ELLE MULTIFAMILY

(aka Blanco Springs MF)

Sewage Collection System Application

PAPE-DAWSON ENGINEERS

Transportation | Water Resources | Land Development | Surveying | Environmental

ELLE MULTIFAMILY

Sewage Collection System Application

PAPE-DAWSON ENGINEERS

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August 1, 2025

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

Re: Elle Multifamily
Sewage Collection System Application

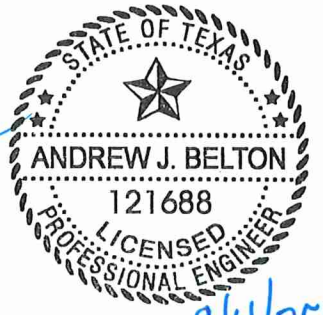
Dear Ms. Reyes:

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

This Sewage Collection System Application applies to the 529.85 linear feet of sewer main and the installation of an additional dry well for an existing lift station proposed as part of this project. Please review the plan information for the items it is intended to address. If acceptable, provide a written approval of the plan in order that construction may begin at the earliest opportunity.

Appropriate review fees ($650) and fee application form are included. If you have questions or require additional information, please do not hesitate to contact me at your earliest convenience.

Sincerely,
Pape-Dawson Consulting Engineers, LLC



8/4/25

Andrew Belton, P.E.
Vice President

Attachments

\\Pape-Dawson.Com\Sat-Pd\135\20\01\Word\Reports\SCS\250627 A1.Docx

EDWARDS AQUIFER APPLICATION COVER PAGE (TCEQ-20705)

Texas Commission on Environmental Quality

Edwards Aquifer Application Cover Page

Our Review of Your Application

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

Administrative Review

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

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

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.

3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.

4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

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

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.

6. If the geologic assessment was completed before October 1, 2004 and the site contains "possibly sensitive" features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.

2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

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

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

Mid-Review Modifications

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

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

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

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

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

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

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

1. Regulated Entity Name: Elle Multifamily						**2. Regulated Entity No.:**			
3. Customer Name: KC Blanco Springs MF Ltd						**4. Customer No.:**			
5. Project Type: (Please circle/check one)	New		Modification			Extension		Exception	
6. Plan Type: (Please circle/check one)	WPAP	CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
7. Land Use: (Please circle/check one)	Residential		Non-residential			**8. Site (acres):**		9.664	
9. Application Fee:	$650		**10. Permanent BMP(s):**						
11. SCS (Linear Ft.):	578		**12. AST/UST (No. Tanks):**						
13. County:	Bexar		**14. Watershed:**					Salado Creek	

Application Distribution

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

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

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

Austin Region			
County:	**Hays**	**Travis**	**Williamson**
Original (1 req.)	___	___	___
Region (1 req.)	___	___	___
County(ies)	___	___	___
Groundwater Conservation District(s)	___Edwards Aquifer Authority ___Barton Springs/ Edwards Aquifer ___Hays Trinity ___Plum Creek	___Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	___Austin ___Buda ___Dripping Springs ___Kyle ___Mountain City ___San Marcos ___Wimberley ___Woodcreek	___Austin ___Bee Cave ___Pflugerville ___Rollingwood ___Round Rock ___Sunset Valley ___West Lake Hills	___Austin ___Cedar Park ___Florence ___Georgetown ___Jerrell ___Leander ___Liberty Hill ___Pflugerville ___Round Rock

San Antonio Region					
County:	**Bexar**	**Comal**	**Kinney**	**Medina**	**Uvalde**
Original (1 req.)	✓	___	___	___	___
Region (1 req.)	✓	___	___	___	___
County(ies)	✓	___	___	___	___
Groundwater Conservation District(s)	✓ Edwards Aquifer Authority ___Trinity-Glen Rose	___Edwards Aquifer Authority	___Kinney	___EAA ___Medina	___EAA ___Uvalde
City(ies) Jurisdiction	___Castle Hills ___Fair Oaks Ranch ___Helotes ___Hill Country Village ___Hollywood Park ✓San Antonio (SAWS) ___Shavano Park	___Bulverde ___Fair Oaks Ranch ___Garden Ridge ___New Braunfels ___Schertz	NA	___San Antonio ETJ (SAWS)	NA

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.
Andrew Belton, P.E. Print Name of Customer/Authorized Agent
Signature of Customer/Authorized Agent Date 8/15/25

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-0585)

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.

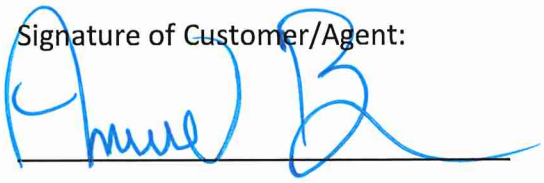
Signature

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: Andrew Belton, P.E.

Date: 8/1/2025

Signature of Customer/Agent:



Project Information

1. Regulated Entity Name: Elle Multifamily
2. County: Bexar
3. Stream Basin: Salado Creek
4. Groundwater Conservation District (If applicable): _____
5. Edwards Aquifer Zone:

   ☒ Recharge Zone
   ☐ Transition Zone

6. Plan Type:

   ☐ WPAP
   ☒ SCS
   ☐ Modification
   ☐ AST
   ☐ UST
   ☐ Exception Request

7. Customer (Applicant):

   Contact Person: Thomas Wells
   Entity: KC Blanco Springs MF Ltd
   Mailing Address: 903 Basse Road
   City, State: San Antonio Zip: 78212
   Telephone: (210) 826-2600 FAX: _____
   Email Address: twells@koontzcorp.com

8. Agent/Representative (If any):

   Contact Person: Andrew Belton, P.E.
   Entity: Pape-Dawson Engineers, Inc.
   Mailing Address: 2000 NW Loop 410
   City, State: San Antonio Zip: 78213
   Telephone: (210) 375-9000 FAX: (210) 375-9010
   Email Address: abelton@pape-dawson.com

9. Project Location:

   ☒ The project site is located inside the city limits of San Antonio, TX.
   ☐ 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.

    This project site is located at 18111 Blanco Springs, San Antonio, TX 78258

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: _____

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

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

15. Existing project site conditions are noted below:

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

Prohibited Activities

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

(1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);

(2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;

(3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;

(4) The use of sewage holding tanks as parts of organized collection systems; and

(5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

(6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

17. ☒ I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:

(1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);

(2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and

(3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

Administrative Information

18. The fee for the plan(s) is based on:

- ☐ For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
- ☒ For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
- ☐ For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
- ☐ A request for an exception to any substantive portion of the regulations related to the protection of water quality.
- ☐ A request for an extension to a previously approved plan.

19. ☒ Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

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

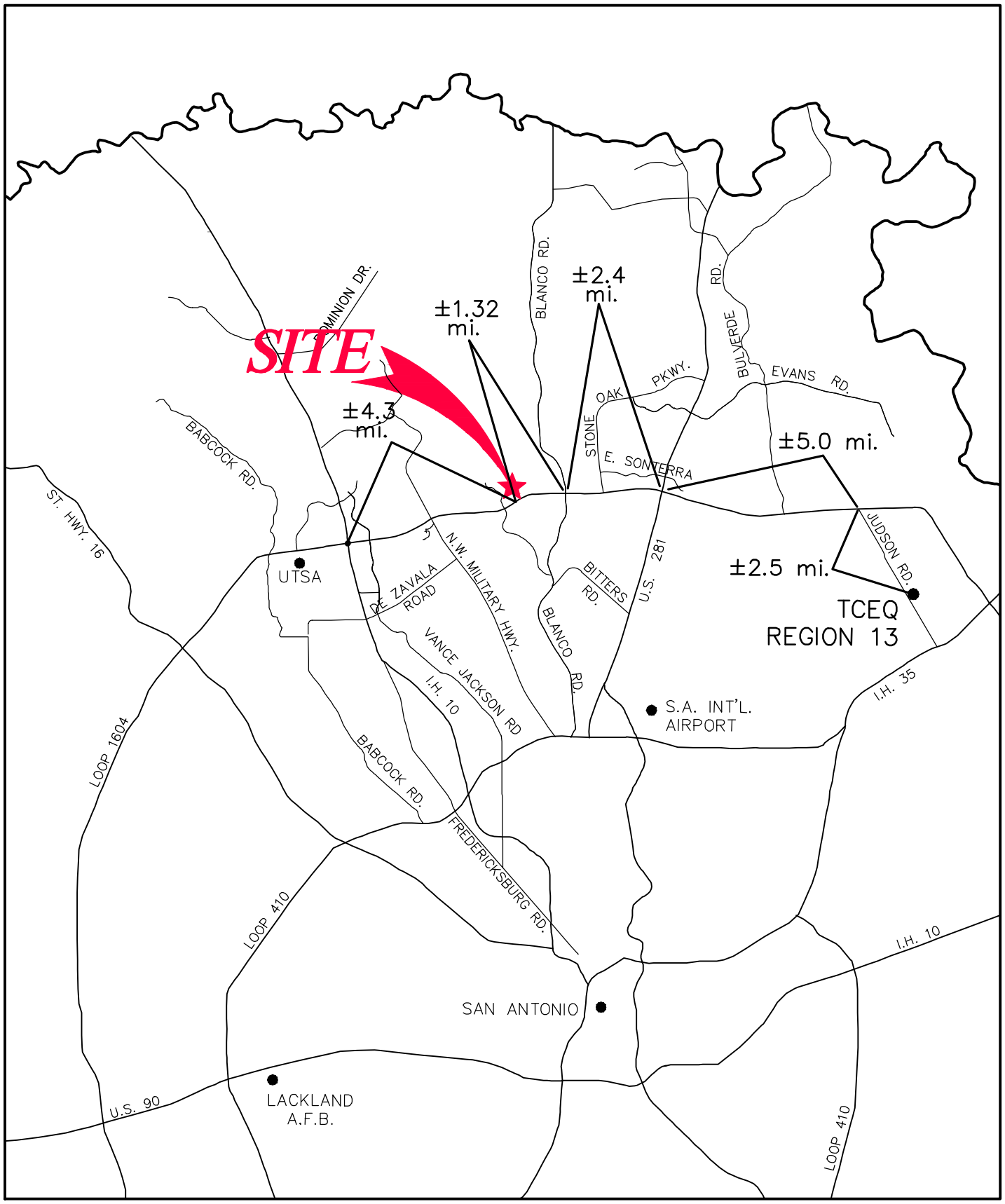
20. ☒ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies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

21. ☒ No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

ATTACHMENT A

ELLE MULTIFAMILY
Sewage Collection System

N
NOT TO SCALE



Pape-Dawson Consulting Engineers, LLC

Date: Jul 14, 2025, 10:43am User ID: sbrannon
File: P:\135\20\01\Design\Exhibits\SCS\Road Map.dwg

ROAD MAP
ATTACHMENT A

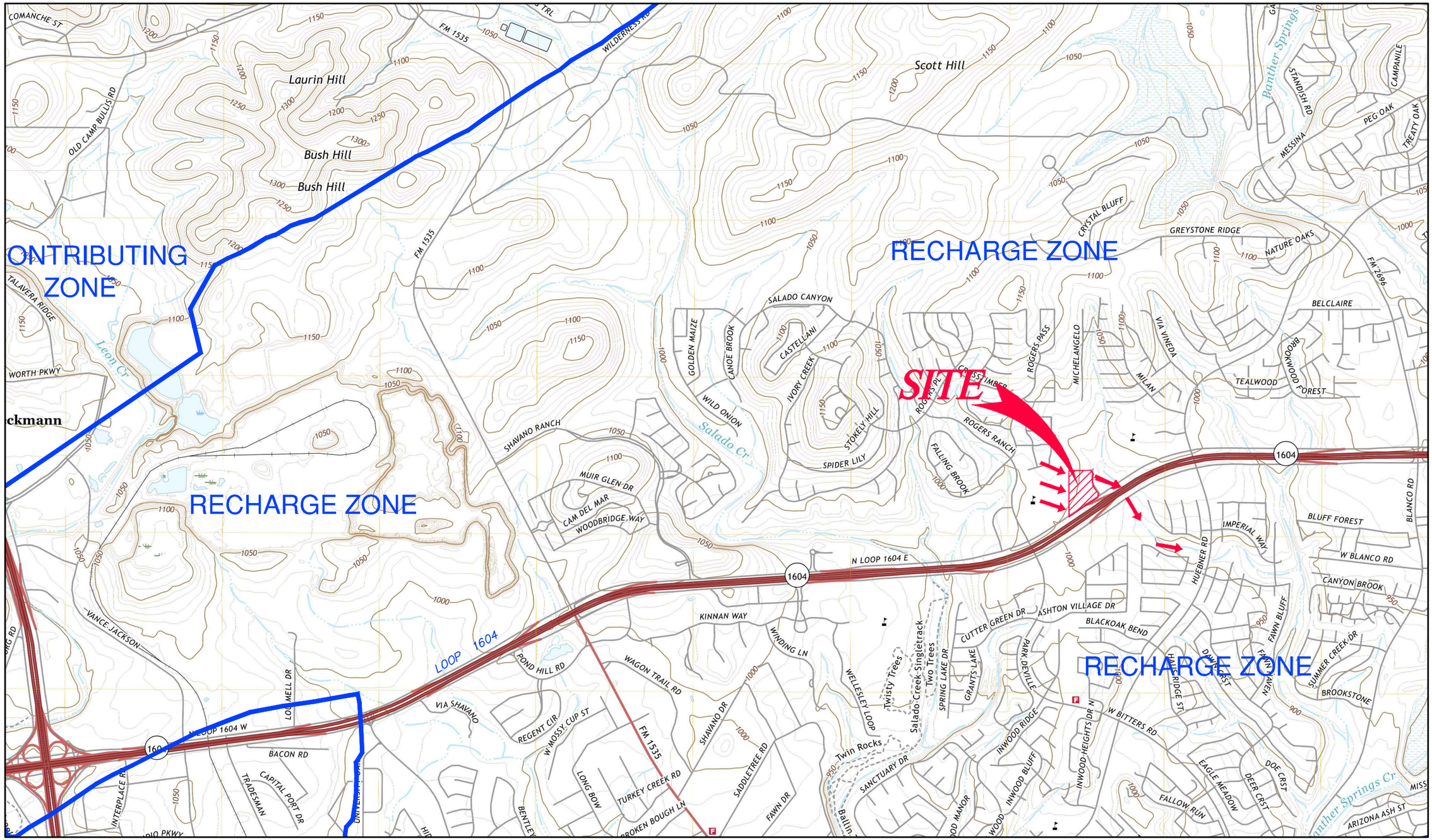
ATTACHMENT B

ELLE MULTIFAMILY

Sewage Collection System

N

SCALE: 1" = 2000'



Date: Jul 14, 2025, 10:43am User ID: sbrannon
File: P:\135\20\01\Design\Exhibits\SCS\Quad Map.dwg

GENERAL LOCATION MAP - CASTLE HILLS, TX QUAD

DRAINAGE FLOW → →

Pape-Dawson Consulting Engineers, LLC

USGS QUAD MAP

ATTACHMENT B

ATTACHMENT C

ELLE MULTIFAMILY
Sewage Collection System Plan

Attachment C – Project Description

Elle Multifamily is a multifamily development on an approximately 9.664 acres within the city of San Antonio in Bexar County, Texas. The site is located at the intersection of the access road of N Loop 1604 W and Blanco Springs, west of Big'z Burger Joint, and is currently undeveloped and lies within the Salado Creek watershed and does not contain 100-year floodplain.

The Elle Multifamily Sewage Collection System (SCS) Application proposes the construction of a total of approximately 529.85 linear feet (LF) of sanitary sewer main to serve the proposed commercial development over the Edwards Aquifer Recharge Zone. The proposed alignment will consist of approximately 489.85 linear feet (LF) of 8-inch (8") polyvinyl chloride (PVC), SDR 26 gravity sewer main and 40 linear feet (LF) of 8-inch (8") PVC, SDR 26 160-psi pressure rated sewer main centered at water line crossings, see included plan and profile exhibits for details. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 2.13 acres may be disturbed as identified by the limits of the fifty foot (50') SCS/GA envelope shown on the plans; however additional grading will disturb approximately 9.664 acres as part of development of the overall unit as approved in the Vineyard Springs Business Park WPAP (EAPP ID# 1724.00).

This project will result in an estimated additional 153 Equivalent Dwelling Units (EDUs). The permanent population associated with Elle Multifamily is estimated to be 610 people, based on two (2) persons per unit. Approximately 30,600 gallons per day (average flow) of domestic wastewater are estimated to be generated by this project. No Stub-outs are proposed with this SCS as this will complete this phase of the multifamily development.

The sewage flow will be disposed of by conveyance to the existing Salado Creek Water Recycling Center operated by the San Antonio Water System (SAWS). Potable water will be supplied by SAWS. No naturally occurring sensitive features were identified with the SCS envelope in the Geological Assessment.

GEOLOGIC ASSESSMENT FORM (TCEQ-0585)

Geologic Assessment

Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

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

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

Signature

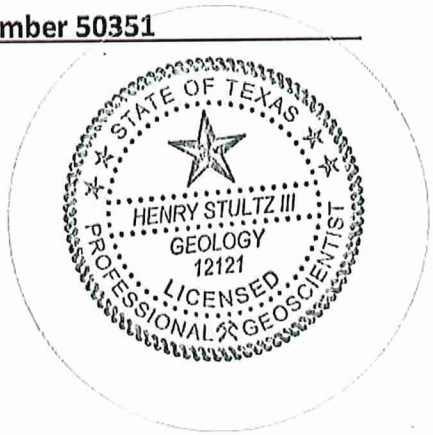
To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

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

Date: March 18, 2025 Fax: **210-375-9090**

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

Signature of Geologist:



Regulated Entity Name: **Blanco Springs MF**

Project Information

1. Date(s) Geologic Assessment was performed: **March 11, 2025**
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)
Crawford, stony and Bexar soils, 0-5% slopes (Cb)	D	3-4

** 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" = **50'**
   Site Geologic Map Scale: 1" = **50'**
   Site Soils Map Scale (if more than 1 soil type): **N/A**

9. Method of collecting positional data:

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

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

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

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

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

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

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

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

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

Administrative Information

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

ATTACHMENT A

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Blanco Springs MF

LOCATION			FEATURE CHARACTERISTICS											EVALUATION			PHYSICAL SETTING		
1A	1B **	1C**	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11	12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY
						X	Y	Z		10						<40	≥40	<1.6	≥1.6	
S-1	29.60632°	-98.52955°	MB	30	Kep								FC	20	50		50	X		Hillside

** DATUM: NAD 83

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

8A INFILLING

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

12 TOPOGRAPHY

Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

STATE OF TEXAS
HENRY STULTZ III
GEOLOGY
12121
LICENSED PROFESSIONAL GEOSCIENTIST

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

Date March 18, 2025

ATTACHMENT A

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

ATTACHMENT B

Attachment B – Stratigraphic Column

Period	Epoch	Group	Formation	Member	Thickness	Lithology	Hydro-logic Unit	Hydro-stratigraphic Unit	Hydrologic Function	Porosity	Cavern Development
Cretaceous	Early Cretaceous	Edwards	Person	Cyclic and marine, undivided	80–90	Pelletal limestone; ranges from chalk to mudstone and miliolid grainstone; thin to massive beds; some crossbedding evident; a packstone containing large caprinids is present near contact with the overlying Georgetown Formations; chert is common as beds and large nodules	Edwards Aquifer	II	Aquifer	MO, BU, VUG, BP, FR, CV	Many subsurface; might be associated with earlier karst development
				Leached and collapsed, undivided	70–90	Hard, dense, recrystallized limestone;mudstone, wackestone, packstone, and grainstone; contains chert as beds and large nodules; heavily bioturbated with iron-stained beds; often stromatolitic; *Toucasia* sp. Often found above contact with the underlying regional dense member; *Montastrea roemeriana* and oysters rare		III	Aquifer	BU, VUG, FR, BP, BR, CV	Extensive lateral development; large rooms
				Regional dense	20–24	Dense, shaly limestone; oyster shell mudstone and iron wackestone; wispy iron staining; chert nodules rarer than in the rest of the chert-bearing Edwards Group		IV	Confining	FR, CV	Very few; only vertical fracture enlargement
			Kainer	Grainstone	40–50	Hard, dense limestone that consists mostly of a tightly cemented miliolid skeletal fragment grainstone; contains interspersed chalky mudstone and wackestone; chert as beds and nodules; crossbedding and ripple marks are common primarily at the contact with the overlying regional dense bed		V	Aquifer	IP, IG, BU, FR, BP, CV	Few
				Kirsch-berg Evaporite	40–50	Highly altered crystalline limestone and chalky mudstone with occasional grainstone associated with tidal channels; chert as beds and nodules, boxwork molds are common, matrix recrystallized to a coarse grain spar; intervals of collapse breccia and travertine deposits		VI	Aquifer	IG, MO, VUG, FR, BR, CV	Probably extensive cave development
				Dolomitic	90–120	Hard, dense to granular, dolomitic limestone; chert as beds and nodules (absent in lower 20 ft); *Toucasia* sp. abundant; lower three-fourths composed of sucrosic dolomites and grainstones with hard, dense limestones interspersed; upper one-fourth composed mostly of hard, dense mudstone, wackestone, packstone, grainstone, and recrystallized dolomites with bioturbated beds		VII	Aquifer	IP, IC, IG, MO, BU, VUG, FR, BP, CV	Cave development as shafts with minor horizontal extent
				Basal nodular	40–50	Moderately hard, shaly, nodular, burrowed mudstone to miliolid grainstone that also contains dolomite; contains dark, spherical textural features known as black rotund bodies; *Ceratostreon texana* , *Caprina* sp., miliolids, and gastropods		VIII	Aquifer, confining unit in areas without caves	IP, MO, BU, BP, FR, CV	Large lateral caves at surface

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

ATTACHMENT C

Attachment C – Site Geology

SUMMARY

The Blanco Springs MF site is located at the northwest corner of North Loop 1604 West and Blanco Springs Road in San Antonio, Texas.

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

SITE GEOLOGY

As observed through field evidence, the geologic formation which outcrops at the surface within the subject site is the cyclic and marine (Kepcm) member of the Person formation. These observations are consistent with published sources. The Kepcm is characterized by a mudstone to pack stone miliolid grainstone, and chert. Karst development within the Kepcm is characterized by small sinkholes and caves developed as vertical shafts as well as lateral rooms.

The predominant trend of faults in the vicinity of the site is approximately N60°E, based on faults identified during the previous mapping of the area.

FEATURE DESCRIPTIONS:

A description of the feature observed onsite is provided below:

Feature S-1

Feature S-1 is an existing sewer line that is not located beneath pavement. The sewer line has been trenched through bedrock and backfilled with a mix of fine and course fill material that may be more permeable than surrounding undisturbed areas. Therefore, the probability of rapid infiltration is intermediate.

REFERENCES

Clark, A.K., Golab, J.A., Morris, R.R., and Pedraza, D.E., 2023, Geologic framework and hydrostratigraphy of the Edwards and Trinity aquifers within northern Bexar and Comal Counties, Texas: U.S. Geological Survey Scientific Investigations Map 3510, 1 sheet, scale 1:24,000, 24-p. pamphlet, https://doi.org/10.3133/sim3510

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

Texas Water Development Board, Wells in TWDB Groundwater Database Viewer, https://www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer, March 12, 2025

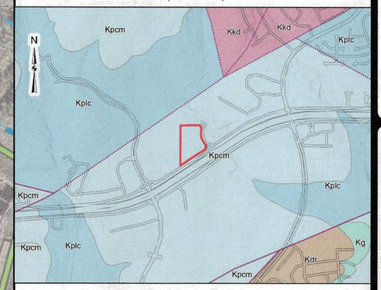
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ATTACHMENT D

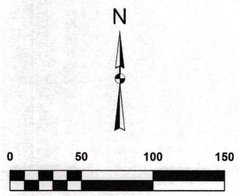




Location Map
(not-to-scale)



Regional Geology Map (Clark 2023)
(not-to-scale)



LEGEND

PROJECT LIMITS

EXISTING CONTOUR LINE — 760

100 YEAR FLOODPLAIN

STREAM

GEOLOGIC FORMATIONS

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

SYMBOLS AND LINES

- S-1 — POTENTIAL RECHARGE FEATURE
- CONTACT, LOCATED APPROXIMATELY
- CONTACT, INFERRED
- FAULT, LOCATED APPROXIMATELY (D, DOWNTHROWN SIDE; U, UPTHROWN SIDE)
- FAULT, EXTRAPOLATED
- FAULT, INFERRED
- STRIKE AND DIP OF BEDDING
- STRIKE AND DIP OF JOINTS
- STRIKE OF VERTICAL JOINTS
- CAVE
- SOLUTION CAVITY
- SOLUTION ENLARGED FRACTURE
- SWALLOW HOLE
- SINKHOLE
- NON - KARST CLOSED DEPRESSION
- ZONE
- OTHER NATURAL BEDROCK FEATURES
- SPRING /SEEP
- MB — MAN - MADE FEATURE IN BEDROCK
- W — WATER WELL
- SANITARY SEWER LINE
- STORM DRAIN LINE

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

NOTE: THE RECHARGE ZONE BOUNDARY IS NOT WITHIN THE AREA SHOWN ON THIS SHEET. THE SITE IS LOCATED ENTIRELY WITHIN THE RECHARGE ZONE.

NOTE: NO NATURALLY OCCURING GEOLOGIC FEATURES WERE DISCOVERED DURING THIS ASSESSMENT.

NO.	REVISION	DATE

STATE OF TEXAS
HENRY STULTZ III
GEOLOGY
12121
LICENSED
PROFESSIONAL GEOSCIENTIST
3/18/25

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

BLANCO SPRINGS MF

BEXAR COUNTY

SITE GEOLOGIC MAP
WATER POLLUTION ABATEMENT PLAN

PLAT NO.	--
JOB NO.	13520-01
DATE	Mar 2025
DESIGNER	HS
CHECKED	HDJ
DRAWN	HS
SHEET	ATT D

Date: Mar 12, 2025 9:25 AM User: HStultz
File: P:\13520\01\ENV\GA\GIS\Working.aprx

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ORGANIZED SEWAGE COLLECTION SYSTEM PLAN (TCEQ-0582)

Organized Sewage Collection System Application

Texas Commission on Environmental Quality

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

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

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

Regulated Entity Name: Elle Multifamily

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

Customer Information

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

   Contact Person: Thomas Wells
   Entity: KC Blanco Springs MF Ltd
   Mailing Address: 903 Basse Road
   City, State: San Antonio, TX Zip: 78212
   Telephone: (210) 826-2600 Fax: _____
   Email Address: twells@koontzcorp.com
   The appropriate regional office must be informed of any changes in this information within 30 days of the change.

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

   Contact Person: Andrew Belton, P.E.
   Texas Licensed Professional Engineer's Number: 121688
   Entity: Pape-Dawson Consulting Engineers, LLC
   Mailing Address: 2000 NW Loop 410
   City, State:San Antonio, TX Zip: 78213
   Telephone:(210)375-9000 Fax:_____
   Email Address:ABelton@pape-dawson.com

Project Information

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

   ☐ Residential: Number of single-family lots: _____
   ☒ Multi-family: Number of residential units: 305
   ☐ Commercial
   ☐ Industrial
   ☐ Off-site system (not associated with any development)
   ☐ Other: _____

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

100% Domestic	30,700 gallons/day
_____% Industrial	_____ gallons/day
_____% Commingled	_____ gallons/day

   Total gallons/day: 30,700

6. Existing and anticipated infiltration/inflow is 5,760 gallons/day. This will be addressed by: Sealing manholes/preventative maintenance.

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

   ☐ The WPAP application for this development was approved by letter dated _____. A copy of the approval letter is attached.
   ☒ The WPAP application for this development was submitted to the TCEQ on June 12, 2025, but has not been approved.
   ☐ A WPAP application is required for an associated project, but it has not been submitted.
   ☐ There is no associated project requiring a WPAP application.

8. Pipe description:

Table 1 - Pipe Description

Pipe Diameter(Inches)	*Linear Feet (1)*	*Pipe Material (2)*	*Specifications (3)*
8 non rated	489.85	PVC, SDR 26	ASTM D3034, ASTM D3212
8 Pressure rated (160)	40	PVC, SDR 26	ASTM D 2241, Class 160 ASTM D3139, ASTM C1173

Total Linear Feet: 529.85

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

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

☒ Existing
☐ Proposed

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

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

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

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

Alignment

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

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

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

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

Manholes and Cleanouts

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

Table 2 - Manholes and Cleanouts

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
LINE "A1.00"	C5.00 Of	5+29.86	MH "A4"
	Of		
	Of		
	Of		

Line	*Shown on Sheet*	*Station*	*Manhole or Clean-out?*
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		

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

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

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

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

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

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

Site Plan Requirements

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

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

Site Plan Scale: 1" = 50'.

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

20. Lateral stub-outs:

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

21. Location of existing and proposed water lines:

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

22. 100-year floodplain:

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

Table 3 - 100-Year Floodplain

Line	*Sheet*	*Station*
	of	to
	of	to
	of	to
	of	to

23. 5-year floodplain:

☒ After construction is complete, no part of this project will be in or cross a 5-year floodplain, either naturally occurring or man-made. (Do not include streets or concrete-lined channels constructed above sewer lines.)
☐ After construction is complete, all sections located within the 5-year floodplain will be encased in concrete or capped with concrete. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Table 4 - 5-Year Floodplain

Line	*Sheet*	*Station*
	of	to
	of	to
	of	to
	of	to

24. ☒ Legal boundaries of the site are shown.

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

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

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

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

Table 5 - Water Line Crossings

Line	*Station or Closest Point*	*Crossing or Parallel*	*Horizontal Separation Distance*	*Vertical Separation Distance*
"A"	0+58.00	Crossing	--	1.30
"A"	1+12.70	Crossing	--	3.05

27. Vented Manholes:

☒ **No part** of this sewer line is within the 100-year floodplain and vented manholes are not required by 30 TAC Chapter 217.
☐ **A portion** of this sewer line is within the 100-year floodplain and vented manholes will be provided at less than 1500 foot intervals. These water-tight manholes are listed in the table below and labeled on the appropriate profile sheets.
☐ **A portion** of this sewer line is within the 100-year floodplain and an alternative means of venting shall be provided at less than 1500 feet intervals. A description of the alternative means is described on the following page.
☐ **A portion** of this sewer line is within the 100-year floodplain; however, there is no interval longer than 1500 feet located within. No vented manholes will be used.

Table 6 - Vented Manholes

Line	*Manhole*	*Station*	*Sheet*

Line	*Manhole*	*Station*	*Sheet*

28. Drop manholes:

☒ There are no drop manholes associated with this project.
☐ Sewer lines which enter new or existing manholes or "manhole structures" higher than 24 inches above the manhole invert are listed in the table below and labeled on the appropriate profile sheets. These lines meet the requirements of 30 TAC §217.55(l)(2)(H).

Table 7 - Drop Manholes

Line	*Manhole*	*Station*	*Sheet*

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

☐ The placement and markings of all sewer line stub-outs are shown and labeled.
☒ No sewer line stub-outs are to be installed during the construction of this sewage collection system.

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

☒ The placement and markings of all lateral stub-outs are shown and labeled.
☐ No lateral stub-outs are to be installed during the construction of this sewage collection system.

31. Minimum flow velocity (From Appendix A)

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

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

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

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

Table 8 - Flows Greater Than 10 Feet per Second

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

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

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

Administrative Information

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

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

Table 9 - Standard Details

Standard Details	*Shown on Sheet*
Lateral stub-out marking **[Required]**	N/A of
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) **[Required]**	C5.20 of DD-852-01
Alternate method of joining lateral to existing SCS line for potential future connections **[Required]**	C5.20 of DD-854-03
Typical trench cross-sections **[Required]**	C5.20 of DD-804-02
Bolted manholes **[Required]**	C5.20 of
Sewer Service lateral standard details **[Required]**	C5.20 of DD-854-EARZ
Clean-out at end of line **[Required, if used]**	N/A of

Standard Details	*Shown on Sheet*
Baffles or concrete encasement for shock/erosion protection **[Required, if flow velocity of any section of pipe >10 fps]**	N/A of
Detail showing Wastewater Line/Water Line Crossing **[Required, if crossings are proposed]**	C5.20 of
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) **[Required, if Flexible Pipe is used]**	N/A of
Drop manholes **[Required, if a pipe entering a manhole is more than 24 inches above manhole invert]**	N/A of

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

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

    ☐ Survey staking was completed on this date: _____

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

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

Signature

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

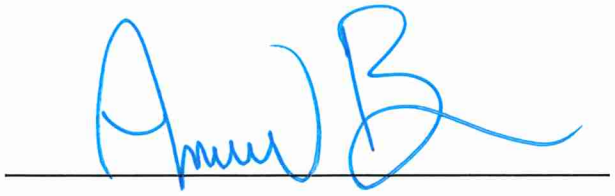
Print Name of Licensed Professional Engineer: Andrew Belton, P.E.

Date: 8/1/2025

Place engineer's seal here:



Signature of Licensed Professional Engineer:



Appendix A-Flow Velocity Table

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

Table 10 - Slope Velocity

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

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

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

Figure 1 - Manning's Formula

Where:

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

ATTACHMENT A
(Engineering Design Report)

ELLE MULTIFAMILY
Engineering Design Report
8” PVC SDR 26

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ELLE MULTIFAMILY
Engineering Design Report
8" PVC SDR 26

INTRODUCTION

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

PROJECT INFORMATION

Elle Multifamily is part of the previously approved Vineyard Springs Business Park WPAP (EAPP File No. 1724.00) approved by Texas Commission on Environmental Quality (TCEQ) on November 27, 2001.

This Elle Multifamily Water Pollution Abatement Plan (WPAP) Modification (MOD) proposes the construction of a multifamily development with associated parking and access driveway on approximately 9.664 acres within the City of San Antonio, in Bexar County, Texas. The site is located at the intersection of the access road of N Loop 1604 W and Blanco Springs, west of Big'z Burger Joint. It is undeveloped and lies within the Salado Creek Watershed and does not contain 100-year floodplain. The WPAP MOD application was submitted to TCEQ for review on June 12, 2025 and is awaiting approval.

Elle Multifamily Sewage Collection System (SCS) Application proposes the construction of approximately 529.85 linear feet (lf) of 8-inch (8") PVC, SDR 26, sewer main over the Edwards Aquifer Recharge Zone. Forty linear feet (40 lf) of the proposed 529.85 lf of sewer main will be pressure-rated pipe at two (2) waterline crossings. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 2.10 acres may be disturbed as identified by the limits of the fifty-foot (50') SCS/GA envelope shown on the plans; however additional grading will disturb approximately 9.664 acres. The proposed SCS sewer main will tie into the existing manhole "Existing" (SAWS Job# 00-1591). No naturally occurring sensitive features were identified in the Geological Assessment.

Potable water service is to be provided by the San Antonio Water System (SAWS). The proposed development will generate approximately 30,600 gallons per day (average flow) of domestic wastewater

based on the assumption of 153 EDUs for multifamily development (305 units * 0.5 EDUs/unit = 153 EDUs). See the included EDR for complete calculations. Wastewater will be disposed of by conveyance to the existing Salado Creek Water Recycling Center operated by SAWS.

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

Safety considerations are the responsibility of the contractor. Refer to SAWS Item Nos. 550 and 902 for construction safety information. Safety protection shall be accomplished in accordance with the most recent requirements of the Occupational Safety and Health Administration (OSHA) Standards and Interpretations.

GRAVITY SANITARY SEWER PIPING: FLOW & CAPACITY ANALYSIS

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

Per Capita Contributions:	✓
Service Connections:	
Land Area and Use:	✓
Fixture Analysis:	

Odor Control

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

Flow Calculation

Peaking Factor used for design: **2.5**

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

Total EDUs = 153

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

= 500 gallons per day (peak flow)

Infiltration = 600 gallons per acre served

*Avg. Flow = **153** EDUs x (200 gpd/EDU) + [(600 gpd/acre) x 9.664 acres] = **36,398** gpd = **25.28** gpm*

*Peak Flow = **153** EDUs x (500 gpd/EDU) + [(600 gpd/acre) x 9.664 acres] = **82,298** gpd = **57.15** gpm*

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

Capacity Calculation

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

Nominal Size = 8"

Outer Diameter (D_o) = 8.40"

Minimum Wall Thickness (t) = 0.323"

Inner Diameter (D_i) = 7.75"

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

Nominal Size = 8"

Outer Diameter (D_o) = 8.625"

Minimum Wall Thickness (t) = 0.332"

Inner Diameter (D_i) = 7.961"

Manning's Equation:

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

$v = Q/A$

Where:

Q = Discharge (cfs)

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

n = Manning's roughness coefficient (unitless)

A = Flow area (ft^2)

R = Hydraulic Radius (ft)

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

S = Slope (ft/ft)

v = Velocity of flow (ft/s)

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

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

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

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

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

S = 0.005

$Q = [(1.49\ ft^{1/3}/sec)/0.013](0.33\ ft^2)(0.16\ ft)^{2/3}(0.005)^{1/2}$

$Q = 0.79\ cfs = 354\ gpm = Q_{full}$

*$v = 0.79\ cfs/0.33\ ft^2$=**2.39 ft/s***

*Qmax = 0.79 cfs (0.90)(7.48 gallons/1 cf)(60 sec/1 min.)=**319 gpm***

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

$A = \pi(D_i^2)/4=\pi(7.961\ in)^2/4=49.76\ in^2=0.35\ ft^2$

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

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

S = 0.005

$Q = [(1.49\ ft^{1/3}/sec)/0.013](0.35\ ft^2)(0.17\ ft)^{2/3}(0.005)^{1/2}$

$Q = 0.87\ cfs = 390\ gpm = Q_{full}$

*$v = 0.87\ cfs/0.35\ ft^2$=**2.49 ft/s***

*Qmax = 0.87 cfs (0.90)(7.48 gallons/1 cf)(60 sec/1 min.)=**351 gpm***

Nominal Main Size (in)	Outer Diameter (in)	Minimum Slope (%)	Area (ft^2)	Hydraulic Radius (A/P) ft	$R^{2/3}$	$S^{1/2}$	Q-Full (cfs)	Max Pipe (%)	Velocity (ft/s)	Q-Max (gpm)
8	*8.40*	*0.50*	*0.33*	*0.16*	*0.29*	*0.07*	*0.79*	*90*	*2.39*	*319*
8	*8.625*	*0.50*	*0.35*	*0.17*	*0.31*	*0.07*	*0.87*	*90*	*2.49*	*351*

Conclusion

The proposed 8" pipe (NR & 160 psi) with a minimum slope of 0.50% has sufficient capacity to convey the projected average and peak flows.

GENERAL STRUCTURAL COMPONENTS

Project Materials (Pipe and Joints):

Nominal Pipe Diameter (in)	Linear Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
8 (NR)	*529.85*	*PVC SDR 26*	*ASTM D3034*	*ASTM D3212*
8 pressure-rated	*40*	*PVC SDR 26*	*ASTM 2241, Class 160*	*ASTM D3139* *ASTM C1173*

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

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

Where a collection system parallels a water supply pipe and a nine-foot separation distance cannot be achieved, Section 217.53 (d)(3)(A)(i) requires a collection system pipe be constructed of cast iron, ductile

iron, or PVC meeting ASTM specifications with at least a 150 pounds per square inch (psi) rating for both the pipe and joints. The proposed project will comply with these requirements.

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

Project Materials (Bedding):

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

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

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

Project Materials (Manholes):

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

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

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

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

The materials specified for manhole construction are **precast concrete.**

Project Materials (Manhole Covers):

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

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

Minimum and Maximum Slopes

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

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

Pipe Diameter: ***8" (NR and 160 psi)*** Min. Slope: ***0.50%*** Max. Slope: ***7.0%***

Backfill

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

Trenching

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

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

Minimum and Maximum Trench Width

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

Pipe Diameter: ***8" (NR)*** Min. Trench Width: ***22***" Max. Trench Width: ***34"***
Pipe Diameter: ***8" (160 psi)*** Min. Trench Width: ***23***" Max. Trench Width: ***35"***

These trench widths account for the bell diameter.

Corrosion Prevention

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

Manholes (General)

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

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

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

Manhole Spacing:

Pipe Diameter: ***8"*** Max. Spacing: ***344.57 LF***

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

Manholes (Inverts)

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

Manholes (Ventilation)

Watertight manholes are proposed for this SCS; as a result, every third manhole will be vented. Vents will minimize inflow. Please see SAWS Detail DD-852-02.

FLEXIBLE PIPE COMPUTATIONS

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

Live Load Calculations

Minimum burial depth without concrete encasement is eight (8) feet. Based on Table 6-6 Live Loads on PVC pipe (from Uni-Bell Handbook for PVC) for this sewer line would be 0.69 psi.

Buckling Pressure Calculations

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

The value of H for use in these calculations is twenty (20) feet as it exceeds the maximum burial depth for this line. The value of γ_s equals 143 pcf is a conservative value based on a dry unit weight of 135 pcf and a moisture content of 6%. This value is conservative as it corresponds to saturated unit weights of commonly used backfill materials. Please see information from Raba-Kistner provided in Appendix C.

Allowable Buckling Pressure:

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

$$q_a = 0.4 * \sqrt[2]{32 * 1 * 0.49 * 400(400{,}000 * 0.003/8.08^3)} = 47.78 \ psi(8" \ PVC \ SDR \ 26, NR)$$

$$q_a = 0.4 * \sqrt[2]{32 * 1 * 0.49 * 400(400{,}000 * 0.003/8.29^3)} = 45.96 \ psi(8" \ PVC \ SDR \ 26, 160 \ psi)$$

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

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

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

$$B' = \frac{1}{1 + 4 * e^{-0.065(20)}} = 0.49$$

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

$$I = (0.323^3/12) = 0.003 in^3 \ (8" \ PVC, SDR \ 26, NR)$$

$$I = (0.332^3/12) = 0.003 in^3 \ (8" \ PVC, SDR \ 26, 160 \ psi)$$

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

$$D = 8.40 inches - 0.323 inches = 8.08 inches (8" PVC, SDR 26, NR)$$

$$D = 8.625 inches - 0.332 inches = 8.29 inches (8" PVC, SDR 26, 160\ psi)$$

Where:

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

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

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

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

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

B' = Empirical coefficient of elastic support

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

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

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

t = Pipe structural wall thickness (in)

D = Mean pipe diameter (in)

D_o = Pipe outer diameter (in)

Pressure Under Installed Conditions

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

$$q_p = 0.0361 * 0 + 1 * (166.89/8.08) + 0.69 = 21.34\ psi (8" PVC, SDR 26, NR)$$

$$q_p = 0.0361 * 0 + 1 * (171.24/8.29) + 0.69 = 21.34\ psi (8" PVC, SDR 26, 160\ psi)$$

Where:

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

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

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

L_l = Live load (lbs)

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

$$W_c = 143 * 20 * (8.08 + 0.323)/144 = 166.89 lb/in (8" PVC, SDR 26, NR)$$

$$W_c = 143 * 20 * (8.29 + 0.332)/144 = 171.24 lb/in (8" PVC, SDR 26, 160 psi)$$

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

D = Mean pipe diameter (in)

Pipe Diameter: ***8" (NR)*** Pipe Material: ***PVC, SDR 26*** q_a: ***47.78*** q_p: ***21.34***

Pipe Diameter: ***8" (160 psi)*** Pipe Material: ***PVC, SDR 26*** q_a: ***45.96*** q_p: ***21.34***

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

Wall Crushing Calculations

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

$$H = (24 * P_c * A)/(\gamma_s * D_o)$$ (*Equation 8)*

$$A = t(in) \times 12(in/ft)$$ (*Equation 9)*

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

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

D_o = outside pipe diameter, in.

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

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

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

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

24 = conversions and coefficients

Installation Temperature Effects

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

Tensile Strength

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

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

Strain

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

Modulus of Soil Reaction

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

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

The modulus of soil reaction for the in-situ soil, E'_n, is **3,000 psi**

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

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

Zeta Calculation

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

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

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

$$zeta = \frac{1.44}{1.22 + (1.44 - 1.22) * 0.13} = 1.15 (8" \, PVC \, SDR \, 26, 160 \, psi)$$

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

$$f = \frac{34/8.40 - 1}{1.154 + 0.444 * (34/8.40 - 1)} = 1.22 (8" \, PVC, SDR \, 26, NR)$$

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

Where:

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

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

Pipe Diameter: ***8” (160 psi)*** Trench Width: ***35"*** Zeta: ***1.15***

Pipe Stiffness

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

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

Deflection

Maximum allowable deflection in installed lines is 5% (per 30 TAC 217), as determined by the deflection analysis and verified by a mandrel test. It is recommended that the percent of vertical deflection is below this range; however, a 7.5% deflection limit (recommended by ASTM D3034) provides a conservative factor of safety against structural failure (Handbook of PVC Pipe, page 249).

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

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

$$\Delta Y/D(\%) = \frac{(0.096)(19.86 + 0.69)*100}{(0.149*115) + (0.061*1.15*400)} = 4.37\% \text{ for } 8" \text{ NR pipe}$$

$$\Delta Y/D(\%) = \frac{(0.096)(19.86 + 0.69)*100}{(0.149*115) + (0.061*1.15*400)} = 4.37\% \text{ for } 8" \text{ 160 psi pipe}$$

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

$$L_p = \frac{143*20}{144} = 19.86 \text{ psi}$$

%ΔY/D = Predicted % vertical deflection under load

ΔY = Change in vertical pipe diameter under load

D = Undeflected mean pipe diameter (in)

K = Bedding angle constant

γ_s = Unit weight of soil (pcf)

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

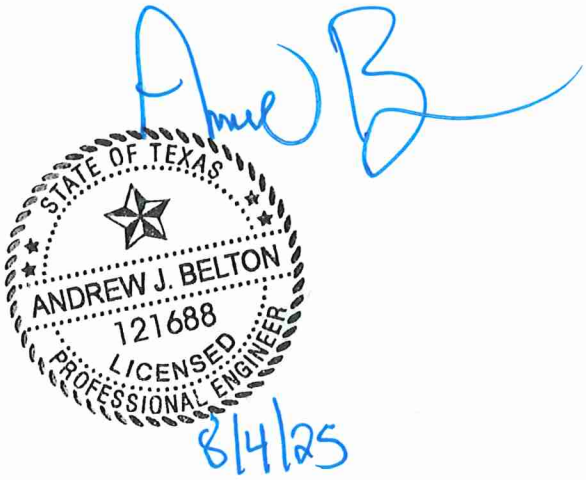
L_p = Prism load (psi)

Type of Pipe Material	P_s (psi)	Zeta Factor Assumed or Calculated	E_b (psi)	% Deflection
8" PVC SDR 26 (NR)	*115*	*1.15*	*400*	*4.37*
8" PVC SDR 26 (pressure-rated)	*115*	*1.15*	*400*	*4.37*

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

ELLE MULTIFAMILY
Engineering Design Report
8" PVC SDR 26

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



APPENDIX A (TABLES)

Table 5 - Water Line Crossings

Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance (ft)
"A"	0+58.00	Crossing	--	1.30
"A"	1+16.00	Crossing	--	3.05

APPENDIX B (SOIL UNIT WEIGHT VALUES)

Raba Kistner

January 14, 2009

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

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

Dear Mr. Forster:

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

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

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

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

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

STATE OF TEXAS
CHRIS L. SCHULTZ
80680
LICENSED
PROFESSIONAL ENGINEER
1/14/09

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

CLS/mem

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

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

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

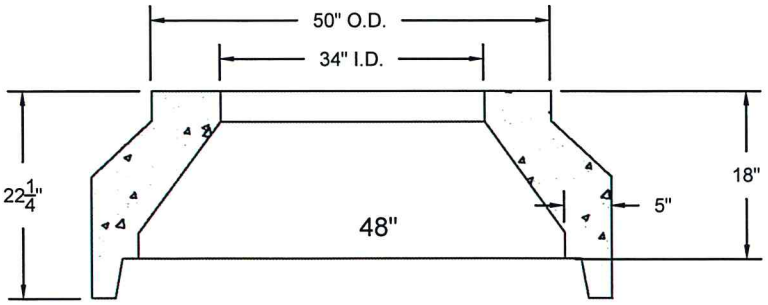
Specification 852: Sanitary Sewer Manholes
https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20852%20Sanitary%20Sewer%20Manholes.pdf

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

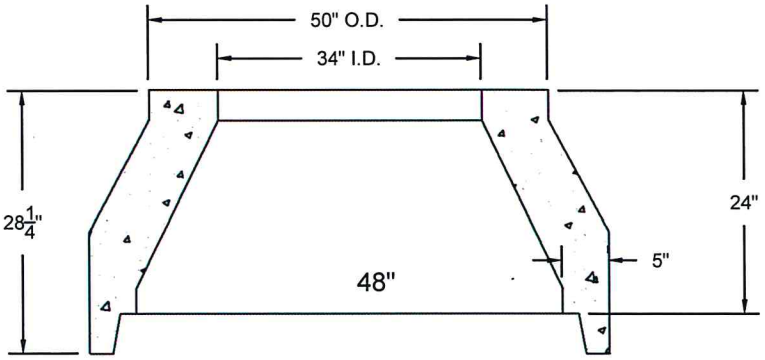
Specification 804: Excavation, Trenching and Backfill
https://apps.saws.org/business_center/specs/constspecs/docs/conspecs_2021/ITEM%20NO.%20804%20Excavation%20Trenching%20and%20Backfill.pdf

48" Dia. Concentric Cones

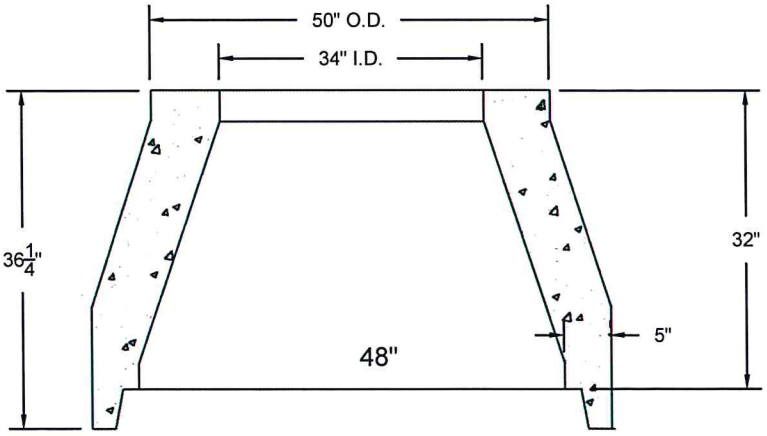
18" Yeild



24" Yeild



32" Yeild



NOTES:

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

Charlotte's Concrete, Inc.

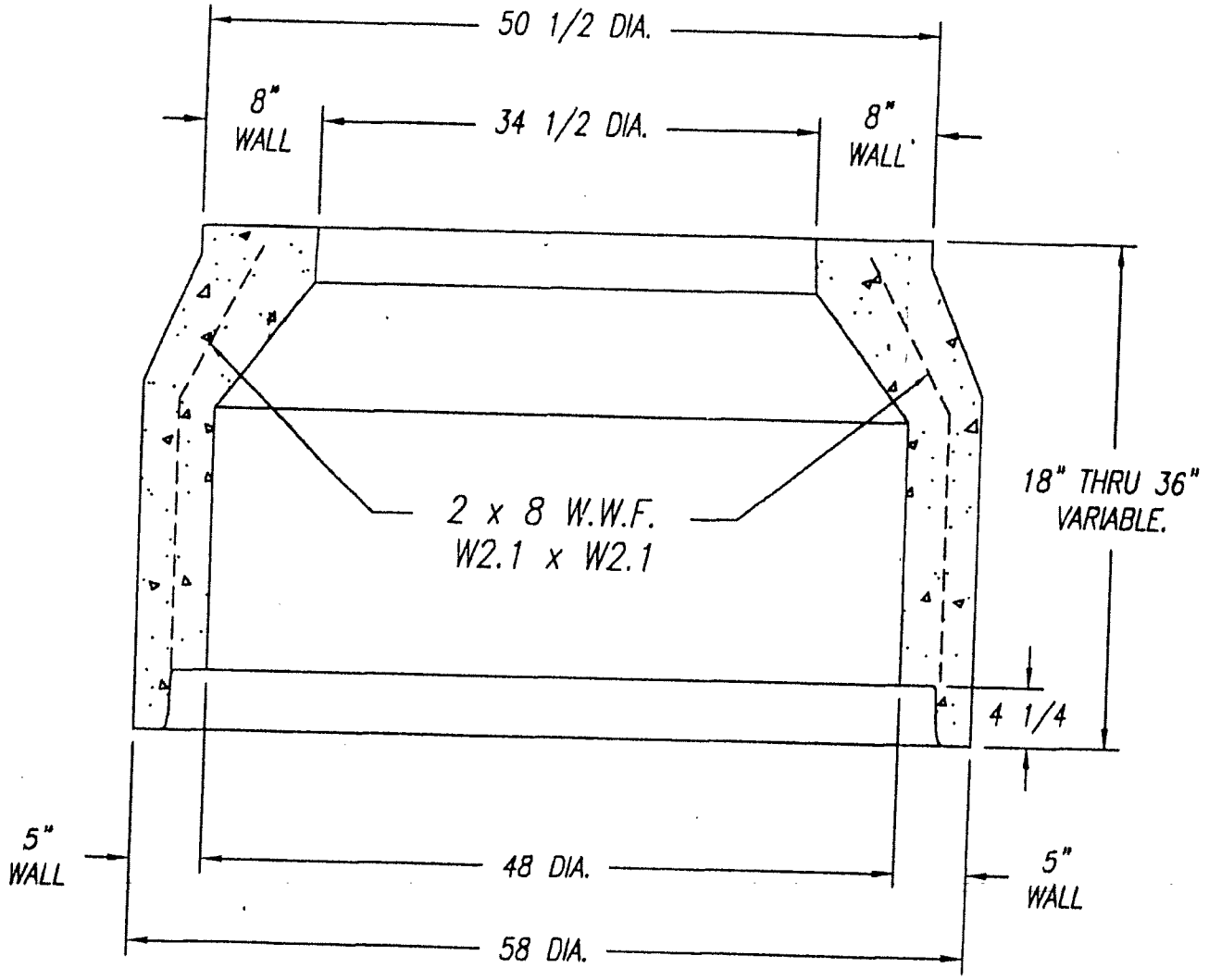
Charlotte's Concrete, Inc.
4950 Lane Dr.
San Antonio, Tx. 78263
Ph. (210) 648-4774

NPCA CERTIFIED PLANT

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

PRE-CAST MANHOLE DRAWINGS & SPECIFICATIONS

\APPROVAL\CONCENTRIC.DWG



(7R JOINT)

REF. FORM DWG. 3-303-5561

INTERNATIONAL PIPE MACHINERY CORP.

QUINN

MACHINE & FOUNDRY CORP.

A MEMBER OF THE BESSER FAMILY OF COMPANIES

BOONE, IOWA U.S.A.

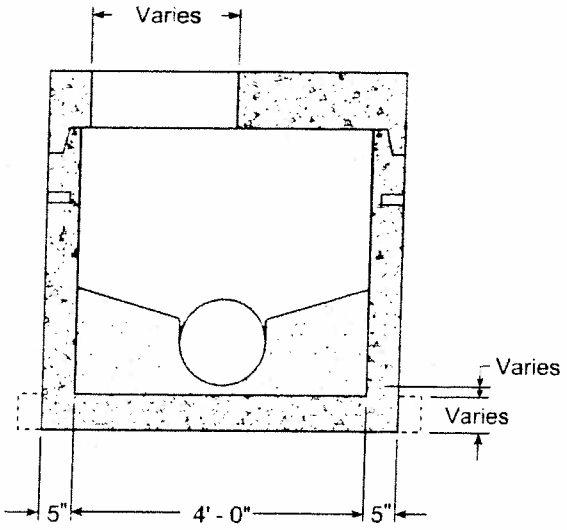
THIS PRINT IS THE PROPERTY OF INTERNATIONAL PIPE MACHINERY CORP. IT IS CONFIDENTIAL AND NOT TO BE REPRODUCED WITHOUT OUR EXPRESSED PERMISSION AND MUST BE RETURNED UPON REQUEST.

CHARLOTTES

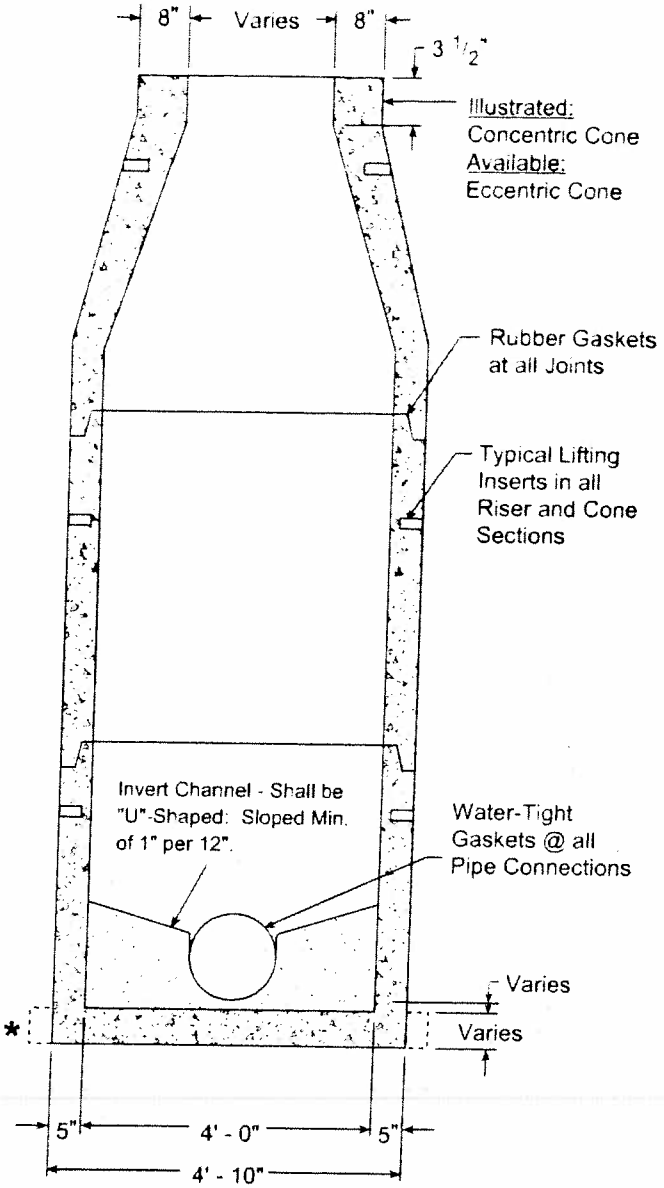
48 x 5 x 34 1/2 x 8 x 36 & 18

CONCENTRIC CONCRETE SECTION

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



Flattop Illustration
for Shallow Manhole



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

Materials & Features

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

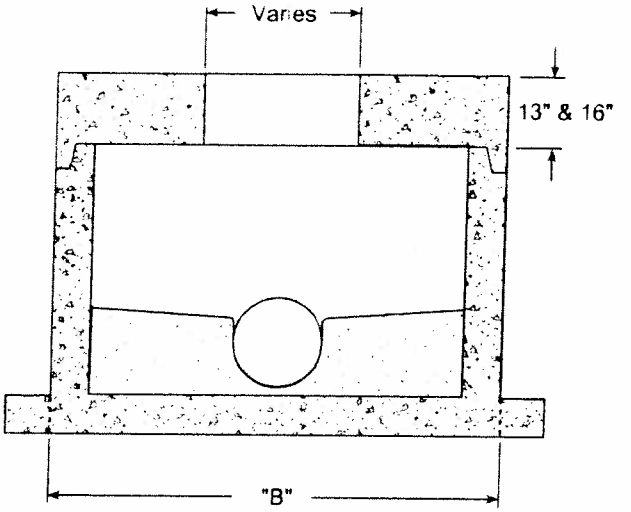
* - Extended base is available to meet local requirements.

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

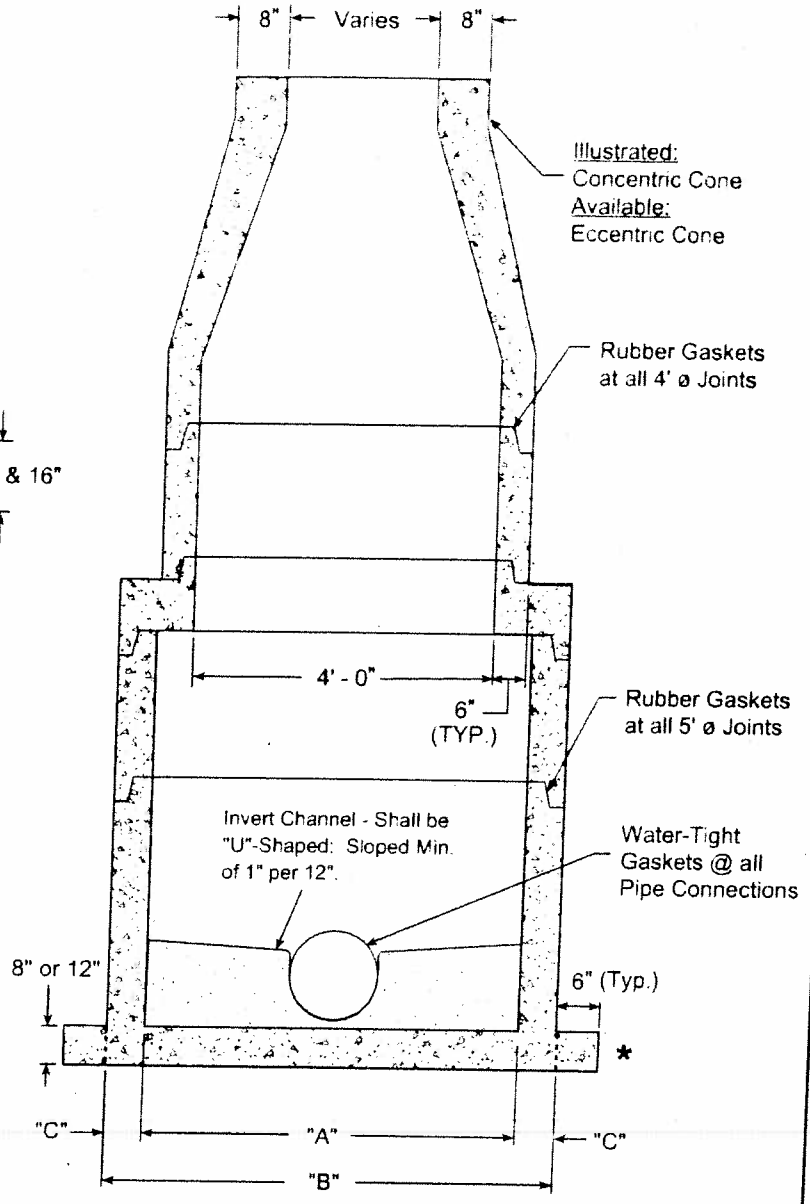
"Manufactured to your specifications."

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

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



Flattop Illustration
for Shallow Manhole



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

Materials & Features

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

"Manufactured to your specifications."

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

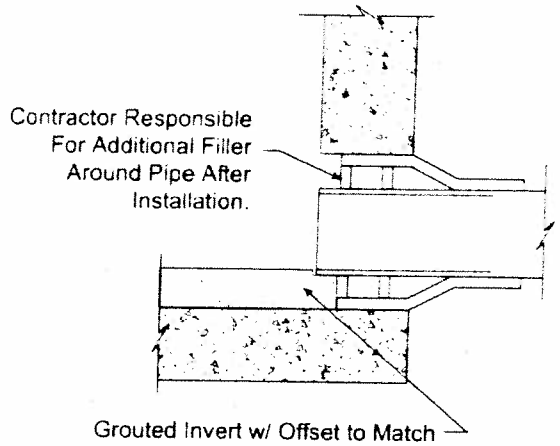
-No Scale-
All dimensions subject to allowable specification tolerances.

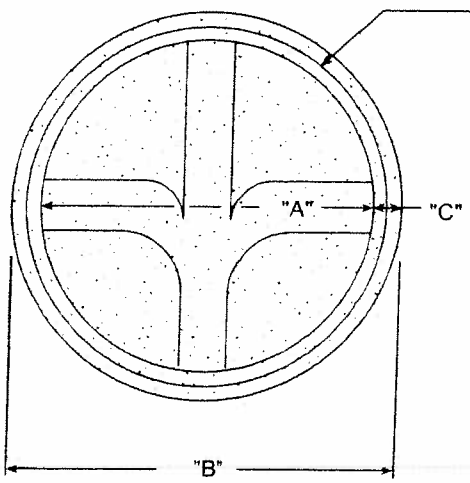
TITLE	PLANT	STATE	SECTION-PAGE	DATE
5'/4' & 6'/4'I.D. Manhole **Extended Base w/Reducing Cone**	All Plants	TX	5.6	08-15-06

Hanson

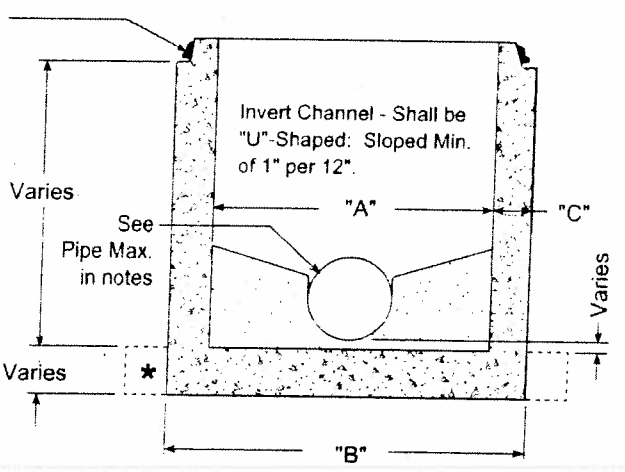
Precast Manholes

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





Plan View



Section View

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

Materials & Features

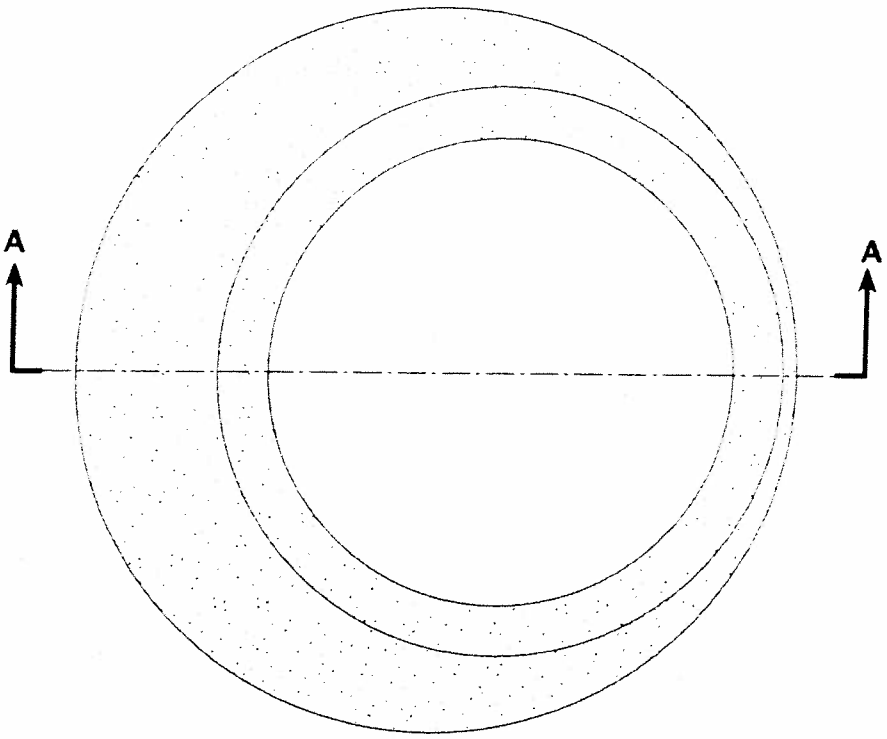
HOLES AS SPECIFIED:
- For 4' I.D. max. diameter = 32"
- For 5' I.D. max. diameter = 40"
- For 6' I.D. max. diameter = 54"

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

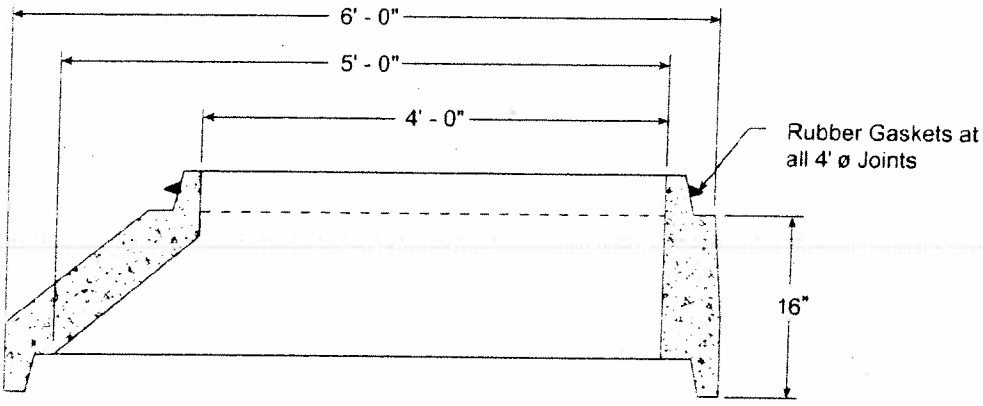
-No Scale-
All dimensions subject to allowable specification tolerances.

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

Hanson



Plan View



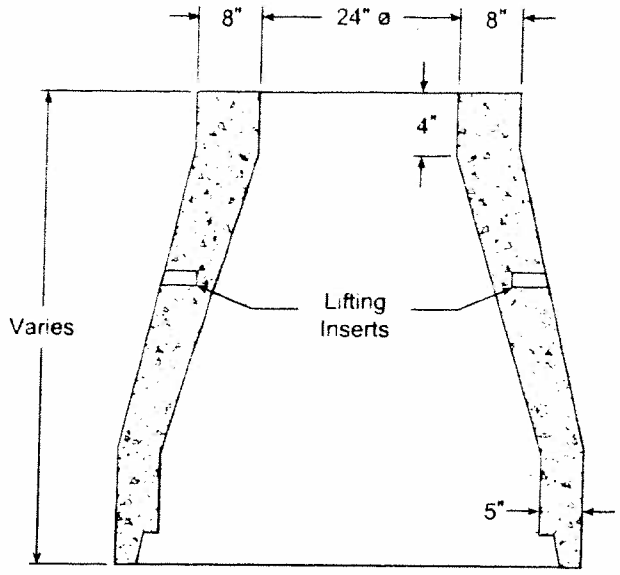
Section View

Materials & Features

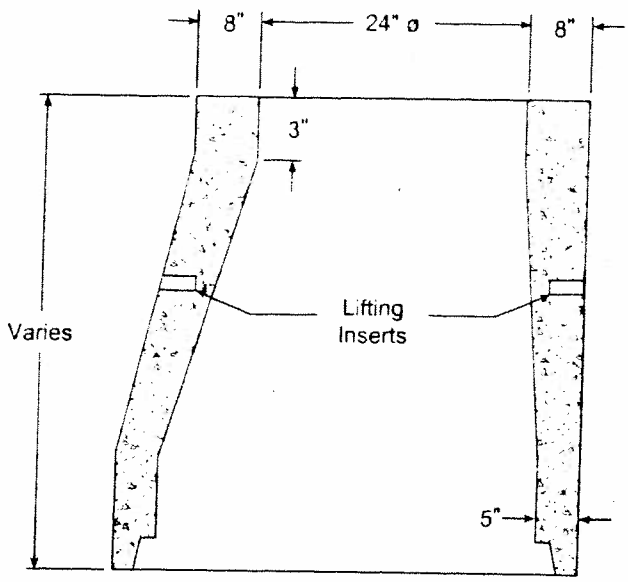
CONCRETE. 5,000 PSI. 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
CONSTRUCTION OF PRECAST is in accordance with ASTM C478.
Concrete is poured according to ACI-500.

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

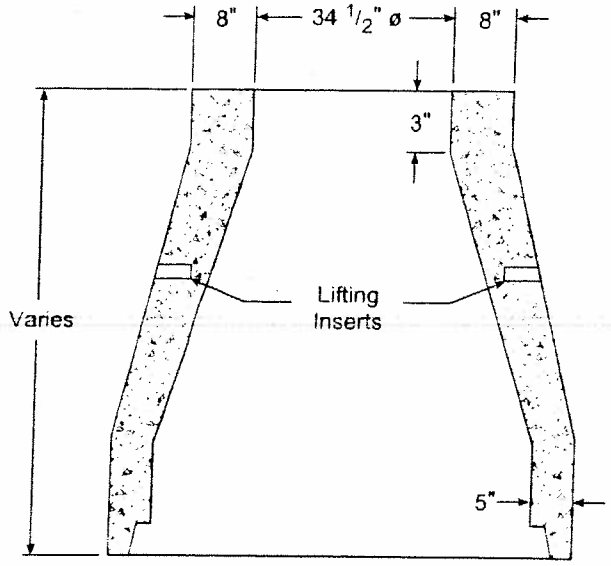
TITLE	PLANT	STATE	SECTION.PAGE	DATE	
5' x 4' Conical Adaptor	Waco	TX	5 8	08-15-06	Hanson



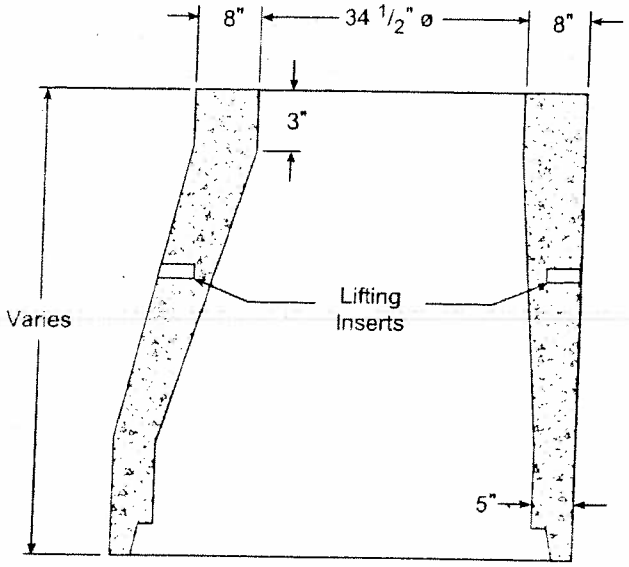
Concentric Cone
24" ø Opening



Eccentric Cone
24" ø Opening



Concentric Cone
34 1/2" ø Opening



Eccentric Cone
34 1/2" ø Opening

Materials & Features

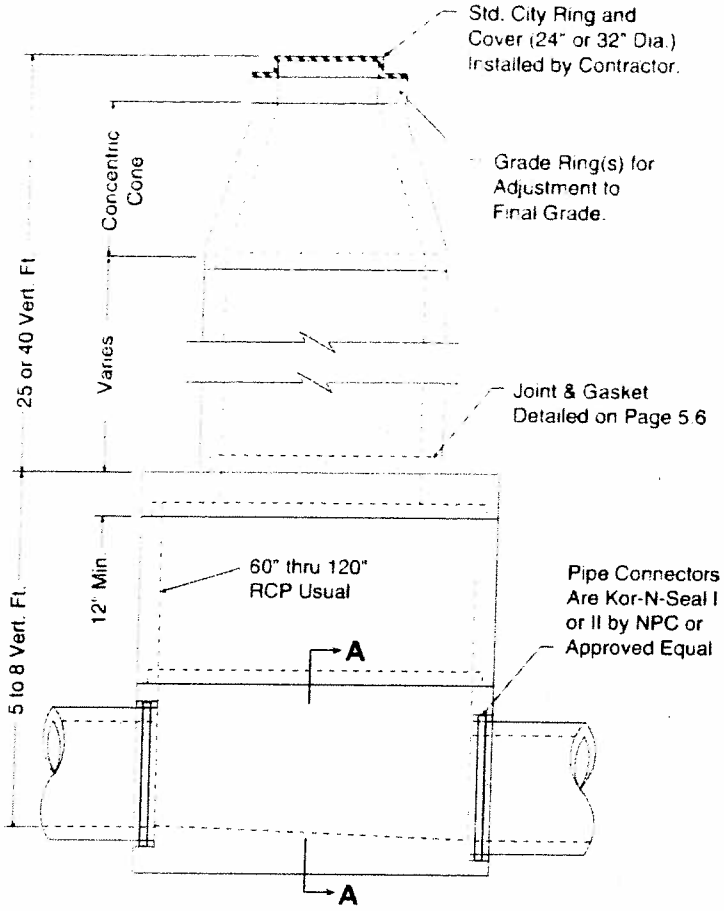
CONCRETE: 5,000 PSI, 28 day strength.
REINFORCING: Meets or exceeds ASTM C478 requirements.
30" ø also available in North Texas.

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

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

Hanson

Precast Manholes



w/ Precast Base



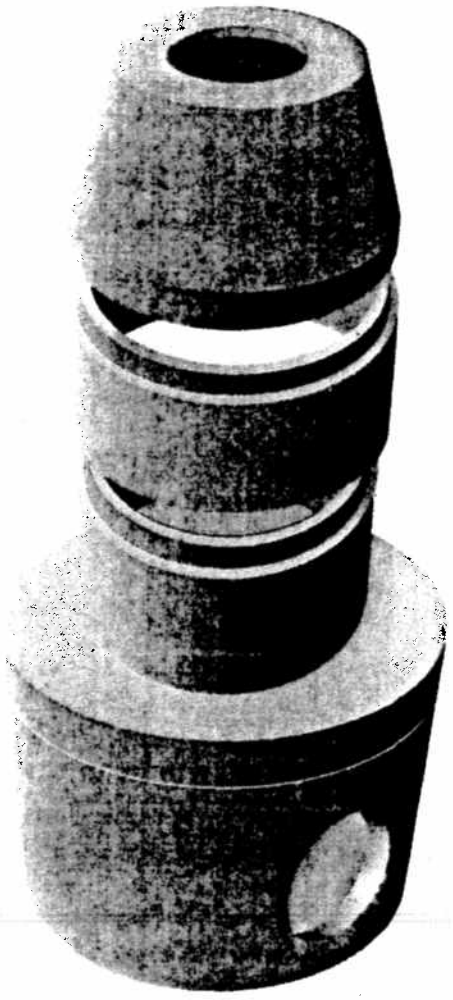
Section A-A

Base Slab Reinforcing

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

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

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



Isometric View

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

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

REINFORCING to meet AASHTO HS 20-44 Loading.

DESIGN EQUAL TO OR EXCEEDS ASTM C-478

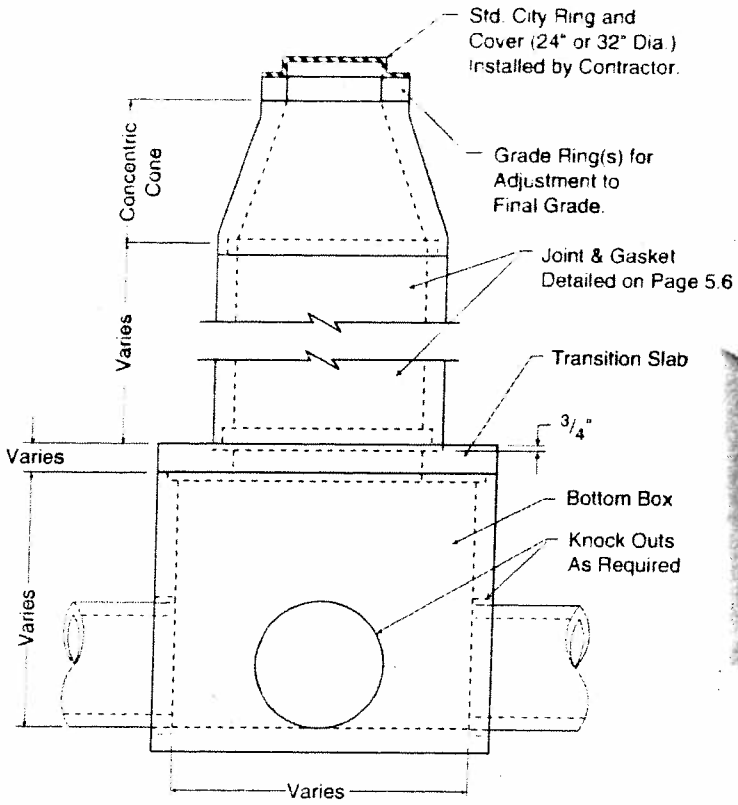
In the event a boot is loose contact your Hanson representative to resolve.

Note:

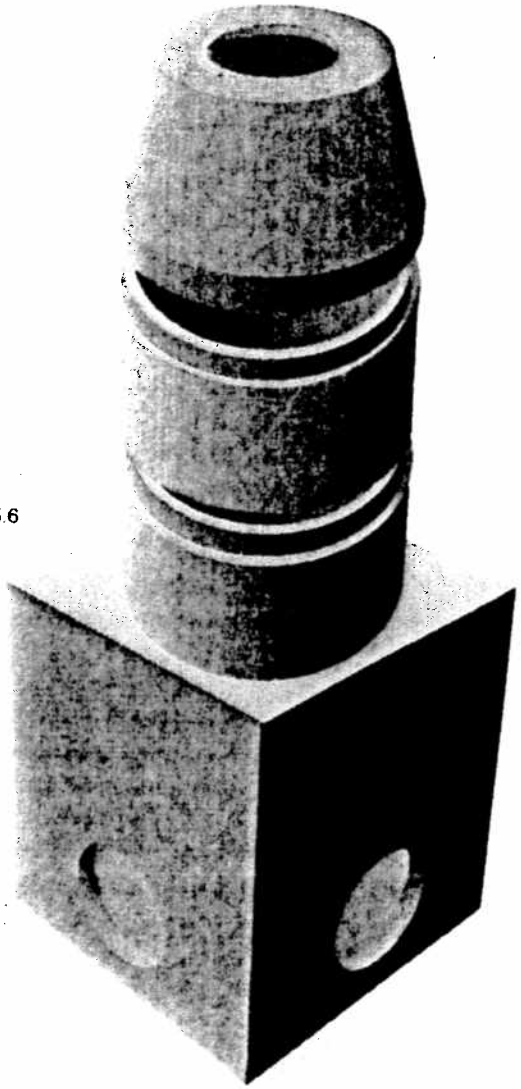
- Inverts shall be specifically sized for connecting pipes; and shall be U-Shaped with the min. depth 3/4 of the largest pipe diameter.

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

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



Side View



Isometric View

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

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

REINFORCING to meet AASHTO HS 20-44 Loading.

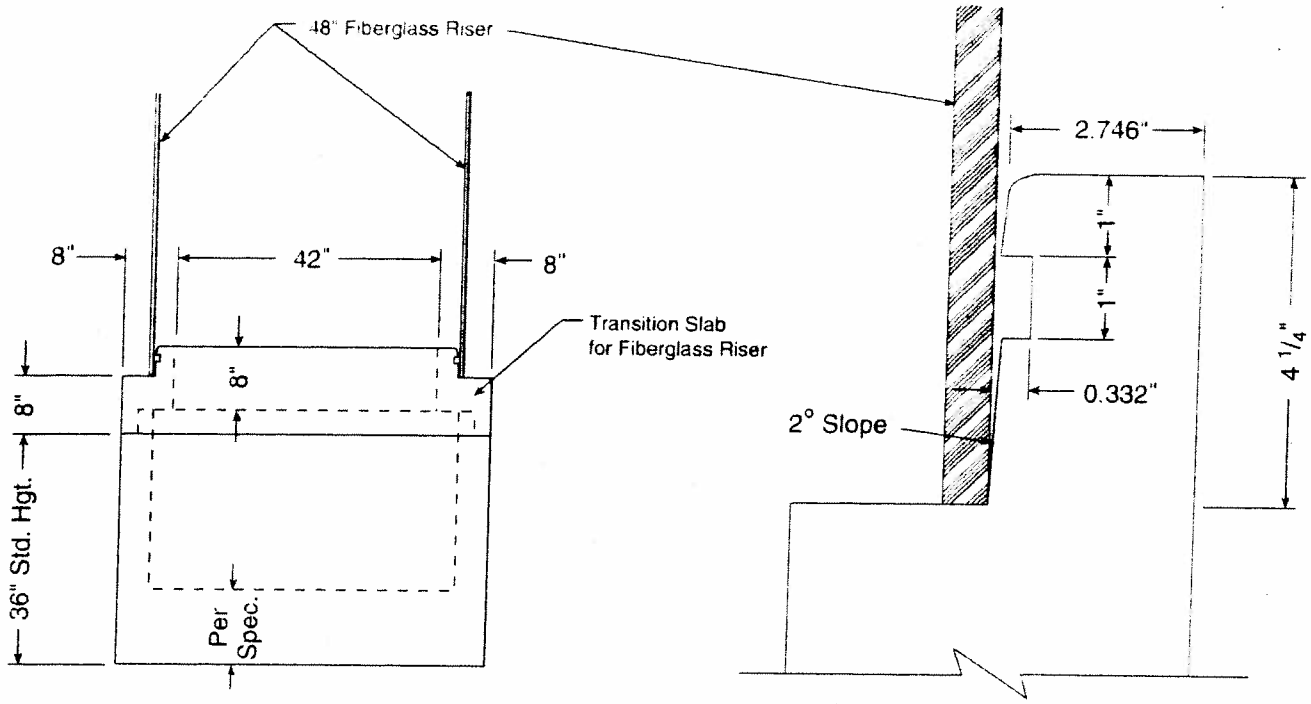
BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

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

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

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



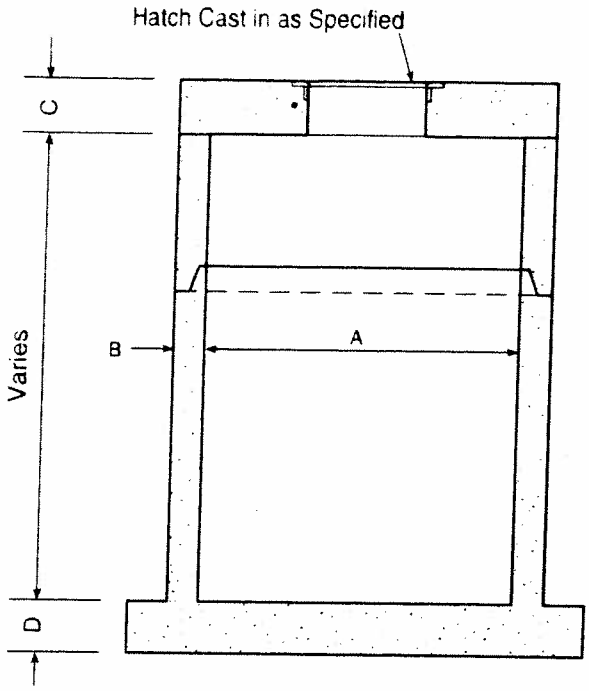
Profile **Joint Detail**

Materials & Features

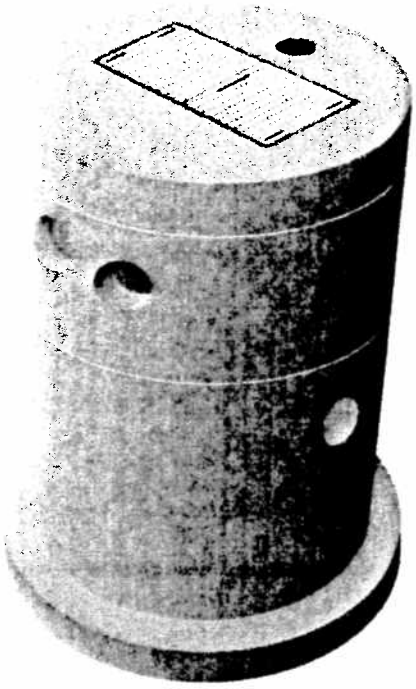
CONCRETE: 5,000 PSI in 28 days.
REINFORCING STEEL: per ASTM A-615, Grade 60.
REINFORCING to meet AASHTO HS 20-44 Loading.
DESIGN EQUAL TO OR EXCEEDS ASTM C-478

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

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

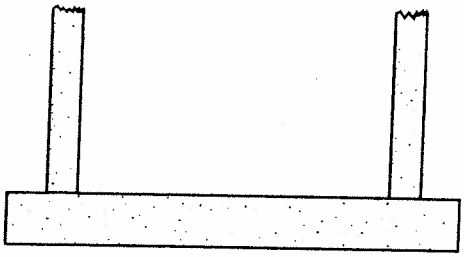


Section View
(Base configuration for 60", 72" & 84")

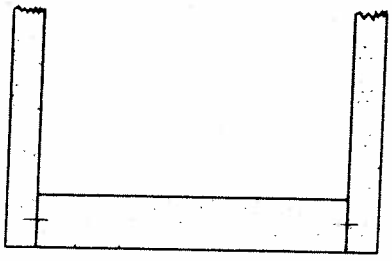


Isometric View

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



Section View
Base configuration for 96"



Section View
Base configuration for 108"-144"

Materials & Features

CONCRETE: 5,000 PSI in 28 days.

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

REINFORCING to meet AASHTO HS 20-44 Loading.

BASE DESIGN EQUAL TO OR EXCEEDS ASTM C-357

RISER DESIGN EQUAL TO OR EXCEEDS ASTM C-478

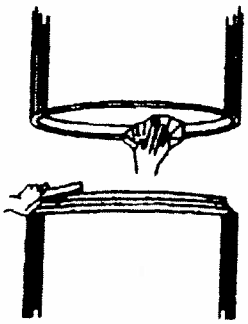
(A). Hatches as specified by Engineer.

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

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

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

① "O"-Ring Gasket

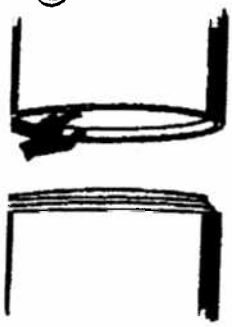


Carefully clean all dirt & foreign objects from the joining surface of the bell or groove end of pipe.

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

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

② Lubricate bell joint surface liberally, covering entire inside surface using proper pipe gasket lubricant.



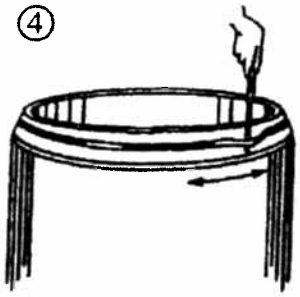
③



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

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

④

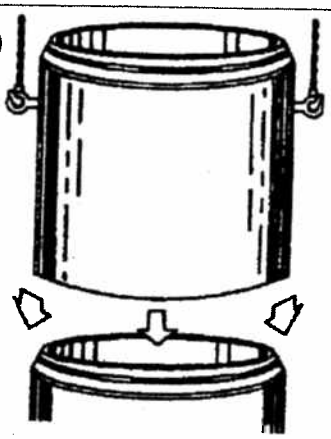


IMPORTANT

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

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

⑤



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

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

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

Profile Gasket

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

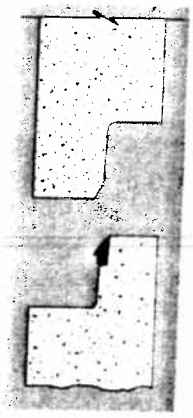


Fig. A

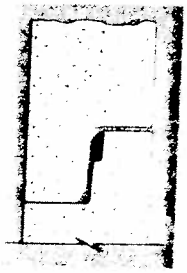
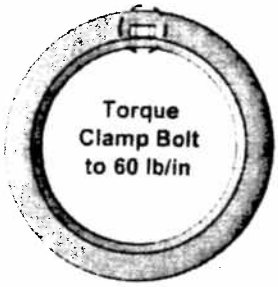


Fig. B

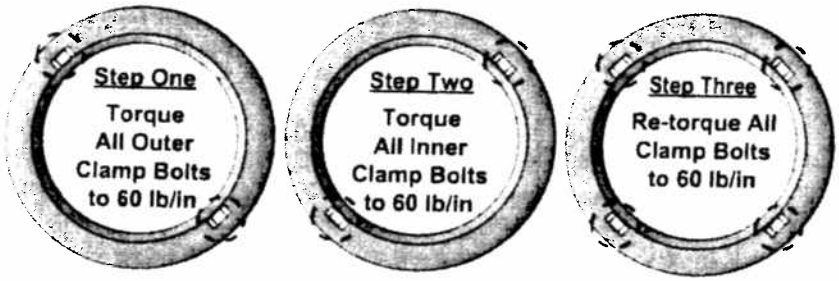
Note: *Manholes in excess of 30' in depth must be vacuum tested prior to backfill. The loads presented by soils and possible groundwater at 30' in addition to the load from the vacuum may exceed the design capacity of the pipe to manhole connector.*

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

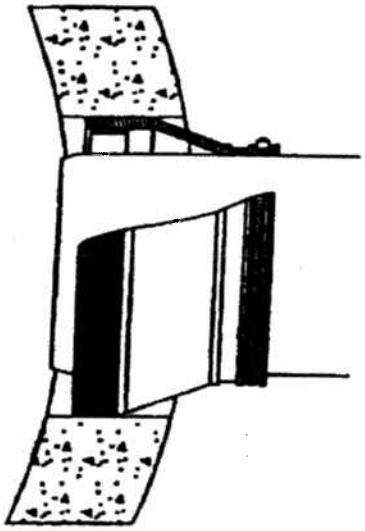
Hanson



Single Clamp



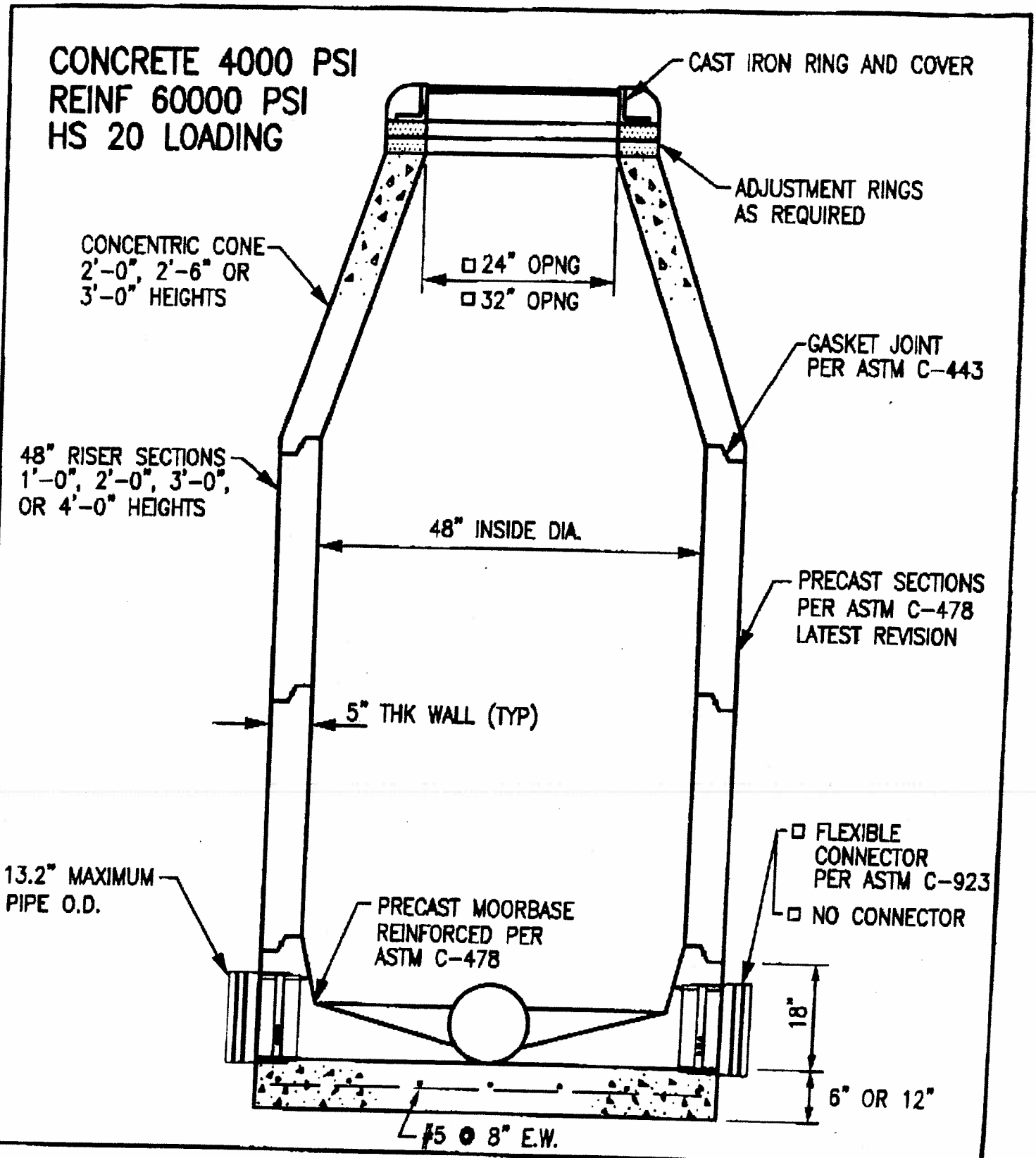
Multiple Clamps



Instructions

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

For more information contact yor local Hanson Representative.



Rinker MATERIALS Moor-Tex
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FAX:(979) 885-7001

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

48" PRECAST CONCENTRIC MANHOLE WITH MOORBASE

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

LIFT STATION/FORCE MAIN SYSTEM APPLICATION (TCEQ-0624)

SAWS LIFT STATION #209 UPGRADES

Engineering Design Report

PAPE-DAWSON ENGINEERS

Transportation | Water Resources | Land Development | Surveying | Environmental

SAWS LIFT STATION #209 UPGRADES

Engineering Design Report



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SAWS LIFT STATION #209 UPGRADES
Engineering Design Report

SEWER SYSTEM INFORMATION

Introduction

The purpose of this report is to define the proposed upgrades to the existing SAWS Vineyard lift station (LS #209), located along of the North Loop 1604 W access road and just east of Blanco Springs Road in San Antonio, Texas (see Exhibit 1). The lift station and force main system is located over the Edwards Aquifer Recharge Zone. According to record drawings provided by SAWS, it appears that the lift station was built in 1996. The LS #209 facility currently conveys flows for 491 equivalent dwelling units (EDU) over a sewershed of 194 acres.

Per SAWS draft Utility Service Agreement #38099, the proposed 9.6-acre Elle MF multi-family development will produce sanitary sewer flow originating from 159 EDU. The sanitary sewer flow from this development will be conveyed to SAWS LS #209.

Upon completion of the Elle MF development a total of 650 EDU within a total sewershed area of 204 acres will be conveyed to LS #209.

Existing Lift Station and Force Main Features and Proposed Upgrades

The existing lift station is composed of an eight-foot diameter pre-cast concrete wetwell. The top of the wetwell is at approximate elevation 978.50 and the invert elevation is 960.50 for a depth of 18 feet. The lift station is served by a duplex system of self-priming pumps, each with a discharge capacity of approximately 407 gallons per minute (gpm) based on wetwell drawdown testing performed by SAWS. Discharge flow is conveyed through a six-inch C900 PVC force main. The lift station operates automatically and is monitored by SAWS via SCADA. The lift station includes an onsite, diesel fueled emergency generator. Based on reviews of existing and proposed sanitary sewer manholes upstream of the lift station, the spill elevation at LS #209 appears to be at elevation 976.00. Under present operating conditions it appears that the lift station does not provide sufficient emergency storage to meet SAWS lift station design criteria.

A proposed eight-foot diameter drywell is proposed to be added to the existing wetwell in order to increase the emergency storage required to meet SAWS lift station design criteria. The drywell will be

connected or "hard-piped" one foot above the invert of the existing wetwell to increase lift station storage capacity. The existing duplex self-priming pumps appear to have a FIRM pumping capacity that exceeds the combination of anticipated increase in peak flows from the proposed Elle MF development and therefore will remain in place. Since there are no proposed upgrades to the existing pumps, no upgrades are required to be made to the electrical and controls system, including the existing emergency generator. In addition, the existing force main will not require any rehabilitation or resizing and shall remain in place.

PUMP STATION AND FORCE MAIN DESIGN CALCULATIONS

Average Dry Weather Flow

A combined total of 650 EDUs will flow to the lift station. Per the SAWS Sanitary Sewer Guidelines, the average daily flow is estimated to be 200 gallons per day (gpd) per EDU. This yields an average daily flow of 130,000 gallons (650 EDUs x 200 gpd). Dividing by 1,440 minutes/day give a flow of approximately 90 gpm.

Peak Dry Weather Flow

To determine peak wet weather flow, a component must be added to the average daily flow. A peaking factor of 2.5 (per SAWS) was applied to the average daily flow (650 EDU x 200 gallons/day x 2.5)/1,440 minutes/day and results in peak flow of approximately 225 gpm.

Peak Wet Weather Flow

Per SAWS guidelines, an inflow and infiltration (I&I) rate of 600 gallons per-acre-per-day was applied to the 204 acres that contribute flows to the LS #209. The I&I flow was calculated to be approximately 85 gpm (204 acres x 600 gallons/acre/day/1,440 min/day). The peak wet weather flow is the sum of the peak flow and the I&I flow (225 gpm + 85 gpm) and results in a flow of approximately 310 gpm.

Minimum Dry Weather Flow

The minimum dry weather flow is used to determine the maximum detention time in the wetwell. The formula used for computing the minimum dry weather flow[1] is:

$$MDWF = 0.2 \times (0.0144 \times ADF)^{.198} \times ADF,$$

where:

MDWF	=	minimum dry weather flow, gallons per minute
ADF	=	average dry weather flow, gallons per minute

Using the above equation and an average dry weather flow of 90 gpm gives a value of approximately 19 gpm for the minimum dry weather flow.

Existing Pump Conditions

Based on the anticipated peak wet weather flow of 310 gpm, SAWS requires that the lift station be equipped with a duplex pump system where each pump can convey the anticipated peak wet weather flow. The existing pumps at LS #209 consist of 25 horsepower (hp) Hydromatic 40MP/MPSF self-priming pumps with 9-5/32" impellers. According to the record drawings provided by SAWS, the discharge design point of the pumps is 480 gpm. However, to verify the discharge capacity a drawdown test was performed by SAWS staff on each pump for three cycles. From the drawdown testing it was noted that the current discharge capacity of each pump averaged 407 gpm. Earlier calculations have shown that the anticipated combined peak wet weather flow will be approximately 310 gpm. Therefore, the existing pumps appear to have sufficient capacity to convey the increased peak wet weather flow that will be coming to LS #209.

Existing Force Main

The existing force main that conveys sanitary sewer flow from this lift station is approximately 1,755 feet in length and consists of 8-inch C900 PVC force main, with a minimum working pressure rating of 150 PSI (DR 18). As described earlier, no modifications are required to the existing self-priming pumps, therefore, no modifications are required to the existing force main.

[1] For the purpose of this design, SAWS Lift Station Guidelines will be used where no other guidelines are available.

Storage Requirements

It is proposed to add an eight-foot diameter drywell to provide additional storage to the existing eight-foot diameter wetwell to increase the emergency storage at the site. The combined area of the existing wetwell and proposed drywell is approximately 100.53 square feet (with an equivalent combined diameter of approximately 11.3 feet). The equivalent diameter was used in calculations to estimate the resultant storage capacity of the upgraded lift station. The drywell will be connected to the wetwell one foot above the invert of the wetwell (961.5) via an 8-inch DR 26 PVC pipe which will allow the incoming flows into the wetwell to distribute into the drywell and provide additional storage capacity.

According to SAWS the following pump operating levels are being used at LS #209:

- -Wetwell Invert Elevation: 960.5
- -All Pumps Off Elevation: 962.5
- -Lead Pump On Elevation: 965.0
- -Lag Pump On Elevation: 965.5

The required wetwell volume (volume between the "Lead Pump On" Elevation and the "All Pumps Off" Elevation) is governed by TCEQ Regulations (30 TAC 217.60(b)(7) Table C.5, December 5, 2015) which states that submersible pump cycle time, based on peak flow (310 gpm), for pumps with motors less than 50 horsepower, must equal or exceed 6 minutes. This rule can be described by the following equation:

$$V_r = (Q^* T)/4$$

Where V_r is the required volume in gallons, Q is the peak wet weather flow (310 gpm), and T is 6 minutes for submersible pumps with a motor less than 50 horsepower.

Alternatively, SAWS lift station design criteria requires 13 minutes (T) of wetwell cycling at the Pumped Flow rate (Q=407 gpm).

At present, SAWS is currently using a lead pump on elevation of 965.00 and an all pumps off elevation of 962.50. When divided by the gallons per foot of the combined volumes of the wetwell and drywell (750 gal/ft), the retention chamber volume (V_r) is approximately 1,875.5 gallons.

Under the TCEQ design criteria discussed earlier, using the peak wet weather flow rate of 310 gpm, the required volume in gallons for a six-minute run time for the LS #209 is 466.5 gallons. Using a combined equivalent diameter wetwell of 11.3 feet gives a minimum depth of approximately 0.62 feet between the "First Pump On" and the "All Pumps Off" Elevations. The minimum Vr depth required by TCEQ of 0.62 feet is exceeded by the existing 2.5 feet of depth (1,875.5 gallons) between the "lead pump on" elevation and the "all pumps off" elevation currently being used by SAWS at LS #209.

The minimum Vr depth required by SAWS lift station design criteria, based on 13 minutes of cycle time at the pumped flow rate of 407 gpm, is approximately 0.41 feet (305 gallons) and is exceeded by the existing 2.5 feet of operating depth (1,875.5 gallons) between the "lead pump on" elevation and the "all pumps off" elevation when using the combined equivalent wetwell diameter of 11.3 feet.

LS #209 is located over the Recharge Zone of the Edwards Aquifer. To prevent discharge of wastewater from the lift station, TCEQ Rule 217.63(i) allows for use of an onsite generator as a system for preventing a discharge. LS #209 incorporates an onsite, diesel fueled emergency power generator to power the entire lift station facility in the event of a power outage. SAWS requires that the emergency storage in the combined volume of the wetwell and drywell be sufficient to retain 60 minutes of average dry weather flow (90 gpm) when an onsite emergency generator is available. Measured from the "lead pump on" elevation of 965.00 to the overflow elevation of 976.00 provides 11 feet of available emergency storage depth in the combined area/volume of the wetwell and drywell .

The SAWS required emergency storage volume is calculated by determining 60 minutes of average dry weather flow (60 min. x 90 gpm). The resultant required storage volume is 5,400 gallons. Based on the equivalent diameter of the combined wetwell and drywell area (11.3 feet), it can be calculated that the volume per foot of depth of the combined wetwell and drywell is approximately 750 gallons per foot of depth. The required amount of storage depth can then be calculated by dividing the required storage

volume by the combined volume of the wetwell and drywell (5,400 gallons/750 gallon per foot), which results in a required emergency storage depth of approximately 7.20 feet.

With the addition of the eight-foot diameter drywell an emergency storage depth of 11 feet will be provided and exceeds the required emergency storage depth of 7.20 feet, based on the existing operating levels within the wetwell that SAWS is currently employing at the site.

Buoyancy Calculations

A buoyancy check was performed for the dry well. It must be shown that the combined weight of the dry well, and concrete slabs is greater than the maximum buoyancy force that the system can encounter. The force of buoyancy (F_B) can be described by the following equation:

$$F_B = W_G \pi \left(\frac{D}{2}\right)^2 d$$

where:

W_G = specific weight of water (approximately 62.4 lbs/ft^3)

D = diameter of the dry well, feet

d = empty depth of the dry well, feet.

The empty depth of the dry well can be determined by subtracting the "All Pumps Off" Elevation from the top elevation of the dry well. This will give the maximum possible volume of the empty dry well. See Table 1 below for the calculation of the buoyancy force that the dry well could be subject to.

Table 1. Buoyancy Force Calculation

Item (units)	Value
Specific Weight of Water (lb/ft^3)	62.4
All Pumps Off Elevation (ft)	962.5
Top of Drywell Elevation (ft)	977
Drywell Diameter (ft)	8
Buoyancy Force (lb)	45,480

The dry well is comprised of several components whose weight will counteract the buoyancy force calculated in Table 3 above. These components are the weight of the concrete slabs that constitute the top and bottom of the drywell; the weight of the stored sewage, the weight of perimeter above the foundation of the drywell, etc. See Table 2 for calculations of these weights and the total weight of the dry well.

Table 2. Dry Well Weight Calculation

Item (units)	Value
Drywell Top Slab Length (ft)	12
Drywell Top Slab Width (ft)	12
Top Slab Thickness (in)	12
Bottom Slab Length and Width (ft)	10
Bottom Slab Thickness (in)	12
Specific Weight of Concrete (lb/ft^3)	144
Volume of Perimeter Concrete Above Bottom Slab (ft^3)	769
Wetwell Depth (ft)	769
Dry Well Unit Weight (lb/ft of depth)	769
Weight of Dry Well (lb)	1,856
Specific Weight of Sewage (lb/ft^3)	62.4
Total Weight of Concrete Slabs (lb)	29,952
All Pumps Off Elevation (ft)	902.50
Dry Well Invert Elevation (ft)	961.53
Dry Well Diameter (ft)	8
Weight of Stored Sewage (lb)	3,042
Weight of Perimeter Concrete (lb)	110,793
Total Dry Well Weight (lb)	145,643

The buoyancy force was calculated in Table 3 to be approximately 45,480 pounds. The total dry well weight was calculated in Table 4 to be approximately 145,643 pounds. It appears that the dry well will not float in the event that it is submerged.

Detention Times and Cycle Times

The amount of time that sewage is detained in the wetwell and proposed dry well is important for several reasons. In order to avoid a septic situation, the waste must be removed in a reasonable amount of time. Per general practices, if the flow is detained in the wetwell for more than 180 minutes, odor control measures should be implemented. In addition, a minimum cycle time must be maintained based on the horsepower rating of the pump(s).

The detention times must be computed for Average Dry Weather Flow, Maximum Wet Weather Flow and Minimum Dry Weather Flow. The detention time (T_d) for the Average Dry Weather Flow and Minimum Dry Weather Flow can be computed as follows:

$$T_d = \frac{V_r}{i} + \frac{V_r}{Q - i}$$

where:

i	=	inflow
Q	=	outflow from the wetwell
V_r	=	volume of the wetwell and dry well between First Pump On and All Pumps Off

The volume (V_r) of the wetwell (between the "All Pumps Off" Elevation and the "First Pump On" Elevation) is 963.7 gallons as calculated in the Storage Requirements section of this report. The outflow (Q) from the wetwell is 407 gpm per the operating point of the pump when one pump is in operation.

Average Dry Weather Flow

Using a V_r equal to 1875.5 gallons (based on the existing operating levels in the existing wetwell) and the inflow (*i*) value of 90 gallons per minute for the Average Dry Weather Flow and the known parameters from the detention time equation shown above yields a detention time (T_d) of 27 minutes.

Minimum Dry Weather Flow

Using a V_r equal to 1875.5 gallons (based on the existing operating levels in the existing wetwell) and using the inflow value (*i*) of 19 gallons per minute for the Minimum Dry Weather Flow and the known parameters from the detention time equation shown above yields a detention time (T_d) of approximately 104 minutes. Note that this value represents the maximum detention time. Since the maximum detention time does not exceed 180 minutes, odor control measures are not necessary based on common engineering practices.

Peak Wet Weather Flow

Using a V_r equal to 1875.5 gallons (based on the existing operating levels in the existing wetwell) and the inflow (*i*) value of 310 gallons per minute for the Peak Wet Weather flow and the know parameters from the detention time equation shown above yields a detention time (T_d) of 26 minutes.

Total Cycle Times

The two proposed pumps at LS #209 will continue to alternate starts to equalize the wear on the two pumps. Therefore, under normal operation, the cycle time of Pump A can be described as the time that Pump A runs, plus the time that it takes for the lift station to fill again, plus the time for Pump B to empty the lift station, plus the time that it takes for the lift station to fill to the "First Pump On" elevation again.

The cycle time for the average and minimum dry weather flows can be determined by the following equation:

$$T_c = \frac{2\mathrm{V_r}}{i} + \frac{2V_r}{Q_1}$$

where:

T_c	=	total cycle time, minutes
V_r	=	storage volume in the wetwell and drywell (volume between the "All Pumps Off" Elevation and "First Pump On" Elevation), (1,875.5 gallons)
i	=	inflow into the lift station, gallons per minute
Q_1	=	rate of outflow from the lift station (w/1-pump operating), gallons per minute.

Table 3. Cycle Times Calculations

Flow	V_r (gal)	*i* (gpm)	Q_1 (gpm)	T_c (min)
Average Dry Weather	1,875.5	90	407	51
Minimum Dry Weather	1,875.5	19	407	207
Peak Wet Weather Flow	1,875.5	310	407	21

Force Main Flush Time

The force main flush time (FT) was calculated for the proposed lift station. To calculate FT, the wetwell filling time (WWFT), pump run time (PRT), and wetwell detention time (WWDT) were also calculated. The calculations are shown below.

The parameters for these equations are as follows:

D = Equivalent diameter of combined wetwell and dry well, 11.3 ft

$\Delta h_{on\text{-}off}$ = distance between lead pump on and all pumps off, 2.50 ft

Q_i = Average Daily Inflow, 90 gpm

Q_o = Pumped flow, 407 gpm (with one pump operating)

L = Force Main lengths, 1,630 ft

v = Force main velocity, 4.18 ft/sec

Wetwell Filling Time:

$$WWFT = \frac{7.4841 \prod D^2 (\Delta h_{on\text{-}off})}{4Qi} \text{ where,}$$

Where D = 11.30'

$\Delta h_{on\text{-}off}$ = 2.50 ft

Qi = 90 gpm

WWFT = 20.84 minutes

Pump Run Time:

$$PRT = \frac{7.4841 \prod D^2 (\Delta h_{on\text{-}off})}{4 (Qo - Qi)} \text{ where,}$$

Where D = 11.30'

$\Delta h_{on\text{-}off}$ = 2.50 ft

Qi = 90 gpm

Qo = 407 gpm

PRT = 5.92 minutes

Wetwell Detention Time; where

WWDT = WWFT + PRT

WWDT = 26.76 minutes

Flushing Cycles; where

FC = L/60v(PRT)

L = 1,630 ft

V = 4.18 fps

FC = 1.18 cycles

FC_W = 1

FC_D = 0.18

Flushing Time; where

FT = (FC_w)(WWDT) + (FC_D)(PRT)

FT = 27.82 minutes

where:

FC_w = the whole number part of the flushing cycles (FC) = 1

FC_D = the decimal number part of the flushing cycles (FC) = 0.18

Since the average flush time (FT) is below 180 minutes, an odor control scrubber is not considered necessary for this lift station per common engineering practices.

Results From the Phase 1 Design Calculations:

1. Combined EDU count: 650
2. Combined Acreage: 204 acres
3. Average Daily Flow: 90 gpm
4. Minimum Dry Weather Flow: 19 gpm
5. Peak Dry Weather Flow: 225 gpm
6. Peak Wet Weather Daily Flow: 310 gpm
7. Existing Wetwell and proposed Drywell Diameter: 8 ft (each)
8. Equivalent Diameter of the two wells: 11.3 ft
9. Retention Chamber Volume (combined): 1,875.5 gallons (using Vr depth = 2.5 ft)
10. Existing Pump Model: Hydromatic 40 MP/MPSF, 25 Hp, 9-5/32" impeller (self-priming)
11. Pump Discharge Rate (avg.): 407 gpm
12. Size and Length of Force Main: 6-inch C900 PVC, DR18, Class 150, with an approximately length of 1,755 feet.
13. Velocity Maintained in Force Main: 4.18 feet per second (w/one pump in operation.
14. Required Emergency Storage Depth: 7.20 ft
15. Available Emergency Storage Depth: 11.00 ft (using combined wetwell and dry well volumes).

CONCLUSION AND RECOMMENDATIONS

It appears that the existing LS #209 pumps and force main system have sufficient capacity to accept and discharge flows from the Elle MF development without the need for rehabilitation. Since there is no apparent need to rehabilitate the existing pump and force main system to accept the proposed additional flows from the Elle MF development, there does not need to be any rehabilitation required for the existing lift station electrical, instrumentation and controls systems.

Under existing flows and operating conditions, the existing wetwell does not appear to meet current SAWS lift station design criteria for emergency storage volume. Subsequently, the addition of flows from the proposed Elle MF development will reduce the insufficient emergency storage volume even further.

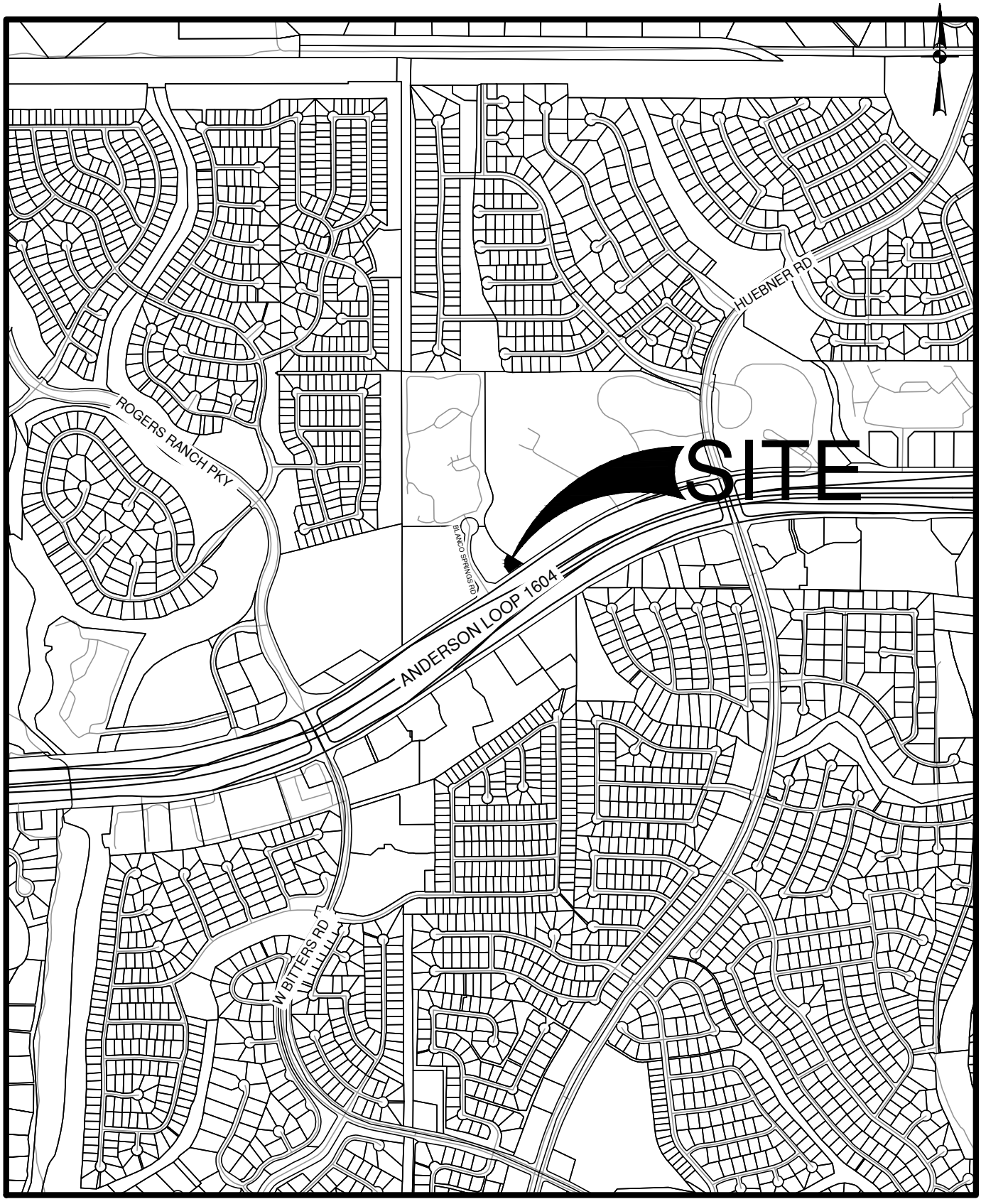
To provide sufficient emergency storage volume at LS #209 it is recommended that an eight-foot diameter drywell be installed and integrated with the existing wetwell. The drywell should be set flush with the pavement at the top and with an invert that is one foot above the invert of the existing wetwell. The drywell should be connected at its invert with an 8-inch SDR 26 PVC gravity main to the wetwell to allow incoming flows to the wetwell to distribute into the drywell. Upon completion of making the necessary pipe penetrations connecting the wetwell and drywell, the contractor will be required to re-apply lining commensurate with SAWS specification at the damaged areas of the interior of the cast in place concrete wetwell.

The proposed additional volume provided by the drywell integration appears to satisfy SAWS' lift station guidelines for emergency storage for the combined existing flows and proposed flows from the Elle MF development.

In addition to the integration of the 8-foot diameter drywell, it is recommended the SAWS adjust the pump control levels in the existing wetwell to lower the "lead pump on" and "lag pump on" elevations while still maintaining their minimum retention chamber volume. Based on earlier calculations and the added volume that the drywell is anticipated to provide, the minimum required Vr depth is estimated to be only 1.76 feet (versus the current Vr depth of 2.5 feet). The reduction in Vr depth by SAWS operators will reduce extended detention times in the combined wetwell/drywell areas and lower the risk of odor generation from the lift station.

EXHIBITS

EXHIBIT 1
Location Map



JOB NO. 13520-01
DATE JULY 2025
DESIGNER RM
CHECKED RM DRAWN AL
SHEET 1 of 1

SAWS LIFT STATION #209 UPGRADES

SAN ANTONIO, TEXAS

LOCATION MAP

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

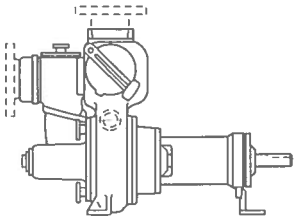
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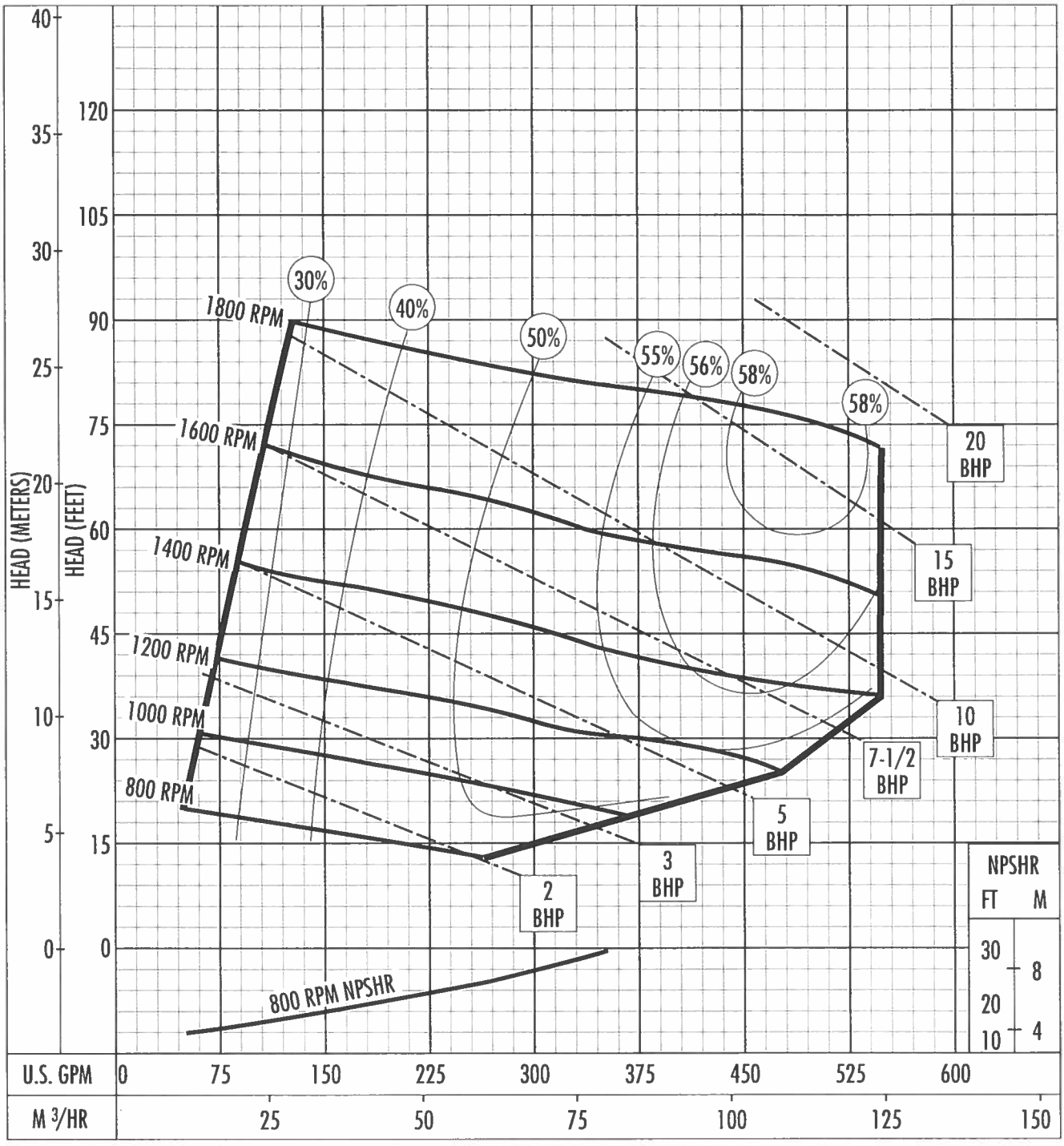
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EXHIBIT 2
Existing Pump Curve and Supporting Information

Performance Curve — 40MP/MPSF

RPM: **Variable** Discharge: **4"**
Solids: **3"** Impeller: **9-5/32"**



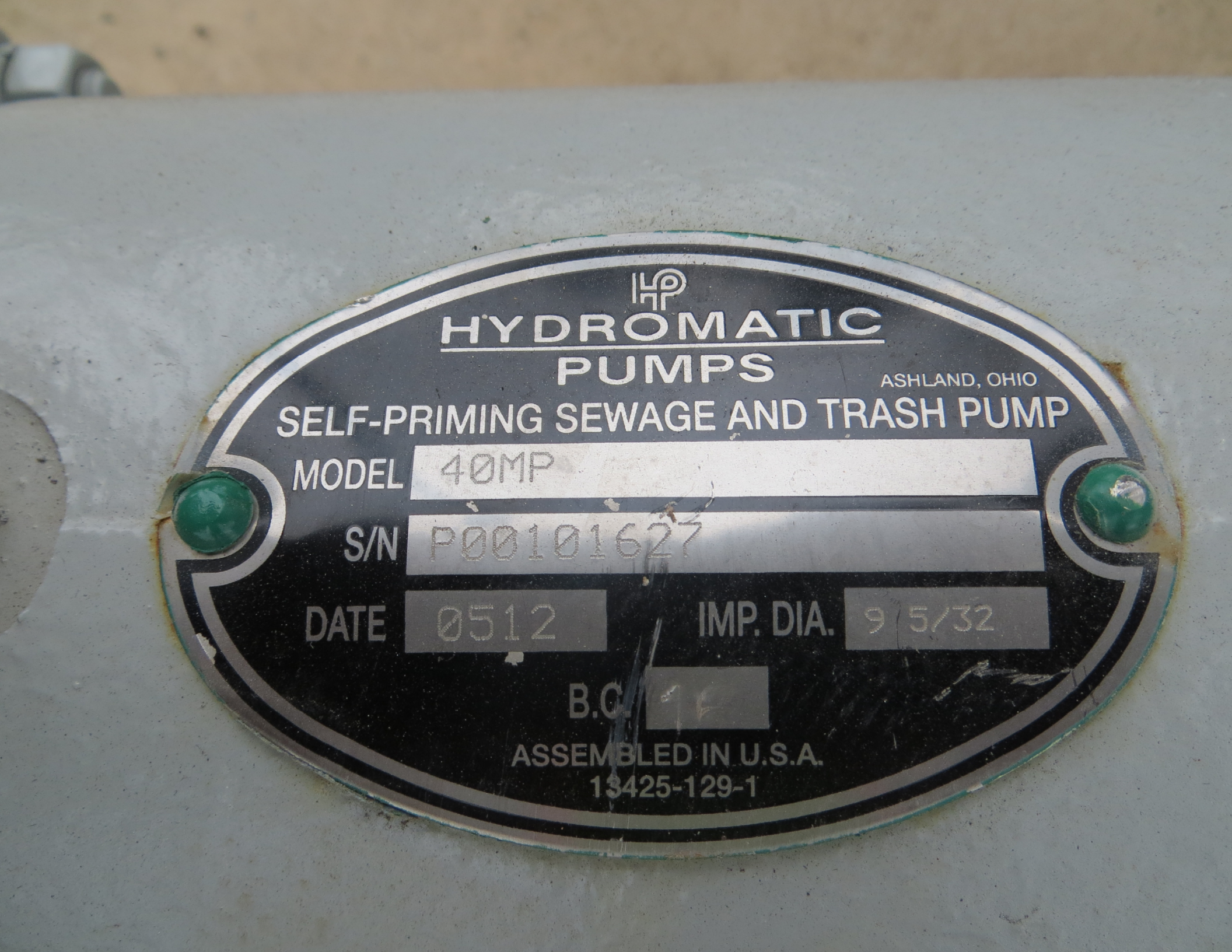


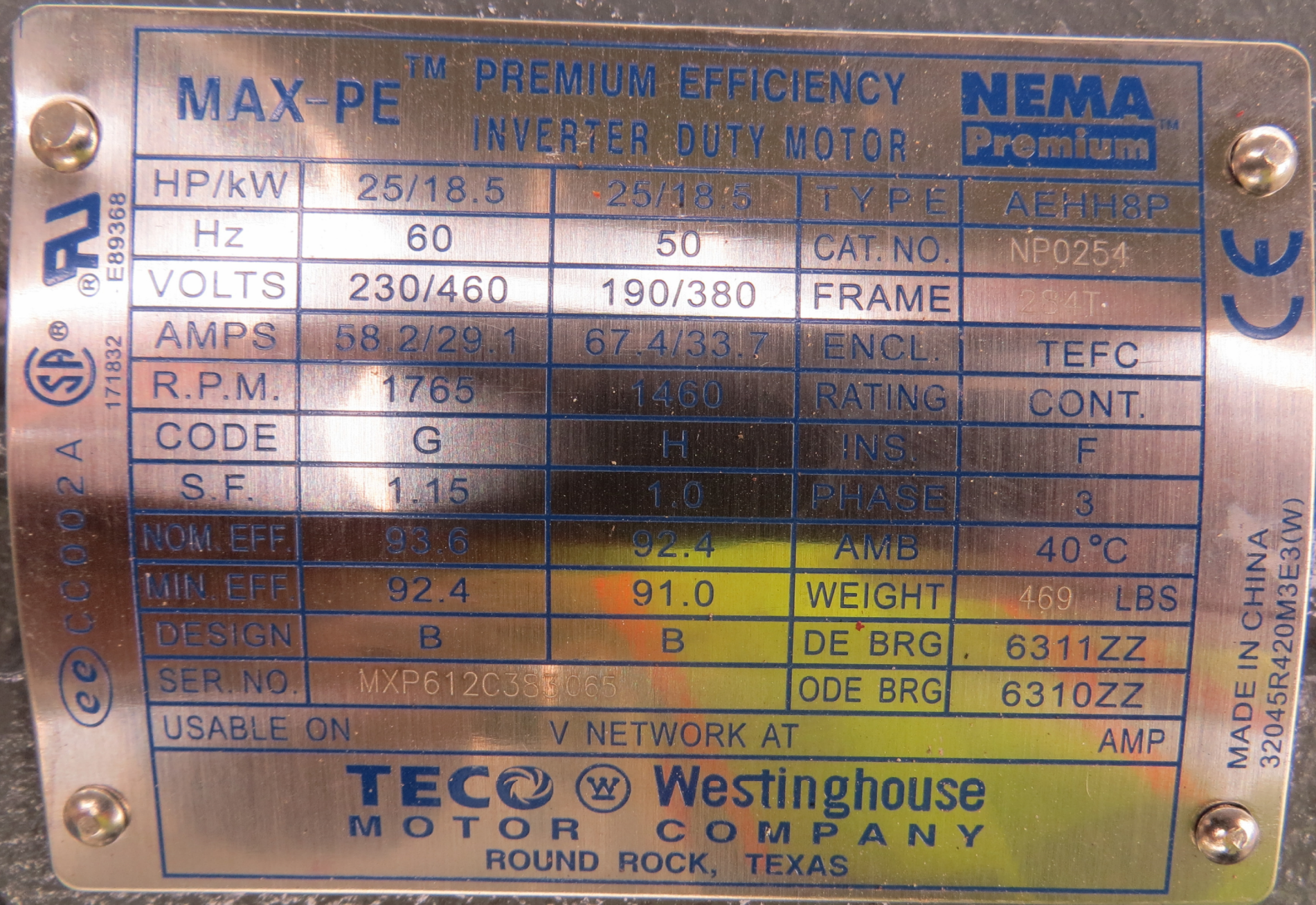
Operation is recommended in the bounded area with operational point within the curve limit.
Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

HYDROMATIC®

Conditions of Service:

GPM: _____ TDH: _____


HYDROMATIC
PUMPS
ASHLAND, OHIO
SELF-PRIMING SEWAGE AND TRASH PUMP
MODEL 40MP
S/N P0010162?
DATE 0512
IMP. DIA. 9 5/32
B.C.
ASSEMBLED IN U.S.A.
13425-129-1



MAX-PE™ PREMIUM EFFICIENCY INVERTER DUTY MOTOR

NEMA Premium™

HP/kW	25/18.5	25/18.5	TYPE	AEHH8P
Hz	60	50	CAT. NO.	NP0254
VOLTS	230/460	190/380	FRAME	284T
AMPS	58.2/29.1	67.4/33.7	ENCL.	TEFC
R.P.M.	1765	1460	RATING	CONT.
CODE	G	H	INS.	F
S.F.	1.15	1.0	PHASE	3
NOM. EFF.	93.6	92.4	AMB	40°C
MIN. EFF.	92.4	91.0	WEIGHT	469 LBS
DESIGN	B	B	DE BRG	6311ZZ
SER. NO.	MXP612C3B3065		ODE BRG	6310ZZ

USABLE ON V NETWORK AT AMP

TECO Westinghouse MOTOR COMPANY

ROUND ROCK, TEXAS

MADE IN CHINA

32045R420M3E3(W)

CC002A

E89368

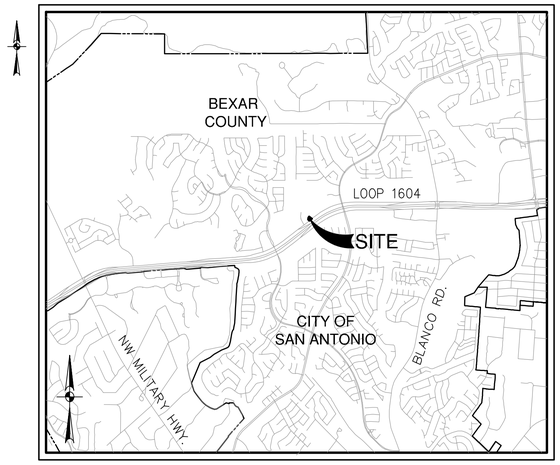
171832

BLANCO SPRINGS DEVELOPMENT

SAWS LIFT STATION #209 UPGRADE
SAN ANTONIO, TEXAS

CIVIL CONSTRUCTION PLANS

SAWS JOB NO. 25-1569



LOCATION MAP
NOT-TO-SCALE

2301 N LOOP 1604 W
SAN ANTONIO, TX 78258

PREPARED FOR:

KOONTZ CORPORATION
903 BASSE ROAD
SAN ANTONIO, TX 78212

AUGUST 2025

PAPE-DAWSON
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Sheet List Table

Sheet #	Sheet Title
C0.00	COVER SHEET
C0.10	GENERAL NOTES
C0.11	TCEQ GENERAL NOTES
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C2.00	SITE PLAN
C3.00	DRY WELL PLAN & PROFILE
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C4.00	SUGGESTED BYPASS PUMPING PLAN
S1	STRUCTURAL GENERAL NOTES
S2	STRUCTURAL SCHEDULES
S3	STRUCTURAL LIFT STATION DETAILS

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
5/14/2025

SEWER

DEVELOPER'S NAME: KOONTZ CORPORATION
ADDRESS: 903 BASSE RD
CITY: SAN ANTONIO STATE: TEXAS ZIP: 78212
PHONE# (210) 826-2600 FAX# XX
SAWS BLOCK MAP# 148644 TOTAL EDU'S 650 TOTAL ACREAGE 204
TOTAL LINEAR FOOTAGE OF PIPE: 8.5 PLAT NO. XXXXX
NUMBER OF LOTS N/A SAWS JOB NO. 25-1569

SHEET C0.00

PD JOB NO. 13520-01 SAWS LIFT STATION #209 UPGRADE

Date: May 13, 2025, 1:57 PM - User ID: dloughlin
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SAWS STANDARD GENERAL CONSTRUCTION NOTES

(NOVEMBER 1, 2024)

GENERAL CONSTRUCTION

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

A. CURRENT TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) "DESIGN CRITERIA FOR DOMESTIC WASTEWATER SYSTEM"; TEXAS ADMINISTRATIVE CODE (TAC) TITLE 30 PART 1 CHAPTER 217 AND "PUBLIC DRINKING WATER"; TAC TITLE 30 PART 1 CHAPTER 290.
B. CURRENT TXDOT "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND DRAINAGE."
C. CURRENT "SAN ANTONIO WATER SYSTEM STANDARD SPECIFICATIONS FOR WATER AND SANITARY SEWER CONSTRUCTION."
D. CURRENT CITY OF SAN ANTONIO "STANDARD SPECIFICATIONS FOR CONSTRUCTION."
E. CURRENT CITY OF SAN ANTONIO "UTILITY EXCAVATION CRITERIA MANUAL" (UECM).

2. THE CONTRACTOR SHALL OBTAIN SAWS STANDARD DETAILS FROM SAWS WEBSITE, HTTPS://APPS.SAWS.ORG/BUSINESS_CENTER/SPECS/CONSTSPECS/ UNLESS OTHERWISE NOTED WITHIN DESIGN PLANS.

3. THE CONTRACTOR IS TO NOTIFY AND MAKE ARRANGEMENTS WITH THE SAWS CONSTRUCTION INSPECTION DIVISION AT 210-233-3500 (DURING REGULAR SAWS WORKING HOURS) AND PROVIDE NOTIFICATION PROCEDURES THE CONTRACTOR WILL USE TO NOTIFY AFFECTED HOME RESIDENTS AND/OR PROPERTY OWNERS TWO (2) WEEKS PRIOR TO EXCAVATION. OUTSIDE OF REGULAR SAWS WORKING HOURS THE SAWS EOC SHOULD BE CONTACTED AT 210-704-7297.

4. IF NECESSARY, CONTRACTOR WILL COORDINATE USE OF SAWS PREMISES AT NO ADDITIONAL COST TO SAWS. SUCH EFFORTS INCLUDE, BUT ARE NOT LIMITED TO, OBTAINING SECURITY IDENTIFICATION BADGES REQUIRED FOR ACCESS TO SAWS FACILITIES.

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

6. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES PRIOR TO CONSTRUCTION WHETHER SHOWN ON PLANS OR NOT. AS-BUILTS FOR SAWS INFRASTRUCTURE CAN BE OBTAINED AT WEBSITE BELOW. CONTRACTOR SHALL COORDINATE PHYSICAL LOCATES FOR SAWS INFRASTRUCTURE THROUGH THE SAWS INSPECTOR. PLEASE ALLOW UP TO 7 BUSINESS DAYS FOR LOCATES REQUESTING PIPE LOCATION MARKERS ON SAWS INFRASTRUCTURE. THE FOLLOWING CONTACT INFORMATION ARE SUPPLIED FOR VERIFICATION PURPOSES:

   SAN ANTONIO WATER SYSTEM:
   REQUEST AS-BUILTS: HTTPS://WWW.SAWS.ORG/SERVICE/LOCATES-SERVICE/
   COSA DRAINAGE 210-206-8433
   COSA TRAFFIC SIGNAL OPERATIONS 210-207-7720
   TEXAS STATEWIDE ONE CALL LOCATOR 1-800-545-6005 OR 811

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING EXISTING FENCES, CURBS, STREETS, DRIVEWAYS, SIDEWALKS, LANDSCAPING, AND STRUCTURES TO ITS ORIGINAL OR BETTER CONDITION AS A RESULT OF DAMAGES DONE BY THE PROJECTIS CONSTRUCTION.

8. CONTRACTOR SHALL NOT MAKE USE OF DUMPSTERS OR WASTE BINS THAT ARE INTENDED TO SERVE RESIDENTS AND/OR BUSINESSES.

9. ALL WORK IN TEXAS DEPARTMENT OF TRANSPORTATION AND BEXAR COUNTY RIGHT-OF-WAY SHALL BE DONE IN ACCORDANCE WITH RESPECTIVE CONSTRUCTION SPECIFICATIONS AND PERMIT.

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

11. ALL WORK WITHIN THE 100-YEAR FLOODPLAIN SHALL BE DONE IN ACCORDANCE WITH FLOODPLAIN DEVELOPMENT PERMIT.

12. ANY WORK COMPLETED WITHOUT PRIOR WRITTEN AUTHORIZATION WHICH IS NOT INCLUDED IN THESE PLANS AND SPECIFICATIONS WILL NOT BE COMPENSATED BY THE SAN ANTONIO WATER SYSTEM.

13. HOLIDAY WORK: CONTRACTORS WILL NOT BE ALLOWED TO PERFORM SAWS WORK ON SAWS RECOGNIZED HOLIDAYS.

    WEEKEND WORK: CONTRACTORS ARE REQUIRED TO SUBMIT REQUEST TO THE SAWS INSPECTION CONSTRUCTION DEPARTMENT BY 12:00PM ON THE WEDNESDAY PRIOR TO THE WEEKEND BEING REQUESTED. REQUEST SHOULD BE SENT TO CONSTWORKREQ@SAWS.ORG.

    ANY AND ALL SAWS UTILITY WORK INSTALLED WITHOUT WEEKEND APPROVAL WILL BE SUBJECT TO BE UNCOVERED FOR PROPER INSPECTION AT NO COST TO SAWS.

14. PRE-CON SITE VIDEO: BEFORE THE START OF ANY CONSTRUCTION. THE SITE MUST BE VIDEO RECORDED BY THE CONTRACTOR WITH ONE COPY SUBMITTED TO SAWS INSPECTIONS. A PRE-SITE VIDEO WILL PROVIDE ACCURATE DOCUMENTATION OF THE EXISTING CONDITIONS (NSPI).

15. POWER POLE BRACING: CONTRACTORS SHOULD BE ADVISED THAT THERE ARE EXISTING OVERHEAD UTILITY POLES ALONG THE PROJECT CORRIDOR. CONTRACTORS SHOULD FURTHER BE ADVISED THAT IF THE DISTANCE FROM THE OUTSIDE FACE OF A UTILITY TRENCH TO THE FACE OF A UTILITY POLE IS LESS THAN 5 FEET, SAID UTILITY POLE IS SUBJECT TO BRACING, BASED ON A DETERMINATION MADE BY UTILITY POLE OWNER. COSTS INCURRED BY CONTRACTOR FOR BRACING OF THESE UTILITY POLES IS SUBSIDIARY TO THAT RESPECTIVE UTILITY COMPANYS WORK. IT IS ADVISABLE FOR THE CONTRACTOR TO REVIEW THE CONSTRUCTION DOCUMENTS AND VISIT THE CONSTRUCTION SITE TO DETERMINE POTENTIAL IMPACTS.

16. CONSTRUCTION SEQUENCING: IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO SCHEDULE SEQUENCING FOR REMOVAL AND INSTALLATION OF EXISTING AND PROPOSED SAWS UTILITIES IN CONJUNCTION WITH GENERAL PROJECT CONSTRUCTION. SEQUENCE OF CONSTRUCTION ACTIVITIES SHALL BE CONSIDERED IN ORDER TO MINIMIZE THE EXTENT AND DURATION OF DISTURBANCES.

17. CONTRACTOR SHALL COMPLY WITH APPLICABLE REGULATIONS INCLUDING, BUT NOT LIMITED TO, THOSE OVERSEEN BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA). OSHA INFORMATION AND RELATED MATERIALS MAY BE OBTAINED AT HTTPS://WWW.OSHA.GOV/ OR AT THE OSHA SAN ANTONIO OFFICE LOCATED AT FOUNTAINHEAD TOWER, SUITE 605 8200 W. INTERSTATE 10 SAN ANTONIO, TX 78230 WHICH IS ALSO REACHABLE BY PHONE AT (210) 472-5040.

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

WATER

19. PRIOR TO TIE-INS, ANY SHUTDOWNS OF EXISTING MAINS OF ANY SIZE MUST BE COORDINATED WITH THE SAWS INSPECTION AND/OR SAWS PRODUCTION GROUPS AT LEAST TWENTY-FIVE (25) CALENDAR DAYS IN ADVANCE OF THE SHUTDOWN. THE CONTRACTOR MUST ALSO PROVIDE A SEQUENCE OF WORK AS RELATED TO THE TIE-INS; THIS IS AT NO ADDITIONAL COST TO SAWS OR THE PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SEQUENCE THE WORK ACCORDINGLY. SAWS PRODUCTION CONTROL CENTER 210-233-2016

20. ASBESTOS CEMENT (AC) PIPE, ALSO KNOWN AS TRANSITE PIPE WHICH IS KNOWN TO CONTAIN ASBESTOS-CONTAINING MATERIAL (ACM), MAYBE LOCATED WITHIN THE PROJECT LIMITS. SPECIAL WASTE MANAGEMENT PROCEDURES AND HEALTH AND SAFETY REQUIREMENTS WILL BE APPLICABLE WHEN REMOVAL AND/OR DISTURBANCE OF THIS PIPE OCCURS, PAYMENT FOR SUCH WORK IS TO BE MADE UNDER ITEM NO. 3000, "HANDLING ASBESTOS CEMENT PIPE". AC PIPE REMOVED ON CONSTRUCTION PROJECTS FOR TIE-IN(S) SHOULD BE IN LENGTH OF 26 LINEAR FEET (LF). LENGTHS OF 13 LF SHOULD BE REMOVED WHERE AC PIPE IS BEING REMOVED AND CROSSING PIPES, CONDUITS, OR BOXES.

21. VALVE REMOVAL: WHERE THE CONTRACTOR IS TO ABANDON A WATER MAIN, THE CONTROL VALVE LOCATED ON THE ABANDONING BRANCH WILL BE REMOVED AND REPLACED WITH A CAP/PLUG. (NSPI)

22. DIVISION VALVES: DIVISION VALVES SHOWN ON PLANS OR NOT SHOWN ON PLANS BUT FOUND IN THE FIELD SHALL ONLY BE OPERATED BY SAWS DISTRIBUTION AND COLLECTION STAFF AND ONLY WITH PRIOR WRITTEN APPROVAL OF THE SAWS DIRECTOR OF PRODUCTION AND OPERATIONS AND PROPER COORDINATION WITH ALL SAWS DEPARTMENTS. CONTRACTOR SHALL PROVIDE WRITTEN NOTIFICATION TO THE INSPECTOR A MINIMUM OF TWENTY-FIVE (25) CALENDAR DAYS IN ADVANCE TO START THE COORDINATION PROCESS AND WILL BE INFORMED BY THE INSPECTOR WHEN THE DIVISION VALVE WILL BE OPERATED BY THE SAWS DISTRIBUTION AND COLLECTION STAFF. THE DIVISION VALVE CAN ONLY BE OPERATED BY SAWS DISTRIBUTION AND COLLECTION STAFF MEMBER NOT THE INSPECTOR OR THE CONTRACTOR. OPERATION OF A DIVISION VALVE WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE SAWS DISTRIBUTION AND COLLECTION STAFF WILL CONSTITUTE A MATERIAL BREACH OF ANY WRITTEN SAWS CONTRACT OR PERMIT IN ADDITION TO SUBJECTING THE CONTRACTOR TO LIABILITY FOR ANY AND ALL FINES, FEES, OR OTHER DAMAGES, DIRECT OR CONSEQUENTIAL, THAT MAY ARISE FROM OR BE CAUSED BY THE OPERATION OF THE VALVE WITHOUT PRIOR WRITTEN PERMISSION. PLEASE BE INFORMED THAT THE APPROVAL OF THE OPERATION OR OPENING OR CLOSING OF A DIVISION VALVE CAN TAKE SEVERAL WEEKS FOR APPROVAL. DIVISION VALVES WILL ALSO HAVE A VALVE LID LABELED DIVISION VALVE AND A LOCKING MECHANISM INSTALLED WITH A KEY. THE LOCK AND KEY MECHANISM WILL BE PAID FOR BY THE CONTRACTOR BUT WILL BE INSTALLED BY SAWS DISTRIBUTION AND COLLECTION STAFF.

23. IN ACCORDANCE WITH SAWS STANDARD SPECIFICATION 847, SAWS SHALL MACHINE CHLORINATE NEW WATER MAINS IF THE INTERCONNECTING WATER MAIN LENGTH IS GREATER THAN 800 FEET. CONTRACTOR SHALL CHLORINATE NEW MAINS WITH HTH IF THE INTERCONNECTING WATER MAIN LENGTH IS 800 FEET OR LESS.

SEWER

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

A. IDENTIFY THE SOURCE OF THE SSO AND NOTIFY SAWS EMERGENCY OPERATIONS CENTER IMMEDIATELY AT 210-704-SAWS (210-704-7297). PROVIDE THE ADDRESS OF THE SPILL AND AN ESTIMATED VOLUME OR FLOW.
B. ATTEMPT TO ELIMINATE THE SOURCE OF THE SSO.
C. CONTAIN SEWAGE FROM THE SSO TO THE EXTENT OF PREVENTING A POSSIBLE CONTAMINATION OF WATERWAYS.
D. CLEAN UP SPILL SITE (RETURN CONTAINED SEWAGE TO THE COLLECTION SYSTEM IF POSSIBLE) AND PROPERLY DISPOSE OF CONTAMINATED SOIL/MATERIALS.
E. CLEAN THE AFFECTED SEWER MAINS AND REMOVE ANY DEBRIS.
F. MEET ALL POST-SSO REQUIREMENTS AS PER THE EPA CONSENT DECREE, INCLUDING LINE CLEANING AND TELEVISING THE AFFECTED SEWER MAINS (AT SAWS DIRECTION) WITHIN 24 HOURS.

    SHOULD THE CONTRACTOR FAIL TO ADDRESS AN SSO IMMEDIATELY AND TO SAWS SATISFACTION, THEY WILL BE RESPONSIBLE FOR ALL COSTS INCURRED BY SAWS, INCLUDING ANY FINES FROM EPA.

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

25. THE CONTRACTOR SHALL PROVIDE BYPASS PUMPING OF SEWAGE AROUND EACH SEGMENT OF PIPE TO BE REPLACED, IN ACCORDANCE WITH SAWS STANDARD SPECIFICATION ITEM NO. 865, "BYPASS PUMPING SMALL DIAMETER SANITARY SEWER MAINS" AND STANDARD SPECIFICATION ITEM NO. 864, "BYPASS PUMPING LARGE DIAMETER SANITARY SEWER MAINS" AS APPLICABLE. PAYMENT FOR SUCH WORK WILL BE MADE UNDER THE APPROPRIATE BID ITEM ASSOCIATED WITH SANITARY SEWER BYPASS PUMPING IN ACCORDANCE WITH SAWS STANDARD SPECIFICATIONS 865 AND 864.

26. PRIOR TO TIE-INS, ANY SHUTDOWNS OF EXISTING FORCE MAINS OF ANY SIZE MUST BE COORDINATED WITH THE SAWS CONSTRUCTION INSPECTION DIVISION AT 210-233-3500 AND/OR SAWS PRODUCTION GROUPS AT LEAST TWO WEEKS OR MORE IN ADVANCE OF THE SHUTDOWN. THE CONTRACTOR MUST ALSO PROVIDE A SEQUENCE OF WORK AS RELATED TO THE TIE-INS; THIS IS AT NO ADDITIONAL COST TO SAWS OR THE PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SEQUENCE THE WORK ACCORDINGLY.

27. ELEVATIONS POSTED FOR TOP OF MANHOLES ARE FOR REFERENCE ONLY:
    IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE ALLOWANCES AND ADJUSTMENTS FOR TOP OF MANHOLES TO MATCH THE FINISHED GRADE OF THE PROJECTS IMPROVEMENTS (NSPI).

28. MANHOLE REMOVAL: WHERE EXISTING MANHOLES ARE TO BE REPLACED BY THE CONTRACTOR, THE EXISTING MANHOLES SHALL BE REMOVED. (NSPI)

29. SMART MANHOLE COVERS: THE CONTRACTOR SHALL NOTIFY SAWS EOC AT 210-704-SAWS (210-233-7297) AND EITHER AMERICA ESPINOZA AT 210-233-2934 OR JOSE A. MARTINEZ AT 210-233-3071 A MINIMUM OF 72 HOURS, NOT COUNTING WEEKENDS OR SAWS HOLIDAYS, BEFORE WORKING ON THE PIPE OR MANHOLE, IN ORDER TO HAVE SAWS REMOVE THE SMART COVER. ANY DAMAGE DONE TO THE SMART COVER WILL BE CHARGED TO THE CONTRACTOR THROUGH A CHANGE ORDER.

30. FLOW METERS IN MANHOLES: THE CONTRACTOR SHALL NOTIFY BOBBY JOHNSON AT 210-233-3493 OR ABEL BORUNDA AT 210-233-3704 A MINIMUM OF 72 HOURS, NOT COUNTING EEKENDS OR SAWS HOLIDAYS, BEFORE WORKING ON THE PIPE OR MANHOLE, IN ORDER TO HAVE SAWS REMOVE THE FLOW METER IN THE MANHOLE. ANY DAMAGE DONE TO THE FLOW METER WILL BE CHARGED TO THE CONTRACTOR THROUGH A CHANGE ORDER.

SAN ANTONIO WATER SYSTEM CRITERIA FOR SEWER MAIN CONSTRUCTION IN THE VICINITY OF WATER MAINS

I. WHERE A SEWER MAIN CROSSES OVER A WATER MAIN AND THE SEPARATION DISTANCE IS LESS THAN NINE (9) FEET, ALL PORTIONS OF THE SEWER MAIN WITHIN NINE (9) FEET OF THE WATER LINE SHALL BE CONSTRUCTED USING 160 PSI PRESSURE RATED HDPE.

II. WHERE A SEMI-RIGID OR RIGID SEWER MAIN CROSSES UNDER A WATER MAIN AND THE SEPARATION DISTANCE IS LESS THAN NINE FEET BUT GREATER THAN TWO FEET, THE INITIAL BACKFILL SHALL BE CEMENT STABILIZED SAND (TWO OR MORE BAGS OF CEMENT PER CUBIC YARD OF SAND) FOR ALL SECTIONS OF THE SEWER WITHIN NINE FEET OF THE WATER MAIN.

III. WHERE A SEWER MAIN CROSSES UNDER A WATER MAIN AND THE SEPARATION DISTANCE IS LESS THAN TWO FEET, THE SEWER MAIN SHALL BE CONSTRUCTED OF HDPE WITH A MINIMUM PRESSURE RATING OF 160 PSI WITHIN NINE FEET OF THE WATER MAIN, SHALL BE PLACED NO CLOSER THAN SIX (6") INCHES BETWEEN OUTER DIAMETERS.

IV. WHERE A SEWER MAIN PARALLELS A WATER MAIN AND THE SEPARATION DISTANCE IS LESS THAN NINE FEET, THE SEWER MAIN SHALL BE BELOW THE WATER MAIN, SHALL BE CONSTRUCTED OF HDPE WITH A MINIMUM PRESSURE RATING OF 160 PSI FOR BOTH PIPE AND JOINTS FOR A DISTANCE OF NINE FEET BEYOND THE POINT OF CONFLICT, SHALL MAINTAIN A MINIMUM SEPARATION DISTANCE BETWEEN OUTER DIAMETERS OF TWO FEET VERTICALLY AND FOUR FEET HORIZONTALLY.

V. SANITARY SEWER MANHOLES SHALL NOT BE INSTALLED ANY CLOSER THAN NINE FEET TO WATER MAINS.

MISCELLANEOUS NOTES

1. THE CONTRACTOR SHALL NOT PROCEED WITH ANY PIPE INSTALLATION WORK UNTIL NOTIFIED BY SAWS CONSTRUCTION INSPECTION DIVISION TO PROCEED WITH THE WORK AND HAS ARRANGED A MEETING WITH THE INSPECTOR AND CONSULTANT FOR THE WORK REQUIREMENTS.

2. THE CONTRACTOR SHALL MAINTAIN SERVICE TO ALL EXISTING SANITARY SEWERS AT ALL TIMES DURING CONSTRUCTION.

3. ON ANY MANHOLES TO BE ABANDONED, THE RINGS AND COVER SHALL BE SALVAGED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, ITEM 862, AND THE HOLE BACKFILLED TO THE SATISFACTION OF THE INSPECTOR.

4. SEWER PIPE CONNECTIONS TO PRE-CAST MANHOLES WILL BE COMPRESSION JOINTS AS APPROVED BY SAWS, MECHANICAL JOINT "BOOT TYPE" CONNECTIONS ALONE WILL NOT BE ALLOWED. "BOOT TYPE JOINTS MAY BE USED IN CONJUNCTION WITH COMPRESSION JOINTS AS APPROVED BY SAWS. ANY CHANGES FROM THESE METHODS MUST BE APPROVED BY SAWS.

5. WHERE REQUIRED, CONCRETE ENCASEMENT SHALL BE PLACED FOR FULL WIDTH OF THE TRENCH TO A PLANE 6" ABOVE THE TOP OF THE PIPE, WITH PAY LIMITS AS SHOWN ON THE ITEM NO. DD-858-01.

6. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL WASTE MATERIALS UPON PROJECT COMPLETION. THE CONTRACTOR SHALL NOT PERMANENTLY PLACE ANY WASTE MATERIALS IN THE 100-YEAR FLOODPLAIN WITHOUT FIRST OBTAINING AN APPROVAL FLOODPLAIN DEVELOPMENT PERMIT.

7. STORM WATER PROTECTION:

A. THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY AND ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIRE EROSION AND SEDIMENTATION CONTROL FOR CONSTRUCTION OF SEWER COLLECTION SYSTEMS. DEVELOPER OR AUTHORIZED REPRESENTATIVE SHALL PROVIDE EROSION AND SEDIMENTATION CONTROL AS NOTED ON THE PROJECT'S PLAN AND PROFILE SHEETS.
B. AT A MINIMUM THESE CONTROLS SHALL CONSIST OF ROCK BERMS AND/OR SILT FENCES CONSTRUCTED PARALLEL TO AND DOWN GRADIENT FROM THE TRENCHES. THE ROCK BERM OR SILT FENCES SHALL BE INSTALLED IN A MANNER SUCH THAT ANY RAINFALL RUNOFF SHALL BE FILTERED. HAY BALES SHALL NOT BE USED FOR TEMPORARY EROSION AND SEDIMENTATION CONTROLS.
C. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE INSTALLED PRIOR TO CONSTRUCTION, SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL BE REMOVED WHEN VEGETATION IS ESTABLISHED AND THE CONSTRUCTION AREA IS STABILIZED. ADDITIONAL PROTECTION MAY BE NECESSARY IF EXCESSIVE SOLIDS ARE BEING DISCHARGED FROM THE SITE.

15. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED BY THE CONTRACTOR AT FINAL ACCEPTANCE OF THE PROJECT BY THE SAN ANTONIO WATER SYSTEM.

16. PLACEMENT OF SUCH CONTROLS SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION PLANS. ACTUAL LOCATIONS MAY VARY SLIGHTLY FROM THE PLANS, BUT WILL BE VERIFIED BY THE ENGINEER/INSPECTOR IN THE FIELD PRIOR TO SEWER LINE CONSTRUCTION. THE CONTRACTOR AND THE INSPECTOR SHALL INSPECT THE CONTROLS AT WEEKLY INTERVALS AND AFTER EVERY SIGNIFICANT RAINFALL TO INSURE SIGNIFICANT DISTURBANCE TO THE STRUCTURES HAS NOT OCCURRED. SEDIMENT DEPOSITED AFTER A SIGNIFICANT RAINFALL SHALL BE REMOVED FROM THE SITE OR PLACED IN AN APPROVED DESIGNATED SOIL DISPOSAL AREA.

17. NO EXTRA PAYMENT SHALL BE ALLOWED FOR WORK CALLED FOR ON THE PLANS BUT NOT INCLUDED ON THE BID SCHEDULE. THIS INCIDENTAL WORK WILL BE REQUIRED AND SHALL BE INCLUDED UNDER THE PAY ITEM TO WHICH IT RELATES.

18. THE DEVELOPER DEDICATES THE SANITARY SEWER MAINS UPON COMPLETION BY THE DEVELOPER AND ACCEPTANCE BY THE SAN ANTONIO WATER SYSTEM. THE SAN ANTONIO WATER SYSTEM WILL OWN AND MAINTAIN SAID SANITARY SEWER MAINS WHICH ARE LOCATED WITHIN THIS PARTICULAR SUBDIVISION. (AS APPLICABLE)

19. WORK COMPLETED BY THE CONTRACTOR WHICH HAS NOT RECEIVED THE CONSENT OF THE SAN ANTONIO WATER SYSTEM CONSTRUCTION INSPECTION DIVISION WILL BE SUBJECT TO REMOVAL AND REPLACEMENT BY AND AT THE EXPENSE OF THE CONTRACTOR.

20. CONTRACTOR SHALL ABIDE BY ALL APPLICABLE GOVERNMENTAL AND REGULATORY STANDARDS AND REQUIREMENTS AND OBTAIN ALL NECESSARY PERMITS AND APPROVALS FOR CONSTRUCTION OF THE FACILITIES SHOWN IN THE PLANS.

21. THE CONTRACTOR SHALL EXCAVATE THE TOP 12 INCHES OF TOPSOIL AND STOCKPILE IT SEPARATELY FROM THE GENERAL EXCAVATION. A SUITABLE VOLUME OF TOPSOIL SHALL BE EXCAVATED TO PLACE A MINIMUM OF 12 INCHES OF TOPSOIL OVER ALL EXCAVATED OR BACKFILLED AREAS. TOPSOILING IS NOT REQUIRED WHERE PAVEMENT, CONCRETE CAP, RIP-RAP OR OTHER FACILITIES ARE REQUIRED AT THE SURFACE. CONTRACTOR MAY MOUND EXCESS TRENCH EXCAVATED MATERIAL OVER PIPE UP TO 1 FOOT IN HEIGHT ABOVE NATURAL GRADE. MOUND SHALL BE COMPLETELY COVERED WITH 12 INCHES OF TOPSOIL. MOUND SHALL BE FREE OF BRUSH AND ROCK. MOUNDING IS NOT PERMITTED IN DEVELOPED PROPERTIES, ROADS, CREEKS, FLOODPLAINS, PAVED AREAS, CULTIVATED FIELDS OR OTHER AREAS DIRECTED BY SAWS'S REPRESENTATIVE. RESTORE GROUND TO ORIGINAL GRADE AND PONDING OF STORM WATER RUNOFF ON ALL GROUND DISTURBED BY CONSTRUCTION ACTIVITIES.

22. CONSTRUCTION SURVEYING IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR INCLUDING BUT NOT LIMITED TO LIMITS OF PERMANENT EASEMENT AND TEMPORARY EASEMENTS, PIPE ALIGNMENT, APPURTENANCE LOCATION AND ROAD CROSSINGS. THE CONTRACTOR SHALL VERIFY ALL CONTROL MONUMENTATION PRIOR TO BEGINNING CONSTRUCTION.

23. CONTRACTOR SHALL MAKE CONNECTIONS TO EXISTING PIPE, STRUCTURES, EQUIPMENT, ETC. AS REQUIRED AND SHALL PROVIDE ALL FITTINGS, ADAPTORS AND APPURTENANCES REQUIRED TO MAKE THE CONNECTIONS, PROVIDE ALL SUPPORTS REQUIRED FOR A RIGID INSTALLATION AND TO HAVE A COMPLETE AND WORKING SYSTEM.

24. VARIOUS LOCATIONS OF THE WORK ARE SUBJECT TO FLOODING AND STANDING WATER DURING WET WEATHER PERIODS. CONTRACTOR SHALL PLAN THIS WORK FOR DRY WEATHER PERIODS AND PROVIDE DEWATERING AND OTHER WET WEATHER PROVISIONS AS INCIDENTAL WORK.

25. CONTRACTOR SHALL COORDINATE HIS/HER PROPOSED CONSTRUCTION WITH OTHER CONTRACTORS IN THE EVENT OF THE OTHER CONTRACTORS DOING WORK IN THE SAME AREA SIMULTANEOUSLY WITH HIS/HER PROJECT. THIS INCLUDES, BUT NOT LIMITED TO, ALL CONNECTION POINTS OR OTHER SPECIAL ITEMS AS REQUIRED FOR TESTING.

26. CONTRACTOR SHALL DISPOSE OF ALL EXCESS MATERIAL, CONSTRUCTION, RUBBLE AND TRASH. ALL TRASH SHALL BE PICKED-UP AND REMOVED AT THE END OF EACH DAY. THE CONTRACTOR SHALL NOT PLACE ANY WASTE MATERIALS IN THE 100-YEAR FLOODPLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOODPLAIN DEVELOPMENT PERMIT AS REQUIRED FROM THE U.S. CORPS OF ENGINEERS.

27. NO BURNING IS ALLOWED.

28. CONTRACTOR IS RESPONSIBLE FOR ALL SITE SAFETY CONSIDERATIONS.

29. ALL FENCING, GATES, SIGNS AND ANY OTHER EXISTING IMPROVEMENTS DAMAGED BY THE CONTRACTOR SHALL BE REPLACED TO ITS ORIGINAL CONDITION OR BETTER AT NO ADDITIONAL COST TO THE OWNER.

30. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL WASTE MATERIALS UPON PROJECT COMPLETION. THE CONTRACTOR SHALL NOT PERMANENTLY PLACE ANY WASTE MATERIALS IN THE 100-YEAR FLOOD PLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOOD PLAIN DEVELOPMENT PERMIT.

STORM WATER PROTECTION AND EROSION CONTROL NOTES

2. CONTRACTOR SHALL INSTALL STORM WATER POLLUTION PREVENTION STRUCTURES INCLUDING BUT NOT LIMITED TO, SILT FENCING AND/OR ROCK BERMS IN ALL AREAS TO BE IMPACTED BY CURRENT AND ONGOING CONSTRUCTION AND MAINTAIN SUCH STRUCTURES UNTIL SUITABLE GROUNDCOVER/REVEGETATION IS ACCEPTED. ALL STORM WATER POLLUTION PREVENTION STRUCTURES SHALL BE CONSTRUCTED WITHIN THE COUNTY RIGHT-OF-WAY AND WATER LINE EASEMENTS. ANY FEATURES ON THE PLANS SHOWN OUTSIDE THESE AREAS ARE SHOWN FOR VISUAL CLARITY ONLY.

3. THE LOCATION OF ANY BEST MANAGEMENT PRACTICES (B.M.P.'S) SUCH AS SILT FENCING, ROCK BERMS, STABILIZED CONSTRUCTION ENTRANCE/EXIT, ETC. THAT MAY BE SHOWN ON THESE PLANS ARE SUBJECT TO FIELD VERIFICATION. CONTRACTOR SHALL ADJUST THE LOCATIONS OF B.M.P.'S TO BEST ACCOMMODATE THE CONDITIONS AND TOPOGRAPHY ENCOUNTERED DURING CONSTRUCTION. QUESTIONS REGARDING THE PLACEMENT AND/OR CHANGES CONCERNING B.M.P.'S SHALL BE REFERRED TO THE OWNER AND THE COUNTY. THE CONTRACTOR IS TO ENSURE THAT SEDIMENTATION AND EROSION WILL BE CONTAINED WITHIN THE PROJECT WORK AREAS AND KEPT OFF ROADWAYS AND ADJACENT PROPERTIES AND OUT OF DRAINAGE CHANNELS AND WATER COURSES.

CPS ENERGY NOTES

1. CALL CPS ENERGY LOCATOR AT 978-3500 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

2. DUE TO FEDERAL REGULATION TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

3. CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING UNDER "HIGH VOLTAGE TRANSMISSION LINES". A WORKING HEIGHT OF 30' FROM GROUND ELEVATION WILL BE OBSERVED WHEN WORKING UNDER THE HIGH VOLTAGE LINE. COORDINATE ALL WORK WITH CPS ENERGY.

4. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CITY PUBLIC SERVICE MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND GAS VALVES THAT ARE IN THE PROJECT AREAS.

UNDERGROUND TELEPHONE/COMMUNICATION LINES NOTE

1. THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE AS SHOWN ON THESE PLANS HAS BEEN TAKEN FROM THE BEST INFORMATION AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR SHALL CONTACT THE TELEPHONE/COMMUNICATION COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 1-800-545-6005. CONTRACTOR SHALL PROTECT AND (AS NECESSARY) INSTALL SHORING FOR TELEPHONE COMPANY FACILITIES DURING CONSTRUCTION.

HAULING AND STORAGE

- HAULING AND/OR TEMPORARY STORAGE OF EQUIPMENT AND MATERIALS MAY BE NECESSARY, INCLUDING EXCAVATED MATERIAL AND

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
ORGANIZED SEWAGE COLLECTION SYSTEM (SCS)
GENERAL CONSTRUCTION NOTES

1. THIS ORGANIZED SEWAGE COLLECTION SYSTEM (SCS) MUST BE CONSTRUCTED IN ACCORDANCE WITH 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S (TCEQ) EDWARDS AQUIFER RULES AND ANY LOCAL GOVERNMENT STANDARD SPECIFICATIONS.

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROPOSED REGULATED PROJECT MUST BE PROVIDED WITH COPIES OF THE SCS PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS MUST BE REQUIRED TO KEEP ON-SITE COPIES OF THE PLAN AND THE APPROVAL LETTER.

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

4. ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED SCS APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF AN SCS APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.

5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY, ALL TEMPORARY EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES MUST BE PROPERLY INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. THESE CONTROLS MUST REMAIN IN PLACE UNTIL THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.

6. IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPLICANT MUST IMMEDIATELY NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TCEQ OF THE FEATURE DISCOVERED. A GEOLOGIST'S ASSESSMENT OF THE LOCATION AND EXTENT OF THE FEATURE DISCOVERED MUST BE REPORTED TO THAT REGIONAL OFFICE IN WRITING AND THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR FOR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.

7. SEWER LINES LOCATED WITHIN OR CROSSING THE 5-YEAR FLOODPLAIN OF A DRAINAGE WAY WILL BE PROTECTED FROM INUNDATION AND STREAM VELOCITIES WHICH COULD CAUSE EROSION AND SCOURING OF BACKFILL. THE TRENCH MUST BE CAPPED WITH CONCRETE TO PREVENT SCOURING OF BACKFILL, OR THE SEWER LINES MUST BE ENCASED IN CONCRETE. ALL CONCRETE SHALL HAVE A MINIMUM THICKNESS OF 6 INCHES.

8. BLASTING PROCEDURES FOR PROTECTION OF EXISTING SEWER LINES AND OTHER UTILITIES WILL BE IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA. SAND IS NOT ALLOWED AS BEDDING OR BACKFILL IN TRENCHES THAT HAVE BEEN BLASTED. IF ANY EXISTING SEWER LINES ARE DAMAGED, THE LINES MUST BE REPAIRED AND RETESTED.

9. ALL MANHOLES CONSTRUCTED OR REHABILITATED ON THIS PROJECT MUST HAVE WATERTIGHT SIZE ON SIZE RESILIENT CONNECTORS ALLOWING FOR DIFFERENTIAL SETTLEMENT. IF MANHOLES ARE CONSTRUCTED WITHIN THE 100-YEAR FLOODPLAIN, THE COVER MUST HAVE A GASKET AND BE BOLTED TO THE RING. WHERE GASKETED MANHOLE COVERS ARE REQUIRED FOR MORE THAN THREE MANHOLES IN SEQUENCE OR FOR MORE THAN 1500 FEET, ALTERNATE MEANS OF VENTING WILL BE PROVIDED. BRICKS ARE NOT AN ACCEPTABLE CONSTRUCTION MATERIAL FOR ANY PORTION OF THE MANHOLE.

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

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

10. WHERE WATER LINES AND NEW SEWER LINE ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN NINE FEET (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES) THE INSTALLATION MUST MEET THE REQUIREMENTS OF 30 TAC §217.53(D) (PIPE DESIGN) AND 30 TAC §290.44(E) (WATER DISTRIBUTION).

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

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

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

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

    IF NO STUB-OUT IS PRESENT AN ALTERNATE METHOD OF JOINING LATERALS IS SHOWN IN THE DETAIL ON PLAN SHEET N/A OF N/A. (FOR POTENTIAL FUTURE LATERALS). NOT USED. NO LATERALS SHALL BE CONNECTED TO THE LIFT STATION.

    THE PRIVATE SERVICE LATERAL STUB-OUTS MUST BE INSTALLED AS SHOWN ON THE PLAN AND PROFILE SHEETS ON PLAN SHEET N/A OF N/A AND MARKED AFTER BACKFILLING AS SHOWN IN THE DETAIL ON PLAN SHEET N/A OF N/A. NOT USED. NO STUBOUTS WILL BE INSTALLED FOR THE LIFT STATION.

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

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

15. ALL SEWER LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.57. THE ENGINEER MUST RETAIN COPIES OF ALL TEST RESULTS WHICH MUST BE MADE AVAILABLE TO THE EXECUTIVE DIRECTOR UPON REQUEST. THE ENGINEER MUST CERTIFY IN WRITING THAT ALL WASTEWATER LINES HAVE PASSED ALL REQUIRED TESTING TO THE APPROPRIATE REGIONAL OFFICE WITHIN 30 DAYS OF TEST COMPLETION AND PRIOR TO USE OF THE NEW COLLECTION SYSTEM. TESTING METHOD WILL BE:
    (a) FOR A COLLECTION SYSTEM PIPE THAT WILL TRANSPORT WASTEWATER BY GRAVITY FLOW, THE DESIGN MUST SPECIFY AN INFILTRATION AND EXFILTRATION TEST OR A LOW-PRESSURE AIR TEST. A TEST MUST CONFORM TO THE FOLLOWING REQUIREMENTS:
        (1) LOW PRESSURE AIR TEST.
            (A) A LOW PRESSURE AIR TEST MUST FOLLOW THE PROCEDURES DESCRIBED IN AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C-828, ASTM C-924, OR ASTM F-1417 OR OTHER PROCEDURE APPROVED BY THE EXECUTIVE DIRECTOR, EXCEPT AS TO TESTING TIMES AS REQUIRED IN TABLE C.3 IN SUBPARAGRAPH (C) OF THIS PARAGRAPH OR EQUATION C.3 IN SUBPARAGRAPH (B)(II) OF THIS PARAGRAPH.
            (B) FOR SECTIONS OF COLLECTION SYSTEM PIPE LESS THAN 36 INCH AVERAGE INSIDE DIAMETER, THE FOLLOWING PROCEDURE MUST APPLY, UNLESS A PIPE IS TO BE TESTED AS REQUIRED BY PARAGRAPH (2) OF THIS SUBSECTION.
                (i) A PIPE MUST BE PRESSURIZED TO 3.5 POUNDS PER SQUARE INCH (PSI) GREATER THAN THE PRESSURE EXERTED BY GROUNDWATER ABOVE THE PIPE.
                (ii) ONCE THE PRESSURE IS STABILIZED, THE MINIMUM TIME ALLOWABLE FOR THE PRESSURE TO DROP FROM 3.5 PSI GAUGE TO 2.5 PSI GAUGE IS COMPUTED FROM THE FOLLOWING EQUATION:

EQUATION C.3

$$T = \frac{0.085 \times D \times K}{Q}$$

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

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

PIPE DIAMETER (INCHES)	MINIMUM TIME (SECONDS)	MAXIMUM LENGTH FOR MINIMUM TIME (FEET)	TIME FOR LONGER LENGTH (SECONDS/FOOT)
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1020	133	7.693
21	1190	114	10.471
24	1360	100	13.676
27	1530	88	17.309
30	1700	80	21.369
33	1870	72	25.856

(D) AN OWNER MAY STOP A TEST IF NO PRESSURE LOSS HAS OCCURRED DURING THE FIRST 25% OF THE CALCULATED TESTING TIME.
(E) IF ANY PRESSURE LOSS OR LEAKAGE HAS OCCURRED DURING THE FIRST 25% OF A TESTING PERIOD, THEN THE TEST MUST CONTINUE FOR THE ENTIRE TEST DURATION AS OUTLINED ABOVE OR UNTIL FAILURE.
(F) WASTEWATER COLLECTION SYSTEM PIPES WITH A 27 INCH OR LARGER AVERAGE INSIDE DIAMETER MAY BE AIR TESTED AT EACH JOINT INSTEAD OF FOLLOWING THE PROCEDURE OUTLINED IN THIS SECTION.
(G) A TESTING PROCEDURE FOR PIPE WITH AN INSIDE DIAMETER GREATER THAN 33 INCHES MUST BE APPROVED BY THE EXECUTIVE DIRECTOR.

(2) INFILTRATION/EXFILTRATION TEST.
(A) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF 2.0 FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE.
(B) AN OWNER SHALL USE AN INFILTRATION TEST IN LIEU OF AN EXFILTRATION TEST WHEN PIPES ARE INSTALLED BELOW THE GROUNDWATER LEVEL.
(C) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE, OR AT LEAST TWO FEET ABOVE EXISTING GROUNDWATER LEVEL, WHICHEVER IS GREATER.
(D) FOR CONSTRUCTION WITHIN A 25-YEAR FLOOD PLAIN, THE INFILTRATION OR EXFILTRATION MUST NOT EXCEED 10 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT THE SAME MINIMUM TEST HEAD AS IN SUBPARAGRAPH (C) OF THIS PARAGRAPH.
(E) IF THE QUANTITY OF INFILTRATION OR EXFILTRATION EXCEEDS THE MAXIMUM QUANTITY SPECIFIED, AN OWNER SHALL UNDERTAKE REMEDIAL ACTION IN ORDER TO REDUCE THE INFILTRATION OR EXFILTRATION TO AN AMOUNT WITHIN THE LIMITS SPECIFIED. AN OWNER SHALL RETEST A PIPE FOLLOWING A REMEDIATION ACTION.

(b) IF A GRAVITY COLLECTION PIPE IS COMPOSED OF FLEXIBLE PIPE, DEFLECTION TESTING IS ALSO REQUIRED. THE FOLLOWING PROCEDURES MUST BE FOLLOWED:
(1) FOR A COLLECTION PIPE WITH INSIDE DIAMETER LESS THAN 27 INCHES, DEFLECTION MEASUREMENT REQUIRES A RIGID MANDREL.
(A) MANDREL SIZING.
(i) A RIGID MANDREL MUST HAVE AN OUTSIDE DIAMETER (OD) NOT LESS THAN 95% OF THE BASE INSIDE DIAMETER (ID) OR AVERAGE ID OF A PIPE, AS SPECIFIED IN THE APPROPRIATE STANDARD BY THE ASTMS, AMERICAN WATER WORKS ASSOCIATION, UNI-BELL, OR AMERICAN NATIONAL STANDARDS INSTITUTE, OR ANY RELATED APPENDIX.
(ii) IF A MANDREL SIZING DIAMETER IS NOT SPECIFIED IN THE APPROPRIATE STANDARD, THE MANDREL MUST HAVE AN OD EQUAL TO 95% OF THE ID OF A PIPE. IN THIS CASE, THE ID OF THE PIPE, FOR THE PURPOSE OF DETERMINING THE OD OF THE MANDREL, MUST EQUAL BE THE AVERAGE OUTSIDE DIAMETER MINUS TWO MINIMUM WALL THICKNESSES FOR OD CONTROLLED PIPE AND THE AVERAGE INSIDE DIAMETER FOR ID CONTROLLED PIPE.
(iii) ALL DIMENSIONS MUST MEET THE APPROPRIATE STANDARD.
(B) MANDREL DESIGN.
(i) A RIGID MANDREL MUST BE CONSTRUCTED OF A METAL OR A RIGID PLASTIC MATERIAL THAT CAN WITHSTAND 200 PSI WITHOUT BEING DEFORMED.
(ii) A MANDREL MUST HAVE NINE OR MORE ODD NUMBER OF RUNNERS OR LEGS.
(iii) A BARREL SECTION LENGTH MUST EQUAL AT LEAST 75% OF THE INSIDE DIAMETER OF A PIPE.
(iv) EACH SIZE MANDREL MUST USE A SEPARATE PROVING RING.
(C) METHOD OPTIONS.
(i) AN ADJUSTABLE OR FLEXIBLE MANDREL IS PROHIBITED.
(ii) A TEST MAY NOT USE TELEVISION INSPECTION AS A SUBSTITUTE FOR A DEFLECTION TEST.
(iii) IF REQUESTED, THE EXECUTIVE DIRECTOR MAY APPROVE THE USE OF A DEFLECTOMETER OR A MANDREL WITH REMOVABLE LEGS OR RUNNERS ON A CASE-BY-CASE BASIS.
(2) FOR A GRAVITY COLLECTION SYSTEM PIPE WITH AN INSIDE DIAMETER 27 INCHES AND GREATER, OTHER TEST METHODS MAY BE USED TO DETERMINE VERTICAL DEFLECTION.
(3) A DEFLECTION TEST METHOD MUST BE ACCURATE TO WITHIN PLUS OR MINUS 0.2% DEFLECTION.
(4) AN OWNER SHALL NOT CONDUCT A DEFLECTION TEST UNTIL AT LEAST 30 DAYS AFTER THE FINAL BACKFILL.
(5) GRAVITY COLLECTION SYSTEM PIPE DEFLECTION MUST NOT EXCEED FIVE PERCENT (5%).
(6) IF A PIPE SECTION FAILS A DEFLECTION TEST, AN OWNER SHALL CORRECT THE PROBLEM AND CONDUCT A SECOND TEST AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.

16. ALL MANHOLES MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC §217.58.
(a) ALL MANHOLES MUST PASS A LEAKAGE TEST.
(b) AN OWNER SHALL TEST EACH MANHOLE (AFTER ASSEMBLY AND BACKFILLING) FOR LEAKAGE, SEPARATE AND INDEPENDENT OF THE COLLECTION SYSTEM PIPES, BY HYDROSTATIC EXFILTRATION TESTING, VACUUM TESTING, OR OTHER METHOD APPROVED BY THE EXECUTIVE DIRECTOR.
(1) HYDROSTATIC TESTING.
(A) THE MAXIMUM LEAKAGE FOR HYDROSTATIC TESTING OR ANY ALTERNATIVE TEST METHODS IS 0.025 GALLONS PER FOOT DIAMETER PER FOOT OF MANHOLE DEPTH PER HOUR.
(B) TO PERFORM A HYDROSTATIC EXFILTRATION TEST, AN OWNER SHALL SEAL ALL WASTEWATER PIPES COMING INTO A MANHOLE WITH AN INTERNAL PIPE PLUG, FILL THE MANHOLE WITH WATER, AND MAINTAIN THE TEST FOR AT LEAST ONE HOUR.
(C) A TEST FOR CONCRETE MANHOLES MAY USE A 24-HOUR WETTING PERIOD BEFORE TESTING TO ALLOW SATURATION OF THE CONCRETE.
(2) VACUUM TESTING.
(A) TO PERFORM A VACUUM TEST, AN OWNER SHALL PLUG ALL LIFT HOLES AND EXTERIOR JOINTS WITH A NON-SHRINK GROUT AND PLUG ALL PIPES ENTERING A MANHOLE.
(B) NO GROUT MUST BE PLACED IN HORIZONTAL JOINTS BEFORE TESTING.
(C) STUB-OUTS, MANHOLE BOOTS, AND PIPE PLUGS MUST BE SECURED TO PREVENT MOVEMENT WHILE A VACUUM IS DRAWN.
(D) AN OWNER SHALL USE A MINIMUM 60 INCH/LB TORQUE WRENCH TO TIGHTEN THE EXTERNAL CLAMPS THAT SECURE A TEST COVER TO THE TOP OF A MANHOLE.
(E) A TEST HEAD MUST BE PLACED AT THE INSIDE OF THE TOP OF A CONE SECTION, AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
(F) THERE MUST BE A VACUUM OF 10 INCHES OF MERCURY INSIDE A MANHOLE TO PERFORM A VALID TEST.
(G) A TEST DOES NOT BEGIN UNTIL AFTER THE VACUUM PUMP IS OFF.
(H) A MANHOLE PASSES THE TEST IF AFTER 2.0 MINUTES AND WITH ALL VALVES CLOSED, THE VACUUM IS AT LEAST 9.0 INCHES OF MERCURY.

17. ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(3)(I). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY

SAN ANTONIO REGIONAL OFFICE
14250 JUDSON ROAD
SAN ANTONIO, TEXAS 78233-4480
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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
LIFT STATIONS AND FORCE MAINS
GENERAL CONSTRUCTION NOTES

1. THIS LIFT STATION AND/OR FORCE MAIN MUST BE CONSTRUCTED IN ACCORDANCE WITH 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) EDWARDS AQUIFER RULES, AND ANY LOCAL GOVERNMENT STANDARD SPECIFICATIONS.

2. ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED LIFT STATION/FORCE MAIN (LSFM) SYSTEM APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF A LSFM SYSTEM APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.

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

4. UPON COMPLETION OF ANY LIFT STATION EXCAVATION, A GEOLOGIST MUST CERTIFY THAT THE EXCAVATION HAS BEEN INSPECTED FOR THE PRESENCE OF SENSITIVE FEATURES. THE CERTIFICATION MUST BE SIGNED, SEALED, AND DATED BY THE GEOLOGIST PREPARING THE CERTIFICATION. CERTIFICATION THAT THE EXCAVATION HAS BEEN INSPECTED MUST BE SUBMITTED TO THE APPROPRIATE REGIONAL OFFICE.
   - IF SENSITIVE FEATURE(S) ARE IDENTIFIED, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY AND MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY FROM THE LIFT STATION.
   - CONSTRUCTION MAY CONTINUE IF THE GEOLOGIST CERTIFIES THAT NO SENSITIVE FEATURE OR FEATURES WERE PRESENT.

5. IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPLICANT MUST IMMEDIATELY NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TCEQ OF THE FEATURE DISCOVERY. A GEOLOGIST'S ASSESSMENT OF THE LOCATION AND EXTENT OF THE FEATURE DISCOVERED MUST BE REPORTED TO THAT REGIONAL OFFICE IN WRITING WITHIN TWO WORKING DAYS. THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR FOR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.

6. ALL FORCE MAIN LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.68. TESTING METHOD WILL BE:
   - A PRESSURE TEST MUST USE 50 POUNDS PER SQUARE INCH ABOVE THE NORMAL OPERATING PRESSURE OF A FORCE MAIN.
   - A TEMPORARY VALVE FOR PRESSURE TESTING MAY BE INSTALLED NEAR THE DISCHARGE POINT OF A FORCE MAIN AND REMOVED AFTER A TEST IS SUCCESSFULLY COMPLETED.
   - A PUMP ISOLATION VALVE MAY BE USED AS AN OPPOSITE TERMINATION POINT.
   - A TEST MUST INVOLVE FILLING A FORCE MAIN WITH WATER.
   - A PIPE MUST HOLD THE DESIGNATED TEST PRESSURE FOR A MINIMUM OF 4.0 HOURS.
   - THE LEAKAGE RATE MUST NOT EXCEED 10.0 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER DAY. THE FOLLOWING EQUATION MUST BE USED TO CALCULATE THE ACCEPTABLE LEAKAGE RATE IN GALLONS PER HOUR PER 1,000 FEET OF PIPE.

FIGURE: 30 TAC §217.68(g)

EQUATION C.5.

$$L = \frac{SD\,P}{155{,}400}$$

WHERE:
L = ACCEPTABLE LEAKAGE RATE (GALLONS/HOUR/1,000 FEET OF PIPE, BASED ON A LEAKAGE RATE OF 10.0 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER DAY)
S = LENGTH OF PIPE
D = NOMINAL DIAMETER OF PIPE (INCHES)
P = AVERAGE TEST PRESSURE (POUNDS/SQUARE INCH)

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

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

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

2. ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROJECT MUST BE PROVIDED WITH COMPLETE COPIES OF THE APPROVED WATER POLLUTION ABATEMENT PLAN (WPAP) AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS ARE REQUIRED TO KEEP ON-SITE COPIES OF THE APPROVED PLAN AND APPROVAL LETTER.

3. IF ANY SENSITIVE FEATURE(S) (CAVES, SOLUTION CAVITY, SINK HOLE, ETC.) IS DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE APPROPRIATE TCEQ REGIONAL OFFICE MUST BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. CONSTRUCTION ACTIVITIES MAY NOT BE RESUMED UNTIL THE TCEQ HAS REVIEWED AND APPROVED THE APPROPRIATE PROTECTIVE MEASURES IN ORDER TO PROTECT ANY SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY.

4. NO TEMPORARY OR PERMANENT HAZARDOUS SUBSTANCE STORAGE TANK SHALL BE INSTALLED WITHIN 150 FEET OF A WATER SUPPLY SOURCE, DISTRIBUTION SYSTEM, WELL, OR SENSITIVE FEATURE.

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

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

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

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

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

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

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

12. THE HOLDER OF ANY APPROVED EDWARD AQUIFER PROTECTION PLAN MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE IN WRITING AND OBTAIN APPROVAL FROM THE EXECUTIVE DIRECTOR PRIOR TO INITIATING ANY OF THE FOLLOWING:

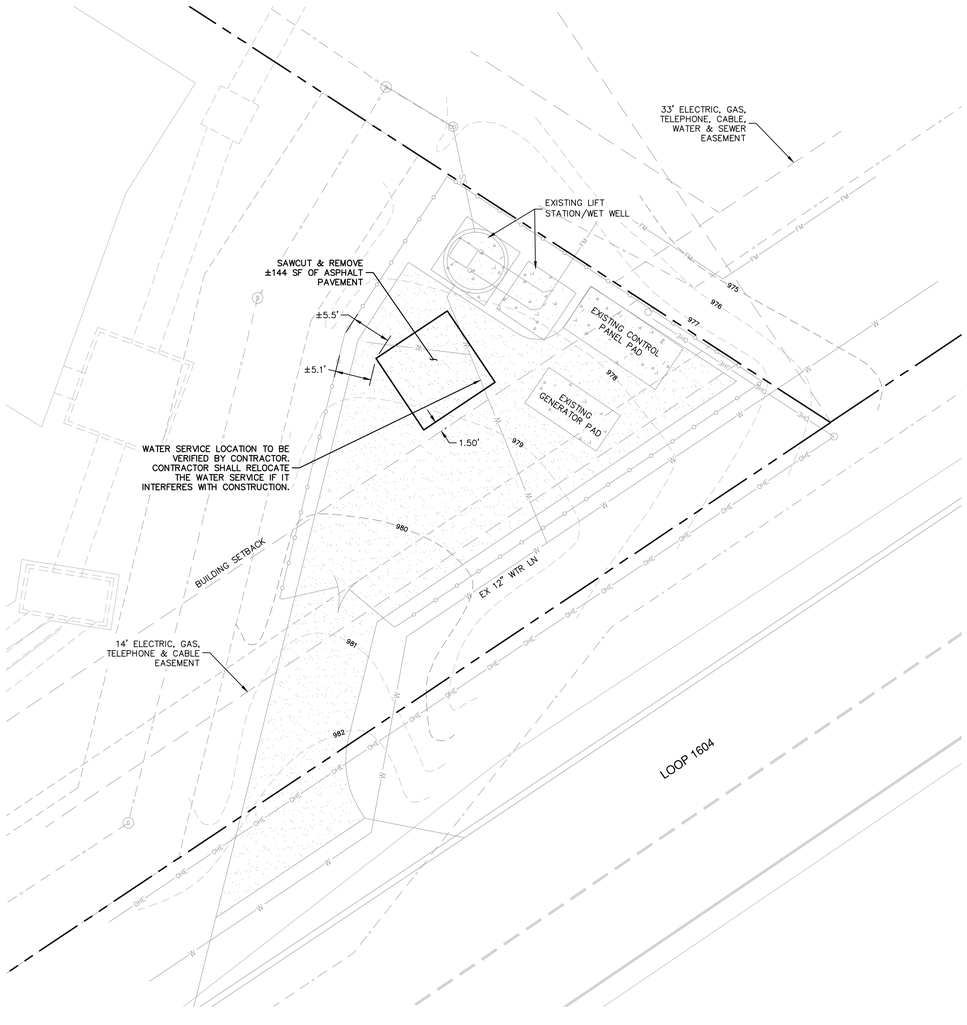
A. ANY PHYSICAL OR OPERATIONAL MODIFICATION OF ANY WATER POLLUTION ABATEMENT STRUCTURE(S), INCLUDING BUT NOT LIMITED TO PONDS, DAMS, BERMS, SEWAGE TREATMENT PLANTS, AND DIVERSIONARY STRUCTURES;

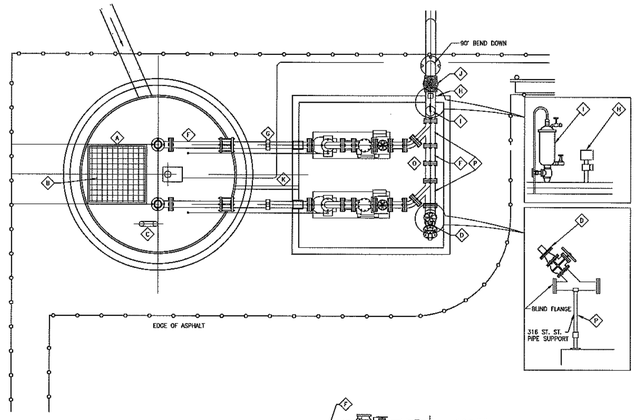
LEGEND

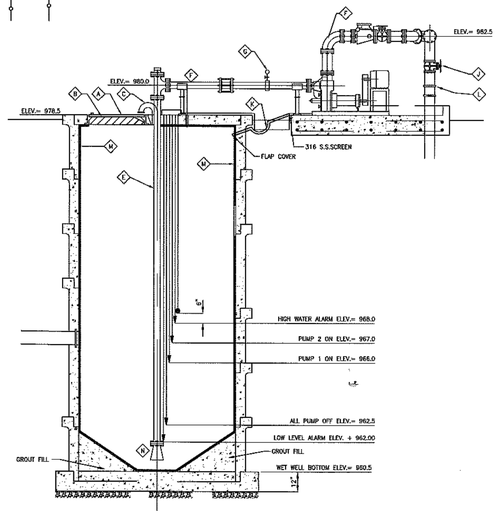
- PROPERTY/ROW LINE
- LOT LINE
- 100 YR FLOODPLAIN
- 965 — EXISTING CONTOUR MAJOR
- 964 — EXISTING CONTOUR MINOR
- EASEMENT LINE
- OHE — EXISTING OVERHEAD ELECTRIC
- EXISTING SECURITY FENCE
- PROPOSED SEWER LINE (BY OTHERS)
- SS — EXISTING SEWER LINE
- FM — EXISTING FORCE MAIN
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT

SCALE: 1"= 10'

0' 10' 20' 30'







PROPOSED MODIFICATIONS
SCALE : 3/8" = 1'

KEYED NOTES – DEMOLITION PLAN

1. REMOVE FLOAT.

KEYED NOTES – PROPOSED MODIFICATIONS

A. RETROFIT EXISTING ACCESS HATCH WITH SAFETY GRATE MADE OF ALUMINUM OR NON-CORROSIVE FIBER GLASS REINFORCED COMPOSITE MATERIAL FOR FALL PROTECTION AS PER ACCESS COVER MANUFACTURER'S RECOMMENDATIONS
B. INSTALL NON-CORROSIVE LOCKING BAR ON WET WELL ACCESS HATCH COMPLETE WITH PADLOCK
C. INSTALL 316 STAINLESS STEEL INSECT SCREEN IN VENT.
D. INSTALL AN EMERGENCY BYPASS CONNECTION COMPLETE WITH QUICK-DISCONNECT MALE FITTING WITH DUST CAP AND GATE VALVE.
E. COAT AND PAINT PIPE AND FITTING INSIDE THE WET WELL
F. COAT AND PAINT PIPE, VALVES, AND FITTING OUTSIDE THE WET WELL
G. INSTALL 2 VACUUM GAUGES WITH ISOLATION BALL VALVES, MIN. 4" DIA. 5% ACCURACY, LIQUID FILLED.
H. INSTALL PRESSURE TRANSMITTER WITH ISOLATION BALL VALVE
I. INSTALL 2" AIR RELEASE VALVE AND PIPING ASSEMBLY. REFER TO DETAIL 3 ON SHEET D-8
J. INSTALL 6" GATE VALVE, RESILIENT WEDGE WITH FLANGED JOINTS ON FORCE MAIN.
K. REPAIR PVC DRAIN LINE COMPLETE WITH P TRAP, 316 STAINLESS STEEL SCREEN AND FLAP COVER.
L. INSTALL RESTRAINED FLANGED COUPLING ADAPTER.
M. COAT ALL INTERIOR CONCRETE SURFACE WITHIN THE WET WELL IN ACCORDANCE WITH ITEM 09911 OF THE SPECIFICATIONS.
N. INSTALL 4" FLANGED FLARE
O. INSTALL PRESSURE GAUGE WITH ISOLATION BALL VALVE, MIN. 4" DIA, 5% NECESSARY, LIQUID FILLED.
P. INSTALL 316 STAINLESS STEEL PIPE SUPPORT. REFER TO DETAIL 5 ON SHEET D-7

NOTES:

1. EXISTING LIFT STATION SHOWN HERE IS BASED ON SAWS RECORD DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING DIMENSIONS AND EQUIPMENT SHOWN HERE.
2. CONTRACTOR SHALL PROVIDE TEMPORARY BY-PASS PUMPING TO MAINTAIN WASTEWATER SERVICE DURING CONSTRUCTION. CONTRACTOR SHALL SUBMIT BYPASS PUMPING PLAN PER ITEM 864 OF THE SPECIFICATIONS.
3. PIPE, VALVES, AND FITTINGS OUTSIDE THE WET WELL SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS EPOXY COATING SYSTEM WITH A TOP COAT SYSTEM OF URETHANE. COLOR SHALL BE GREY PANTONE #431U. APPROVED MANUFACTURERS INCLUDE TNEMEC, CARBOLINE, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS
4. PIPE AND FITTINGS WITHIN THE WET WELL SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS COAL TAR EPOXY COATING SYSTEM. COLOR SHALL BE GREY PANTONE #431U. APPROVED MANUFACTURERS INCLUDE TNEMEC, CARBOLINE, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS
5. CONTRACTOR SHALL SUBMIT PROPOSED DEMOLITION AND REMOVAL SCHEDULE FOR APPROVAL AND NOTIFY OWNER'S REPRESENTATIVE IN WRITING AT LEAST 48 HOURS BEFORE STARTING DEMOLITION. SUBMIT APPROVED COPY OF CITY OF SAN ANTONIO DEMOLITION PERMIT PRIOR TO COMMENCEMENT OF DEMOLITION OPERATIONS.
6. CONTRACTOR SHALL RETURN TO SAWS THE FOLLOWING EQUIPMENT AND MATERIALS: PUMPS, MOTORS, VALVES, PIPE, FITTINGS, CONTROLS AND ACCESSORIES.

STATION OPERATION TABLES

RISING LEVEL CYCLE

WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
962.50	PUMPS OFF LEVEL	ALL PUMPS ARE OFF
966.00	LEAD PUMP LEVEL	LEAD PUMP ON
967.00	LAG PUMP LEVEL	LEAD & LAG PUMPS ON
968.00	HIGH WATER ALARM LEVEL	HIGH WATER ALARM SOUND

FALLING LEVEL CYCLE

WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
967.00	LAG PUMP LEVEL	LEAD & LAG PUMPS ON ALARM TURNS OFF
966.00	LEAD PUMP LEVEL	LEAD & LAG PUMPS ON
962.50	ALL PUMPS OFF LEVEL	ALL PUMPS STOPPED – LAG PUMP SWITCHES TO LEAD PUMP

EXISTING LIFT STATION PLAN & PROFILE

NOT-TO-SCALE

GROUNDING NOTES:

1. IF ANY GROUNDS ARE IDENTIFIED WITHIN THE AREA OF EXCAVATION, THE GROUND RODS SHOULD BE RELOCATED BY THE CONTRACTOR.
2. RELOCATED GROUND RODS SHALL HAVE A MINIMUM CLEAR BUFFER RADIUS OF 10' FROM ALL OTHER ONSITE EQUIPMENT.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

TRENCH EXCAVATION SAFETY PROTECTION

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

SEWER

DEVELOPER'S NAME: KOONTZ CORPORATION
ADDRESS: 903 BASSE RD
CITY: SAN ANTONIO STATE: TEXAS ZIP: 78212
PHONE# (210) 826-2600 FAX# XX
SAWS BLOCK MAP# 148644 TOTAL EDU'S 650 TOTAL ACREAGE 204
TOTAL LINEAR FOOTAGE OF PIPE: 8.5 PLAT NO. XXXXX
NUMBER OF LOTS N/A SAWS JOB NO. 25-1569

NO.	REVISION	DATE

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
9/14/2025

PAPE-DAWSON
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT

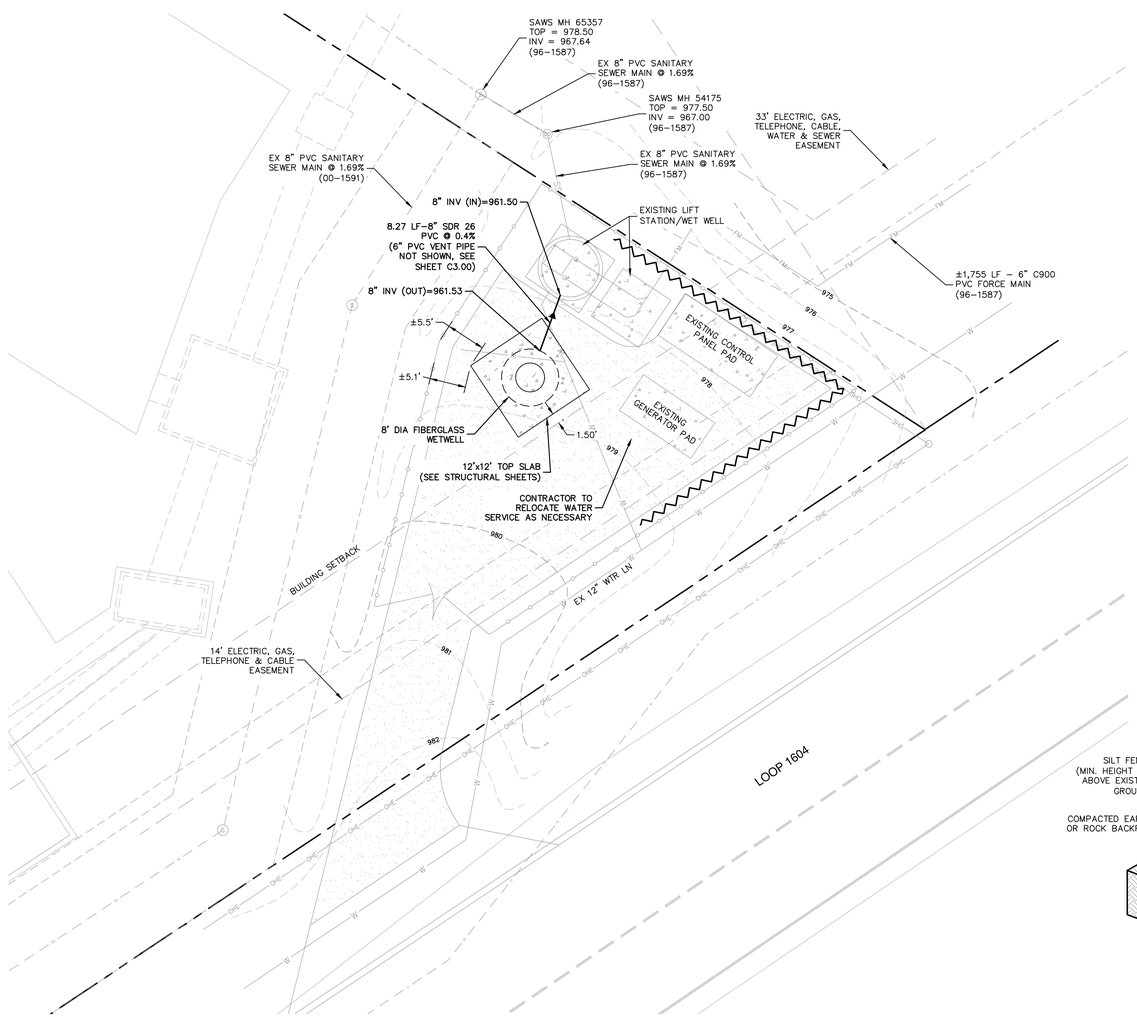
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS

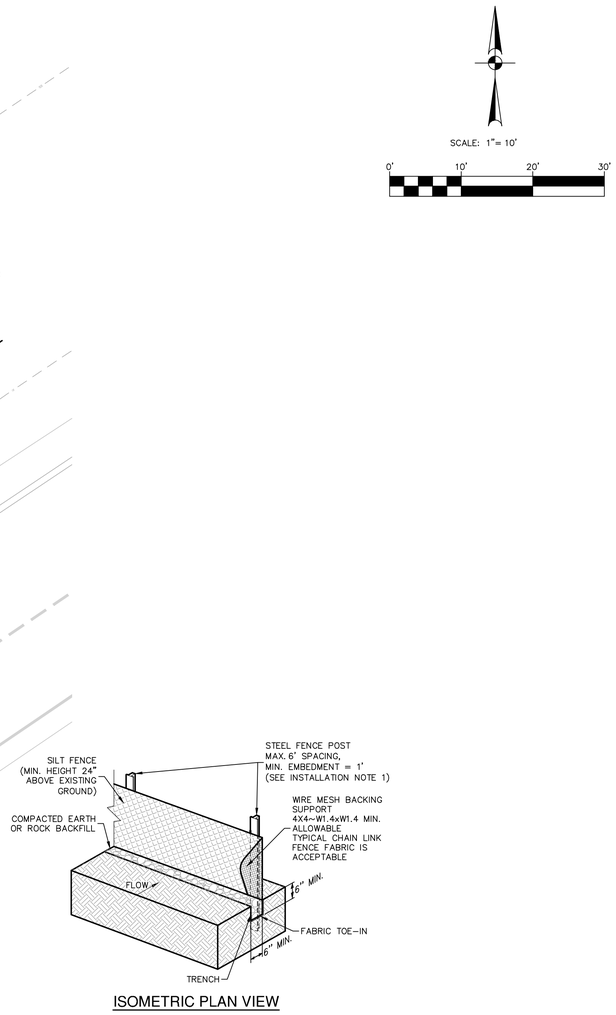
EXISTING CONDITIONS & DEMOLITION PLAN

PLAT NO. 010025
JOB NO. 13520-01
DATE AUGUST 2025
DESIGNER RM
CHECKED RM DRAWN AL
SHEET C1.00

Date: May 13, 2025, 1:58 PM – User ID: dloughlin
File: P:\13520\01\Design\Civil\Lift Station\Sheets\EC-1352001-LS.dwg

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ISOMETRIC PLAN VIEW

SILT FENCE

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

THE PURPOSE OF A SILT FENCE IS TO INTERCEPT AND DETAIN WATER-BORN SEDIMENT FROM UNPROTECTED AREAS OF A LIMITED EXTENT. SILT FENCE IS USED DURING THE PERIOD OF CONSTRUCTION NEAR THE PERIMETER OF A DISTURBED AREA TO INTERCEPT SEDIMENT WHILE ALLOWING WATER TO PERCOLATE THROUGH. THIS FENCE SHOULD REMAIN IN PLACE UNTIL THE DISTURBED AREA IS PERMANENTLY STABILIZED. SILT FENCE SHOULD NOT BE USED WHERE THERE IS A CONCENTRATION OF WATER IN A CHANNEL OR DRAINAGE WAY. IF CONCENTRATED FLOW OCCURS AFTER INSTALLATION, CORRECTIVE ACTION MUST BE TAKEN SUCH AS PLACING A ROCK BERM IN THE AREAS OF CONCENTRATED FLOW.

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

MATERIALS

1. SILT FENCE MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE WOVEN OR NONWOVEN FABRIC. THE FABRIC SHOULD BE 36 INCHES, WITH A MINIMUM UNIT WEIGHT OF 4.5 OZ/YD, MULLEN BURST STRENGTH EXCEEDING 190 LB/IN2, ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NUMBER 30.

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

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

INSTALLATION

1. STEEL POSTS, WHICH SUPPORT THE SILT FENCE, SHOULD BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF 1-FOOT DEEP AND SPACED NOT MORE THAN 8 FEET ON CENTER. WHERE WATER CONCENTRATES, THE MAXIMUM SPACING SHOULD BE 6 FEET.

2. LAY OUT FENCING DOWN-SLOPE OF DISTURBED AREA, FOLLOWING THE CONTOUR AS CLOSELY AS POSSIBLE. THE FENCE SHOULD BE SITED SO THAT THE MAXIMUM DRAINAGE AREA IS ¼ ACRE/100 FEET OF FENCE.

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

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

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

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

COMMON TROUBLE POINTS

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

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

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

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

INSPECTION AND MAINTENANCE GUIDELINES

1. INSPECT ALL FENCING WEEKLY, AND AFTER RAINFALL.

2. REMOVE SEDIMENT WHEN BUILDUP REACHES 6 INCHES.

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

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

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

SILT FENCE DETAIL

NOT-TO-SCALE

CAUTION!!

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SEWER

DEVELOPER'S NAME: KOONTZ CORPORATION
ADDRESS: 903 BASSE RD
CITY: SAN ANTONIO STATE: TEXAS ZIP: 78212
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SAWS BLOCK MAP# 148644 TOTAL EDU'S 650 TOTAL ACREAGE 204
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LEGEND

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- PROPOSED SEWER LINE
- SILT FENCE
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT
- PROPOSED CONCRETE

SCALE: 1"= 10'

0' 10' 20' 30'

NO.	REVISION	DATE

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
9/14/2025

PAPE-DAWSON
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

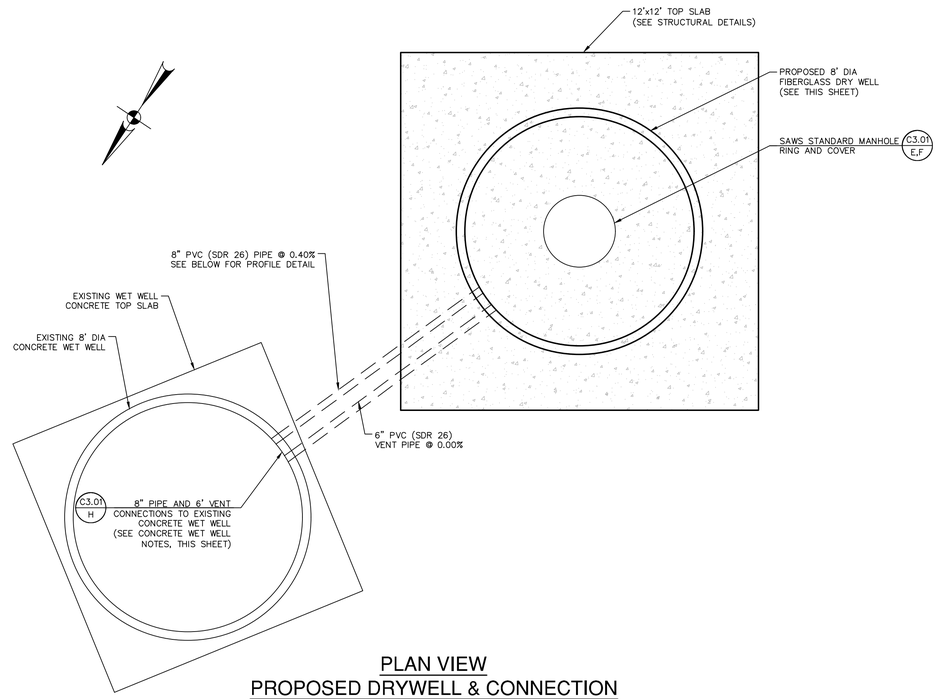
BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS

SITE PLAN

PLAT NO. 010025
JOB NO. 13520-01
DATE AUGUST 2025
DESIGNER RM
CHECKED RM DRAWN AL
SHEET C2.00

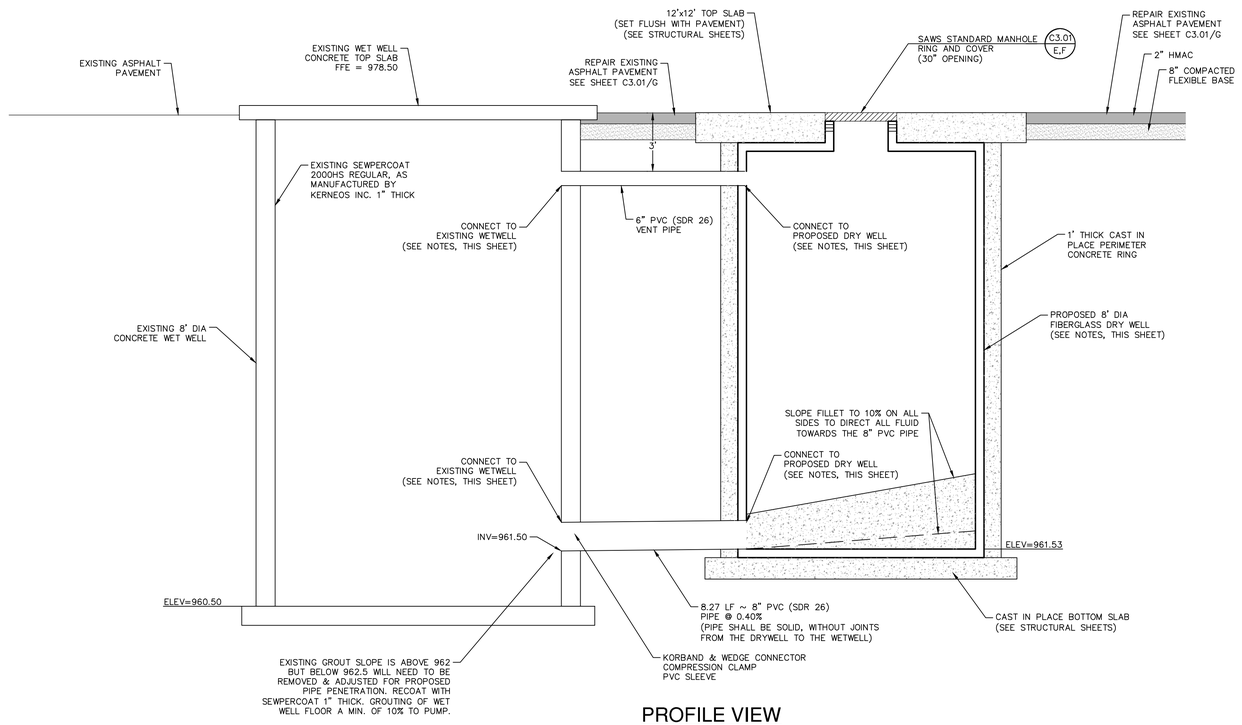
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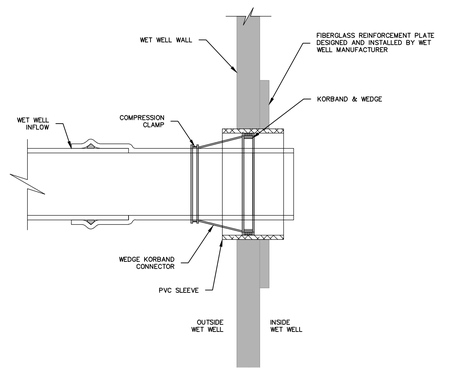
PLAN VIEW
PROPOSED DRYWELL & CONNECTION TO EXISTING WETWELL

NOT-TO-SCALE



PROFILE VIEW
PROPOSED DRYWELL & CONNECTION TO EXISTING WETWELL

NOT-TO-SCALE



WET WELL INFLOW PENETRATION DETAIL

NOT-TO-SCALE

EXISTING WETWELL AND PROPOSED DRYWELL NOTES:

1. CONTRACTOR SHALL REPAIR THE CONCRETE WETWELL AT THE PROPOSED PIPE PENETRATIONS BY APPLYING A ONE-INCH THICK COAT OF KERNEOS SEWPERCOAT HS 2000 AND PG.
2. UPON COMPLETION OF PIPE PENETRATIONS AN APPLICATION OF REPAIR COATING, CONTRACTOR SHALL PERFORM A HYDROSTATIC TEST ON THE CONCRETE WETWELL.
3. PROPOSED DRYWELL SHALL CONFORM TO SAWS SPEC ITEM 853.
4. PRIOR TO PUTTING THE LIFT STATION BACK INTO SERVICE, THE CONTRACTOR SHALL DEMONSTRATE SUCCESSFUL HYDROSTATIC TESTS ON THE EXISTING WETWELL AND THE PROPOSED DRYWELL AND PROVIDE INTERIOR COATING REPAIR TO THE WETWELL.
5. VENT PIPE (BETWEEN THE TWO WELLS) BURY DEPTH OF 3-FT MAY BE ADJUSTED TO AVOID RISER JOINTS IN THE CONCRETE WETWELL.

GENERAL COMPACTION NOTE

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING 98% COMPACTION ON ALL TRENCH BACKFILL AND PAYING FOR THE TESTS TO BE PERFORMED BY A THIRD PARTY. COMPACTION TESTS WILL BE DONE AT ONE LOCATION POINT RANDOMLY SELECTED OR AS INDICATED BY THE SAWS INSPECTOR/TEST ADMINISTER, PER EACH 12-INCH LOOSE LIFT PER 400 LINEAR FEET AT A MINIMUM. THIS PROJECT WILL NOT BE ACCEPTED AND FINALIZED BY SAWS WITHOUT THIS REQUIREMENT BEING MET AND VERIFIED BY PROVIDING ALL NECESSARY DOCUMENTED TEST RESULTS.

CAUTION!!!

1. CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT 1-800-DIG-TESS A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.
2. CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING UNDER AND/OR AROUND OVERHEAD ELECTRIC LINES. CONTRACTOR SHALL COORDINATE WITH CPS ENERGY TO ESTABLISH THE MAXIMUM WORKING HEIGHT FROM GROUND ELEVATION. COORDINATE ALL WORK CPS ENERGY.

TRENCH EXCAVATION SAFETY PROTECTION

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

SEWER

DEVELOPER'S NAME: KOONTZ CORPORATION
ADDRESS: 903 BASSE RD
CITY: SAN ANTONIO STATE: TEXAS ZIP: 78212
PHONE# (210) 826-2600 FAX# XX
SAWS BLOCK MAP# 148644 TOTAL EDU'S 650 TOTAL ACREAGE 204
TOTAL LINEAR FOOTAGE OF PIPE: 8.5 PLAT NO. XXXXX
NUMBER OF LOTS N/A SAWS JOB NO.. 25-1569

NO.	REVISION	DATE

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
9/14/2025

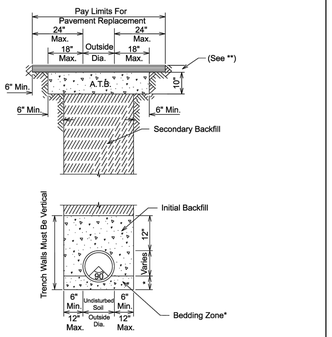
PAPE-DAWSON
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS
DRY WELL PLAN & PROFILE

PLAT NO. 010025
JOB NO. 13520-01
DATE AUGUST 2025
DESIGNER RM
CHECKED RM DRAWN AL
SHEET C3.00

Date: May 13, 2025, 1:58 PM — User ID: daughlin
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* Sewer Gravel 6" Min. or 1/8 O.D. of the pipe, whichever is greater.

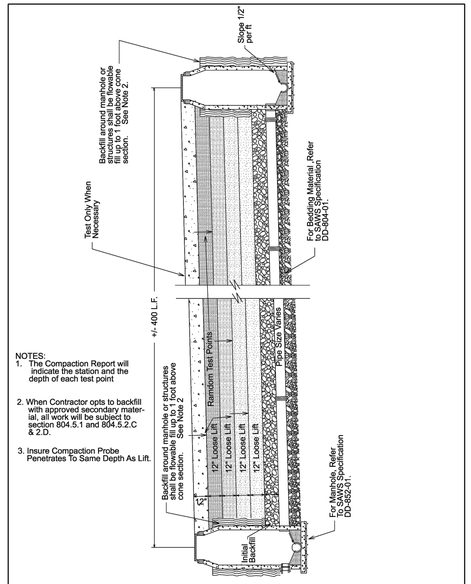
In areas of over excavation, encasement shall extend from trench wall to trench wall. Pay Limits shall not exceed 12" max. as shown on detail. Additional encasement shall be incidental.

** Min 2" HMAC Type "D" for trench repair in Local / Residential streets.

** Min 3" HMAC Type "C" for trench repair in Collector / Arterial streets.

PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	SANITARY SEWER PIPE LAID IN TRENCH	APPROVED MARCH 2008	REVISED APRIL 2014	DD-804-01	SHEET 1 OF 1

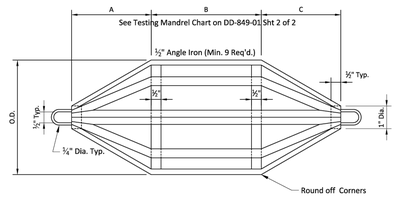
C3.01 A — SANITARY SEWER PIPE LAID IN TRENCH
N.T.S.



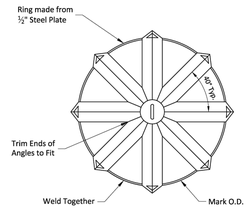
NOTES:
1. The Compaction Report will indicate the station and the depth of each test point
2. When Contractor opts to backfill with approved secondary material, all work will be subject to section 804.5.1 and 804.5.2.C & 2.D.
3. Insure Compaction Probe Penetrates To Same Depth As Lift.

PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	TRENCH COMPACTION DETAIL	APPROVED MARCH 2008	REVISED APRIL 2014	DD-804-02	SHEET 1 OF 1

C3.01 B — TRENCH COMPACTION DETAIL
N.T.S.



SIDE OR TOP VIEW



END VIEW

Note:
All Mandrels must be Approved by SAWS Construction Inspection Dept. and Stamped before Use.

PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	GO, NO GO DEFLECTION TESTING MANDREL	APPROVED March 2008	REVISED December 2019	DD-849-01	SHEET 1 OF 2

C3.01 C — GO, NO GO DEFLECTION TEST RING MANDREL
N.T.S.

SIZE	A	B*	MANDREL O.D. PVC (SDR -26)	RING O.D. PVC (SDR -26)
6"	4.0"	4.5"	5.50	4.79
8"	5.5"	6"	7.37	6.66
10"	7.0"	7.5"	9.21	8.50
12"	8.0"	9"	10.96	10.25
15"	10.0"	11"	13.42	12.71
18"	12.0"	13.5"	———	———
21"	14.0"	16"	———	———
24"	16.0"	18"	———	———
27"	18.0"	20"	———	———

*Minimum Length

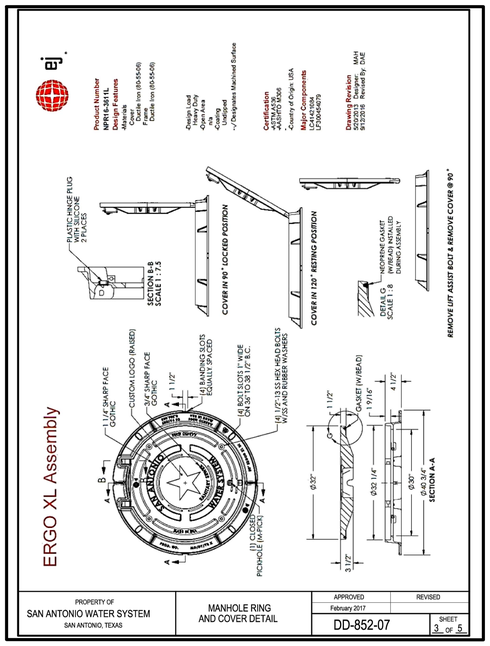
CHART

Notes:
PVC Pipes and Fittings 6" to 15" in Diameter shall Conform to ASTM D-2241
PVC Pipes and Fittings 18" to 27" in Diameter shall Conform to ASTM F-679

This information is provided as a reference. All deflection testing shall be done in accordance with TCEQ Capter 217.

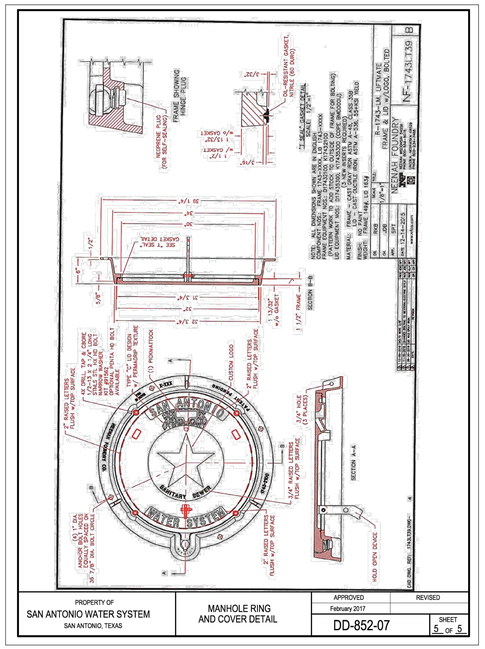
PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	GO, NO GO DEFLECTION TESTING MANDREL CHART	APPROVED March 2008	REVISED December 2019	DD-849-01	SHEET 2 OF 2

C3.01 D — GO, NO GO DEFLECTION TEST RING MANDREL CHART
N.T.S.



PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	MANHOLE RING AND COVER DETAIL	APPROVED February 2017	REVISED	DD-852-07	SHEET 3 OF 5

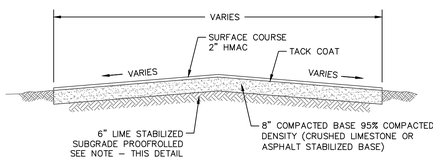
C3.01 E — MANHOLE RING AND COVER DETAIL
N.T.S.



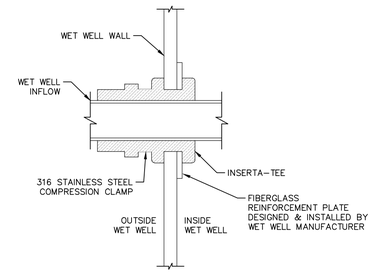
PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	MANHOLE RING AND COVER DETAIL	APPROVED February 2017	REVISED	DD-852-07	SHEET 5 OF 5

C3.01 F — MANHOLE RING AND COVER DETAIL
N.T.S.

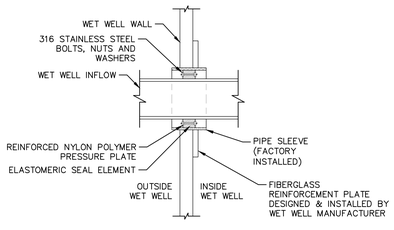
NOTE
IF THE SUBGRADE HAS A PLASTICITY INDEX OF 20 OR LESS, LIME STABILIZATION IS NOT REQUIRED. HOWEVER THE SUBGRADE SHALL BE COMPACTED TO 95% OF THE STANDARD PROCTOR (ASTM D-698). THE SUBGRADE SHALL BE MOISTURE CONDITIONED TO THE OPTIMUM MOISTURE CONTENT (MINIMUM) TO +4%



C3.01 G — LIFT STATION ASPHALT PAVEMENT DETAIL
N.T.S.



C3.01 H — INSERTA-TEE DETAIL
N.T.S.



C3.01 I — LINK SEAL DETAIL
N.T.S.

NO.	REVISION	DATE

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
8/14/2025

PAPE–DAWSON
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS

DRY WELL DETAILS

PLAT NO. 010025
JOB NO. 13520-01
DATE AUGUST 2025
DESIGNER RM
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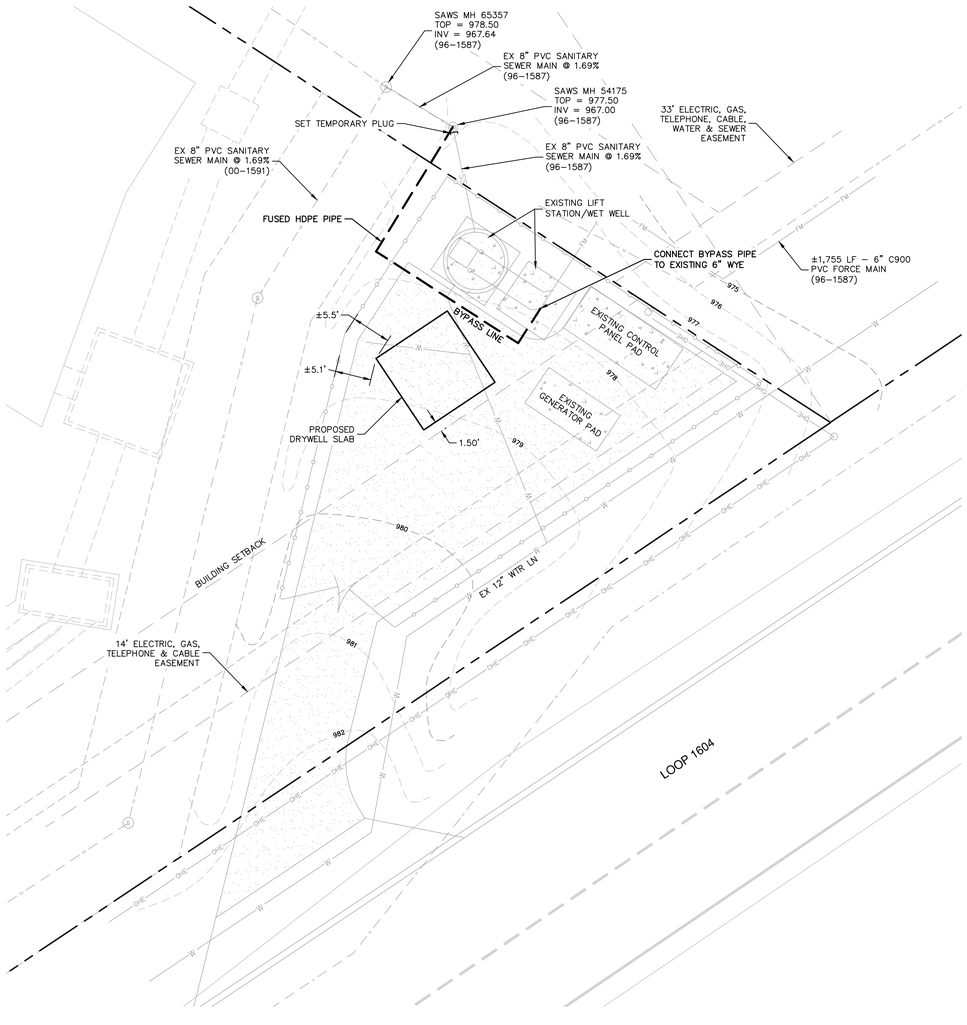
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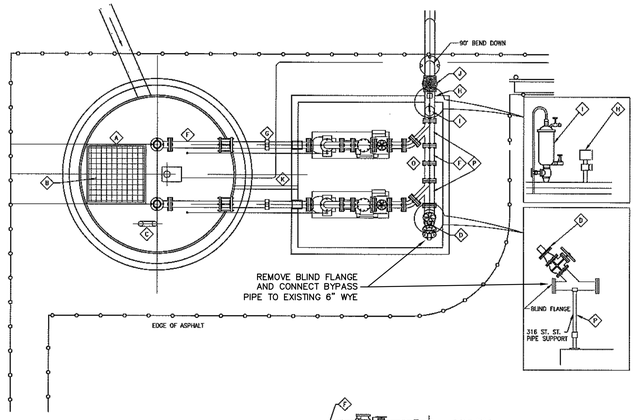
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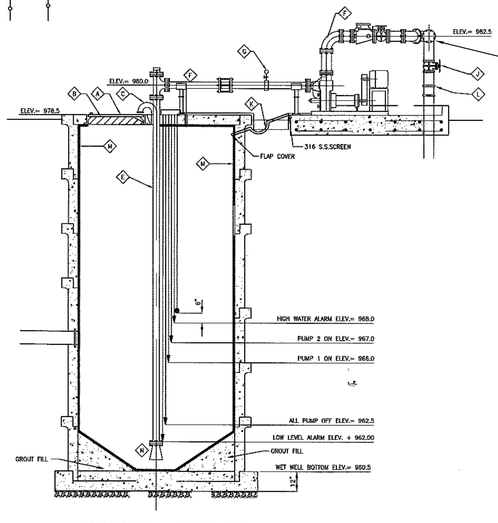
SAWS PROJECT NO.	SAWS BYPASS MH ID NO.	INCOMING SAN SEWER DIA (IN) & SLOPE (%)	ESTIMATED FULL PIPE FLOW (GPM) (SEE BYPASS NOTES, THIS SHEET)	APPROX FM LENGTH (FT)	APPROX FM HIGH POINT ELEV (FT)	APPROX FM DISCHARGE ELEV (FT)	FM DISCHARGE MH ID NO.	FM DISCHARGE MH INV ELEV (FT)
96-1587	54175	8" @ 1.69%	707	1,745	1,004.00	1,000.72	55075	998.72

SCALE: 1"= 10'

0' 10' 20' 30'







PROPOSED MODIFICATIONS

SCALE : 3/8" = 1'

KEYED NOTES – DEMOLITION PLAN

1. REMOVE FLOAT.

KEYED NOTES – PROPOSED MODIFICATIONS

1. RETROFIT EXISTING ACCESS HATCH WITH SAFETY GRATE MADE OF ALUMINUM OR NON-CORROSIVE FIBER GLASS REINFORCED COMPOSITE MATERIAL FOR FALL PROTECTION AS PER ACCESS COVER MANUFACTURER'S RECOMMENDATIONS
2. INSTALL NON-CORROSIVE LOCKING BAR ON WET WELL ACCESS HATCH COMPLETE WITH PADLOCK
3. INSTALL 316 STAINLESS STEEL INSECT SCREEN IN VENT.
4. INSTALL AN EMERGENCY BYPASS CONNECTION COMPLETE WITH QUICK-DISCONNECT MALE FITTING WITH DUST CAP AND GATE VALVE.
5. COAT AND PAINT PIPE AND FITTING INSIDE THE WET WELL
6. COAT AND PAINT PIPE, VALVES, AND FITTING OUTSIDE THE WET WELL
7. INSTALL 2 VACUUM GAUGES WITH ISOLATION BALL VALVES, MIN. 4" DIA. 5% ACCURACY, LIQUID FILLED.
8. INSTALL PRESSURE TRANSMITTER WITH ISOLATION BALL VALVE
9. INSTALL 2" AIR RELEASE VALVE AND PIPING ASSEMBLY. REFER TO DETAIL 3 ON SHEET D-8
10. INSTALL 6" GATE VALVE, RESILIENT WEDGE WITH FLANGED JOINTS ON FORCE MAIN.
11. REPAIR PVC DRAIN LINE COMPLETE WITH P TRAP, 316 STAINLESS STEEL SCREEN AND FLAP COVER.
12. INSTALL RESTRAINED FLANGED COUPLING ADAPTER.
13. COAT ALL INTERIOR CONCRETE SURFACE WITHIN THE WET WELL IN ACCORDANCE WITH ITEM 09811 OF THE SPECIFICATIONS.
14. INSTALL 4" FLANGED FLARE
15. INSTALL PRESSURE GAUGE WITH ISOLATION BALL VALVE, MIN. 4" DIA. 5% NECESSARY, LIQUID FILLED.
16. INSTALL 316 STAINLESS STEEL PIPE SUPPORT. REFER TO DETAIL 5 ON SHEET D-7

NOTES:

1. EXISTING LIFT STATION SHOWN HERE IS BASED ON SAWS RECORD DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING DIMENSIONS AND EQUIPMENT SHOWN HERE.
2. CONTRACTOR SHALL PROVIDE TEMPORARY BY-PASS PUMPING TO MAINTAIN WASTEWATER SERVICE DURING CONSTRUCTION. CONTRACTOR SHALL SUBMIT BYPASS PUMPING PLAN PER ITEM 864 OF THE SPECIFICATIONS.
3. PIPE, VALVES, AND FITTINGS OUTSIDE THE WET WELL SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS EPOXY COATING SYSTEM WITH A TOP COAT SYSTEM OF URETHANE. COLOR SHALL BE GREY PANTONE #431U. APPROVED MANUFACTURERS INCLUDE TNEMEC, CARBOLINE, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS
4. PIPE AND FITTINGS WITHIN THE WET WELL SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS COAL TAR EPOXY COATING SYSTEM. COLOR SHALL BE GREY PANTONE #431U. APPROVED MANUFACTURERS INCLUDE TNEMEC, CARBOLINE, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS
5. CONTRACTOR SHALL SUBMIT PROPOSED DEMOLITION AND REMOVAL SCHEDULE FOR APPROVAL AND NOTIFY OWNER'S REPRESENTATIVE IN WRITING AT LEAST 48 HOURS BEFORE STARTING DEMOLITION. SUBMIT APPROVED COPY OF CITY OF SAN ANTONIO DEMOLITION PERMIT PRIOR TO COMMENCEMENT OF DEMOLITION OPERATIONS.
6. CONTRACTOR SHALL RETURN TO SAWS THE FOLLOWING EQUIPMENT AND MATERIALS: PUMPS, MOTORS, VALVES, PIPE, FITTINGS, CONTROLS AND ACCESSORIES.

STATION OPERATION TABLES

RISING LEVEL CYCLE

WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
962.50	PUMPS OFF LEVEL	ALL PUMPS ARE OFF
966.00	LEAD PUMP LEVEL	LEAD PUMP ON
967.00	LAG PUMP LEVEL	LEAD & LAG PUMPS ON
968.00	HIGH WATER ALARM LEVEL	HIGH WATER ALARM SOUND

FALLING LEVEL CYCLE

WATER LEVEL ELEVATION	ACTION	PUMP(S) IN OPERATION
967.00	LAG PUMP LEVEL	LEAD & LAG PUMPS ON ALARM TURNS OFF
966.00	LEAD PUMP LEVEL	LEAD & LAG PUMPS ON
962.50	ALL PUMPS OFF LEVEL	ALL PUMPS STOPPED – LAG PUMP SWITCHES TO LEAD PUMP

BYPASS NOTES:

1. THE CONTRACTOR SHALL ADHERE TO SAWS SPEC ITEM NO. 865 FOR SMALL DIAMETER BYPASS PUMPING OPERATIONS.
2. CONTRACTOR TO COORDINATE WITH SAWS STAFF TO ROUTE THE BYPASS PIPING THROUGH THE FENCING AND SHALL REPAIR ALL FENCING TO EXISTING CONDITION OR BETTER AFTER COMPLETION.
3. THE CONTRACTOR SHALL MAINTAIN SITE ACCESSIBILITY FOR SAWS VEHICLES TO ACCESS ALL PARTS OF THE LIFT STATION DURING BYPASS OPERATIONS.
4. CONTRACTOR SHALL PREPARE HIS OWN BYPASS PLAN FOR SUBMITTAL REVIEW.
5. SANITARY SEWER FLOWS SHOWN ARE ESTIMATED AND SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO MOBILIZING BYPASS EQUIPMENT.
6. EXISTING SAWS SANITARY SEWER ASSETS SHOWN IN THESE PLANS INCLUDING BUT NOT FORCE MAIN SIZE, LENGTH, ALIGNMENT, DISCHARGE LOCATION ARE BASED ON RECORD DRAWING INFORMATION FROM SAWS JOB NO. 96-1587 AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR FOR BYPASS PLAN PREPARATION.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

TRENCH EXCAVATION SAFETY PROTECTION

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

SEWER

DEVELOPER'S NAME: KOONTZ CORPORATION
ADDRESS: 903 BASSE RD
CITY: SAN ANTONIO STATE: TEXAS ZIP: 78212
PHONE# (210) 826-2600 FAX# XX
SAWS BLOCK MAP# 148644 TOTAL EDU'S 650 TOTAL ACREAGE 204
TOTAL LINEAR FOOTAGE OF PIPE: 8.5 PLAT NO. XXXXX
NUMBER OF LOTS N/A SAWS JOB NO. 25-1569

EXISTING LIFT STATION PLAN & PROFILE

NOT-TO-SCALE

LEGEND

- PROPERTY/ROW LINE
- LOT LINE
- 100 YR FLOODPLAIN
- 965 EXISTING CONTOUR MAJOR
- 964 EXISTING CONTOUR MINOR
- EASEMENT LINE
- OHE EXISTING OVERHEAD ELECTRIC
- EXISTING SECURITY FENCE
- PROPOSED SEWER LINE (BY OTHERS)
- SS EXISTING SEWER LINE
- FM EXISTING FORCE MAIN
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT

NO.	REVISION	DATE

STATE OF TEXAS
KIM KEEFER
117744
LICENSED
PROFESSIONAL ENGINEER
9/14/2025

PAPE-DAWSON
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT

SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS

SUGGESTED BYPASS PUMPING PLAN

PLAT NO. 010025
JOB NO. 13520-01
DATE AUGUST 2025
DESIGNER RM
CHECKED RM DRAWN AL
SHEET C4.00

Date: May 13, 2025, 1:58 PM – User ID: dloughlin
File: P:\135\20\01\Design\Civil\Lift Station\Sheets\BP-1352001-LS.dwg

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DESIGN CRITERIA

LOCATION: SAN ANTONIO, TEXAS.

BUILDING CODE:
- IBC 2024
- AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318-19)
- AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR ENVIRONMENTAL CONCRETE STRUCTURES (ACI 350-20)
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL 15TH EDITION
- STRUCTURAL WELDING CODE – STEEL: AWS D1.1
- STRUCTURAL WELDING CODE – ALUMINUM: AWS D1.6
- STRUCTURAL WELDING CODE – STAINLESS STEEL: AWS D1.6

DESIGN LOADS:
- DEAD LOAD = EQUIPMENT WEIGHT + SELF WEIGHT
- LIVE LOAD = 300 PSF EQUIPMENT WEIGHT
- GROUND SNOW LOAD = 5 PSF
- STRUCTURE RISK CATEGORY: III

GEOTECHNICAL CONDITIONS:
- STRUCTURAL FILL SHALL CONSIST OF MEDIUM DENSE COHESIONLESS SOILS OR STIFF COHESIVE SOILS OF GW, GP, SW, GW-GM, GW-GC, SW-SC, OR CL WITH PLASTIC INDEX BETWEEN 8 AND 20 AND LIQUID LIMIT LESS THAN 40. COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY.

WIND DESIGN LOAD:
- BASIC WIND SPEED: 114 MPH
- WIND EXPOSURE: B
- INTERNAL PRESSURE COEFFICIENT, GCpi = ±0.18
- COMPONENTS AND CLADDING: ASCE 7

SEISMIC DESIGN LOADS:
- SITE SOIL CLASS: D (DEFAULT)
- Ss = 0.055
- S1 = 0.024
- Sds = 0.050
- Sd1 = 0.035
- DESIGN CATEGORY: A
- IMPORTANCE FACTOR, I: 1.25
- RESPONSE COEFFICIENT, Cs = 0.0156
- DESIGN BASE SHEAR = 0.0156W
- ANALYSIS PROCEDURE: NOT APPLICABLE

GENERAL NOTES

1. THESE PLANS ARE INTENDED TO DESCRIBE THE GENERAL REQUIREMENTS FOR THIS PROJECT. NOT ALL CONDITIONS ARE SPECIFICALLY DETAILED. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL ITEMS REQUIRED FOR A COMPLETE AND FINISHED PRODUCT.
2. THE NOTES CONTAINED HEREWITH CORRESPOND TO THE STRUCTURAL WORK CONTAINED IN THIS PROJECT. CONSTRUCTION NOTES PROVIDED IN OTHER SHEETS RELATE TO THE PORTION OF THE WORK ON THOSE SHEETS.
3. CONTRACTOR SHALL VERIFY EQUIPMENT AND MEMBER SIZES AND ACTUAL DIMENSIONS AND ACCOMMODATE THE CONSTRUCTION WORK TO ALLOW A PROPER FIT OF SAID COMPONENTS WITH THE PROPOSED STRUCTURES FOR WHICH SAID COMPONENTS WILL BE INSTALLED.
4. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES AND/OR POTENTIAL CONFLICTS WITH OTHER COMPONENTS OF THE CONSTRUCTION WORK, SUPPORTS, OR EQUIPMENT.
5. CONTRACTOR SHALL COMPLY WITH OSHA REGULATIONS AND STATE OF TEXAS LAW CONCERNING EXCAVATION, TRENCHING AND SHORING.
6. ALL MATERIAL & EQUIPMENT SHALL BE APPROVED THROUGH THE SHOP DRAWING SUBMITTAL PROCESS.
7. SEE ELECTRICAL DRAWINGS AND CIVIL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.

CONCRETE NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE PROJECT SPECIFICATIONS AND ACI 318 BUILDING CODE FOR REINFORCED CONCRETE. WHERE THE PROJECT SPECIFICATIONS CONFLICTS WITH ACI 318, THE STRICTER SPECIFICATION SHALL GOVERN.
2. CONCRETE PLACEMENT IN HOT OR COLD WEATHER SHALL CONFORM TO THE PROVISIONS OF ACI 305R OR 306R, RESPECTIVELY.
3. ALL REINFORCING STEEL SHALL BE GRADE 60 STEEL AS PER ASTM A615. ALL LAP SPLICES FOR CONTINUOUS REINFORCING STEEL SHALL BE 50 BAR DIAMETERS UNLESS OTHERWISE SPECIFIED. ALL REINFORCING SHOWN TO BE HOOKED SHALL HAVE STANDARD HOOKS AS PER ACI 315.
4. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION PLANS, ALL CAST-IN-PLACE STRUCTURAL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI @ 28 DAYS. MUD MAT/SEAL SLAB SHALL HAVE A MINIMUM STRENGTH OF 1,500 PSI @ 28 DAYS.
5. COVER (CLR) IS THE LEAST DISTANCE BETWEEN THE SURFACE OF THE EMBEDDED REINFORCEMENT AND THE SURFACE OF THE CONCRETE. COVER IS A MINIMUM CLEAR DISTANCE BUT IS ALSO A MAXIMUM DISTANCE, SPECIFYING THE LOCATION OF THE REINFORCEMENT. THROUGH ACI 117-10 SPECIFICATIONS FOR TOLERANCES FOR CONCRETE, THE MAXIMUM DISTANCE BETWEEN THE SURFACE OF THE CONCRETE AND THE SURFACE OF THE REINFORCEMENT IS THE CLR DISTANCE PLUS THE REINFORCEMENT PLACEMENT TOLERANCE. BASED ON ACI 117, FOR CONCRETE MEMBERS 12 INCHES THICK OR LESS, THE TOLERANCE IS ⅜ INCH, AND FOR CONCRETE MEMBERS GREATER THAN 12 INCHES THICK, THE TOLERANCE IS ½ INCH. SEE CONCRETE PROTECTION TABLE DETAIL 3 SHEET S2 FOR COVER REQUIREMENTS.
6. REINFORCEMENT ACROSS CONSTRUCTION JOINTS SHALL BE IN ACCORDANCE WITH LAP SCHEDULE. TERMINATE IN STANDARD HOOKS WHERE CONCRETE DIMENSIONS DO NOT ALLOW FULL DEVELOPMENT OF REINFORCEMENT USING LAP SPLICES.
7. CONSTRUCTION JOINTS AND/OR SAW CUT JOINTS SHALL BE AT SPACING LESS THAN 40 TIMES SLAB THICKNESS IN EACH DIRECTION IN SLABS ON GRADE UNLESS OTHERWISE NOTED AND ARE NOT ALLOWED IN MAT FOUNDATIONS OR SLABS WITH THICKNESS 18 INCHES OR GREATER.
8. COORDINATE ALL LOCATIONS OF PENETRATIONS IN SLAB AS NEEDED FOR PIPING, WIRING, AND CONTROLS WITH REINFORCING. PENETRATIONS FOR ELECTRICAL CONDUITS OR PIPING SHALL MAINTAIN 2 INCHES CLEAR FROM REINFORCEMENT. REINFORCEMENT MAY NOT BE MOVED OR OMITTED TO ALLOW PENETRATION OF CONDUITS THROUGH CONCRETE WALLS AND FOUNDATIONS WITHOUT PERMISSION OF ENGINEER OF RECORD.
9. ALL EXPOSED EDGES OF BEAMS, COLUMNS, SLABS AND WALLS SHALL BE CHAMFERED ¾" UNLESS MASONRY OR OTHER MEMBERS ARE ERECTED FLUSH WITH THEM.

FOUNDATION NOTES

1. ALL EXCAVATIONS SHALL BE CONDUCTED IN THE DRY, AND PROVISIONS MADE TO PREVENT THE BOTTOM OF ALL EXCAVATIONS FROM FREEZING OR FLOODING.
2. THE AREA AROUND THE ENTIRE STRUCTURE SHALL BE WELL GRADED TO DRAIN AWAY FROM THE STRUCTURE WITHOUT DRAINING TO ADJACENT PROPERTIES. FINISH GRADE ELEVATIONS SHOWN ARE APPROXIMATE. SEE GRADING AND DRAINAGE PLANS FOR TRUE F.G. ELEVATIONS.

MISCELLANEOUS NOTES

1. EPOXY GROUT SHALL BE POR-ROK EPOXY GROUT, OR APPROVED EQUAL.
2. PROVIDE CONTINUOUS WATER STOPS IN ALL CONSTRUCTION JOINTS.
3. ALL DIMENSIONS AND LOCATIONS SHALL BE VERIFIED FROM CERTIFIED VENDOR DRAWINGS, PRIOR TO CONSTRUCTION.

STRUCTURAL STEEL NOTES

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST AISC "SPECIFICATION FOR THE DESIGN. FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS". STEEL PIPE & HSS SHALL CONFORM TO ASTM A500 GR B. WIDE FLANGES SHALL CONFORM TO ASTM A992. ALL OTHER STRUCTURAL STEEL SHALL PROVIDE A MINIMUM YIELD STRENGTH OF 36 KSI.
2. ALL BOLTED CONNECTIONS SHALL BE MADE WITH ¾-INCH DIAMETER ASTM F593 STAINLESS STEEL BOLTS EXCEPT AS OTHERWISE SHOWN OR NOTED.
3. FIELD CONNECTIONS SHALL BE BOLTED, EXCEPT AS OTHERWISE SHOWN OR NOTED.
4. ALL WELDING SHALL CONFORM TO THE LATEST SPECIFICATION OF THE AMERICAN WELDING SOCIETY. ALL WELDED CONNECTIONS SHALL BE MADE WITH AWS A5.1 OR A5.5 E70 XX ELECTRODE.
5. ANCHOR BOLTS – ASTM F593.
6. ANCHOR BOLTS WHICH ARE SUBMERGED, LOCATED ABOVE A LIQUID SURFACE, OR ARE IN A CORROSIVE ENVIRONMENT: SS 304 OR SS 316.
7. ALL EQUIPMENT ANCHOR BOLT DIMENSIONS AND LOCATIONS SHALL BE VERIFIED FROM CERTIFIED VENDOR DRAWINGS, PRIOR TO CONSTRUCTION.
8. ALL STRUCTURAL STEEL SECTIONS, PLATES, BOLTS, NUTS, & ANCHORS SHALL BE HOT-DIP GALVANIZED UNLESS OTHERWISE NOTED.
9. ALL HOLES TO BE STANDARD HOLES. UNLESS OTHERWISE NOTED.
10. GRIND ALL SHARP EDGES SMOOTH AS REQUIRED. HOT-DIP GALVANIZE AFTER FABRICATION.
11. ALL JOINTS ARE TO BE WELDED USING A ⅜" MIN. CONT. FILLET WELD, UNLESS OTHERWISE NOTED.
12. USE STAINLESS STEEL TYPE 304L OR TYPE 316L WHERE STAINLESS STEEL IS TO BE WELDED.

REINFORCING LAP SPLICE TABLE – 4,000 PSI CONCRETE

BAR SIZE	CONDITION 1 (CLEAR COVER >= 2 DIA AND C-TO-C SPA >= 5 DIA) TOP	CONDITION 1 (CLEAR COVER >= 2 DIA AND C-TO-C SPA >= 5 DIA) OTHER	CONDITION 2 (CLEAR COVER >= 2 DIA AND C-TO-C SPA >= 3 DIA) TOP	CONDITION 2 (CLEAR COVER >= 2 DIA AND C-TO-C SPA >= 3 DIA) OTHER	CONDITION 3 ALL BARS	HOOKS STD 90 DEGREE HOOK LENGTH
#3	1'-4"	1'-4"	2'-0"	1'-6"	SEE NOTE 3	0'-6"
#4	1'-7"	1'-4"	2'-8"	2'-1"		0'-8"
#5	2'-0"	1'-6"	3'-4"	2'-8"		0'-10"
#6	2'-6"	1'-10"	4'-0"	3'-1"		1'-0"
#7	3'-6"	2'-9"	5'-10"	4'-7"		1'-2"
#8	4'-0"	3'-1"	6'-8"	5'-2"		1'-4"
#9	4'-6"	3'-6"	7'-7"	5'-10"		1'-7"
#10	5'-1"	3'-11"	8'-6"	6'-6"		1'-10"
#11	5'-8"	4'-4"	9'-5"	7'-4"		2'-0"

DETAIL NOTES:

1. LAP ALL BARS PER THIS SCHEDULE UNLESS NOTED OTHERWISE.
2. BAR COVER AND SPACING MUST BOTH MEET THE CRITERIA OF CONDITION 1 OR 2 IN ORDER TO USE THAT PARTICULAR LAP LENGTH.
3. TOP BARS SHALL BE DEFINED AS ANY HORIZONTAL BARS PLACED SUCH THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE BAR IN ANY SINGLE POUR. HORIZONTAL WALL BARS ARE CONSIDERED TOP BARS.
4. FOR BARS THAT DO NOT SATISFY EITHER CONDITION, LAP LENGTH SHALL BE THE LENGTH FROM THE APPROPRIATE CATEGORY ("TOP" OR "OTHER") OF CONDITION 2 MULTIPLIED BY 1.5.
5. NONCONTACT LAP SPLICE LENGTH IS THE LAP SPLICE PLUS THE SEPARATION OF BARS BEING LAPPED. BARS BEING LAPPED CANNOT BE FURTHER APART THAN ⅕" OF THE LAP SPLICE LENGTH OR 6 INCHES, WHICHEVER IS SMALLER.
6. CLEAR COVER IS DISTANCE FROM THE FACE OF CONCRETE TO FACE OF BAR.

1 CONCRETE REINFORCING LAP SPLICE TABLE
SCALE: NONE

NO.	REVISION	DATE

07/11/2025

STATE OF TEXAS
MARCOS A. WORTLEY
128045
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS
STRUCTURAL
GENERAL NOTES

PLAT NO. 010025
JOB NO. 13520-01
DATE JULY 2025
DESIGNER CAA
CHECKED MAW DRAWN LNV

SHEET

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STANDARD CONCRETE ANCHORS						
ANCHOR DIAMETER	⅜"	½"	⅝"	¾"	⅞"	1"
STANDARD MECHANICAL ANCHOR EMBED, UNO (NOTE 1)	3¼"	3½"	4½"	5½"	N/A	N/A
STANDARD ADHESIVE ANCHOR EMBED, UNO (NOTE 1)	3¼"	4"	5"	6"	8"	10"
MINIMUM SPACING	4"	6"	8"	9"	12"	16"
MINIMUM EDGE DISTANCE	4"	4"	5"	8"	12"	16"
MINIMUM CONCRETE THICKNESS	5"	6"	8"	10"	12"	14"
ALLOWABLE TENSION "T" (LB) *	750*	1,100*	1,450*	2,350*	5,200*	7,800*
ALLOWABLE SHEAR "V" (LB) *	300*	400*	625*	1,150*	1,950*	3,250*

* LOADS ONLY APPLICABLE TO INSTALLATION INTO CRACKED CONCRETE 4,000 ≤ Fc' ≤ 8,000 PSI MEETING MINIMUM EMBED, SPACING, AND EDGE DISTANCES SHOWN. LOADS FOR SINGLE ANCHOR, OUT OF THE GROUP BELOW, WITH SERVICE LEVEL (ASD) LOADING.

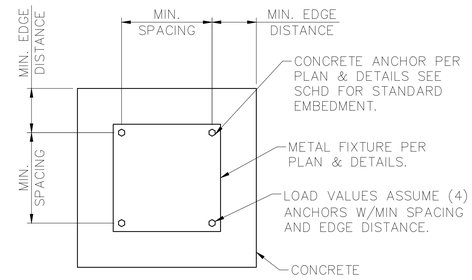
DETAIL NOTES:

1. ALL ANCHORS SHALL RECEIVE STANDARD EMBED, SPACING, EDGE DISTANCE, CONCRETE THICKNESS, AND LOAD CONDITIONS, UNLESS NOTED OTHERWISE ON "S" SHEETS. UNLESS NOTED OTHERWISE, MINIMUM EMBEDMENT SHALL BE PER TABLE ABOVE. IN NO CASE MAY THE EMBEDMENT BE LESS THAN THE MANUFACTURER'S "MINIMUM EMBEDMENT" FROM PUBLISHED CATALOG LITERATURE.
2. CONTRACTOR SHALL USE BASIS OF DESIGN ANCHORS OR SUBMIT ENGINEERED ANCHORS MEETING REQUIREMENTS OF ACI 355.2 & APPLICABLE TO EDGE AND SPACING REQUIREMENTS OF THE CONTRACT DOCUMENTS FOR APPROVAL. BASIS OF DESIGN ANCHORS INCLUDE:
   A. SCREW: HILTI KWIK-HUS EZ AND SIMPSON TITEN HD
   B. EXPANSION: HILTI KWIK BOLT 2
   C. ADHESIVE: HILTI HIT-RE 500 V3 & SIMPSON SET 3G WITH THREADED ROD

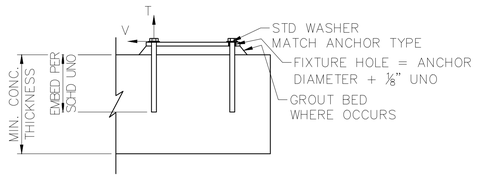
   WHERE DRAWINGS CALL FOR CONCRETE ANCHORS, CONTRACTOR MAY CHOOSE BETWEEN EXPANSION, SCREW OR ADHESIVE ANCHOR. WHERE DRAWINGS CALL FOR MECH ANCHOR, CONTRACTOR MAY CHOOSE BETWEEN EXPANSION AND SCREW ANCHOR.
3. INSTALL IN STRICT ACCORDANCE WITH MANUFACTURER'S PUBLISHED RECOMMENDATIONS AND ADDITIONAL RECOMMENDATIONS OF ICC EVALUATION SERVICE REPORT.
4. ALL CONCRETE ANCHORS MUST BE INSPECTED TWICE:
   A. AFTER HOLE IS DRILLED AND CLEANED, AND
   B. DURING INSTALLATION OF ADHESIVE AND/OR MECHANICAL ANCHOR.
5. ON DRAWINGS, ADHESIVE ANCHORS MAY ALSO BE REFERRED TO AS EPOXY OR EPOXY SET ANCHORS.
6. FOR ANCHORS RESISTING TENSION AND SHEAR USE FOLLOWING EQUATION: (ACTUAL TENSION/ALLOWABLE TENSION) + (ACTUAL SHEAR/ALLOWABLE SHEAR) < 1.00
7. ADHESIVE ANCHORS MAY NOT BE USED IN OVERHEAD APPLICATIONS UNLESS NOTED OTHERWISE ON THE "S" SHEETS.
8. ANY ADHESIVE ANCHOR IN CONSTANT TENSION OR INSTALLED IN ANY ORIENTATION BETWEEN HORIZONTAL AND OVERHEAD VERTICAL MUST BE INSTALLED AND INSPECTED BY CERTIFIED INSTALLER/INSPECTOR. SEE DIVISION 5 SPECIFICATIONS.
9. ALL CONCRETE ANCHORS SHALL BE STAINLESS STEEL TYPE 316 UNO.
10. DO NOT INSTALL ADHESIVE IN CONCRETE LESS THAN 21 DAYS OLD.

1 CONCRETE ANCHOR SCHEDULE

N.T.S.



TOP VIEW OF ANCHOR GROUP IN CONCRETE



SECTION VIEW INTO CONCRETE

CONCRETE SCHEDULE	
MATERIAL PROPERTIES	CONCRETE MIX STRUCTURAL CONCRETE
COMPRESSIVE STRENGTH – MINIMUM	4,000 PSI
PORTLAND CEMENT – ASTM C150	TYPE I OR TYPE II
FLYASH – ASTM C618	15% MAX
AGGREGATE – COARSE – ASTM C33	1" MAX
AIR ENTRAINMENT – ASTM C260	4% ± 1%
SUPER PLASTICIZER – ASTM C494	(OPTIONAL) TYPE F
WATER TO CEMENT RATIO – MAXIMUM	0.45 MAX
SYNTHETIC FIBERS	OPTIONAL
SLUMP	3" ± 1"
WATERPROOFING	N/A

DETAIL NOTES:

1. ALL CONCRETE SHALL BE STRUCTURAL CONCRETE UNLESS NOTED OTHERWISE.
2. TOPPING SLABS SHALL BE 2" MIN THICKNESS, MIX 1, BUT WITH MAX ½" AGGREGATE.
3. LIMIT AIR CONTENT OF STEEL-TROWELED FLOORS TO 3% MAX.

2 CONCRETE MATERIAL SCHEDULE

N.T.S.

CONCRETE PROTECTION FOR REINFORCEMENT CONCRETE CLEAR COVER DIMENSIONS UNLESS NOTED OTHERWISE	
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH OR "RAW" SEWAGE	3"
CONCRETE IN CONTACT WITH OR IMMEDIATELY ABOVE OR ADJACENT TO WATER/WASTEWATER	2"
CONCRETE EXPOSED TO EARTH OR WEATHER	
#6 THROUGH #11 BARS	2"
#5 AND SMALLER, W31 OR D31 WIRE	1½"
CONCRETE NOT EXPOSED TO WEATHER, CONTACT WITH GROUND, OR WASTEWATER	
SLABS, WALLS, AND JOISTS: #11 AND LARGER BARS	1½"
#10 AND SMALLER BARS	LARGER OF 1" OR BAR DIA
BEAMS AND COLUMNS: PRIMARY REINFORCEMENT, TIES STIRRUPS AND SPIRALS	1½"

DETAIL NOTES:

1. SEE SPECIFICATIONS OR GENERAL NOTES FOR TOLERANCES.
2. CLEAR COVER IS DISTANCE FROM FACE OF CONCRETE TO FACE OF BAR.

3 CONCRETE COVER REQUIREMENTS

N.T.S.

NO.	REVISION	DATE

07/11/2025

STATE OF TEXAS
MARCOS A. WORTLEY
128045
LICENSED PROFESSIONAL ENGINEER

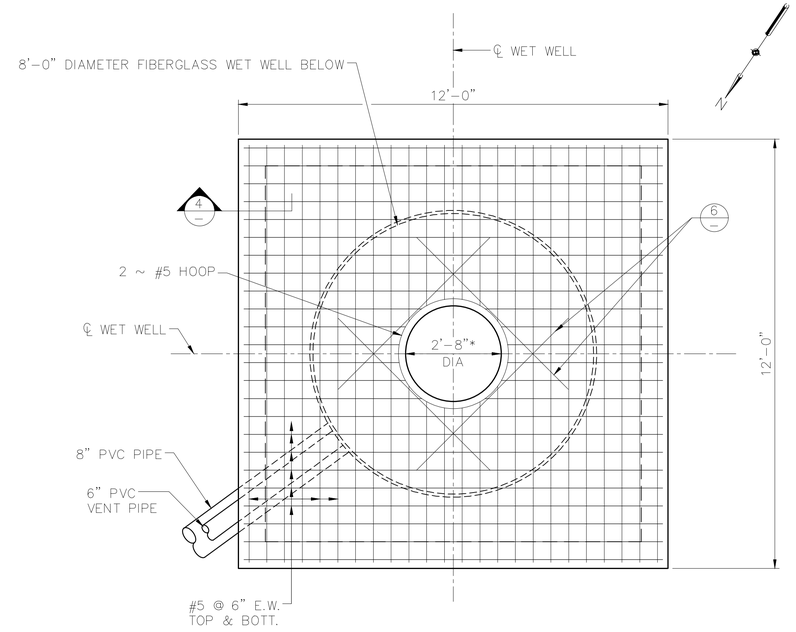
PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS
STRUCTURAL SCHEDULES

PLAT NO. 010025
JOB NO. 13520-01
DATE JULY 2025
DESIGNER CAA
CHECKED MAW DRAWN LNV
SHEET

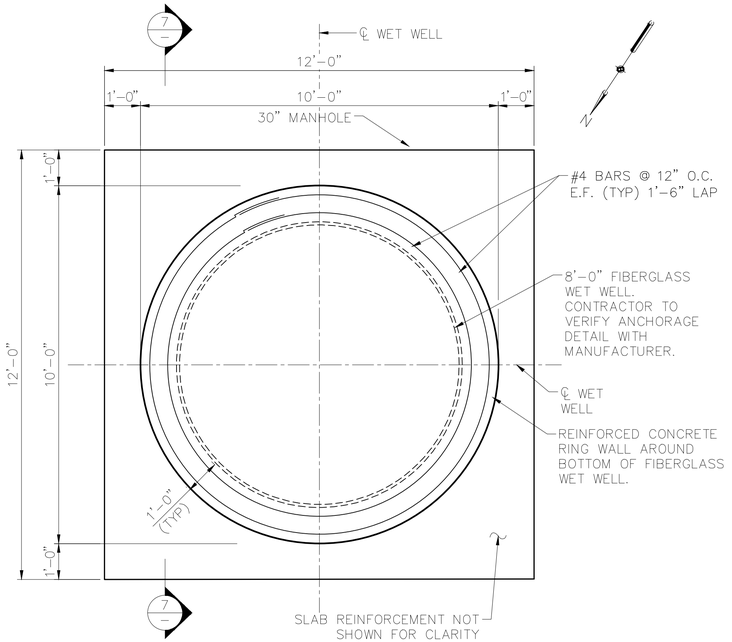
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*VERIFY DIMENSIONS WITH SUPPLIERS PRIOR TO ANY CONSTRUCTION.

1 PLAN VIEW - TOP SLAB
SCALE: ½"=1'-0"

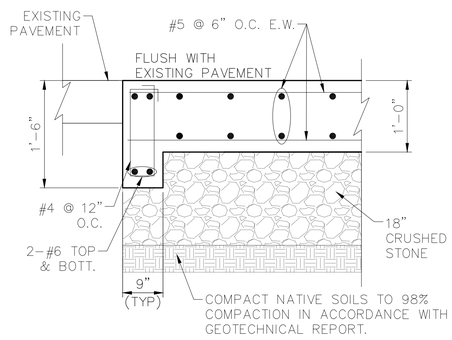


VERTICAL REINFORCING NOT SHOWN FOR CLARITY

2 ANTI-FLOTATION BOTTOM SLAB PLAN
SCALE: ½"=1'-0"

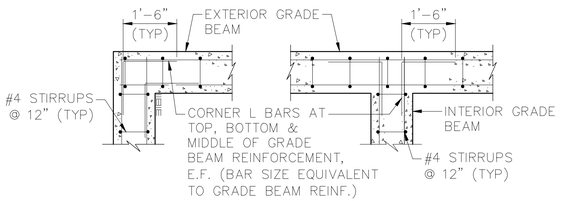
NOTES:

1. SEE SHEET S1 FOR STRUCTURAL NOTES.
2. SEE 1/S1 FOR LAP SCHEDULE

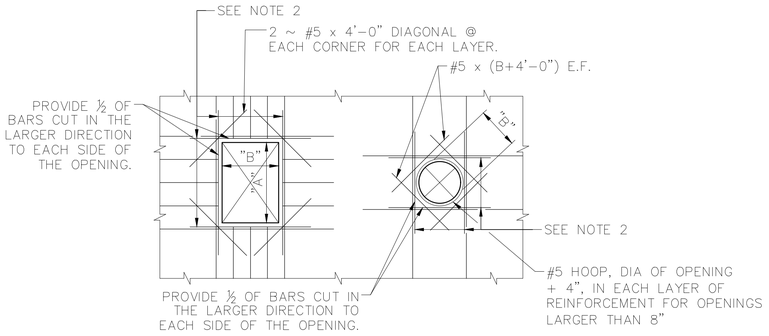


**SEE CIVIL TO CONFIRM ELEVATION

4 TOP SLAB SECTION
SCALE: ¾"=1'-0"

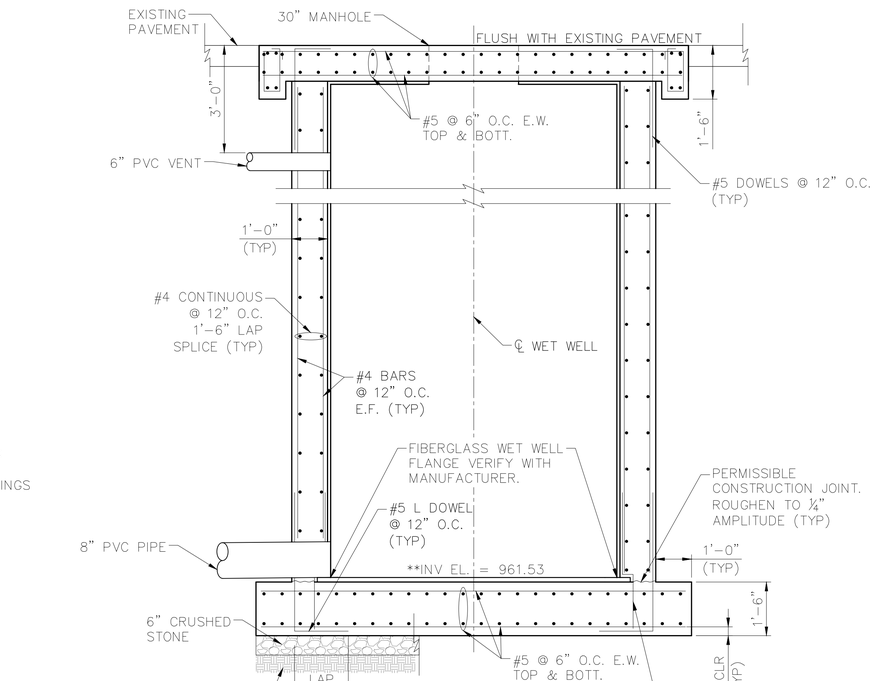


5 GRADE BEAM CORNER DETAILS
N.T.S.



1. THE MAXIMUM DIAMETER OR RECTANGULAR OPENING ALLOWED IS 6'-0"
2. PROVIDE LAPS FOR ALL REINFORCEMENT AS SPECIFIED IN SCHEDULE FOR TOP BARS.
3. DO NOT WELD REINFORCING BARS TO PIPE SLEEVES OR INSERTS.
4. CONTRACTOR TO COORDINATE ALL OPENINGS WITH ALL DISCIPLINES.
5. DIAGONAL BARS TO BE BENT AT CONSTRAINED LOCATIONS. NO CUTTING OF SAID BARS ARE ALLOWED WITHOUT ENGINEER'S REVIEW.
6. REINFORCEMENT SHOWN IS ADDITIONAL TO THE SPECIFIED REINFORCEMENT SPECIFIED ELSEWHERE IN THE PLANS.

6 ADDITIONAL REINFORCING STEEL AT OPENINGS IN WALLS AND SLABS
N.T.S.



7 BOTTOM SLAB SECTION
SCALE: ½"=1'-0"

NO.	REVISION	DATE

08/11/2025
STATE OF TEXAS
MARCOS A. WORTLEY
128045
LICENSED
PROFESSIONAL ENGINEER
Marcos Oneil Wortley

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #100288-00

BLANCO SPRINGS DEVELOPMENT
SAWS LIFT STATION #209 UPGRADE
CITY OF PROJECT, TEXAS
STRUCTURAL
LIFT STATION DETAILS

PLAT NO. 010025
JOB NO. 13520-01
DATE JULY 2025
DESIGNER CAA
CHECKED MAW DRAWN LNV
SHEET

Date: May 13, 2025, 5:59 PM - User ID: mwortley
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SPECIFICATIONS FOR SAWS LIFT STATION #209 UPGRADES

PAPE-DAWSON ENGINEERS

Transportation | Water Resources | Land Development | Surveying | Environmental

SPECIFICATIONS FOR SAWS
LIFT STATION #209 UPGRADES



Birdsong Development/North Rim Lift Station Upgrades

SPECIFICATIONS

August 2025

08/07/2025



SECTIONS 02316, 03055, 03100, 03211, 03310, 03350, 03390, 03600, 05500, 05512

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*The technical and material specifications for this project are published by SAWS and TCEQ. Reference to those documents shall apply as if the entire specification was reproduced herein. Applicable modifications to this document and additional specifications are included herein.

SPECIAL CONSTRUCTION CONDITIONS

SC-1.0 Except where bid items are specifically provided in the Proposal, payment to the CONTRACTOR to accommodate the requirements specified herein shall be considered subsidiary to the various items of work under this contract and no direct payment will be made.

SC-2.0 The CONTRACTOR shall perform all work necessary for the proper installation and functioning of the various types and sizes of pipe, equipment and associated appurtenances at the locations shown on the plans.

SC-3.0 The CONTRACTOR shall obtain all necessary permits that are required for the project. Any fees required for the obtaining of permits will be considered subsidiary and no additional direct payment will be made to the CONTRACTOR.

SC-4.0 The use of explosives of any kind for this project is strictly prohibited.

SC-5.0 The CONTRACTOR, at his/her own expense, is responsible for performing quality control inspection and testing to assure compliance with all Contract Documents. All observation/inspection of the work, and quality assurance testing performed by SAWS or by Owner's Consultant and/or Engineer is for the sole benefit of Owner and CONTRACTOR agrees not to rely thereon for any reason.

SC-6.0 Trench protection will be required on this project. The CONTRACTOR will be required to provide the Owner and Engineer copies of a trench protection plan that meets the more stringent rules of SAWS, TCEQ, OSHA or other applicable agency. The CONTRACTOR shall be solely responsible for the development of a Site Safety and Health Plan for the project. Neither the professional activities of the Consultant, nor the presence of the Consultant or its employees and subconsultants at a construction/project site, shall relieve the CONTRACTOR of its obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending and coordinating the Work in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Consultant and its personnel have no authority to exercise any control over any construction contractor or its employees in connection with their work or any health or safety programs or procedures. The Owner agrees that the CONTRACTOR shall be solely responsible for jobsite safety and warrants that this intent shall be carried out in the Owner's contract with the CONTRACTOR.

SC-7.0 Revegetation shall be in accordance with TxDOT Items 160, 164, 166, 168, 169, and 170 and as shown in the plans. Revegetation is required for all disturbed

areas; however, the bid item pay limits are restricted to the easement and public right-of-way areas for the gravity sewer mains, force mains, unimproved areas of the access road easements, electrical easement, and water service line easement. Areas other than those listed that may be impacted by construction activities such as staging and storage areas and areas outside of the prescribed easements shall be revegetated with 4" of topsoil and hydroseeding at the CONTRACTOR's expense.

SC-8.0 It is understood and agreed that CONTRACTOR has, by careful examination, satisfied himself/herself as to the nature and location of the Work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work under this Agreement. No verbal agreement or conversation with any officer, agent, or employee of Owner either before or after the execution of this Agreement shall affect or modify any of the terms or obligations herein contained.

SC-9.0 The CONTRACTOR shall be responsible for payment of all related Water Impact Fees, Water Supply Development fees and water meter installation fees associated with the cost of the construction of the sanitary sewer lift station. These fees will be considered as a no separate pay item and subsidiary to the Lift Station bid item.

SC-10.0 CONTRACTOR shall be solely responsible for coordinating and/or negotiating with the property owner as necessary to secure an area for the staging and storing of materials and equipment. Any cost or expense associated with securing a staging and storage area shall be the CONTRACTOR's sole responsibility.

SC-11.0 SAWS Construction Inspections and Consultant Observation: During construction, the contractor shall coordinate periodic site inspections by the SAWS Inspectors. The Contractor shall coordinate the above noted inspections every (2) weeks. The Contractor shall notify the Inspector of pending features of the Lift Station that will require specific inspection and indicate to the Inspector if the SAWS electrical, civil, or mechanical inspection staff are required for the subsequent lift station inspection.

SC-12.0 The Contractor shall coordinate with the Structural Engineer for the engineer to perform construction observations of concrete structures including foundations, excavations, steel reinforcement, foundation pad material, prior to placing concrete.

SC-13.0 The Contractor shall coordinate with the Civil Engineer for periodic construction observations.

SC-14.0 The SAWS Inspection staff and Consultants shall note deficiencies during construction observation and provide a report to the Contractor.

SC-15.0 All test runs for bypass pumping must take place on weekdays only. Test runs will not be permitted on Saturdays or Sundays.

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

A. The work of this Contract comprises the construction of one (1) sanitary sewer lift station; FRP drywell connection to existing wetwell with six and eight-inch PVC sewer pipe, and bypass pumping.

B. All work done under this Contract shall conform to local ordinances. CONTRACTOR shall arrange and pay all cost of permits and inspection fees and shall confine his operations to the limits set by law.

C. It is the intent of the Owner to award this project to one PRIME CONTRACTOR.

D. Portions of this project may be subject to review and acceptance by various agencies. The CONTRACTOR will be required to coordinate with these agencies for such items as issuance of permits or work orders, inspections during construction, final acceptance, etc. The agencies for this project that may require coordination include, but are not limited to, the following:

1. San Antonio Water System (SAWS)
2. Texas Commission on Environmental Quality (TCEQ)
3. Bexar County
4. CPS Energy (CPS)
5. Texas Department of Transportation (TxDOT)

E. All work shall be performed in accordance with, but not limited to, the following agencies:

1. San Antonio Water System (SAWS) Lift Station Design & Construction Guidelines (Latest Version)
2. Texas Commission on Environmental Quality (TCEQ)
3. Bexar County
4. CPS Energy (CPS)
5. Texas Department of Transportation (TxDOT)
6. OSHA

1.02 EXISTING CONDITIONS

A. Locate and protect all existing utilities.

B. Protect all existing public and private aboveground fixtures.

1.03 WORK SEQUENCE

A. Coordinate the construction schedule and operations with the Owner's Representatives.

1.04 CONTRACTOR'S USE OF PREMISES

A. CONTRACTOR shall limit his use of the premises for Work and storage, to allow for work by other CONTRACTORS.

B. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

C. Move any stored products, under CONTRACTOR's control, which may interfere with operations of the Owner or separate CONTRACTOR.

D. Obtain and pay for the use of additional storage or work areas needed for operations.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1- GENERAL

1.01 DESCRIPTION OF WORK:

This section describes the requirements for preparing and presenting submittals that are necessary for the execution of this contract. Requirements within the following subject areas are included:

A. Definitions

B. Procedures

C. Product Data

D. Shop drawings

E. Samples

F. Manufacturer's certificates

1.02 DEFINITIONS:

A. Product Data and Shop Drawing, General Definition
Drawings, diagrams, illustrations, brochures, schedules, bills of materials and other data prepared by the CONTRACTOR, his subcontractors, suppliers or distributors, or equipment manufacturers and fabricators, illustrating the manufacture, fabrication, construction, or installation of the Work or a portion thereof.

B. Shop Drawings
Assembly and fabrication drawings, bills of materials for items shop fabricated exclusively for this project. In addition, shop drawings should show fabrication details of each part, the assembly of each part and how each part and/ or assembly is integrated into the project including existing parts or assemblies.

C. Manufacturer's Representative
A representative from the manufacturer's plant with 5 years of experience in the actual problems of manufacturing, installing, and operating the particular product. Sales representatives or agents of the manufacturer will not be acceptable.

D. Working Drawings
CONTRACTOR-prepared plans for temporary structures and facilities. Working drawings for elements of work that may affect the safety and health of persons or property will be certified by an engineer licensed in the state of Texas. Calculations, as necessary, will accompany working drawings.

1.03 PROCEDURES:

A. CONTRACTOR's Responsibilities

1. Submit a schedule of specified submittals for all materials to be installed for the Project to the Engineer within 14 calendar days of receipt of the notice to proceed.

2. Submissions will be made to the Engineer's office. Data and correspondence that originates with subcontractors and suppliers must be submitted to the Engineer through the CONTRACTOR. CONTRACTOR to approve all submittals prior to submission.

3. The CONTRACTOR will submit dimensional and layout drawings and product data, certified correct for construction, for review by the Engineer.

4. Submit shop drawings and product data in accordance with the approved submittal schedule. Also submit shop drawings to the Engineer for review prior to their need in the Work, allowing sufficient time for the Engineer's review and response.

    a. The CONTRACTOR shall limit each submittal to only one item of material or equipment for review by the Engineer.

5. The CONTRACTOR will make specific mention of those items that vary from the requirements of the Plans and Specifications in the letter of transmittal.

6. Submit shop drawings and product data covering related items of equipment or material or integrated systems of equipment or material at the same time. Partial submissions will not be accepted.

7. The CONTRACTOR will coordinate shop drawings and product data with drawings previously submitted, with drawings being prepared, and with drawings and data previously approved. All such coordination shall be indicated by reference.

8. The CONTRACTOR will assign a sequential number to each submittal (1, 2, 3, etc.). The CONTRACTOR shall assign each piece of material or equipment its own submittal number. Multiple items under the same submittal number will not be accepted. Re-submittals will be identified with their original number followed by a sequential letter (A, B, C, etc.). For example, submittal 12-C is the third submittal of the twelfth item for the project.

   The CONTRACTOR will not deliver to the site, storage, or incorporate into the Work, any materials or equipment for which approved submittals have not been obtained.

B. Engineer's Review:

1. The Engineer will conduct a review after its receipt in the Engineer's office so as not to create delay. This review will be for general conformance, subject to the requirements of the Contract Documents, and will be an effort to assist the CONTRACTOR to discover errors and omissions in submittals.

2. Engineer's review or other appropriate action regarding CONTRACTOR's submissions will be only to check conformity with the design concept of the Project and for compliance with the information contained in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Plans and Specifications) or to safety precautions or programs incident thereto. The review and approval of a separate component item will not indicate approval of the assembly into which the item is functionally integrated. CONTRACTOR shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings to the Engineer. CONTRACTOR may be required to resubmit as required revised Shop Drawings or Samples for further review and approval. CONTRACTOR shall direct specific attention in writing to any new revisions not specified by CONTRACTOR on previous CONTRACTOR submissions.

3. The Engineer's review does not relieve the CONTRACTOR of the obligation and responsibility to coordinate the Work and plan the details of the Work.

4. The Engineer reserves the right to require written confirmation from the CONTRACTOR that the comments placed on submittals stamped "Reviewed" will be implemented.

5. Review by SAWS or Engineer will not be construed as relieving the CONTRACTOR of the responsibility for the accuracy, proper fit, functioning, or performance of the Work.

1.04 PRODUCT DATA:

A. Product data, including materials reproduced from manufacturer's product catalogs, will not be larger than 8½" by 11" in size.

B. Catalog data will be explicit regarding the name of the manufacturer and to the details of the products being furnished. It will also be complete enough to enable the Engineer to determine that the products being submitted conform to the requirements of the specifications.

C. For submittals with more than one style or size of a product on a sheet, the CONTRACTOR will clearly indicate which product is being submitted for review.

D. The CONTRACTOR will submit one (1) electronic copy to the Engineer.

1.05 SHOP DRAWINGS:

A. The CONTRACTOR shall reasonably check and verify all field measurements and will submit to the Engineer for review and approval. These shop drawings will bear a stamp from the CONTRACTOR that indicates that the CONTRACTOR has reviewed the shop drawings and that the submittal is complete and in compliance with Contract Documents.

B. The CONTRACTOR will submit detailed drawings and descriptions of proposed deviations from details or component arrangement indicated on the Plans.

C. Single line drawings will not be acceptable. Copies of the Plans will not be accepted for submission as drawings, nor will catalog numbers alone of materials or equipment.

D. The CONTRACTOR will submit one (1) electronic copy of each shop drawing to the Engineer for review.

1.06 SAMPLES

The CONTRACTOR will furnish samples of items and materials as required. Samples shall be submitted to the Engineer in duplicate. Each sample will be properly labeled and identified by providing the following:

A. Date

B. Job name for which it is offered

C. Specification section and paragraph

D. CONTRACTOR’s name

E. Supplier and trade name

F. Other data indicating conformance to specifications.

1.07 MANUFACTURER'S CERTIFICATES AND AFFIDAVITS:

Where specified in the Plans and Specifications that a certificate and affidavit shall be submitted to the Engineer for review of a particular product, or component of a product, such submittals shall be made in accordance with the following:

A. A certificate submitted for a product, or component of a product, indicates test results proving that product, or component of a product, meets the requirements of the standard specified in the Plans and Specifications.

B. An affidavit consisting of a sworn statement by an official of the company manufacturing the product indicating that the information on the certificate is true and accurate shall accompany the certificate.

C. A statement from the CONTRACTOR, or his subcontractors, suppliers, or other agent which indicates that a particular item of equipment, or product, or component of a product, meets the requirements of the Plans and Specifications shall not be considered as certificate and will not be approved.

1.08 MANUFACTURER’S REPRESENTATIVE

The CONTRACTOR will include in the contract price the cost of furnishing competent and experienced manufacturer’s representatives to represent the manufacturer on all products furnished and to assist the CONTRACTOR to install the products in conformity with the Plans and Specifications.

1.09 MISCELLANEOUS SUBMISSIONS:

A. Work plans - Submit 2 copies

B. Accident reports - 2 copies

C. Inspection and test reports - 2 copies

D. Guarantees and Warranties - 2 copies (Originals)

E. Operation and Maintenance Manuals - 2 copies

F. Course of Action Plan (Fuel Spill or Other Substances)

1. The CONTRACTOR must submit the Course of Action Plan (Fuel Spill or Other Substances) to the Owner prior to start of construction.

2. Regarding the accidental spill of fuel, the Plan must address the procedures required by applicable regulations and laws.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01511

TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide connections as necessary for temporary utilities.

1.02 TESTING

A. All power, water, light, ventilation, or heat required for completion and testing of the work shall be paid for by the CONTRACTOR.

B. All collection and disposal of refuse, debris, garbage, and temporary sanitary sewer facilities from the work area shall be paid for by the CONTRACTOR.

C. Comply with Federal, State, and local codes and regulations and with utility company requirements.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Materials and equipment may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Provide connections as necessary, size and provide service required for power and lighting. CONTRACTOR to pay the costs of power used.

B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction using construction-type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

D. CONTRACTOR shall provide for his extension cords and any additional lighting that may be required to complete his work.

E. Prior to final inspection remove temporary lamps and install new lamps if permanent fixtures were used for temporary lighting.

2.03 TEMPORARY HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.

C. Portable heaters shall be units meeting applicable codes complete with controls. Pay all costs of installations, maintenance, operation, and removal, and for fuel consumed.

D. Provide connections as necessary; extend and supplement with temporary units as required to comply with requirements. Pay all costs of installation, maintenance, operation, and removal. CONTRACTOR to pay costs of fuel used from the existing system.

2.04 TEMPORARY TELEPHONE SERVICE (NOT USED)

2.05 TEMPORARY WATER

A. Make connections to existing facilities, provide water for construction purposes. CONTRACTOR to pay costs of water used. Contractor shall coordinate with SAWS Inspector to determine viable water source and must obtain a water meter from the SAWS meter shop for use during construction.

B. Install branch piping with taps located so that water is available throughout the construction using hoses. Protect piping and fittings against freezing.

C. CONTRACTOR shall provide distribution hoses as required to complete his work.

2.06 TEMPORARY SANITARY FACILITIES

A. Provide and maintain adequate temporary outdoor toilet facilities for use of persons working at the Site.

B. Keep toilets clean and in sanitary condition. Provide toilet tissue in suitable holders. Comply with applicable legal and health requirements.

C. Remove temporary toilets when construction is completed.

D. Existing plumbing facilities shall not be used by construction personnel.

2.07 TEMPORARY FIRE PROTECTION

A. Observe and enforce throughout the work during the whole period of construction all requirements of the local City Fire Marshal and Insurance Authorities to minimize the fire hazard during the progress of the work.

B. Make connections to existing facilities, provide water for fire protection purposes; CONTRACTOR to pay costs of water used.

C. Install branch piping with taps located so that water is available throughout the construction using hoses. Protect piping and fittings against freezing.

PART 3 - EXECUTION

3.01 GENERAL

A. Maintain and operate systems to assure continuous service.

B. Modify and extend systems as work progress requires.

C. CONTRACTOR shall be responsible for coordinating material storage, parking and fencing with the Owner.

D. CONTRACTOR shall be solely responsible for providing temporary security systems to protect equipment, materials, etc. in the construction area.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore existing facilities used for temporary services to specified, or original condition.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to perform all clearing and grubbing as shown and specified.

B. The work covered by this Section consists of removing and disposing of trees, stumps, brush, roots, shrubs, vegetation, logs, and rubbish, including the removal of selective vegetation; removal of all poisonous vegetation, obnoxious shrubs, and vines; protection of trees and plants designated to remain; and the removal of all trash and related materials and other objectionable material from the site as required to perform the work.

1.02 RELATED SECTIONS

A. Section 02221, Site Earthwork

1.03 QUALITY ASSURANCE

A. Codes and Standards
State and local laws and code requirements shall govern the hauling and disposal of trees, shrubs, stumps, roots, rubbish, debris, and other matter. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations, and codes.

1.04 JOB CONDITIONS

A. Protection:

1. Streets, roads, adjacent property and other works and structures shall be protected throughout the entire project. CONTRACTOR, at his expense, shall restore to original condition, satisfactory to the Engineer, damaged facilities caused by the CONTRACTOR's operations.

2. Trees, shrubs, and grassed areas designated to remain shall be protected by fences, barricades, wrapping or other methods as specified in related Sections. Equipment, stockpiles, etc., shall not be permitted within tree

branch spread. Trees shall not be removed without authorization of the Engineer unless shown or specified.

1.05 GUARANTEE

A. CONTRACTOR shall guarantee that work performed under this Section will not permanently damage trees, shrubs, turf, or plants designated to remain, or other adjacent work or facilities. If damage resulting from CONTRACTOR's operations appears during the period up to eighteen (18) months after completion of the project, the CONTRACTOR shall replace damaged items at no cost to the Owner.

PART 2 - PRODUCTS (omitted)

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. Limits of clearing shall be all areas shown on the plans where proposed construction is to occur and as directed by the Engineer. These areas may include proposed street rights-of-way, and drainage and utility easements. Trees to be removed or relocated within the site shall be designated by the Engineer prior to commencement of clearing operations. The CONTRACTOR shall be required to survey, and layout all proposed improvements within the Project area and notify the Engineer prior to any tree removal necessary for the execution of the work.

B. Except as noted in Paragraph 3.01.A of this Section, CONTRACTOR shall remove from the site and satisfactorily dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences, and miscellaneous other structures not covered under other Sections as shown, specified, or otherwise required to permit construction of the new work.

C. Burning on site shall not be allowed unless allowed by authorities having jurisdiction, and the Owner. If allowed, on-site burning shall be in complete accordance with rules and regulations of local authorities having jurisdiction, and the Owner.

D. Trees and shrubs shall be trimmed when doing so will avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are acceptable to the Engineer. Trees and shrubs which are intended to remain, and which are damaged beyond repair, or removed, shall be replaced by the CONTRACTOR at no cost to the Owner.

E. Air pollution caused by dust and dirt shall be controlled and comply with governing regulations.

END OF SECTION

SECTION 02200

SITE PREPARATION

PART 1 - GENERAL

1.01 DEFINITIONS

A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.

B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.

C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 6 inches below subgrade.

D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.

E. Stripping: Removal of topsoil remaining after applicable scalping is completed.

F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.02 SUBMITTALS

A. Shop Drawings: Drawings clearly showing clearing, grubbing, and stripping limits.

1.03 QUALITY ASSURANCE

A. Obtain Owner's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.04 SCHEDULING AND SEQUENCING

A. Prepare site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls.

1.05 RELATED WORK

Related work not included in this section can be found in the following sections.

A. Section 02221, Site Earthwork.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Clear, grub, and strip areas needed for staging area or site improvements within limits shown or specified.

B. Do not injure or deface vegetation that is not designated for removal.

3.02 LIMITS

B. As follows, but not to extend beyond Project limits.

1. Excavation Including Trenches: 5 feet beyond top of cut slopes.

2. Fill:
   a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.

   b. Stripping and Scalping: 5 feet beyond toe of permanent fill.

3. Staging Area:
   a. Clearing: 5 feet beyond perimeter.

   b. Scalping and Stripping: Not required.

   c. Grubbing: Around perimeter as necessary for neat, finished appearance.

B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 CLEARING

A. Clear areas within limits of construction.

B. Fell trees so that they fall away from facilities and vegetation not designated for removal.

C. Cut stumps not designated for grubbing flush with ground surface.

D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.04 GRUBBING

A. Grub areas within limits of construction.

3.05 SCALPING

A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.

B. Scalp areas within project limits.

3.06 STRIPPING

A. Do not remove topsoil until after scalping is completed.

B. Strip areas within project limits to minimum depths. Do not remove subsoil with topsoil.

3.07 TREE REMOVAL OUTSIDE CLEARING LIMITS

A. Remove Trees Within Project Limits:

1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.

2. Trees designated by Owner.

B. Cut stumps off flush with ground, remove debris, and if disturbed, restore surrounding area to its original condition.

3.08 PRUNING

A. Remove branches below the following heights: 20 feet above roadways and shoulders.

B. Prune as specified in local ordinances.

3.09 SALVAGE

A. Saleable logs timber may be sold to CONTRACTOR’s benefit. Promptly remove from Project site.

B. Sod with commercial value may be sold to CONTRACTOR’s benefit. Promptly remove from Project site.

3.10 DISPOSAL

A. Clearing and Grubbing Debris:

1. Dispose of debris offsite.

2. Burning of debris onsite will not be allowed.

3. Woody debris may be chipped. Chips may be sold to CONTRACTOR's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4-inch by 2-inch. Dispose of chips that are unsaleable or unsuitable for landscaping or other uses with unchipped debris.

4. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Scalpings: As specified for clearing and grubbing debris.

C. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite.

2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SECTION 02221

SITE EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals as shown, specified and necessary to complete the work of site preparation, erosion control, surface drainage, ground water control, construction of compacted fills, excavations, trenching, and backfilling of concrete foundations and structures, installation and removal of sheeting and bracing, backfilling and final site grading.

B. This Section also includes providing backfill materials for all excavations including select backfill, backfill, fill, granular embedment, and the satisfactory disposal of surplus and unacceptable materials.

C. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.

D. The CONTRACTOR shall perform all earthwork as specified in this Section. All trenching shall conform to the requirements of SAWS Specification Section 550, "Trench Excavation Safety Protection".

1.02 RELATED SECTIONS:

A. Section 01300, Submittals

B. Section 02200, Site Preparation

C. Section 02500, Site Pavement

1.03 REFERENCE STANDARDS

The CONTRACTOR shall comply with applicable provisions and recommendations of the most recent versions following:

A. ASTM A 36, Structural Steel.

B. ASTM D 422, Particle-size Analysis of Soils.

C. ASTM D 423, Liquid Limit of Soils.

D. ASTM D 424, Plastic Limit & Plasticity Index of Soils.

E. ASTM D 427, Shrinkage Factors of Soils.

F. ASTM D 698, Moisture-Density Relations of Soils, using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8 mm) Drop.

G. ASTM D 1140, Amount of Material in Soils Finer than the No. 200 Sieve.

H. TxDOT TEX-113-E, Moisture-Density Relations of Soils, using 5.5 lb. 2.5 kg) Rammer and 12-inch (304.8 mm) Drop.

I. ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

J. ASTM D 2922, Density of Soils and Soil-Aggregate in Place by Nuclear Methods.

K. Texas Department of Transportation (TxDOT) Standard Specifications for Construction of Highways, Streets and Bridges.

L. SAWS Specifications for Sewer and Water Construction.

1.04 SUBMITTALS

Provide the following in conformance with applicable requirements contained in Section 01300, Submittals.

A. Test Reports
The testing laboratory shall submit copies of the following reports directly to the CONTRACTOR, with copy to the Engineer:

1. Field Density (Compaction) Tests.

2. Optimum Moisture - maximum density curve for each soil used for backfilling.

3. Concrete Slump and 28-day compressive strength test.

B. Samples of all select backfill, backfill, fill, granular embedment, and drain gravel, shall be submitted by the CONTRACTOR to the Testing Laboratory. Samples of the proposed material shall be submitted at least fourteen (14) days in advance of its anticipated use.

C. The Project will not be accepted unless test reports are submitted to the Engineer and SAWS by the CONTRACTOR.

D. Testing frequency and intervals shall be in accordance with SAWS Specification Item 804 – "Excavation, Trenching, and Backfill."

1.05 QUALITY ASSURANCE

A. Testing Services

1. General:
Testing of materials, testing for moisture content during placement and compaction of fill materials, and of compaction requirements for compliance with technical requirements of the Specifications shall be performed by a testing laboratory.

2. Testing Services Include:

a. Test the CONTRACTOR's proposed materials in the laboratory and/or field for compliance with the Specifications.

b. Perform field moisture content and density tests to assure that the specified compaction of backfill materials has been obtained.

c. Report all test results to the CONTRACTOR and the Engineer.

1.06 SITE CONDITIONS

A. All traffic during construction shall confine their limits to an established "traffic route" submitted by the CONTRACTOR and reviewed by the Engineer.

1.07 COORDINATION

A. The CONTRACTOR shall expedite placement of compacted fills and embankments at the earliest practical time.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill, Fill, Select Backfill

1. Materials used for backfilling, fill, and select backfill shall be in accordance with SAWS Specification Item 804 "Excavation, Trenching, and Backfill."

2. All material for use as backfill, fill, and select backfill shall be tested and verified by the Testing Laboratory.

B. Granular Sanitary Sewer Pipe Embedment Material (Initial Backfill)
Granular embedment material shall meet the requirements of SAWS Specification Item 804 "Excavation, Trenching, and Backfill." Section 804.5.2.a(3).

C. Drain Gravel

1. Drain gravel shall be washed gravel conforming to the following gradation:

Sieve Size	Percent Retained on Sieve
2 inch	0
1 ½ inch	0-10
1 inch	45-75
½ inch	90-100
¼ inch	95-100

2. The material shall have a LA abrasion number of 35 or less.

3. All drainage material must be tested and accepted by the Testing Laboratory.

4. No drainage material shall be placed without authorization.

PART 3 - EXECUTION

3.01 SITE PREPARATION

A. The portions of the site on which the work is to be constructed shall be cleared of all objectionable materials and debris. All materials and debris shall be disposed of off the project site in accordance with applicable regulations.

3.02 EROSION CONTROL, DEWATERING AND POLLUTION CONTROL

A. Erosion Control

1. In general, the construction procedures outlined herein shall be implemented to ensure minimum damage to the environment during construction.

2. Whenever possible, access roads shall be located and constructed to avoid environmental damage.

3. Temporary Measures shall be coordinated with the construction of permanent drainage facilities and other work to the extent practicable to assure economical, effective, and continuous erosion and siltation control.

4. The CONTRACTOR shall prevent blowing and movement of dust from exposed soil surfaces to reduce on and off-site damage and health hazards.

B. Dewatering

1. The CONTRACTOR shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and groundwater entering excavations, trenches, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until all backfill operations have been completed. All dewatering operations by the CONTRACTOR shall be at no additional cost to the Owner.

   a. The different working areas on the site shall be kept free of surface water at all times. The CONTRACTOR shall install drainage ditches and dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations and fill areas. The diversion and removal of surface water shall be performed in a manner that will prevent the accumulation of water behind temporary structures or at any other locations within the construction area where it may be detrimental.

   b. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the water downstream of the point of discharge shall not be directly discharged. Such waters shall be diverted through a settling basin or filter before being discharged.

   c. The CONTRACTOR will be held responsible for the condition of any pipe, conduit, or channel which he may use for drainage

purposes and all such pipes, conduits or channels shall be left clean and free of sediment.

2. The CONTRACTOR shall provide, install, and operate sufficient trenches, sumps, pumps, hose, piping, wellpoints, deep wells, etc., necessary to depress and maintain the ground water level below the base of the excavations during all stages of construction operation. The ground water table shall be lowered in advance of excavation and maintained two feet below the lowest subgrade excavation made until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural groundwater. The system must be operated on a 24-hour basis and standby pumping facilities and personnel shall be provided to maintain the continued effectiveness of the system. If, in the opinion of the Engineer, the water levels are not being lowered or maintained as required by these Specifications, the CONTRACTOR shall install additional or alternate dewatering devices as necessary, at no additional cost to the Owner.

   a. Elements of the system shall be located to allow a continuous dewatering operation without interfering with the construction of the permanent work. Where portions of the dewatering system are in the area of permanent construction, the CONTRACTOR shall submit details of the methods he proposes to construct the permanent work in this location for the review of the Engineer. Controls of groundwater shall continue until the permanent construction provides sufficient dead load to withstand the hydrostatic uplift of the normal ground water, until concrete has attained sufficient strength to withstand earth and hydrostatic loads, until all waterproofing work below normal ground water level has been completed, and until pipelines are properly jointed.

      Dispose of all water removed from the excavation in such a manner so as not to endanger any portion of the work under construction or completed. Convey water from the excavations in a closed conduit. Do not use trench excavations as temporary drainage ditches. Before discontinuing dewatering operations, or permanently permitting the rise of the ground water level, computations shall be made to show that any pipeline or structure affected by the water level rise is protected by backfill or other means to sustain uplift. Use safety factor of 1.25 when making these computations.

   b. Dewatering operations shall not be discontinued without the prior authorization of the Engineer.

3.03 EXCAVATION

A. General

1. The CONTRACTOR shall excavate and backfill, in advance of the construction, test pits to determine conditions or location of the existing utilities. The CONTRACTOR shall perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling, and replacing pavements for the test pits.

   The CONTRACTOR shall be responsible for the definite location of each facility constructed by others involved within the area of his excavation for work under this contract. Care shall be exercised during such location work to avoid damaging and/or disrupting the affected facility. The CONTRACTOR shall be responsible for repairing, at his expense, damage to any structure, piping, or utility caused by his work.
   Blasting shall not be permitted.

2. Excavation of every description and of whatever substance encountered within the grading limits of the project shall be performed to the lines and grades indicated on the Drawings. All excavation shall be performed in the manner and sequence as required for the work.

   a. Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

   b. Subgrades for wetwell, concrete pads, concrete foundations, and pavements shall be firm, dense, and thoroughly compacted.

   c. Exposed soil after excavations have been made shall be protected against detrimental damage and change in condition from physical disturbance and rain. Wherever possible, concrete footings shall be done the same day the excavation is made. If this is not done, the footing excavations shall be properly protected.

3. All excavated materials that meet the requirements for backfill shall be stockpiled within the site (but not less than 25 feet from the surface borders of any excavation) for use as backfill, or for providing final site

grades. All excavated materials which are not considered suitable for fill, and any surplus or excavated material which is not required for fill shall be disposed of off the site by the CONTRACTOR. Upon completion of the fill, all on-site waste and disposal areas shall be cleaned, and the debris removed from the site.

Materials deposited off the site shall be transported and placed in accordance with all applicable rules and regulations of all authorities having jurisdiction thereof. No surplus or unacceptable excavated materials of any kind shall be deposited in any stream or water course or dumped on public property.

B. Excavations for Lift Station Concrete Pads, Concrete Foundations and Pavements.

1. Excavations for the construction of concrete pads, and foundations shall be carefully made to the depths indicated on the plans. Bottoms for footings and slabs shall be level, clean, dry, and clear of loose material and the lower sections true to size. Footings and slab excavations shall be verified by the Testing Laboratory, and reviewed by the Structural Engineer, before concrete is placed thereon.

2. In excavations for structures where, in the opinion of the Testing Laboratory, the ground, not affected by high water level, is spongy or otherwise unsuitable for the contemplated foundation, the CONTRACTOR will be required to remove such unsuitable earth and replace it with suitable material in accordance with this Section.

3. Excavations for structures which have been carried below the depths indicated shall be refilled to the proper grade with select backfill material properly compacted, in accordance with this Section.

4. All structure excavations shall be hand-trimmed to permit the placing of full widths and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

5. Excavations shall be extended to the recommended dimensions shown in the plans for this project on each side of structures, footings, etc., unless otherwise shown or specified.

6. When the excavation has reached the design subgrade, the exposed subgrade shall be compacted, and moisture conditioned.

7. Pavement excavation shall consist of excavation for the lift station pavement and driveway, in conformity with the typical sections shown on the plans, and to the lines and grades established by the Engineer, by the removal of existing material or addition of acceptable material. All unstable or otherwise objectionable material shall be removed from the subgrade and replaced with acceptable material. All holes, ruts, and depressions shall be filled with acceptable material. The surface of the subgrade shall be finished to the lines and grades as established and be in conformity with the typical sections shown on the plans. Any deviation in excess of one-half inch (1/2") in cross section, and in a length of sixteen feet (16'), measured longitudinally, shall be corrected by loosening, adding, or removing material, reshaping and compacting by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work.

C. Excavation, Trenching and Backfill for Piping

1. All excavation, trenching and backfilling for pipe trenches shall conform to SAWS Specification Item No. 804 “Excavation, Trenching, and Backfill.”

3.04 UNAUTHORIZED EXCAVATION

All excavation outside the lines and grades shown, and which is not in conformance with the plans and specifications as determined by the Testing Laboratory, together with the removal and disposal of the associated material shall be at the CONTRACTOR's expense. The unauthorized excavation shall be filled and compacted as specified by the Testing Laboratory, with backfill in accordance with this Section by the CONTRACTOR at his expense.

3.05 PLACEMENT OF FILL, BACKFILL, AND SELECT BACKFILL

A. General

1. All select backfill, backfill and fill required for structures and pavements are required to be provided to the finished grades shown and as described herein shall be furnished, placed, and compacted by the CONTRACTOR.

2. Backfill excavations as promptly as work permits, but not until completion of the following:

a. Observation by the Engineer of construction below finish grade.

b. Observation, testing and recording of locations of underground piping and ductwork.

c. Removal of concrete formwork.

d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.

e. Removal of trash and debris.

f. Backfill against foundation walls, only after review by the Engineer. Do not damage waterproofing when placing backfill.

3. Fill containing organic materials or other unacceptable materials shall be removed and replaced with acceptable fill material.

B. Placement of Fill Materials, Backfill, and Select Backfill.

1. Placement of Fill, Backfill, and Select Backfill shall be in accordance with the Owner and SAWS guidelines.

2. Material shall be placed to the grades shown on the Drawings.

3. Backfill around and outside of structures and over select backfill shall be deposited in layers not to exceed eight inches (8") in uncompacted thickness and mechanically compacted, using platform type tampers. Compaction of structural backfill by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of select backfill and/or backfill by inundation with water will not be permitted. All materials shall be deposited as specified herein and as shown on the Drawings.

4. No material shall be placed when free water is standing on the surface of the area where the material is to be placed. No compaction of material will be permitted with free water on any portion of the material to be compacted. No material shall be placed or compacted in a frozen condition or on top of frozen material. Any material containing organic materials or other unacceptable material previously described shall be removed and replaced with acceptable material prior to compaction.

5. Compaction shall be performed with equipment suitable for the type of material being placed. The contractor shall select equipment which can provide the minimum density required by these Specifications. The gross weight of compacting equipment shall not exceed 7,000 pounds within

ten feet (10') from the wall of any existing structure or completed structure under this contract. Equipment shall be provided that can compact in restricted areas next to structures and around piping. The effectiveness of the equipment selected by the CONTRACTOR shall be tested at the commencement of compacted material work by construction of a small section of material within the area where material is to be placed. If tests on this section of backfill show that the specified compaction is not obtained, the CONTRACTOR shall increase the number of coverages, decrease the lift thicknesses, or obtain a different type of compactor.

6. Care shall be taken to compact structural backfill which will be beneath pipes, roads, or other surface construction or structures. In addition, wherever a trench passes through structure backfill, the structure backfill shall be placed and compacted to an elevation twelve inches (12") above the top of the pipe before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

C. Backfill in Pipe Trenches

1. All pipe trenches shall be excavated, prepared, and backfilled in accordance with SAWS Specification Item No. 804 Excavation, Trenching, and Backfilling.

2. Pipeline trenches may be backfilled prior to pressure testing but no structure shall be constructed over any pipeline until it has been tested.

3. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.

D. Compaction Density Requirements

1. Compaction, moisture conditioning and testing required for all non-pipeline trench types of fills shall be in accordance with Bexar County guidelines.

2. Compaction, moisture conditioning and testing for pipe trench backfilling, and backfilling around the wetwell shall be in accordance with SAWS Specification Item No. 804 Excavation, Trenching, and Backfilling.

3.06 FINAL GRADING AND EMBANKMENTS

A. To the extent available, backfill material from excavations shall be placed in accordance with this Section to final grades with a minimum compacted depth of twelve inches (12").

B. After other outside work has been finished, and backfilling and embankments completed and settled, all areas on the site of the work which are to be graded shall be brought to a subgrade suitable with the indicated elevations, slopes, and grades with suitable excess excavation material. Final grades shall be within 0.1 foot of the finished grades shown on the Drawings.

END OF SECTION

SECTION 02222

CONSTRUCTION BEST MANAGEMENT PRACTICES AND SEDIMENT AND EROSION CONTROL MEASURES

PART 1 - GENERAL

1.01 SUMMARY

A. A TPDES Stormwater Pollution Plan shall be prepared by the CONTRACTOR.

B. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals as shown, specified and necessary to complete the work required for compliance with the TPDES Storm Water Regulations and any other related State, County or local requirements.

C. As a condition of the award of the Contract, the CONTRACTOR will be required to sign and submit a Certification as shown below:

"I certify under penalty of law that this document was 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, and accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

END OF SECTION

SECTION 02316

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE

This Section governs the excavation, backfilling, and compaction of backfill for structures.

1.02 DEFINITIONS

A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.

2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.

C. Select Material: Material as defined in Paragraph 2.02A.

D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.

E. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

F. Foundation Base: For foundation base material, use cement stabilized sand or concrete seal slab. The foundation base provides a smooth, level working surface for the construction of the concrete foundation.

G. Foundation Subgrade: Foundation subgrade is the surface of the natural soil which has been excavated and prepared to support the foundation base where needed.

H. Ground Water Control Systems: Installations external to the excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower the ground water, intercepting seepage which would otherwise emerge from the side or bottom of the excavation, and depressurization to prevent failure or heaving of the excavation bottom. Refer to Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER."

I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from the excavation. Remove rain water and surface water which accidentally enters the excavation as a part of excavation drainage.

J. Excavation Drainage: Removal of surface and seepage water in the excavation by sump pumping and using French drains surrounding the foundation to intercept the water.

K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below the foundation as shown on Construction Plans and backfilled with foundation backfill material.

L. Shoring System: A structure that supports the sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.03 SUBMITTALS

A. Submit a work plan for excavation and backfill for each structure with complete written description which identifies details of the proposed method of construction and the sequence of operations for construction relative to excavation, dewatering (if required), and backfill activities. The descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to the Engineer that the procedures meet the requirements of the Specifications and Construction Plans.

B. Submit excavation safety system plan.

1. The excavation safety system plan shall be in accordance with applicable OSHA requirements for all excavations.

2. The excavation safety system plan shall be in accordance with the requirements of Federal Requirements, 29 CFR, Part 1926, Standards - Excavation, Occupational Safety and Health Administration (OSHA).

C. Submit a ground and surface water control plan in accordance with requirements in this Section entitled, "CONTROL OF GROUND WATER AND SURFACE WATER."

D. Submit backfill material sources and product quality information in accordance with requirements of the section entitled, "BACKFILL MATERIALS".

E. Submit project record documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.04 TESTS

Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the Owner.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Perform excavation with equipment suitable for achieving the requirements of this Specification.

B. Use equipment which will produce the degree of compaction specified. Backfill within 3 feet of walls shall be compacted with hand operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to the depth of the fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

Select Backfill: Clayey gravel or sand or lean clay with a plasticity index between 7 and 20 or clayey soils treated with the required proportion of lime.

PART 3 EXECUTION

3.01 PREPARATION

A. Conduct an inspection to determine condition of existing structures and other permanent installations.

B. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified in the section entitled, “EXCAVATION SUPPORT AND PROTECTION SYSTEMS FOR STRUCTURES”.

C. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section entitled, “CONTROL OF GROUND WATER AND SURFACE WATER.”

3.02 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects within the project area.

B. Protect and support above-grade and below-grade utilities which are to remain.

C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities are indicated on the Construction Plans.

D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.

E. Maintain excavation and backfill areas until start of subsequent work. Repair and re-compact slides, washouts, settlements, or areas with loss of density at no additional cost to the Owner.

3.03 EXCAVATION

A. Perform excavation work so that the underground structure can be installed to depths and alignments shown on Construction Plans. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to the absolute minimum necessary. No additional payment will be made for excess excavation not authorized by Engineer.

B. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Engineer and obtain instructions before proceeding in such areas.

C. Immediately notify the agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Engineer and agency for any repairs or relocations, either temporary or permanent.

D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.

E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.

F. Conduct hauling operations so that trucks and other vehicles do not create a dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud, or other materials that spill onto streets or are deposited onto streets by vehicle tires.

G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by the Work.

H. Provide sheeting, shoring, and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on Construction Plans, and to protect the Work and adjacent structures or improvements.

I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, concrete fill, cement stabilized sand, or other material approved by Engineer.

J. After completion of the structure, remove sheeting, shoring, and bracing unless shown on Construction Plans to remain in place or directed by Engineer in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures or improvements.

K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or material approved by Engineer.

3.04 HANDLING EXCAVATED MATERIALS

A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at a sufficient distance from excavation to prevent slides or cave-ins.

B. Provide additional backfill material, if adequate quantities of suitable material are not available from excavation and trenching operations at the site.

3.05 DEWATERING

A. Provide ground water control per Section entitled, “CONTROL OF GROUND WATER AND SURFACE WATER.”

B. Keep ground water surface elevation a minimum of 2 feet below the bottom of the foundation base.

C. Maintain ground water control as directed by Section entitled, “CONTROL OF GROUND WATER AND SURFACE WATER” and until the structure is sufficiently complete to provide the required weight to resist hydrostatic uplift with a minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

A. Notify Engineer at least 48 hours prior to planned completion of foundation excavations. Do not place the foundation base until the excavation is accepted by the Engineer.

B. Excavate to elevations shown on Construction Plans, as needed to provide space for the foundation base, forming a level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or a material as directed by the Engineer. Prior to placing material over it, re-compact the subgrade where indicated on the Construction Plans, scarifying as needed, to 95 percent of the maximum Standard Dry Density according to ASTM D 698. If the specified level of compaction cannot be achieved, moisture condition the subgrade and re-compact until 95 percent is achieved, over-excavate to provide a minimum layer of 24 inches of foundation backfill material, or other means acceptable to the Engineer.

C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by the Engineer.

D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in a satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.

E. Soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to the required subgrade, shall be removed and replaced with foundation backfill material, as directed by Engineer, at no additional cost to the Owner.

F. Place foundation base, where needed, over the subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with a seal slab or cement-stabilized sand.

G. Crushed aggregate, and other free draining Class I materials, shall have a filter fabric separating it from native soils or select material backfill. The fabric shall overlap a minimum of 12-inches beyond where another material stops contact with the soil.

H. Crushed aggregate, and other Class I materials, shall be placed in uniform layers of 8-inch maximum thickness. Compaction shall be by means of at least two passes of a vibratory compactor.

3.07 FOUNDATION BASE

After the subgrade is properly prepared, including the placement of foundation backfill where needed, the foundation base shall be placed. The foundation base shall consist of a 12-inch layer of crushed stone aggregate or cement stabilized sand. Alternately, a seal slab with a minimum thickness of 4 inches may be placed. The foundation base shall extend a minimum of 12 inches beyond the edge of the structure foundation, unless shown otherwise on the Construction Plans.

3.08 BACKFILL

A. Complete backfill to surface of natural ground or to lines and grades shown on Construction Plans. Use existing material that qualifies as select material, unless indicated otherwise. Deposit backfill in uniform layers and compact each layer as specified.

B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that the concrete has reached a minimum of 85 percent of the specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until the slab or intermediate walls have been placed and concrete has attained sufficient strength.

C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.

D. Maintain fill material at no less than 2 percent below nor more than 2 percent above optimum moisture content. Place fill material in uniform 8-inch maximum loose layers. Compaction of fill shall be to at least 95 percent of the maximum Standard Dry Density according to ASTM D 698 under paved areas. Compact to at least 90 percent around structures below unpaved areas.

E. Where backfill is placed against a sloped excavation surface, run compaction equipment across the boundary of the cut slope and backfill to form a compacted slope surface for placement of the next layer of backfill.

F. Place backfill using cement stabilized sand in accordance with Section entitled, “CEMENT STABILIZED SAND.”

3.09 FIELD QUALITY CONTROL

A. Tests will be performed initially on minimum of one different sample of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.

B. In-place density tests of compacted subgrade and backfill will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions:

1. A minimum of one test for every 100 cubic yards of compacted backfill material.

2. A minimum of three density tests for each full work shift.

3. Density tests will be performed in all placement areas.

4. The number of tests will be increased if inspection determines that soil types or moisture contents are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density.

C. At least one test for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.

D. If tests indicate work does not meet specified compaction requirements, recondition, re-compact, and retest at Contractor's expense.

3.10 DISPOSAL OF EXCESS MATERIAL

Dispose of excess materials in accordance with requirements of Section entitled, “WASTE MATERIAL DISPOSAL.”

- END OF SPECIFICATION –

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SECTION 02500

SITE PAVEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope

1. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to provide hot mix-hot laid bituminous paving, as well as concrete paving for driveways as shown.

a. Lift Station Pavement (HMAC)

b. Concrete Driveway

2. The work includes the following:

a. Flexible Base

b. Asphalt Stabilized Base

c. Surface Treatments

d. Hot Mix Asphaltic Concrete

e. Portland Cement Concrete Pavement

f. Testing As Specified

1.02 RELATED SECTIONS

A. Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets and Bridges.

B. SAWS Construction Specifications

1.03 QUALITY ASSURANCE

A. Testing Services

1. General: Testing of materials and of compaction requirements for compliance with technical requirements of the Specifications shall be the duty of a testing laboratory as provided for by the specifications for this Project.

2. Testing Services: The testing laboratory shall:

   a. Test the CONTRACTOR's proposed materials in the laboratory and field for compliance with the Specifications.

   b. Perform field density tests to assure that the specified compaction of surface and base course materials has been obtained.

   c. Report all test results to the CONTRACTOR and the Engineer.

   d. Perform asphaltic concrete testing in accordance with the Project specifications.

1.04 SUBMITTALS

Provide the following in conformance with applicable requirements contained in Section 01300, Submittals.

A. Product Data: Submit product data for the following materials:

1. Flexible Base.

2. Asphalt Stabilized Base.

3. Cement.

4. Curing Seal Coat.

5. Tack Coat.

6. Hot Mix Asphaltic Concrete.

7. Aggregates for Surface Treatments.

8. Reinforcing Steel.

B. Laboratory Test Reports

Submit copies of laboratory test reports for optimum lime content for subgrade stabilization, gradation and Atterberg limits for flexible base, gradation and mix designs for asphalt treated base, and mix designs for Hot Mix Asphaltic Concrete and Portland Cement Concrete.

C. All paving and base course materials shall be tested and approved prior to delivery to the site. Samples of materials proposed for use as pavement and base course should be submitted by the CONTRACTOR to the Testing Laboratory for testing. Samples of materials shall be submitted at least 14 days in advance of its use.

PART 2 - PRODUCTS

2.01 MATERIALS

The source of materials shall be acceptable to the Engineer. Materials shall conform to the following:

A. Flexible Base

1. Base material shall be crushed or uncrushed as necessary to meet the requirements hereinafter specified, and shall consist of durable stone or gravel, crushed and/or screened to the required particle size, with or without other approved fine sized materials. Unless otherwise specified in this section, all flexible base materials shall conform to TxDOT Item 247 "Flexible Base". The material shall be from approved sources.

a. Testing of flexible base material shall be in accordance with the following standard laboratory test procedures:

Preparation of Soil	
Constants and Sieve Analysis	TxDOT TEX-101-E
Liquid Limit	TxDOT TEX-104-E
Plastic Limit	TxDOT TEX-105-E
Plasticity Index	TxDOT TEX-106-E
Linear Shrinkage	TxDOT TEX-107-E
Sieve Analysis	TxDOT TEX-110-E
West Ball Mill	TxDOT TEX 116-E
Los Angeles Abrasion	ASTM C 131 (Grad. A)

b. Samples for testing the material shall be taken prior to compaction operations.

c. The material shall be well graded and when properly tested shall meet the following requirements of Texas Department of Transportation Specifications for Type A Grade 2 Flexible Base:

Retained on 2½ inch sieve	0%
Retained on 1¾ inch sieve	0-10%
Retained on No. 4 sieve	45-75%
Retained on 40 mesh sieve	60-85%

d. The material passing the 40-mesh sieve shall be known as "Soil Binder" and shall meet the following requirements:

The liquid limit shall not exceed	40
The plasticity index shall not exceed	12
The linear shrinkage shall not exceed	10

(Note: The linear shrinkage shall be calculated from the volumetric shrinkage at the liquid limit.)

e. The crushed stone or crushed gravel shall have an abrasion of no more than 40 when subjected to the Los Angeles Abrasion Test.

B. Water

Water shall be free from substances deleterious to the hardening of the treated base.

C. Asphalt Oils and Emulsions

"RC-2" Liquid Asphalt and "EA-11-M" Emulsion used as a seal shall meet the requirements set forth in Item 300 "Asphalts, Oils and Emulsions" of the Texas Department of Transportation Standard Specifications.

Where Emulsified Asphalts are used, the amount of emulsified asphalt as a percentage by volume of the total mixture shall be within the limits shown on the plans or shall be of a percentage as directed by the Engineer.

1. Prime Coat:

The asphaltic material for Prime Coat shall meet the requirements for Cut-Back Asphalt, "MC-30," Emulsified Asphalt "EA-11M," or "EA-10S," or other asphalts or emulsions as shown on the plans, or as directed, or reviewed by the Engineer. Asphalts and Emulsions shall conform to the requirements of Item 300, "Asphalts, Oils and Emulsions" of the Standard Specifications of the Texas Department of Transportation.

2. Tack Coat:
   The asphaltic material used for Tack Coat shall meet the requirements for "Asphalt Cement", "Cut-Back Asphalt", or "Emulsified Asphalt", in Item No. 300 "Asphalts, Oils and Emulsions" of the Texas Department of Transportation Standard Specifications. The asphaltic material used for Tack Coat shall be that type or grade shown on the plans, or shall be as directed, or reviewed by the Engineer.

3. Asphaltic Materials for Surface Treatments:
   The asphaltic material used for surface treatments shall meet the requirements for "Asphaltic Cement" in Item No. 300 "Asphalts, Oils and Emulsions" of the Texas Department of Transportation Standard Specifications. The asphaltic material used shall be AC-10 or equal or shall be as reviewed by the Engineer.

D. Hot Mix Asphaltic Concrete

1. Materials used in Hot Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340, "Hot Mix Asphaltic Concrete Pavement" of the Texas Department of Transportation Standard Specifications.

2. Paving Mixture used shall be Type D. This mixture shall conform to the requirements of Paragraph 340.3 of Item 340, "Hot Mix Asphaltic Concrete Pavement" of the Texas Department of Transportation Standard Specifications.

   a. Part (2) of Paragraph 340.3 shall be revised as follows, and no other requirements are waived or changed hereby.

DENSITY, PERCENT			STABILITY, PERCENT
Min.	Max.	Optimum	Not less than 45 nor
95	98	96	more than 60.

E. Forms: Formwork shall conform to the provisions of TxDOT Item 360 "Concrete Pavement". Forms shall be constructed of wood or steel, profiled to suit condition.

F. Concrete Pavement and Driveways

1. Concrete and concrete materials shall conform to the provisions of the TxDOT Standard Specifications Item 360, "Concrete Pavement", unless otherwise stated in this specification.

a. Coarse aggregate will conform to the gradation requirements of Aggregate Grade No. 2.

b. Fine aggregates will conform to the gradation requirements of Aggregate Grade No. 1.

c. Portland Cement shall be Type I.

2. Air content shall be 4% + 1%.

3. Slump shall range from 2 to 5 inches.

G. Steel Expansion Joint Dowels: Dowel bars shall be round smooth steel conforming to ASTM A 36, Grade 60.

H. Concrete Pavement/Driveway Reinforcement

1. Reinforcing steel bars (diameter shown on plans) shall conform to TxDOT Item 440, "Reinforcing Steel", ASTM A 615 Grade 60, deformed bars. All reinforcing steel shall be new billet steel.

2. All welded wire fabric shall conform to TxDOT Item 440, “Reinforcing Steel”.

2.02 CUTTING AND REPLACING PAVEMENTS

All materials used for cutting and replacing pavements shall conform to the requirements of this section.

PART 3 - EXECUTION

3.01 GENERAL

The drives and pavement areas shall be constructed to the lines, and typical section shown on the drawings. Pavement removal and replacement within the project shall be performed in accordance with City of San Antonio guidelines.

3.02 SUBGRADE PREPARATION

A. Preparation of the subgrade including compaction shall be completed for the full width of the pavement areas and access roads, or as shown on plans.

1. The subgrade shall be compacted to at least 95 percent (95%) of maximum density between optimum moisture content and optimum moisture content +2% as determined by ASTM D-698. Subgrades with a plasticity index greater than 20 shall be lime stabilized to a depth of 6”

below the top of final subgrade elevation to a plasticity index of 20 or less.

2. Six-inches (6") of flexible base or asphalt stabilized base may be substituted for lime-stabilized subgrade at no additional cost to the Owner.

B. No materials shall be placed on subgrades that are muddy or have water thereon.

3.03 CONSTRUCTION OF HOT MIX ASPHALTIC CONCRETE PAVEMENTS

A. General

1. The pavement areas shall be constructed to the lines, grades, and typical section shown on the Drawings.

2. Conform to all applicable requirements of the Texas Department of Transportation Standard Specifications.

B. Flexible Base Course

1. Equipment:
All equipment necessary to properly perform and complete the work shall be on the project prior to beginning the work, shall be subject to the review of the Engineer, and shall be always maintained in a satisfactory condition.

a. Motor graders shall be self-propelled, shall have tandem or four-wheel drive, shall have a blade length of not less than 12 feet, shall have a wheelbase length (the distance between front and rear axles) of not less than 16 feet, and shall be in good operating condition and reviewed by the Engineer.

b. Compaction equipment shall be of sufficient weight and adequately loaded to accomplish the required compaction.

c. Water distributors shall be equipped with positive and rapidly working cut-off valves, approved spray bars equipped with bituminous nozzles and a power pump that will insure distribution of water in a uniform and controllable rate of application. Spray bars shall be so constructed that the effective length may be quickly and easily altered.

d. Nothing in this section shall relieve the CONTRACTOR of his responsibility for producing finished work of the quality specified.

2. Construction Methods:

a. General:
It is the intent of this specification to obtain a complete course, or courses, of Flexible Base of uniform moisture and density, with a closely-knit surface free from laminations, cracks, ridges, or loose material, and to the surface requirements hereinafter specified.

b. Placing of Flexible Base Material:
The Flexible Base material shall be placed on the approved subgrade in courses not to exceed six inches (6") compacted depth. It shall be the responsibility of the CONTRACTOR that the required amount of material be delivered and uniformly spread and shaped. All material shall be moved from the place where it is dumped by cutting into windrows. After the material has been cut into windrows, it shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation, and as necessary for required compaction.

c. Compaction and Finishing:
Flexible Base shall be compacted to an apparent dry density of not less than 95 percent of the maximum dry density between optimum moisture content and optimum moisture content + 2%, as determined in accordance with TxDOT Test Method TEX 113-E. Tests for density will be made within 24 hours after compaction operations are completed. If the material fails to meet the density specified, it shall be reworked as necessary to meet the density required. Just prior to the placing of any succeeding course of Flexible Base, surfacing on any previously completed course, the density and moisture of the top three inches (3") of Flexible Base shall be checked and if tests show the density to be more than 2 percent below the specified minimum, or the moisture content to be more than 3 percent above or below the optimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.

The surface upon completion shall be smooth and in conformity with the typical sections and to the established lines and grades. Any deviation more than 1/4 inch in cross-section and in length of 16 feet measured longitudinally shall be corrected. All

irregularities, depressions, or weak spots that develop shall be corrected.

C. Prime Coat

1. When the area and/or base is satisfactory to receive the prime coat, the surface shall be cleaned by sweeping or other acceptable methods. If necessary, the surface shall be lightly sprinkled with water just prior to application of the asphaltic material. The asphaltic material shall be applied on the clean surface by an acceptable type of self-propelled pressure distributor so operated as to distribute the prime coat at a rate not to exceed 0.20 gallon per square yard of surface, evenly and smoothly, under a pressure necessary for proper distribution. During the application of prime coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures.

2. Prime Coat shall not be applied when the air temperature is below 60° F and falling, but it may be applied when the air temperature is above 50° F and is rising: the air temperature being taken in the shade away from artificial heat.

   Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.

D. Tack Coat

1. Before the tack coat is applied, the surface shall be cleaned thoroughly. The asphaltic material shall be applied on the clean surface by an acceptable type of self-propelled pressure distributor so operated as to distribute the tack coat at a rate not to exceed 0.10 gallon per square yard of surface, evenly and smoothly under a pressure necessary for proper distribution. All contact surfaces of curbs and structures and all joints shall be painted with a thin uniform coat of the asphaltic material used for tack coat. The tack coat shall be rolled with a pneumatic tire roller. During the application of tack coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures.

E. Hot Mix Asphaltic Concrete

1. Construction methods used in laying Hot Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340 "Hot Mix Asphaltic Concrete Pavement" of the Texas Department of Transportation Standard Specifications, with the following exception:

Application of Hot Mix Asphaltic Concrete Pavement shall not begin unless the air temperature is at least fifty degrees Fahrenheit (50° F) in the shade and rising.

F. Construction Joints

1. Construction joints shall be made in such a manner as to ensure a neat junction, thorough compaction, and bond throughout.

2. A transverse joint extending over the full width of the strip being laid and at right angles to its centerline shall be constructed at the end of each day's work and at any other times when the operations of placing the hot mixture are suspended for a period which will permit the mixture to chill. The forward end of a freshly laid strip shall be thoroughly compacted by rolling before the mixture has become chilled. When work is resumed, the end shall be cut vertically for the full depth of the layer.

3. When new pavement is to join pavement installed by others or previously laid pavement by the CONTRACTOR, the in-place pavement shall be neatly and carefully edged to allow for overlapping and feathering of the new surface course material. A tack coat of bituminous prime coat material shall be placed at the interface of new and previously laid material.

G. Traffic Maintenance

The pavement shall be opened to traffic when directed by the Engineer. Construction traffic on the pavement shall be held to a minimum and shall be acceptable to the Engineer. Adequate protection methods as reviewed by the Engineer shall be utilized when crossing roadways is required.

H. Field Quality Control

1. CONTRACTOR will employ a testing laboratory to perform field quality control. The testing laboratory will make compaction testing of flexible base. The testing laboratory will test the HMAC for Asphalt Extraction, Gradation, Bitumen Content, Stability, and laboratory density. CONTRACTOR shall furnish all necessary assistance required by the testing laboratory. CONTRACTOR shall also furnish all labor, materials, and equipment necessary for sampling. CONTRACTOR shall furnish all necessary transportation to the Owner's Testing Laboratory required by the testing.

2. Quality Control Testing During Construction:

a. The testing laboratory will perform sampling and testing for field quality control during the placement of materials as follows:

(1) HMAC shall be tested as described in these Specifications, at least once for every 500 tons of materials placed or fraction thereof.

(2) Density:

(a) Compare density of in-place material against laboratory specimen or certificated on same for bituminous concrete mixture.

(b) Acceptable densities of in-place materials shall conform to applicable State Standard Requirements.

(3) Thickness:
In-place compacted thickness shall average not less than the thickness specified.

(4) Surface Smoothness:

(a) Test finished surface of each bituminous concrete course for smoothness, using a 10-foot straight edge applied parallel to and at right angles to centerline of paved areas.

(b) Check surfaced areas at intervals as directed by Engineer.

(c) Surfaces will not be acceptable if deviations exceed the following:

i) Base Courses: 3/8 inch in 10 feet.

ii) Surface Course: 1/4 inch in 10 feet.

iii) Crowned Surfaces:

a) Test crowned surfaces with a crown template, centered and at right angle to the crown.

b) Surfaces will not be acceptable if varying more than 1/4" from the template.

3.04 PORTLAND CEMENT CONCRETE PAVING AND DRIVEWAYS

A. General

1. Unless otherwise noted in these Specifications, construction methods used to place all Portland Cement Concrete Paving are specified by TxDOT Standard Specifications Item 360, "Concrete Pavement".

B. Inspection

1. Verify subgrade is ready to support paving and imposed loads.

2. Verify gradients and elevations of subgrade are correct.

C. Preparation

1. Moisten subgrade to minimize absorption of water from fresh concrete.

2. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

D. Forming

1. Place and secure forms to correct location, dimension, and profile.

2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3. Place joint fillers vertical in position, in straight lines. Secure to form work during concrete placement.

E. Reinforcement

1. Reinforcing steel as described earlier in this specification shall be grade 60 and shall be placed as shown on the plans. All concrete shall be continuously reinforced.

F. Formed Joints

1. Transverse and longitudinal joints shall be constructed in accordance with Texas Department of Transportation Specifications.

2. Joints shall be filled in accordance with the construction drawings.

G. Placing Concrete

1. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
2. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

H. Finishing

1. All concrete pavements shall be finished in accordance with Texas Department of Transportation Item 360.

I. Curing

1. The CONTRACTOR shall select one of the methods of curing stated in TxDOT Standard Specifications, Item 360, Paragraph 360.11, "Curing".

2. If the CONTRACTOR elects to use Membrane Curing, the Engineer must review the curing compound.

J. Protection

1. Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical injury.

3.05 CLEANING AND PROTECTION

A. Cleaning
After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

B. Protect newly finished pavement until it has become properly hardened by cooling.

END OF SECTION

SECTION 02732

SANITARY SEWER LIFT STATION

PART 1 - GENERAL

1.01 SUMMARY

A. CONTRACTOR shall furnish all labor, materials, equipment, and incidentals as shown, specified and necessary to complete the sanitary sewer lift station and site work.

B. The principal items of equipment for the lift station shall include (but not limited to), 8-foot diameter drywell, and connection to existing wetwell.

1.02 RELATED SECTIONS

A. Section 01300, Submittals

B. Section 02110, Site Clearing

C. Section 02200, Site Preparation

D. Section 02221, Site Earthwork

E. Section 02500, Site Pavement

1.03 REFERENCE STANDARDS

The CONTRACTOR shall comply with applicable provisions and recommendations of the following:

A. Texas Commission on Environmental Quality, Chapter 217.

B. Texas Department of Transportation, Standard Specification for Highways, Streets and Bridges.

C. SAWS Construction Specifications.

D. American Society for Testing and Materials (ASTM).

1.04 SUBMITTALS

Provide the following in conformance with applicable requirements.

A. Product Data

1. Submittals shall be in accordance with Section 1300, “Submittals” of these specifications.

1.05 QUALITY ASSURANCE

A. Testing - The CONTRACTOR shall coordinate all testing required by this Section with the Engineer prior to commencement of testing.

B. The testing laboratory shall sample and test construction materials in accordance with the project specifications.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products in accordance with manufacturer's latest published requirements and specifications.

B. The Engineer reserves the right to extend the delivery and installation period beyond the CONTRACTOR's specified time should it be determined the CONTRACTOR is not directly responsible for the delay.

PART 2 – PRODUCTS

2.01 Fiberglass Reinforced Drywell

A. Resin: The resins used shall be commercial grade unsaturated polyester resin.

1. The resin system shall be switchable for atmospherics containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems.

B. Reinforcing Materials: The reinforcing materials shall be commercial grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric, or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

1. Surfacing Materials: If reinforcing materials are used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.

2. Fillers and Additives: Fillers, when used, shall be inert to the environment and wet well construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.

3. Fabrication:

   (a) The wetwell shall be a one-piece unit manufactured by NOV Fiberglass Solutions, or SAWS approved equal.

   (b) Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections. Hand-work finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than ½ inch in diameter, delamination, and fiber show.

   (c) Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than ½ inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted up to 6/square feet if they are less than ¾ inch in diameter and less than 1/16 inch deep.

4. Defects not Permitted:

   (a) Exposed Fibers: Glass fibers not wet out with resin.

   (b) Resin Runs: Runs of resin and sand on the surface.

   (c) Dry Areas: Areas with glass not wet out with resin.

   (d) Delamination: Separation in the laminate.

   (e) Blisters: Light colored areas larger than ½ inch in diameter.

   (f) Crazing: Cracks caused by sharp objects.

   (g) Pits or Voids: Air pockets.

   (h) Wrinkles: Smooth irregularities in the surface.

   (i) Sharp Protection: Fiber or resin projections necessitating gloves for handling.

5. The manufactured wet well shall have a buoyancy ring within the slab that would serve as a tie-down to prevent uplift. The Engineer must confirm the proposed counter-buoyancy plan prior to wet well slab installation.

6. The bottom to be fabricated using fiberglass material, bottom to be attached to wet well pipe with fiberglass layup to comply with A.S.T.M-D3299 Specifications, reinforcement, if needed shall be fiberglass channel laminated to wet well bottom per A.S.T.M-D3299.

7. The fiberglass wet well top shall be fabricated using fiberglass material top to be attached to wet well pip with fiberglass layup to comply with A.S.T.M - D3299 specifications. Reinforcement, if needed, shall be fiberglass channel laminated to wet well bottom per A.S.T.M -D3299.

8. Influent pipe shall be Kor-N-Seal or Inserta-Tee (refer to standard drawings for details). Sleeve shall be either PVC or Fiberglass pipe and it shall be installed and tested by the manufacturer, installation of stub outs to be fiberglass layup to comply with A.S.T.M. - D3299 specifications.

9. Require wet well be designed for the project service conditions (initial and ultimate build out), assuming fully saturated soil to external loading and buoyant uplift, with related design calculations included in the engineering report.

10. The (FRP) wet well shall be installed in strict accordance with the wet well manufacturer's recommendations.

11. Each wet well shall be marked with the following information.
    (a) manufacturer's name or trademark
    (b) manufacturing special number
    (c) total length and nominal diameter

12. Wet well testing. An exfiltration test must be performed immediately after the wet well has been backfilled and compacted. Exfiltration shall not exceed 0.0142 gal/hr. per foot diameter per foot depth. The test must be done by plugging the gravity invert and filling up the wet well with water to either 1-foot below the wet well top slab, or up to the manhole lid with the lowest elevation below top slab. (This level must be clearly temporarily marked in the wet well internal wall). Once the wet well is filled, it must be left for stabilization for 48 hours minimum prior to beginning the exfiltration test. After the stabilization period, the wet well must be refilled up to the mark to begin the test. The test shall be done for two hours minimum, and no water may be added to the wet well during the test period. The exfiltration test must be determined by measuring the amount of water required to raise the wet well level back to the mark at the end of the test period. The maximum allowable water loss to pass the test is determined by the following equation:

Water loss (gallons)=0.0142tdh

Where:

T = test period (2 hours)
D = wet well diameter (in feet)
H = water level depth within wet well (in feet)

If the exfiltration test fails, the design engineer must work with the contractor to determine all the necessary corrective actions to reduce the exfiltration. Once the repairs are completed the test shall be repeated. The wet well will pass the test when the exfiltration is equal or less then the allowable water loss. Saws inspector, contractor and design engineer shall witness the complete exfiltration test. Design engineer shall provide a certified letter showing the results of the exfiltration test to saws inspector test, including water loss, wet well level mark, and any corrective actions taken if a prior test failed.

C. Physical Requirements

1. Loading Rating: The complete wetwell shall have a minimum dynamic-load of 16,000 ft-lbs. when tested in accordance with Section A.5. To establish this rating, the complete wetwell shall not leak, crack, or suffer other damage when load testing to 40.000 ft-lbs and shall not deflect vertically downward more than ¼-inch at the point of load application when loaded to 24,000 lbs.

2. Stiffness: The wetwell cylinder shall have a minimum pipe-stiffness value shown in Table 1 when tested in accordance with Section C.4.

Length-Ft.	F/AY - PSI
10 to 20	2.01
21 to 30	3.02
31 to 40	5.24

3. Physical Properties

	Hoop Direction	Axial Direction
a. Tensile Strength (psi)	18,000	5,000
b. Tensile Modules (psi)	0.8×10^6	0.7×10^6
c. Flexural Strength (psi)	26,000	4.500
d. Flexural Modules (psi)		
(No ribs-48”, 60”, 72”) (psi)	1.4×10^6	0.7×10^6
(With ribs-96”, 144”)	0.7×10^6	0.7×10^6

4. Test Methods: Tests shall be performed as specified in A.S.T.M-D3753 latest edition, Section 8.

5. The manufactured wetwell shall have a buoyancy ring within the slab that would serve as a tie-down to prevent uplift. The Engineer must confirm the proposed counter-buoyancy plan prior to wetwell slab installation.

2.02 PVC Pipe

A. PVC pipe shall conform to SAWS Specification Section 848, Sanitary Sewer.

2.03 Field Quality Control

A. Inspect the completed installation and note deficiencies.

B. Assist SAWS during start-up, adjusting, and site testing of completed installation as required.

C. Instruct SAWS personnel in the operations and maintenance of the equipment.

2.04 Warranty

A. All equipment purchased and installed for the project shall be warranted for a minimum period of two (2) years, or manufacturer's time of warranty; whichever is larger, from the date of substantial completion of the project.

PART 3 - EXECUTION

3.01 INSTALLATION

All work shall conform to these Specifications, TCEQ Chapter 217 and the manufacturer's recommendations.

A. Pipe

All buried pipes shall be installed in trenches and backfilled in accordance with the requirements of the specifications shown herein.

B. Drywell Slabs

All excavation and backfill work associated with the above-mentioned slabs shall be in accordance with the plans and the requirements of the specifications shown herein.

C. Functionality Testing. After installation and calibration, the Contractor shall conduct a functionality test of the installed equipment.

1. Functional testing shall be performed by the Contractor in the presence of the SAWS Civil and Electrical Inspection personnel, the Design Engineer and the pump manufacturer.

2. Potable water shall be used for the testing.

3.02 CLEANING

Upon completion of the work of this Section, dispose of, away from the site, all excess material, all debris, trash, containers, residue, remnants, and scraps which result from the work of this section.

END OF SECTION

SECTION 03055

CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extent of Work: This Section governs for construction of all types of structures involving structural concrete.

B. Related Work (if utilized in this project)

1. Excavation: Per the section entitled, “Excavation and Backfill for Structures”.

2. Concrete: Per the section entitled, “Structural Concrete”.

3. Reinforcing Steel: Per the section entitled, “Reinforcing Steel”.

1.02 QUALITY ASSURANCE

A. Submittals: For samples, mix designs, tests and reports per the section entitled, “Structural Concrete”.

B. Prior to start of work submit the following information when requested:

1. Methods of construction.

2. Plans for forms and false work.

3. Amount and type of equipment.

4. Concrete placing schedule with facilities for handling concrete shrinkage.

5. Tabulation of concrete surfaces indicating types of finish on each surface.

1.03 REFERENCES

A. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

B. ASTM D545- Standard Test Methods for Preformed Expansion Joint Fillers for Concrete Construction, (Nonextruding and Resilient Types).

C. ASTM D1752- Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

D. CRD-C572-74- Corps of Engineer Specifications for Polyvinylchloride Waterstop.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete: Per the section entitled “Structural Concrete”, class as shown on Plans.

B. Expansion Joint Material: As per ASTM D1752. Furnish test results as to compliance with ASTM D545 if requested.

C. Waterstop: Manufactured from virgin polyvinylchloride plastic compound conforming to U.S. Corps of Engineers Specification No. CRD C572 74 and containing no scrap or reclaimed material. Unless otherwise specified or shown, water stops to conform to size and shape of Durajoint as manufactured by Durajoint Concrete Accessories, Garrettsville, Ohio or equivalent of the type indicated as follows:

1. Expansion Joint: Type 5

2. Construction Joint: Type 3

D. Curing Materials: Unless otherwise designated on Plans, use either of the following:

1. Water Curing: Water to meet requirements for concrete mixing water, and which will not stain or leave unsightly residue.

2. Membrane Curing Compound: Per ASTM C309.

3. Cotton Mats for Curing: A filling material cotton "bat" or "bats" (min. 12 oz. per sq. yd.), covered with unsized cloth (min. 6 oz. per sq. yd.), tufted or stitched to maintain stability, free from tears, and in good general condition

E. Forms and Falsework

1. Timber

a. Seasoned timber of good quality, free from loose or unsound knots, knot holes, twists, shakes, decay and other imperfections which would affect its strength or impair finished surface of concrete.
b. Wedges, when required, to be hardwood.

2. Metal

a. See Paragraph 3.02.D
b. Aluminum not permitted.

F. Nonshrinking Grout: Refer to the section entitled, “Structural Grout”.

G. Polyethelene Film for Permanent Moisture Barrier: Minimum thickness of 0.006-inch (six mils) and high impact strength rating.

H. Concrete Bonding Agent: Any of the following:

1. "Daraweld C" as manufactured by W. R. Grace and Company.

2. "Bond Crete" as manufactured by Dayton Superior.

3. Or equivalent.

I. Paint Type Coating (if used): Refer to the section entitled “Painting”.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Time Sequence of Construction Operations

1. Do not place superstructure members, forms, falsework or erection equipment on substructure before concrete has cured for four days.

2. Erect forms on footings supported by piling or drilled shafts after concrete has cured for 4 days. Such work may begin on spread footings after concrete has aged at least 2 curing days.

3. Support of tie beam and/or cap forms by falsework placed on previously placed tie beams is permissible, provided curing requirements are completed and tie beams are properly supported to eliminate stresses not provided for in design.

3.02 CONSTRUCTION

A. Forming

1. General Requirements: Design and construct to carry maximum anticipated loads and provide rigidity to prevent settlement or deformation.

2. Design Loads: Use 150 pounds per cubic foot for concrete and live load of 50 pounds per square foot of horizontal surface of form work with 125 percent of allowable stresses used for design of structures.

3. Falsework

a. Make timber sills and grillages large enough to support superimposed load without settlement.
b. Place falsework which cannot be founded on a satisfactory spread footing, on piling or drilled shafts.

c. Cap each falsework bent transversely by a member of proper size, and fasten caps securely to each pile or column in bent and set at proper elevation allowing for a construction camber.
d. Use wedges, if required, in pairs and arrange so as to ensure uniform bearing.
e. Use of wedges to compensate for incorrectly cut bearing surfaces not permitted.

B. Forms

1. General

a. Provide mortar tight forms sufficient in strength to prevent bulging or sagging.

b. If bulging or sagging occurs remove concrete causing such condition and reset forms.

c. Remove metal alignment appliances from forms to a depth of at least ½-inch from concrete surface without undue chipping or spalling, leaving a smooth opening in the concrete surface.

i. Turning off of rods, bolts or ties not permitted.

ii. Cut wire ties back at least ½-inch from face of concrete.

iii. Prior to erection treat facing of forms with oil or other bond breaking coating which will not discolor or otherwise injuriously affect concrete surface.

iv. Wet surface of forms to be in contact with concrete immediately before placing concrete.

C. Timber

1. Timber for facing or sheathing surfaced on at least one side and two edges.

2. Use nominal 2 inch lumber minimum thickness for forms for bottoms of beams.

3. Use lumber of nominal 1 inch minimum thickness elsewhere, generally, and back by sufficient number of studs and wales.

4. Plywood form lining made with waterproof adhesive to be ¼ inch minimum thickness, oiled at mill, and reoiled or lacquered on job before using.

5. Use tempered Masonite Concrete Form Board, 3/16 inch minimum thickness, as alternate form lining.

a. Keep moist at least 12 hours before applying to sheathing by moistening screen side of board and stacking boards screen side to screen side.

b. Use smooth, hard face as concrete contact surface of form.

6. Plywood forms to be minimum ¾ inch thickness made with waterproof adhesive backed by adequate studs and wales, with form lining not required.

7. Molding for chamfer strips or other uses.

    a. Redwood, cypress, or pine.
    b. Use quality which will not split when nailed and will hold true lines.
    c. Mill cut, dressed on all faces.
    d. Fillet sharp corners and edges with triangular chamfer strips, ¾ inch on sides.

D. Metal

1. Lining not required.

2. Thickness of metal forms as required to maintain true shape without warping or bulging.

3. Countersink bolt and rivet heads on facing sides of metal forms.

4. Straight metal panel forms may be used for all structures with straight walls, and for those structures with curved walls only below ground level.

5. Curved metal panels may be used for all structures with curved walls.

E. Joints

1. Expansion Joints

    a. Remove form from formed joints as soon as possible to permit free expansion of concrete.

    b. Anchor expansion joint fillers to concrete on side of joint by means of copper wire not lighter than No. 12 B&S gage or copper nails of approved size.

    c. Ensure complete separation of concrete sections by joint material.

2. Construction Joints

    i. Other than those indicated, joints are not permitted without written authorization.

    ii. Roughen previously placed concrete surface so as to expose aggregate particles.

    iii. Remove loose materials, and wash and scrub surface clean with stiff brooms.

    iv. Keep concrete surface moist for 12 hours prior to placing adjacent concrete.

v. For horizontal joints in walls, slosh surface of concrete with coating of mortar approximately ¼ inch thick immediately prior to placing concrete thereon.

vi. Use regular concrete mix, less coarse aggregate, for mortar.

vii. Apply mortar on previously placed vertical surfaces by brushing, where possible, and work mortar into irregularities of surface.

F. Placing Reinforcement: Per the section entitled “Reinforcing Steel”.

G. Placing Concrete

1. Seal Slabs

a. Use in all excavations for structures requiring reinforcing steel in base slab, except for retaining wall footings, unless shown in Plans.
b. Excavate 2-inches minimum below bottom of structural slab and pour seal slab concrete to structural slab bottom elevation.

c. Provide rough float finish.

d. No direct payment made for seal slab concrete.

2. General Requirements

a. Give advance notice before placing concrete.

b. Place concrete only after forms and reinforcing placement have been checked.

c. Discontinue heavy machinery use and other causes of vibration until concrete has attained an age of at least 18 hours.

d. Mix, place, and finish concrete in daylight hours. If necessary, to continue after daylight hours, light entire working area.

e. Do not place concrete when impending weather conditions, such as rain, sleet, or snow, threaten to impair quality of finished work.

f. If rainfall occurs during concrete placement, provide covering to protect work.

3. Handling and Transportation

a. Use method and equipment to maintain rate of placement as required to prevent cold joints.

b. Place concrete by buckets, chutes, buggies, pipes, or troughs, which prevent separation of concrete ingredients.

c. With prior written approval, use belt conveyers or pumps, and test samples at discharge end.

d. Protect concrete transported by conveyers from sun and wind, to prevent loss of slump and workability.

e. Pipes used to pump concrete to be shaded and/or wrapped with wet burlap to prevent loss of slump and workability.

f. Do not transport concrete through aluminum pipes, tubes, or other aluminum equipment.

g. Use of chutes in excess of 35-feet total length prohibited.

4. Depositing: Contractor to provide thermometer to measure temperature of concrete.

a. Equip chutes with baffles for depositing concrete on steep slopes, or make chutes in short lengths that reverse lateral direction of movement.

b. Provide downpipe at end of chute.

c. Use no slope steeper than one vertical to two horizontal.

d. Discharge concrete from chutes and troughs either vertically down inside of forms or into pockets outside of forms from which it may flow through holes left in forms.

e. Keep chutes, troughs, and pipes clean and free from coatings of hardened concrete.

f. Deposit concrete in continuous horizontal layers maximum 12-inches thick.

g. Depositing large quantities at one point and running or working it along forms not permitted.

h. Limit free fall of concrete to 4-feet, except in walls 10-inches or less in thickness, if segregation can be prevented.

i. Use tremies for placing concrete in walls over 10-inches thick.

j. Remove hardened concrete spatter ahead of plastic concrete.

k. Do not jar forms after concrete has taken initial set or place any strain on projecting reinforcement.

l. Make tremies in sections, or provide in several lengths, so outlet may be adjusted to proper heights during placing operations.

m. Place each layer while preceding layer is still plastic, but do not allow more than one hour to elapse between placement of successive layers.

n. Apply vibrators to concrete immediately after depositing, and move throughout mass, through layer of concrete just placed and several inches into plastic layer below.

o. Consolidate concrete and flush mortar to form surfaces by continuous working with immersion type vibrators.

p. Do not attach vibrators to forms or reinforcement.

q. Provide one standby vibrator for emergency use.

r. If excessive bleeding causes water to form on surface of concrete in tall forms, use stiffer mix.

s. In walls and deep beams, place concrete to a point approximately 1-foot below finished elevation of bottom of slab or beam to be poured monolithically with wall, and allow to settle; but to avoid a cold joint, resume placement of concrete before initial set occurs.

t. Overfill forms and screed off excess concrete after partial stiffening.

u. Placing Concrete in Cold Weather: Minimum temperature of all concrete at time of placement to be not less than 50° F.

    i. Maintain slab temperatures at 50° F or above for period of 72 hours from time of placement and above 40° F for additional 72 hours.

    ii. Maintain temperature of all other structural elements at 40° F or above for period of 72 hours from time of placement.

    iii. Maintain temperature of concrete placed on or in the ground above 40° for a period of 72 hours from time of placement.

    iv. Protect concrete against freezing during curing period in accordance with Portland Cement Association "Design and Control of Concrete Mixtures".

    v. Protect concrete from temperatures below 40° F until it has cured for a minimum of three days at 70° F or five days at 50° F. Remove and replace, at Contractor's expense, all concrete deemed unsatisfactory by Engineer.

    vi. Protection may consist of additional covering, insulated forms, artificial heatings, or other means approved by Engineer.

v. Placing Concrete in Hot Weather: When air temperature is above 90° F, use approved retarding agent in all exposed concrete, and in all cased drilled shafts regardless of temperature.

i. Reinforcing steel, steel beam flanges, and other surfaces in contact with concrete, to be cooled to below 90° F by means of water spray or other approved methods.

ii. Concrete temperature prior to placement not to exceed 85° F, plus a maximum tolerance of 5° F. Concrete above this maximum will be rejected.

iii. Reduce concrete temperature at time of placement to satisfy maximum allowable temperature by one or more of the following:

A) Addition of cold water with a subsequent addition of cement to maintain proper water cement ratio. Tanks or trucks used for storing or transporting water to be insulated or painted white. Mechanical refrigeration may be used to reduce water temperatures.
B) Addition of crushed, shaved, or chipped ice directly into the mixer with a subsequent addition of cement to maintain proper water cement ratio. Continue mixing until ice is completely melted.

C) Other approved methods.

w. Placing concrete in water

i. Only when authorized, use concrete mix with minimum 6.5 sacks cement per cubic yard of concrete.

ii. Forms, cofferdams, or caissons to be sufficiently tight to prevent water current passing through space in which concrete is being deposited.

iii. Pumping water not permitted during placing, nor until concrete with tremie, closed bottom dump bucket, or other approved method, to avoid free fall through water.

iv. Do not disturb concrete after depositing, and maintain horizontal layers at all times.

v. Use watertight tube 10-inches or less in diameter for tremie and constructed, so that bottom can be sealed and opened after it is in place and fully charged with concrete.

vi. Support tremie to allow easy movement horizontally to cover work area and vertically to control concrete flow.

vii. Stop flow by lowering tremie.

viii. Capacity of bottom dump buckets not less than one half cubic yard.

ix. Lower bucket or tremie gradually and carefully to rest upon concrete already placed and raise very slowly during upward travel, intent being to maintain still water at point of discharge and to avoid agitating mixture.

x. Pour concrete continuously until work is completed.

x. Placing Concrete on Ground:

i. Place concrete in footings after depth and character of foundation is observed.

ii. Place footing or base slab concrete upon seal slabs after caissons or cofferdams are free from water and seal surface cleaned.

iii. Locate pumps or bailing equipment in sump outside of forms.

iv. Immediately before placing concrete, moisten subgrade to decrease absorption of moisture, if seal slab or waterproofing not required.

v. With prior authorization, side forms in dry excavation may be omitted.

vi. Place column concrete monolithically unless otherwise provided.

H. Curing Concrete:

1. Keep forms tight against concrete or remove and start curing operations.

2. Length of Curing

a. Cure concrete for six consecutive curing days.

b. Cure high early strength concrete for three consecutive curing days.

3. Definition of Curing Day

a. "Curing day" is any calendar day during in which the temperature, taken in the shade and away from artificial heat, is above 50° F for at least 19 hours (or colder days if satisfactory provisions are made to maintain the temperature at all surfaces of the concrete above 40° F for the entire 24 hour day).

b. Required curing period begins when all concrete therein has attained initial set.

4. Curing Methods

a. Water Curing: Keep all exposed concrete surfaces wet continuously for required curing time.

i. Place wet cotton mats as soon as possible after surface has hardened sufficiently to prevent damage to concrete.

ii. Weight mats down to provide continuous contact with all concrete surfaces.

iii. Use overlapping water sprays or sprinklers that keep all unformed surfaces continuously wet.

iv. Use minimum 2-inches clean, granular material kept wet at all times or minimum 1 inch depth of water.

v. Provide dam or similar procedure to retain water or saturated sand.

b. Membrane Curing

i. Deliver curing compound in original containers showing name of compound, manufacturer, and batch number.

ii. Spray compound, using pressure tank type spraying equipment, and keep thoroughly mixed during application.

iii. Apply in single, uniform coating at rate of coverage recommended by manufacturer, but not less than 1 gallon per 180 square feet of area.

iv. Apply to walls immediately after form removal or after first rubbing, as applicable.

v. Apply on slabs immediately after finishing or after excess moisture has disappeared.

vi. Keep in place and protect against abrasive action for 10 days to obtain curing equivalent to a 6 day moist curing.

vii. Protect against any traffic and apply protective coating no sooner than 24 hours after application of membrane curing compound.

viii. Immediately repair any damage to membrane.

ix. Do not use on surface to receive first rubbing with No. 16 carborundum stone, surfaces to be painted, or to which waterproofing material or liquid floor hardener is to be applied, and surfaces on which additional concrete is to be placed.

x. Use on surfaces which cannot be cured satisfactorily with mats, when so directed.

I. Removal of Forms and Falsework:

1. Remove forms from surface to receive rubbed finish when concrete has attained adequate strength to prevent damage, and remove only as rapidly as rubbing operation progresses.

2. Rewet wood forms or form lining left in place longer than 24 hours as required to keep them moist.

3. Remove forms and falsework from portions of structures that do not require rubbed finish, after the following number of curing days:

a. Forms for falsework under slabs, beams or girders 7 days.
b. Forms for walls, columns and piers 2 days.

4. If cold weather continues below 40° F, form and falsework may be removed at the end of a period of calendar days equal to twice the number of curing days specified.

J. Defective Work

Any defective work discovered after form removal to be repaired or replaced immediately at Contractor's expense.

K. Concrete Surface Finish: For concrete having no special finish indicated, remove ties, fill holes, and remove fins and rough edges. Provide finish as follows:

1. Monolithic Finish

a. Finish slabs, platforms, and steps monolithically between joints.

b. Set screeds prior to concrete placement, and make sufficiently rigid to withstand impact of concrete being placed.

c. Tamp concrete thoroughly to force coarse aggregate away from surface of slab, then float to secure hard surface.

d. Provide wood float finish, except use steel trowel finish for building and pump station floor slabs, and elsewhere as indicated on Plans, unless otherwise directed.

e. "Dusting" floor surfaces with dry material not permitted.

f. Round edges at all expansion joints with suitable jointing or edging tools.

L. Exposed Aggregate Panels

1. Forms for raised panels to be sandblasted may be removed on the day following concrete placement (about 18 hours). Continue curing after sandblasting.

2. Immediately after form removal, sandblast to a depth of from 3/8-inch to 5/8-inch.

3. Protect smooth surfaces adjacent to sandblasted panels during sandblasting.

4. Coarse aggregate for raised panels range from Standard No. 4 to 1½-inch gradation.

5. Exposed aggregate sandblasted surfaces are to receive a coat of Prime A Pell 200 as manufactured by Chemproke Corp., Garland, Texas, or equivalent. Preparatory work, application, and precautions in strict compliance with manufacturer's recommendations.

M. Rub Finished Surfaces

1. General

Rub finish exposed vertical and battered surfaces from 6-inches below ground surface or from 6 inches below normal water level to top, except for small plinths and similar structures which extend less than 12-inches above finished grade.

2. Procedure

a. Start rubbing operations when concrete has attained adequate strength for form removal (about 18 hours after concrete placement). Continue curing afterwards.

b. Do necessary pointing as forms are removed.

c. Remove forms only as rubbing progresses in order to prevent rapid hardening of surface to be rubbed.

d. After pointing has set, wet surface with brush and give first surface rubbing with No. 16 carborundum stone or equal.

e. Rub sufficiently to bring surface to paste and to produce smooth dense surface without irregularities.

f. Do not add cement to form surface paste.

g. Spread or brush material, which has been ground to paste, uniformly over surfaces and allow to take reset.

h. Do not rub chamfered corner in first rubbing.

i. Complete first rubbing within 36 hours after completion of concrete placement.

j. For final acceptance, clean surfaces of structure and give final finish rubbing with No. 30 carborundum stone or equal.

k. After rubbing, strip surfaces with brush and allow mortar on surface to take reset; then wash surface with clean water.

l. Leave structure with clean, neat, and uniform appearing finish.

N. Paint Type and Grout Finishes: When specified on Plans or by Special Provision, the following alternative procedures to rubbing apply.

1. Adhesive Grout Coating:
   a. Perform first rub to eliminate rough surfaces, then give surface a coating of latex base adhesive grout of approximately 1/8 inch thickness.

   b. Apply grout by rubbing with sponge rubber float or similar applicator.

   c. Mix to be one part latex base adhesive, two parts white cement, two parts natural cement, two parts fine masonry sand, and sufficient water to produce desired consistency and color.

2. Paint Type Coating

   a. Perform first rub to eliminate rough surfaces before applying paint type coating as specified in Paragraph 2.01.I.

   b. Furnish sample of coating selected, for approval, before application to concrete surfaces.

O. Patching and Filling Holes

1. Tie and Bolt Holes

   a. Fill holes with cement mortar to which has been added white cement so that patches will not appear darker than adjacent concrete surface.

   b. Use mortar as dry as possible and pack into holes.

   c. Fill holes, entirely through concrete, with non-shrinking grout from inside structure with a pressure gun or other device that will force mortar through to outside face.

   d. Strike off excess mortar flush and finish surface to make filled holes as inconspicuous as possible.

2. Honeycomb and Minor Defects

   a. Patch slight honeycomb and minor defects in concrete with cement mortar mixed one part cement to two parts fine aggregate. Match color of adjacent concrete.

b. Repair area by cutting out unsatisfactory material by chipping or other approved methods and replace with new concrete, securely keyed and bonded to old concrete, and finish so as to make joints as inconspicuous as possible. Use stiff mixture and thoroughly tamp into place.

P. Waterstops

1. Secure complete embedment of waterstop into concrete.

2. Make waterstops continuous by heat sealing at splices as recommended by manufacturer. Miter waterstops at directional changes, and butt weld straight splices.

3. Place concrete around splice only after inspection.

Q. Grouting

1. Headworks

a. Prepare slab to receive grout using bonding agent specified in paragraph 2.01.H in accordance with manufacturer's recommendation.

b. Use grout mixture of one part Portland cement and three parts sand by weight.

c. Surface receiving bonding agent shall be free of dirt, grease, and other foreign substances before placement of bonding agent.

d. Placing Grout

i. Do not deposit large quantities at one point.

ii. Use clarifier mechanism operated by hand only for final screeding.

iii. Do not allow grout to build up in front of mechanism greater than three inches.

2. For Setting New Equipment

a. Use nonshrinking grout as specified in paragraph 2.01.F.
b. Blow out bolt holes.
c. Chip concrete to obtain firm bond.
d. Set grout forms true, level, tight, and well braced
e. Assemble equipment to be grouted before grouting.
f. Clean baseplates and all items to be embedded and set in final position.
g. Shim equipment bases for easy removal of shims.
h. Moisten area to receive grout.
i. Do not mix more grout than can be placed in 20 minutes.
j. Place grout from one end or side only to avoid excessive air entrapment and assure good compaction.

k. Work and rod grout continuously while it is being placed.
l. After grout has attained full strength, remove shims.
m. Replace grout damaged by shim removal with like material.
n. Steel trowel exposed grout, and protect exposed area from drying out rapidly.
o. Do not stress items embedded in grout, and do not operate equipment for 36 hours after grout is placed.

3. Other Grouting

a. For general purposes, use mixture of one part Portland cement and two parts sand by weight.

b. If space to be grouted is one inch or less in thickness and cannot be tamp grouted, use a mixture of one part Portland cement and one part sand by weight.

c. If space to be grouted is large, use original concrete mixture.

d. For grout to be tamped, use stiff mixture produced by prolonged mixing.

e. To obtain stiff grout, mix mortar using amount of water required to thoroughly mix ingredients, then continue mixing without additional water until grout is stiff enough to be compacted by tamping when placed.

f. For grouting blockouts, embedded pipes, and similar items, use nonshrinking grout as per paragraph 2.01.F of this specification.

R. Cleanup

Clean up area and remove excess material, dismantled forms and falsework, and debris during construction; and clean area completely and thoroughly after completion of the work herein described.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SCOPE

Design, construction, erection, and removal of structural formwork.

1.02 REFERENCE STANDARDS

ACI 117: Standard Tolerances for Concrete Construction and Materials.
ACI 347R: Recommended Practice for Concrete Formwork.
U.S. Product Standard PS 1 Construction and Industrial Plywood.
U.S. Product Standard PS 20 American Softwood Lumber Standard.

1.03 SUBMITTALS

A. Conform to Section entitled, "SUBMITTALS."

B. Shop Drawings: Show location, member size and loading of shoring. When reshoring is permitted, submit plans showing locations and member size of reshoring.

C. Product Data and Samples

1. Corrugated Fiberboard Carton Forms: Submit certification of compliance with design criteria, description of forms, and one foot long sample.

2. Form coating Materials: Submit trade or brand names of manufacturers and complete description of products.

3. Form ties and related accessories, including taper tie plugs, if taper ties are used. Form gaskets.

D. Detailed Layout for Slip forming: Submit detailed layout of proposed slip-forming, including description of equipment, rate of progress, and other data to show suitability of method. Show provisions for ensuring attainment of required concrete surface finish.

PART 2 PRODUCTS

2.01 MATERIALS

A. Smooth Forms: New plywood, metal, plastic, tempered concrete form hardboard, dressed lumber faced with plywood or fiberboard lining, or metal framed plywood ¬faced panel material, to provide continuous, straight, smooth surfaces. Form material shall be free of raised grain, torn surfaces, worn edges, patches, dents or other defects. Furnish material in

largest practical sizes to minimize number of joints and, when indicated on Construction Plans, conform to joint system indicated. Form material shall have sufficient strength and thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Rough Forms: Plywood, metal, dressed or undressed lumber free of knots, splits or other defects, or other material acceptable to Engineer of sufficient strength and thickness to withstand pressure of newly placed concrete without bow or deflecti

C. Plywood: Conform to U.S. Product Standard, PS 1, Class 1.

D. Lumber: Conform to U.S. Product Standard, PS 20.

E. Edge Forms and Intermediate Screed Strips: Type and strength compatible with the screed equipment and methods used.

F. Plastic Forms: One piece forms for domes, beams and pan joists. Single lengths for columns not exceeding height of 7 feet 6 inches. For columns over 7 feet 6-inches, use 7 foot 6 inch sections and filler sections as needed. To facilitate removal of pan joist forms, taper sides one inch per foot.

G. Metal Pan Joist Forms: Removable type; fabricated of minimum 14 gauge steel; one piece between end closures. Adjustable forms not allowed. Taper sides one inch per foot to facilitate removal.

H. Earth Cuts for Forms:

1. Use earth cuts for forming unexposed sides of grade beams cast monolithically with slabs on grade.

2. Where sides of excavations are stable enough to prevent caving or sloughing, following surfaces may be cast against neat cut excavations:

a. Sides of footings

b. Inside face of perimeter grade beams not monolithic with slab on grade. When inside face is cast against earth, increase beam width indicated on Construction Plans by one (1) inch.

c. Both faces of interior grade beams not monolithic with slab on grade. When grade beam is cast against earth, increase beam width indicated on Construction Plans by two (2) inches.

I. Corrugated Fiberboard Carton Forms

1. Corrugated fiberboard carton forms, when called for, are intended to form a void space beneath pile supported and pier supported slabs and other structural elements as shown.

2. Provide products of a reputable manufacturer regularly engaged in commercial production of double faced corrugated fiberboard carton forms, constructed of waterproof paper and laminated with waterproof adhesive.

3. Fiberboard forms: Capable of supporting required dead load plus construction loads, and designed to lose their strength upon prolonged contact with moisture and soil bacteria.

   a. Seal cuts and ends of each form section by dipping in waterproof wax, unless liners and flutes are completely impregnated with waterproofing.

   b. Size forms as indicated on Construction Plans. Assemble as recommended by manufacturer, either with steel banding at four (4) feet maximum on centers, or, where liners and flutes are impregnated with waterproofing, with adequate stapling.

J. Circular Forms

1. Form round section members with paper or fiber tubes, constructed of laminated plies using water resistant adhesive with wax impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation. Provide manufacturer's seamless units to minimize spiral gaps and seams.

2. Fiberglass or steel forms may be used for round section members.

K. Shores: Wood or adjustable metal, with bearing plates, with double wedges at lower end.

L. Form Ties

1. Use commercially manufactured ties, hangers and other accessories for embedding in concrete. Do not use wire not commercially fabricated for use as a form accessory.

2. Fabricate ties so ends or end fasteners can be removed without causing spalling of concrete faces. Depth from formed concrete face to the embedded portion: At least one (1) inch, or twice the minimum dimension of tie, whichever is greater.

3. Provide water stop feature for form ties used on liquid containing structures and on concrete walls which will have earth backfill on one side.

4. Removable ties: Taper ties may be used when approved by the Engineer. In the hole left by the removal of the taper tie, insert a preformed neoprene or polyurethane plug sized to seat at the center of the wall.

M. Form Coating: Commercial formulation of form oil or form release agent having proven satisfactory performance. Coating shall not bond with, stain or otherwise adversely affect concrete surfaces, or impair their subsequent treatment, including application of bonding agents, curing compounds, paint, protective liners and membrane waterproofing.

N. Coating for Plastic Forms: Alkali resistant gel coated.

O. Chamfer Strips: Unless otherwise indicated on the Construction Plans, provide 3/4 inch chamfer strips in corners of forms to produce beveled edges.

P. Form Gaskets: Polyethylene rod, closed cell, 1 inch diameter

2.02 DESIGN OF FORMWORK

A. Conform to ACI 117, ACI 347R and City Building Codes, unless more restrictive requirements are specified or shown on Construction Plans. Contractor shall design and engineer concrete formwork, including shoring and bracing. Design formwork to be readily removed without impact, shock or damage to concrete surfaces and adjacent materials.

B. Slip Forming: Permitted on written approval of Engineer. Contractor shall demonstrate suitability of method proposed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Formwork Construction

1. Construct and maintain formwork so that it will maintain correct sizes of members, shape, alignment, elevation and position during concrete placement and until concrete has gained sufficient strength.

2. Construct forms for easy removal without damage to concrete surfaces.

3. Make formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

4. Place chamfer strips in forms to bevel edges and corners permanently exposed to view, except top edges of walls, and slabs which are indicated on Construction Plans to be tooled. Do not bevel edges of formed joints and interior corners unless indicated on Construction Plans. Form beveled edges for vertical and horizontal corners of equipment bases. Unless otherwise indicated on Construction Plans, make bevels 3/4 inch wide.

5. Provide temporary openings at bases of column and wall forms and other points as required for observation and cleaning immediately before concrete is placed.

6. Where runways are required for moving equipment, support runways directly on the formwork or structural members. Do not allow runways or supports to rest on reinforcing steel.

7. Use smooth forms on formed concrete surfaces required to have smooth form finish or rubbed finish as specified in the Section entitled, "CONCRETE FINISHING."

8. Rough forms may be used on formed concrete surfaces indicated to have rough form finish as specified in the Section entitled, "CONCRETE FINISHING."

B. Forms for Surfaces Requiring Smooth Form Finish:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Uniformly space form ties and align in horizontal and vertical rows. Install taper ties, if used, with the large end on the wet face of the wall.

2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back up joints with extra studs or girts to maintain true, square intersections.

3. Form molding shapes, recesses and projections with smooth finish materials and install in forms with sealed joints to prevent displacement.

4. Form exposed corners of beams to produce square, smooth, solid, unbroken lines.

5. Provide exterior exposed edges with 3/4 inch chamfer or 3/4 inch radius.

6. Arrange facing material in orderly and symmetrical fashion. Keep number of joints to practical minimum. Support facing material adequately to prevent deflection in excess of allowable tolerances.

7. For flush surfaces exposed to view in completed structure, overlap previously placed hardened concrete with form sheathing by approximately 1 inch. Hold forms against hardened concrete to maintain true surfaces, preventing offsets or loss of mortar.

C. Forms for Surfaces Requiring Rubbed Finish: Provide forms as specified in Paragraph 3.01(B) of this Section. Use smooth plywood or fiberboard linings or forms, in as large sheets as practicable, and with smooth, even edges and close joints.

D. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure supports for types of screeds required.

E. Circular Forms: Set forms in one piece for full height of member.

F. Surfaces to Receive Membrane Waterproofing: Coordinate surface finish, anchors, reglets and similar requirements with membrane waterproofing applicator.

G. Fireproofing Steel Member: Construct forms to provide not less than the concrete thickness necessary, measured from face of steel member, to provide the required fire rating. Forms for concealed surfaces may be unlined.

H. Tolerances:

1. Unless noted otherwise on Construction Plans, construct formwork so concrete surfaces will conform to tolerance limits listed in TABLE 03100 located at the end of this Section.

2. Establish sufficient control points and bench marks as references for tolerance checks. Maintain these references in undisturbed condition until final completion and acceptance of Work.

I. Adjustment of Formwork:

1. Use wedges or jacks to provide positive adjustment of shores and struts. After final inspection and before concrete placement, fasten in position wedges used for final adjustment of forms.

2. Brace forms securely against lateral deflections. Prepare to compensate for settling during concrete placement.

J. Corrugated Fiberboard Carton Forms:

1. Place on smooth firm bed of suitable material to prevent vertical displacement; set tight to prevent horizontal displacement. Exercise care to avoid buckling of forms. Install in accordance with manufacturer's directions and recommendations.

2. Fit carton forms tightly around piles and piers; completely fill the space between subgrade and concrete placement with carton forms to form a void space.

3. Protect carton forms from moisture and maintain in a dry condition until concrete is placed on them. If they become wet before placement of concrete, allow them to dry and carefully inspect for strength before concrete is placed.

4. Before concrete placement, replace damaged or deteriorated forms which are in capable of supporting concrete dead load plus construction live loads.

3.02 PREPARATION OF FORM SURFACES

A. Clean surfaces of forms and embedded materials before placing concrete. Remove accumulated mortar, grout, rust and other foreign matter.

B. Coat forms for exposed or painted concrete surfaces with form oil or form release agent before placing reinforcement. Cover form surfaces with coating material in accordance with manufacturer's printed instructions. Do not allow excess coating material to accumulate in forms or to contact hardened concrete against which fresh concrete will be placed. Remove coating material from reinforcement before placing concrete.

C. Forms for unexposed surfaces, other than retained in place metal forms, may be wet with water immediately before concrete placement in lieu of coating. When possibility of freezing temperatures exists, however, the use of coating is mandatory.

3.03 REMOVAL OF FORMS

A. Time Limits:

1. When repair of surface defects or finishing is required before concrete is aged, forms on vertical surfaces may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations.

2. Formwork for non water retaining walls, sides of beams and other formwork components not supporting weight of concrete may be removed after twelve (12) hours, provided concrete has hardened sufficiently to resist damage from removal operations, andprovided removal offorms will not disturb members supporting weight of concrete.

3. Forms and shoring supporting weight of concrete or construction loads: Leave in place until concrete has reached minimum strength specified for removal of forms and shoring. Do not remove such forms in less than four (4) days.

B. Circular Paper or Spiral Tube Forms: Follow manufacturer's directions for form removal. Take necessary precautions to prevent damage to concrete surface. When removal is done before completion of curing time, replace form, tie in place and seal to retard escape of moisture.

C. Removal Strength:

1. Control Tests: Suitable strength control tests will be required as evidence that concrete has attained specified strength for removal of formwork or shoring supporting weight of concrete in beams, slabs and other structural members. Furnish test cylinders and data to verify strength for early form removal.

a. Field cured Test Cylinders: When field cured test cylinders reach specified removal strength, formwork or shoring may be removed from respective concrete placements.

b. Laboratory cured Test Cylinders: When concrete has been cured as specified for structural concrete for same time period required by laboratory cured cylinders to reach specified strength, formwork or shoring may be removed from respective concrete placements. Determine length of time that concrete has been cured by totaling the days or fractions of days, not necessarily consecutive, during which air temperature surrounding concrete is above 50 degrees F and concrete has been damp or thoroughly sealed against evaporation and loss of moisture.

2. Compressive Strengths: The minimum concrete compressive strength for removal of formwork supporting weight of concrete is seventy five (75) percent of specified minimum 28 day strength for class of concrete involved.

3.04 RESHORING

A. When reshoring is permitted, plan operations in advance and obtain Engineer's approval of such operations. While reshoring is under way, keep live load off new construction. Do not permit concrete in any beam, slab, column or other structural member to be subjected to combined dead and construction loads in excess of loads permitted for developed concrete strength at time of reshoring.

B. Place reshores as soon as practicable after form stripping operations are complete but in no case later than end of day on which stripping occurs. Tighten reshores to carry required loads without over stressing construction. Leave reshores in place until tests representative of concrete being supported have reached specified strength at time of removal of formwork supporting weight of concrete.

C. Floors supporting shores under newly placed concrete: Leave original supporting shores in place, or re shore. Locate reshores directly under shore position above. Extend reshoring over a sufficient number of stories to distribute weight of newly ¬placed concrete, forms and construction live loads in such manner that design superimposed loads of floors supporting shores are not exceeded.

3.05 FORM REUSE

Do not reuse forms that are worn or damaged beyond repair. Thoroughly clean and re coat forms before reuse. For wood and plywood forms to be used for exposed smooth finish, sand or otherwise dress concrete contact surface to original condition or provide form liner facing material. For metal forms, straighten, remove dents and clean to return forms to original condition.

TABLE 03100
TOLERANCES FOR FORMED SURFACES CONCRETE IN BUILDINGS **

VARIATION FROM	VARIATION IN	FOR ANY 10 FOOT LENGTH	FOR ANY 20 FOOT LENGTH OR ANY BAY	MAXIMUM FOR ENTIRE DIMENSION
Plumb or Specified Batter	Lines and Surfaces of Columns, Piers, Walls and Arrises	1/4 inch	-	1 inch
	Exposed Corner Columns, Control Joint Grooves, and Other Conspicuous Lines		1/4 inch	1/2 inch
Level or Specified Grade	Slab Soffits, Ceilings, Beam Soffits, and Arrises (Measured Before Removal of Shores)	1/4 inch	3/8 inch	3/4 inch
	Exposed Lintels, Sills, Parapets, Horizontal Grooves and Other Conspicuous Lines		¼-inch	½-inch
Drawing Dimensions	Position of Linear Building Lines, Columns, Walls, and Partitions		½-inch	1-inch
	Size and Location of Sleeves, Floor Openings and Wall Openings			+/- ¼-inch
	Cross Section of Columns, Beams, Slabs, and Walls			+ ½-inch, - ¼-inch
	Footings in Plan *			+ 2-inch, - ½-inch
	Footing Misplacement or Eccentricity in Direction of Error (The Lesser Of)			2 % of Width or 2-inch
	Footing Thickness Decrease			5 %
	Footing Thickness Increase			No Limit
	Step Rise in Flight of Stairs			+/- 1/8-inch
	Step Tread in Flight of Stairs			+/- ¼-inch
	Consecutive Step Rise			+/- 1/16-inch
	Consecutive Step Tread			+/- 1/8-i

* Footing tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

** Includes water and wastewater process structures.

END OF SECTION

SECTION 03211

REINFORCING STEEL

PART 1 GENERAL

1.01 SECTION INCLUDES

Structural concrete reinforcement and grouting of reinforcement dowel bars into hardened concrete.

1.02 REFERENCES

ACI 315 - Details and Detailing of Concrete Reinforcement.
ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
ASTM A36 - Standard Specification for Carbon Structural Steel.
ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete Reinforcement.
ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM A675 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
AWS D1.4 - Structural Welding Code - Reinforcing Steel.
WRI - Manual of Standard Practice for Welded Wire Fabric.
CRSI MSP-1 - Manual of Standard Practice.

1.03 SUBMITTALS

A. Conform to the section entitled, “SUBMITTAL.”

B. Shop Drawings

1. Submit shop drawings detailing reinforcement fabrication, bar placement location, splices, spacing, bar designation, bar type, length, size, bending, number of bars, bar support type and other pertinent information, including dimensions. Provide sufficient detail for placement of reinforcement without use of Contract Drawings. Information shall correspond directly to data listed on bill of materials.

2. Use of reproductions of Contract Drawings by Contractor, Subcontractor, erector, fabricator or material supplier in preparation of shop drawings (or in lieu of preparation of shop drawings).

3. Detail shop drawings in accordance with ACI 315, Figure 6.

4. Submit shop drawings showing location of proposed additional construction joints as required under Section 03055 - Concrete Structures, and obtain approval of Engineer, prior to submitting reinforcing steel shop drawings.

C. Bill of Materials: Submit with shop drawings.

D. Product Data

1. Mechanical Bar Splices: Submit manufacturer's technical literature, including specifications and installation instructions.

2. Epoxy grout proposed for anchoring reinforcing dowels to hardened concrete: Submit manufacturer's technical literature including recommended installation procedures.

E. Certificates

1. Submit steel manufacturer's certificates of mill tests giving properties of steel proposed for use. List manufacturer's test number, heat number, chemical analysis, yield point, tensile strength and percentage of elongation. Identify proposed location of steel in work.

2. Foreign-manufactured reinforcing bars shall be tested for conformance to ASTM requirements by a certified independent testing laboratory located in United States. Certification from any other source is not acceptable. Submit test reports for review. Do not begin fabrication of reinforcement until material has been approved.

1.04 HANDLING AND STORAGE

Store steel reinforcement above ground on platforms, skids or other supports. Protect reinforcing from mechanical injury, surface deterioration and formation of excessive, loose or flaky rust caused by exposure to weather. Protect epoxy-coated reinforcing from formation of any amount of rust.

1.05 QUALITY ASSURANCE

Notify Resident Project Representative at least 48 hours before concrete placement so that reinforcement may be inspected, and errors corrected, without delaying Work.

PART 2 PRODUCTS

2.01 MATERIAL

A. Reinforcing Bars: Deformed bars conforming to ASTM A615, grade as indicated on Drawings, except column spirals and those shown on Drawings to be smooth bars. Where grade is not shown on Drawings, use Grade 60.

B. Smooth Bars: Where indicated on Drawings, use smooth bars conforming to ASTM A36; ASTM A615, Grade 60; or ASTM A675, Grade 70.

C. Column Spirals: Bars conforming to ASTM A615, Grade 60, or wire conforming to ASTM A82.

D. Epoxy-Coated Deformed Bars, Column Spirals and Smooth Bars: Conform to ASTM A775/A775M.

E. Welded Wire Fabric:

1. Welded Smooth Wire Fabric: Conform to ASTM A185.

2. Welded Deformed Wire Fabric: Conform to ASTM A497.

3. Provide wire size, type and spacing as shown. Where type is not shown on Drawings, use welded smooth wire fabric.

4. Furnish welded wire fabric in flat sheets only.

F. Tie Wire: 16-1/2 gage or heavier annealed steel wire. Use plastic-coated tie wire with epoxy-coated reinforcing steel.

G. Bar Supports: Provide chairs, riser bars, ties and other accessories made of plastic or metal, except as otherwise specified. Use bar supports and accessories of sizes required to provide required concrete cover. Where concrete surfaces are exposed to weather, water or wastewater, provide plastic accessories only; do not use galvanized or plastic-tipped metal in such locations. Provide metal bar supports and accessories rated Class 1 or 2 conforming to CRSI MSP-1 Manual of Standard Practice. Use epoxy-coated bar supports with epoxy-coated reinforcing bars.

H. Slabs on Grade: Provide chairs with sheet metal bases or provide precast concrete bar supports 3 inches wide, 6 inches long, and thick enough to allow required cover. Embed tie wires in 3 inch by 6-inch side.

I. Mechanical Bar Splices

1. Conform to ACI 318; use where indicated on Drawings.

a. Compression splices shall develop ultimate stress of reinforcing bar.

b. Tension splices shall develop 125 percent of minimum yield point stress of reinforcing bar.

2. Regardless of chemical composition of steel, any heat effect shall not adversely affect performance of reinforcing bar.

J. Welded Splices

1. Provide welded splices where shown and where approved by the Engineer. Welded splices of reinforcing steel shall develop a tensile strength exceeding 125 percent of the yield strength of the reinforcing bars connected.

2. Provide materials for welded splices conforming to AWS D1.4.

K. Epoxy Grout: High-strength rigid epoxy adhesive, conforming to ASTM C881, Type IV, manufactured for purpose of anchoring dowels into hardened concrete and the moisture condition, application temperature and orientation of the hole to be filled. Unless otherwise shown, depth of embedment shall be as required to develop the full tensile strength (125 percent of yield strength) of dowel, but not less than 12 diameters.

2.02 FABRICATION

A. Bending: Fabricate bars to shapes indicated on Drawings by cold bending. Bends shall conform to minimum bend diameters specified in ACI 318. Do not straighten or rebend bars. Fabricate epoxy-coated reinforcing steel to required shapes in a manner that will not damage epoxy coating. Repair any damaged epoxy coating with patching material conforming to Item 4.4 of ASTM A775/A775M.

B. Splices

1. Locate splices as indicated on Drawings. Do not locate splices at other locations without approval of Engineer. Use minimum number of splices located at points of minimum stress. Stagger splices in adjacent bars.

2. Length of lap splices: As shown on Drawings.

3. Prepare ends of bars at mechanical splices in accordance with splice manufacturer's requirements.

C. Construction Joints: Unless otherwise shown, continue reinforcing through construction joints.

D. Bar Fabrication Tolerances: Conform to tolerances listed in ACI 315, Figures 4 and 5.

E. Standard Hooks: Conform to the requirements of ACI 318.

F. Marking: Clearly mark bars with waterproof tags showing number of bars, size, mark, length and yield strength. Mark steel with same designation as member in which it occurs.

PART 3 EXECUTION

3.01 PREPARATION

Clean reinforcement of scale, loose or flaky rust and other foreign material, including oil, mud or coating that will reduce bond to concrete.

3.02 INSTALLATION

A. Placement Tolerances: Place reinforcement within tolerances of Table 03211A at the end of this Section. Bend tie wire away from forms to maintain the specified concrete coverage.

B. Interferences: Maintain 2-inch clearance from embedded items. Where reinforcing interferes with location of other reinforcing steel, conduit or embedded items, bars may be moved within specified tolerances or one bar diameter, whichever is greater. Where greater movement of bars is required to avoid interference, notify Engineer. Do not cut reinforcement to install inserts, conduit, mechanical openings or other items without approval of Engineer.

C. Concrete Cover: Provide clear cover measured from reinforcement to face of concrete as listed in Table 03211B at the end of this Section, unless otherwise indicated on Drawings.

D. Placement in Forms: Use spacers, chairs, wire ties and other accessory items necessary to assemble, space and support reinforcing properly. Provide accessories of sufficient number, size and strength to prevent deflection or displacement of reinforcement due to construction loads or concrete placement. Use appropriate accessories to position and support bolts, anchors and other embedded items. Tie reinforcing bars at each intersection, and to accessories. Blocking reinforcement with concrete or masonry is prohibited.

E. Placement for Concrete on Ground: Support bar and wire reinforcement on chairs with sheet metal bases or precast concrete blocks spaced at approximately 3 feet on centers each way. Use minimum of one support for each 9 square feet. Tie supports to reinforcing bars and wires.

F. Vertical Reinforcement in Columns: Offset vertical bars by at least one bar diameter at splices. Provide accurate templates for column dowels to ensure proper placement.

G. Splices

1. Do not splice bars, except at locations indicated on Drawings or reviewed shop drawings, without approval of Engineer.

2. Lap Splices: Unless otherwise shown or noted, Class B, conforming to ACI 318, Section 12.15.1. Tie securely with wire prior to concrete placement, to prevent displacement of splices during concrete placement.

3. Mechanical Bar Splices: Use only where indicated on Drawings or approved by the Engineer. Install in accordance with manufacturer's instructions.

a. Couplers located at a joint face shall be of a type which can be set either flush or recessed from the face as shown. Seal couplers prior to concrete placement to completely eliminate concrete or cement paste from entering.

b. Couplers intended for future connections: Recess 1/2 inch minimum from concrete surface. After concrete is placed, plug coupler and fill recess with sealant to prevent contact with water or other corrosive materials.

c. Unless noted otherwise, match mechanical coupler spacing and capacity to that shown for the adjacent reinforcing.

H. Construction Joints: Place reinforcing continuous through construction joints, unless noted otherwise.

I. Welded Wire Fabric: Install wire fabric in as long lengths as practicable. Unless otherwise indicated on Drawings, lap adjoining pieces at least 6 inches or one full mesh plus 2 inches, whichever is larger. Lace splices with wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps. Conform to WRI - Manual of Standard Practice for Welded Wire Fabric.

J. Field Bending: Shape reinforcing bent during construction operations to conform to Drawings. Bars shall be cold-bent; do not heat bars. Closely inspect reinforcing for breaks. When reinforcing is damaged, replace, Cadweld, or otherwise repair, as directed by Engineer. Do not bend reinforcement after it is embedded in concrete.

K. Epoxy-coated Reinforcing Steel: Install in accordance with paragraph 3.02J, Field Bending, and in a manner that will not damage epoxy coating. Repair damaged epoxy coating with patching material as specified in paragraph 2.02A, Bending.

L. Field Cutting: Cut reinforcing bars by shearing or sawing. Do not cut bars with cutting torch.

M. Welding of reinforcing bars is prohibited, except where shown on Drawings.

3.03 GROUTING OF REINFORCING AND DOWEL BARS

Use epoxy grout for anchoring reinforcing and dowel steel to existing concrete in accordance with epoxy manufacturer's instructions. Drill hole not more than 1/4 inch larger than steel bar diameter (including height of deformations for deformed bars) in existing concrete. Just before installation of steel, blow hole clean of all debris using compressed air. Partially fill hole with epoxy, using enough epoxy so when steel bar is inserted, epoxy grout will completely fill hole around bar. Dip end of steel bar in epoxy and twist bar while inserting into partially-filled hole.

Table 03211A

REINFORCEMENT PLACEMENT TOLERANCES

PLACEMENT	**TOLERANCE IN INCHES**
Clear Distance -	
To formed soffit:	-1/4
To other formed surfaces:	+/- 1/4
Minimum spacing between bars:	-1/4
Clear distance from unformed surface to top reinforcement -	
Members 8 inches deep or less:	+/- 1/4
Members more than 8 inches deep but less than 24 inches deep:	-1/4, +1/2
Members 24 inches deep or greater:	-1/4, +1
Uniform spacing of bars (but the required number of bars shall not be reduced):	+/- 2
Uniform spacing of stirrups and ties (but the required number of stirrups and ties shall not be reduced):	+/- 1
Longitudinal locations of bends and ends of reinforcement -	
General:	+/- 2
Discontinuous ends of members:	+/- 1/2
Length of bar laps:	-1-1/2
Embedded length -	
For bar sizes No. 3 through 11:	-1
For bar sizes No. 14 and 18:	-2

Table 03211B

MINIMUM CONCRETE COVER FOR REINFORCEMENT

SURFACE	MINIMUM COVER IN INCHES
Slabs and Joists -	
Top and bottom bars for dry conditions -	
No. 14 and No. 18 bars:	1-1/2
No. 11 bars and smaller:	1
Formed concrete surfaces exposed to earth, water or weather; over, or in contact with, sewage; and for bottoms bearing on work mat, or slabs supporting earth cover -	
No. 5 bars and smaller:	1-1/2
No. 6 through No. 18 bars:	2
Beams and Columns -	
For dry conditions -	
Stirrups, spirals and ties:	1-1/2
Principal reinforcement:	2
Exposed to earth, water, sewage or weather -	
Stirrups and ties:	2
Principal reinforcement:	2-1/2
Walls -	
For dry conditions -	
No. 11 bars and smaller:	1
No. 14 and No. 18 bars:	1-1/2
Formed concrete surfaces exposed to earth, water, sewage or weather, or in contact with ground -	
Circular tanks with ring tension:	2
All others:	2
Footings and Base Slabs -	
At formed surfaces and bottoms bearing on concrete work mat:	2
At unformed surfaces and bottoms in contact with earth:	3
Over top of piles:	2
Top of footings -- same as slabs	

END OF SECTION

SECTION 03310

STRUCTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

Cast-in-place normal-weight structural concrete and mass concrete.

1.02 REFERENCES

ACI 301 - Specifications for Structural Concrete for Buildings.
ACI 304.2R - Placing Concrete by Pumping Methods
ACI 305R - Hot Weather Concreting.
ACI 306.1 - Standard Specification for Cold Weather Concreting.
ACI 309R - Guide for Consolidation of Concrete.
ACI 318 - Building Code Requirements for Reinforced Concrete.
ACI 350R - Environmental Engineering Concrete Structures.
ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
ASTM C33 - Standard Specification for Concrete Aggregates.
ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
ASTM C94 - Standard Specification for Ready-Mixed Concrete.
ASTM C127 - Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM C136 - Standard Test Method for Sieve Analyses of Fine and Coarse Aggregates.Q.ASTM
C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
ASTM C150 - Standard Specification for Portland Cement.
ASTM C157 – Standard Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

ASTM C 535 - Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.
ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic Cement Concrete.
Concrete Plant Manufacturer's Bureau (CPMB), Plant Mixer Manufacturers Division: Concrete Plant Mixer Standards.
National Ready-Mixed Concrete Association (NRMCA): Certification of Ready-Mixed Concrete Production Facilities (checklist with instructions).
John Wiley and Sons, Interscience Publishers Division, "Encyclopedia of Industrial Chemical Analysis," Vol. 15, Page 230 (alkalinity test procedure)

1.03 DEFINITIONS

A. Mass Concrete: Concrete sections 4 feet or more in least dimension.

B. Hot Weather: Any combination of high air temperature, low relative humidity and wind velocity tending to impair quality of fresh or hardened concrete or otherwise resulting in abnormal properties.

C. Cold Weather: Period when, for more than 2 successive days, mean daily temperature is below 40 degrees F.

1.04 SUBMITTALS

A. Conform to the section entitled, "Submittals."

B. Mill Certificates: Required for bulk cement.

C. Design Mixes:

1. Submit test data on proposed design mixes for each type of concrete in the Work, including each class, and variations in type, source or quantity of material. Include type, brand and amount of cementitious materials; type, brand and amount of each admixture; slump; air content; aggregate sources, gradations, specific gravity and absorption; total water (including moisture in aggregate); water/cement ratio; compressive strength test results for 7 and 28 days; and shrinkage tests for Class A and D concrete at 21 or 28 days of drying.

2. Submit abrasion loss and soundness test results for limestone aggregate.

3. Testing of aggregates, including sieve analysis, shall be performed by a certified independent testing laboratory. Tests shall have been performed no earlier than 3 months before Notice to Proceed.

4. Provide standard deviation data for plant producing concrete. Data shall include copies of laboratory test results and standard deviation calculated in accordance with ACI 318,

Item 5.3.1. Laboratory tests shall have been performed within past 12 months. When standard deviation data is not available, comply with ACI 318, Table 5.3.2.2.

5. Review and acceptance of mix design does not relieve Contractor of responsibility to provide concrete of quality and strength required by these Specifications.

D. Admixtures: Submit manufacturer's technical information, including following:

1. Air-Entraining Admixture: Give requirements to control air content under all conditions, including temperature variations and presence of other admixtures.

2. Chemical Admixtures: Give requirements for quantities and types to be used under various temperatures and job conditions to produce uniform, workable concrete mix. Submit evidence of compatibility with other admixtures and cementitious materials proposed for use in design mix.

E. High-range Water Reducer (Superplasticizer): When approved for use by Engineer, submit manufacturer's technical information and instructions for use of superplasticizer. Superplasticizer will not be added at ready-mix plant. When superplasticizer will be added at job site, submit proposed plan for measuring and adding superplasticizer to concrete mix at job site, and establish dosing area on site with holding tanks and metering devices. Identify portions of Work on which superplasticizer is proposed for use.

F. Hot and Cold Weather Concreting: Submit, when applicable, proposed plans for hot and cold weather concreting. Review and acceptance of proposed procedure will not relieve Contractor of responsibility for quality of finished product.

G. Project Record Drawings: Accurately record actual locations of embedded utilities and components which are concealed from view.

1.05 QUALITY ASSURANCE

A. Provide necessary controls during evaluation of materials, mix designs, production and delivery of concrete, placement and compaction to assure that the Work will be accomplished in accordance with Contract Documents. Maintain records of concrete placement. Record dates, locations, quantities, air temperatures, and test samples taken.

B. Code Requirements: Concrete construction for buildings shall conform to ACI 318. Concrete construction for water and wastewater treatment and conveying structures shall conform to ACI 318 with modifications by ACI 350R, Item 2.6. Where this Specification conflicts with ACI 318 or ACI 350R, this Specification governs.

C. Testing and Other Quality Control Services:

1. Concrete testing required in this section, except concrete mix design, limestone aggregate test data, and testing of deficient concrete, will be performed by an

independent commercial testing laboratory employed and paid by the Owner in accordance with the section entitled, “Testing Laboratory Services.”

2. Provide material for and cooperate fully with Owner's testing laboratory technician in obtaining samples for required tests.

3. Standard Services: The following testing and quality control services will be provided by Owner in accordance with the section entitled, “Testing Laboratory Services:”
   a. Verification that plant equipment and facilities conform to NRMCA “Certification of Ready-Mix Concrete Production Facilities”.

   b. Testing of proposed materials for compliance with this Specification.

   c. Review of proposed mix design submitted by Contractor.

   d. Obtaining production samples of materials at plants or stockpiles during work progress and testing for compliance with this Specification.

   e. Strength testing of concrete according to following procedures:

      (1) Obtaining samples for field test cylinders from every 50 cubic yards and any portion less than 50 cubic yards for each mix design placed each day, according to ASTM C 172, with each sample obtained from a different batch of concrete on a representative, random basis. Selecting test batches by any means other than random numbers chosen before concrete placement begins is not allowed. In the event that a structure is completed with less than 50 cubic yards, a minimum of two random samples shall be selected for that structure.

      (2) Molding four specimens from each sample according to ASTM C 31, and curing under standard moisture and temperature conditions as specified in Sections 7(a) and (b) of ASTM C 31.

      (3) Testing two specimens at 7 days and two specimens at 28 days according to ASTM C 39, reporting test results averaging strengths of two specimens. However, when one specimen evidences improper sampling, molding or testing, it will be discarded and remaining cylinder considered test result. When high-early-strength concrete is used, specimens will be tested at 3 and 7 days.

   f. Air content: For each strength test, determination of air content of normal weight concrete according to ASTM C 231.

   g. Slump: For each strength test, and whenever consistency of concrete appears to vary, conducting slump test in accordance with ASTM C 143.

h. Temperature: For each strength test, checking concrete temperature in accordance with ASTM C 1064.

i. Lightweight concrete: For each strength test, or more frequently when requested by Engineer, determination of air content by ASTM C 567 and unit weight by ASTM C 567.

j. Monitoring of current and forecasted climatic conditions to determine when rate of evaporation, as determined by Figure 2.1.5 of ACI 305R, will produce loss of 0.2 pounds of water, or more, per square foot per hour. Testing lab representative will advise Contractor to use hot weather precautions when such conditions will exist during concrete placement, and note on concrete test reports when Contractor has been advised that hot weather conditions will exist.

k. Class A and D Concrete Shrinkage Tests: Performance of drying shrinkage tests for trial batches as follows:

(1) Preparation and Testing of Specimens: Compression and drying shrinkage test specimens will be taken in each case from the same concrete sample; shrinkage tests will be considered a part of the normal compression tests for the project. 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10 inches, fabricated, cured, dried and measured in accordance with ASTM C157, modified as follows:

(i) Wet curing: Remove specimens from molds at an age of 23 hours “1 hour after trial batching and immediately immerse in water at 70 degrees F “3 degrees F for at least 30 minutes.

(ii) Measure within 30 minutes after first 30 minutes of immersion to determine original length (not to be confused with “base length”);

(iii) Then submerge in saturated limewater, at 73 degrees F +/- 3 degrees F, for 7 days;

(iv) Then measure at age 7 days to establish “base length” for drying shrinkage calculations (“zero” days drying age)

(v) Calculate expansion (base length expressed as a percentage of original length);

(vi) Immediately store specimens in a temperature- and humidity-controlled room maintained at 73 degrees F, +3 degrees F and 50 percent +/- 4 percent relative humidity, for the remainder of the test.

(vii) Measure to determine shrinkage, expressed as percentage of base length. Compute the drying shrinkage deformation of each

specimen as the difference between the base length (at zero days drying age) and the length after drying at each test age. Compute the average drying shrinkage deformation of the specimens to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, disregard the results obtained from that specimen. Report results of shrinkage tests to the nearest 0.001 percent of shrinkage.

(viii) Report shrinkage separately for 7, 14, 21, and 28 days of drying after 7 days of moist curing.

4. Additional Testing and Quality Control Services: The following will be performed by an independent commercial testing laboratory employed and paid by the Owner in accordance with the section entitled, "Testing Laboratory Services," when requested by Engineer.

   a. Checking of batching and mixing operations.

      (1) Review of manufacturer's report of each cement shipment and conducting laboratory tests of cement.

      (2) Molding and testing reserve 7 day cylinders or field cylinders

      (3) Conducting additional field tests for slump, concrete temperature and ambient temperature.

      (4) Alkalinity Tests: For concrete used in sanitary structures, one test for each structure. Perform alkalinity tests on concrete covering reinforcing steel on the inside of the pipe or structure in accordance with "Encyclopedia of Industrial Chemical Analysis," Vol. 15, page 230.

5. Contractor shall provide the following testing and quality control services:

   a. Employ an independent commercial testing laboratory, acceptable to Owner, to prepare and test design mix for each class of concrete for which material source has been changed.

   b. Notify commercial testing laboratory employed by Owner 24 hours prior to placing concrete.

6. Testing of deficient concrete in place:

   a. When averages of three consecutive strength test results fail to equal or exceed specified strength, or when any individual strength test result falls below specified strength by more than 500 psi, strength of concrete shall be considered potentially

deficient and core testing, structural analysis or load testing may be required by Engineer.

b. When concrete in place proves to be deficient, Contractor shall pay costs, including costs due to delays, incurred in providing additional testing and analysis services provided by the Engineer, or the independent commercial testing laboratory selected by the Owner.

c. Replace concrete work judged inadequate by core tests, structural analysis or load tests at no additional cost to the Owner.

d. Core Tests:

(1) Obtain and test cores in accordance with ASTM C 42. Where concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 degrees F, relative humidity less than 60 percent) for 7 days before test; test dry. Where concrete in structure will be more than superficially wet under service conditions, test cores after moisture conditioning in accordance with ASTM C 42.

(2) Take at least three representative cores from each member or area of concrete in place that is considered potentially deficient. Location of cores shall be determined by Engineer so as to least impair strength of structure. When, before testing, one or more cores shows evidence of having been damaged during or after removal from structure, replace the damaged cores.

(3) Concrete in area represented by core test will be considered adequate when average strength of cores is equal to at least 85 percent of specified strength, and when no single core is less than 75 percent of specified strength.

(4) Patch core holes in accordance with the section entitled, “Concrete Finishing.”

e. Structural Analysis: When core tests are inconclusive or impractical to obtain, Engineer may perform additional structural analysis at Contractor's expense to confirm safety of structure.

f. Load Tests: When core tests and structural analysis do not confirm safety of structure, load tests may be required, and their results evaluated, in accordance with ACI 318.

g. Testing by impact hammer, sonoscope, probe penetration tests (Windsor probe), or other nondestructive device may be permitted by Engineer to determine relative strengths at various locations in structure, to evaluate concrete strength in place, or for selecting areas to be cored. However, such tests, unless properly calibrated and correlated with other test data, shall not be used as basis for acceptance or rejection of structure's safety.

1.06 STORAGE AND HANDLING OF MATERIALS

A. Cement: Store cement in weather tight buildings, bins or silos to provide protection from dampness and contamination and to minimize warehouse set. When there is any doubt as to expansive potential of shrinkage-compensating cements because of method or length of storage and exposure, laboratory test cement before use.

B. Aggregate: Arrange and use aggregate stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3 feet in thickness. Complete each layer before next is started.

C. Fine Aggregate: Before using, allow fine aggregate to drain until uniform moisture content is reached.

D. Admixtures: Store admixtures to avoid contamination, evaporation or damage. For those used in form of suspensions or non-stable solutions, provide suitable agitating equipment to assure uniform distribution of ingredients. Protect liquid admixtures from freezing and other temperature changes which would adversely affect their characteristics.

E. Lightweight Aggregates: Uniformly pre-dampen lightweight aggregates as necessary to prevent excessive variations in moisture content. Allow pre-dampened aggregates to remain in stockpiles, under continuous fog spray, for minimum of 24 hours before use. Provide adequate drainage in stockpile areas to eliminate excess water and accumulation of contaminated fines.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement:

1. Use same brand of cement used in concrete mix design. Use only one brand of each type in each structure, unless otherwise indicated on Drawings.

2. Portland Cement: ASTM C150, Type I or Type II, gray in color. Use Type III only when specifically authorized by Engineer in writing. Use Type II, including the requirements of Table 2, in construction of liquid-containing structures and cooling towers, unless shown otherwise on Drawings.

B. Admixtures:

1. Do not use calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions.

2. Air-Entraining Admixtures: ASTM C260, compatible with other admixtures used.

3. Chemical Admixtures: Polymer type, non-staining, chloride-free admixtures conforming to ASTM C494, Type A, C, D or E.

4. High-Range Water Reducer (Superplasticizer): ASTM C494, Type F or G, compatible with and by the same manufacturer as other admixtures.

C. Mixing Water: Use clean, potable water, free from harmful amounts of oils, acids, alkalis or other deleterious substances, meeting requirements of ASTM C94.

D. Aggregates: Use coarse aggregate from only one source, and fine aggregate from only one source, for exposed concrete in any single structure.

1. Coarse Aggregate: Gravel, crushed gravel or crushed limestone conforming to ASTM C33.

2. Fine Aggregate: Natural sand complying with ASTMC33.

3. Limestone aggregate shall conform to ASTM C33 and the following additional requirements: Clean, hard, strong and durable particles free of chemicals and coatings of silt, clay, or other fine materials that may affect hydration and bond of cement paste. Select crushed limestone: High-calcium limestone (minimum 95 percent $CaCO_3$ and maximum 3.5 percent $MgCO_3$) with maximum Los Angeles Abrasion loss of 38 percent, when tested in accordance with ASTM C131 or ASTM C535. Test aggregate for soundness in accordance with ASTM C 88; maximum loss shall not exceed 18 percent after 5 cycles of magnesium sulfate test.

4. Maximum size of coarse aggregate:
   a. Normal weight concrete, except as noted below: 1-1/2 inches.

   b. Formed members 6 inches or less in least dimension: 1/5 least dimension.

   c. Slabs: 1/3 depth of slab.

   d. Drilled shafts: 1/3 clearance between reinforcing steel, but not greater than 3/4 inch.
   e. Concrete fill, seal slabs and bonded concrete topping in clarifiers: 3/8 inch.

5. Coarse aggregate for lightweight concrete: ASTM C330. Grading limits: 3/4 inch to No. 4.

6. Abrasive Aggregate: Conform to requirements of the section entitled, “Concrete Finishing.”

E. Calcium Chloride: Not permitted.

F. Evaporation Retardant: Masterbuilders “Confilm”, Euclid “Eucobar”, or equal.

G. Miscellaneous Materials:

1. Bonding Agent: Two-component modified epoxy resin.

2. Vapor barrier: 6 mil clear polyethylene film of type recommended for below-grade application.

3. Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement and water-reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.02 CONCRETE MIX

A. Objective: Select proportions of ingredients to produce concrete having proper place-ability, durability, strength, appearance, and other specified properties.

B. Mix Design: Employ and pay an independent commercial testing laboratory, acceptable to Owner, to prepare and test mix designs for each type of concrete specified. Proportion mix design ingredients by weight. Submit mix designs and test results for approval.

1. During the trial batches, aggregate proportions may be adjusted by the testing laboratory using two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor. Concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. Prepare trial batches using the aggregates, cement and admixtures proposed for the project. Make trial batches large enough to obtain 3 drying shrinkage test specimens and 6 compression test specimens from each batch. Shrinkage testing is required only for Class A and D concrete.

2. Determine compressive strength by testing 6-inch diameter by 12-inch high cylinders, made, cured and tested in accordance with ASTM C192 and ASTM C39. Test 3 compression test cylinders at 7 days and 3 at 28 days. Average compressive strength for the 3 cylinders tested at 28 days for any given trial batch shall be not less than 125 percent of the specified compressive strength.

3. Perform sieve analysis of the combined aggregate for each trial batch according to of ASTM C136. Report percentage passing each sieve.

4. In mix designs for Class A and D concrete, fine aggregate shall not exceed 41 percent of total aggregate by weight.

C. Shrinkage Limitations, Class A and D Concrete

1. Maximum concrete shrinkage for specimens cast in the laboratory from the trial batch: 0.036 percent as measured at 21-day drying age, or 0.042 percent at 28-day drying age. Use for construction only mix designs that meet trial batch shrinkage requirements. Shrinkage limitations apply only to Class A and D concrete.

2. Maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

3. If the required shrinkage limitation is not met during construction, take any or all of the following actions, at no additional cost to the Owner, for securing the specified shrinkage requirements: Changing the source or aggregates, cement or admixtures; reducing water content; washing of aggregate to reduce fines; increasing the number of construction joints; modifying the curing requirements; or other actions designed to minimize shrinkage or its effects.

D. Selecting Ingredient Proportions for Concrete:

1. Proportion concrete mix according to ACI 301, Chapter 3.

2. Establish concrete mix design by laboratory trial batches prepared by independent testing laboratory, or on basis of previous field experience in accordance with provisions of ACI 318, Item 5.3; however, minimum cement content for each class of concrete shall not be less than specified.

3. Concrete mix design data submitted for review shall have average 28-day compressive strength calculated in accordance with ACI 318, Item 5.3.2.1. When data is not available to determine standard deviation in accordance with ACI 318, Item 5.3.1, average 28-day strength of mix design shall conform to ACI 318, Table 5.3.2.2.

E. Water-Cement Ratios:

1. Maximum allowable water-cement ratios shall be as follows:

   a. Concrete for liquid-containing structures: 0.45.
   b. Concrete subjected to brackish water, salt spray or deicers: 0.40.
   c. All other concrete: 0.55.

2. Superplasticizer may be added to maintain specified maximum water-cement ratios. Include free water in aggregate in water-cement ratio computations.

F. Adjustment of Mix Proportions: After sufficient data becomes available during construction, mix may be adjusted upon approval of Engineer, in accordance with ACI 318, Item 5.5; however, minimum cement content for each class of concrete shall not be less than specified.

G. Entrained Air: Air-entrain all concrete except drilled shafts. Total air content in accordance with ASTM C173: 4 to 6 percent.

H. Consistency, Workability, and Slump:

1. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce concrete which can be worked properly into place without segregation, and which can be compacted by vibratory methods as specified, to give the desired strength, density, impermeability, and smoothness of surface. Change the quantity of water as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. Determine the consistency of the concrete in successive batches by slump tests in accordance with ASTM C 143. Slumps shall be as follows:

Concrete Type	Minimum Slump	Maximum Slump
Portland Cement Concrete	2”	4”
Concrete to be dosed with superplasticizer	1”	3”
Normal Weight Concrete after dosing with superplasticizer	4”	9”
Lightweight Concrete after dosing with superplasticizer	4”	7”
Drilled Shaft Concrete	4” *	8”

* Minimum slump where drilled shafts are cast in temporary casings: 5 inches.

2. Specified slump shall apply at time when concrete is discharged at job site. Perform slump tests to monitor uniformity and consistency of concrete delivered to job site; however, do not use as basis for mix design. Do not exceed water-cement ratios specified.

I. Admixtures: Proportion admixtures according to manufacturer's recommendations. Use of accelerator is permitted when air temperature is less than 40 degrees F. Use of retarder is permitted when temperature of placed concrete exceeds 65 degrees F.

J. High-Range Water Reducers (Superplasticizers): Use superplasticizer to improve workability of concrete or delay hydration of cement, in accordance with requirements and recommendations of product manufacturer and approved submittals.

K. Concrete Classification and Strength:

1. Strength: Conform to values for class of concrete indicated on Drawings for each portion of Work. Requirements are based on 28-day compressive strength. If high early-strength concrete is allowed, requirements are based on 7-day compressive strength.

2. Classification:

Class (Normal Weight)	Minimum 28-Day Compressive Strength (psi)	Minimum Cement Content Pounds per Cubic Yard
Concrete for Structures Containing Water or Wastewater		
A	4000	564 (6 Sacks)
B	1500	329 (3-1/2 Sacks)
C	3000	470 (5 Sacks)
D	5000	658 (7 Sacks)
H	4500	611 (6-1/2 Sacks)
Class (Normal Weight)	Minimum 28-Day Compressive Strength (psi)	Minimum Cement Content Pounds per Cubic Yard
Concrete for Buildings, Slabs on Grade and Miscellaneous Structures		
AB	4000	Not Applicable
BB	1500	Not Applicable
CB	3000	Not Applicable
DB	5000	Not Applicable
Class (Normal Weight)	Minimum 28-Day Compressive Strength (psi)	Minimum Cement Content Pounds per Cubic Yard
E	3000	Not Applicable
F	4000	Not Applicable
G	5000	Not Applicable

3. Maximum size aggregate for Class H concrete: 3/8 inch. Maximum size aggregate for all other normal-weight concrete: 1-1/2 inches, except as specified in Paragraph 2.01D.4.

4. When required strength is not obtained with minimum cement content as specified, add cement, lower water-cement ratio or provide other aggregates as necessary.

5. In addition to conforming to specified strength, lightweight concrete must be within specified unit weight limits. Maximum air-dry unit weight is 118 pounds per cubic foot; minimum is 110 pounds per cubic foot unless shown otherwise on Drawings. Determine air-dry unit weight in accordance with ASTM C 567. Correlate air-dry unit weight with fresh unit weight of the same concrete as a basis for acceptance during construction.

L. Use of Classes of Concrete:

1. Use classes of concrete as indicated on the Drawings and in other specifications.

2. Liquid-containing structures: If not otherwise indicated, use the following classes for structures containing water or wastewater and for utility applications in the locations described:

a. Class A: All reinforced concrete and where not otherwise defined.

b. Class B: Unreinforced concrete used for plugging pipes, seal slabs, thrust blocks and trench dams, unless indicated otherwise.

c. Class H: Fill and topping. Where concrete fill thickness exceeds 3 inches in the majority of a placement and is not less than 1.5 inches thick, Class A concrete may be used.

3. All other structures: If not otherwise indicated, use the following classes in the locations described:

a. Class AB: All reinforced concrete and where not otherwise defined.

b. Class CB: Duct banks; see the section entitled, “Underground Duct Banks” for additional requirements.

c. Class BB: Unreinforced concrete fill under structures.

2.03 MIXING NORMAL WEIGHT CONCRETE

A. Conform to ACI 301, Chapter 7.

B. Ready-Mixed Concrete:

1. Measure, batch, mix and transport ready-mixed concrete according to ASTM C 94. Plant equipment and facilities shall conform to NRMCA “Certification of Ready Mixed Concrete Production Facilities.”

2. Provide batch tickets with information specified in ASTM C 94. Deliver batch ticket with concrete and give to Owner’s on-site testing laboratory representative.

C. Batch Mixing at Site:

1. Mix concrete in batch mixer conforming to requirements of CPMB “Concrete Plant Mixer Standards”. Use mixer equipped with suitable charging hopper, water storage tank and water measuring device. Batch mixer shall be capable of mixing aggregates, cement and water into uniform mass within specified mixing time, and of discharging mix without segregation. Operate mixer according to rated capacity and recommended revolutions per minute printed on manufacturer's rating plate.

2. Charge batch into mixer so some water will enter before cement and aggregates. Keep water running until one-fourth of specified mixing time has elapsed. Provide controls to prevent discharging until required mixing time has elapsed. When concrete of normal weight is specified, provide controls to prevent addition of water during mixing. Discharge entire batch before mixer is recharged.

3. Mix each batch of 2 cubic yards or less for not less than 1 minute and 30 seconds. Increase minimum mixing time 15 seconds for each additional cubic yard or fraction of cubic yard.

4. Keep mixer clean. Replace pick-up and throw-over blades in drum when they have lost 10 percent of original depth.

D. Admixtures:

1. Charge air-entraining and chemical admixtures into mixer as solution using automatic dispenser or similar metering device. Measure admixture to accuracy within + 3 percent. Do not use admixtures in powdered form.

2. Two or more admixtures may be used in same concrete, provided that admixtures in combination retain full efficiency and have no deleterious effect on concrete or on properties of each other. Inject admixtures separately during batching sequence.

3. Add retarding admixtures as soon as practicable after addition of cement.

E. Temperature Control

1. When ambient temperature falls below 40 degrees F, keep as-mixed temperature above 55 degrees F to maintain concrete above minimum placing temperature.

2. When water or aggregate has been heated, combine water with aggregate in mixer before cement is added. Do not add cement to mixtures of water and aggregate when temperature of mixture is greater than 100 degrees F.

3. In hot weather, maintain temperature of concrete below maximum placing temperature. When necessary, temperature may be lowered by cooling ingredients, cooling mixer drum by fog spray, using chilled water or well-crushed ice in whole or part for added water, or arranging delivery sequence so that time of transport and placement does not generate unacceptable temperatures.

4. Submit hot weather and cold weather concreting plans for approval.

2.04 MIXING LIGHTWEIGHT CONCRETE

A. Determining Absorption of Aggregates: Mixing procedures vary according to total absorption by weight of lightweight aggregates. Determine total absorption by weight before pre-damping in accordance with ASTM C 127.

B. Ten Percent or Less Absorption: Follow same requirements as for mixing normal-weight concrete when preparing concrete made with low-absorptive lightweight aggregates having 10 percent or less total absorption by weight. To be low-absorptive, aggregates must absorb less than 2 percent additional water in first hour after mixing.

C. More Than 10 Percent Absorption: Batch and mix concrete made with lightweight aggregates having more than 10 percent total absorption by weight, as follows:

1. Place approximately 80 percent of mixing water in mixer.

2. If aggregates are pre-dampened, add air-entraining admixture and all aggregates. Mix for minimum of 30 seconds, or 5 to 10 revolutions of truck mixer.\

3. When aggregates have not been pre-dampened, mix aggregates and water for minimum of 1 minute and 30 seconds, or 15 to 30 revolutions of truck mixer. Then add air-entraining admixture and mix for additional 30 seconds.

4. Then, in the following sequence, add specified or permitted admixtures (other than air-entraining agent), all cement, and mixing water previously withheld.

5. Complete mixing using procedures for normal-weight concrete.

2.05 MASS CONCRETE

A. Do not use high early-strength cement (Type III) or accelerating admixtures.

B. Use high-range water-reducing admixture (superplasticizer) to minimize water content and cement content.

C. Specified water-reducing retarding admixture may be required to prevent cold joints when placing large quantities of concrete, to permit re-vibration of concrete, to offset effects of high temperature in concrete or weather, and to reduce maximum temperature or rapid temperature rise.

2.06 EQUIPMENT

A. Select equipment of size and design to ensure continuous flow of concrete at delivery end. Conform to following equipment and operations requirements.

B. Truck mixers, agitators and manner of operation: Conform to ASTM C 94. Use of non-agitating equipment for transporting concrete is not permitted.

C. Belt conveyors: Configure horizontally, or at a slope causing no segregation or loss. Use approved arrangement at discharge end to prevent separation. Discharge long runs without separation into hopper.

D. Chutes: Metal or metal-lined (other than aluminum). Arrange for vertical-to-horizontal slopes not more than 1 to 2 nor less than 1 to 3. Chutes longer than 20 feet or not meeting slope requirements may be used if concrete is discharged into hopper before distribution.

E. Do not use aluminum or aluminum-alloy pipe or chutes for conveying concrete.

PART 3 EXECUTION

3.01 SPECIAL CONSIDERATIONS

A. Concreting Under Water: Not permitted except where shown otherwise on Drawings or approved by Engineer. When shown or permitted, deposit concrete under water by methods acceptable to the Engineer so fresh concrete enters mass of previously-placed concrete from within, causing water to be displaced with minimum disturbance at surface of concrete.

B. Protection from Adverse Weather: Unless adequate protection is provided or Engineer's approval is obtained, do not place concrete during rain, sleet, snow or freezing weather. Do not permit rainwater to increase mixing water or to damage surface finish. If rainfall occurs after placing operations begin, provide adequate covering to protect Work.

C. Existing Concrete: Where matching existing concrete, texture and finish of proposed concrete shall match the existing surface. Costs for texture and finish shall be considered subsidiary to the concrete item.

3.02 PREPARATION OF SURFACES FOR CONCRETING

A. Earth Surfaces

1. Under interior slabs on grade, install vapor barrier. Lap joints at least 6 inches and seal watertight with tape, or sealant applied between overlapping edges and ends. Repair vapor barrier damaged during placement of reinforcing and inserts with vapor barrier material; lap over damaged areas at least 6 inches and seal watertight.

2. Other Earth Surfaces: Thoroughly wet by sprinkling prior to placing concrete, and keep moist by frequent sprinkling up to time of placing concrete thereon. Remove standing water. Surfaces shall be free from standing water, mud and debris at the time of placing concrete.

B. Construction Joints

1. Definition: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been interrupted so that, in the judgment of the Engineer, new concrete cannot be incorporated integrally with that previously placed.

2. Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, use forms or other means to shape the working face to secure proper union with subsequent work. Make construction joints only where acceptable to the Engineer.

3. Preparation: Give horizontal joint surfaces a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, clean joint surfaces of laitance, loose or defective concrete and foreign material by hydro-blasting or sandblasting (exposing aggregate), roughen surface to expose aggregate to a depth of at least 1/4 inch and wash thoroughly. Remove standing water from the construction joint surface before new concrete is placed.

4. After surfaces have been prepared cover approximately horizontal construction joints with a 3-inch lift of a grout mix consisting of Class A concrete batched without coarse aggregate; place and spread grout uniformly. Place wall concrete on the grout mix immediately thereafter.

C. Set and secure reinforcement, anchor bolts, sleeves, inserts and similar embedded items in the forms where indicated on Contract Drawings, shop drawings and as otherwise required. Obtain Engineer's acceptance before concrete is placed. Accuracy of placement is the sole responsibility of the Contractor.

D. Place no concrete until at least 4 hours after formwork, inserts, embedded items, reinforcement and surface preparation have been completed and accepted by the Resident Project Representative. Clean surfaces of forms and embedded items that have become encrusted with grout or previously-placed concrete before placing adjacent concrete.

E. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), thoroughly clean and roughen the surface of the old concrete by hydro-blasting or sandblasting (exposing aggregate). Coat joint surface with epoxy bonding agent following manufacturer's written instructions, unless indicated otherwise. Unless noted otherwise, this provision does not apply to vertical wall joints where waterstop is installed.

F. Protection from Water: Place no concrete in any structure until water entering the space to be filled with concrete has been properly cut off or diverted and carried out of the forms, clear of the work. Deposit no concrete underwater. Do not allow still water to rise on any concrete until concrete has attained its initial set. Do not allow water to flow over the surface of any concrete in a manner and at a velocity that will damage the surface finish of the concrete. Pumping, dewatering and other necessary operations for removing ground water, if required, are subject to Resident Project Representative review.

G. Corrosion Protection: Position and support pipe, conduit, dowels and other ferrous items to be embedded in concrete construction prior to placement of concrete so there is at least a 2 inch clearance between them and any part of the concrete reinforcement. Do not secure such items in position by wiring or welding them to the reinforcement.

H. Where practicable, provide for openings for pipes, inserts for pipe hangers and brackets, and setting of anchors during placing of concrete.

I. Accurately set anchor bolts and maintain in position with templates while they are being embedded in concrete.

J. Cleaning: Immediately before concrete is placed, thoroughly clean dirt, grease, grout, mortar, loose scale, rust and other foreign substances from surfaces of metalwork to be in contact with concrete.

3.03 HANDLING, TRANSPORTING AND PLACING CONCRETE

A. Conform to applicable requirements of Chapter 8 of ACI 301 and this Section. Use no aluminum materials in conveying concrete.

B. Rejected Work: Remove concrete found to be defective or non-conforming in materials or workmanship. Replace rejected concrete with concrete meeting requirements of Contract Documents, at no additional cost to the Owner.

C. Unauthorized Placement: Place no concrete except in the presence of the Resident Project Representative. Notify the Resident Project Representative in writing at least 24 hours before placement of concrete.

D. Placement in Wall Forms

1. Do not drop concrete through reinforcing steel.

2. Do not place concrete in any form so as to leave an accumulation of mortar on form surfaces above the concrete.

3. Pump concrete or use hoppers and, if necessary, vertical ducts of canvas, rubber or metal (other than aluminum) for placing concrete in forms so it reaches the place of final deposit without separation. Free fall of concrete shall not exceed 4 feet below the ends of pump hoses, ducts, chutes or buggies. Uniformly distribute concrete during depositing.

4. Do not displace concrete in forms more than 6 feet in horizontal direction from place where it was originally deposited.

5. Deposit in uniform horizontal layers not deeper than 2 feet; take care to avoid inclined layers or inclined construction joints except where required for sloping members.

6. Place each layer while the previous layer is still soft. Rate of placement shall not exceed 5 feet of vertical rise per hour.

7. Provide sufficient illumination in form interior so concrete at places of deposit is visible from the deck or runway.

E. Conveyors and Chutes: Design and arrange ends of chutes, hopper gates and other points of concrete discharge in the conveying, hoisting and placing system so concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyors, if used, shall be of a type acceptable to the Resident Project Representative. Do not use chutes longer than 50 feet. Slope chutes so concrete of specified consistency will readily flow. If a conveyor is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyors and chutes shall be covered.

F. Placement of Slabs: In hot or windy weather, conducive to plastic shrinkage cracks, apply evaporation retardant to slab after screeding in accordance with manufacturer's instructions and recommendations. Do not use evaporation retardant to increase water content of the surface cement paste. Place concrete for sloping slabs uniformly from the bottom of the slab to the top, for the full width of the placement. As work progresses, vibrate and carefully work concrete around slab reinforcement. Screed the slab surface in an up-slope direction.

G. Concrete Temperature: When placed, not more than 90 degrees F nor less than 55 degrees F for sections less than 12 inches thick, nor less than 50 degrees for all other sections. Do not heat concrete ingredients to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. When concrete temperature is 85 degrees F or above, do not exceed 60 minutes between introduction of cement to the aggregates and discharge. When the weather is such that the concrete temperature would exceed 90 degrees F, employ effective means, such as pre-cooling of aggregates and mixing water, using ice or placing at night, as necessary to maintain concrete temperature, as placed, below 90 degrees F.

H. Cold Weather Placement: Conform to ACI 306.1 - Standard Specification for Cold Weather Concreting, and the following:

1. Remove snow, ice and frost from surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches. Warm reinforcement and embedded items to above 32 degrees F prior to concrete placement.

2. Maintain concrete temperature above 50 degrees F for at least 3 days after placement.

3.04 PUMPING OF CONCRETE

A. If pumped concrete does not produce satisfactory results, in the judgment of the Resident Project Representative, discontinue pumping operations and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment: Use a 2-cylinder pump designed to operate with only one cylinder if one is not functioning or have a standby pump on site during pumping.

C. The minimum hose (conduit) diameter: Comply with ACI 304.2R.

D. Replace pumping equipment and hoses (conduits) that do not function properly.

E. Do not use aluminum conduits for conveying concrete.

F. Field Control: Take samples for slump, air content and test cylinders at the placement (discharge) end of the line.

3.05 CONCRETE PLACEMENT SEQUENCE

A. Place concrete in a sequence acceptable to the Engineer. To minimize effects of shrinkage, place concrete in units bounded by construction joints shown. Place alternate units so each unit placed has cured at least 7 days for hydraulic structures, or 3 days for other structures, before contiguous unit or units are placed, except do not place corner sections of vertical walls until the 2 adjacent wall panels have cured at least 14 days for hydraulic structures and 7 days for other structures.

B. Level the concrete surface whenever a run of concrete is stopped. To ensure straight and level joints on the exposed surface of walls, tack a wood strip at least 3/4-inch thick to the forms on these surfaces. Carry concrete about 1/2 inch above the underside of the strip. About one hour after concrete is placed, remove the strip, level irregularities in the edge formed by the strip with a trowel and remove laitance.

3.06 TAMPING AND VIBRATING

A. Thoroughly settle and compact concrete throughout the entire depth of the layer being consolidated, into a dense, homogeneous mass; fill corners and angles, thoroughly embed reinforcement, eliminate rock pockets and bring only a slight excess of water to the exposed surface of concrete during placement. Use ACI 309R Group 3 immersion-type high-speed power vibrators (8,000 to 12,000 rpm) in sufficient number and with sufficient (at least one) standby units. Use Group 2 vibrators only when accepted by the Resident Project Representative for specific locations.

B. Use care in placing concrete around waterstops. Carefully work concrete by rodding and vibrating to make sure air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, work concrete under waterstops by hand, making sure air and rock pockets have been eliminated. Give concrete surrounding the waterstops additional vibration beyond that used for adjacent concrete placement to assure complete embedment of waterstops in concrete.

C. Concrete in Walls: Internally vibrate, ram, stir, or work with suitable appliances, tamping bars, shovels or forked tools until concrete completely fills forms or excavations and closes snugly against all surfaces. Do not place subsequent layers of concrete until previously-placed layers have been so worked. Provide vibrators in sufficient numbers, with standby units as required to accomplish the results specified within 15 minutes after concrete of specified consistency is placed in the forms. Keep vibrating heads from contact with form surfaces. Take care not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 PLACING MASS CONCRETE

Observe the following additional restrictions when placing mass concrete.

A. Use specified superplasticizer.

B. Maximum temperature of concrete when deposited: 70 degrees F.

C. Place in lifts approximately 18 inches thick. Extend vibrator heads into previously-placed layer.

3.08 REPAIRING SURFACE DEFECTS AND FINISHING

Conform to the section entitled, “Concrete Finishing.”

3.09 CURING

Conform to the section entitled, “Concrete Curing.”

3.10 PROTECTION

A. Protect concrete against damage until final acceptance by the Owner.

B. Protect fresh concrete from damage due to rain, hail, sleet or snow. Provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

C. Do not backfill around concrete structures or subject them to design loadings until all components of the structure needed to resist the loading are complete and have reached the specified 28-day compressive strength, except as authorized otherwise by the Engineer.

END OF SECTION

SECTION 03350

CONCRETE FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repairing surface defects.

B. Finishing concrete surfaces including both formed and unformed surfaces.

C. Sealing concrete surfaces.

D. Installation of concrete fill and installation of concrete topping in bottoms of clarifiers and thickeners.

1.02 RELATED SECTIONS

SECTION 03055 – Concrete Structures
SECTION 03310 – Structural Concrete
SECTION 03390 – Concrete Curing
SECTION 03600 – Structural Grout

1.03 REFERENCES

AASTM C144 – Standard Specification for Aggregate for Masonry Mortar.
ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
ASTM D4587 – Standard Practice for Fluorescent UV-Condensation of Paint and Related Coatings
ASTM E1155 – Standard Test Method for Determining Floor Flatness and Levelness Using the F Number System.

1.04 SUBMITTALS

A. Conform to Submittals Specification.

B. Submit manufacturer's technical literature on the following products proposed for use. Include manufacturer's installation and application instructions and, where specified, manufacturer's certification of conformance to requirements and suitability for use in the applications indicated.

1. Floor hardener.
2. Sealer.

3. Epoxy floor topping.
4. Epoxy penetrating sealer.
5. Latex bonding agent.
6. Epoxy adhesive.
7. Abrasive aggregate.
8. Evaporation retardant.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sealer/Dustproofer (VOC Compliant): Water-based acrylic sealer; non-yellowing under ultraviolet light after 200-hour test in accordance with ASTM D4587. Conform to local, state and federal solvent emission requirements.

B. Epoxy Floor Topping: Two-component epoxy resin meeting ASTM C881 Type III, resistant to wear, staining and chemical attack, blended with granite, sand, trap rock or quartz aggregate, trowel-applied over concrete floor. Topping thickness, 1/8 inch; color, gray.

C. Abrasive Aggregate for Nonslip Finish: Fused aluminum oxide grit, or crushed emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Material shall be factory graded, packaged, rustproof and non-glazing, and unaffected by freezing, moisture and cleaning materials.

D. Epoxy Penetrating Sealer: Low-viscosity, two-component epoxy system designed to give maximum penetration into concrete surfaces. Sealer shall completely seal concrete surfaces from penetration of water, oil and chemicals; prevent dusting and deterioration of concrete surfaces caused by heavy traffic; and be capable of adhering to floor surfaces subject to hydrostatic pressure from below. Color, transparent amber or gray; surface, nonslip.

E. Latex Bonding Agent: Non re-dispersible latex base liquid conforming to ASTM C1059. When used in water and wastewater treatment structures, bonding agent shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required.

F. Bonding Grout: Prepare bonding grout by mixing approximately one part cement to one part fine sand meeting ASTM C 144 but with 100 percent passing No. 30 mesh sieve. Mix with water to consistency of thick cream. At Contractor's option, a commercially-prepared bonding agent used in accordance with manufacturer's recommendations and instructions may be used. When used in water and wastewater treatment structures, bonding agent shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required. Submit manufacturer's technical information on proposed bonding agent.

G. Patching Mortar

1. Make patching mortar of same materials and of approximately same proportions as concrete, except omit coarse aggregate. Substitute white Portland cement for part of gray Portland cement on exposed concrete in order to match color of surrounding concrete. Determine color by making trial patch. Use minimum amount of mixing water required for handling and placing. Mix patching mortar in advance and allow to stand. Mix frequently with trowel until it has reached stiffest consistency that will permit placing. Do not add water.

2. Proprietary compounds for adhesion or specially formulated cementitious repair mortars may be used in lieu of or in addition to foregoing patching materials provided that properties of bond and compressive strength meet or exceed the foregoing and color of surrounding concrete can be matched where required. Use such compounds according to manufacturer's recommendations. When used in water and wastewater treatment structures, material shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required.

H. Epoxy Adhesive: Two-component, 100 percent solids, 100 percent reactive compound developing 100 percent of strength of concrete, suitable for use on dry or damp surfaces. Epoxy used to inject cracks and as a binder in epoxy mortar shall meet ASTM C 881, Type VI. Epoxy used as a bonding agent for fresh concrete shall meet ASTM C 881, Type V.

I. Non-shrink Grout: See Section 03600 - Structural Grout.

J. Spray-Applied Coating: Acceptable products are Thoro System Products “Thoroseal Plaster Mix” or equal. Color: Gray.

K. Concrete Topping: Class H concrete with 3/8-inch maximum coarse aggregate size, as specified in the Section 03310 – Structural Concrete.

L. Concrete Fill: Class H concrete with 3/8-inch maximum coarse aggregate size, (Class C where fill thickness exceeds 3 inches throughout a placement), as specified in the Section 03310 – Structural Concrete.

M. Evaporation Retardant: Confilm, manufactured by Master Builders; Eucobar, manufactured by Euclid Chemical Company; or equal.

PART 3 EXECUTION

3.01 AGGREGATE CONCEALMENT

Unless indicated otherwise on Drawings or approved by Engineer, all surfaces to be finished shall be free of exposed aggregate.

3.02 REPAIRING SURFACE DEFECTS

A. Defective Areas: Repair immediately after removal of forms. Remove honeycombed and other defective concrete down to sound concrete but in no case to a depth less than one inch. Make edges of cuts perpendicular to concrete surface. Thoroughly work bonding grout into the surface with a brush as that the entire surface is covered. Alternatively, a proprietary bonding agent may be used. Use bonding agent in accordance with manufacturer's instructions. While bonding coat is still tacky, apply premixed patching mortar. Thoroughly consolidate mortar into place and strike off to leave patch slightly higher than surrounding surface. To permit initial shrinkage, leave undisturbed for at least 1 hour before final finishing. Keep patched area damp for 7 days. Alternatively, a proprietary cementitious repair mortar may be used and placed in accordance with manufacturer's instructions. Do not use metal tools in finishing patches in formed walls which will be exposed.

B. Tie Holes: Patch holes immediately after removal of forms. After cleaning and roughening with a wire brush on a rotary drill, thoroughly dampen tie hole and fill solid with patching mortar. Taper tie holes shall have the plug, specified in Section 03055 –Concrete Structures, driven into the hole to the center of the wall before grouting. Completely fill taper tie holes with patching mortar except that non-shrink grout shall be used for all walls in contact with soil or liquid. On wall faces exposed to view, fill the outer 2 inches of the taper tie hole with patching mortar blended to match adjacent concrete.

C. Cracks: Repair cracks in excess of 0.01 inch by pressure injection of moisture-insensitive epoxy-resin system. Submit proposed material and method of repair for approval prior to making repairs.

D. Structural Repair: When required, make structural repairs after prior approval of Engineer as to method and procedure, using specified epoxy adhesive or approved epoxy mortar.

3.03 FINISHING OF FORMED SURFACES

A. Unfinished Surfaces: Finish is not required on surfaces concealed from view in completed structure by earth, ceilings or similar cover, unless indicated otherwise on Drawings.

B. Rough Form Finish

1. No form facing material is required on rough form finish surfaces.

2. Patch tie holes and defects. Chip off fins exceeding 1/4 inch in height.

3. Rough form finish may be used on concrete surfaces which will be concealed from view by earth in completed structure, except concealed surfaces required to have smooth form finish, as shown on Drawings.

C. Smooth Form Finish

1. Form facing shall produce smooth, hard, uniform texture on concrete. Use plywood or fiberboard linings or forms in as large sheets as practicable, and with smooth, even edges and close joints.

2. Patch tie holes and defects. Rub fins and joint marks with wooden blocks to leave smooth, unmarred finished surface.

3. Provide smooth form finish on the wet face of formed surfaces of water-holding structures, and of other formed surfaces not concealed from view by earth in completed structure, except where otherwise indicated on Drawings. Walls that will be exposed after future construction, at locations indicated on Drawings, shall have smooth form finish. Smooth form finish on exterior face of exterior walls shall extend 2 feet below final top of ground elevation. Exterior face of all perimeter grade beams shall have smooth form finish for full depth of grade beam.

D. Rubbed Finish

1. Use plywood or fiberboard linings or forms in as large sheets as practicable, and with smooth, even edges and close joints.

2. Remove forms as soon as practicable, repair defects, wet surfaces, and rub with No. 16 carborundum stone or similar abrasive. Continue rubbing sufficiently to bring surface paste, remove form marks and fins, and produce smooth, dense surface of uniform color and texture. Do not use cement paste other than that drawn from concrete itself. Spread paste uniformly over surface with brush. Allow paste to reset, then wash surface with clean water.

3. Use rubbed finish at locations indicated on Drawings, except where rubbed finish is indicated for a wall which will be containing a liquid, use spray-applied coating.

E. Spray-applied Coating: At Contractor's option, in lieu of rubbed finish, spray-applied coating may be applied after defects have been repaired and fins removed. Remove form oil, curing compound and other foreign matter that would prevent bonding of coating. Apply coating in uniform texture and color in accordance with coating manufacturer's instructions.

F. Related Unformed Surfaces: Tops of piers, walls, bent caps, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed. Float unformed surfaces to texture reasonably consistent with that of formed surfaces. Continue final treatment on formed surfaces uniformly across unformed surfaces.

3.04 HOT WEATHER FINISHING

When hot weather conditions exist, as defined by Section 03310 – Structural Concrete" and as judged by the Engineer, apply evaporation retardant to the surfaces of slabs, topping and concrete fill placements immediately after each step in the finishing process has been completed.

3.05 FINISHING SLABS AND SIMILAR FLAT SURFACES TO CLASS A, B, AND C TOLERANCES

A. Apply Class A, B, and C finishes at locations indicated on Drawings.

B. Shaping to Contour: Use strike-off templates or approved compacting-type screeds riding on screed strips or edge forms to bring concrete surface to proper contour. See Section 03055 – Concrete Structures for edge forms and screeds.

C. Consolidation and Leveling: Concrete to be consolidated shall be as stiff as practicable Thoroughly consolidate concrete in slabs and use internal vibration in beams and girders of framed slabs and along bulkheads of slabs on grade. Consolidate and level slabs and floors with vibrating bridge screeds, roller pipe screeds or other approved means. After consolidation and leveling, do not permit manipulation of surfaces prior to finishing operations.

D. Tolerances for Finished Surfaces: Check tolerances by placing straightedge of specified length anywhere on slab. Gap between slab and straightedge shall not exceed tolerance listed for specified class.

Class	Straight Edge Length in Feet	Tolerance in Inches
A	10	1/8
B	10	1/4
C	2	1/4

E. Raked Finish: After concrete has been placed, struck off, consolidated and leveled to Class C tolerance, roughen surface before final set. Roughen with stiff brushes or rakes to depth of approximately ¼-inch. Notify Engineer prior to placing concrete requiring initial raked surface finish so that acceptable raked finish standard may be established for project. Protect raked, base-slab finish from contamination until time of topping. Provide raked finish for following:

1. Surfaces to receive bonded concrete topping or fill.
2. Steep ramps, as noted on Drawings.
3. Additional locations as noted on Drawings.

F. Float Finish

1. After concrete has been placed, struck off, consolidated and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, or when mix has stiffened sufficiently to permit proper operation of power-driven float. Consolidate surface with power-driven floats. Use hand floating with wood or cork-faced floats in locations inaccessible to power-driven machine and on small, isolated slabs.

2. After initial floating, re-check tolerance of surface with 10-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots to Class B tolerance. Immediately re-float slab to a uniform, smooth, granular texture.

3. Provide float finish at locations not otherwise specified and not otherwise indicated on Drawings.

G. Trowel Finish

1. Apply float finish as previously specified. After power floating, use power trowel to produce smooth surface, which is relatively free of defects, but which may still contain some trowel marks. Do additional troweling by hand after surface has hardened sufficiently. Do final troweling when ringing sound is produced as trowel is moved over surface. Thoroughly consolidate surface by hand troweling operations.

2. Produce finished surface free of trowel marks, uniform in texture and appearance and conforming to Class A tolerance. On surfaces intended to support floor coverings, remove defects which might show through covering by grinding.

3. Provide trowel finish for floors which will receive floor covering and additional locations indicated on Drawings.

H. Broom or Belt Finish

1. Apply float finish as previously specified. Immediately after completing floated finish, draw broom or burlap belt across surface to give coarse transverse scored texture.

2. Provide broom or belt finish at locations indicated on Drawings.

3.06 FINISHING SLABS AND SIMILAR FLAT SURFACES TO “F NUMBER SYSTEM” FINISH

A. Shaping to Contour: Use strike-off templates or approved compacting-type screeds riding on screed strips or edge forms to bring concrete surface to proper contour. Edge forms and screeds: Conform to Section 03055 –Concrete Structures.

B. Consolidation and Leveling: Concrete to be consolidated shall be as dry as practicable. Thoroughly consolidate concrete in slabs and use internal vibration in beams and girders of framed slabs and along bulkheads of slabs on grade. Consolidate and level slabs and floors with vibrating bridge screeds, roller pipe screeds or other approved means. After consolidation and leveling, do not manipulate surfaces prior to finishing operations.

C. Tolerances for Finished Surfaces: Independent testing laboratory will check floor flatness and levelness in accordance with paragraph 3.12, Field Quality Control.

D. Float Finish

1. After concrete has been placed, struck off, consolidated and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, or when mix has stiffened sufficiently to permit proper operation of power-driven float. Consolidate surface with power-driven floats. Use hand floating with wood or cork-faced floats in locations inaccessible to power-driven machine and on small, isolated slabs.

2. Check tolerance of surface after initial floating with a 10-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots. Immediately refloat slab to uniform, smooth, granular texture to FF20/FL17 tolerance, unless shown otherwise on Drawings.

3. Provide “F Number System” float finish at locations indicated on Drawings.

E. Trowel Finish

1. Apply float finish as previously specified. After power floating, use power trowel to produce smooth surface, which is relatively free of defects, but which may still contain some trowel marks. Do additional troweling by hand after surface has hardened sufficiently. Do final troweling when ringing sound is produced as trowel is moved over surface. Thoroughly consolidate surface by hand troweling operations.

2. Produce finished surface free of trowel marks, uniform in texture and appearance and conforming to an FF25/FL20 tolerance for slabs on grade and FF25/FL17 for elevated slabs, unless shown otherwise on Drawings. On surfaces intended to support floor coverings, remove defects, which might show through covering, by grinding.

3.07 BONDED CONCRETE TOPPING AND FILL

A. Surface Preparation

1. Protect raked, base-slab finish from contamination until time of topping. Mechanically remove oil, grease, asphalt, paint, clay stains or other contaminants, leaving clean surface.

2. Prior to placement of topping or fill, thoroughly dampen roughened slab surface and leave free of standing water. Immediately before topping or fill is placed, scrub coat of bonding grout into surface. Do not allow grout to set or dry before topping or fill is placed.

B. Concrete Fill

1. Where concrete fill intersects a wall surface at an angle steeper than 45 degrees from vertical, provide a 1.5-inch deep keyway in the wall at the point of intersection; size keyway so that no portion of the concrete fill is less than 1.5 inches thick. Form keyway

in new walls; create by saw cutting the top and bottom lines and chipping in existing walls.

2. Apply wood float finish to surfaces of concrete fill.

3. Provide concrete fill at locations shown on Drawings.

3.08 EPOXY PENETRATING SEALER

A. Surfaces to receive epoxy penetrating sealer: Apply wood float finish. Clean surface and apply sealer in compliance with manufacturer's instructions.

B. Rooms with concrete curbs or bases: Continue application of floor coating on curb or base to its juncture with masonry wall. Rooms with solid concrete walls or wainscots: Apply minimum 2-inch-high coverage of floor coating on vertical surface.

C. Mask walls, doors, frames and similar surface to prevent floor coating contact.

D. When coving floor coating up vertical concrete walls, curbs, bases or wainscots, use masking tape or other suitable material to keep a neat level edge at top of cove.

E. Provide epoxy penetrating sealer at locations indicated on Drawings.

3.09 EPOXY FLOOR TOPPING

A. Surfaces to receive epoxy floor topping: Apply wood float finish unless recommended otherwise by epoxy floor topping manufacturer. Clean surface and apply epoxy floor topping in compliance with manufacturer's recommendations and instructions. Thickness of topping: 1/8 inch.

B. Rooms with concrete curbs or bases: Continue application of floor coating on curb or base to its juncture with masonry wall. Rooms with solid concrete walls or wainscots: apply 2-inch-high coverage of floor coating on vertical surface.

C. Mask walls, doors, frames and similar surfaces to prevent floor coating contact.

D. When coving floor coating up vertical concrete walls, curbs, bases or wainscots, use masking tape or other suitable material to keep a neat level edge at top of cove.

E. Finished surface shall be free of trowel marks and dimples.

F. Provide epoxy floor topping at locations indicated on Drawings.

3.10 SEALER/DUSTPROOFER

Where sealer or sealer/dustproofer is indicated on Drawings, just prior to completion of construction, apply coat of specified clear sealer/dustproofing compound to exposed interior concrete floors in accordance with manufacturer's instructions.

3.11 NONSLIP FINISH

A. Apply float finish as specified. Apply two-thirds of required abrasive aggregate by method that ensures even coverage without segregation and re-float. Apply remainder of abrasive aggregate at right angles to first application, using heavier application of aggregate in areas not sufficiently covered by first application. Re-float after second application of aggregate and complete operations with troweled finish. Perform finishing operations in a manner that will allow the abrasive aggregate to be exposed and not covered with cement paste.

B. Provide nonslip finish at locations indicated on Drawings.

3.12 FIELD QUALITY CONTROL

A. Flatness and levelness of slabs and similar flat surfaces that are indicated on Drawings to receive "F Number System" finish will be checked by independent testing laboratory employed by Owner in accordance with Section 01410 – Testing Laboratory Services.

B. Tolerances for "F Number System" finished surfaces:

1. Floor tolerance shall be determined in accordance with ASTM E1155.

2. Floor flatness and levelness tolerances:

a. F_F defines maximum floor curvature allowed over 24 inches. Computed on the basis of successive 12-inch elevation differentials, FF is commonly referred to as the "flatness F-Number."

b. $F_F = 4.57$
Maximum difference in elevation, in decimal inches,
between successive 12-inch elevation differences.

c. F_L defines relative conformity of floor surface to horizontal plane as measured over 10-foot distance. FL is commonly referred to as "levelness F-number."

d. $F_L = 12.5$
Maximum difference in elevation, in inches,
between two points separated by 10 feet.

3. Achieve specified overall slab tolerance. Minimum local tolerance (1/2 bay, unless otherwise designated by Engineer): 2/3 of specified tolerance.

4. Tolerance for floated finish: FF20/FL17, unless otherwise shown on Drawings.

5. Tolerance for troweled finish: FF25/FL20 for slabs on grade, and FF25/FL17 for elevated slabs, unless otherwise shown on Drawings.

3.13 CURING

Conform to requirements of Section 03390 – Concrete Curing.

END OF SECTION

SECTION 03390

CONCRETE CURING

PART 1 GENERAL

1.01 SCOPE

This Section governs the curing of structural concrete.

1.02 REFERENCES

ACI 308 - Standard Specification for Curing Concrete.
ASTM C171 - Standard Specifications for Sheet Materials for Curing Concrete.
ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM D4587 - Conducting Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.

1.03 DEFINITIONS

Mass Concrete: Concrete sections 4 feet or more in least dimension.

1.04 SUBMITTALS

A. Conform to Submittals Specification.

B. Product Data: Submit description of proposed curing method for concrete. When use of membrane-forming compound is proposed, submit manufacturer's technical information including material specifications, installation instructions and recommendations, and evidence that compound is satisfactory for intended application. State locations where curing compound will be used.

C. When membrane-forming compounds are to be used, submit certification by the manufacturer of compliance with specified requirements and compatibility with toppings, coatings, finishes, and adhesives to be applied.

PART 2 PRODUCTS

2.01 MATERIALS

A. Membrane-forming Curing Compound: Conform to ASTM C309, Type 1D, and following requirements.

1. Minimum solids content: 30 percent.

2. Compound shall not permanently discolor concrete. When used for liquid- containing structures, curing compound shall be white-pigmented.

3. When used in areas that are to be coated, or that will receive topping or floor covering, material shall not reduce bond of coating, topping, or floor covering to concrete. Curing compound manufacturer's technical information shall state conditions under which compound will not prevent bond.

4. Conform to local, state and federal solvent emission requirements.

B. Clear Curing and Sealing Compound (VOC Compliant): Conform to ASTM C 309, Type 1, Class B, and the following requirements: 30 percent solids content minimum; non-yellowing under ultraviolet light after 500-hour test in accordance with ASTM D 4587. Sodium silicate compounds are not permitted. Conform to local, state and federal solvent emission requirements.

C. Sheet Material for Curing Concrete: ASTM C171; waterproof paper, polyethylene film or white burlap-polyethylene sheeting.

D. Curing Mats (for use in Curing Method 2): Heavy shag rugs or carpets, or cotton mats quilted at 4 inches on center; 12 ounce per square yard minimum weight when dry.

E. Water for curing: Clean and potable.

PART 3 EXECUTION

3.01 CURING PROCEDURES

A. Comply with ACI 308 and the requirements specified herein. Protect freshly-deposited concrete from premature drying and excessively hot or cold temperatures. Maintain minimal moisture loss and relatively constant temperature during time necessary for hydration of cement and proper hardening of concrete.

B. Unformed Surfaces: For concrete surfaces not in contact with forms, use one of following procedures immediately after completion of placement and finishing.

1. Ponding or continuous sprinkling.

2. Absorptive mat or fabric kept continuously wet.

3. Sand or other covering kept continuously wet.

4. Continuous steam bath (not exceeding 150 degrees F at surface of concrete).

5. Vapor mist bath.

6. Membrane-forming curing compound applied according to manufacturer's recommendations. After the curing compound has dried, wet slab surfaces and cover with waterproof paper, polyethylene film, or white burlap-polyethylene sheeting after the application of the curing compound. Tape sheet seams together and provide sufficient weights to keep the sheeting in place. Wet the slab surface again if the sheeting becomes dislodged and replace the sheeting.

7. Other moisture-retaining coverings as approved by Engineer.

C. Restrictions on Use of Curing Compounds: Unless curing compound manufacturer certifies that curing compound will not prevent bond to cured surface, do not use curing compound on surfaces that will be rubbed or receive additional concrete, mortar, topping, terrazzo or other cementitious finishing materials, on slabs under resilient floors or built-up roofing, or on surfaces to be waterproofed, sealed, hardened or painted.

D. Curing and Sealing Compounds: At locations indicated, cure exposed interior slabs and troweled slabs receiving mastic-applied adhesives with specified clear curing and sealing compound in accordance with manufacturer's recommendations. Do not store materials directly on curing membranes. Use plywood to protect curing membrane from damage. Immediately repair membranes damaged by foot traffic or other operations.

E. Duration of Curing: Continue curing until cumulative number of days or fractions of days during which ambient temperature is above 50 degrees F has totaled 7. Continue curing of water-retaining structures for a total of 14 days. When high-early-strength concrete has been used, continue curing for total of 3 days. Prevent rapid drying at end of curing period.

F. Formed Surfaces: During the curing period keep wet steel forms heated by sun and wood forms in contact with concrete. When forms are to be removed during curing period, employ curing materials or methods immediately. Continue such curing for remainder of curing period.

G. Temperature:

1. Cold Weather. When mean daily temperature of atmosphere is less than 40 degrees F, maintain temperature of concrete between 50 and 70 degrees F for required curing period. When necessary, make arrangements for heating, covering, insulating or housing concrete work in advance of placement to maintain required temperature and moisture conditions. Prevent damage or injury due to concentration of heat. When combustion heaters are necessary in enclosed or protected area where concrete slabs are being placed, vent heaters.

2. Hot Weather. In advance of placement make arrangements for shading, fog spraying, sprinkling, ponding or installation of windbreaks or wet covering of light color. Take such protective measures as quickly as concrete hardening and finishing operations will allow.

3. Temperature Changes. Control so rate of change in temperature of concrete is as uniform as possible. Do not permit temperature change to exceed 5 degrees F in any one hour or 50 degrees F in any 24-hour period.

H. Protection from Mechanical Injury. During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. Protect finished concrete surfaces from damage caused by construction equipment, materials or methods, and by rain or running water. Do not load self-supporting structures in a way that over stresses concrete.

3.02 CURING MASS CONCRETE

Observe the following additional restrictions when curing mass concrete.

A. Minimum curing period: 2 weeks.

B. When ambient air temperature falls below 32 degrees F, protect surface of concrete against freezing.

C. Do not use steam or other curing methods that will add heat to concrete.

D. Keep forms and exposed concrete continuously wet for at least the first 48 hours after placing, and whenever surrounding air temperature is above 90 degrees F during final curing period.

E. During 2-week curing period, provide necessary controls to prevent ambient air temperature immediately adjacent to concrete from falling more than 30 degrees F in 24 hours.

END OF SECTION

SECTION 03600

STRUCTURAL GROUT

PART 1 GENERAL

1.01 SCOPE

This Section governs the application of non-shrink grout used wherever grout is shown in the Documents, unless another type is specifically referenced. Two classes of non-shrink grout (Class I and II) and areas of application are specified.

1.02 REFERENCES

CRD C621 - Corps of Engineers Specification for Non-shrink Grout
ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)
ASTM C230 - Specifications for Flow Table for use in Tests of Hydraulic Cement
ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

1.03 SUBMITTALS

A. Conform to Submittals Specification.

B. Quality Control:

1. The Contractor shall submit manufacturer's literature certifying compliance with the specified properties for Class I and II grouts.

2. The Contractor shall submit manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

C. The Contractor shall submit manufacturer's written warranty as specified.

1.04 QUALITY ASSURANCE

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Resident Project Representative to ensure continued compliance with these Specifications. The specimens will be made by the Resident Project Representative or its representative.

2. Compression tests and fabrication of specimens for non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Resident

Project Representative. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.

3. Grout already placed which fails to meet the requirements of these Specifications is subject to removal and replacement no additional cost to the owner.

4. The cost of laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Resident Project Representative in obtaining specimens for testing. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. The Contractor shall supply materials necessary for fabricating the test specimens.

B. Warranty

1. Provide one-year warranty for work provided under this Section.

2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to only the purchase price of products or materials furnished.

3. Manufacturer shall warrant participation with Contractor in replacing or repairing grout found to be defective due to faulty materials, as determined by industry standard test methods.

PART 2 PRODUCTS

2.01 APPLICATION

A. The following is a listing of typical applications and the corresponding type of grout which is to be used. Unless indicated otherwise, grouts shall be provided as listed below whether or not called for on the Drawings.

Application:	Type of Grout
Structural member base plates	Non-shrink Class II
Storage tanks and other equipment	Non-shrink Class I
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-shrink Class II (Class I where placement time exceeds 15 minutes)
Under precast concrete elements	Non-shrink Class I
Toppings and concrete fill less than 3 inches thick	Concrete Topping per the section entitled, “STRUCTURAL CONCRETE”
Toppings and concrete fill greater than 3 inches thick	Concrete Fill per the section entitled, “STRUCTURAL CONCRETE”
Any application not listed above, where grout is called for on the Drawings	Non-shrink Class I, unless noted otherwise

2.02 PREPACKAGED GROUTS

A. Basic Requirements for Cementitious Non-Shrink Grout

1. Provide prepackaged non-shrink grout that is inorganic, flowable, non-gas-liberating, non-metallic, and cement-based, requiring only the addition of water.

2. Deliver grout in original packaging with manufacturer's instructions printed on each container.

3. Select the specific formulation for each class of non-shrink grout specified to conform to that recommended by the manufacturer for the particular application.

4. Compressive strength at 28 days: 7000 psi minimum.

5. Do not use a grout for which the non-shrink property is based on a chemically generated gas or gypsum expansion.

B. Class I Non-Shrink Grout

1. Supply Class I Grout conforming to these specifications and to CRD C621 and ASTM C1107 Grade C and B (as modified below) when tested using the amount of water needed to achieve the following properties:
   a. Fluid consistency (20 to 30 seconds) per CRD C 611 at initial testing.
   b. Fluid consistency (45 seconds) per CRD C 611 at 30 minutes after mixing.
   c. At temperatures of 45, 73.4, and 95 degrees F.

2. To satisfy non-shrink requirements, the length change from placement to time of final set shall not have a shrinkage greater than the amount of expansion measured after final set at 3 and 14 days. The expansion at 3 and 14 days shall not exceed the 28-day expansion.

3. Fluid grout shall pass through the flow cone, with a continuous flow, 1 hour after mixing.

4. Demonstrate in tests that grout maintains contact with the baseplate to provide an minimum effective bearing area of 95 percent of the gross contact area after final set.

5. The grout packaging shall list weight, maximum amount of mixing water to be used, maximum usable working time (pot life) at flowable consistency, and temperature restrictions for preparation and placement within which grout will meet specified requirements.

C. Class II Non-Shrink Grout

1. Supply Class II Grout confirming to ASTM C1107 and the following requirements when tested using the amount of water needed to achieve the following properties:
   a. Flowable consistency: 140 percent flow on ASTM C 230, five drops in 30 seconds.
   b. Fluid working time: 15 minutes, minimum.

c. Flowable duration: 30 minutes, minimum.

2. When tested, the grout shall not bleed at maximum allowed water.

2.03 CURING MATERIALS

Curing materials: As specified in the section entitled, “CONCRETE CURING” and as recommended by the manufacturer of prepackaged grouts.

2.04 CONSISTENCY

Mix grouts to the consistency necessary to completely fill the space to be grouted. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that base concrete or masonry has attained design strength before grout is placed.

B. When cementitious grouts are used on concrete surfaces, saturate the concrete surface with water for 24 hours prior to placement of cement-based grout. Upon completion of saturation period remove excess water prior to grouting.

3.02 GROUTING PROCEDURES

Prepackaged Grouts: Perform mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts according to the written instructions of the manufacturer. Use prepackaged materials in the quantities and proportions as directed by the manufacturer unless there is certified test data verifying that the specified properties are attained by modified mix.

3.03 CONSOLIDATION

Place grout in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION

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.

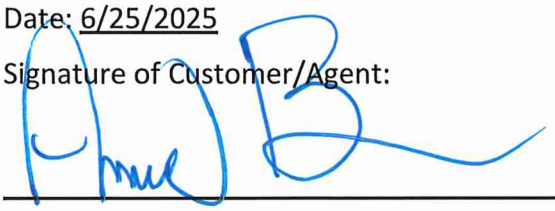
Signature

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: Andrew Belton, P.E.

Date: 6/25/2025

Signature of Customer/Agent:



Regulated Entity Name: Elle Multifamily

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: Salado Creek

Temporary Best Management Practices (TBMPs)

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

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

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

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

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

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

8. ☐ The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

☐ **Attachment E - Request to Temporarily Seal a Feature**. A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.

☒ There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. ☒ **Attachment F - Structural Practices**. A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided.

10. ☐ **Attachment G - Drainage Area Map**. A drainage area map supporting the following requirements is attached:

☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.

☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.

☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.

☒ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

☐ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.

11. ☒ **Attachment H - Temporary Sediment Pond(s) Plans and Calculations**. Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.

☐ N/A

12. ☒ **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.

13. ☒ All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. ☒ If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. ☒ Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. ☒ Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

Soil Stabilization Practices

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

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

18. ☒ Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. ☒ Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

Administrative Information

20. ☒ All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.

21. ☒ If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. ☒ Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

ATTACHMENT A

Attachment A – Spill Response Actions

In the event of an accidental leak or spill:

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

In the event of an accidental significant or hazardous spill:

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

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

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

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

- Other agencies which may need to be consulted include, but are not limited to, the City Police Department, County Sheriff Office, Fire Departments, etc.

- Contaminated soils will be sampled for waste characterization. When the analysis results are known the contaminated soils will be removed from the site and disposed in a permitted landfill in accordance with applicable regulations.

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

ATTACHMENT B

Attachment B – Potential Sources of Contamination

Other potential sources of contamination during construction include:

Potential Source	Preventative Measure
Asphalt products used on this project.	▪ After placement of asphalt, emulsion or coatings, the contractor will be responsible for immediate cleanup should an unexpected rain occur. For the duration of the asphalt product curing time, the contractor will maintain standby personnel and equipment to contain any asphalt wash-off should an unexpected rain occur. The contractor will be instructed not to place asphalt products on the ground within 48 hours of a forecasted rain.
Oil, grease, fuel, and hydraulic fluid contamination from construction equipment and vehicle dripping.	▪ 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.
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.	▪ 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.
Miscellaneous trash and litter from construction workers and material wrappings.	▪ Trash containers will be placed throughout the site to encourage proper trash disposal.
Construction debris.	▪ 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 a level ground surface. ▪ Portable toilets will be inspected regularly for leaks and will be serviced and sanitized at time intervals that will maintain sanitary conditions.

ATTACHMENT C

Attachment C – Sequence of Major Activities

The sequence of major activities which disturb soil during construction on this site will be divided into two stages. The first is site preparation that will include clearing and grubbing of vegetation where applicable to include additional grading outside of the sewer alignment. This will disturb approximately 7.57 acre. The second is construction activities in previously cleared areas, which will include construction of sewer trenches, installation of sewer manholes, pipe, backfilling, and site cleanup, including removal of excess material. This will disturb approximately 2.10 acre as noted by the 50' sewer envelope.

ATTACHMENT D

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.

No upgradient water will cross the site. Upgradient water will be intercepted through earthen channels around the site.

b. A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.

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

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

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

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

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

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

BMP measures utilized in this plan are intended to allow stormwater to continue downstream after passing through the BMPs. This will allow stormwater runoff to continue downgradient to streams or features that may exist downstream of the site.

ATTACHMENT F

Attachment F – Structural Practices

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

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

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

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

ATTACHMENT G

Attachment G – Drainage Area Map

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

ATTACHMENT H

Attachment H – Temporary Sedimentation Pond(s) Plans and Calculations

The proposed sedimentation/filtration basins will be used as temporary sediment traps during site construction for each respective watershed. The basins will be converted to permanent basins and filter media installed after 70% of the pavement areas in each watershed have been paved.

Prior to final acceptance by the owner, the contractor will remove trash, debris and accumulated silt from each sedimentation/filtration basin and re-establish them to proper operating condition.

The minimum drain time for a full sedimentation/filtration basin is 24 hours. The contractor shall restrict the flow through the sedimentation/filtration basin by adjusting the valve on the discharge pipe so as to provide a minimum 24-hour and maximum 48-hour draw down time.

Basin volumes are based on 2-year 24-hour storm, not 3600 cf/acre

ATTACHMENT I

Attachment I – INSPECTIONS

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

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

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

ELLE MULTIFAMILY
Sewage Collection System Plan

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

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

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

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

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

PROJECT MILESTONE DATES

Date when major site grading activities begin:

Construction Activity	Date
Installation of BMPs	

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

Construction Activity	Date

Dates when stabilization measures are initiated:

Stabilization Activity	Date
Removal of BMPs	

ATTACHMENT J

Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices

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

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

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 Thomas Wells,
Print Name

Vice President,
Title - Owner/President/Other

of KC Blanco Springs MF Ltd,
Corporation/Partnership/Entity Name

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

of **Pape-Dawson Consulting Engineers, LLC**
Print Name of Firm

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

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Thomas Wells
Applicant's Signature

5-19-25
Date

THE STATE OF Texas §

County of Bexar §

BEFORE ME, the undersigned authority, on this day personally appeared Thomas Wells 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 19th day of May 2025

Nancy Denise Sullivan
NOTARY PUBLIC

NANCY DENISE SULLIVAN
Notary Public, State of Texas
Comm. Expires 06-04-2027
Notary ID 132036768

Nancy Denise Sullivan
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 6/4/2027

APPLICATION FEE FORM (TCEQ-0574)

Application Fee Form

Texas Commission on Environmental Quality
Name of Proposed Regulated Entity: Elle Multifamily
Regulated Entity Location: San Antonio, TX
Name of Customer: KC Blanco Springs MF Ltd
Contact Person: Andrew Belton, P.E. Phone: (210)375-9000
Customer Reference Number (if issued):CN _____
Regulated Entity Reference Number (if issued):RN _____

Austin Regional Office (3373)

☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362)

☒ Bexar ☐ Medina ☐ Uvalde
☐ Comal ☐ Kinney

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

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

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

Site Location (Check All That Apply):

☒ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	*Size*	*Fee Due*
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	578 L.F.	$ 650
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

Signature: _____

Date: 6/20/2025

Application Fee Schedule

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

Water Pollution Abatement Plans and Modifications

Contributing Zone Plans and Modifications

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

Organized Sewage Collection Systems and Modifications

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

Underground and Aboveground Storage Tank System Facility Plans and Modifications

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

Exception Requests

Project	*Fee*
Exception Request	$500

Extension of Time Requests

Project	*Fee*
Extension of Time Request	$150

CORE DATA FORM
(TCEQ-10400)

TCEQ Use Only

TCEQ Core Data Form

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

SECTION I: General Information

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

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

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

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

SECTION II: Customer Information

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

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

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

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

KC Blanco Springs MF Ltd

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
805612573			

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

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

13. Independently Owned and Operated?
☒ Yes ☐ No

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

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

15. Mailing Address:

903 Basse Road

City	San Antonio	State	TX	ZIP	78212	ZIP + 4	

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) 826-2600		( ) -

SECTION III: Regulated Entity Information

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

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

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

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

Elle Multifamily

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

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	Located at the intersection of the access road of N Loop 1604 W and Blanco Springs, west of Big'z Burger Joint.

26. Nearest City	State	Nearest ZIP Code
San Antonio	TX	78258

27. Latitude (N) In Decimal:	29°36'25.10"N	28. Longitude (W) In Decimal:	-98°31'49.43"

Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

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)
1542		236220	

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

34. Mailing Address:							
	City		State		ZIP		ZIP + 4	
35. E-Mail Address:							

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

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

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

SECTION IV: Preparer Information

40. Name:	Sterling Brannon, P.E.	41. Title:	Project Engineer

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(210) 375-9000		( ) -	SBrannon@pape-dawson.com

SECTION V: Authorized Signature

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

Company:	Pape-Dawson	Job Title:	Vice President
Name *(In Print)*:	Andrew Belton, P.E.	Phone:	(210) 375- 9000
Signature:		Date:	

Form **W-9**
(Rev. March 2024)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give form to the requester. Do not send to the IRS.

Before you begin. For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

Print or type. See *Specific Instructions* on page 3.

1 Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)

KC BLANCO SPRINGS MF, LTD

2 Business name/disregarded entity name, if different from above.

3a Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor ☐ C corporation ☐ S corporation ☐ Partnership ☐ Trust/estate

☑ LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) . . . . P

Note: Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner.

☐ Other (see instructions)

3b If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions . . . . . ☐

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any)

(Applies to accounts maintained outside the United States.)

5 Address (number, street, and apt. or suite no.). See instructions.

903 BASSE RD.

Requester's name and address (optional)

6 City, state, and ZIP code

SAN ANTONIO, TX 78212

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

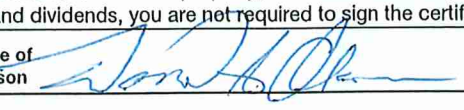
9	9	–	3	8	8	4	0	8	4

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here Signature of U.S. person  Date 7/9/2025

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9*.

What's New

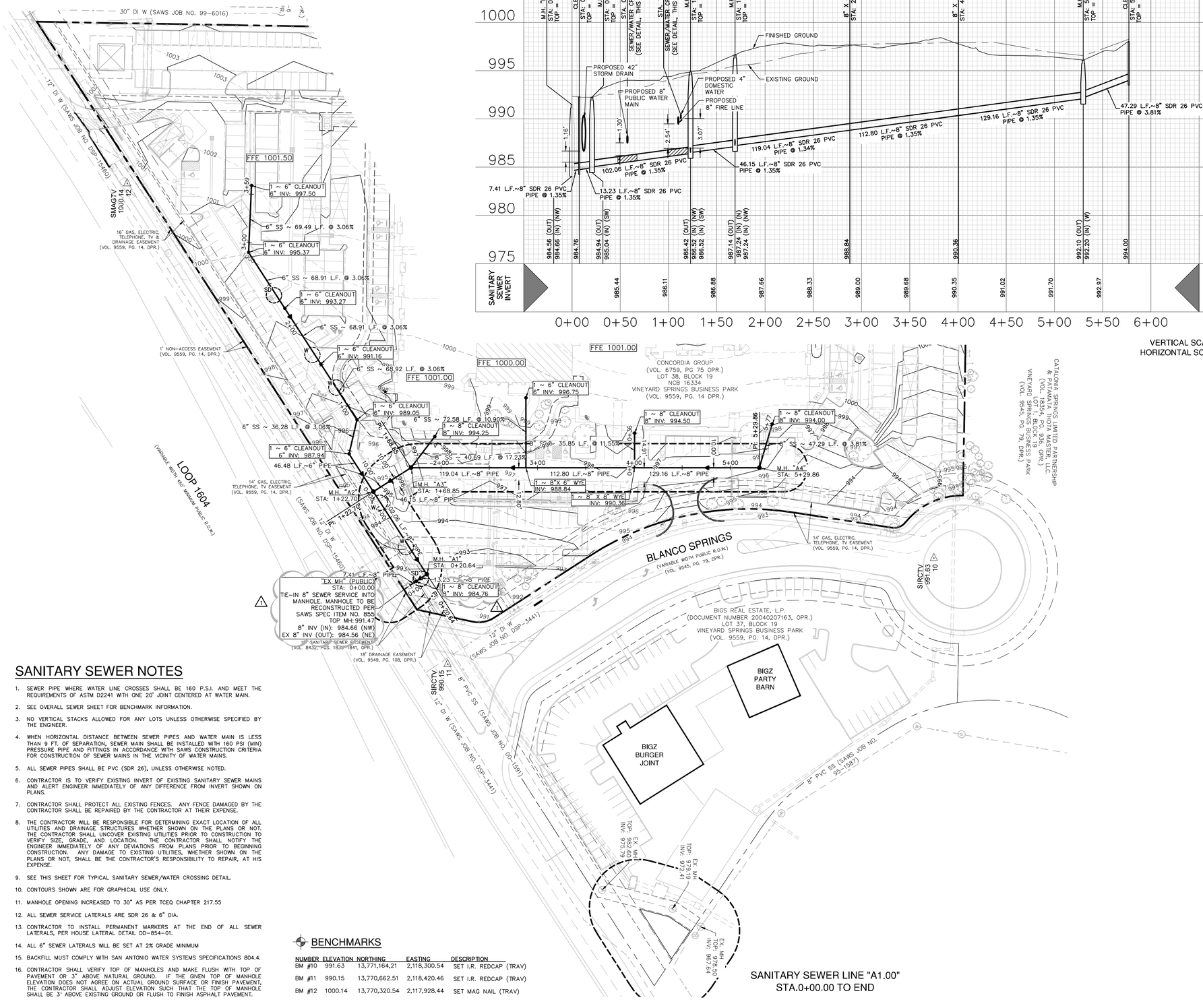
Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

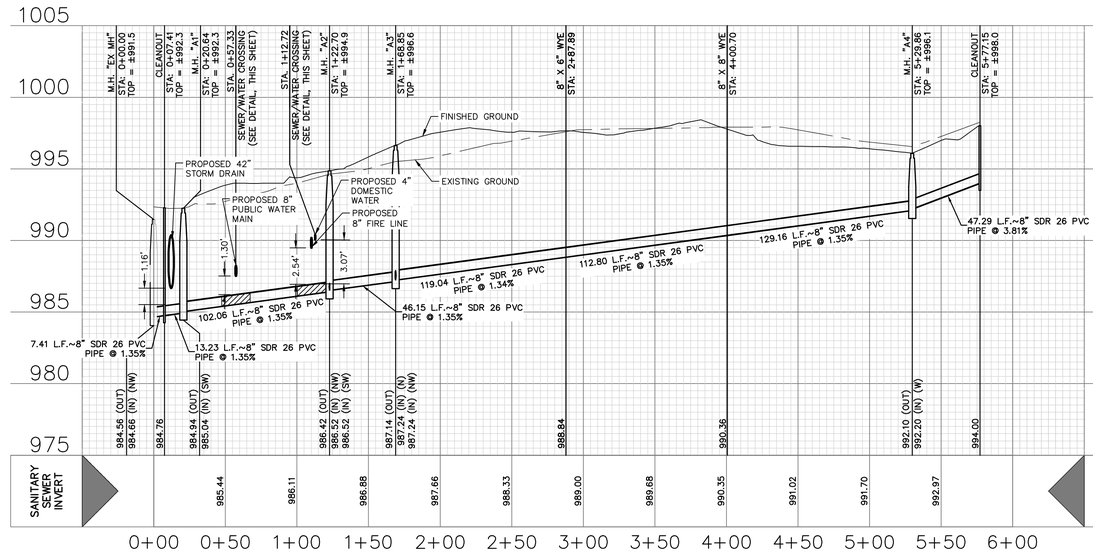
New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

Purpose of Form

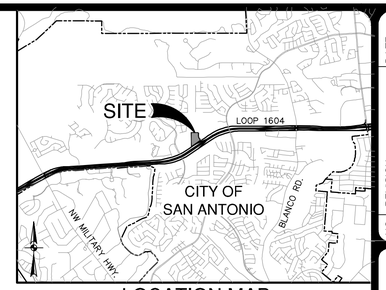
An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

FINAL PLAN AND PROFILE SHEETS





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

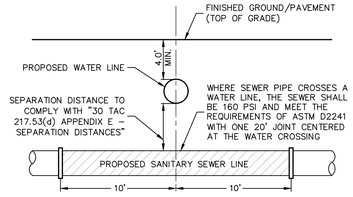


LOCATION MAP
NOT-TO-SCALE

SCALE: 1"= 50'
0' 50' 100' 150'

LEGEND

- PROPERTY LINE
- 880 EXISTING CONTOURS MAJOR
- 880 EXISTING CONTOURS MINOR
- 880 PROPOSED CONTOURS
- OHE EXISTING OVERHEAD ELECTRIC
- EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- W PROPOSED WATER MAIN
- UGE PROPOSED UNDERGROUND ELECTRIC
- PROPOSED FIRE HYDRANT
- PROPOSED IRRIGATION METER
- PROPOSED WATER METER
- EXISTING STORM DRAINAGE
- JUNCTION BOX / WITH GRATE — PROPOSED STORM DRAINAGE
- EXISTING SANITARY SEWER
- FLOW / MANHOLE — PROPOSED SANITARY SEWER
- WYE WITH 1/8 BEND
- SEWER SERVICE LATERAL
- CLEAN OUT
- 50' SANITARY SEWER ENVELOPE
- SD CAUTION!! DRAIN CROSSING/SEWER
- W CAUTION!! WATER/SEWER



TYPICAL SANITARY SEWER/WATER CROSSING DETAIL

NOT-TO-SCALE

NOTE

SEE SHEET C0.10 FOR ADDITIONAL GENERAL NOTES.

CAUTION!!

CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT 1-800-DIG-TESS A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

TRENCH EXCAVATION SAFETY PROTECTION

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

SANITARY SEWER NOTES

1. SEWER PIPE WHERE WATER LINE CROSSES SHALL BE 160 P.S.I. AND MEET THE REQUIREMENTS OF ASTM D2241 WITH ONE 20' JOINT CENTERED AT WATER MAIN.
2. SEE OVERALL SEWER SHEET FOR BENCHMARK INFORMATION.
3. NO VERTICAL STACKS ALLOWED FOR ANY LOTS UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
4. WHEN HORIZONTAL DISTANCE BETWEEN SEWER PIPES AND WATER MAIN IS LESS THAN 9 FT. OF SEPARATION, SEWER MAIN SHALL BE INSTALLED WITH 160 PSI (MIN) PRESSURE PIPE AND FITTINGS IN ACCORDANCE WITH SAWS CONSTRUCTION CRITERIA FOR CONSTRUCTION OF SEWER MAINS IN THE VICINITY OF WATER MAINS.
5. ALL SEWER PIPES SHALL BE PVC (SDR 26), UNLESS OTHERWISE NOTED.
6. CONTRACTOR IS TO VERIFY EXISTING INVERT OF EXISTING SANITARY SEWER MAINS AND ALERT ENGINEER IMMEDIATELY OF ANY DIFFERENCE FROM INVERT SHOWN ON PLANS.
7. CONTRACTOR SHALL PROTECT ALL EXISTING FENCES. ANY FENCE DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.
8. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING EXACT LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES PRIOR TO CONSTRUCTION TO VERIFY SIZE, GRADE, AND LOCATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY DEVIATIONS FROM PLANS PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR, AT HIS EXPENSE.
9. SEE THIS SHEET FOR TYPICAL SANITARY SEWER/WATER CROSSING DETAIL.
10. CONTOURS SHOWN ARE FOR GRAPHICAL USE ONLY.
11. MANHOLE OPENING INCREASED TO 30" AS PER TCEQ CHAPTER 217.55
12. ALL SEWER SERVICE LATERALS ARE SDR 26 & 6" DIA.
13. CONTRACTOR TO INSTALL PERMANENT MARKERS AT THE END OF ALL SEWER LATERALS, PER HOUSE LATERAL DETAIL DD-854-01.
14. ALL 6" SEWER LATERALS WILL BE SET AT 2% GRADE MINIMUM
15. BACKFILL MUST COMPLY WITH SAN ANTONIO WATER SYSTEMS SPECIFICATIONS 804.4.
16. CONTRACTOR SHALL VERIFY TOP OF MANHOLES AND MAKE FLUSH WITH TOP OF PAVEMENT OR 3" ABOVE NATURAL GROUND. IF THE GIVEN TOP OF MANHOLE ELEVATION DOES NOT AGREE ON ACTUAL GROUND SURFACE OR FINISH PAVEMENT, THE CONTRACTOR SHALL ADJUST ELEVATION SUCH THAT THE TOP OF MANHOLE SHALL BE 3" ABOVE EXISTING GROUND OR FLUSH TO FINISH ASPHALT PAVEMENT.

BENCHMARKS

NUMBER	ELEVATION	NORTHING	EASTING	DESCRIPTION
BM #10	991.63	13,771,164.21	2,118,300.54	SET I.R. REDCAP (TRAV)
BM #11	990.15	13,770,662.51	2,118,420.46	SET I.R. REDCAP (TRAV)
BM #12	1000.14	13,770,320.54	2,117,928.44	SET MAG NAIL (TRAV)

SANITARY SEWER LINE "A1.00"
STA.0+00.00 TO END

NO.	REVISION	DATE
1	REV. PER SAWS CTR COMMENTS	08/29/2025

8/8/2025

STATE OF TEXAS
ANDREW J. BELTON
121688
LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 | SAN ANTONIO, TX. 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

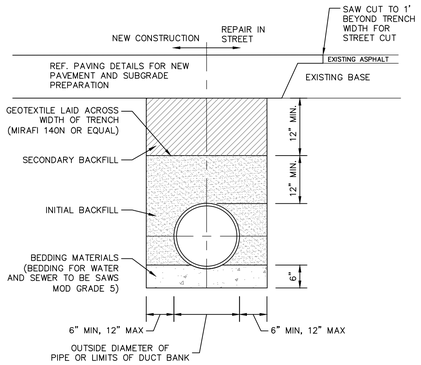
ELLE MF
SAN ANTONIO, TEXAS

SANITARY SEWER LINE A1.00 P&P - STA 0+00.00 TO END

PLAT NO. 010025
JOB NO. 13520-01
DATE JULY 2025
DESIGNER JV
CHECKED LM DRAWN JV
SHEET C5.00

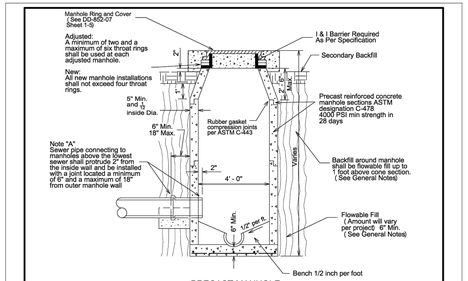
Date: October 2, 2024, 5:05 PM – User ID: ESantillan
File: P:\135\20\01\Design\Civil\SSPP-13520101.dwg

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



UTILITY & STORM DRAINAGE TRENCH

NOT-TO-SCALE

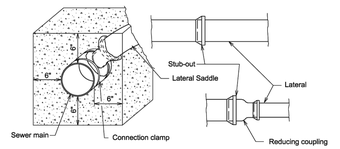


General Notes:

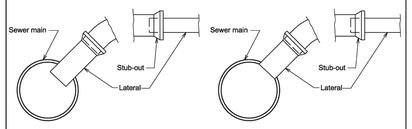
1) Material for sanitary sewer pipe must be the same from manhole to manhole. Changes in type of pipe may be made only at manholes, or special structures, except as approved by the SAWS inspector.
2) Adaptors and Concrete Collars shall be used as directed and approved by the SAWS inspector.
3) Watertight manhole rings and covers shall be Trans-Tex A77 "O" Ring or approved equal.
4) The minimum angle of flow for a connecting sewer to the direction of flow defined by a collection system is 90 degrees, unless approved by the engineer.
5) Contractor can opt to backfill with approved secondary material, subject to provisions of item 304.5.2.C.

PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	STANDARD PRECAST MANHOLE	APPROVED: May 2013	REVISED: February 2017	DD-852-01	SHEET 1 OF 2

LATERAL CONNECTION TO EXISTING SEWER MAIN



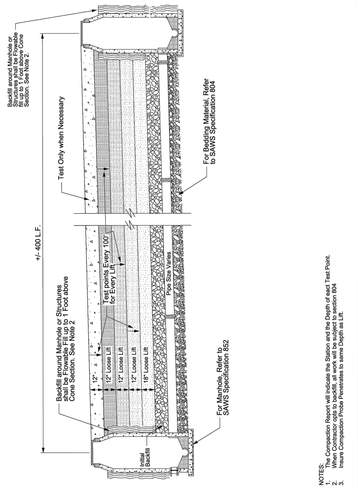
ACCEPTABLE



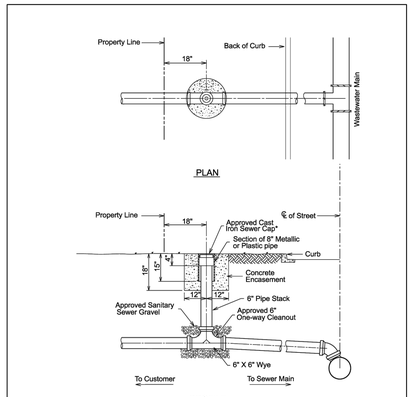
UNACCEPTABLE ACCEPTABLE

Note:
The saddle shall be permanently bonded to the existing main by the use of compounds or or clamps as recommended by the manufacturer.

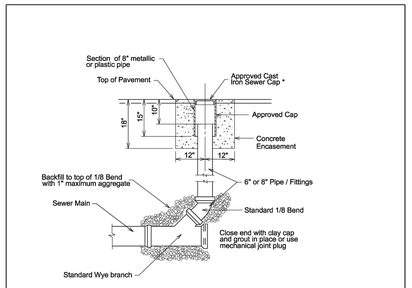
PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	LATERAL CONNECTION	APPROVED: MARCH 2008	REVISED: APRIL 2014	DD-854-03	SHEET 1 OF 1



PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	TRENCH COMPACTION DETAIL	APPROVED: MARCH 2018	REVISED: DEC 2018	DD 804-02	SHEET 1 OF 1

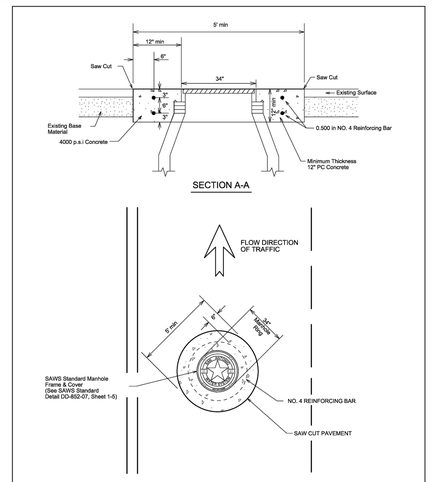


PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	TYPICAL CLEANOUT DETAIL	APPROVED: MARCH 2008	REVISED: APRIL 2014	DD-854-02	SHEET 2 OF 2



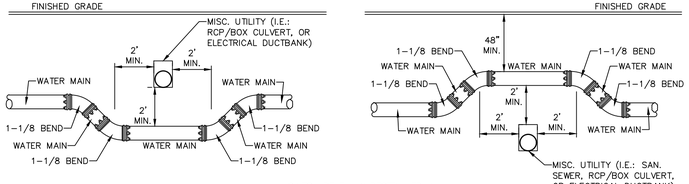
Note: Depending upon the type of service that an 8 inch lateral (on a dead end main) is providing, A standard manhole in lieu of is cleanout may be required. Consult with the SAWS Inspector.

PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	TYPICAL 6" OR 8" CLEANOUT DETAIL (ON DEAD-END MAIN)	APPROVED: MARCH 2008	REVISED: APRIL 2014	DD-854-02	SHEET 1 OF 2



NOTE:
1. The concrete shall be 4000 psi, min, and reinforced with No. 4 bars, as shown.
2. The concrete shall extend to edge of saw cut pavement.
3. Manhole Ring Encasement is required on all manholes.

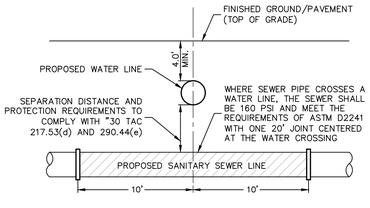
PROPERTY OF SAN ANTONIO WATER SYSTEM, SAN ANTONIO, TEXAS	MANHOLE RING ENCASEMENT DETAIL	APPROVED: AUGUST 2009	REVISED: FEBRUARY 2017	DD-852-03	SHEET 1 OF 2



ALL JOINTS ARE FULLY RESTRAINED IN ACCORDANCE WITH SAWS SPECIFICATION TABLE DD-839-06.

TYPICAL UTILITY/WATER CROSSING DETAIL

NOT-TO-SCALE



TYPICAL SANITARY SEWER/WATER CROSSING DETAIL

NOT-TO-SCALE

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 | SAN ANTONIO, TX. 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

NO. | REVISION | DATE

5/30/2025

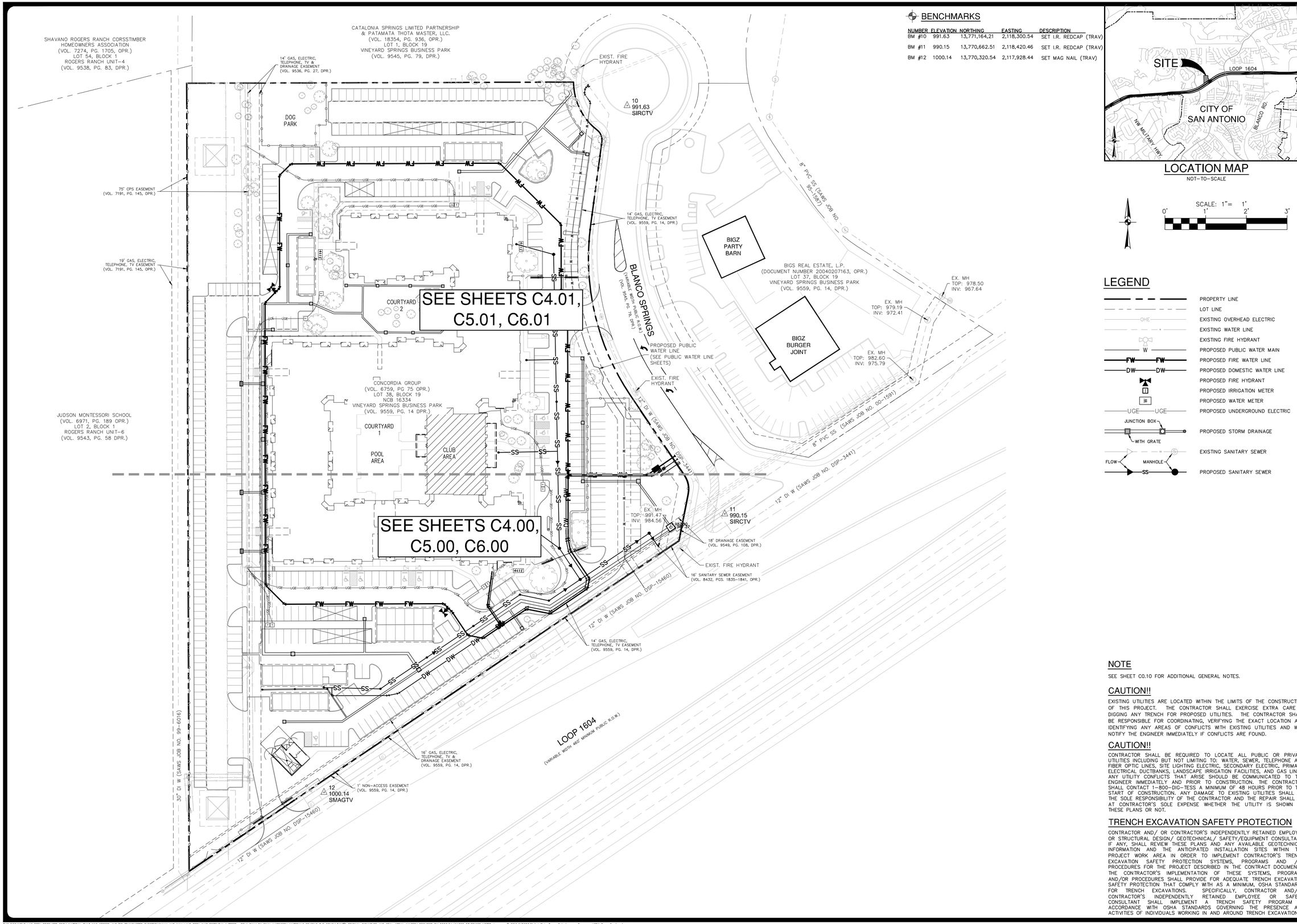
STATE OF TEXAS
ANDREW J. BELTON
121688
LICENSED
PROFESSIONAL ENGINEER

ELLE MF
SAN ANTONIO, TEXAS
SANITARY SEWER DETAILS

PLAT NO. 010025
JOB NO. 13520-01
DATE MAY 2025
DESIGNER BT
CHECKED LM DRAWN RG
SHEET C5.20

Date: October 2, 2024, 4:21 PM - User ID: jallarreal
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BENCHMARKS

NUMBER	ELEVATION	NORTHING	EASTING	DESCRIPTION
BM #10	991.63	13,771,164.21	2,118,300.54	SET I.R. REDCAP (TRAV)
BM #11	990.15	13,770,662.51	2,118,420.46	SET I.R. REDCAP (TRAV)
BM #12	1000.14	13,770,320.54	2,117,928.44	SET MAG NAIL (TRAV)

LOCATION MAP
NOT-TO-SCALE

SCALE: 1"= 1' 0' 1' 2' 3'

LEGEND

- PROPERTY LINE
- LOT LINE
- OHE — EXISTING OVERHEAD ELECTRIC
- EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- W — PROPOSED PUBLIC WATER MAIN
- FW FW — PROPOSED FIRE WATER LINE
- DW DW — PROPOSED DOMESTIC WATER LINE
- PROPOSED FIRE HYDRANT
- W — PROPOSED IRRIGATION METER
- PROPOSED WATER METER
- UGE UGE — PROPOSED UNDERGROUND ELECTRIC
- JUNCTION BOX WITH GRATE — PROPOSED STORM DRAINAGE
- EXISTING SANITARY SEWER
- FLOW MANHOLE SS — PROPOSED SANITARY SEWER

NOTE

SEE SHEET C0.10 FOR ADDITIONAL GENERAL NOTES.

CAUTION!!

EXISTING UTILITIES ARE LOCATED WITHIN THE LIMITS OF THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL EXERCISE EXTRA CARE IN DIGGING ANY TRENCH FOR PROPOSED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING, VERIFYING THE EXACT LOCATION AND IDENTIFYING ANY AREAS OF CONFLICTS WITH EXISTING UTILITIES AND WILL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS ARE FOUND.

CAUTION!!

CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT 1-800-DIG-TESS A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

TRENCH EXCAVATION SAFETY PROTECTION

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

NO.	REVISION	DATE

5/30/2025

STATE OF TEXAS ANDREW J. BELTON 121688 LICENSED PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
2000 NW LOOP 410 | SAN ANTONIO, TX. 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

ELLE MF
SAN ANTONIO, TEXAS
OVERALL UTILITY PLAN

PLAT NO. 010025
JOB NO. 13520-01
DATE MAY 2025
DESIGNER BT
CHECKED LM DRAWN RG
SHEET C3.00

Date: October 2, 2024, 4:19 PM — User ID: jvillarreal
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