

# **SHAVANO HIGHLANDS HILLTOP**

## **Water Pollution Abatement Plan and Sewage Collection System Modification**

**February 2023**



February 8, 2023

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

Re: Shavano Highlands Hilltop  
Water Pollution Abatement Plan Modification & Sewage Collection System

Dear Ms. Butler:

Please find included herein the Shavano Highlands Hilltop Water Pollution Abatement Plan Modification & Sewage Collection System. This Water Pollution Abatement Plan Modification 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 Modification applies to an approximate 18.91-acre site as identified by the project limits. This Sewage Collection System Application applies to the 4,095.69-linear feet of sewer main as proposed as part of this project. 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 (\$4,000 and \$2,047.85) 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 Engineers, Inc.



Caleb Chance, P.E.  
Vice President

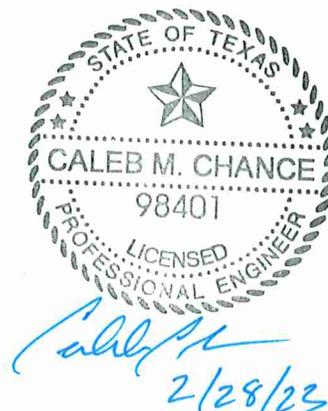
Attachments

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# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan and Sewage Collection System Modification

February 2023



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

# Texas Commission on Environmental Quality

## Edwards Aquifer Application Cover Page

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### Our Review of Your Application

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

### Administrative Review

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

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

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.
3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.
4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

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

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.
6. If the geologic assessment was completed before October 1, 2004 and the site contains “possibly sensitive” features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

### Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.
2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

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

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

**Mid-Review Modifications**

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

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

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

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

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

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

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

<b>1. Regulated Entity Name:</b>				<b>2. Regulated Entity No.:</b>					
<b>3. Customer Name:</b>				<b>4. Customer No.:</b>					
<b>5. Project Type:</b> (Please circle/check one)	New	<input checked="" type="radio"/> <b>Modification</b>		Extension	Exception				
<b>6. Plan Type:</b> (Please circle/check one)	<input checked="" type="radio"/> WPAP	<input type="radio"/> CZP	<input checked="" type="radio"/> SCS	<input type="radio"/> UST	<input type="radio"/> AST	<input type="radio"/> EXP	<input type="radio"/> EXT	Technical Clarification	Optional Enhanced Measures
<b>7. Land Use:</b> (Please circle/check one)	<input checked="" type="radio"/> Residential		Non-residential			<b>8. Site (acres):</b>			
<b>9. Application Fee:</b>	\$4,000;\$2,047.85		<b>10. Permanent BMP(s):</b>						
<b>11. SCS (Linear Ft.):</b>			<b>12. AST/UST (No. Tanks):</b>						
<b>13. County:</b>			<b>14. Watershed:</b>						

# Application Distribution

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

[http://www.tceq.texas.gov/assets/public/compliance/field\\_ops/eapp/EAPP%20GWCD%20map.pdf](http://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/EAPP%20GWCD%20map.pdf)

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

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

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

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.

Caleb Chance, P.E.

Print Name of Customer/Authorized Agent



2/28/23

Signature of Customer/Authorized Agent

Date

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

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

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

# General Information Form

## Texas Commission on Environmental Quality

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

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

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

## Signature

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

Print Name of Customer/Agent: Caleb Chance, P.E.

Date: 2/28/23

Signature of Customer/Agent:



## Project Information

1. Regulated Entity Name: Shavano Highlands Hilltop
2. County: Bexar
3. Stream Basin: Salado Creek
4. Groundwater Conservation District (If applicable): Trintiy 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: Lloyd A. Denton, Jr.  
Entity: Shavano Rogers Ranch North No. 3  
Mailing Address: 11 Lynn Batts Ln  
City, State: San Antonio, TX Zip: 78218  
Telephone: (210) 828-6131 FAX: \_\_\_\_\_  
Email Address: laddiedenton@bitterblue.com

8. Agent/Representative (If any):

Contact Person: Caleb Chance, P.E.  
Entity: Pape-Dawson Engineers, Inc.  
Mailing Address: 2000 NW Loop 410  
City, State: San Antonio, Texas Zip: 78213  
Telephone: (210) 375-9000 FAX: (210) 375-9010  
Email Address: cchance@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 regional office, travel north on Judson Rd for 2.5 miles to Loop 1604 and turn left. Proceed approximately 9.4 miles to take the exit toward FM 1535/Military Hwy/Shavano Park/Camp Bullis. Continue on N Loop 1604W for 1.1 miles to NW Military Hwy and turn right. Travel approximately 0.6 miles to Shavano Ranch Rd and turn right. The project site is located approximately 0.5 miles on the right.

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 of TCEQ site visit

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:

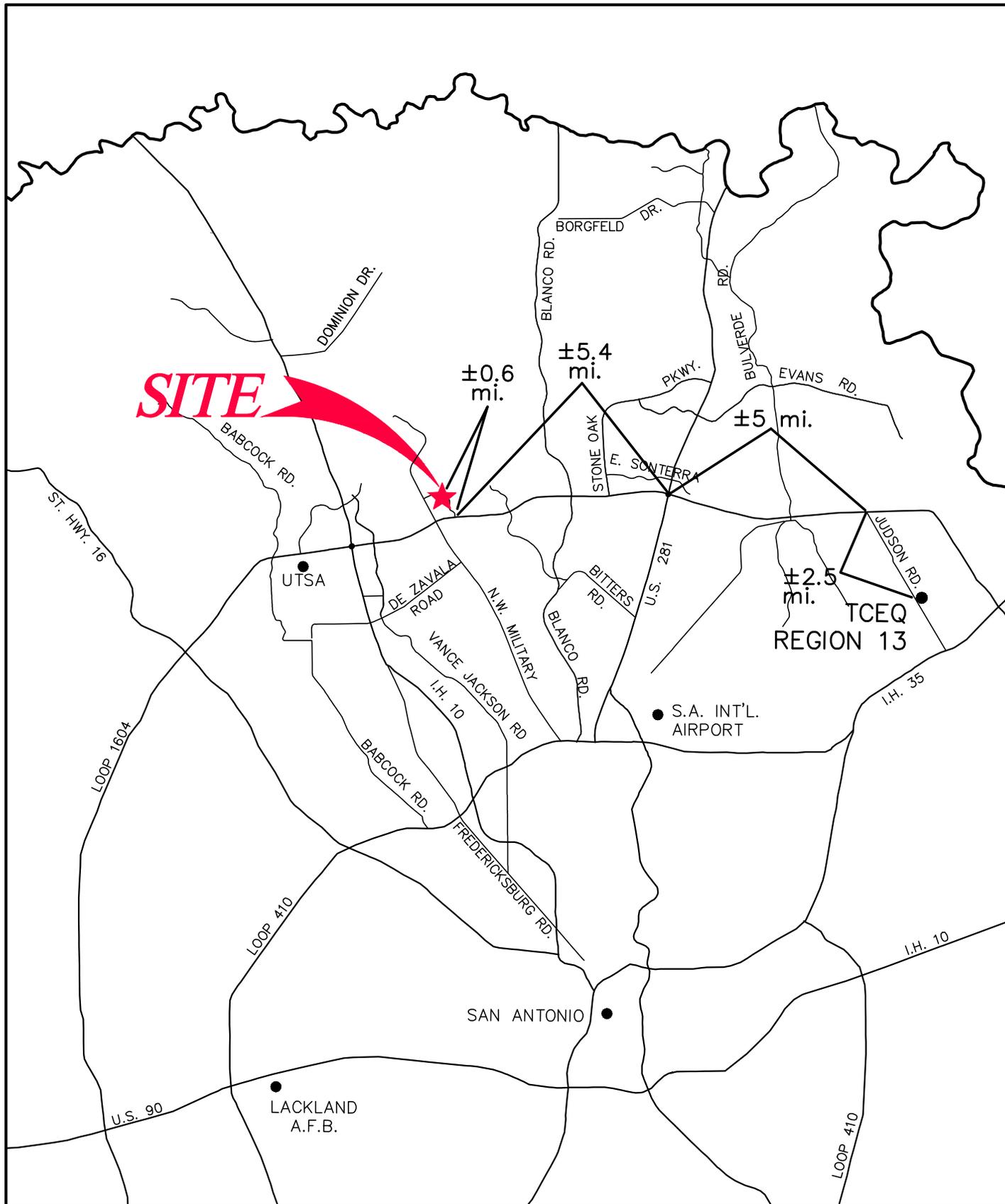
- TCEQ cashier
- Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

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**

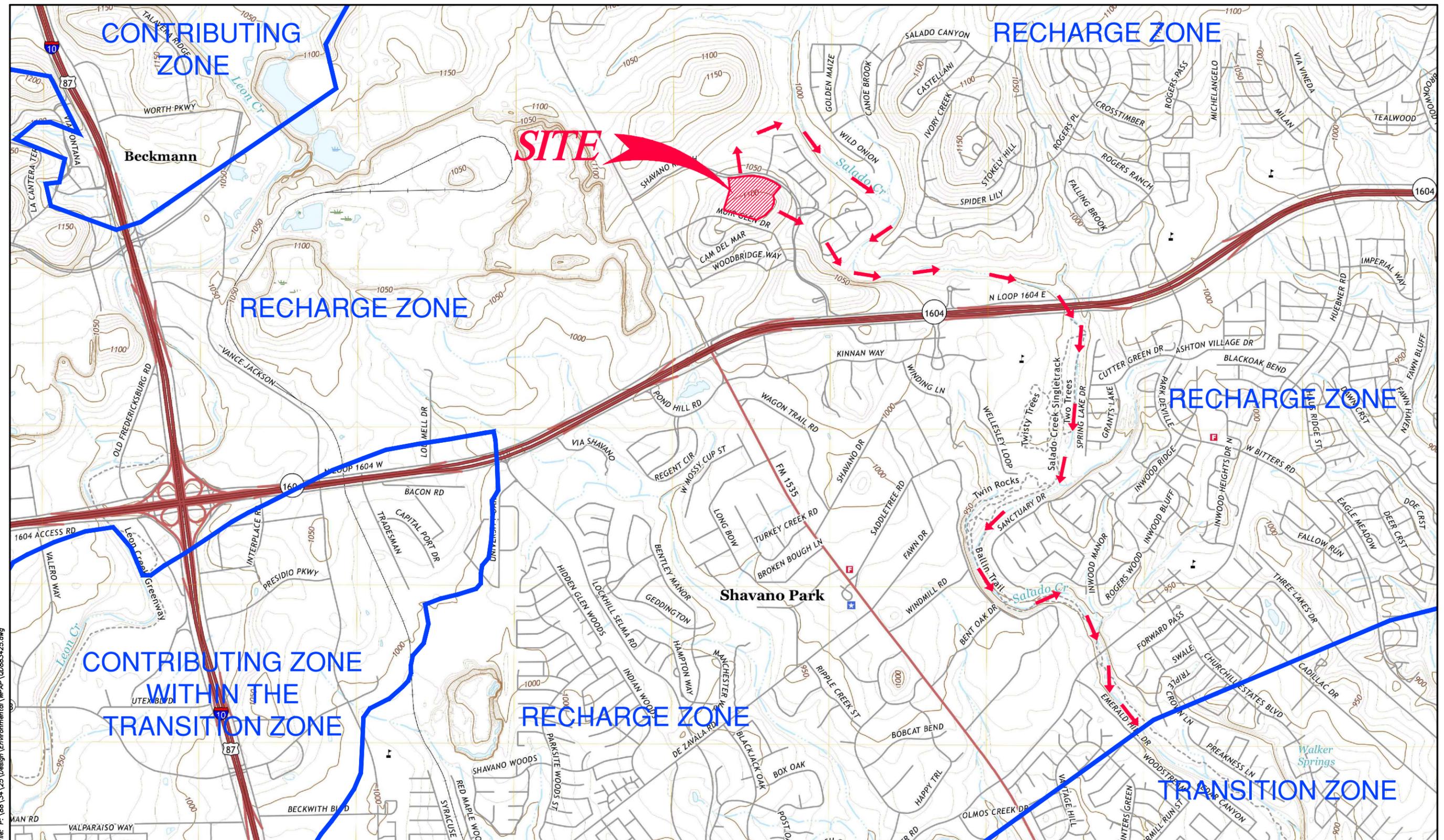
# SHAVANO HIGHLAND HILLTOP Water Pollution Abatement Plan



**ATTACHMENT B**

**SHAVANO HIGHLAND HILLTOP  
Water Pollution Abatement Plan**

**N**  
SCALE: 1" = 2000'



Date: Jul 08, 2022, 11:31am User ID: rafvarez  
File: P:\88\34\25\Design\Environmental\WPAP\00863425.dwg

GENERAL LOCATION MAP - CASTLE HILLS, TX QUAD

USGS/EDWARDS RECHARGE ZONE MAP

DRAINAGE FLOW   
Pape-Dawson Engineers, Inc.

ATTACHMENT B

**ATTACHMENT C**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### Attachment C – Project Description

The Shavano Highlands Hilltop Water Pollution Abatement Plan Modification (WPAP MOD) is a modification of the previously approved Shavano Highlands Hilltop WPAP & SCS (EAPP ID No. 13001568 – 13001569). This project was approved for the construction of 53 single-family residential homes with associated driveways, patios, sidewalks, and streets on an approximately 17.73-acre site. This site is located south of Powder Mill and Shavano Ranch Rd intersection in San Antonio, Bexar County, Texas. The site is undeveloped and lies within the Upper Salado Creek watershed and does not contain 100-year floodplain. There were two naturally occurring sensitive geological features identified in the Geologic Assessment, Construction personnel will be educated to be aware of the features and their respective buffers. Absolutely no disturbance of any kind will take place within the proposed buffers as noted on the plan sheets.

This WPAP Mod proposes additional clearing, grading, excavation, installation of utilities and drainage improvements, construction of two (2) Jellyfish® filter basins, 57 single-family homes with driveways, patios, sidewalks, and streets. Additional home lots have increased the project limits to 18.91 acres, and one previously approved engineered vegetative filter strip has been removed. The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment is two (2) Jellyfish® filter basin and two (2) fifteen-foot (15') engineered vegetative filter strip 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 6.626 acres of impervious cover, or 35.0% of the 18.91-acre project limits, are proposed for construction in this WPAP MOD. Please see the Treatment Summary table attached with this application. All PBMPs have been designed in accordance with the Texas Commission on Environmental Quality's (TCEQ) Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in Total Suspended Solids (TSS) from this site. Please see the Treatment Summary table attached with this application.

The Shavano Highlands Hilltop Sewage Collection System (SCS) Application was originally approved for 2,291.09 linear feet (LF) of 8-inch (8") diameter PVC SDR 26 gravity sewer main and 320 LF of 8-inch (8") PVC SDR 26 160-psi pressure rated sewer main. Due to increase in home lots and project limits, this SCS Application now proposes the construction of approximately 4,095.69 linear feet (LF) of sanitary sewer main to serve the development over the Edwards Aquifer Recharge Zone. The proposed alignment will consist of approximately 3,775.69 LF of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main and 320 LF of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered over waterline crossings. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 9.4 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 18.91 acres for the overall development of the site, in accordance with the concurrent WPAP MOD.

Potable water service is to be provided by the San Antonio Water System (SAWS). The proposed development will generate approximately 11,400 gallons per day (average flow) of domestic wastewater based on the assumption of 200 gpd per home (200 gpd x 57 homes x 1 EDU/home).

Wastewater will be disposed of by conveyance to the existing Steven M. Clouse 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.

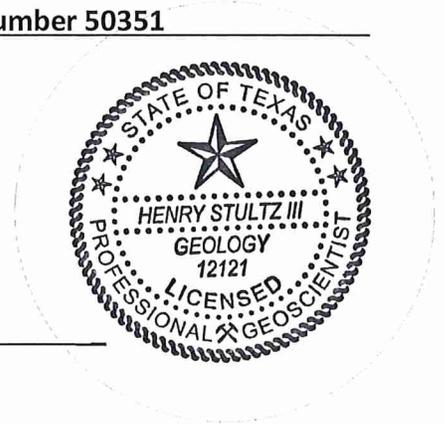
Telephone: 210-375-9000

Date: April 1, 2022

Fax: 210-375-9090

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

Signature of Geologist:



Regulated Entity Name: Shavano Highlands Hilltop

## Project Information

1. Date(s) Geologic Assessment was performed: March 28, 2022

2. Type of Project:

WPAP

AST

SCS

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 very cobbly clay, 5 to 15 percent slopes (TaC)	D	0-3

\* 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" = 100'  
 Site Geologic Map Scale: 1" = 100'  
 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: Shavano Highlands Hilltop**

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								<40	>40	<1.6	>1.6
S-7	29.60761°	-98.56225°	SH	20	Kek	6	6	3	-				O,F	5	25	25	X		Hillside
S-8	29.60744°	-98.56139°	SH	20	Kek	7	9	3.5	N20°E				O,C	35	55	55	X		Hillside
S-9	29.60742°	-98.56133°	SH	20	Kek	3.5	3.9	1.2	N65°W				O,C	35	55	55	X		Hillside
S-10	29.60778°	-98.56114°	CD	5	Kek	4	6	1.5	E-W				O,F	5	10	10	X		Hillside
S-11	29.60775°	-98.56136°	CD	5	Kek	3	3	0.5	-				O,F	5	10	10	X		Hillside
S-15	29.60548°	-98.55866°	F	20	Kep/Kek	945			N56°E	10			F	5	35	35		X	Hillside
S-17	29.60834°	-98.56014°	SC	20	Kep	2	1	4	N30°W				O,C	20	40	40	X		Hillside
S-18	29.60668°	-98.55853°	MB	30	Kek	30	30	5	-				F,C	5	35	35		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 understand, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

*[Handwritten Signature]*

Date April 1, 2022



**ATTACHMENT B**  
**Stratigraphic Column**

# SHAVANO HIGHLANDS HILLTOP Geologic Assessment (TCEQ-0585)

## 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	Person	Cyclic and marine, undivided	80–90	Pelletal limestone; ranges from chalk to mudstone and miliolid grainstone; thin to massive beds; some crossbedding evident; a packstone containing large caprinids is present near contact with the overlying Georgetown Formations; chert is common as beds and large nodules	Edwards Aquifer	II	Aquifer	MO, BU, VUG, BP, FR, CV	Many subsurface; might be associated with earlier karst development
				Leached and collapsed, undivided	70–90	Hard, dense, recrystallized limestone; mudstone, wackestone, packstone, and grainstone; contains chert as beds and large nodules; heavily bioturbated with iron-stained beds; often stromatolitic; <i>Toucasia</i> sp. Often found above contact with the underlying regional dense member; <i>Montastrea roemeriana</i> and oysters rare		III	Aquifer	BU, VUG, FR, BP, BR, CV	Extensive lateral development; large rooms
				Regional dense	20–24	Dense, shaly limestone; oyster shell mudstone and iron wackestone; wispy iron staining; chert nodules rarer than in the rest of the chert-bearing Edwards Group		IV	Confining	FR, CV	Very few; only vertical fracture enlargement
			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		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); <i>Toucasia</i> 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; <i>Ceratostreon texana</i> , <i>Caprina</i> sp., miliolids, and gastropods		VIII	Aquifer, confining unit in areas without caves	IP, MO, BU, BP, FR, CV	Large lateral caves at surface

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**

# SHAVANO HIGHLANDS HILLTOP Geologic Assessment

## Attachment C – Site Geology

### SUMMARY

The Shavano Highlands Hilltop site is located approximately ½ mile east of the intersection of NW Military Highway and Shavano Ranch Road in 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)*, three naturally occurring sensitive features were identified on site. The overall potential for fluid migration to the Edwards Aquifer for the site is moderate.

### SITE GEOLOGY

As observed through field evidence, the geologic units which outcrop at the surface within the subject site are the grainstone (Kekg), Kirschberg (Kekk), and dolomitic (Kekd) members of the Kainer formation, and the cyclic and marine (Kepcm) member of the Person formation. Descriptions of these units are detailed below.

- The Kekg is characterized by a white, cross bedded, miliolid grainstone and mudstone. Karst development within the Kekg is uncommon.
- The Kekk is a highly altered, crystalline limestone with chert. Karst development within the Kekk is characterized by extensive cave formation.
- The Kekd is a massively bedded, mudstone to grainstone, crystalline limestone. Karst development within the Kekd is characterized by small sinkholes and often caves develop as vertical shafts.
- The Kepcm is characterized by a mudstone to pack stone miliolid grainstone, and chert. Karst development within the Kepcm is characterized by small sinkholes and caves developed as vertical shafts as well as lateral rooms.

The predominant trend of faults in the vicinity of the site is approximately N56°E, based on faults identified during the previous mapping of the area.

# SHAVANO HIGHLANDS HILLTOP Geologic Assessment

## FEATURE DESCRIPTIONS:

A description of the features observed onsite is provided below:

### Feature S-7

Feature S-7 is a possible sinkhole. The feature appears to be a result of slope erosion and animal burrowing underneath a slab of limestone in the weathering profile. Loose organics and some fines were observed within the feature. The presence of fine infilling, apparent non-karst origin, and presence within the weathering profile indicate the probability for rapid infiltration is low.

### Features S-8 and S-9

Features S-8 and S-9 are sinkholes. Loose organic and coarse-grained material was observed within the features. Therefore, the probability for rapid infiltration is high. As they are classified as sensitive, the 50 ft buffer and natural surface water catchment area are shown on the Site Geologic Map (Attachment D).

### Features S-10 and S-11

Features S-10 and S-11 are closed depressions that appear to be a result of tree removal or uprooting. Soil development was observed, and the features do not appear to be formed by karst processes. Therefore, the probability of rapid infiltration is low.

### Feature S-15

Feature S-15 is a fault identified by aerial photographs and previous mapping east of the subject site. Soil development and fine infilling are present. No areas of enhanced permeability along the fault were observed within the limits of this project. Therefore, the probability for rapid infiltration is low.

### Feature S-17

Feature S-17 is a solution cavity that contains coarse cobble-sized materials. Evidence of sapping of fines was observed. Due to the karst origin, and coarse infilling, but small catchment area, the probability for rapid infiltration is intermediate. As it is classified as sensitive, the 50 ft buffer and natural surface water catchment area are shown on the Site Geologic Map (Attachment D).

# SHAVANO HIGHLANDS HILLTOP

## Geologic Assessment

### Feature S-18

Feature S-18 is an existing storm drain line that is not located beneath pavement. The storm drain line has been trenched through bedrock and backfilled with a mix of fine and course fill material that may be more permeable than surrounding undisturbed areas. Therefore, the probability of rapid infiltration is intermediate.

## 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.

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<https://www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer>, April 1, 2022.

U.S. Geological Survey, National Water Information System: Mapper,  
<https://maps.waterdata.usgs.gov/mapper/index.html>, April 1, 2022.

**ATTACHMENT D**  
**Site Geologic Map(s)**



**MODIFICATION OF A  
PREVIOUSLY APPROVED  
WATER POLLUTION  
ABATEMENT PLAN (TCEQ-  
0590)**

# Modification of a Previously Approved Plan

## Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Transition Zone and Relating to 30 TAC 213.4(j), Effective June 1, 1999

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

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

## Signature

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

Print Name of Customer/Agent: Caleb Chance, P.E.

Date: 2/24/23

Signature of Customer/Agent:



## Project Information

1. Current Regulated Entity Name: Shavano Highlands Hilltop  
Original Regulated Entity Name: Shavano Highlands Hilltop  
Regulated Entity Number(s) (RN): 111530820  
Edwards Aquifer Protection Program ID Number(s): 13001568-13001569  
 The applicant has not changed and the Customer Number (CN) is: 602406613  
 The applicant or Regulated Entity has changed. A new Core Data Form has been provided.
2.  **Attachment A: Original Approval Letter and Approved Modification Letters.** A copy of the original approval letter and copies of any modification approval letters are attached.

3. A modification of a previously approved plan is requested for (check all that apply):
- Physical or operational modification of any water pollution abatement structure(s) including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;
  - Change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;
  - Development of land previously identified as undeveloped in the original water pollution abatement plan;
  - Physical modification of the approved organized sewage collection system;
  - Physical modification of the approved underground storage tank system;
  - Physical modification of the approved aboveground storage tank system.
4.  Summary of Proposed Modifications (select plan type being modified). If the approved plan has been modified more than once, copy the appropriate table below, as necessary, and complete the information for each additional modification.

<b><i>WPAP Modification</i></b>	<b><i>Approved Project</i></b>	<b><i>Proposed Modification</i></b>
<b><i>Summary</i></b>		
Acres	<u>17.73</u>	<u>18.91</u>
Type of Development	<u>single-family residential</u>	<u>single-family residential</u>
Number of Residential Lots	<u>53</u>	<u>57</u>
Impervious Cover (acres)	<u>5.28</u>	<u>6.626</u>
Impervious Cover (%)	<u>29.8</u>	<u>35.0</u>
Permanent BMPs	<u>Jellyfish, VFS</u>	<u>Jellyfish, VFS</u>
Other	_____	_____

<b><i>SCS Modification</i></b>	<b><i>Approved Project</i></b>	<b><i>Proposed Modification</i></b>
<b><i>Summary</i></b>		
Linear Feet	<u>2,291.09</u>	<u>4,095.69</u>
Pipe Diameter	<u>8"</u>	<u>8"</u>
Other	_____	_____

<b><i>AST Modification</i></b>	<b><i>Approved Project</i></b>	<b><i>Proposed Modification</i></b>
<b><i>Summary</i></b>		
Number of ASTs	_____	_____
Volume of ASTs	_____	_____
Other	_____	_____

<b><i>UST Modification</i></b>	<b><i>Approved Project</i></b>	<b><i>Proposed Modification</i></b>
<b><i>Summary</i></b>		
Number of USTs	_____	_____
Volume of USTs	_____	_____
Other	_____	_____

5.  **Attachment B: Narrative of Proposed Modification.** A detailed narrative description of the nature of the proposed modification is attached. It discusses what was approved, including any previous modifications, and how this proposed modification will change the approved plan.
  
6.  **Attachment C: Current Site Plan of the Approved Project.** A current site plan showing the existing site development (i.e., current site layout) at the time this application for modification is attached. A site plan detailing the changes proposed in the submitted modification is required elsewhere.
  - The approved construction has not commenced. The original approval letter and any subsequent modification approval letters are included as Attachment A to document that the approval has not expired.
  - The approved construction has commenced and has been completed. Attachment C illustrates that the site was constructed as approved.
  - The approved construction has commenced and has been completed. Attachment C illustrates that the site was **not** constructed as approved.
  - The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was constructed as approved.
  - The approved construction has commenced and has **not** been completed. Attachment C illustrates that, thus far, the site was **not** constructed as approved.
  
7.  The acreage of the approved plan has increased. A Geologic Assessment has been provided for the new acreage.
  - Acreage has not been added to or removed from the approved plan.
  
8.  Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

**ATTACHMENT A**

Jon Niermann, *Chairman*  
Emily Lindley, *Commissioner*  
Bobby Janecka, *Commissioner*  
Toby Baker, *Executive Director*



## TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

September 9, 2022

Mr. Lloyd A. Denton, Jr.  
Shavano Rogers Ranch North No. 3, Ltd.  
11 Lynn Batts Ln  
San Antonio, Texas 78218

Re: Edwards Aquifer, Bexar County

NAME OF PROJECT: Shavano Highlands Hilltop; Located south of Power Mill and Shavano Ranch Intersection; San Antonio, Texas

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

Regulated Entity No. RN111530820; Additional ID No. 13001568-13001569

Dear Mr. Denton:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the WPAP and SCS applications for the above-referenced project submitted to the San Antonio Regional Office by Pape-Dawson Engineers, Inc. on behalf of Shavano Rogers Ranch North No. 3, Ltd. on July 28, 2022. As presented to the TCEQ, the Temporary and Permanent Best Management Practices (BMPs) were selected and construction plans were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213 and Chapter 217. These planning materials were sealed, signed and dated by a Texas Licensed Professional Engineer. Therefore, based on the engineer's concurrence of compliance, the planning materials for construction of the proposed project and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer Protection Plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires two (2) years from the date of this letter unless, prior to the expiration date, more than 10 percent of the construction has commenced on the project or an extension of time has been requested.*

### PROJECT DESCRIPTION

The proposed residential project will have an area of approximately 17.73 acres. It will include 53 single-family residential homes with driveways, patios, sidewalks, and streets. The impervious cover will be 5.28 acres (29.8 percent).

The proposed sewage collection system will consist of 2,291.09 linear feet of 8-inch diameter PVC SDR 26 (ASTM D3034, ASTM D3212) gravity sewer pipe, 320 linear feet of 8-inch diameter PVC SD 26 (ASTM D2241, Class 160, ASTM D3139) pressure rated sewer pipe, manholes, and appropriate appurtenances. The system will be connected to an existing City of San Antonio wastewater line for conveyance to the Steven M. Clouse Water Recycling Center for treatment and disposal. The project is located within the City of San Antonio and will conform to all applicable codes, ordinances, and requirements of the City of San Antonio and San Antonio Water System.

#### PERMANENT POLLUTION ABATEMENT MEASURES

To prevent the pollution of stormwater runoff originating on-site or upgradient of the site and potentially flowing across and off the site after construction, one Jellyfish Filter System and three engineered vegetative filter strips, designed using the TCEQ technical guidance document, Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices (2005), will be constructed to treat stormwater runoff. The required total suspended solids (TSS) treatment for this project is 4,308 pounds of TSS generated from the 5.28 acres of impervious cover. The approved measures meet the required 80 percent removal of the increased load in TSS caused by the project.

#### GEOLOGY

According to the geologic assessment included with the application, the site lies on the Kainer Formation and Person Formation. Eight features, one manmade feature in bedrock and seven geologic features were identified by the project geologist. Three of the geologic features, S-8, S-9, and S-17, were rated sensitive. None of the sensitive features are within the 50-foot envelope of the proposed sanitary sewer system. The site assessment conducted on September 7, 2022, revealed the site was generally as described in the geologic assessment.

Natural buffers were proposed for features S-8 (sinkhole), S-9 (sinkhole), and S-17 (solution cavity). No regulated activities (such as construction or soil disturbing activities) will take place within the natural buffers. The size is generally based on the drainage area for each sensitive feature. The buffers are illustrated on the site plans.

#### SPECIAL CONDITIONS

- I. All permanent pollution abatement measures shall be operational prior to first occupancy of the homes within their respective drainage areas.
- II. All sediment and/or media removed from the water quality treatment device during maintenance activities shall be properly disposed of according to 30 TAC 330 or 30 TAC 335, as applicable.
- III. By the responsible engineer's dated signature and seal on the Engineering Design Report attached to the submitted application, all information therein accurately reflects the information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer in accordance with the requirements of 30 TAC 213.5 (c) and Chapter 217.

#### STANDARD CONDITIONS

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.
2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations

and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.

3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. Within 60 days of receiving written approval of an Edwards Aquifer Protection Plan, the applicant must submit to the San Antonio Regional Office, proof of recordation of notice in the county deed records, with the volume and page number(s) of the county deed records of the county in which the property is located. A description of the property boundaries shall be included in the deed recordation in the county deed records. A suggested form (Deed Recordation Affidavit, TCEQ-0625) that you may use to deed record the approved WPAP is enclosed.
5. All contractors conducting regulated activities at the referenced project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and SCS plans and this notice of approval shall be maintained at the project location until all regulated activities are completed.
6. Modification to the activities described in the referenced WPAP and SCS application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.
7. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.
8. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved applications, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TCEQ may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.
9. All borings with depths greater than or equal to 20 feet must be plugged with non-shrink grout from the bottom of the hole to within three (3) feet of the surface. The remainder of the hole must be backfilled with cuttings from the boring. All borings less than 20 feet must be backfilled with cuttings from the boring. All borings must be backfilled or plugged within four (4) days of completion of the drilling operation. Voids may be filled with gravel.

During Construction:

10. During the course of regulated activities related to this project, the applicant or agent shall comply with all applicable provisions of 30 TAC Chapter 213 and Chapter 217. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity, upon which that person or entity shall assume responsibility for all provisions and conditions of this approval.
11. This approval does not authorize the installation of temporary aboveground storage tanks on this project. If the contractor desires to install a temporary aboveground storage tank

for use during construction, an application to modify this approval must be submitted and approved prior to installation. The application must include information related to tank location and spill containment. Refer to Standard Condition No. 6, above.

12. If any sensitive feature (caves, solution cavities, sink holes, etc.) is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the <Austin/San Antonio> Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.
13. No wells exist on site. All water wells, including injection, dewatering, and monitoring wells must be in compliance with the requirements of the Texas Department of Licensing and Regulation under Title 16 TAC Chapter 76 (relating to Water Well Drillers and Pump Installers) and all other locally applicable rules, as appropriate.
14. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.
15. Intentional discharges of sediment laden water are not allowed. If dewatering becomes necessary, the discharge will be filtered through appropriately selected best management practices. These may include vegetated filter strips, sediment traps, rock berms, silt fence rings, etc.
16. The following records shall be maintained and made available to the executive director upon request: the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
17. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.
18. No part of the system shall be used as a holding tank for a pump-and-haul operation.

After Completion of Construction:

19. A Texas Licensed Professional Engineer must certify in writing that the permanent BMPs or measures were constructed as designed. The certification letter must be submitted to the San Antonio Regional Office within 30 days of site completion.
20. The applicant shall be responsible for maintaining the permanent BMPs after construction until such time as the maintenance obligation is either assumed in writing by another entity having ownership or control of the property (such as without limitation, an owner's association, a new property owner or lessee, a district, or municipality) or the ownership of the property is transferred to the entity. The regulated entity shall then be responsible for maintenance until another entity assumes such obligations in writing or ownership is transferred. A copy of the transfer of responsibility must be filed with the executive director through San Antonio Regional Office within 30 days of the transfer. A copy of the transfer form (TCEQ-10263) is enclosed.
21. Certification by a Texas Licensed Professional Engineer of the testing of sewage collection systems required by 30 TAC Chapter 213 and Chapter 217 shall be submitted to the San Antonio Regional Office within 30 days of test completion and prior to the new sewage collection system being put into service. The certification should include the project name

as it appeared on the approved application, the program ID number, and two copies of a site plan sheet(s) indicating the wastewater lines and manholes that were tested and are being certified as complying with the appropriate regulations. The engineer must certify in writing that all wastewater lines have passed all required testing to the appropriate regional office within 30 days of test completion and prior to use of the new collection system. Should any test result fail to meet passing test criteria and then subsequently pass testing, the result(s) and an explanation of what repair, adjustment, or other means were taken to facilitate a subsequent passing result shall be provided.

22. Every five years after the initial certification, the sewage collection system shall be retested. Any lines that fail the test must be repaired and retested. Certification that the system continues to meet the requirements of 30 TAC Chapter 213 and Chapter 217 shall be submitted to the San Antonio Regional Office. The certification should include the project name as it appeared on the approved application, the program ID number and two copies of a site plan sheet(s) indicating the wastewater lines and manholes that were tested and are being certified as complying with the appropriate regulations. Should any test result fail to meet passing test criteria, and then subsequently pass testing, the result(s) and an explanation of what repair, adjustment, or other means were taken to facilitate a subsequent passing result shall be provided.
23. Upon legal transfer of this property, the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.
24. An Edwards Aquifer protection plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.
25. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality. If you have any questions or require additional information, please contact Mr. Joshua Vacek of the Edwards Aquifer Protection Program of the San Antonio Regional Office at 210-403-4028.

Sincerely,



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

LIB/jv

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

cc: Mr. Caleb Chance, P.E.

**ATTACHMENT B**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### Attachment B – Narrative of Proposed Modification

The Shavano Highlands Hilltop Water Pollution Abatement Plan Modification (WPAP MOD) is a modification of the previously approved Shavano Highlands Hilltop WPAP & SCS (EAPP ID No. 13001568 – 13001569). This project was approved for the construction of 53 single-family residential homes with associated driveways, patios, sidewalks, and streets on an approximately 17.73-acre site. This site is located south of Powder Mill and Shavano Ranch Rd intersection in San Antonio, Bexar County, Texas. The site is undeveloped and lies within the Upper Salado Creek watershed and does not contain 100-year floodplain. There were two naturally occurring sensitive geological features identified in the Geologic Assessment, Construction personnel will be educated to be aware of the features and their respective buffers. Absolutely no disturbance of any kind will take place within the proposed buffers as noted on the plan sheets.

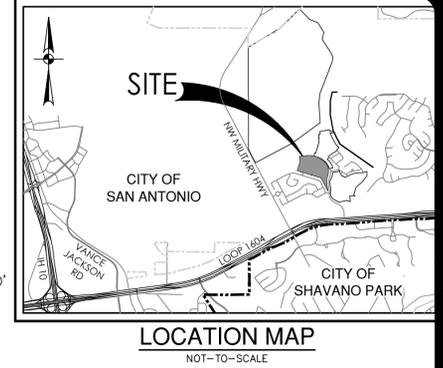
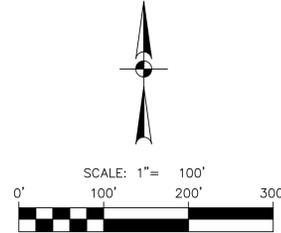
This WPAP Mod proposes additional clearing, grading, excavation, installation of utilities and drainage improvements, construction of two (2) Jellyfish® filter basins, 57 single-family homes with driveways, patios, sidewalks, and streets. Additional home lots have increased the project limits to 18.91 acres, and one previously approved engineered vegetative filter strip has been removed. The proposed Permanent Best Management Practices (PBMPs) for stormwater treatment is two (2) Jellyfish® filter basin and two (2) fifteen-foot (15') engineered vegetative filter strip 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 6.626 acres of impervious cover, or 35.0% of the 18.91-acre project limits, are proposed for construction in this WPAP MOD. Please see the Treatment Summary table attached with this application. All PBMPs have been designed in accordance with the Texas Commission on Environmental Quality's (TCEQ) Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in Total Suspended Solids (TSS) from this site. Please see the Treatment Summary table attached with this application.

The Shavano Highlands Hilltop Sewage Collection System (SCS) Application was originally approved for 2,291.09 linear feet (LF) of 8-inch (8") diameter PVC SDR 26 gravity sewer main and 320 LF of 8-inch (8") PVC SDR 26 160-psi pressure rated sewer main. Due to increase in home lots and project limits, this SCS Application now proposes the construction of approximately 4,095.69 linear feet (LF) of sanitary sewer main to serve the development over the Edwards Aquifer Recharge Zone. The proposed alignment will consist of approximately 3,775.69 LF of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main and 320 LF of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered over waterline crossings. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 9.4 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 18.91 acres for the overall development of the site, in accordance with the concurrent WPAP MOD.

Potable water service is to be provided by the San Antonio Water System (SAWS). The proposed development will generate approximately 11,400 gallons per day (average flow) of domestic wastewater based on the assumption of 200 gpd per home (200 gpd x 57 homes x 1 EDU/home).

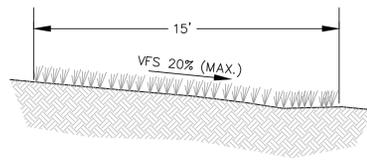
Wastewater will be disposed of by conveyance to the existing Steven M. Clouse Water Recycling Center operated by SAWS.

# **ATTACHMENT C**



**LEGEND**

- PLATTED BOUNDARY
- PROJECT AREA
- EXISTING GRADE
- PROPOSED GRADE
- FLOW ARROW (EXISTING)
- FLOW ARROW (PROPOSED)
- WATERSHED BOUNDARY
- WATERSHED DESIGNATION
- FHA LOT GRADING DESIGNATION
- 15' WIDE ENGINEERED VEGETATIVE FILTER STRIP
- Kbu BUDA FORMATION
- Kdr DEL RIO FORMATION
- Kep PERSON FORMATION
- S-1 POTENTIAL RECHARGE FEATURE
- CONTACT, LOCATED APPROXIMATELY
- FAULT, LOCATED APPROXIMATELY (D, DOWNTOWN SIDE; U, UPTHROWN SIDE)
- NON-KARST CLOSED DEPRESSION



**15' WIDE ENGINEERED VEGETATIVE FILTER STRIP DETAIL**  
N.T.S.

- SUMMARY OF PERMANENT POLLUTION ABATEMENT MEASURES:**
- TEMPORARY BMP'S WILL BE MAINTAINED UNTIL THE SITE IMPROVEMENTS ARE COMPLETED AND THE SITE HAS BEEN STABILIZED, INCLUDING SUFFICIENT VEGETATION BEING ESTABLISHED.
  - DURING CONSTRUCTION, TO THE EXTENT PRACTICAL, CONTRACTOR SHALL MINIMIZE THE AREA OF SOIL DISTURBANCE. AREAS OF DISTURBED SOIL SHALL BE REVEGETATED TO STABILIZE SOIL USING SOLID SOD IN A STAGGERED PATTERN. SEE DETAIL ON TEMPORARY POLLUTION ABATEMENT DETAIL SHEET AND REFER TO SECTION 1.3.11 IN TCEQ'S TECHNICAL GUIDANCE MANUAL RG-348 (2005). SOD SHOULD BE USED IN CHANNELS AND ON SLOPES > 15%. THE CONTRACTOR MAY SUBSTITUTE THE USE OF SOD WITH THE PLACEMENT OF TOP SOIL AND A FRIABLE SEED BED WITH A PROTECTIVE MATTING OR HYDRAULIC MULCH ALONG WITH WATERING UNTIL VEGETATION IS ESTABLISHED. APPLICATIONS AND PRODUCTS SHALL BE THOSE APPROVED BY TxDOT AS OF FEBRUARY 2001 AND IN COMPLIANCE WITH THE TGM RG-348 (2005). SEED MIXTURE AND/OR GRASS TYPE TO BE DETERMINED BY OWNER AND SHOULD BE IN COMPLIANCE WITH TGM RG-348 (2005) GUIDELINES. IRRIGATION MAY BE REQUIRED IN ORDER TO ESTABLISH SUFFICIENT VEGETATION.
  - FOR DISTURBED AREAS WHERE INSUFFICIENT SOIL EXISTS TO ESTABLISH VEGETATION, CONTRACTOR SHALL PLACE A MINIMUM OF 6" OF TOPSOIL PRIOR TO REVEGETATION.
  - TYPICAL SLOPES ON THIS PROJECT RANGE FROM APPROXIMATELY 3.8% TO 23.5%.

- PERMANENT POLLUTION ABATEMENT MEASURES:**
- SILT FENCING AND ROCK BERMS, WHERE APPROPRIATE, WILL BE MAINTAINED UNTIL THE ROADWAY, UTILITY, DRAINAGE IMPROVEMENTS, AND BUILDING CONSTRUCTION ARE COMPLETED.
  - A JELLYFISH FILTER SYSTEM AND A 15-FOOT WIDE ENGINEERED VEGETATIVE FILTER STRIP WILL SERVE AS THE PERMANENT BEST MANAGEMENT PRACTICE (BMP) FOR DRAINAGE AREAS "A"- "G".
  - ENERGY DISSIPATORS (TO HELP REDUCE EROSION) WILL BE PROVIDED AT POINTS OF CONCENTRATED DISCHARGE WHERE EXCESSIVE VELOCITIES MAY BE ENCOUNTERED.
- NOTES:**
- CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION FOR SOIL STABILIZATION PRIOR TO SITE CLOSEOUT.
  - ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.

**SHAVANO HIGHLANDS HILLTOP TREATMENT SUMMARY**

Area	Total Area (ac.)	Existing Impervious Cover (ac.)	Proposed Impervious Cover from Lots (ac.)	Proposed Impervious Cover from Roadways (ac.)	Total Proposed Impervious Cover (ac.)	Total Impervious Cover (ac.)	BMP	Total Annual TSS Generated (lbs)	Total SS Removed (lbs)
A	1.53	0	0.55	0	0.55	0.55	Engineered VFS	449	449.00
B	0.15	0	0	0.12	0.12	0.12	Contech Jellyfish Filter System	98	98.00
C	0.65	0	0	0.3	0.3	0.3	Contech Jellyfish Filter System	245	245.00
D	3.59	0	0.78	0.86	1.64	1.64	Contech Jellyfish Filter System	1338	1338.00
E	0.34	0	0.11	0	0.11	0.11	Engineered VFS	90	90.00
F	2.57	0	0.44	0.94	1.38	1.38	Contech Jellyfish Filter System	1126	1126.00
G	4.70	0	1.02	0	1.02	1.02	Engineered VFS	832	832.00
H	0.22	0	0	0.16	0.16	0.16	Overtreatment by Jellyfish Filter System	131	131.00
<b>TOTAL</b>	<b>13.75</b>	<b>0.00</b>	<b>2.90</b>	<b>2.38</b>	<b>5.28</b>	<b>5.28</b>		<b>4309.00</b>	<b>4309.00</b>

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**

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

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

STATE OF TEXAS  
CALEB M. CHANCE  
98401  
LICENSED PROFESSIONAL ENGINEER  
Caleb M. Chance  
7/26/22

**PAPE-DAWSON ENGINEERS**  
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1008890

**SHAVANO HIGHLANDS HILLTOP**  
SAN ANTONIO, TEXAS

**WATER POLLUTION ABATEMENT PLAN**  
**PERMANENT WATER POLLUTION ABATEMENT PLAN**

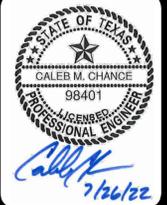
PLAT NO. \_\_\_\_\_  
JOB NO. 8834-25  
DATE JUNE 2022  
DESIGNER DL  
CHECKED BL DRAWN EG  
SHEET 1 OF 1

Notes: 1. 07 2022 2:26pm User: B. Richardson  
File: P:\8834\25\Drawings\Exhibits\CEP\8834-25.dwg

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

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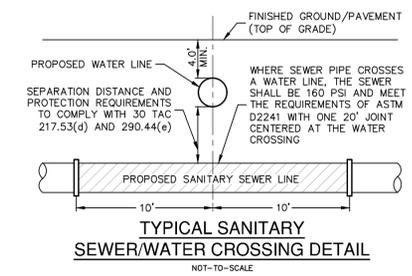
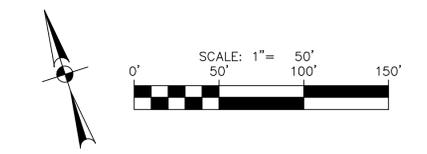
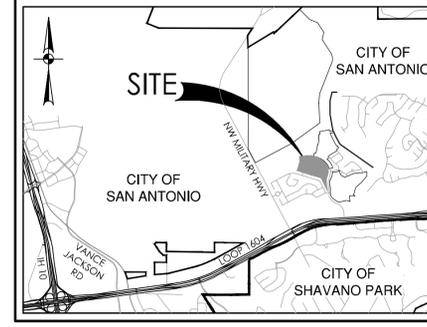
DATE	
NO.	REVISION



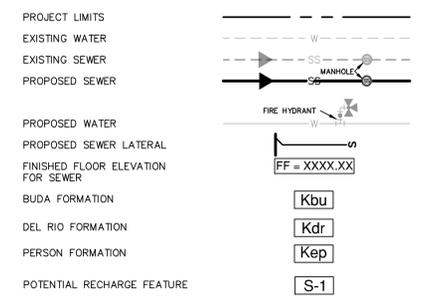
**PAPE-PAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008890

**SHAVANO HIGHLANDS HILLTOP**  
 SAN ANTONIO, TEXAS  
**OVERALL SANITARY SEWER PLAN**

PLAT NO.	-
JOB NO.	8834-25
DATE	MAY 2022
DESIGNER	DL
CHECKED	BL DRAWN EG
SHEET	C5.00



**SEWER LEGEND**



**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.

**FINISHED FLOOR NOTES:**

- THE FINISHED FLOOR ELEVATIONS (FF) REPRESENT THE MINIMUM POSSIBLE FLOOR ELEVATION TO PROVIDE SANITARY SEWER SERVICE TO EACH LOT. ACTUAL FINISHED FLOOR ELEVATIONS FOR EACH LOT ARE TO BE DETERMINED BY THE BUILDER AND SHALL TAKE INTO CONSIDERATION AS-BUILT CONDITIONS FOR FOUND SEWER SERVICES AND ACTUAL LATERAL PLACEMENT. IT IS THE BUILDER'S SOLE RESPONSIBILITY TO DETERMINE ACTUAL FINISHED FLOOR ELEVATIONS FOR EACH LOT PRIOR TO THE START OF HOME FOUNDATION CONSTRUCTION TAKING INTO CONSIDERATION SITE DRAINAGE, STREET ACCESS AND SANITARY SEWER SERVICE ELEVATIONS.
- THE MINIMUM SANITARY SEWER LATERAL GRADES WERE BASED UPON THE MINIMUM FINISHED FLOOR ELEVATIONS FOR THE LOTS LOCATED ON THE DOWNHILL SIDES OF THE PROPOSED ROADWAYS.

**ROW PERMIT NOTE:**

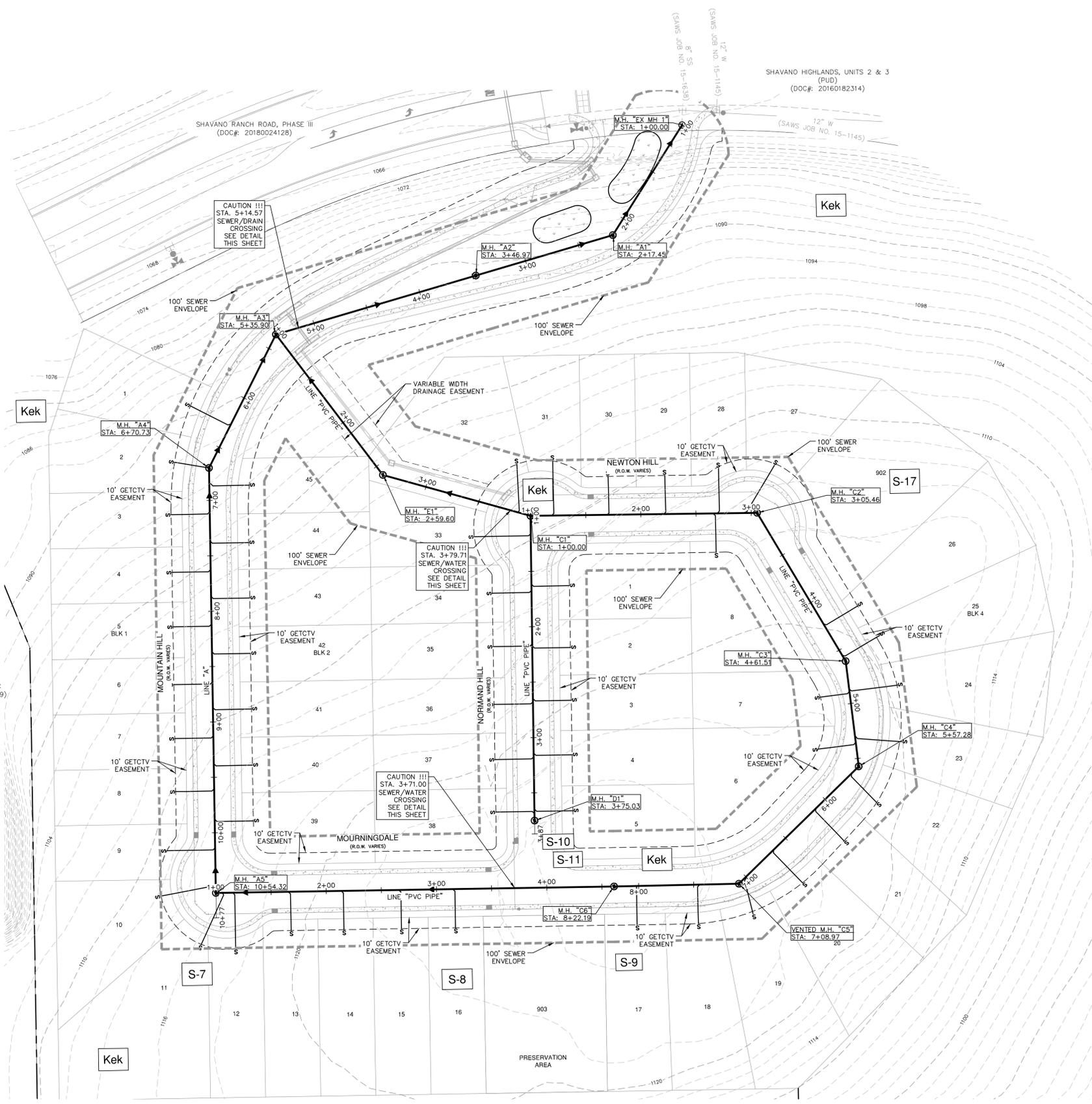
A BEXAR COUNTY PERMIT MUST BE OBTAINED BEFORE WORKING IN BEXAR COUNTY RIGHTS-OF-WAY.

**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.

**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTIS DRIVE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 828-6131 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .53 TOTAL ACREAGE 27.35  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 2611 LF PLAT NO. XXXXX  
 NUMBER OF LOTS 53 SAWS JOB NO. XXXX-XX



Notes: Jul. 27, 2022, 2:15pm. User: P. P. Garcia  
 File: P:\8834\25\Drawings\DWG\SSDW-C5-883425.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: Caleb Chance, P.E.

Date: 2/28/23

Signature of Customer/Agent:



Regulated Entity Name: Shavano Highlands Hilltop

## Regulated Entity Information

1. The type of project is:

- Residential: Number of Lots: 57
- Residential: Number of Living Unit Equivalents: \_\_\_\_\_
- Commercial
- Industrial
- Other: \_\_\_\_\_

2. Total site acreage (size of property): 18.91

3. Estimated projected population: 228 (57 homes x 4 person/home)

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

**Table 1 - Impervious Cover Table**

Impervious Cover of Proposed Project	Sq. Ft.	Sq. Ft./Acre	Acres
Structures/Rooftops	172,640	÷ 43,560 =	3.963
Parking		÷ 43,560 =	
Other paved surfaces	116,000	÷ 43,560 =	2.663
Total Impervious Cover	288,640	÷ 43,560 =	6.626

**Total Impervious Cover  $6.626 \div$  Total Acreage  $18.91 \times 100 = 35.0\%$  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.

$L \times W =$  \_\_\_\_\_  $\text{Ft}^2 \div 43,560 \text{ Ft}^2/\text{Acre} =$  \_\_\_\_\_ acres.

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

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

$L \times W =$  \_\_\_\_\_  $\text{Ft}^2 \div 43,560 \text{ Ft}^2/\text{Acre} =$  \_\_\_\_\_ acres.

Pavement area \_\_\_\_\_ acres  $\div$  R.O.W. area \_\_\_\_\_ acres  $\times 100 =$  \_\_\_\_\_ % impervious cover.

11.  A rest stop will be included in this project.
- A rest stop will not be included in this project.

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

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

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

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

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

<u>100%</u> Domestic	<u>11,400</u> Gallons/day
<u>      </u> % Industrial	<u>      </u> Gallons/day
<u>      </u> % Commingled	<u>      </u> Gallons/day
TOTAL gallons/day <u>11,400 (200 gpd/EDU x 57 EDU)</u>	

15. Wastewater will be disposed of by:

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

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

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

Sewage Collection System (Sewer Lines):

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

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

The SCS was previously submitted on \_\_\_\_\_.

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 Steven M. Clouse (name) Treatment Plant. The treatment facility is:

Existing.

Proposed.

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

## **Site Plan Requirements**

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

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

Site Plan Scale: 1" = 100'.

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. 48029C0235G, Dated 9/29/2010

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**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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 35.3 cfs. The runoff coefficient for the site changes from approximately 0.53 before development to 0.71 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:** Shavano Highlands Hilltop

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, Texas

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: Caleb Chance, P.E.

Texas Licensed Professional Engineer's Number: 98401

Entity: Pape-Dawson Engineers, Inc.

Mailing Address: 2000 NW Loop 410

City, State: San Antonio

Zip: 78213

Telephone: (210) 375-9000

Fax: (210) 375-9000

Email Address: cchance@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: 57
- Multi-family: Number of residential units: \_\_\_\_\_
- Commercial
- Industrial
- Off-site system (not associated with any development)
- Other: \_\_\_\_\_

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

100% Domestic 11,400 gallons/day  
 \_\_\_\_\_% Industrial \_\_\_\_\_ gallons/day  
 \_\_\_\_\_% Commingled \_\_\_\_\_ gallons/day  
 Total gallons/day: 11,400 gpd average (based on 200 gpd/ EDU x 57 EDU)

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

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

- The WPAP application for this development was approved by letter dated 09/09/2022. A copy of the approval letter is attached.
- The WPAP application for this development was submitted to the TCEQ on \_\_\_\_\_, but has not been approved.
- A WPAP application is required for an associated project, but it has not been submitted.
- There is no associated project requiring a WPAP application.

8. Pipe description:

**Table 1 - Pipe Description**

<i>Pipe Diameter(Inches)</i>	<i>Linear Feet (1)</i>	<i>Pipe Material (2)</i>	<i>Specifications (3)</i>
8" NR	3,775.69	PVC, SDR 26	ASTM D3034, ASTM D3212
8" PR (160 psi)	320	PVC, SDR 26	ASTM D 2241, Class 160 ASTM D3139, ASTM C1173

**Total Linear Feet: 4,095.69**

- (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 Steven M. Clouse (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 (SAWS) 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**

<i>Line</i>	<i>Shown on Sheet</i>	<i>Station</i>	<i>Manhole or Clean-out?</i>
"A"	C5.02 Of	13+28.23	MH A10
"B"	C5.04 Of	10+14.80	MH A10
"C"	C5.05 Of	5+76.82	MH C5
"D"	C5.06 Of	3+78.71	MH D1

<i>Line</i>	<i>Shown on Sheet</i>	<i>Station</i>	<i>Manhole or Clean-out?</i>
"E"	C5.07 Of	9+86.92	MH E5
"F"	C5.08 Of	4+10.19	MH D3
	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:

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

- Attachment C – Justification for Variance from Maximum Manhole Spacing.** The maximum spacing between manholes on this project (for each pipe diameter used) is greater than listed in the table above. A justification for any variance from the maximum spacing is attached, and must include a letter from the entity which will operate and maintain the system stating that it has the capability to maintain lines with manhole spacing greater than the allowed spacing.
17.  All manholes will be monolithic, cast-in-place concrete.
- The use of pre-cast manholes is requested for this project. The manufacturer's specifications and construction drawings, showing the method of sealing the joints, are attached.

## **Site Plan Requirements**

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

18.  The Site Plan must have a minimum scale of 1" = 400'.  
Site Plan Scale: 1" = 100'.
19.  The Site Plan must include the sewage collection system general layout, including manholes with station numbers, and sewer pipe stub outs (if any). Site plan must be overlain by topographic contour lines, using a contour interval of not greater than ten feet and showing the area within both the five-year floodplain and the 100-year floodplain of any drainage way.

20. Lateral stub-outs:

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

21. Location of existing and proposed water lines:

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

22. 100-year floodplain:

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

**Table 3 - 100-Year Floodplain**

<i>Line</i>	<i>Sheet</i>	<i>Station</i>
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**

<i>Line</i>	<i>Sheet</i>	<i>Station</i>
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**

<i>Line</i>	<i>Station or Closest Point</i>	<i>Crossing or Parallel</i>	<i>Horizontal Separation Distance</i>	<i>Vertical Separation Distance</i>
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**

<i>Line</i>	<i>Manhole</i>	<i>Station</i>	<i>Sheet</i>

<i>Line</i>	<i>Manhole</i>	<i>Station</i>	<i>Sheet</i>

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(I)(2)(H).

**Table 7 - Drop Manholes**

<i>Line</i>	<i>Manhole</i>	<i>Station</i>	<i>Sheet</i>
"D"	"D3"	1+00.00	C5.06

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**

<i>Line</i>	<i>Profile Sheet</i>	<i>Station to Station</i>	<i>FPS</i>	<i>% Slope</i>	<i>Erosion/Shock Protection</i>

33. Assuming pipes are flowing full, where flows are  $\geq 10$  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**

<b>Standard Details</b>	<b>Shown on Sheet</b>
Lateral stub-out marking <b>[Required]</b>	C5.10 of
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) <b>[Required]</b>	C5.10 of
Alternate method of joining lateral to existing SCS line for potential future connections <b>[Required]</b>	C5.10 of
Typical trench cross-sections <b>[Required]</b>	C5.10 of
Bolted manholes <b>[Required]</b>	C5.10 of
Sewer Service lateral standard details <b>[Required]</b>	C5.10 of
Clean-out at end of line <b>[Required, if used]</b>	N/A of
Baffles or concrete encasement for shock/erosion protection <b>[Required, if flow velocity of any section of pipe &gt;10 fps]</b>	N/A of

<b>Standard Details</b>	<b>Shown on Sheet</b>
Detail showing Wastewater Line/Water Line Crossing <b>[Required, if crossings are proposed]</b>	C5.01 of
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) <b>[Required, if Flexible Pipe is used]</b>	C5.10 of
Drop manholes <b>[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]</b>	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 of TCEQ site inspection
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**

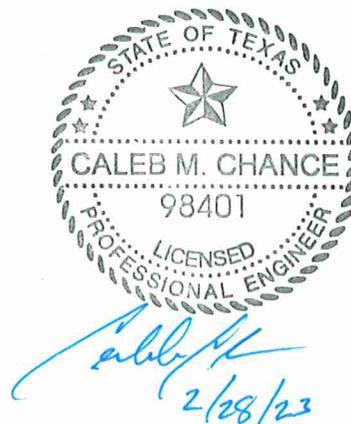
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Organized Sewage Collection System Application** is hereby submitted for TCEQ review and executive director 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: Caleb Chance, P.E

Date: \_\_\_\_\_

Place engineer's seal here:

Signature of Licensed Professional Engineer:



---

## **Appendix A-Flow Velocity Table**

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

**Table 10 - Slope Velocity**

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

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

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

**Figure 1 - Manning's Formula**

Where:

*v* = velocity (ft/sec)

*n* = Manning's roughness coefficient  
(0.013)

*R<sub>h</sub>* = hydraulic radius (ft)

*S* = slope (ft/ft)

**SHAVANO HIGHLANDS HILLTOP  
Organized Sewage Collection System Application (TCEQ-0582)**

**Table 5 - Water Line Crossings**

Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance (ft)
"A"	7+60.97	Crossing	-	6.81
"A"	8+55.47	Crossing	-	6.85
"A"	8+61.47	Crossing	-	5.96
"A"	10+45.96	Crossing	-	5.91
"A"	10+51.97	Crossing	-	5.92
"A"	13+01.27	Crossing	-	3.9
"A"	13+07.62	Crossing	-	3.88
"B"	2+34.89	Crossing	-	2.72
"B"	5+69.07	Crossing	-	3.82
"B"	5+75.09	Crossing	-	3.78
"B"	7+47.89	Crossing	-	3.79
"B"	7+57.67	Crossing	-	3.72
"B"	9+29.43	Crossing	-	4.79
"B"	9+35.43	Crossing	-	4.81
"C"	3+61.76	Crossing	-	3.53
"C"	5+30.77	Crossing	-	3.76

**ATTACHMENT A**  
**(Engineering Design Report)**

**SHAVANO HIGHLANDS HILLTOP  
Engineering Design Report  
8" PVC SDR 26**

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**SHAVANO HIGHLANDS HILLTOP  
Engineering Design Report  
8" PVC SDR 26**

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# SHAVANO HIGHLANDS HILLTOP

## 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

The Shavano Highlands Hilltop Water Pollution Abatement Plan Modification (WPAP MOD) is a modification of the previously approved Shavano Highlands Hilltop WPAP & SCS (EAPP ID No. 13001568-13001569). This WPAP MOD proposes construction of a single-family residential subdivision with associated civil infrastructure, streets, and sidewalks on approximately 18.91 acres within the City of San Antonio, in Bexar County, Texas. The site is located south of Powder Mill and Shavano Ranch Rd intersection. The site is undeveloped and lies within the Upper Salado Creek watershed and does not contain the 100-year floodplain. There were two naturally occurring sensitive geological features identified in the Geologic Assessment. Construction personnel will be educated to be aware of the features and their respective buffers. Absolutely no disturbance of any kind will take place within the proposed buffers as noted on the plan sheets.

This Sewage Collection System (SCS) Application proposed the construction of approximately 4,095.69 linear feet (LF) of sanitary sewer main to serve the development over the Edwards Aquifer Recharge Zone. The proposed alignment will consist of approximately 3,775.69 LF of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main and 320 LF of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered over waterline crossings. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 9.4 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 18.91 acres for the overall development of the site, in accordance with the concurrent WPAP MOD.

# SHAVANO HIGHLANDS HILLTOP

## Engineering Design Report

### 8" PVC SDR 26

Potable water service is to be provided by the San Antonio Water System (SAWS). The proposed development will generate approximately 11,400 gallons per day (average flow) of domestic wastewater based on the assumption of 200 gpd per home (200 gpd x 57 homes x 1 EDU/home). Wastewater will be disposed of by conveyance to the existing Steven M. Clouse Water Recycling Center operated by SAWS. Please refer to the EDR below for additional details.

Please refer to the attached sewer plans, which show 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 EDUs = 57

*\*The total number of EDUs includes flow from both currently proposed and anticipated future construction, as based on SAWS criteria.*

# SHAVANO HIGHLANDS HILLTOP Engineering Design Report 8" PVC SDR 26

1 EDU = 200 gallons per day (average sewage flow)

= 500 gallons per day (peak flow)

Infiltration = 600 gallons per acre served

I/I acreage = 18.91 ac

Avg. Flow =  $57 \text{ EDUs} \times (200 \text{ gpd/EDU}) + [(600 \text{ gpd/acre}) \times 18.91 \text{ acres}] = 22,475 \text{ gpd} = 15.80 \text{ gpm}$

Peak Flow =  $57 \text{ EDUs} \times (500 \text{ gpd/EDU}) + [(600 \text{ gpd/acre}) \times 18.91 \text{ acres}] = 39,846 \text{ gpd} = 27.67 \text{ gpm}$

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:

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

$$v = Q/A$$

# SHAVANO HIGHLANDS HILLTOP Engineering Design Report 8" PVC SDR 26

Where:

$Q$  = Discharge (cfs)

$k$  = Constant [(1.49 ft<sup>1/3</sup>)/sec.]

$n$  = Manning's roughness coefficient (unitless)

$A$  = Flow area (ft<sup>2</sup>)

$R$  = Hydraulic Radius (ft) =  $A/P$  = Cross sectional area of flow (ft<sup>2</sup>)/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:

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

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

$$R = A/P = 0.33 \text{ ft}^2/2.03 \text{ ft} = 0.16 \text{ ft}$$

$$S = 0.004$$

$$Q = [(1.49 \text{ ft}^{1/3}/\text{sec})/0.013](0.33 \text{ ft}^2)(0.16 \text{ ft})^{2/3}(0.004)^{1/2}$$

$$Q = 0.70 \text{ cfs} = 316 \text{ gpm} = Q_{full}$$

$$v = 0.70 \text{ cfs}/0.33 \text{ ft}^2 = \mathbf{2.15 \text{ ft/s}}$$

$$Q_{max} = 0.70 \text{ cfs} (0.90)(7.48 \text{ gallons/1 cf})(60 \text{ sec/1 min.}) = \mathbf{284 \text{ gpm}}$$

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

$$A = \pi(D_i^2)/4 = \pi(7.961 \text{ in})^2/4 = 49.78 \text{ in}^2 = 0.35 \text{ ft}^2$$

$$P = \pi(D_i) = \pi(7.961 \text{ in}) = 25.01 \text{ in} = 2.08 \text{ ft}$$

$$R = A/P = 0.35 \text{ ft}^2/2.08 \text{ ft} = 0.17 \text{ ft}$$

$$S = 0.004$$

$$Q = [(1.49 \text{ ft}^{1/3}/\text{sec})/0.013](0.35 \text{ ft}^2)(0.17 \text{ ft})^{2/3}(0.004)^{1/2}$$

$$Q = 0.76 \text{ cfs} = 339 \text{ gpm} = Q_{full}$$

$$v = 0.76 \text{ cfs}/0.35 \text{ ft}^2 = \mathbf{2.19 \text{ ft/s}}$$

$$Q_{max} = 0.76 \text{ cfs} (0.90)(7.48 \text{ gallons/1 cf})(60 \text{ sec/1 min.}) = \mathbf{306 \text{ gpm}}$$

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Nominal Main Size (in)	Outer Diameter (in)	Minimum Slope (%)	Area (ft <sup>2</sup> )	Hydraulic Radius (A/P) ft	R <sup>2/3</sup>	S <sup>1/2</sup>	Q-Full (cfs)	Max Pipe (%)	Velocity (ft/s)	Q-Max (gpm)
8	8.40	0.40	0.33	0.16	0.30	0.063	0.70	90	2.15	284
8	8.625	0.40	0.35	0.17	0.30	0.063	0.76	90	2.19	306

**Conclusion**

The proposed 8" pipe (NR & 160 psi) with a minimum slope of 0.40% 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	3,775.69	PVC SDR 26	ASTM D3034	ASTM D3212
8	320	PVC SDR 26	ASTM 2241, Class 160	ASTM D3139 ASTM C1173

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.

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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 pipes.

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 **precast concrete**.

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#### 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" (NR and 160 psi)      Min. Slope: 0.40%      Max. Slope: 8.00%

#### 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.

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#### Minimum and Maximum Trench Width

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

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

Pipe Diameter: **8" (160 psi)** 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

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Manhole Spacing:

Pipe Diameter: 8" Max. Spacing: 324.96 LF

See SAWS Standard Specification in Appendix C 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 six (6) feet. Based on Table 6-6 Live Loads on PVC pipe (from Uni-Bell Handbook for PVC) for this sewer line would be 1.39 psi. Live load effects will not be calculated at 15-ft bury depth due to effects being negligible below 10 feet.

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#### Buckling Pressure Calculations

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

The value of  $H$  for use in these calculations is fifteen (15) feet as it exceeds the maximum burial depth for this line. The value of  $\gamma_s$  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:

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

$$q_a = 0.4 * \sqrt{32 * 1 * 0.40 * 400(400,000 * 0.003/8.08^3)} = 41.72 \text{ psi (8" PVC, SDR26, NR)}$$

$$q_a = 0.4 * \sqrt{32 * 1 * 0.40 * 400(400,000 * 0.003/8.29^3)} = 41.78 \text{ psi (8" PVC, SDR26, PR)}$$

$$R_w = 1 - 0.33 * (h_w/h) \quad \text{Equation 2}$$

$$R_w = 1 - 0.33 * (0/15) = 1$$

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

$$B' = \frac{1}{1 + 4 * e^{-0.065 * 15}} = 0.40$$

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

$$I = .323^3/12 = .003 \text{ in}^3 \text{ (8" PVC SDR26, NR)}$$

$$I = .332^3/12 = .003 \text{ in}^3 \text{ (8" PVC SDR26, PR)}$$

$$D = D_o - t \quad \text{Equation 5}$$

$$D = 8.4 \text{ inches} - 0.323 \text{ inches} = 8.08 \text{ inches (8" PVC SDR26, NR)}$$

$$D = 8.625 \text{ inches} - 0.332 \text{ inches} = 8.29 \text{ inches (8" PVC SDR26, PR)}$$

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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  $h_w = 0$ ,  $R_w = 1$ . If  $0 \leq h_w \leq h$  (groundwater elevation is between the top of the pipe and the ground surface), calculate  $R_w$  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,  $\text{inch}^4/\text{linear inch} = \text{inch}^3$ . 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

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

$$q_p = 0.361 * 0 + 1 * (125.13/8.08) + 1.39 = 16.88 \text{ psi (8" PVC SDR26, NR)}$$

$$q_p = 0.361 * 0 + 1 * (128.48/8.29) + 1.39 = 16.88 \text{ psi (8" PVC SDR26, PR)}$$

Where:

- $q_p$  = Pressure applied to pipe under installed conditions (psi)
- $\gamma_w$  = 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)
- $\gamma_s$  = Specific weight of soil in pounds per cubic foot (pcf)
- $D$  = Mean pipe diameter (in)

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

*Equation 7*

$$W_c = 143 * 15 * (8.08 + 0.323)/144 = 125.13\text{lb/in}^2(8'' \text{ PVC SDR 26, NR})$$

$$W_c = 143 * 15 * (8.29 + 0.332)/144 = 128.48\text{lb/in}^2(8'' \text{ PVC SDR 26, PR})$$

Pipe Diameter: **8" (NR)** Pipe Material: **PVC, SDR 26**  $q_a$ : **41.72**  $q_p$ : **16.88**

Pipe Diameter: **8" (PR)** Pipe Material: **PVC, SDR 26**  $q_a$ : **41.78**  $q_p$ : **16.88**

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.

$$H = (24 * P_c * A) / (\gamma_s * D_o)$$

*Equation 8*

$$A = t(\text{in}) \times 12(\text{in}/\text{ft})$$

*Equation 9*

$$H = (24 * 4,000 * 3.876) / (143 * 8.4) = 309.77(8'' \text{ PVC SDR 26, NR})$$

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

$$H = (24 * 4,000 * 3.984) / (143 * 8.625) = 310.10(8'' \text{ PVC SDR 26, PR})$$

$$A = 0.332(\text{in}) \times 12(\text{in}/\text{ft}) = 3.984$$

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.<sup>2</sup>/ft [conversion factor of 12 applied to change from ft. to in.]

$\gamma_s$  = 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

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#### 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

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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 =  $E_b/E'_n = 400 \text{ psi}/3,000 \text{ psi} = 0.13$

### 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.

$$\text{zeta} = \frac{1.44}{f + (1.44 - f) * (E_b/E'_n)} \quad \text{Equation 10}$$

$$\text{zeta} = \frac{1.44}{1.22 + (1.44 - 1.22) * 0.13} = 1.15(8'' \text{ PVC SDR 26, NR})$$

$$\text{zeta} = \frac{1.44}{1.22 + (1.44 - 1.22) * 0.13} = 1.15(8'' \text{ PVC SDR 26, PR})$$

$$f = \frac{(b/d_a) - 1}{1.154 + 0.444 * ((b/d_a) - 1)} \quad \text{Equation 11}$$

$$f = \frac{(34/8.4) - 1}{1.154 + 0.444 * ((34/8.4) - 1)} = 1.22(8'' \text{ PVC SDR 26, NR})$$

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

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Where:

- f = Pipe/trench width coefficient
- b = Trench width (in)
- d<sub>a</sub> = Pipe diameter (in)
- E<sub>b</sub> = Modulus of soil reaction for the bedding material (psi)
- E'<sub>n</sub> = Modulus of soil reaction for the in-situ soil (psi)

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

Pipe Diameter: 8" (160 psi) 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).

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.

$$\Delta Y/D(\%) = \frac{K * (L_p + L_1) * 100}{(0.149 * P_s) + (0.061 * \text{zeta} * E_b)} \quad \text{Equation 12}$$

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$$\Delta Y/D(\%) = \frac{0.096 * (14.90 + 0) * 100}{(0.149 * 115) + (0.061 * 1.15 * 400)} = 3.15\%(8'' \text{ PVC SDR 26, NR})$$

$$\Delta Y/D(\%) = \frac{0.096 * (14.90 + 0) * 100}{(0.149 * 115) + (0.061 * 1.15 * 400)} = 3.15\%(8'' \text{ PVC SDR 26, PR})$$

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

Equation 13

$$L_p = \frac{143 * 15}{144} = 14.90 \text{ psi}$$

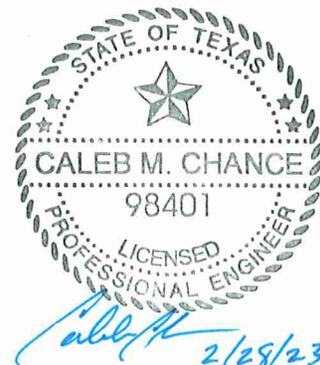
Where:

- %ΔY/D = Predicted % vertical deflection under load
- ΔY = Change in vertical pipe diameter under load
- D = Undeformed mean pipe diameter (in)
- K = Bedding angle constant
- γ<sub>s</sub> = Unit weight of soil (pcf)
- H = Depth of burial (ft) from ground surface to crown of pipe
- L<sub>p</sub> = Prism load (psi)

Type of Pipe Material	P <sub>s</sub> (psi)	Zeta Factor Assumed or Calculated	E <sub>b</sub> (psi)	% Deflection
8" PVC SDR 26	115	1.15	400	3.15
8" PVC SDR 26 160 psi	115	1.15	400	3.15

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

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



# **APPENDIX A (TABLES)**

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

<sup>A</sup> Based on the material passing the 3-in. (75-mm) sieve.

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup>  $Cu = D_{60} / D_{10}$

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

<sup>D</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>E</sup> 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

<sup>F</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>G</sup> If fines are organic, add "with organic fines" to group name.

<sup>H</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>I</sup> 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

<sup>J</sup> If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay (see Test Method D4318).

<sup>K</sup> If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel", whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly sand, add "sandy" to group name.

<sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup>  $PI < 4$  or plots below "A" line.

<sup>P</sup>  $PI$  plots on or above "A" line.

<sup>Q</sup>  $PI$  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 <sup>A,B</sup>	Soil Class	American Association of State Highway and Transportation Officials (AASHTO) Soil Groups <sup>C</sup>
Crushed rock, angular <sup>D</sup> , 100% passing 1-1/2 in. sieve, $\leq$ 15 % passing #4 sieve, $\leq$ 25 % passing 3/8 in. sieve and $\leq$ 12 % passing #200 sieve	Class I	--
Clean, coarse grained soils: SW, SP, GW, GP or any soil beginning with one of these symbols with $\leq$ 12 % passing #200 sieve <sup>E,F</sup>	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 $\geq$ 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

<sup>A</sup> See Classification D2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

<sup>B</sup> 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."

<sup>C</sup> AASHTO M145, Classification of Soils and Soil Aggregate Mixtures.

<sup>D</sup> All particle face shall be fractured.

<sup>E</sup> 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.

<sup>F</sup> 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 <sup>A</sup>	Class I <sup>B</sup>	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 <sup>D</sup>	See Note <sup>C</sup>	85 % (SW and SP soils) For GW and GP soils See Note <sup>E</sup>	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

<sup>A</sup> Class V materials are unsuitable as embedment. They may be used as final backfill as permitted by the engineer.

<sup>B</sup> 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.

<sup>C</sup> Suitable compaction typically achieved by dumped placement (that is, uncompacted but worked into haunch zone to ensure complete placement).

<sup>D</sup> SPD is standard Proctor density as determined by Test Method D698.

<sup>E</sup> Place and compact GW and GP soils with at least two passes of compaction equipment.

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

Height of Cover (ft)	Live Load Transferred to Pipe, lb/in <sup>2</sup>			Height of Cover (ft)	Live Load Transferred to Pipe, lb/in <sup>2</sup>		
	Highway H20 <sup>1</sup>	Railway E80 <sup>2</sup>	Airport <sup>3</sup>		Highway H20 <sup>1</sup>	Railway E80 <sup>2</sup>	Airport <sup>3</sup>
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	*	*	*

<sup>1</sup> Simulates 20 ton truck traffic + impact (Source: ASTM A 796)

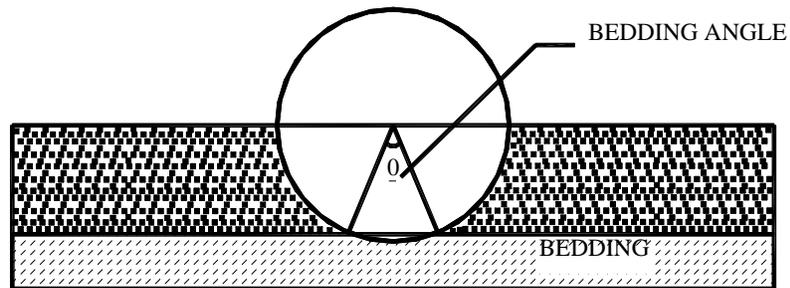
<sup>2</sup> Simulates 80,000 lb/ft railway load + impact (Source: ASTM A 796)

<sup>3</sup> 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**

<u>BEDDING ANGLE (DEGREES)</u>	<u>K</u>
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 <sup>a</sup> ) (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) <sup>b</sup> Soils with medium to high plasticity, CH, MH, CH-MH	No data available; consult a competent soils engineer; Otherwise use E' = 0			
Fine-grained Soils (LL<50) Soils with medium to no plasticity, CL, ML, ML-CL, with less than 25% coarse- grained particles	50	200	400	1,000
Fine-grained Soils (LL<50) Soils with medium to no plasticity, CL, ML, ML-CL, with more than 25% coarse-grained particles Coarse-grained Soils with Fines GM, GC, SM, SC <sup>c</sup> contains more than 12% fines	100	400	1,000	2,000
Coarse-grained Soils with Little or no Fines GW, GP, SW, SP <sup>c</sup> 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 <sup>d</sup>	± 2	± 2	± 1	± 0.5
<sup>a</sup> ASTM Designation D 2487, USBR Designation E-3. <sup>b</sup> LL = Liquid limit. <sup>c</sup> Or any borderline soil beginning with one of these symbols (i.e. GM-GC, GC-SC). <sup>d</sup> 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 <sup>3</sup> ) (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.

# **APPENDIX B (SOIL UNIT WEIGHT VALUES)**



**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

January 14, 2009

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

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

Dear Mr. Forster:

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

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

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

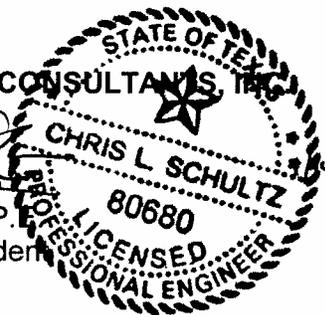
We appreciate the opportunity to be of service to you. If you have any questions or need additional assistance, please call.

Very truly yours,

**RABA-KISTNER CONSULTANTS, INC.**

*[Handwritten Signature]*  
 1/14/09

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



CLS/mem

**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](https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20852%20Sanitary%20Sewer%20Manholes.pdf)

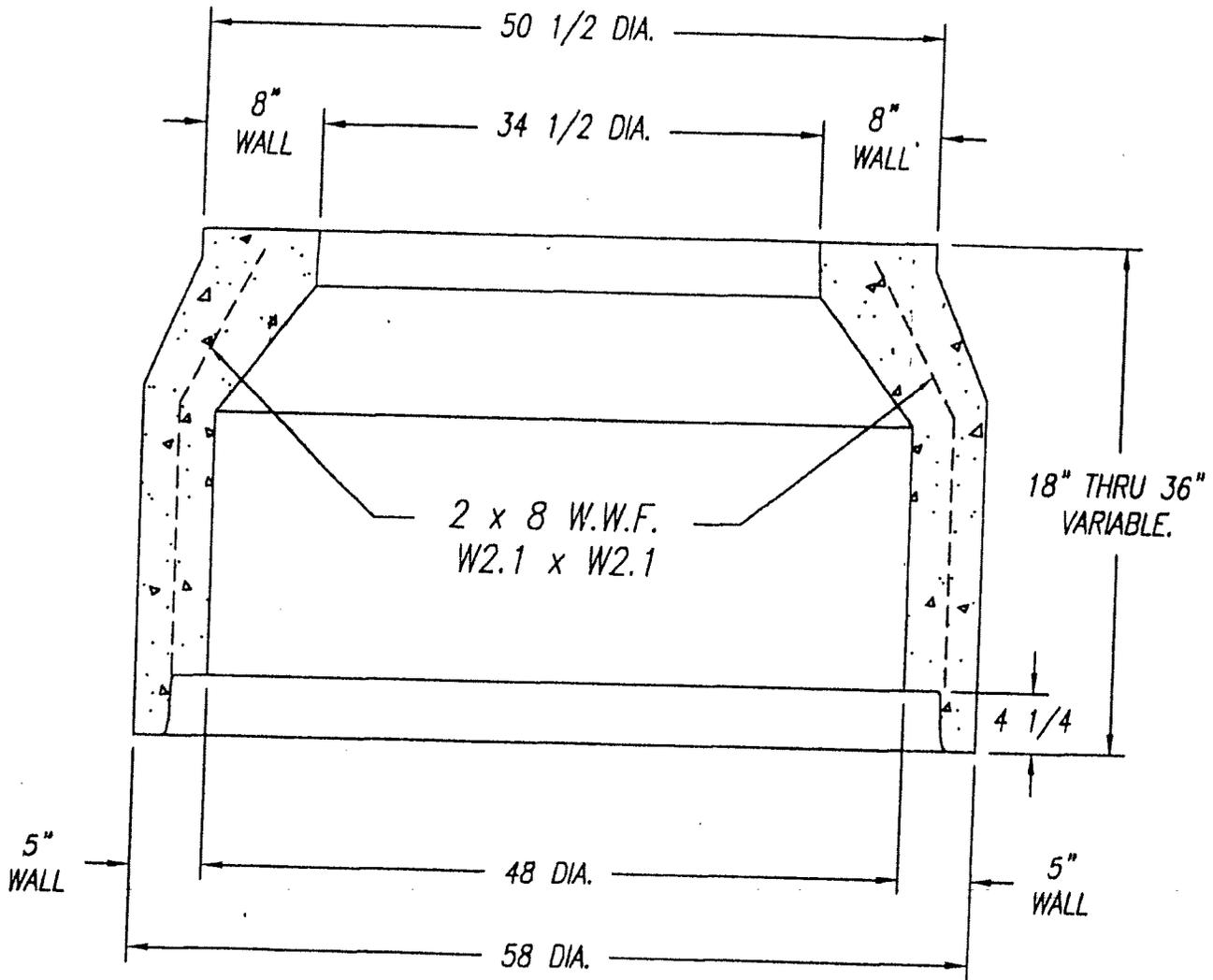
Specification 854: Sanitary Sewer Laterals

[https://apps.saws.org/business\\_center/specs/constspecs/docs/conspecs\\_2021/ITEM%20NO.%20854%20Sanitary%20Sewer%20Laterals.pdf](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](https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20804%20Excavation%20Trenching%20and%20Backfill.pdf)

**PRE-CAST MANHOLE  
DRAWINGS &  
SPECIFICATIONS**

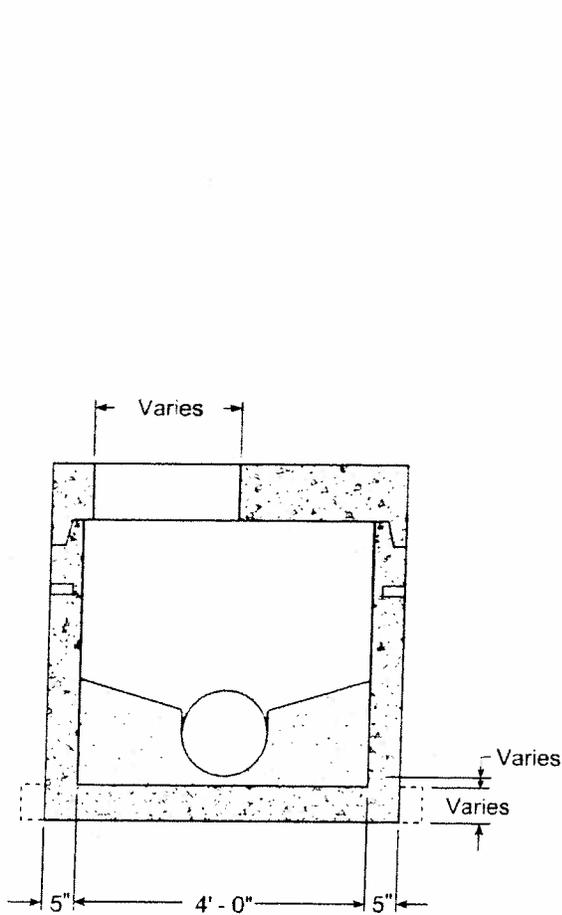


(7R JOINT)

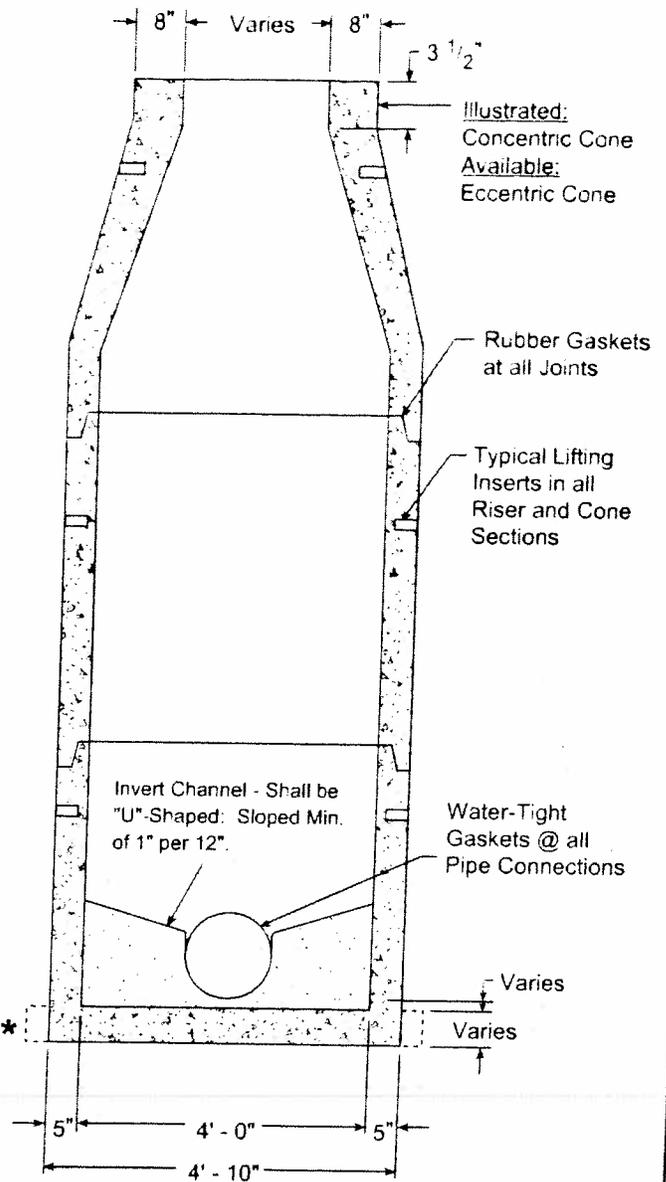
REF. FORM DWG. 3-303-5561

		<p><b>QUINN</b>  <b>MACHINE &amp; FOUNDRY CORP.</b>          A MEMBER OF THE BESSER FAMILY OF COMPANIES          BOONE, IOWA U.S.A.</p>	
<p><small>THIS PRINT IS THE PROPERTY OF INTERNATIONAL PIPE MACHINERY CORP. IT IS CONFIDENTIAL AND NOT TO BE REPRODUCED WITHOUT OUR EXPRESS PERMISSION AND MUST BE RETURNED UPON REQUEST.</small></p>			
<p><b>CHARLOTTE</b></p>			
<p>48 x 5 x 34 1/2 x 8 x 36 &amp; 18          CONCENTRIC CONCRETE SECTION</p>			
DRAFTER	JJK	4/19/02	REV.
CHECKED			
SCALE: 1/16" = 1"			<p><b>CONCENTRIC</b></p>

# Precast Manholes



**Flattop Illustration**  
for Shallow Manhole



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

## Materials & Features

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

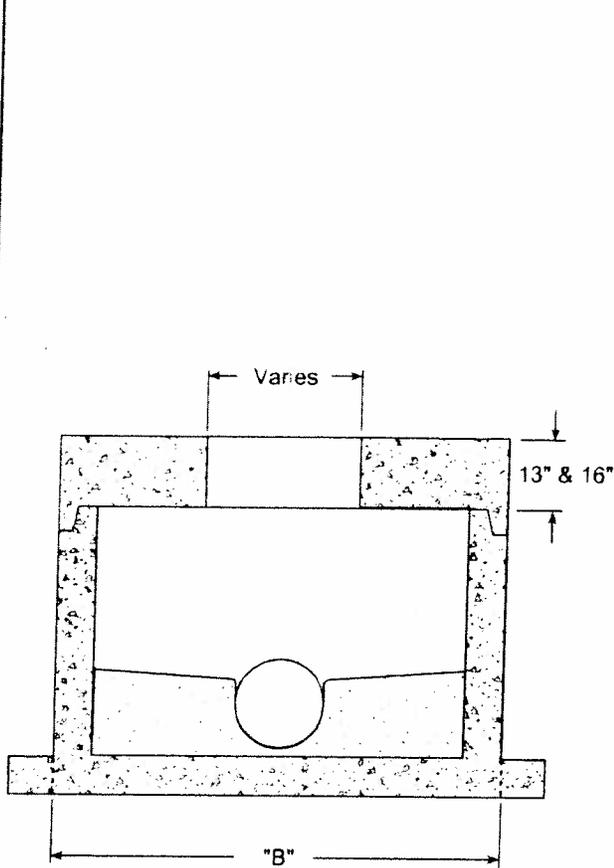
TITLE	PLANT	STATE	SECTION, PAGE	DATE	
4' I.D. Manhole Regular Base w/ Reducing Cone	All Plants	TX	5.5	08-15-06	

Contact Hanson

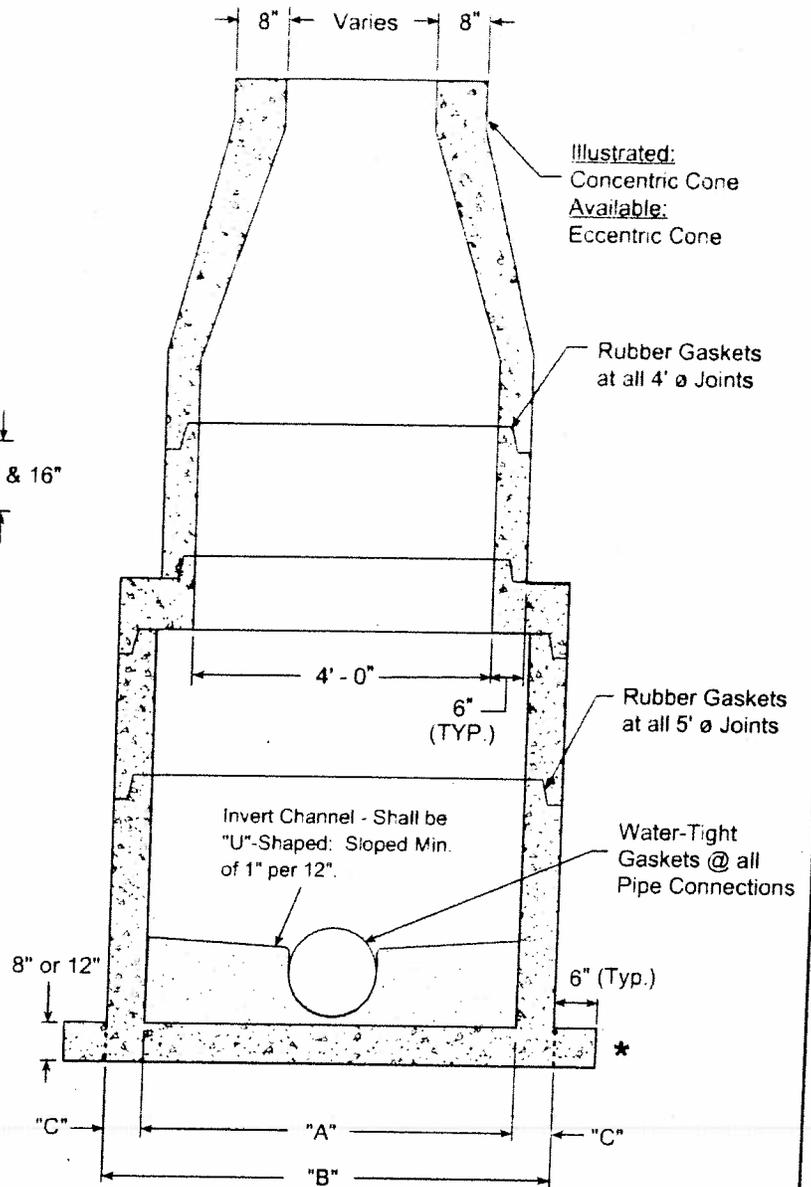
Go to Index

EXIT 

# Precast Manholes



**Flattop Illustration**  
for Shallow Manhole



**Section View**  
5' 1/4' & 6' 1/4' 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' 1/4' & 6' 1/4' I.D. Manhole**  
Extended Base w/Reducing Cone

All Plants

TX

5.6

08-15-06

**Hanson**

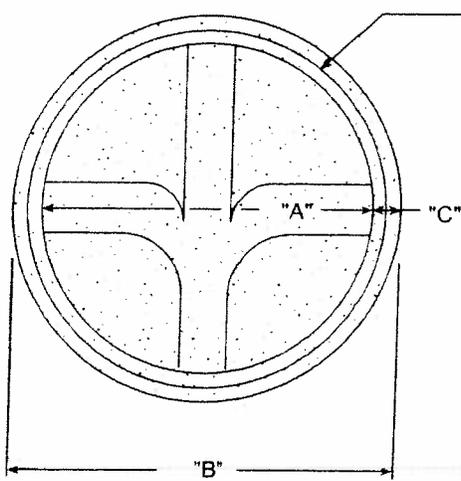
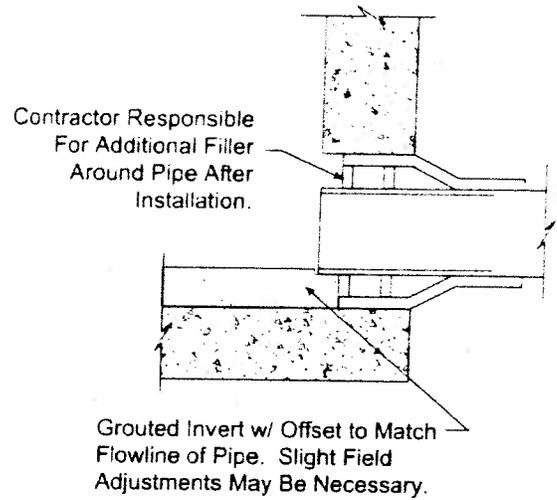
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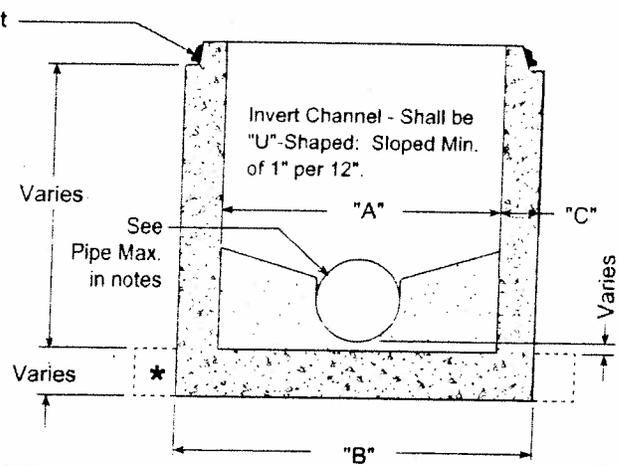
EXIT

# Precast Manholes

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



**Plan View**



**Section View**

## 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.

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"

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

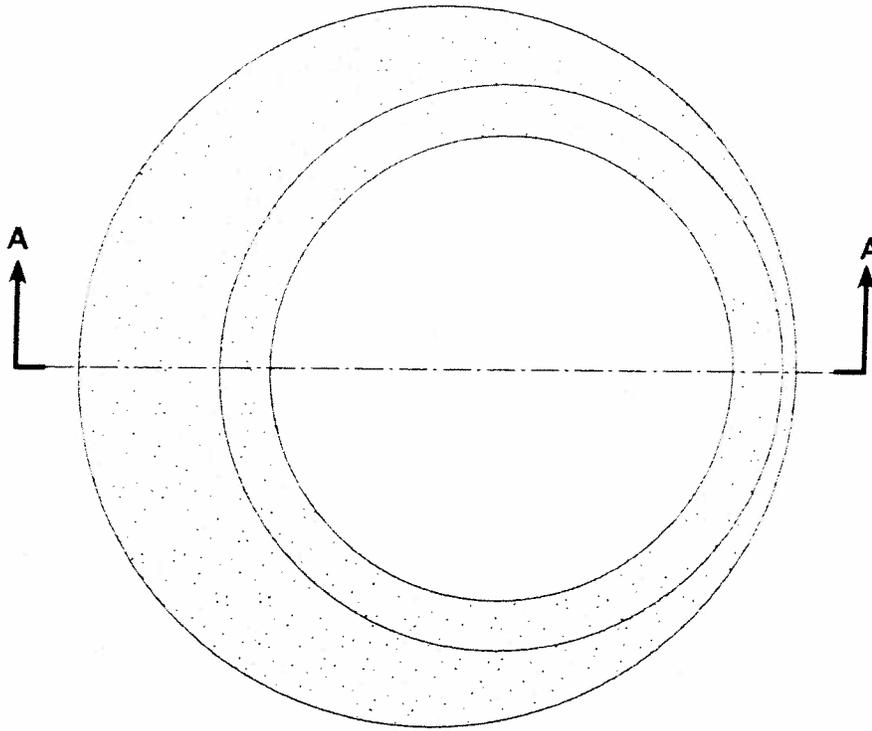
TITLE	PLANT	STATE	SECTION/PAGE	DATE	
<b>Details: 4', 5' &amp; 6' I.D. Precast Regular Manhole Base</b>	All Plants	TX	5.7	08-15-06	

**Contact Hanson**

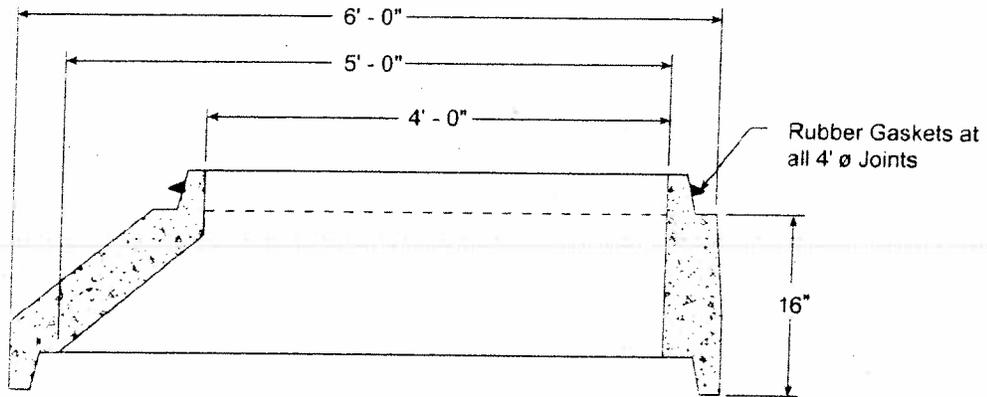
**Go to Index**

**EXIT**

**Precast Manholes**



**Plan View**



**Section View**

**Materials & Features**

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

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

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

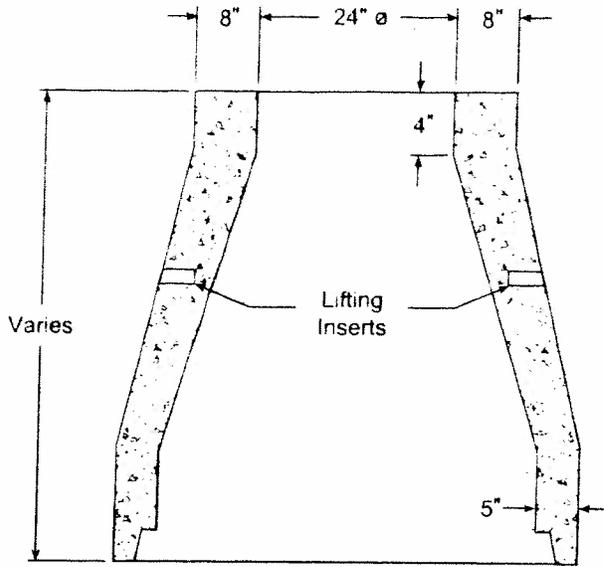


**Contact Hanson**

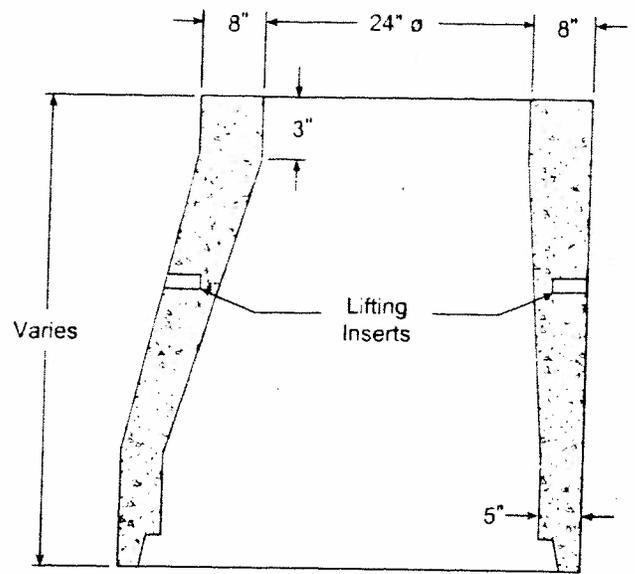
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**EXIT**

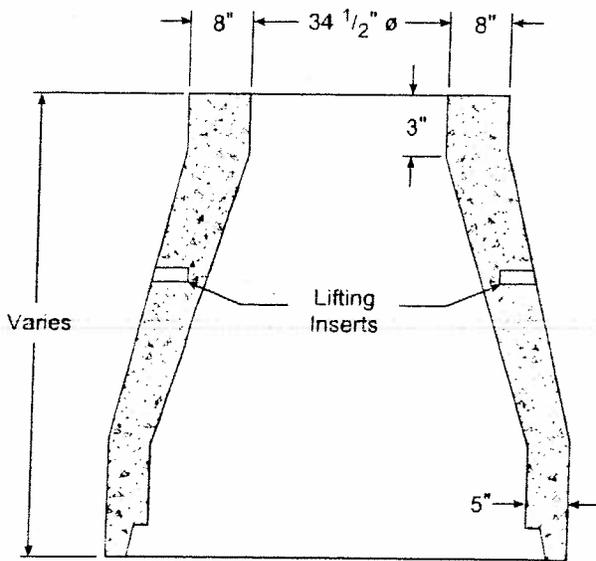
# Precast Manholes



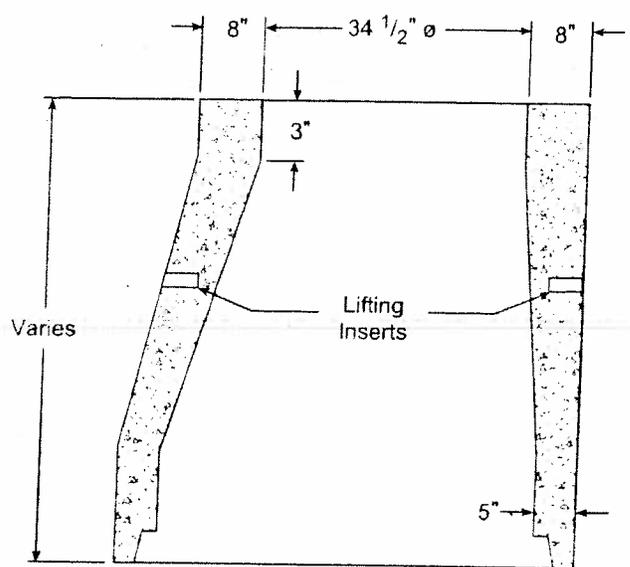
**Concentric Cone**  
24"  $\varnothing$  Opening



**Eccentric Cone**  
24"  $\varnothing$  Opening



**Concentric Cone**  
34 1/2"  $\varnothing$  Opening



**Eccentric Cone**  
34 1/2"  $\varnothing$  Opening

## Materials & Features

CONCRETE: 5,000 PSI, 28 day strength.  
REINFORCING: Meets or exceeds ASTM C478 requirements.  
30"  $\varnothing$  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

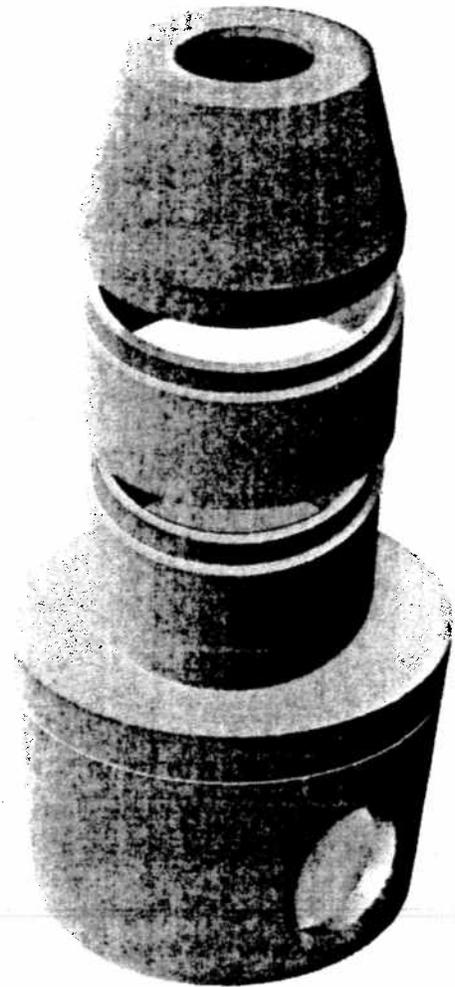
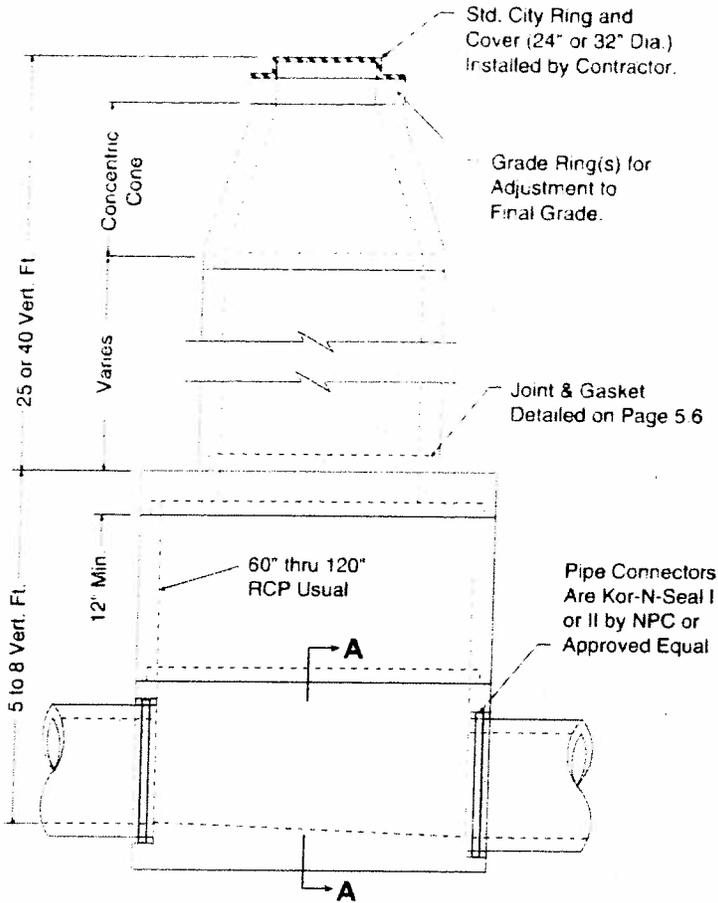


Contact Hanson

Go to Index

EXIT

# Precast Manholes



**Isometric View**

**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 1/2" cover from top of slab.

**Materials & Features**

CONCRETE: 5,000 PSI in 28 days.  
 REINFORCING STEEL, per ASTM A-615, Grade 60.  
 REINFORCING to meet AASHTO HS 20-44 Loading.  
 DESIGN EQUAL TO OR EXCEEDS ASTM C-478  
 In the event a boot is loose contact your Hanson representative to resolve.

**Note:**

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

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

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

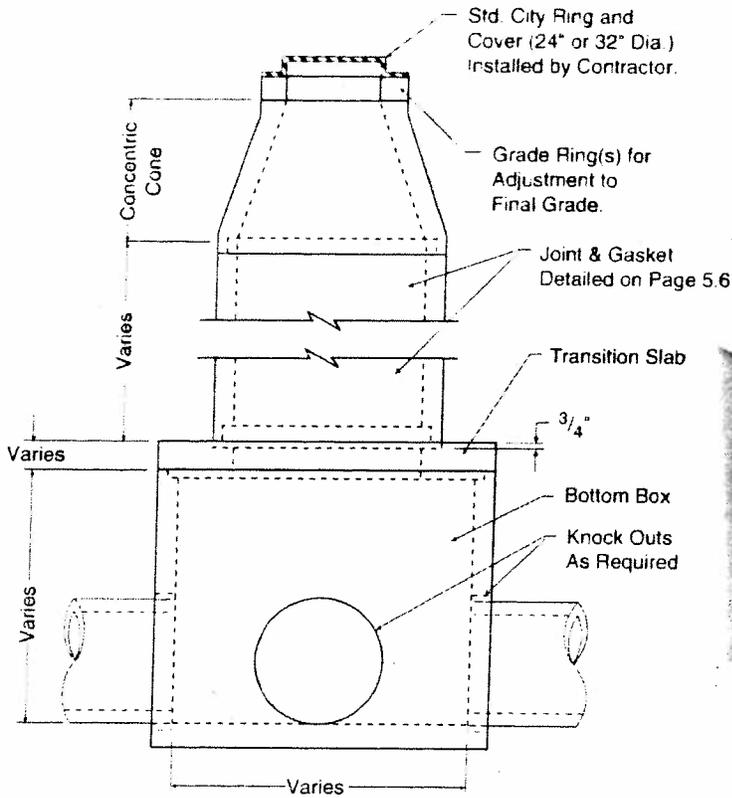


**Contact Hanson**

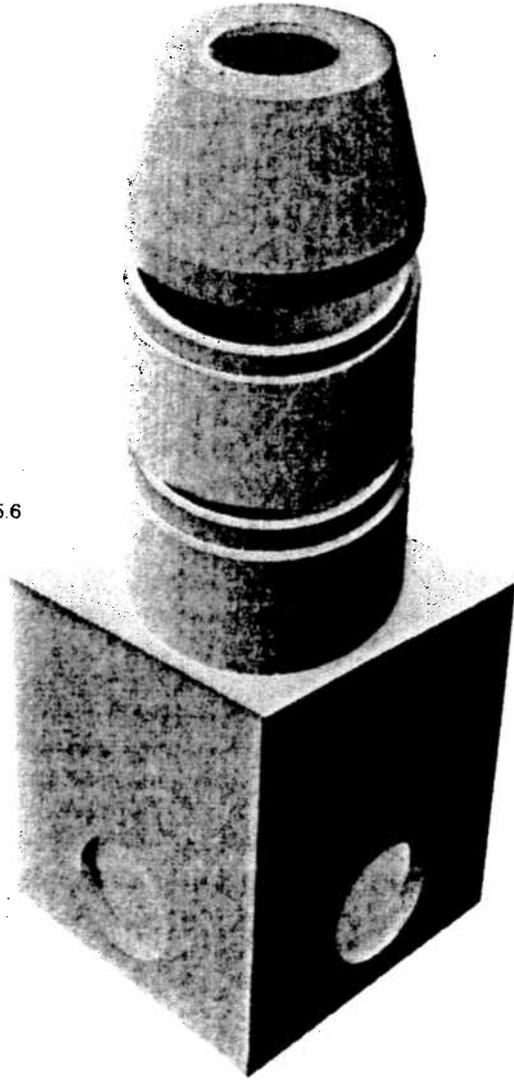
**Go to Index**



# Precast Manholes



**Side View**



**Isometric View**

## Materials & Features

CONCRETE: 5,000 PSI in 28 days.

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

REINFORCING to meet AASHTO HS 20-44 Loading.

BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

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

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

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

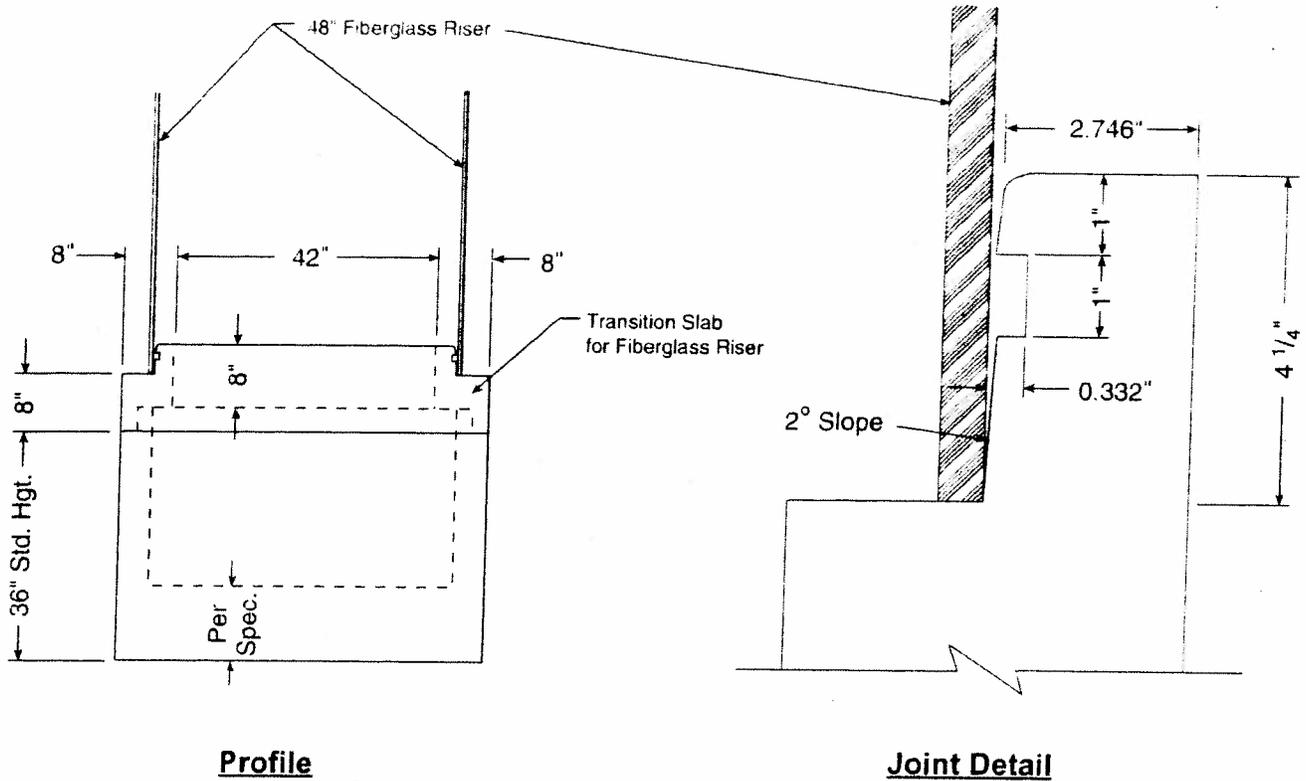


**Contact Hanson**

**Go to Index**

**EXIT**

# Precast Manholes



## 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.

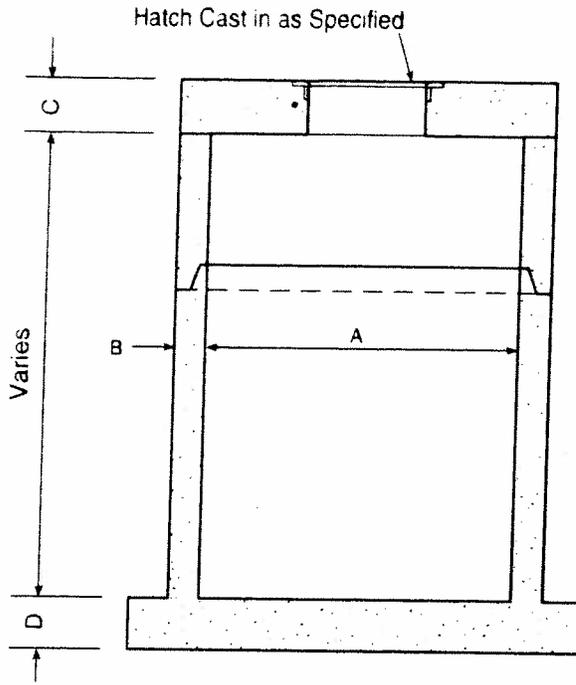
TITLE	PLANT	STATE	SECTION, PAGE	DATE	
ASTM C-478 Special Base	Houston	TX	5.12	08-15-06	

Contact Hanson

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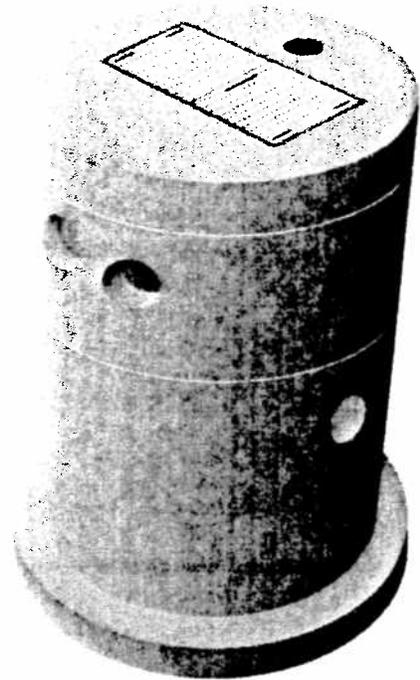
EXIT

# Precast Manholes



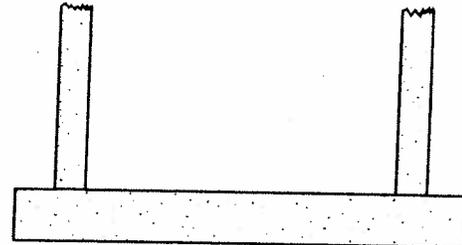
**Section View**

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



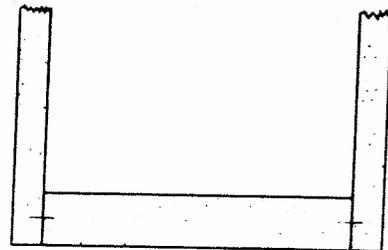
**Isometric View**

Product Dimensions				
A	B	C	D	
60"	Contact your local Hanson representative for product dimensions.			
72"				
84"				
96"				
108"				
120"				
132"				
144"				



**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	

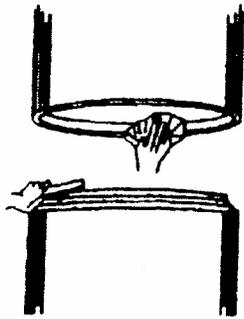
**Contact Hanson**

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**EXIT**

①

### "O"-Ring Gasket



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

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

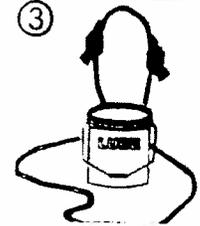
Improperly prepared bell and spigot surfaces may prevent homing of the pipe or keep the gasket from sealing.

②



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

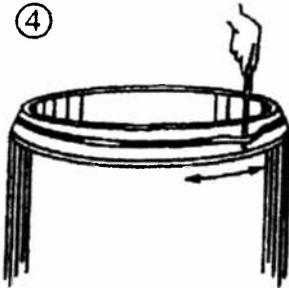
③



Lubricate the gasket thoroughly 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

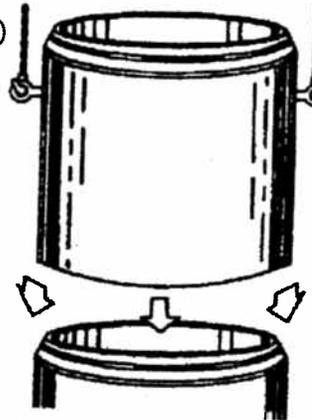


#### \*\*IMPORTANT\*\*

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 handled 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

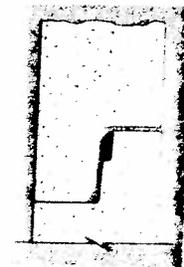


Fig. B

**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.

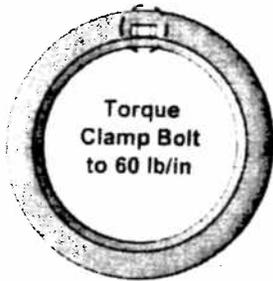
TITLE	PLANT	STATE	SECTION, PAGE	DATE	
O-Ring & Profile Gasket Installation on Manholes	All Plants	TX	5.14	08-15-06	

Contact Hanson

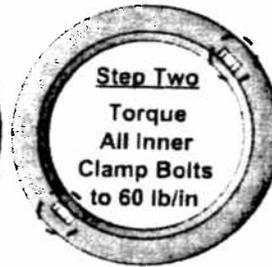
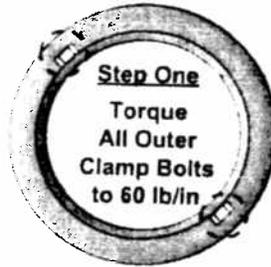
Go to Index

EXIT

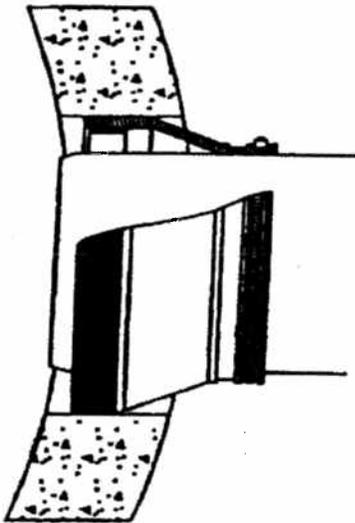
# Precast Manholes



**Single Clamp**



**Multiple Clamps**



## Instructions

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

**For more information contact your local Hanson Representative.**

TITLE	PLANT	STATE	SECTION, PAGE	DATE
Pipe to Manhole Connector Installation Guide	All Plants	TX	5.15	08-15-06

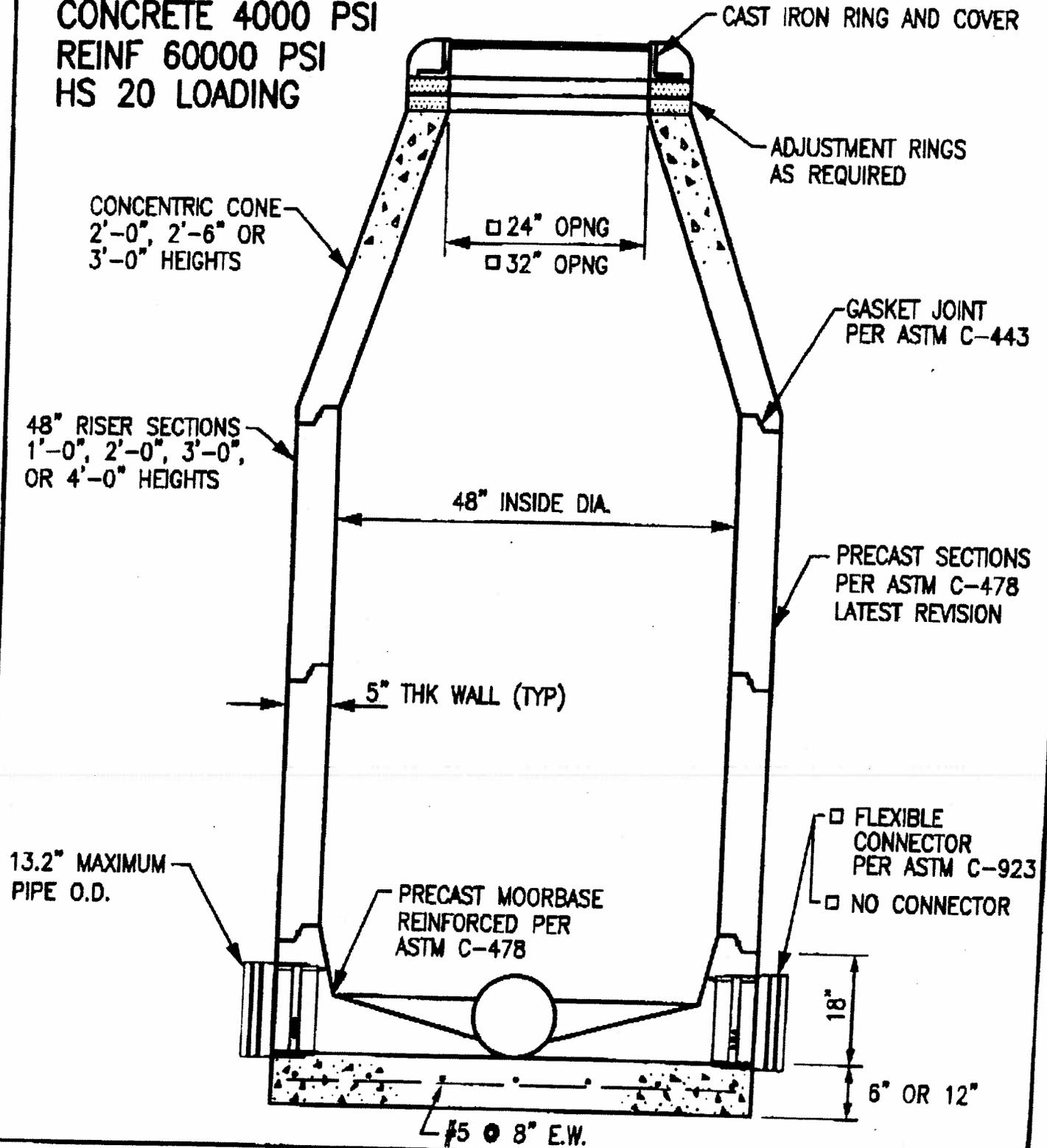


**Contact Hanson**

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**EXIT**

**CONCRETE 4000 PSI  
REINF 60000 PSI  
HS 20 LOADING**



**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
<b>48" PRECAST CONCENTRIC MANHOLE WITH MOORBASE</b>		
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: Caleb Chance, P.E.

Date: 2/28/25

Signature of Customer/Agent:



---

Regulated Entity Name: Shavano Highlands Hilltop

## 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: Salado 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**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### Attachment A – Spill Response Actions

In the event of an accidental leak or spill:

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

In the event of an accidental significant or hazardous spill:

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

- Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site. [https://www.tceq.texas.gov/response/spills/spill\\_rq.html](https://www.tceq.texas.gov/response/spills/spill_rq.html)
- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

## **SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan Modification**

- 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**

# SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

## Attachment B – Potential Sources of Contamination

Other potential sources of contamination during construction include:

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

## SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

- |                      |   |   |
|----------------------|---|---|
| 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**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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 18.91 acres. The second is construction that will include construction of homes with associated streets and sidewalks, the Jellyfish filter basin, construction of new pavement area, landscaping and site cleanup. This will disturb approximately 18.91 acres. Approximately 9.4 acres of the project site may be disturbed for this SCS installation, including excavation, construction of sewer mains, backfill, and compaction.

**ATTACHMENT D**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan

### 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.

***Due to site topography, 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.

***Sensitive features within the project limits will be protected by the proposed TBMPs within this plan. Construction personnel will be educated to be aware of the features and their respective buffers. Absolutely no disturbance of any kind will take place within the proposed buffers as noted on the plan sheets.***

***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.***

## SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan Modification

- 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**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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**

# SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

## Attachment G – Drainage Area Map

No more than ten (10) acres will be disturbed within a common drainage area at one time as construction of civil infrastructure (utilities, roads, drainage, etc.) will precede home building construction. All TBMPs utilized are adequate for the drainage areas served.

**ATTACHMENT I**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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.

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

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

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

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

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

\_\_\_\_\_  
Inspector's Name

\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Date

# SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan Modification

## PROJECT MILESTONE DATES

Date when major site grading activities begin:

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

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

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

Dates when stabilization measures are initiated:

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

**ATTACHMENT J**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan

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

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

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

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

# Permanent Stormwater Section

## Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(C), (D)(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: Caleb Chance, P.E.

Date: 2/28/23

Signature of Customer/Agent



Regulated Entity Name: Shavano Highlands Hilltop

## Permanent Best Management Practices (BMPs)

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

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

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

N/A

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

N/A

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

The site will be used for low density single-family residential development and has 20% or less impervious cover.

The site will be used for low density single-family residential development but has more than 20% impervious cover.

The site will not be used for low density single-family residential development.

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

**Attachment A - 20% or Less Impervious Cover Waiver.** The site will be used for multi-family residential developments, schools, or small business sites and has 20% or less impervious cover. A request to waive the requirements for other permanent BMPs and measures is attached.

The site will be used for multi-family residential developments, schools, or small business sites but has more than 20% impervious cover.

The site will not be used for multi-family residential developments, schools, or small business sites.

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

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

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

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

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

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

**ATTACHMENT B**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### Attachment B – BMPs for Upgradient Stormwater

No upgradient stormwater will flow across the project limits.

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

**ATTACHMENT C**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

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

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

**ATTACHMENT D**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### Attachment D – BMPs for Surface Streams

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

**ATTACHMENT F**

**SHAVANO HIGHLANDS HILLTOP  
Water Pollution Abatement Plan Modification**

**Attachment F – Construction Plans**

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

**ATTACHMENT G**

# SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

## PERMANENT POLLUTION ABATEMENT MEASURES MAINTENANCE SCHEDULE AND MAINTENANCE PROCEDURES

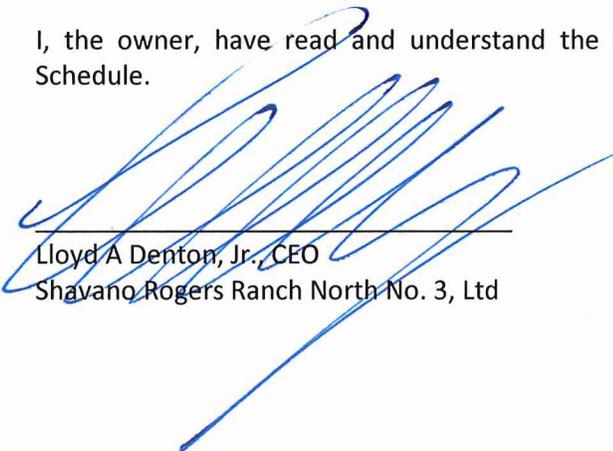
This document has been prepared to provide a description and schedule for the performance of maintenance on permanent pollution abatement measures. Maintenance measures to be performed will be dependent on what permanent pollution abatement measures are incorporated into the project. The project specific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

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.



\_\_\_\_\_  
Lloyd A Denton, Jr., CEO  
Shavano Rogers Ranch North No. 3, Ltd

07.05.22  
Date

# SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

## INSPECTION AND MAINTENANCE SCHEDULE FOR PERMANENT POLLUTION ABATEMENT MEASURES

<i>Recommended Frequency</i>	<i>Task to be Performed</i>			
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Annually*</i>	√	√	√	√

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

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

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

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

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan

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

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

1. **Cleaning.** Removal and appropriate disposal of all water, sediment, oil and grease, and debris that has accumulated within the unit will be performed. The Jellyfish® Filter will be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. Since some of the maintenance procedures require manned entry into the Jellyfish structure, only professional maintenance service providers trained in confined space entry procedures should enter the vessel. *A written record will be kept of inspection results and maintenance performed.*
2. **Manual Backflush / Flow Rate Test.** A manual backflush must be performed on a single draindown cartridge using a Jellyfish Cartridge Backflush Pipe (described in the Jellyfish® Filter Owner's Manual). If the time required to drain 14 gallons of backflush water from the Backflush Pipe (from top of pipe to the top of the open flapper valve) exceeds 15 seconds, it is recommended to perform a manual backflush on each of the cartridges. After the manual backflush, the draindown test should be repeated on a single cartridge to determine if the cartridge can drain 14 gallons of water in 15 seconds. If the cartridge still does not achieve the design flow rate, it must be replaced. Filter cartridges should be tested for adequate flow rate, every 12 months and cleaned and re-commissioned, or replaced if necessary. *Written record will be kept of inspection results and maintenance performed.*
3. **External Rinsing.** If external rinsing is performed within the structure, the cartridge or individual filtration tentacles should be rinsed while safely suspended over the maintenance access wall opening in the cartridge deck, such that rinsate flows into the lower chamber of the Jellyfish® Filter. If the rinsing procedure is performed outside the structure, the cartridge or individual filtration tentacles should be rinsed in a suitable basin such as a plastic barrel or tub, and rinsate subsequently poured into the maintenance access wall opening in the cartridge deck. Sediment is subsequently removed from the lower chamber by standard vacuum service. *Written record will be kept of inspection results and maintenance performed.*
4. **Vegetated Filter Strips:** Once a vegetated area is well established, little additional maintenance is generally necessary. The key to establishing a viable vegetated feature is the care and maintenance it receives in the first few months after it is planted. Once established, all vegetated BMPs require some basic maintenance to insure the health of the plants. An Integrated Pest Management (IPM) Plan should be developed for vegetated areas. This plan should specify how problem insects and weeds will be controlled with minimal or no use of insecticides and herbicides.

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. Sediment removal is not

## SHAVANO HIGHLANDS HILLTOP Water Pollution Abatement Plan

normally required in filter strips since the vegetation normally grows through it and binds it to the soil. However, sediment may accumulate along the upstream boundary of the strip preventing uniform overland flow. Excess sediment should be removed by hand or with flat-bottomed shovels.

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, re-grading and placement of solid block sod over the affected area. Construction of a level spreader device may be necessary to reestablish shallow overland flow. Corrective maintenance, such as weeding, or replanting should be done more frequently in the first two to three years after installation to ensure stabilization. Dense vegetation may require irrigation immediately after planting, and during particularly dry periods, particularly as the vegetation is initially established. A written record will be kept of inspection results and corrective measures taken.

### Recordkeeping Procedures for Inspections, Maintenance, Repairs, and Retrofits:

- Written records shall be kept by the party responsible for maintenance or a designated representative.
  - Written records shall be retained for a minimum of five years.
5. Hazardous Material Spill. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site and may be required in the event of a chemical spill or due to excessive sediment loading. In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and appropriate regulatory agencies immediately. Maintenance should be performed by a licensed liquid waste hauler. Cartridge replacement may also be required in the event of an accidental significant or hazardous spill. Industrial and hazardous waste materials will be disposed of in accordance with TCEQ rules in 30 Texas Administration Code (TAC) Sections (§§)335.501-.521 (subchapter R). If class I or II non-hazardous or hazardous wastes are generated, a third-party disposal contractor will manage the wastes. *Written record will be kept of inspection results and maintenance performed.*

**ATTACHMENT I**

# SHAVANO HIGHLANDS HILLTOP

## Water Pollution Abatement Plan Modification

### 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 Lloyd A Denton, Jr.  
Print Name

CEO  
Title - Owner/CEO/Other

of Shavano Rogers Ranch North No. 3  
Corporation/Partnership/Entity Name

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

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

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

I also understand that:

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

SIGNATURE PAGE:

[Handwritten Signature]  
Applicant's Signature

July 13, 2022  
Date

THE STATE OF Texas §

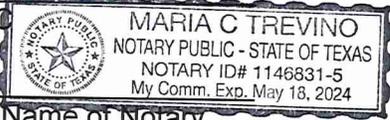
County of Bexar §

BEFORE ME, the undersigned authority, on this day personally appeared Lloyd A. Denton, Jr. 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 13 day of July 2022

Maria C Trevino

NOTARY PUBLIC



Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 5-18-24

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

# Application Fee Form

**Texas Commission on Environmental Quality**

Name of Proposed Regulated Entity: Shavano Highlands Hilltop

Regulated Entity Location: South of Powder Mill and Shavano Ranch Rd intersection

Name of Customer: Shavano Rogers Ranch North No. 3

Contact Person: Lloyd A. Denton, Jr. Phone: (210) 828-6131

Customer Reference Number (if issued): CN 602406613

Regulated Entity Reference Number (if issued): RN 111530820

**Austin Regional Office (3373)**

- Hays  Travis  Williamson

**San Antonio Regional Office (3362)**

- Bexar  Medina  Uvalde  
 Comal  Kinney

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

- Austin Regional Office  San Antonio Regional Office  
 Mailed to: TCEQ - Cashier  Overnight Delivery to: TCEQ - Cashier  
 Revenues Section 12100 Park 35 Circle  
 Mail Code 214 Building A, 3rd Floor  
 P.O. Box 13088 Austin, TX 78753  
 Austin, TX 78711-3088 (512)239-0357

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

- Recharge Zone  Contributing Zone  Transition Zone

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	18.91 Acres	\$ 4,000
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	\$
Sewage Collection System	4,095.69 L.F.	\$ 2,047.85
Lift Stations without sewer lines	Acres	\$
Underground or Aboveground Storage Tank Facility	Tanks	\$
Piping System(s)(only)	Each	\$
Exception	Each	\$
Extension of Time	Each	\$

Signature: 

Date: 2/28/23

# Application Fee Schedule

Texas Commission on Environmental Quality

Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

## **Water Pollution Abatement Plans and Modifications**

### **Contributing Zone Plans and Modifications**

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

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

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

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

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

### **Exception Requests**

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

### **Extension of Time Requests**

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

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



TCEQ Use Only

# TCEQ Core Data Form

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

## SECTION I: General Information

<b>1. Reason for Submission</b> (If other is checked please describe in space provided.)		
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
<b>2. Customer Reference Number</b> (if issued)	<a href="#">Follow this link to search for CN or RN numbers in Central Registry**</a>	<b>3. Regulated Entity Reference Number</b> (if issued)
CN 602406613		RN 111530820

## SECTION II: Customer Information

<b>4. General Customer Information</b>		<b>5. Effective Date for Customer Information Updates</b> (mm/dd/yyyy)	
<input type="checkbox"/> New Customer		<input type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		<input type="checkbox"/> Change in Regulated Entity Ownership	
<b>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</b>			
<b>6. Customer Legal Name</b> (If an individual, print last name first: eg: Doe, John)		If new Customer, enter previous Customer below:	
Shavano Rogers Ranch North No. 3			
<b>7. TX SOS/CPA Filing Number</b>	<b>8. TX State Tax ID</b> (11 digits)	<b>9. Federal Tax ID</b> (9 digits)	<b>10. DUNS Number</b> (if applicable)
<b>11. Type of Customer:</b>	<input type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
<b>12. Number of Employees</b>		<b>13. Independently Owned and Operated?</b>	
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>14. Customer Role</b> (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator			
<input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> Voluntary Cleanup Applicant <input type="checkbox"/> Other:			
<b>15. Mailing Address:</b>	11 Lynn Batts Ln, Ste 100		
	City	San Antonio	State TX ZIP 78218 ZIP + 4
<b>16. Country Mailing Information</b> (if outside USA)		<b>17. E-Mail Address</b> (if applicable)	
		laddiedention@bitterblue.com	
<b>18. Telephone Number</b>		<b>19. Extension or Code</b>	<b>20. Fax Number</b> (if applicable)
( 210 ) 828-6131			( ) -

## SECTION III: Regulated Entity Information

<b>21. General Regulated Entity Information</b> (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)	
<input type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input checked="" type="checkbox"/> Update to Regulated Entity Information	
<b>The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).</b>	
<b>22. Regulated Entity Name</b> (Enter name of the site where the regulated action is taking place.)	
Shavao highlands Hilltop	

23. Street Address of the Regulated Entity: (No PO Boxes)							
	City		State		ZIP		ZIP + 4
24. County	Bexar						

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	South of Powder Mill and Shavano Ranch Rd intersection						
26. Nearest City	San Antonio				State	TX	Nearest ZIP Code
							78257
27. Latitude (N) In Decimal:	29.608534			28. Longitude (W) In Decimal:	-98.561397		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		
29	36	30.7	-98	33	41		
29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)		32. Secondary NAICS Code (5 or 6 digits)			
1521		236115					
33. What is the Primary Business of this entity? (Do not repeat the SIC or NAICS description.)							
Single familt residential development							
34. Mailing Address:	11 Lynn Batts, Ste 100						
	City	San Antonio	State	TX	ZIP	78218	ZIP + 4
35. E-Mail Address:	laddiedention@bitterblue.com						
36. Telephone Number		37. Extension or Code		38. Fax Number (if applicable)			
( 210 ) 828-6131				( ) -			

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

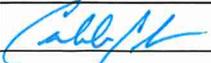
<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input checked="" type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input type="checkbox"/> New Source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

### SECTION IV: Preparer Information

40. Name:	Jean Autrey, P.E., CESSWI	41. Title:	Senior Project Engineer
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
( 210 ) 375-9000	2604	( 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 Engineers, Inc.	Job Title:	Vice President
Name (In Print):	Caleb Chance, P.E.	Phone:	( 210 ) 375- 9000
Signature:		Date:	2/28/23



TCEQ Use Only

# TCEQ Core Data Form

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

## SECTION I: General Information

<b>1. Reason for Submission</b> (If other is checked please describe in space provided.)		
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
<b>2. Customer Reference Number</b> (if issued)	<a href="#">Follow this link to search for CN or RN numbers in Central Registry**</a>	<b>3. Regulated Entity Reference Number</b> (if issued)
CN 602406613		RN 111530820

## SECTION II: Customer Information

<b>4. General Customer Information</b>		<b>5. Effective Date for Customer Information Updates</b> (mm/dd/yyyy)		
<input type="checkbox"/> New Customer		<input type="checkbox"/> Update to Customer Information		<input type="checkbox"/> Change in Regulated Entity Ownership
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)				
<b>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</b>				
<b>6. Customer Legal Name</b> (If an individual, print last name first: eg: Doe, John)			If new Customer, enter previous Customer below:	
Shavano Rogers Ranch North No. 3				
<b>7. TX SOS/CPA Filing Number</b>	<b>8. TX State Tax ID</b> (11 digits)	<b>9. Federal Tax ID</b> (9 digits)	<b>10. DUNS Number</b> (if applicable)	
<b>11. Type of Customer:</b>	<input type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited	
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship		<input type="checkbox"/> Other:	
<b>12. Number of Employees</b>		<b>13. Independently Owned and Operated?</b>		
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher		<input type="checkbox"/> Yes <input type="checkbox"/> No		
<b>14. Customer Role</b> (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following				
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator				
<input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> Voluntary Cleanup Applicant <input type="checkbox"/> Other:				
<b>15. Mailing Address:</b>	11 Lynn Batts Ln, Ste 100			
	City	San Antonio	State	TX
	ZIP	78218	ZIP + 4	
<b>16. Country Mailing Information</b> (if outside USA)			<b>17. E-Mail Address</b> (if applicable)	
			laddiedenton@bitterblue.com	
<b>18. Telephone Number</b>		<b>19. Extension or Code</b>		<b>20. Fax Number</b> (if applicable)
( 210 ) 828-6131				( ) -

## SECTION III: Regulated Entity Information

<b>21. General Regulated Entity Information</b> (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)	
<input type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input checked="" type="checkbox"/> Update to Regulated Entity Information	
<b>The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).</b>	
<b>22. Regulated Entity Name</b> (Enter name of the site where the regulated action is taking place.)	
Shavano Highlands Hilltop	

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

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

25. Description to Physical Location:	South of Powder Mill and Shavano Ranch Rd intersection						
26. Nearest City					State	Nearest ZIP Code	
San Antonio					TX	78257	
27. Latitude (N) In Decimal:	29.608534			28. Longitude (W) In Decimal:	-98.561397		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		
29	36	30.7	98	33	41		
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)		
1623			237110				
33. What is the Primary Business of this entity? <i>(Do not repeat the SIC or NAICS description.)</i>							
Sewage collection system for single family residential development							
34. Mailing Address:	11 Lynn Batts Ln, Ste 100						
	City	San Antonio	State	TX	ZIP	78218	ZIP + 4
35. E-Mail Address:	laddiedenton@bitterblue.com						
36. Telephone Number		37. Extension or Code			38. Fax Number (if applicable)		
( 210 ) 828-6131					( ) -		

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

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

**SECTION IV: Preparer Information**

40. Name:	Jean Autrey, P.E., CESSWI		41. Title:	Senior Project Engineer	
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address		
( 210 ) 375-9000	2604	( 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 Engineers, Inc.	Job Title:	Vice President		
Name (In Print):	Caleb Chance, P.E.	Phone:	( 210 ) 375- 9000		
Signature:		Date:	2/28/23		

# **POLLUTANT LOAD AND REMOVAL CALCULATIONS**

**SHAVANO HIGHLANDS HILLTOP TREATMENT SUMMARY**

<b>Area</b>	<b>Total Area (ac)</b>	<b>Proposed Impervious Cover from Lots (ac.)</b>	<b>Proposed Impervious Cover from Roadways (ac.)</b>	<b>Total Proposed Impervious Cover (ac.)</b>	<b>BMP</b>	<b>Total Annual TSS Generated (lbs)</b>	<b>Total SS Removed (lbs)</b>
A	0.14	0.000	0.111	0.111	Over Treatment	91	
B	0.37	0.060	0.130	0.190	Over Treatment	155	
C	1.08	0.135	0.340	0.475	Contech Jellyfish Filter System (B)	388	945
D	0.57	0.075	0.297	0.372	Contech Jellyfish Filter System (A)	304	2149
E	1.03	0.135	0.533	0.668	Contech Jellyfish Filter System (B)	545	
F	5.17	0.990	1.250	2.240	Contech Jellyfish Filter System (A)	1828	
G	0.78	0.360	0.000	0.360	Engineered VFS	294	323
H	6.43	2.210	0.000	2.210	Engineered VFS	1803	2008
<b>TOTAL</b>	<b>15.57</b>	<b>3.965</b>	<b>2.661</b>	<b>6.626</b>		<b>5407</b>	<b>5425</b>

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell to see the text. 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 calculations.

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

Calculations from RG-348

Pages 3-27 to 3-29

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

where:

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

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

County =	<b>Bexar</b>	
Total project area included in plan *	<b>18.91</b>	acres
Predevelopment impervious area within the limits of the plan *	<b>0.00</b>	acres
Total post-development impervious area within the limits of the plan *	<b>6.626</b>	acres
Total post-development impervious cover fraction *	<b>0.35</b>	
P =	<b>30</b>	inches

$L_{M \text{ TOTAL PROJECT}} = 5407$  lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **7**

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

Drainage Basin/Outfall Area No. = **VFS F**

Total drainage basin/outfall area =	<b>0.78</b>	acres
Predevelopment impervious area within drainage basin/outfall area =	<b>0.00</b>	acres
Post-development impervious area within drainage basin/outfall area =	<b>0.36</b>	acres
Post-development impervious fraction within drainage basin/outfall area =	<b>0.46</b>	
$L_{M \text{ THIS BASIN}}$ =	<b>294</b>	lbs.

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

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

- Aqualogic Car
- Bioretention
- Contech Storm
- Constructed Wetland
- Extended Detention
- Grassy Swale
- Retention / Irrigation
- Sand Filter
- Stormceptor
- Vegetated Filter Strip
- Vortexes
- Wet Basin
- Wet Vault

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

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

where:

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

$A_C$ =	<b>0.78</b>	acres
$A_I$ =	<b>0.36</b>	acres
$A_P$ =	<b>0.42</b>	acres
$L_R$ =	<b>323</b>	lbs

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

Desired  $L_{M \text{ THIS BASIN}}$  = **323** lbs.



*Caleb M. Chance*  
2/28/23

Additional information is provided for cells with a red triangle in the upper right corner. Place the cursor over the cell to see the text. 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 calculations.

**1. The Required Load Reduction for the total project:** Calculations from RG-348 Pages 3-27 to 3-29

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

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

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

County =	<b>Bexar</b>	
Total project area included in plan *	<b>18.91</b>	acres
Predevelopment impervious area within the limits of the plan *	<b>0.00</b>	acres
Total post-development impervious area within the limits of the plan *	<b>6.626</b>	acres
Total post-development impervious cover fraction *	<b>0.35</b>	
P =	<b>30</b>	inches

$L_{M \text{ TOTAL PROJECT}} = 5407$  lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **7**

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

Drainage Basin/Outfall Area No. =	<b>VFS G</b>	
Total drainage basin/outfall area =	<b>6.43</b>	acres
Predevelopment impervious area within drainage basin/outfall area =	<b>0.00</b>	acres
Post-development impervious area within drainage basin/outfall area =	<b>2.21</b>	acres
Post-development impervious fraction within drainage basin/outfall area =	<b>0.34</b>	
$L_{M \text{ THIS BASIN}}$ =	<b>1803</b>	lbs.

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

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

- Aqualogic Car
- Bioretention
- Contech Storm
- Constructed Wetland
- Extended Detention
- Grassy Swale
- Retention / Irrigation
- Sand Filter
- Stormceptor
- Vegetated Filter
- Vortexes
- Wet Basin
- Wet Vault

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

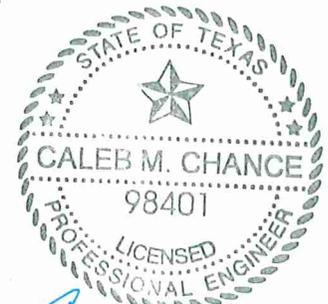
RG-348 Page 3-33 Equation 3.7:  $L_R = (\text{BMP efficiency}) \times P \times (A_i \times 34.6 + A_p \times 0.54)$

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

$A_C$ =	<b>6.43</b>	acres
$A_i$ =	<b>2.21</b>	acres
$A_p$ =	<b>4.22</b>	acres
$L_R$ =	<b>2008</b>	lbs

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

Desired  $L_{M \text{ THIS BASIN}}$  = **2008** lbs.



*Caleb M. Chance*  
2/28/23



**KOONTZ BRYANT  
JOHNSON WILLIAMS**

FORMERLY CBC ENGINEERS

## ENGINEERING REPORT

TO: Contech Engineered Solutions LLC  
9100 Centre Pointe Drive, Suite 400  
West Chester, Ohio 45069

DATE: February 27, 2023

KBJW NO: 23-26044-001-02-0223

ATTN: Robbin DeArmond  
Stormwater Design Engineer

Re: Review of TSS Removal Calculations and Shop Drawings for Two (2) Jellyfish® Filters (708308);  
Shavano Highlands Hilltop, San Antonio, Texas; KBJW Report No. 23-26044-001-02-0223

Koontz Bryant Johnson Williams, Inc. (KBJW, formerly CBC Engineers and Associates, Ltd.) is pleased to submit our report for the above referenced project. The purpose of this report is to provide a peer review of the TSS removal calculations and shop drawings for the two (2) proposed Jellyfish® Filters at the above referenced project location. We have evaluated the calculations and shop drawings, and agree they conform to the requirements of TCEQ RG-348 and to accepted industry standards for this product type. We have not made an independent verification of the data used to perform the calculations, and understand all initial assumptions and data are correct as presented to us. The proposed "A" Jellyfish® filter (JFPD0808-14-3 with 14 hi-flo and 3 drain down 54" cartridges) treatment flow rate (2.76 cfs) meets or exceeds the required water quality treatment flow rate for its respective drainage basin (2.71 cfs) as shown in the attached calculations. The proposed "B" Jellyfish® filter (JFPD0806-6-2 with 6 hi-flo and 2 drain down 54" cartridges) treatment flow rate (1.25 cfs) meets or exceeds the required water quality treatment flow rate for its respective drainage basin (1.23 cfs) as shown in the attached calculations. No structural design calculations or details have been reviewed in conjunction with this project and others than KBJW are responsible for all other aspects of this project including but not limited to the structural design and buoyancy evaluation. We have accordingly signed and sealed this report containing the calculations and shop drawings, and they are attached in Appendix A and Appendix B of this report, respectively.

If you have any questions, please contact us.

Respectfully submitted,

Koontz Bryant Johnson Williams, Inc.

Mitchell T. Hardert, P.E.  
Chief Engineer



Koontz Bryant Johnson Williams, Inc.  
TBPE Firm Number F-23121

2/27/23

MTH/mth

cc: Client (robbin.dearmond@conteches.com)

cc: Alex MacLeod (alex.macleod@conteches.com)

cc: Jamie Minnick (jamie.minnick@conteches.com)

1-File

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

Project Name: **Shavano Highlands Hilltop**  
Date Prepared: **2/22/2023**

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

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

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

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

County =	<b>Bexar</b>	
Total project area included in plan * =	<b>18.91</b>	acres
Predevelopment impervious area within the limits of the plan * =	<b>0.00</b>	acres
Total post-development impervious area within the limits of the plan* =	<b>6.626</b>	acres
Total post-development impervious cover fraction * =	<b>0.35</b>	
P =	<b>30</b>	inches
$L_{M\text{TOTAL PROJECT}}$ =	<b>5407</b>	lbs.

Number of drainage basins / outfalls areas leaving the plan area = **7**

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

Drainage Basin/Outfall Area No. = **BASIN A**

Total drainage basin/outfall area =	<b>5.74</b>	acres
Predevelopment impervious area within drainage basin/outfall area =	<b>0.00</b>	acres
Post-development impervious area within drainage basin/outfall area =	<b>2.612</b>	acres
Post-development impervious fraction within drainage basin/outfall area =	<b>0.46</b>	
$L_{M\text{THIS BASIN}}$ =	<b>2131</b>	lbs.

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

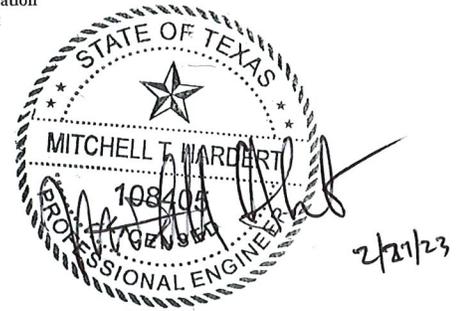
Proposed BMP =	<b>JF</b>	abbreviation
Removal efficiency =	<b>86</b>	percent

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

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

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

$A_C$ =	<b>5.74</b>	acres
$A_I$ =	<b>2.612</b>	acres
$A_P$ =	<b>3.13</b>	acres
$L_R$ =	<b>2375</b>	lbs.



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

Desired $L_{M\text{THIS BASIN}}$ =	<b>2149</b>	lbs.
F =	<b>0.90</b>	

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

Offsite area draining to BMP =	<b>0.00</b>	acres
Offsite impervious cover draining to BMP =	<b>0.00</b>	acres

Calculations from RG-348  
Pages Section 3.2.22

Rainfall Intensity =	<b>1.10</b>	inches per hour
Effective Area =	<b>2.44</b>	acres
Cartridge Length =	<b>54</b>	inches

Peak Treatment Flow Required = **2.71** cubic feet per second

**7. Jellyfish**

Designed as Required in RG-348  
Section 3.2.22

<b>Flow Through Jellyfish Size</b>	
Jellyfish Size for Flow-Based Configuration =	<b>JFPDo808-14-3</b>
Jellyfish Treatment Flow Rate =	<b>2.76</b> cfs

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

Project Name: **Shavano Highlands Hilltop**  
Date Prepared: **2/22/2023**

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

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

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

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

County = **Bexar**  
Total project area included in plan \* = **18.91** acres  
Predevelopment impervious area within the limits of the plan \* = **0.00** acres  
Total post-development impervious area within the limits of the plan\* = **6.626** acres  
Total post-development impervious cover fraction \* = **0.35**  
 $P$  = **30** inches  
 $L_{M\text{TOTAL PROJECT}}$  = **5407** lbs.

Number of drainage basins / outfalls areas leaving the plan area = **7**

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

Drainage Basin/Outfall Area No. = **BASIN B**

Total drainage basin/outfall area = **2.11** acres  
Predevelopment impervious area within drainage basin/outfall area = **0.00** acres  
Post-development impervious area within drainage basin/outfall area = **1.143** acres  
Post-development impervious fraction within drainage basin/outfall area = **0.54**  
 $L_{M\text{THIS BASIN}}$  = **933** lbs.

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

Proposed BMP = **JF** abbreviation  
Removal efficiency = **86** percent

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

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

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

$A_C$  = **2.11** acres  
 $A_I$  = **1.143** acres  
 $A_P$  = **0.97** acres  
 $L_R$  = **1034** lbs.



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

Desired  $L_{M\text{THIS BASIN}}$  = **945** lbs.  
 $F$  = **0.91**

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

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

Calculations from RG-348  
Pages Section 3.2.22

Rainfall Intensity = **1.15** inches per hour  
Effective Area = **1.06** acres  
Cartridge Length = **54** inches

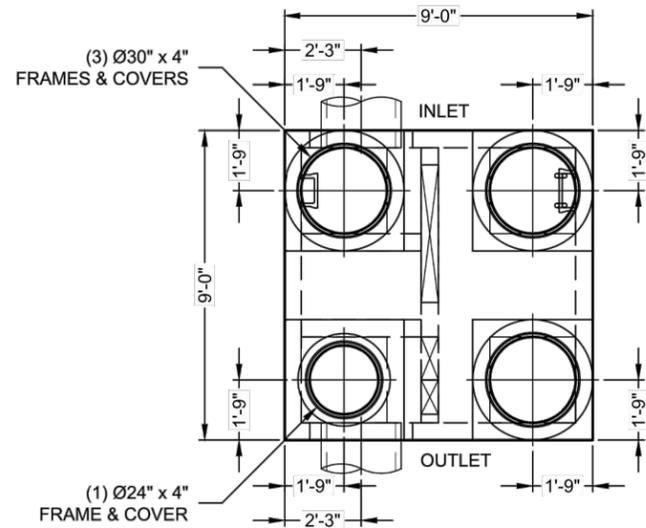
Peak Treatment Flow Required = **1.23** cubic feet per second

**7. Jellyfish**

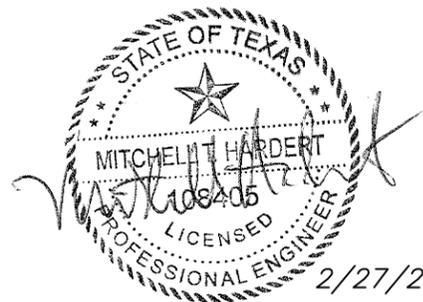
Designed as Required in RG-348  
Section 3.2.22

**Flow Through Jellyfish Size**

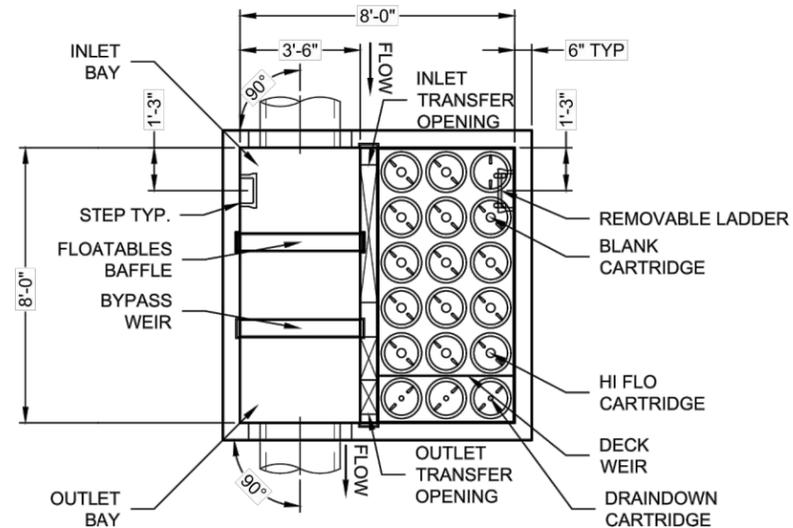
Jellyfish Size for Flow-Based Configuration = **JFPD0806-6-2**  
Jellyfish Treatment Flow Rate = **1.25** cfs



**PLAN VIEW**



2/27/23  
 KOONTZ BRYANT JOHNSON WILLIAMS, INC.  
 TBPE FIRM NUMBER F-23121



**PLAN VIEW**

(TOP SLAB NOT SHOWN FOR CLARITY)

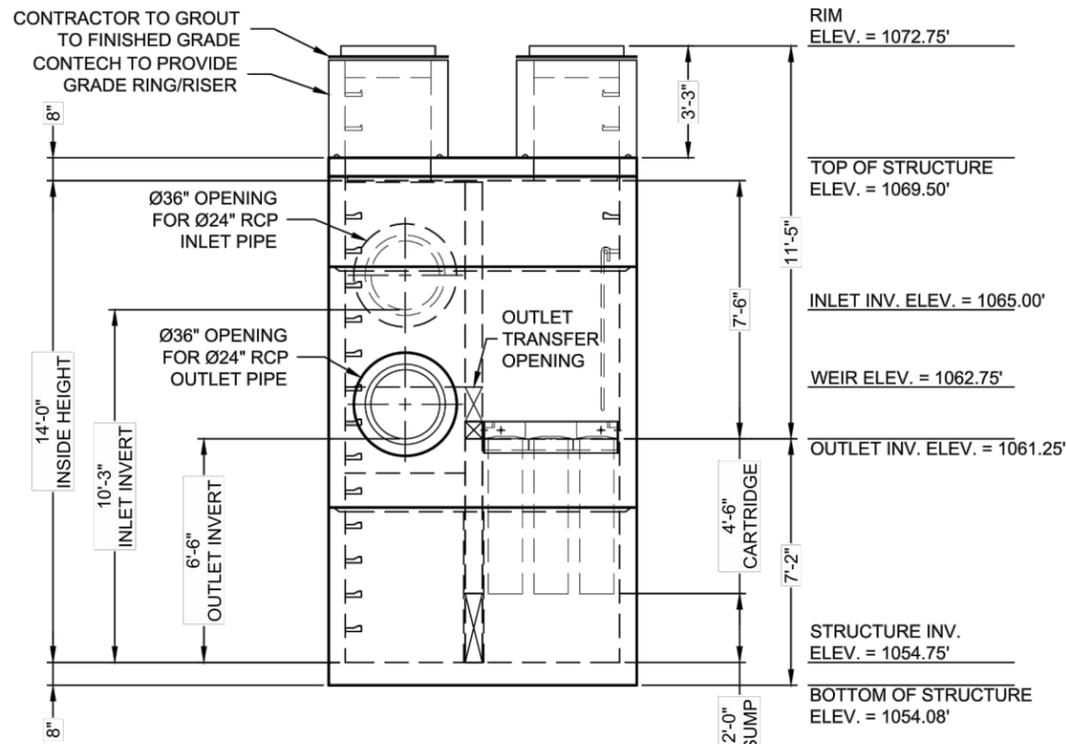
**MATERIAL LIST - PROVIDED BY CONTECH**

COUNT	DESCRIPTION	INSTALLED BY
14	54" HI-FLO CARTRIDGE (70 mm ORIFICE)	CONTECH
3	54" DRAINDOWN CARTRIDGE (35 mm ORIFICE)	CONTECH
1	CARTRIDGE BLANK (NO ORIFICE)	CONTECH
1	JELLYFISH VAULT 18-CARTRIDGE DECK, STANDARD	CONTECH
1	JOINT SEALANT (BY PRECASTER)	CONTRACTOR
3	Ø30" X 4" FRAME & COVER, EJ #41600483	CONTRACTOR
1	Ø24" X 4" FRAME & COVER, EJ #41600389	CONTRACTOR
4 PLCS.	GRADE RING/RISER	CONTRACTOR
18	STEPS	CONTECH

**SITE DESIGN DATA**

WATER QUALITY	
FLOW RATE	2.76 CFS
PEAK FLOW RATE	28.76 CFS
RETURN PERIOD OF PEAK FLOW	25 YRS

Approved By	Date		Rev.	Date	By	Description
MTH	2/27/23					
Project No.	Rev.					
23-26044-001	-					



**ELEVATION VIEW**

**GENERAL NOTES:**

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. WWW.CONTECHES.COM
- JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
- STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' - 4', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
- STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

**INSTALLATION NOTES**

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE.
- CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
- WHEN ACTIVATED PRIOR TO SITE STABILIZATION, CONTRACTOR TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
- CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ACCORDING TO THE PROVISIONS IN THE ACTIVATION CHECKLIST AND THE QUOTED SCOPE OF WORK. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION AT (800) 338-1122.

**STRUCTURE WEIGHT**

APPROXIMATE HEAVIEST PICK OF (7) PIECES = 26,000 LBS.

CONTECH  
**CONTRACT**  
 DRAWING

SLY  
 492043 / 5918  
 LAYOUT 7  
 CLASS 600

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MARK	DATE	REVISION DESCRIPTION	BY

**8' X 8' JELLYFISH - 708308-10**  
 SHAVANO HIGHLANDS HILLTOP  
 SAN ANTONIO, TX  
 SITE DESIGNATION: JF(A)

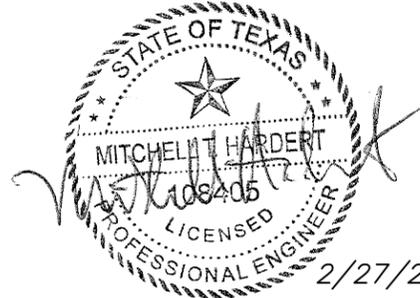
**CONTECH**  
 ENGINEERED SOLUTIONS LLC  
 www.contechES.com  
 5025 Centre Pointe Dr., Suite 400, West Chester, OH 45389  
 800-338-1122 513-645-7000 513-645-7983 FAX

**Jellyfish Filter**  
 THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS OR PATENT PENDING APPLICATIONS:  
 OTHER INTERNATIONAL PATENTS PENDING

DATE: 2/8/2023

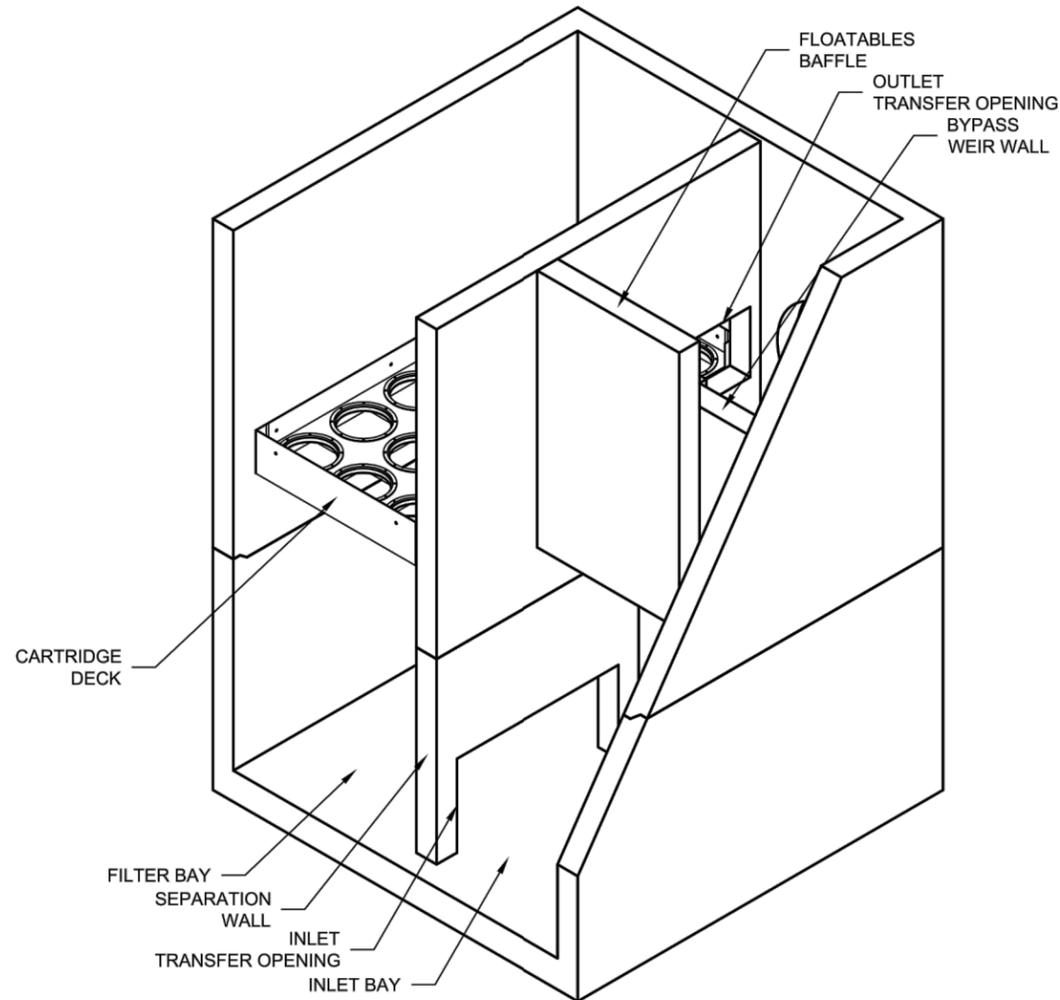
DESIGNED: RKD	DRAWN: KOB
CHECKED: RKD	APPROVED: RKD
PROJECT No.: 708308	SEQUENCE No.: 10
SHEET: 1	OF 2

ISOMETRIC VIEWS ARE REPRESENTATIONAL. SEE DETAILED FABRICATION DRAWING FOR SITE SPECIFIC DIMENSIONS

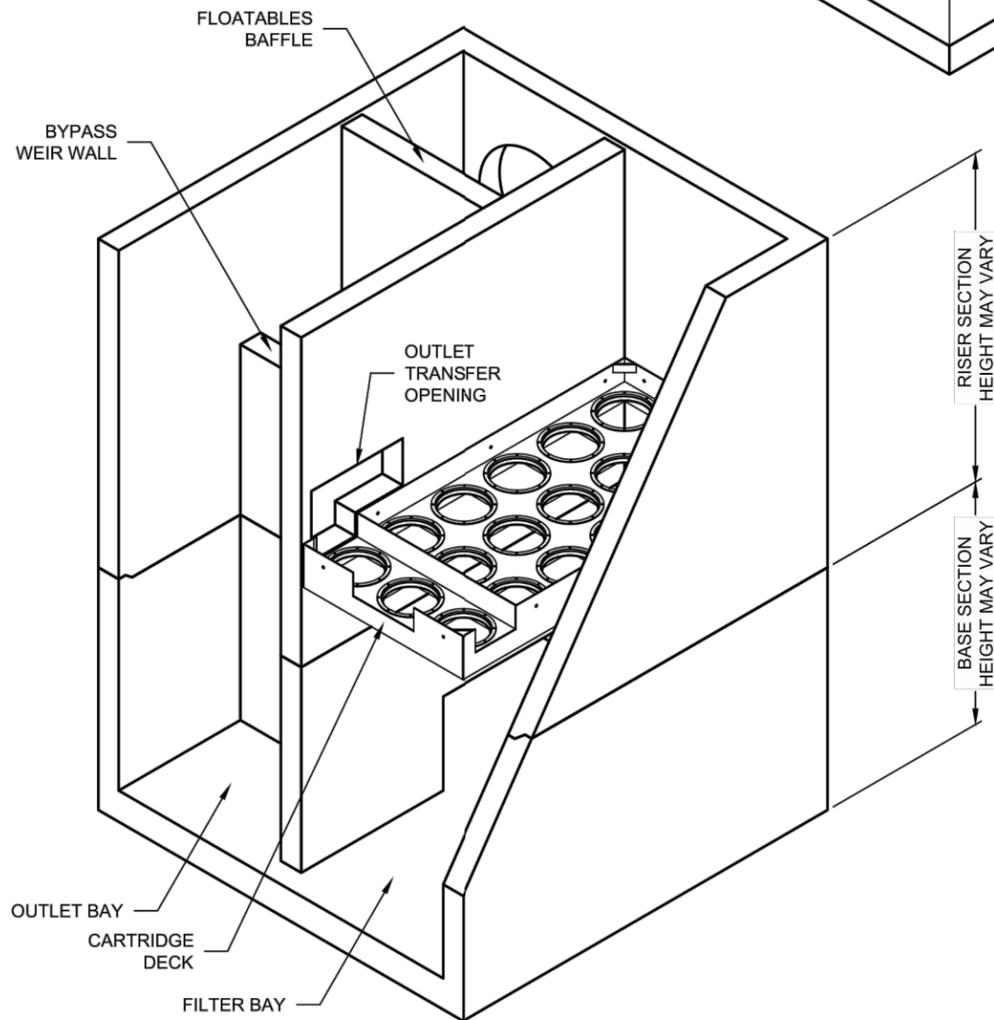


KOONTZ BRYANT JOHNSON WILLIAMS, INC.  
TBPE FIRM NUMBER F-23121

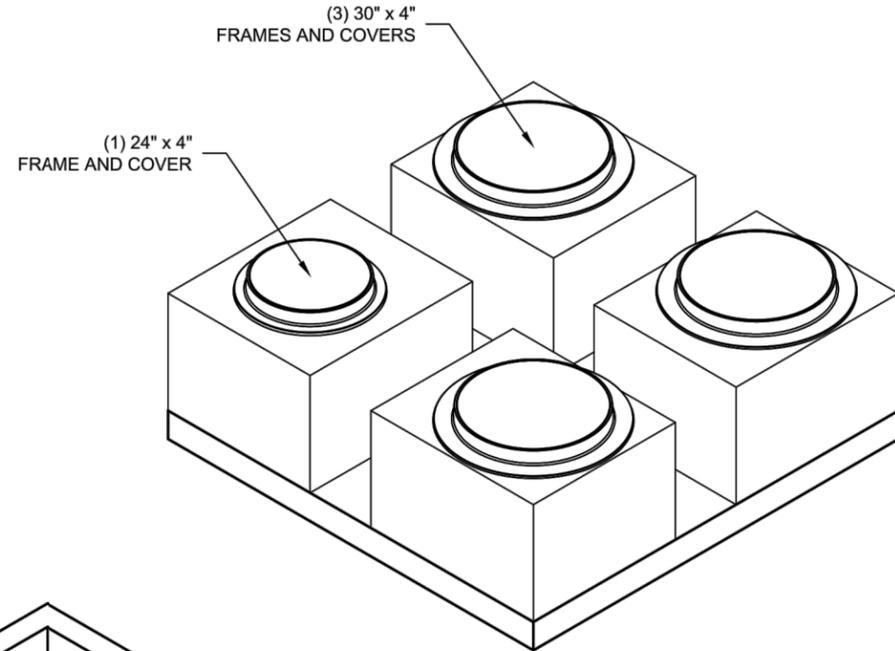
Approved By: MTH	Date: 2/27/23	Rev.	Date	By	Description
Project No.: 23-26044-001	Rev.:				



**NW ISOMETRIC VIEW**



**SE ISOMETRIC VIEW**



CONTECH  
CONTRACT  
DRAWING

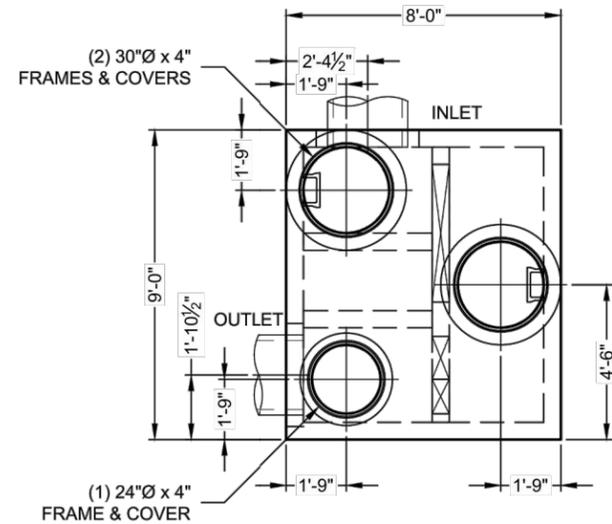
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MARK	DATE	REVISION DESCRIPTION	BY

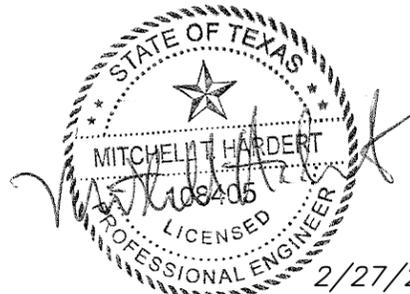
8' X 8' JELLYFISH - 708308-10  
SHAVANO HIGHLANDS HILLTOP  
SAN ANTONIO, TX  
SITE DESIGNATION: JF(A)

**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.conteches.com  
9025 Centex Folsom Dr., Suite 400, West Chester, OH 45399  
800-338-1122 513-645-7000 513-645-7993 FAX  
**Jellyfish Filter**  
OTHER INTERNATIONAL PATENTS PENDING

DATE:	2/8/2023	
DESIGNED:	RKD	DRAWN: KOB
CHECKED:	RKD	APPROVED: RKD
PROJECT No.:	708308	SEQUENCE No.: 10
SHEET:	2 OF 2	

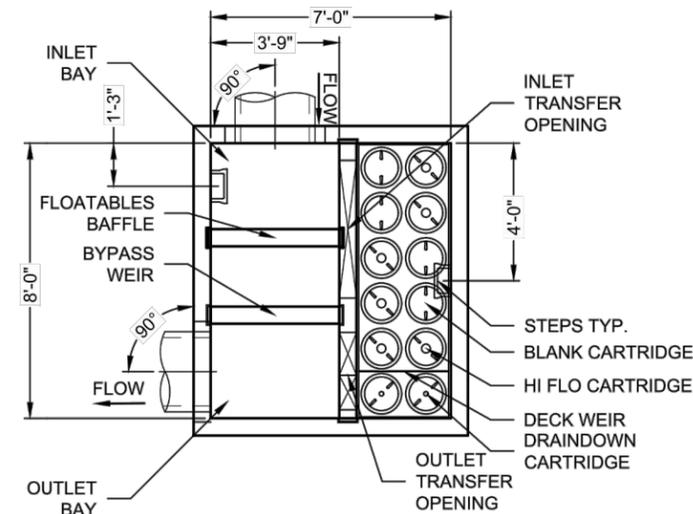


**PLAN VIEW**



2/27/23

KOONTZ BRYANT JOHNSON WILLIAMS, INC.  
TBPE FIRM NUMBER F-23121



**PLAN VIEW**

(TOP SLAB NOT SHOWN FOR CLARITY)

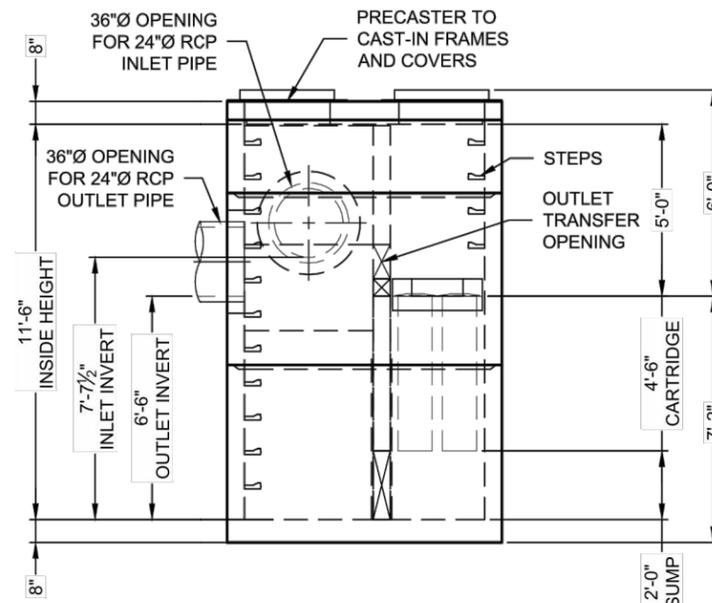
**MATERIAL LIST - PROVIDED BY CONTECH**

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6	54" HI-FLO CARTRIDGE (70 mm ORIFICE)	CONTECH
2	54" DRAINDOWN CARTRIDGE (35 mm ORIFICE)	CONTECH
4	CARTRIDGE BLANK (NO ORIFICE)	CONTECH
1	JELLYFISH VAULT 12-CARTRIDGE DECK, STANDARD	CONTECH
1	JOINT SEALANT (BY PRECASTER)	CONTRACTOR
2	30"Ø X 4" FRAME & COVER, EJ #41600483	CONTRACTOR
1	24"Ø X 4" FRAME & COVER, EJ #41600389	CONTRACTOR
15	STEPS	CONTECH

**SITE DESIGN DATA**

WATER QUALITY FLOW RATE	1.25 CFS
PEAK FLOW RATE	13.56 CFS
RETURN PERIOD OF PEAK FLOW	25 YRS

Approved By: MTH	Date: 2/27/23		Rev.	Date	By	Description
Project No.: 23-26044-001	Rev.:					



**ELEVATION VIEW**

RIM ELEV. = 1069.87'  
 TOP OF STRUCTURE ELEV. = 1069.54'  
 WEIR ELEV. = 1065.37'  
 INLET INV. ELEV. = 1065.00'  
 OUTLET INV. ELEV. = 1063.87'  
 STRUCTURE INV. ELEV. = 1057.37'  
 BOTTOM OF STRUCTURE ELEV. = 1056.70'

**GENERAL NOTES:**

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**STRUCTURE WEIGHT**

APPROXIMATE HEAVIEST PICK OF (5) PIECES = 23,000 LBS.

CONTECH  
**CONTRACT**  
DRAWING

SLY  
492043 / 5918  
LAYOUT 7  
CLASS 600

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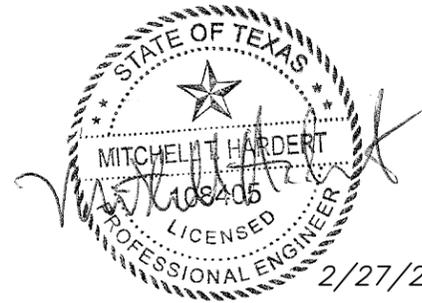
MARK	DATE	REVISION DESCRIPTION	BY

8' X 6' JELLYFISH - 708308-20  
SHAVANO HIGHLANDS HILLTOP  
SAN ANTONIO, TX  
SITE DESIGNATION: JF(B)

**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.conteches.com  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45389  
800-338-1122 513-645-7000 513-645-7885 FAX  
**Jellyfish Filter**

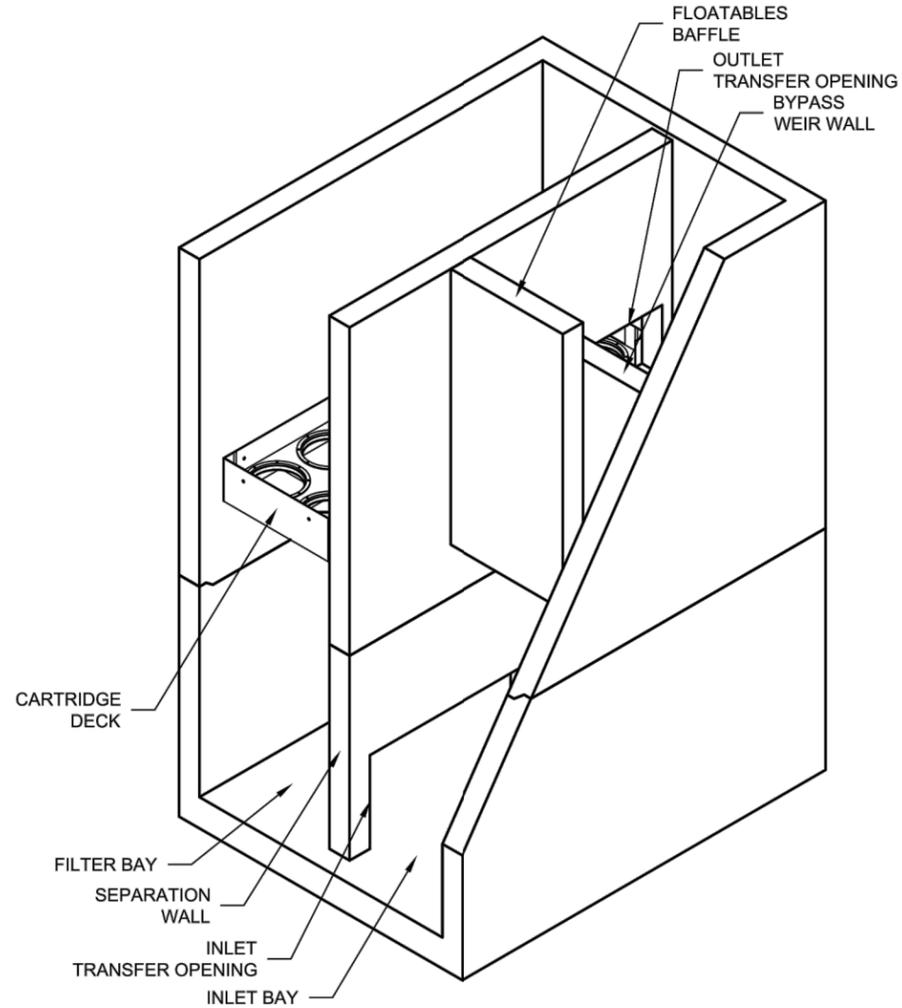
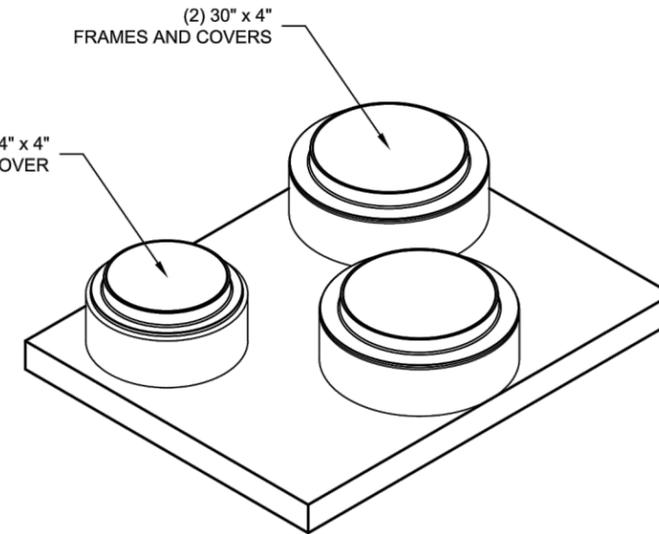
DATE:	2/9/2023		
DESIGNED:	RKD	DRAWN:	KOB
CHECKED:	RKD	APPROVED:	RKD
PROJECT No.:	708308	SEQUENCE No.:	20
SHEET:	1 OF 2		

ISOMETRIC VIEWS ARE REPRESENTATIONAL. SEE DETAILED FABRICATION DRAWING FOR SITE SPECIFIC DIMENSIONS

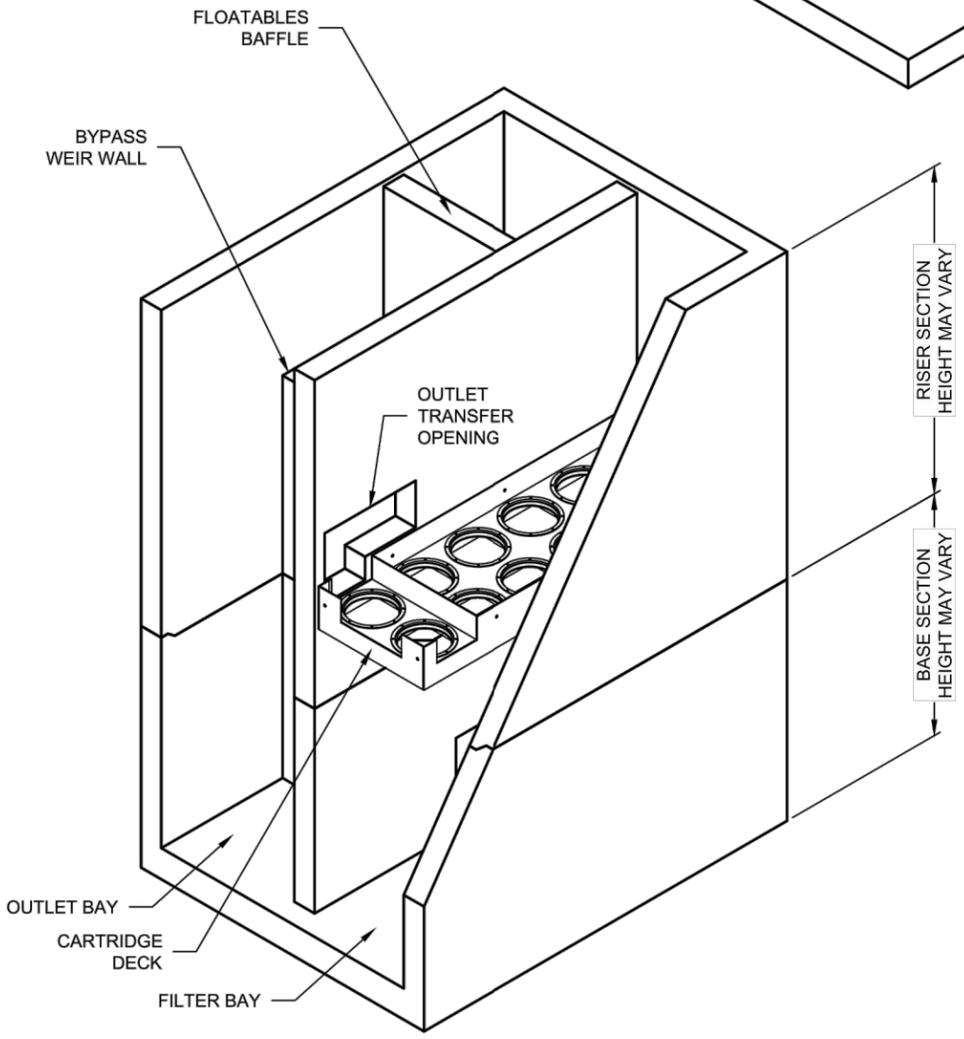


KOONTZ BRYANT JOHNSON WILLIAMS, INC.  
TBPE FIRM NUMBER F-23121

Approved By	MTH	Date	2/27/23	Rev.	Date	By	Description
Project No.	23-26044-001	Rev.	-				



**NW ISOMETRIC VIEW**



**SE ISOMETRIC VIEW**

CONTECH  
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DRAWING

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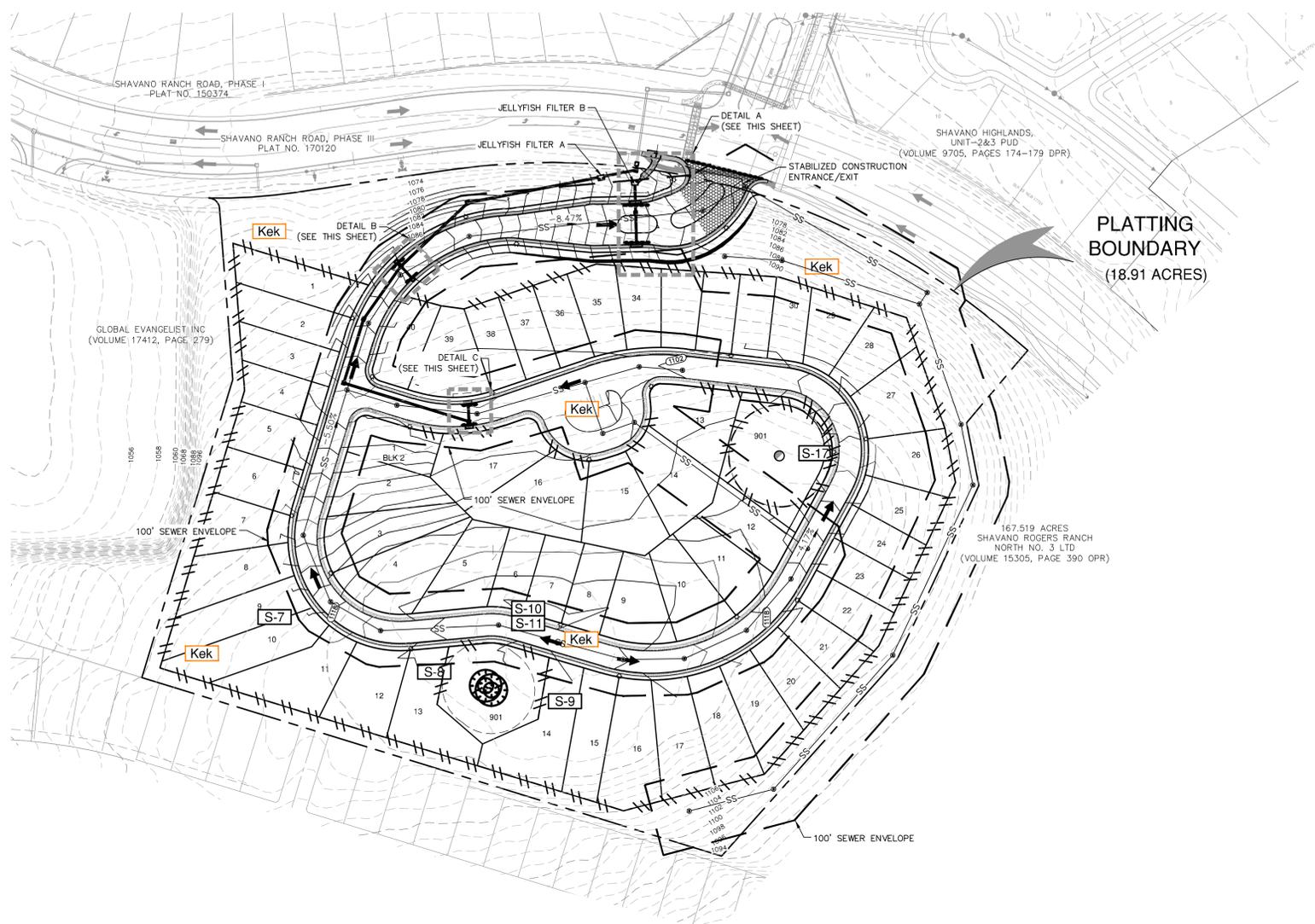
MARK	DATE	REVISION DESCRIPTION	BY

8' X 6' JELLYFISH - 708308-20  
SHAVANO HIGHLANDS HILLTOP  
SAN ANTONIO, TX  
SITE DESIGNATION: JF(B)

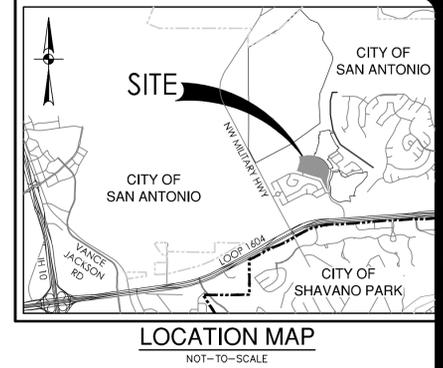
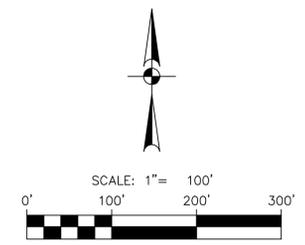
**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.conteches.com  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45389  
800-335-1122 513-645-7000 513-645-7957 FAX  
**Jellyfish Filter**

DATE:	2/9/2023		
DESIGNED:	RKD	DRAWN:	KOB
CHECKED:	RKD	APPROVED:	RKD
PROJECT No.:	708308	SEQUENCE No.:	20
SHEET:	2 OF 2		

# **EXHIBITS**



**PLATTING BOUNDARY**  
(18.91 ACRES)



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

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

**LEGEND**

- PLATTED BOUNDARY
- PROJECT AREA
- EXISTING GRADE
- PROPOSED GRADE
- FLOW ARROW (EXISTING)
- FLOW ARROW (PROPOSED)
- SILT FENCE
- ROCK BERM
- INLET PROTECTION
- GRAVEL FILTER BAGS
- STABILIZED CONSTRUCTION ENTRANCE/EXIT (FIELD LOCATE)
- CONSTRUCTION EQUIPMENT, VEHICLE & MATERIALS STORAGE AREA (FIELD LOCATE)
- CONCRETE TRUCK WASH-OUT PIT (FIELD LOCATE)
- BUDA FORMATION
- DEL RIO FORMATION
- PERSON FORMATION
- POTENTIAL RECHARGE FEATURE
- CONTACT, LOCATED APPROXIMATELY
- FAULT, LOCATED APPROXIMATELY (D, DOWNTHROWN SIDE; U, UPTHROWN SIDE)
- NON-KARST CLOSED DEPRESSION

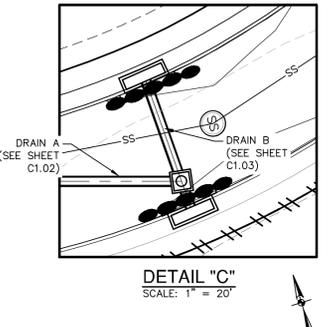
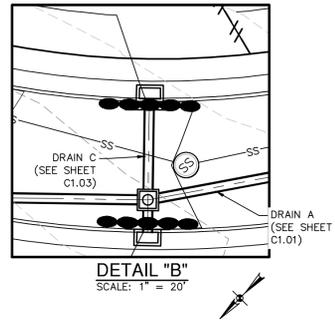
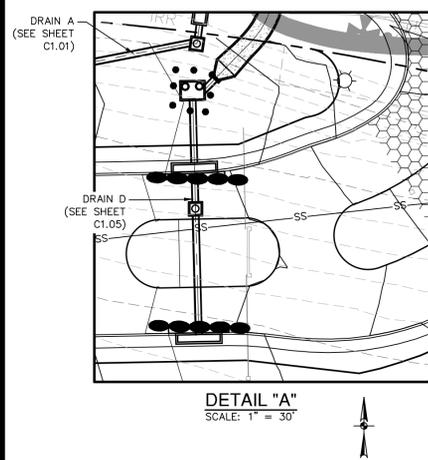
**GENERAL NOTES**

- DO NOT DISTURB VEGETATED AREAS (TREES, GRASS, WEEDS, BRUSH, ETC.) ANY MORE THAN NECESSARY FOR CONSTRUCTION.
- LOCATIONS OF CONSTRUCTION ENTRANCE/EXITS, CONCRETE WASHOUT PITS, AND CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARDS TO BE DETERMINED IN THE FIELD.
- STORM WATER POLLUTION PREVENTION CONTROLS MAY NEED TO BE MODIFIED IN THE FIELD TO ACCOMPLISH THE DESIRED EFFECT; ALL MODIFICATIONS ARE TO BE NOTED ON THIS EXHIBIT AND SIGNED AND DATED BY THE RESPONSIBLE PARTY.
- RESTRICT ENTRY/EXIT TO THE PROJECT SITE TO DESIGNATED LOCATIONS BY USE OF ADEQUATE FENCING, IF NECESSARY.
- ALL STORM WATER POLLUTION PREVENTION CONTROLS ARE TO BE MAINTAINED AND IN WORKING CONDITIONS AT ALL TIMES.
- CONTRACTOR, TO THE EXTENT PRACTICAL, SHALL MINIMIZE THE AMOUNT OF AREA DISTURBED. AS SOON AS PRACTICAL, ALL DISTURBED SOIL THAT WILL NOT BE COVERED BY IMPERVIOUS COVER SUCH AS PARKWAY AREAS, EASEMENT AREAS, EMBANKMENT SLOPES, ETC. WILL BE STABILIZED PER APPLICABLE PROJECT SPECIFICATIONS.
- BEST MANAGEMENT PRACTICES MAY BE INSTALLED IN STAGES TO COINCIDE WITH THE DISTURBANCE OF UPGRADE AREAS.
- BEST MANAGEMENT PRACTICES MAY BE REMOVED IN STAGES ONCE THE WATERSHED FOR THAT PORTION CONTROLLED BY THE BEST MANAGEMENT PRACTICES HAS BEEN STABILIZED.
- ALL TEMPORARY BMPs WILL BE REMOVED ONCE WATERSHED IS STABILIZED.
- MUD OR DIRT INADVERTENTLY TRACKED OFF-SITE AND ONTO EXISTING STREETS SHALL BE REMOVED IMMEDIATELY BY HAND OR MECHANICAL BROOM SWEEPING.
- PRIOR TO INITIATION OF SUBSEQUENT PHASES OF CONSTRUCTION, TEMPORARY BMPs INCLUDING SILT FENCING, CONSTRUCTION ENTRANCE/EXIT, CONCRETE WASHOUT PIT, AND CONSTRUCTION STAGING AREA SHALL BE FIELD LOCATED AS APPROPRIATE FOR THE AREA OF CONSTRUCTION.
- TEMPORARY POLLUTION ABATEMENT MEASURES SHOWN ON THE PLAN ARE FOR THE OVERALL DEVELOPMENT. TEMPORARY BMPs MAY REQUIRE ADJUSTMENT BASED ON PHASING OF CONSTRUCTION OF THE DEVELOPMENT. RECORDS OF ADJUSTMENTS AND REVISIONS SHALL BE MAINTAINED AS APPROPRIATE.
- TEMPORARY BMPs SHOWN ON THIS SHEET ARE FOR GRAPHICAL PURPOSES AND MAY NOT BE TO SCALE. BMPs SHALL BE LOCATED WITHIN THE PROJECT LIMITS.
- UPON COMPLETION OF THE PROJECT AND BEFORE FINAL PAYMENT IS ISSUED, CONTRACTOR SHALL REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SEQUENCING AND REMOVAL OF TEMPORARY POLLUTION ABATEMENT MEASURES THAT CONFLICT WITH SITE IMPROVEMENTS SUCH AS LANDSCAPING AND FENCES SO AS TO PREVENT SEDIMENT FROM ESCAPING THE PROJECT SITE.

**TEMPORARY POLLUTION ABATEMENT NOTES**

- CONSTRUCTION OF LOTS, DRIVEWAYS, AND DRAINAGE STRUCTURES MAY BEGIN UPON APPROVAL. THE CONTRACTOR IS RESPONSIBLE FOR PLACING SILT FENCE ALONG THE DOWN GRADIENT SIDE OF THE DISTURBED AREA PERPENDICULAR TO THE DRAINAGE FLOW.
- GRAVEL FILTER BAGS SHALL BE PLACED IN AREAS WHERE DRAINAGE FLOW IS CONCENTRATED DUE TO NATURAL CONDITIONS OR CONSTRUCTION ACTIVITIES SUCH AS AT DRAINAGE STRUCTURES. THESE BAGS WILL BE MAINTAINED UNTIL THEY ARE NO LONGER NEEDED OR UNTIL THEY ARE REPLACED WITH PERMANENT POLLUTION ABATEMENT MEASURES.
- CONSTRUCTION WITHIN THE DEVELOPMENT MAY NOT BE CONTINUOUS. THE CONTRACTOR IS RESPONSIBLE FOR PLACING SILT FENCE ALONG THE DOWN GRADIENT SIDE OF EACH PAD DURING BUILDING CONSTRUCTION. ALL SILT FENCE SHALL BE PLACED PERPENDICULAR TO DRAINAGE FLOW.

SAN ANTONIO REGIONAL OFFICE  
14250 JUDSON ROAD  
SAN ANTONIO, TEXAS 78233-4480  
PHONE (210) 499-3098  
FAX (210) 545-4329



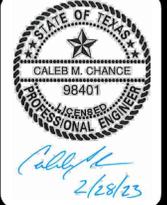
TEMPORARY BMP MODIFICATIONS		
DATE	SIGNATURE	DESCRIPTION

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 1**

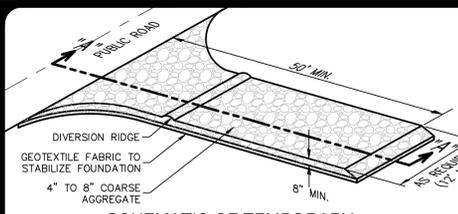
DATE	
NO.	
REVISION	



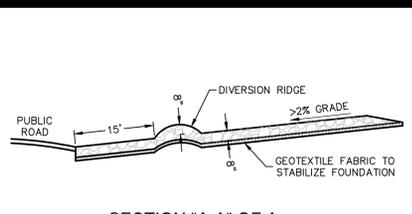
**PAPE-DAWSON ENGINEERS**  
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1008800

**SHAVANO HIGHLANDS HILLTOP**  
SAN ANTONIO, TEXAS  
**WATER POLLUTION ABATEMENT PLAN**  
**TEMPORARY WATER POLLUTION ABATEMENT PLAN**

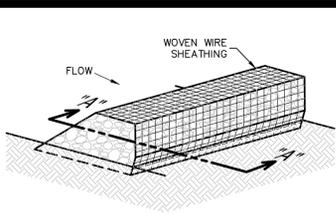
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JOB NO.	
DATE	JUNE 2022
DESIGNER	DL
CHECKED	BL DRAWN EG
SHEET	1 OF 2



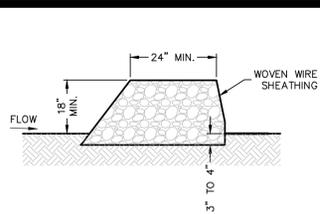
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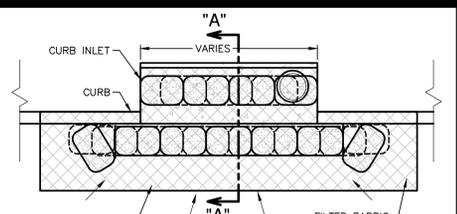
**SECTION "A-A" OF A CONSTRUCTION ENTRANCE/EXIT**



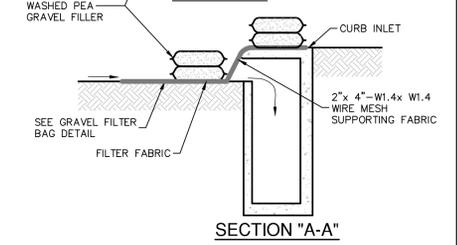
**ISOMETRIC PLAN VIEW**



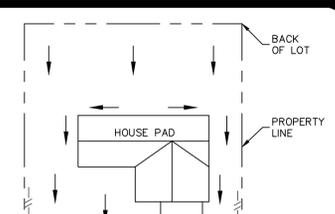
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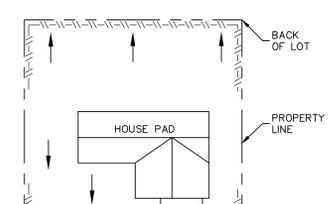
**PLAN VIEW**



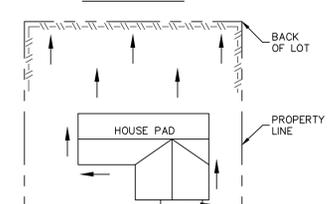
**SECTION "A-A"**



**LOT TYPE-A**



**LOT TYPE-B**

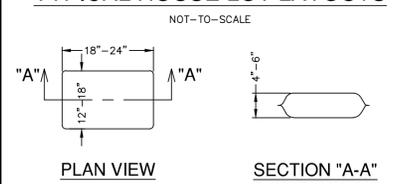


**LOT TYPE-C**

NOTE: SILT FENCE TO BE INSTALLED PER THESE DETAILS AND LOCATED ON THE DOWNGRADIENT SIDE OF EACH LOT LINE OR LIMITS OF CLEARING AS GENERALLY SHOWN ON THE OVERALL SITE PLAN.

LEGEND  
SILT FENCE

**TYPICAL HOUSE LOT LAYOUTS**

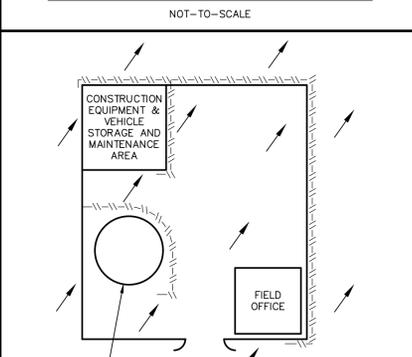


**PLAN VIEW**

**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**



**CONSTRUCTION STAGING AREA**

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

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

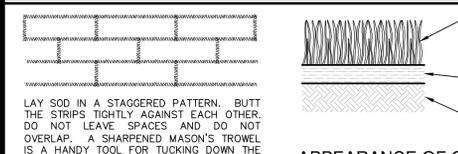
**EXHIBIT 2**

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

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

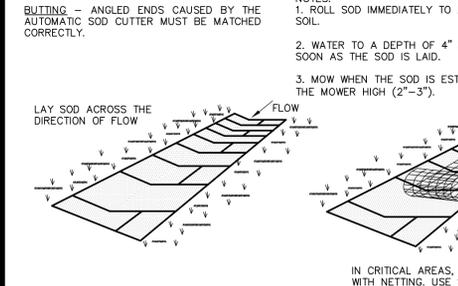
**STABILIZED CONSTRUCTION ENTRANCE/EXIT DETAIL**

NOT-TO-SCALE



**APPEARANCE OF GOOD SOD**

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



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 1/4" INCH) AT THE TIME OF CUTTING. THIS THICKNESS SHOULD INCLUDE 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.

**INSTALLATION IN CHANNELS**

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

**SOD INSTALLATION DETAIL**

NOT-TO-SCALE

**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.

**ROCK BERMS**

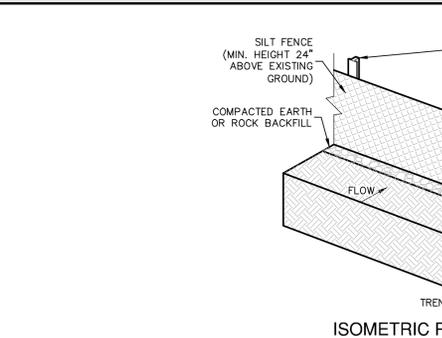
THE PURPOSE OF A ROCK BERM IS TO SERVE AS A CHECK DAM IN AREAS OF CONCENTRATED FLOW, TO INTERCEPT SEDIMENT-LADEN RUNOFF, DETAIN THE SEDIMENT AND RELEASE THE WATER IN SHEET FLOW. THE ROCK BERM SHOULD BE USED WHEN THE CONTRIBUTING DRAINAGE AREA IS LESS THAN 5 ACRES. ROCK BERMS ARE USED IN AREAS WHERE THE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

**INSPECTION AND MAINTENANCE GUIDELINES**

1. INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL BY THE RESPONSIBLE PARTY. FOR INSTALLATIONS IN STREAMBEDS, ADDITIONAL DAILY INSPECTIONS SHOULD BE MADE.  
2. REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6 INCHES AND DISPOSE OF THE ACCUMULATED SILT IN AN APPROVED MANNER THAT WILL NOT CAUSE ANY ADDITIONAL SILTATION.  
3. REPAIR ANY LOOSE WIRE SHEATHING.  
4. THE BERM SHOULD BE RESHAPED AS NEEDED DURING INSPECTION.  
5. THE BERM SHOULD BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.  
6. THE ROCK BERM SHOULD BE LEFT IN PLACE UNTIL ALL UPSTREAM AREAS ARE STABILIZED AND ACCUMULATED SILT REMOVED.

**ROCK BERM DETAIL**

NOT-TO-SCALE



**ISOMETRIC PLAN VIEW**

**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 SHOT 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**

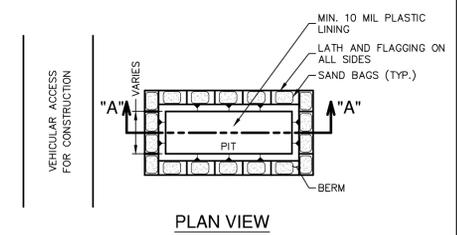
1. LAY OUT THE WOVEN WIRE SHEATHING PERPENDICULAR TO THE FLOW LINE. THE SHEATHING SHOULD BE 20 GAUGE WOVEN WIRE MESH WITH 1 INCH OPENINGS.  
2. BERM SHOULD HAVE A TOP WIDTH OF 2 FEET MINIMUM WITH SIDE SLOPES BEING 2:1 (H:V) OR FLATTER.  
3. PLACE THE ROCK ALONG THE SHEATHING AS SHOWN IN THE DIAGRAM TO 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).

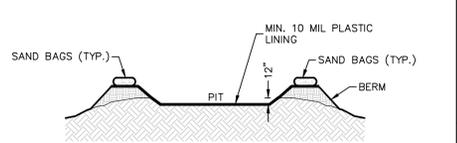
**BAGGED GRAVEL CURB INLET PROTECTION DETAIL**

NOT-TO-SCALE



**PLAN VIEW**

**SECTION "A-A"**



**GENERAL NOTES**

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

**MATERIALS**

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

**MAINTENANCE**

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

**CONCRETE TRUCK WASHOUT PIT DETAIL**

NOT-TO-SCALE

**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/IN<sup>2</sup>, ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NUMBER 30.  
2. FENCE POSTS SHOULD BE MADE OF HOT ROLLED STEEL, AT LEAST 4 FEET LONG WITH TEE OR Y-BAR CROSS SECTION, SURFACE PAINTED OR GALVANIZED, MINIMUM WEIGHT 1.25 LB/FT, AND BRINELL HARDNESS EXCEEDING 140.  
3. WOVEN WIRE BACKING TO SUPPORT THE FABRIC SHOULD BE GALVANIZED 2" X 4" WELDED WIRE, 12 GAUGE MINIMUM.

**INSTALLATION**

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

**SILT FENCE DETAIL**

NOT-TO-SCALE

DATE	
NO.	
REVISION	

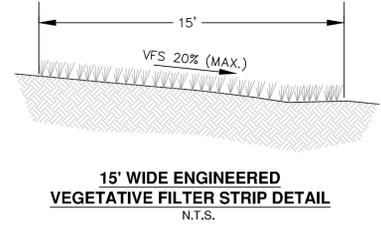
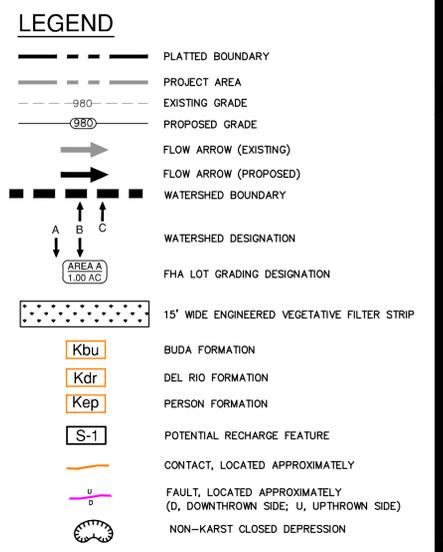
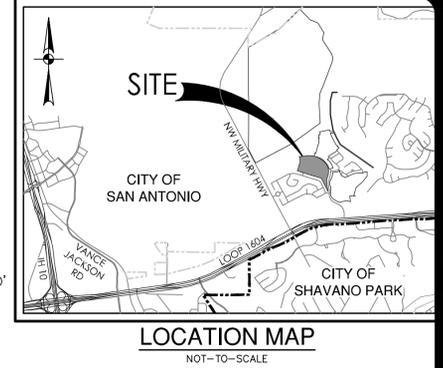
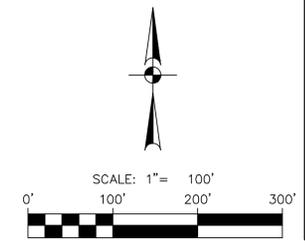


**PAPE-DAWSON ENGINEERS**  
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1008890

**SHAVANO HIGHLAND HILLTOP**  
SAN ANTONIO, TEXAS  
**WATER POLLUTION ABATEMENT PLAN**

PLAT NO.	
JOB NO.	8834-25
DATE	JUNE 2022
DESIGNER	DL
CHECKED	BL DRAWN EG
SHEET	2 OF 2

XXXXXXXXXX



SHAVANO HIGHLANDS HILLTOP TREATMENT SUMMARY							
Area	Total Area (ac)	Proposed Impervious Cover from Lots (ac.)	Proposed Impervious Cover from Roadways (ac.)	Total Proposed Impervious Cover (ac.)	BMP	Total Annual TSS Generated (lbs)	Total SS Removed (lbs)
A	0.14	0.000	0.111	0.111	Over Treatment	91	
B	0.37	0.060	0.130	0.190	Over Treatment	155	
C	1.08	0.135	0.340	0.475	Contech Jellyfish Filter System (B)	388	945
D	0.57	0.075	0.297	0.372	Contech Jellyfish Filter System (A)	304	2149
E	1.03	0.135	0.533	0.668	Contech Jellyfish Filter System (B)	545	
F	5.17	0.990	1.250	2.240	Contech Jellyfish Filter System (A)	1828	
G	0.78	0.360	0.000	0.360	Engineered VFS	294	323
H	6.43	2.210	0.000	2.210	Engineered VFS	1803	2008
<b>TOTAL</b>	<b>15.57</b>	<b>3.965</b>	<b>2.661</b>	<b>6.626</b>		<b>5407</b>	<b>5425</b>

- SUMMARY OF PERMANENT POLLUTION ABATEMENT MEASURES:**
- TEMPORARY BMP'S WILL BE MAINTAINED UNTIL THE SITE IMPROVEMENTS ARE COMPLETED AND THE SITE HAS BEEN STABILIZED, INCLUDING SUFFICIENT VEGETATION BEING ESTABLISHED.
  - DURING CONSTRUCTION, TO THE EXTENT PRACTICAL, CONTRACTOR SHALL MINIMIZE THE AREA OF SOIL DISTURBANCE. AREAS OF DISTURBED SOIL SHALL BE REVEGETATED TO STABILIZE SOIL USING SOLID SOD IN A STAGGERED PATTERN. SEE DETAIL ON TEMPORARY POLLUTION ABATEMENT DETAIL SHEET AND REFER TO SECTION 1.3.11 IN TCEQ'S TECHNICAL GUIDANCE MANUAL RG-348 (2005). SOD SHOULD BE USED IN CHANNELS AND ON SLOPES > 15%. THE CONTRACTOR MAY SUBSTITUTE THE USE OF SOD WITH THE PLACEMENT OF TOP SOIL AND A FRIABLE SEED BED WITH A PROTECTIVE MATTING OR HYDRAULIC MULCH ALONG WITH WATERING UNTIL VEGETATION IS ESTABLISHED. APPLICATIONS AND PRODUCTS SHALL BE THOSE APPROVED BY TxDOT AS OF FEBRUARY 2001 AND IN COMPLIANCE WITH THE TGM RG-348 (2005). SEED MIXTURE AND/OR GRASS TYPE TO BE DETERMINED BY OWNER AND SHOULD BE IN COMPLIANCE WITH TGM RG-348 (2005) GUIDELINES. IRRIGATION MAY BE REQUIRED IN ORDER TO ESTABLISH SUFFICIENT VEGETATION.
  - FOR DISTURBED AREAS WHERE INSUFFICIENT SOIL EXISTS TO ESTABLISH VEGETATION, CONTRACTOR SHALL PLACE A MINIMUM OF 6" OF TOPSOIL PRIOR TO REVEGETATION.
  - TYPICAL SLOPES ON THIS PROJECT RANGE FROM APPROXIMATELY 3.8% TO 23.5%.

- PERMANENT POLLUTION ABATEMENT MEASURES:**
- SILT FENCING AND ROCK BERMS, WHERE APPROPRIATE, WILL BE MAINTAINED UNTIL THE ROADWAY, UTILITY, DRAINAGE IMPROVEMENTS, AND BUILDING CONSTRUCTION ARE COMPLETED.
  - A JELLYFISH FILTER SYSTEM AND A 15-FOOT WIDE ENGINEERED VEGETATIVE FILTER STRIP WILL SERVE AS THE PERMANENT BEST MANAGEMENT PRACTICE (BMP) FOR DRAINAGE AREAS "A"- "G".
  - ENERGY DISSIPATORS (TO HELP REDUCE EROSION) WILL BE PROVIDED AT POINTS OF CONCENTRATED DISCHARGE WHERE EXCESSIVE VELOCITIES MAY BE ENCOUNTERED.
- NOTES:**
- CONTRACTOR SHALL INSTALL AND ESTABLISH VEGETATION FOR SOIL STABILIZATION PRIOR TO SITE CLOSEOUT.
  - 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**

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

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

STATE OF TEXAS  
CALEB M. CHANGE  
LICENSED PROFESSIONAL ENGINEER  
98401  
2/16/23

**PAPE-DAWSON ENGINEERS**  
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1008800

**SHAVANO HIGHLANDS HILLTOP**  
SAN ANTONIO, TEXAS

**WATER POLLUTION ABATEMENT PLAN**  
**PERMANENT WATER POLLUTION ABATEMENT PLAN**

PLAT NO. \_\_\_\_\_  
JOB NO. 8834-25  
DATE January 2023  
DESIGNER RG  
CHECKED BL DRAWN EG  
SHEET 1 OF 1

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**FINAL PLAN AND PROFILE  
SHEETS**

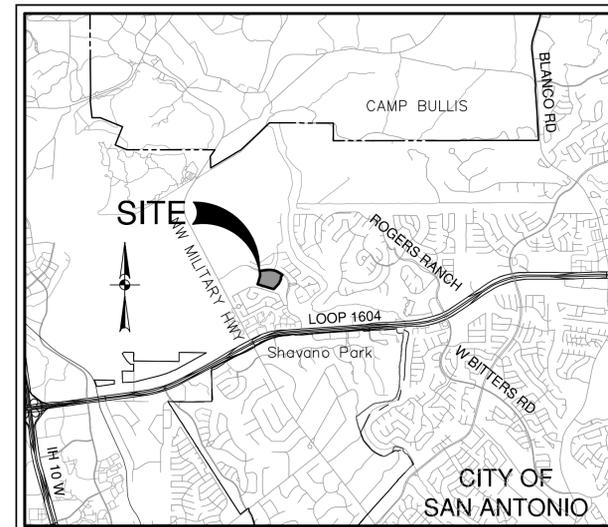
# SHAVANO HIGHLANDS HILLTOP

## SAN ANTONIO, TEXAS

### CIVIL CONSTRUCTION PLANS

Sheet List Table

Sheet Title	Sheet Number
COVER SHEET	C0.00
MASTER DRAINAGE PLAN	C1.00
DRAIN A PLAN & PROFILE (STA. 1+00.00 TO 4+60.00)	C1.01
DRAIN A PLAN & PROFILE (STA. 4+60.00 TO END)	C1.02
DRAIN B & C PLAN & PROFILE	C1.03
DRAIN D PLAN & PROFILE (STA. 1+00 TO 1+80.00)	C1.04
DRAIN D PLAN & PROFILE (STA. 1+80.00 TO END)	C1.05
DRAINAGE DETAILS	C1.10
DRAINAGE DETAILS	C1.11
DRAINAGE DETAILS	C1.12
DRAINAGE DETAILS	C1.13
MOUNTAIN HILL PLAN & PROFILE (STA. 1+53.75 TO 7+00.00)	C2.00
MOUNTAIN HILL PLAN & PROFILE (STA. 7+00.00 TO 12+00.00)	C2.01
MOUNTAIN HILL PLAN & PROFILE (STA. 12+00.00 TO 20.00)	C2.02
MOUNTAIN HILL PLAN & PROFILE (STA. 20+00.00 TO END)	C2.03
STREET DETAILS SHEET 1 OF 3	C2.10
STREET DETAILS SHEET 2 OF 3	C2.11
STREET DETAILS SHEET 3 OF 3	C2.12
SIGNAGE PLAN	C3.00
SIGNAGE DETAILS	C3.10
SIGNAGE DETAILS	C3.11
OVERALL WATER PLAN	C4.00
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WATER NOTES	C4.11
OVERALL SANITARY SEWER PLAN	C5.00
SANITARY SEWER LINE A PLAN AND PROFILE (STA. 1+00.00 TO 8+00.00)	C5.01
SANITARY SEWER LINE A PLAN AND PROFILE (STA. 8+00.00 TO END)	C5.02
SANITARY SEWER LINE B PLAN AND PROFILE (STA. 1+00.00 TO 5+50.00)	C5.03
SANITARY SEWER LINE B PLAN AND PROFILE (STA. 5+50.00 TO END)	C5.04
SANITARY SEWER LINE C PLAN AND PROFILE	C5.05
SANITARY SEWER LINE D & E PLAN AND PROFILE (STA. 1+00.00 TO 6+50.00)	C5.06
SANITARY SEWER LINE E PLAN AND PROFILE (STA. 6+50.00 TO END)	C5.07
SANITARY SEWER LINE F PLAN AND PROFILE	C5.08
SANITARY SEWER DETAILS	C5.10
SANITARY SEWER NOTES	C5.11
UTILITY PLAN	C6.00
GRADING PLAN	C7.00
SWPPP	C8.00
SWPPP DETAILS	C8.10



LOCATION MAP  
NOT-TO-SCALE

PREPARED FOR:

SHAVANO ROGERS NORTH NO. 3, LTD  
11 LYNN BATTS LANE SUITE 100  
SAN ANTONIO, TEXAS 78218

FEBRUARY 2023



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

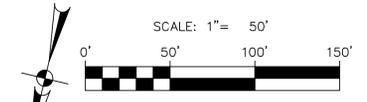
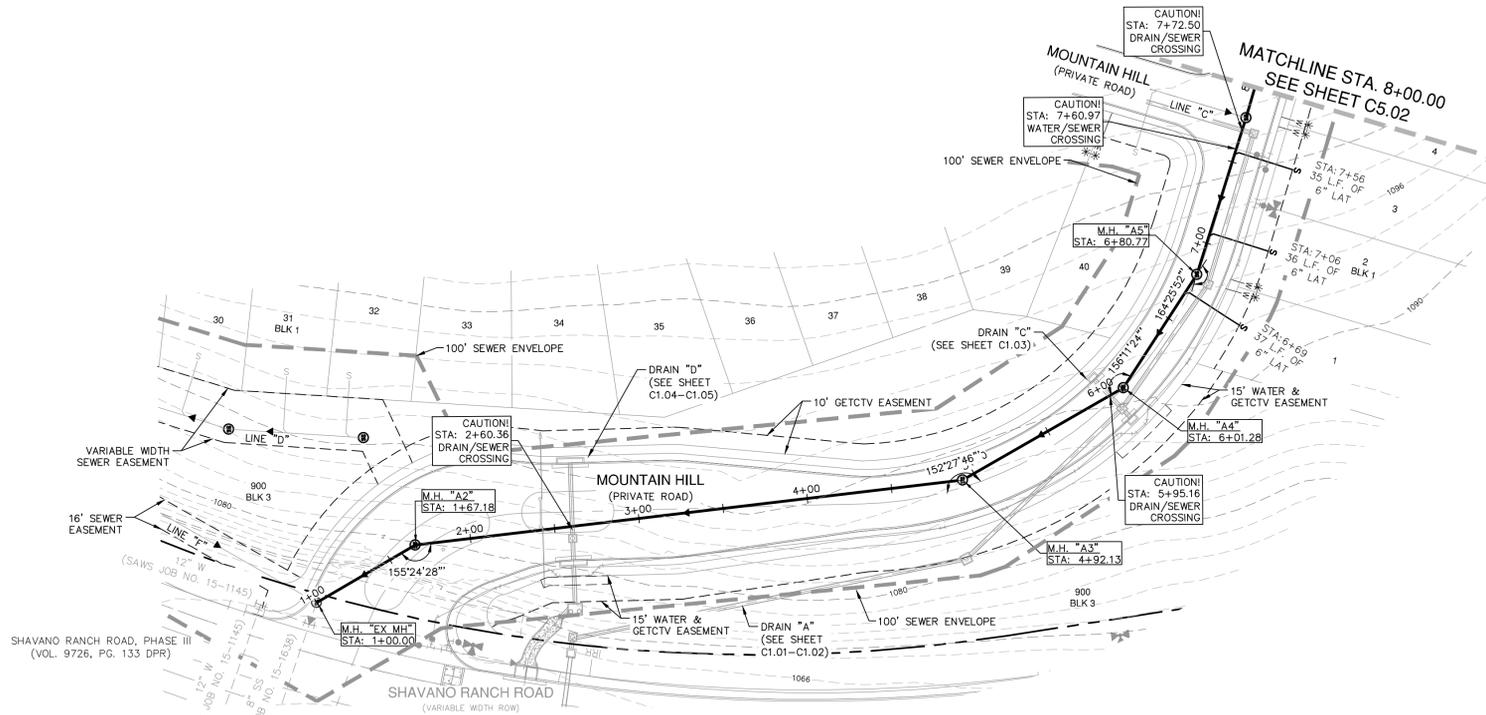
WATER (SAWS PRESSURE ZONE 11)

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD
ADDRESS: 11 LYNN BATTS LANE SUITE 100
CITY: SAN ANTONIO STATE: TX ZIP: 78218
PHONE# (210)-828-6131 FAX#
SAWS BLOCK MAP# 138644 TOTAL EDU'S 57 TOTAL ACREAGE 18.91
TOTAL LINEAR FOOTAGE OF PIPE: 8"-3087 LF PLAT NO. 23-11800016
NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

SEWER

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD
ADDRESS: 11 LYNN BATTS LANE SUITE 100
CITY: SAN ANTONIO STATE: TX ZIP: 78218
PHONE# (210) 496-2668 FAX#
SAWS BLOCK MAP# 138644 TOTAL EDU'S 57 TOTAL ACREAGE 18.91
TOTAL LINEAR FOOTAGE OF PIPE: 8" 4096 LF PLAT NO. 23-11800016
NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX



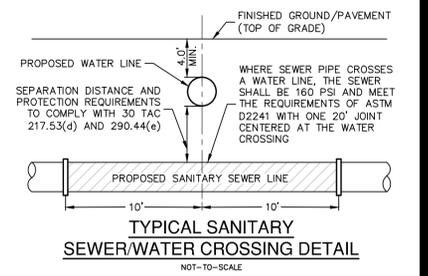
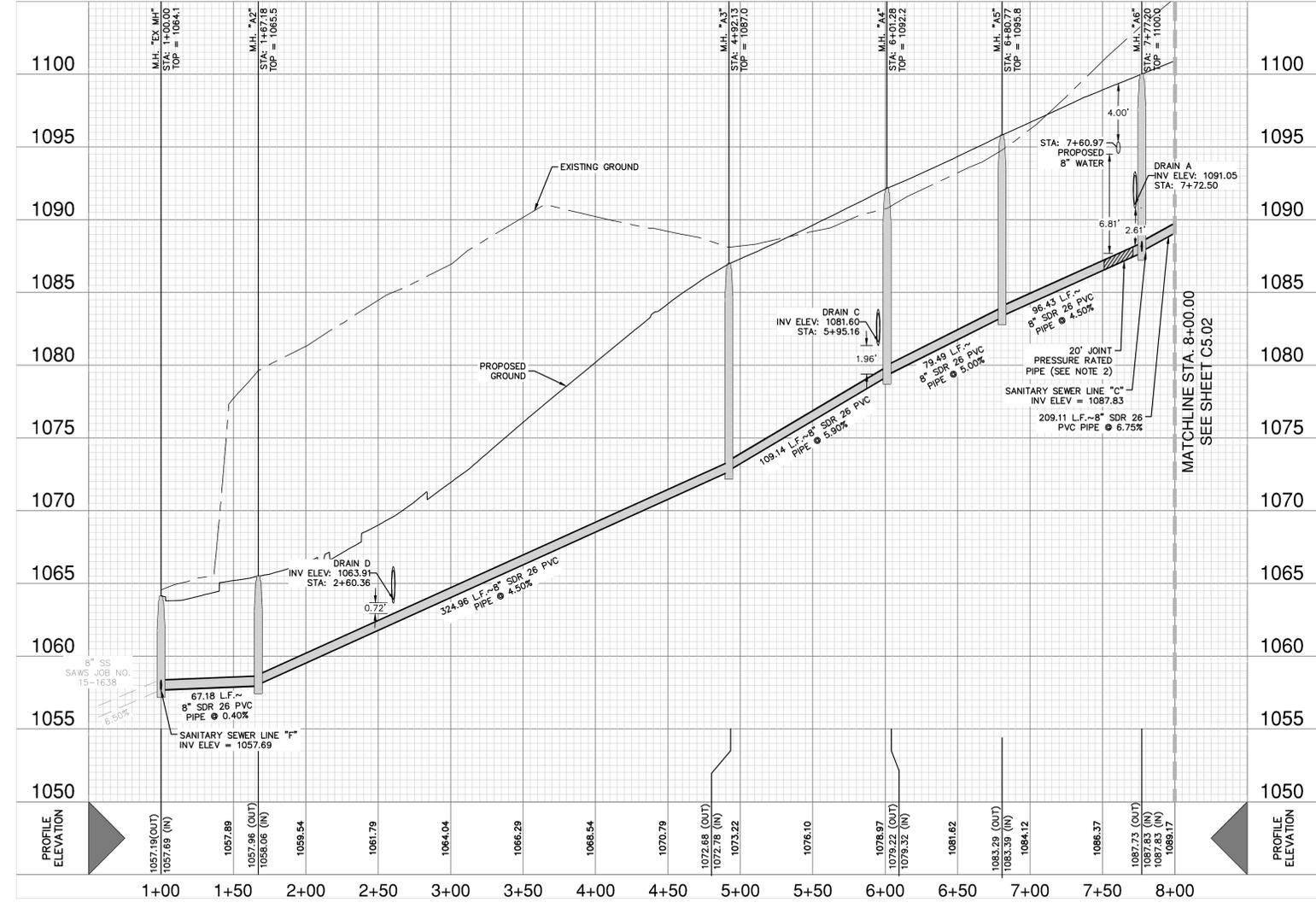


**SEWER LEGEND**

PROJECT LIMITS	---
EXISTING WATER	---
EXISTING SEWER	---
PROPOSED SEWER	---
PROPOSED WATER	---
PROPOSED SEWER LATERAL	---

**SANITARY SEWER LINE "A"**  
STA. 1+00.00 TO 8+00.00

VERTICAL SCALE: 1" = 5'  
HORIZONTAL SCALE: 1" = 50'



**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:**  
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.

**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 4098 LF PLAT NO. 23-11800014  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

DATE \_\_\_\_\_

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

*Caleb M. Change*  
2/16/23

**PAPE-DAWSON ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008890

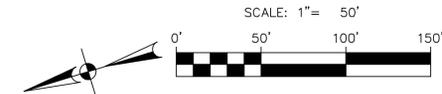
**SHAVANO HIGHLANDS HILLTOP**  
SAN ANTONIO, TEXAS

**SANITARY SEWER LINE A PLAN & PROFILE**  
STA 1+00.00 TO 8+00.00

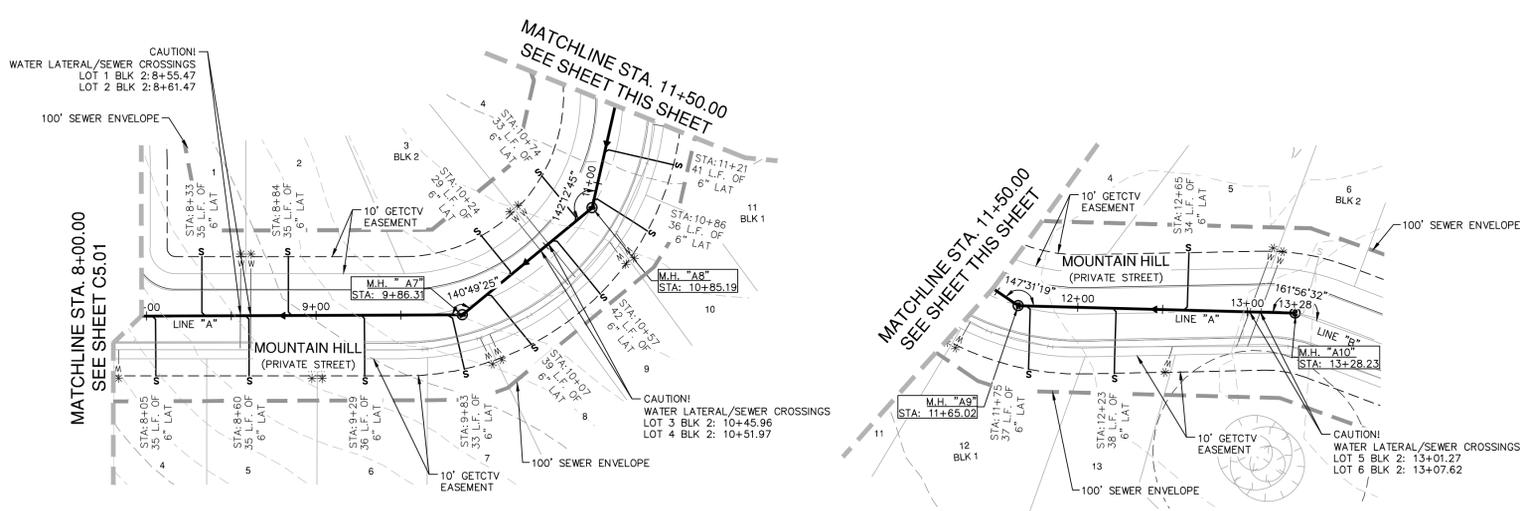
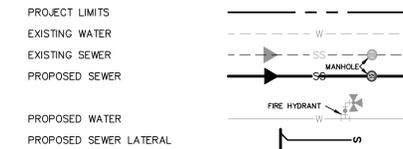
PLAT NO. 23-11800016  
 JOB NO. 8834-25  
 DATE FEBRUARY 2023  
 DESIGNER RG  
 CHECKED BL DRAWN RG  
 SHEET C5.01

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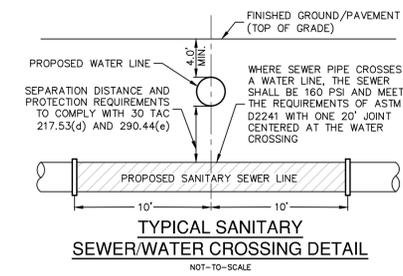
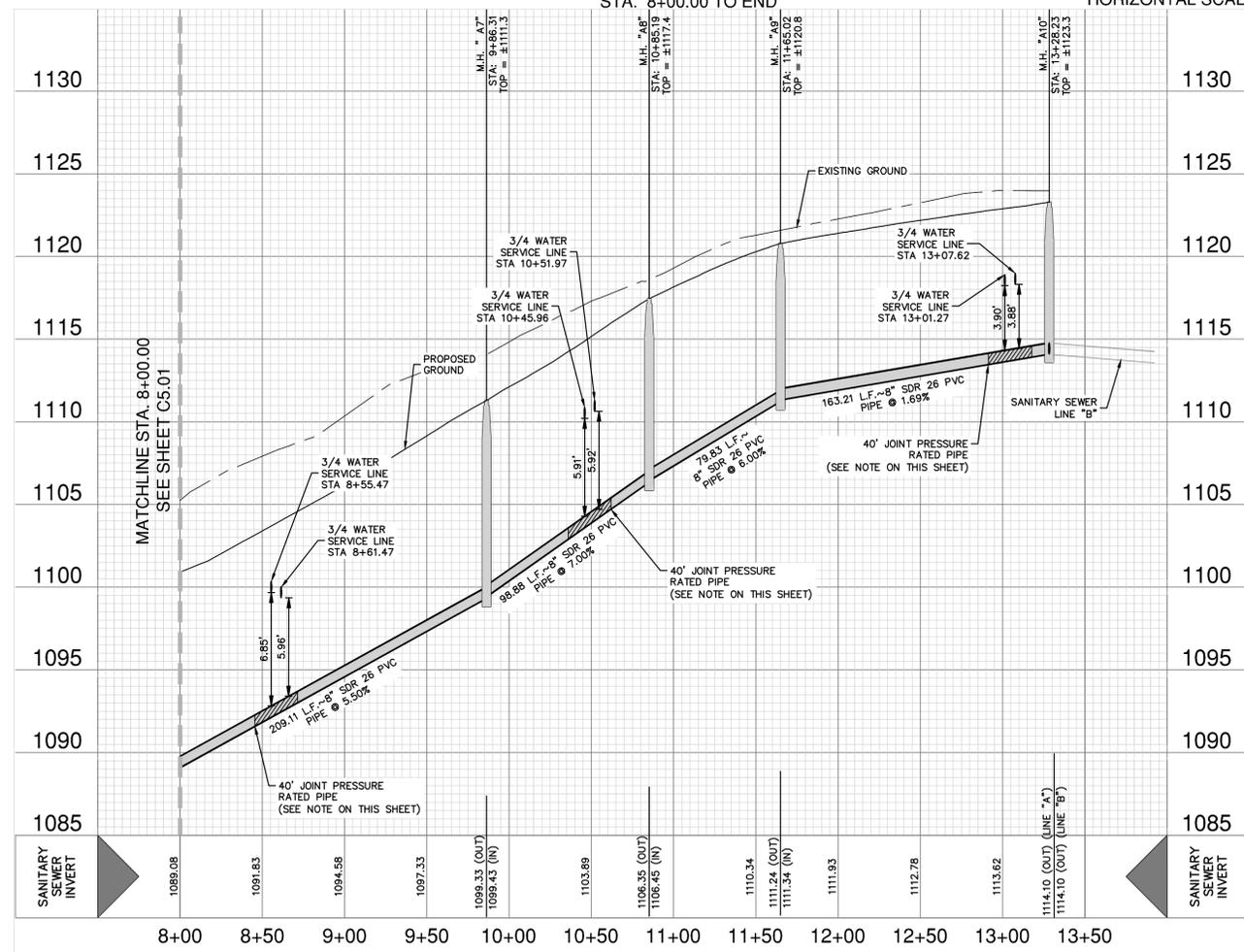
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**SEWER LEGEND**



**SANITARY SEWER LINE "A"**  
STA. 8+00.00 TO END  
VERTICAL SCALE: 1" = 5'  
HORIZONTAL SCALE: 1" = 50'



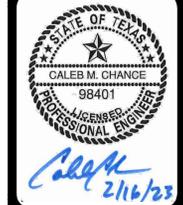
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**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8' 4098 LF PLAT NO. 23-11800014  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

DATE	
NO.	REVISION



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 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008800

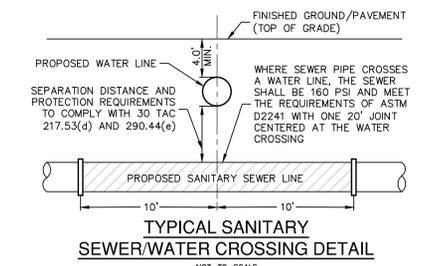
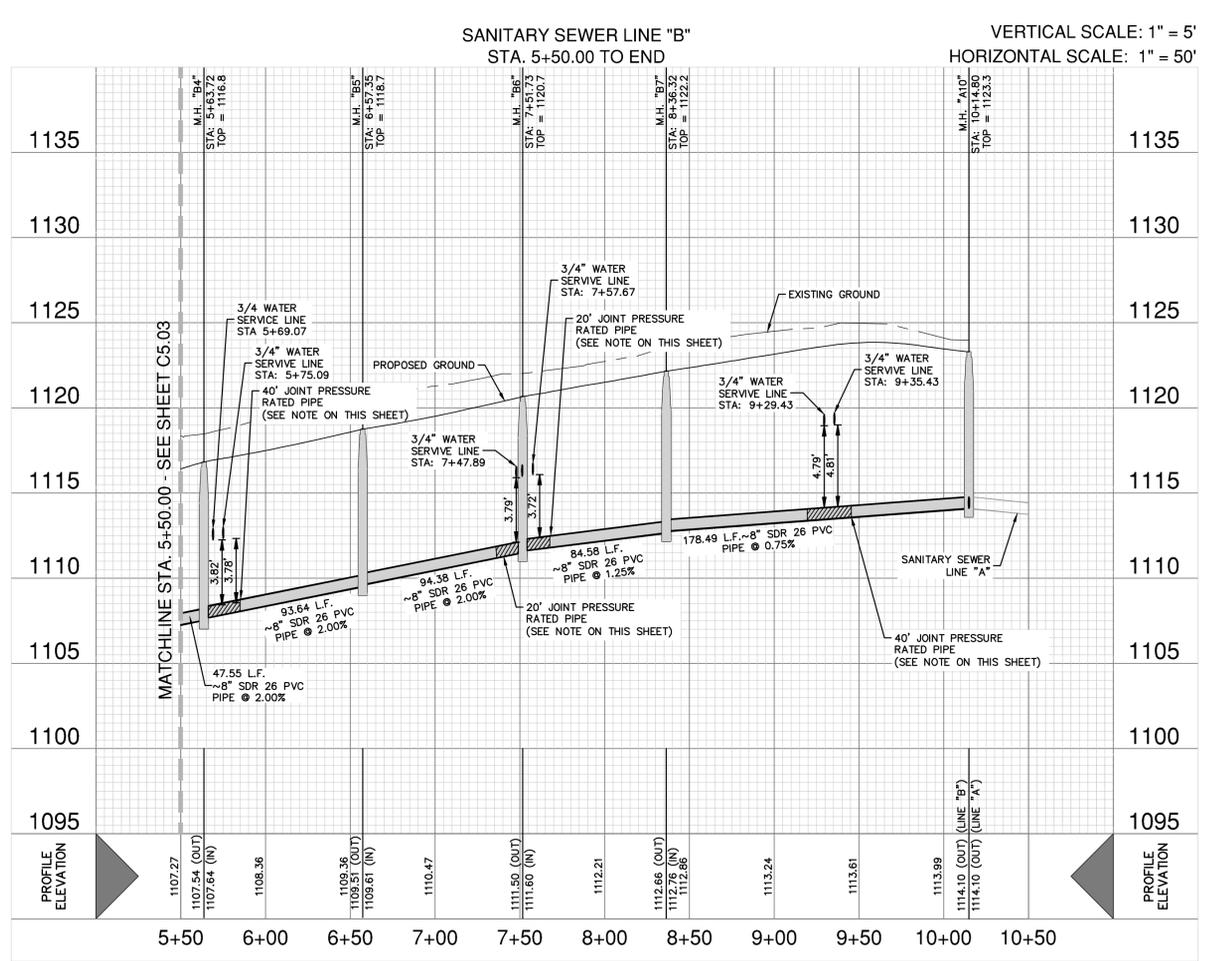
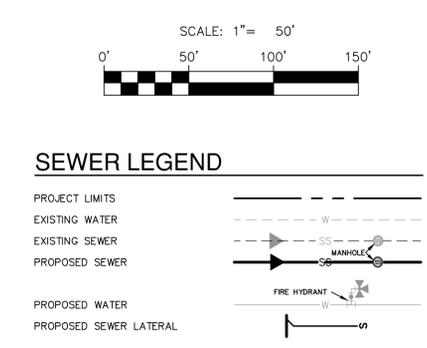
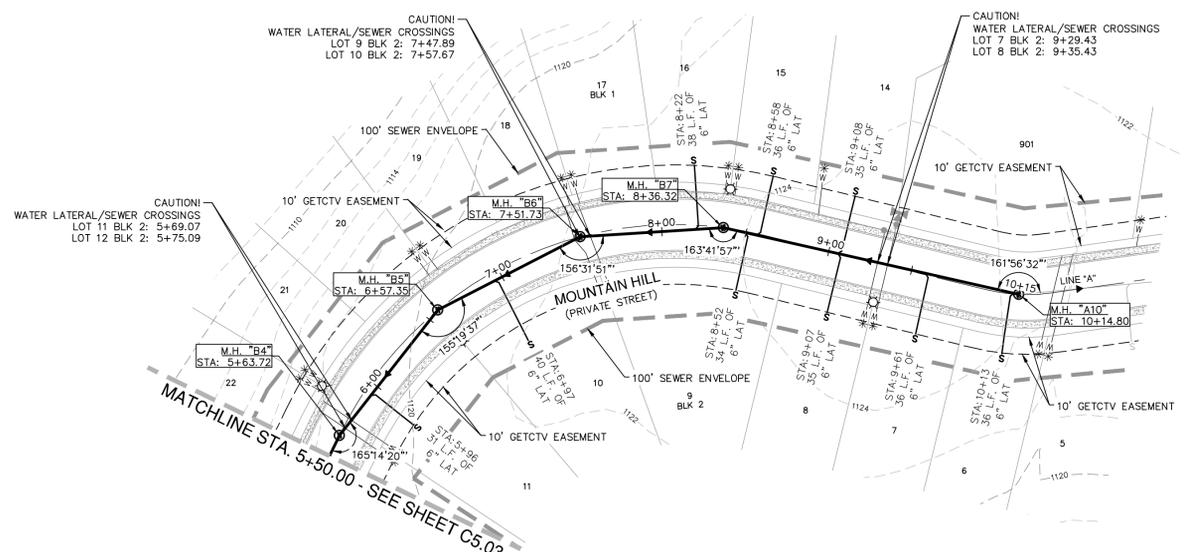
**SHAVANO HIGHLANDS HILLTOP**  
 SAN ANTONIO, TEXAS  
**SANITARY SEWER LINE A PLAN & PROFILE**  
 8+00.00 TO END

PLAT NO.	23-11800016
JOB NO.	8834-25
DATE	JANUARY 2023
DESIGNER	RG
CHECKED	BL DRAWN RG
SHEET	C5.02

Notes: File: 17\_2023\_7\_32.dwg User: ID: RishardCorcoba  
 Plot: P: 888 1/4 x 25 1/4 Drawing: Civil/SSA-883425.dwg

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





**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:**  
 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.

**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 4098 LF PLAT NO. 23-11800014  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

DATE \_\_\_\_\_

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

STATE OF TEXAS  
 CALEB M. CHANCE  
 98401  
 LICENSED PROFESSIONAL ENGINEER  
 3/1/23

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008890

**SHAVANO HIGHLANDS HILLTOP**  
 SAN ANTONIO, TEXAS

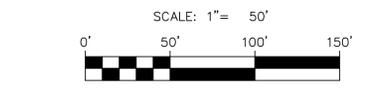
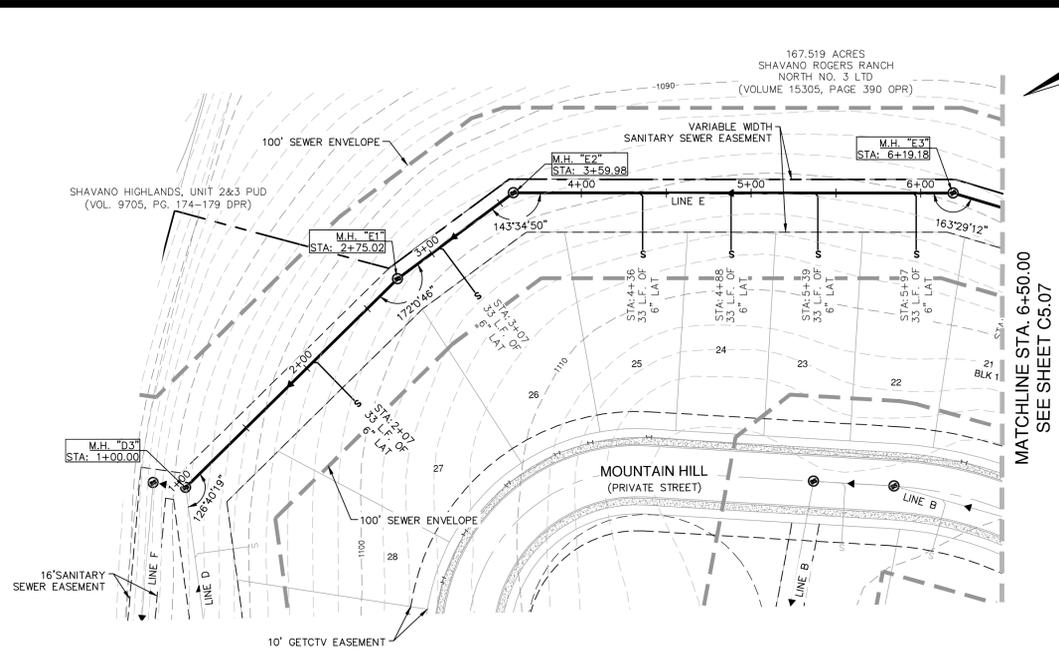
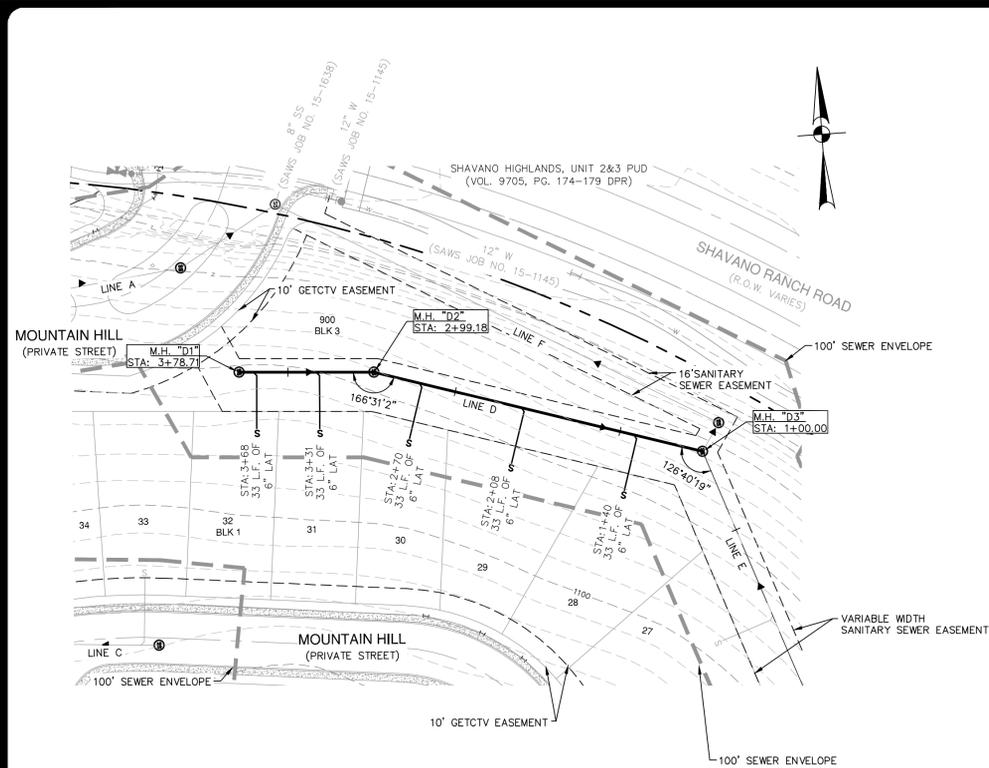
**SANITARY SEWER LINE B PLAN & PROFILE**  
 STA. 5+50.00 TO END

PLAT NO. 23-11800016  
 JOB NO. 8834-25  
 DATE FEBRUARY 2023  
 DESIGNER RG  
 CHECKED BL DRAWN EG  
 SHEET C5.04

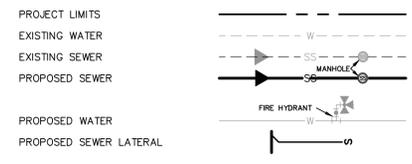
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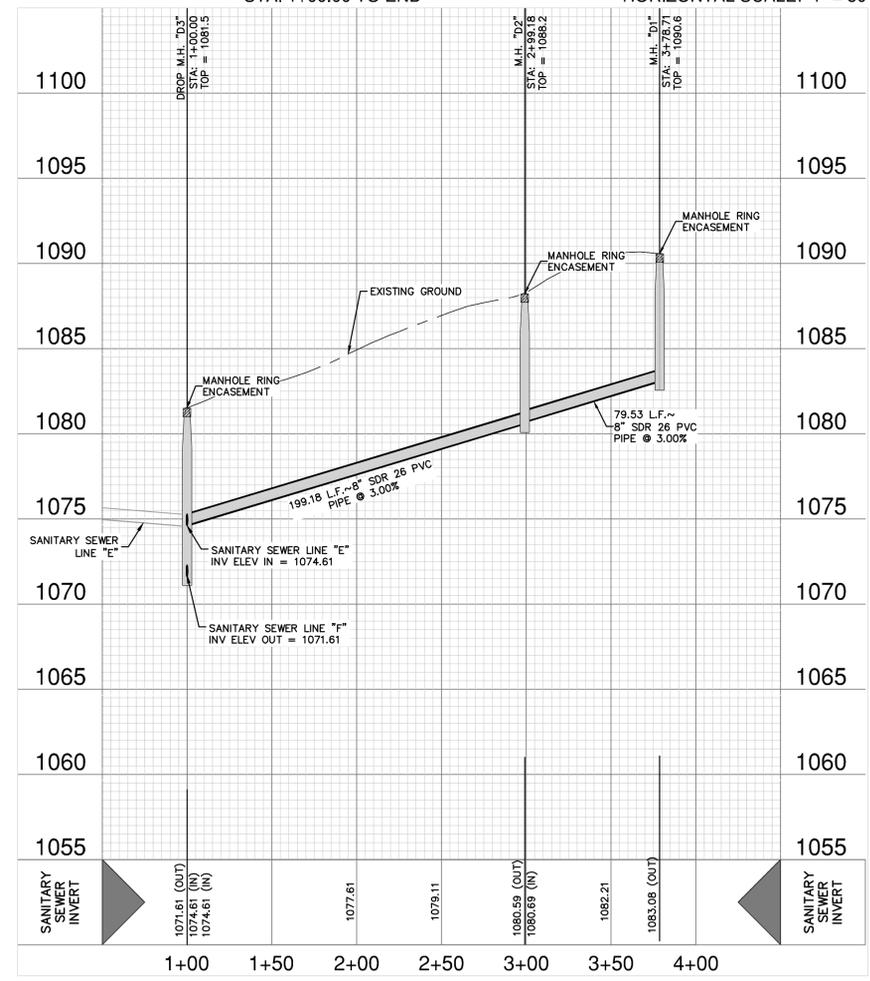




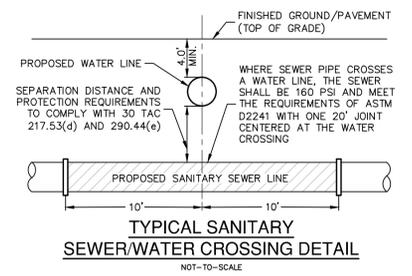
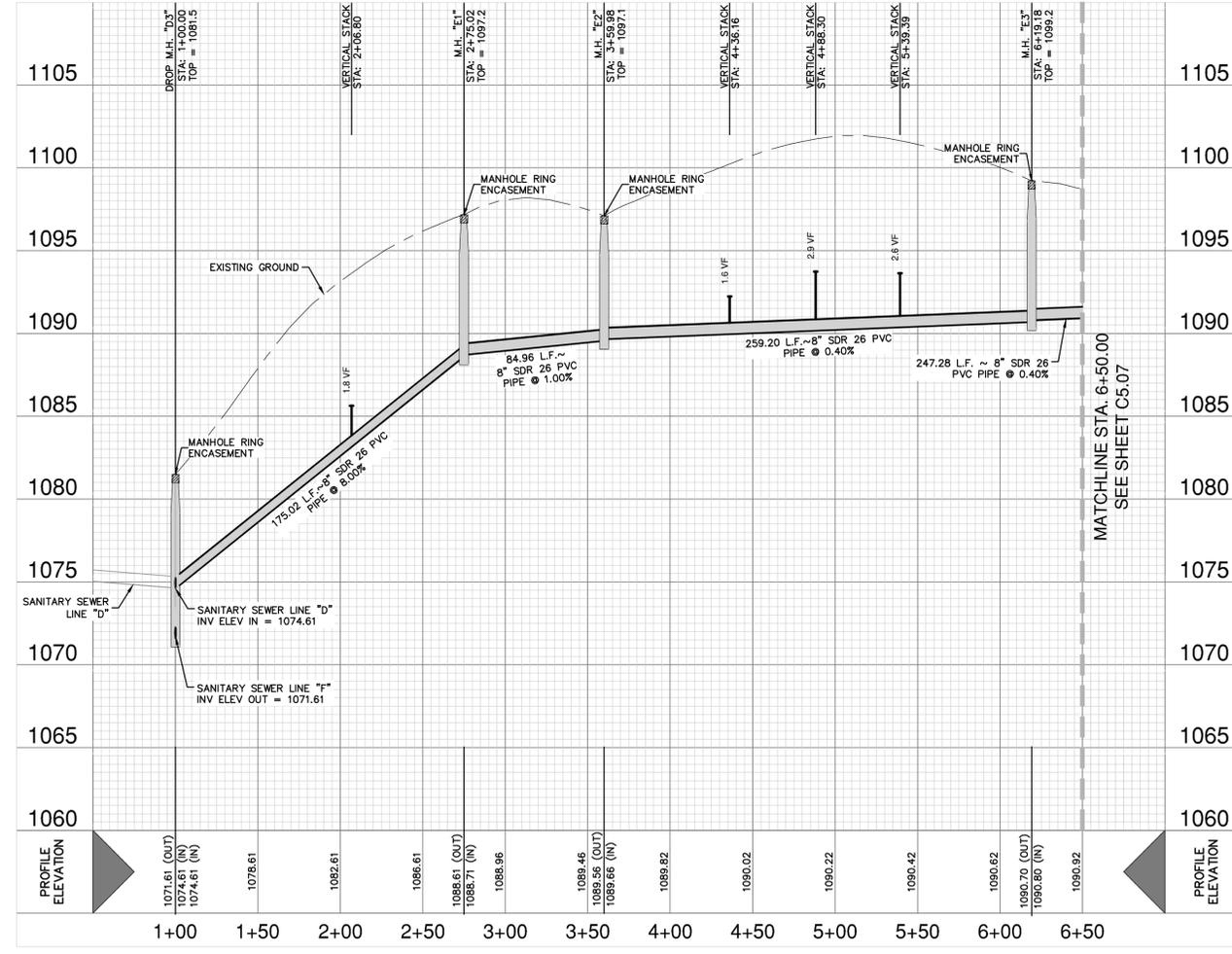
**SEWER LEGEND**



**SANITARY SEWER LINE "D"**  
STA. 1+00.00 TO END  
VERTICAL SCALE: 1" = 5'  
HORIZONTAL SCALE: 1" = 50'



**SANITARY SEWER LINE "E"**  
STA. 1+00.00 TO 6+50.00  
VERTICAL SCALE: 1" = 5'  
HORIZONTAL SCALE: 1" = 50'



**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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**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 4098 LF PLAT NO. 23-11800014  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

DATE	NO.	REVISION

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008890

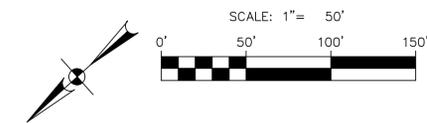
CALEB M. CHANGE  
 LICENSED PROFESSIONAL ENGINEER  
 98401  
 2/16/23

**SHAVANO HIGHLANDS HILLTOP**  
 SAN ANTONIO, TEXAS

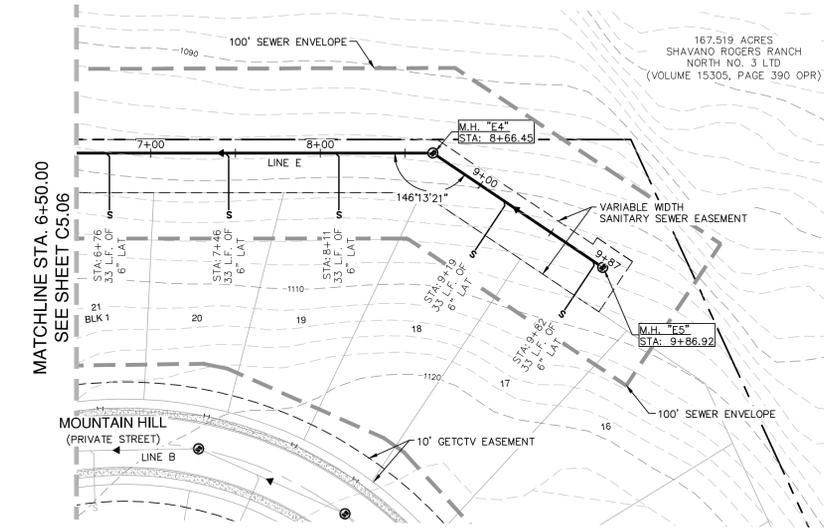
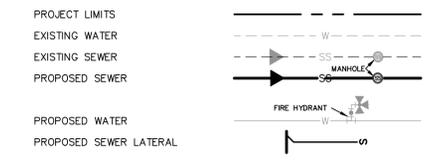
**SANITARY SEWER LINE D & E PLAN AND PROFILE**  
 STA 1+00.00 TO 9+00.00

PLAT NO.	23-11800016
JOB NO.	8834-25
DATE	FEBRUARY 2023
DESIGNER	RG
CHECKED	BL DRAWN BM
SHEET	C5.06

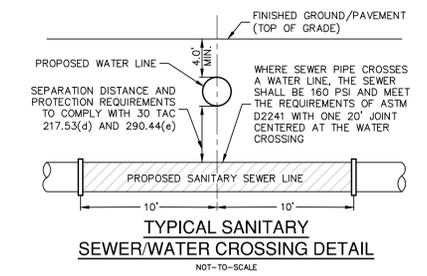
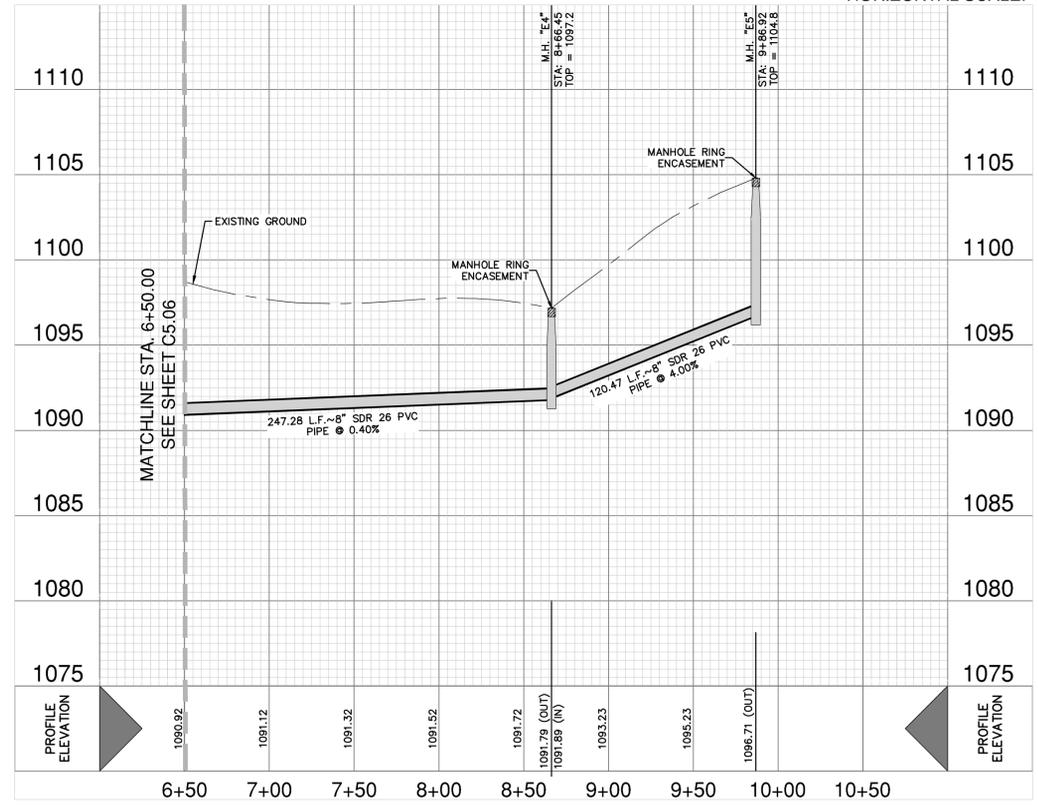
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**SEWER LEGEND**



**SANITARY SEWER LINE "E"**  
 STA. 6+50.00 TO END  
 VERTICAL SCALE: 1" = 5'  
 HORIZONTAL SCALE: 1" = 50'



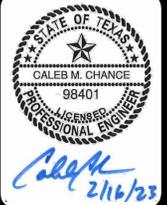
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**SEWER**

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO.3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 4096 LF PLAT NO. 23-11800014  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

NO.	REVISION



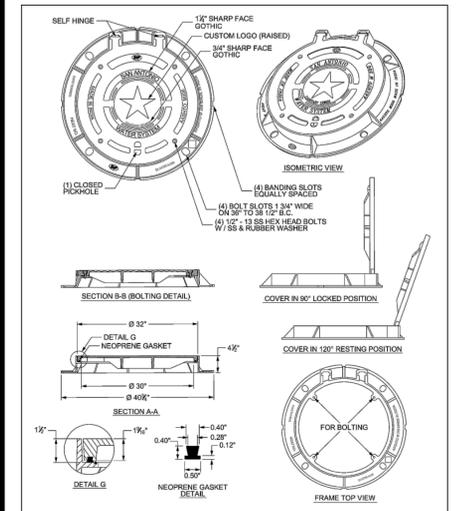
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #479 | TEXAS SURVEYING FIRM #1008890

**SHAVANO HIGHLANDS HILLTOP**  
 SAN ANTONIO, TEXAS  
**SANITARY SEWER LINE E PLAN & PROFILE**  
 STA 9+00.00 TO END

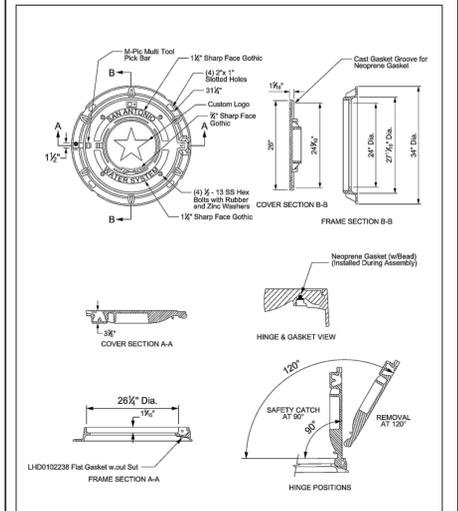
PLAT NO.	23-11800016
JOB NO.	8834-25
DATE	FEBRUARY 2023
DESIGNER	RG
CHECKED	BL DRAWN BM
SHEET	C5.07

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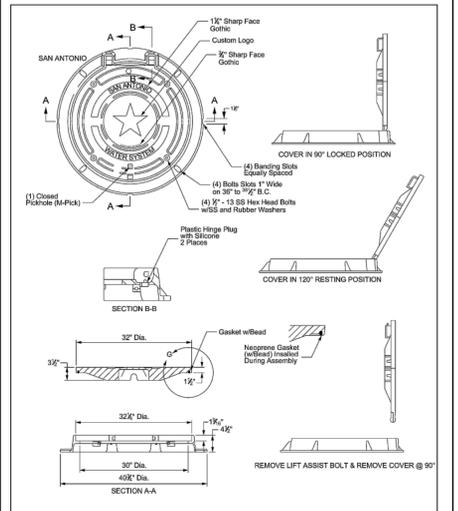




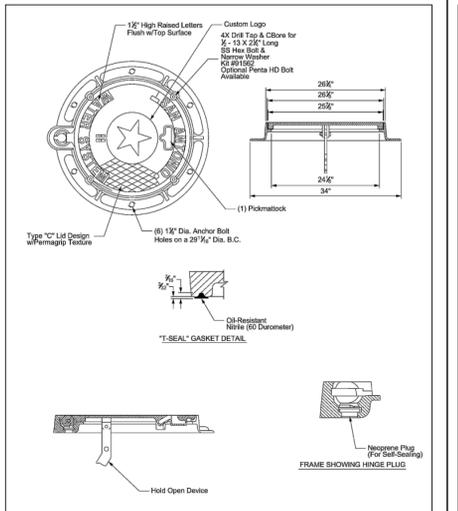
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		DD 852-07	1 OF 5



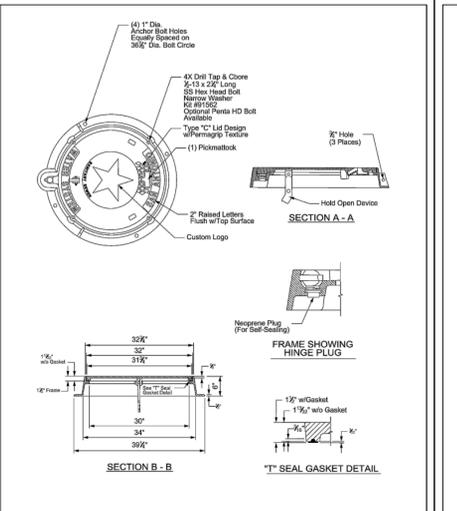
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		DD 852-07	2 OF 5



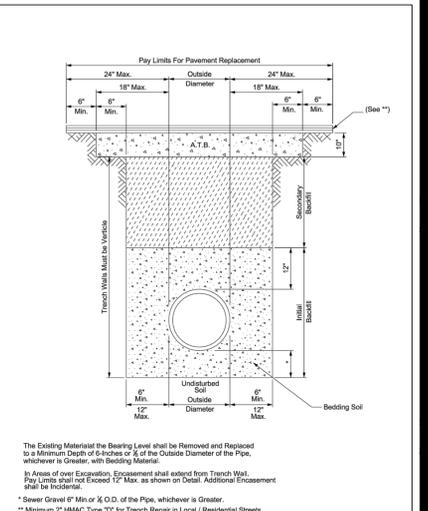
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		DD 852-07	3 OF 5



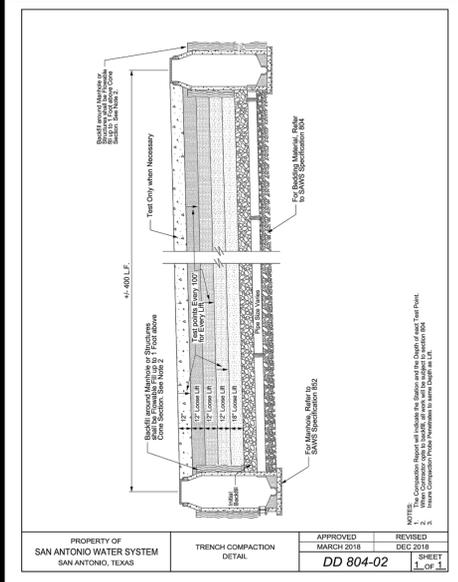
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		DD 852-07	4 OF 5



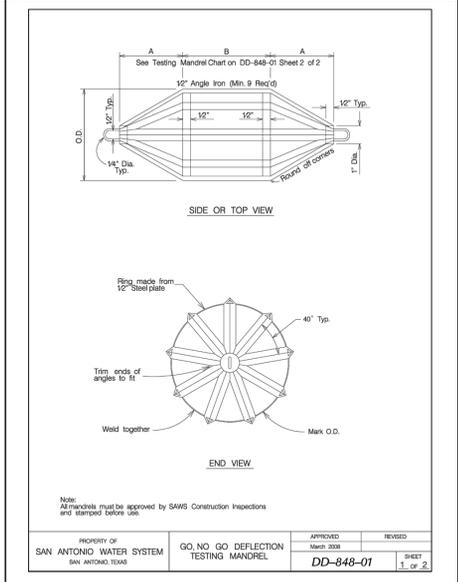
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		DD 852-07	5 OF 5



PROPERTY OF	SAN ANTONIO WATER SYSTEM	APPROVED	REVIS
		MARCH 2008	AUG 2019
		DD-804-01	1 OF 1



PROPERTY OF	SAN ANTONIO WATER SYSTEM	APPROVED	REVIS
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		DD 804-02	1 OF 1

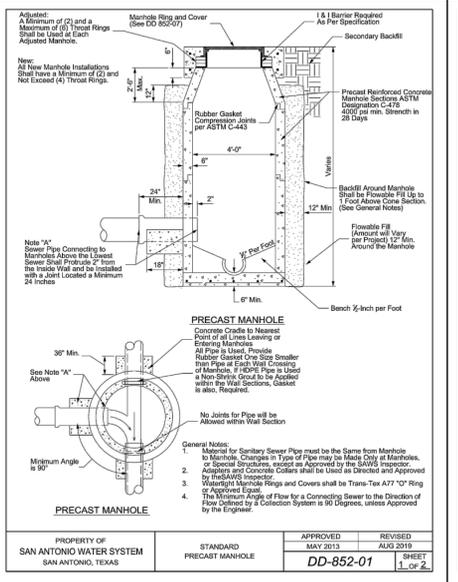


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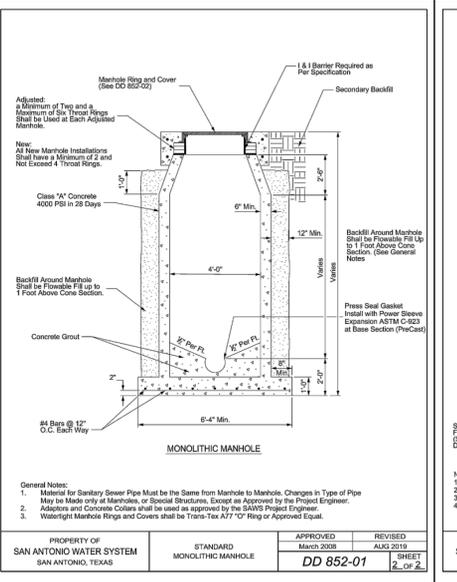
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6"	4.0"	4.8"	1.50	4.73
8"	5.5"	6"	7.37	6.66
10"	7.0"	7.5"	9.21	8.50
12"	8.0"	8"	10.86	10.25
15"	10.0"	11"	13.42	12.71
18"	12.0"	13.5"	—	—
21"	14.0"	16"	—	—
24"	16.0"	18"	—	—
27"	18.0"	20"	—	—

Notes:  
 PVC pipes and fittings 6" to 18" in diameter shall conform to ASTM D-3034-08.  
 PVC pipes and fittings 18" to 27" in diameter shall conform to ASTM D-4749-08.  
 This information is provided as a reference. All deflection testing shall be done in accordance with TCEQ Chapter 217.

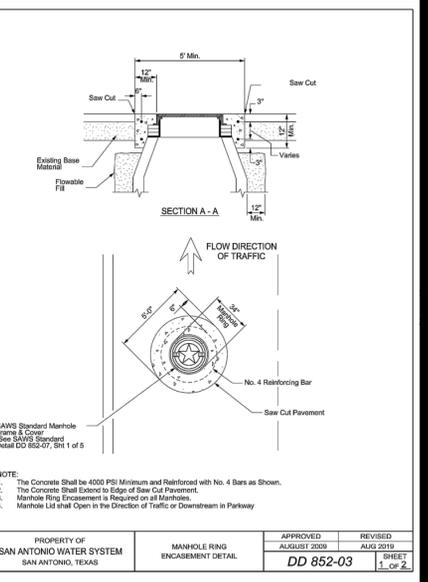
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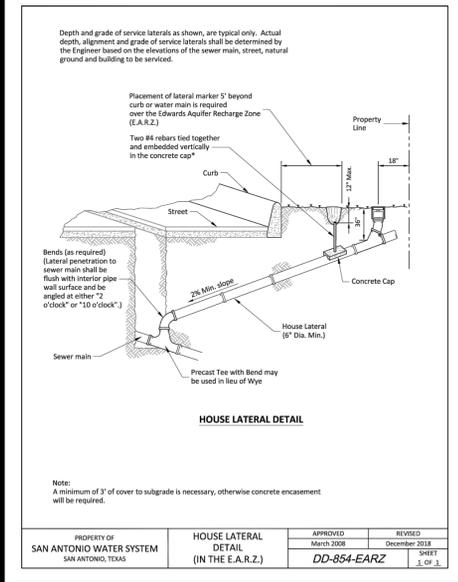
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		DD-852-01	1 OF 2



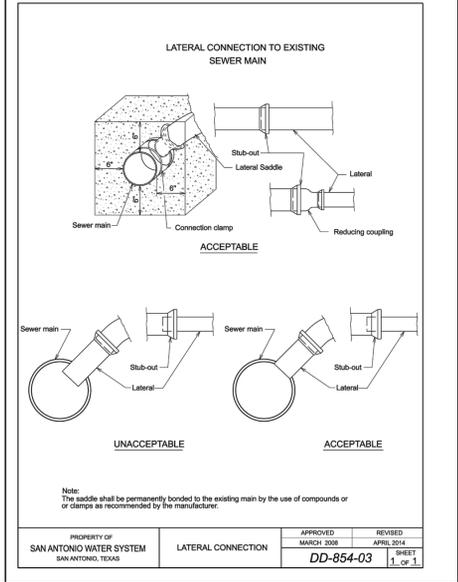
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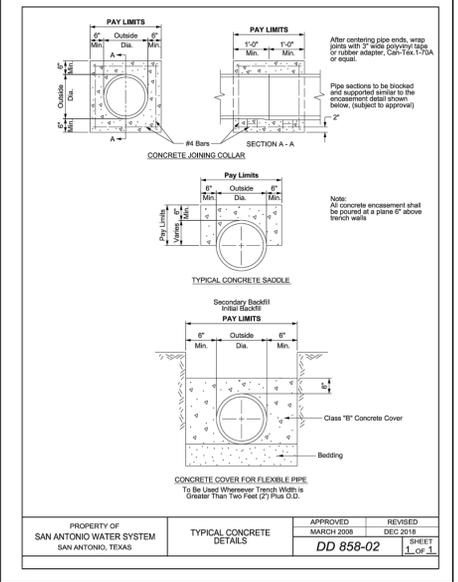
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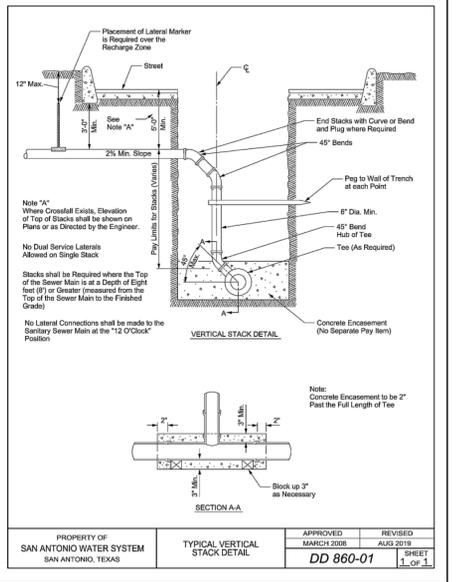
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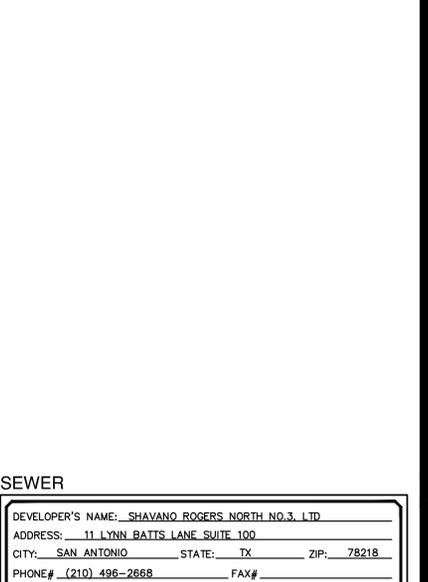
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		DD-854-03	1 OF 1



PROPERTY OF	SAN ANTONIO WATER SYSTEM	APPROVED	REVIS
		MARCH 2008	DEC 2019
		DD 858-02	1 OF 1



PROPERTY OF	SAN ANTONIO WATER SYSTEM	APPROVED	REVIS
		MARCH 2008	AUG 2019
		DD 860-01	1 OF 1



PROPERTY OF	SAN ANTONIO WATER SYSTEM	APPROVED	REVIS
		MARCH 2008	AUG 2019
		DD 860-01	1 OF 1

SEWER

DEVELOPER'S NAME: SHAVANO ROGERS NORTH NO. 3, LTD  
 ADDRESS: 11 LYNN BATTS LANE SUITE 100  
 CITY: SAN ANTONIO STATE: TX ZIP: 78218  
 PHONE# (210) 496-2668 FAX#  
 SAWS BLOCK MAP# 138644 TOTAL EDU'S .57 TOTAL ACREAGE 18.91  
 TOTAL LINEAR FOOTAGE OF PIPE: 8" 4098 LF PLAT NO. 23-11800016  
 NUMBER OF LOTS 57 SAWS JOB NO. XXXX-XX

DATE

NO. REVISION

STATE OF TEXAS  
 CALEB M. CHANGE  
 LICENSED PROFESSIONAL ENGINEER  
 98401  
 2/16/23

SHAVANO HILLTOP  
 SAN ANTONIO, TEXAS

PAPE-DAWSON  
 ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #1008890

PLAT NO. 23-11800016  
 JOB NO. 8834-25  
 DATE FEBRUARY 2023  
 DESIGNER RG  
 CHECKED BL DRAWN EG  
 SHEET C5.10

### TCEQ - ORGANIZED SEWAGE COLLECTION SYSTEM GENERAL CONSTRUCTION NOTES

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

THE DIAMETER OF THE MANHOLES MUST BE A MINIMUM OF FOUR FEET AND THE MANHOLE FOR ENTRY MUST HAVE A MINIMUM CLEAR OPENING DIAMETER OF 30 INCHES. THESE DIMENSIONS AND OTHER DETAILS SHOWING COMPLIANCE WITH THE COMMISSION'S RULES CONCERNING MANHOLES AND SEWER LINE/MANHOLE INVERTS DESCRIBED IN 30 TAC §217.55 ARE INCLUDED ON PLAN SHEET C&D.05.

IT IS SUGGESTED THAT ENTRANCE INTO MANHOLES IN EXCESS OF FOUR FEET DEEP BE ACCOMPLISHED BY MEANS OF A PORTABLE LADDER. THE INCLUSION OF STEPS IN A MANHOLE IS PROHIBITED.

WHERE WATER LINES AND NEW SEWER LINE ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN NINE FEET (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES), CONSTRUCTION DEPARTMENT 48 HOURS IN ADVANCE TO REQUEST 30 TAC §217.53(D) (PIPE DESIGN) AND 30 TAC §290.44(E) (WATER DISTRIBUTION).

WHERE SEWERS LINES DEVIATE FROM STRAIGHT ALIGNMENT AND UNIFORM GRADE ALL CURVATURE OF SEWER PIPE MUST BE ACHIEVED BY THE FOLLOWING PROCEDURE WHICH IS RECOMMENDED BY THE PIPE MANUFACTURER: N/A

IF PIPE FLEXURE IS PROPOSED, THE FOLLOWING METHOD OF PREVENTING DEFLECTION OF THE JOINT MUST BE USED: N/A

SPECIFIC CARE MUST BE TAKEN TO ENSURE THAT THE JOINT IS PLACED IN THE CENTER OF THE TRENCH AND PROPERLY BEDDED IN ACCORDANCE WITH 30 TAC §217.54.

NEW SEWAGE COLLECTION SYSTEM LINES MUST BE CONSTRUCTED WITH STUB OUTS FOR THE CONNECTION OF ANTICIPATED EXTENSIONS. THE LOCATION OF SUCH STUB OUTS MUST BE MARKED ON THE GROUND SUCH THAT THEIR LOCATION CAN BE EASILY DETERMINED AT THE TIME OF CONNECTION OF THE EXTENSIONS. SUCH STUB OUTS MUST BE MANUFACTURED AND TESTED THAT ARE COMPATIBLE IN SIZE AND MATERIAL WITH BOTH THE SEWER LINE AND THE EXTENSION. AT THE TIME OF ORIGINAL CONSTRUCTION, NEW STUB-OUTS MUST BE CONSTRUCTED SUFFICIENTLY TO EXTEND BEYOND THE END OF THE STREET PAVEMENT. ALL STUB-OUTS MUST BE SEALED WITH A MANUFACTURED CAP TO PREVENT LEAKAGE. EXTENSIONS THAT WERE NOT ANTICIPATED AT THE TIME OF ORIGINAL CONSTRUCTION OR THAT ARE TO BE CONNECTED TO AN EXISTING SEWER LINE NOT FURNISHED WITH STUB OUTS MUST BE CONNECTED USING A MANUFACTURED SADDLE AND IN ACCORDANCE WITH ACCEPTED PLUMBING TECHNIQUES.

IF NO STUB-OUT IS PRESENT AN ALTERNATE METHOD OF JOINING LATERALS IS SHOWN IN THE DETAIL ON SHEET C3.04. (FOR POTENTIAL FUTURE LATERALS).

THE PRIVATE SERVICE LATERAL STUB-OUTS MUST BE INSTALLED AS SHOWN ON THE PLAN AND PROFILE SHEETS ON PLAN SHEET C&D.01 AND C&D.02 AND MARKED AFTER BACKFILLING AS SHOWN IN THE DETAIL ON PLAN SHEET C3.03.

13. TRENCHING, BEDDING AND BACKFILL MUST CONFORM WITH 30 TAC §217.54. THE BEDDING AND BACKFILL FOR FLEXIBLE PIPE MUST COMPLY WITH THE STANDARDS OF ASTM D-2321, CLASSES IA, IB, II OR III. RIGID PIPE BEDDING MUST COMPLY WITH THE REQUIREMENTS OF ASTM C 12 (ANSI A 106.2) CLASSES A, B OR C.

14. SEWER LINES MUST BE TESTED FROM MANHOLE TO MANHOLE. WHEN A NEW SEWER LINE IS CONNECTED TO AN EXISTING STUB OR CLEAN-OUT, IT MUST BE TESTED FROM EXISTING MANHOLE TO NEW MANHOLE. IF A STUB OR CLEAN-OUT IS USED AT THE END OF THE PROPOSED SEWER LINE, NO PRIVATE SERVICE ATTACHMENTS MAY BE CONNECTED BETWEEN THE LAST MANHOLE AND THE CLEANOUT UNLESS IT CAN BE CERTIFIED AS CONFORMING WITH THE PROVISIONS OF 30 TAC §213.5(C)(3)(E).

15. ALL SEWER LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.57. THE ENGINEER MUST RETAIN COPIES OF ALL TEST RESULTS WHICH MUST BE MADE AVAILABLE TO THE EXECUTIVE DIRECTOR UPON REQUEST. THE ENGINEER MUST CERTIFY IN WRITING THAT ALL WASTEWATER LINES HAVE PASSED ALL REQUIRED TESTING TO THE APPROPRIATE REGIONAL OFFICE WITHIN 30 DAYS OF TEST COMPLETION AND PRIOR TO USE OF THE NEW COLLECTION SYSTEM. TESTING METHOD WILL BE:

(a) FOR A COLLECTION SYSTEM PIPE THAT WILL TRANSPORT WASTEWATER BY GRAVITY FLOW, THE DESIGN MUST SPECIFY AN INFILTRATION AND EXFILTRATION TEST OR A LOW-PRESSURE AIR TEST. A TEST MUST CONFORM TO THE FOLLOWING REQUIREMENTS:

(1) LOW PRESSURE AIR TEST.

(A) A LOW PRESSURE AIR TEST MUST FOLLOW THE PROCEDURES DESCRIBED IN AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C-828, ASTM C-924, OR ASTM F-1417 OR OTHER PROCEDURE APPROVED BY THE EXECUTIVE DIRECTOR, EXCEPT AS TO TESTING TIMES AS REQUIRED IN TABLE C.3 INSUBPARAGRAPH (C) OF THIS PARAGRAPH OR EQUATION C.3 IN SUBPARAGRAPH (B)(1) OF THIS PARAGRAPH.

(B) FOR SECTIONS OF COLLECTION SYSTEM PIPE LESS THAN 36 INCH AVERAGE INSIDE DIAMETER, THE FOLLOWING PROCEDURES MUST APPLY UNLESS A PIPE IS TO BE TESTED AS REQUIRED BY PARAGRAPH (2) OF THIS SUBSECTION.

(1) A PIPE MUST BE PRESSURIZED TO 3.5 POUNDS PER SQUARE INCH (PSI) GREATER

THAN THE PRESSURE EXERTED BY GROUNDWATER ABOVE THE PIPE.

(H) ONCE THE PRESSURE IS STABILIZED, THE MINIMUM TIME ALLOWABLE FOR THE PRESSURE TO DROP FROM 3.5 PSI GAUGE TO 2.5 PSI GAUGE IS COMPUTED FROM THE FOLLOWING EQUATION:

$$EQUATION C.3$$

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

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

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

PIPE DIAMETER (INCHES)	MIN. TIME (SECONDS)	LENGTH FOR MIN. (FEET)	TIME, LONGER LENGTH (SECONDS)
6	340	398	0,855(L)
8	454	298	1,520(L)
10	567	100	2,374(L)
12	680	199	3,419(L)
15	850	159	5,342(L)
18	1120	133	7,693(L)
21	1090	114	10,471(L)
24	1360	100	13,876(L)
27	1530	88	17,309(L)
30	1700	80	21,369(L)
33	1870	72	25,856(L)

(D) AN OWNER MAY STOP A TEST IF NO PRESSURE LOSS HAS OCCURRED DURING THE FIRST 25% OF THE CALCULATED TESTING TIME.

(E) IF ANY PRESSURE LOSS OR LEAKAGE HAS OCCURRED DURING THE FIRST 25% OF A TESTING PERIOD, THEN THE TEST MUST CONTINUE FOR THE ENTIRE TEST DURATION AS OUTLINED ABOVE OR UNTIL FAILURE.

(F) WASTEWATER COLLECTION SYSTEM PIPES WITH A 27 INCH OR LARGER AVERAGE INSIDE DIAMETER MAY BE AIR TESTED AT EACH JOINT INSTEAD OF FOLLOWING THE PROCEDURE OUTLINED IN THIS SECTION.

(G) A TESTING PROCEDURE FOR PIPE WITH AN INSIDE DIAMETER GREATER THAN 33 INCHES MUST BE APPROVED BY THE EXECUTIVE DIRECTOR.

(A) INFILTRATION/EXFILTRATION TEST.

(1) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF 2.0 FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE.

(B) AN OWNER SHALL USE AN INFILTRATION TEST IN LIEU OF AN EXFILTRATION TEST WHEN PIPES ARE INSTALLED BELOW THE GROUNDWATER LEVEL.

(C) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE, OR AT LEAST TWO FEET ABOVE EXISTING GROUNDWATER LEVEL, WHICHEVER IS GREATER.

(D) FOR CONSTRUCTION WITHIN A 25-YEAR FLOOD PLAIN, THE INFILTRATION OR EXFILTRATION MUST NOT EXCEED 10 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT THE SAME MINIMUM TEST HEAD AS IN SUBPARAGRAPH (C) OF THIS PARAGRAPH.

(E) IF THE QUANTITY OF INFILTRATION OR EXFILTRATION EXCEEDS THE MAXIMUM QUANTITY SPECIFIED, AN OWNER SHALL UNDERTAKE REMEDIAL ACTION IN ORDER TO REDUCE THE INFILTRATION OR EXFILTRATION TO AN AMOUNT WITHIN THE LIMITS SPECIFIED. AN OWNER SHALL RETEST A PIPE FOLLOWING A REMEDIAL ACTION.

(F) IF A GRAVITY COLLECTION PIPE IS COMPOSED OF FLEXIBLE PIPE, DEFLECTION TESTING IS ALSO REQUIRED. THE FOLLOWING PROCEDURES MUST BE FOLLOWED:

(1) FOR A COLLECTION PIPE WITH INSIDE DIAMETER LESS THAN 27 INCHES, DEFLECTION MEASUREMENT REQUIRES A RIGID MANDREL.

(2) A RIGID MANDREL MUST HAVE AN OUTSIDE DIAMETER (OD) NOT LESS THAN 95% OF THE BASE INSIDE DIAMETER (ID) OR AVERAGE ID OF A PIPE, AS SPECIFIED IN THE APPROPRIATE STANDARD BY THE ASTM'S, AMERICAN WATER WORKS ASSOCIATION, LINE-BELL OR AMERICAN NATIONAL STANDARDS INSTITUTE, OR ANY RELATED APPENDIX.

(3) IF A MANDREL SIZING DIAMETER IS NOT SPECIFIED IN THE APPROPRIATE STANDARD, THE MANDREL MUST HAVE AN OD EQUAL TO 95% OF THE ID OF A PIPE. IN THIS CASE, THE ID OF THE PIPE, FOR THE PURPOSE OF DETERMINING THE OD OF THE MANDREL, MUST EQUAL BE THE AVERAGE OUTSIDE DIAMETER MINUS TWO MINIMUM WALL THICKNESSES FOR OD CONTROLLED PIPE AND THE AVERAGE INSIDE DIAMETER FOR ID CONTROLLED PIPE.

(4) ALL DIMENSIONS MUST MEET THE APPROPRIATE STANDARD.

(5) MANDREL DESIGN.

(a) A RIGID MANDREL MUST BE CONSTRUCTED OF A METAL OR A RIGID PLASTIC MATERIAL THAT CAN WITHSTAND 200 PSI WITHOUT BEING DEFORMED.

(b) A MANDREL MUST HAVE NINE OR MORE OD NUMBER OF RUNNERS OR LEGS.

(c) A BARREL SECTION LENGTH MUST BE EQUAL AT LEAST 75% OF THE INSIDE DIAMETER OF A PIPE.

(d) EACH SIZE MANDREL MUST USE A SEPARATE PROVING RING.

(e) METHOD OPTIONS.

(1) AN ADJUSTABLE OR FLEXIBLE MANDREL IS PROHIBITED.

(2) A TEST MAY NOT USE TELEVISION INSPECTION AS A SUBSTITUTE FOR A DEFLECTION TEST.

(3) IF REQUESTED, THE EXECUTIVE DIRECTOR MAY APPROVE THE USE OF A DEFLECTOMETER OR A MANDREL WITH REMOVABLE LEGS OR RUNNERS ON A CASE-BY-CASE BASIS.

(4) FOR A GRAVITY COLLECTION SYSTEM PIPE WITH AN INSIDE DIAMETER 27 INCHES AND GREATER, OTHER TEST METHODS MAY BE USED TO DETERMINE VERTICAL DEFLECTION. A DEFLECTION TEST METHOD MUST BE ACCURATE TO WITHIN PLUS OR MINUS 0.2% DEFLECTION.

(5) AN OWNER SHALL NOT CONDUCT A DEFLECTION TEST UNTIL AT LEAST 30 DAYS AFTER THE FINAL BACKFILL.

(6) GRAVITY COLLECTION SYSTEM PIPE DEFLECTION MUST NOT EXCEED FIVE PERCENT (5%).

(7) IF A PIPE SECTION FAILS A DEFLECTION TEST, AN OWNER SHALL CORRECT THE PROBLEM AND CONDUCT A SECOND TEST AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.

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

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

(b) AN OWNER SHALL TEST EACH MANHOLE (AFTER ASSEMBLY AND BACKFILLING) FOR LEAKAGE, SEPARATE AND INDEPENDENT OF THE COLLECTION SYSTEM PIPES, BY HYDROSTATIC EXFILTRATION TESTING, VACUUM TESTING, OR OTHER METHOD APPROVED BY THE EXECUTIVE DIRECTOR.

(1) HYDROSTATIC TESTING.

(A) THE MAXIMUM LEAKAGE FOR HYDROSTATIC TESTING OR ANY ALTERNATIVE TEST METHODS IS 0.025 GALLONS PER FOOT DIAMETER PER FOOT OF MANHOLE DEPTH PER HOUR.

(B) TO PERFORM A HYDROSTATIC EXFILTRATION TEST, AN OWNER SHALL SEAL ALL WASTEWATER PIPES COMING INTO A MANHOLE WITH AN INTERNAL PIPE PLUG. FILL THE MANHOLE WITH WATER, AND MAINTAIN THE TEST FOR AT LEAST ONE HOUR.

(C) A TEST FOR CONCRETE MANHOLES MAY USE A 24-HOUR WETTING PERIOD BEFORE TESTING TO ALLOW SATURATION OF THE CONCRETE.

(2) VACUUM TESTING.

(A) TO PERFORM A VACUUM TEST, AN OWNER SHALL PLUG ALL LIFT HOLES AND EXTERIOR JOINTS WITH A NON-SHRINK GROUT AND PLUG ALL PIPES ENTERING A MANHOLE.

(B) NO GROUT MUST BE PLACED IN HORIZONTAL JOINTS BEFORE TESTING.

(C) STUB-OUTS, MANHOLE BOOTS, AND PIPE PLUGS MUST BE SECURED TO PREVENT MOVEMENT WHILE A VACUUM IS DRAWN.

(D) AN OWNER SHALL USE A MINIMUM 60 INCH/LB TORQUE WRENCH TO TIGHTEN THE EXTERNAL CLAMPS THAT SECURE A TEST COVER TO THE TOP OF A MANHOLE.

(E) A TEST HEAD MUST BE PLACED AT THE INSIDE OF THE TOP OF A CONE SECTION, AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

(F) THERE MUST BE A VACUUM OF 10 INCHES OF MERCURY INSIDE A MANHOLE TO PERFORM A VALID TEST.

(G) A TEST DOES NOT BEGIN UNTIL AFTER THE VACUUM PUMP IS OFF.

(H) A MANHOLE PASSES THE TEST IF AFTER 2.0 MINUTES AND WITH ALL VALVES CLOSED, THE VACUUM IS AT LEAST 9.0 INCHES OF MERCURY.

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

THESE GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON THE CONSTRUCTION PLANS PROVIDED TO THE CONTRACTOR AND ALL SUBCONTRACTORS.

### SAWS CONSTRUCTION NOTES

(LAST REVISED JULY 2017)

### SAWS GENERAL SECTION

1. ALL MATERIALS AND CONSTRUCTION PROCEDURES WITHIN THE SCOPE OF THIS CONTRACT SHALL BE APPROVED BY THE SAN ANTONIO WATER SYSTEM (SAWS) AND COMPLY WITH THE PLANS, SPECIFICATIONS, GENERAL CONDITIONS AND WITH THE FOLLOWING AS APPLICABLE:

A. CURRENT TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) "DESIGN CRITERIA FOR DOMESTIC WASTEWATER SYSTEM," TEXAS ADMINISTRATIVE CODE (TAC) TITLE 30 PART CHAPTER 217 AND "PUBLIC DRINKING WATER," TAC TITLE 30 PART CHAPTER 290.  
 B. CURRENT TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND DRAINAGE.  
 C. CURRENT "SAN ANTONIO WATER SYSTEM STANDARD SPECIFICATIONS FOR WATER AND SANITARY SEWER CONSTRUCTION".  
 D. CURRENT CITY OF SAN ANTONIO "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".  
 E. CURRENT CITY OF SAN ANTONIO "UTILITY EXCAVATION CRITERIA MANUAL" (UECM).

2. THE CONTRACTOR SHALL NOT PROCEED WITH ANY PIPE INSTALLATION WORK UNTIL THEY OBTAIN A COPY OF THE APPROVED COUNTER PERMIT OR GENERAL CONSTRUCTION PERMIT (GCP) FROM THE CONSULTANT AND HAS BEEN NOTIFIED BY SAWS CONSTRUCTION INSPECTION DIVISION TO PROCEED WITH THE WORK AND HAS ARRANGED A MEETING WITH THE INSPECTOR AND CONSULTANT FOR THE WORK REQUIREMENTS. WORK COMPLETED BY THE CONTRACTOR WITHOUT AN APPROVED COUNTER PERMIT AND/OR GCP WILL BE SUBJECT TO REMOVAL AND REPLACEMENT AT THE EXPENSE OF THE CONTRACTORS AND/OR THE DEVELOPER.

3. THE CONTRACTOR SHALL OBTAIN THE SAWS STANDARD DETAILS FROM THE SAWS WEBSITE, HTTP://WWW.SAWS.ORG/BUSINESS\_CENTER/SPECS. UNLESS OTHERWISE NOTED WITHIN THE DESIGN PLANS.

4. THE CONTRACTOR IS TO MAKE ARRANGEMENTS WITH THE SAWS CONSTRUCTION INSPECTION DIVISION TO OBTAIN ACCESS TO THE WORK AREA AND HAS ARRANGED A MEETING WITH THE INSPECTOR AND CONSULTANT FOR THE WORK REQUIREMENTS. WORK COMPLETED BY THE CONTRACTOR WITHOUT AN APPROVED COUNTER PERMIT AND/OR GCP WILL BE SUBJECT TO REMOVAL AND REPLACEMENT AT THE EXPENSE OF THE CONTRACTORS AND/OR THE DEVELOPER.

5. LOCATION AND DEPTH OF EXISTING UTILITIES AND SERVICE LATERALS SHOWN ON THE PLANS ARE UNDERSTOOD TO BE APPROXIMATE. ACTUAL LOCATIONS AND DEPTHS MUST BE FIELD VERIFIED BY THE CONTRACTOR AT LEAST 1 WEEK PRIOR TO CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE UTILITY SERVICE LINES AS REQUIRED FOR CONSTRUCTION AND TO PROTECT THEM DURING CONSTRUCTION AT NO COST TO SAWS.

6. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES AT LEAST 1-2 WEEKS PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT. PLEASE ALLOW UP TO 7 BUSINESS DAYS FOR LOCATES REQUESTING PIPE LOCATION MARKERS ON SAWS FACILITIES. THE FOLLOWING CONTACT INFORMATION ARE SUPPLIED FOR VERIFICATION PURPOSES:

- SAWS UTILITY LOCATES: HTTP://WWW.SAWS.ORG/SERVICE/LOCATES
- COSA DRAINAGE (210) 207-0724 OR (210) 207-8026
- COSA TRAFFIC SIGNAL OPERATIONS (210) 206-8480
- COSA TRAFFIC SIGNAL OPERATIONS (210) 207-3951
- TEXAS STATE WIDE ONE CALL LOCATOR 1-800-545-6005 OR 811

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING EXISTING FENCES, CURBS, STREETS, DRIVEWAYS, SIDEWALKS, LANDSCAPING AND STRUCTURES TO ITS ORIGINAL OR BETTER CONDITION IF DAMAGES ARE MADE AS A RESULT OF THE PROJECT'S CONSTRUCTION.

8. ALL WORK IN TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) AND/OR BEARX COUNTY RIGHT-OF-WAY SHALL BE DONE IN ACCORDANCE WITH RESPECTIVE CONSTRUCTION SPECIFICATIONS AND PERMIT REQUIREMENTS.

9. THE CONTRACTOR SHALL COMPLY WITH CITY OF SAN ANTONIO OR OTHER GOVERNING MUNICIPALITY'S TREE ORDINANCES WHEN EXCAVATING NEAR TREES.

10. THE CONTRACTOR SHALL NOT PLACE ANY WASTE MATERIALS IN THE 100-YEAR FLOOD PLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOOD PLAN PERMIT.

11. HOLIDAY WORK: CONTRACTORS WILL NOT BE ALLOWED TO PERFORM SAWS WORK ON SAWS RECOGNIZED HOLIDAYS. REQUEST SHOULD BE SENT TO CONSTWKRK@SAWS.ORG.

WEEKEND WORK: CONTRACTORS ARE REQUIRED TO NOTIFY THE SAWS INSPECTION CONSTRUCTION DEPARTMENT 48 HOURS IN ADVANCE TO REQUEST WEEKEND WORK. REQUEST SHOULD BE SENT TO CONSTWKRK@SAWS.ORG.

ANY AND ALL SAWS UTILITY WORK INSTALLED WITHOUT HOLIDAY/WEEKEND APPROVAL WILL BE SUBJECT TO BE UNCOVERED FOR PROPER INSPECTION.

12. COMPACTION NOTE (ITEM 804): THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING THE COMPACTION REQUIREMENTS ON ALL TRENCH BACKFILL AND FOR PAYING FOR THE TESTS PERFORMED BY A THIRD PARTY. COMPACTION TESTS WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED, OR AS INDICATED BY THE SAWS INSPECTOR AND/OR THE TEST ADMINISTRATOR, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED BY SAWS UNLESS THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.

13. A COPY OF ALL TESTING REPORTS SHALL BE FORWARDED TO SAWS CONSTRUCTION INSPECTION DIVISION.

### SAWS SEWER NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT NO SANITARY SEWER OVERFLOW (SSO) OCCURS AS A RESULT OF THEIR WORK. ALL CONTRACTOR PERSONNEL RESPONSIBLE FOR SSO PREVENTION AND CONTROL SHALL BE TRAINED ON PROPER RESPONSE. SHOULD AN SSO OCCUR, THE CONTRACTOR SHALL:

- IDENTIFY THE SOURCE OF THE SSO AND NOTIFY SAWS EMERGENCY OPERATIONS CENTER (EOC) IMMEDIATELY AT (210) 233-2014. PROVIDE THE ADDRESS OF THE SPILL AND AN ESTIMATED VOLUME OR FLOW.
- ATTEMPT TO ELIMINATE THE SOURCE OF THE SSO.
- CONTAIN SEWAGE FROM THE SSO TO THE EXTENT OF PREVENTING A POSSIBLE CONTAMINATION OF WATERWAYS.
- CLEAN UP SPILL SITE (RETURN CONTAINED SEWAGE TO THE COLLECTION SYSTEM IF POSSIBLE) AND PROPERLY DISPOSE OF CONTAMINATED SOIL/MATERIALS.
- CLEAN THE AFFECTED SEWER MAINS AND REMOVE ANY DEBRIS.
- MEET ALL POST-SSO REQUIREMENTS AS PER THE EPA CONSENT DECREE, INCLUDING LINE CLEANING AND TELEVISIONING THE AFFECTED SEWER MAINS (AT SAWS DIRECTION) WITHIN 24 HOURS.

SHOULD THE CONTRACTOR FAIL TO ADDRESS AN SSO IMMEDIATELY AND TO SAWS SATISFACTION, THEY WILL BE RESPONSIBLE FOR ALL COSTS INCURRED BY SAWS, INCLUDING ANY FINES FROM EPA, TCEQ AND/OR ANY OTHER FEDERAL, STATE OR LOCAL AGENCIES.

NO SEPARATE MEASUREMENT OR PAYMENT SHALL BE MADE FOR THIS WORK. ALL WORK SHALL BE DONE ACCORDING TO GUIDELINES SET BY THE TCEQ AND SAWS.

2. IF BYPASS PUMPING IS REQUIRED, THE CONTRACTOR SHALL PERFORM SUCH WORK IN ACCORDANCE WITH SAWS STANDARD SPECIFICATION FOR WATER AND SANITARY SEWER CONSTRUCTION, ITEM NO. 864, "BYPASS PUMPING".

3. PRIOR TO TIE-INS, ANY SHUTDOWNS OF EXISTING FORCE MAINS OF ANY SIZE MUST BE COORDINATED WITH THE SAWS CONSTRUCTION INSPECTION DIVISION AT (210) 233-2973. AT LEAST ONE WEEK IN ADVANCE OF THE SHUTDOWN, THE CONTRACTOR MUST ALSO PROVIDE A SEQUENCE OF WORK AS RELATED TO THE TIE-INS; THIS IS AT NO ADDITIONAL COST TO SAWS OR THE PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SEQUENCE THE WORK ACCORDINGLY.

4. SEWER PIPE WHERE WATER LINE CROSSES SHALL BE 160 PSI AND MEET THE REQUIREMENTS OF ASTM D2241, TAC 217.53 AND TCEQ 290.44(C). EXCEPT AT JOINTS, ALL JOINTS OF 160 PSI PRESSURE RATED PVC AT THE PROPOSED WATER CROSSING.

5. ELEVATIONS POSTED FOR TOP OF MANHOLES ARE FOR REFERENCE ONLY; IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE ALLOWANCES AND ADJUSTMENTS FOR TOP OF MANHOLES TO MATCH THE FINISHED GRADE OF THE PROJECT'S IMPROVEMENTS. (NSP)

6. SPILLS, OVERFLOWS, OR DISCHARGES OF WASTEWATER, ALL SPILLS, OVERFLOWS, OR DISCHARGES OF WASTEWATER, UNCLE TOM'S WATER, PETROLEUM PRODUCTS, OR CHEMICALS MUST BE REPORTED IMMEDIATELY TO THE SAWS INSPECTOR ASSIGNED TO THE COUNTER PERMIT OR GENERAL CONSTRUCTION PERMIT (GCP). THIS REQUIREMENT APPLIES TO EVERY SPILL, OVERFLOW, OR DISCHARGE REGARDLESS OF SIZE.

7. MANHOLE AND ALL PIPE TESTING (INCLUDING THE TV INSPECTION) MUST BE PERFORMED AND PASSED PRIOR TO FINAL FIELD ACCEPTANCE BY SAWS CONSTRUCTION INSPECTION DIVISION. AS PER THE SAWS SPECIFICATIONS FOR WATER AND SANITARY SEWER CONSTRUCTION.

8. ALL PVC PIPE OVER 14 FEET OF COVER SHALL BE EXTRA STRENGTH WITH MINIMUM PIPE STIFFNESS OF 115 PSI.

### PROJECT SEWER NOTES

1. ALL RESIDENTIAL SEWER SERVICE LATERALS ARE 6" DIA. AND SHALL BE EXTENDED TO 10' PAST THE PROPERTY LINE AND GAPPED AND SEALED. CONTRACTOR SHALL INSTALL A 2" X 4" STAKE, FOUR (4) FEET LONG, TWO (2) FEET DEEP INTO THE GROUND AT THE END OF EACH SERVICE. NO SEPARATE PAY ITEM.

2. CONTRACTOR TO INSTALL CLEANOUTS AT THE END OF ALL SEWER LATERALS, PER LATERAL DETAIL SHEET C&X.XX.

3. NO VERTICAL STACKS ALLOWED FOR ANY LOTS UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.

4. ALL 6" SEWER LATERALS WILL BE SET AT 2% GRADE FROM THE MAIN TO THE PROPERTY LINE.

5. WHEN HORIZONTAL DISTANCE BETWEEN SEWER PIPES AND WATER MAIN IS LESS THAN 9 FOOT OF SEPARATION, SEWER MAIN SHALL BE INSTALLED WITH 150 PSI (MIN) PRESSURE PIPE AND FITTINGS IN ACCORDANCE WITH SAWS CONSTRUCTION CRITERIA FOR CONSTRUCTION OF SEWER MAINS IN THE VICINITY OF WATER MAINS.

6. CONTRACTOR SHALL ENSURE THAT MANHOLES OUTSIDE OF PAVED AREAS ARE SET WITH TOP ELEVATIONS 6" ABOVE FINISHED GRADE WITH CONCRETE RING ENCASEMENT.

7. ALL SEWER PIPES SHALL BE 8" PVC (SDR 26), UNLESS OTHERWISE NOTED.

8. CONTRACTOR IS TO VERIFY EXISTING INVERT OF EXISTING SANITARY SEWER MAINS AND LATERALS. ENGINEER IMMEDIATELY OF ANY DIFFERENCE FROM INVERT SHOWN ON PLANS.

9. CONTRACTOR SHALL PROTECT ALL EXISTING FENCES, ANY FENCE DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.

10. 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.

11. CONCRETE RING ENCASEMENT TO BE INSTALLED ON ALL MANHOLES AND, WITHIN LIMITS OF PAVEMENT, BE INSTALLED TO THE TOP OF THE BASE LAYER WITH A MINIMUM OF 2" OF ASPHALT ON TOP OF THE RING ENCASEMENT.

12. MANHOLE OPENING INCREASED TO 30" AS PER TAC CHAPTER 217.55.

13. ALL SEWER PIPE LATERALS SHALL BE SDR 26 (CLASS 160) PVC PIPE.

14. IF THE GIVEN TOP OF MANHOLE ELEVATION DOES NOT AGREE ON ACTUAL GROUND SURFACE OR FINISH PAVEMENT, THE CONTRACTOR SHALL ADJUST ELEVATIONS SUCH THAT THE TOP OF MANHOLE SHALL BE 0.5' ABOVE EXISTING GROUND, OR FL