ADDENDUM NO. 1
to
PLANS and SPECIFICATIONS

for

Medina River Sewer Outfall, Segment 2
SAWS Job No. 11-2503

Issue Date: November 1, 2010

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL, SEGMENT 2
SAWS PROJECT # 11-2503
ADDENDUM NO. 1

November 1, 2010

This addendum, applicable to the project noted above, is an amendment to the bidding and specification documents and as such shall be a part of and included in the Contract. Acknowledge receipt of this addendum by entering the addendum number and issue date in the spaces provided on all submitted copies of the proposal.

1.0 Addendum Purpose

The purpose of this addendum is to issue revisions and clarifications for the Medina River Sewer Outfall, Segment 2 (SAWS Job No. 11-2503).

2.0 Project Site Visit

A. A non-mandatory project site visit will take place on November 10, 2010. The project site visit will allow the CONTRACTOR to view and visit the project site (no invasive work). No questions will be answered regarding the project during the project site visit. All parties interested in attending shall meet at Toyota Motor Manufacturing Texas, Inc. (1 Lone Star Pass, San Antonio, Texas 78221) and park on the property at Trailer City by 1:30 pm. The CONTRACTORS will be shuttled to the project area. The project site visit is intended to be a driving tour. Portions of the alignment are not accessible by driving. The CONTRACTOR will be permitted to walk into inaccessible areas at their own risk. The project site visit will end at 3:00 pm.

3.0 Clarifications

A. Drawing No. C-26, Sheet No. 13 – Please note that if the method shown on the construction plans of constructing the MRSO sewer main at the Existing Highline Tower can not be met then the CONTRACTOR shall use an alternate solution for constructing the sewer main at no additional cost to the OWNER (See Tower Note).

4.0 Specifications

A. Special Conditions, Attachment B - Add the attached Geotechnical Data Report prepared by Raba-Kistner Consultants, Inc. titled "Geotechnical Data Report, Medina River Sewer Outfall Utility Project, Segment 2 – Applewhite Road Tunnel, San Antonio, TX" (attached).

B. Special Conditions, Attachment C - Add the attached Geotechnical Baseline Report prepared by Raba-Kistner Consultants, Inc. titled "Geotechnical Baseline Report, Medina River Sewer Outfall Utility Project, Segment 2 – Applewhite Road Tunnel, San Antonio, TX" (attached).

C. Section 01025, Measurement and Payment, Item No. 14 and 15 – The description of these items shall include grout.

5.0 Plans

A. Drawing No. G-01, Sheet No. 2 – The Bid Quantities have been revised. Remove and Replace this sheet with the attached plan sheet.

B. Drawing No. C-25, Sheet No. 12 – The beginning station and associated dimensions have been revised. Remove and replace this sheet with the attached plan sheet.

C. Drawing No. C-26, Sheet No. 13 – The matchline at Station 350+50.00 is shown in the incorrect location. Remove and replace this sheet with the attached plan sheet.

D. Drawing No. C-28, Sheet No. 15 – The Erosion Control Matting shown on the profile shall be a no separate pay item and is subsidiary to Bid Item # 1. The 12", 36", and 42" Siphon Barrels shall be FRP SN72 and shall meet the requirements of Project Specification SS848. Remove and replace this sheet with the attached plan sheet.

E. Drawing No. C-44, Sheet No. 31 – The 78" X 66" reducer is a no separate pay item and is subsidiary to Bid Item # 4. Remove and replace this sheet with the attached plan sheet.

F. Drawing No. C-144, Sheet No. 32 – Remove and replace number 4 on Detail C-144/A with the following: "Interior "Bridge" 10" pipe to be removed upon acceptance of MRSO. The CONTRACTOR shall plug and abandon the 10" sanitary sewer main (+/- 400 LF) and manholes downstream of the Special Tee Base Structure and allow flow from the 10" pipe into the MRSO. Remove and replace this sheet with the attached plan sheet.

G. Drawing No. D-02, Sheet No. 42 – Revise the connection detail between Segment 1 and Segment 2. Remove and replace this sheet with the attached plan sheet.

H. Drawing No. D-08, Sheet No. 44 – Revise the secondary backfill callout on Detail D-08/D and D-08/E to specify 98% compaction. Remove and replace this sheet with the attached plan sheet.

I. Drawing No. D-11, Sheet No. 47 – Revise graphical representation of concrete encasement. Remove and replace this sheet with the attached plan sheet.

J. Drawing No. D-12, Sheet No. 48 – Add a note to the manhole schedule that states the following: "All manholes shall be vented by a vented manhole ring and cover unless noted otherwise on the manhole schedule. Remove and replace this sheet with the attached plan sheet.

6.0 Questions and Answers

Question: What is the approximate length, size and type of pipe used?

Answer: The project is approximately 4 miles of 78-inch fiberglass pipe (please see the construction plans and specifications for further details).

Question: Is there any jacking and boring or directional boring associated with the installation of pipes?

Answer: There is two locations where tunneling will be required, please see the construction plans and specifications.

Question: What is the approximate cost estimate of the whole project?

Answer: The estimated cost is $13,800,000.00 .

Question: Are there any minority set-aside requirements for this project?

Answer: The San Antonio Water System (SAWS) does not have set-asides built into its contracting requirements. However, we do have an aspirational goal of 17% minority participation for all SAWS construction projects. Although the 17% goal is not mandatory, we ask our vendors to put forth a Good Faith Effort to meet or exceed the goal.

Question: Are you going to have a pre-bid meeting?

Answer: Yes, a mandatory pre-bid meeting will be held on November 10, 2010 at 10:00am at San Antonio Water System's Customer Service Building, Tower II, 2800 U.S. Hwy 281 North, 1st floor, Conference Room CR-C145, San Antonio, Texas 78212.

Question: Could you please let me know if the above mentioned project requires the contractor to be pre-qualified, and if so, where can I access the Pre-qualification?

Answer: No, the contractor does not have to be pre-qualified to bid for this project. SAWS does not pre-qualify contractors.

Question: Is there any flowable fill or cellular grout on this project?

Answer: Yes, please refer to the plans and specifications for specific requirements.

Question: How many tunnels are on the project and size?

Answer: *There are two tunnels or borings that shall be constructed for a 78" FRP sewer main. Please refer to the contract documents for further details.*

Question: Do you have a plan holder list that you can forward me?

Answer: *The plan holders list for this project is located on the SAWS website at www.saws.org. Please note, however, that the list self populates as potential bidders download the plans and specifications. Therefore, the plan holders list changes daily.*

Question: Is San Antonio Water System prequalifying contractors?

Answer: *SAWS does not prequalify contractors.*

Question: What date is the project slated to start?

Answer: *The approximate construction start date is Feburary 24, 2011.*

Question: What is the construction schedule for the project?

Answer: *The project duration is 540 calendar days.*

ACKNOWLEDGEMENT BY BIDDER

Each bidder is requested to acknowledge receipt of this Addendum No. 1 and the associated attachments by his/her signature affixed hereto and to file same and attach with his/her bid.

The undersigned acknowledges receipt of this Addendum No. 1 along with the bid submitted herewith is in accordance with the information and stipulations set forth.

_____ _____

Date Signature

END OF ADDENDUM NO. 1

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Raba Kistner

Project No. ASA08-146-01
September 24, 2010

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Mr. Patrick O'Connor, E.I.T.
San Antonio Water Systems
2800 US 281 North
San Antonio, Texas 78212

RE: Geotechnical Data Report
Medina River Sewer Outfall Utility Project, Segment 2 – Applewhite Road Tunnel
San Antonio, Texas

Dear Mr. O'Connor:

Raba-Kistner Consultants Inc. (R-K) is pleased to submit the Geotechnical Data Report for Segment 2 of the above-referenced project. This study was prepared in accordance with Amendment No. 1 to the 2008 Geotechnical and Construction Materials Testing Services Contract, approved by SAWS Board Resolution No. 10-091, dated March 2, 2010.

The following report contains the Geotechnical Data Report for the proposed Applewhite Road Tunnel as a part of the Medina River Sewer Outfall, Segment 2 utility project. The organization of this Geotechnical Data Report (GDR) utilizes and broadly follows a GDR preparation outline established in the U.S. Department of Transportation and the Federal Highway Administration publication entitled "Technical Manual for Design and Construction of Road Tunnels - Civil Elements" dated December, 2009.

We appreciate the opportunity to be of service to you on this project. Should you have any questions about the information presented in this report, or if we may be of additional assistance please call.

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

STATE OF TEXAS
GARLAND L. BURCH
38126
LICENSED
PROFESSIONAL ENGINEER
9-24-10

FOR Dana P. Spolum, P.E.
Project Engineer

Garland L. Burch, P.E.
Senior Geotechnical Consultant

DPS/GLB/jg

Attachments

Copies Submitted: Above (4)

GEOTECHNICAL DATA REPORT

For

MEDINA RIVER SEWER OUTFALL UTILITY PROJECT, SEGMENT 2
APPLEWHITE ROAD TUNNEL
SAN ANTONIO, TEXAS

Prepared for

SAN ANTONIO WATER SYSTEMS
San Antonio, Texas

Prepared by

RABA-KISTNER CONSULTANTS, INC.
San Antonio, Texas

PROJECT NO. ASA08-146-01

September 24, 2010

TABLE OF CONTENTS

ATTACHMENTS

1 INTRODUCTION

1.1 GENERAL

Raba-Kistner Consultants Inc. (R-K) is pleased to submit the following Geotechnical Data Report (GDR) for the proposed San Antonio Water System's (SAWS) Applewhite Road Tunnel as a part of the Medina River Sewer Outfall, Segment 2 utility project. Based on the project plans provided to **R-K** by representatives of Pape-Dawson Engineers Inc., dated February 2010, Segment 2 of the MRSO utility project extends from approximately 0.2 miles north of the intersection of Applewhite Road and the Medina River and generally extends to the east-northeast approximately 4 miles to approximately one-half mile north-northwest of the intersection of Pleasanton Road and the Medina River where Segment 1 begins. Specific information on the Applewhite Road tunnel was based on the plan and profile sheet 30 titled "STA. 538+00 to STA. 549+00" sealed by Mr. Brice B. Moczygemba P.E. on June 4, 2010 and provided to **R-K** by representatives of Pape-Dawson Engineers Inc.

1.2 SCOPE

The San Antonio Water System's (SAWS) Medina River Sewer Outfall (MRSO) utility project consists of six segments; Segment 2 extends from STA 306+14.19 to STA 600+13 and is located on the south side of San Antonio. Segment 2 of the MRSO utility project extends from approximately 0.2 miles north of the intersection of Applewhite Road and the Medina River and generally extends to the east-northeast approximately 4 miles to approximately one-half mile north-northwest of the intersection of Pleasanton Road and the Medina River where Segment 1 begins.

Segment 2 consists of approximately 20,723 ft of 78 in. diameter pipe and will primarily consist of open cut construction. We understand that all the pipe on this project will consist of fiberglass reinforced pipe for pipes larger than 24 in. Included in this segment and the focus of this GDR is the approximately 172 ft tunnel under Applewhite Road (STA 545+28 to STA 547+00) whose average invert depth is approximately 35 ft below the ground surface. Within the proposed tunnel alignment the pipeline invert elevation ranges from approximately elevation 510.00 ft to elevation 510.05 ft and the ground surface elevation ranges from approximately elevation 541.5 ft to elevation 546 ft.

In the overall alignment of Segment 2, the pipeline invert elevation ranges from approximately elevation 498 ft at the eastern end of the proposed alignment (STA 306+14.19) to approximately elevation 510 ft at the western end of the proposed alignment (STA 600+13). Also associated with this project are 32 manholes and 1 inverted siphon station; Siphon #2 - Leon Creek (STA 358+93 to STA 364+61), along with approximately 250 ft of concrete cap construction, approximately 100 ft of concrete encasement construction and approximately 20 ft of steel encasement.

1.3 PURPOSE

The Geotechnical Data Report's (GDR) primary purpose is to present the geological, geotechnical, groundwater and laboratory testing data collected during **R-Ks** subsurface investigation and laboratory testing programs. To this end two borings were drilled in the vicinity

of the upstream and downstream ends of the proposed Applewhite Road tunnel alignment. The drilling operations, which include collecting sampling, relative strength testing, and taking groundwater level readings, and laboratory testing of specified soil samples were also done as part of the investigation. In addition a review of the available project information and the geological conditions in the vicinity of these borings were done in order to prepare the geotechnical data report (GDR).

1.4 ORGANIZATION (TABLE OF CONTENT)

The organization of this Geotechnical Data Report (GDR) utilizes and broadly follows a GDR preparation outline established in the U.S. Department of Transportation and the Federal Highway Administration publication entitled "Technical Manual for Design and Construction of Road Tunnels - Civil Elements" dated December, 2009. The GDR generally utilizes the following sections presented as a part of a GDR sample outline.

- Introduction (Section 1) presents the general information, the scope, the purpose, the organization of report, and the project limitations;
- Background Information (Section 2) presents the geology and seismic sections;
- Field Investigation (Section 3) presents the general information, the boring locations and groundwater information; and
- Laboratory Testing (Section 4) presents the boring and laboratory testing.

1.5 LIMITATIONS

This Geotechnical Data Report (GDR) has been prepared in accordance with accepted Geotechnical Engineering practices in the region of south central Texas and for the use of San Antonio Water Systems (SAWS - CLIENT) and its representatives. This report may not contain sufficient information for purposes of other parties or other uses. The information contained in this report is based on information contained in Bid Package 2 of the Medina River Sewer Outfall (MRSO) utility project (dated February 2010) and presents subsurface data observed during **R-Ks** subsurface investigation of Segment 2 of the San Antonio Water System's (SAWS) Medina River Sewer Outfall (MRSO) utility project.

A total of 2 geotechnical borings have been drilled as a part of this GDR. The borings were drilled in the vicinity of the upstream and downstream ends of the proposed Applewhite Road tunnel alignment.

It should be noted that subsurface information depicted in the boring logs, which may be seen in the attachments, contain subsurface information specific to the location where the boring was drilled and the conditions at the time drilling operations occurred.

Measured groundwater levels contained in this report may not reflect the true groundwater levels, just the conditions in our borings at the time of our drilling operations and should not be construed with the groundwater level readings in the area of the Medina River or other streams and tributaries at the time construction commences. There are several factors that will likely negatively affect the accuracy of the groundwater level readings taken at the time of **R-K**'s drilling operations, they include; that none of the boring locations were converted into monitoring

wells, the proximity of the excavation to the Medina river and/or its tributaries, and that drilling operations for the "T" series borings were conducted after the drought had broken.

The scope of our Geotechnical Data Report does not include an environmental assessment of the air, soil, rock, or water conditions either on or adjacent to the site. No environmental opinions are presented in this report.

2 BACKGROUND INFORMATION

2.1 GEOLOGY

A reviewing of the *Geologic Atlas of Texas, San Antonio Sheet,* indicates that Borings B-30 and B-32 are all naturally underlain with soils of the Leona Formation. The Leona Formation is associated with terrace deposits of the Nueces and Leona Rivers and typically consists of clays/silts grading down into coarse gravel and cobbles. The Leona Formation can be highly variable and can therefore result in highly variable conditions over relatively short distances. Key geotechnical engineering concerns for development supported on the Leona Formation are the expansive nature of the clays, the consistency and/or relative density of the deposits, and the absence/presence as well as thickness of potentially water-bearing gravels.

2.2 SEISMIC COEFFICIENTS

Based upon a review of Section 1613 *Earthquake Loads* of the 2006 International Building Code (IBC), the following information has been summarized for seismic considerations associated with this alignment. It should be noted that coordinates from several points along the alignment were taken and the most conservative value was utilized to discern the acceleration response.

- Site Class Definition (Table 1613.5.2): **Class C**. Based on the exploratory boring conducted for this investigation, the upper 100 feet of soil may be characterized as very dense soil and soft rock.
- Mapped Maximum Considered Earthquake Ground Motion for a 0.2 sec., Spectral Response Acceleration (Figure 1613.5(1)): $\mathbf{S_s = 0.12g}$. Note that the value taken from Figure 1613.5(1) is based on Site Class B and is adjusted per 1613.5.3 below.
- Mapped Maximum Considered Earthquake Ground Motion for a 1 sec., Spectral Response Acceleration (Figure 1613.5(2)): $\mathbf{S_1 = 0.03g}$. Note that the value taken from Figure 1613.5(2) is based on Site Class B and is adjusted per 1613.5.3 below.
- Value of Site Coefficient (Table 1613.5.3 (1)): $\mathbf{F_a = 1.2}$.
- Value of Site Coefficient (Table 1613.5.3 (2)): $\mathbf{F_v = 1.7}$.

The Maximum Considered Earthquake Spectral Response Accelerations are as follows:

- 0.2 sec., adjusted based on equation 16.37: $\mathbf{S_{ms} = 0.14g}$.
- 1 sec., adjusted based on equation 16.38: $\mathbf{S_{m1} = 0.04g}$.

The Design Spectral Response Acceleration Parameters are as follows:

- 0.2 sec., based on equation 16.39: S_{DS} = **0.09g**.
- 1 sec., based on equation 16.40: S_{D1} = **0.03g**.

Based on the parameters listed above, Tables 1613.5.6(1) and 1613.5.6(2), and calculations performed using a Java program titled, "Seismic Hazard Curves and Uniform Hazard Response Spectra" published by the United States Geological Survey (USGS), the Seismic Design Category for both short period and 1 second response accelerations is **A**. However, without more information we are not able to discern the Seismic Use Group, which is expected to be one of the following four choices; I, II, III, or IV.

3 FIELD INVESTIGATION

3.1 GENERAL

R-K has conducted two geotechnical borings in the vicinity of Applewhite Road to establish the geotechnical properties of the soils observed during the excavation of the proposed tunnel. A total of two soils borings were drilled as a part of the Segment 2 study, of which the names, locations, elevations and depths may be seen in the following chart.

Boring Name	Drill Depth (ft)	Depth to Water (ft)	Boring Coordinates		MRSO Station as of 2/2010	Offset from CL	Ground Surface Elev. (ft)	Bottom of Pipe Elev. (ft)
			Easting	Northing				
T-30	40	Dry	543843	3235726	546+40	1 N	544	510.04
T-32	40	Dry	543815	3235736	545+35	2 N	542	510.00

3.2 GROUNDWATER

A total of 2 soils borings, Borings T-30 and T-32, were drilled as a part of the proposed Applewhite Road tunnel located in Segment 2 of the MRSO project; it should be noted that neither boring encountered groundwater as may be seen in the following table. It is important to note that these measured groundwater levels may not reflect the true groundwater levels, just the conditions in our borings at the time of our drilling operations and should not be construed with the groundwater level readings in the area of the Medina River or other streams and tributaries at the time construction commences. There are several factors that will could negatively affect the accuracy of the groundwater level readings taken at the time of **R-K's** drilling operations, they include; that none of the boring locations were converted into monitoring wells, the proximity of the excavation to the river and/or its tributaries, and that drilling operations for borings T-30 and T-32 were conducted shortly after a two year historical drought in this area had broken.

Boring Name	Drill Depth (ft)	Depth to Water (ft)	Boring Coordinates		MRSO Station as of 2/2010	Offset from CL	Ground Surface Elev. (ft)	Bottom of Pipe Elev. (ft)
			Easting	Northing				
T-30	40	Dry	543843	3235726	546+40	1 N	544	510.04
T-32	40	Dry	543815	3235736	545+35	2 N	542	510.00

4 LABORATORY TESTING

4.1 BORINGS AND LABORATORY TESTS

Subsurface conditions at the site were evaluated by 2 borings drilled at the locations shown on the Boring Location Map, Figure 1. These locations are approximate and distances were measured using a hand-held recreation grade GPS locator, tape, angles, and known reference points. The ground surface elevations at our borings along with the borings depths may be seen in section 3.1 *General* of this report. During drilling operations, the following samples were collected:

Type of Sample	Number Collected
Split-Spoon (with Standard Penetration Test)	21
Undisturbed Shelby Tube	4
Grab Samples	1

Each sample was visually classified in the laboratory by a member of our Geotechnical Engineering staff. The geotechnical engineering properties of the strata were evaluated by the following tests:

Type of Test	Number Conducted
Natural Moisture Content	26
Atterberg Limits	7
Sieve Analysis	10
Unconfined Compression with Unit Dry Wt.	4

The results of all laboratory tests are presented in graphical or numerical form on the boring logs illustrated on Figures 2 and 3. A key to classification terms and symbols used on the logs is presented on Figure 4. The results of the laboratory and field testing are also tabulated on Figure 5 for ease of reference.

Standard penetration test results are noted as "blows per ft" on the boring logs and Figure 5, where "blows per ft" refers to the number of blows by a falling hammer required for 1 ft of penetration into the soil/weak rock. Where hard or dense materials were encountered, the tests were terminated at 50 blows even if one foot of penetration had not been achieved. When all

50 blows fall within the first 6 in. (seating blows), refusal "ref" for 6 in. or less will be noted on the boring logs and on Figure 5.

Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the request of the Client.

* * * * * * * * * * * * * * * * * *

The following figures are attached and complete this report:

Figure 1	Boring Location Map
Figures 2 and 3	Logs of Borings
Figure 4	Key to Terms and Symbols
Figure 5	Results of Soil Analyses

ATTACHMENTS

NAME	LONGITUDE	LATITUDE
T-30	98°32'56.640	29°14'58.981
T-32	98°32'55.593	29°14'58.645

T-30

T-32

APPLEWHITE RD

Legend

- Tunnel Boring
- Station Node
- MRSO Alignment
- Proposed Tunnel Structure

N W E S

0 25 50 100 Feet

Approximate Scale

Raba Kistner

Engineering • Testing • Environmental Facilities • Infrastructure

12821 West Golden Lane
San Antonio, Texas 78249
(210)699-9090 TEL
(210)699-6426 FAX
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SOURCE: 2009 Aerial Photograph Provided by The City of San Antonio (COSA)

PROPOSED BORING LOCATION MAP

APPLEWHITE ROAD TUNNEL
STATION No. 545+28 - 547+00
MEDINA RIVER SEWER OUTFALL
BEXAR COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:	ASA08-146-00
ISSUE DATE:	8-4-10
DRAWN BY:	CCL
CHECKED BY:	DPS
REVIEWED BY:	GLB

FIGURE

1

LOG OF BORING NO. T-30

Medina River Sewer Outfall
San Antonio, Texas

Raba Kistner
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.24968; W 98.54906

SURFACE ELEVATION: 544 ft

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT² (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0) / PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80)	PLASTICITY INDEX	% -200
			CLAY, Sandy, Very Stiff, Brown, with calcareous material	20			21	
				18				61
5			CLAY, Sandy, Very Stiff to Hard, Tan, with calcareous material and gray mottling	17				68
			SAND, Cemented, Very Dense, Gray	50/8"			10	
			SAND, Silty, Clayey, Dense to Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	40				20
10								
15				50/8"			3	
20				50/10"				
25				ref/6"				
30					108			32
					104		3	
35			-with cemented sand seam and partings below 34 ft	ref/2"	109			26
40				ref/6"				24
45								

DEPTH DRILLED: 39.0 ft
DATE DRILLED: 8/26/2010

DEPTH TO WATER: Dry
DATE MEASURED: 8/26/2010

PROJ. No.: ASA08-146-01
FIGURE: 2

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. T-32

Medina River Sewer Outfall
San Antonio, Texas

Raba Kistner
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.24957; W 98.54879

SURFACE ELEVATION: 542 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	CLAY, Sandy, Very Stiff to Hard, Brown, with calcareous material	27		21	
		50/5"			56
5	SAND, Cemented, Very Dense, Gray	ref/0"			
	SAND, Silty, Clayey, Dense to Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	32			28
10		47		7	
15		50/11"			
20		50/6"			
25		50/4"	104		29
		ref/6"		7	
30	SAND, Cemented, Very Dense, Gray				
	SAND, Silty, Clayey, Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	ref/5"			27
35					
		ref/5"			
40					
45					

SHEAR STRENGTH, TONS/FT^2: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT: 10 20 30 40 50 60 70 80

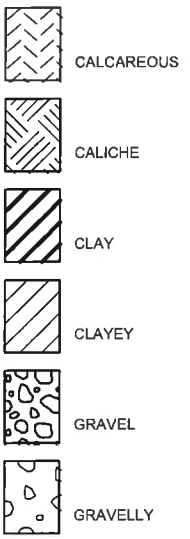
DEPTH DRILLED:	38.9 ft	**DEPTH TO WATER:**	Dry	**PROJ. No.:**	ASA08-146-01
DATE DRILLED:	8/28/2010	**DATE MEASURED:**	8/28/2010	**FIGURE:**	3

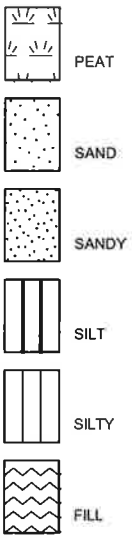
NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

KEY TO TERMS AND SYMBOLS

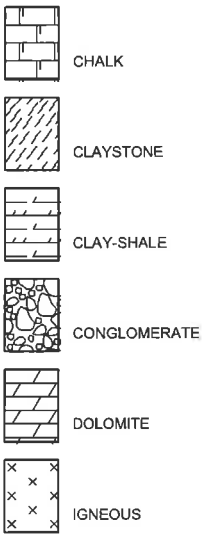
MATERIAL TYPES

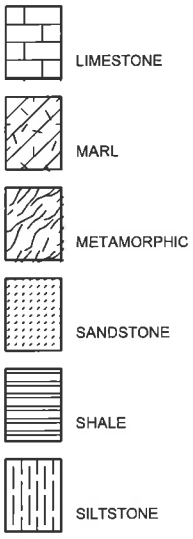
SOIL TERMS



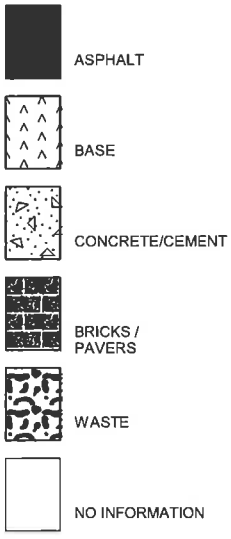


ROCK TERMS

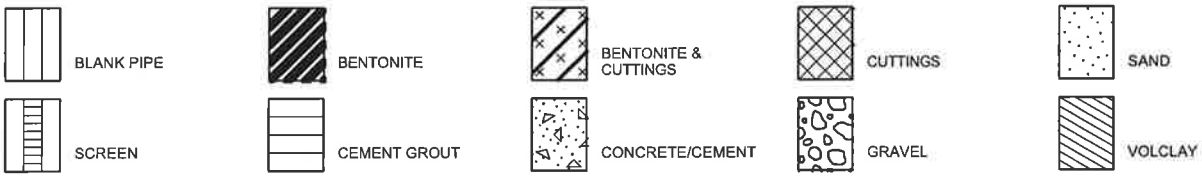




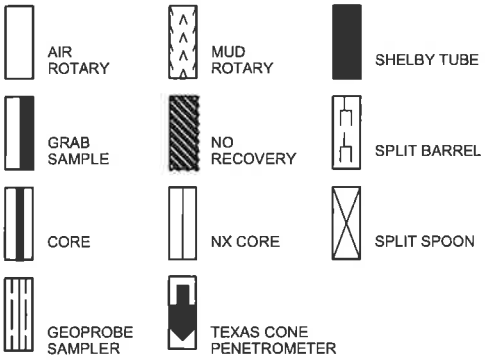
OTHER



WELL CONSTRUCTION AND PLUGGING MATERIALS



SAMPLE TYPES



STRENGTH TEST TYPES

NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

PROJECT NO. ASA08-146-01

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

Terms used in this report to describe soils with regard to their consistency or conditions are in general accordance with the discussion presented in Article 45 of SOILS MECHANICS IN ENGINEERING PRACTICE, Terzaghi and Peck, John Wiley & Sons, Inc., 1967, using the most reliable information available from the field and laboratory investigations. Terms used for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in American Society for Testing and Materials D2487-06 and D2488-00, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics; 2005.

The depths shown on the boring logs are not exact, and have been estimated to the nearest half-foot. Depth measurements may be presented in a manner that implies greater precision in depth measurement, i.e 6.71 meters. The reader should understand and interpret this information only within the stated half-foot tolerance on depth measurements.

RELATIVE DENSITY

Penetration Resistance Blows per ft	Relative Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
> 50	Very Dense

COHESIVE STRENGTH

Resistance Blows per ft	Consistency	Cohesion TSF
0 - 2	Very Soft	0 - 0.125
2 - 4	Soft	0.125 - 0.25
4 - 8	Firm	0.25 - 0.5
8 - 15	Stiff	0.5 - 1.0
15 - 30	Very Stiff	1.0 - 2.0
> 30	Hard	> 2.0

PLASTICITY

Plasticity Index	Degree of Plasticity
0 - 5	None
5 - 10	Low
10 - 20	Moderate
20 - 40	Plastic
> 40	Highly Plastic

ABBREVIATIONS

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
BTEX = Total BTEX
TPH = Total Petroleum Hydrocarbons
ND = Not Detected
NA = Not Analyzed
NR = Not Recorded/No Recovery
OVA = Organic Vapor Analyzer
ppm = Parts Per Million

Qam, Qas, Qal = Quaternary Alluvium
Qat = Low Terrace Deposits
Qbc = Beaumont Formation
Qt = Fluviatile Terrace Deposits
Qao = Seymour Formation
Qle = Leona Formation
Q-Tu = Uvalde Gravel
Ewi = Wilcox Formation
Emi = Midway Group
Mc = Catahoula Formation
El = Laredo Formation
Kknm = Navarro Group and Marlbrook Marl
Kpg = Pecan Gap Chalk
Kau = Austin Chalk

Kef = Eagle Ford Shale
Kbu = Buda Limestone
Kdr = Del Rio Clay
Kft = Fort Terrett Member
Kgt = Georgetown Formation
Kep = Person Formation
Kek = Kainer Formation
Kes = Escondido Formation
Kew = Walnut Formation
Kgr = Glen Rose Formation
Kgru = Upper Glen Rose Formation
Kgrl = Lower Glen Rose Formation
Kh = Hensell Sand

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

SAMPLING METHODS

RELATIVELY UNDISTURBED SAMPLING

Cohesive soil samples are to be collected using three-inch thin-walled tubes in general accordance with the Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D1587) and granular soil samples are to be collected using two-inch split-barrel samplers in general accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586). Cohesive soil samples may be extruded on-site when appropriate handling and storage techniques maintain sample integrity and moisture content.

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARRELL SAMPLER DRIVING RECORD

Blows Per Foot	Description
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

KEY TO TERMS AND SYMBOLS (CONT'D)

ROCK TERMINOLOGY

ROCK TYPE

"Rock type refers to the general geologic classification of the rock (e.g. basalt, sandstone, limestone, etc.). Certain physical characteristics are ascribed to a particular rock type with a geological name given according to the rocks mode of origin. Although the rock type is used primarily for identification and correlation, the type is often an important preliminary indication of rock mass behavior."

WEATHERING

Fresh	-	No evidence of any chemical or mechanical alteration.
Slightly Weathered	-	Slight discoloration on surface, slight alteration along discontinuities, less than 10 percent of the rock volume altered.
Moderately Weathered	-	Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10 to 50 percent of the rock altered.
Highly Weathered	-	Entire mass discolored, alteracation pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
Decomposed	-	Rock reduced to a soil with relicit rock texture, generally molded and crumbled by hand.

HARDNESS

Very soft	-	Can be deformed by hand.
Soft	-	Can be scratched with a fingernail.
Moderately hard	-	Can be scratched easily with a knife.
Hard	-	Can be scratched with difficulty with a knife.
Very hard	-	Cannot be scratched with a knife.

ROCK QUALITY DESIGNATION

	<	25	Very Poor
25	<	50	Poor
50	<	75	Fair
75	<	90	Good
90	<	100	Excellent

TEXTURE

Sedimentary

Texture	Grain Diameter	Particle Name	Rock Name
*	80 mm	Cobble	Conglomerate
*	5 - 80 mm	Gravel	-
Coarse Grained	2 - 5 mm	-	-
Medium Grained	0.4 - 2 mm	Sand	Sandstone
Fine Grained	0.1 - 0.4 mm	-	-
Very Fine Grained	0.1 mm	Clay, Silt	Shale, Claystone Siltstone

Igneous and Metamorphic

Texture	Grain Diameter
Coarse Grained	5 mm
Medium Grained	1 - 5 mm
Fine Grained	0.1 - 1 mm
Aphanite	0.1 mm

ROCK STRUCTURE

Massive	- 3-ft thick or greater	Unfractured	- 6 ft or more	Flat	- 0 to 20 degrees
Thickly Bedded	- beds from 1- to 3-ft thick	Slightly Fractured	- 2 to 6 ft	Dipping	- 20 to 45 degrees
Medium Bedded	- beds from 4 in. to 1-ft thick	Moderately Fractured	- 8 in. to 2 ft	Steeply Dipping	- 45 to 90 degrees
Thinly Bedded	- 4-in. thick or less	Highly Fractured	- 2 in. to 8 in.		
		Intensely Fractured	- 2 in. or less		

DISCONTINUITIES

Describe the type of joint (i.e. bedding, cleavage, foliation, schistocity, or extension), the degree of weathering, joint wall separations (filled or clean), roughness, and any infilling (source, type, and thickness).

From United States Army Corps of Engineers, EM 1110-1-2908 Rock Foundations, November 1994

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Medina River Sewer Outfall
San Antonio, Texas

FILE NAME: ASA08-146-01.GPJ 9/23/2010

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
T-30	0.0 to 1.5	20	9	34	13	21	CL				
	2.5 to 4.0	18	8						61		
	4.5 to 6.0	17	11						68		
	6.5 to 7.7	50/8"	12	24	14	10	CL				
	7.7 to 8.5		1								
	8.5 to 10.0	40	10						20		
	13.5 to 14.7	50/8"	11	26	23	3	ML				
	18.5 to 19.8	50/10"	11								
	23.5 to 24.0	ref/6"	12								
	29.0 to 30.0		14					108	32	0.44	UC
	30.0 to 31.0		14	26	23	3	ML	104		0.24	UC
	33.0 to 34.5		12					109	26	0.49	UC
	34.5 to 34.6	ref/2"	1								
	38.5 to 39.0	ref/6"	13						24		
T-32	0.0 to 1.5	27	9	33	12	21	CL				
	2.5 to 3.3	50/5"	6						56		
	4.5 to 4.5	ref/0"	1								
	6.5 to 8.0	32	11						28		
	8.5 to 10.0	47	11	28	21	7	CL-ML				
	13.5 to 14.8	50/11"	10								
	18.5 to 19.5	50/6"	10								
	23.5 to 24.3	50/4"	13						29		
	25.0 to 27.0		11					104		1.00	PP
	28.5 to 29.0	ref/6"	19	31	24	7	ML				
	33.5 to 33.9	ref/5"	12						27		
	38.5 to 38.9	ref/5"	13								

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial

CU = Consolidated Undrained Triaxial

PROJECT NO. ASA08-146-01

Raba Kistner

Project No. ASA08-146-01
September 24, 2010

Raba-Kistner Consultants, Inc.
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TBPE Firm F-3257

Mr. Patrick O'Connor, E.I.T.
San Antonio Water System
2800 US 281 North
San Antonio, Texas 78212

RE: Geotechnical Baseline Report
Medina River Sewer Outfall Utility Project, Segment 2 – Applewhite Road Tunnel
San Antonio, Texas

Dear Mr. O'Connor:

Raba-Kistner Consultants Inc. (R-K) is pleased to submit the Geotechnical Baseline Report for the above-referenced project. This study was performed in accordance with **R-K** Proposal No. PSA10-013-00, dated February 4, 2010. Authorization for this study was received by our firm on April 16, 2010 via San Antonio Water System's (SAWS) "Contract Agreement Amendment No. 1".

The following report contains the geotechnical baseline report for the proposed Applewhite Road Tunnel as a part of the Medina River Sewer Outfall, Segment 2 utility project. The organization of this Geotechnical Baseline Report (GBR) utilizes and broadly follows a GBR preparation outline established in the ASCE document entitled "Geotechnical Baseline Reports for Construction" dated 2007.

We appreciate the opportunity to be of service to you on this project. Should you have any questions about the information presented in this report, or if we may be of additional assistance with the materials testing-quality control program during construction, please call.

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

STATE OF TEXAS
GARLAND L. BURCH
38126
LICENSED
PROFESSIONAL ENGINEER
9-24-10

FOR Dana P. Spolum, P.E.
Project Engineer

Garland L. Burch, P.E.
Senior Geotechnical Consultant

DPS/GLB/jg

Attachments

Copies Submitted: Above (4)

GEOTECHNICAL BASELINE REPORT

For

MEDINA RIVER SEWER OUTFALL UTILITY PROJECT, SEGMENT 2
APPLEWHITE ROAD TUNNEL
SAN ANTONIO, TEXAS

Prepared for

SAN ANTONIO WATER SYSTEM
San Antonio, Texas

Prepared by

RABA-KISTNER CONSULTANTS, INC.
San Antonio, Texas

PROJECT NO. ASA08-146-01

September 24, 2010

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ATTACHMENTS

Applewhite Road Tunnel – Plan and Profile

1 INTRODUCTION

1.1 GENERAL

Raba-Kistner Consultants Inc. (R-K) is pleased to submit the following Geotechnical Baseline Report (GBR) for the proposed Applewhite Road tunnel to be constructed as part of Segment 2 of the San Antonio Water System's (SAWS) Medina River Sewer Outfall (MRSO) utility project.

The GBR's primary purpose is to establish the geotechnical conditions anticipated to be encountered during tunnel construction and is based on Segment 2 plans, dated February 2010 and project information given to **R-K** by representatives of Pape-Dawson Engineers Inc. Specific information on the Applewhite Road tunnel was based on the plan and profile sheet 30 titled "STA. 538+00 to STA. 549+00" sealed by Mr. Brice B. Moczygemba P.E. on June 4, 2010 and provided to **R-K** by representatives of Pape-Dawson Engineers Inc.

The GBR should not be construed as amending or altering the Project Plans and Specifications, nor the Contractor's responsibilities according to the Project Plans and Specifications. The GBR was prepared with the understanding that the tunnel design was performed by others in accordance with standards consistent within the underground construction industry and in accordance with the requirements established by regulatory agencies and utilities whose Right-of-Way the tunnel encroaches or crosses.

Bidders should utilize a qualified geotechnical engineer with experience in projects of similar type and complexity to assist in the review and clarification of the technical issues specific to the geotechnical engineering aspects contained herein. This will help the contractor better understand the information presented in this report prior to submitting a bid.

The contractor or others hired by the contractor shall be required to develop a trench safety plan for utility trenches or other excavations extend to or below a depth of 5 ft below construction grade to protect personnel entering the trench or the trench vicinity. In areas where the excavation is greater than 20 ft deep, a registered professional engineer must design the protective system. The development of a trench safety plan, which could include designs for sloping, benching, various types of temporary shoring or a combination thereof are the responsibility of the Contractor. Any such designs and safety plans shall be developed in accordance with current OSHA guidelines and other applicable industry standards.

1.2 PURPOSE

This GBR establishes a contractual statement of the subsurface conditions, referred to as the baseline conditions. The purpose of the GBR is to:

- Set baselines for geotechnical conditions and material behavior anticipated to be encountered during construction and to provide a basis for determining the technical merits for claims of differing site conditions (DSC);
- Identify important geotechnical considerations and constraints that need to be addressed during bid preparation and construction; and
- Provide assistance to the contractor in evaluating the requirements for excavating and supporting the ground.

This GBR is the sole location for geotechnical interpretations of the available data and information regarding subsurface conditions, and represents the design team's established contractual assumptions to be utilized as base site conditions upon which the contractor should and may rely. This subsurface interpolation of the exploratory borings is a balance between the borings drilled as a part of this study, previous geotechnical engineering studies in the area, familiarity with the soil conditions in this region, engineering judgment, past construction experience, and the risk allocation as a function of subsurface conditions. It should be understood that the baselines established in this GBR represents the contractual assumptions of site conditions, which do not necessarily represent the actual subsurface conditions to be encountered during construction. Risk associated with conditions consistent with or less adverse than the baselines established herein are allocated to the contractor and those significantly more adverse than the baseline are accepted by the owner, which means that the assumptions made by the contractor which are more optimistic than the contractual baseline established herein are made at the contractor's own risk. Regardless of the assumptions made during the bid phase, the contractor is responsible for conditions ranging from more favorable up to those established baselines contained herein. The established baselines contained herein will be utilized to evaluate the merits of any DSC claims, in accordance with the DSC clause contained in the contract documents, regardless of how the contractor bids the work.

In addition to contractual assumptions made about the subsurface conditions between the borings within the proposed tunnel alignment, the GBR, based on the available information, has several assumptions regarding the sequencing of construction and the means and methods to be utilized by the contractor. The behavior of the subsurface materials set forth as the baseline will be influenced by the construction means and methods selected and used by the Contractor. Due to the inherent variability associated with soils in the vicinity of the proposed tunnel alignment, the Contractor must assess the soil and groundwater conditions contained herein on their impact to the selected means and methods for construction. Any construction techniques proposed by the contractor, or adverse subsurface conditions that may prompt the reevaluation or potential invalidation of the GBR must be identified at the earliest possible stage and discussed during the bid phase of the project, prior to the Contract being awarded. Failure by the Contractor to inform the Owner and the representatives of potential changes they feel may render the baselines invalid or require baseline modification during the bid phase will result in the baseline being enforced as stated in the Contract.

1.3 ORGANIZATION (TABLE OF CONTENT)

The organization of this GBR utilizes and broadly follows a GBR preparation outline set forth in the ASCE document entitled "Geotechnical Baseline Reports for Construction" dated 2007. The GBR generally utilizes the following sections presented as a part of a GBR preparation checklist.

- Introduction (Section 1) presents the project name, purpose of report; organization of report, and contractual precedence;
- Project Description (Section 2) presents descriptions of the project location, project type and purpose, and summary of key project features;
- Geotechnical Data (Section 3) presents the baseline statements and descriptions of the subsurface conditions;

- Design Considerations – Tunnels (Section 4) presents the anticipated ground behavior and design considerations;
- Design Considerations – Shaft/Portals (Section 5) presents the design considerations for the shaft and portal construction;
- Construction Considerations (Section 6) presents construction related issues and concerns;
- Limitations (Section 7);

2 PROJECT DESCRIPTION

2.1 BACKGROUND OF THE MRSO PROGRAM

The San Antonio Water System's (SAWS) Medina River Sewer Outfall (MRSO) utility project has been divided into six segments, designated as Segment 1 through Segment 6. Segment 2 extends from STA 306+14.19 to STA 600+13, and is located on the south side of San Antonio, Texas. This segment generally extends from approximately 0.2 miles north of the intersection of Applewhite Road and the Medina River and generally extends to the east-northeast approximately 4 miles to approximately one-half mile north-northwest of the intersection of Pleasanton Road and the Medina River where Segment 1 begins.

Segment 2 consists of approximately 20,723 ft of 78 in. diameter pipe and will primarily consist of open cut construction. We understand that all of the pipe on this segment of the project will consist of fiberglass reinforced pipe. Also associated with this project are 31 manholes and one inverted siphon station; Siphon #2 - Leon Creek (STA 358+93 to STA 364+62), along with approximately 250 ft of concrete cap construction, approximately 100 ft of concrete encasement construction and approximately 20 ft of steel encasement.

2.2 SEGMENT 2 TUNNEL DESCRIPTION

Segment 2 of the MRSO utility project includes a single proposed tunnel and is summarized in the following table.

Tunnel Name	Down-stream MRSO Station	Up-stream MRSO Station	Approx. Tunnel Dist. (ft)	Pipe Dia. (in.)	Downstream Invert Elev. (ft)	Upstream Invert Elev. (ft)	Downstream Ground Surface Elev. (ft)	Upstream Ground Surface Elev. (ft)
Applewhite Road	545+28	547+00	172	78	510.00	510.05	541.5	546

The tunnel is named in reference to the major surface features that it crosses. In addition to that surface feature, the tunnel will also cross a number of underground utilities as shown on the Drawings.

Tunneling operations will be staged from shafts/portals constructed at each end of the tunnels. The shafts/portals will also be used to connect the tunnels with open cut portions of the MRSO.

It is noted that a 24-inch diameter high pressure, natural gas lines will also be tunneled beneath as part of the MRSO Segment 2 project. This pipeline is located at Station 307+15. However, borings have not been drilled near the location of this crossing, and as such, it is not included as part of this GBR. We recommend that additional subsurface investigations be performed for these crossings.

3 GEOTECHNICAL DATA

3.1 GEOTECHNICAL INVESTIGATION

R-K has performed geotechnical engineering services and conducted two geotechnical borings in the vicinity of the proposed tunnel alignment indicated in the table below. These borings were drilled in late August of 2010. The borings were drilled in the vicinity of the proposed Applewhite Road tunnel to establish the baseline geotechnical properties of the soils to be encountered during the excavation of the proposed tunnel. A total of two soils borings have been drilled as a part of the Segment 2 GBR. The boring locations, elevations and depths may be seen in the following chart.

Boring Name	Tunnel Name	Drill Depth (ft)	Depth to Water (ft)	Boring Coordinates		MRSO Station	Offset from CL	Ground Surface Elev. (ft)	Bottom of Pipe Elev. (ft)
				Easting	Northing				
T-30	Applewhite Road	40	Dry	543843	3235726	546+40	1 N	544	510.04
T-32		40	Dry	543815	3235736	545+35	2 N	542	510.00

3.2 GROUNDWATER CONDITIONS

Groundwater levels at the boring locations were estimated from observations and measurements at the time of the drilling operations and from observing the soil samples obtained during this process. Groundwater was not detected in either of the borings drilled as a part of Segment 2 tunnel study. The baseline elevation for groundwater at this tunnel location is below elevation 502 ft.

It is important to note that although groundwater levels were not observed in these 2 borings, these were the conditions observed at the time of our drilling operations and should not be construed with the groundwater level readings in the area of the Medina River or other nearby streams and tributaries at the time construction commences. There are several factors that likely negatively affected these groundwater level readings at the time of **R-K**'s drilling operations, they include; that none of the boring locations were converted into monitoring wells, the variable nature of the soils in the area, the proximity of the excavation to the river and/or its tributaries,

STRATIGRAPHY AND BASELINE CONDITIONS

A reviewing of the *Geologic Atlas of Texas, San Antonio Sheet,* indicates that Borings B-30 and B-32 are all naturally underlain with soils of the Leona Formation. The Leona Formation is associated with terrace deposits of the Nueces and Leona Rivers and typically consists of

clays/silts grading down into coarse gravel and cobbles. The Leona Formation can be highly variable and can therefore result in highly variable conditions over relatively short distances. Key geotechnical engineering concerns for development supported on the Leona Formation are the expansive nature of the clays, the consistency and/or relative density of the deposits, and the absence/presence as well as thickness of potentially water-bearing gravels.

Although not shown on the boring logs, based on our prior experience in this area and with this geology, any excavations, this includes the proposed tunnel, should expect to encounter concretions, along with cemented sand seams and partings during the excavation phase of construction. A baseline for obstructions is discussed in Section 6.1 Obstructions of this report.

3.2.1 Applewhite Road Tunnel

The Applewhite Road Tunnel interval is expected to be between elevations 509 and 517 ft. The following table presents the subsurface data and baseline conditions for the Applewhite Road Tunnel based on Borings T-30 and T-32:

Applewhite Tunnel (STA 545+28 to STA547+00)										
Elev. (ft)	USCS	Description of Materials	SPT (Blows per ft)	Shear Strength (tsf)	Moisture Content	Plasticity Index	Percent Gravel	Percent Sand	Percent Clay/Silt	Dry Unit Weight (pcf)
544 to 538	CL	CLAY, Sandy, Brown to Tan, with calcareous deposits	Range:17 to 50/5in. Baseline: 50/9in.	NDA	Range: 6 to 12 Baseline: 9	Range: 10 to 21 Baseline: 21	Baseline: 0	Baseline: 39	Range: 56 to 68 Baseline: 61	NDA
538 to 536		Cemented Sand Seam	Baseline: ref/0in.	NDA	Baseline:1	NDA	NDA	NDA	NDA	NDA
536 to 523	SC-SM	SAND, Silty, Clayey, Dense to Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Range:32 to 50/8in. Baseline: 50/10in.	NDA	Range: 10 to 11 Baseline: 11	Range: 3 to 7 Baseline: 7	Baseline: 0	Baseline: 80	Range: 20 to 28 Baseline: 20	Baseline: 106
523 to 513	SC-SM	SAND, Silty, Clayey, Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Range: 50/4in. to ref/6in. Baseline: 50/1in.	Range: 0.24 to 0.49 Baseline: 0.40	Range: 1 to 19 Baseline: 12	Range: 3 to 7 Baseline: 7	Baseline: 0	Baseline: 80	Range: 24 to 32 Baseline: 27	Range: 104 to 108 Baseline: 106
513** to 511.5**		Cemented Sand Seam	Baseline: ref/2in.	NDA	Baseline:1	NDA	NDA	NDA	NDA	NDA
511.5 to 502	SC-SM	SAND, Silty, Clayey, Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Range: ref/6in. to ref/2in. Baseline: ref/4in.	NDA	Range: 1 to 19 Baseline: 12	Range: 3 to 7 Baseline: 7	Baseline: 0	Baseline: 80	Range: 24 to 32 Baseline: 27	Range: 104 to 108 Baseline: 106

NDA indicates No Data Available because testing was not performed.
** For the purposes of the baseline report assume that the cemented sand seam is 1.5 ft thick however the depth at which it may be encountered can vary to elevation 510 ft.

Groundwater was not encountered at either of the borings at the time of drilling. Baseline groundwater elevation is assumed to be at below elevation 502 ft.

It is important to note that the measured groundwater levels may not reflect the true groundwater levels, just the conditions in our borings at the time of our drilling operations and should not be construed with the groundwater level readings in the area of the Medina River or other streams and tributaries at the time construction commences. There are several factors that will could negatively affect the accuracy of the groundwater level readings taken at the time of **R-K**'s drilling operations, they include; that none of the boring locations were converted into monitoring wells, the proximity of the excavation to the river and/or its tributaries, and that drilling operations for the borings T-30 and T-32 were conducted shortly after a 2 year historical drought in this area had broken.

4 DESIGN CONSIDERATIONS – TUNNELS

4.1 ANTICIPATED GROUND BEHAVIOR

Behavior of soils along the alignment will impact the Contractor's means and methods for the construction of tunnels and temporary excavation support. Ground behavior depends upon several factors, including: texture of soil materials (e.g. the percentage and plasticity of fine materials), groundwater conditions, the overall geology in the area, and the construction means and methods selected by the contractor. The anticipated ground behavior for the formations encountered during execution of this project has been classified in accordance with the Tunnelman's Ground Classification (Terzaghi, 1950; modified by Heuer, 1974).

Tunnelman's Ground Classification			
Classification		**Behavior**	**Typical Soil Types**
Firm		Heading can be advanced without initial support, and final lining can be constructed before ground starts to move	Loess above water table, hard clay, marl, cemented sand and gravel, when not highly overstressed.
Raveling	Slow Raveling Fast Raveling	Chunks or flakes of material begin to drop out of the arch or walls, some time after the ground has been exposed, due to loosening or to overstress and "brittle" fracture (ground separates or breaks along distinct surfaces, as opposed to squeezing ground). In fast raveling ground, the process starts within a few minutes; otherwise, the ground is slow raveling.	Residual soils or sand with small amounts of binder may be fast raveling below the water table, and slow raveling above. Stiff fissured clays may be slow or fast raveling depending upon the degree of overstress.
Squeezing		Ground squeezes or extrudes plastically into tunnel. Without visible fracturing or loss of continuity, and without perceptible increase in water content. Ductile, plastic yield and flow due to overstress.	Ground with low frictional strength. Rate of squeeze depends on degree of overstress. Occurs at shallow to medium depth in clay of very soft to medium consistency. Stiff to hard clay under high cover may move in combination of raveling at execution surface and squeezing at depth behind face.

Tunnelman's Ground Classification			
Classification		**Behavior**	**Typical Soil Types**
Running	Non-Cohesive Running Running	Granular materials without cohesion are unstable at a slope greater than their angle of repose (±30° to 35°). When exposed at steeper slopes, they run like granulated sugar or dune sand until slope flattens to the angle of repose.	Clean, dry granular materials. Apparent cohesion in moist sand or weak cementation in any granular soil, may allow the material to stand for a brief period of raveling before it breaks down and runs. Such behavior is cohesive running.
Flowing		A mixture of soil and water flows into the tunnel like a viscous fluid. The material can enter the tunnel from the invert as well as from the face, crown, and wall, and can flow great distances, completely filling the tunnel in some cases.	Below the water table in silt, sand, or gravel without enough clay content to give significant cohesion or plasticity. May also occur in highly sensitive clay when such material is disturbed.
Swelling		Ground absorbs water, increases in volume, and expands slowly into the tunnel.	Highly preconsolidated clay with plasticity index in excess of about 30, generally containing significant percentages of montmorillonite

4.1.1 Applewhite Road Tunnel

The following table summarizes the anticipated ground behavior of soils that will be encountered during construction of the Applewhite Road Tunnel:

Applewhite Road Tunnel (STA 545+28 to STA 547+00)			
Elev. (ft)	**USCS**	**Description of Materials**	**Anticipated Ground Behavior**
544 to 538	CL	CLAY, Sandy, Brown to Tan, with calcareous deposits	Firm, Slow Raveling
538 to 536		Cemented Sand Seam	Firm
536 to 523	SC- SM	SAND, Silty, Clayey, Dense to Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Fast Raveling
523 to 513	SC- SM	SAND, Silty, Clayey, Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Fast Raveling
513** to 511.5**		Cemented Sand Seam	Firm
511.5 to 502	SC- SM	SAND, Silty, Clayey, Very Dense, Light-Reddish Brown to Tan, with intermittent cemented sand seams and partings	Fast Raveling

4.2 CONSTRUCTION STAGING AREAS

Staging areas are required near work shafts/portals to provide space for construction equipment, material storage, fabrication, materials handling and muck removal and disposal. Support facilities, such as office trailers, change houses, and sanitation facilities will also be necessary. The construction easements are shown on the Drawings.

4.3 SETTLEMENT AND ADJACENT STRUCTURES PROTECTION - TUNNELS

Surface settlement due to tunneling operations can result from a number of factors: the overcutting by the tunneling machine; loss of ground at the heading; steering adjustments; and movement of the soil into the annular space outside the pipe. Although surface settlement generally occurs due to loss of ground during soft ground tunneling, it can be limited by selecting tunneling equipment suitable for the anticipated conditions, implementing appropriate construction methods and practicing good workmanship. The Contractor shall abide by a maximum allowable settlement/heave values presented in the Contract Specifications.

Estimates of the amount of surface settlement that could occur due to tunneling operations will need to be made to evaluate the potential impact on each roadway and underground utilities. The settlement pattern that typically develops above a soft ground tunnel is a trough-shaped depression resembling an inverted bell curve with the maximum settlement occurring above the tunnel centerline.

The allowable ground movements (settlement/heave) for tunneling operations and shaft/portal excavations should be based upon the requirements of Bexar County, the utility providers, and other public or private agencies crossed by the tunnel.

The Contractor is responsible for repairing any damage due to settlement resulting from the work. The Contractor is required to perform a baseline survey of the structures along the tunnel alignment before the tunnel excavation begins. A geotechnical instrumentation monitoring program shall also be provided by the Contractor for protection against settlement. The Contractor shall install and monitor the settlement monitoring stations and instrumentation in accordance with Contract Specifications.

4.4 GROUND IMPROVEMENT

The contractor is required to implement ground improvement methods to protect existing structures and utilities where the predicted settlements exceed the allowable settlements.

5 DESIGN CONSIDERATIONS – SHAFTS/PORTALS

Shafts/portals will be required to facilitate tunneling operations. The shafts/portals will require temporary shoring support to conduct the work safely and protect adjacent structures. The subsurface conditions and anticipated ground behavior at shaft/portal locations have been presented previously.

5.1 GEOMETRY

The size and shape of the excavations and the type of excavation support system will be determined by the Contractor subject to the limitations shown on the Drawings and the requirements stated in the specifications. All shafts/portals must be able to accommodate the requirements for excavation, groundwater control, and tunneling operations. The excavation depth will be a function of the selected working slab elevation and the required base plug thickness, if required, to resist heave and uplift.

5.2 CONSTRUCTION REQUIREMENTS

The shaft construction methods will be the responsibility of the contractor. The presence of groundwater, where encountered, must be addressed through watertight shaft construction methods that preclude water from entering the excavation, external dewatering that lowers the groundwater below the excavation depth, and/or ground improvement methods that modify the soils to create a seepage barrier around the shafts/portals.

5.3 BREAKIN/BREAKOUT

Ground stabilization methods will be required at shaft/portal locations to improve and stabilize the soils for breakin/breakout of the tunneling equipment. The contractor should complete ground stabilization prior to commencing tunneling activities so that ground stabilization does not interfere with the tunneling operations.

5.4 LATERAL EARTH PRESSURES

Lateral earth pressures appropriate for design will be a function of the type of support system, installation procedures, depth of excavation, retained subsurface materials, groundwater conditions, and magnitude of surcharge loads on the ground surface adjacent to the excavation. Selection of the shoring system for the shafts is the Contractor's option. The structural components of the temporary shoring system are required to minimize horizontal and vertical ground movements, and to protect adjacent utilities from damage in accordance with the Specifications.

5.5 SETTLEMENT AND ADJACENT STRUCTURES PROTECTION - SHAFTS

Potential sources of surface settlements include ground loss when shoring systems are installed and removed and compression of backfill. The amount of settlement due to ground loss is primarily a function of the construction methods. By limiting the excavation depth prior to installing the shoring system, as well as maintaining contact between the back of the shoring and the retained ground, will help to limit the amount of ground loss and consequential surface settlement during shaft construction. Ensuring that the shafts are backfilled in a timely manner as the shoring systems are removed will help limit potential ground loss. Meeting specified soil compaction criteria reduces the potential for compression of backfill.

Instrumentation and monitoring of surface structures should be performed to observe for potential settlement. The location of control points and the frequency of monitoring are stated in the Specifications. The Contractor should also develop a contingency plan in the event that settlement approaches or exceeds allowable settlement tolerances.

5.6 DEWATERING AND GROUNDWATER DISPOSAL

Water, where encountered, must be removed from the construction shafts prior to, and during, tunneling operations. Groundwater control and discharge must be provided for in accordance with the Specification. Dewatering within the shafts is expected to consist of sumps and pumps positioned at the base of the shaft to collect any shaft leakage and surface water infiltration. No evidence of groundwater contamination has been identified along the MRSO alignment. The

Contractor is to formulate their bid based on the assumption that no groundwater contamination will be encountered during shaft excavations or tunneling segments along the MRSO alignment.

5.7 BASE STABILITY

Each shaft must be designed to resist uplift forces due to heave and groundwater head, where groundwater is encountered. A working slab will be required to facilitate tunneling operations and a base plug may be required to resist uplift forces. The methods of base plug installation include deep soil treatment beneath the base using jet grouting prior to excavation of the shaft or by excavating "in-the-wet" and tremie grouting a plug.

6 GENERAL CONSTRUCTION CONSIDERATIONS

6.1 OBSTRUCTIONS

The Contract Documents define an obstruction as a naturally occurring or man-made object, such as wood, concrete fragment, concretions or sandstone seams or boulders, having a diameter or thickness greater than 1/3 of the pipe diameter that lies entirely or partially within the excavation zone and impedes the progress of excavation. It should be noted that cemented sand seams and partings were encountered in both of our borings which may be considered obstructions as defined in the Contract Documents. For baseline purposes the Contractor should assume that obstructions will be present for 100 ft of the tunnel excavation. Additionally during shaft excavations obstructions consisting of seams and partings will be encountered at a rate totaling 5 ft per 50 ft of excavation.

6.2 UTILITIES

The proposed MRSO Segment 2 Applewhite Road tunnels cross beneath a multitude of utilities including but not limited to gas, water, sewer, electricity, and telephone/communications. The following table summarizes the utilities shown on the Drawings within the horizontal extents of the tunnel.

Tunnel	Utility	Station	Owner
Applewhite Road	15" Water	545+40	-
	(2) Fiber Optic	545+44	AT&T Telephone
	12" Sanitary Sewer	546+67	-

Existing utilities in the alignment must be avoided or relocated with minimal disruption to service. The Contractor shall protect all surface and subsurface utilities along the pipeline alignment. The Contractor is solely responsible for damage to any existing utilities, whether shown on the Project Plans or not, as well as protection, relocation, and removal of utilities within the project area as necessary.

While the Project Plans illustrate the location of certain utilities, they do not necessarily show all the utilities that existing along the alignment. It is the Contractor's responsibility to verify the accuracy and completeness of the utility location information. The means of accomplishing this

task are the Contractors however at a minimum this should include contacting the appropriate utility owners, operators, and the utility location agencies. All utilities must remain in good repair and service after construction. Several significant utility crossings will be required as part of the project. In addition to locating existing utilities, the Contractor shall also be responsible for mitigating movement to and damage of all existing utilities along the entire pipeline alignment.

6.3 EXCAVATED MATERIAL DISPOSAL

Native materials and man-made fill excavated during construction can be disposed of off-site without restriction or it may be used as backfill provided that it meets the backfill requirements stated in the Specifications. The temporary stockpiling and final disposal of all such materials excavated and not able to be replaced is the responsibility of the Contractor. For bidding purposes, contaminated materials will not be present in the excavation envelopes. For bidding purposes water from excavation dewatering operations may be piped to local storm drains once treatment to remove turbidity and other pollutants has been completed. Any and all water and/or material discharges/disposals must follow local, state, and federal regulations and requirements. The Contractor is responsible for obtaining any required permits. The Contractor shall install appropriate measures to settle out fines and other pollutants to meet water discharge requirements stated in any permits. These measures include but shall not be limited to settlement basins, mechanical treatment units, additives, and other sediment, particulate and pollutant control measures as may be required. The Contractor is responsible for and shall maintain any local, state, and federal environmental regulations and requirements. If excavated materials are going to be temporarily stored along the edge of the excavation then the trench safety plan must include the surcharge from both the stockpile and the equipment utilized to handle this material.

7 LIMITATIONS

This Geotechnical Baseline Report (GBR) summarizes the geotechnical basis for design of the Project and presents a baseline description of subsurface conditions to be encountered during construction. Interpretation of the subsurface and groundwater conditions is based on available exploratory boring data. These borings depict subsurface conditions for the indicated locations at the time of drilling operations. Based on the stratigraphy encountered in the borings non-uniform conditions across the alignment were encountered and are expected to occur between borings. This GBR should be referred to for geotechnical interpretation of the available data. This report has been prepared in accordance with accepted Geotechnical Engineering practices in the region of south/central Texas. No other representation is intended.

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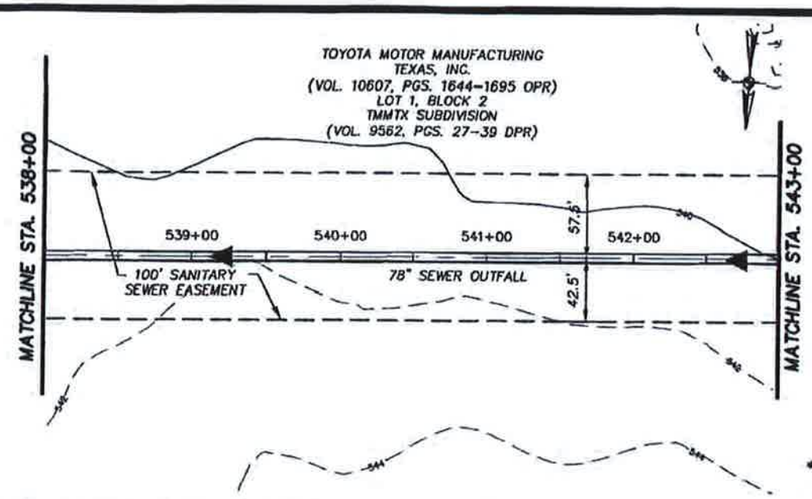
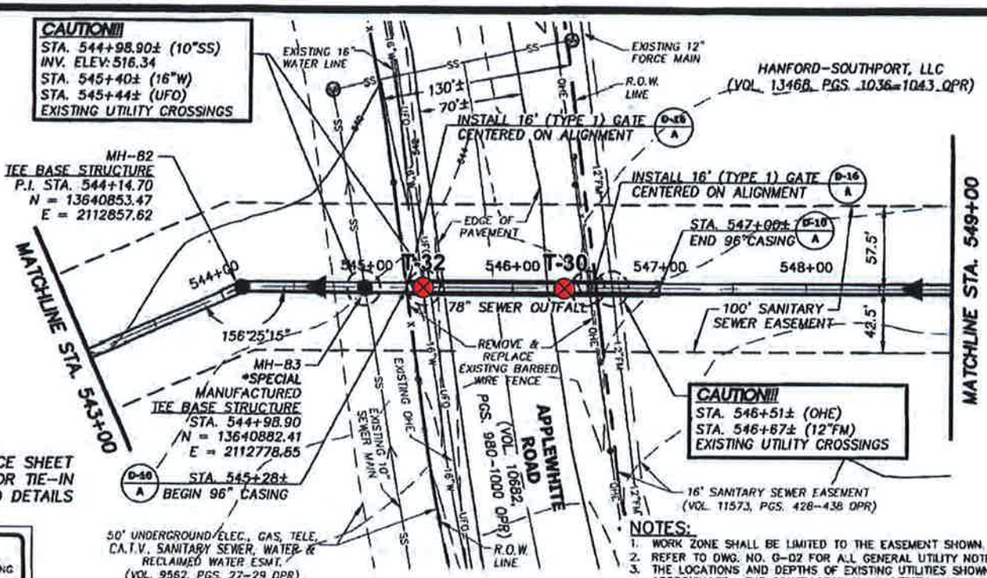
ATTACHMENTS





* REFERENCE SHEET C-144 FOR TIE-IN PLAN AND DETAILS

TRENCH EXCAVATION SAFETY PROTECTION

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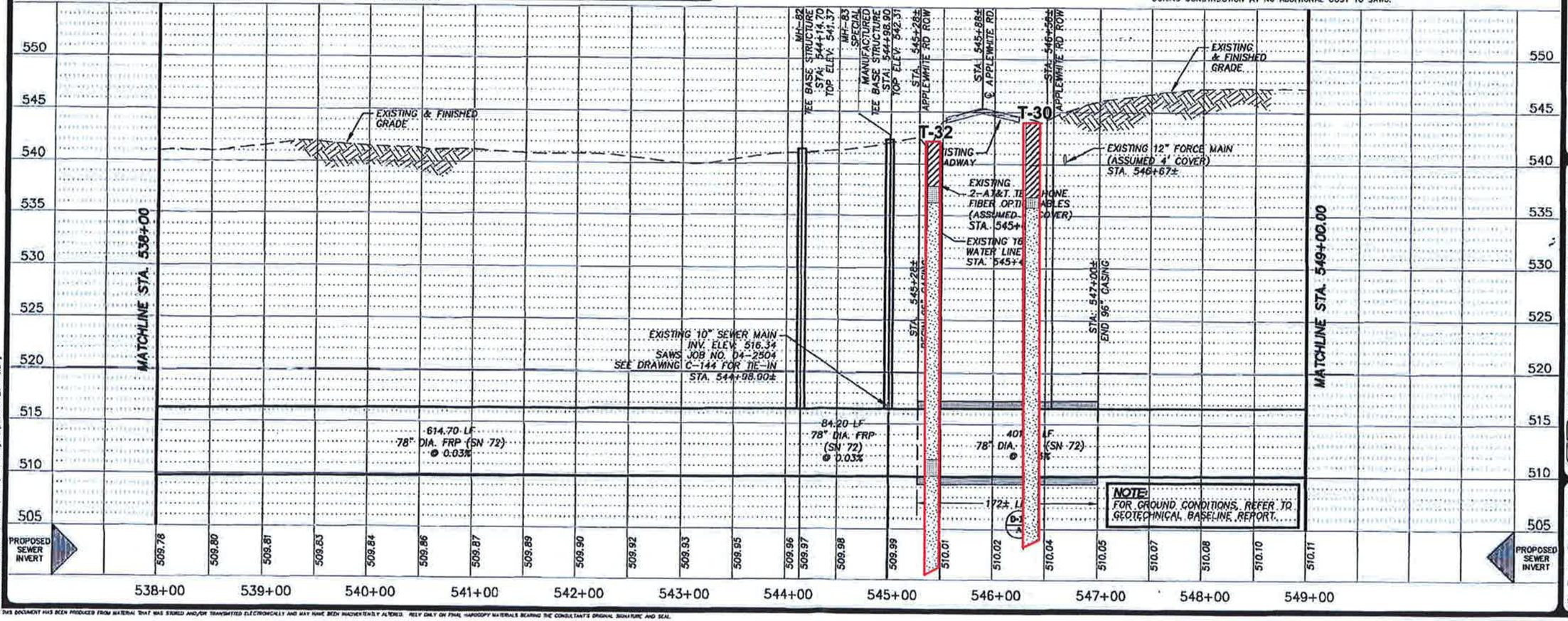

NO.	DATE	REVISION	APP

NOTE: THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF REVIEW UNDER THE AUTHORIZATION OF BRICE MOCZYGEMBA, P.E. #85747. IT IS NOT TO BE USED FOR CONSTRUCTION

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TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN AND PROFILE SHEET STA. 538+00 TO STA. 549+00

JOB NO. 6866-00
DATE FEBRUARY 2010
DESIGNER JCM
DRAWN JAG
CHECKED RM
DRAWING No. C-43
SHEET No.

Date: Feb 11, 2010, 1:45pm User ID: JDorre
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SHEET INDEX

1

BID QUANTITIES

ITEM NUMBER	DESCRIPTION	UNIT	QTY.
1	EROSION & SEDIMENTATION CONTROLS	LS	1
2	TRENCH EXCAVATION SAFETY PROTECTION	LF	21,743
3	REVEGETATION	SY	237,146
4	78"(FRP, SN 72)	LF	20,663
5	78" TEE BASE MH	EA	5
6	78"SPECIAL TEE BASE MH	EA	1
7	78" TEE BASE MH, MITER	EA	11
8	78" TEE BASE MH (DROP)	EA	8
9	78" TEE BASE MH, MITER (DROP)	EA	6
10	TEE BASE MH, 60" RISER EXTRA DEPTH	LF	307
11	TOYOTA LIFT STATION TIE IN	LS	1
12	FENCE GATE 16' (TYPE 1)	EA	3
13	REMOVE AND REPLACE FENCING	LF	410
14	BORING OR TUNNELING FOR 78" DIA. FRP	LF	421
15	CARRIER PIPE INSTALLED IN STEEL CASING OR TUNNEL LINER PLATE (78" DIA FRP)	LF	421
16	DOWNSTREAM SIPHON STRUCTURE NO. 2	LS	1
17	UPSTREAM SIPHON STRUCTURE NO. 2	LS	1
18	12" (FRP, SN 72) FOR SIPHON NO. 2	LF	530
19	36" (FRP, SN 72) FOR SIPHON NO. 2	LF	530
20	42" (FRP, SN 72) FOR SIPHON NO. 2	LF	530
21	30" HDPE (AIR BY-PASS PIPE)	LF	550
22	AIR BYPASS MANHOLE (FRP)	EA	2
23	ROCK RIP RAP (12" TO 18")	SY	889
24	CONCRETE CAP	LF	250
25	CONCRETE ENCASEMENT	LF	373
26	BYPASS PUMPING	LS	1
27	ABANDONMENT OF SANITARY SEWER MAIN AND MANHOLES	LF	400
28	TREE PROTECTION	LS	1
29	CONNECTION TO MRSO SEGMENT 1	LS	1
30	CONNECTION TO MRSO SEGMENT 3	LS	1
31	GRAVITY SEWER OUTFALL TESTING	LF	21,084

LEGEND
(EXISTING ITEMS)

- 488 — EXISTING 2' CONTOUR
- 490 — EXISTING 10' CONTOUR
- EXISTING BARBED WIRE FENCE
- EXISTING CHAIN LINK FENCE
- EXISTING CONCRETE WALL/FENCE
- EXISTING FENCE POST
- PROPERTY LINE
- GAS — EXISTING GAS LINE/PIPELINE
- OHE — EXISTING OVERHEAD ELECTRIC
- UFO — EXISTING UNDERGROUND FIBER OPTIC
- TELE — EXISTING UNDERGROUND TELEPHONE
- EXISTING POWER POLE
- EXISTING DRAINAGE/UTILITY EASEMENT
- EXISTING TREE
- SS — EXISTING SANITARY SEWER
- FM — EXISTING FORCE MAIN
- EXISTING SEWER MANHOLE
- 8"W — EXISTING 8" POTABLE WATER
- 12"W — EXISTING 12" POTABLE WATER
- 16"W — EXISTING 16" POTABLE WATER
- EXISTING FIRE HYDRANT
- EXISTING BENCHMARK LOCATION
- EXISTING SIGN
- EXISTING GUARDRAIL
- EXISTING RAILROAD
- EXISTING ASPHALT/ROAD

LEGEND
(PROPOSED ITEMS)

- 500 — PROPOSED GRADING CONTOUR
- PROPOSED SEWER EASEMENT
- 125+00 — PROPOSED SEWER CENTERLINE STATION
- PROPOSED SEWER CENTERLINE
- PROPOSED SEWER PIPE
- PROPOSED SEWER FLOW DIRECTION
- D-01 / A — PROPOSED DETAIL REFERENCE (SHEET/ITEM)
- PROPOSED MANHOLE TEE BASE — D-11 / B
- PROPOSED DROP MANHOLE LOCATION — D-11 / A
- PROPOSED SIPHON STRUCTURE
- PROPOSED CONCRETE ENCASEMENT
- PROPOSED CONCRETE CAP
- PROPOSED CASING
- PROPOSED EROSION CONTROL MAT
- PROPOSED REMOVABLE BOLLARD — D-14 / D

LEGEND
(ABBREVIATIONS)

FRP	FIBER-REINFORCED PLASTIC PIPE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
PVC	POLYVINYL CHLORIDE PIPE
MH	MANHOLE
SS	SANITARY SEWER
FM	FORCE MAIN
WL	WATER LINE
BM	BENCHMARK
ECM	EROSION CONTROL MAT
ROW	RIGHT OF WAY
DS	DOWNSTREAM
US	UPSTREAM
UPRR	UNION PACIFIC RAILROAD
OPR	OFFICIAL PUBLIC RECORDS
℄	PROPERTY LINE
℄	CENTER LINE
EXTG	EXISTING
IRR	IRRIGATION
UFO	UNDERGROUND FIBER OPTIC

NO.	DATE	REVISION	APP.
1	11/1/10	ADDENDUM #1 REVISIONS	BM

STATE OF TEXAS
BRICE B. MCCZYGEMBA
65747
LICENSED
PROFESSIONAL ENGINEER

PAPE-DAWSON ENGINEERS
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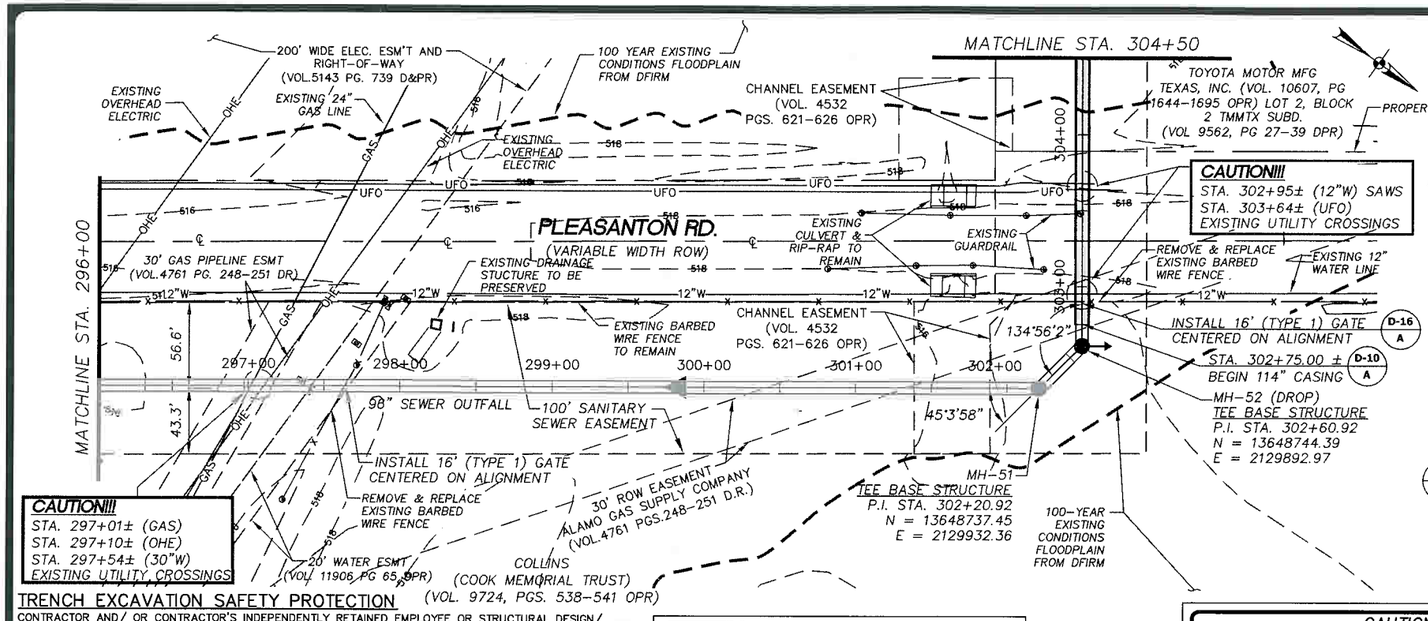
SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

SHEET INDEX, BID QUANTITIES AND LEGEND

JOB NO. 6866-00
DATE NOVEMBER 2010
DESIGNER JO
DRAWN BS
CHECKED BM
DRAWING No. G-01
SHEET No. 2



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CAUTION!!!
CAUTION HIGH PRESSURE NATURAL GAS PIPELINE.
MR. GARY STUMP, 10647 GULFDALE DRIVE, SAN ANTONIO, TX. 78216, PHONE NUMBER 210-528-4756 SHALL BE CONTACTED A MINIMUM OF 48 HOURS BEFORE ANY WORK OVER THE PIPELINE SO THAT HE CAN HAVE THE LINE LOCATED AND MARKED.
SHOULD AN ACCIDENT OCCUR REGARDING THE PIPELINE, IMMEDIATELY NOTIFY ENTERPRISE PRODUCTS OPERATING, L.P., GAS CONTROL DEPARTMENT, HOUSTON, TX. TELEPHONE NUMBER 713-803-2407

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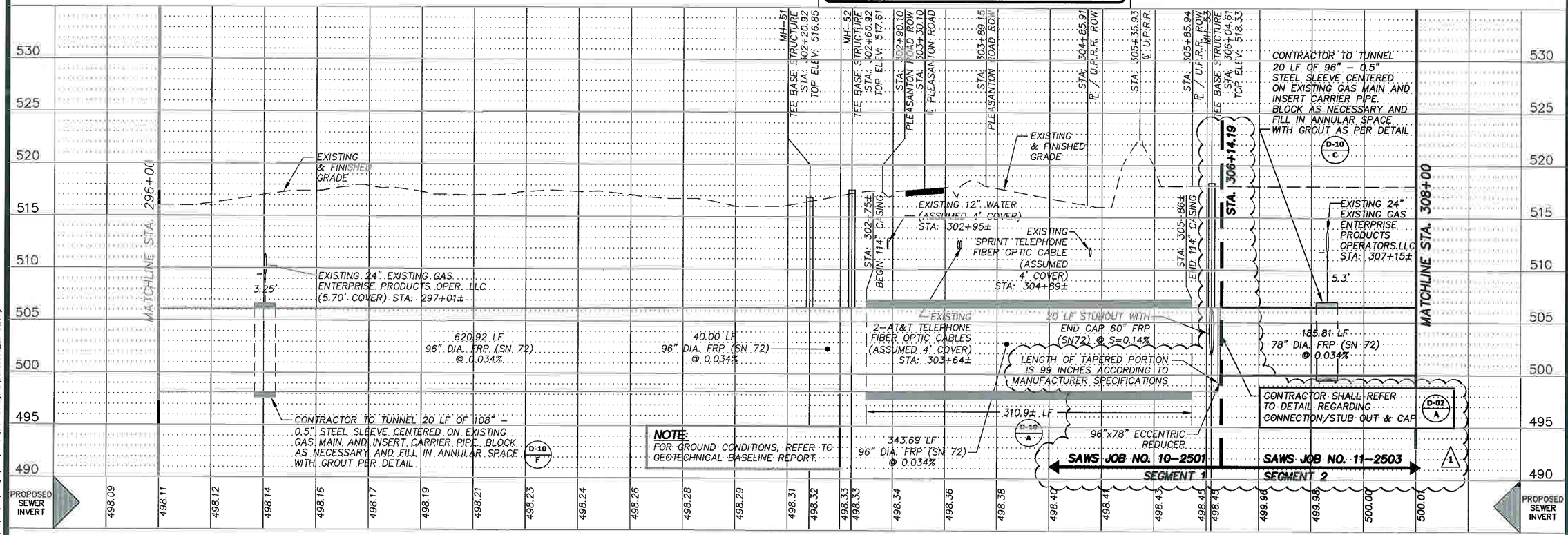

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NO.	DATE	REVISION	APP
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STATE OF TEXAS — BRICE B MOCZYGEMBA — 65747 — LICENSED PROFESSIONAL ENGINEER — 11/1/10

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN AND PROFILE SHEET STA. 296+00 TO STA. 308+00

JOB NO.	6866-00
DATE	NOVEMBER 2010
DESIGNER	JGM
DRAWN	JAC
CHECKED	BM
DRAWING No.	C-25
SHEET No.	12

Date: Nov 01, 2010, 11:06am User ID: BSmith
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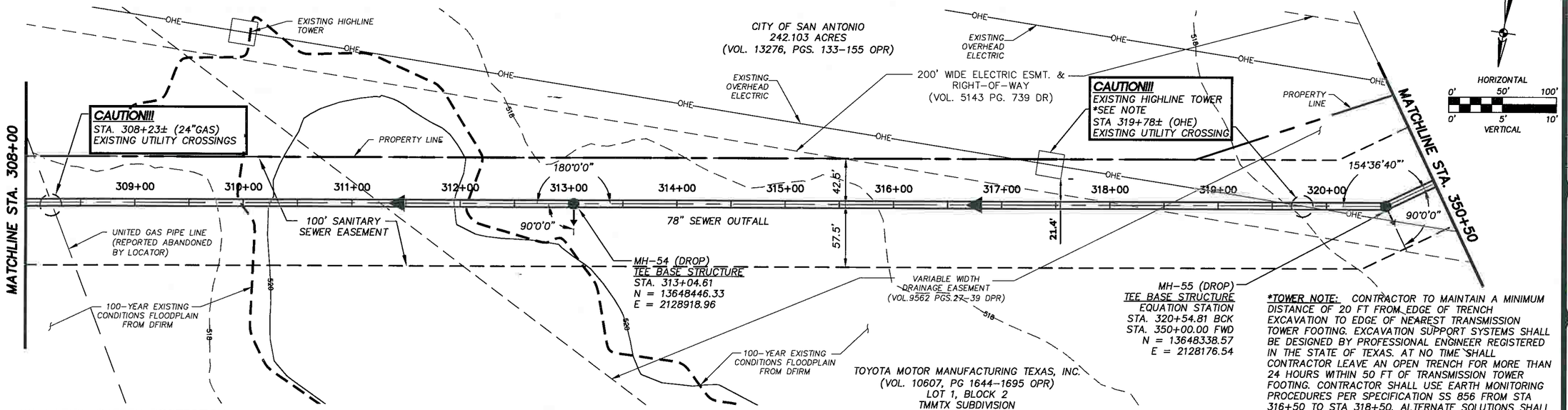

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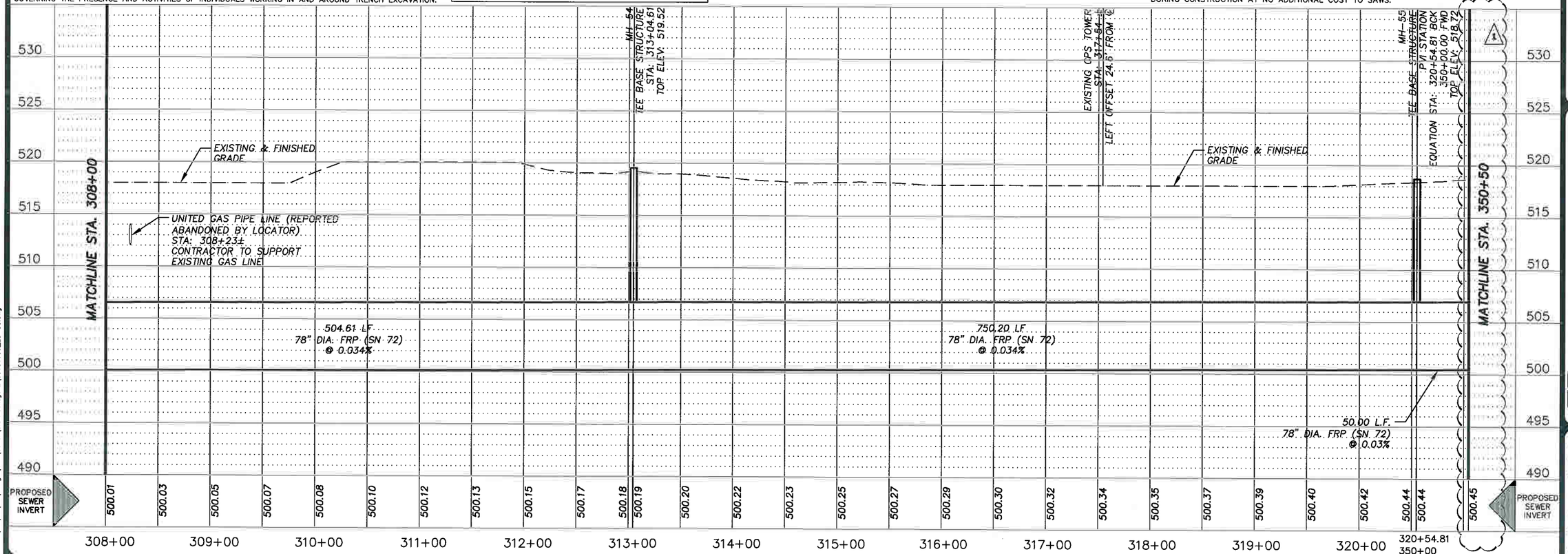
CAUTION!!!

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 WITH CPS ENERGY.

***TOWER NOTE:** CONTRACTOR TO MAINTAIN A MINIMUM DISTANCE OF 20 FT FROM EDGE OF TRENCH EXCAVATION TO EDGE OF NEAREST TRANSMISSION TOWER FOOTING. EXCAVATION SUPPORT SYSTEMS SHALL BE DESIGNED BY PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS. AT NO TIME SHALL CONTRACTOR LEAVE AN OPEN TRENCH FOR MORE THAN 24 HOURS WITHIN 50 FT OF TRANSMISSION TOWER FOOTING. CONTRACTOR SHALL USE EARTH MONITORING PROCEDURES PER SPECIFICATION SS 856 FROM STA 316+50 TO STA 318+50. ALTERNATE SOLUTIONS SHALL BE AT NO ADDITIONAL COST.*

NOTES:

1. WORK ZONE SHALL BE LIMITED TO THE EASEMENT SHOWN.
2. REFER TO DWG. NO. G-02 FOR ALL GENERAL UTILITY NOTES AND CONTACT INFORMATION.
3. THE LOCATIONS AND DEPTHS OF EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ACTUAL LOCATIONS AND DEPTHS OF ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES PRIOR TO EXCAVATION AND INSTALLATION. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL UTILITIES WHETHER SHOWN ON THE PLANS OR NOT AND TO PROTECT ALL UTILITIES DURING CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND REPAIRING ANY UTILITIES DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO SAWS.



NO.	DATE	REVISION	APP
1	11/2/10	ADDENDUM #1 REVISIONS	BM

STATE OF TEXAS
BRICE B. MOCZYGEMBA
65747
LICENSED
PROFESSIONAL ENGINEER
11/10

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN AND PROFILE SHEET
STA. 308+00 TO STA. 350+50

JOB NO.	6866-90
DATE	NOVEMBER 2010
DESIGNER	JGM
DRAWN	JAG
CHECKED	BM
DRAWING No.	C-26
SHEET No.	13

Date: Nov 01, 2010, 11:06am User ID: BSmith
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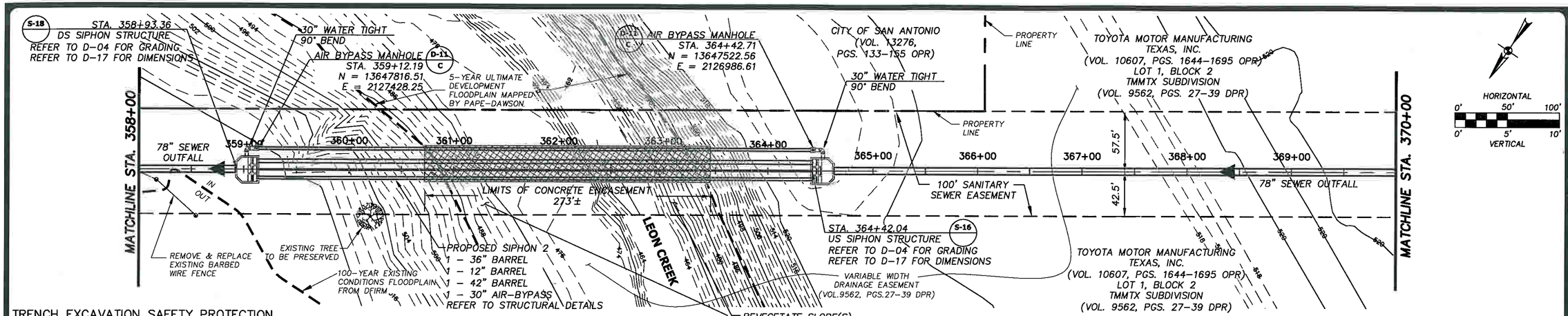

TRENCH EXCAVATION SAFETY PROTECTION

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CAUTION!!!

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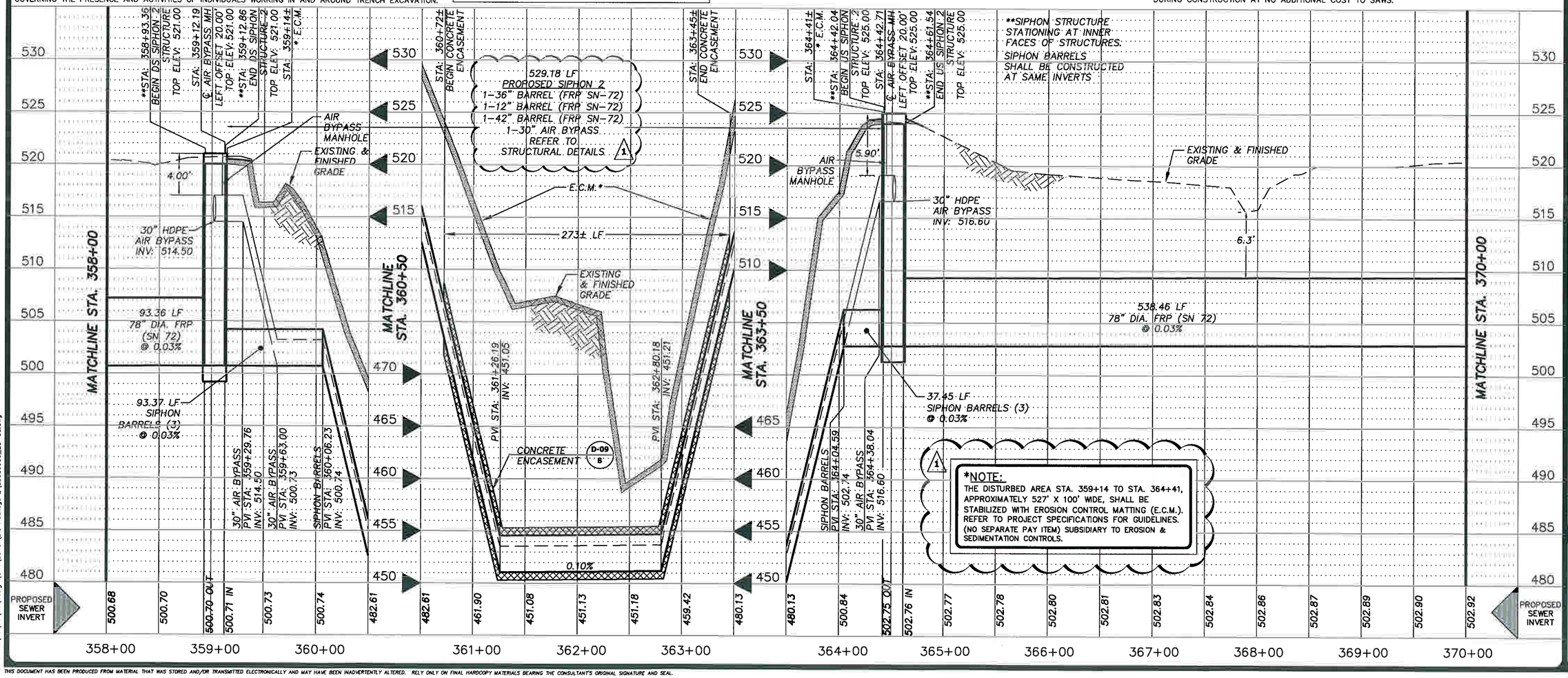

NO.	DATE	REVISION	APP
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BRICE B. MOCZYGEMBA 65747 LICENSED PROFESSIONAL ENGINEER

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555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN & PROFILE SHEET STA. 358+00 TO STA. 370+00

JOB NO. 6866-00
DATE NOVEMBER 2010
DESIGNER JGM
DRAWN JAG
CHECKED BM
DRAWING No. C-28
SHEET No. 15

Date: Nov 01, 2010, 11:07am User ID: BSmith
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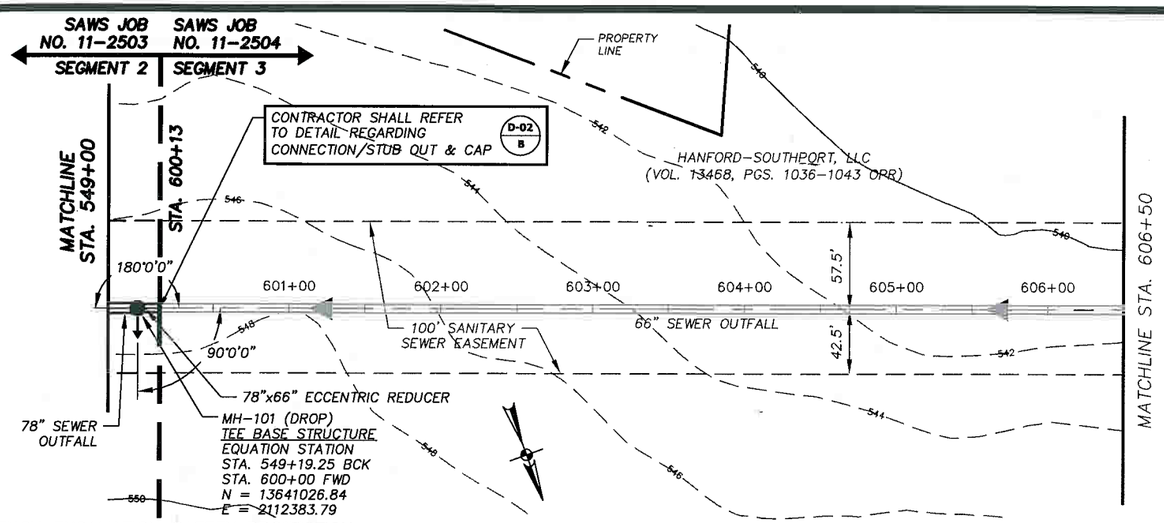

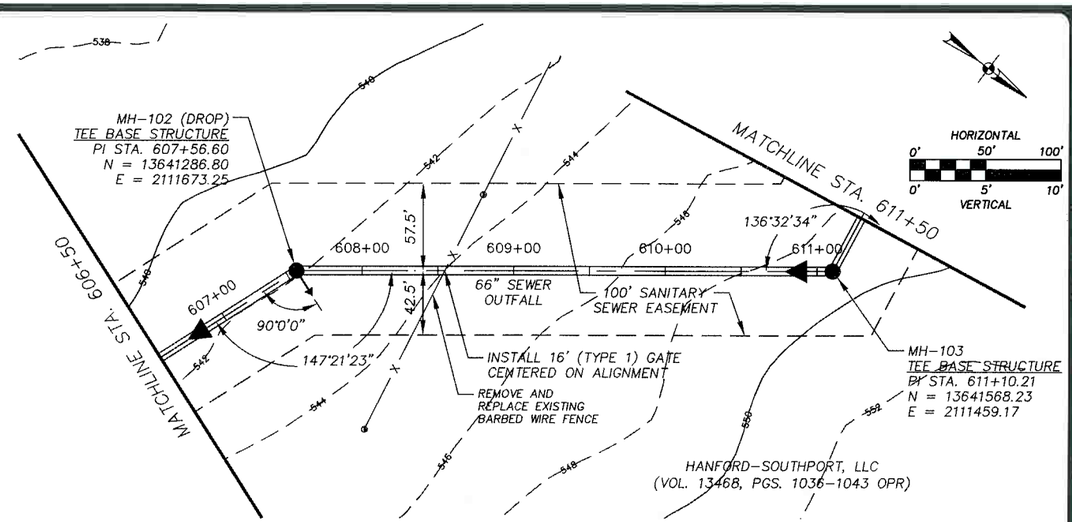

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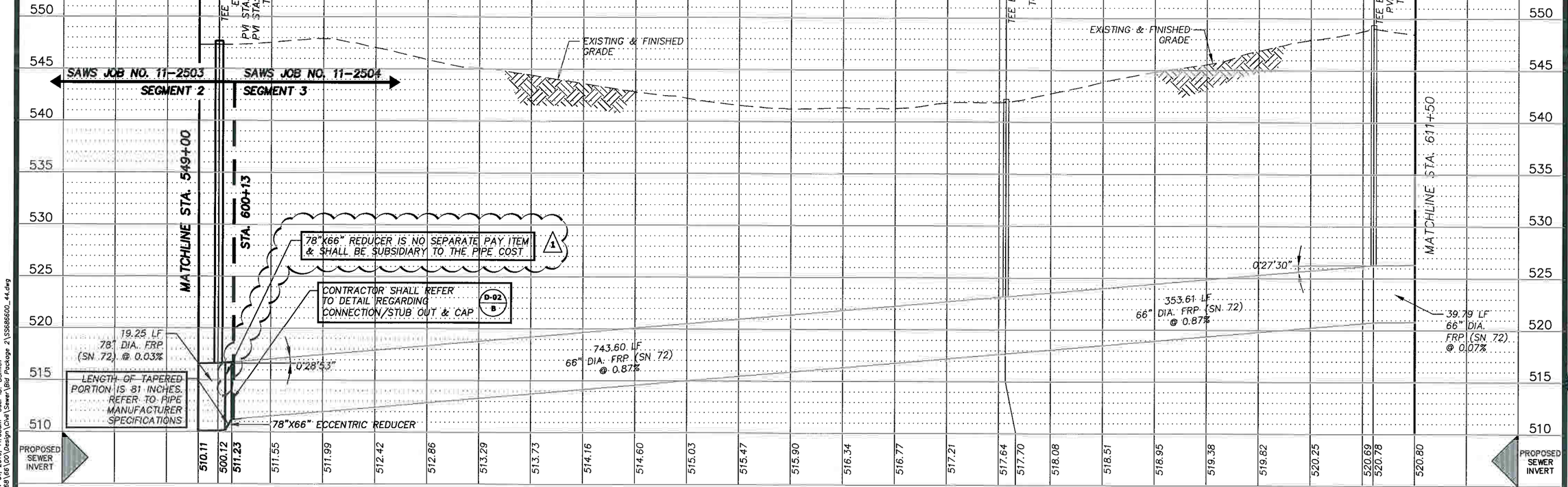

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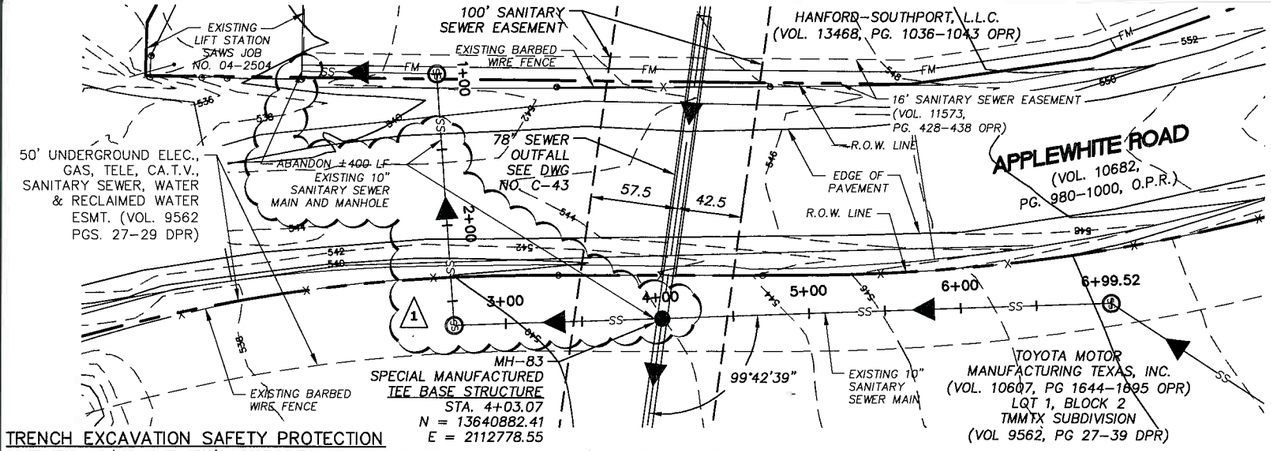
BRUCE B. MCCLENDON 65747 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN AND PROFILE SHEET STA. 549+00 TO STA. 600+13

JOB NO.	6866-00
DATE	NOVEMBER 2010
DESIGNER	JO
DRAWN	BS
CHECKED	BM
DRAWING No.	C-44
SHEET No.	31



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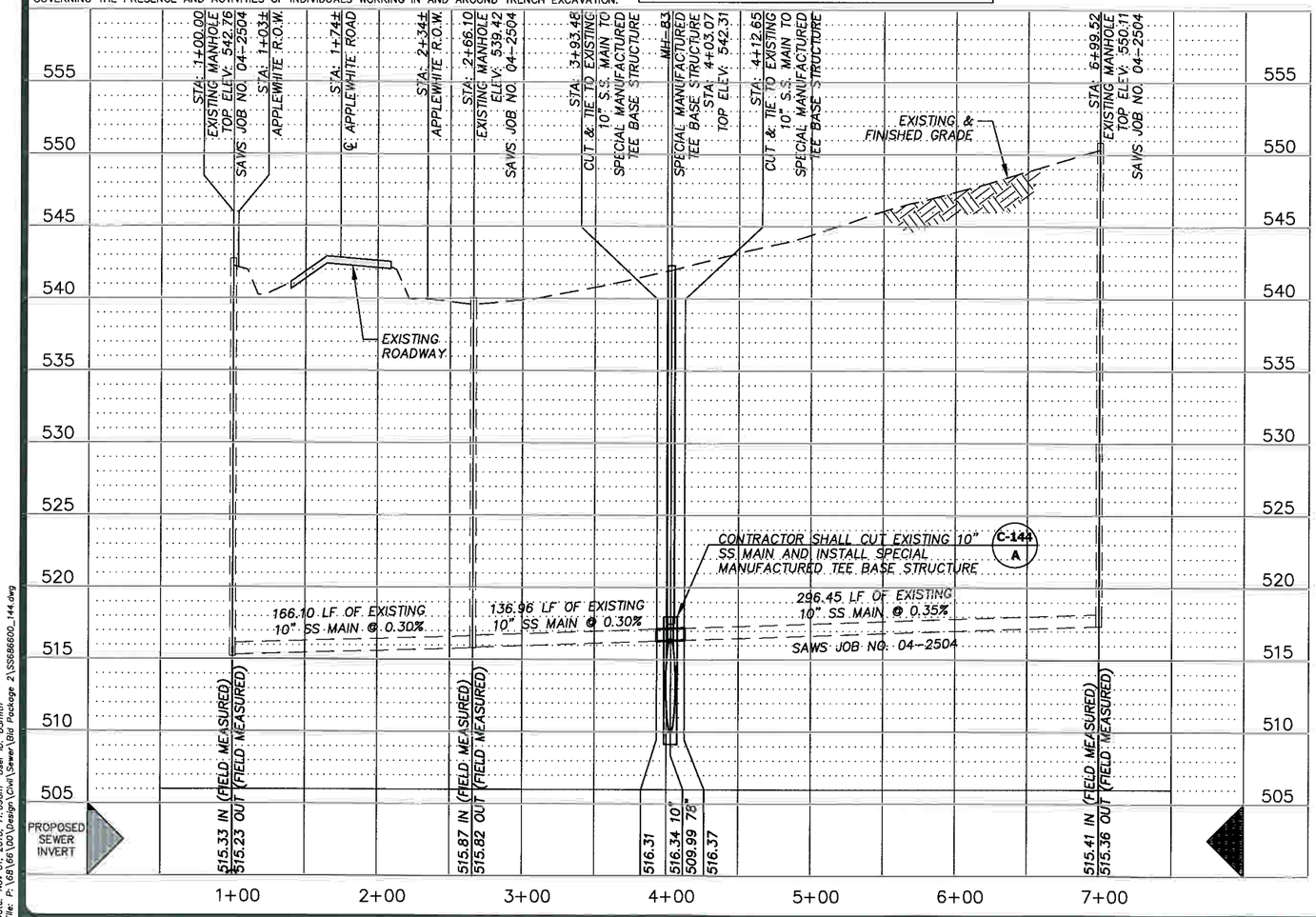

TEE BASE CONNECTION NOTE

SPECIAL TEE BASE STRUCTURE IS CONFIGURED SUCH THAT EXISTING 10-INCH SANITARY SEWER MAIN CAN BE CONNECTED TO THE MEDINA RIVER SEWER OUTFALL (MRSO) WHILE MAINTAINING SERVICE TO THE TOYOTA MOTOR MANUFACTURING TEXAS, INC. (TMMTX) SITE THROUGH THE 10" MAIN UNTIL SUCH TIME THAT THE MRSO IS ACCEPTED BY SAWS. CONTRACTOR TO COORDINATE WITH TMMTX REPRESENTATIVES AND THE ENGINEER TO SCHEDULE TIME AND DATE OF CONNECTION. CONTRACTOR TO PROVIDE PROVISIONS SUCH AS BYPASS PUMPING OR ALTERNATE METHOD NECESSARY TO SUSTAIN FLOW FROM THE EXISTING MANHOLE NORTH OF THE MRSO TO THE EXISTING MANHOLE SOUTH OF THE MRSO DURING INSTALLATION OF SPECIAL TEE BASE MANHOLE. AT THE TIME OF ACCEPTANCE OF THE MRSO BY SAWS, CONTRACTOR SHALL REMOVE THE PORTION OF THE 10-INCH MAIN BRIDGED ACROSS THE MRSO PER DETAIL ON THIS SHEET AND ALLOW FLOW FROM THE TMMTX 10-INCH MAIN INTO THE MRSO.

HORIZONTAL 0' 50' 100'
VERTICAL 0' 5' 10'

NOTES:

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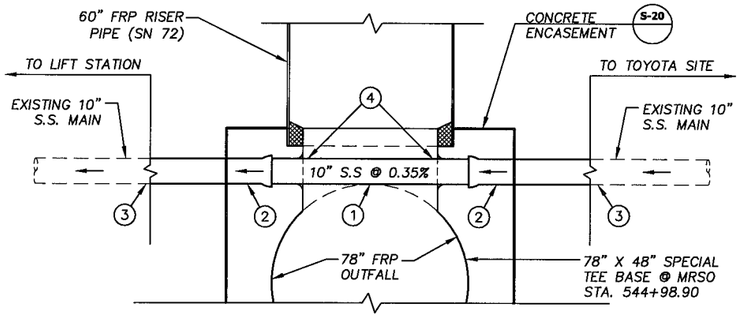

1. APPROXIMATELY 7 L.F. OF 10" SDR 26 PVC CAST INTO SPECIAL TEE BASE BY MANUFACTURER.
2. CONTRACTOR TO ADD 10" SDR 26 PVC EXTENSIONS TO EACH END OF 10" STUB-OUTS WITH ADEQUATE LENGTH TO CLEAR CONCRETE ENCASEMENT.
3. CONTRACTOR TO TIE IN SPECIAL TEE BASE INTO EXISTING 10" SANITARY SEWER MAIN AND RESTORE FLOW FROM EXISTING 10" SERVICE FROM TOYOTA SITE TO LIFT STATION.
4. INTERIOR "BRIDGE" 10" PIPE TO BE REMOVED UPON ACCEPTANCE OF MRSO. CONTRACTOR SHALL PLUG AND ABANDON THE 10" SANITARY SEWER MAIN (+/- 400 LF) AND MANHOLES DOWNSTREAM OF THE SPECIAL TEE BASE STRUCTURE AND ALLOW FLOW FROM THE 10" PIPE INTO MRSO.

SPECIAL TEE BASE STRUCTURE CONNECTION DETAIL C-144 A

SCALE : 1" = 5'

NO	DATE	REVISION	APP
1	11/1/10	ADDENDUM #1 REVISIONS	BM

STATE OF TEXAS · BRICE B MOCZYGEMBA · 65747 · LICENSED PROFESSIONAL ENGINEER

BMM 11/1/10

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

PLAN AND PROFILE SHEET
TOYOTA LIFT STATION TIE-IN

JOB NO. 6866-00
DATE NOVEMBER 2010
DESIGNER JGM
DRAWN JL
CHECKED BM
DRAWING No. C-144
SHEET No. 32

Date: Nov 01, 2010, 11:09am User ID: BSmith
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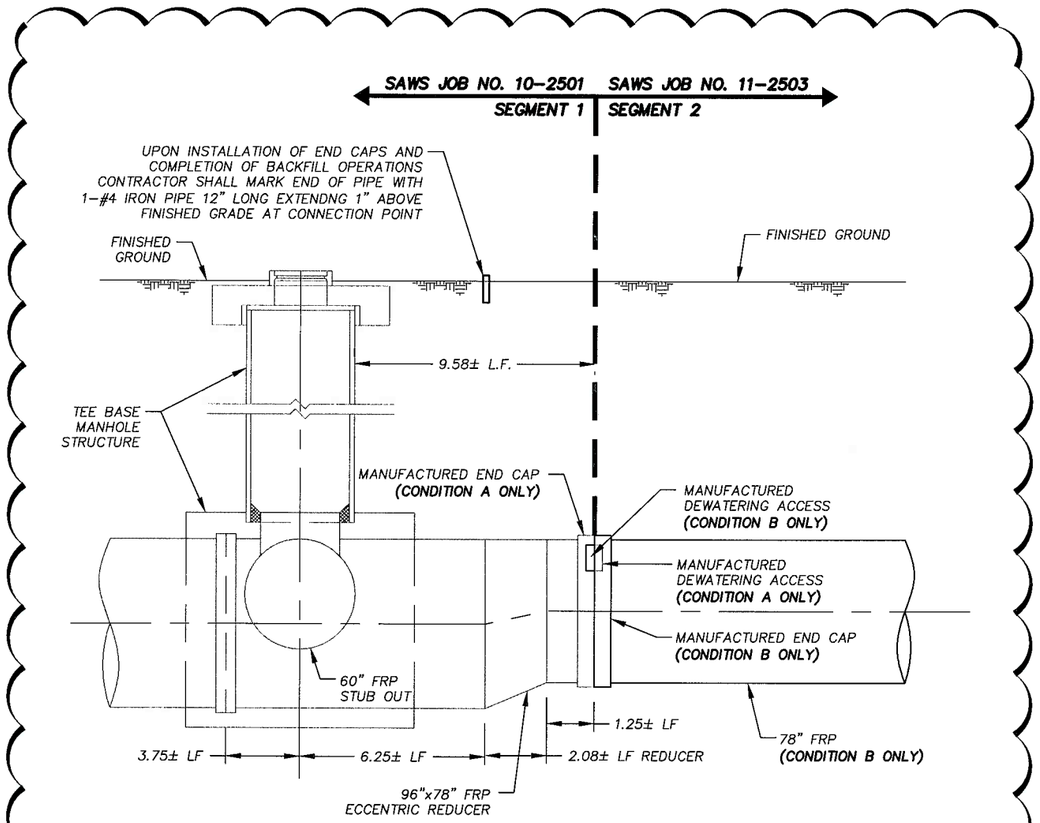
CONNECTION NOTES:

CONDITION–A:
SEGMENT 1 COMPLETED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF SEGMENT 2.

1. CONTRACTOR SHALL CONTACT THE ENGINEER PRIOR TO COMMENCING ANY WORK ASSOCIATED WITH THE CONNECTION OF SEGMENT 2 TO SEGMENT 1.
2. CONTRACTOR SHALL LOCATE, EXPOSE, AND VERIFY SEGMENT 1 INVERT ELEVATION. CONTRACTOR SHALL REPORT ANY DISCREPANCIES FROM THE PLAN LOCATION OR ELEVATION IMMEDIATELY TO THE ENGINEER.
3. UPON FIELD ACCEPTANCE OF SEGMENT 2, CONTRACTOR SHALL DEWATER AND REMOVE SEGMENT 1 END CAP, AND PERFORM CONNECTION IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.

CONDITION–B:
SEGMENT 1 IS NOT COMPLETED PRIOR TO COMMENCING CONSTRUCTION OF SEGMENT 2.

1. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO CONFIRM ALIGNMENT LOCATION AND ELEVATION PRIOR TO INSTALLATION OF SEGMENT 2, 96" PIPE, END CAP, AND DEWATERING ACCESS.



BEGINNING DETAIL FOR FIBERGLASS PIPE AND CAP D-02 A
N.T.S.

1

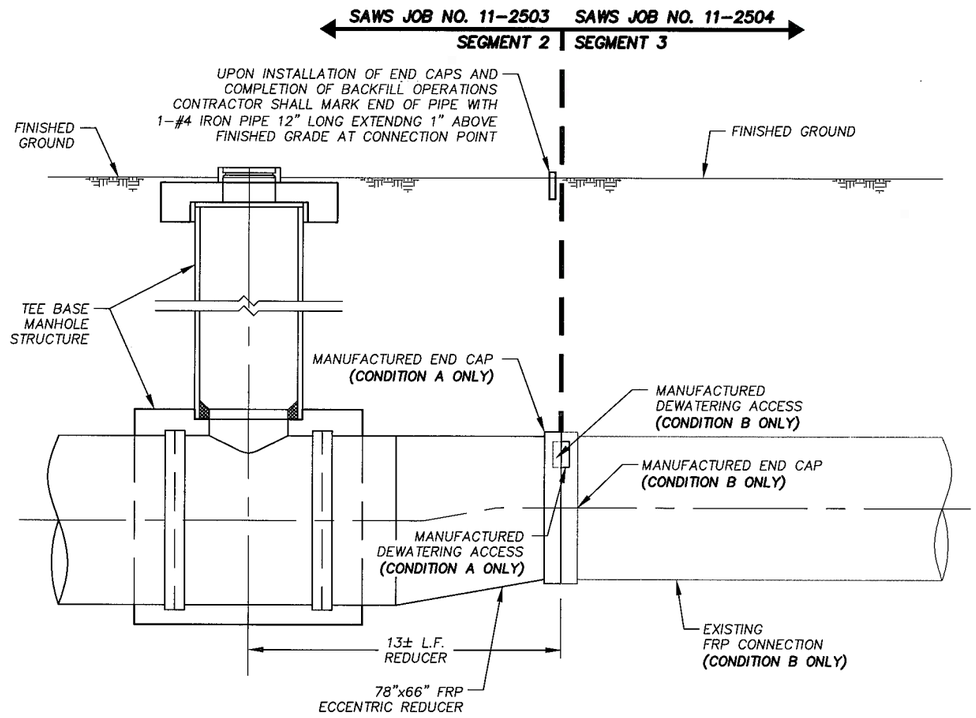
CONNECTION NOTES:

CONDITION–A:
SEGMENT 2 COMPLETED PRIOR TO COMMENCING CONSTRUCTION ASSOCIATED WITH SEGMENT 3.

1. CONTRACTOR SHALL INSTALL STUBOUT AND CAP WITH DEWATERING ACCESS FOR FUTURE CONNECTION OF SEGMENT 3.

CONDITION–B:
THE CONSTRUCTION OF SEGMENT 3 HAS COMMENCED PRIOR TO THE COMPLETION OF SEGMENT 2.

1. CONTRACTOR SHALL CONTACT THE ENGINEER PRIOR TO COMMENCING ANY WORK ASSOCIATED WITH THE CONNECTION OF SEGMENT 2 TO SEGMENT 3.
2. CONTRACTOR SHALL LOCATE, EXPOSE, AND VERIFY SEGMENT 3 INVERT ELEVATION. CONTRACTOR SHALL REPORT ANY DISCREPANCIES FROM PLAN LOCATION OR ELEVATION IMMEDIATELY TO THE ENGINEER.
3. UPON FIELD ACCEPTANCE OF SEGMENT 2, CONTRACTOR SHALL REMOVE SEGMENT 3 END CAP, DEWATER, AND PERFORM CONNECTION IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATION.



END DETAIL FOR FIBERGLASS REDUCER AND CAP D-02 B
N.T.S.

NO.	DATE	REVISION	APP
1	11/1/10	ADDENDUM #1 REVISIONS	BM

STATE OF TEXAS
BRICE B. MOCZYGEMBA
65747
LICENSED PROFESSIONAL ENGINEER

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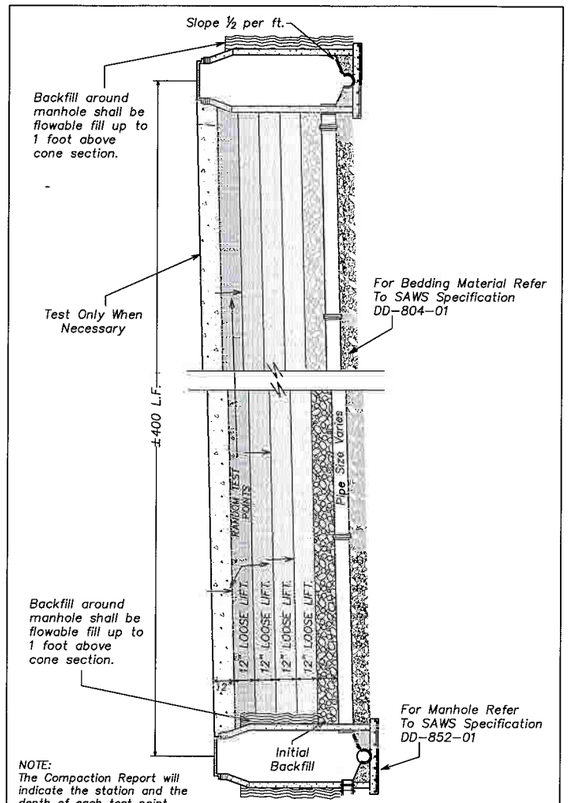
SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

CONNECTION DETAILS

JOB NO. 6866-06
DATE NOVEMBER 2010
DESIGNER JGM
DRAWN BS
CHECKED BM
DRAWING No. D-02
SHEET No. 42



PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TRENCH COMPACTION DETAIL	APPROVED MARCH 2008	REVISED JUNE 2009
		DD-804-02	SHEET 1 OF 1

TRENCH COMPACTION DETAIL D-08 B
N.T.S.

NOTES:

1. THE NUMBER OF LIFTS VARIES AS TRENCH DEPTH INCREASES.
2. THE FINAL LIFT SHALL MEET REQUIREMENTS SET FORTH IN THE PROJECT SPECIFICATIONS.
3. CONTRACTOR SHALL REFER TO PROJECT SPECIFICATIONS FOR COMPACTING METHODS ABOVE THE PROPOSED SEWER MAIN.

HDPE NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION

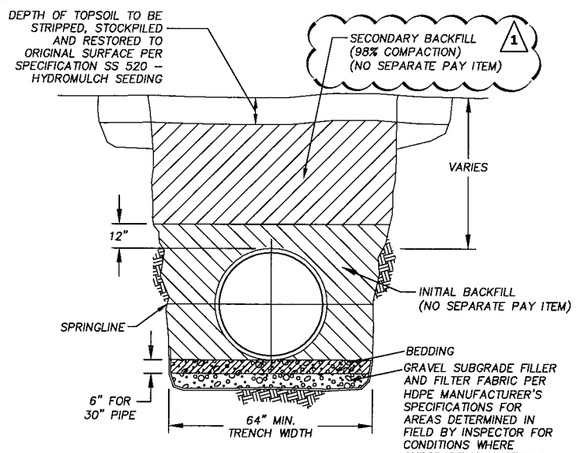
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.

3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.

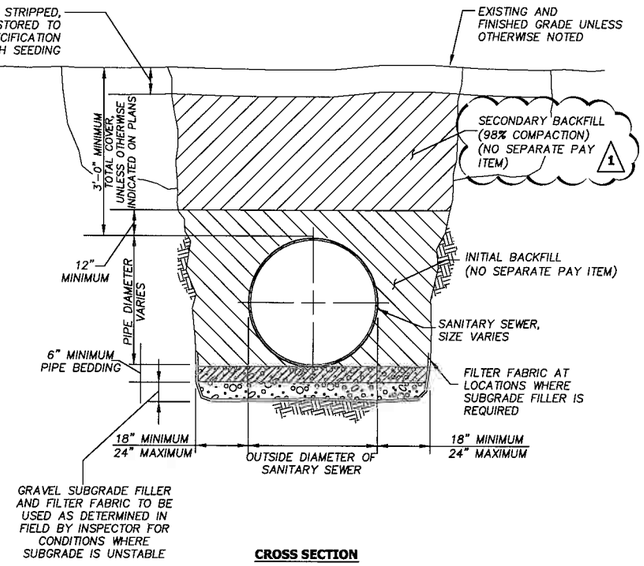
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"–24" (100mm–600mm); 6" (150mm) FOR 30"–60" (750mm–900mm).

5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

6. MINIMUM COVER: MINIMUM COVER, H, IN NON–TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"–60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.



30" HDPE TRENCH COMPACTION DETAIL (AIR BYPASS) D-08 D
N.T.S.



CROSS SECTION

TYPICAL PIPE TRENCH D-08 E
N.T.S. (GREATER THAN 27" DIAMETER SEWER PIPE)

NO.	DATE	REVISION	APP
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MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

TYPICAL TRENCH DETAILS

JOB NO.	6866-00
DATE	NOVEMBER 2010
DESIGNER	JGM
DRAWN	BS
CHECKED	BM
DRAWING No.	D-08
SHEET No.	44

Date: Nov 01, 2010, 11:09am User ID: BSmith
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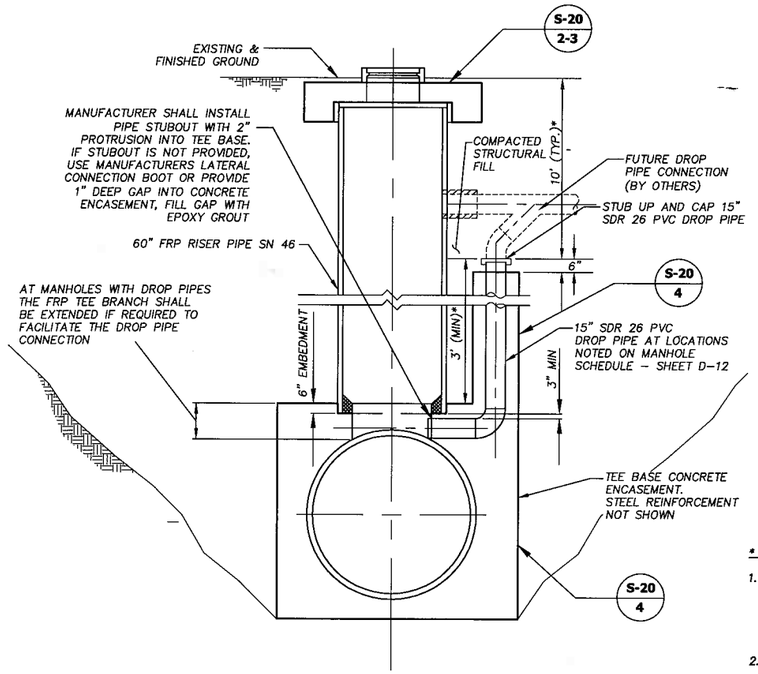


SECTION THROUGH PIPE AND MANHOLE

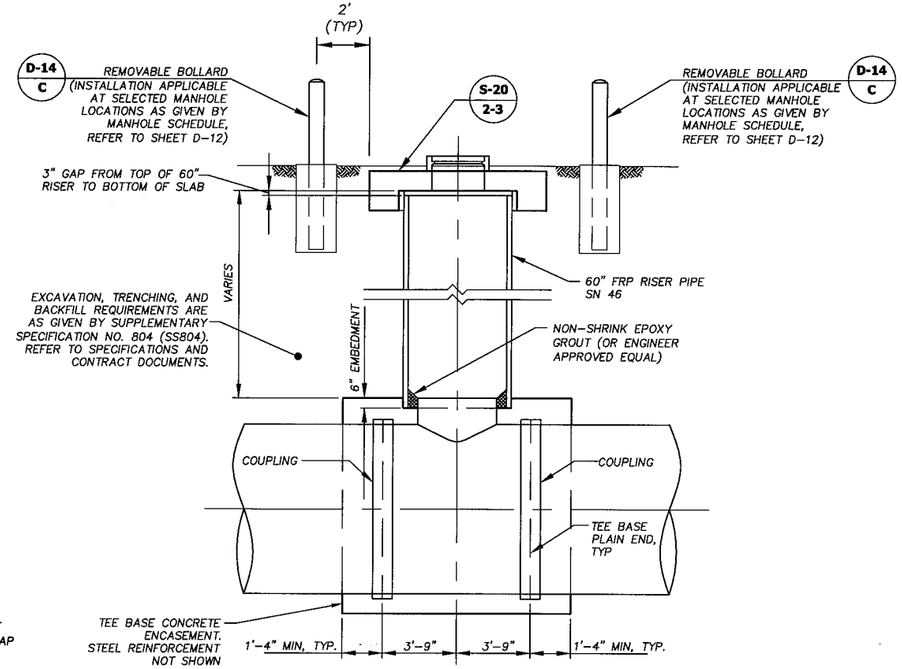
DROP MANHOLE DETAIL FOR TEE BASE STRUCTURE

N.T.S.

D-11 A

* NOTE:

1. WHERE GROUND COVER IS NOT SUFFICIENT TO ALLOW EXTENSION OF THE MANHOLE RISER 10' FROM FINISHED GROUND TO TOP OF 15" PVC CAP, DROP PIPE STUBOUT SHALL EXTEND UPWARD SUCH THAT TOP OF 15" PVC CAP IS 3' ABOVE TEE BASE CONCRETE ENCASEMENT.
2. ORIENTATION OF DROP PIPE IS ASSUMED TO BE 90° FROM OUTFALL ALIGNMENT UNLESS OTHERWISE NOTED ON PLAN AND PROFILE SHEET.
3. EXCAVATION, TRENCHING, AND BACKFILL SHALL BE CONDUCTED IN ACCORDANCE WITH SAWS ITEM NO. 804 AND SSB04. REFER TO PROJECT SPECIFICATIONS AND CONTRACT DOCUMENTS.

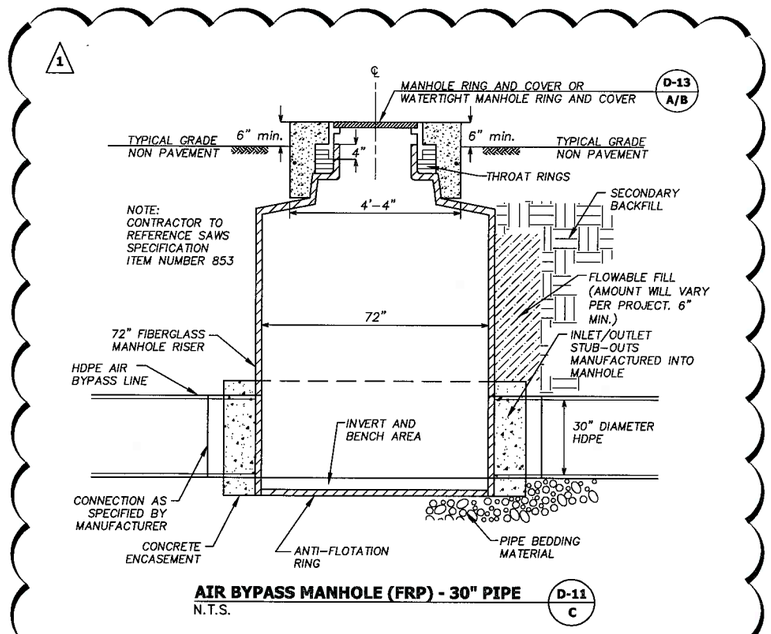


PROFILE VIEW

TYPICAL TEE BASE STRUCTURE

N.T.S.

D-11 B



AIR BYPASS MANHOLE (FRP) - 30" PIPE

N.T.S.

D-11 C

NO.	DATE	REVISION	APP.
1	11/1/10	ADDENDUM #1 REVISIONS	BM

STATE OF TEXAS
BRICE B. MOCZYGEMBA
65747
LICENSED PROFESSIONAL ENGINEER
11/1/2010

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

SAN ANTONIO WATER SYSTEM
MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

TEE BASE AND DROP MANHOLE DETAILS

JOB NO. 6866-00
DATE NOVEMBER 2010
DESIGNER JO
DRAWN BS
CHECKED BM
DRAWING No. D-11
SHEET No. 47

MANHOLE SCHEDULE

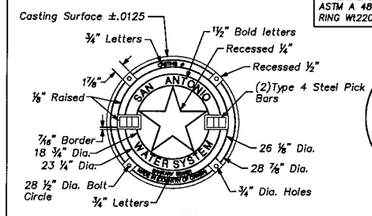
STATION	MANHOLE ID	MATERIALS: FRP	FIBERGLASS	WATERTIGHT	ALTERNATE VENT	DROP *	BOLLARDS
313+04.61	MH-54	X		X		X	
320+54.81 BACK - 350+00 FWD	MH-55	X		X		X	
371+91.02	MH-56	X		X		X	
381+00	MH-57	X				X	
390+50	MH-58	X					
399+37	MH-59	X		X		X	
403+90.29	MH-60	X					
413+90.29	MH-61	X					
415+97.31	MH-62	X					
417+06.56	MH-63	X					
418+15.80	MH-64	X					
424+26.09	MH-65	X					
429+38.14	MH-66	X					
437+66.31	MH-67	X				X	
446+66.31	MH-68	X				X	
455+07	MH-69	X				X	
456+51.61	MH-70	X					
464+00	MH-71	X					
471+00	MH-72	X					
478+13.15	MH-73	X					
485+91.60	MH-74	X					
494+00	MH-75	X				X	
502+00	MH-76	X				X	
510+00	MH-77	X				X	
518+38.30	MH-78	X					
524+00	MH-79	X					
530+25.54	MH-80	X				X	
537+00	MH-81	X				X	
544+14.70	MH-82	X					
544+98.90	**MH-83	X					
549+19.25 BACK - 600+00 FWD	MH-101	X				X	

* DROP: X = 1 DROP, XX = 2 DROPS
** SPECIAL MANUFACTURED TEEBASE MANHOLE (SEE SHEET C-144)

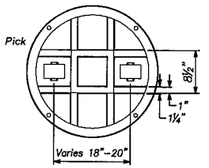
NOTE: AIR BYPASS PIPING MANHOLES ARE NOT INCLUDED IN MANHOLE SCHEDULE.
NOTE: ALL MANHOLES SHALL BE VENTED BY A VENTED MANHOLE RING AND COVER UNLESS NOTED OTHERWISE ON THE MANHOLE SCHEDULE.

1

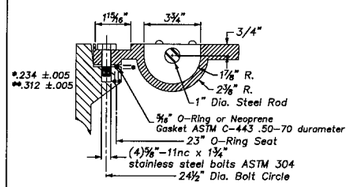
MATERIAL STANDARDS REQUIREMENTS
ASTM A 48 CLASS 30 B AASHTO M-306-89
RING W220 +/- Lbs. Lid Wt 200 +/- 5 Lbs.



COVER FACE
(Unpainted +/-.125)

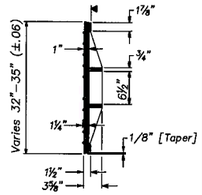


COVER BACK
(Unpainted +/-.125)



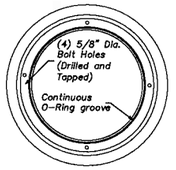
WATERTIGHT AND PICK BAR DETAIL

Manhole shall be proof-load tested to 40,000 lbs. in accordance with AASHTO M-306-89
Covers and Rings shall be interchangeable with approved manufacturers.

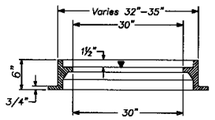


COVER SECTION
(Unpainted +/-.125)

▼ *All seating surfaces shall be machined (±.06).*



FRAME TOP VIEW



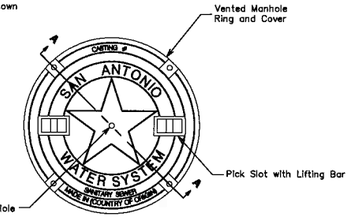
FRAME SECTION
(Unpainted +/-.125)

PROPERTY OF		APPROVED	REVISED
SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	MANHOLE RING AND COVER DETAIL	MARCH 2008	JUNE 2009
		DD-852-07	SHEET 1 OF 1

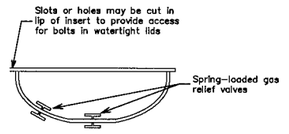
WATERTIGHT MANHOLE RING AND COVER DETAIL D-12 A
N.T.S.

Note:
Standard Manhole Ring and Cover: All applicable dimensions shall conform to the dimensions shown here

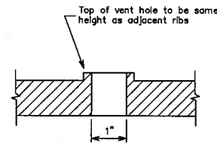
Note:
The bearing surfaces and O-Ring groove shall be Machine ground



VENTED MANHOLE RING AND COVER



WATERTIGHT MANHOLE INSERT DETAIL



VENT HOLE DETAIL SECTION A-A

Manhole cover inserts shall be FRW Industries, Inc., "Inflow Protector-Cover" Preco Industries, Ltd.,"Sewer Guard", or approved equal, and shall be installed in strict accordance with the manufacturer's recommendations. The contractor shall be responsible for making the necessary field measurements for the manufacturer prior to production.

PROPERTY OF		APPROVED	REVISED
SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	VENTED MANHOLE RING AND COVER DETAIL	MARCH 2008	JUNE 2009
		DD-852-02	SHEET 1 OF 1

VENTED MANHOLE RING AND COVER DETAIL D-12 B
N.T.S.

NO.	DATE	REVISION	APP.
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MEDINA RIVER SEWER OUTFALL PROJECT
SAWS JOB NO. 11-2503

MANHOLE SCHEDULE AND MANHOLE DETAILS

JOB NO. 6866-00
DATE NOVEMBER 2010
DESIGNER JO
DRAWN BS
CHECKED BM
DRAWING No. D-12
SHEET No. 48

Date: Nov 01, 2010, 11:09am User ID: BSmith
File: P:\68\66\00\Design\Civil\Sewer\Bid Package 2\D1686600-Sewer.dwg