

EMERGENCY PREPAREDNESS PLAN
IMPLEMENTATION

IH-10 Pump Station

**WATER POLLUTION
ABATEMENT PLAN**



9/27/2023

September 2023

PLANNING • ENGINEERING • PROJECT MANAGEMENT

MCI Moreno
Cardenas Inc.

SAN ANTONIO • EL PASO

**Edwards Aquifer Application
(TCEQ-20705)**

Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

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

Administrative Review

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

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

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

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

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

Technical Review

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

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

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

Mid-Review Modifications

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

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

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

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

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

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

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

1. Regulated Entity Name: IH-10 Pump Station				2. Regulated Entity No.:					
3. Customer Name: San Antonio Water System				4. Customer No.: 600529069					
5. Project Type: (Please circle/check one)	<input checked="" type="radio"/> New	Modification		Extension	Exception				
6. Plan Type: (Please circle/check one)	<input checked="" type="radio"/> WPAP	<input type="radio"/> CZP	<input type="radio"/> SCS	<input type="radio"/> UST	<input type="radio"/> AST	<input type="radio"/> EXP	<input type="radio"/> EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	<input type="radio"/> Residential		<input checked="" type="radio"/> Non-residential		8. Site (acres):		3.05 ac		
9. Application Fee:	\$4,000.00		10. Permanent BMP(s):			Vegetative Filter Strips			
11. SCS (Linear Ft.):	N/A		12. AST/UST (No. Tanks):			N/A			
13. County:	Bexar		14. Watershed:			Leon Creek			

Application Distribution

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

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

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

Austin Region			
County:	Hays	Travis	Williamson
Original (1 req.)	—	—	—
Region (1 req.)	—	—	—
County(ies)	—	—	—
Groundwater Conservation District(s)	<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

San Antonio Region					
County:	Bexar	Comal	Kinney	Medina	Uvalde
Original (1 req.)	<u>X</u>	—	—	—	—
Region (1 req.)	<u>X</u>	—	—	—	—
County(ies)	<u>X</u>	—	—	—	—
Groundwater Conservation District(s)	<input checked="" type="checkbox"/> Edwards Aquifer Authority <input checked="" 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 checked="" 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.

Saqib Shirazi

Print Name of Customer/Authorized Agent



9-3-2023

Signature of Customer/Authorized Agent

Date

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

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

**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.

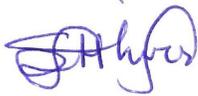
Signature

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: Dr. Saqib Shirazi, P.E., PMP

Date: September 2023

Signature of Customer/Agent:



Project Information

1. Regulated Entity Name: IH-10 Pump Station
2. County: Bexar
3. Stream Basin: Leon Creek
4. Groundwater Conservation District (If applicable): Trinity Glen Rose/Edwards Aquifer Authority
5. Edwards Aquifer Zone:
 Recharge Zone
 Transition Zone
6. Plan Type:
 WPAP SCS

- Modification
 AST

- UST
 Exception Request

7. Customer (Applicant):

Contact Person: Dr. Saqib Shirazi, P.E., PMP
Entity: San Antonio Water System
Mailing Address: 2800 U.S. Hwy 281 N.
City, State: San Antonio, TX
Telephone: (210) 233-3840
Email Address: Saqib.Shirazi@saws.org

Zip: 78212
FAX: _____

8. Agent/Representative (If any):

Contact Person: Mark Medina, P.E.
Entity: Moreno Cardenas Inc.
Mailing Address: 9601 McAllister Freeway #507
City, State: San Antonio, TX
Telephone: (210) 314-3553
Email Address: MMedina@morenocardenas.com

Zip: 78216
FAX: _____

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.

Project is located approx. 1 mile north of the intersection of 1604 E and IH10 N. The the project site is approx. 500 ft W of IH10 along La Cantera Pkwy. Site gate access is approx. 1,500 ft along Fiesta Texas Dr

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: TBD

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: Pump station and storage tank

Prohibited Activities

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

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

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

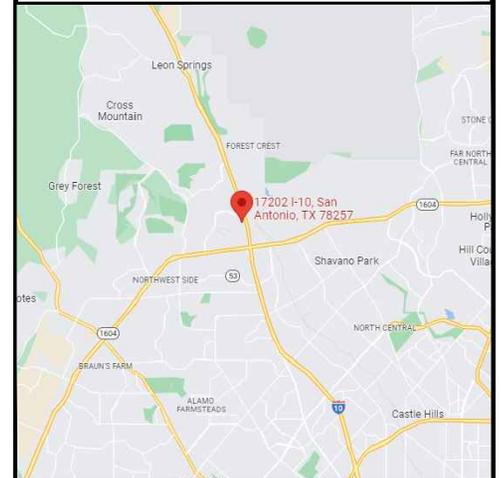
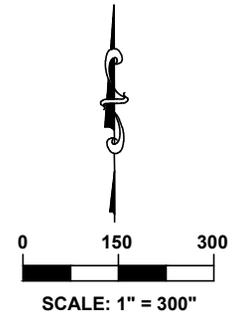
Administrative Information

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

Attachment A – Road Map



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LOCATION MAP
NOT TO SCALE

EMERGENCY PREPAREDNESS
PLAN IMPLEMENTATION

NATURAL GAS GENERATOR
INSTALLATION CONTRACT

IH -10 PUMP STATION

PLANNING • ENGINEERING • PROJECT MANAGEMENT

MCi Moreno
Cardenas Inc.

SAN ANTONIO

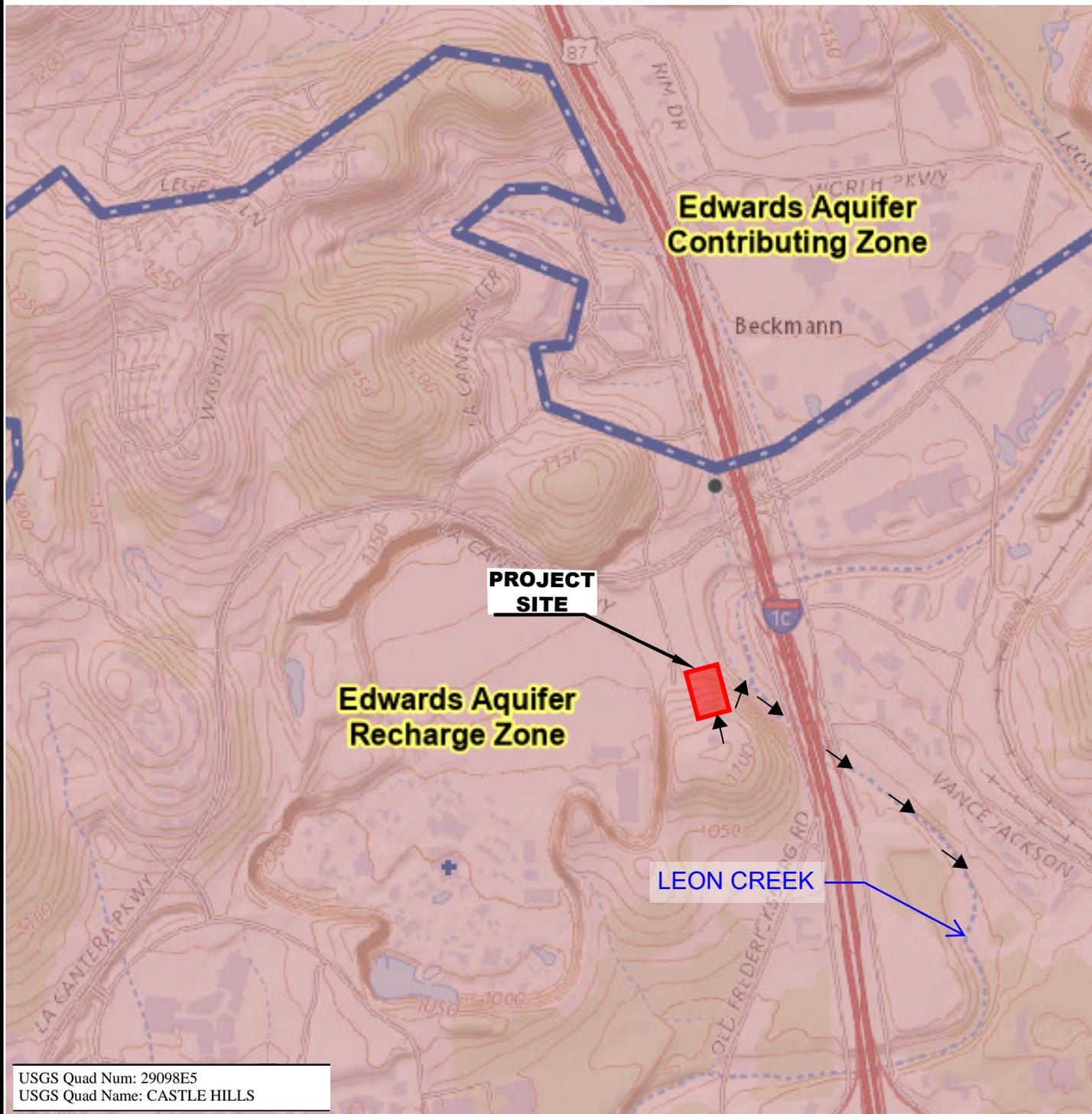
EL PASO

9601 McAllister Freeway #507, San Antonio TX 78216 (210) 314-3553
Texas Board of Professional Engineers Registration No. F-000554

ATTACHMENT A - ROAD MAP

EXHIBIT

**Attachment B – USGS /
Edwards Recharge Zone Map**



LEGEND

- PROJECT SITE
- EXISTING CONTOUR
- AQUIFER BOUNDARY
- DRAINAGE PATH
- USGS QUADRANGLE ZONE DIVISION LINE
- CREEK

0 1000 2000
SCALE: 1" = 2000'



LOCATION MAP
NOT TO SCALE

EMERGENCY PREPAREDNESS
PLAN IMPLEMENTATION

NATURAL GAS GENERATOR
INSTALLATION CONTRACT

IH -10 PUMP STATION

PLANNING • ENGINEERING • PROJECT MANAGEMENT

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Cardenas Inc.

SAN ANTONIO • EL PASO

9601 McAllister Freeway #507, San Antonio TX 78216 (210) 314-3553
Texas Board of Professional Engineers Registration No. F-000554

**ATTACHMENT B - USGS EDWARDS
RECHARGE ZONE MAP**

EXHIBIT

USGS Quad Num: 29098E5
USGS Quad Name: CASTLE HILLS

Attachment C – Project Description

Attachment C – Project Description

PROJECT DESCRIPTION

The IH-10 Pump Station is located at 17202 I-10, San Antonio, TX 78257. The pump station was built during 1994, at the time the improvements consisted on a 3 MG steel storage tank, pump station, yard piping, switch gear room, electrical improvements and driveway. During 2018 the site was under construction for the SAWS Job. No. 13-0118 IH 10 Ground Storage Tank Rehabilitation and Painting Project. The proposed improvements include new concrete foundations and asphalt paved road. The foundations are for the installation of new natural gas metering stations, electrical switchboard and gear, electrical communications building, transformer, and generators. The project also includes electrical conduit, natural gas pipes, and electrical poles. The improvement will increase the impervious area by 0.22 acres.

AREA OF THE SITE, SITE HISTORY, AND PREVIOUS DEVELOPMENT

The project site is 3.05 acres. The location of the site is approximately 1 mile north of the intersection of 1604 E and IH10 N. The project site is approx. 500 ft W of IH10 along La Cantera Pkwy. Site gate access is approximately 1,500 ft along Fiesta Texas Drive. This site lies within Leon Creek, not located within the 100-yr floodplain. No naturally occurring sensitive geological features are identified in the Geological Assessment performed on 05/19/2023. Based on the as-built records, the Hills Pump Station was built in 1994 and has since been operating as a pump station and water storage facility.

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.

OFFSITE AREAS

The surrounding areas comprise the following:

- The area surrounding the project site is undeveloped.

IMPERVIOUS COVER

IH-10 Pump Station has an existing impervious cover of 0.46 acres. The proposed improvements increase the impervious cover by 0.22 acres. As a result, the post-development impervious cover is 0.67 acres.

	DA-1	DA-2	DA-3	DA-4	DA-5	TOTAL
DRAINAGE AREA (AC)	0.29	0.53	0.62	0.57	1.04	3.05
PRE-DEVELOPMENT IC (AC)	0.08	0.21	0.10	0.06	0.00	0.46
POST-DEVELOPMENT IC (AC)	0.08	0.21	0.10	0.14	0.14	0.67
IC INCREASE (AC)	0.00	0.00	0.00	0.08	0.13	0.22
TSS LOAD (LBS)	0.00	0.00	0.00	67	110	177

PERMANENT BMPS

The permanent BMPs for the site include an existing vegetative filter strip. This BMP is sufficient to reduce TSS for current site conditions and the additional proposed impervious cover. Refer to TCEQ-0600, Attachment F – Construction Plans for the location of the vegetative filter strip.

PROPOSED SITE USE

The site will remain a storage and pumping facility for potable water.

AREAS TO BE DEMOLISHED

Clearing and grubbing along with demolition of existing paved areas are expected for this project. Refer to TCEQ-0600, Attachment F – Construction Plans.

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



**Narrative Description of Site-Specific Geology for the
San Antonio Water System – IH-10 Pump Station
Site Located in San Antonio, Bexar County, Texas**

Prepared for:

ADAMS ENVIRONMENTAL

Prepared by:

CAMBRIAN ENVIRONMENTAL

August 11th, 2023

NARRATIVE DESCRIPTION OF SITE-SPECIFIC GEOLOGY FOR THE SAN ANTONIO WATER SYSTEM – IH-10 PUMP STATION SITE LOCATED IN SAN ANTONIO, BEXAR COUNTY, TEXAS

Prepared for:

Adams Environmental, Inc.
12521 Nacogdoches Road
Suite 102
San Antonio, TX 78217

Prepared by:

Craig Crawford, P.G.

Cambrian Environmental
4422 Pack Saddle Pass
Suite 204
Austin, Texas 78745

TX Geoscience Firm Registration #50484

As a licensed professional geoscientist, I attest that the contents of this report are complete and accurate to the best of my knowledge.



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: Craig Crawford, PG

Telephone: 512.705.5541

Date: 11 August 2023

Fax: _____

Representing: Cambrian Environmental (TBPG Firm # 50484) (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:

Regulated Entity Name: SAWS IH-10 Pump Station



Project Information

1. Date(s) Geologic Assessment was performed: 22 February 2023

2. Type of Project:

- WPAP
 SCS

- AST
 UST

3. Location of Project:

- Recharge Zone
 Transition Zone
 Contributing Zone within the Transition Zone

4. **Attachment A - Geologic Assessment Table.** Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.
5. Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness(feet)
Eckrant (TaC)	D	< 6

* Soil Group Definitions (Abbreviated)

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

6. **Attachment B – Stratigraphic Column.** A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.
7. **Attachment C – Site Geology.** A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.
8. **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1": 400'
 Applicant's Site Plan Scale: 1" = 60'
 Site Geologic Map Scale: 1" = 60'
 Site Soils Map Scale (if more than 1 soil type): 1" = 100'
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 – Geological
Assessment Table (TCEQ-0585-
Table)**

Attachment B – Stratigraphic Column

Stratigraphic Column

*Area shaded gray represents the lithology directly underlying the project site

Upper Cretaceous	Upper Confining Units		Navarro and Taylor Groups, undivided; 600 feet thick		
			Austin Group; 130-150 feet thick		
			Eagle Ford Group; 30-50 feet thick		
			Buda Limestone; 40-50 feet thick		
			Del Rio Clay; 40-50 feet thick		
Lower Cretaceous	Edwards Aquifer	Edwards Group	I	Georgetown Formation	10-40 feet thick
			II	Person Formation; 170-200 feet thick	Cyclic and Marine member, undivided
			III		Leached and Collapsed member, undivided
			IV		Regional Dense member
			V		Kainer Formation; 260-310 feet thick
			VI	Kirschberg Evaporite member	
			VII	Dolomitic member	
			VIII	Basal Nodular member	
	Lower Confining Units		Upper member of Glen Rose Limestone; 350-500 feet thick		

Attachment C – Site Geology



NARRATIVE DESCRIPTION OF SITE-SPECIFIC GEOLOGY FOR THE SAN ANTONIO WATER SYSTEM – IH-10 PUMP STATION SITE LOCATED IN SAN ANTONIO, BEXAR COUNTY, TEXAS

INTRODUCTION

This narrative Geologic Assessment accompanies the Texas Commission on Environmental Quality (TCEQ) Geologic Assessment Form TCEQ-0585 completed for the San Antonio Water Systems (SAWS) Interstate Highway 10 (IH-10). Pump Station site located on the west side of IH-10, approximately 0.65 miles north of the intersection with Loop 1604, in San Antonio, Bexar County, Texas (see Site Location Map). The tract consists of a previously built SAWS pump station facility that is currently in operation.

METHODOLOGY

A Cambrian Environmental Registered Professional Geoscientist (Texas License #10791) conducted a field survey for a Geologic Assessment on the 22nd of February 2023. The pedestrian survey was completed by walking parallel transects spaced approximately 50 feet apart as directed by the TCEQ in the Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (Rev. 10-01-04). Closer spacing was used where vegetation inhibited clear observation. The project site was thoroughly examined for the presence of potential karst features, including depressions, holes, and animal burrows. A number of techniques can be used for this effort, including probing with a digging implement to determine the thickness and consistency of fill material and feeling for the presence of air flow, which may indicate the presence of a sub-surface void space. Other techniques include making observations of any notable characteristics of the feature site such as the presence of various types of vegetation or a semi-circular burrow mound produced by the activities of small mammals.

RESULTS

Soils

Soils mapped on the property consist of the Eckrant (TaC) series soils¹ (see Site Soils Map). The Eckrant series (formerly referred to as “Tarrant”) soils are within the “D” classification of the hydrologic soil groups. Type “D” soils have a very slow infiltration rate (very high runoff potential) when thoroughly wet. This association occurs in the northern third of the county, and can be gently undulating and stony. The soils are dark colored, very shallow, clayey, and weakly calcareous. They have developed over hard limestone and have scattered stones, gravel, channery fragments, cobblestones and flagstones on the surface and within the surface layer.

Geology

The bedrock geology underlying the project area consists of the Kainer Formation of the Edwards Group Limestone (“Kk”, see Site Geologic Map). This geologic formation is subdivided into (bottom to top) the Basal Nodular, Dolomitic, Kirschberg Evaporite, and Grainstone members. The members of the Edwards Group Limestone, including the Kainer Formation mapped on this project site, are locally known to be the primary cave-forming units in Bexar County. Faults can enhance the potential for cave formation;

¹ United States Department of Agriculture, Natural Resource Conservation Service. Online Web Soil Survey, Bexar County, Texas. <http://websoilsurvey.sc.egov.usda.gov/>

however, no faults are mapped as crossing the project site, and none were observed during the pedestrian survey.

Recharge into the aquifer primarily occurs in areas where the Edwards Group Limestone and upper confining units are exposed at the surface. Most recharge is from direct infiltration via precipitation and streamflow loss. Recharge occurs predominantly along secondary porosity features such as faults, fractures, and karst features (caves, solution cavities, sinkholes, etc.); and these types of karst features are commonly formed along joints, fractures, and bedding plane surfaces formed within the Edwards Group Limestone. No potential recharge features were identified during the pedestrian survey.

Site Hydrogeologic Assessment

In the absence of discrete recharge features, the likelihood of recharge occurring within the limits of the project area and contributing to the main body of the aquifer is thought to be low. Should any karst features be discovered during the construction phase of the project, they should be reported to TCEQ to determine the appropriate mitigation measures.

Feature Descriptions

No karst or geologic features, or man-made features were identified on the site during the pedestrian survey. No wells are known to exist inside the pump station facility.



Photo 1. View of the project site.



Photo 2. View of the project site.



Photo 3. View of the project site.



Photo 4. View of the project site.



Photo 5. View of the project site.



Photo 6. View of the project site.

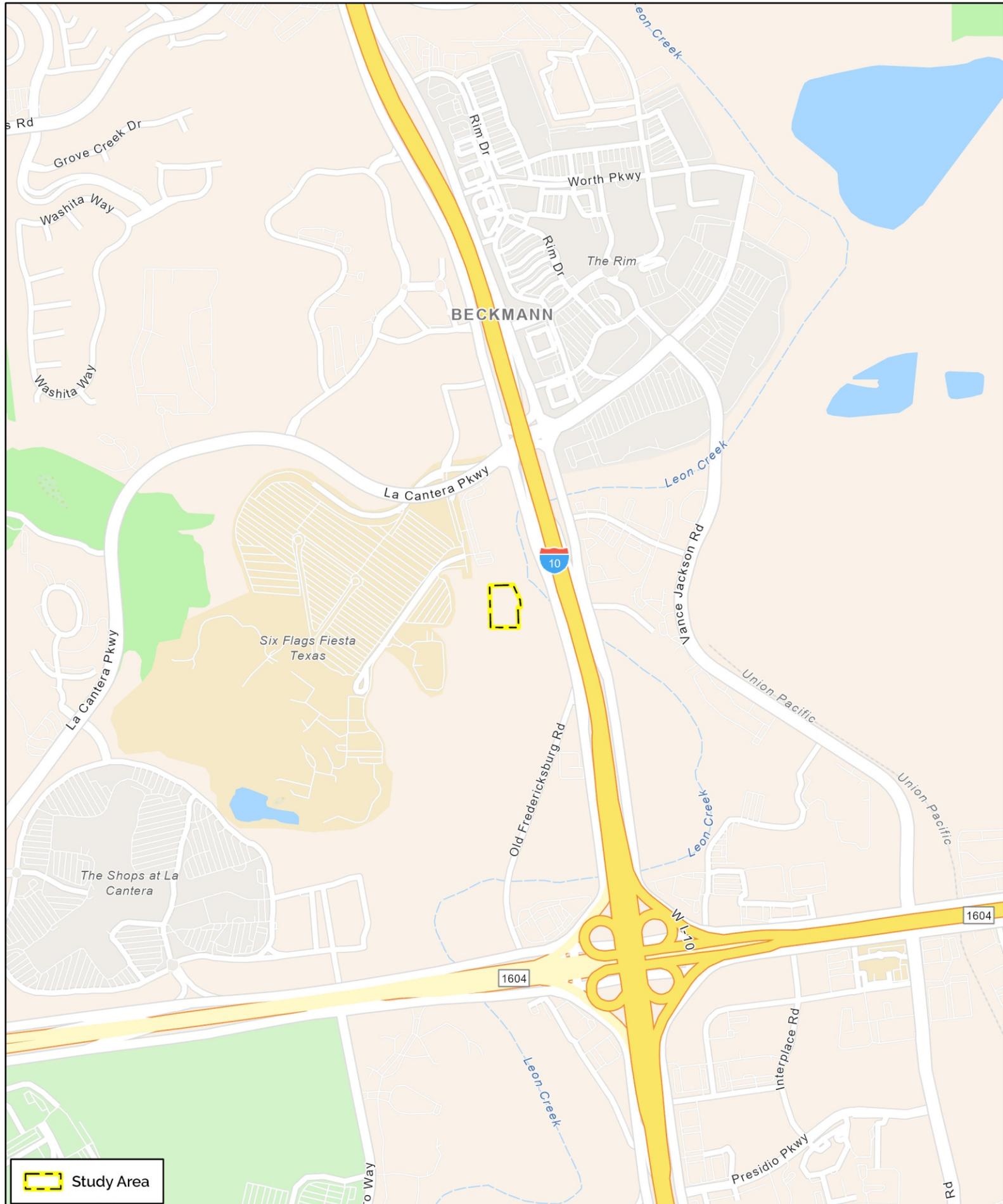


Photo 7. View of the project site.



Photo 8. View of the project site.

Attachment D – Site Geologic Map(s)



 Study Area



Coordinate System: NAD 1983
 StatePlane Texas South Central
 FIPS 4204 Feet

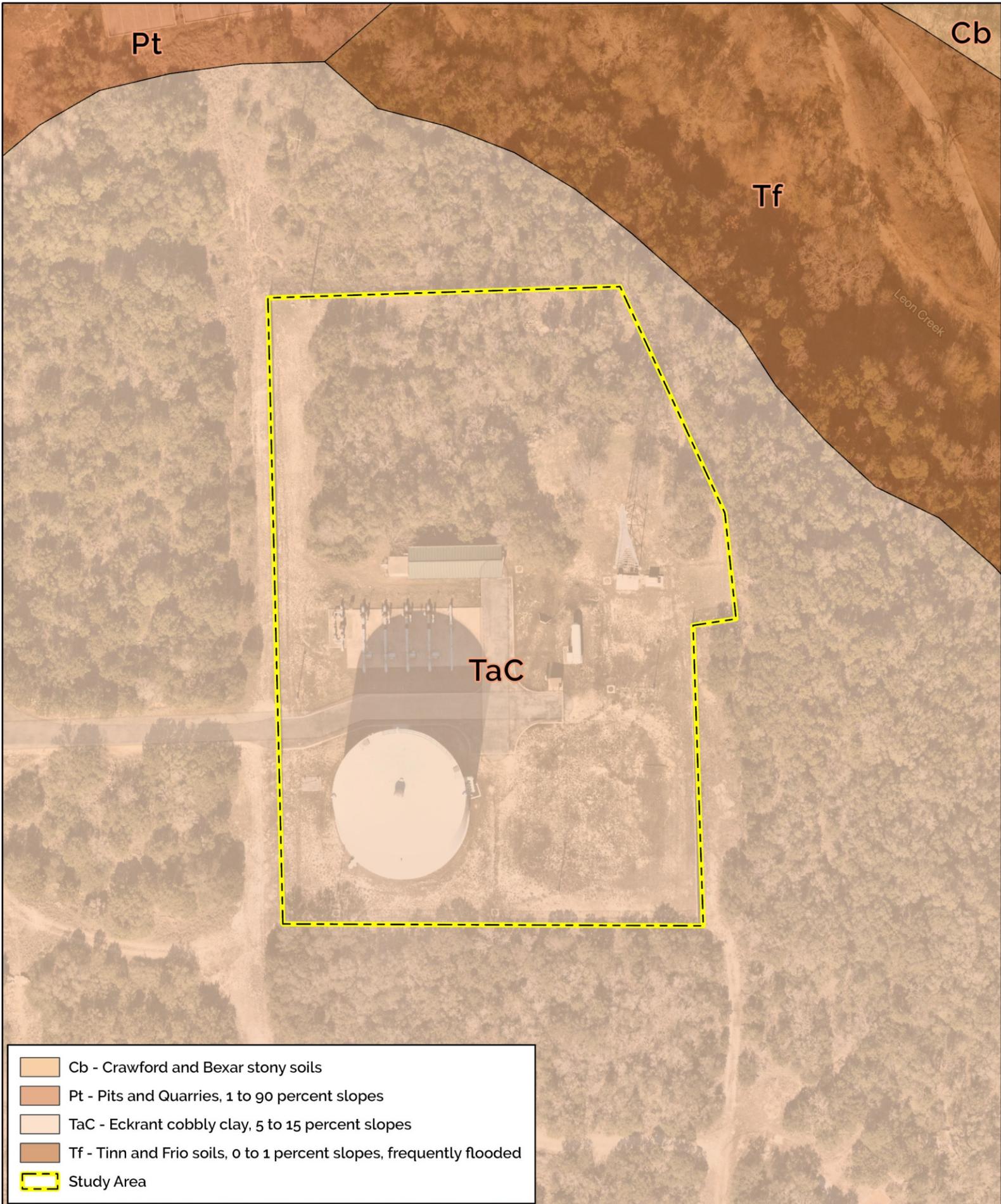
1:15,000

0 750 1,500 2,250 3,000 Feet

Site Location Map



Cambrian



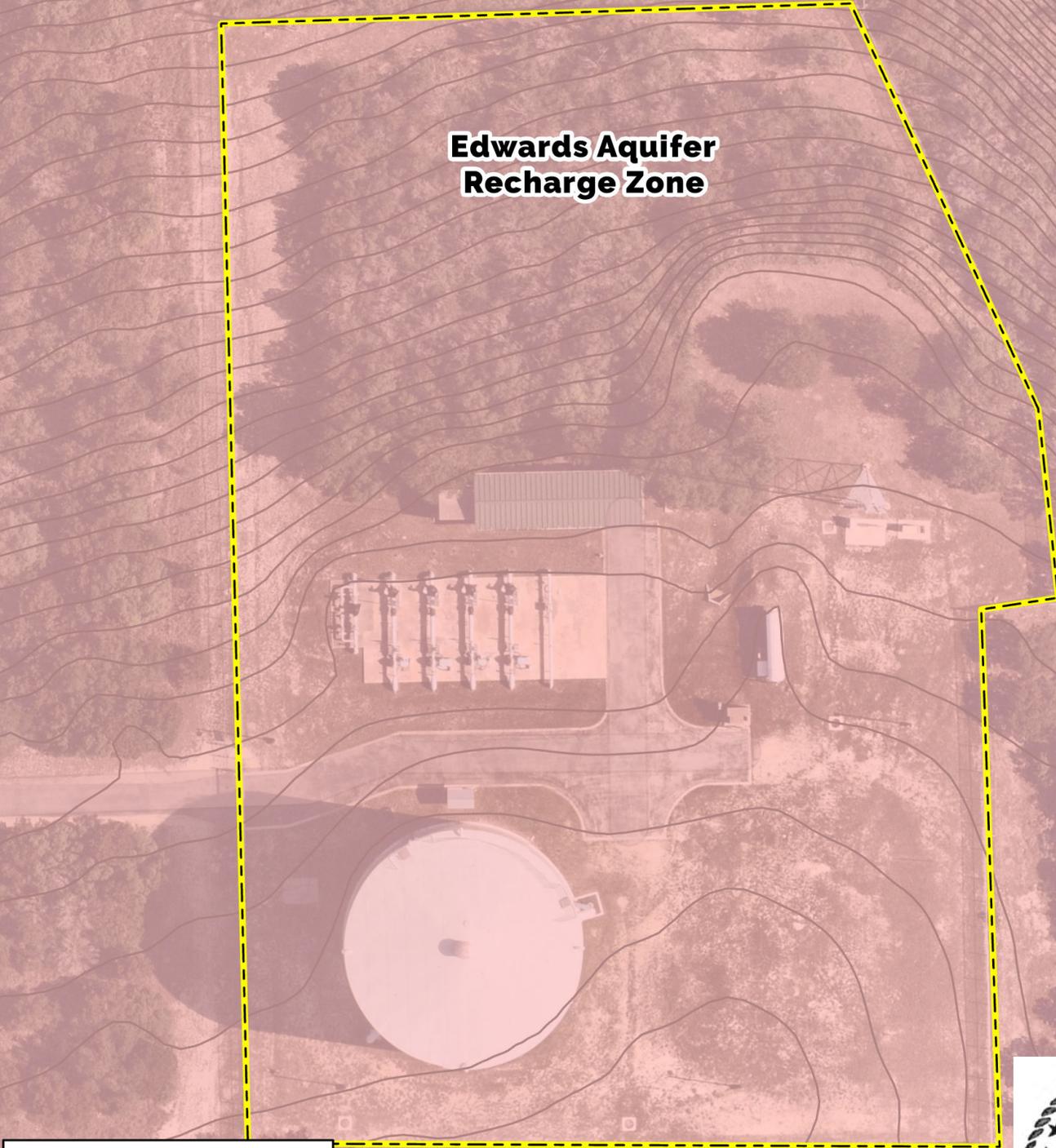
- Cb - Crawford and Bexar stony soils
- Pt - Pits and Quarries, 1 to 90 percent slopes
- TaC - Eckrant cobbly clay, 5 to 15 percent slopes
- Tf - Tinn and Frio soils, 0 to 1 percent slopes, frequently flooded
- Study Area

1:1,000

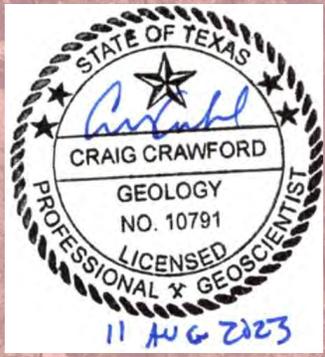
Feet

Coordinate System: NAD 1983
StatePlane Texas South Central
FIPS 4204 Feet

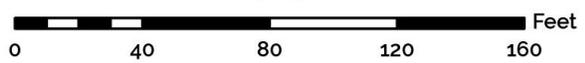
Edwards Aquifer Recharge Zone



- Two-Foot Contours
- Kk- Kainer Formation
- Qal- Quaternary Alluvium
- ▭ Study Area
- ▨ 100-Year Floodplain



1 Inch = 60 Feet



Coordinate System: NAD 1983
StatePlane Texas South Central
FIPS 4204 Feet

Geologic Map



**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: Dr. Saqib Shirazi, P.E., PMP

Date: September 2023

Signature of Customer/Agent:



Regulated Entity Name: IH-10 Pump Station

Regulated Entity Information

1. The type of project is:

- Residential: Number of Lots: _____
- Residential: Number of Living Unit Equivalents: _____
- Commercial
- Industrial
- Other: Pump station and storage tank

2. Total site acreage (size of property): 3.05 ac

3. Estimated projected population: _____

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	437	÷ 43,560 =	0.01
Parking	N/A	÷ 43,560 =	N/A
Other paved surfaces	9,017	÷ 43,560 =	0.21
Total Impervious Cover	9,455	÷ 43,560 =	0.22

Total Impervious Cover 0.22 ÷ Total Acreage 3.05 X 100 = 7.2% Impervious Cover

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

For Road Projects Only

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

7. Type of project:

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

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

- Concrete
- Asphaltic concrete pavement
- Other: _____

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

Width of R.O.W.: _____ feet.

L x W = _____ Ft² ÷ 43,560 Ft²/Acre = _____ acres.

10. Length of pavement area: _____ feet.

Width of pavement area: _____ feet.

L x W = _____ Ft² ÷ 43,560 Ft²/Acre = _____ acres.

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

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

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

Stormwater to be generated by the Proposed Project

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

Wastewater to be generated by the Proposed Project

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

_____ % Domestic	_____ Gallons/day
_____ % Industrial	_____ Gallons/day
_____ % Commingled	
_____ Gallons/day	
TOTAL gallons/day _____	

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 _____ (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" = 20'.

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): Panel Number 48029 230, Sep 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 – Factors Affecting Surface Water Quality

Attachment A – Factors Affecting Surface Water Quality

Factors that could affect surface water and groundwater quality:

DURING CONSTRUCTION

- Vehicle maintenance operations
- Excavation and grading
- Paving
- Human generated debris
- Construction trash and debris
- Application of excessive fertilizers, herbicides, and pesticides
- Soil and debris transported by storm water runoff

POST CONSTRUCTION

- Debris and contaminants tracked on site by vehicles
- Human generated debris
- Application of excessive fertilizers, herbicides, and pesticides
- Unusually heavy rainfall events
- High concentrations of metals in areas designated as vehicle operations and outdoor storage areas

Attachment B – Volume and Character of Stormwater

Attachment B – Volume and Character of Stormwater

The pre-development and post-development storm water runoff conditions are in conformance with the City of San Antonio drainage development codes. The site is in the Leon Creek watershed and the Upper Leon Creek sub watershed. Its existing conditions comprise a 0.62-acre. The area has slopes beginning from the north to the south. The slopes range from 1% to 5%. The proposed project improvements consist of a new electrical switchgear, control building, gas metering station, transformers, switchboards, reinforced concrete pavement, and generators.

PRE-DEVELOPMENT

The existing property is 0.62 acres and owned by San Antonio Water System (SAWS). The site is developed with storage tank facilities on Crawford and Bexar soils, and Eckrant-Rock outcrop per USGS Soil Survey and Field Observation. This site is part of Leon Creek watershed and Upper Leon Creek subwatershed and it is not within the City of San Antonio Mandatory Detention Area. The property slopes from north to south at an approximate 2.7% average slope. The weighted runoff coefficient for the existing conditions is 65.60 (see **Table- 1**).

Table 1- Pre-Development Conditions

PROJECT SITE DRAINAGE RUNOFF AREA COMPUTATIONS						
DRAINAGE AREA NO.	DRAINAGE AREA (AC)	TIME OF CONC. (MIN)	WEIGHTED RUNOFF COEFF.	5 YEAR DISCHARGE Q5-YR (CFS)	25 YEAR DISCHARGE Q25-YR (CFS)	100 YEAR DISCHARGE Q100-YR (CFS)
1	0.28	6.35	66.85	1.4	1.9	2.5
2	0.34	6.33	64.56	1.6	2.3	2.9
Totals	0.62		65.60	3.0	4.2	5.3

POST-DEVELOPMENT

The proposed development consists of a new electrical switchgear, control building, gas metering station, transformers, switchboards, concrete pavement, and generators. The weighted runoff coefficient for the overall post-construction conditions is 73.96 and the ultimate conditions runoff coefficient is 85.74 (see **Table - 2** and **Table - 3**)

Table 2- Post-Development Conditions

PROJECT SITE DRAINAGE RUNOFF AREA COMPUTATIONS						
DRAINAGE AREA NO.	DRAINAGE AREA (AC)	TIME OF CONC. (MIN)	WEIGHTED RUNOFF COEFF.	5 YEAR DISCHARGE Q5-YR (CFS)	25 YEAR DISCHARGE Q25-YR (CFS)	100 YEAR DISCHARGE Q100-YR (CFS)
1	0.28	6.45	81.24	1.7	2.4	3.0
2	0.34	6.31	67.94	1.7	2.4	3.0
Totals	0.62		73.96	3.4	4.7	6.0

Table 3- Ultimate Conditions

PROJECT SITE DRAINAGE RUNOFF AREA COMPUTATIONS						
DRAINAGE AREA NO.	DRAINAGE AREA (AC)	TIME OF CONC. (MIN)	WEIGHTED RUNOFF COEFF.	5 YEAR DISCHARGE Q5-YR (CFS)	25 YEAR DISCHARGE Q25-YR (CFS)	100 YEAR DISCHARGE Q100-YR (CFS)
1	0.28	6.45	89.29	1.8	2.6	3.3
2	0.34	6.31	82.79	2.1	2.9	3.7
Totals	0.62		85.74	3.9	5.5	7.0

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.

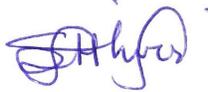
Signature

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: Dr. Saqib Shirazi, P.E., PMP

Date: September 2023

Signature of Customer/Agent:



Regulated Entity Name: IH-10 Pump Station

Project Information

Potential Sources of Contamination

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

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

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

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

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

- Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
- Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
- Fuels and hazardous substances will not be stored on the site.
- 2. **Attachment A - Spill Response Actions.** A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.
- 3. Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
- 4. **Attachment B - Potential Sources of Contamination.** A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

Sequence of Construction

- 5. **Attachment C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.
 - For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.
 - For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.
- 6. Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Leon Creek

Temporary Best Management Practices (TBMPs)

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

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

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

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

Soil Stabilization Practices

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

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

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

Administrative Information

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

Attachment A – Spill Response Actions

Attachment A – Spill Response Actions

Site Specific:

- To respond to the event of accidental spills of hazardous materials or hydrocarbons, the contractor will be required to maintain stockpile of sand material in the construction staging area, sized according to the capacity of fuel or oil trucks. This sand material will be used to provide dikes to contain large spills and to provide an adsorbent material that can be disposed of off the Recharge Zone after the clean up process. The contractor will be required to notify the owner, who will in turn notify the TCEQ in the event of a spill. All contaminated material caused by a spill will be removed from the project and disposed of in accordance with applicable regulations off the Recharge Zone.

General:

- Keep People Safe
 - a) Avoid direct contact with the spilled material.
 - b) Avoid inhalation of any gases, fumes, vapors, or smoke. All personnel should stay upwind (some gases inhibit the sense of smell or may be dangerous at undetectable concentrations).
 - c) Move and keep people away from the incident scene. Contact the nearest law-enforcement authority for assistance, if necessary.
 - d) Find and, if possible, safely remove all ignition sources.
 - e) Assess the situation with regard to injuries.
 - f) Contact the appropriate authorities and responsible parties and allow them to handle the response.

- Substance Identification

If you cant determine a substance spilled from the information available at the site, call CHEMTREC at 800-424-9300 (emergency) or 800-262-8200 (non-emergency).

- Posting of Warning Signs

The threat posed by contamination from a discharge or spill may warrant the placement of Contaminated Area warning signs by TCEQ personnel on affect property.

More information on spill rules and appropriate responses is available on the TCEQ website at: [What to Do after a Spill - Texas Commission on Environmental Quality - www.tceq.texas.gov](http://www.tceq.texas.gov)

Attachment B – Potential Sources of Contamination

Attachment B – Potential Sources of Contamination

Per the previously approved WPAP,

Potential Source	Preventative Measure
<p align="center">Asphalt products on this project</p>	<ul style="list-style-type: none"> • After placement of asphalt, emulsion or coatings, the contractor will be responsible for immediate clean-up should be an unexpected rain to 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.
<p align="center">Oil, grease, fuel and hydraulic fluid contamination from construction equipment and vehicle dropping.</p>	<ul style="list-style-type: none"> • 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.
<p align="center">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.</p>	<ul style="list-style-type: none"> • 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.
<p align="center">Miscellaneous trash and litter from construction workers and material wrapping.</p>	<ul style="list-style-type: none"> • Trash containers will be placed throughout the site to encourage proper trash disposal.
<p align="center">Construction debris</p>	<ul style="list-style-type: none"> • 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.

Spills/Overflow of waste from portable toilets

- Portable toilets will be placed away from high traffic vehicular areas and storm drain inlets.
- Portable toilets will be placed on level ground surfaces.
- Portable toilets will be inspected regularly for leaks and will be serviced and sanitized at time intervals that will maintain sanitary conditions.

Attachment C – Sequence of Major Activities

Attachment C – Sequence of Major Activities

The sequence of major activities that will disturb approximately 1.3-acres of the 2.2-acre site soil during construction on this site will be divided into two stages as described below:

- Site preparation will include clearing and grubbing of vegetation where applicable.
- Construction of new pavement access road, concrete pads, vegetative filter strip, and site cleanup.

In case of tree removal, it should be in accordance with the City of San Antonio approved tree preservation plan.

- Under the Tree Preservation Ordinance, a tree permit must be obtained before any property development.
- Development activities that remove trees and disturb vegetation require a Tree Preservation Plan to be submitted with the Tree Permit application.

Implement Storm Water Protection Plan.

- Implement a temporary erosion/sedimentation control fence along the site perimeter and a construction entrance established at the project site, per the SW3P project site.
- Temporary control measures shall remain in place for the duration of construction.

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

Attachment D – Temporary Best Management Practices and Measures

- A. A description of how BMPs and measures will prevent pollution of surface water, groundwater, or stormwater that originates upgradient from the site and flows across the site.

Upgradient water will cross the site from undeveloped land northeast of the project limits. All TMBPs are adequate for the drainage areas they serve.

- B. A description of how BMPs and measures will prevent pollution of surface water or ground water 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 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) designation of a vegetative filter strip along the downgradient boundary of construction activities for temporary erosion and sedimentation controls, (2) erection of silt fences along the downgradient boundary of construction activities for temporary erosion and sedimentation controls, (3) installation of temporary erosion 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 solids within the site, they will not enter surface streams and/or sensitive features.

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

There were no naturally-occurring sensitive features observed on the site and no surface streams on, or adjacent, to the project limits.

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

- D. A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring features identified to either the geological assessment, TCEQ inspections, or during excavation, blasting or construction.

There were no naturally-occurring sensitive features observed on the site and no surface streams on, or adjacent, to the project limits.

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

Attachment E – Request to Temporary Seal a Feature

NOT USED

Attachment F – Structural Practices

Attachment F – Structural Practices

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

- Designation of a vegetative filter strip along the downgradient boundary of construction activities and rock berms with silt fence for secondary protection.
- Erection of silt fences along the downgradient boundary of construction activities for temporary erosion and sedimentation controls.
- Installation of stabilized construction entrance/exit(s) and construction staging area(s).
- Installation of concrete truck washout pit(s)

Attachment G – Drainage Area Map

Attachment G – Drainage Area Map

No more than (10) acres will be disturbed within a common area at one time. All TBMPs utilized are adequate for the drainage areas served. See Drainage Area Map on Permanent Stormwater Section (TCEQ - 0600), Attachment F - Construction Plans

Attachment H – Temporary Sediment Pond(s) Plan and Calculations

NOT USED

Attachment I – Inspection and Maintenance for BMPs

Attachment I – Inspection And Maintenance For BMPs

Temporary sediment control fence

- 1) Inspections should be made weekly and after each rainfall. Repair or replacement of the temporary sediment control fence should be done promptly as needed by the contractor. Use the inspection form below. Maintain a record of inspection with an onsite copy of WPAP.
- 2) Remove sediment when the buildup reaches a depth of 6 inches. Removed sediment should be deposited in a suitable area and in such a manner that it will not erode.
- 3) Replace any torn fabric or install a second line of fencing parallel to the torn section.
- 4) Replace or repair any sections crushed or collapsed during construction activity. If a section of fence is obstructing vehicular access, consider relocating it to a spot where it will provide equal protection, but will not obstruct vehicles. A triangular filter dike may be preferable to a temporary sediment control fence at common vehicle access points.
- 5) When construction is complete, the sediment should be disposed of in a manner that will not cause additional situations. The fence itself should be disposed of in an approved landfill.

A 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:

- Significant disturbed areas for evidence of erosion
- Storage areas for evidence of leakage from the exposed stored materials
- Structural controls (rock berm outlets, silt fences, drainage swales, etc.) for evidence of failure of excess siltation (over 6 inches deep)
- Vehicles exit point for evidence of off-site sediment tracking
- Vehicles storage areas for signs of leaking equipment or spills
- Concrete truck rinse-out pit for signs of potential failure
- Embankment, spillways, and outlet of sediment basin (where applicable) for erosion damage
- 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.

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

_____ **A brief statement describing the qualification 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 that 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.

Inspector's Name

Inspector's Signature

Date

Attachment J – Schedule of Interim and Permanent Soil Stabilization Practices

Attachment J – Schedule of Interim and Permanent Soil Stabilization Practices

1. Existing areas that are disturbed will receive treatment to replace vegetation lost during construction.
2. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site. In areas experiencing droughts where the initiation of the stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
3. Daily records will be kept, detailing among other things, the beginning of major grading operations, cessation of construction, either temporary or permanent, and dates when stabilization measures are implemented.
4. It is not anticipated that interim soil stabilization practices will be required.

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

Permanent Stormwater Section

Texas Commission on Environmental Quality

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

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

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

Signature

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

Print Name of Customer/Agent: Dr. Saqib Shizari, P.E., PMP

Date: September 2023

Signature of Customer/Agent



Regulated Entity Name: IH-10 Pump Station

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 A – 20% or Less Impervious Cover Waiver

NOT USED

Attachment B – BMPs for Upgradient Stormwater

Attachment B – BMPs for Upgradient Stormwater

Since the site is located on top of a hill there are no BMPs for Upgradient Stormwater.

Attachment C – BMPs for On-site Stormwater

Attachment C – BMPs for On-Site Stormwater

Vegetative filter strip (VFS) are the proposed Permanent Best Management practices (PBMPs) for this site. All PBMPs have been designed in accordance with the TCEQ's Technical Guidance Manual (TGM) RG-348 (2005) to remove 80% of the increase in TSS from the site. The VFS will be placed around the proposed improvements and capture all sheet flow that comes from the proposed improvements.

Attachment D – BMPs for Surface Streams

Attachment D – BMPs for Surface Streams

No geological or man-made features were identified in the geological assessment.

Attachment E – Request to Seal Features

NOT USED

Attachment F – Construction Plans



9/26/2023

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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

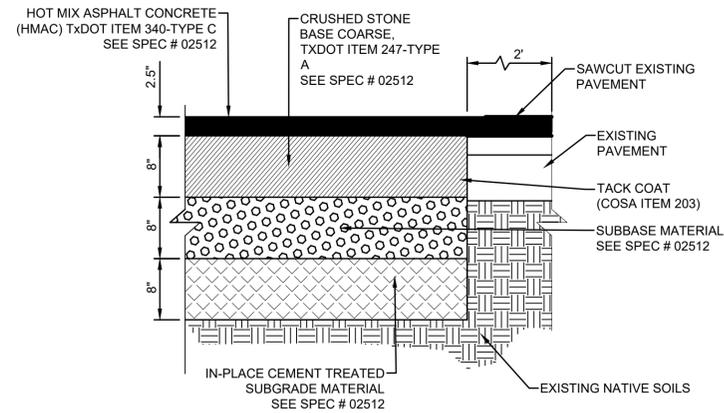
REVISIONS AND RECORD OF ISSUE

DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

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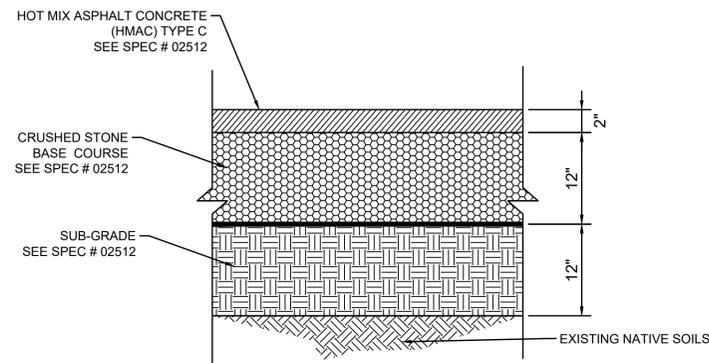
PAVEMENT DETAILS
1 OF 2

C-00-501 OF



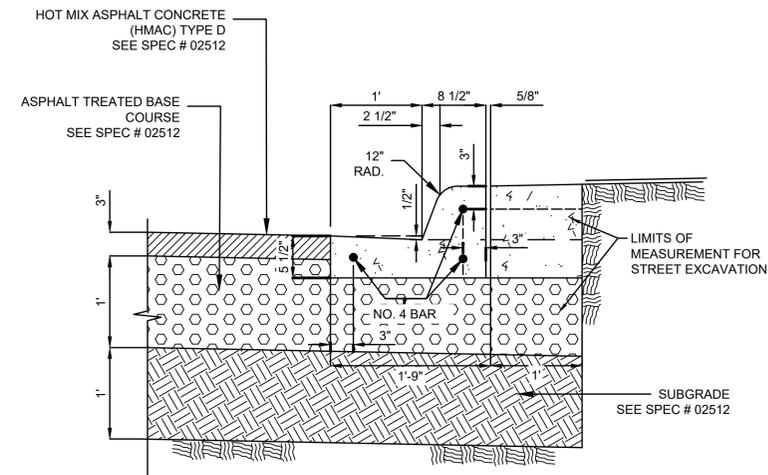
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1
C-00-501 1"=1'



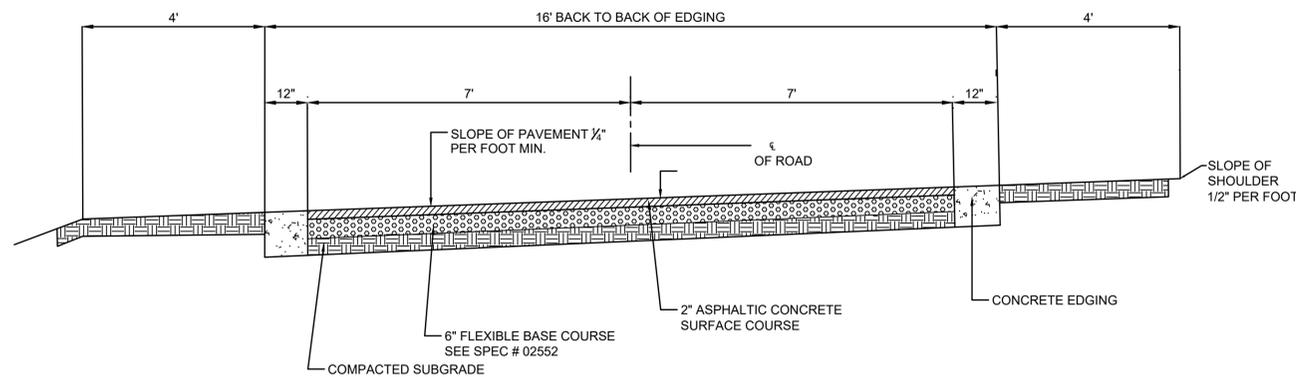
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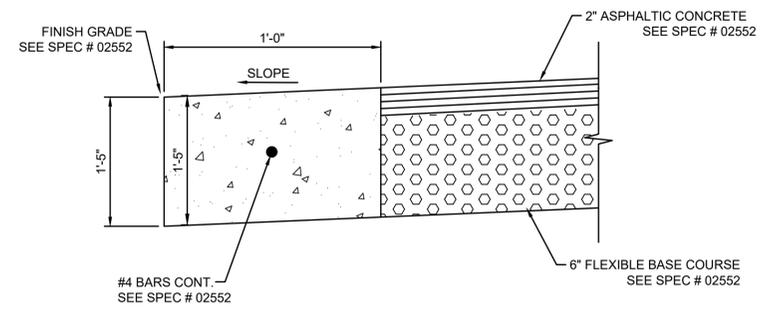
TYPICAL CURB & GUTTER DETAIL & CURB DOWEL
ASPHALT TREATED BASE OR ASPHALTIC CONCRETE BASE

3
C-00-501 1"=1'



ASPHALT CONCRETE PAVEMENT W/CONCRETE EDGING

4
C-00-501 1"=2'



HEADER/RIBBON CURB

5
C-00-501 1"=1'



9/26/2023

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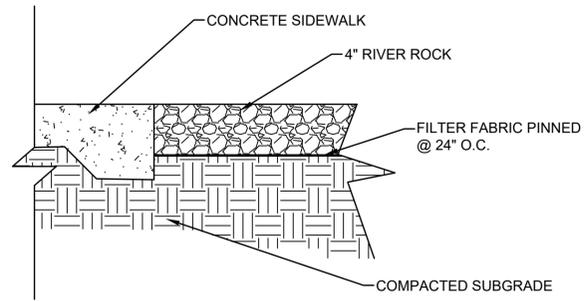
EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

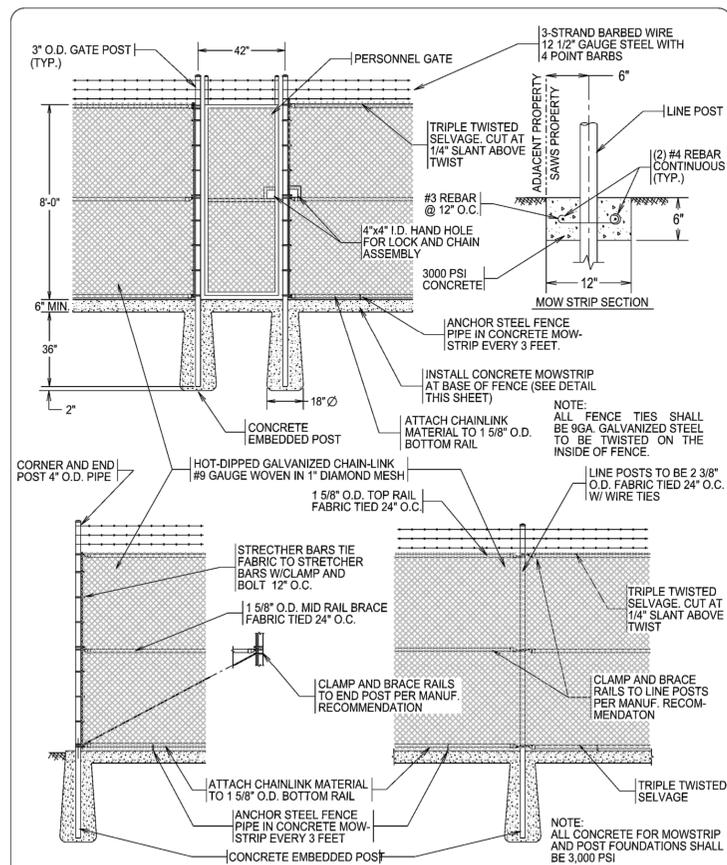
NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE

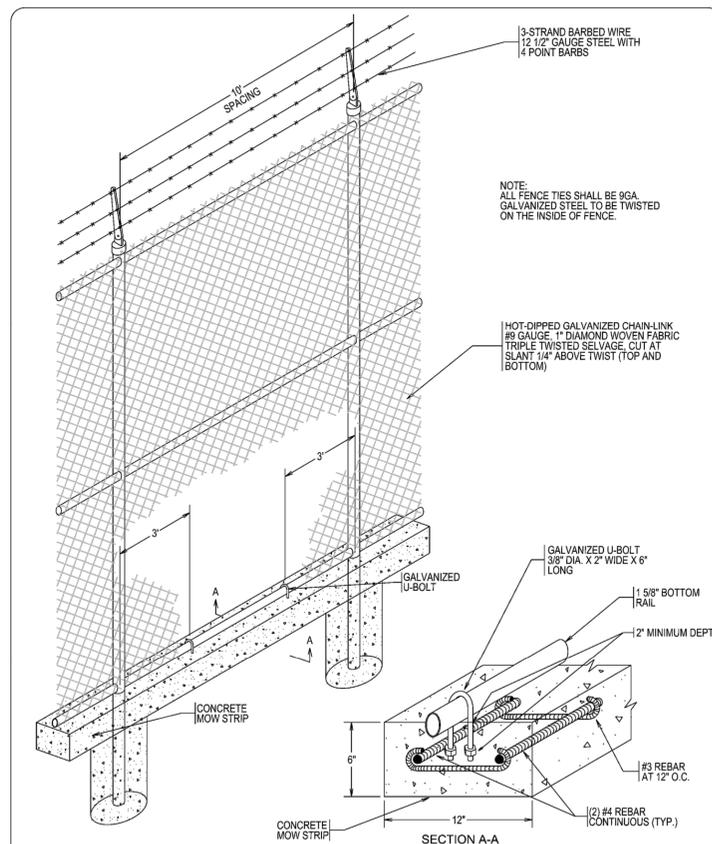
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
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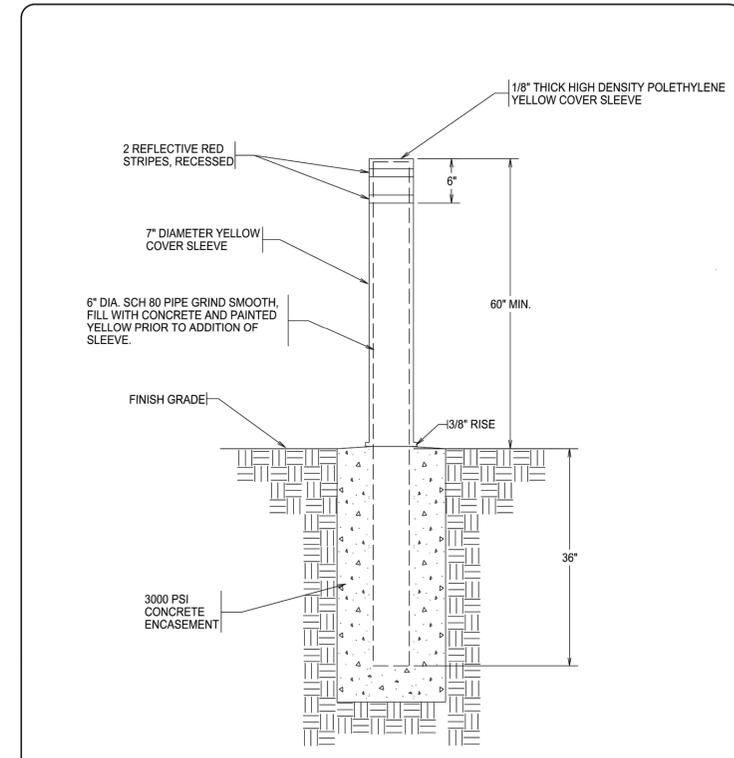
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C-00-503 1" = 1'



2 TYPICAL FENCE DETAIL
C-00-503 1" = 1'

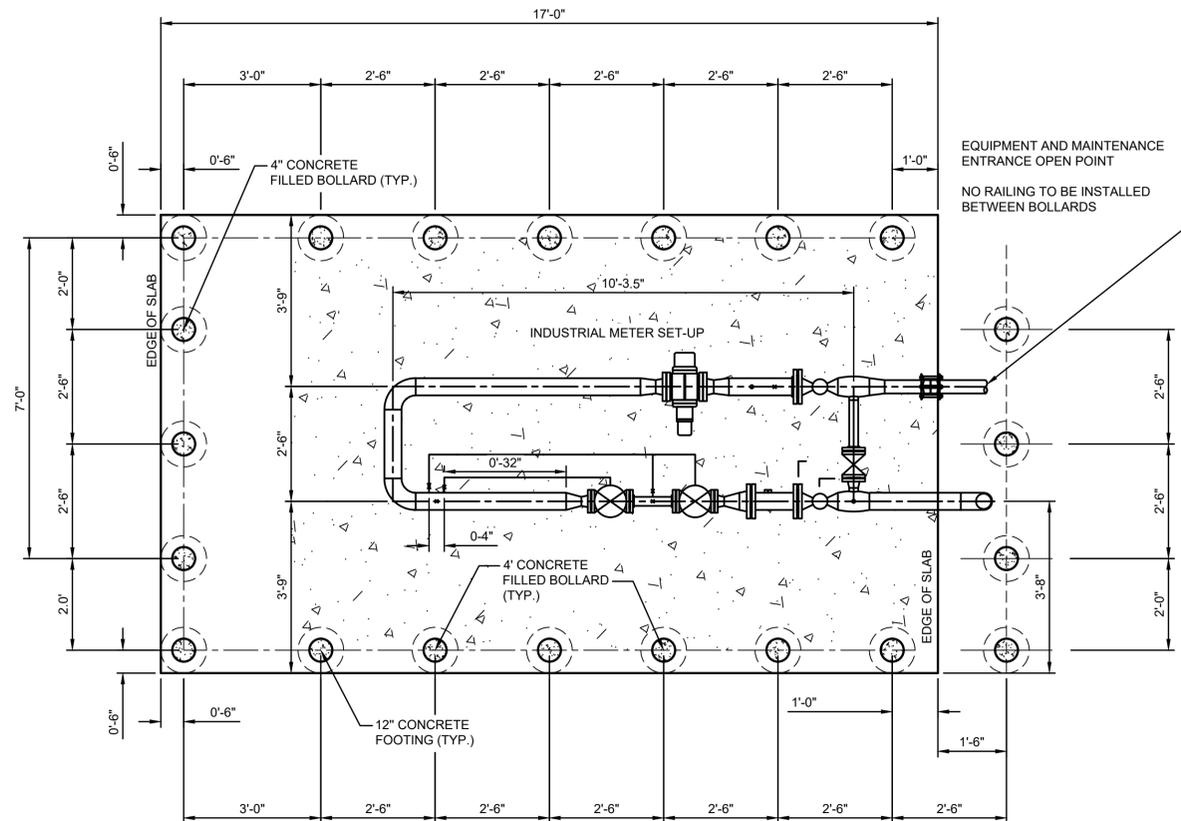


3 TYPICAL FENCE DETAIL
C-00-503 1" = 1'

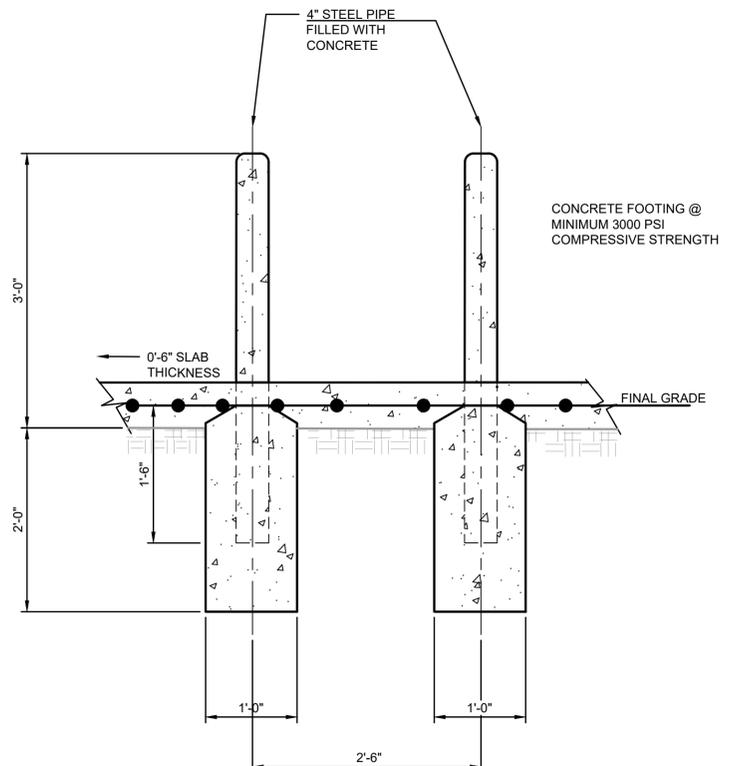


4 TYPICAL BOLLARD DETAIL
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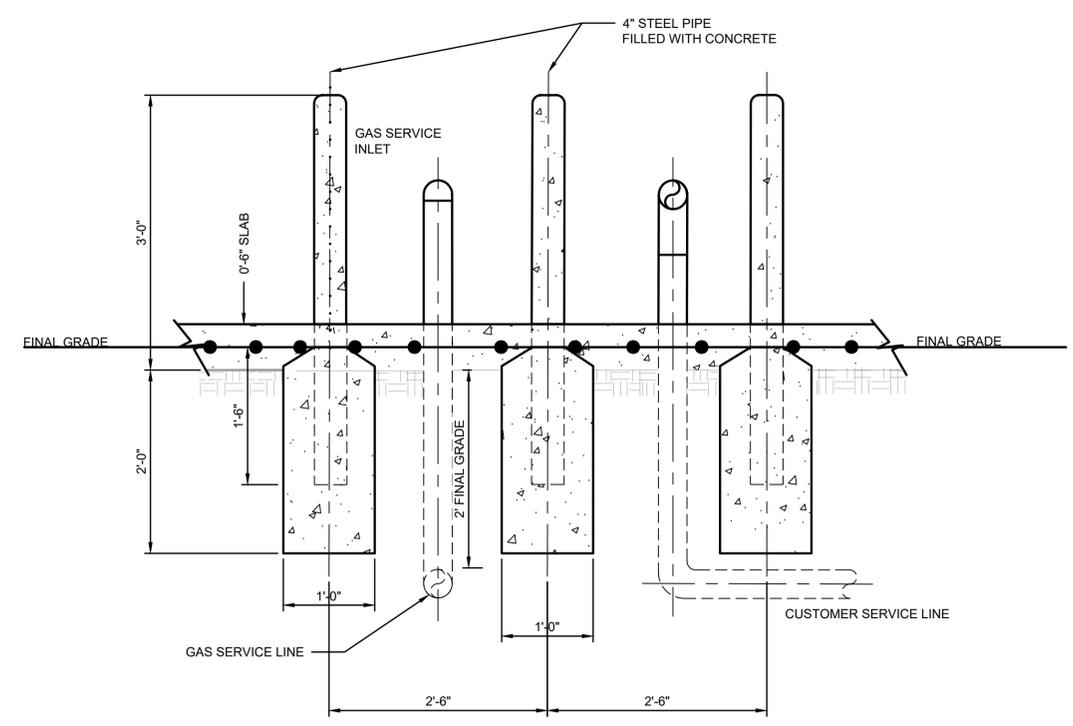


PROPOSED GAS METERING STATION ALL PIPING AND ACCESSORIES UP TO AND INCLUDING METER AND PRESSURE REGULATOR BY UTILITY. CONTRACTOR TO COORDINATE WITH UTILITY.

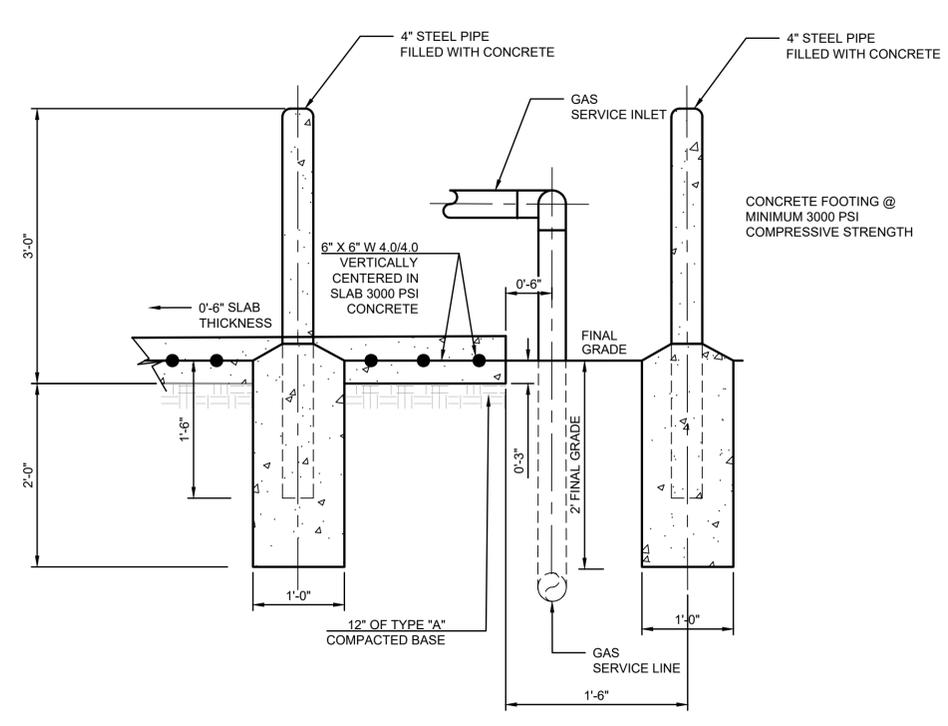


1 INDUSTRIAL METER CONCRETE SLAB & BOLLARD PLAN
C-00-504 1" = 2'

3 SECTION BB-BB
C-00-504 1" = 1'



4 SECTION CC-CC
C-00-504 1" = 1'



2 SECTION AA-AA
C-00-504 1" = 1'

REVISIONS AND RECORD OF ISSUE	
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CPS GAS METERING CONCRETE SLAB AND BOLLARD DETAILS

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9/26/2023
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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE			
DESIGNED:	E. GUTIERREZ / E. COBOS		
DETAILED:	M. LIZA		
CHECKED:	D. ALCORTA		
APPROVED:	M. MEDINA		
DATE:	9/26/2023		
PROJECT NO.:	412782		

GENERAL
CIVIL

TREE PROTECTION NOTES AND DETAILS

C-00-505 OF

SHEET 23 OF 26

PREPARED BY: FERNANDEZ FRAZIER WHITE & ASSOC. INC. & C. F. ZAVALA GROUP

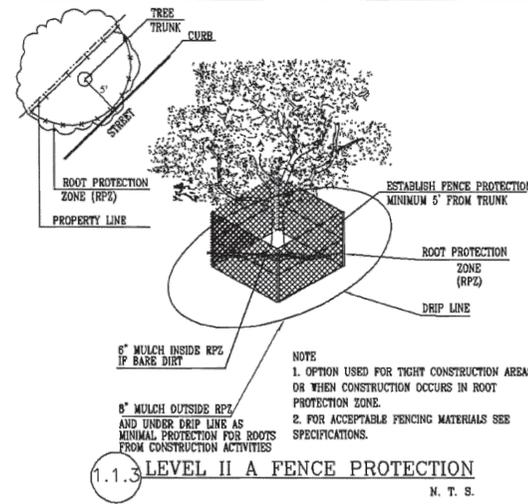


CITY OF SAN ANTONIO
TREE PROTECTION DETAILS
TREE PRESERVATION

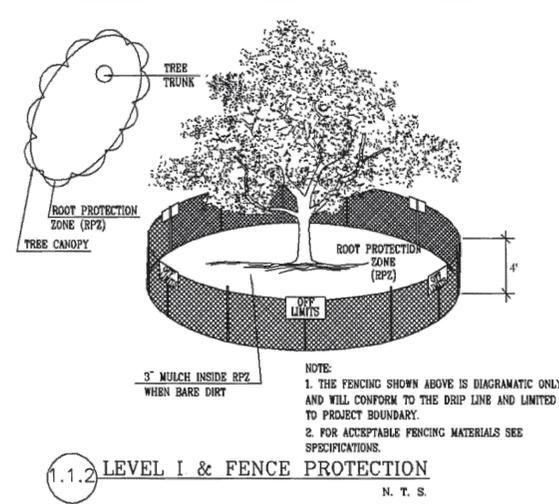
DESIGNED:	FED. RD. DIST. NO.	STATE	SHT. NO.
CHECKED:	TEXAS		1 OF 4
DRAWN:	STATE DIST. NO.	COUNTY	CONTROL NO.
CHECKED:	BEVWR		

GENERAL NOTES

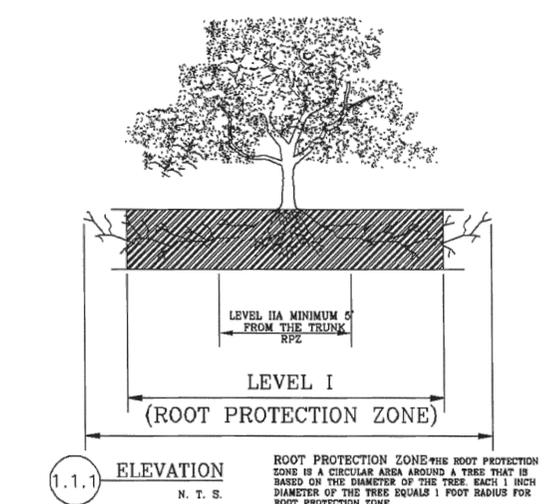
- ALL THE TREES WITH A DIAMETER GREATER THAN 3 INCHES AFFECTED BY CONSTRUCTION SHALL HAVE THE LIMBS AND ROOTS TRIMMED AND PRUNED ACCORDING TO ITEM No. 802. TREE PRUNING, SOIL AMENDING AND FERTILIZATION, UNLESS SPECIFIED TREES SHALL RECEIVE LEVEL 2 PROTECTION AS PER ITEM No. 802. TREES TO RECEIVE LEVEL 1 PROTECTION AS PER ITEM No. 802 ARE SHOWN ON TREE PROTECTION TABLE ON THIS SHEET.
- ALL TREES SHALL REMAIN UNLESS NOTED ON THE PLANS.
- NO SITE PREPARATION WORK SHALL BEGIN IN AREAS WHERE TREE PRESERVATION AND TREATMENT MEASURES HAVE NOT BEEN COMPLETED AND APPROVED.
- TREE PROTECTION FENCING SHALL BE REQUIRED. TREE PROTECTION FENCING SHALL BE INSTALLED, MAINTAINED AND REPAIRED BY THE CONTRACTOR DURING SITE CONSTRUCTION.
- THE CONTRACTOR SHALL AVOID CUTTING ROOTS LARGER THAN THREE INCHES IN DIAMETER WHEN EXCAVATING NEAR EXISTING TREES. EXCAVATION IN THE VICINITY OF TREES SHALL PROCEED WITH CAUTION. THE CONTRACTOR SHALL CONTACT THE CITY INSPECTOR.
- THE ROOT PROTECTION ZONE IS THAT AREA SURROUNDING A TREE, AS MEASURED BY A RADIUS FROM THE TREE TRUNK, IN WHICH NO EQUIPMENT, VEHICLES OR MATERIALS MAY OPERATE OR BE STORED. THE REQUIRED RADIUS LENGTH IS 1 FOOT PER DIAMETER INCH OF THE TREE. FOR EXAMPLE, A 10-INCH DIAMETER TREE WOULD HAVE A 5-FOOT RADIUS ROOT PROTECTION ZONE AROUND THE TREE. ROOTS OR BRANCHES THAT ARE IN CONFLICT WITH THE CONSTRUCTION SHALL BE CUT CLEANLY ACCORDING TO PROPER PRUNING METHODS. LIVE OAK WOUNDS SHALL BE PAINTED OVER, WITHIN 20 MINUTES TO PREVENT OAK WILT.
- ACCESS TO FENCED AREAS WILL BE PERMITTED ONLY WITH THE APPROVAL OF THE ENGINEER OR CITY INSPECTOR.
- GRADING, IF REQUIRED, SHALL BE LIMITED TO A 3 INCH CUT OR FILL WITHIN THE FENCED ROOT ZONE AREAS.
- TREES, SHRUBS OR BUSHES TO BE CLEARED FROM PROTECTED ROOT ZONE AREAS SHALL BE REMOVED BY HAND AS DIRECTED BY THE PROJECT MANAGER OR CITY INSPECTOR.
- TREES DAMAGED OR LOST DUE TO CONTRACTOR'S NEGLIGENCE DURING CONSTRUCTION SHALL BE MITIGATED TO THE ENGINEER'S SATISFACTION.
- EXPOSED ROOTS SHALL BE COVERED AT THE END OF EACH DAY USING TECHNIQUES SUCH AS COVERING WITH SOIL, MULCH OR WET BURLAP.
- ANY TREE REMOVAL SHALL BE APPROVED BY THE CITY ARBORIST PRIOR TO ITS REMOVAL.



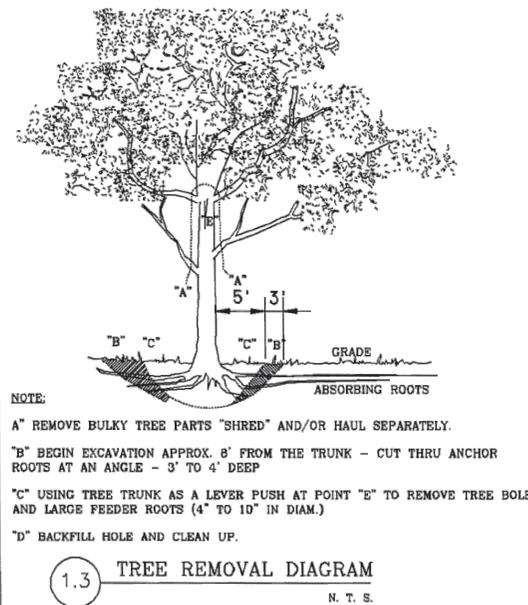
1.1.3 LEVEL II A FENCE PROTECTION
N. T. S.



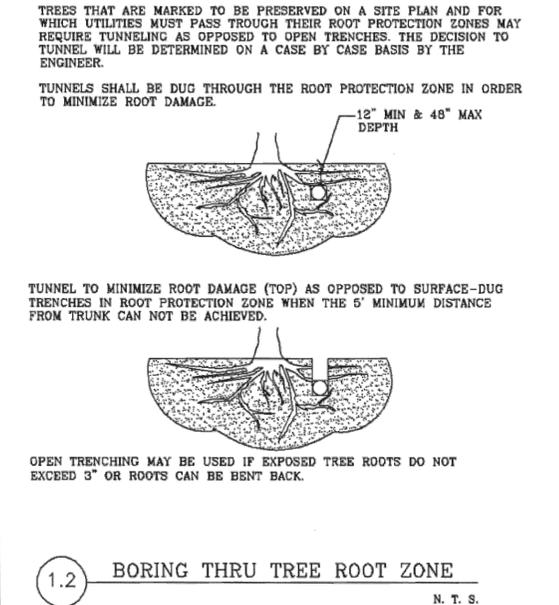
1.1.2 LEVEL I & FENCE PROTECTION
N. T. S.



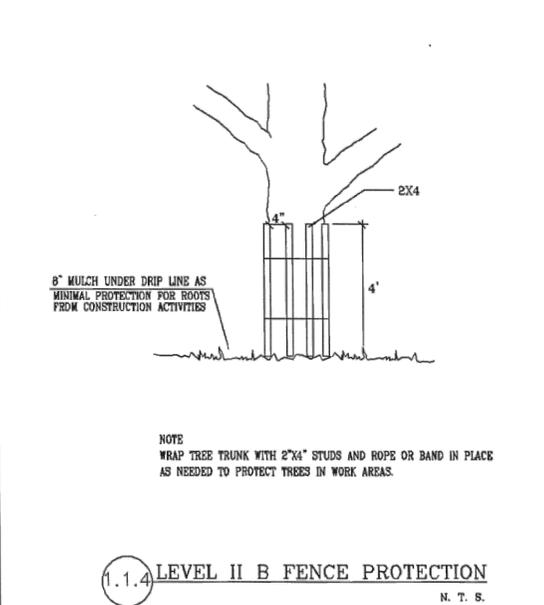
1.1.1 ELEVATION
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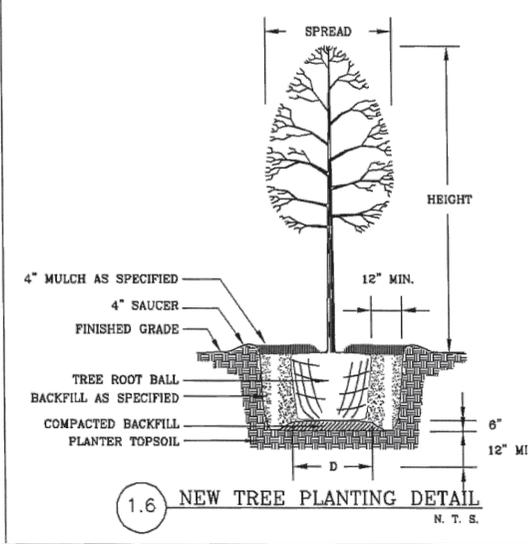
1.3 TREE REMOVAL DIAGRAM
N. T. S.



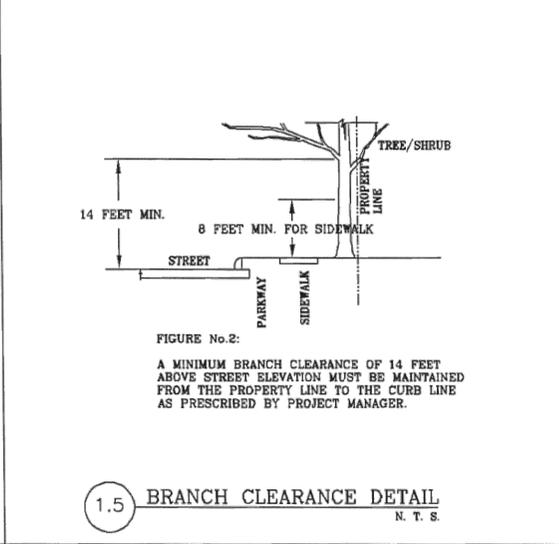
1.2 BORING THRU TREE ROOT ZONE
N. T. S.



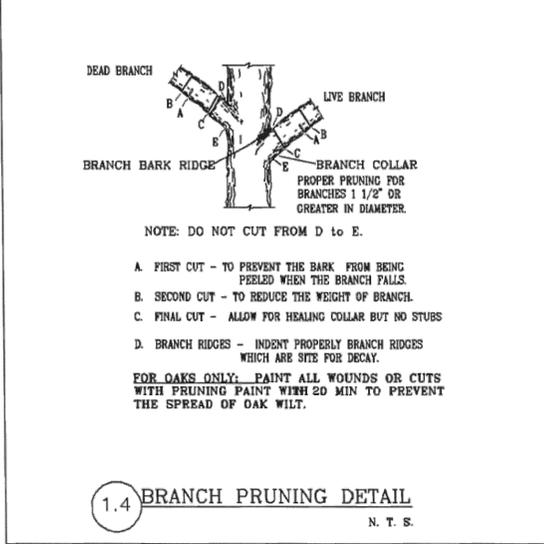
1.1.4 LEVEL II B FENCE PROTECTION
N. T. S.



1.6 NEW TREE PLANTING DETAIL
N. T. S.



1.5 BRANCH CLEARANCE DETAIL
N. T. S.



1.4 BRANCH PRUNING DETAIL
N. T. S.



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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE

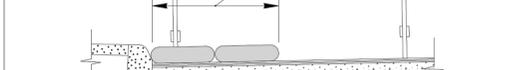
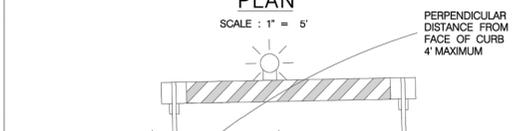
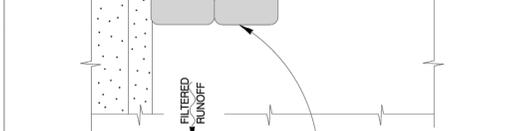
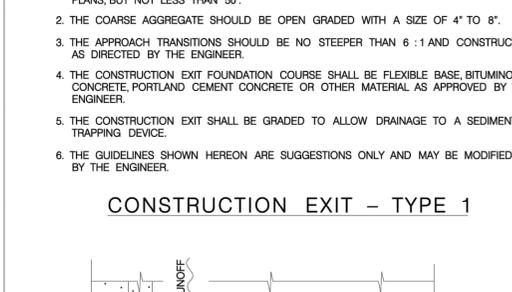
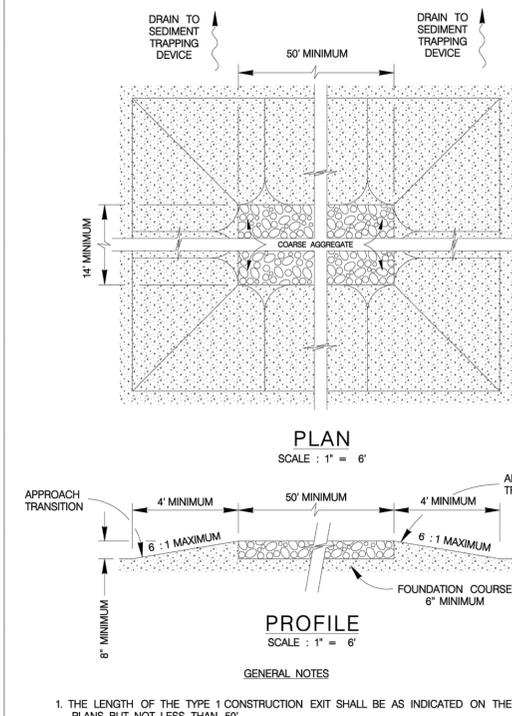
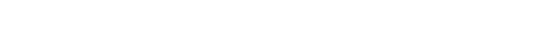
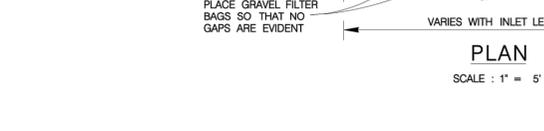
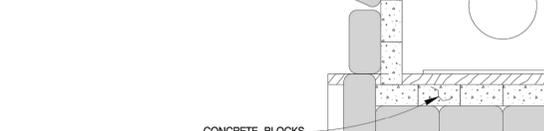
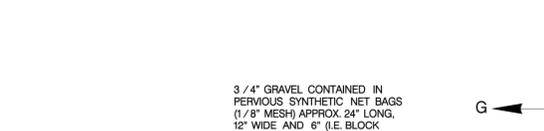
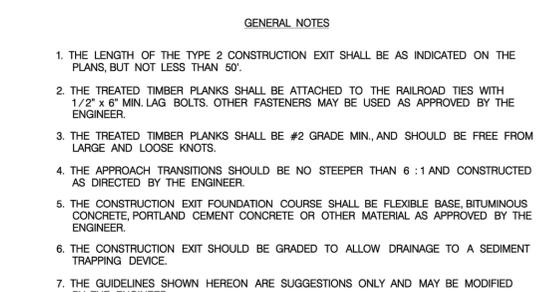
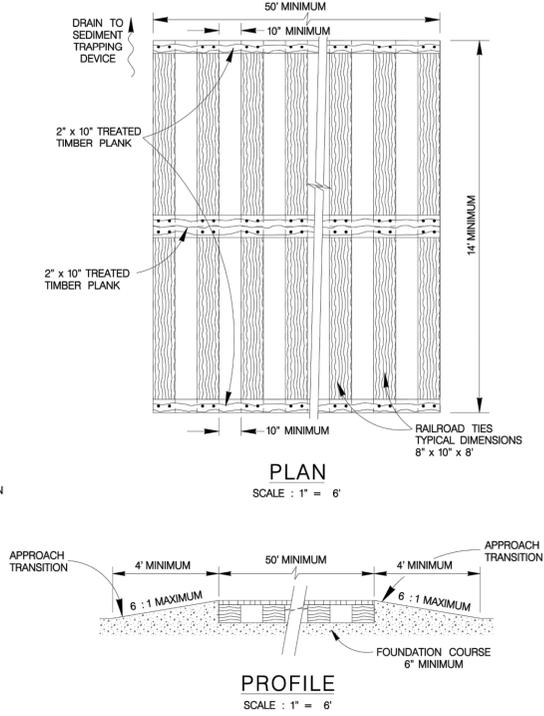
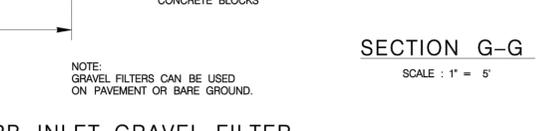
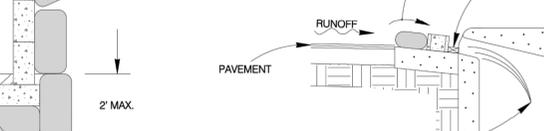
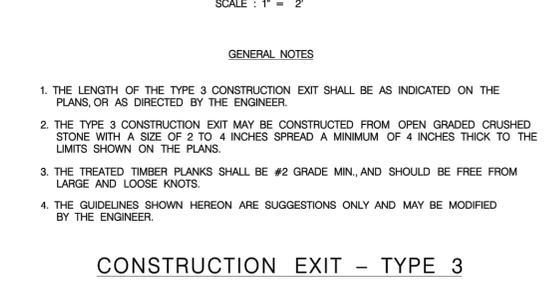
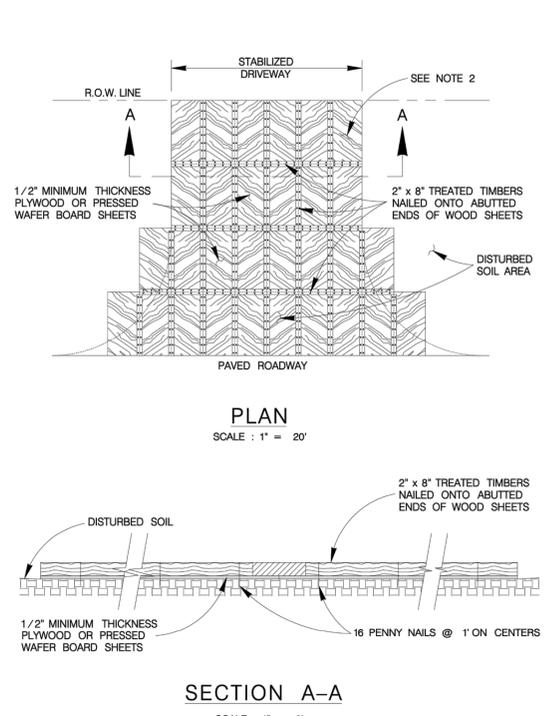
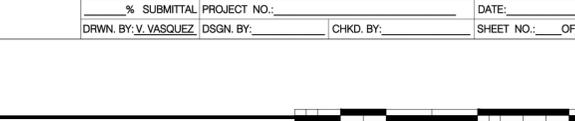
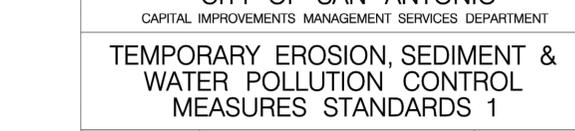
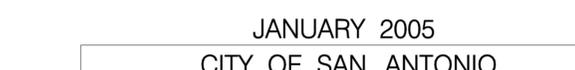
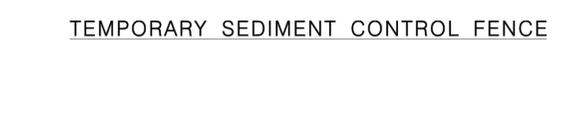
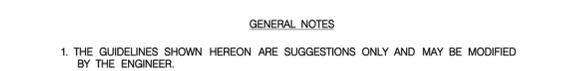
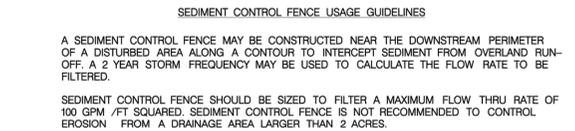
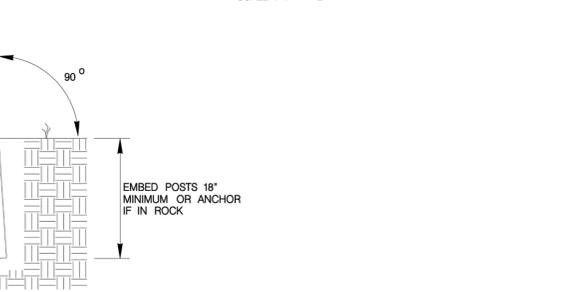
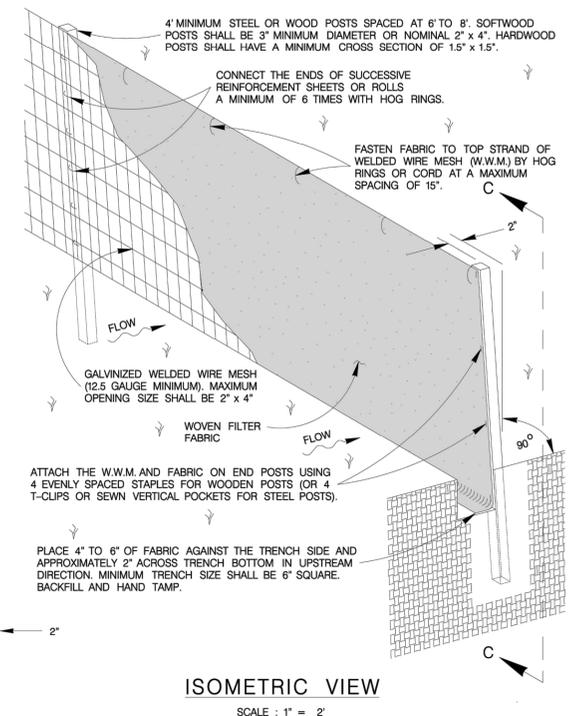
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

GENERAL

CIVIL

EROSION, SEDIMENT CONTROL AND SW3P DETAILS 1 OF 2

C-00-506 OF

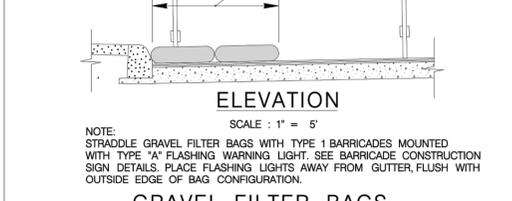
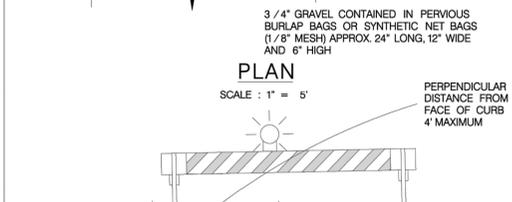
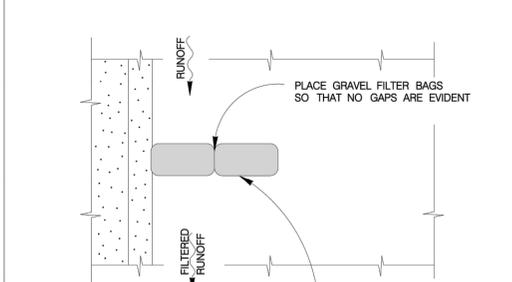


- GENERAL NOTES**
1. THE LENGTH OF THE TYPE 1 CONSTRUCTION EXIT SHALL BE AS INDICATED ON THE PLANS, BUT NOT LESS THAN 50'.
 2. THE COARSE AGGREGATE SHOULD BE OPEN GRADED WITH A SIZE OF 4" TO 8".
 3. THE APPROACH TRANSITIONS SHOULD BE NO STEEPER THAN 6:1 AND CONSTRUCTED AS DIRECTED BY THE ENGINEER.
 4. THE CONSTRUCTION EXIT FOUNDATION COURSE SHALL BE FLEXIBLE BASE, BITUMINOUS CONCRETE, PORTLAND CEMENT CONCRETE OR OTHER MATERIAL AS APPROVED BY THE ENGINEER.
 5. THE CONSTRUCTION EXIT SHALL BE GRADED TO ALLOW DRAINAGE TO A SEDIMENT TRAPPING DEVICE.
 6. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

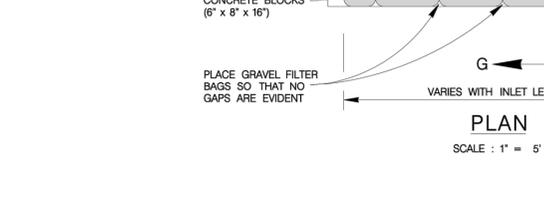
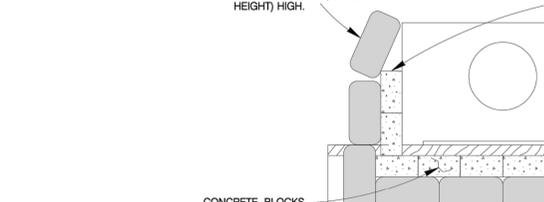
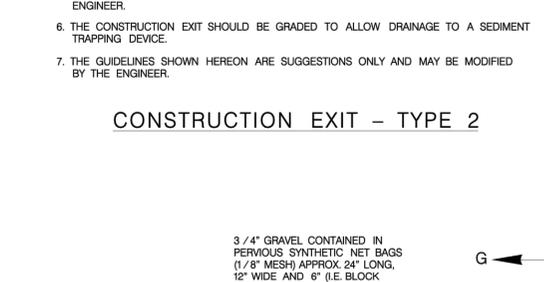
- GENERAL NOTES**
1. THE LENGTH OF THE TYPE 2 CONSTRUCTION EXIT SHALL BE AS INDICATED ON THE PLANS, BUT NOT LESS THAN 50'.
 2. THE TREATED TIMBER PLANKS SHALL BE ATTACHED TO THE RAILROAD TIES WITH 1/2" x 6" MIN. LAG BOLTS. OTHER FASTENERS MAY BE USED AS APPROVED BY THE ENGINEER.
 3. THE TREATED TIMBER PLANKS SHALL BE #2 GRADE MIN., AND SHOULD BE FREE FROM LARGE AND LOOSE KNOTS.
 4. THE APPROACH TRANSITIONS SHOULD BE NO STEEPER THAN 6:1 AND CONSTRUCTED AS DIRECTED BY THE ENGINEER.
 5. THE CONSTRUCTION EXIT FOUNDATION COURSE SHALL BE FLEXIBLE BASE, BITUMINOUS CONCRETE, PORTLAND CEMENT CONCRETE OR OTHER MATERIAL AS APPROVED BY THE ENGINEER.
 6. THE CONSTRUCTION EXIT SHOULD BE GRADED TO ALLOW DRAINAGE TO A SEDIMENT TRAPPING DEVICE.
 7. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

- GENERAL NOTES**
1. THE LENGTH OF THE TYPE 3 CONSTRUCTION EXIT SHALL BE AS INDICATED ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.
 2. THE TYPE 3 CONSTRUCTION EXIT MAY BE CONSTRUCTED FROM OPEN GRADED CRUSHED STONE WITH A SIZE OF 2 TO 4 INCHES SPREAD A MINIMUM OF 4 INCHES THICK TO THE LIMITS SHOWN ON THE PLANS.
 3. THE TREATED TIMBER PLANKS SHALL BE #2 GRADE MIN., AND SHOULD BE FREE FROM LARGE AND LOOSE KNOTS.
 4. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

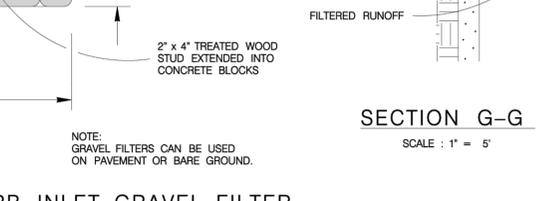
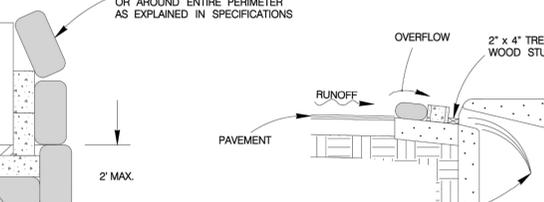
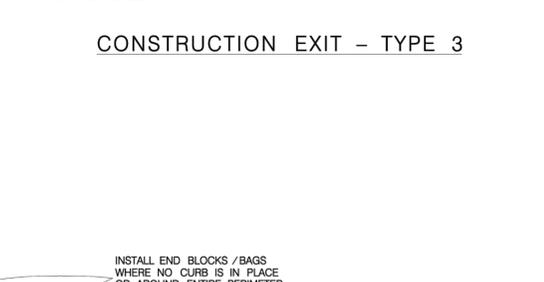
CONSTRUCTION EXIT - TYPE 1



CONSTRUCTION EXIT - TYPE 2



CONSTRUCTION EXIT - TYPE 3



GRAVEL FILTER BAGS



CURB INLET GRAVEL FILTER



SECTION G-G



SEDIMENT CONTROL FENCE USAGE GUIDELINES

A SEDIMENT CONTROL FENCE MAY BE CONSTRUCTED NEAR THE DOWNSTREAM PERIMETER OF A DISTURBED AREA ALONG A CONTOUR TO INTERCEPT SEDIMENT FROM OVERLAND RUN-OFF. A 2 YEAR STORM FREQUENCY MAY BE USED TO CALCULATE THE FLOW RATE TO BE FILTERED.

SEDIMENT CONTROL FENCE SHOULD BE SIZED TO FILTER A MAXIMUM FLOW THRU RATE OF 100 GPM / FT SQUARED. SEDIMENT CONTROL FENCE IS NOT RECOMMENDED TO CONTROL EROSION FROM A DRAINAGE AREA LARGER THAN 2 ACRES.

GENERAL NOTES

1. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

TEMPORARY SEDIMENT CONTROL FENCE



JANUARY 2005

CITY OF SAN ANTONIO

CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

TEMPORARY EROSION, SEDIMENT & WATER POLLUTION CONTROL MEASURES STANDARDS 1

DRWN. BY: V. VASQUEZ DSGN. BY: CHKD. BY: SHEET NO.: OF

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

GENERAL

CIVIL

EROSION, SEDIMENT CONTROL AND SW3P DETAILS 2 OF 2

C-00-507 OF

ROCK FILTER DAM USAGE GUIDELINES

ROCK FILTER DAMS SHOULD BE CONSTRUCTED DOWNSTREAM FROM DISTURBED AREAS TO INTERCEPT SEDIMENT FROM OVERLOAD RUNOFF AND /OR CONCENTRATED FLOW. THE DAMS SHOULD BE SIZED TO FILTER A MAXIMUM FLOW THRU RATE OF 60 GPM /FT SQUARED OF CROSS SECTIONAL AREA. A 2 YEAR STORM FREQUENCY MAY BE USED TO CALCULATE THE FLOW RATE.

TYPE 1 (18" HIGH WITH NO WIRE MESH):

TYPE 1 MAY BE USED AT THE TOE OF SLOPES, AROUND INLETS IN SMALL DITCHES AND AT DIKE OR SWALE OUTLETS. THIS TYPE OF DAM IS RECOMMENDED TO CONTROL EROSION FROM A DRAINAGE AREA OF 5 ACRES OR LESS. TYPE 1 MAY NOT BE USED IN CONCENTRATED HIGH VELOCITY FLOWS (APPROXIMATELY 8 FT./SEC. OR MORE) IN WHICH AGGREGATE WASH OUT MAY OCCUR. SANDBAGS MAY BE USED AT THE EMBEDDED FOUNDATION (4" DEEP MIN.) FOR BETTER FILTERING EFFICIENCY OF LOW FLOWS IF CALLED FOR ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

TYPE 2 (18" HIGH WITH WIRE MESH):

TYPE 2 MAY BE USED IN DITCHES AND AT DIKE OR SWALE OUTLETS.

TYPE 3 (36" HIGH WITH WIRE MESH):

TYPE 3 MAY BE USED IN STREAM FLOW AND SHOULD BE SECURED TO THE STREAM BED.

TYPE 4 (SACK GABIONS):

TYPE 4 MAY BE USED IN DITCHES AND SMALLER CHANNELS TO FORM AN EROSION CONTROL DAM.

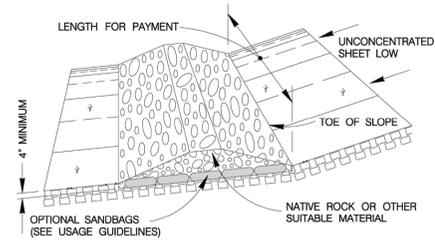
GENERAL NOTES

- IF SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER, FILTER DAMS SHOULD BE PLACED NEAR THE TOE OF SLOPES WHERE EROSION IS ANTICIPATED, UPSTREAM AND / OR DOWNSTREAM AT DRAINAGE STRUCTURES, AND IN ROADWAY DITCHES AND CHANNELS TO COLLECT SEDIMENT.
- MATERIALS (AGGREGATE, WIRE MESH, SANDBAGS, ETC.) SHALL BE AS INDICATED BY THE SPECIFICATION FOR ROCK FILTER DAMS FOR EROSION AND SEDIMENTATION CONTROL.
- THE ROCK FILTER DAM DIMENSIONS SHALL BE AS INDICATED ON THE STORM WATER POLLUTION PREVENTION PLANS.
- SIDE SLOPES SHOULD BE 2 : 1 OR FLATTER. DAMS WITHIN THE SAFETY ZONE SHALL HAVE SIDE SLOPES OF 6 : 1 OR FLATTER.
- MAINTAIN A MINIMUM OF 1' BETWEEN TOP OF ROCK FILTER DAM WEIR AND TOP OF EMBANKMENT FOR FILTER DAMS AT SEDIMENT TRAPS.
- FILTER DAMS SHOULD BE EMBEDDED A MINIMUM OF 4" INTO THE EXISTING GROUND.
- THE SEDIMENT TRAP FOR PONDING OF SEDIMENT LADEN RUNOFF SHALL BE OF THE DIMENSIONS SHOWN ON THE PLANS.
- ROCK FILTER DAM TYPES 2 & 3 SHALL BE SECURED WITH 20 GAUGE GALVANIZED WOVEN WIRE MESH WITH 1" DIAMETER HEXAGONAL OPENINGS. THE AGGREGATE SHALL BE PLACED ON THE MESH TO THE HEIGHT AND SLOPES SPECIFIED. THE MESH SHALL BE FOLDED AT THE UPSTREAM SIDE OVER THE AGGREGATE AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES OR HOG RINGS. IN STREAM USE, THE MESH SHOULD BE SECURED OR STAKED TO THE STREAM BED PRIOR TO AGGREGATE PLACEMENT.
- SACK GABIONS SHOULD BE STAKED DOWN WITH 3/4" DIA. REBAR STAKES.
- FLOW OUTLET SHOULD BE ONTO A STABILIZED AREA (VEGETATION, ROCK, ETC.).
- THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

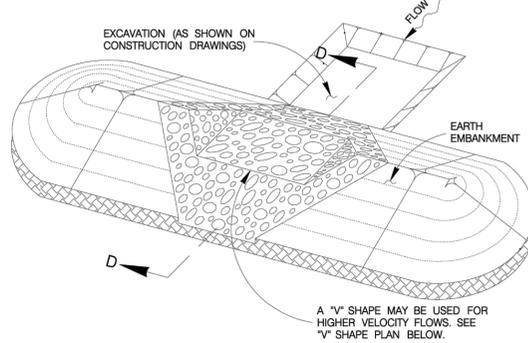
JANUARY 2005

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
TEMPORARY EROSION, SEDIMENT & WATER POLLUTION CONTROL MEASURES STANDARDS 2

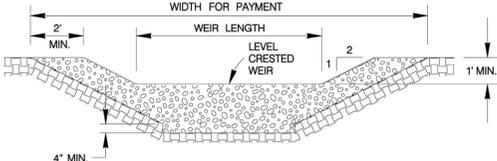
DRWN. BY: V. VASQUEZ, DSGN. BY: _____, CHKD. BY: _____, SHEET NO.: _____ OF _____



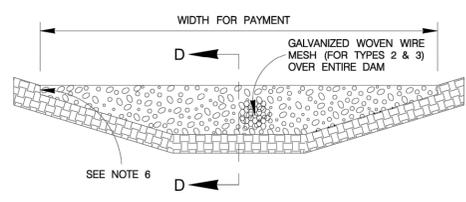
TYPE 1 FILTER DAM AT TOE OF SLOPE
SCALE : 1" = 10'



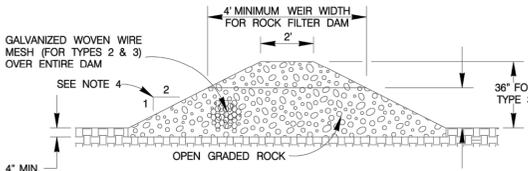
TYPE 1 & 2 FILTER DAM AT SEDIMENT TRAP
SCALE : 1" = 10'



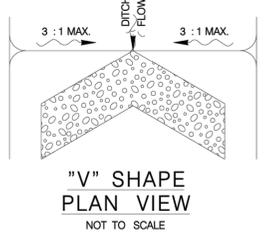
PROFILE OF TYPE 1 & 2 FILTER DAM AT SEDIMENT TRAP
SCALE : 1" = 6'



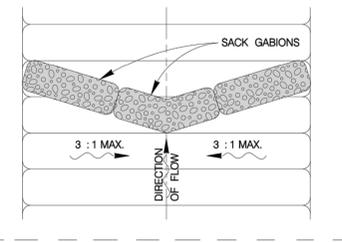
TYPE 1, 2 & 3 FILTER DAM AT CHANNEL SECTIONS
SCALE : 1" = 6'



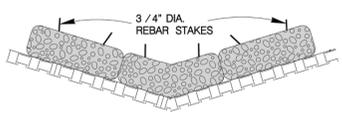
SECTION D-D
SCALE : 1" = 6'



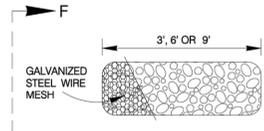
"V" SHAPE PLAN VIEW
NOT TO SCALE



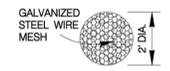
PLAN VIEW
SCALE : 1" = 10'



SECTION E-E
SCALE : 1" = 10'



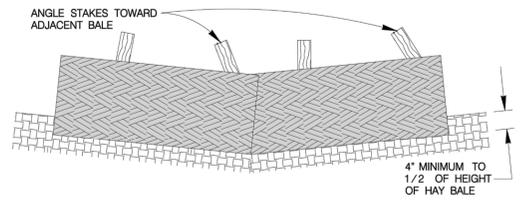
TYPE 4 SACK GABION DETAIL
SCALE : 1" = 6'



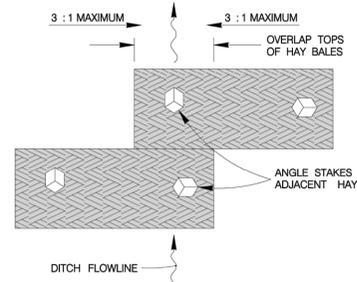
SECTION F-F
SCALE : 1" = 6'

TYPE 4 FILTER DAM AT DITCHES & SMALLER CHANNELS PLAN VIEW

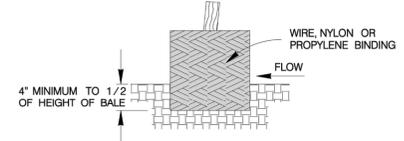
ROCK FILTER DAMS



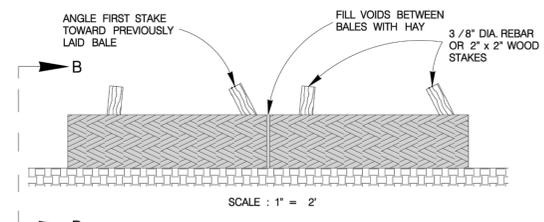
PROFILE VIEW
SCALE : 1" = 2'



PLAN VIEW
SCALE : 1" = 2'



SECTION B-B
SCALE : 1" = 2'



SCALE : 1" = 2'

BALED HAY USAGE GUIDELINES

A BAILED HAY INSTALLATION MAY BE CONSTRUCTED NEAR THE DOWNSTREAM PERIMETER OF A DISTURBED AREA ALONG A CONTOUR TO INTERCEPT SEDIMENT FROM OVERLAND RUNOFF. A TWO YEAR STORM FREQUENCY MAY BE USED TO CALCULATE THE FLOW RATE TO BE FILTERED. THE INSTALLATION SHOULD BE SIZED TO FILTER A MAXIMUM FLOW THRU RATE OF 5 GPM /FT SQUARED OF CROSS SECTIONAL AREA. BALED HAY MAY BE USED AT THE FOLLOWING LOCATIONS:

- WHERE THE RUNOFF APPROACHING THE BALED HAY FLOWS OVER DISTURBED SOIL FOR LESS THAN 100'. IF THE SLOPE OF THE DISTURBED SOIL EXCEEDS 10 %, THE LENGTH OF SLOPE UPSTREAM OF THE BALED HAY SHOULD BE LESS THAN 50'.
- WHERE THE INSTALLATION WILL BE REQUIRED FOR LESS THAN 3 MONTHS.
- WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN 1/2 ACRE.

FOR BALED HAY INSTALLATIONS IN SMALL DITCHES, THE FOLLOWING ADDITIONAL CONSIDERATIONS APPLY:

- THE DITCH SIDESLOPES SHOULD BE GRADED AS FLAT AS POSSIBLE TO MAXIMIZE THE DRAINAGE FLOW RATE THRU THE HAY.
- THE DITCH SHOULD BE GRADED LARGE ENOUGH TO CONTAIN THE OVERLAPPING DRAINAGE WHEN SEDIMENT HAS FILLED TO THE TOP OF THE BALED HAY.

BALES SHOULD BE REPLACED USUALLY EVERY 2 MONTHS OR MORE OFTEN DURING WET WEATHER WHEN LOSS OF STRUCTURAL INTEGRITY IS ACCELERATED.

GENERAL NOTES

- HAY BALES SHALL BE A MINIMUM OF 30" IN LENGTH AND WEIGH A MINIMUM OF 50 LBS.
- HAY BALES SHALL BE BOUND BY EITHER WIRE OR NYLON OR POLYPROPYLENE STRING. THE BALES SHALL BE COMPOSED ENTIRELY OF VEGETABLE MATTER.
- HAY BALES SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4" AND, WHERE POSSIBLE, ONE-HALF THE HEIGHT OF THE BALE.
- HAY BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES. THE BALES SHALL BE PLACED WITH BINDINGS PARALLEL TO THE GROUND.
- HAY BALES SHALL BE SECURELY ANCHORED IN PLACE WITH 3/8" DIA. REBAR OR 2" x 2" WOOD STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE SHALL BE ANGLED TOWARDS THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
- THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

BALED HAY FOR EROSION CONTROL



9/26/2023
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. NO. 93830 ON SEPTEMBER 26, 2023 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT



EMERGENCY
PREPAREDNESS PLAN
IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS
GENERATOR
INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

GENERAL

CIVIL

CONCRETE
HEADWALLS DETAILS
2 OF 2

C-00-509 OF

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe				Values to be Added for Each Add'l Pipe				
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	3'-3 1/2"	2'-8 3/4"	2'-10"	3'-3 1/4"	85	0.5	1'-9 3/4"	20	0.2
	15"	3'-10 1/2"	3'-0 1/4"	3'-4"	3'-10 1/4"	97	0.6	2'-3"	25	0.3
	18"	4'-5 1/2"	3'-4"	3'-10"	4'-5"	119	0.8	2'-9 1/4"	32	0.4
	21"	5'-0 3/4"	3'-7 1/2"	4'-4"	5'-0"	134	0.9	3'-2 1/4"	43	0.5
	24"	5'-9 1/4"	4'-0 3/4"	4'-10"	5'-7"	154	1.1	3'-8 1/2"	51	0.6
	27"	6'-4 1/2"	4'-4 1/2"	5'-4"	6'-2"	164	1.3	4'-0 3/4"	57	0.7
	30"	6'-11 1/2"	4'-8"	5'-10"	6'-8 3/4"	187	1.5	4'-5 3/4"	67	0.8
	33"	7'-6 1/2"	4'-11 3/4"	6'-4"	7'-3 3/4"	205	1.7	4'-10"	73	0.9
	36"	8'-1 3/4"	5'-3 1/4"	6'-10"	7'-10 3/4"	231	1.9	5'-3 1/4"	82	1.1
	42"	9'-3 3/4"	5'-10 1/2"	7'-10"	9'-0 1/2"	271	2.4	6'-0 1/2"	100	1.4
	48"	10'-9 1/2"	6'-5 3/4"	9'-4"	10'-9 1/4"	325	3.2	6'-9 3/4"	121	1.8
	54"	11'-11 3/4"	7'-1"	10'-4"	11'-11 1/4"	384	3.8	7'-9 1/4"	154	2.2
3:1	12"	4'-1 1/4"	2'-8 3/4"	4'-3"	4'-11"	108	0.7	1'-9 3/4"	23	0.2
	15"	4'-10"	3'-0 1/4"	5'-0"	5'-9 1/4"	127	0.9	2'-3"	29	0.3
	18"	5'-7"	3'-4"	5'-9"	6'-7 3/4"	156	1.1	2'-9 1/4"	37	0.5
	21"	6'-3 3/4"	3'-7 1/2"	6'-6"	7'-6"	177	1.3	3'-2 1/4"	49	0.6
	24"	7'-2"	4'-0 3/4"	7'-3"	8'-4 1/2"	204	1.6	3'-8 1/2"	59	0.7
	27"	7'-11"	4'-4 1/2"	8'-0"	9'-2 3/4"	225	1.9	4'-0 3/4"	68	0.9
	30"	8'-7 3/4"	4'-8"	8'-9"	10'-1 1/4"	260	2.2	4'-5 3/4"	79	1.0
	33"	9'-4 1/2"	4'-11 3/4"	9'-6"	10'-11 3/4"	282	2.5	4'-10"	86	1.2
	36"	10'-1 1/4"	5'-3 1/4"	10'-3"	11'-10"	313	2.9	5'-3 1/4"	97	1.4
	42"	11'-7"	5'-10 1/2"	11'-9"	13'-6 3/4"	379	3.7	6'-0 1/2"	122	1.8
	48"	13'-5 3/4"	6'-5 3/4"	14'-0"	16'-2"	465	4.9	6'-9 3/4"	152	2.4
	54"	14'-11 1/2"	7'-1"	15'-6"	17'-10 3/4"	544	5.9	7'-9 1/4"	190	3.0
60"	16'-5"	7'-8 1/4"	17'-0"	19'-7 1/2"	616	7.0	8'-6 1/2"	224	3.5	
66"	17'-10 3/4"	8'-3 1/2"	18'-6"	21'-4 1/4"	701	8.1	9'-0 3/4"	248	4.0	
72"	19'-4 1/4"	8'-10 3/4"	20'-0"	23'-1 1/4"	786	9.4	9'-8"	281	4.6	
4:1	12"	4'-11"	2'-8 3/4"	5'-8"	6'-6 1/2"	136	0.9	1'-9 3/4"	26	0.3
	15"	5'-9 1/2"	3'-0 1/4"	6'-8"	7'-8 1/2"	162	1.2	2'-3"	33	0.4
	18"	6'-8 1/4"	3'-4"	7'-8"	8'-10 1/4"	198	1.5	2'-9 1/4"	43	0.6
	21"	7'-6 3/4"	3'-7 1/2"	8'-8"	10'-0"	232	1.8	3'-2 1/4"	57	0.7
	24"	8'-6 3/4"	4'-0 3/4"	9'-8"	11'-2"	264	2.2	3'-8 1/2"	68	0.9
	27"	9'-5 1/4"	4'-4 1/2"	10'-8"	12'-3 3/4"	292	2.6	4'-0 3/4"	79	1.1
	30"	10'-4"	4'-8"	11'-8"	13'-5 3/4"	333	3.0	4'-5 3/4"	91	1.3
	33"	11'-2 1/2"	4'-11 3/4"	12'-8"	14'-7 1/2"	368	3.5	4'-10"	104	1.5
	36"	12'-1"	5'-3 1/4"	13'-8"	15'-9 1/4"	411	4.0	5'-3 1/4"	115	1.7
	42"	13'-10"	5'-10 1/2"	15'-8"	18'-1"	495	5.1	6'-0 1/2"	144	2.2
	48"	16'-2 1/4"	6'-5 3/4"	18'-8"	21'-6 3/4"	612	6.8	6'-9 3/4"	183	3.0
	54"	17'-11 1/4"	7'-1"	20'-8"	23'-10 1/4"	729	8.2	7'-9 1/4"	231	3.7
60"	19'-8 1/4"	7'-8 1/4"	22'-8"	26'-2"	824	9.8	8'-6 1/2"	270	4.4	
66"	21'-5 1/2"	8'-3 1/2"	24'-8"	28'-5 3/4"	947	11.4	9'-0 3/4"	305	5.0	
72"	23'-2 1/2"	8'-10 3/4"	26'-8"	30'-9 1/2"	1,060	13.2	9'-8"	342	5.7	
6:1	12"	6'-6 3/4"	2'-8 3/4"	8'-6"	9'-9 3/4"	192	1.4	1'-9 3/4"	30	0.4
	15"	7'-8 3/4"	3'-0 1/4"	10'-0"	11'-6 1/2"	230	1.9	2'-3"	40	0.5
	18"	8'-10 3/4"	3'-4"	11'-6"	13'-3 1/4"	281	2.4	2'-9 1/4"	51	0.7
	21"	10'-0 3/4"	3'-7 1/2"	13'-0"	15'-0 1/4"	334	2.9	3'-2 1/4"	69	1.0
	24"	11'-4 1/4"	4'-0 3/4"	14'-6"	16'-9"	377	3.5	3'-8 1/2"	83	1.3
	27"	12'-6 1/4"	4'-4 1/2"	16'-0"	18'-5 3/4"	428	4.2	4'-0 3/4"	98	1.5
	30"	13'-8 1/4"	4'-8"	17'-6"	20'-2 1/2"	488	4.9	4'-5 3/4"	113	1.8
	33"	14'-10 1/4"	4'-11 3/4"	19'-0"	21'-11 1/4"	551	5.7	4'-10"	130	2.0
	36"	16'-0 1/4"	5'-3 1/4"	20'-6"	23'-8"	606	6.5	5'-3 1/4"	145	2.4
	42"	18'-4 1/2"	5'-10 1/2"	23'-6"	27'-1 1/2"	740	8.4	6'-0 1/2"	184	3.1
	48"	21'-6 3/4"	6'-5 3/4"	28'-0"	32'-4"	946	11.4	6'-9 3/4"	240	4.1
	54"	23'-10 3/4"	7'-1"	31'-0"	35'-9 1/2"	1,124	13.8	7'-9 1/4"	303	5.2
60"	26'-2 3/4"	7'-8 1/4"	34'-0"	39'-3"	1,278	16.4	8'-6 1/2"	358	6.2	

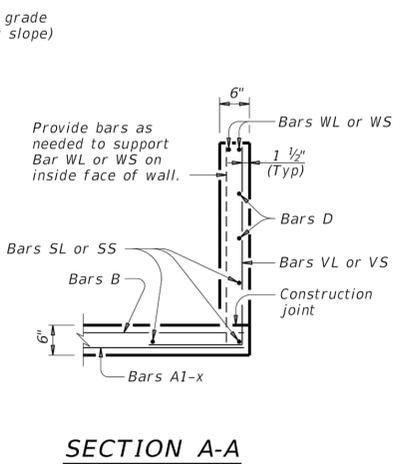
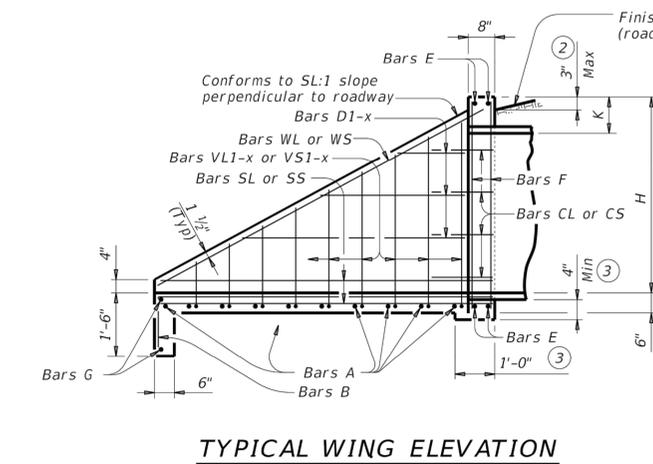
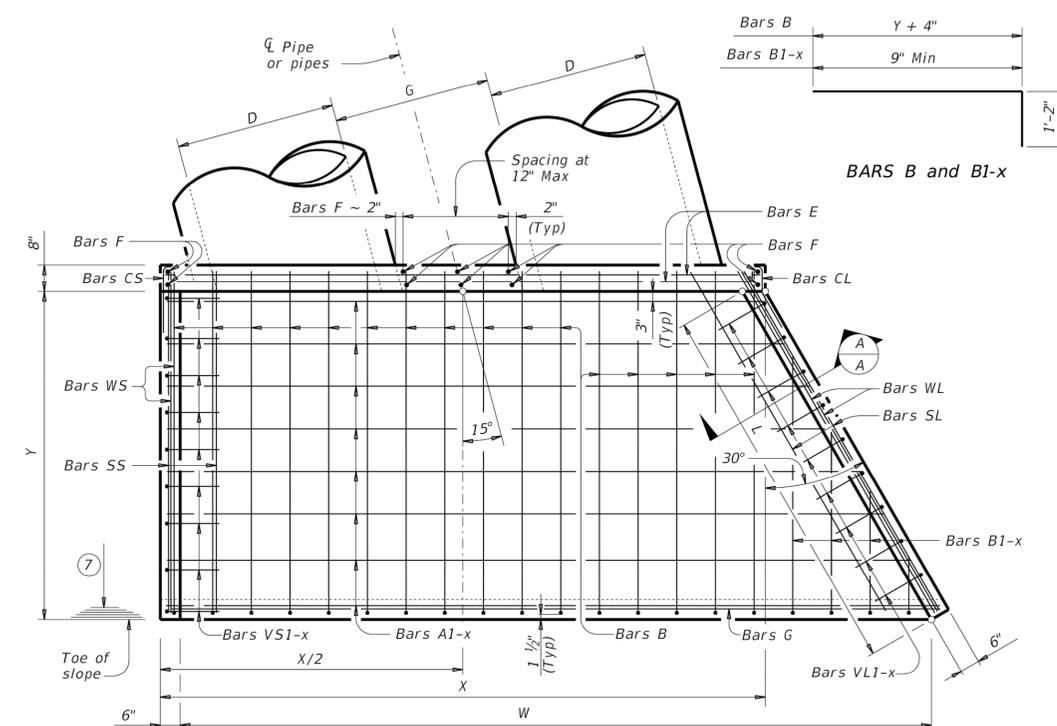
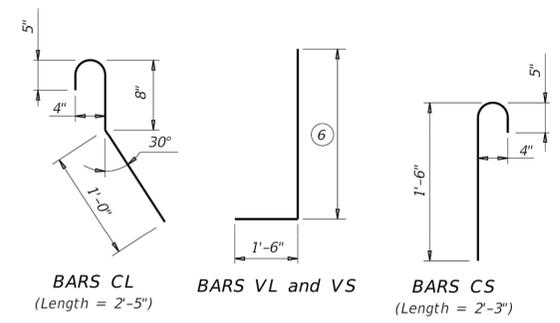
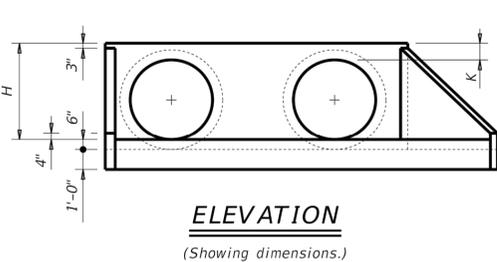


TABLE OF REINFORCING STEEL (5)

Bar	Size	Spa	No.
A	#4	1'-0"	~
B	#3	1'-6"	~
CL & CS	#4	1'-0"	~
D	#3	1'-0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
SL & SS	#4	~	6
VL & VS	#4	1'-0"	~
WL & WS	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (4)	H
12"	0'-9"	1'-0"	2'-0"
15"	0'-11"	1'-0"	2'-3"
18"	1'-2"	1'-0"	2'-6"
21"	1'-4"	1'-0"	2'-9"
24"	1'-7"	1'-0"	3'-0"
27"	1'-8"	1'-0"	3'-3"
30"	1'-10"	1'-0"	3'-6"
33"	1'-11"	1'-0"	3'-9"
36"	2'-1"	1'-0"	4'-0"
42"	2'-4"	1'-0"	4'-6"
48"	2'-7"	1'-3"	5'-3"
54"	3'-0"	1'-3"	5'-9"
60"	3'-3"	1'-3"	6'-3"
66"	3'-3"	1'-3"	6'-9"
72"	3'-4"	1'-3"	7'-3"

- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.
- Dimensions shown are usual and maximum.
- Quantities shown are for one structure end only (one headwall).
- Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L} \right)$
Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L} \right) - 1"$
- Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation
Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 15° SKEW PIPE CULVERTS

CH-FW-15

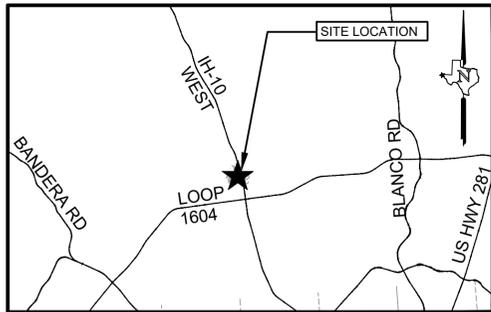
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REV	DATE	BY	CHKD	REASON

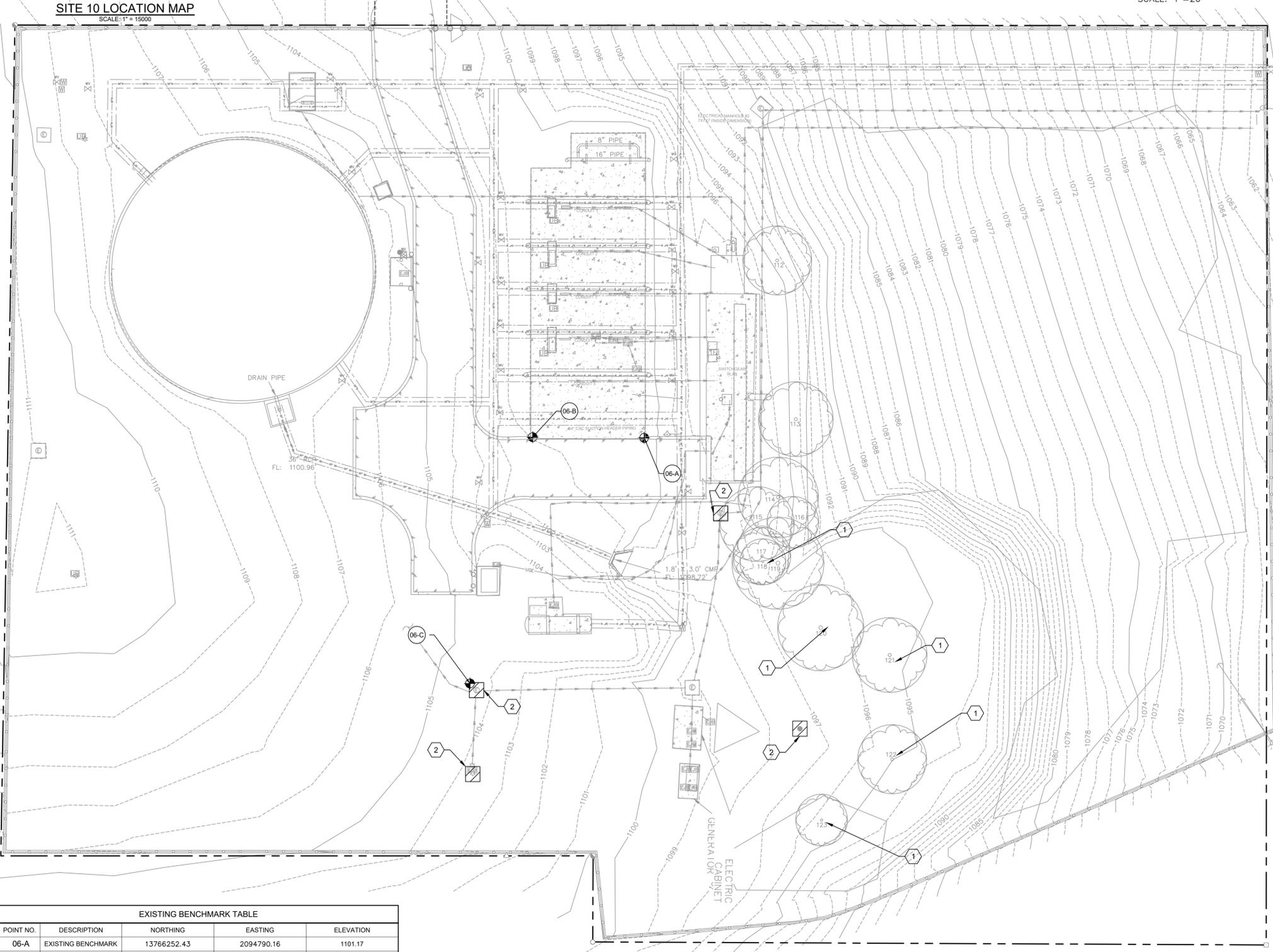
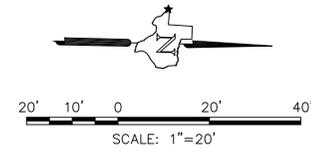
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CITY OF SAN ANTONIO
ACCESS EASEMENT
CALLED O.3581
VOL. 516 PAGE 329
S.P.B.C.V.



EXISTING BENCHMARK TABLE				
POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
06-A	EXISTING BENCHMARK	13766252.43	2094790.16	1101.17
06-B	EXISTING BENCHMARK	13766213.60	2094790.65	0.00
06-C	EXISTING BENCHMARK	13766193.73	2094876.47	1104.61

LEGEND	
	PROJECT LIMITS
	PROPERTY LINE
	EXISTING UTILITY EASEMENT
	EXISTING STORM DRAIN LINE
	EXISTING WATER LINE
	EXISTING UNDERGROUND ELECTRIC LINE
	EXISTING FENCE LINE
	EXISTING ASPHALT PAVEMENT
	EXISTING CONCRETE PAVEMENT
	DEMOLITION

KEYED LEGEND	
	EXISTING BENCHMARK

BENCHMARK	
06-A: BENCHMARK NO. 2300146-60101 BRASS DISK FOUND IN SOUTHEAST CORNER OF CONCRETE PAD. ELEVATION: 1101.18' (NAVD '88-GEOID 18)	
06-B: BENCHMARK NO. 2300146-11 MAG NAIL WITH WASHER STAMPED "CP&Y NO. 11" SET IN CONCRETE. NORTHEAST CORNER OF CONCRETE PAD. ELEVATION: 1101.18' (NAVD '88-GEOID 18)	
06-C: BENCHMARK NO. 2300146-12 MAG NAIL WITH WASHER STAMPED "CP&Y NO. 12" SET IN CONCRETE. SOUTHWEST CORNER OF ELECTRIC MANHOLE. ELEVATION: 1104.61' (NAVD '88-GEOID 18)	

NOTES	
1. ANY DAMAGE/DISTURBANCE OUTSIDE OF PROJECT LIMITS TO BE RESTORED TO EXISTING CONDITIONS OR BETTER AT CONTRACTOR'S EXPENSE UNLESS APPROVED BY SAWS.	

EXISTING UTILITIES	
1. EXISTING UTILITIES SHOWN ON THESE DRAWINGS ARE BASED ON INFORMATION OBTAINED FROM AS-BUILT RECORD DRAWINGS AS PROVIDED BY OTHERS. THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION HAS NOT BEEN VERIFIED. CONTRACTOR IS RESPONSIBLE FOR OBTAINING THE LOCATIONS AND DEPTHS OF EACH UTILITY THAT IS WITHIN THE PROJECT WORKING LIMITS PRIOR TO PERFORMING ANY WORK.	

SHEET KEYNOTES	
1. REFERENCE TREE PRESERVATION SHEET C-06-109 FOR TREE REMOVAL.	
2. CONTRACTOR TO REMOVE EXISTING ASPHALT PAVEMENT PER 02050 AND REPLACE PER 02512.	
3. CONTRACTOR TO REMOVE AND REPLACE CONCRETE CURB PER 02522.	

BLACK & VEATCH
Black & Veatch Corporation
San Antonio, Texas
Texas Registration No. F-258

SUBCONSULTANT:
PLANNING-ENGINEERING-PROJECT MANAGEMENT
MCI Moreno
Cardenas Inc.
SAN ANTONIO, TEXAS
9601 McAllister Freeway #507, San Antonio, TX 78216 (210) 314-3553
Texas Board of Professional Engineers Registration No. F-000554

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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

SITE - 06

CIVIL

EXISTING SITE, SURVEY CONTROL, AND DEMOLITION PLAN

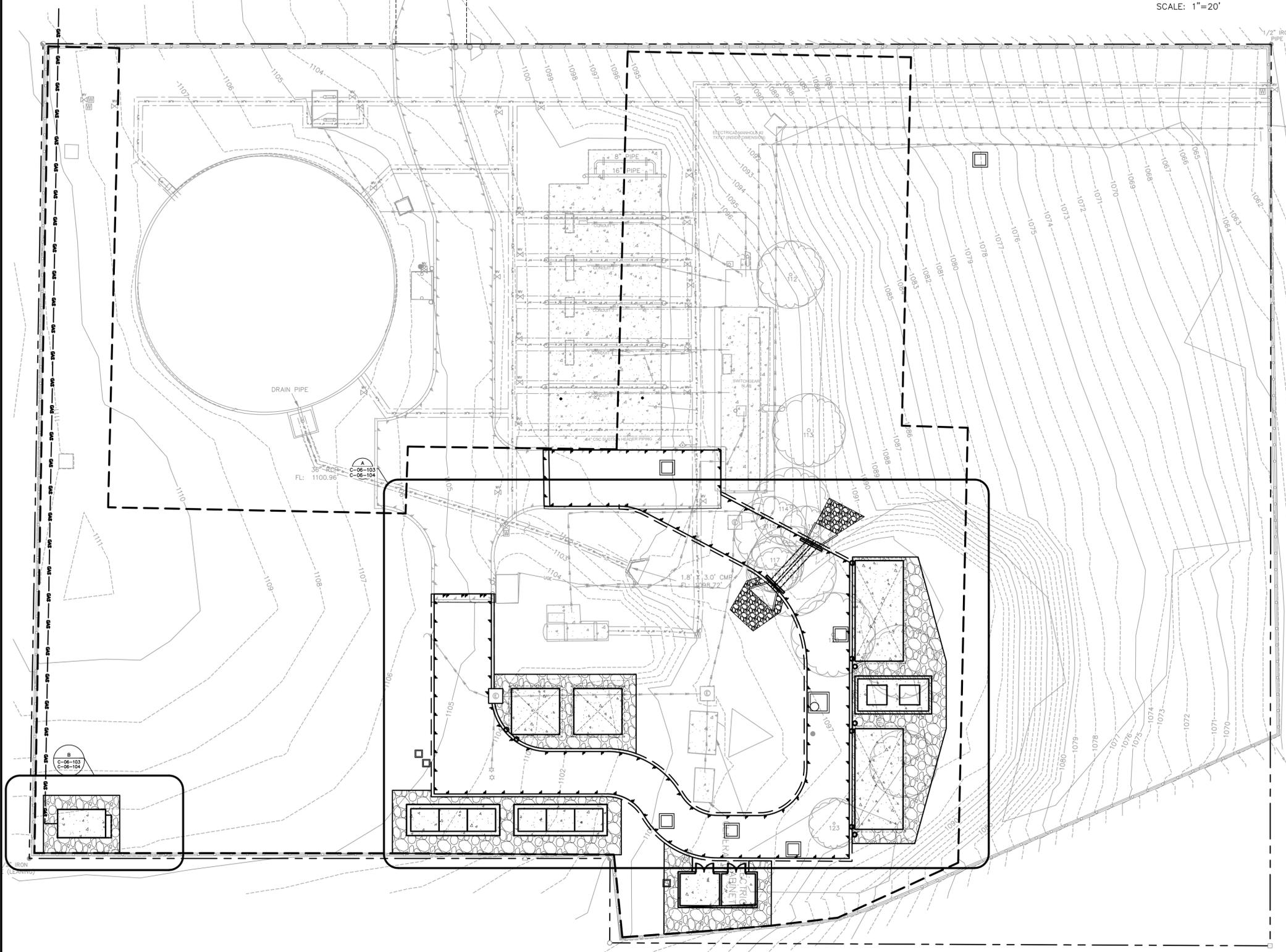
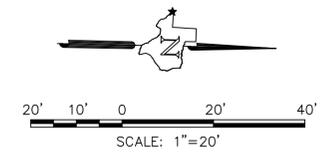
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(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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CITY OF SAN ANTONIO
 ACCESS EASEMENT
 CALLED 0.3551
 VOL. 586, P. 329
 D.B.F.C.11.



LEGEND	
	PROJECT LIMITS
	PROPERTY LINE
	EXISTING UTILITY EASEMENT
	EXISTING STORM DRAIN LINE
	EXISTING WATER LINE
	EXISTING UNDERGROUND ELECTRIC LINE
	PROPOSED MAJOR CONTOUR AND ELEVATION
	PROPOSED MINOR CONTOUR
	EXISTING MAJOR CONTOUR AND ELEVATION
	EXISTING MINOR CONTOUR
	PROPOSED GAS PIPE BY OTHERS
	PROPOSED RIBBED CURB
	PROPOSED HYDROMULCH

KEYED LEGEND	
	PROPOSED CONCRETE PAD..... 1 S-00-501
	PROPOSED ASPHALT PAVEMENT..... 2 C-00-501
	PROPOSED CANOPY..... 1 A-00-101
	PROPOSED VEGETATIVE FILTER STRIP..... 1 C-06-108
	PROPOSED LANDSCAPING ROCK..... 1 C-00-503

- NOTES**
- EXISTING PAVEMENT REMOVED SHALL BE SAWCUT TO STRAIGHT LINES. CONTRACTOR SHALL PROVIDE VEHICULAR ACCESS TO EXISTING EQUIPMENT DURING ALL CONSTRUCTION DURATION.
 - ANY DAMAGE/DISTURBANCE OUTSIDE OF PROJECT LIMITS TO BE RESTORED TO EXISTING CONDITIONS OR BETTER AT CONTRACTORS EXPENSE UNLESS APPROVED BY SAWS.
 - ANY NATURAL GROUND RESTORATION WITHIN PROJECT LIMITS TO BE RESTORED WITH GRAVEL OTHERWISE HYDROMULCH NO SEPARATE LINE ITEM.
 - SEE SHEET C-06-103 FOR HORIZONTAL CONTROL CALLOUTS.
 - SEE SHEET C-06-104 FOR GRADING PLAN.
 - SEE SHEET C-06-109 FOR TREE REMOVAL.
 - REFERENCE ELECTRICAL OVERALL SITE PLAN SHEET E-06-101.
 - CONTRACTOR SHALL COORDINATE WITH CPS ENERGY FOR THE INSTALLATION OF GAS METERING STATION PAD.
 - THE LOCATION OF THE GAS PIPE SHOWN IS PRELIMINARY AND THE CONTRACTOR SHALL COORDINATE WITH CPS ENERGY FOR FINAL LOCATION.

- EXISTING UTILITIES**
- EXISTING UTILITIES SHOWN ON THESE DRAWINGS ARE BASED ON INFORMATION OBTAINED FROM AS-BUILT RECORD DRAWINGS AS PROVIDED BY OTHERS. THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION HAS NOT BEEN VERIFIED. CONTRACTOR IS RESPONSIBLE FOR OBTAINING THE LOCATIONS AND DEPTHS OF EACH UTILITY THAT IS WITHIN THE PROJECT WORKING LIMITS PRIOR TO PERFORMING ANY WORK.

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SAN ANTONIO, TEXAS
 9601 McAllister Freeway #507, San Antonio, TX 78216 (210) 314-3553
 Texas Board of Professional Engineers Registration No. F-000554

Professional Engineer Seal for Marcos Medina, License No. 93830, State of Texas. The seal is circular with the text 'STATE OF TEXAS', 'MARCOS MEDINA', '93830', and 'LICENSED PROFESSIONAL ENGINEER'.

9/28/2023

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. NO. 93830 ON SEPTEMBER 26, 2023 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT

San Antonio Water System

EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE	
DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

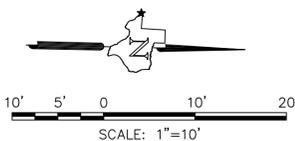
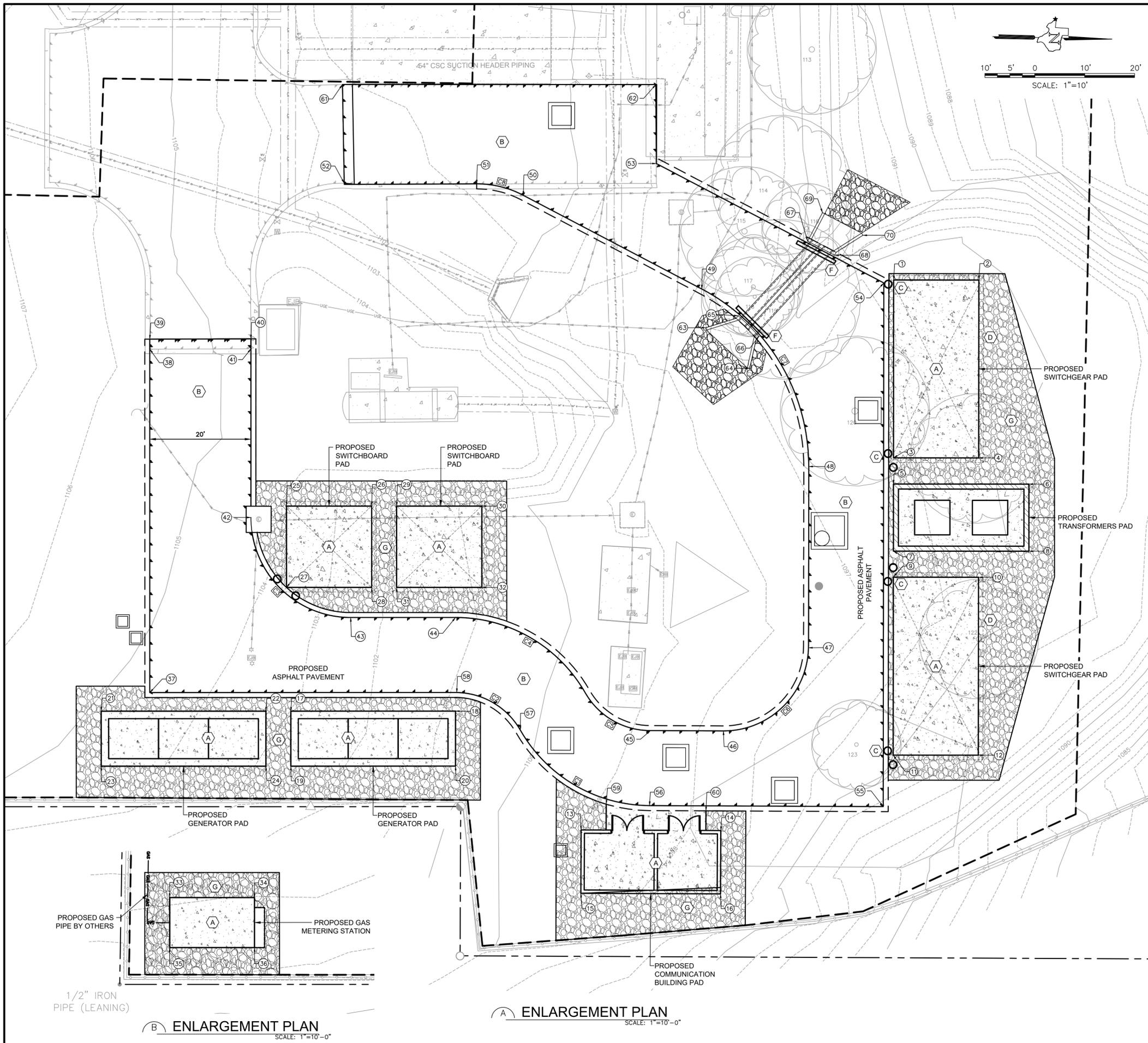
SITE - 06

CIVIL

OVERALL PROPOSED SITE PLAN HORIZONTAL CONTROL AND PAVING PLAN

C-06-102 OF

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



LEGEND	
	PROJECT LIMITS
	PROPERTY LINE
	EXISTING UTILITY EASEMENT
	EXISTING STORM DRAIN LINE
	EXISTING WATER LINE
	EXISTING UNDERGROUND ELECTRIC LINE
	PROPOSED RIBBED CURB
	PROPOSED HYDROMULCH

KEYED LEGEND	
	PROPOSED CONTROL POINT
	CURVE DATA
	PROPOSED CONCRETE PAD..... 1 S-00-501
	PROPOSED ASPHALT PAVEMENT..... 3 C-00-501
	PROPOSED BOLLARD..... 4 C-00-503
	PROPOSED CANOPY..... 1 A-00-101
	PROPOSED VEGETATIVE FILTER STRIP..... C-06-108
	PROPOSED GUARD RAIL..... C-04-105
	PROPOSED LANDSCAPING ROCK..... 1 C-00-503

- NOTES**
- EXISTING PAVEMENT REMOVED SHALL BE SAWCUT TO STRAIGHT LINES. CONTRACTOR SHALL PROVIDE VEHICULAR ACCESS TO EXISTING EQUIPMENT DURING ALL CONSTRUCTION DURATION.
 - ANY DAMAGE/DISTURBANCE OUTSIDE OF PROJECT LIMITS TO BE RESTORED TO EXISTING CONDITIONS OR BETTER AT CONTRACTORS EXPENSE UNLESS APPROVED BY SAWS.
 - ANY NATURAL GROUND RESTORATION WITHIN PROJECT LIMITS TO BE RESTORED WITH GRAVEL OTHERWISE HYDROMULCH NO SEPARATE LINE ITEM.
 - SEE SHEET C-06-103 FOR HORIZONTAL CONTROL CALLOUTS.
 - SEE SHEET C-06-104 FOR GRADING PLAN.
 - SEE SHEET C-06-109 FOR TREE REMOVAL.
 - REFERENCE ELECTRICAL OVERALL SITE PLAN SHEET E-06-101.
 - SEE SHEET C-06-105 FOR POINT AND CURVE TABLES.

- EXISTING UTILITIES**
- EXISTING UTILITIES SHOWN ON THESE DRAWINGS ARE BASED ON INFORMATION OBTAINED FROM AS-BUILT RECORD DRAWINGS AS PROVIDED BY OTHERS. THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION HAS NOT BEEN VERIFIED. CONTRACTOR IS RESPONSIBLE FOR OBTAINING THE LOCATIONS AND DEPTHS OF EACH UTILITY THAT IS WITHIN THE PROJECT WORKING LIMITS PRIOR TO PERFORMING ANY WORK.

BLACK & VEATCH
 Black & Veatch Corporation
 San Antonio, Texas
 Texas Registration No. F-258

SUBCONSULTANT:
 PLANNING+ENGINEERING+PROJECT MANAGEMENT
MCI Moreno Cardenas Inc.
 SAN ANTONIO, TEXAS
 9601 McAllister Freeway #907, San Antonio, TX 78216 (210) 314-3553
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STATE OF TEXAS
 MARCOS MEDINA
 93830
 LICENSED PROFESSIONAL ENGINEER
 9/28/2023
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San Antonio Water System

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 SAWS JOB NO. 22-6020
NATURAL GAS GENERATOR INSTALLATION CONTRACT

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SITE - 06
 CIVIL

ENLARGED PROPOSED SITE PLAN HORIZONTAL CONTROL AND PAVING PLAN

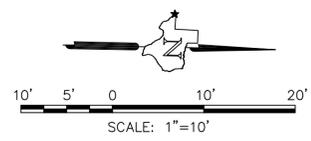
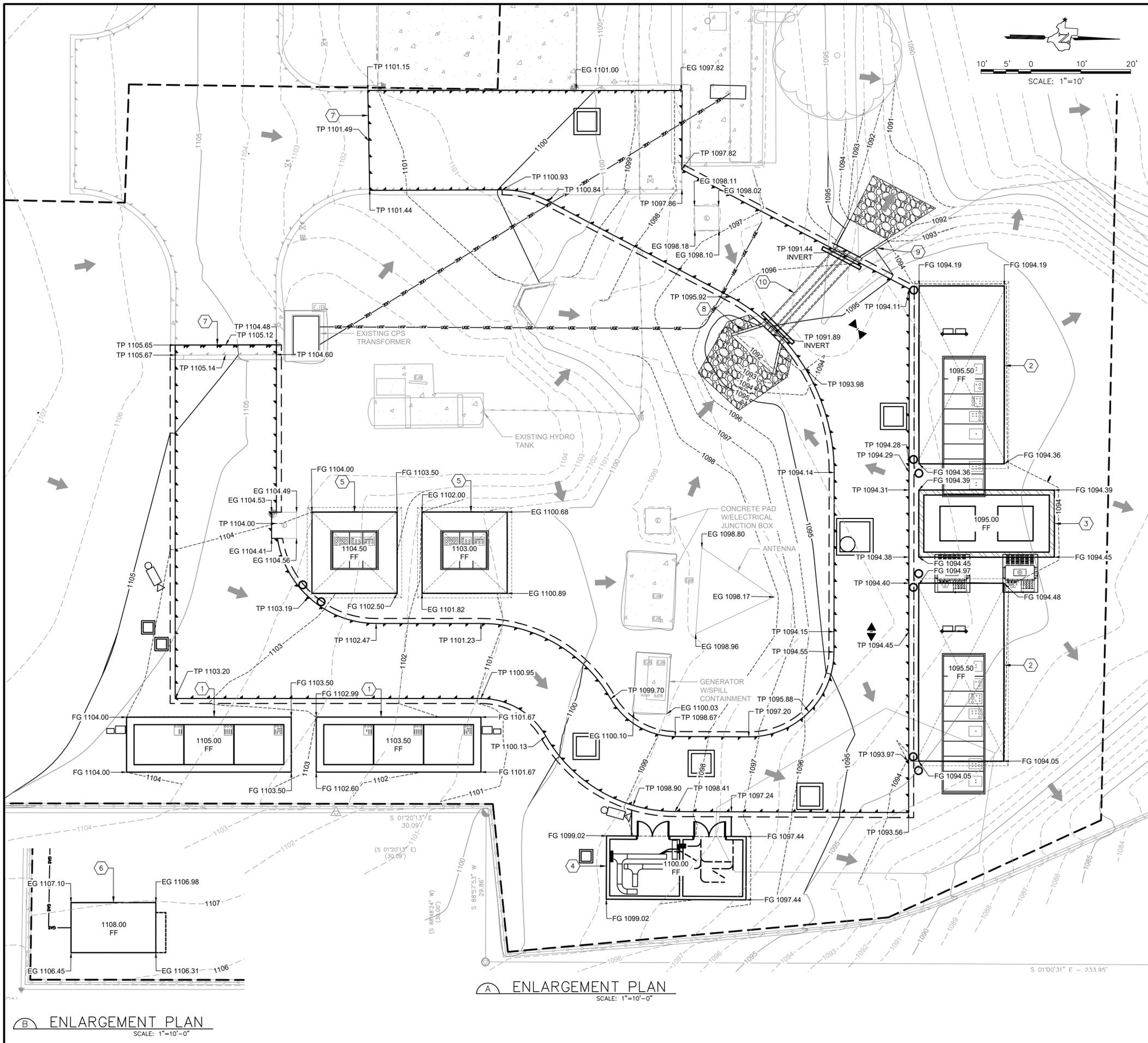
C-06-103 OF

(B) ENLARGEMENT PLAN
 SCALE: 1"=10'-0"

(A) ENLARGEMENT PLAN
 SCALE: 1"=10'-0"

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(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



FLOOD ZONE "X"
 AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

FIRM - FLOOD INSURANCE RATE MAP CITY OF SAN ANTONIO, BEXAR COUNTY TX.

PANEL 230 OF 785 COMMUNITY - PANEL NUMBER 48029C 230 G
 MAP REVISED: SEPTEMBER 29, 2010

LEGEND

	PROPOSED PROJECT LIMITS LINE
	DA - X DRAINAGE AREA IDENTIFICATION
	985 PROPOSED MAJOR CONTOUR AND ELEVATION
	984 PROPOSED MINOR CONTOUR
	985 EXISTING MAJOR CONTOUR AND ELEVATION
	984 EXISTING MINOR CONTOUR
	EXISTING STORM DRAIN LINE
	EXISTING WATER LINE
	EXISTING UNDERGROUND ELECTRIC LINE
	EXISTING FENCE LINE
	EXISTING ASPHALT PAVEMENT
	PROPOSED ASPHALT PAVEMENT
	PROPOSED RIBBON CURB
	PROPOSED SWALE
	EXISTING CONCRETE PAVEMENT
	SPOT ELEVATION
	TOP OF PAVEMENT
	EXISTING GROUND
	FINISH FLOOR
	FINISH GROUND
	FLOW DIRECTION

- SHEET KEYNOTE
- PROPOSED GENERATOR CONCRETE PAD. SEE SHEET S-00-103.
 - PROPOSED SWITCHGEAR CONCRETE PAD. SEE SHEET S-00-105.
 - PROPOSED TRANSFORMER CONCRETE PAD. SEE SHEET S-00-101.
 - PROPOSED COMMUNICATION BUILDING CONCRETE PAD. SEE SHEET S-00-102.
 - PROPOSED SWITCHBOARD CONCRETE PAD. SEE SHEET STRUCTURAL FOUNDATION DETAILS.
 - PROPOSED CPS METERING STATION CONCRETE PAD AND BOLLARD DETAILS. SEE SHEET C-00-504.
 - CONNECT EXISTING ASPHALT PAVEMENT TO PROPOSED ASPHALT PAVEMENT PER DETAIL C-00-501.
 - PROPOSED CONCRETE HEADWALL WITH WINGWALLS PER DETAIL C-00-508.
 - PROPOSED CONCRETE HEADWALL WITH WINGWALLS PER DETAIL C-00-509.
 - PROPOSED DRAINAGE PIPE PROFILE SEE SHEET C-06-106.

BLACK & VEATCH

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SUBCONSULTANT:
 PLANNING/ENGINEERING/PROJECT MANAGEMENT

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EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS AND RECORD OF ISSUE

DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

SITE - 06

CIVIL

PROPOSED SITE GRADING PLAN

C-06-104 OF

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B ENLARGEMENT PLAN
 SCALE: 1"=10'-0"

A ENLARGEMENT PLAN
 SCALE: 1"=10'-0"

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



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SAWS JOB NO. 22-6020

NATURAL GAS GENERATOR INSTALLATION CONTRACT

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DESIGNED:	E. GUTIERREZ / E. COBOS
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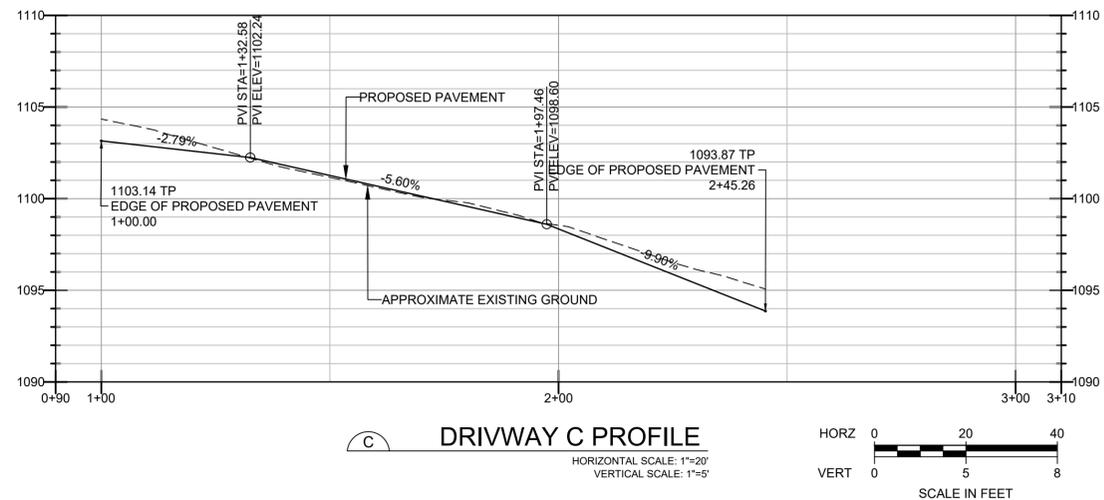
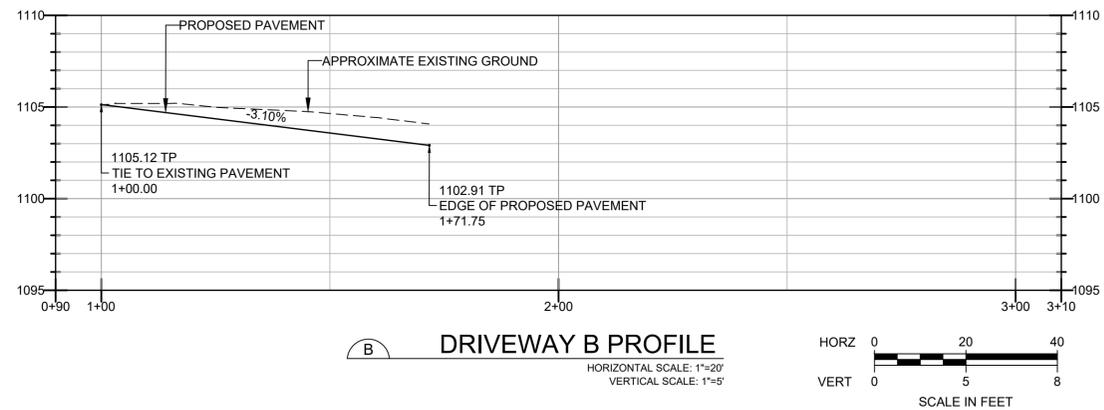
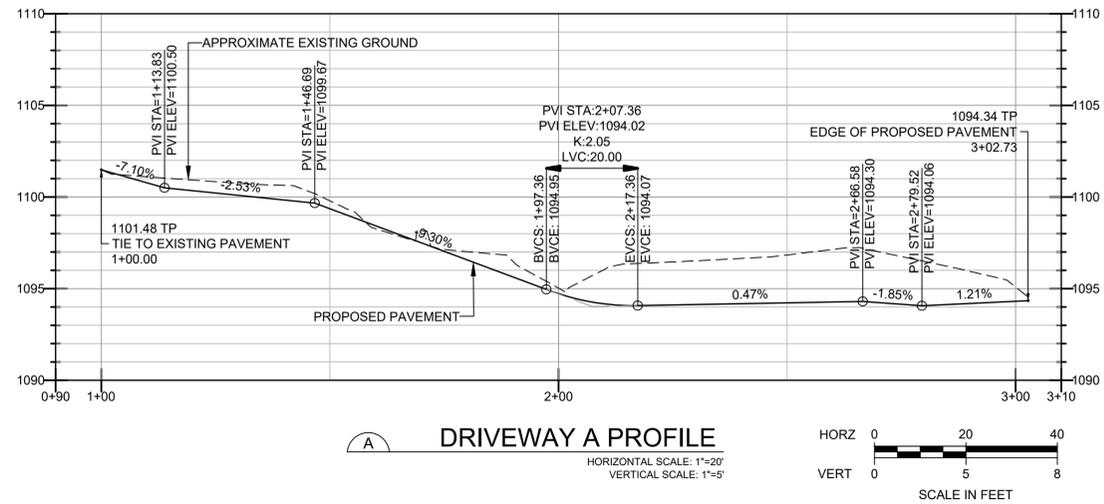
SITE - 06

CIVIL

DRIVEWAY PROFILES, POINT AND CURVE TABLES

C-06-105

OF



CURVE	RADIUS	LENGTH	TANGENT	CHORD	DELTA	(X, Y) COORDINATE	(X, Y) COORDINATE
C1	30.00'	31.37'	17.29'	29.96'	59°54'15"	2094934.23, 13766275.67	2094919.73, 13766249.45
C2	15.00'	15.75'	8.69'	15.04'	60°10'12"	2094919.73, 13766249.45	2094912.48, 13766236.28
C3	20.00'	31.42'	20.00'	28.29'	90°00'38"	2094878.40, 13766194.50	2094897.95, 13766214.94
C4	30.00'	31.51'	17.38'	30.08'	60°10'12"	2094897.49, 13766235.94	2094911.98, 13766262.30
C5	15.00'	15.81'	8.73'	15.09'	60°23'55"	2094911.98, 13766262.30	2094919.23, 13766275.54
C6	17.00'	26.40'	16.70'	23.83'	88°59'29"	2094918.97, 13766290.14	2094901.97, 13766306.84
C7	40.00'	43.59'	24.24'	41.46'	62°26'01"	2094865.73, 13766306.09	2094830.73, 13766283.87
C8	20.00'	9.72'	4.96'	9.62'	27°49'54"	2094812.78, 13766247.67	2094810.71, 13766238.28

POINT NO.	DESCRIPTION	NORTHING	EASTING
1	PROPOSED SWITCHGEAR PAD	13766322.29	2094828.07
2	PROPOSED SWITCHGEAR PAD	13766339.37	2094827.71
3	PROPOSED SWITCHGEAR PAD	13766323.04	2094863.64
4	PROPOSED SWITCHGEAR PAD	13766340.12	2094863.28
5	PROPOSED TRANSFORMER PAD	13766323.13	2094868.87
6	PROPOSED TRANSFORMER PAD	13766350.29	2094868.28
7	PROPOSED TRANSFORMER PAD	13766323.42	2094882.28
8	PROPOSED TRANSFORMER PAD	13766350.58	2094881.69
9	PROPOSED SWITCHGEAR PAD	13766323.53	2094887.49
10	PROPOSED SWITCHGEAR PAD	13766340.61	2094887.13
11	PROPOSED SWITCHGEAR PAD	13766324.27	2094923.06
12	PROPOSED SWITCHGEAR PAD	13766341.35	2094922.70
13	PROPOSED COMMUNICATION BUILDING PAD	13766262.07	2094939.39
14	PROPOSED COMMUNICATION BUILDING PAD	13766290.06	2094938.90
15	PROPOSED COMMUNICATION BUILDING PAD	13766262.29	2094952.06
16	PROPOSED COMMUNICATION BUILDING PAD	13766290.29	2094951.57
17	PROPOSED GENERATOR PAD	13766203.35	2094916.93
18	PROPOSED GENERATOR PAD	13766236.36	2094916.20
19	PROPOSED GENERATOR PAD	13766203.59	2094927.93
20	PROPOSED GENERATOR PAD	13766236.61	2094927.20

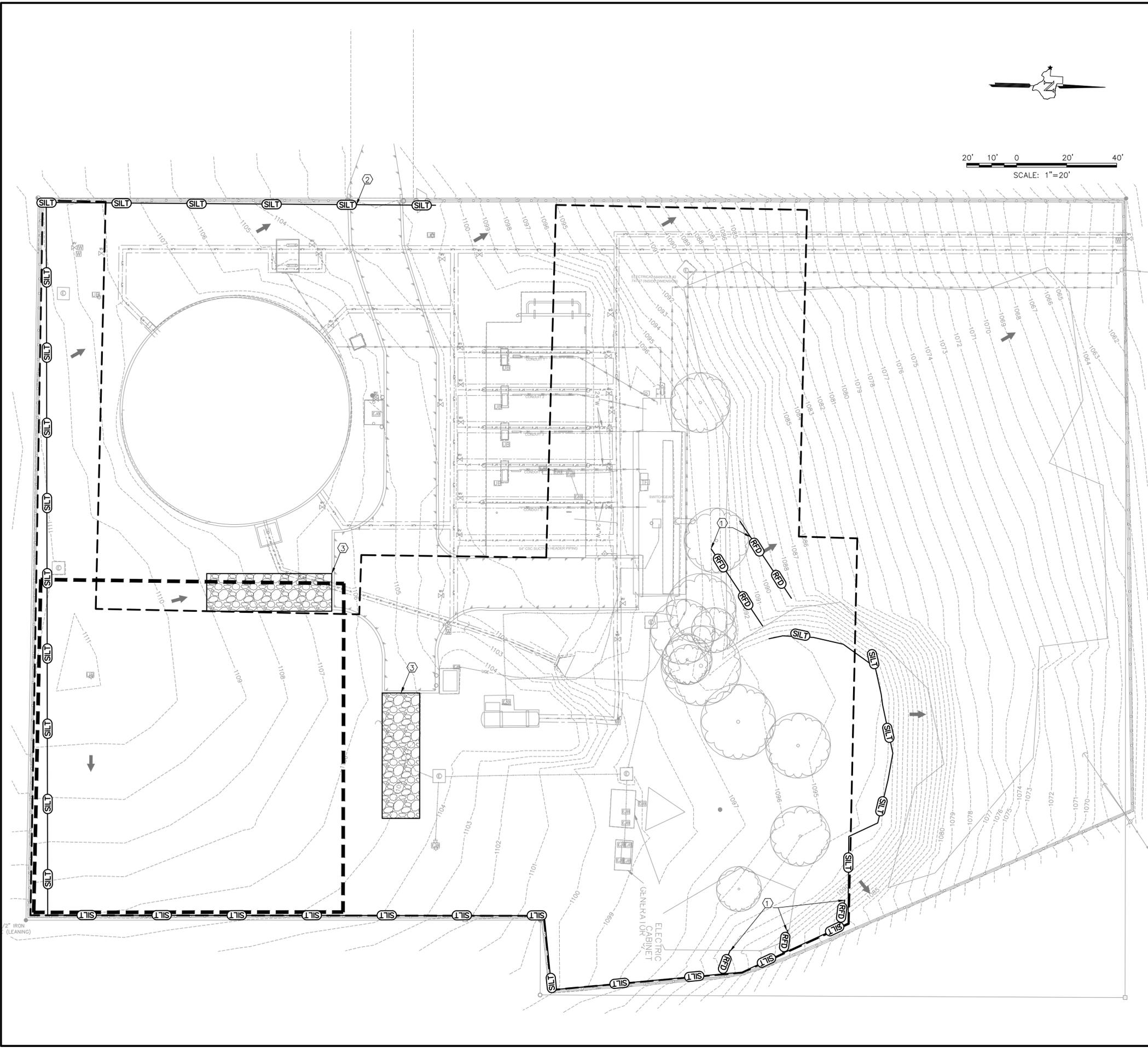
POINT NO.	DESCRIPTION	NORTHING	EASTING
21	PROPOSED GENERATOR PAD	13766165.34	2094917.78
22	PROPOSED GENERATOR PAD	13766198.35	2094917.04
23	PROPOSED GENERATOR PAD	13766165.58	2094928.78
24	PROPOSED GENERATOR PAD	13766198.59	2094928.04
25	PROPOSED SWITCHBOARD PAD	13766201.58	2094875.97
26	PROPOSED SWITCHBOARD PAD	13766218.65	2094875.59
27	PROPOSED SWITCHBOARD PAD	13766201.94	2094892.22
28	PROPOSED SWITCHBOARD PAD	13766219.02	2094891.84
29	PROPOSED SWITCHBOARD PAD	13766223.65	2094875.48
30	PROPOSED SWITCHBOARD PAD	13766240.73	2094875.10
31	PROPOSED SWITCHBOARD PAD	13766224.01	2094891.72
32	PROPOSED SWITCHBOARD PAD	13766241.09	2094891.34
33	PROPOSED GAS METERING STATION PAD	13766041.79	2094922.25
34	PROPOSED GAS METERING STATION PAD	13766058.78	2094921.88
35	PROPOSED GAS METERING STATION PAD	13766042.01	2094932.25
36	PROPOSED GAS METERING STATION PAD	13766059.00	2094931.87

POINT NO.	DESCRIPTION	NORTHING	EASTING
37	EDGE OF PAVEMENT	13766175.00	2094913.84
38	EDGE OF PAVEMENT	13766173.49	2094845.19
39	EDGE OF PAVEMENT	13766173.44	2094843.19
40	EDGE OF PAVEMENT	13766193.71	2094842.69
41	EDGE OF PAVEMENT	13766193.76	2094844.69
42	PC OF 20' RADIUS	13766194.50	2094878.40
43	PT OF 20' RADIUS	13766214.94	2094897.95
44	PC OF 30' RADIUS	13766235.94	2094897.49
45	PT OF 15' RADIUS	13766275.54	2094919.23
46	PC OF 17' RADIUS	13766290.14	2094918.97
47	PT OF 17' RADIUS	13766306.84	2094901.97
48	PC OF 40' RADIUS	13766306.09	2094865.73
49	PT OF 40' RADIUS	13766283.87	2094830.73
50	PC OF 20' RADIUS	13766247.67	2094812.78
51	PT OF 20' RADIUS	13766238.28	2094810.71
52	EDGE OF PAVEMENT	13766211.73	2094811.18
53	EDGE OF PAVEMENT	13766274.20	2094805.85
54	EDGE OF PAVEMENT	13766320.32	2094828.71
55	EDGE OF PAVEMENT	13766322.50	2094933.40
56	PT OF 30' RADIUS	13766275.67	2094934.23

POINT NO.	DESCRIPTION	NORTHING	EASTING
57	PC OF 15' RADIUS	13766249.45	2094919.73
58	PT OF 15' RADIUS	13766236.52	2094912.48
59	PAVEMENT CONNECTION POINT	13766266.98	2094934.14
60	PAVEMENT CONNECTION POINT	13766287.00	2094935.03
61	EDGE OF PAVEMENT	13766210.94	2094791.43
62	EDGE OF PAVEMENT	13766273.74	2094790.06

POINT NO.	DESCRIPTION	NORTHING	EASTING
63	PROPOSED CONCRETE WINGWALL	13766284.83	2094838.46
64	PROPOSED CONCRETE WINGWALL	13766293.82	2094846.38
65	PROPOSED CONCRETE HEADWALL	13766291.28	2094835.91
66	PROPOSED CONCRETE HEADWALL	13766295.52	2094839.95
67	PROPOSED CONCRETE HEADWALL	13766304.87	2094820.68
68	PROPOSED CONCRETE HEADWALL	13766310.33	2094823.39
69	PROPOSED CONCRETE WINGWALL	13766307.72	2094814.93
70	PROPOSED CONCRETE WINGWALL	13766315.92	2094819.27

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LEGEND	
	PROPERTY LINE
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	FLOW DIRECTION
	STAGING AREA
	PROJECT AREA

KEYED LEGEND	
①	TEMPORARY ROCK FENCE DAM..... C-00-507
②	TEMPORARY SEDIMENT CONTROL FENCE..... C-00-508
③	STABILIZED CONSTRUCTION ENTRANCE/ EXIT..... C-00-509

- NOTES**
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION OF TEMPORARY ACCESS ROADS AND SETUP OF STAGING AREAS.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF ACCESS ROADS FOR THE DURATION OF THE PROJECT. EQUIVALENT TEMPORARY ROADS SHALL BE RECONSTRUCTED WHEN WORK ACTIVITIES REQUIRE REMOVAL.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL MATERIALS ASSOCIATED WITH THE TEMPORARY ACCESS ROADS AND RESTORING DISTURBED AREAS TO THEIR NATURAL CONDITION AT THE END OF THE PROJECT.
 - TREES SHOWN ARE FOR REFERENCE ONLY. CONTRACTOR TO REFERENCE THE APPROVED TREE PROTECTION PLAN FOR THE SITE AND COMPLY WITH ALL PROTECTION REQUIREMENTS SHOWN THEREON. ALL TREES WITHIN OFF-SITE STAGING AREAS SHALL REMAIN AND BE PROTECTED DURING CONSTRUCTION.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY INSTALLATION AND COORDINATION OF UTILITIES TO THEIR STAGING/ LAYDOWN AREAS.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR SECURITY OF THEIR OWN EQUIPMENT.
 - CONTRACTOR TO COMPLETE PRE-CONSTRUCTION SURVEY OF STAGING AREAS AND SHALL BE RESPONSIBLE FOR REMOVING ALL TEMPORARY FACILITIES AND RETURNING STAGING AREAS TO PRE-CONSTRUCTION CONDITIONS.
 - CONTRACTOR SHALL REFERENCE THE APPROVED TCEQ WATER POLLUTION ABATEMENT PLAN FOR THE SITE AND COMPLY WITH ALL REQUIREMENTS SHOWN THEREON.
 - LOCATION OF CONCRETE WASHOUT PITS AND CONSTRUCTION EQUIPMENT AND MATERIAL STORAGE YARDS TO BE DETERMINED IN THE FIELD.
 - SW3P SIGN SHALL BE LOCATED WITHIN PROJECT SITE.
 - CONTRACTOR TO POST T.C.E.Q. CONSTRUCTION SITE NOTICE ON THE JOB SITE.
 - SEDIMENT CONTROL FENCE TO BE LOCATED DOWNSTREAM ROW LINE OR AT PROPOSED GRADING LIMITS OR AS PER DIRECTION OF THE ENGINEER.
 - LOCATION OF CONSTRUCTION EXITS ARE PRELIMINARY AND ARE TO BE LOCATED AS PER DIRECTION OF THE ENGINEER.
 - ALL DISTURBED AREAS THAT ARE NOT SHOWN ON THIS SITE PLAN SHALL BE RESTORED TO PAST CONDITION USING BROADCAST SEEDING.
 - MUD OR DIRT INADVERTENTLY TRACKED OFF-SITE AND ONTO EXISTING STREETS SHALL BE REMOVED IMMEDIATELY BY HAND OR MECHANICAL BROOM SWEEPING.
 - UPON COMPLETION OF THE PROJECT AND BEFORE FINAL PAYMENT IS ISSUED, CONTRACTOR SHALL REMOVE ALL SEDIMENT AND EROSION CONTROL MEASURES.
 - CONTRACTOR SHALL ENSURE THE SITE IS ACCESSIBLE TO OWNER FOR NORMAL STANDARD OPERATION, INGRESS AND EGRESS OF THE SITE.
 - IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTROL DOWNSTREAM EROSION AND SILTATION DURING ALL PHASES OF CONSTRUCTION. EROSION CONTROL SHALL CONFORM TO THE CITY OF SAN ANTONIO STANDARDS FOR TEMPORARY EROSION AND SEDIMENT CONTROL. EROSION CONTROL SHALL BE IN PLACE PRIOR TO ANY EXCAVATION

REVISIONS AND RECORD OF ISSUE	
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DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
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DATE:	9/26/2023
PROJECT NO.:	412782

SITE - 06

CIVIL

CONTRACTOR STAGING,
EROSION AND
SEDIMENT CONTROL
PLAN

C-06-107 OF

BLACK & VEATCH

Black & Veatch Corporation
San Antonio, Texas

Texas Registration No. F-258

SUBCONSULTANT:

MCI Moreno
Cardenas Inc.

SAN ANTONIO, TEXAS

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MARCO S MEDINA
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SAWS JOB NO. 22-6020

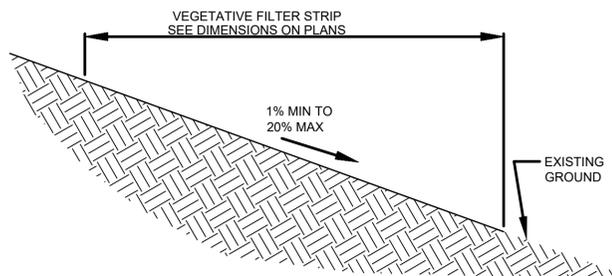
NATURAL GAS GENERATOR INSTALLATION CONTRACT

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4

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

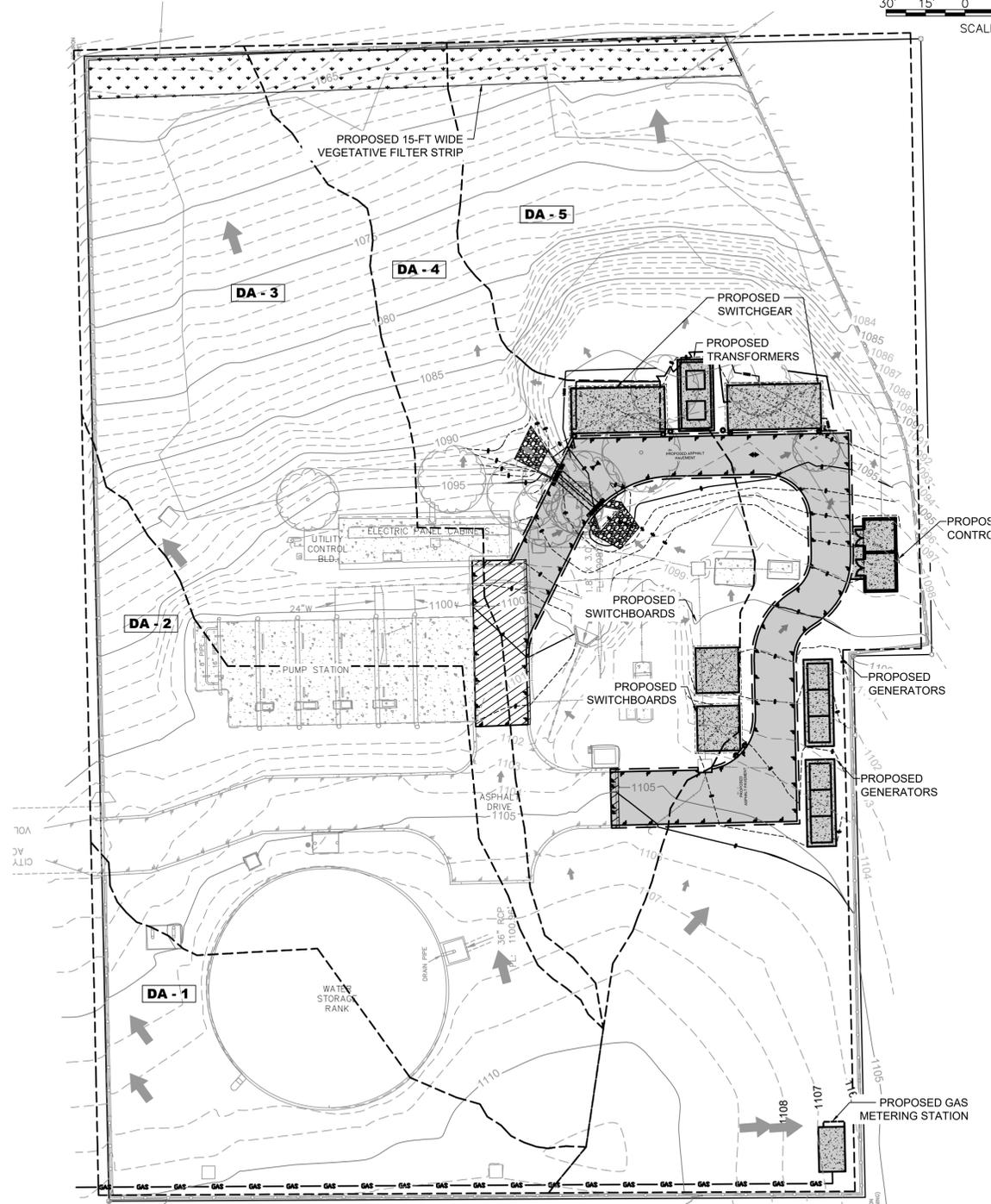
- A WRITTEN NOTICE OF CONSTRUCTION MUST BE SUBMITTED TO THE TCEQ REGIONAL OFFICE AT LEAST 48 HOURS PRIOR TO THE START OF ANY REGULATED ACTIVITIES. THIS NOTICE MUST INCLUDE:
 - THE NAME OF THE APPROVED PROJECT;
 - THE ACTIVITY START DATE; AND
 - THE CONTACT INFORMATION OF THE PRIME CONTRACTOR.
- ALL CONTRACTORS 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 EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:
 - A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;
 - B. ANY CHANGE IN THE NATURE OR CHARACTER OF THE REGULATED ACTIVITY FROM THAT WHICH WAS ORIGINALLY APPROVED OR A CHANGE WHICH WOULD SIGNIFICANTLY IMPACT THE ABILITY OF THE PLAN TO PREVENT POLLUTION OF THE EDWARDS AQUIFER;
 - C. ANY DEVELOPMENT OF LAND PREVIOUSLY IDENTIFIED AS UNDEVELOPED IN THE ORIGINAL WATER POLLUTION ABATEMENT PLAN.

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



ENGINEERED VEGETATIVE FILTER STRIP DETAIL

1
C-06-108
1" = 5'



	DA-1	DA-2	DA-3	DA-4	DA-5	TOTAL
DRAINAGE AREA (AC)	0.29	0.53	0.62	0.57	1.04	3.05
PRE-DEVELOPMENT IC (AC)	0.08	0.21	0.10	0.06	0.00	0.46
POST-DEVELOPMENT IC (AC)	0.08	0.21	0.10	0.14	0.14	0.67
IC INCREASE (AC)	0.00	0.00	0.00	0.08	0.13	0.22

30' 15' 0 30' 60'
SCALE: 1"=30'

LEGEND

- DA - X DRAINAGE AREA IDENTIFICATION
- DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- ▨ PROPOSED VEGETATIVE FILTER STRIP
- PROPOSED IMPERVIOUS COVER

NOTES

VEGETATIVE FILTER STRIP NOTES:

- CONTRACTOR TO GRADE VEGETATIVE FILTER STRIP (VFS) TO BE FREE OF GULLIES OR RILLS AND SEE.
- USE 4" TOP SOIL AND SOD TO ACHIEVE 80% VEGETATIVE COVER.
- PRODUCE UNIFORM, SHALLOW OVERLAND FLOW ACROSS THE ENTIRE STRIP.
- THE FILTER STRIP SHOULD NOT EXCEED 20%.
- THE MINIMUM DIMENSION OF THE FILTER STRIP (IN THE DIRECTION OF THE FLOW) SHOULD BE NO LESS THAN 15 FEET.
- THE MINIMUM VEGETATED COVER FOR ENGINEERED STRIPS IS 80%.
- THE AREA TO BE USED FOR THE STRIP SHOULD BE FREE OF GULLIES OR RILLS THAT CAN CONCENTRATE OVERLAND FLOW.
- THE TOP EDGE OF THE FILTER STRIP ALONG THE PAVEMENT WILL BE DESIGNED TO AVOID THE SITUATION WHERE RUNOFF WOULD TRAVEL ALONG THE TOP OF THE FILTER STRIP, RATHER THAN THROUGH IT.
- LEADING EDGE OF THE FILTER STRIP ALONG PLACED TO AVOID THE SITUATION WHERE RUNOFF WOULD TRAVEL ALONG THE TOP OF THE FILTER STRIP, RATHER THAN THROUGH IT.
- TOP EDGE OF THE FILTER STRIP SHOULD BE LEVEL.
- FILTER STRIPS SHOULD BE LANDSCAPED AFTER OTHER PORTIONS OF THE PROJECT ARE COMPLETED. VEGETATION MAINTAINED WITH WATERING BY CONTRACTOR UNTIL ESTABLISHED.



Black & Veatch Corporation
San Antonio, Texas

Texas Registration No. F-258

SUBCONSULTANT:

PLANNING-ENGINEERING-PROJECT MANAGEMENT

MCi Moreno
Cardenas Inc.

SAN ANTONIO EL PASO
9601 McAllister Freeway #907, San Antonio TX 78216 (210) 314-3333
Texas Board of Professional Engineers Registration No. F-00054



THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. NO. 93830 ON SEPTEMBER 28, 2023. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT



EMERGENCY
PREPAREDNESS PLAN
IMPLEMENTATION

SAWS JOB NO. 22-6020

NATURAL GAS
GENERATOR
INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE

DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/28/2023
PROJECT NO.:	412782

SITE - 06

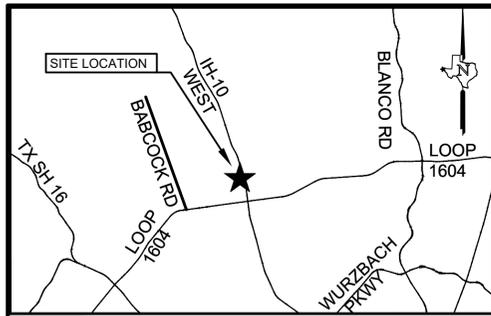
CIVIL

WATER POLLUTION
ABATEMENT PLAN

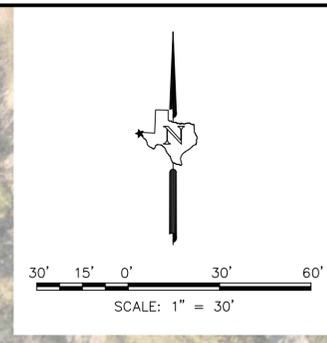
C-06-108

OF

(SCALE BAR IS 4" AT FULL SCALE) 0 1/2 1 2 3 4



SITE 10 LOCATION MAP
SCALE: 1" = 15000'



LEGEND

	PROPERTY LINE
	EXISTING CANOPY
	CANOPY TO BE REMOVED

NOTES

Tree Preservation Calculations

Total Canopy Within Floodplain (sq ft)	0			
Canopy to Remain	0			
Canopy to Remove	0			
Percentage of Canopy Preserved Within Floodplain	100%			
Total Canopy Within Buffer (sq ft)	852			
Canopy to Remain	822			
Canopy to Remove	30			
Percentage of Canopy Preserved Within Buffer	96%			
Total Canopy Outside Floodplain/Buffer (sq ft)	37,739			
Canopy to Remain	32,833			
Canopy to Remove	4,906			
Percentage of Canopy Preserved Outside Floodplain	87%			
Heritage Trees (inches)				
	Floodplain	Buffer	Upland	Total
Remain	0	0	0	0
Remove	0	0	0	0
Preserved	N/A	N/A	N/A	N/A
Total Canopy sq ft/Inches Required to Be Preserved				
Canopy Within Floodplain (80% of Total Canopy)		0		
Canopy Outside Floodplain (25% Required)		9,435		
Heritage (100% of Total)		0		
Total Inches to Mitigate				
Significant (1:1)		0		
Heritage (3:1)		0		
Heritage (1:1)		0		
TOTAL MITIGATION REQUIREMENT		0		

BLACK & VEATCH
Black & Veatch Corporation
San Antonio, Texas
Texas Registration No. F-258

SUBCONSULTANT:
PLANNING-ENGINEERING-PROJECT MANAGEMENT
MCI Moreno
Cardenas Inc.
SAN ANTONIO, TEXAS
9601 McAllister Freeway #507, San Antonio, TX 78216 (210) 314-3353
Texas Board of Professional Engineers Registration No. F-000554

9/26/2023
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. NO. 93830 ON SEPTEMBER 26, 2023. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

San Antonio Water System

EMERGENCY PREPAREDNESS PLAN IMPLEMENTATION
SAWS JOB NO. 22-6020
NATURAL GAS GENERATOR INSTALLATION CONTRACT

REVISIONS AND RECORD OF ISSUE

DESIGNED:	E. GUTIERREZ / E. COBOS
DETAILED:	M. LIZA
CHECKED:	D. ALCORTA
APPROVED:	M. MEDINA
DATE:	9/26/2023
PROJECT NO.:	412782

SITE - 06
CIVIL

TREE PRESERVATION PLAN

C-06-109 OF

PLOTTED: Sep 26, 2023 07:50:07 AM
FILE: F:\21115\DWG\C-06\H10PS\06 H10PS_TPP.dwg



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

Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.

Characters shown in red are data entry fields.

Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project:

Calculations from RG-348

Pages 3-27 to 3-30

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

where:

$L_{M \text{ TOTAL PROJECT}}$ = Required TSS removal resulting from the proposed development = 80% of increased load

A_N = Net increase in impervious area for the project

P = Average annual precipitation, inches

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

County =	Bexar	
Total project area included in plan *	3.05	acres
Predevelopment impervious area within the limits of the plan *	0.46	acres
Total post-development impervious area within the limits of the plan *	0.67	acres
Total post-development impervious cover fraction *	0.22	
P =	30	inches

$L_{M \text{ TOTAL PROJECT}}$ = **177** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **5**



9/27/2023

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

Drainage Basin/Outfall Area No. = **1**

Total drainage basin/outfall area =	0.29	acres
Predevelopment impervious area within drainage basin/outfall area =	0.08	acres
Post-development impervious area within drainage basin/outfall area =	0.08	acres
Post-development impervious fraction within drainage basin/outfall area =	0.27	
$L_{M \text{ THIS BASIN}}$ =	0	lbs.

3. Indicate the proposed BMP Code for this basin.

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

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

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

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

where:

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

A_I = Impervious area proposed in the BMP catchment area

A_P = Pervious area remaining in the BMP catchment area

L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **0.28** acres

A_I = **0.08** acres

A_P = **0.20** acres

L_R = **71** lbs

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

Desired $L_{M \text{ THIS BASIN}}$ = **0** lbs.

F = **0.00**

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

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = #N/A inches
Post Development Runoff Coefficient = 0.25
On-site Water Quality Volume = #N/A cubic feet

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

Off-site area draining to BMP = 0.00 acres
Off-site Impervious cover draining to BMP = 0.00 acres
Impervious fraction of off-site area = 0
Off-site Runoff Coefficient = 0.00
Off-site Water Quality Volume = #N/A cubic feet

Storage for Sediment = #N/A

Total Capture Volume (required water quality volume(s) x 1.20) = #N/A cubic feet

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

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = NA cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = 0 in/hr Enter determined permeability rate or assumed value of 0.1
Irrigation area = NA square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = NA cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet For minimum water depth of 2 feet

Minimum sedimentation basin area = NA square feet For maximum water depth of 8 feet

9B. Partial Sedimentation and Filtration System

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

10. Bioretention System

Designed as Required in RG-348

Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348

Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348

Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348

Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348

Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 0.00 acres
 Impervious Cover in Drainage Area = 0.00 acres
 Rainfall intensity = i = 1.1 in/hr
 Swale Slope = 0 ft/ft
 Side Slope (z) = 0
 Design Water Depth = y = 0.00 ft
 Weighted Runoff Coefficient = C = #DIV/0!

A_{CS} = cross-sectional area of flow in Swale = #DIV/0! sf
 P_W = Wetted Perimeter = #DIV/0! feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = #DIV/0! feet
 n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = \#DIV/0! \text{ feet}$

$Q = C i A = \#DIV/0! \text{ cfs}$

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = $Q/A_{CS} = \#DIV/0! \text{ ft/sec}$

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = #DIV/0! feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	#DIV/0!	cfs	
Manning's Equation Q =	0.00	cfs	Error 1 = #DIV/0!
Swale Width=	6.00	ft	

Instructions are provided to the right (green comments).

Flow Velocity	#DIV/0!	ft/s
Minimum Length =	#DIV/0!	ft

Instructions are provided to the right (blue comments).

Design Width =	0	ft	
Design Discharge =	0.00	cfs	Error 2 = #DIV/0!
Design Depth =	0.33	ft	
Flow Velocity =	#DIV/0!	cfs	
Minimum Length =	#DIV/0!	ft	

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

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

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

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

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Characters shown in red are data entry fields.

Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project:

Calculations from RG-348

Pages 3-27 to 3-30

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

where:

$L_{M \text{ TOTAL PROJECT}}$ = Required TSS removal resulting from the proposed development = 80% of increased load

A_N = Net increase in impervious area for the project

P = Average annual precipitation, inches

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

County =	Bexar	
Total project area included in plan *	3.05	acres
Predevelopment impervious area within the limits of the plan *	0.46	acres
Total post-development impervious area within the limits of the plan *	0.67	acres
Total post-development impervious cover fraction *	0.22	
P =	30	inches

$L_{M \text{ TOTAL PROJECT}}$ = **177** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **5**



9/27/2023

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

Drainage Basin/Outfall Area No. = **2**

Total drainage basin/outfall area =	0.53	acres
Predevelopment impervious area within drainage basin/outfall area =	0.21	acres
Post-development impervious area within drainage basin/outfall area =	0.21	acres
Post-development impervious fraction within drainage basin/outfall area =	0.41	
$L_{M \text{ THIS BASIN}}$ =	0	lbs.

3. Indicate the proposed BMP Code for this basin.

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

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

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

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

where:

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

A_I = Impervious area proposed in the BMP catchment area

A_P = Pervious area remaining in the BMP catchment area

L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **0.53** acres

A_I = **0.21** acres

A_P = **0.31** acres

L_R = **194** lbs

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

Desired $L_{M \text{ THIS BASIN}}$ = **0** lbs.

F = **0.00**

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

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = #N/A inches
Post Development Runoff Coefficient = 0.31
On-site Water Quality Volume = #N/A cubic feet

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

Off-site area draining to BMP = 0.00 acres
Off-site Impervious cover draining to BMP = 0.00 acres
Impervious fraction of off-site area = 0
Off-site Runoff Coefficient = 0.00
Off-site Water Quality Volume = #N/A cubic feet

Storage for Sediment = #N/A

Total Capture Volume (required water quality volume(s) x 1.20) = #N/A cubic feet

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

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = NA cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = 0 in/hr Enter determined permeability rate or assumed value of 0.1
Irrigation area = NA square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = NA cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet For minimum water depth of 2 feet

Minimum sedimentation basin area = NA square feet For maximum water depth of 8 feet

9B. Partial Sedimentation and Filtration System

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

10. Bioretention System

Designed as Required in RG-348

Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348

Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348

Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348

Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348

Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 0.00 acres
 Impervious Cover in Drainage Area = 0.00 acres
 Rainfall intensity = i = 1.1 in/hr
 Swale Slope = 0 ft/ft
 Side Slope (z) = 0
 Design Water Depth = y = 0.00 ft
 Weighted Runoff Coefficient = C = #DIV/0!

A_{CS} = cross-sectional area of flow in Swale = #DIV/0! sf
 P_W = Wetted Perimeter = #DIV/0! feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = #DIV/0! feet
 n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = \#DIV/0! \text{ feet}$

$Q = C i A = \#DIV/0! \text{ cfs}$

To calculate the flow velocity in the swale:

$V \text{ (Velocity of Flow in the swale)} = Q/A_{CS} = \#DIV/0! \text{ ft/sec}$

To calculate the resulting swale length:

$L = \text{Minimum Swale Length} = V \text{ (ft/sec)} * 300 \text{ (sec)} = \#DIV/0! \text{ feet}$

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	#DIV/0!	cfs	
Manning's Equation Q =	0.00	cfs	Error 1 = #DIV/0!
Swale Width=	6.00	ft	

Instructions are provided to the right (green comments).

Flow Velocity	#DIV/0!	ft/s
Minimum Length =	#DIV/0!	ft

Instructions are provided to the right (blue comments).

Design Width =	0	ft	
Design Discharge =	0.00	cfs	Error 2 = #DIV/0!
Design Depth =	0.33	ft	
Flow Velocity =	#DIV/0!	cfs	
Minimum Length =	#DIV/0!	ft	

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

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

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

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

Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.

Characters shown in red are data entry fields.

Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project:

Calculations from RG-348

Pages 3-27 to 3-30

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

where:

$L_{M \text{ TOTAL PROJECT}}$ = Required TSS removal resulting from the proposed development = 80% of increased load

A_N = Net increase in impervious area for the project

P = Average annual precipitation, inches

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

County =	Bexar	
Total project area included in plan *	3.05	acres
Predevelopment impervious area within the limits of the plan *	0.46	acres
Total post-development impervious area within the limits of the plan *	0.67	acres
Total post-development impervious cover fraction *	0.22	
P =	30	inches

$L_{M \text{ TOTAL PROJECT}}$ = **177** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **5**



9/27/2023

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

Drainage Basin/Outfall Area No. = **3**

Total drainage basin/outfall area =	0.62	acres
Predevelopment impervious area within drainage basin/outfall area =	0.10	acres
Post-development impervious area within drainage basin/outfall area =	0.10	acres
Post-development impervious fraction within drainage basin/outfall area =	0.17	
$L_{M \text{ THIS BASIN}}$ =	0	lbs.

3. Indicate the proposed BMP Code for this basin.

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

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

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

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

where:

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

A_I = Impervious area proposed in the BMP catchment area

A_P = Pervious area remaining in the BMP catchment area

L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **0.61** acres

A_I = **0.10** acres

A_P = **0.51** acres

L_R = **99** lbs

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

Desired $L_{M \text{ THIS BASIN}}$ = **0** lbs.

F = **0.00**

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

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = #N/A inches
Post Development Runoff Coefficient = 0.18
On-site Water Quality Volume = #N/A cubic feet

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

Off-site area draining to BMP = 0.00 acres
Off-site Impervious cover draining to BMP = 0.00 acres
Impervious fraction of off-site area = 0
Off-site Runoff Coefficient = 0.00
Off-site Water Quality Volume = #N/A cubic feet

Storage for Sediment = #N/A

Total Capture Volume (required water quality volume(s) x 1.20) = #N/A cubic feet

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

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = NA cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = 0 in/hr Enter determined permeability rate or assumed value of 0.1
Irrigation area = NA square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = NA cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet For minimum water depth of 2 feet

Minimum sedimentation basin area = NA square feet For maximum water depth of 8 feet

9B. Partial Sedimentation and Filtration System

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

10. Bioretention System

Designed as Required in RG-348

Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348

Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348

Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348

Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348

Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 0.00 acres
 Impervious Cover in Drainage Area = 0.00 acres
 Rainfall intensity = i = 1.1 in/hr
 Swale Slope = 0 ft/ft
 Side Slope (z) = 0
 Design Water Depth = y = 0.00 ft
 Weighted Runoff Coefficient = C = #DIV/0!

A_{CS} = cross-sectional area of flow in Swale = #DIV/0! sf
 P_W = Wetted Perimeter = #DIV/0! feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = #DIV/0! feet
 n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = \#DIV/0! \text{ feet}$

$Q = C i A = \#DIV/0! \text{ cfs}$

To calculate the flow velocity in the swale:

$V \text{ (Velocity of Flow in the swale)} = Q/A_{CS} = \#DIV/0! \text{ ft/sec}$

To calculate the resulting swale length:

$L = \text{Minimum Swale Length} = V \text{ (ft/sec)} * 300 \text{ (sec)} = \#DIV/0! \text{ feet}$

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	#DIV/0!	cfs	
Manning's Equation Q =	0.00	cfs	Error 1 = #DIV/0!
Swale Width=	6.00	ft	

Instructions are provided to the right (green comments).

Flow Velocity	#DIV/0!	ft/s
Minimum Length =	#DIV/0!	ft

Instructions are provided to the right (blue comments).

Design Width =	0	ft	
Design Discharge =	0.00	cfs	Error 2 = #DIV/0!
Design Depth =	0.33	ft	
Flow Velocity =	#DIV/0!	cfs	
Minimum Length =	#DIV/0!	ft	

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

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

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

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

Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.

Characters shown in red are data entry fields.

Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project:

Calculations from RG-348

Pages 3-27 to 3-30

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

where:

$L_{M \text{ TOTAL PROJECT}}$ = Required TSS removal resulting from the proposed development = 80% of increased load

A_N = Net increase in impervious area for the project

P = Average annual precipitation, inches

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

County =	Bexar	
Total project area included in plan *	3.05	acres
Predevelopment impervious area within the limits of the plan *	0.46	acres
Total post-development impervious area within the limits of the plan *	0.67	acres
Total post-development impervious cover fraction *	0.22	
P =	30	inches

$L_{M \text{ TOTAL PROJECT}}$ = **177** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **5**

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

Drainage Basin/Outfall Area No. = **4**

Total drainage basin/outfall area =	0.57	acres
Predevelopment impervious area within drainage basin/outfall area =	0.06	acres
Post-development impervious area within drainage basin/outfall area =	0.14	acres
Post-development impervious fraction within drainage basin/outfall area =	0.25	
$L_{M \text{ THIS BASIN}}$ =	67	lbs.



9/27/2023

3. Indicate the proposed BMP Code for this basin.

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

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

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

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

where:

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

A_I = Impervious area proposed in the BMP catchment area

A_P = Pervious area remaining in the BMP catchment area

L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **0.57** acres

A_I = **0.14** acres

A_P = **0.43** acres

L_R = **131** lbs

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

Desired $L_{M \text{ THIS BASIN}}$ = **67** lbs.

F = **0.51**

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

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = **0.44** inches
Post Development Runoff Coefficient = **0.23**
On-site Water Quality Volume = **208** cubic feet

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

Off-site area draining to BMP = **0.00** acres
Off-site Impervious cover draining to BMP = **0.00** acres
Impervious fraction of off-site area = **0**
Off-site Runoff Coefficient = **0.00**
Off-site Water Quality Volume = **0** cubic feet

Storage for Sediment = **42**

Total Capture Volume (required water quality volume(s) x 1.20) = 250 cubic feet

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

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = **NA** cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = **0** in/hr **Enter determined permeability rate or assumed value of 0.1**
Irrigation area = **NA** square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = **NA** cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = **NA** cubic feet

Minimum filter basin area = **NA** square feet

Maximum sedimentation basin area = **NA** square feet **For minimum water depth of 2 feet**

Minimum sedimentation basin area = **NA** square feet **For maximum water depth of 8 feet**

9B. Partial Sedimentation and Filtration System

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

10. Bioretention System

Designed as Required in RG-348

Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348

Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348

Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348

Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348

Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = NA acres
 Impervious Cover in Drainage Area = NA acres
 Rainfall intensity = i = 1.1 in/hr
 Swale Slope = NA ft/ft
 Side Slope (z) = NA
 Design Water Depth = y = NA ft
 Weighted Runoff Coefficient = C = #VALUE!

A_{CS} = cross-sectional area of flow in Swale = #VALUE! sf
 P_W = Wetted Perimeter = #VALUE! feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = #VALUE! feet
 n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = \text{\#VALUE! feet}$

$Q = CiA = \text{\#VALUE! cfs}$

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = $Q/A_{CS} = \text{\#VALUE! ft/sec}$

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = #VALUE! feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA = #VALUE! cfs
Manning's Equation Q = #VALUE! cfs
Swale Width= 6.00 ft
Error 1 = #VALUE!

Instructions are provided to the right (green comments).

Flow Velocity #VALUE! ft/s
Minimum Length = #VALUE! ft

Instructions are provided to the right (blue comments).

Design Width = NA ft
Design Discharge = #VALUE! cfs
Design Depth = 0.33 ft
Flow Velocity = #VALUE! cfs
Minimum Length = #VALUE! ft
Error 2 = #VALUE!

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

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

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

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

Text shown in blue indicate location of instructions in the Technical Guidance Manual - RG-348.

Characters shown in red are data entry fields.

Characters shown in black (Bold) are calculated fields. Changes to these fields will remove the equations used in the spreadsheet.

1. The Required Load Reduction for the total project:

Calculations from RG-348

Pages 3-27 to 3-30

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

where:

$L_{M \text{ TOTAL PROJECT}}$ = Required TSS removal resulting from the proposed development = 80% of increased load

A_N = Net increase in impervious area for the project

P = Average annual precipitation, inches

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

County =	Bexar	
Total project area included in plan *	3.05	acres
Predevelopment impervious area within the limits of the plan *	0.46	acres
Total post-development impervious area within the limits of the plan *	0.67	acres
Total post-development impervious cover fraction *	0.22	
P =	30	inches

$L_{M \text{ TOTAL PROJECT}}$ = **177** lbs.

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

Number of drainage basins / outfalls areas leaving the plan area = **5**



9/27/2023

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

Drainage Basin/Outfall Area No. = **5**

Total drainage basin/outfall area =	1.04	acres
Predevelopment impervious area within drainage basin/outfall area =	0.00	acres
Post-development impervious area within drainage basin/outfall area =	0.14	acres
Post-development impervious fraction within drainage basin/outfall area =	0.13	
$L_{M \text{ THIS BASIN}}$ =	110	lbs.

3. Indicate the proposed BMP Code for this basin.

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

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

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

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

where:

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

A_i = Impervious area proposed in the BMP catchment area

A_p = Pervious area remaining in the BMP catchment area

L_R = TSS Load removed from this catchment area by the proposed BMP

A_C = **0.85** acres

A_i = **0.14** acres

A_p = **0.72** acres

L_R = **130** lbs

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

Desired $L_{M \text{ THIS BASIN}}$ = **110** lbs.

F = **0.84**

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

Calculations from RG-348

Pages 3-34 to 3-36

Rainfall Depth = 1.26 inches
Post Development Runoff Coefficient = 0.17
On-site Water Quality Volume = 676 cubic feet

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

Off-site area draining to BMP = 0.00 acres
Off-site Impervious cover draining to BMP = 0.00 acres
Impervious fraction of off-site area = 0
Off-site Runoff Coefficient = 0.00
Off-site Water Quality Volume = 0 cubic feet

Storage for Sediment = 135
Total Capture Volume (required water quality volume(s) x 1.20) = 811 cubic feet

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

7. Retention/Irrigation System

Designed as Required in RG-348

Pages 3-42 to 3-46

Required Water Quality Volume for retention basin = NA cubic feet

Irrigation Area Calculations:

Soil infiltration/permeability rate = 0 in/hr Enter determined permeability rate or assumed value of 0.1
Irrigation area = NA square feet
NA acres

8. Extended Detention Basin System

Designed as Required in RG-348

Pages 3-46 to 3-51

Required Water Quality Volume for extended detention basin = NA cubic feet

9. Filter area for Sand Filters

Designed as Required in RG-348

Pages 3-58 to 3-63

9A. Full Sedimentation and Filtration System

Water Quality Volume for sedimentation basin = NA cubic feet

Minimum filter basin area = NA square feet

Maximum sedimentation basin area = NA square feet For minimum water depth of 2 feet
Minimum sedimentation basin area = NA square feet For maximum water depth of 8 feet

9B. Partial Sedimentation and Filtration System

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

10. Bioretention System

Designed as Required in RG-348

Pages 3-63 to 3-65

Required Water Quality Volume for Bioretention Basin = **NA** cubic feet

11. Wet Basins

Designed as Required in RG-348

Pages 3-66 to 3-71

Required capacity of Permanent Pool = **NA** cubic feet **Permanent Pool Capacity is 1.20 times the WQV**
Required capacity at WQV Elevation = **NA** cubic feet **Total Capacity should be the Permanent Pool Capacity plus a second WQV.**

12. Constructed Wetlands

Designed as Required in RG-348

Pages 3-71 to 3-73

Required Water Quality Volume for Constructed Wetlands = **NA** cubic feet

13. AquaLogic™ Cartridge System

Designed as Required in RG-348

Pages 3-74 to 3-78

**** 2005 Technical Guidance Manual (RG-348) does not exempt the required 20% increase with maintenance contract with AquaLogic™.**

Required Sedimentation chamber capacity = **NA** cubic feet
Filter canisters (FCs) to treat WQV = **NA** cartridges
Filter basin area (RIA_F) = **NA** square feet

14. Stormwater Management StormFilter® by CONTECH

Required Water Quality Volume for Contech StormFilter System = **NA** cubic feet

THE SIZING REQUIREMENTS FOR THE FOLLOWING BMPs / LOAD REMOVALS ARE BASED UPON FLOW RATES - NOT CALCULATED WATER QUALITY VOLUMES

15. Grassy Swales

Designed as Required in RG-348

Pages 3-51 to 3-54

Design parameters for the swale:

Drainage Area to be Treated by the Swale = A = 0.00 acres
 Impervious Cover in Drainage Area = 0.00 acres
 Rainfall intensity = i = 1.1 in/hr
 Swale Slope = 0 ft/ft
 Side Slope (z) = 0
 Design Water Depth = y = 0.00 ft
 Weighted Runoff Coefficient = C = #DIV/0!

A_{CS} = cross-sectional area of flow in Swale = #DIV/0! sf
 P_W = Wetted Perimeter = #DIV/0! feet
 R_H = hydraulic radius of flow cross-section = A_{CS}/P_W = #DIV/0! feet
 n = Manning's roughness coefficient = 0.2

15A. Using the Method Described in the RG-348

Manning's Equation: $Q = \frac{1.49}{n} A_{CS} R_H^{2/3} S^{0.5}$

$b = \frac{0.134 \times Q}{y^{1.67} S^{0.5}} - zy = \text{\#DIV/0!} \text{ feet}$

$Q = C i A = \text{\#DIV/0!} \text{ cfs}$

To calculate the flow velocity in the swale:

V (Velocity of Flow in the swale) = $Q/A_{CS} = \text{\#DIV/0!} \text{ ft/sec}$

To calculate the resulting swale length:

L = Minimum Swale Length = V (ft/sec) * 300 (sec) = #DIV/0! feet

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters must be modified and the solver rerun.

15B. Alternative Method using Excel Solver

Design Q = CiA =	#DIV/0!	cfs	
Manning's Equation Q =	0.00	cfs	Error 1 = #DIV/0!
Swale Width=	6.00	ft	

Instructions are provided to the right (green comments).

Flow Velocity	#DIV/0!	ft/s
Minimum Length =	#DIV/0!	ft

Instructions are provided to the right (blue comments).

Design Width =	0	ft	
Design Discharge =	0.00	cfs	Error 2 = #DIV/0!
Design Depth =	0.33	ft	
Flow Velocity =	#DIV/0!	cfs	
Minimum Length =	#DIV/0!	ft	

If any of the resulting values do not meet the design requirement set forth in RG-348, the design parameters may be modified and the solver rerun.
If any of the resulting values still do not meet the design requirement set forth in RG-348, widening the swale bottom value may not be possible.

16. Vegetated Filter Strips

Designed as Required in RG-348

Pages 3-55 to 3-57

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

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

**Attachment G – Inspection,
Maintenance, Repair and
Retrofit Plan**

Attachment G – Inspection, Maintenance, Repair, And Retrofit Plan

The San Antonio Water System (SAWS) regularly has the property maintained by a landscaping service. Since the vegetative filter strip is grass vegetation, the BMP’s will be mowed regularly with the rest of the site during routine landscape maintenance activities. Additional guidance can be obtained from TCEQ’s Technical Guidance Manual (TGM) RG-348 (2005) Section 3.5.

The following general maintenance guidelines for the BMP’s are taken from TCEQ RG-348. Once the vegetated is well established, little additional maintenance is generally necessary.

Activity	Schedule
<ul style="list-style-type: none"> Mow strips to a height of 3” using a mulching mower (or removal of clippings). Limit vegetation height to 18 inches maximum. Grass clippings and brush debris should not be deposited on vegetated filter strip areas. Regular mowing should also include weed control practices; however, herbicide use should be kept to a minimum. Inspect for and remove pests. 	As needed (frequently seasonally, twice per year minimum)
<ul style="list-style-type: none"> Inspect for erosion or damage to vegetation. Strip should be checked for uniformity of grass cover, debris and litter, and areas of sediment accumulation. Replant and/or restore bare spots and areas of erosion identified during inspection. 	Semi-annual (more frequent the first few years)
<ul style="list-style-type: none"> Remove trash and other accumulated debris. Remove sediment buildup along the upstream boundary of the strip preventing uniform overland flow. Excess sediment should be removed by hand or with flat-bottomed shovels. 	4 times per year minimum

9-26-2023

Signature

Date

Saqib Shirazi

Printed Name



Attachment H – Pilot-Scale Field Testing Plan

NOT USED

Attachment I – Measures for Minimizing Surface Stream Contamination

Attachment I – Measures Minimizing Surface Stream Contamination

To ensure that surface stream contamination is avoided or minimized during construction, the SWPPP will be followed. There will be an effort to reduce stream flashing. This will help to prevent erosion which can lead to water quality degradation. Additionally, the silt fence used as shown on the SWPPP will ensure that the water entering the stream is not impacted adversely. Overall, these measures are designed to safeguard the environment and ensure that the stream remains healthy and free from contamination.

**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 Dr. Saqib Shirazi, P.E., PMP,
Print Name

Manager – Operations Support Engineering,
Title - Owner/President/Other

of San Antonio Water System,
Corporation/Partnership/Entity Name

have authorized Mark Medina, P.E.
Print Name of Agent/Engineer

of Moreno Cardenas Inc.
Print Name of Firm

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

I also understand that:

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

SIGNATURE PAGE:



Applicant's Signature

9-12-2023

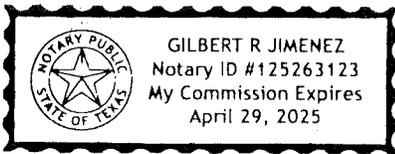
Date

THE STATE OF TEXAS §

County of BEXAR §

BEFORE ME, the undersigned authority, on this day personally appeared SAQIB SHIRAZI 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 12 day of SEPTEMBER 2023




NOTARY PUBLIC

Gilbert R. Jimenez
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: April 29, 2023

**Fee Application Form (TCEQ-
0574)**

<i>Type of Plan</i>	<i>Size</i>	<i>Fee Due</i>
Extension of Time	Each	\$

Signature:  _____

Date: September 2023

Application Fee Schedule

Texas Commission on Environmental Quality

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

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

<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
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	≥ 500	\$10,000
	< 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

1. Reason for Submission (If other is checked please describe in space provided.)		
<input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
2. Customer Reference Number (if issued)	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number (if issued)
CN 600529069		RN

SECTION II: Customer Information

4. General Customer Information		5. Effective Date for Customer Information Updates (mm/dd/yyyy)	
<input type="checkbox"/> New Customer		<input checked="" 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	
The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).			
6. Customer Legal Name (If an individual, print last name first: eg: Doe, John)		If new Customer, enter previous Customer below:	
San Antonio Water System			
7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)
	17426325308	742632530	
11. Type of Customer:	<input type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input checked="" type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input checked="" type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
12. Number of Employees		13. Independently Owned and Operated?	
<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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
14. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input checked="" 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:			
15. Mailing Address:	2088 U.S. Hwy 281 North		
	City	San Antonio	State TX ZIP 78212 ZIP + 4 3106
16. Country Mailing Information (if outside USA)		17. E-Mail Address (if applicable)	
18. Telephone Number		19. Extension or Code	20. Fax Number (if applicable)
(210) 233-3410			() -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (If "New Regulated Entity" is selected below this form should be accompanied by a permit application)	
<input checked="" type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information	
The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).	
22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)	
IH-10 Pump Station	

23. Street Address of the Regulated Entity: <i>(No PO Boxes)</i>	17202 IH 10 W						
	City	San Antonio	State	TX	ZIP	78257	ZIP + 4
24. County	Bexar						

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	The project is located approx. 1 mile north of the intersection of 1604 E and IH10 N. The project site is approx. 500 ft W of IH10 along La Cantera Pkwy						
26. Nearest City	San Antonio			State	TX	Nearest ZIP Code	78255
27. Latitude (N) In Decimal:	29.600707			28. Longitude (W) In Decimal:	-98.602828		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		
29	36	2.6	98	36	10.2		
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)				
4941		221310					
33. What is the Primary Business of this entity? <i>(Do not repeat the SIC or NAICS description.)</i>							
Water Utility							
34. Mailing Address:	P.O. Box 2449						
	City	San Antonio	State	TX	ZIP	78298	ZIP + 4
35. E-Mail Address:							
36. Telephone Number		37. Extension or Code		38. Fax Number <i>(if applicable)</i>			
() -				() -			

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:	Crista Cerda, E.I.T.	41. Title:	Engineer
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(210) 314-3553		() -	ccerda@morenocardenas.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:	Moreno Cardenas Inc.	Job Title:	Engineer
Name <i>(In Print)</i> :	Mark Medina, P.E.	Phone:	(210) 314- 3553
Signature:		Date:	9/9/2023