
6	inch	10.08	8.50	6.30	5.91	8.07	8i 3/4-10	9.50	16.50	22.24	2.32	0.98	F07	50.0 / 51.0 lb
	mm	256	216	160	150	205	—	241.3	419	565	59	25		22.7 / 23.1 kg

Doc: 5673.0118 Cornelius, N.C. • USA www.valworx.com

Dimensions:

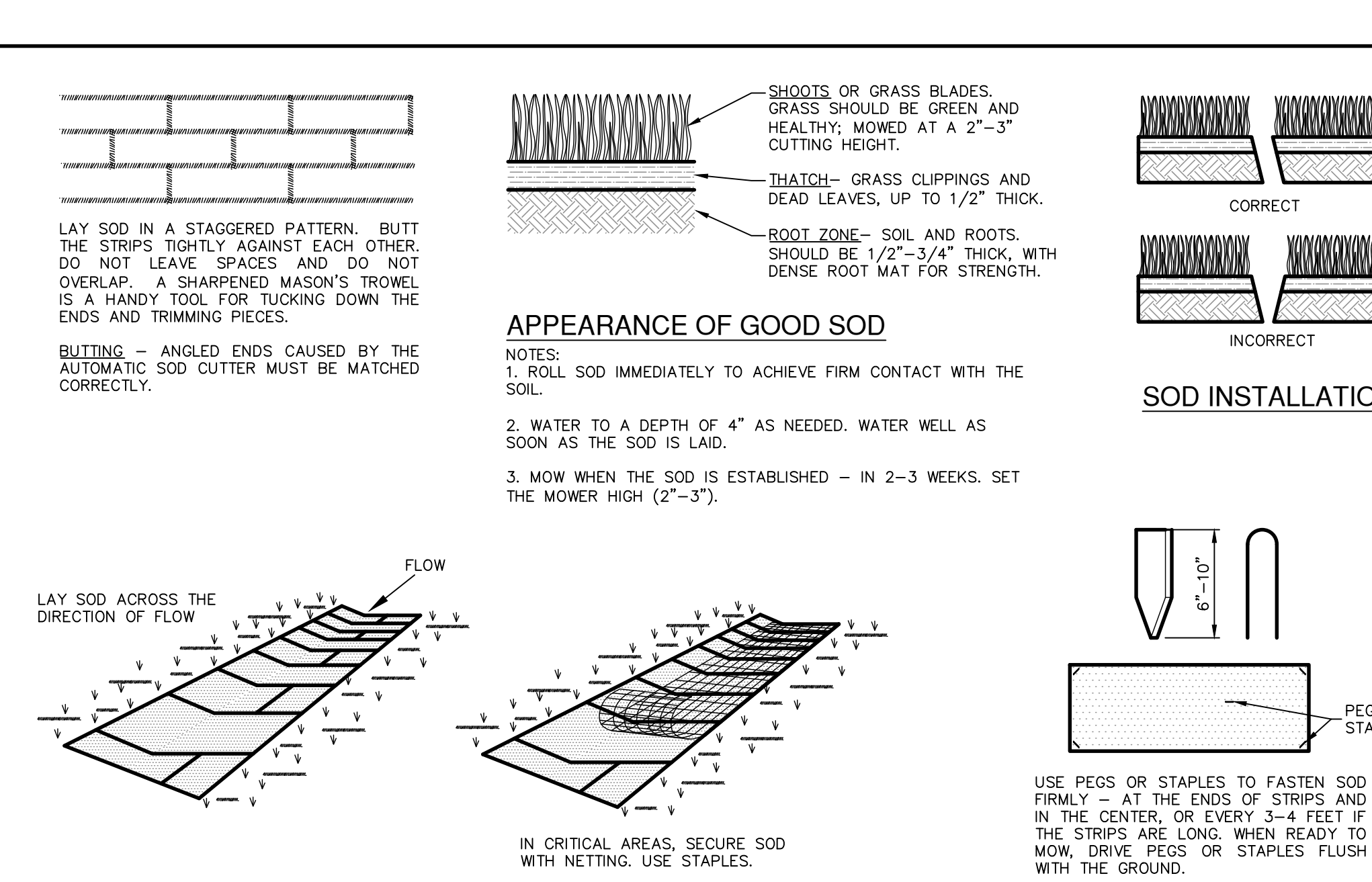
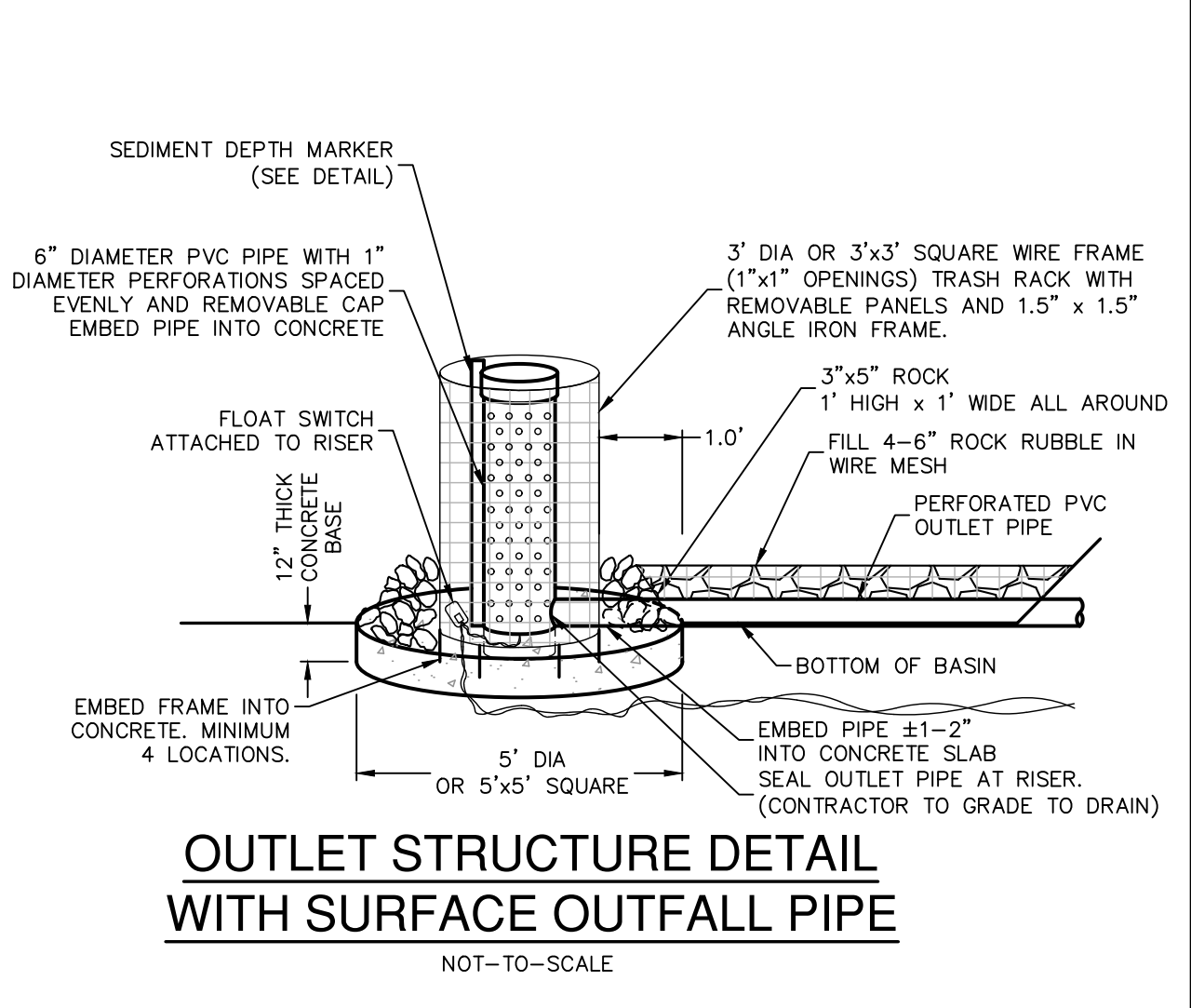
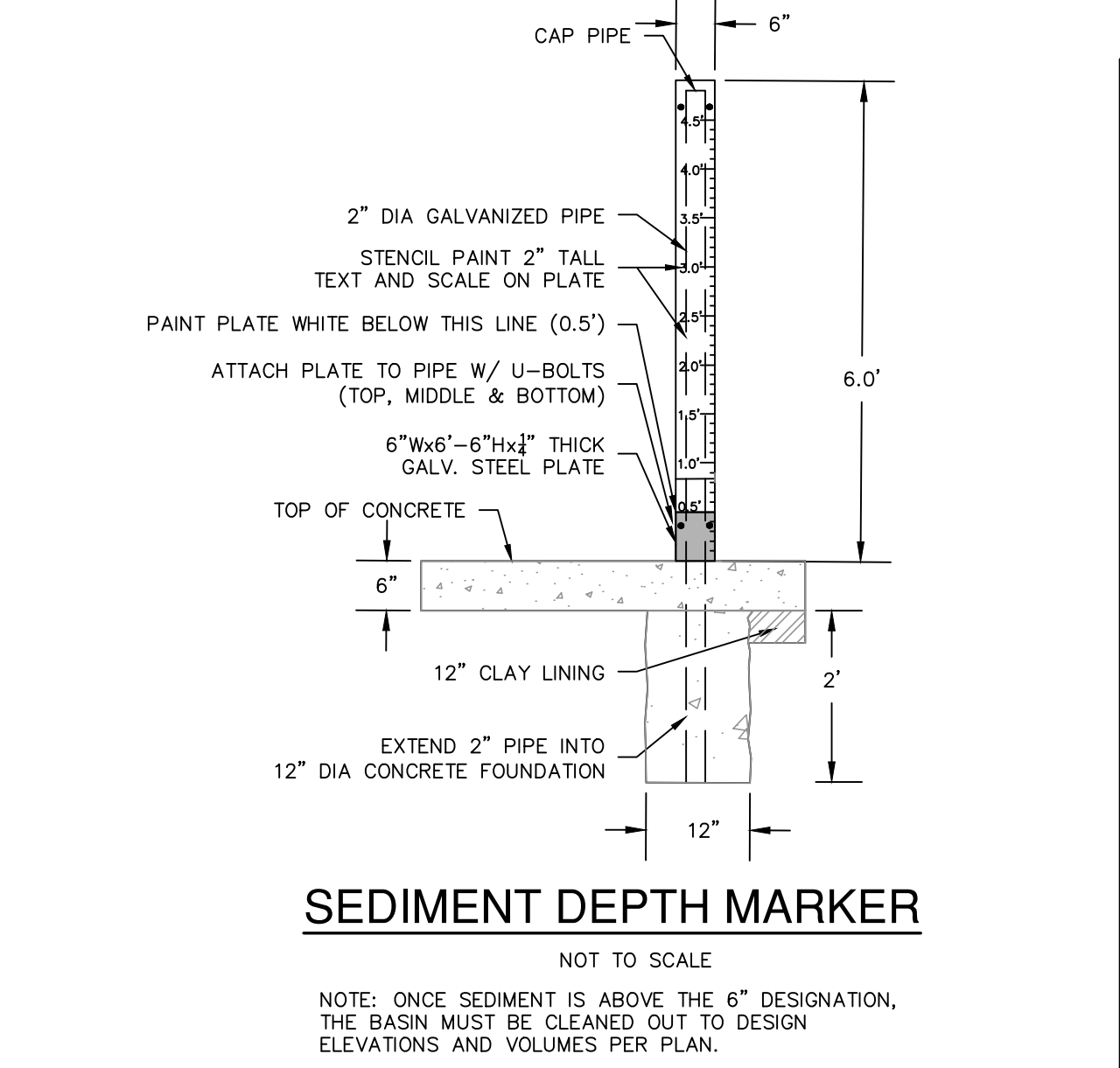
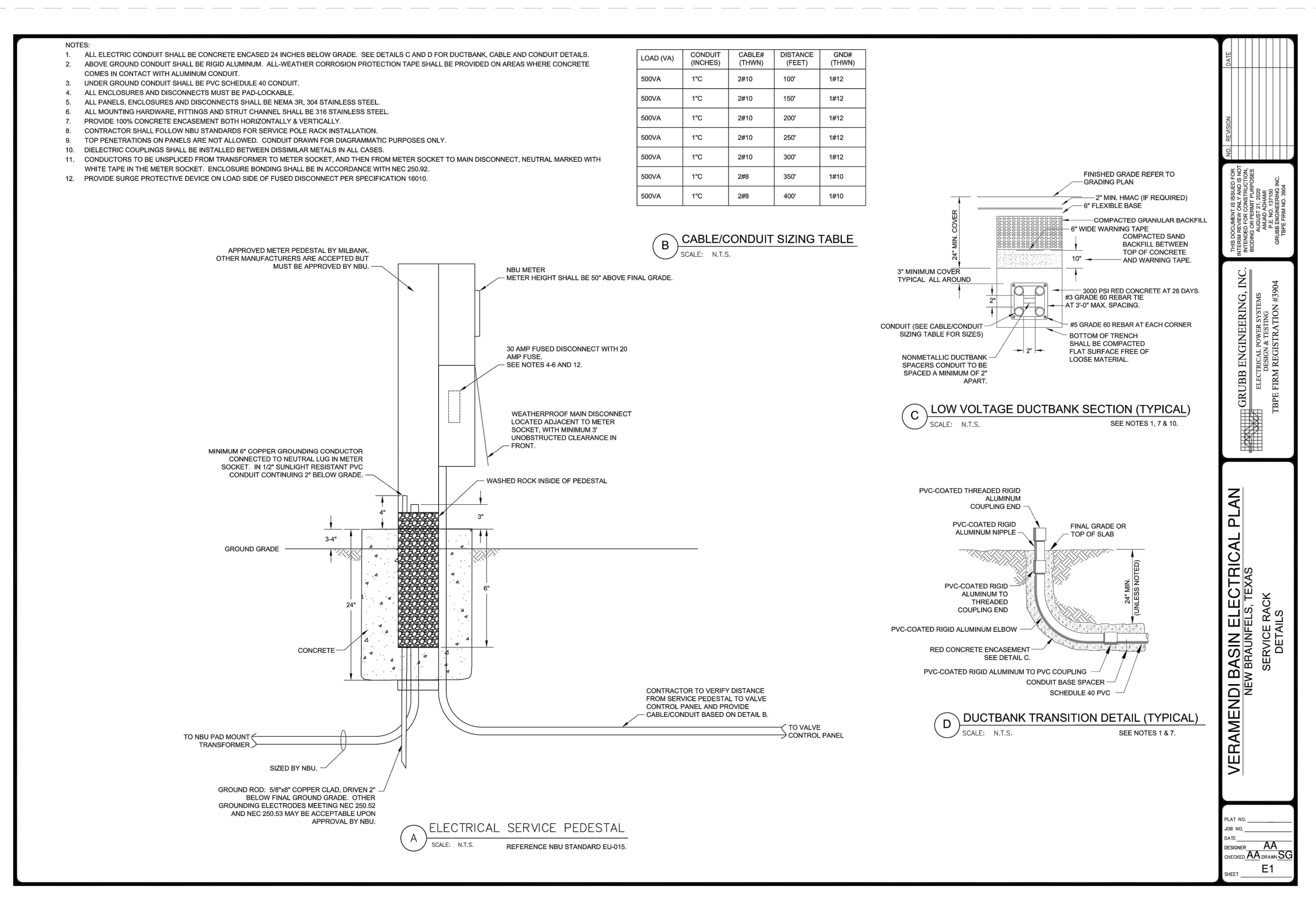


Suitable between flanges:

- ANSI ASME B16.5 CLASS 150
- ANSI ASME B16.1 CLASS 125
- EN 1092 PN10, PN16
- JIS B 2238 10K, 16K
- BS 10 Table D, Table E

Pipe Size		A	B	C	D	E	H	J	K	M	Weight (AC/DI)
2	inch	6.34	7.09	4.65	1.97	3.90	12.05	15.04	1.81	0.98	10.5/9.3 lb
	mm	161	180	118	50	99	306	382	46	25	4.8/4.3 kg
DN50	inch	6.34	7.09	4.65	2.56	4.48	12.38	15.59	1.93	0.98	11.8/10.6 lb
	mm	161	180	118	65	113	314	396	49	25	5.3/4.8 kg
3	inch	6.34	7.09	4.65	3.15	5.07	13.27	17.03	1.93	0.98	13.4/12.4 lb
	mm	161	180	118	80	129	337	432.5	49	25	6.1/5.6 kg
DN80	inch	6.34	7.09	4.65	3.94	6.17	13.68	18.54	2.20	0.98	17.0/16.0 lb
	mm	161	180	118	100	157	347	471	56	25	7.7/7.3 kg
6	inch	10.08	8.50	6.30	5.91	8.39	16.50	22.24	2.32	0.98	37.2/38.2 lb
	mm	256	216	160	150	213	419	565	59	25	16.9/17.3 kg
8	inch	10.08	8.50	6.30	7.87	10.67	17.48	24.25	2.38	0.98	48.9 lb
	mm	256	216	160	200	271	444	618	60	25	22.2 kg
DN200	inch	10.08	8.50	6.30	11.81	15.0	19.9	29.4	3.07	0.98	79.4 lb
	mm	256	216	160	300	381	505	747	78	25	36 kg

Doc: 5670.1219 Cornelius, N.C. • USA www.valworx.com



**MATERIALS**

- SOD SHOULD BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF 3/4" INCH (± 1/4" INCH) AT THE TIME OF CUTTING. THIS THICKNESS SHOULD EXCLUDE SHOOT GROWTH AND THATCH.
- PIECES OF SOD SHOULD BE CUT TO THE SUPPLIER'S STANDARD WIDTH AND LENGTH, WITH A MAXIMUM ALLOWABLE DEVIATION IN ANY DIMENSION OF 5% TORN OR UNEVEN PADS SHOULD NOT BE ACCEPTABLE.
- STANDARD SIZE SECTIONS OF SOD SHOULD BE STRONG ENOUGH TO SUPPORT THEIR OWN WEIGHT AND RETAIN THEIR SIZE AND SHAPE WHEN SUSPENDED FROM A FIRM GRASP ON ONE END OF THE SECTION.
- SOD SHOULD BE HARVESTED, DELIVERED, AND INSTALLED WITHIN A PERIOD OF 36 HOURS.

**SITE PREPARATION**

- PRIOR TO SOD PREPARATION, AREAS TO BE SODDED SHOULD BE BROUGHT TO FINAL GRADE IN ACCORDANCE WITH THE APPROVED PLAN.
- THE SURFACE SHOULD BE CLEARED OF ALL TRASH, DEBRIS AND OF ALL ROOTS, BRUSH, WIRE, GRADE STAKES AND OTHER OBJECTS THAT WOULD INTERFERE WITH PLANTING, FERTILIZING OR MAINTENANCE OPERATIONS.
- FERTILIZER ACCORDING TO SOIL TESTS, FERTILIZER NEEDS CAN BE DETERMINED BY A SOIL TESTING LABORATORY OR REGIONAL RECOMMENDATIONS CAN BE MADE BY COUNTY AGRICULTURAL EXTENSION AGENTS. FERTILIZER SHOULD BE WORKED INTO THE SOIL TO A DEPTH OF 3 INCHES WITH A DISC, SPRINGTOOTH HARROW OR OTHER SUITABLE EQUIPMENT. ON SLOPING LAND, THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON THE CONTOUR.

**INSTALLATION IN CHANNELS**

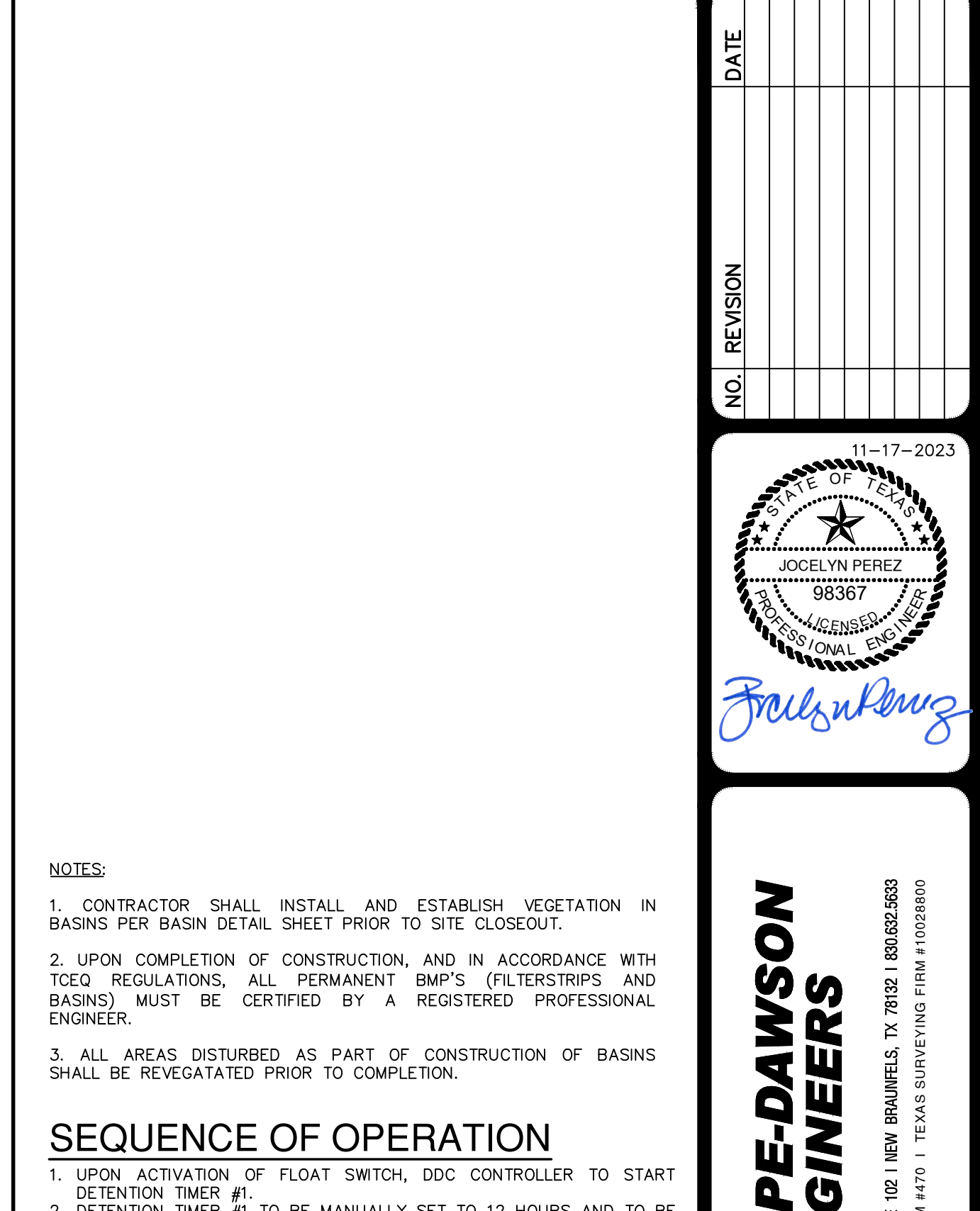
- SOD STRIPS IN WATERWAYS SHOULD BE LAID PERPENDICULAR TO THE DIRECTION OF FLOW. CARE SHOULD BE TAKEN TO BUTT ENDS OF STRIPS TIGHTLY (SEE FIGURE ABOVE).
- AFTER ROLLING OR TAMPING, SOD SHOULD BE PEGGED OR STAPLED TO RESIST WASHOUT DURING THE ESTABLISHMENT PERIOD. MESH OR OTHER NETTING MAY BE PEGGED OVER THE SOD FOR EXTRA PROTECTION IN CRITICAL AREAS.

**GENERAL INSTALLATION (VA. DEPT. OF CONSERVATION, 1992)**

- SOD SHOULD NOT BE CUT OR LAID IN EXCESSIVELY WET OR DRY WEATHER. SOD ALSO SHOULD NOT BE LAID ON SOIL SURFACES THAT ARE FROZEN.
- DURING PERIODS OF HIGH TEMPERATURE, THE SOIL SHOULD BE LIGHTLY IRRIGATED IMMEDIATELY PRIOR TO LAYING THE SOD, TO COOL THE SOIL AND REDUCE ROOT BURNING AND DIEBACK.
- THE FIRST ROW OF SOD SHOULD BE LAID IN A STRAIGHT LINE WITH SUBSEQUENT ROWS PLACED PARALLEL TO AND BUTTING TIGHTLY AGAINST EACH OTHER. LATERAL JOINTS SHOULD BE STAGGERED TO PROMOTE MORE UNIFORM GROWTH AND STRENGTH. CARE SHOULD BE EXERCISED TO ENSURE THAT SOD IS NOT STRETCHED OR OVERLAPPED AND THAT ALL JOINTS ARE BUTTED TIGHT IN ORDER TO PREVENT VOIDS WHICH WOULD CAUSE DRYING OF THE ROOTS (SEE FIGURE ABOVE).
- ON SLOPES 3:1 OR GREATER, OR WHEREVER EROSION MAY BE A PROBLEM, SOD SHOULD BE LAID WITH STAGGERED JOINTS AND SECURED BY STAPLING OR OTHER APPROVED METHODS. SOD SHOULD BE INSTALLED WITH THE LENGTH PERPENDICULAR TO THE SLOPE (ON CONTOUR).
- AS SODDING OF CLEARLY DEFINED AREAS IS COMPLETED, SOD SHOULD BE ROLLED OR TAMPED TO PROVIDE FIRM CONTACT BETWEEN ROOTS AND SOIL.
- AFTER ROLLING, SOD SHOULD BE IRRIGATED TO A DEPTH SUFFICIENT THAT THE UNDERSIDE OF THE SOD PAD AND THE SOIL 4 INCHES BELOW THE SOD IS THOROUGHLY WET.
- UNTIL SUCH TIME A GOOD ROOT SYSTEM BECOMES DEVELOPED, IN THE ABSENCE OF ADEQUATE RAINFALL, WATERING SHOULD BE PERFORMED AS OFTEN AS NECESSARY TO MAINTAIN MOIST SOIL TO A DEPTH OF AT LEAST 4 INCHES.
- THE FIRST MOWING SHOULD NOT BE ATTEMPTED UNTIL THE SOD IS FIRMLY ROOTED, USUALLY 2-3 WEEKS. NOT MORE THAN ONE THIRD OF THE GRASS LEAF SHOULD BE REMOVED AT ANY ONE CUTTING.

**INSPECTION AND MAINTENANCE GUIDELINES**

- SOD SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAIN EVENT TO LOCATE AND REPAIR ANY DAMAGE.
- DAMAGE FROM STORMS OR NORMAL CONSTRUCTION ACTIVITIES SUCH AS TIRE RUTS OR DISTURBANCE OF SWALE STABILIZATION SHOULD BE REPAIRED AS SOON AS PRACTICAL.



**SEQUENCE OF OPERATION**

- UPON ACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #1.
- DETENTION TIMER #1 TO BE MANUALLY SET TO 12 HOURS AND TO BE USER ADJUSTABLE VALUE.
- WHEN DETENTION TIMER #1 HAS ELAPSED, A 6" BUTTERFLY VALVE IS TO OPEN AND RELEASE DETAINED WATER BASIN.
- UPON DEACTIVATION OF FLOAT SWITCH, DDC CONTROL TO START DETENTION TIMER #2.
- DETENTION TIMER #2 TO BE MANUALLY SET TO 19-48 HOURS AND TO BE USER ADJUSTABLE.
- WHEN DETENTION TIMER #2 HAS ELAPSED, THE 6" BUTTERFLY VALVE IS TO CLOSE.
- VALVE TO BE ACTUATED PERIODICALLY TO SHOW ACTIVE REGARDLESS OF FLOAT SWITCH OPERATION.

**NOTES TO CONTRACTOR (EACH PHASE OF BASIN CONSTRUCTION)**

- CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR PRIOR APPROVAL.
- CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN BASIN CONSTRUCTION HAS PROCEEDED TO THE FOLLOWING MILESTONES:
  - REINFORCING STEEL FOR BASIN OVERFLOW WALL OR RIPRAP PILOT CHANNEL HAS BEEN SET. CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE AND RISER PIPE IS IN PLACE. CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE RISER PIPE HAS BEEN SET AT PROPER ELEVATION AND GRADE.
  - BASIN HAS BEEN COMPLETELY FINISHED INCLUDING SOD OR SEED PLACEMENT ON SIDE SLOPES (WHERE APPLICABLE).
- WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.
- UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:
  - TOP OF BANKWALL AT EACH CORNER OF BASIN
  - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
  - SPLASH PAD/INLET PIPES
  - OVERFLOW WEIRS

BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.

**CLAY LINER SPECIFICATIONS**

PROPERTY	TEST METHOD	SPECIFICATION
PERMEABILITY (CM/SEC)	ASTM D 2434	1 x 10 <sup>-6</sup>
PLASTICITY INDEX OF CLAY (%)	ASTM D 423/D 424	NOT LESS THAN 15
LIQUID LIMIT OF CLAY (%)	ASTM D 2216	NOT LESS THAN 30
CLAY PARTICLES PASSING (%)	ASTM D 422	NOT LESS THAN 30
CLAY COMPACTION (%)	ASTM D 2216	95% OF STANDARD PROCTOR DENSITY

**NOTES:**

- THE CLAY LINER SHALL HAVE A MINIMUM THICKNESS OF TWELVE (12) INCHES.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.

THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

**EXHIBIT 5**