BELLA VIDA

Water Pollution Abatement Plan & Sewage Collection System Application

September 2024

PAPE-DAWSON ENGINEERS

Transportation | Water Resources | Land Development | Surveying | Environmental

PAPE-DAWSON ENGINEERS

September 23, 2024

Ms. Monica Reyes
Texas Commission on Environmental Quality (TCEQ)
Region 13
14250 Judson Road
San Antonio, Texas 78233-4480

Re: Bella Vida
Water Pollution Abatement Plan & Sewage Collection System

Dear Ms. Reyes:

Please find included herein the Bella Vida Water Pollution Abatement Plan & Sewage Collection System Application. This Water Pollution Abatement Plan has been prepared in accordance with the regulations of the Texas Administrative Code (30 TAC 213) and current policies for development over the Edwards Aquifer Recharge Zone.

This Sewage Collection System Application has been prepared to be consistent with the regulations of the Texas Administrative Code (30 TAC 213, 217 and 290) and current policies for development over the Edwards Aquifer Recharge Zone.

This Water Pollution Abatement Plan & Sewage Collection System Application applies to an approximate 26.58-acre site as identified by the project limits and 1,489.17 linear feet of sewer main. Please review the plan information for the items it is intended to address. If acceptable, please provide a written approval of the plan in order that construction may begin at the earliest opportunity.

Appropriate review fees ($6,500 and $744.59) and fee application 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
Texas Registered Engineering Firm # 470

9/23/24

Thomas M. Carter, P.E.
Senior Vice President

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

Attachments

P:\119\33\10\Word\Reports\WPAP\240923a1.docx

BELLA VIDA

Water Pollution Abatement Plan & Sewage Collection System Application

September 2024

9/23/24

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

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.

1. Regulated Entity Name: Bella Vida						**2. Regulated Entity No.:**			
3. Customer Name: Forefront Living						**4. Customer No.:**			
5. Project Type: **(Please circle/check one)**	(New)		Modification			Extension		Exception	
6. Plan Type: **(Please circle/check one)**	(WPAP)	CZP	(SCS)	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: **(Please circle/check one)**	Residential		(Non-residential)			**8. Site (acres):**			26.58
9. Application Fee:	$6,500+744.59		**10. Permanent BMP(s):**					Sedimentation Filtration Basins	
11. SCS (Linear Ft.):	1,489.17		**12. AST/UST (No. Tanks):**						
13. County:	Bexar		**14. Watershed:**					Leon Creek	

Application Distribution

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

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

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

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

San Antonio Region					
County:	**Bexar**	**Comal**	**Kinney**	**Medina**	**Uvalde**
Original (1 req.)	✔	☐	☐	☐	☐
Region (1 req.)	✔	☐	☐	☐	☐
County(ies)	✔	☐	☐	☐	☐
Groundwater Conservation District(s)	✔ Edwards Aquifer Authority ✔ Trinity-Glen Rose	☐ Edwards Aquifer Authority	☐ Kinney	☐ EAA ☐ Medina	☐ EAA ☐ Uvalde
City(ies) Jurisdiction	☐ Castle Hills ☐ Fair Oaks Ranch ☐ Helotes ☐ Hill Country Village ☐ Hollywood Park ✔ San Antonio (SAWS) ☐ Shavano Park	☐ Bulverde ☐ Fair Oaks Ranch ☐ Garden Ridge ☐ New Braunfels ☐ Schertz	NA	☐ San Antonio ETJ (SAWS)	NA

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.
Thomas M. Carter, P.E. Print Name of Customer/Authorized Agent
Signature of Customer/Authorized Agent — Date: 9/23/2024

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

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: Thomas M. Carter, P.E.

Date: 9/23/2024

Signature of Customer/Agent:

Project Information

1. Regulated Entity Name: Bella Vida
2. County: Bexar
3. Stream Basin: Leon Creek
4. Groundwater Conservation District (If applicable): Trinity Glen Rose; Edwards Aquifer
5. Edwards Aquifer Zone:

   ☒ Recharge Zone
   ☐ Transition Zone

6. Plan Type:

   ☒ WPAP
   ☒ SCS
   ☐ Modification
   ☐ AST

☐ UST ☐ Exception Request

7. Customer (Applicant):

Contact Person: Scott Polzin
Entity: Forefront Living
Mailing Address: 12467 Merit Dr
City, State: Dallas, Texas Zip: 75251
Telephone: (972) 402-3631 FAX: _____
Email Address: spolzin@forefrontliving.org

8. Agent/Representative (If any):

Contact Person: Thomas M. Carter, P.E.
Entity: Pape-Dawson Consulting Engineers, LLC
Mailing Address: 2000 NW Loop 410
City, State: San Antonio, Texas Zip: 78213
Telephone: (210) 375-9000 FAX: (210) 375-9010
Email Address: tcarter@pape-dawson.com

9. Project Location:

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

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

From TCEQ's Regional Office, turn left on Judson Rd toward I-35. Travel south on I-35 for 1.9 miles before exiting toward I-410 W. Travel west on I-410 W for 8.9 miles toward I-10 W. Travel north on I-10 W for 8.4 miles, exiting at Camp Bullis Rd. Travel 1.2 miles on I-10 Frontage Rd and take the soonest turn-around. Travel 0.8 miles south on I-10 toward La Cantera Terrace. The site is located at the NW corner of I-10 Frontage Rd and La Cantera Terrace.

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: when advised by TCEQ

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.

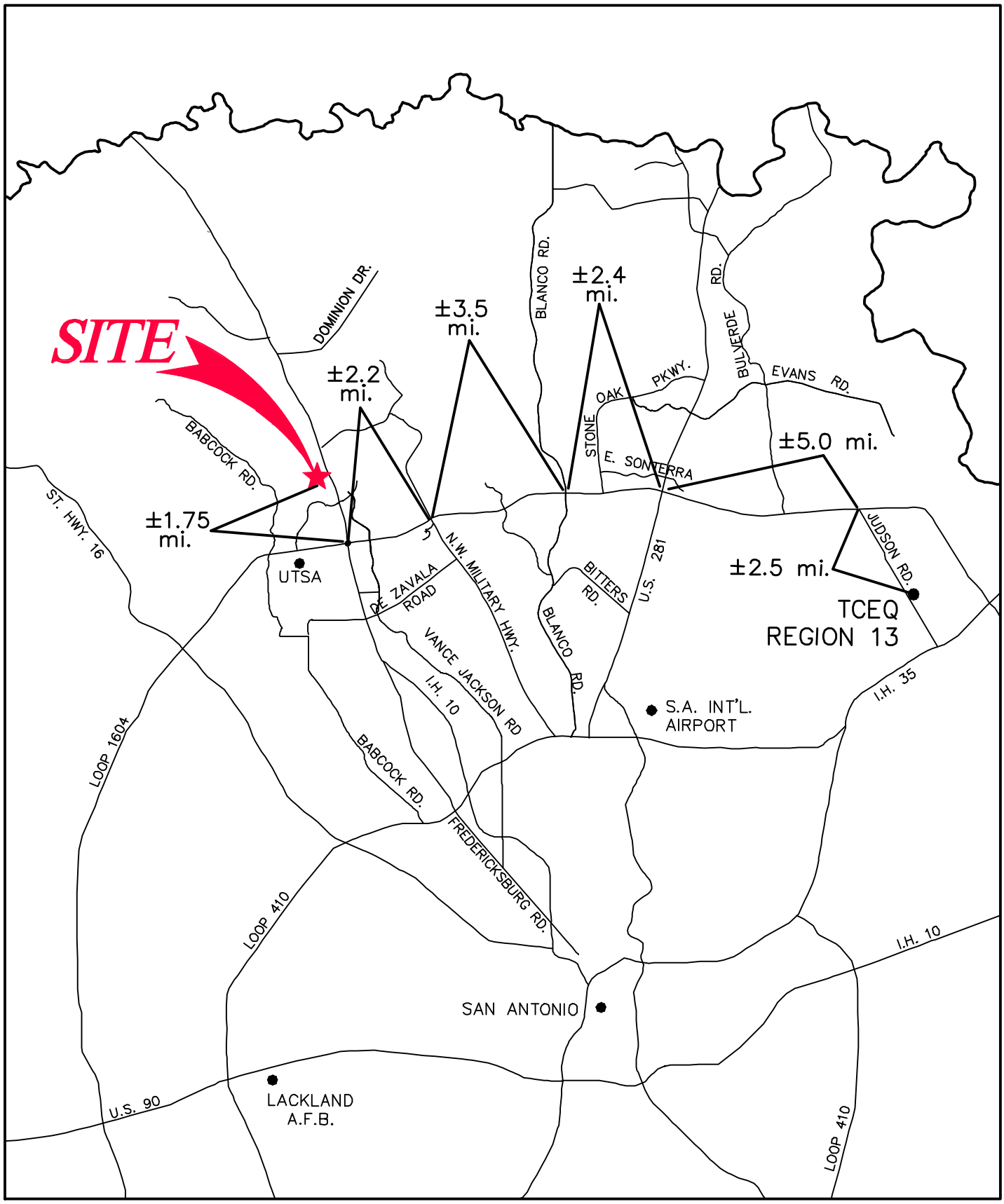
ATTACHMENT A

BELLA VIDA

Water Pollution Abatement Plan and Sewage Collection System

N

NOT TO SCALE



Pape-Dawson Engineers, Inc.

Date: Sep 23, 2024, 4:26pm User ID: kherrera
File: P:\119\33\10\Design\Environmental\SCS\RM1193310.dwg

ROAD MAP

ATTACHMENT A

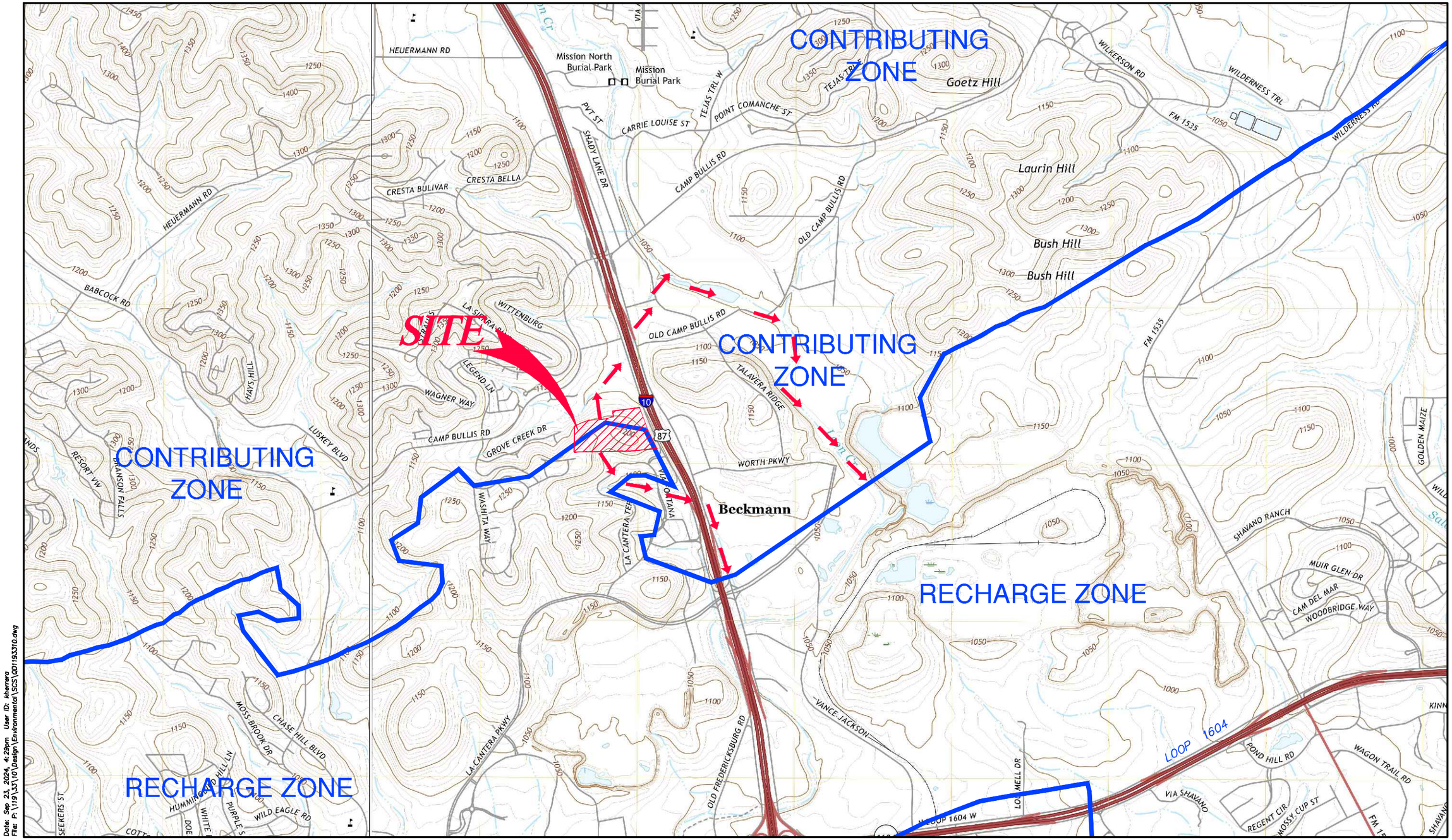
ATTACHMENT B

BELLA VIDA

Water Pollution abatement Plan and Sewage Collection System

N

SCALE: 1" = 2000'



Date: Sep 23, 2024, 4:29pm User ID: khrrera
File: P:\119\331\0\design\Environmental\SCS\Qb1193310.dwg

GENERAL LOCATION MAP - CASTLE HILLS, TX QUAD

DRAINAGE FLOW → →

Pape-Dawson Engineers, Inc.

USGS QUAD MAP

ATTACHMENT B

ATTACHMENT C

Attachment C – Project Description

Bella Vida is a proposed continuing care facility with buildings, associated parking, sidewalks, drives, and turn lanes on approximately 26.58 acres (legal limit) within the City of San Antonio, Bexar County, Texas. The site is located approximately 750 linear feet (LF) north of La Cantera Bend and IH-10 Frontage Road intersection. The site is currently undeveloped, lies within the Leon Creek watershed, and does not contain the 100-year floodplain. There were no naturally occurring sensitive geological features identified in the Geologic Assessment.

This Bella Vida WPAP proposes clearing, grading, excavation, installation of utilities and drainage improvements, construction of one (1) six-story building and forty (40) one-story buildings, associated parking, sidewalks, drives, deceleration and turn lanes on a project limits of 26.58 acres. Approximately 9.53 ac of impervious cover, or 35.9% of the 26.58 ac project limits, is proposed for this site. The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are three (3) sedimentation filtration basins, 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. Approximately 0.04 acres of impervious cover from the driveway entrances will be uncaptured, and overtreatment will be provided via adequate sizing of the basins on the site. The basins have been sized for additional overtreatment of deceleration lanes, which will be submitted as a separate plan. Please see the Treatment Summary table attached with this application.

The Bella Vida Sewage Collection System (SCS) Application proposes the construction of a total of approximately 1,489.17 linear feet (LF) of sanitary sewer main to serve the proposed multi-family development over the Edwards Aquifer Recharge Zone. The site is transected by the Contributing Zone where a portion of the alignment will extend to the first manhole outside of the Recharge Zone. The proposed alignment will consist of approximately 1,152.84 linear feet (LF) of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main, 116.33 linear feet (LF) of 6-inch (6") PVC, SDR 26 160-psi pressure rated sewer main, and 220 linear feet (LF) of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered at water line crossings, see included plan and profile exhibits for details. The proposed SCS will extend from manhole "A7" to manhole "A12" on Line "A" and manhole "B6" to manhole "B12" on Line "B". Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 3.44 acres may be disturbed as identified by the limits of the fifty-foot (50') SCS/GA envelope shown on the plans; however additional grading will disturb approximately 26.58 acres as part of development of the overall plan.

The permanent population associated with this plan is estimated to be 600 people, based on two (2) persons per unit. This project will result in an estimated additional 235 Equivalent Dwelling Units (EDUs). The proposed development will generate approximately 47,000 (235 EDU x 200 gpd) gallons per day (average flow) of domestic wastewater based on 150 EDUs for the residential units and an additional 85 EDUs for onsite clubhouse and restaurant/retail facilities. Potable water service is to be provided by the San Antonio Water System (SAWS).

Wastewater will be disposed of by conveyance to the existing Leon Creek Water Recycling Center operated by SAWS.

GEOLOGIC ASSESSMENT FORM (TCEQ-0585)

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

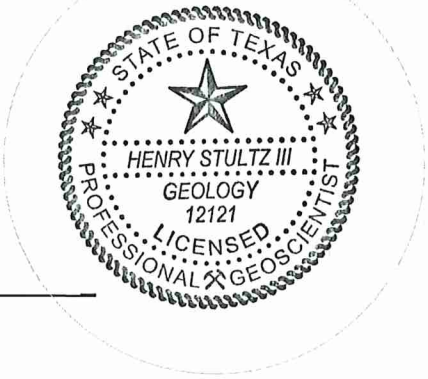
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: **Henry E. Stultz III, P.G.** Telephone: **210-375-9000**

Date: December 23, 2022 Fax: **210-375-9090**

Representing: **Pape-Dawson Engineers, Inc., TBPG registration number 50351**

Signature of Geologist:



Regulated Entity Name: **Crownridge**

Project Information

1. Date(s) Geologic Assessment was performed: **November 29, 2022**
2. Type of Project:
   - ☒ WPAP
   - ☐ SCS
   - ☐ AST
   - ☐ UST
3. Location of Project:
   - ☒ Recharge Zone
   - ☐ Transition Zone
   - ☐ Contributing Zone within the Transition Zone

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

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

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness(feet)
Eckrant-Rock outcrop association, 8-30 % slopes (TaD)	D	0-1

** 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" = **60'**
   Site Geologic Map Scale: 1" = **60'**
   Site Soils Map Scale (if more than 1 soil type): **N/A**

9. Method of collecting positional data:

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

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

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

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

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

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

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

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

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

Administrative Information

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

ATTACHMENT A
Geologic Assessment Table

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: CROWNRIDGE

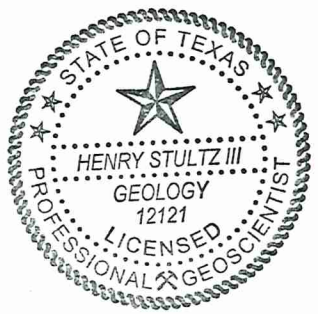
LOCATION			FEATURE CHARACTERISTICS											EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11	12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
S-1	29.61460	-98.61098	CD	5	Kek	6	6	1.5					F,C	5	10	10		X		Hillside
S-2	29.61480	-98.61089	CD	5	Kek	8	8	1					F,C	5	10	10		X		Hillside

** DATUM: NAD 83

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

Date December 23, 2022

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

ATTACHMENT A

ATTACHMENT B
Stratigraphic Column

Attachment B – Stratigraphic Column

Period	Epoch	Group	Formation	Member	Thickness	Lithology	Hydro-logic Unit	Hydro-stratigraphic Unit	Hydrologic Function	Porosity	Cavern Development
Cretaceous	Early Cretaceous	Edwards	Kainer	Grainstone	40–50	Hard, dense limestone that consists mostly of a tightly cemented miliolid skeletal fragment grainstone; contains interspersed chalky mudstone and wackestone; chert as beds and nodules; crossbedding and ripple marks are common primarily at the contact with the overlying regional dense bed	Edwards Aquifer	V	Aquifer	IP, IG, BU, FR, BP, CV	Few
				Kirsch-berg Evaporite	40–50	Highly altered crystalline limestone and chalky mudstone with occasional grainstone associated with tidal channels; chert as beds and nodules, boxwork molds are common, matrix recrystallized to a coarse grain spar; intervals of collapse breccia and travertine deposits		VI	Aquifer	IG, MO, VUG, FR, BR, CV	Probably extensive cave development
				Dolomitic	90–120	Hard, dense to granular, dolomitic limestone; chert as beds and nodules (absent in lower 20 ft); *Toucasia* sp. abundant; lower three-fourths composed of sucrosic dolomites and grainstones with hard, dense limestones interspersed; upper one-fourth composed mostly of hard, dense mudstone, wackestone, packstone, grainstone, and recrystallized dolomites with bioturbated beds		VII	Aquifer	IP, IC, IG, MO, BU, VUG, FR, BP, CV	Cave development as shafts with minor horizontal extent
				Basal nodular	40–50	Moderately hard, shaly, nodular, burrowed mudstone to miliolid grainstone that also contains dolomite; contains dark, spherical textural features known as black rotund bodies; *Ceratostreon texana*, *Caprina* sp., miliolids, and gastropods		VIII	Aquifer, confining unit in areas without caves	IP, MO, BU, BP, FR, CV	Large lateral caves at surface
		Trinity	Glen Rose Limestone	Upper Glen Rose	0–120 (absent in northern Comal Co.)	Alternating resistant and nonresistant beds of blue shale, nodular marl, and impure, fossiliferous limestone; gray to yellowish gray; stair-step topography; contains two distinct evaporite zones; distinct *Corbula* sp. bed marks the contact with the underlying lower member of the Glen Rose Limestone; *Orbitulina texana*	Upper Trinity Lower confining unit to the Edwards aquifer	Cavernous	Aquifer	MO, BR, BP, FR, CV	Some surface cave development
					120–230 (thicker in northern Comal Co.)			Camp Bullis	Confining	BU, BP, FR, occasional CV	
					0–10			Upper evaporite	Aquifer	IP, MO, BU, BR	
					0–40			Fossil-iferous – Upper	Aquifer	MO, BU, FR, CV	
					80–150			Fossil-iferous – Lower	Confining	MO, BU, FR	
					8–10			Lower evaporite	Aquifer	IP, MO, BU, BR	

Source: Clark, Golab, and Morris (2016); Cavern development modified from Stein and Ozuna (1995). Porosity types - Fabric selective: IP, interparticle porosity; IG, intergranular porosity; IC, intercrystalline porosity; SH, shelter porosity; MO, moldic porosity; BU, burrowed porosity; FE, fenestral; BP, bedding plane porosity. Not fabric selective: FR, fracture porosity; CH, channel porosity; BR, breccia; VUG, vug porosity; CV, cave porosity.

ATTACHMENT C
Site Geology

Attachment C – Site Geology

SUMMARY

The Crownridge site is located adjacent west of IH-10, approximately 0.7 miles south of the intersection of Camp Bullis Road and IH-10 in San Antonio, Bexar County, Texas.

Based on the results of the field survey conducted in accordance with *Instructions for Geologists for Geologic Assessments in the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585 Instructions),* no naturally occurring sensitive features were identified on site. The overall potential for fluid migration to the Edwards Aquifer for the site is low.

SITE GEOLOGY

As observed through field evidence, the geologic formation which outcrops at the surface within the subject site is the upper member of the Glen Rose (Kgru) formation and the basal nodular (Kekbn) member of the Kainer formation. The Kgru is characterized as yellowish-tan thinly bedded limestone and marl. Karst development within the Kgru is characterized by cave formation, with predominantly lateral large rooms. The Kekbn is a massive, shaly, mudstone to grainstone, nodular limestone. Karst development within the Kekbn is characterized by vertical shafts as well as large lateral caves.

The predominant trend of faults in the vicinity of the site is approximately N63°E, based on faults identified during the previous mapping of the area.

FEATURE DESCRIPTIONS:

A description of the features observed onsite is provided below:

Features S-1 and S-2

Feature S-1 and S-2 are non-karst closed depressions in the Kek. No dissolution or evidence of karst processes were observed within the features. Minor hand excavation was conducted to further evaluate vertical and horizontal void space. Cobbles and blocks of weathered limestone were removed from the features. Probing into the floor of the feature revealed clay and weathered limestone. This features were

likely created by anthropogenic disturbance. Due to the non-karst origin and lack of evidence of dissolution, the probability of rapid infiltration is low.

REFERENCES

Clark, A.K., Golab, J.A., and Morris, R.R., 2016, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Northern Bexar and Comal Counties, Texas: U.S. Geological Survey Scientific Investigations Map 3366, scale 1:24,000, 20 p. pamphlet.

Nationwide Environmental Title Research, LLC. Historical Aerials, HistoricAerials.com. https://www.historicaerials.com/viewer, December 23, 2022.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. http://websoilsurvey.sc.egov.usda.gov/, December 23, 2022.

Stein, W.G., and Ozuna, G.B., 1995, Geologic framework and hydrogeologic characteristics of the Edwards Aquifer recharge zone, Bexar County, Texas: U.S. Geological Survey Water-Resources Investigations Report 95–4030, 8 p.

Texas Water Development Board, Wells in TWDB Groundwater Database Viewer, https://www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer, December 23, 2022.

U.S. Geological Survey, National Water Information System: Mapper, https://maps.waterdata.usgs.gov/mapper/index.html, December 23, 2022.

ATTACHMENT D
Site Geologic Map(s)

LEGEND

PROJECT LIMITS

100 YEAR FLOODPLAIN

STREAM

SYMBOLS AND LINES

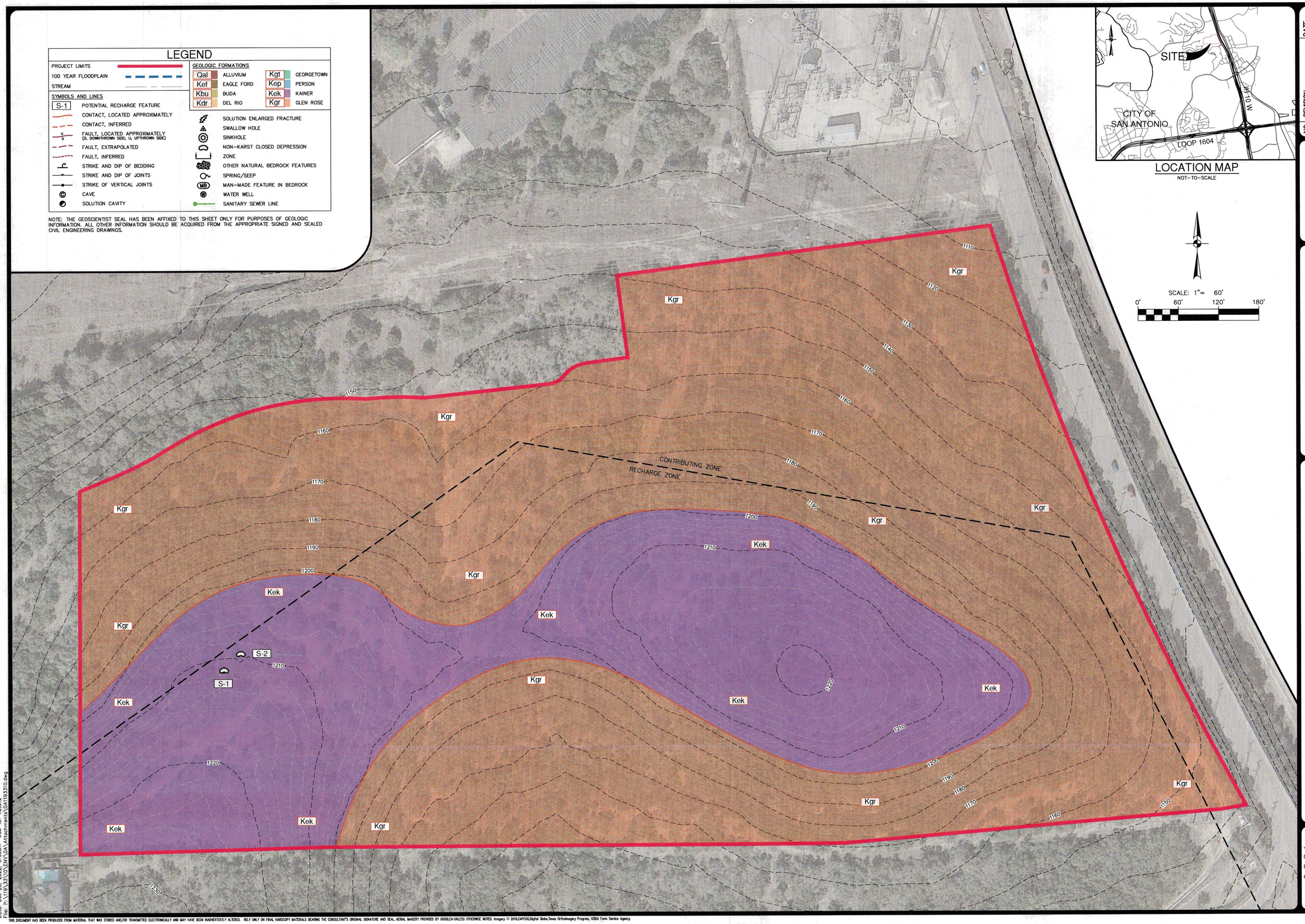
- S-1 — POTENTIAL RECHARGE FEATURE
- CONTACT, LOCATED APPROXIMATELY
- CONTACT, INFERRED
- FAULT, LOCATED APPROXIMATELY (D, DOWN-THROWN SIDE; U, UP-THROWN SIDE)
- FAULT, EXTRAPOLATED
- FAULT, INFERRED
- STRIKE AND DIP OF BEDDING
- STRIKE AND DIP OF JOINTS
- STRIKE OF VERTICAL JOINTS
- CAVE
- SOLUTION CAVITY

GEOLOGIC FORMATIONS

- Qal — ALLUVIUM
- Kef — EAGLE FORD
- Kbu — BUDA
- Kdr — DEL RIO
- Kgt — GEORGETOWN
- Kep — PERSON
- Kek — KAINER
- Kgr — GLEN ROSE

- SOLUTION ENLARGED FRACTURE
- SWALLOW HOLE
- SINKHOLE
- NON-KARST CLOSED DEPRESSION
- ZONE
- OTHER NATURAL BEDROCK FEATURES
- SPRING/SEEP
- MB — MAN-MADE FEATURE IN BEDROCK
- W — WATER WELL
- SANITARY SEWER LINE

NOTE: THE GEOSCIENTIST SEAL HAS BEFFIXED TO THIS SHEET ONLY FOR PURPOSES OF GEOLOGIC INFORMATION. ALL OTHER INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SIGNED AND SEALED CIVIL ENGINEERING DRAWINGS.



LOCATION MAP

NOT-TO-SCALE

SCALE: 1"= 60'

0' 60' 120' 180'

DATE

NO. REVISION

STATE OF TEXAS
HENRY STULTZ III
GEOLOGY
12121
LICENSED
PROFESSIONAL GEOSCIENTIST
Dec 23,2022

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPG FIRM REGISTRATION #50351

CROWNRIDGE
SAN ANTONIO, TEXAS

SITE GEOLOGIC MAP

JOB NO. 11933-10
DATE DECEMBER 2022
DESIGNER HS
CHECKED HDJ DRAWN HS

ATTACHMENT D

Date: Dec 23, 2022, 9:38am User ID: hstultz
File: P:\119\33\10\ENV\GA\Attachments\GA119331O.dwg

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.

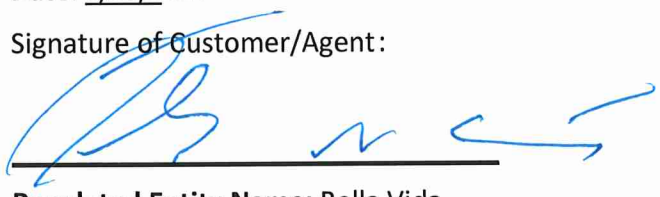
Signature

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: Thomas M. Carter, P.E.

Date: 9/23/2024

Signature of Customer/Agent:



Regulated Entity Name: Bella Vida

Regulated Entity Information

1. The type of project is:

   ☐ Residential: Number of Lots:_____
   ☐ Residential: Number of Living Unit Equivalents: 150
   ☒ Commercial
   ☐ Industrial
   ☐ Other:_____

2. Total site acreage (size of property): 26.58

3. Estimated projected population: 600

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	173,571	÷ 43,560 =	3.98
Parking	207,641	÷ 43,560 =	4.77
Other paved surfaces	34,304	÷ 43,560 =	0.78
Total Impervious Cover	415,516	÷ 43,560 =	9.53

Total Impervious Cover 9.53 **÷ Total Acreage** 26.58 **X 100 =** 35.9**% Impervious Cover**

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

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

For Road Projects Only

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

7. Type of project:

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

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

   ☐ Concrete
   ☐ Asphaltic concrete pavement
   ☐ Other: _____

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

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

10. Length of pavement area: _____ feet.

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

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

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

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

Stormwater to be generated by the Proposed Project

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

Wastewater to be generated by the Proposed Project

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

100% Domestic	_____Gallons/day
_____% Industrial	_____Gallons/day
_____% Commingled	
47,000Gallons/day	

TOTAL gallons/day 47,000 (based on 235 EDU x 200 gpd/EDU)

15. Wastewater will be disposed of by:

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

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

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

☒ Sewage Collection System (Sewer Lines):

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

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

☐ The SCS was previously submitted on_____.

☒ The SCS was submitted with this application.

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

☒ The sewage collection system will convey the wastewater to the Leon Creek (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" = 60'.

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 (Digital Flood Insurance Rate Map for Bexar County, Texas and Incorporated Areas) Panel No. 48029C, Dated 09.28.2010

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

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

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 378 cfs. The runoff coefficient for the site changes from approximately 0.52 before development to 0.66 after development. Values are based on the Rational Method using runoff coefficients per the City of San Antonio Unified Development Code.

ORGANIZED SEWAGE COLLECTION SYSTEM PLAN (TCEQ-0582)

Organized Sewage Collection System Application

Texas Commission on Environmental Quality

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

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

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

Regulated Entity Name: Bella Vida

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

Customer Information

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

   Contact Person: Jeff Brown
   Entity: San Antonio Water System
   Mailing Address: 2800 US HWY 281
   City, State: San Antonio, TX Zip: 78212

   Telephone: (210) 233-3605 Fax: (210) 233-4966

   Email Address: _____
   The appropriate regional office must be informed of any changes in this information within 30 days of the change.

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

   Contact Person: Thomas M. Carter, P.E.
   Texas Licensed Professional Engineer's Number: 79272
   Entity: Pape-Dawson Consulting Engineers, LLC
   Mailing Address: 2000 NW Loop 410
   City, State:San Antonio, TX

Zip: 78213
Telephone:(210) 375-9000 Fax:(210) 375-9010

Email Address:tcarter@pape-dawson.com

Project Information

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

- ☐ Residential: Number of single-family lots: _____
- ☒ Multi-family: Number of residential units: 150
- ☒ Commercial
- ☐ Industrial
- ☐ Off-site system (not associated with any development)
- ☐ Other: _____

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

100% Domestic _____ gallons/day
_____% Industrial _____ gallons/day
_____% Commingled
47,000 gallons/day

Total gallons/day: 47,000 (based on the assumption of 150 EDUs for 300 multi family units and 85 EDUs for retail and restaurant space * 200 gpd/EDU)

6. Existing and anticipated infiltration/inflow is 600 gallons/day. This will be addressed by: proper sizing of the mains.

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

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

8. Pipe description:

Table 1 - Pipe Description

Pipe Diameter(Inches)	*Linear Feet (1)*	*Pipe Material (2)*	*Specifications (3)*
8	1,152.84	PVC, SDR 26	ASTM D3034, ASTM D3212

Pipe Diameter(Inches)	*Linear Feet (1)*	*Pipe Material (2)*	*Specifications (3)*
8" Pressure rated	220	PVC, SDR 26	ASTM D 2241, Class 160 ASTM D3139, ASTM C1173
6" pressure-rated lateral	116.33	PVC, SDR 26	ASTM 2241, CLASS 160, ASTM D3139, ASTM C1173

Total Linear Feet: 1,489.17

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

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

☒ Existing
☐ Proposed

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

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

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

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

Alignment

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

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

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

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

Manholes and Cleanouts

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

Table 2 - Manholes and Cleanouts

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
A	C5.02 Of	12+90.73	MH "A12"
B	C5.04 Of	14+90.74	MH "B12"
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		

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

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

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

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

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

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

Site Plan Requirements

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

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

    Site Plan Scale: 1" = 60'.

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

20. Lateral stub-outs:

    ☒ The location of all lateral stub-outs are shown and labeled.
    ☐ No lateral stub-outs will be installed during the construction of this sewer collection system.

21. Location of existing and proposed water lines:

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

22. 100-year floodplain:

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

Table 3 - 100-Year Floodplain

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

23. 5-year floodplain:

    ☒ After construction is complete, no part of this project will be in or cross a 5-year floodplain, either naturally occurring or man-made. (Do not include streets or concrete-lined channels constructed above sewer lines.)

☐ After construction is complete, all sections located within the 5-year floodplain will be encased in concrete or capped with concrete. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Table 4 - 5-Year Floodplain

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

24. ☒ Legal boundaries of the site are shown.

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

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

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

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

Table 5 - Water Line Crossings

Line	*Station or Closest Point*	*Crossing or Parallel*	*Horizontal Separation Distance*	*Vertical Separation Distance*
see attached				

27. Vented Manholes:

☒ **No part** of this sewer line is within the 100-year floodplain and vented manholes are not required by 30 TAC Chapter 217.

☐ **A portion** of this sewer line is within the 100-year floodplain and vented manholes will be provided at less than 1500 foot intervals. These water-tight manholes are listed in the table below and labeled on the appropriate profile sheets.

☐ **A portion** of this sewer line is within the 100-year floodplain and an alternative means of venting shall be provided at less than 1500 feet intervals. A description of the alternative means is described on the following page.

☐ **A portion** of this sewer line is within the 100-year floodplain; however, there is no interval longer than 1500 feet located within. No vented manholes will be used.

Table 6 - Vented Manholes

Line	*Manhole*	*Station*	*Sheet*
N/A			

28. Drop manholes:

☐ There are no drop manholes associated with this project.

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

Table 7 - Drop Manholes

Line	*Manhole*	*Station*	*Sheet*
"B"	MH "B9"	11+00.93	C5.04
"B"	MH "B10"	11+61.17	C5.04
"B"	MH "B11"	13+10.71	C5.04
"B"	MH "B12"	14+90.74	C5.04

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

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

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

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

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

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

31. Minimum flow velocity (From Appendix A)

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

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

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

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

Table 8 - Flows Greater Than 10 Feet per Second

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

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

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

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

☒ N/A

Administrative Information

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

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

Table 9 - Standard Details

Standard Details	*Shown on Sheet*
Lateral stub-out marking **[Required]**	C5.10 of
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) **[Required]**	C5.10 of

Standard Details	*Shown on Sheet*
Alternate method of joining lateral to existing SCS line for potential future connections **[Required]**	C5.10 of
Typical trench cross-sections **[Required]**	C5.10 of
Bolted manholes **[Required]**	C5.10 of
Sewer Service lateral standard details **[Required]**	C5.10 of
Clean-out at end of line **[Required, if used]**	of
Baffles or concrete encasement for shock/erosion protection **[Required, if flow velocity of any section of pipe >10 fps]**	of
Detail showing Wastewater Line/Water Line Crossing **[Required, if crossings are proposed]**	C5.10 of
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) **[Required, if Flexible Pipe is used]**	C5.10 of
Drop manholes **[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]**	C5.10 of

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

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

    ☒ Survey staking was completed on this date: when advised by TCEQ

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

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

Signature

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

Print Name of Licensed Professional Engineer: Thomas M. Carter, P.E.

Date: 9/23/2024

Place engineer's seal here:

9/23/24

Signature of Licensed Professional Engineer:

Appendix A-Flow Velocity Table

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

Table 10 - Slope Velocity

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

Pipe Diameter(Inches)	*% Slope required for minimum flow velocity of 2.0 fps*	*% Slope which produces flow velocity of 10.0 fps*
36	0.045	1.12
39	0.04	1.01
>39	*	*

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

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

Figure 1 - Manning's Formula

Where:

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

Table 5 - Water Line Crossings

Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance (ft)
A	9+24.23	Crossing	--	3.10
A	10+75.06	Crossing	--	2.34
A	11+36.80	Crossing	--	2.16
A	11+97.77	Crossing	--	2.88
A	12+34.04	Crossing	--	3.31
B	7+80.50	Crossing	--	5.35
B	8+36.19	Crossing	--	3.62
B	8+83.11	Crossing	--	1.76
B	12+25.80	Crossing	--	5.45
B	13+16.22	Crossing	--	2.95
B	14+08.61	Crossing	--	3.11

ATTACHMENT A
(Engineering Design Report)

BELLA VIDA
Engineering Design Report
8" PVC SDR 26

TABLE OF CONTENTS

BELLA VIDA
Engineering Design Report
8" PVC SDR 26

INTRODUCTION

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

PROJECT INFORMATION

Bella Vida is a proposed continuing care facility with buildings, associated parking, sidewalks, drives, and turn lanes on approximately 26.58 acres (legal limit) within the City of San Antonio, Bexar County, Texas. The site is located approximately 750 linear feet (LF) north of La Cantera Bend and IH-10 Frontage Road intersection. The site is currently undeveloped, lies within the Leon Creek watershed, and does not contain the 100-year floodplain. There were no naturally occurring sensitive geological features identified in the Geologic Assessment.

The Bella Vida Sewage Collection System (SCS) Application proposes the construction of a total of approximately 1,489.17 linear feet (LF) of sanitary sewer main to serve the proposed multi-family development over the Edwards Aquifer Recharge Zone. The site is transected by the Contributing Zone where a portion of the alignment will extend to the first manhole outside of the Recharge Zone. The proposed alignment will consist of approximately 1,152.84 linear feet (LF) of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main, 116.33 linear feet (LF) of 6-inch (6") PVC, SDR 26 160-psi pressure rated sewer main, and 220 linear feet (LF) of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered at water line crossings, see included plan and profile exhibits for details. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 3.44 acres may be disturbed as identified by the limits of the fifty-foot (50') SCS/GA envelope shown on the plans; however additional grading will disturb approximately 26.58 acres as part of development of the overall plan.

Please refer to Sheet C5.00 of the attached sewer plans, which shows the proposed service area and its topographic features. This system is designed to have a minimum structural life of 50 years. Safety considerations are the responsibility of the contractor.

GRAVITY SANITARY SEWER PIPING: FLOW & CAPACITY ANALYSIS

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

Per Capita Contributions: _____

Service Connections: ✓

Land Area and Use: ✓

Fixture Analysis: _____

Odor Control

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

Flow Calculation

Peaking Factor used for design: **2.5**

Peaking Factor is based on: **SAWS Specifications for peak dry weather flow (from SAWS USR 11.3.1)**

Total Demand = 235 EDUs

85 EDUs for restaurant and retail

150 EDUs for 300 multi-family residential

Infiltration = 600 gallons per acre served

Avg. Flow = (235 x 200 gpd/EDU) + [600 gpd/acre x 26.58 acres] = ***62,948*** *gpd =* ***43.71*** *gpm*

Peak Flow = (235 x 500 gpd/EDU) + [(600 gpd/acre) x 26.58 acres] = ***133,448*** *gpd =* ***92.67*** gpm

Please note that capacities are determined using Manning's equation for pipes flowing full with an "n" value of 0.013. A reference for Manning's Equation can be found in "The Uni-Bell Handbook of PVC Pipe: Design and Construction".

Capacity Calculation

Characteristics of 8" ASTM D3034, SDR 26, PVC Sewer Pipe:

Nominal Size = 8"

Outer Diameter (D_o) = 8.40"

Minimum Wall Thickness (t) = 0.323"

Inner Diameter (D_i) = 7.75"

Characteristics of 8" ASTM 2241, Class 160, SDR 26, PVC Sewer Pipe:

Nominal Size = 8"

Outer Diameter (D_o) = 8.625"

Minimum Wall Thickness (t) = 0.332"

Inner Diameter (D_i) = 7.961"

Manning’s Equation:

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

$v = Q/A$

Where:

Q = Discharge (cfs)

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

n = Manning’s roughness coefficient (unitless)

A = Flow area (ft^2)

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

S = Slope (ft/ft)

v = Velocity of flow (ft/s)

n = 0.013 [as required by 30 TAC 213.53 A(i)]

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

$A = \pi(D_i^2)/4 = \pi(7.75\ in)^2/4 = 47.17\ in^2 = 0.33\ ft^2$

$P = \pi(D_i) = \pi(7.75\ in) = 24.35\ in = 2.03\ ft$

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

S = 0.01

Q = [(1.49 ft$^{1/3}$/sec)/0.013](0.33 ft^2)(0.16 ft)$^{2/3}$(0.010)$^{1/2}$

Q = 1.11 cfs = 500 gpm =Q_{full}

*v = 1.11 cfs/0.33 ft^2=**3.40 ft/s***

*Qmax = 1.11 cfs (0.90)(7.48 gallons/1 cf)(60 sec/1 min.)=**450 gpm***

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

A = π(D_i^2)/4=π(7.961 in)^2/4=49.76 in^2=0.35 ft^2

P = π(D_i)=π(7.961 in)=25.01 in=2.08 ft

R = A/P = 0.35 ft^2/2.08 ft.=0.17 ft

S = 0.010

Q = [(1.49 ft$^{1/3}$/sec)/0.013](0.35 ft^2)(0.17 ft)$^{2/3}$(0.010)$^{1/2}$

Q = 1.20 cfs = 537 gpm =Q_{full}

*v = 1.20 cfs/0.35 ft^2=**3.46 ft/s***

*Qmax = 1.20 cfs (0.90)(7.48 gallons/1 cf)(60 sec/1 min.)=**483 gpm***

Nominal Main Size (in)	Outer Diameter (in)	Minimum Slope (%)	Area (ft^2)	Hydraulic Radius (A/P) ft	$R^{2/3}$	$S^{1/2}$	Q-Full (cfs)	Max Pipe (%)	Velocity (ft/s)	Q-Max (gpm)
8	*8.40*	*1.00*	*0.33*	*0.16*	*0.29*	*0.10*	*2.23*	*90*	*3.40*	*450*
8 (PR)	*8.625*	*1.00*	*0.35*	*0.17*	*0.31*	*0.1*	*322*	*90*	*3.46*	*483*

Conclusion

The proposed 8" pipe (NR) with a minimum slope of 1.00% has sufficient capacity to convey the projected average and peak flows.

GENERAL STRUCTURAL COMPONENTS

Project Materials (Pipe and Joints):

Nominal Pipe Diameter (in)	Linear Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
8	*1152.84*	*PVC SDR 26*	*ASTM D3034*	*ASTM D3212*
8 pressure-rated	*220*	*PVC SDR 26*	*ASTM 2241, Class 160*	*ASTM D3139*
6 pressure-rated	*116.33*	*PVC SDR 26*	*ASTM 2241, Class 160*	*ASTM D3139*

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

Watertight, size on size resilient connectors conforming to ASTM C-923 have been specified for connecting pipe to manholes. See SAWS Standard Specification for Construction Detail DD-852-01.

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

Where a collection system pipe crosses a water supply line and a nine-foot separation distance cannot be achieved, Section 217.53(d)(3)(B)(i) requires the collection system pipe be constructed of cast iron, ductile iron, or PVC with a minimum pressure rating of 150 psi. The proposed project will comply with this requirement and that of 217.53(d)(3)(B)(iii).

Project Materials (Bedding):

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

Pipe Diameter (in)	Pipe Material	Bedding Class
8	*PVC*	*Class I & Class III*

The selection of bedding class is based on SAWS detail DD-804-01 for sanitary sewer pipe laid in a trench. Initial backfill for the pipe sizes shown above will be Class I. Secondary backfill will be Class III. See Table 2 of ASTM D2321-11 "Soil Classes" in Appendix A of this subsection.

Project Materials (Manholes):

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

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

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

Under 30 TAC 213.5(C)(3)(A), all manholes over the Recharge Zone must be watertight, with watertight rings and covers. The proposed project complies with this requirement.
The materials specified for manhole construction are **cast-in-place concrete.**

Project Materials (Manhole Covers):

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

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

Minimum and Maximum Slopes

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

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

Pipe Diameter: ***8"*** Min. Slope: ***1.00%*** Max. Slope: ***8.40%***

Backfill

Note: The backfill will be free of stones greater than 6 inches in diameter and free of organic or any other unstable material. See SAWS Item No. 804 for additional specifications.

Trenching

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

Trenching will occur over the Recharge Zone and will comply with 30 TAC 213.5.

Minimum and Maximum Trench Width

Based on SAWS Standard Drawing DD-804-01 and 30 TAC 217.54:

Pipe Diameter: ***8"*** Min. Trench Width: ***22***" Max. Trench Width: ***34"***

Pipe Diameter: 8" (PR) Min. Trench Width: 23" Max. Trench Width: *35*"

These trench widths account for the bell diameter.

Corrosion Prevention

Proposed collection system components (pipes, manholes, etc.) will not be susceptible to deterioration through the corrosive effects of an anaerobic sewage environment. The interior of the manholes, however, are to be coated with a SAWS approved sewer structural coating per SAWS April 2014 Standard Specifications (Item No. 852, Section 852.3, Item 5). Epoxy coating specifically approved. The epoxy coating on the interior walls of the manhole provide interior corrosion protection.

Manholes (General)

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

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

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

Manhole Spacing:

Pipe Diameter: ***8"*** Max. Spacing: ***246.78 LF***

See SAWS Standard Specification in Appendix B for additional manhole specifications.

Manholes (Inverts)

The bottom of a manhole must contain a U-shaped channel, which is a smooth continuation of the inlet, and outlet pipes. The bench above the channel must be sloped a minimum of 0.5 inches per foot. See SAWS detail DD-852-01, which complies with these requirements. Note, a manhole connected to a pipe less than 15 inches in diameter must have a channel depth equal to at least half the largest pipe's diameter.

Manholes (Ventilation)

Vented manholes are not proposed for this SCS. When required every third manhole will be vented to minimize inflow. Please see SAWS Detail DD-852-02 when proposed.

FLEXIBLE PIPE COMPUTATIONS

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

Live Load Calculations

Minimum burial depth without concrete encasement is seven (7) feet. Based on Table 6-6 Live Loads on PVC pipe (from Uni-Bell Handbook for PVC) for this sewer line would be 1.22 psi.

Buckling Pressure Calculations

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

The value of H for use in these calculations is twenty three (23) feet as it exceeds the maximum burial depth for this line. The value of γ_s equals 143 pcf is a conservative value based on a dry unit weight of 135

pcf and a moisture content of 6%. This value is conservative as it corresponds to saturated unit weights of commonly used backfill materials. Please see information from Raba-Kistner provided in Appendix C.

Allowable Buckling Pressure:

$$q_a = 0.4 * \sqrt[2]{32 * R_w * B' * E_b * (E * I / D^3)}$$ *Equation 1*

$$q_a = 0.4 * \sqrt{32 * 1 * 0.53 * 400 * (400{,}000 * .003 / 8.08^3)} = 47.97 \text{psi } (8'' \text{ PVC SDR 26})$$

$$q_a = 0.4 * \sqrt[2]{32 * 1 * 0.53 * 400 (400{,}000 * 0.003 / 8.29^3)} = 48.05\ psi\ (8"\ PVC\ SDR\ 26, PR)$$

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

$$R_w = 1 - 0.33 * (0/240) = 1$$

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

$$B' = \frac{1}{1 + 4 * e^{-0.065(23)}} = 0.53$$

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

$$I = .323^3 / 12 = 0.003 in^3\ (8'' PVC\ SDR\ 26)$$

$$I = (0.332^3 / 12) = 0.003 in^3 (8" PVC, SDR26, PR)$$

$$D = D_o - t$$ *Equation 5*

$$D = 8.40 inches - 0.323 inches = 8.08\ inches (8" PVC, SDR26)$$

$$D = 8.62\ inches - 0.332\ inches = 8.29\ inches (8" PVC, SDR26, PR)$$

Where:

q_a = Allowable buckling pressure, pounds per square inch (psi)

h = Height of soil surface above top of pipe in inches (in)

h_w = Height of water surface above top of pipe in inches (in) (groundwater elevation)

R_w = Water buoyancy factor. If hw = 0, Rw = 1. If $0 \leq hw \leq h$ (groundwater elevation is between the top of the pipe and the ground surface), calculate Rw with Equation 2

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

B' = Empirical coefficient of elastic support

E_b = Modulus of soil reaction for the bedding material (psi)

E = Modulus of elasticity of the pipe material (psi)

I = Moment of inertia of the pipe wall cross section per linear inch of pipe, inch4/linear inch = inch3. For solid wall pipe, "I" can be calculated with Equation 4

t = Pipe structural wall thickness (in)

D = Mean pipe diameter (in)

D_o = Pipe outer diameter (in)

Pressure Under Installed Conditions

$$q_p = \gamma_w * h_w + R_w * (W_c/D) + L_l$$ *Equation 6*

$$q_p = 0.0361 * 0 + 1 * (191.86/8.08) + 1.22 = 24.97 psi (8"PVC, SDR26)$$

$$q_p = 0.0361 * 0 + 1 * (197.00/8.29) + 1.22 = 24.97 psi\ (8"PVC, SDR26, PR)$$

Where:

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

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

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

L_l = Live load (lbs)

$$W_c = \gamma_s * H * (D + t)/144$$ *Equation 7*

$$W_c = 143 * 18 * (8.08 + 0.323)/144 = 191.86 lb/in^2 (8'' PVC\ SDR\ 26\ NR)$$

$$W_c = 143 * 18 * (8.29 + 0.332)/144 = 197.00 lb/in^2 (8'' PVC\ SDR\ 26\ PR)$$

Where:

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

D = Mean pipe diameter (in)

Pipe Diameter: ***8" (NR)***	Pipe Material: ***PVC, SDR 26***	q_a: ***47.97***	q_p: ***24.97***
Pipe Diameter: ***8" (PR)***	Pipe Material: ***PVC, SDR 26***	q_a: ***48.05***	q_p: ***24.97***

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

Wall Crushing Calculations

No portion of the proposed SCS is located in the 5-year floodplain.

$$H = (24 * P_c * A)/(\gamma_s * D_{o)} \quad \textit{(Equation 8)}$$

$$A = t(in) \times 12(in/ft) \quad \textit{(Equation 9)}$$

$$\text{H}= (24*4{,}000*3.876)/(143*8.4) = 309.77(8"\text{PVC,SDR26})$$

$$A = 0.323(in) \times 12(in/ft) = 3.876$$

Where:

D_o = outside pipe diameter, in.

P_c = compressive stress or hydrostatic design basis (HDB). For typical PVC pipe assume 4,000 psi. For any other pipe material, the HDB must be supplied by the pipe manufacturer.

A = surface area of the pipe wall, in.^{2}/ft [conversion factor of 12 applied to change from ft. to in.]

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

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

24 = conversions and coefficients

Installation Temperature Effects

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

Tensile Strength

The information below is from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" Table 2.1 pages 14-15. This applies to all PVC SDR-26 pipe.

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

Strain

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

Modulus of Soil Reaction

The modulus of soil reaction for the bedding material, $E_{b,}$ is **400 psi**.

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D2321-11 and "Average Values of Modulus of Soil Reaction, E" Table 7.3 from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" attached in Appendix A of this subsection. Based on SAWS detail DD-804-01, Class III material was chosen. As the secondary backfill (Class III) has a lower Modulus of Soil Reaction than initial backfill (Class I), its value was used in the calculations that follow. Class III on Table 2 corresponds to coarse-grained soils with fines (GM, GC, SM or SC) and sandy or gravelly fine-grained soils (CL or ML). On Table 7.3, coarse-grained soils with fines at a slight compaction have an E' equal to 400 psi.

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

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D 2321-11 and "Average Values of Modulus of Soil Reaction, E" Table 7.3 from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" attached in Appendix A of this subsection. Based on SAWS detail DD-804-01, Class I material was chosen, which includes crushed rock as shown on Table 2. Compacted crushed rock on Table 7.3 has an E' equal to 3,000 psi. Values in Table 7.3 are based on empirical data and derived from laboratory and field tests for buried pipe.

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

Zeta Calculation

Where native soil is significantly weaker than bedding material, or where predicted deflection approaches 5%, the effect of native soil must be quantified using Leonhardt's Zeta factor. If the ration of bedding modulus to soil modulus is not equal to 1.0, a zeta factor must be calculated by using the equations below, where zeta is a factor, which corrects for the effect of in-situ soil on pipe stability (Uni-Bell Handbook of Pipe, page 267). To calculate zeta, directly use the formulas below. The calculations that are done to determine the zeta factors for the different pipe diameters must be included with this submittal.

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

$$zeta = \frac{1.44}{1.22 + (1.44 - 1.22) * 0.13} = 1.15(8"PVC\ SDR26)$$

$$zeta = \frac{1.44}{1.22 + (1.44 - 1.22) * 0.13} = 1.15(8"PVCSDR26,PR)$$

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

$$f = \frac{(34/8.08) - 1}{1.154 + 0.444 * ((34/8.08) - 1)} = 1.22\ (8''\ PVC\ SDR\ 26)$$

$$f = \frac{35/8.625 - 1}{1.154 + 0.444 * (35/8.625 - 1)} = 1.22\ (8"\ PVC, SDR\ 26, 160\ psi)$$

Where:

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

Pipe Diameter: ***8" (NR)*** Trench Width: ***34"*** Zeta: ***1.15***

Pipe Diameter: ***8" (PR)*** Trench Width: ***35"*** Zeta: ***1.15***

Pipe Stiffness

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

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

Deflection

Maximum allowable deflection in installed lines is 5% (per 30 TAC 217), as determined by the deflection analysis and verified by a mandrel test. It is recommended that the percent of vertical deflection is below this range; however, a 7.5% deflection limit (recommended by ASTM D3034) provides a conservative factor of safety against structural failure (Handbook of PVC Pipe, page 249). Live loads below ten (10) feet bury depth are negligible and not considered for deflection.

Note: Per Table 7.2 attached in Appendix A of the SCS Application, K = 0.096 when the bedding angle is 90 degrees. A bedding angle of 90 degrees is required as shown on SAWS detail DD-804-01.

$$\Delta Y/D(\%) = \frac{K * (L_p + L_1) * 100}{(0.149 * P_s) + (0.061 * zeta * E_b)}$$ *(Equation 11)*

$$\Delta Y/D(\%) = \frac{0.096 * (22.8 + 0) * 100}{(0.149 * 115) + (0.061 * 1.15 * 400)} = 4.84\% (8"\text{PVC SDR 26 at } 18')$$

$$L_p = \frac{\gamma_s * H}{144}$$ *(Equation 12)*

$$L_p = \frac{143 * 23}{144} = 22.8\, psi$$

Where:

%ΔY/D = Predicted % vertical deflection under load

ΔY = Change in vertical pipe diameter under load

D = Undeflected mean pipe diameter (in)

K = Bedding angle constant

γ_s = Unit weight of soil (pcf)

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

L_p = Prism load (psi)

Type of Pipe Material	P_s (psi)	Zeta Factor Assumed or Calculated	E_b (psi)	% Deflection
8" PVC SDR 26	*115*	*1.15*	*400*	*4.84*

All pipes proposed for this project have a maximum predicted deflection below 5.0%

Signature, Seal and Date of the Texas Professional Engineer Below:

9/23/27

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

APPENDIX A (TABLES)

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

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

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

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

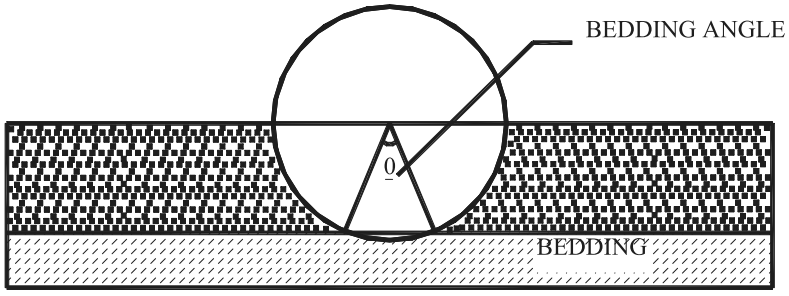


TABLE 7.2
VALUES OF BEDDING CONSTANT, K

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

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

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

[a]ASTM Designation D 2487, USBR Designation E-3.
[b]LL = Liquid limit.
[c]Or any borderline soil beginning with one of these symbols (i.e. GM-GC, GC-SC).
[d]For ± 1% accuracy and predicted deflection of 3%, actual deflection would be between 2% and 4%

Note: Values applicable only for fills less than 50 ft (15 m). Table does not include any safety factor. For use in predicting initial deflections only, appropriate Deflection Lag Factor must be applied for long-term deflections. If bedding falls on the borderline between two compaction categories, select lower E' value or average the two values. Percentage Proctor based on laboratory maximum dry density from test standards using about 12,500 ft-lb/cu ft (598,000 J/m^3) (ASTM D 698, AASHTO T-99, USBR Designation E-11). 1 psi = 6.9 kPa.

SOURCE: "Soil Reaction for Buried Flexible Pipe" by Amster K. Howard, U.S. Bureau of Reclamation, Denver, Colorado. Reprinted with permission from American Society of Civil Engineers.

SOIL CLASSIFICATION CHART

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

TABLE 1 Soil Classification Chart (see Classification D2487)

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

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

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

[D] If soil contains ≥15 % sand, add "with sand" to group name.
[E] Gravels with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt:
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[F] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[G] If fines are organic, add "with organic fines" to group name.
[H] If soil contains ≥ 15 % gravel, add "with gravel" to group name.
[I] Sands with 5 to 12 % fines require dual symbols:
SW-SM well graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay (see Test Method D4318).
[K] If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel", whichever is predominant.
[L] If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.

SOIL CLASSIFICATION CHART

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

TABLE 2 Soil Classes

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

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

SOIL CLASSIFICATION CHART

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

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

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

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

APPENDIX B (SOIL UNIT WEIGHT VALUES)

Raba Kistner

January 14, 2009

Raba-Kistner Consultants, Inc.
12821 W. Golden Lane
P.O. Box 690287, San Antonio, TX 78269-0287
(210) 699-9090 • FAX (210) 699-6426
www.rkci.com

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

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

Dear Mr. Forster:

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

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

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

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

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

STATE OF TEXAS
CHRIS L. SCHULTZ
80680
LICENSED
PROFESSIONAL ENGINEER

1/14/09

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

CLS/mem

O:\Admin - Non Project\San Antonio\PD back fill letter.doc

APPENDIX C (STANDARD SPECS AND PRE-CAST MANHOLES SPECS)

30 TAC 217 regulations will apply where more stringent than the following SAWS Specifications

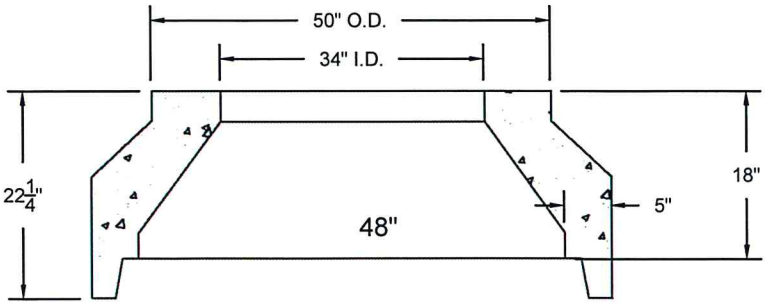
Specification 852: Sanitary Sewer Manholes
https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20852%20Sanitary%20Sewer%20Manholes.pdf

Specification 854: Sanitary Sewer Laterals
https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20854%20Sanitary%20Sewer%20Laterals.pdf

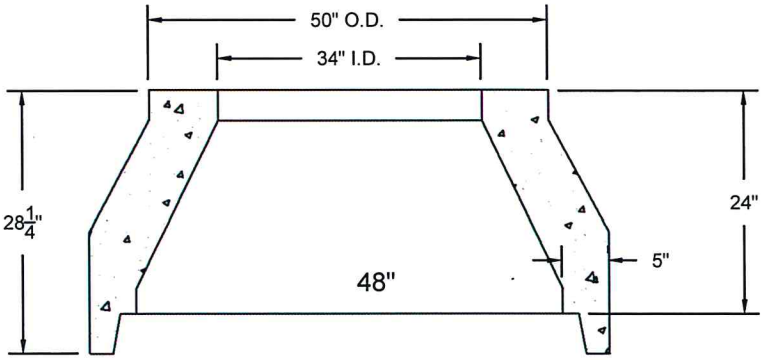
Specification 804: Excavation, Trenching and Backfill
https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20804%20Excavation%20Trenching%20and%20Backfill.pdf

48" Dia. Concentric Cones

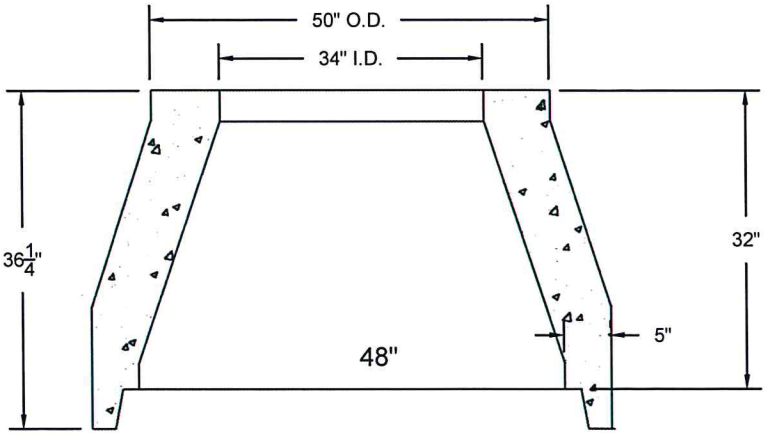
18" Yeild



24" Yeild



32" Yeild



NOTES:

1. Concrete: 4,000 PSI, 28 day Strength. Exceeds ASTM C - 478 - 11
2. Welded wire fabric strength fy = 65,000 psi.
3. Live Load - AASHOT HS-20.

Charlotte's Concrete, Inc.

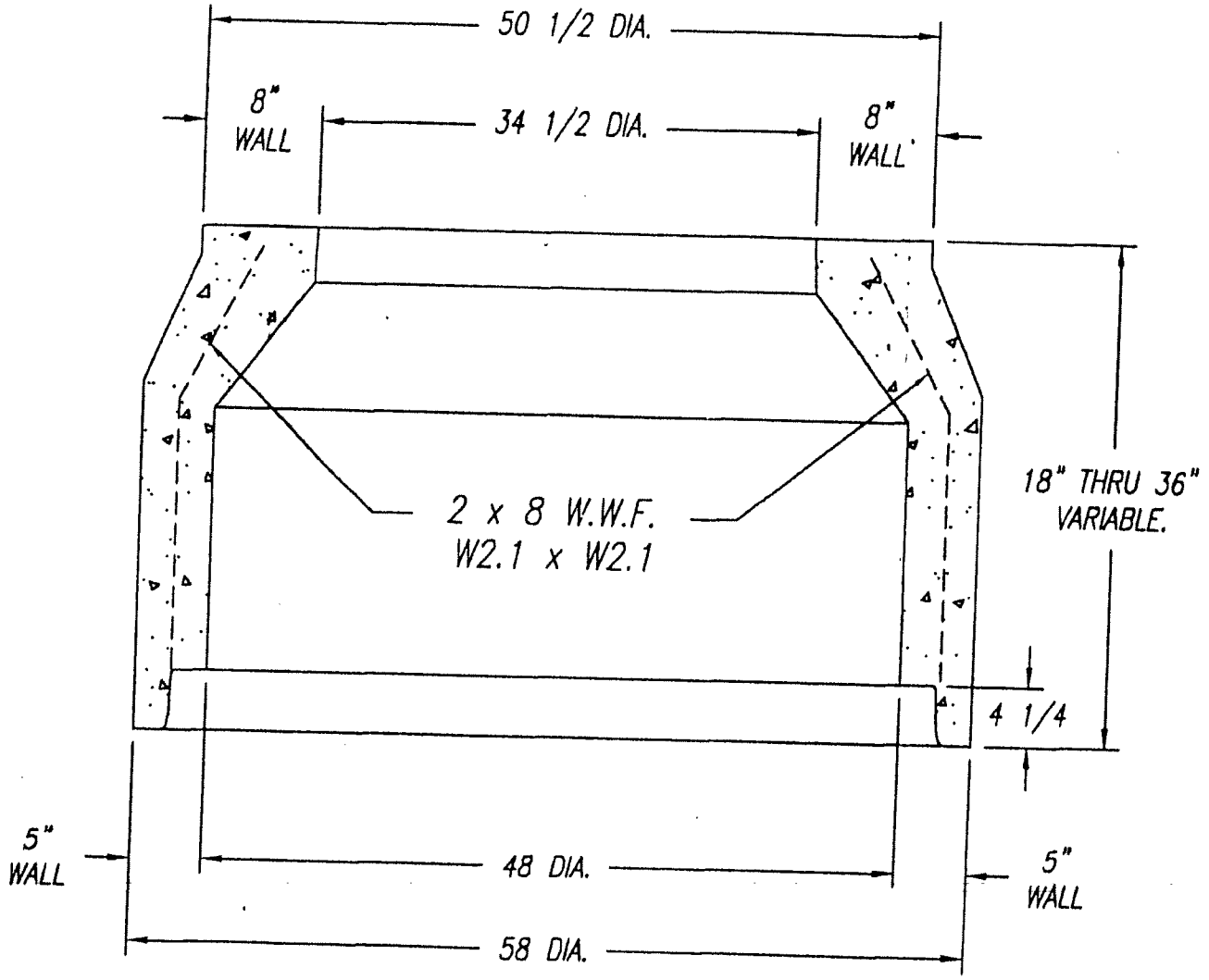
Charlotte's Concrete, Inc.
4950 Lane Dr.
San Antonio, Tx. 78263
Ph. (210) 648-4774

NPCA CERTIFIED PLANT

FOR 18", 24" & 32" Concentric Cones			
JOB			
DRAWN BY CA	DATE 08-06-15	REV. NO. -	SHEET 1 OF 1
FILE			

PRE-CAST MANHOLE DRAWINGS & SPECIFICATIONS

\APPROVAL\CONCENTRIC.DWG



(7R JOINT)

REF. FORM DWG. 3-303-5561

INTERNATIONAL PIPE MACHINERY

QUINN

MACHINE & FOUNDRY CORP.

A MEMBER OF THE BESSER FAMILY OF COMPANIES

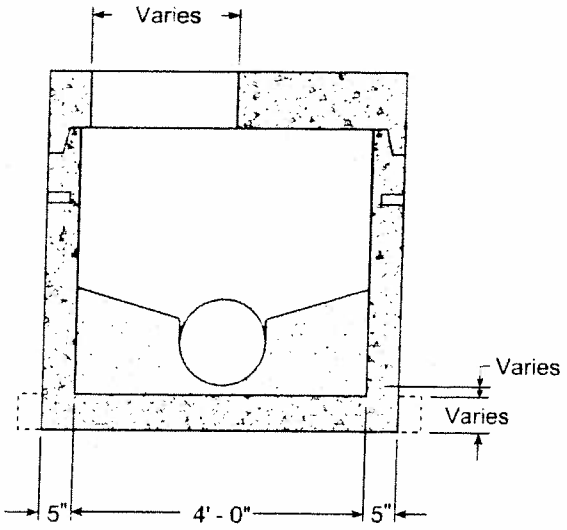
BOONE, IOWA U.S.A.

CHARLOTTES

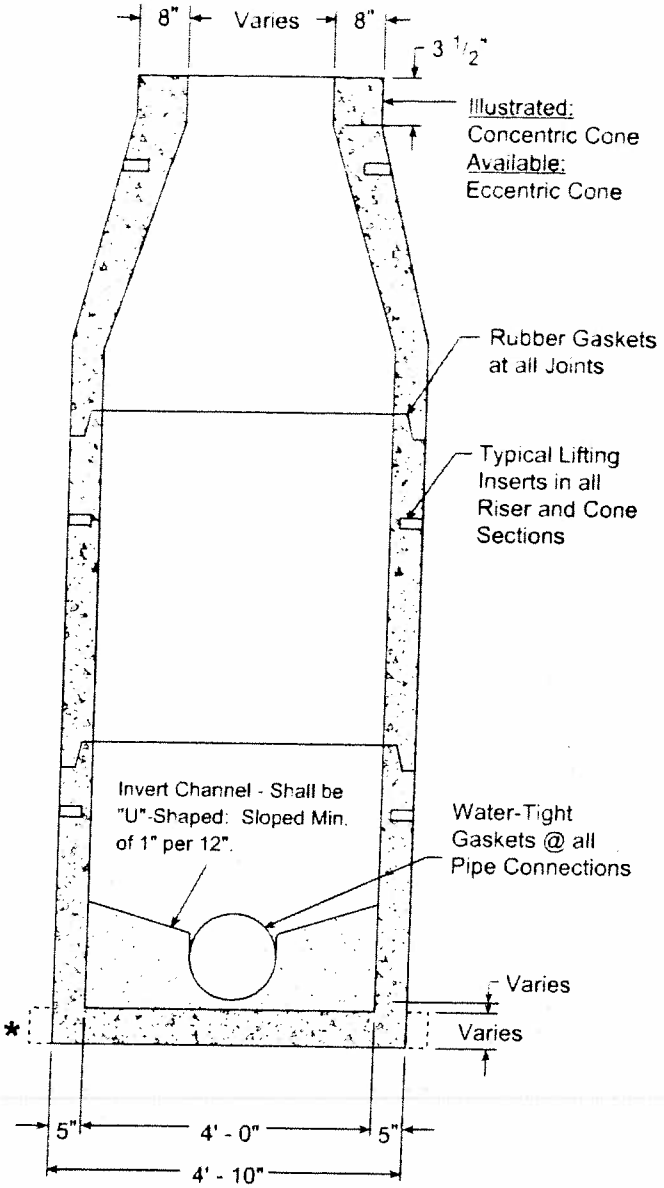
48 x 5 x 34 1/2 x 8 x 36 & 18

CONCENTRIC CONCRETE SECTION

DRAFTER	JJK	4/19/02	CONCENTRIC	REV.
CHECKED				
SCALE:	1/12" = 1"			



Flattop Illustration
for Shallow Manhole



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

Materials & Features

HOLES AS SPECIFIED: Max diameter = 32"
CONCRETE: 5,000 PSI, 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
Average weight of 24" depth base w/8" invert = 4,500 lbs.
Estimated weight of riser and cone sections = 870 lbs. / vt. ft.

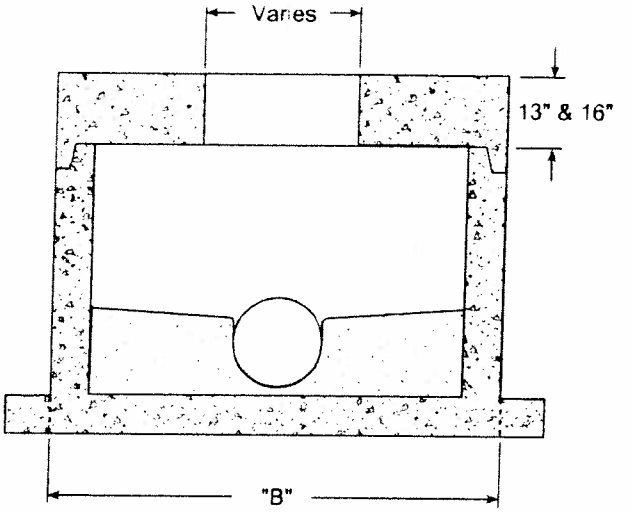
* - Extended base is available to meet local requirements.

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

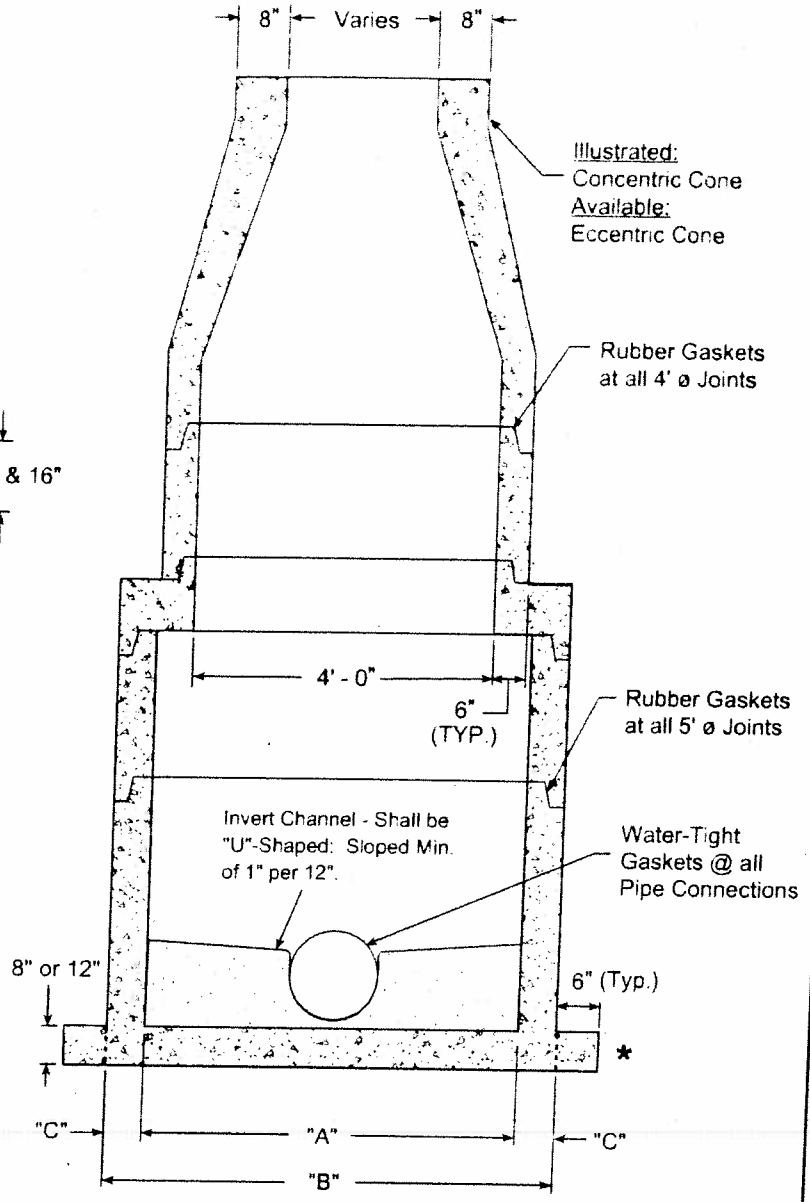
"Manufactured to your specifications."

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

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
4' I.D. Manhole **Regular Base w/ Reducing Cone**	All Plants	TX	5.5	08-15-06	Hanson



Flattop Illustration
for Shallow Manhole



Section View
5'/4' & 6'/4' I.D. Manhole
Extended Base with Reducing Cone

Materials & Features

HOLES AS SPECIFIED: for 5' I.D. max diameter = 40"
for 6' I.D. max diameter = 54"
CONCRETE: 5,000 PSI, 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
Average weight of 24" depth base w/8" invert:
for 5' I.D. = 7,500 lbs.
for 6' I.D. = 10,600 lbs.
Estimated weight of riser and sections:
for 5' I.D. = 1,325 lbs. / vt. ft.
for 6' I.D. = 1,800 lbs. / vt. ft.
For pipe sizes 15" and larger, invert shall be equal to the larger pipe diameter.
* - Extended base shown; Regular base also available."
In the event a boot is loose contact your Hanson representative to resolve.

"Manufactured to your specifications."

Pipe Size	I.D. "A"	O.D. "B"	Wall Thk. "C"
5'	5' - 0"	6' - 0"	6"
6'	6' - 0"	7' - 2"	7"

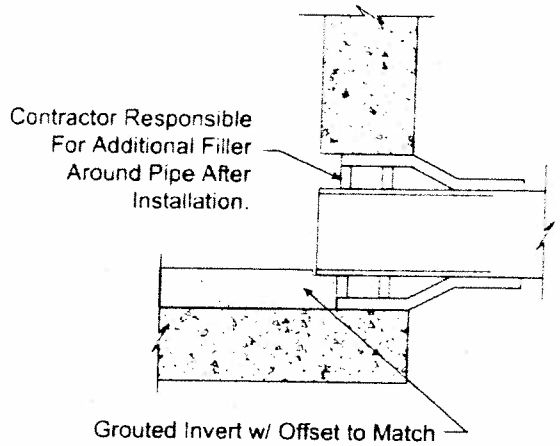
-No Scale-
All dimensions subject to allowable specification tolerances.

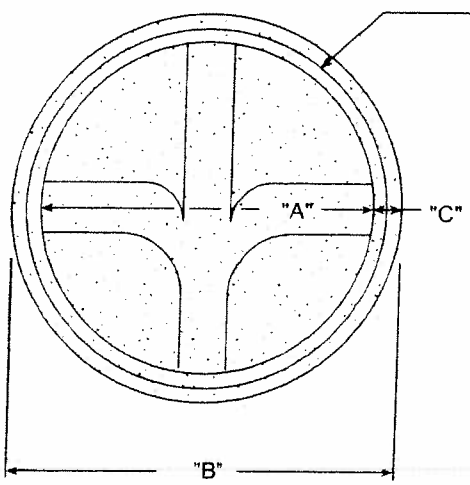
TITLE	PLANT	STATE	SECTION-PAGE	DATE
5'/4' & 6'/4'I.D. Manhole **Extended Base w/Reducing Cone**	All Plants	TX	5.6	08-15-06

Hanson

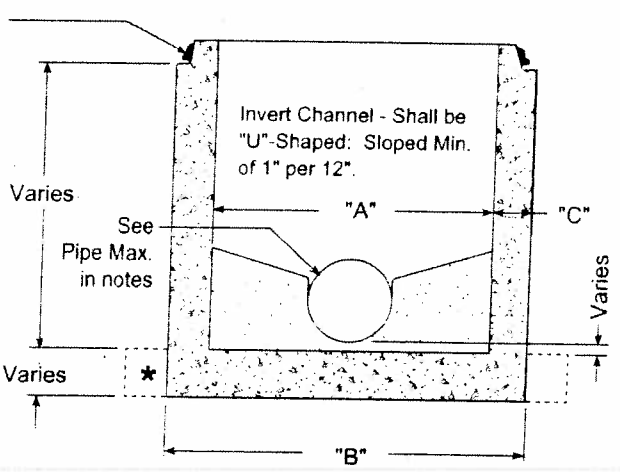
Precast Manholes

For Pipe Entering the Manhole at Excessive Depths Above the Flow Line Out, the Contractor May be Responsible for Grout Work Necessary to Bring Channel up to Flow Line on Inlet Pipe.





Plan View



Section View

Pipe Size	I.D. "A"	O.D. "B"	Wall Thk. "C"
4'	4' - 0"	4' - 10"	5"
5'	5' - 0"	6' - 0"	6"
6'	6' - 0"	7' - 2"	7"

Materials & Features

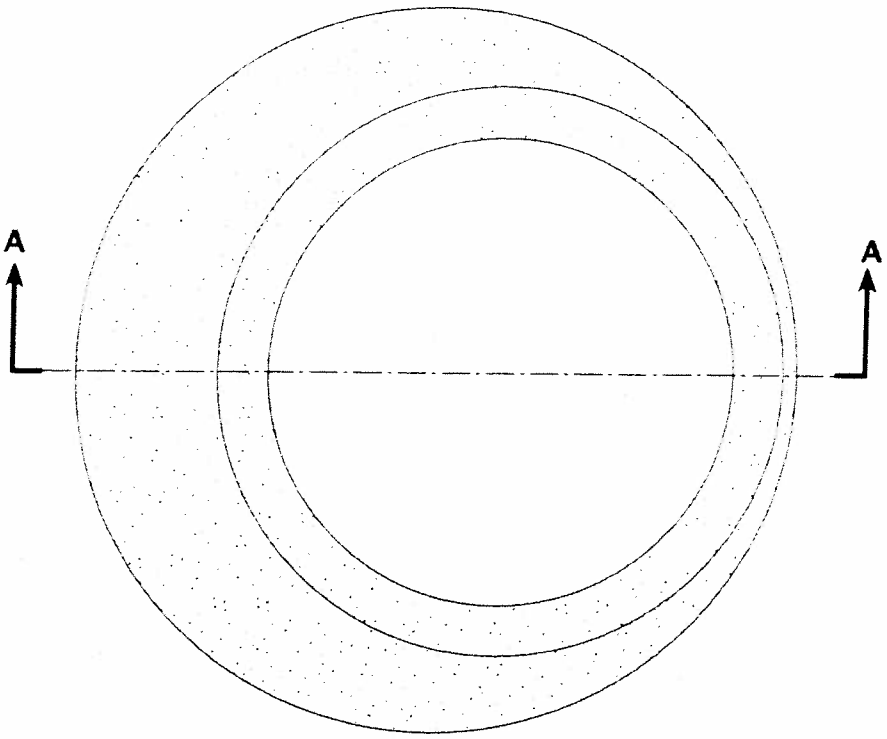
HOLES AS SPECIFIED:
- For 4' I.D. max. diameter = 32"
- For 5' I.D. max. diameter = 40"
- For 6' I.D. max. diameter = 54"

CONCRETE: 5,000 PSI, 28 day strength
REINFORCING: Meets or exceeds ASTM C478 requirements.
Average weight of 24" depth base w/8" invert = 4,500 lbs.
Water-tight gaskets at all pipe connections.
* - Regular base shown: Extended base also available.
In the event a boot is loose contact your Hanson representative to resolve.

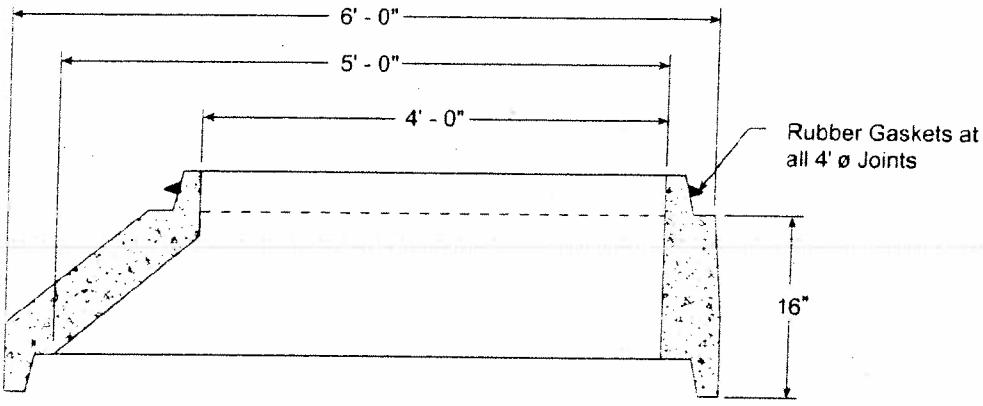
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Details: 4', 5' & 6' I.D. Precast Regular Manhole Base	All Plants	TX	5.7	08-15-06	Hanson

Contact Hanson | Go to Index | EXIT



Plan View



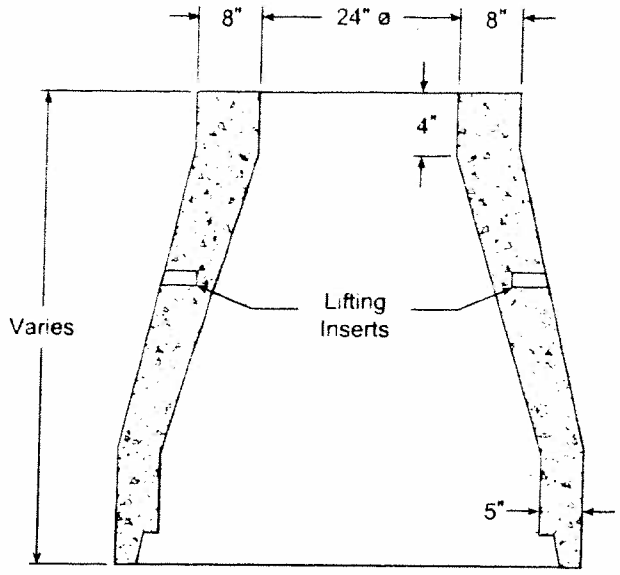
Section View

Materials & Features

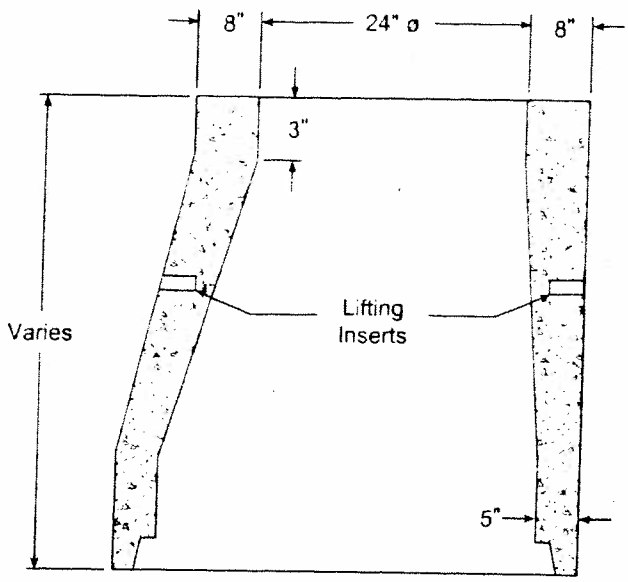
CONCRETE. 5,000 PSI. 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
CONSTRUCTION OF PRECAST is in accordance with ASTM C478.
Concrete is poured according to ACI-500.

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

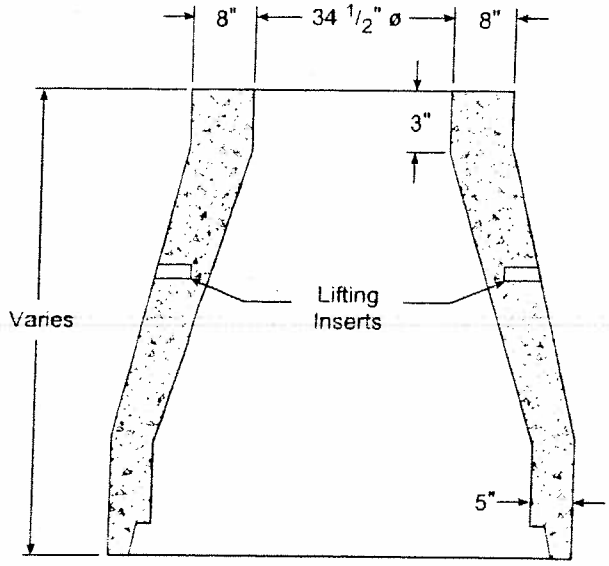
TITLE	PLANT	STATE	SECTION.PAGE	DATE	
5' x 4' Conical Adaptor	Waco	TX	5 8	08-15-06	Hanson



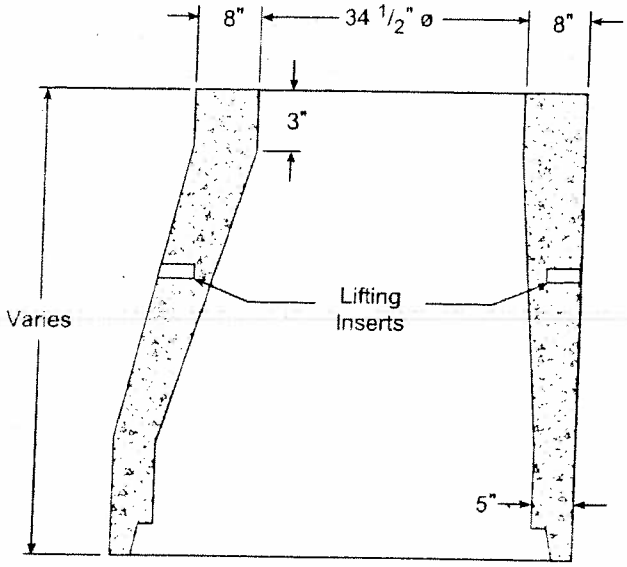
Concentric Cone
24" ø Opening



Eccentric Cone
24" ø Opening



Concentric Cone
34 1/2" ø Opening



Eccentric Cone
34 1/2" ø Opening

Materials & Features

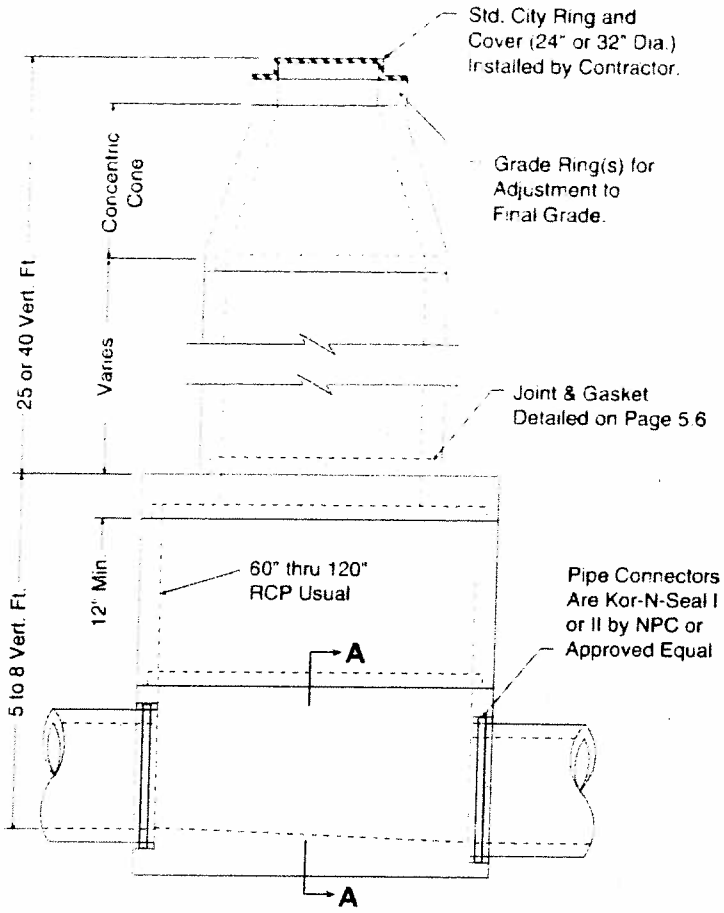
CONCRETE: 5,000 PSI, 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
30" ø also available in North Texas.

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

TITLE	PLANT	STATE	SECTION/PAGE	DATE
Hanson 48" Manhole Reducing Cone Detail	Waco Houston	TX	5.9	08-15-06

Hanson

Precast Manholes



w/ Precast Base

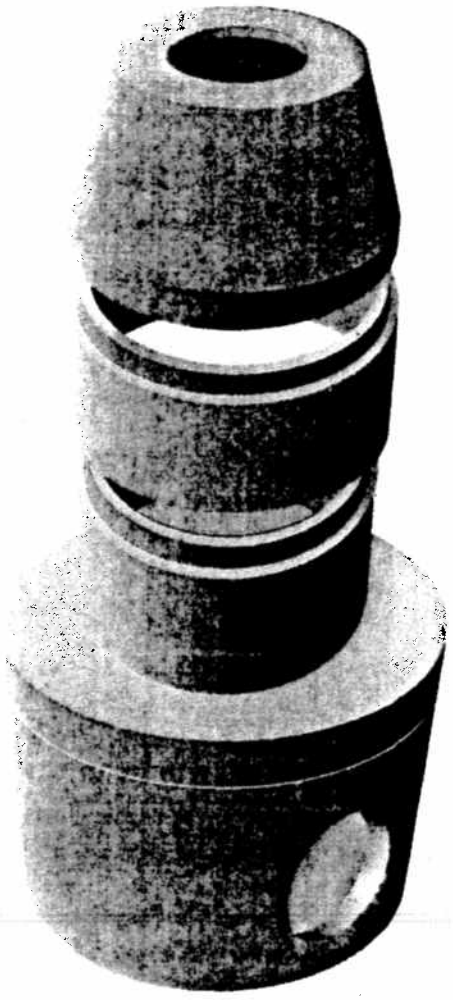
Section A-A

Base Slab Reinforcing

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

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

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



Isometric View

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

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

REINFORCING to meet AASHTO HS 20-44 Loading.

DESIGN EQUAL TO OR EXCEEDS ASTM C-478

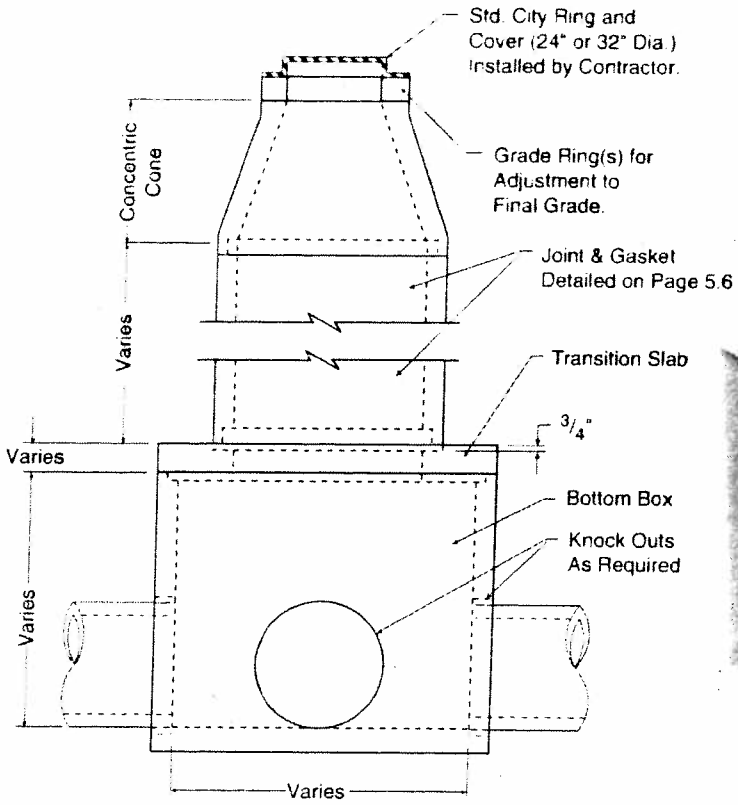
In the event a boot is loose contact your Hanson representative to resolve.

Note:

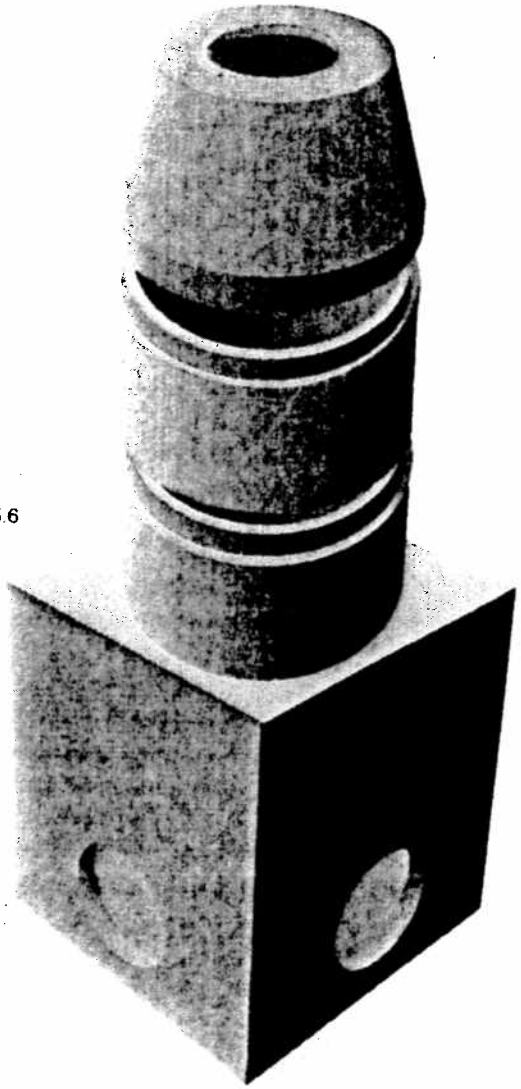
- Inverts shall be specifically sized for connecting pipes; and shall be U-Shaped with the min. depth 3/4 of the largest pipe diameter.

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

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
30 & 45 Ft. Depth 60" thru 96"Large Base Manhole	Houston San Antonio	TX	5.10	08-15-06	Hanson



Side View



Isometric View

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

REINFORCING STEEL: per ASTM A-615 / A-185

REINFORCING to meet AASHTO HS 20-44 Loading.

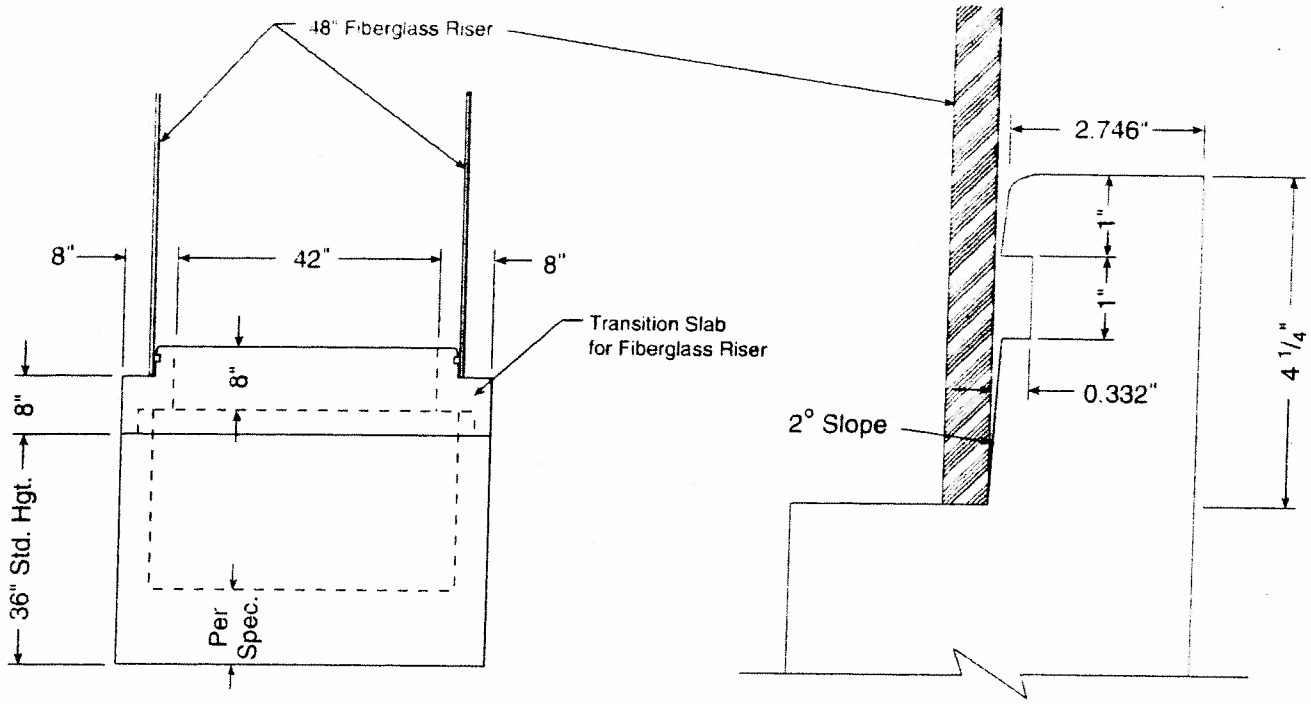
BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

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

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

TITLE	PLANT	STATE	SECTION, PAGE	DATE	
Type "C" Manhole	Houston San Antonio	TX	5.11	08-15-06	Hanson



Profile **Joint Detail**

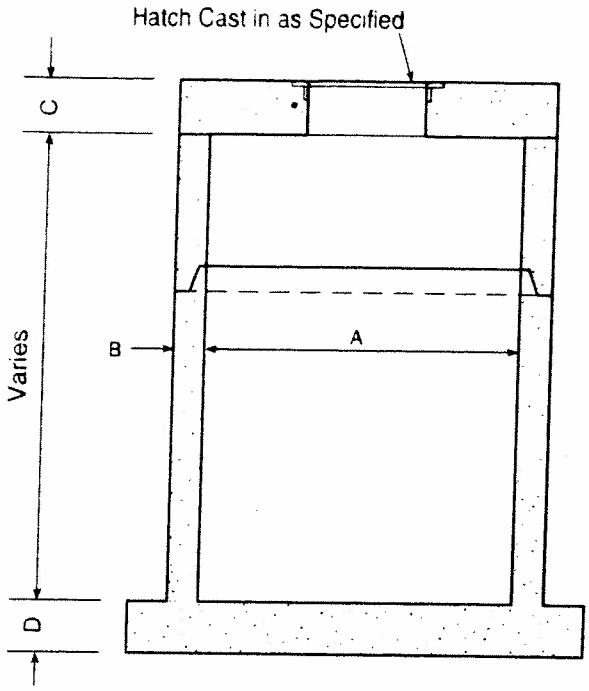
Materials & Features

CONCRETE: 5,000 PSI in 28 days.
REINFORCING STEEL: per ASTM A-615, Grade 60.
REINFORCING to meet AASHTO HS 20-44 Loading.
DESIGN EQUAL TO OR EXCEEDS ASTM C-478

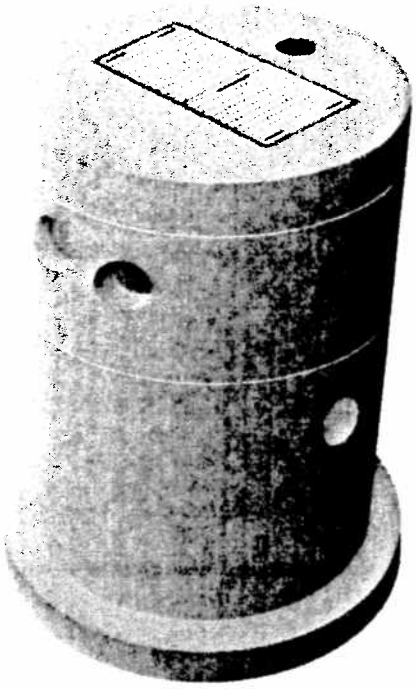
-No Scale-
All dimensions subject to allowable specification tolerances.

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
ASTM C-478 Special Base	Houston	TX	5.12	08-15-06	Hanson

Precast Manholes



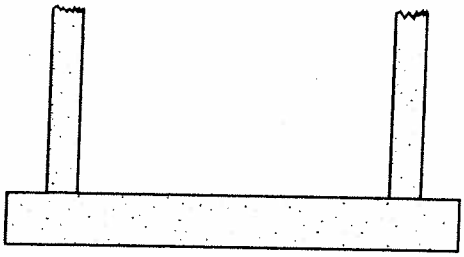
Section View
(Base configuration for 60", 72" & 84")



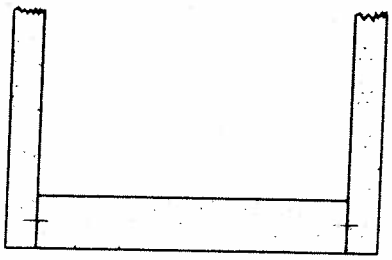
Isometric View

Product Dimensions			
A	B	C	D
60"			
72"			
84"			
96"			
108"			
120"			
132"			
144"			

Contact your local Hanson representative for product dimensions.



Section View
Base configuration for 96"



Section View
Base configuration for 108"-144"

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

REINFORCING STEEL: per ASTM A-615 / A-185

REINFORCING to meet AASHTO HS 20-44 Loading.

BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

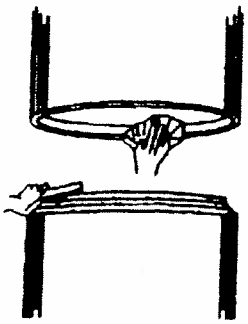
(A). Hatches as specified by Engineer.

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

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

TITLE	PLANT	STATE	SECTION.PAGE	DATE	
Typical Wetwells - Various Diameters	All Plants	TX	5.13	08-15-06	Hanson

① "O"-Ring Gasket

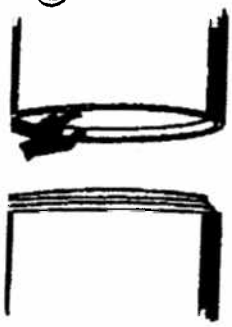


Carefully clean all dirt & foreign objects from the joining surface of the bell or groove end of pipe.

Carefully clean spigot or tongue end of pipe, including the gasket recess. Inspect the bell and spigot ends of each section to make sure they are free from cracks, chips or voids that will interfere with gasket.

Improperly prepared bell and spigot surfaces may prevent homing of the pipe or keep the gasket from sealing.

②



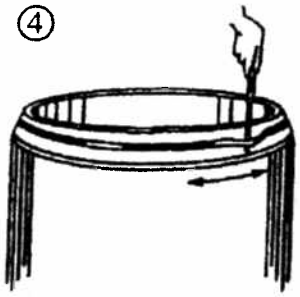
Lubricate bell joint surface liberally, covering entire inside surface using proper pipe gasket lubricant.

③

Lubricate the gasket throughly before it is placed on the spigot or tongue.

Bell and Gasket not lubricated or improperly lubricated may cause the gasket to roll and leak or possibly damage the bell.

④

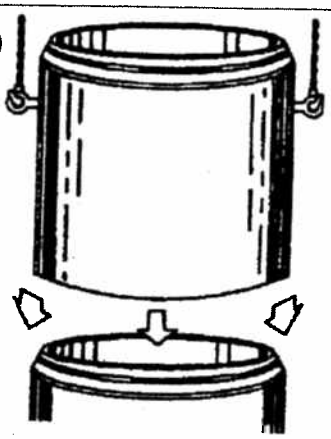


****IMPORTANT****

Fit the gasket carefully, equalizing the rubber gasket stretch by running a smooth, round object (inserted between the gasket & spigot) around the entire circumference several times.

Unequal stretch could cause bunching of the gasket and may cause leaks in the joint or crack the bell.

⑤



Align the bell & spigot to be joined. Before homing the joint, check that the gasket is in contact with the bell end entrance taper around the entire circumference.

Do not force sections together. If sections do not seat properly, unstack and contact your Hanson Sales Representative.

Improper alignment can dislodge gasket, causing leaks or possibly breaking the bell.

Profile Gasket

1. Manhole sections should be handed with extreme caution to avoid chipping of the bell or spigot ends. Proper lifting devices must be used on all sections.
2. Inspect gasket sealing area for any voids or rough edges that may interfere with the seal.
3. Place the 4-G Gasket in the step of the spigot. (Making sure that the pointed end of the gasket is toward the end of the pipe as shown in Fig A.)
4. ****IMPORTANT**** Equalize the stretch on the gasket by pulling the sealing lube away from the spigot at least one inch and then releasing the gasket. Repeat this every three or four inches around the circumference of the pipe. Equalization of stretch makes sure that the gasket has the same stretched cross-section and tension throughout. **Do not lube the gasket or spigot end of the pipe.**
5. Remove all dirt and other foreign matter from the inside surface of the bell. Apply lube to the inner surface of the bell including the lead-in taper surface on the outer edge of the bell. Align spigot with the bell. Gasket should touch lead-in taper around the entire circumference before pushing the pipe home.
6. Push the manhole section carefully, until the spigot is all the way home. (Fig B) Do not force sections together. If sections do not seat properly, unstack and contact your Hanson Sales Representative.
7. Every manhole will not come home exactly the same. Differences in application, consistency of lubricants, dimensions in the spigot and groove will cause variations in installation. If joining problems arise, please contact the manhole manufacturer immediately rather than forcing manhole sections together with subsequent damage to the manhole.
8. All testing should be performed prior to backfill of the manhole. Problems can not be detected after the manhole is backfilled. **Testing the manhole after backfill voids all warranties.**

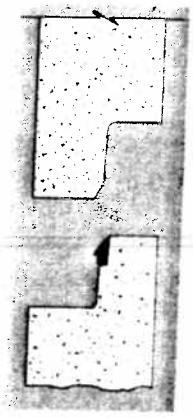


Fig. A

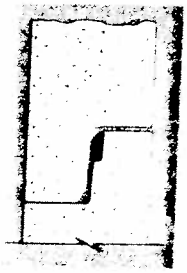
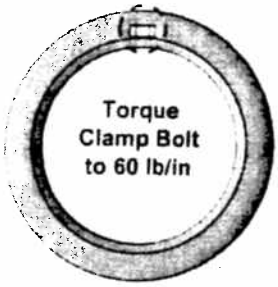


Fig. B

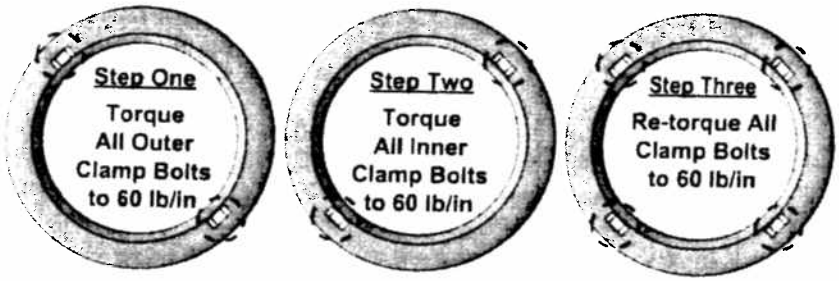
Note: *Manholes in excess of 30' in depth must be vacuum tested prior to backfill. The loads presented by soils and possible groundwater at 30' in addition to the load from the vacuum may exceed the design capacity of the pipe to manhole connector.*

TITLE	PLANT	STATE	SECTION.PAGE	DATE
O-Ring & Profile Gasket Installation on Manholes	All Plants	TX	5.14	08-15-06

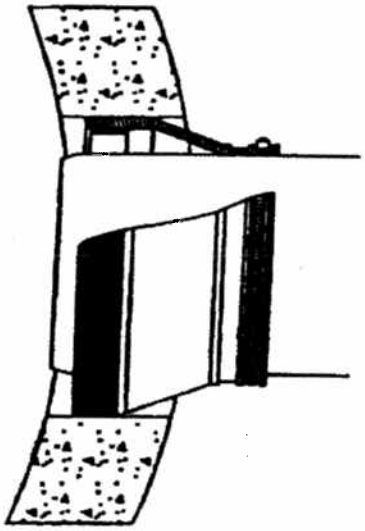
Hanson



Single Clamp



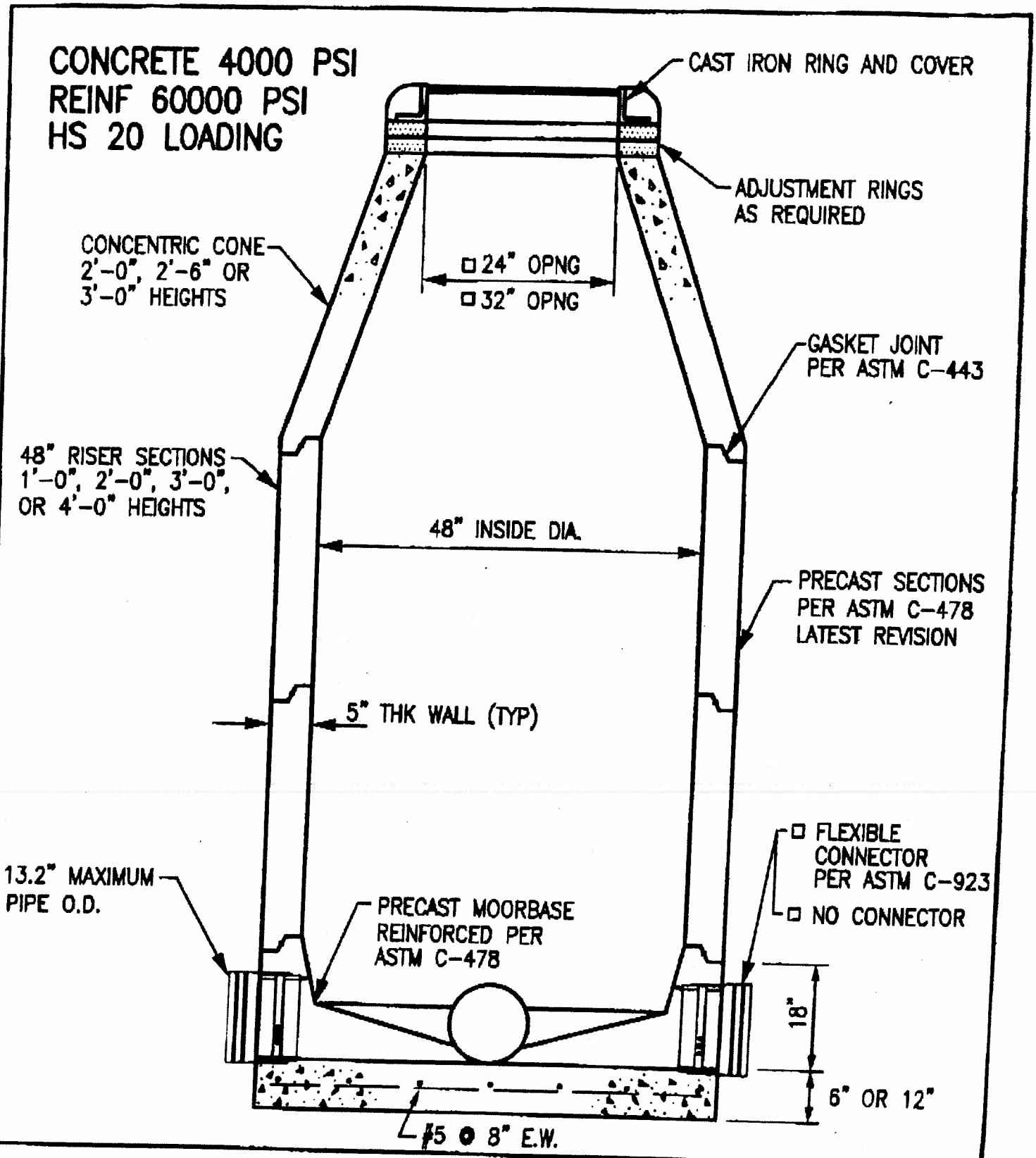
Multiple Clamps



Instructions

1. Clean pipe and boot to ensure no dirt or foreign materials are present.
2. Clamping surface on pipe must be clean and smooth.
3. Center pipe in opening and insert until pipe is at least equal to the inside plane of the manhole.
4. Attach take-up clamps(s) and stagger screw(s) of clamps(s) around the groove of the gasket so that take-up pressure will be equalized. Make sure each clamp is completely in the correct groove.
5. Using a torque ratchet or torque wrench, gradually tighten all screw(s) of clamp(s) in an alternating pattern to 60 lbs/in torque.
6. After reaching 60 lbs/in torque on final screw, check all screws again to ensure equal compression of all clamps.
7. If system is to be tested, testing shall be completed prior to backfilling, following all recommendations and requirements of the test system manufacturer. Vacuum testing shall be conducted in accordance with ASTM C-1244.
8. Adjust pipe to line and grade. Use proper bedding, backfill materials and techniques so that pipe deflection and deformation is minimized.
9. Any pipe stubs installed in the manhole must be positively restrained from movement.
10. Vacuum testing after backfill voids warranty.

For more information contact yor local Hanson Representative.



Rinker MATERIALS Moor-Tex
2735 HWY. 36 NORTH
MAILING: P.O. BOX 1088
SEALY, TEXAS 77474
PH: (979) 885-7403
(281) 375-6121
FAX:(979) 885-7001

REV.	DESCRIPTION	DATE
DATE: 8-09-02	SCALE: 3/4"=1'-0"	BY: RB

48" PRECAST CONCENTRIC MANHOLE WITH MOORBASE

JOB: 2002	FILE: 48CM	DWG. NO. 48CM

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.

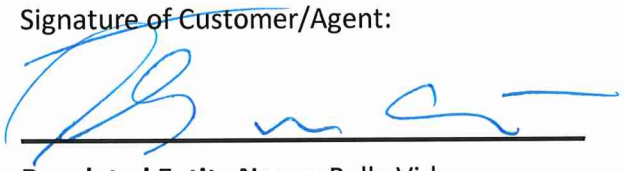
Signature

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: Thomas M. Carter, P.E.

Date: 9/23/2024

Signature of Customer/Agent:



Regulated Entity Name: Bella Vida

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: Leon 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

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
- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

- Notification should first be made by telephone and followed up with a written report.

- The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

- Other agencies which may need to be consulted include, but 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

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 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

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, clearing and grubbing of vegetation where applicable. This will disturb approximately 26.58 acres. The second is construction that will include construction of buildings, parking, sidewalks, drives, turn lanes, the sand filtration basins, landscaping and site cleanup. This will disturb approximately 26.58 acres.

ATTACHMENT D

Attachment D – Temporary Best Management Practices and Measures

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.

No upgradient water will cross the site. 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.

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.

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.

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

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

Attachment G – Drainage Area Map

No more than ten (10) acres will be disturbed within a common drainage area at one time as the site is comprised of multiple sub-drainage areas. All TBMPs utilized are adequate for the drainage areas served.

ATTACHMENT I

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.

BELLA VIDA
Water Pollution Abatement Plan

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

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

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

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

Inspector's Name _____ Inspector's Signature _____ Date _____

PROJECT MILESTONE DATES

Date when major site grading activities begin:

Construction Activity	Date
Installation of BMPs	

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

Construction Activity	Date

Dates when stabilization measures are initiated:

Stabilization Activity	Date
Removal of BMPs	

ATTACHMENT J

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 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures must be initiated as soon as practicable.

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)(Ii), (E), and (5), Effective June 1, 1999

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

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

Signature

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

Print Name of Customer/Agent: Thomas M. Carter, P.E.

Date: 9/23/2024

Signature of Customer/Agent

Regulated Entity Name: Bella Vida

Permanent Best Management Practices (BMPs)

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

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

   ☐ N/A

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

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

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

☐ N/A

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

   ☐ N/A

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

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

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

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

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

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

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

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

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

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

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

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

☐ N/A

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

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

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

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

☒ Design calculations (TSS removal calculations)

☒ TCEQ construction notes

☒ All geologic features

☒ All proposed structural BMP(s) plans and specifications

☐ N/A

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

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

    ☐ N/A

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

    ☒ N/A

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

    ☐ N/A

Responsibility for Maintenance of Permanent BMP(s)

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

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

    ☐ N/A

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

    ☐ N/A

ATTACHMENT B

Attachment B – BMPs for Upgradient Stormwater

No offsite upgradient stormwater will flow across the project limits. The onsite PBMP has been sized to account for the flows from these areas.

The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are three (3) partial sand filtration basins 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

Attachment C – BMPs for On-Site Stormwater

The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are three (3) partial sand filtration basins 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

Attachment D – BMPs for Surface Streams

There are no surface streams on or near the project limits.

The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment are three (3) partial sand filtration basins 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

Attachment F – Construction Plans

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

ATTACHMENT G

BELLA VIDA
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.

Scott Polzin, Chief Operating Officer
Forefront Living

3/25/24
Date

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**	**14**
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 w*ritten record should be kept of inspection results and maintenance performed.*

Task No. & Description	***Included in this project***	
1. Check Depth of Vegetation	**Yes**	~~No~~
2. Check Depth of Silt Deposit in Basin	**Yes**	~~No~~
3. Removal of Debris and Trash	**Yes**	~~No~~
4. Cut-off Valve	**Yes**	~~No~~
5. Inlet Splash Pad	**Yes**	~~No~~
6. Underdrain System	**Yes**	~~No~~
7. Structural Integrity	**Yes**	~~No~~
8. Discharge Pipe	**Yes**	~~No~~
9. Drawdown Time	**Yes**	~~No~~
10. Vegetated Filter Strips	~~Yes~~	**No**
11. For Pump Stations	~~Yes~~	**No**
12. For Pump Stations	~~Yes~~	**No**
13. For Pump Stations	~~Yes~~	**No**
14. Visually Inspect Security Fencing for Damage or Breach	**Yes**	~~No~~

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.

1. Check Depth of Vegetation. Vegetation in the basin shall not exceed 18-inches in depth. When vegetation needs to be cut, it shall be cut to an approximately 4-inch height. *A written record should be kept of inspection results and maintenance performed.*

2. Check Depth of Silt Deposit in Basin. Top of cleanouts shall be set 4-inches above sand layer. When silt has accumulated to top of cleanouts, the silt shall be removed. The top two (2) inches of the sand media shall also be removed and replaced with clean, silica-based washed sand meeting ASTM C33 specifications [0.0165 inch (#40 sieve) to 0.0469 inch (#16 sieve)]. Silt/sediment shall be cleared from the inlet structure at least every year and from the basin at least every five (5) years. Any sand discolored as a result of apparent impact by petroleum hydrocarbon or hazardous materials should also be removed and replaced. *Written record should be kept of inspection results and maintenance performed.*

3. Removal of Debris and Trash. The basin and inlet structure shall be checked for the accumulation of debris and trash such as brush, limbs, leaves, paper cups, aluminum cans, plastic bottles etc. Accumulated trash and debris shall be raked or collected from the basin and inlet structure and disposed of properly. *Written record should be kept of inspection results and maintenance performed.*

4. Cut-off Valve. The cut-off valve shall be turned to confirm full opening and full closure. Prior to operating the valve, the valve setting shall be checked to determine the position to which the valve is to be returned (which should limit drawdown time of the basin between 24-hours and 48-hours). Count should be kept of number of turns to open and close the valve so that the valve can be reset to the starting position. Defects in the operation of the cut-off valve shall be corrected within 7 working days. *A written record should be kept of inspection results and maintenance performed.*

5. Inlet Splash Pad. The filter area around the inlet splash pad shall be checked for erosion and for the condition of the rock rubble. Erosion or disturbance of the rock rubble should be corrected by removing the rock rubble, restoring missing sand media to appropriate depth and replacement of the rock rubble. If the condition persists in subsequent inspections, the size of the rock rubble should be increased. Rubble should be placed to a density that minimizes the amount of exposed sand between the rock rubble. Deficiencies should be corrected within seven working days. A w*ritten record should be kept of inspection results and maintenance performed.*

6. Underdrain System. The underdrain system shall be visually inspected for the accumulation of silt in the pipe system. The pipe clean-outs shall have the caps removed and visually inspected for accumulation of silt deposits. If silt deposits appear to have accumulated so as to significantly reduce the drain capacity of the pipes, then maintenance shall be performed. When silt deposits have accumulated to the stage described above, the clean-outs and drainpipes can be flushed with a

high-pressure water flushing process. Clean-out caps must be replaced onto the clean-outs after maintenance so as to avoid the possibility of short circuiting the filtering process. Sediment accumulation at outlet pipe or in wet well due to flushing shall be removed and disposed of properly. *A written record should be kept of inspection results and the maintenance performed.*

7. Structural Integrity. In addition to Items 1 through 6 the following are measures which should be reviewed during a check of structural integrity:
   - Observe the height of the confining berm for visible signs of erosion or potential breach. Signs of erosion should be identified and repaired immediately. Corrective measures include but are not limited to addition of topsoil or appropriate soil material so as to restore the original berm height of the sand filter basin. Restored areas shall be protected through placement of solid block sod.
   - Bypass of filter process. This condition can manifest itself in several ways. One way is by visually inspecting the clean-outs for accumulation of silt as described in Item 6. Significant accumulations of silt could be a sign of a torn filter fabric. Observations should be made over several inspection cycles to determine whether the condition persists. A second non-intrusive way of making observations for structural condition would be to visually look for collapsed or depressed areas along the edge of the filter media interface with basin side slope. If condition exists, corrective action should be performed within 15 working days. Removal of sand and replacement of filter fabric and/or pipe and gravel may be necessary. *A written record should be kept of inspection results and corrective measures taken.*

8. 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*

9. Drawdown Time. 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 gate valve shall be checked and partially closed to limit the drawdown time. Extensive drawdown time greater than 48 hours may indicated blockage of the sand media, the underdrain system and/or 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.*

10. 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 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*

11. For Pump Stations. Check wet well discharge pipe to confirm flow through the pump system. If flow is not present, allow sufficient time for pump to cycle on and off. If flow does not occur, the wet well should be checked for the level of water. The wet well should be opened and the on/off float switches should be moved up and down to activate the pump. If the pump does not start, a repair technician shall be called in to repair the malfunction within 5 working days. *A written record of the inspection findings and corrective actions performed should be made*

12. For Pump Stations. Check the wet well for accumulation for trash, debris and silt. Trash and debris shall be removed and disposed of properly. Silt depth can be checked by probing the bottom of the wet well with a stick or PVC pipe. Silt accumulations should be removed when silt collects to a depth of three (3) inches over the entire wet well bottom. Silt can be removed by vacuum pump method. If silt buildup continues, underdrain system shall be inspected. *A written record should be kept of inspection results and maintenance performed.*

13. For Pump Stations. Visually check aboveground pump wiring and connections for damage. Damaged or loose connections should be repaired within 5 working days. *A written record should be kept of inspection results and the maintenance performed.*

14. 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.*

ATTACHMENT I

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 Scott Polzin,
Print Name

Chief Operating Officer,
Title - Owner/President/Other

of Forefront Living,
Corporation/Partnership/Entity Name

have authorized **Pape-Dawson Consulting Engineers, LLC**
Print Name of Agent/Engineer

of **Pape-Dawson Consulting Engineers, LLC**
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:

Scott Polzin
Applicant's Signature

3/25/24
Date

THE STATE OF Texas §

County of Dallas §

BEFORE ME, the undersigned authority, on this day personally appeared Scott Polzin 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 25 day of March, 2024.

NOTARY PUBLIC

Christina Raville
Typed or Printed Name of Notary

NOTARY PUBLIC STATE OF TEXAS
Christina Marie Raville
My Commission Expires
03/19/2025
ID No. 132986660

MY COMMISSION EXPIRES: 3/19/25

APPLICATION FEE FORM (TCEQ-0574)

Application Fee Form

Texas Commission on Environmental Quality
Name of Proposed Regulated Entity: Bella Vida
Regulated Entity Location: 19111 IH 10 W, San Antonio, Texas 78230
Name of Customer: Forefront Living
Contact Person: Scott Polzin Phone: (972) 402-3631
Customer Reference Number (if issued):CN _____
Regulated Entity Reference Number (if issued):RN _____

Austin Regional Office (3373)

☐ Hays ☐ Williamson
☐ Travis

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
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

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

Site Location (Check All That Apply):

☒ Recharge Zone ☒ Contributing Zone ☐ Transition Zone

Type of Plan	***Size***	***Fee Due***
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	26.58 Acres	$ 6,500
Sewage Collection System	1,489.17 L.F.	$ 744.59
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$

Type of Plan	Size	Fee Due
Extension of Time	Each	$

Signature: _____ Date: 9/23/2024

Application Fee Schedule

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

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

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

Organized Sewage Collection Systems and Modifications

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

Underground and Aboveground Storage Tank System Facility Plans and Modifications

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

Exception Requests

Project	Fee
Exception Request	$500

Extension of Time Requests

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

CORE DATA FORM
(TCEQ-10400)

TCEQ Core Data Form

TCEQ Use Only

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

SECTION I: General Information

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

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

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

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

SECTION II: Customer Information

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

☒ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name (*If an individual, print last name first: eg: Doe, John*) *If new Customer, enter previous Customer below:*

Forefront Living

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)
0800890733	32034039647	87-2465887	

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

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

13. Independently Owned and Operated?
☒ Yes ☐ No

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

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

15. Mailing Address:

12467 Merit Dr

City	State	ZIP	ZIP + 4
Dallas	TX	75251	

16. Country Mailing Information (*if outside USA*)

17. E-Mail Address (*if applicable*)
spolzin@forefrontliving.org

18. Telephone Number	19. Extension or Code	20. Fax Number (if applicable)
(972) 402-3631		( ) -

SECTION III: Regulated Entity Information

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

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

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

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

Bella Vida

23. Street Address of the Regulated Entity: *(No PO Boxes)*	19111 IH 10 W							
	City	SanAntonio	**State**	TX	**ZIP**	78230	**ZIP + 4**	
24. County	Bexar							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:					
26. Nearest City			**State**		**Nearest ZIP Code**
27. Latitude (N) In Decimal:	29.615417 N		**28. Longitude (W) In Decimal:**	-98.607417 W	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	36	55.5	-98	36	26.7

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)
1522	1623	236116	237110

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

Retirement Community with independent and dependent living facilities

34. Mailing Address:	**12467 Merit Dr**							
	City	**Dallas**	**State**	**TX**	**ZIP**	**75251**	**ZIP + 4**	

35. E-Mail Address:	**spolzin@forefrontliving.org**

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(972) 402-3631		**( ) -**

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

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

SECTION IV: Preparer Information

40. Name:	Jean Autrey, P.E., CESSWI	**41. Title:**	Program Manager

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(210) 375-9000		(210) 375-9010	jautrey@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 Consulting Engineers, LLC	**Job Title:**	Senior Vice President
Name *(In Print):*	Thomas M. Carter, P.E.	**Phone:**	(210) 375- 9000
Signature:		**Date:**	9/23/2024

POLLUTANT LOAD AND REMOVAL CALCULATIONS

BELLA VIDA CONTINUING CARE COMMUNITY

Treatment Summary by Watershed					
Watershed	**Total Watershed Area (ac.)**	**Proposed Impervious Cover (ac.)**	**PBMP**	**Required TSS Removal Annually (lbs)**	**Designed TSS Removed Annually (lbs)**
A	6.09	3.72	Water Quality Basin "A"	3,036	3,072
B	4.78	1.50	Water Quality Basin "B"	1,224	1,368
C	7.97	4.27	Water Quality Basin "C"	3,484	3,577
Uncaptured Driveway	0.04	0.04	Overtreatment	33	-
TOTAL	**18.88**	**9.53**	---	**7,776**	**8,017**

Water Quality Basin Summary

Basin	**Designed Capture Volume (cf)**	**Required Volume (cf)**	**Excess Volume Capacity (cf)**	**Designed Sand Area (sf)**	**Required Sand Area (sf)**	**Excess Sand Area (sf)**
A	18,578	**17,043**	1,535	1,803	**1,704**	99
B	15,123	**14,354**	769	2,483	**1,435**	1,048
C	20,302	**20,998**	-696	3,253	**2,100**	1,153

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: BELLA VIDA
Date Prepared: 9/23/2024

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 spre

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of inc
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 =	Bexar	
Total project area included in plan * =	26.58	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	9.53	acres
Total post-development impervious cover fraction * =	0.36	
P =	30	inches

$L_{M\ TOTAL\ PROJECT}$ = **7776** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 3

9/22/24

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

Drainage Basin/Outfall Area No. =	**A**	
Total drainage basin/outfall area =	**6.09**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**3.72**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.61**	
$L_{M\ THIS\ BASIN}$ =	**3036**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP =	**Sand Filter**	
Removal efficiency =	**89**	percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

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

A_C =	**6.09**	acres
A_I =	**3.72**	acres
A_P =	**2.37**	acres
L_R =	**3471**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	**3072**	lbs.

F = **0.88**

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

Rainfall Depth =	**1.50**	inches
Post Development Runoff Coefficient =	**0.43**	
On-site Water Quality Volume =	**14202**	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 =	**2840**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**17043**	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**17043**	cubic feet	
Minimum filter basin area =	**1420**	square feet	
Maximum sedimentation basin area =	**5681**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**355**	square feet	**For maximum water depth of 8 feet**

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: BELLA VIDA
Date Prepared: 9/23/2024

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell.
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where:

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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 =	Bexar	
Total project area included in plan * =	26.58	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	9.53	acres
Total post-development impervious cover fraction * =	0.36	
P =	30	inches

$L_{M\ TOTAL\ PROJECT}$ = **7776** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 3

9/22/24

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

Drainage Basin/Outfall Area No. =	**B**	
Total drainage basin/outfall area =	**4.78**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**1.50**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.31**	
$L_{M\ THIS\ BASIN}$ =	**1224**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP =	**Sand Filter**	
Removal efficiency =	**89**	percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

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

A_C =	**4.78**	acres
A_I =	**1.50**	acres
A_P =	**3.28**	acres
L_R =	**1433**	lbs

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

Desired $L_{M\ THIS\ BASIN}$ =	**1368**	lbs.
F =	**0.95**	

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

Rainfall Depth =	**2.60**	inches
Post Development Runoff Coefficient =	**0.27**	
On-site Water Quality Volume =	**11961**	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 =	**2392**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**14354**	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**14354**	cubic feet	
Minimum filter basin area =	**1196**	square feet	
Maximum sedimentation basin area =	**4785**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**299**	square feet	**For maximum water depth of 8 feet**

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009

Project Name: BELLA VIDA
Date Prepared: 9/23/2024

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 spre

1. The Required Load Reduction for the total project: Calculations from RG-348 Pages 3-27 to 3-30

Page 3-29 Equation 3.3: $L_M = 27.2(A_N \times P)$

where:

$L_{M\ TOTAL\ PROJECT}$ = Required TSS removal resulting from the proposed development = 80% of inc
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 =	Bexar	
Total project area included in plan * =	26.58	acres
Predevelopment impervious area within the limits of the plan * =	0.00	acres
Total post-development impervious area within the limits of the plan* =	9.53	acres
Total post-development impervious cover fraction * =	0.36	
P =	30	inches

$L_{M\ TOTAL\ PROJECT}$ = **7776** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = 3

9/22/24

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

Drainage Basin/Outfall Area No. =	**C**	
Total drainage basin/outfall area =	**7.97**	acres
Predevelopment impervious area within drainage basin/outfall area =	**0.00**	acres
Post-development impervious area within drainage basin/outfall area =	**4.27**	acres
Post-development impervious fraction within drainage basin/outfall area =	**0.54**	
$L_{M\ THIS\ BASIN}$ =	**3484**	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP =	**Sand Filter**	
Removal efficiency =	**89**	percent

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

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A_I x 34.6 + A_P x 0.54)

where:

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

A_C =	**7.97**	acres
A_I =	**4.27**	acres
A_P =	**3.70**	acres
L_R =	**3998**	lbs

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

			additional for OT
Desired $L_{M\ THIS\ BASIN}$ =	**3577**	lbs.	93
F =	**0.89**		

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

Rainfall Depth =	**1.60**	inches
Post Development Runoff Coefficient =	**0.38**	
On-site Water Quality Volume =	**17499**	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 =	**3500**	
Total Capture Volume (required water quality volume(s) x 1.20) =	**20998**	cubic feet

The following sections are used to calculate the required water quality volume(s) for the selected BMP.

9B. Partial Sedimentation and Filtration System

Water Quality Volume for combined basins =	**20998**	cubic feet	
Minimum filter basin area =	**1750**	square feet	
Maximum sedimentation basin area =	**6999**	square feet	**For minimum water depth of 2 feet**
Minimum sedimentation basin area =	**437**	square feet	**For maximum water depth of 8 feet**

EXHIBITS

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

1. A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
   - THE NAME OF THE APPROVED PROJECT;
   - THE ACTIVITY START DATE; AND
   - THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE 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 HAZARDOUS SUBSTANCE STORAGE TANK SHALL BE INSTALLED WITHIN 150 FEET OF A WATER SUPPLY SOURCE, DISTRIBUTION SYSTEM, WELL, OR SENSITIVE FEATURE.

5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND MANUFACTURERS SPECIFICATIONS. IF INSPECTIONS INDICATE A CONTROL HAS BEEN USED INAPPROPRIATELY, OR INCORRECTLY, THE APPLICANT MUST REPLACE OR MODIFY THE CONTROL FOR SITE SITUATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.

6. ANY SEDIMENT THAT ESCAPES THE CONSTRUCTION SITE MUST BE COLLECTED AND PROPERLY DISPOSED OF BEFORE THE NEXT RAIN EVENT TO ENSURE IT IS NOT WASHED INTO SURFACE STREAMS, SENSITIVE FEATURES, ETC.

7. SEDIMENT MUST BE REMOVED FROM THE SEDIMENT TRAPS OR SEDIMENTATION BASINS NOT LATER THAN WHEN IT OCCUPIES 50% OF THE BASIN'S DESIGN CAPACITY.

8. LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION CHEMICALS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BEING DISCHARGED OFFSITE.

9. ALL SPOILS (EXCAVATED MATERIAL) GENERATED FROM THE PROJECT SITE MUST BE STORED ON-SITE WITH PROPER E&S CONTROLS. FOR STORAGE OR DISPOSAL OF SPOILS AT ANOTHER SITE ON THE EDWARDS AQUIFER RECHARGE ZONE, THE OWNER OF THE SITE MUST RECEIVE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN FOR THE PLACEMENT OF FILL MATERIAL OR MASS GRADING PRIOR TO THE PLACEMENT OF SPOILS AT THE OTHER SITE.

10. IF PORTIONS OF THE SITE WILL HAVE A TEMPORARY OR PERMANENT CEASE IN CONSTRUCTION ACTIVITY LASTING LONGER THAN 14 DAYS, SOIL STABILIZATION IN THOSE AREAS SHALL BE INITIATED AS SOON AS POSSIBLE PRIOR TO THE 14TH DAY OF INACTIVITY. IF ACTIVITY WILL RESUME PRIOR TO THE 21ST DAY, STABILIZATION MEASURES ARE NOT REQUIRED. IF DROUGHT CONDITIONS OR INCLEMENT WEATHER PREVENT ACTION BY THE 14TH DAY, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE.

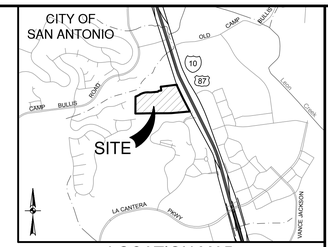
11. THE FOLLOWING RECORDS SHALL BE MAINTAINED AND MADE AVAILABLE TO THE TCEQ UPON REQUEST:
   - THE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR;
   - THE DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   - THE DATES WHEN STABILIZATION MEASURES ARE INITIATED.

12. THE HOLDER OF ANY APPROVED EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
   A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;
   B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;
   C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

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

LEGEND

- PROJECT LIMITS
- 976 EXISTING CONTOUR
- 970 PROPOSED CONTOUR
- FLOW ARROW (EXISTING)
- FLOW ARROW (PROPOSED)
- SILT FENCE
- ROCK BERM
- GRAVEL FILTER BAGS
- GRATE INLET PROTECTION
- SEDIMENT CONTROL ROLLS
- LIMITS OF DISTURBED AREA
- STABILIZED CONSTRUCTION ENTRANCE/EXIT (FIELD LOCATE)
- CONSTRUCTION EQUIPMENT, VEHICLE & MATERIALS STORAGE AREA (FIELD LOCATE)
- CONCRETE TRUCK WASH-OUT PIT (FIELD LOCATE)
- 50' NATURAL VEGETATIVE BUFFER



LOCATION MAP
NOT-TO-SCALE

SCALE: 1" = 60'
0' 60' 120' 180'

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 IMPERVIOUS COVER SUCH AS 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 UPGRADIENT 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.

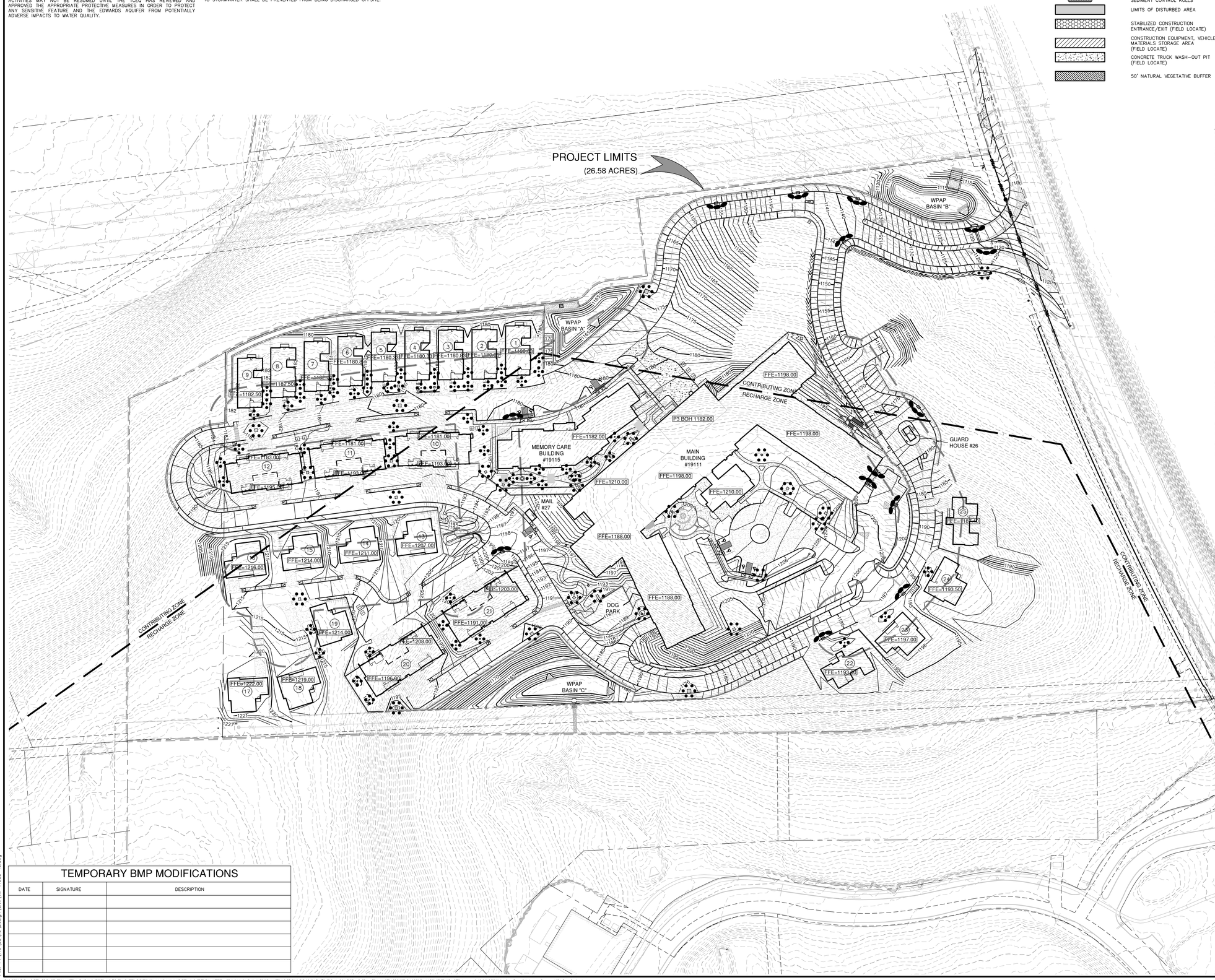
11. UPON COMPLETION OF THE PROJECT, INCLUDING SITE STABILIZATION, AND BEFORE FINAL PAYMENT IS ISSUED, CONTRACTOR SHALL REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES, PAYING SPECIAL ATTENTION TO ROCK BERMS IN DRAINAGE FEATURES.

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. HOUSE CONSTRUCTION ACTIVITIES WILL REQUIRE A SEPARATE STORM WATER POLLUTION PREVENTION PLAN.

14. PRIOR TO BEGINNING CONSTRUCTION, CONTRACTOR SHALL COORDINATE PLACEMENT OF TEMPORARY BEST MANAGEMENT PRACTICES WITHIN TXDOT RIGHT-OF-WAY WITH TXDOT.

15. CPS ENERGY MAY FUNCTION AS A SECONDARY OPERATOR ON THIS PROJECT AND MAY BE INSTALLING ELECTRIC UTILITIES FOR ON-SITE CONSTRUCTION AND OFF-SITE FEED TO THE PROJECT.



TEMPORARY BMP MODIFICATIONS

DATE	SIGNATURE	DESCRIPTION

THIS 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 2
1 OF 2

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

three design that lifts the human spirit
214.559.0960 facsimile
214.559.4280 telephone
Dallas, Texas 75206
4925 Greenville Ave suite 600

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/24/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

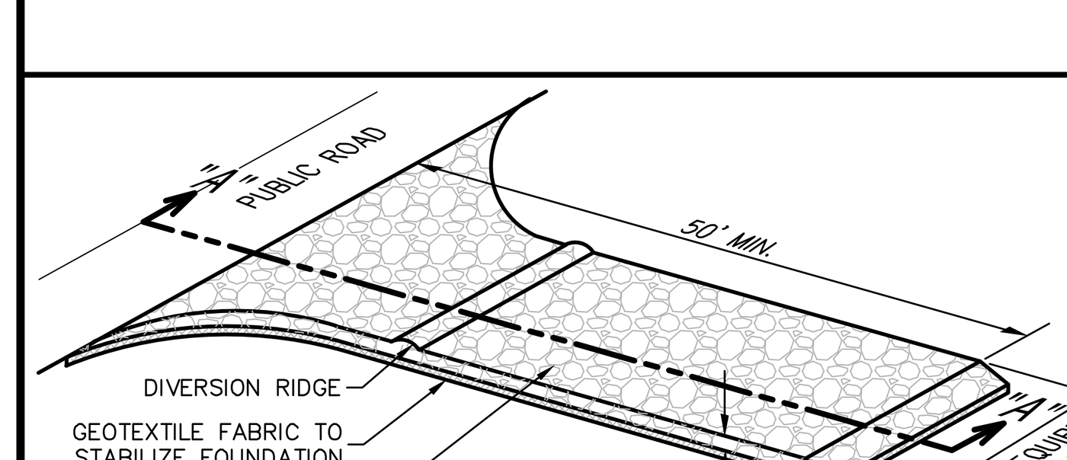
Client Information:
Forefront Living

Key Plan:

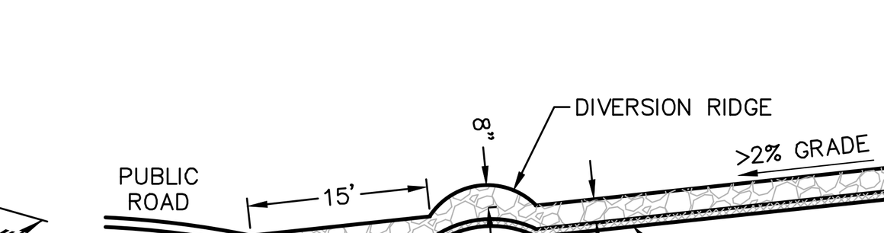
Phase:
ISSUE FOR GMP

Sheet Description:
TEMPORARY WATER POLLUTION ABATEMENT SITE PLAN

Sheet Number:
C7.00



SCHEMATIC OF TEMPORARY CONSTRUCTION ENTRANCE/EXIT



SECTION "A-A" OF A 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/YD², A MULLEN BURST RATING OF 140 LB/IN², 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.

COMMON TROUBLE POINTS

1. INADEQUATE RUNOFF CONTROL–SEDIMENT WASHES ONTO PUBLIC ROAD.

2. STONE TOO SMALL OR GEOTEXTILE FABRIC ABSENT, RESULTS IN MUDDY CONDITION AS STONE IS PRESSED INTO SOIL.

3. PAD TOO SHORT FOR HEAVY CONSTRUCTION TRAFFIC–EXTEND PAD BEYOND THE MINIMUM 50–FOOT LENGTH AS NECESSARY.

4. PAD NOT FLARED SUFFICIENTLY AT ROAD SURFACE, RESULTS IN MUD BEING TRACKED ON TO ROAD AND POSSIBLE DAMAGE TO ROAD.

5. UNSTABLE FOUNDATION – USE GEOTEXTILE FABRIC UNDER PAD AND/OR IMPROVE FOUNDATION DRAINAGE.

INSPECTION AND MAINTENANCE GUIDELINES

1. THE ENTRANCE SHOULD BE MAINTAINED IN A CONDITION, WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

2. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY SHOULD BE REMOVED IMMEDIATELY BY CONTRACTOR.

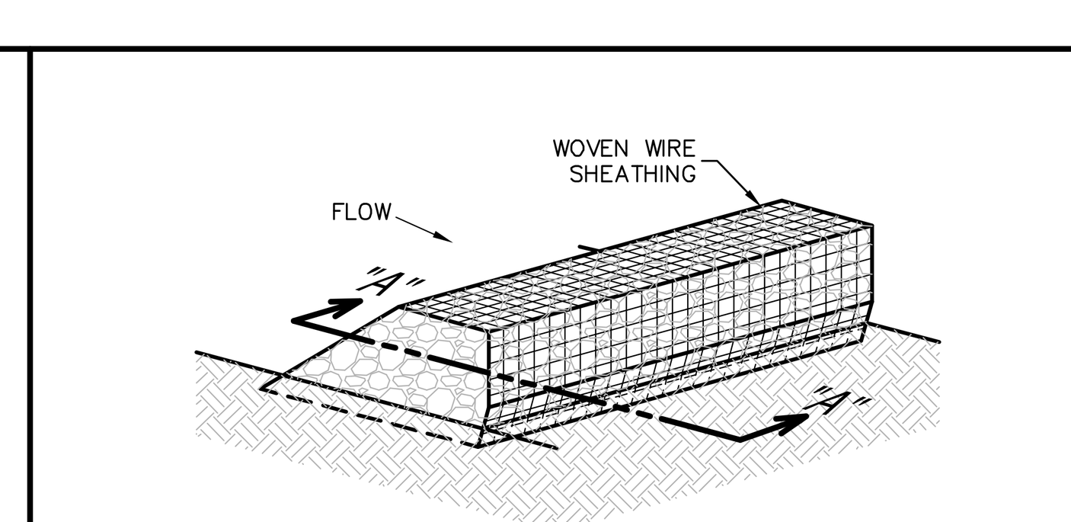
3. WHEN NECESSARY, WHEELS SHOULD BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT–OF–WAY.

4. WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

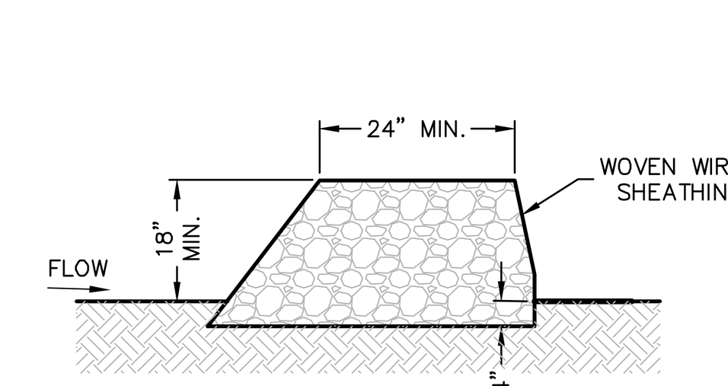
5. ALL SEDIMENT SHOULD BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATER COURSE BY USING APPROVED METHODS.

STABILIZED CONSTRUCTION ENTRANCE/EXIT DETAIL

NOT–TO–SCALE



ISOMETRIC PLAN VIEW



SECTION "A-A"

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 BED LOAD IN CHANNELS AND SHOULD NOT BE SUBSTITUTED FOR OTHER EROSION AND SEDIMENT CONTROL MEASURES FARTHER 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.

MATERIALS

1. THE BERM STRUCTURE SHOULD BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM OPENING OF 1 INCH AND A MINIMUM WIRE DIAMETER OF 20 GAUGE GALVANIZED AND SHOULD BE SECURED WITH SHOAT RINGS.

2. CLEAN, OPEN GRADED 3–INCH TO 5–INCH DIAMETER ROCK SHOULD BE USED, EXCEPT IN AREAS WHERE HIGH VELOCITIES OR LARGE VOLUMES OF FLOW ARE EXPECTED, WHERE 5–INCH TO 8–INCH DIAMETER ROCKS MAY BE USED.

INSTALLATION

1. LAY OUT THE WOVEN WIRE SHEATHING PERPENDICULAR TO THE FLOW LINE. THE SHEATHING SHOULD BE 20 GAUGE WOVEN WIRE MESH WITH 1 INCH OPENINGS.

2. BERM SHOULD HAVE A TOP WIDTH OF 2 FEET MINIMUM WITH SIDE SLOPES BEING 2:1 (H:V) OR FLATTER.

3. PLACE THE ROCK ALONG THE SHEATHING AS SHOWN IN THE DIAGRAM TO A HEIGHT NOT LESS THAN 18".

4. WRAP THE WIRE SHEATHING AROUND THE ROCK AND SECURE WITH TIE WIRE SO THAT THE ENDS OF THE SHEATHING OVERLAP AT LEAST 2 INCHES, AND THE BERM RETAINS ITS SHAPE WHEN WALKED UPON.

5. BERM SHOULD BE BUILT ALONG THE CONTOUR AT ZERO PERCENT GRADE OR AS NEAR AS POSSIBLE.

6. THE ENDS OF THE BERM SHOULD BE TIED INTO EXISTING UPSLOPE GRADE AND THE BERM SHOULD BE BURIED IN A TRENCH APPROXIMATELY 3 TO 4 INCHES DEEP TO PREVENT FAILURE OF THE CONTROL.

COMMON TROUBLE POINTS

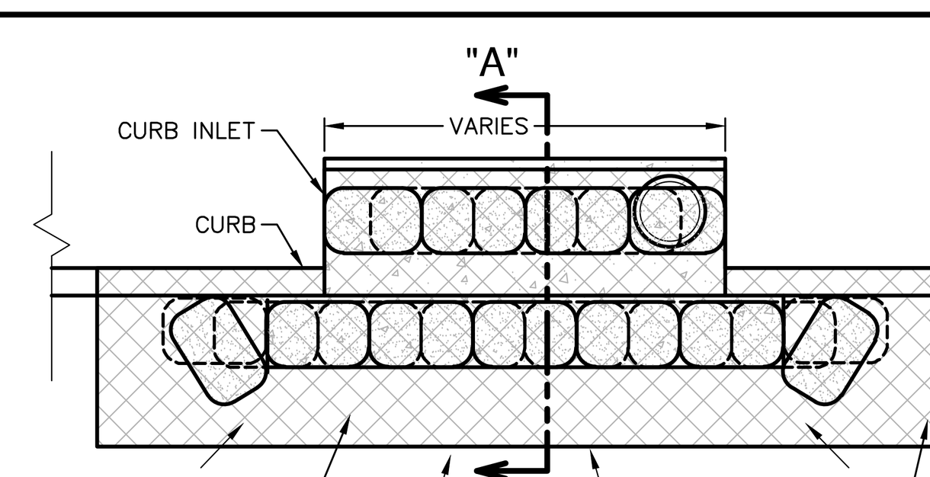
1. INSUFFICIENT BERM HEIGHT OR LENGTH (RUNOFF QUICKLY ESCAPES OVER THE TOP OR AROUND THE SIDES OF BERM).

2. BERM NOT INSTALLED PERPENDICULAR TO FLOW LINE (RUNOFF ESCAPING AROUND ONE SIDE).

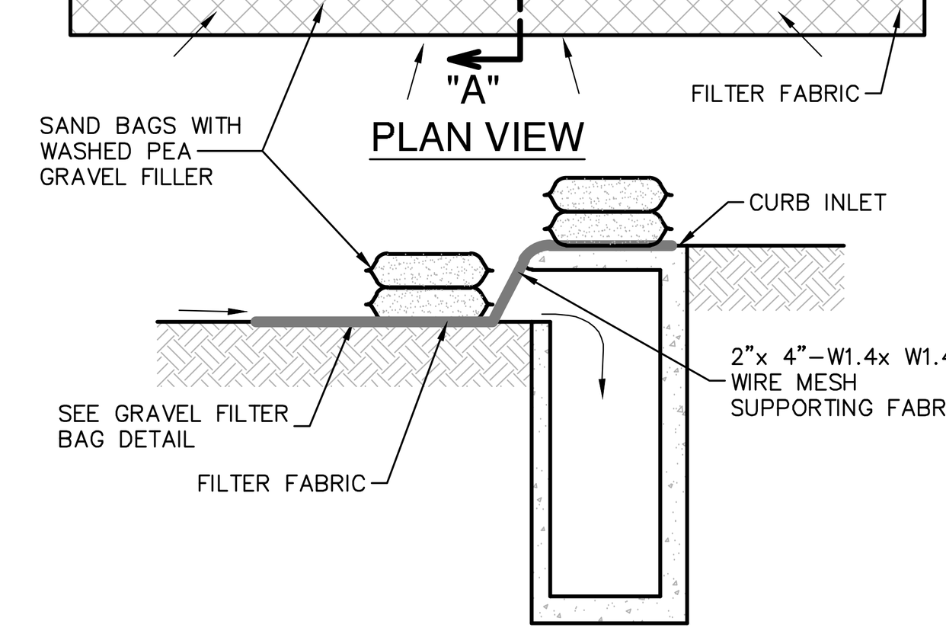
PROJECT LIMITS
(0000 ACRES)

ROCK BERM 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 GUTTER 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.

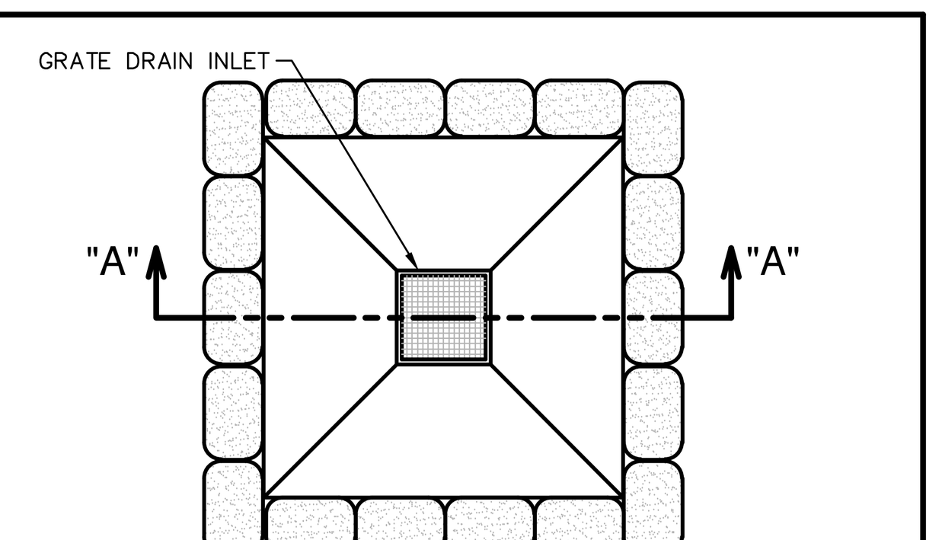
3. CHECK PLACEMENT OF DEVICE TO PREVENT GAPS BETWEEN DEVICE AND CURB.

4. INSPECT FILTER FABRIC AND PATCH OR REPLACE IF TORN OR MISSING.

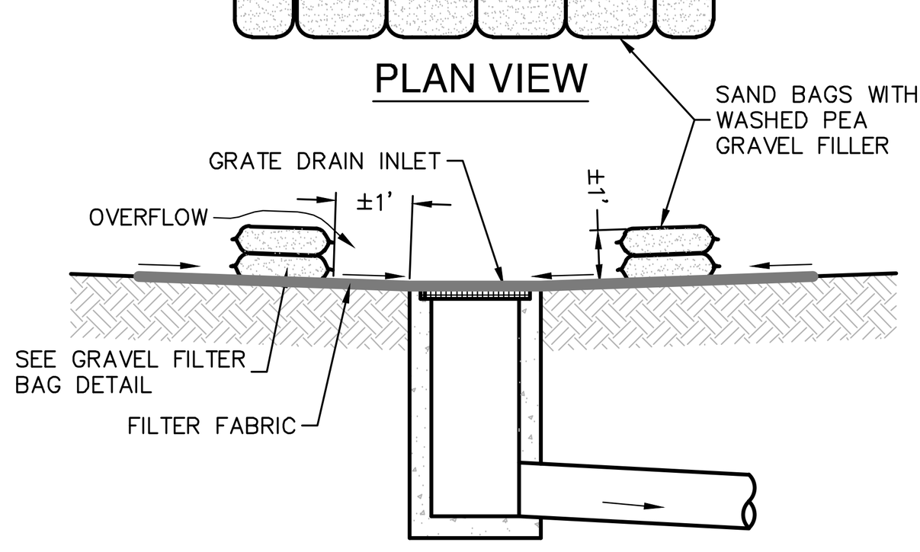
5. STRUCTURES SHOULD BE REMOVED AND THE AREA STABILIZED ONLY AFTER THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

BAGGED GRAVEL CURB INLET PROTECTION DETAIL

NOT–TO–SCALE



PLAN VIEW



SECTION "A-A"

GENERAL NOTES

1. 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 MATTER THAT IT WILL NOT ERODE.

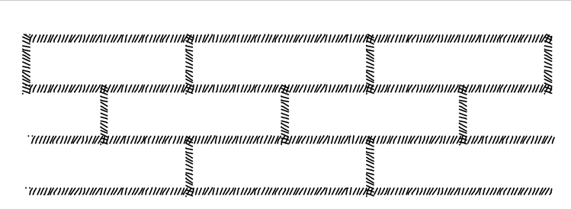
3. CHECK PLACEMENT OF DEVICE TO PREVENT GAPS BETWEEN DEVICE AND CURB.

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.

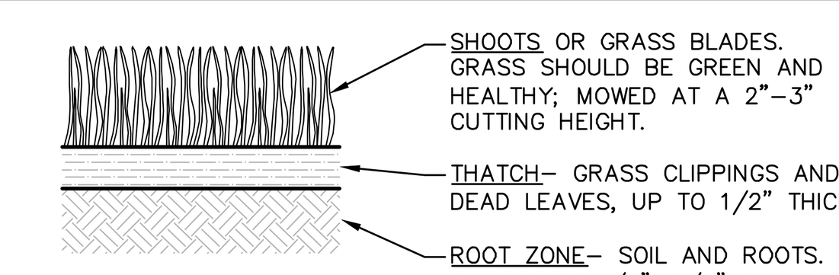
BAGGED GRAVEL GRATE INLET PROTECTION DETAIL

NOT–TO–SCALE



LAY SOD IN A STAGGERED PATTERN. BUTT THE STRIPS TIGHTLY AGAINST EACH OTHER. DO NOT LEAVE SPACES AND DO NOT OVERLAP. A SHARPENED MASON'S TROWEL IS A HANDY TOOL FOR TUCKING DOWN THE ENDS AND TRIMMING PIECES.

BUTTING – ANGLED ENDS CAUSED BY THE AUTOMATIC SOD CUTTER MUST BE MATCHED CORRECTLY.

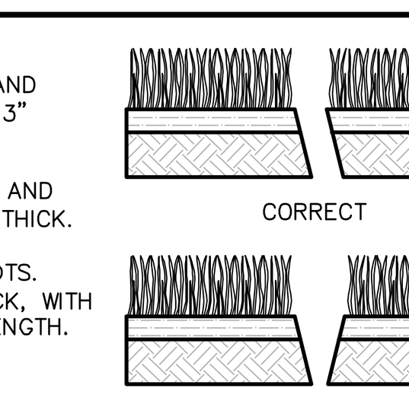


APPEARANCE OF GOOD SOD

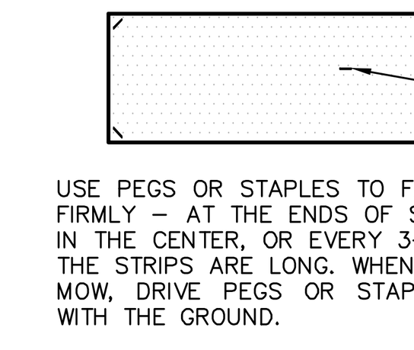
NOTES:
1. ROLL SOD IMMEDIATELY TO ACHIEVE FIRM CONTACT WITH THE SOIL.

2. WATER TO A DEPTH OF 4" AS NEEDED. WATER WELL AS SOON AS THE SOD IS LAID.

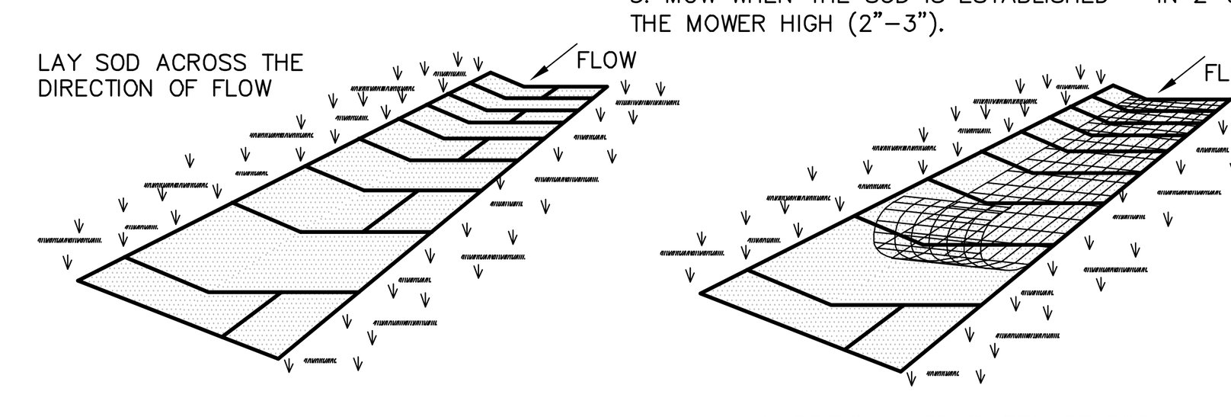
3. MOW WHEN THE SOD IS ESTABLISHED – IN 2–3 WEEKS. SET THE MOWER HIGH (2"–3").



SOD INSTALLATION



USE PEGS OR STAPLES TO FASTEN SOD FIRMLY – AT THE ENDS OF STRIPS AND IN THE CENTER, OR EVERY 3–4 FEET IF THE STRIPS ARE LONG. WHEN READY TO MOW, DRIVE PEGS OR STAPLES FLUSH WITH THE GROUND.



IN CRITICAL AREAS, SECURE SOD WITH NETTING. USE STAPLES.

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 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.

SITE PREPARATION

1. PRIOR TO SOIL 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.

TEMPORARY BMP MODIFICATIONS

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.

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

1. 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.

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.

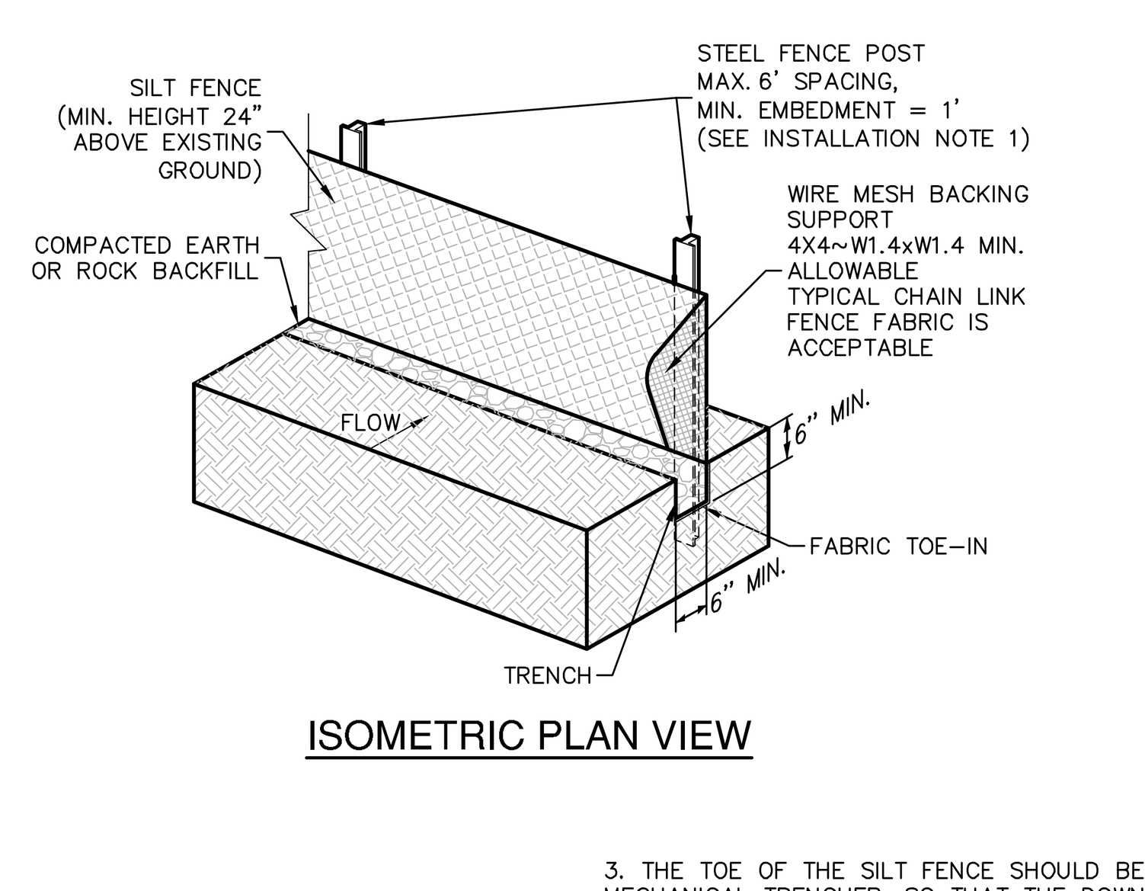
INSPECTION AND MAINTENANCE GUIDELINES

1. SOD SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAIN EVENT TO LOCATE AND REPAIR ANY DAMAGE.

2. 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



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.

SILT FENCING WITHIN THE SITE MAY BE TEMPORARILY MOVED DURING THE DAY TO ALLOW CONSTRUCTION ACTIVITY PROVIDED IT IS REPLACED AND PROPERLY ANCHORED TO THE GROUND AT THE END OF THE DAY. SILT FENCES ON THE PERIMETER OF THE SITE OR AROUND DRAINAGE WAYS SHOULD NOT BE MOVED AT ANY TIME.

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/IN2, 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 ¼ ACRE/100 FEET OF FENCE.

3. THE TOE OF THE SILT FENCE SHOULD BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWN–SLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G., PAVEMENT OR ROCK OUTCROP), WEIGHT FABRIC FLAP WITH 3 INCHES OF PEA GRAVEL ON UPHILL SIDE TO PREVENT FLOW FROM SEEPING UNDER FENCE.

4. THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.

5. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST. THERE SHOULD BE A 3–FOOT OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.

6. SILT FENCE SHOULD BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

COMMON TROUBLE POINTS

1. FENCE NOT INSTALLED ALONG THE CONTOUR CAUSING WATER TO CONCENTRATE AND FLOW OVER THE FENCE.

2. FABRIC NOT SEATED SECURELY TO GROUND (RUNOFF PASSING UNDER FENCE).

3. FENCE NOT INSTALLED PERPENDICULAR TO FLOW LINE (RUNOFF ESCAPING AROUND SIDES).

4. FENCE TREATING TOO LARGE AN AREA, OR EXCESSIVE CHANNEL FLOW (RUNOFF OVERTOPS OR COLLAPSES FENCE).

INSPECTION AND MAINTENANCE GUIDELINES

1. INSPECT ALL FENCING WEEKLY, AND AFTER RAINFALL.

2. REMOVE SEDIMENT WHEN BUILDUP REACHES 6 INCHES.

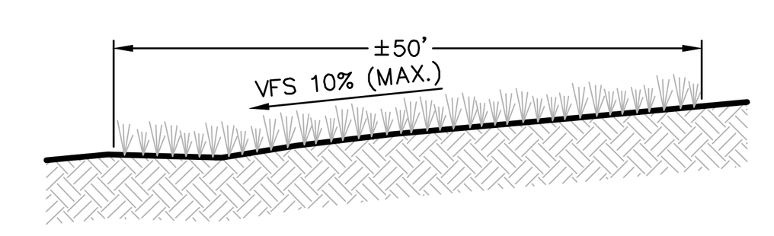
3. REPLACE TORN FABRIC OR INSTALL A SECOND LINE OF FENCING PARALLEL TO THE TORN SECTION.

4. REPLACE OR REPAIR SECTIONS CRUSHED OR COLLAPSED IN THE COURSE OF CONSTRUCTION ACTIVITY. IF A SECTION OF FENCE IS OBSTRUCTING VEHICULAR ACCESS, CONSIDER RELOCATING IT TO A SPOT WHERE IT WILL PROVIDE EQUAL PROTECTION, BUT WILL NOT OBSTRUCT VEHICLES. A TRIANGULAR FILTER DIKE MAY BE PREFERABLE TO A SILT FENCE AT COMMON VEHICLE ACCESS POINTS.

5. WHEN CONSTRUCTION IS COMPLETE, THE SEDIMENT SHOULD BE DISPOSED OF IN A MANNER THAT WILL NOT CAUSE ADDITIONAL SILTATION AND THE PRIOR LOCATION OF THE SILT FENCE SHOULD BE REVEGETATED. THE FENCE ITSELF SHOULD BE DISPOSED OF IN AN APPROVED LANDFILL.

SILT FENCE DETAIL

NOT–TO–SCALE



NATURAL VEGETATIVE BUFFER DETAIL

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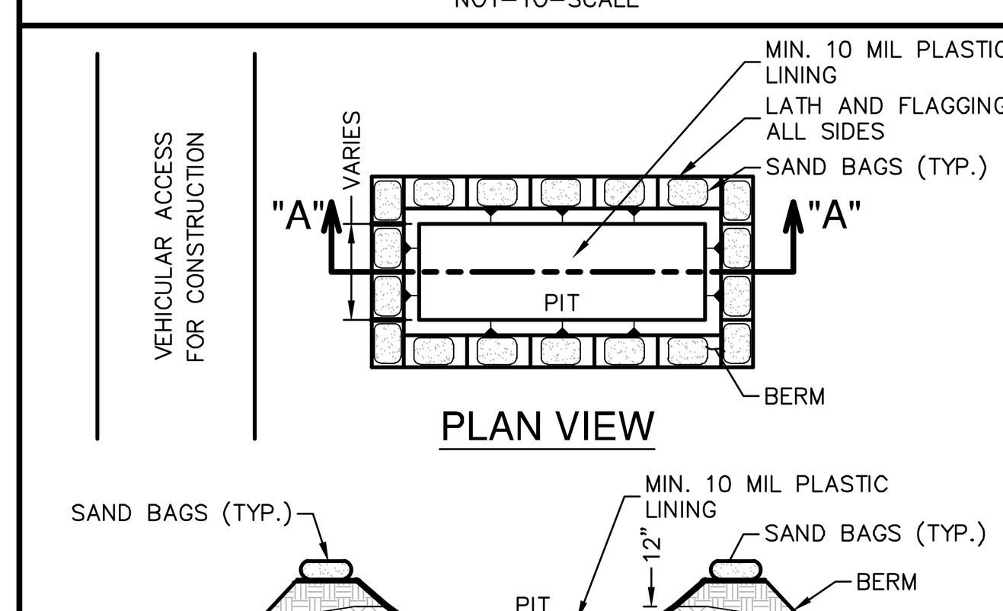
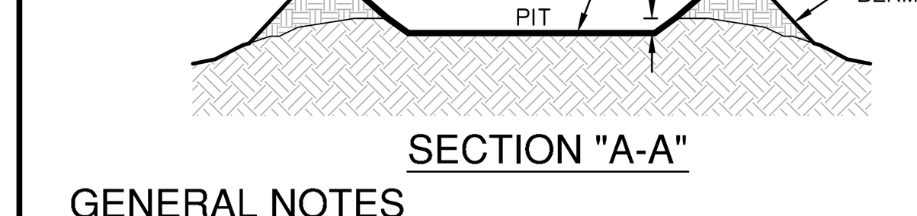


PLAN VIEW



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

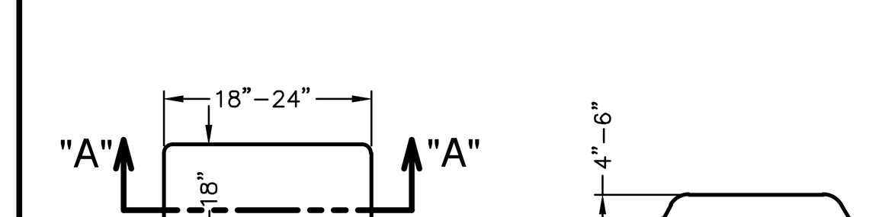
1. WHEN TEMPORARY CONCRETE WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR THE WORK, THE HARDENED CONCRETE SHOULD BE REMOVED AND DISPOSED OF.

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"

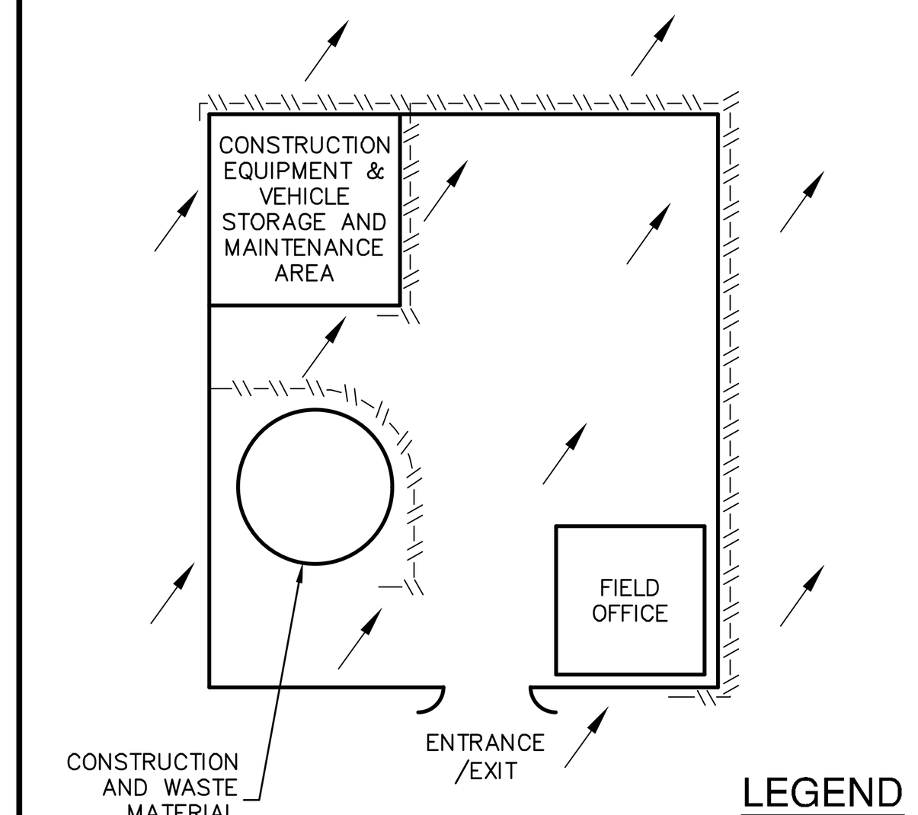
NOTES:
1. THE FILTER BAG MATERIAL SHALL BE MADE OF POLYPROPYLENE, POLYETHYLENE OR POLYAMIDE WOVEN FABRIC, MIN. UNIT WEIGHT OF 4 OUNCES/SY, HAVE A MULLEN BURST STRENGTH EXCEEDING 300 PSI AND ULTRAVIOLET STABILITY EXCEEDING 70%.

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.

GRAVEL FILTER BAG DETAIL

NOT–TO–SCALE



CONSTRUCTION STAGING AREA

NOT–TO–SCALE

three design that lifts the human spirit

4925 Greenville Ave suite 600 | Dallas, Texas 75206 | 214.559.4080 telephone | 214.559.0990 facsimile

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10

Date MAY 9, 2024

Seal:

9/23/2024

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

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 2
2 OF 2

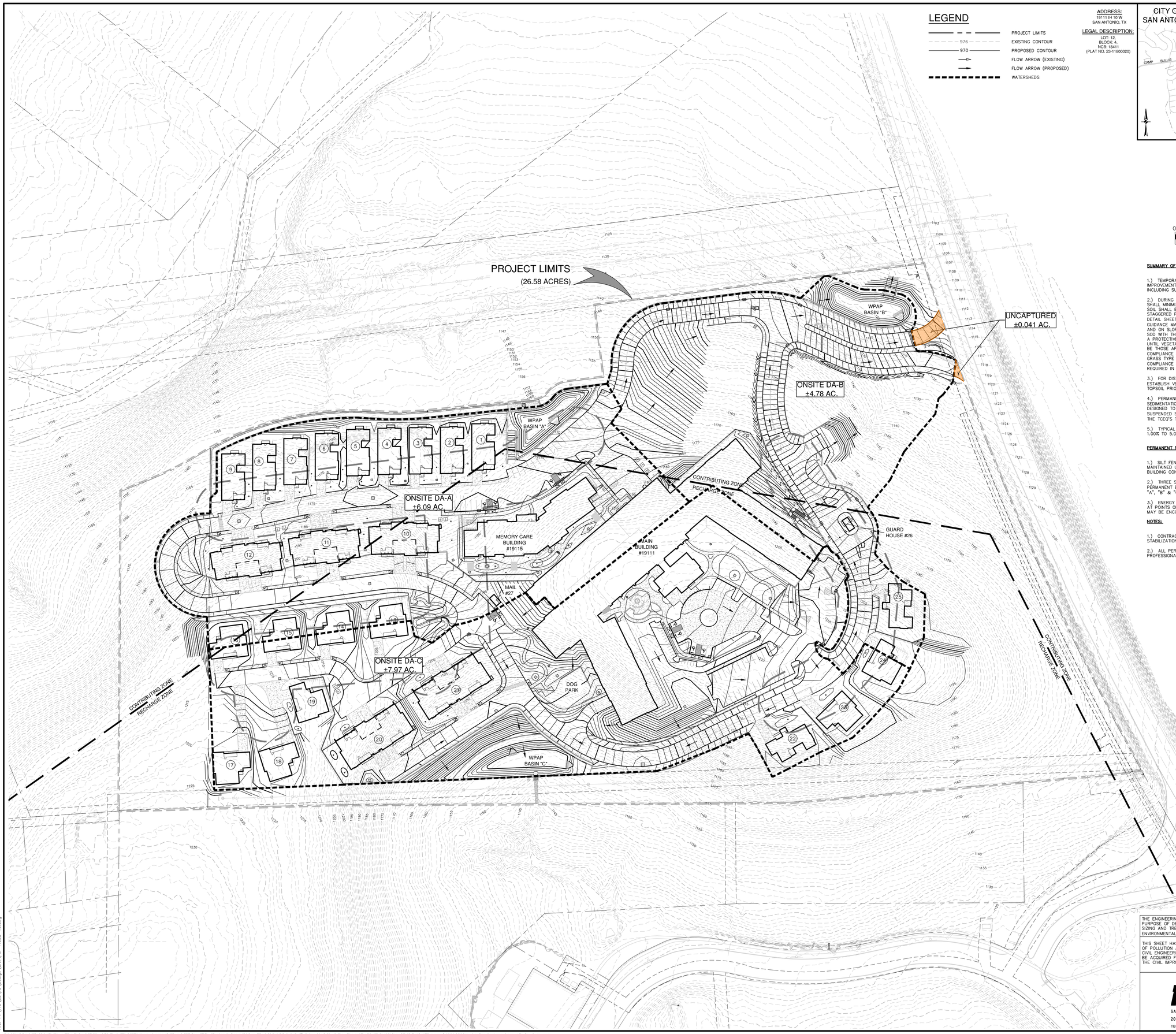
Sheet Description:
TEMPORARY WATER POLLUTION ABATEMENT TYPICAL DETAILS

Sheet Number:
C7.01

PAPE-DAWSON ENGINEERS

SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800

Date: Sep 23, 2024, 2:05pm User ID: btriesch
File: P:\119\33\10\Design\Civil\TMDT-11933-10.dwg



LEGEND

- PROJECT LIMITS
- 976 EXISTING CONTOUR
- 970 PROPOSED CONTOUR
- FLOW ARROW (EXISTING)
- FLOW ARROW (PROPOSED)
- WATERSHEDS

ADDRESS:
19111 IH 10 W
SAN ANTONIO, TX

LEGAL DESCRIPTION:
LOT: 12,
BLOCK: 4,
NCB: 18411
(PLAT NO. 23-11800020)

LOCATION MAP
NOT-TO-SCALE

SCALE: 1"= 60'
0' 60' 120' 180'

SUMMARY OF PERMANENT POLLUTION ABATEMENT MEASURES:

1.) TEMPORARY BMP'S WILL BE MAINTAINED UNTIL THE SITE IMPROVEMENTS ARE COMPLETED AND THE SITE HAS BEEN STABILIZED, INCLUDING SUFFICIENT VEGETATION BEING ESTABLISHED.

2.) 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.

3.) FOR DISTURBED AREAS WHERE INSUFFICIENT SOIL EXISTS TO ESTABLISH VEGETATION, CONTRACTOR SHALL PLACE A MINIMUM OF 6" OF TOPSOIL PRIOR TO REVEGETATION.

4.) PERMANENT BMP'S FOR THIS SITE INCLUDE THREE SEDIMENTATION/FILTRATION BASINS. THESE PERMANENT BMP'S HAVE BEEN DESIGNED TO REMOVE AT LEAST 80% OF THE INCREASED TOTAL SUSPENDED SOLIDS (TSS) FOR THE 27.11 ACRES IN ACCORDANCE WITH THE TCEQ'S TECHNICAL GUIDANCE MANUAL (TGM) RG-348 (2005).

5.) TYPICAL SLOPES ON THIS PROJECT RANGE FROM APPROXIMATELY 1.00% TO 5.00%

PERMANENT POLLUTION ABATEMENT MEASURES:

1.) SILT FENCING AND ROCK BERMS, WHERE APPROPRIATE, WILL BE MAINTAINED UNTIL THE ROADWAY, UTILITY, DRAINAGE IMPROVEMENTS, AND BUILDING CONSTRUCTION ARE COMPLETED.

2.) THREE SEDIMENTATION/FILTRATION BASINS WILL SERVE AS THE PERMANENT BEST MANAGEMENT PRACTICE (BMP) FOR DRAINAGE AREAS "A", "B" & "C".

3.) ENERGY DISSIPATORS (TO HELP REDUCE EROSION) WILL BE PROVIDED AT POINTS OF CONCENTRATED DISCHARGE WHERE EXCESSIVE VELOCITIES MAY BE ENCOUNTERED.

NOTES:

1.) CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION FOR SOIL STABILIZATION PRIOR TO SITE CLOSEOUT.

2.) ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

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 3

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

three design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.509.0960 Telephone
214.509.0961 Facsimile

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

Client Information:
Forefront Living

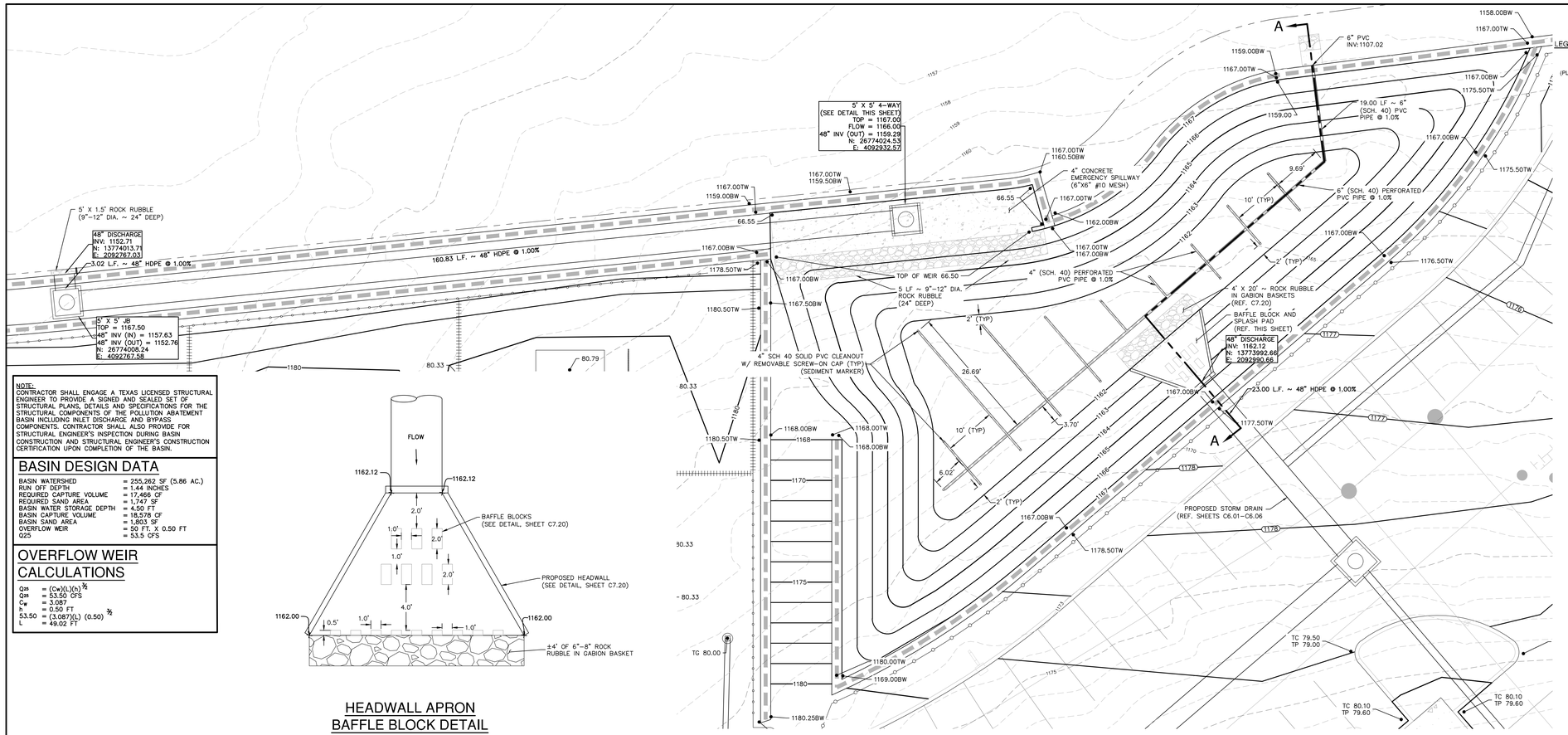
Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
PERMANENT WATER POLLUTION ABATEMENT SITE PLAN

Sheet Number: C7.10

Date: Sep 23, 2024, 2:05pm User ID: bfritsch
File: J:\11933\100\Design\Civil\PW-11933-10.dwg



LOCATION MAP

NOT-TO-SCALE

NOTE:
CONTRACTOR SHALL ENGAGE A TEXAS LICENSED STRUCTURAL ENGINEER TO PROVIDE A SIGNED AND SEALED SET OF STRUCTURAL PLANS, DETAILS AND SPECIFICATIONS FOR THE STRUCTURAL COMPONENTS OF THE POLLUTION ABATEMENT BASIN INCLUDING INLET DISCHARGE AND BYPASS COMPONENTS. CONTRACTOR SHALL ALSO PROVIDE FOR STRUCTURAL ENGINEER'S INSPECTION DURING BASIN CONSTRUCTION AND STRUCTURAL ENGINEER'S CONSTRUCTION CERTIFICATION UPON COMPLETION OF THE BASIN.

BASIN DESIGN DATA

BASIN WATERSHED	= 255,262 SF (5.86 AC.)
RUN OFF DEPTH	= 1.44 INCHES
REQUIRED CAPTURE VOLUME	= 17,466 CF
REQUIRED SAND AREA	= 1,747 SF
BASIN WATER STORAGE DEPTH	= 4.50 FT
BASIN CAPTURE VOLUME	= 18,578 CF
BASIN SAND AREA	= 1,803 SF
OVERFLOW WEIR	= 50 FT, X 0.50 FT
Q25	= 53.5 CFS

OVERFLOW WEIR CALCULATIONS

$Q_{25} = (C_W)(L)(h)^{3/2}$
$Q_{25} = 53.50$ CFS
$C_W = 3.087$
$h = 0.50$ FT
$53.50 = (3.087)(L)\ (0.50)^{3/2}$
$L = 49.02$ FT

HEADWALL APRON
BAFFLE BLOCK DETAIL

(NOT TO SCALE)

BASIN A - PLAN VIEW

SCALE: 1" = 10'

0' 10' 20' 30'

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 PROGRESSED TO THE FOLLOWING MILESTONES:

a.) REINFORCING STEEL FOR BASIN WALL OR RIPRAP LINER HAS BEEN SET, CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE IS IN PLACE. WHERE EPDM LINER IS USED, CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE LINER HAS BEEN SET AT PROPER ELEVATION AND GRADE.

b.) CONCRETE RIPRAP OR EPDM LINER IS IN PLACE AND UNDER-DRAIN SYSTEM IS IN PLACE WITHOUT GRAVEL.

c.) GRAVEL AROUND UNDER-DRAIN SYSTEM IS IN PLACE AND FILTER FABRIC IS INSTALLED AND ATTACHED TO WALLS OR RIPRAP.

d.) SAND FILTER MEDIA HAS BEEN PLACED & 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 AT EACH STAGE. 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 BANK/WALL AT EACH CORNER OF BASIN
- TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
- SPLASH PAD/INLET PIPES
- OVERFLOW WEIRS

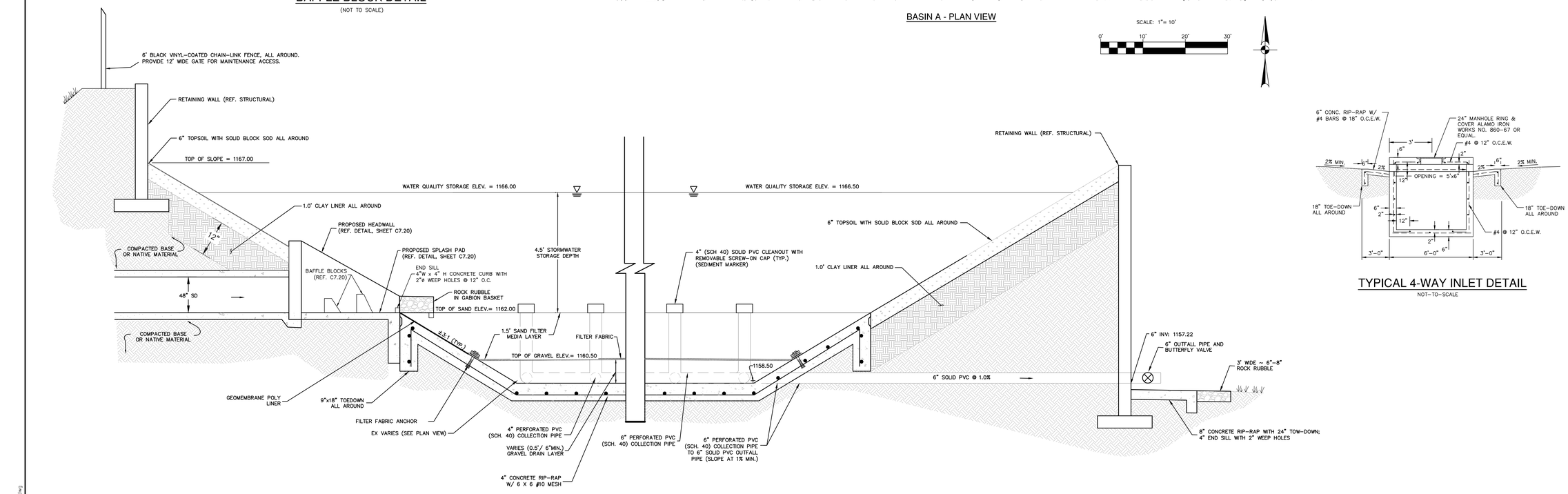
5. BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.

6. THE MINIMUM DRAIN TIME FOR A FULL BASIN IS 24 HOURS. THE CONTRACTOR SHALL RESTRICT THE FLOW THROUGH THE BASIN BY ADJUSTING THE GATE VALVE ON THE DISCHARGE PIPE SO AS TO PROVIDE THE MINIMUM 24 HOUR DRAW-DOWN TIME.

SAND & GRAVEL SPECIFICATIONS

SAND FILTER MATERIAL SHALL BE ASTM C33 0.0165 IN (#40 SIEVE) TO 0.0469 IN (#16 SIEVE) SILICA BASED WASHED SAND.

ROCK FOR GRAVEL LAYER SHALL BE 1/2" TO 1" DIAMETER WASHED RIVER GRAVEL.



BASIN CROSS-SECTION "A-A"

NOT-TO-SCALE

TYPICAL 4-WAY INLET DETAIL

NOT-TO-SCALE

CLAY LINER SPECIFICATIONS

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

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

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
PERMANENT WATER POLLUTION ABATEMENT PLAN - BASIN A

Sheet Number: C7.11

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.

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EXHIBIT

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

three design that lifts the human spirit
4925 Greenville Ave suite 600 | Dallas, Texas 75206 | 214.509.0360 Telephone | 214.509.0360 facsimile

Bella Vida
San Antonio, Texas

Date: Sep 23, 2024, 2:06pm User ID: bfrisch
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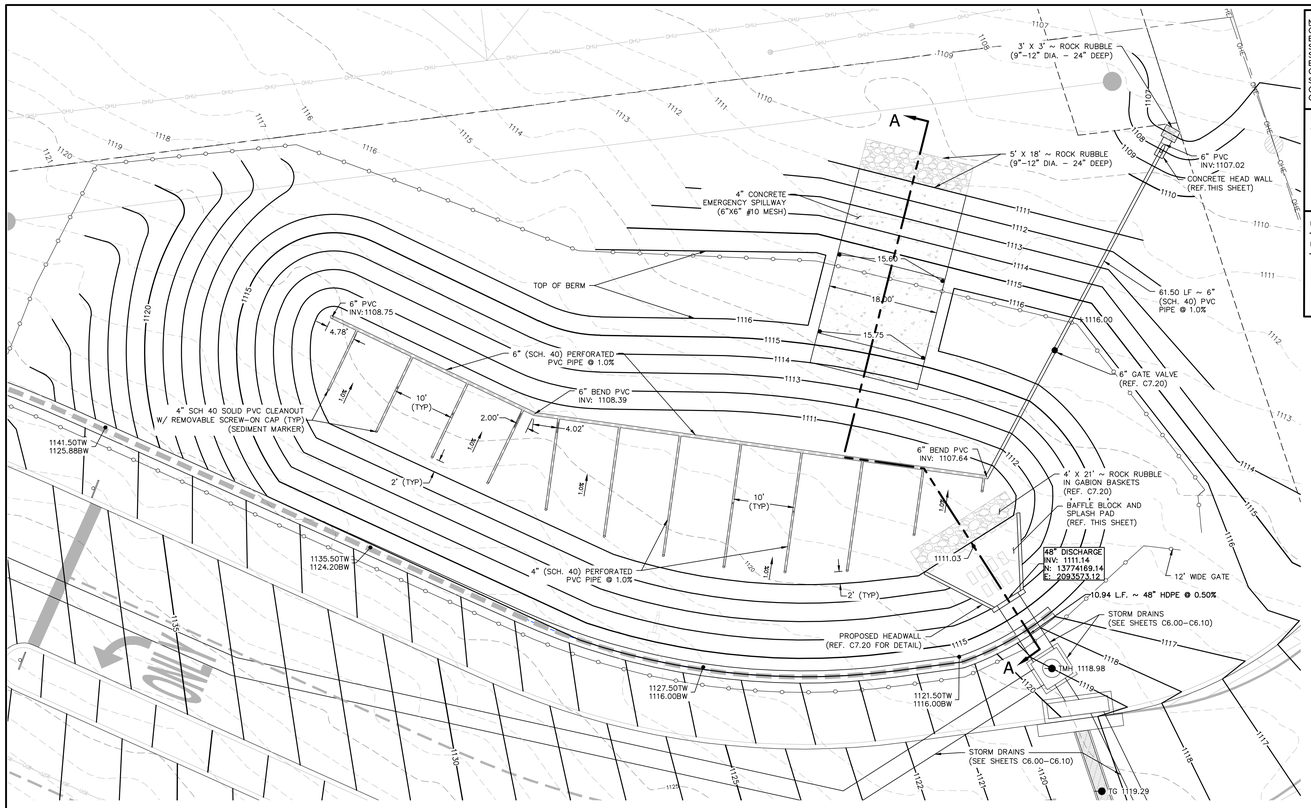


BASIN B - PLAN VIEW

SCALE: 1"= 10'

0' 10' 20' 30'

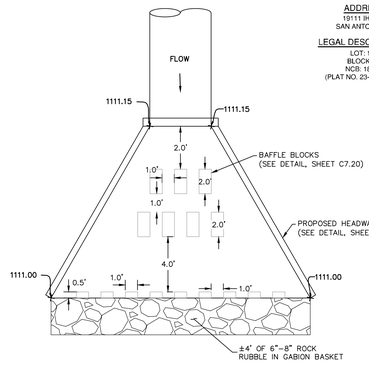
NOTE:
CONTRACTOR SHALL ENGAGE A TEXAS LICENSED STRUCTURAL ENGINEER TO PROVIDE A SIGNED AND SEALED SET OF STRUCTURAL PLANS, DETAILS AND SPECIFICATIONS FOR THE STRUCTURAL COMPONENTS OF THE POLLUTION ABATEMENT BASIN INCLUDING INLET DISCHARGE AND BYPASS COMPONENTS. CONTRACTOR SHALL ALSO PROVIDE FOR STRUCTURAL ENGINEER'S INSPECTION DURING BASIN CONSTRUCTION AND STRUCTURAL ENGINEER'S CONSTRUCTION CERTIFICATION UPON COMPLETION OF THE BASIN.

BASIN DESIGN DATA

BASIN WATERSHED	= 200,812 SF (4.61 AC.)
RUN OFF DEPTH	= 1.44 INCHES
REQUIRED CAPTURE VOLUME	= 7,519 CF
REQUIRED SAND AREA	= 752 SF
BASIN WATER STORAGE DEPTH	= 4.0 FT
BASIN CAPTURE VOLUME	= 15,123 CF
BASIN SAND AREA	= 2,483 SF
OVERFLOW WEIR	= 18 FT. X 1.00 FT
Q25	= 51.0 CFS

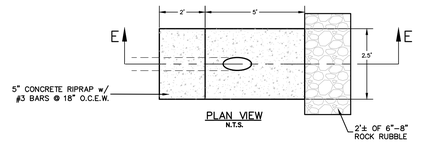
OVERFLOW WEIR CALCULATIONS

$Q_{25} = (C_w)(L)(h)^{3/2}$
$Q_{25} = 51.0$ CFS
$C_w = 3.087$
$L = 16.52$ FT
$45.2 = (3.087)(16.52)(1)^{3/2}$
$h = 1$ FT

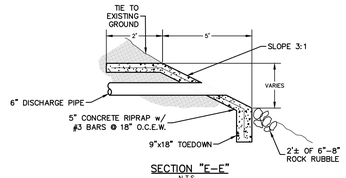


HEADWALL APRON BAFFLE BLOCK DETAIL

(NOT TO SCALE)



PLAN VIEW
N.T.S.



SECTION "E-E"
N.T.S.

DISCHARGE HEADWALL DETAIL

NOT-TO-SCALE

ADDRESS:
19111 IH 10 W
SAN ANTONIO, TX

LEGAL DESCRIPTION:
LOT: 12,
BLOCK: 4,
NCB: 18411
(PLAT NO. 23-11800020)

LOCATION MAP

NOT-TO-SCALE

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 PROGRESSED TO THE FOLLOWING MILESTONES:

a.) REINFORING STEEL FOR BASIN WALL OR RIPRAP LINER HAS BEEN SET, CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE IS IN PLACE. WHERE EPDM LINER IS USED, CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE LINER HAS BEEN SET AT PROPER ELEVATION AND GRADE.

b.) CONCRETE RIPRAP OR EPDM LINER IS IN PLACE AND UNDER-DRAIN SYSTEM IS IN PLACE WITHOUT GRAVEL.

c.) GRAVEL AROUND UNDER-DRAIN SYSTEM IS IN PLACE AND FILTER FABRIC IS INSTALLED AND ATTACHED TO WALLS OR RIPRAP.

d.) SAND FILTER MEDIA HAS BEEN PLACED & 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 AT EACH STAGE. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.

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- TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
- SPLASH PAD/INLET PIPES
- OVERFLOW WEIRS

5. 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.

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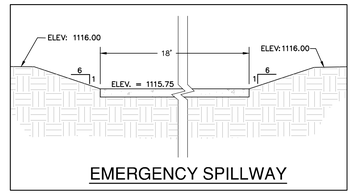
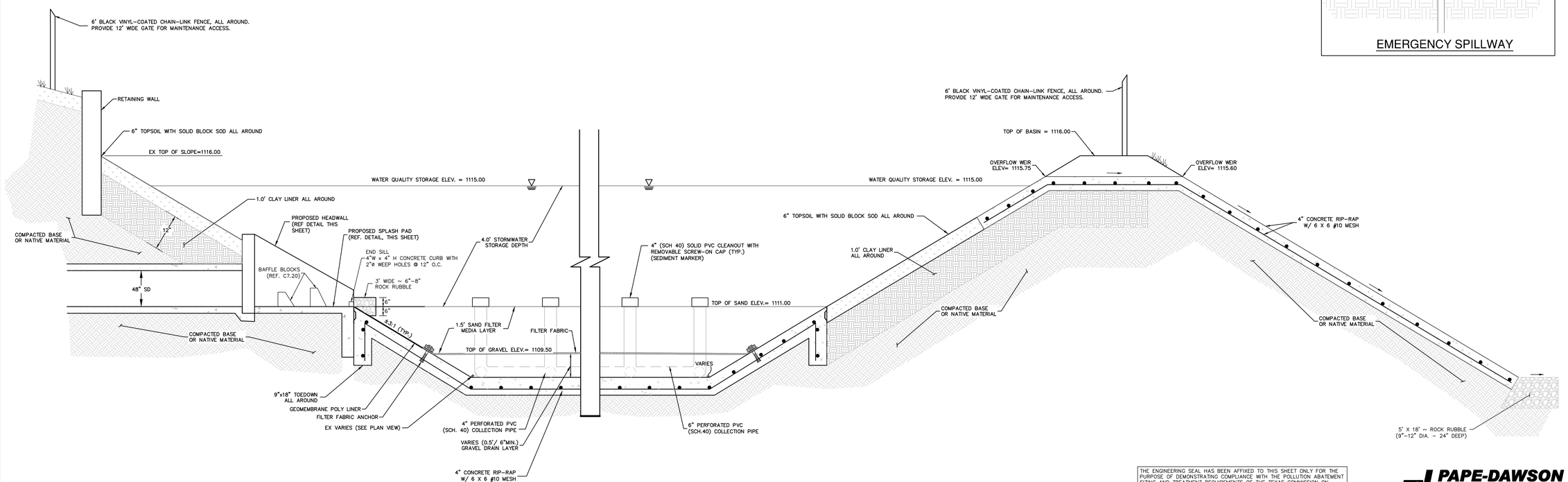
SAND & GRAVEL SPECIFICATIONS

SAND FILTER MATERIAL SHALL BE ASTM C33 0.0165 IN (#40 SIEVE) TO 0.0469 IN (#16 SIEVE) SILICA BASED WASHED SAND.

ROCK FOR GRAVEL LAYER SHALL BE 1/2" TO 1" DIAMETER WASHED RIVER GRAVEL.



EMERGENCY SPILLWAY



BASIN CROSS-SECTION "A-A"

NOT-TO-SCALE

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EXHIBIT

PAPE-DAWSON ENGINEERS

SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800

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design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.559.0990 telephone
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Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
PERMANENT WATER POLLUTION ABATEMENT PLAN - BASIN B

Sheet Number: C7.12

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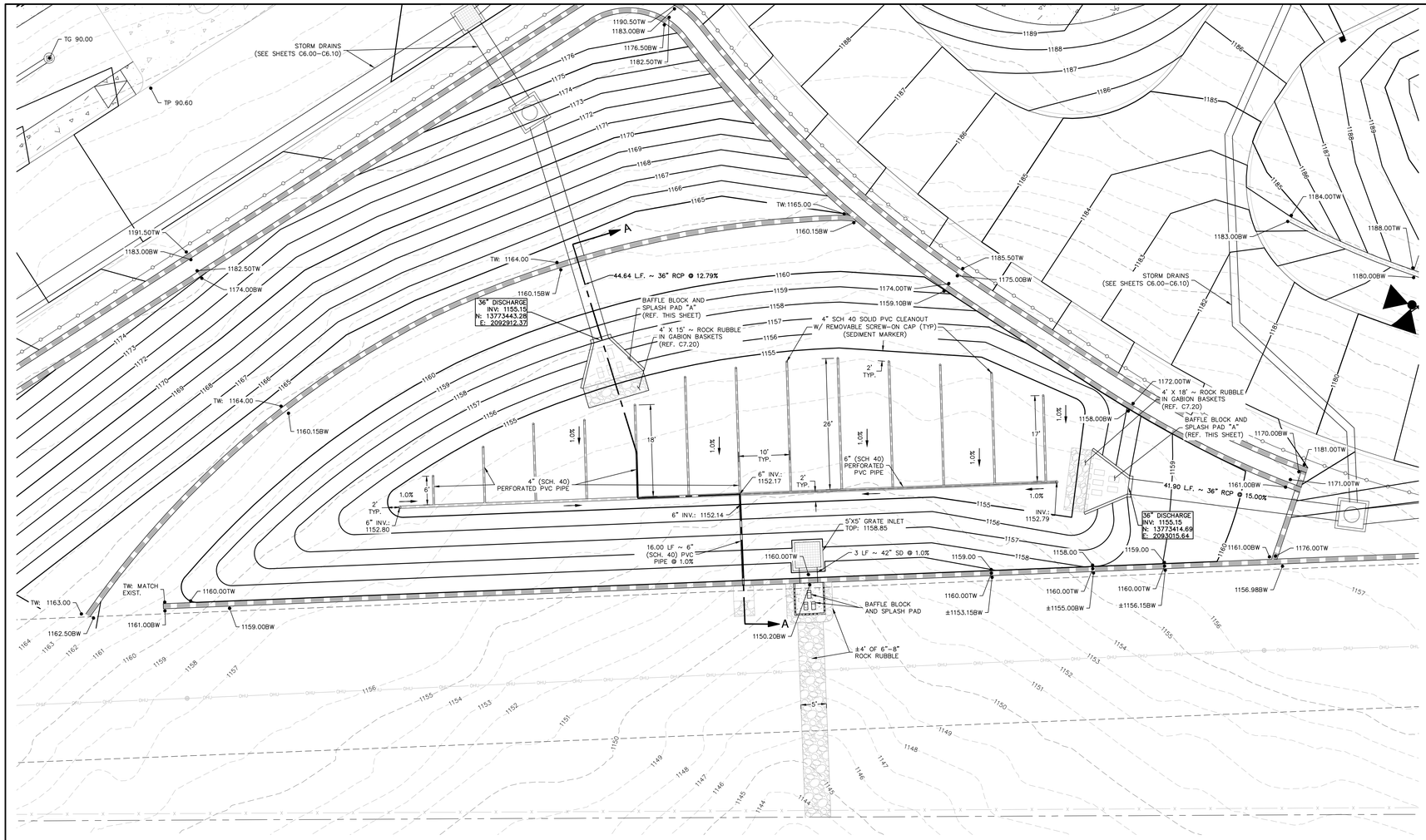
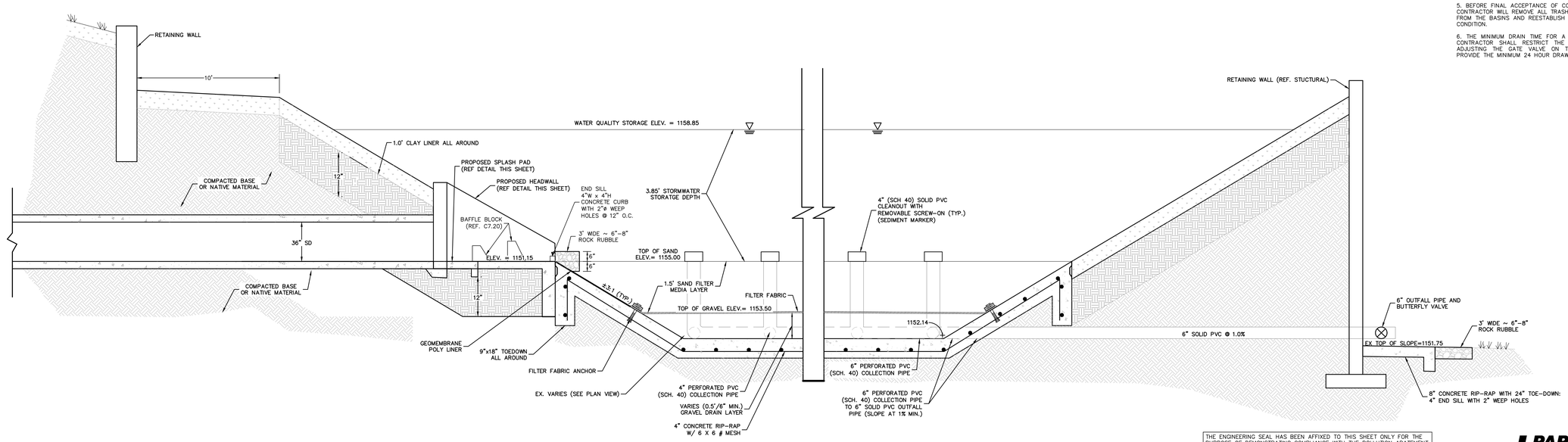


BASIN C - PLAN VIEW



BASIN CROSS-SECTION "A-A"

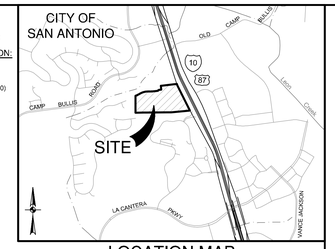
NOT–TO–SCALE

ADDRESS:
19111 IH 10 W
SAN ANTONIO, TX

LEGAL DESCRIPTION:
LOT: 12,
BLOCK: 4,
NCB: 18411
(PLAT NO. 23-11800020)

SCALE: 1"= 10'

0' 10' 20' 30'



LOCATION MAP

NOT–TO–SCALE

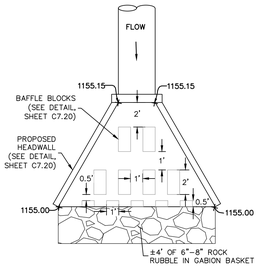
NOTE:
CONTRACTOR SHALL ENGAGE A TEXAS LICENSED STRUCTURAL ENGINEER TO PROVIDE A SIGNED AND SEALED SET OF STRUCTURAL PLANS, DETAILS AND SPECIFICATIONS FOR THE STRUCTURAL COMPONENTS OF THE POLLUTION ABATEMENT BASIN INCLUDING INLET DISCHARGE AND BYPASS COMPONENTS. CONTRACTOR SHALL ALSO PROVIDE FOR STRUCTURAL ENGINEER'S INSPECTION DURING BASIN CONSTRUCTION AND STRUCTURAL ENGINEER'S CONSTRUCTION CERTIFICATION UPON COMPLETION OF THE BASIN.

BASIN DESIGN DATA

BASIN WATERSHED	= 347,173 SF (7.97 AC.)
RUN OFF DEPTH	= 1.44 INCHES
REQUIRED CAPTURE VOLUME	= 18,899 CF
REQUIRED SAND AREA	= 1,890 SF
BASIN WATER STORAGE DEPTH	= 3.85 FT
BASIN CAPTURE VOLUME	= 20,302 CF
BASIN SAND AREA	= 3,253 SF
OVERFLOW WEIR	= 20 FT. X 1.15 FT
Q25	= 66.9 CFS

OVERFLOW WEIR CALCULATIONS

Q_{25} = $(C_w)(L)(h)^{3/2}$
Q_{25} = 66.9 CFS
C_w = 3.087
L = 20 FT
66.9 = $(3.087)(20)(h)^{3/2}$
h = 1.05 FT



HEADWALL APRON
BAFFLE BLOCK DETAIL "A"

(NOT TO SCALE)

SAND & GRAVEL SPECIFICATIONS

SAND FILTER MATERIAL SHALL BE ASTM C33 0.0165 IN (#40 SIEVE) TO 0.0469 IN (#16 SIEVE) SILICA BASED WASHED SAND.

ROCK FOR GRAVEL LAYER SHALL BE 1/2" TO 1" DIAMETER WASHED RIVER GRAVEL.

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(EACH PHASE OF BASIN CONSTRUCTION)

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b.) CONCRETE RIPRAP OR EPDM LINER IS IN PLACE AND UNDER–DRAIN SYSTEM IS IN PLACE WITHOUT GRAVEL.

c.) GRAVEL AROUND UNDER–DRAIN SYSTEM IS IN PLACE AND FILTER FABRIC IS INSTALLED AND ATTACHED TO WALLS OR RIPRAP.

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EXHIBIT

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
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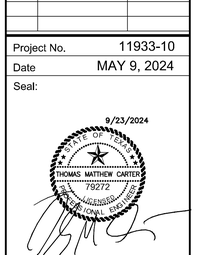
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.509.0960 facsimile
214.509.4060 telephone

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:



Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
PERMANENT WATER POLLUTION ABATEMENT PLAN - BASIN C

Sheet Number: C7.13

Date: Sep 23, 2024, 2:07pm User ID: bfriesch
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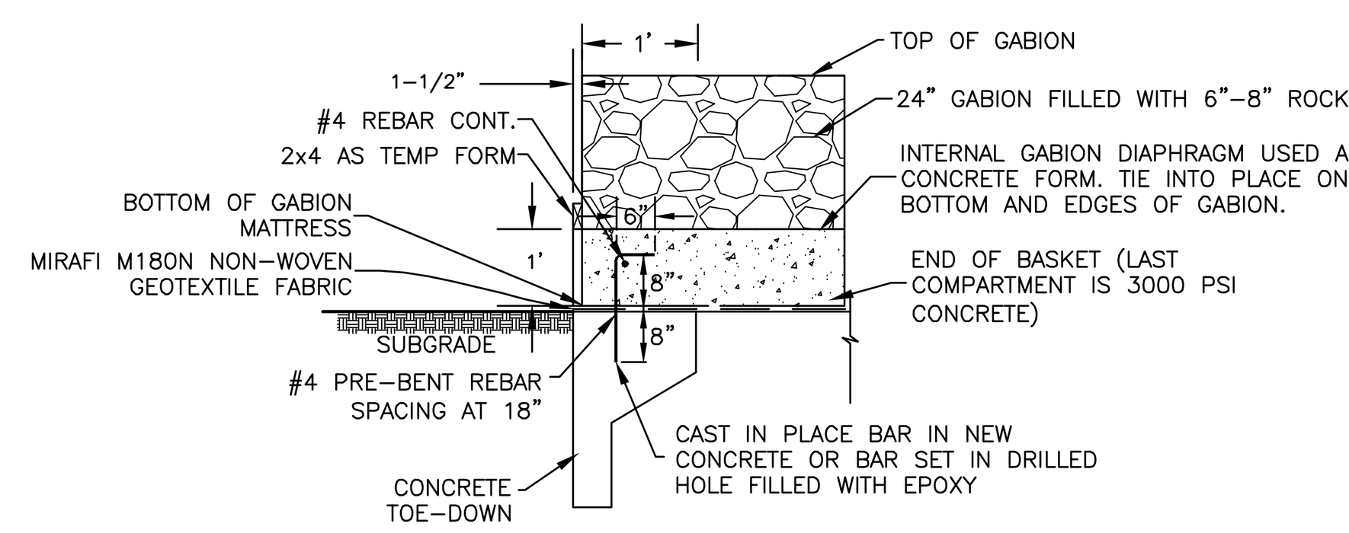
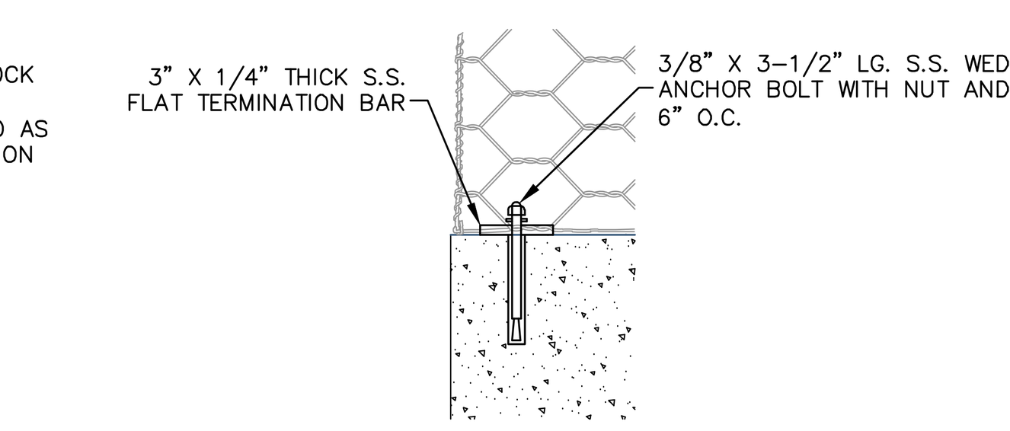


PREFERRED GABION TO CONCRETE ATTACHMENT DETAIL

NOT-TO-SCALE

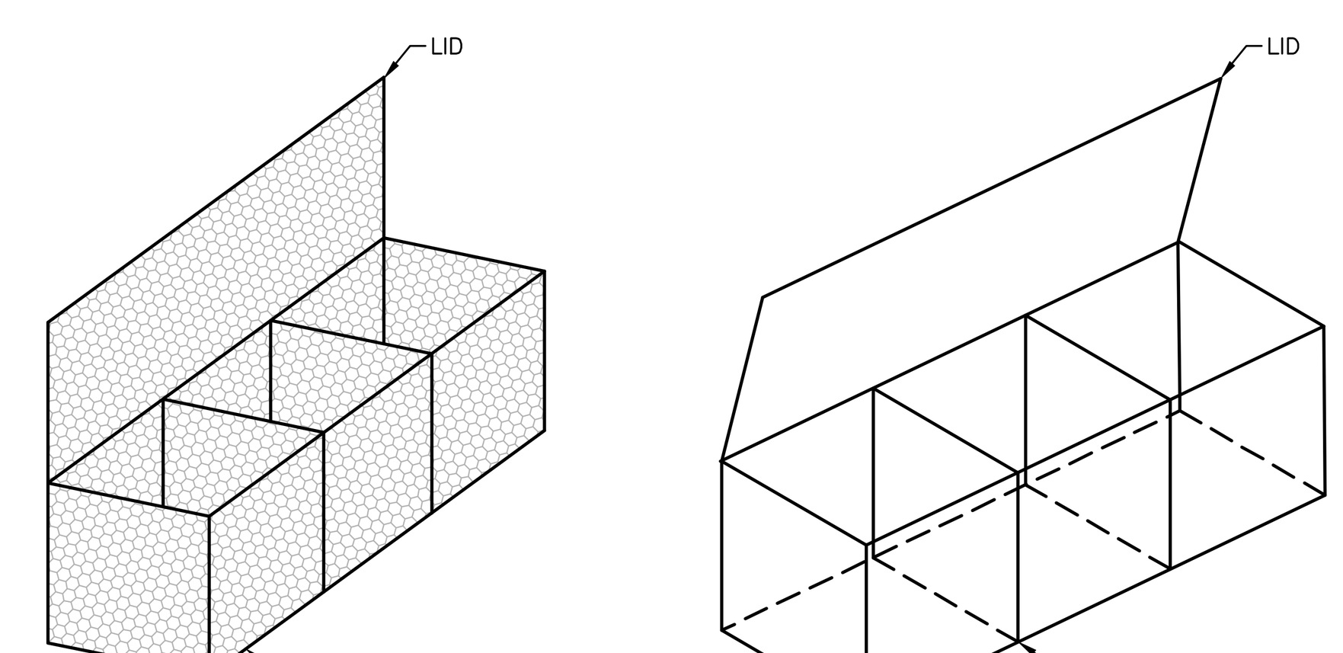


GABION TO CONCRETE CONNECTION DETAIL (OPTIONAL)

NOT-TO-SCALE

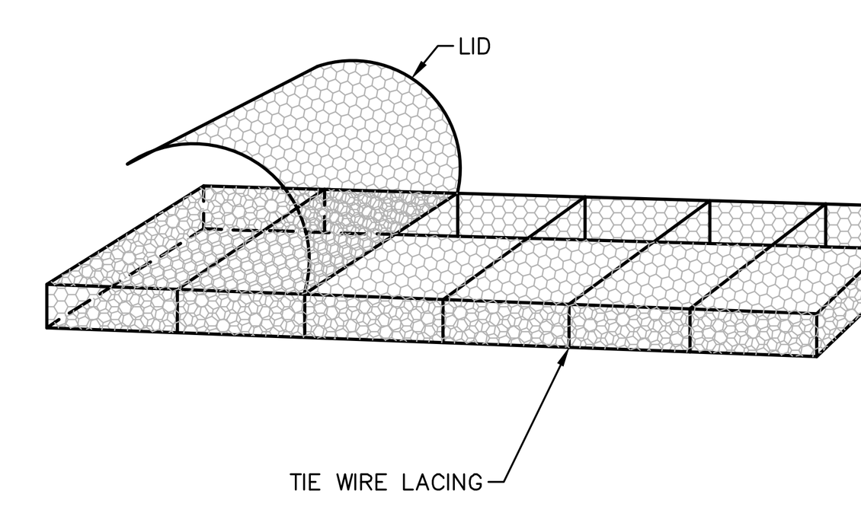
GABION BASKET NOTES

1) GABION BASKET SHALL BE FABRICATED FROM GALVANIZED 12 GAUGE WIRE.
2) GABION SHALL BE DOUBLE TWISTED WOVEN WIRE MESH, WELDED WIRE GABION WILL NOT BE ALLOWED
3) GABION MESH OPENINGS SHALL BE 3.25 INCHES X 4.5 INCHES
4) MATERIAL SOURCE: MACCAFERRI GABIONS FROM GEO-SOLUTIONS, INC. 210-651-3816
5) AFTER PLACING STONE IN GABIONS, PLACE MIN. 3" TOP SOIL INTO GABIONS TO FILL VOIDS IN GABION STONE. SOIL SHALL BE VEGETATED BY APPLICATION OF THE PROJECT SEE MIX AND FLEXTERRA, FLEXIBLE GROWTH MEDIUM AT 3000 LBS./ACRE.



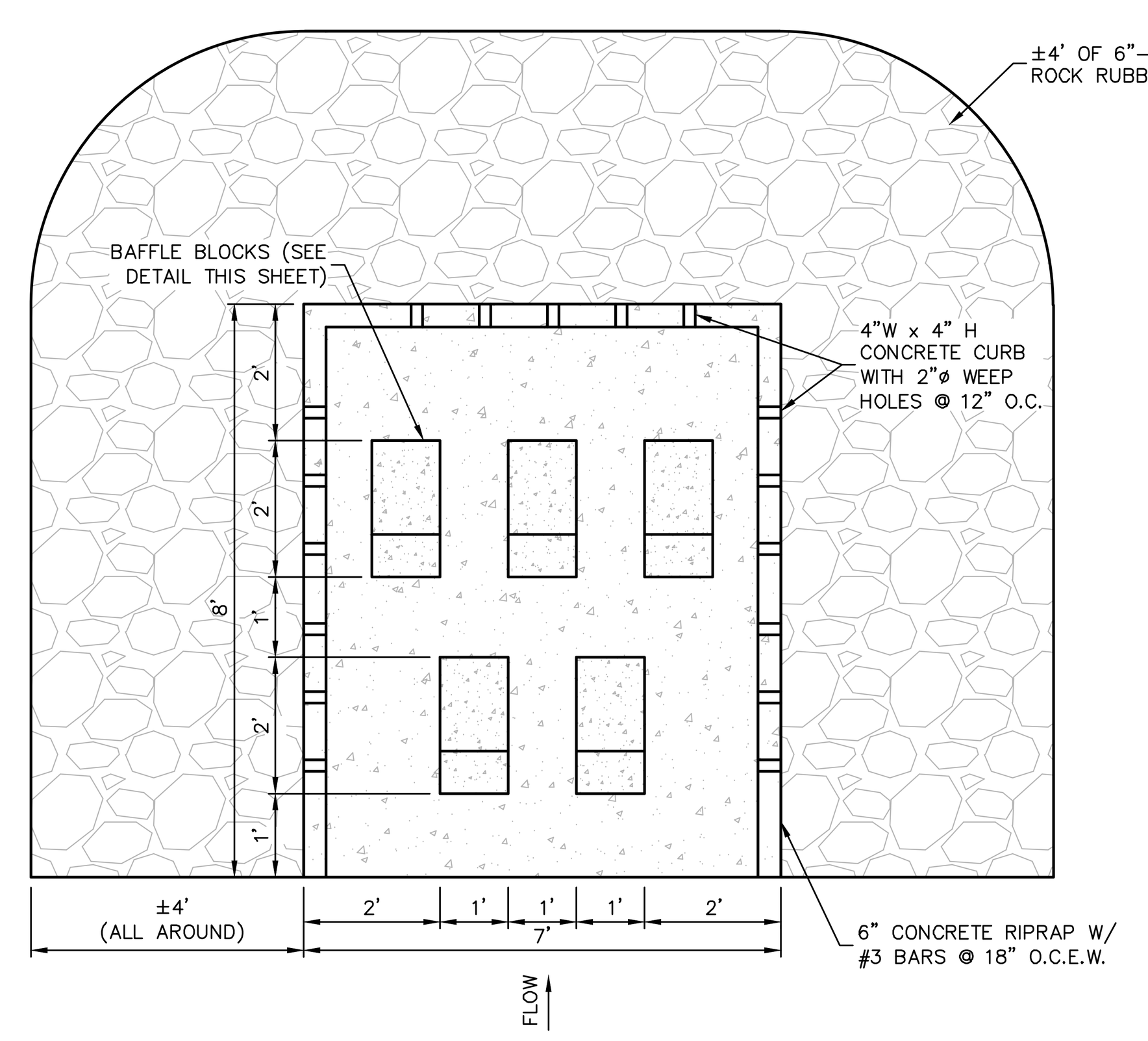
TYPICAL ASSEMBLED GABION BASKET DETAIL

NOT-TO-SCALE



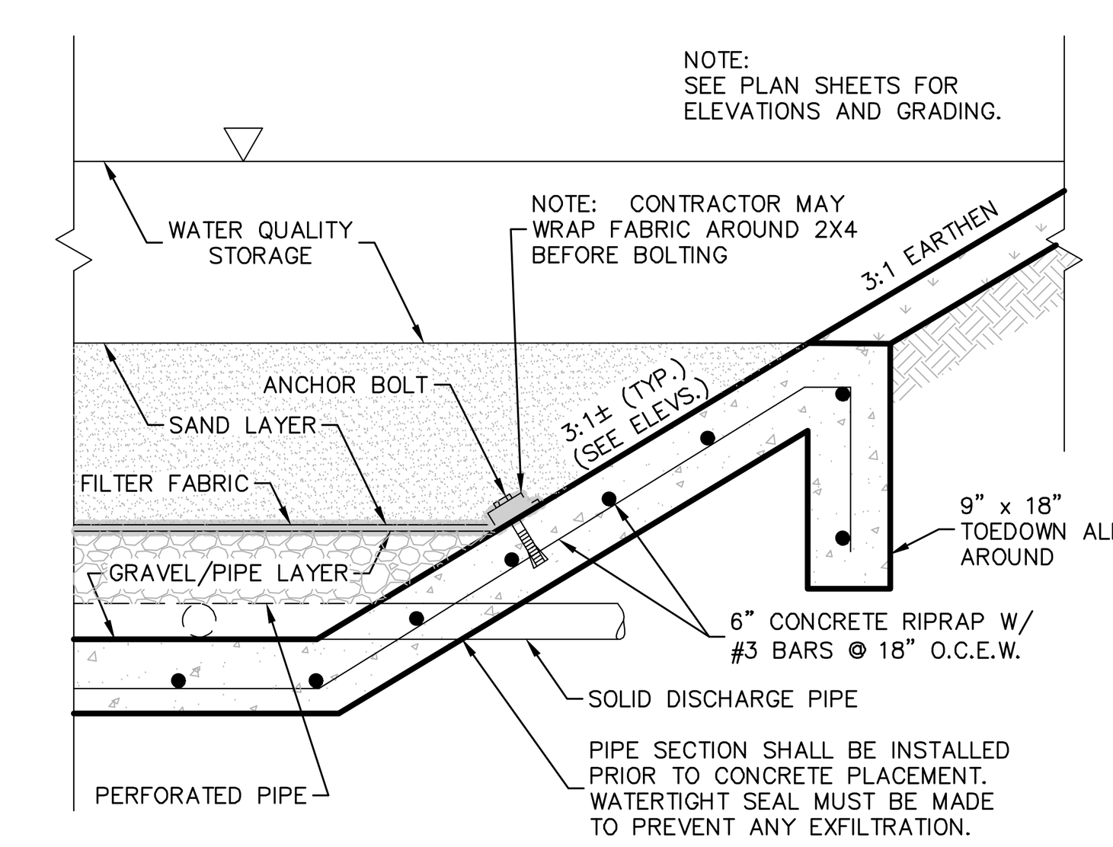
TYPICAL ASSEMBLED GABION MATTRESS DETAIL

NOT-TO-SCALE



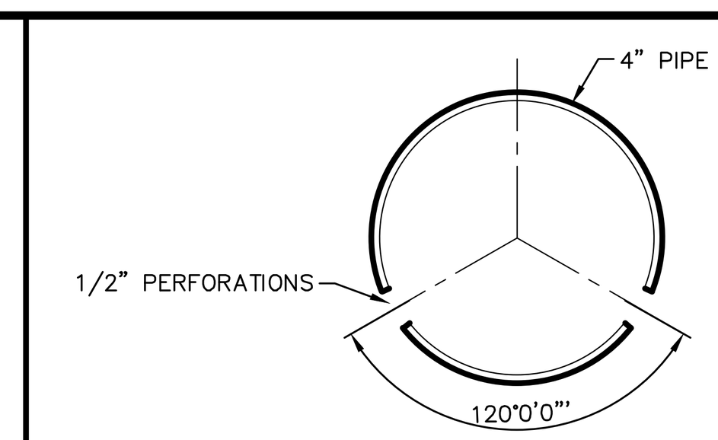
SPLASH PAD DETAIL

NOT-TO-SCALE



PIPE DISCHARGE AT LINER DETAIL

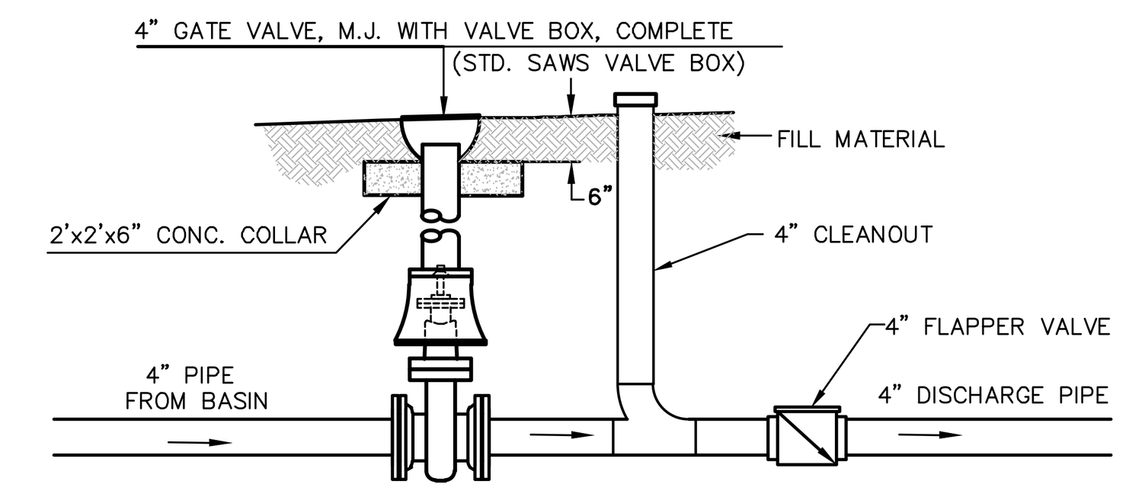
NOT-TO-SCALE



NOTES:
1. MINIMUM DIAMETER = 4 INCHES; SCHEDULE 40 PVC. (SEE PLAN VIEW)
2. THE MAXIMUM SPACING BETWEEN ROWS OF PERFORATIONS SHOULD NOT EXCEED 6".
3. SET PERFORATIONS DOWN.
4. PERFORATIONS SHOULD BE LESS THAN A 1/2".
5. PIPES SHOULD LIE FLAT ON CONCRETE BOTTOM WHICH HAS BEEN GRADED TO DRAIN AS SHOWN ON PLAN VIEW.
6. ALL CLEANOUTS SHALL BE SOLID PIPE AND SHALL BE AT THE END OF EACH LINE.

4" PERFORATED PIPE DETAIL

NOT-TO-SCALE



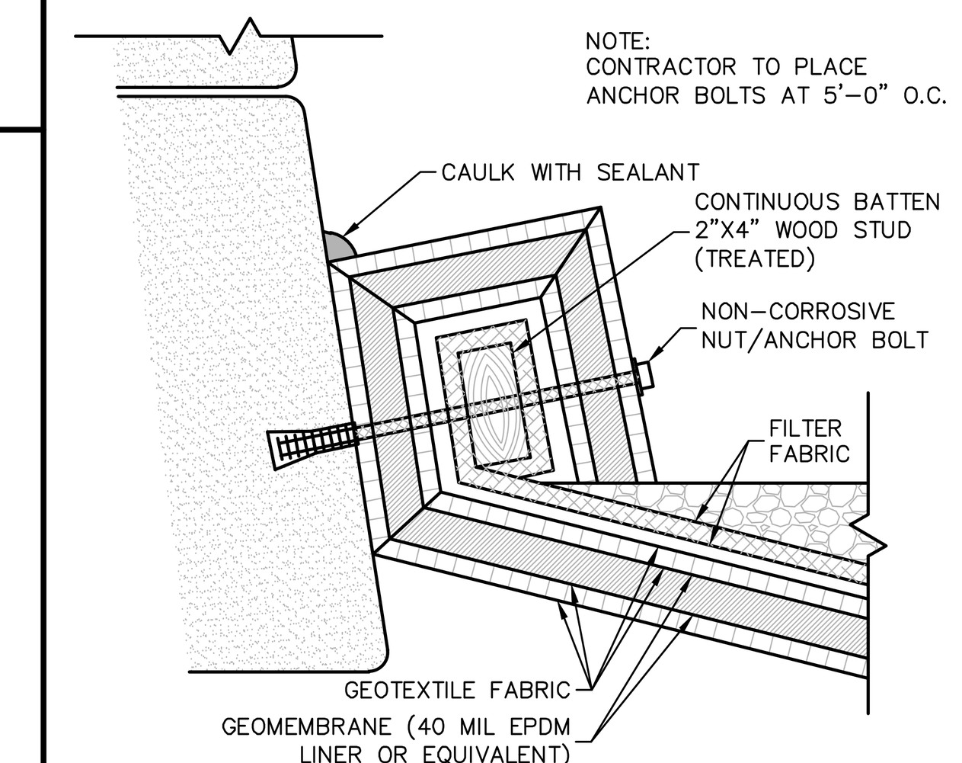
4" GATE & FLAPPER VALVE DETAIL

N.T.S.

NOTE:

1. VALVE WILL BE SET PARTIALLY CLOSED SO AS TO PROVIDE A MINIMUM DRAWDOWN TIME OF 24 HOURS.

2. CONTRACTOR SHALL PROVIDE OWNER WITH VALVE OPERATING KEY/ROD PRIOR TO PROJECT COMPLETION.

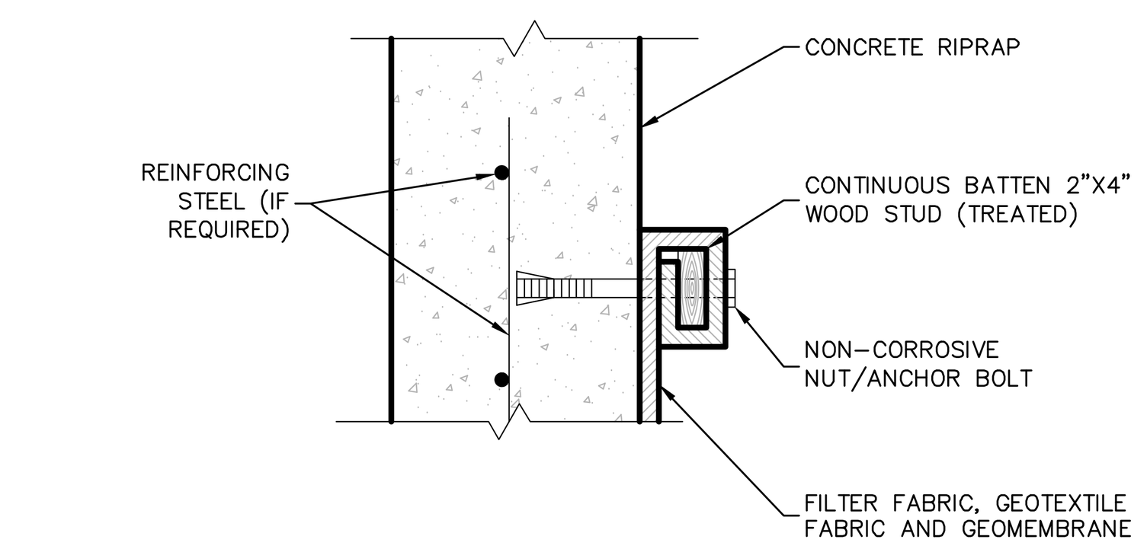


LINER & GEOTEXTILE FILTER FABRIC ANCHORING INTO STACK ROCK DETAIL

NOT-TO-SCALE

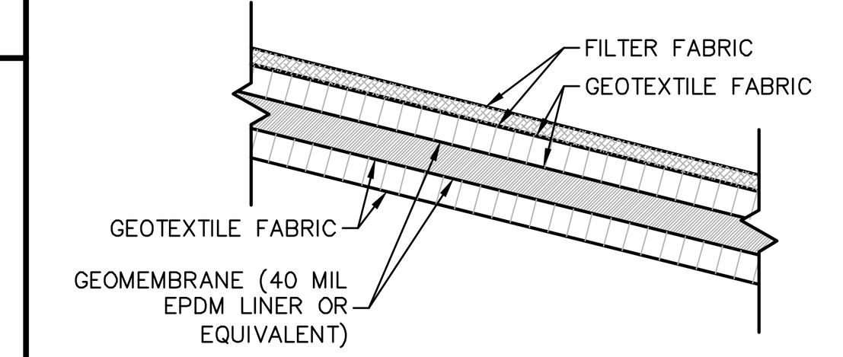
NOTES:
1. CONTRACTOR TO PLACE ANCHOR BOLTS AT 5'-0" O.C.

2. GEOMEMBRANE AND PROTECTIVE GEOTEXTILE FABRIC TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.



FILTER FABRIC ANCHORING DETAIL

NOT-TO-SCALE



NOTES:
1. LINER AND PROTECTIVE GEOTEXTILE FABRIC, IF REQUIRED, ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
2. GEOMEMBRANE LINER SHALL HAVE A MINIMUM THICKNESS OF THIRTY (30) MILS, FORTY (40) MILS RECOMMENDED.
3. SELECTION OF FINAL LINER WILL BE IDENTIFIED IN CERTIFICATION LETTER TO TCEQ AFTER COMPLETION OF BASIN CONSTRUCTION.

ALTERNATIVE LINER DETAIL

NOT-TO-SCALE

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 PROGRESSED TO THE FOLLOWING MILESTONES:

a.) REINFORCING STEEL FOR BASIN WALL OR RIPRAP LINER HAS BEEN SET, CONCRETE HAS NOT BEEN PLACED AND DRAIN PIPE IS IN PLACE. WHERE EPDM LINER IS USED, CONTRACTOR SHALL PROVIDE ENGINEER WITH SURVEY DATA WHICH DEMONSTRATES THE LINER HAS BEEN SET AT PROPER ELEVATION AND GRADE.

b.) CONCRETE RIPRAP OR EPDM LINER IS IN PLACE AND UNDER-DRAIN SYSTEM IS IN PLACE WITHOUT GRAVEL.

c.) GRAVEL AROUND UNDER-DRAIN SYSTEM IS IN PLACE AND FILTER FABRIC IS INSTALLED AND ATTACHED TO WALLS OR RIPRAP.

d.) SAND FILTER MEDIA HAS BEEN PLACED & BASIN HAS BEEN COMPLETELY FINISHED INCLUDING SOD OR SEED PLACEMENT ON SIDE SLOPES (WHERE APPLICABLE).

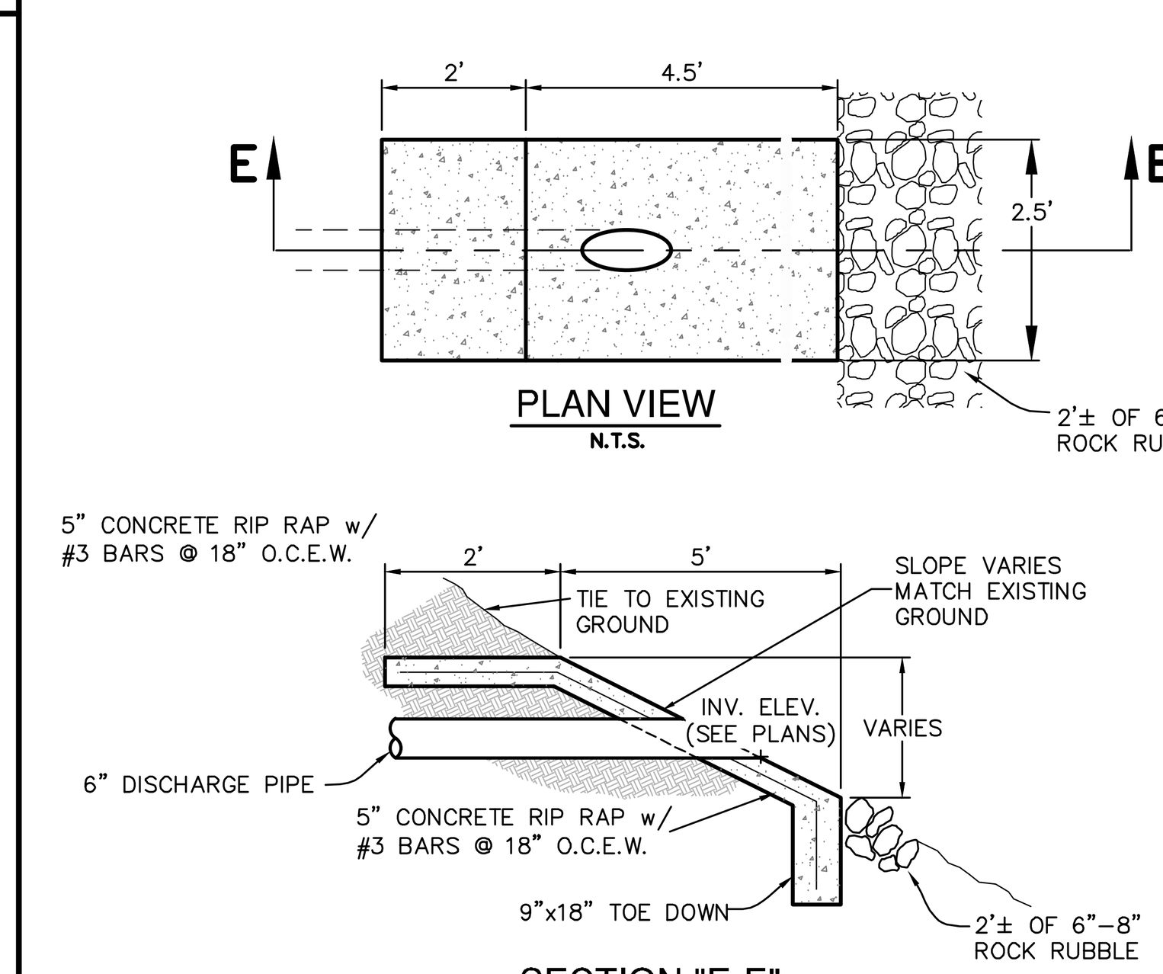
3. WORK SHALL NOT CONTINUE ON THE BASIN UNTIL THE ENGINEER HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION AT EACH STAGE. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.

4. UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:

- TOP OF BANK/WALL AT EACH CORNER OF BASIN
- TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
- SPLASH PAD/INLET PIPES
- OVERFLOW WEIRS

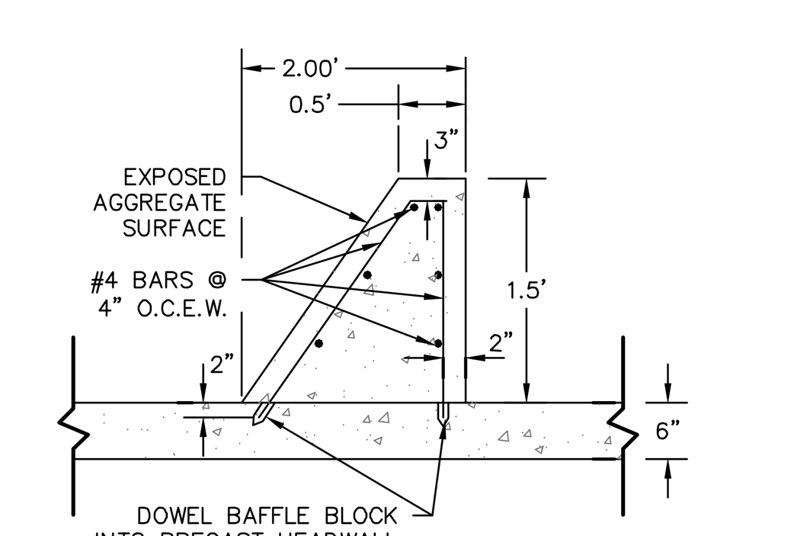
5. BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.

6. THE MINIMUM DRAIN TIME FOR A FULL BASIN IS 24 HOURS. THE CONTRACTOR SHALL RESTRICT THE FLOW THROUGH THE BASIN BY ADJUSTING THE GATE VALVE ON THE DISCHARGE PIPE SO AS TO PROVIDE THE MINIMUM 24 HOUR DRAW-DOWN TIME.



6" HEADWALL AT DISCHARGE DETAIL

NOT-TO-SCALE



TYPICAL BAFFLE BLOCK DETAIL SECTION

NOT-TO-SCALE

CLAY LINER SPECIFICATIONS

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

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.

EXHIBIT

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

(Dimensions: Hw, W, X, Y, Z; Variable Reinforcing: Bars J1, Bars J2; Estimated Quantities per ft of wing length (2~wings) ③)

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C - 0.250'
A = (Hw - 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

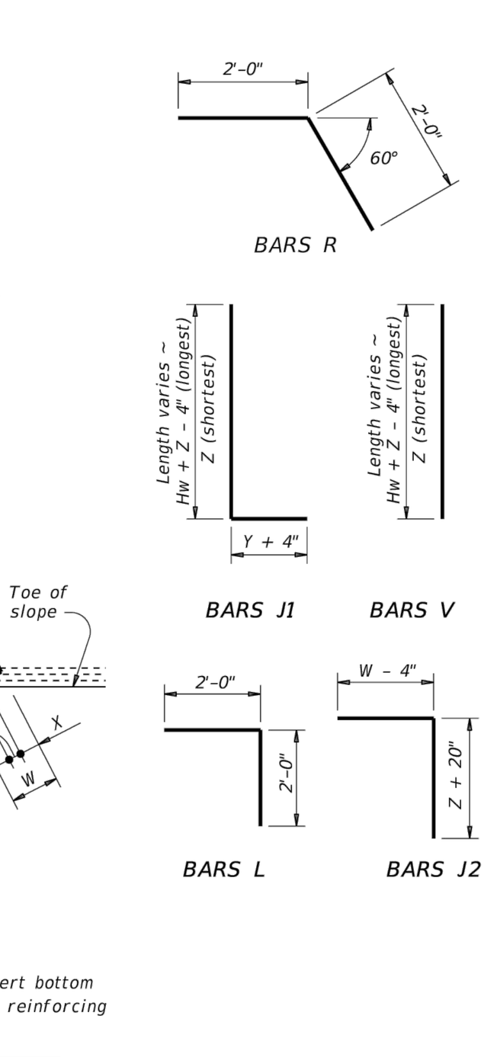
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

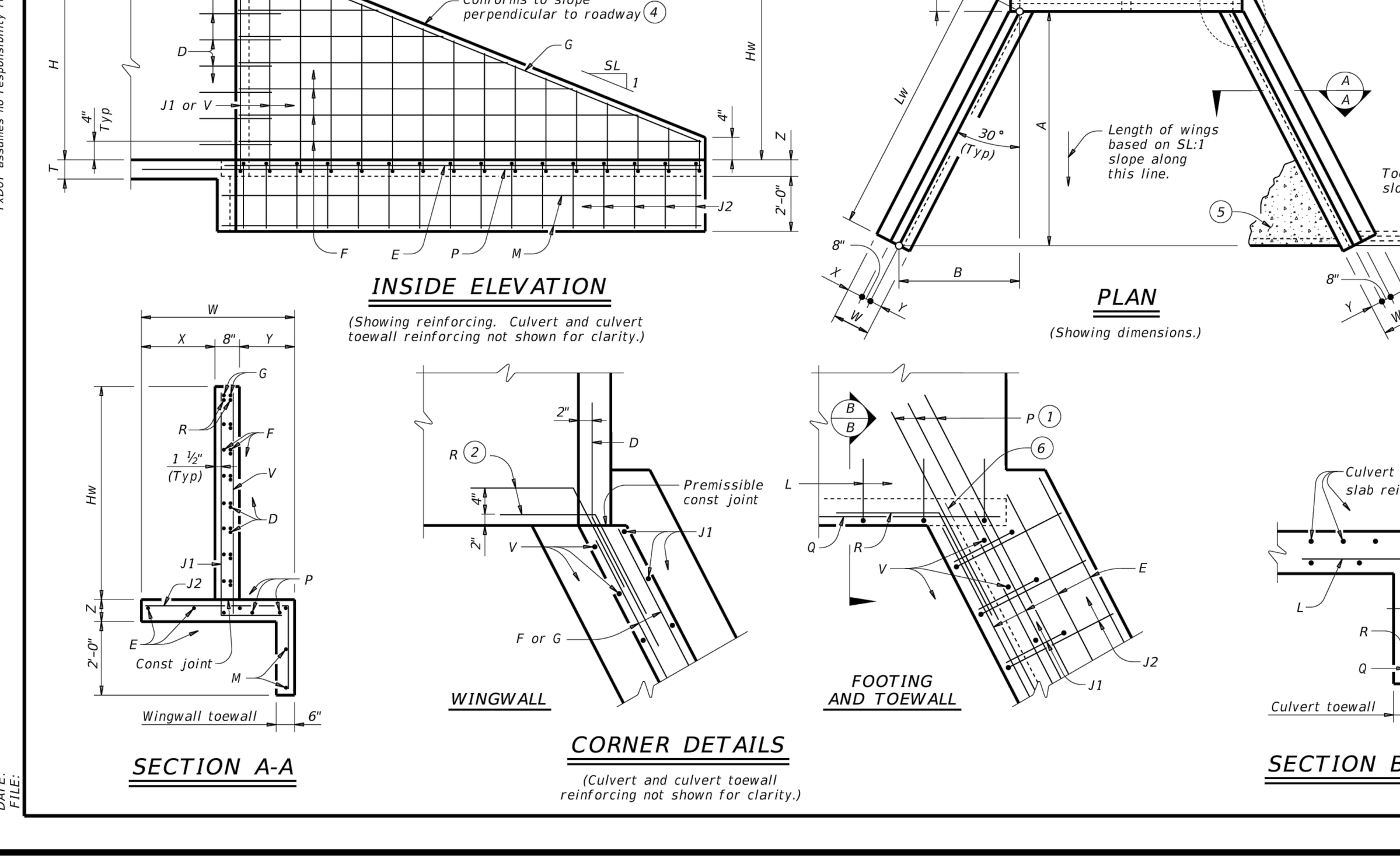
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.





① Extend Bars P 3'-0" minimum into bottom slab of box culvert.

② Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

③ Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

④ Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

⑤ When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap." Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

⑥ At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

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

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

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

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

FILE: CD-FW0-20.dgn | DN: GAF | CK: CAT | DW: TxDOT | CK: TxDOT
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REVISIONS | DIST | COUNTY | SHEET NO.

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design that lifts the human spirit
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Dallas, Texas 75206
214.559.4080 telephone
214.559.0990 facsimile

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
PERMANENT WATER POLLUTION ABATEMENT DETAILS

Sheet Number:
C7.20

Date: Sep 23, 2024, 2:07pm User ID: btriesch
File: P:\119\33\10\Design\Civil\PMDT-11933-10.dwg

FINAL PLAN AND PROFILE SHEETS

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.

NOTE

SEE SHEET C0.10 FOR ADDITIONAL GENERAL NOTES.

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 1-800-DIG-TESS 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.

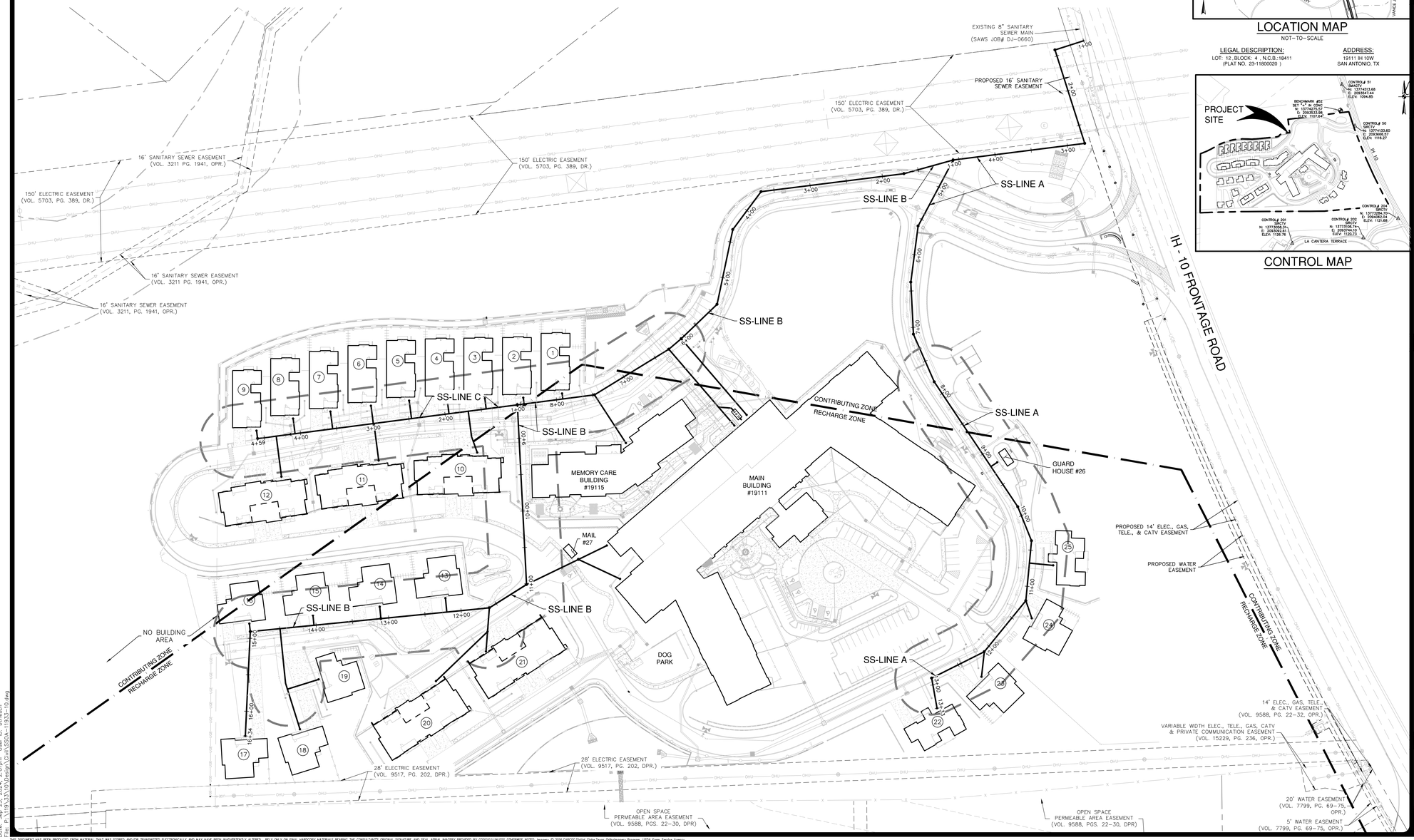
SCALE: 1"= 60'

0' 60' 120' 180'

LEGEND

- PROPERTY LINE
- EXISTING OVERHEAD LINE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 50' SANITARY SEWER ENVELOPE

FLOW — MANHOLE — SS — WYE WITH 1/8 BEND — SEWER SERVICE LATERAL — CLEAN OUT



LOCATION MAP

NOT-TO-SCALE

LEGAL DESCRIPTION:
LOT: 12, BLOCK: 4 , N.C.B.:18411
(PLAT NO. 23-11800020)

ADDRESS:
19111 IH 10W
SAN ANTONIO, TX

CONTROL MAP

NO.	REVISION	DATE

9/23/2024

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800

BELLA VIDA

SAN ANTONIO, TEXAS

OVERALL SANITARY SEWER PLAN

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.00

Date: Sep 23, 2024, 2:01pm User ID: btriesch
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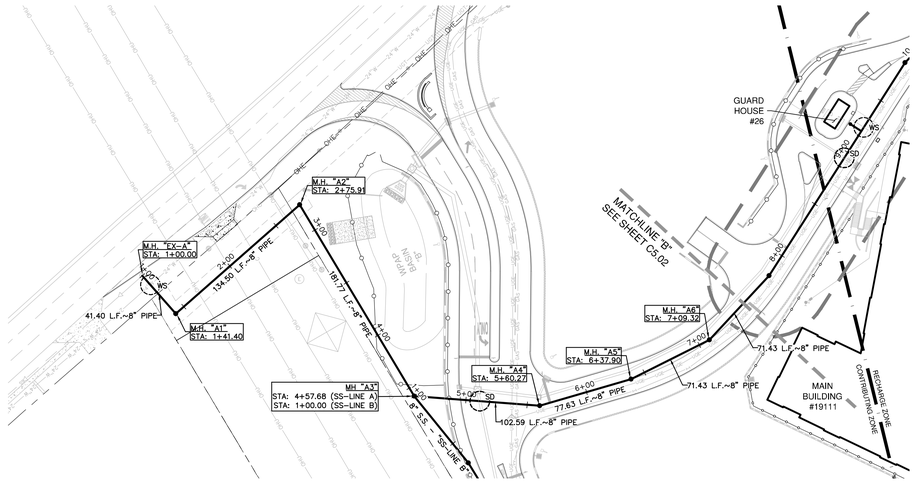
Phase:
ISSUE FOR GMP

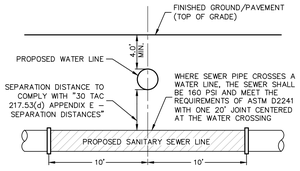
Sheet Description:
OVERALL SANITARY SEWER PLAN

Sheet Number: **C5.00**

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800



SANITARY SEWER LINE "A"
STA. 1+00.00 TO STA. 7+50.00



TYPICAL SANITARY
SEWER/WATER CROSSING DETAIL
NOT-TO-SCALE

SANITARY SEWER NOTES

1. SEWER PIPE WHERE WATER LINE CROSSES SHALL BE 160 P.S.I. AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT WATER MAIN.
2. SEE OVERALL SEWER SHEET FOR BENCHMARK INFORMATION.
3. NO VERTICAL STACKS ALLOWED FOR ANY LOTS UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
4. WHEN HORIZONTAL DISTANCE BETWEEN SEWER PIPES AND WATER MAIN IS LESS THAN 9 FT. OF SEPARATION, SEWER MAIN SHALL BE INSTALLED WITH 160 PSI (MIN) PRESSURE PIPE AND FITTINGS IN ACCORDANCE WITH SAWS CONSTRUCTION CRITERIA FOR CONSTRUCTION OF SEWER MAINS IN THE VICINITY OF WATER MAINS.
5. ALL SEWER PIPES SHALL BE PVC (SDR 26), UNLESS OTHERWISE NOTED.
6. CONTRACTOR IS TO VERIFY EXISTING INVERT OF EXISTING SANITARY SEWER MAINS AND ALERT ENGINEER IMMEDIATELY OF ANY DIFFERENCE FROM INVERT SHOWN ON PLANS.
7. CONTRACTOR SHALL PROTECT ALL EXISTING FENCES. ANY FENCE DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.
8. 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.
9. SEE THIS SHEET FOR TYPICAL SANITARY SEWER/WATER CROSSING DETAIL.
10. CONTOURS SHOWN ARE FOR GRAPHICAL USE ONLY.
11. MANHOLE OPENING INCREASED TO 30" AS PER TCEQ CHAPTER 217.55
12. ALL SEWER SERVICE LATERALS ARE SDR 26 & 6" DIA.
13. CONTRACTOR TO INSTALL PERMANENT MARKERS AT THE END OF ALL SEWER LATERALS, PER HOUSE LATERAL DETAIL DD-854-01.
14. ALL 6" SEWER LATERALS WILL BE SET AT 2% GRADE MINIMUM
15. BACKFILL MUST COMPLY WITH SAN ANTONIO WATER SYSTEMS SPECIFICATIONS 804.4.
16. CONTRACTOR SHALL VERIFY TOP OF MANHOLES AND MAKE FLUSH WITH TOP OF PAVEMENT OR 3" ABOVE NATURAL GROUND. IF THE GIVEN TOP OF MANHOLE ELEVATION DOES NOT AGREE ON ACTUAL GROUND SURFACE OR FINISH PAVEMENT, THE CONTRACTOR SHALL ADJUST ELEVATION SUCH THAT THE TOP OF MANHOLE SHALL BE 3" ABOVE EXISTING GROUND OR FLUSH TO FINISH ASPHALT PAVEMENT.

LOCATION MAP
NOT-TO-SCALE

LEGAL DESCRIPTION:
LOT: 12 ,BLOCK: 4 , N.C.B.:18411
(PLAT NO. 23-11800020)

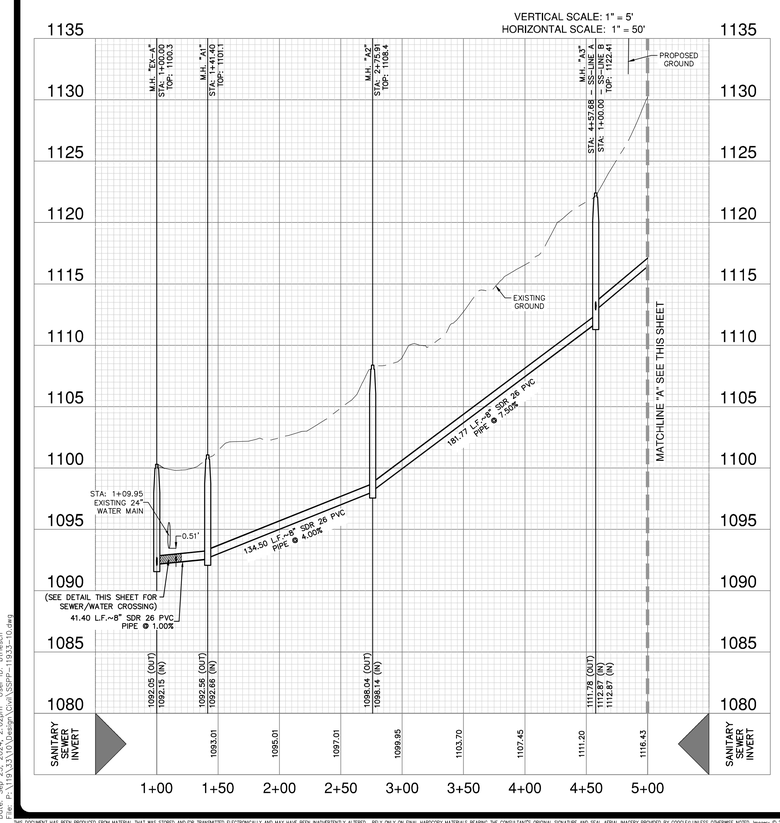
ADDRESS:
19111 IH 10W
SAN ANTONIO, TX

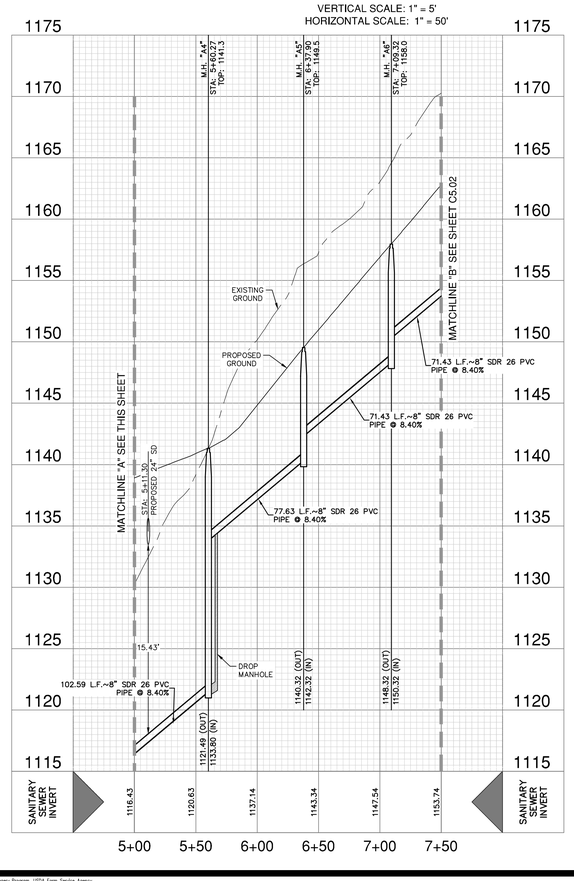
SCALE: 1"= 50'
0' 50' 100' 150'

LEGEND

- PROPERTY LINE
- 880 EXISTING CONTOURS MAJOR
- 880 EXISTING CONTOURS MINOR
- 880 PROPOSED CONTOURS
- EX-OHE EXISTING OVERHEAD ELECTRIC
- EX-W EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- W PROPOSED WATER MAIN
- UGE PROPOSED UNDERGROUND ELECTRIC
- PROPOSED FIRE HYDRANT
- PROPOSED IRRIGATION METER
- PROPOSED WATER METER
- EXISTING STORM DRAINAGE
- JUNCTION BOX, WITH GRATE — PROPOSED STORM DRAINAGE
- EX-SS EXISTING SANITARY SEWER
- FLOW, MANHOLE, SS, WYE WITH 1/8 BEND, SEWER SERVICE LATERAL, CLEAN OUT — PROPOSED SANITARY SEWER
- 50' SANITARY SEWER ENVELOPE
- SD CAUTION!! DRAIN CROSSING/SEWER
- W CAUTION!! WATER/SEWER

NOTE: SEE SHEET C0.10 FOR ADDITIONAL CONSTRUCTION NOTES.





ROW PERMIT NOTE:

A TXDOT PERMIT MUST BE OBTAINED BEFORE WORKING IN TXDOT RIGHTS-OF-WAY.

NOTE:

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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 1-800-DIG-TESS 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:

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PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #100288800

BELLA VIDA
SAN ANTONIO, TEXAS
SANITARY SEWER LINE A P&P - STA. 1+00.00 TO 7+50.00

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.01

NO.	REVISION	DATE

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

PLAN SHEET INCLUDED FOR
REFERENCE - NOT PART OF SCS

three design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.559.0980 telephone
214.559.0990 facsimile

Bella Vida
San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE A P&P - STA. 1+00.00 TO 7+50.00

Sheet Number: C5.01

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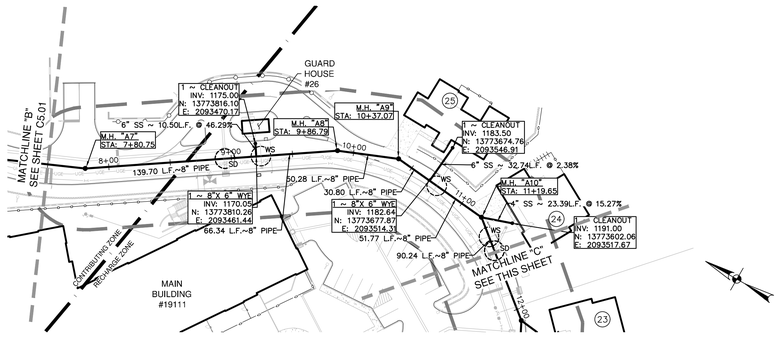
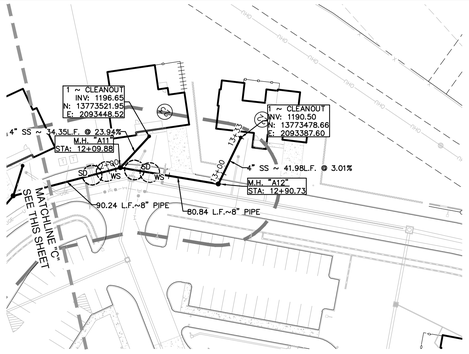
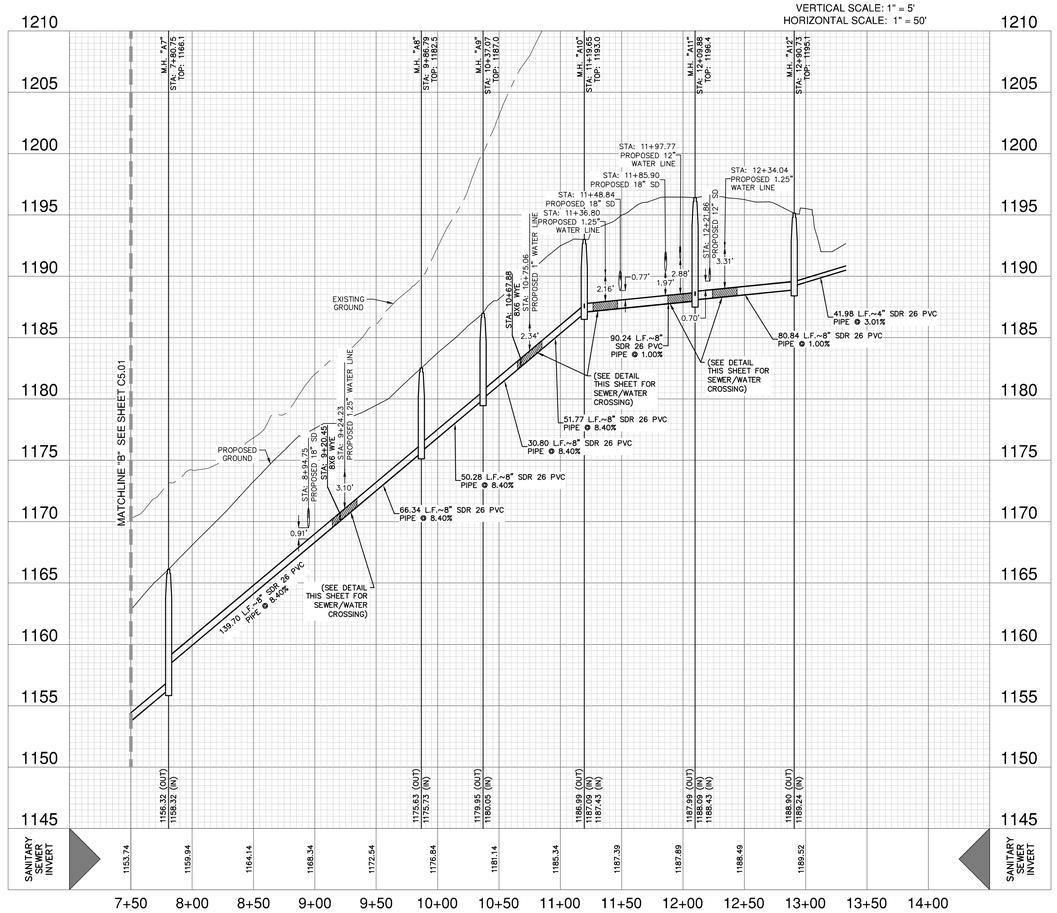
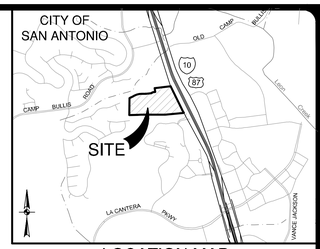


SANITARY SEWER LINE "A"
STA. 7+50.00 TO STA. 11+50.00



SANITARY SEWER LINE "A"
STA. 11+50.00 TO STA. 12+90.04 END





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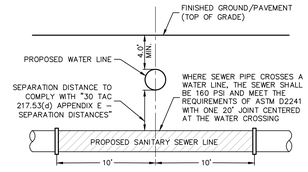

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DATE | NO. | REVISION

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

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BELLA VIDA
SAN ANTONIO, TEXAS
SANITARY SEWER LINE A P&P - STA. 7+50.00 TO 13+94.00 END

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.02

three design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.559.0480 telephone
214.559.0960 facsimile

Bella Vida
San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

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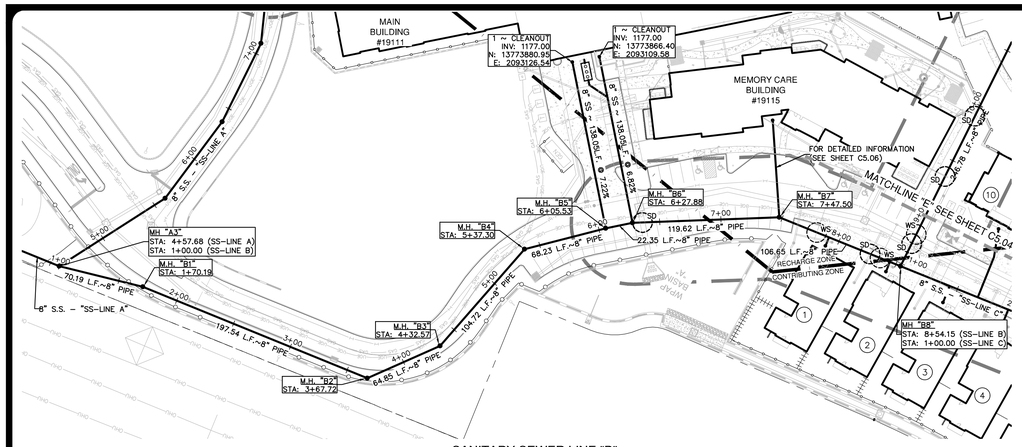
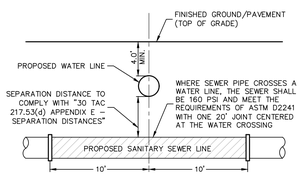
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE A P&P - STA. 7+50.00 TO 13+94.00 END

Sheet Number: C5.02



SANITARY SEWER LINE "B"
STA. 4+50.00 TO STA. 12+56.00 END



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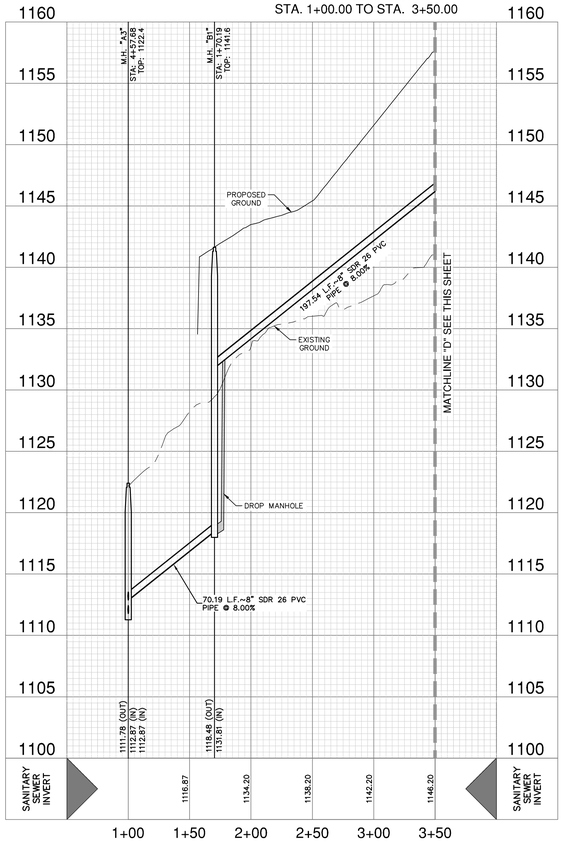

SANITARY SEWER LINE "B"
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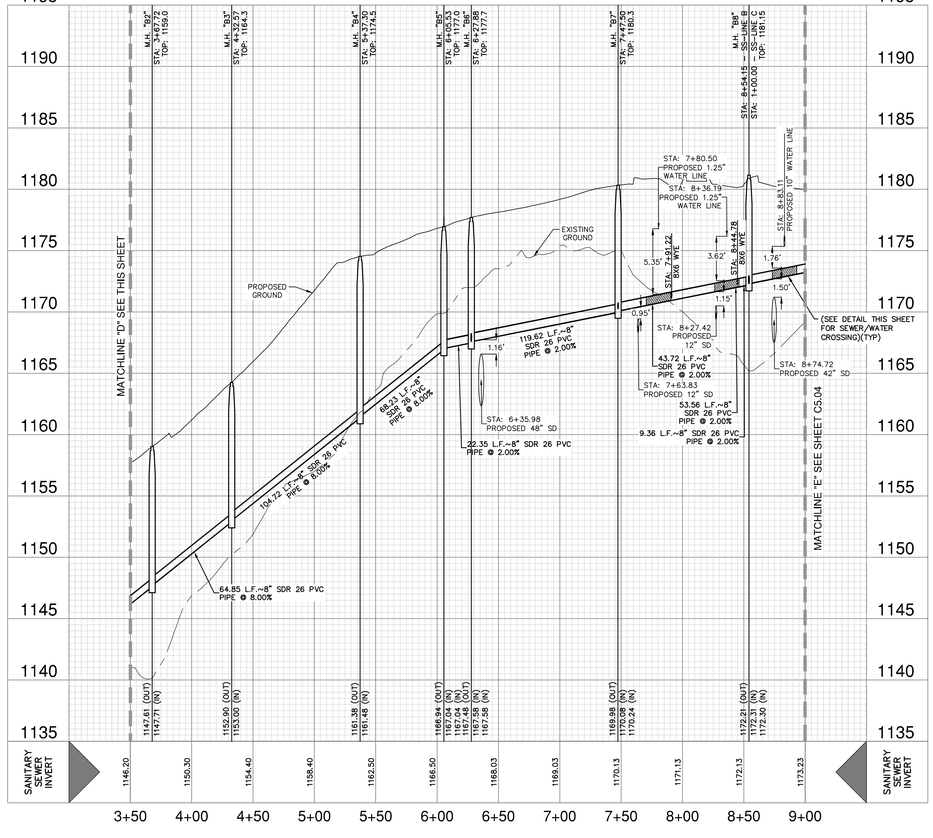

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three design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.509.4080 telephone
214.509.0990 facsimile

NO.	REVISION	DATE

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800

BELLA VIDA
SAN ANTONIO, TEXAS
SANITARY SEWER LINE B P&P - STA. 1+00.00 TO 4+50.00

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.03

Bella Vida
San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED PROFESSIONAL ENGINEER

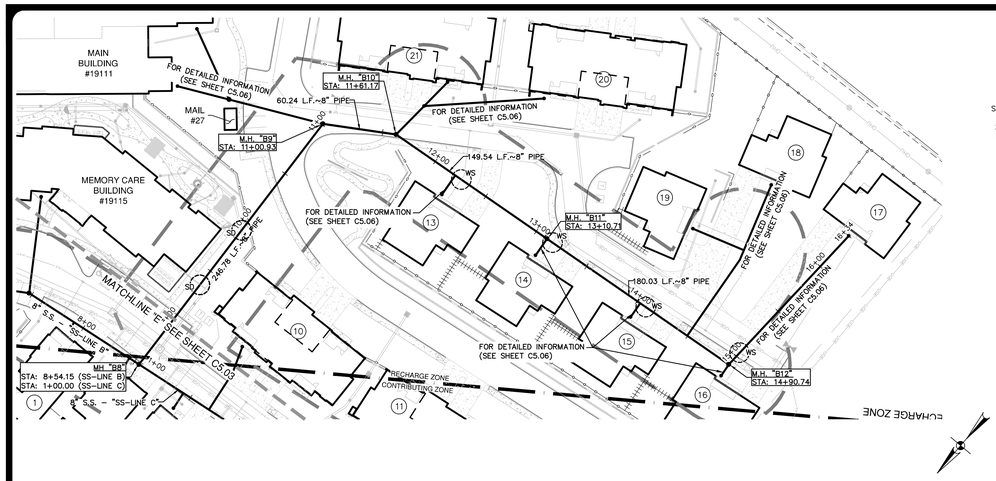
Client Information:
Forefront Living

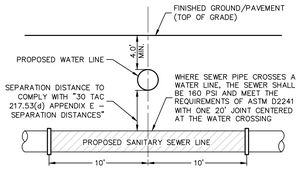
Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE B P&P - STA. 1+00.00 TO 4+50.00

Sheet Number: C5.03





TYPICAL SANITARY SEWER/WATER CROSSING DETAIL

NOT-TO-SCALE

SANITARY SEWER NOTES

1. SEWER PIPE WHERE WATER LINE CROSSES SHALL BE 160 P.S.I. AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT WATER MAIN.
2. SEE OVERALL SEWER SHEET FOR BENCHMARK INFORMATION.
3. NO VERTICAL STACKS ALLOWED FOR ANY LOTS UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
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5. ALL SEWER PIPES SHALL BE PVC (SDR 26), UNLESS OTHERWISE NOTED.
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LOCATION MAP

NOT-TO-SCALE

LEGAL DESCRIPTION:
LOT: 12 ,BLOCK: 4 , N.C.B.:18411
(PLAT NO. 23-11800020)

ADDRESS:
19111 IH 10W
SAN ANTONIO, TX

SCALE: 1"= 50'

0' 50' 100' 151'

LEGEND

- PROPERTY LINE
- 880 EXISTING CONTOURS MAJOR
- 880 EXISTING CONTOURS MINOR
- 880 PROPOSED CONTOURS
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- EX-W EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- W PROPOSED WATER MAIN
- UGE PROPOSED UNDERGROUND ELECTRIC
- PROPOSED FIRE HYDRANT
- PROPOSED IRRIGATION METER
- PROPOSED WATER METER
- EXISTING STORM DRAINAGE
- JUNCTION BOX, WITH GRATE — PROPOSED STORM DRAINAGE
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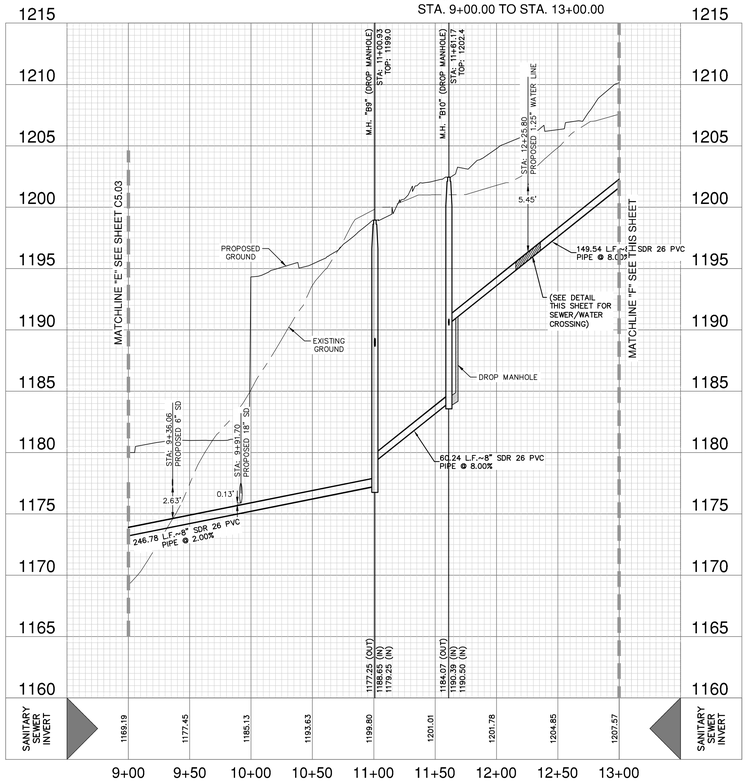
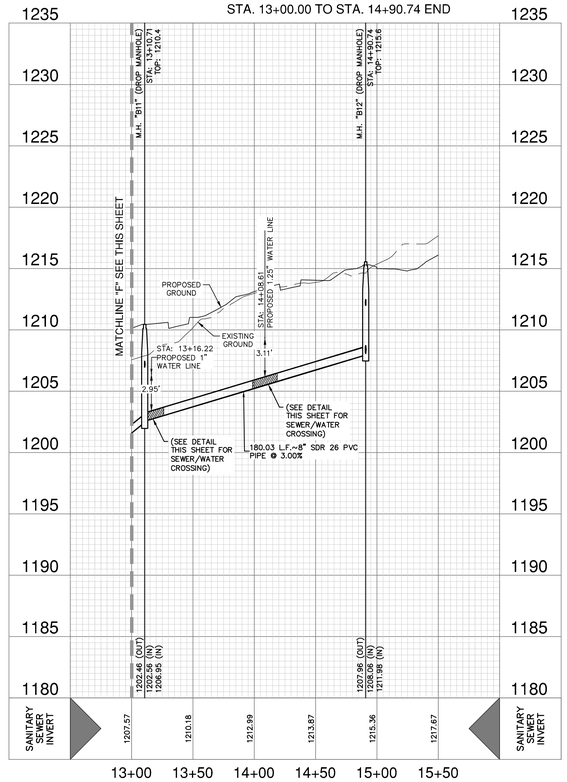
- 50' SANITARY SEWER ENVELOPE
- SD CAUTION!! DRAIN CROSSING/SEWER
- W CAUTION!! WATER/SEWER

SANITARY SEWER LINE "B"
STA. 9+00.00 TO STA. 13+00.00



SANITARY SEWER LINE "B"
STA. 13+00.00 TO STA. 14+90.74 END



NOTE:

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PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028800

NO.	REVISION	DATE

9/23/2024

STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
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BELLA VIDA
SAN ANTONIO, TEXAS

SANITARY SEWER LINE B P&P - STA. 4+50.00 TO 12+56.00 END

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.04

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE B P&P - STA. 4+50.00 TO 12+56.00 END

Sheet Number: **C5.04**

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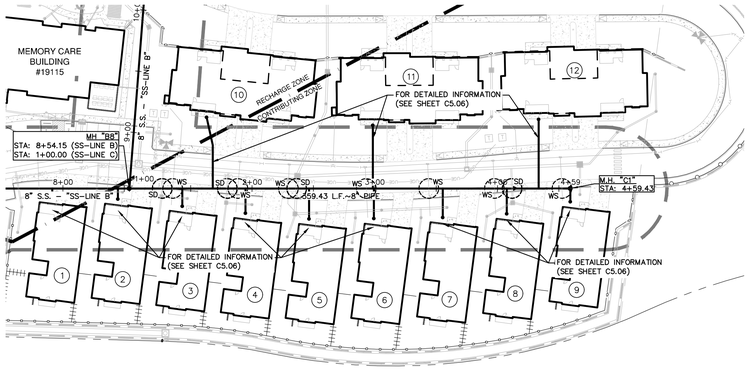
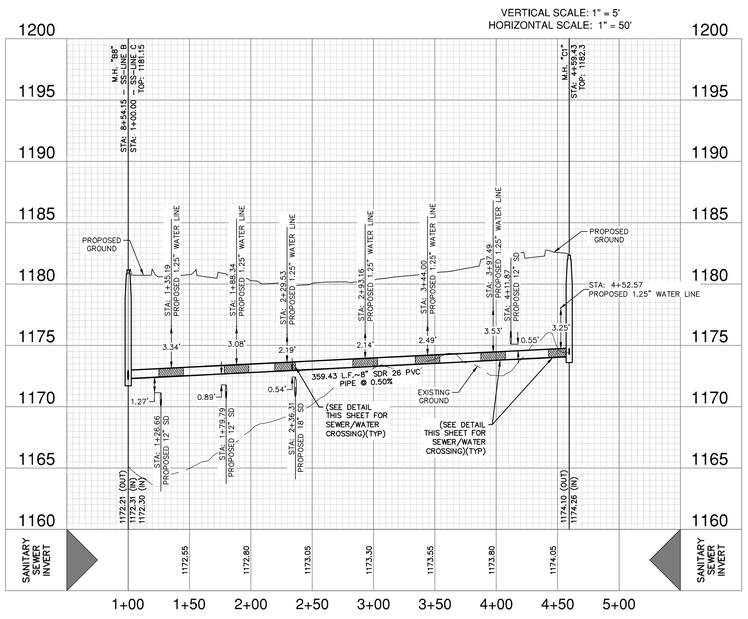


SANITARY SEWER LINE "C"
STA. 1+00.00 TO STA. 4+59.00 END



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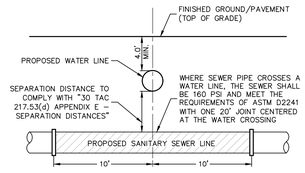

TYPICAL SANITARY
SEWER/WATER CROSSING DETAIL
NOT-TO-SCALE

LOCATION MAP
NOT-TO-SCALE

LEGAL DESCRIPTION:
LOT: 12 ,BLOCK: 4 , N.C.B.:18411
(PLAT NO. 23-11800020)

ADDRESS:
19111 IH 10W
SAN ANTONIO, TX

SCALE: 1"= 50'
0' 50' 100' 150'

LEGEND

- PROPERTY LINE
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- 880 EXISTING CONTOURS MINOR
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- FLOW / MANHOLE / SS / WYE WITH 1/8 BEND / SEWER SERVICE LATERAL / CLEAN OUT — PROPOSED SANITARY SEWER
- 50' SANITARY SEWER ENVELOPE
- SD CAUTION!! DRAIN CROSSING/SEWER
- W CAUTION!! WATER/SEWER

NOTE:

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NO.	REVISION	DATE

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #100288800

BELLA VIDA
SAN ANTONIO, TEXAS
SANITARY SEWER LINE C P&P - STA. 1+00.00 TO 7+55.88 END

PLAT NO. 23-11800020
JOB NO. 11933-10
DATE MAY 9, 2024
DESIGNER BT
CHECKED LM DRAWN BT/RG
SHEET C5.05

Date: Sep 23, 2024, 2:03pm User ID: bfriesch
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PLAN SHEET INCLUDED FOR
REFERENCE - NOT PART OF SCS

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #100288800

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three design that lifts the human spirit
4925 Greenville Ave suite 600
Dallas, Texas 75206
214.559.0980 telephone
214.559.0990 facsimile

Bella Vida
San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10
Date MAY 9, 2024
Seal:

9/23/2024
STATE OF TEXAS
THOMAS MATTHEW CARTER
79272
LICENSED
PROFESSIONAL ENGINEER

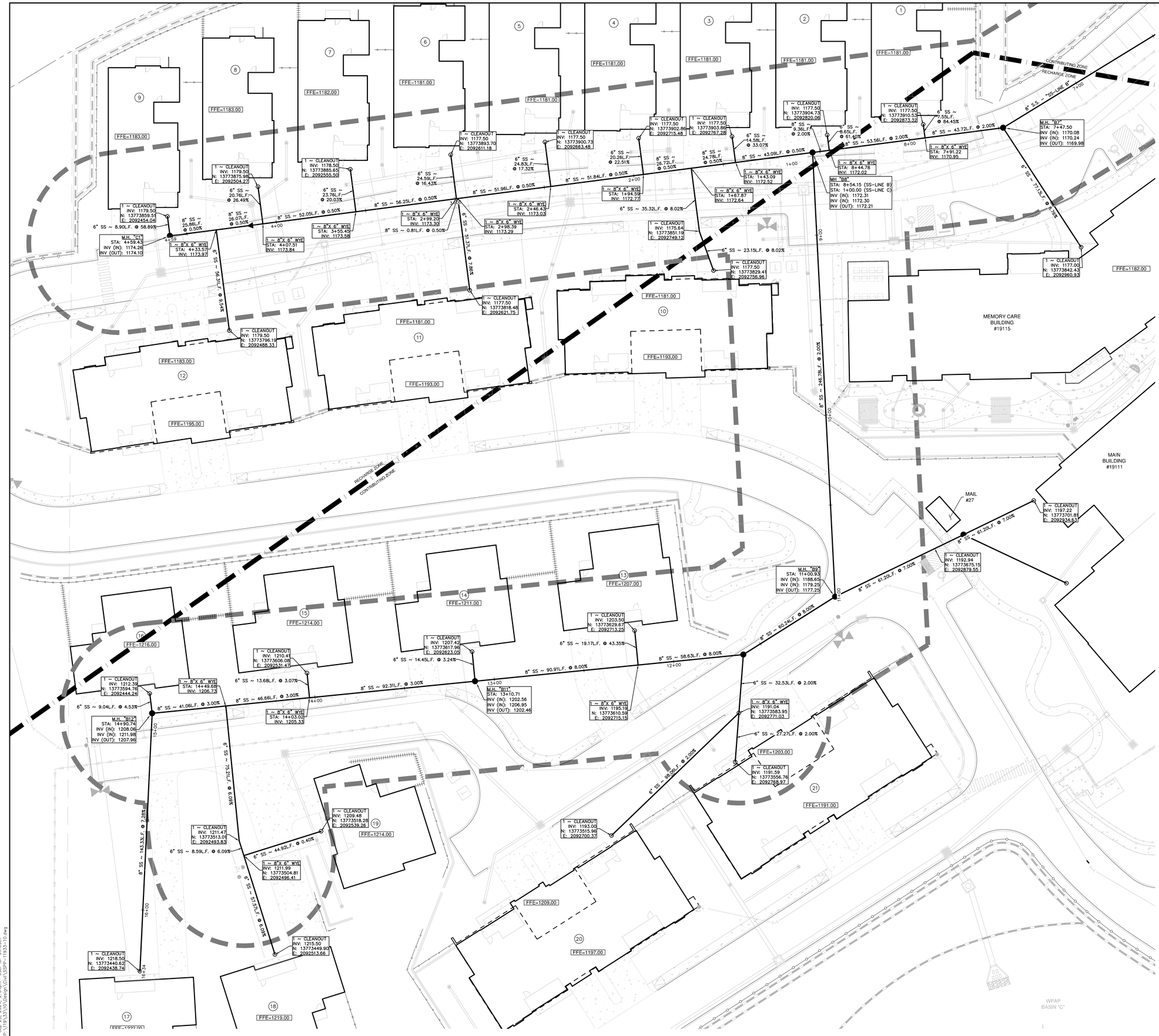
Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE C P&P - STA. 1+00.00 TO 7+55.88 END

Sheet Number: C5.05



LOCATION MAP
NOT-TO-SCALE

SCALE: 1"= 20'
0' 20' 40' 60'

LEGEND

- PROPERTY LINE
- 880 EXISTING CONTOURS MAJOR
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NOTE:

SEE SHEET C0.10 FOR ADDITIONAL GENERAL NOTES.

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 SHALL BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT 1–800–DIG–TESS 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.

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214.559.0990 facsimile
214.559.4580 telephone

Bella Vida

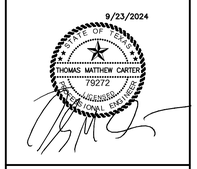
San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10

Date MAY 9, 2024

Seal:



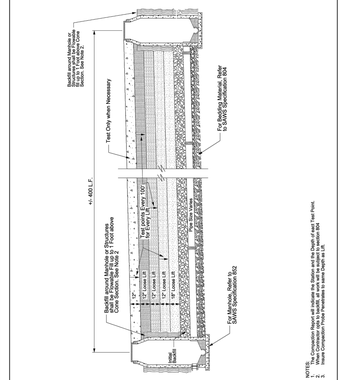
Client Information:
Forefront Living

Key Plan:

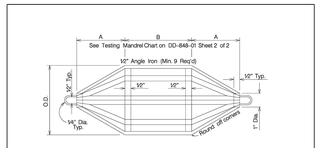
Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER LINE PLAN DETAIL

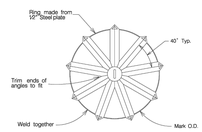
Sheet Number: C5.06



PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TRENCH COMPACTION DETAIL	APPROVED MARCH 2018	REVISED DEC 2018
		DD 804-02	SHEET 1 of 1



SIDE OR TOP VIEW



END VIEW

Note:
All manchels must be approved by SAWS Construction Inspections and stamped before use.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	GO, NO GO DEFLECTION TESTING MANDREL	APPROVED March 2008	REVISED
		DD-848-01	SHEET 1 of 2

SIZE	A	B*	MANDREL O.D. PVC (SDR-26)	RING O.D. PVC (SDR-26)
8"	4.0"	4.5"	5.35	6
8"	5.0"	6"	7.37	6.66
10"	7.0"	7.5"	9.21	8.50
12"	8.0"	9"	10.96	10.25
15"	10.0"	11"	13.42	12.71
18"	12.0"	13.5"	———	———
21"	14.0"	16"	———	———
24"	16.0"	18"	———	———
27"	18.0"	20"	———	———

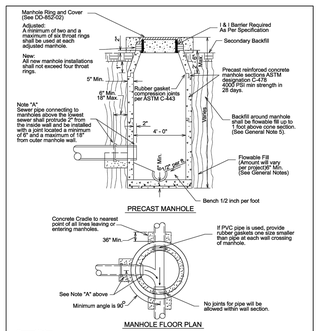
* Minimum Length

CHART

Notes:
PVC pipes and fittings 6" to 15" in diameter shall conform to ASTM D-3034-08.
PVC pipes and fittings 18" to 27" in diameter shall conform to ASTM F-679-08.

This information is provided as a reference. All deflection testing shall be done in accordance with TCEQ Chapter 217.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	GO, NO GO DEFLECTION TESTING MANDREL CHART	APPROVED MARCH 2008	REVISED APRIL 2014
		DD-848-01	SHEET 2 of 2

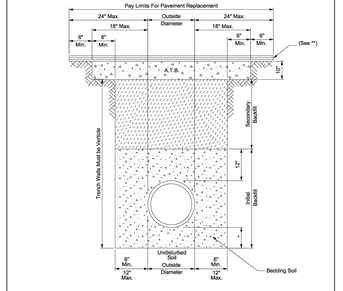


PRECAST MANHOLE

MANHOLE FLOOR PLAN

General Notes:
1) Material for sanitary sewer pipe must be the same from manhole to manhole. Changes in type of pipe may be made only at manholes, or special structures, except as approved by the SAWS inspector.
2) Adaptors and Concrete Collars shall be used as directed and approved by the SAWS inspector.
3) Watertight manhole rings and covers shall be Trans-Tex A77 "O" Ring or approved equal.
4) The minimum angle of flow for a connecting sewer to the direction of flow defined by a collection system is 90 degrees, unless approved by the engineer.
5)Contractor can opt to backfill with approved secondary material, subject to provisions of item 304.5.2.C.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	STANDARD PRECAST MANHOLE	APPROVED MARCH 2008	REVISED APRIL 2014
		DD-852-01	SHEET 1 of 1

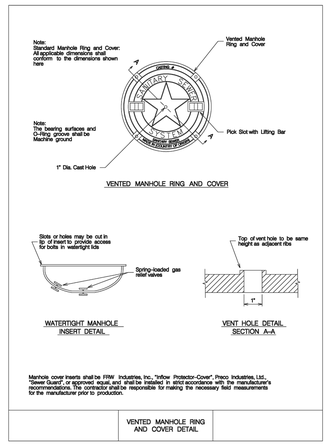


The Existing Materialat the Bearing Level shall be Removed and Replaced to a Minimum Depth of 6-inches or ¼ of the Outside Diameter of the Pipe, whichever is Greater, with Bedding Material.

In Areas of over Excavation, Encasement shall extend from Trench Wall. Any Excavation that Exceed 12" Max. as shown on Detail: Additional Encasement shall be Incidental.

* Sewer Gravel 6" Min.or ¼ O.D. of the Pipe, whichever is Greater.
** Minimum 2" HMAC Type "D" for Trench Repair in Local / Residential Streets.
** Minimum 3" HMAC Type "C" for Trench Repair in Collector / Arterial Streets.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	SANITARY SEWER PIPE LAID IN TRENCH	APPROVED MARCH 2008	REVISED DEC 2018
		DD-804-01	SHEET 1 of 1



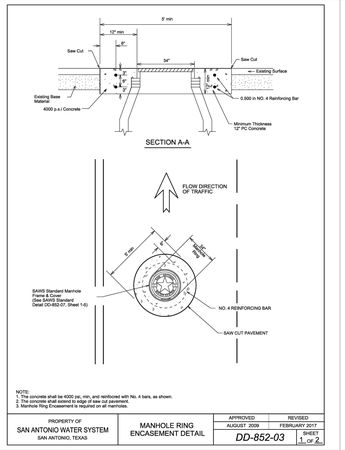
VENTED MANHOLE RING AND COVER

WATERTIGHT MANHOLE INSERT DETAIL

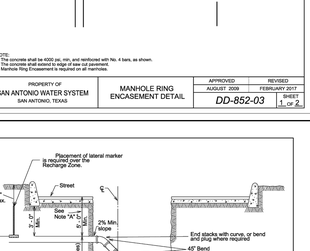
VENT HOLE DETAIL SECTION A-A

Manhole cover inserts shall be FRW Industries, Inc., "Inflow Protector-Cover", Preco Industries, Ltd., "Sewer Guard", or approved equal,and shall be installed in strict accordance with the manufacturer's recommendations. The contractor shall be responsible for making the necessary field measurements for the manufacturer prior to production.

VENTED MANHOLE RING AND COVER DETAIL

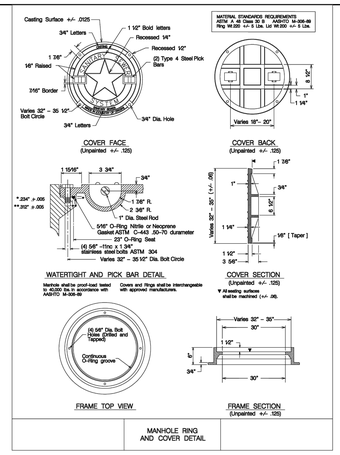


SECTION A-A

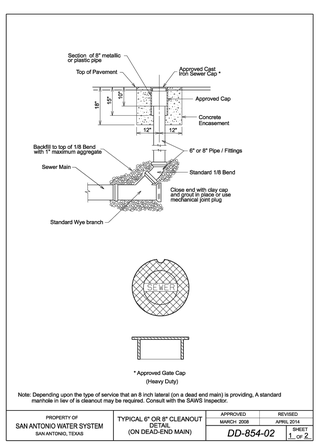


NOTE:
1. The concrete shall be 4000 psi, min, and reinforced with No. 4 bars, as shown.
2. The concrete shall extend to edge of saw cut pavement.
3. Manhole Ring Encasement is required on all manholes.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	MANHOLE RING ENCASEMENT DETAIL	APPROVED AUGUST 2009	REVISED FEBRUARY 2017
		DD-852-03	SHEET 1 of 2



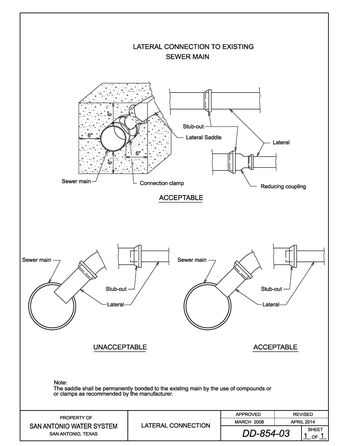
MANHOLE RING AND COVER DETAIL



* Approved Gate Cap (Heavy Duty)

Note: Depending upon the type of service that an 8 inch lateral (on a dead end main) is providing, A standard manhole in lieu of a cleanout may be required. Consult with the SAWS Inspector.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TYPICAL 6" OR 8" CLEANOUT DETAIL (ON DEAD-END MAIN)	APPROVED MARCH 2008	REVISED APRIL 2014
		DD-854-02	SHEET 1 of 2

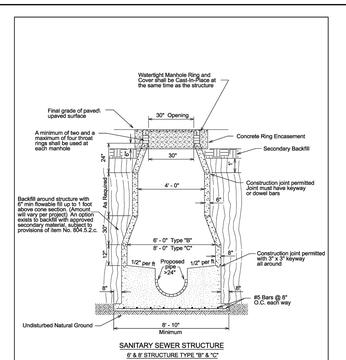


ACCEPTABLE

UNACCEPTABLE ACCEPTABLE

Note:
The saddle shall be permanently bonded to the existing main by the use of compounds or or clamps as recommended by the manufacturer.

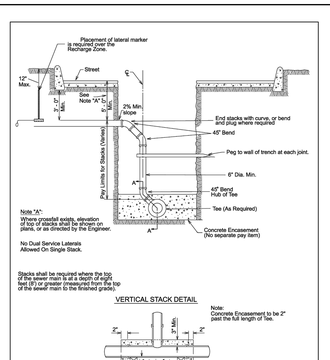
PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	LATERAL CONNECTION	APPROVED MARCH 2008	REVISED APRIL 2014
		DD-854-03	SHEET 1 of 1



SANITARY SEWER STRUCTURE
6' & 8' STRUCTURE TYPE "B" & "C"

Notes:
The channel depth shall be at least equal to the largest pipe diameter. Structures shall be designed and installed on all mains greater than 24" in diameter.

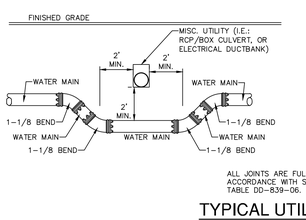
PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TYPICAL SANITARY SEWER STRUCTURE	APPROVED JANUARY 2006	REVISED APRIL 2014
		DD-850-01	SHEET 1 of 1

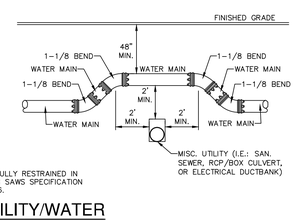


VERTICAL STACK DETAIL

SECTION A-A

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TYPICAL VERTICAL STACK DETAIL	APPROVED MARCH 2008	REVISED APRIL 2014
		DD-860-01	SHEET 1 of 1

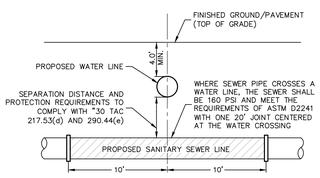




ALL JOINTS ARE FULLY RESTRAINED IN ACCORDANCE WITH SAWS SPECIFICATION TABLE DD–839–06.

TYPICAL UTILITY/WATER CROSSING DETAIL

NOT–TO–SCALE



TYPICAL SANITARY SEWER/WATER CROSSING DETAIL

NOT–TO–SCALE

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214.559.0980 telephone
214.559.0990 facsimile

Bella Vida

San Antonio, Texas

No.	Description	Date
1	CITY PERMIT COMMENT RESPONSES	08/14/2024

Project No. 11933-10

Date MAY 9, 2024

Seal:

Client Information:
Forefront Living

Key Plan:

Phase:
ISSUE FOR GMP

Sheet Description:
SANITARY SEWER DETAILS

Sheet Number: C5.10

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