CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

ADDENDUM NO. 1

PROJECT NAME: **Old Grissom Road from Grissom to Culebra**

DATE: 9/15/2015

ADDENDUM NO.1

This addendum should be included in and be considered part of the plans and specifications for the name of the project. The contractor shall be required to sign an acknowledgement of the receipt of this addendum and submit with their bid.

TCI PROJECT NO.: **40-00253**

Addendum No. 1 includes the following:

(1) Pre-Bid Meeting Minutes and sign in sheet from September 10, 2015.

(2) Revised 020 Form

(3) Remove and replace plan sheet No. 8. "Additional Notes" added for Soil Policy.

(4) Remove and replace plan sheet No. 23. Driveway near Sta. 11+90 on the east side was updated.

(5) Geotechnical Report and Global Stability Analysis. Geotechnical Report and Global Stability Analysis added to the Contract.

(6) Large Commercial Services and Developments Electric and Gas Service Package. This package was added to the Contract to show the requirements needed to submit the CPS Application for the relocation of the existing meter for the High Water Detection System (HWDS). A permit must also be obtained by the contractor from the Development Services Department (DSD). The CPS application and DSD permit are all requirements necessary under specification section and pay item 1100 and there are no separate pay items for the application, permit and necessary coordination to get the electric service meter relocated.

Poznecki-Camarillo, Inc.
TBPE Reg No. F-483

Note: Addenda Acknowledgement Form for Addendum 1 is attached herein. This form must be signed and submitted with the bid package.

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

Old Grissom Road #40-00253

Pre-Bid Meeting Sign-In **September 10, 2015**

NAME	ORGANIZATION	PHONE	EMAIL
Elizabeth Vidal	TCI	207-2072	Elizabeth.vidal@SANANTONIO.gov
Ricardo Zamora	Poznecki-Camarillo	349-3273	rzamora@pozcam.com
Jesus de Luna	PCI	349-3273	jdeluna@pozcam.com
Matthew Matuln	SAWS	233-3945	Matthew.Matuln@SAWS.org
Yvonne Gomez	SAWS	233-2342	Yvonne.Gomez@SAWS.org
Irene Maldo	EDD	207-8124	Irene.Maldo@sanantonio.gov
David Palacios	TCI	207-2094	david.palacios6@sanantonio.gov
Francisco Valdez	TCI	207-9389	Francisco.Valdez@SanAntonio.gov
SEAN STRONG	TCE	207-8037	Sean.Strong@sanantonio.gov
Sammy Villegas	Posado Construction	210-687-9616	SVILLEGAS@posadoconstructionco.com
RYAN DETRY	E-Z BEL CONST	210 736.6695	RYANDETRY@EZBEL.com
Roy Heath Jr.	SAC, Ltd.	(210)885-5539	mgc5214@aol.com
FRED BECFORT	DRASH CONSULTANTS	(210)340-5004	cbelfortedrashconsultants.com
Theresa Larson	TCI	207-1446	theresa.larson@sanantonio.gov
LOGAN GINBEY	CAPITAL EXCAVATION	512-781-8281	lginbey@capitalexcavation.com

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

Old Grissom Road #40-00253

Pre-Bid Meeting Sign-In **September 10, 2015**

NAME	ORGANIZATION	PHONE	EMAIL
Thomas Gonzalez	TCI	207-1328	TCI.schedules@sanantonio.gov
John Wolters	TCI	207-6054	john.wolters@sanantonio.gov

THIS FORM WILL BE POSTED TO THE CITY WEBSITE, SIGNING THIS FORM GIVES CITY PERMISSION TO RELEASE YOUR INFORMATION

CITY OF SAN ANTONIO
TRANSPORTATION AND CAPITAL IMPROVEMENTS

PROJECT NAME: OLD GRISSOM ROAD FROM CULEBRA TO GRISSOM
CIMS PROJECT NO. 40-00253

DATE: SEPTEMBER 10, 2015

Pre-Bid Conference Meeting Minutes

A Non-Mandatory Pre-submittal conference was held at the Municipal Plaza Building 9th Floor Conference Room on September 10 at 10:00 a.m. The following items were discussed:

Introductions – please see the sign-in sheet, attached, for a list of attendees.

This project is a low bid project, 180 calendar days, $1,160,000 estimated cost.

Required forms are: 010, 020, 025, the bid bond, subcontract/supplier user utilization commitment form (signed), and addendum. All documents are on the TCI website. Bid results and addenda will be posted on website. Questions about the project need to be submitted in writing. Thursday, September 17, 2015 at 4:00 p.m. is deadline for questions. The questions will be posted and answered via addenda. Bid submittals are due September 29, 2015 by 2:00 p.m. at the City Clerk's office on the 2nd floor of City Hall at 100 Military Plaza, time as determined by the City Clerk's time clock. Respondents are reminded to allow time to pass through the building security and obtain a visitor's pass. No communication with City officers will be permitted regarding this project after the pre-bid conference, with the exception of the SBEDA Program office, other than through the written questions which will be posted and answered in an addendum. Be sure to sign and have original signatures on all documents 010, 020, 025, Addendum Acknowledgement Forms, and SBEDA Utilization Plan.

A SBEDA handout was provided and discussed to attendees. Compliance requirement for this project is 15% M/WBE subcontracting goal with a 2% AABE Subtracting goal. M/WBE's and AABE's must be certified SBE's. A Subcontractor/Supplier Utilization Plan is required. The South Central Texas Regional Certification Agency (SCTRCA) and that they are registered on City of San Antonio website are recognized for eligibility. The utilization plan must be based on the base bid only. Submittals not meeting the SBEDA goals without a waiver will deem the contractor nonresponsive. Waivers are available on the website. Contact Irene Maldonado, SBEDA Economic Development Manager, or Ruben Flores may also be available.

Labor Compliance mentioned that very project has a wage decision assign to it. This project type is Heavy and Highway. The publication was on January 2, 2015. The City of San Antonio has a list of observed holidays in which all employees must be paid time and a half. Employees must be paid time and a half for hours worked over 40 hours. Anyone that works on the project must be classified in LCP tracker. All workers must be classified properly based on their work and workers must be paid minimum rate on the list. Primary contractor is responsible for all certified payrolls and can get administrative access to the LCP tracker to review the subcontractor's certified payroll documentation. All employees must be hourly, no day rates. Site visits will be performed by the City inspectors to see that employees match with LCP documentation. Violations could result in fines of $60 per employee per incident per day and restitution to the employees. Certified payroll documentation will be in certified weekly in LCP Tracker system. The General Contractor is responsible for reviewing the certified payrolls. The General Contractor is responsible for all labor compliance issues.

Monthly updated schedules will be required for this project. The City of San Antonio has Primavera 6.2 and schedule submittals must be compatible with this system. TIA's will be addressed as outlined in the specifications. Please fill out narrative attached to the template in monthly updates. Base line needs to be submitted prior to the preconstruction meeting. If there are delays in the project, please continue submitting monthly updates. Contact Thomas Gonzalez if there are any scheduling questions.

Pre-Bid Conference Meeting Minutes (Continued, Page 2 of 2)

Utilities are currently being adjusted for CPS overhead. There will not be joint bid gas because is a seasonal main that will be adjusted prior to construction. SAWS work will be joint bid. Old Grissom Road work will be from Culebra to Grissom Road. There will be installation of the 10' x 8' box culvert with retaining walls to connect to the hike and bike trail from Cathedral Rock Park to the Tezel Road path. There will be 400 LF of full roadway construction and 1600 LF of mill and overlay work. There will be proposed sidewalk on the north end which ties in from the trail to Culebra Road. There will be no drainage work because this is not a drainage project in any way. Full road closure will be done for the box culvert installation with a detour route provided to Timber Path.

SAWS water work is a 24" large diameter main that runs the full length of the project and under the proposed pedestrian crossing. SAWS sewer work is just manhole adjustments. The project is a 180 calendar day project utilizing a 6-day work week as stated in general conditions.

CPS gas awaiting their contractor and there is currently no start date.

CPS poles need to be released so overhead lines can be transferred. There are adjustments that still need to be made to the poles. Other overhead utilities on the poles are AT&T and Time Warner Cable who will adjust after CPS.

There were no comments from the COSA Environmental group.

A tree permit is required on this project and has been received.

CPO will be Pete Rodriguez.

Inspections will be Manuel de la Torre.

There will be a public meeting prior to construction.

There will be two project signs on this project. There is adjustment to an existing water detection system which is a bid item for this project.

Asphalt will be machine laid, except for small repairs.

The 020 form will be revised to separate the City based bid work and SAWS sewer and water. (NOT NEEDED)

When SAWS work is done, a 4" TY B temporary pavement patch will be performed under SAWS Item 804, unless stated otherwise in the plans.

The geotechnical report will be included in the addendum.

Questions from Bidders:

1. What is the projected start date for the utility conflicts?
   -Typically, 3 months from advertisement. Completion in the December time frame. CPS gas needs 3 weeks for adjustment. CPS energy needs about a week or two. Time warner needed about two days for adjustments.
2. During design phase, there was right of way exchange. Is a TxDOT permit still required for the work?
   -No, it is all City ROW since the Old Timber Path realignment.

Additional comments – Detour to Timber Path will increase congestion at Timber Path.

Meeting Adjourned

END OF MEETING MINUTES

CITY OF SAN ANTONIO

Project Name: Old Grissom Road **Date Issued: September 15, 2015**
ID NO.: 40-00253-05-01
The estimated construction budget for this contract is $1,160,000.00

020

BID FORM

I. BASE BID

Amount of Street/Roadway Construction Base Bid (Insert Amount in Words and Numbers):

Total Amount of Base Bid (City & SAWS) (Insert Amount in Words and Numbers):

_____ **$** _____

II. ALTERNATES

Amount of each Alternates (if applicable) insert in Numbers: N/A

III. UNIT PRICES

Bidders shall submit unit pricing on the 025 Unit Pricing form, and it shall be attached immediately following this sheet.

IV. ALLOWANCES (if applicable)

Official Name of Company (legal)	Telephone No.
Address	Fax No.
City, State and Zip Code	E-mail Address

Name of the proposed **Project Manager:** _____

Name of the proposed **Site Superintendent:** _____

SUPPLEMENTAL NOTES

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN ALL REQUIRED STORM WATER PERMITS, FEES, AND APPROVALS. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PERMITS REQUIRED FOR CONSTRUCTION IN DRAINAGE EASEMENTS, RIGHT-OF-WAYS, AND FLOODPLAINS.

2. THE CONTRACTOR SHALL NOTIFY STORM WATER ENGINEERING AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF ANY DRAINAGE FACILITY WITHIN THE DRAINAGE EASEMENT OR STREET RIGHT-OF-WAY NOT INDICATED ON THE CONSTRUCTION PLANS.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING DRAINAGE FACILITIES FROM DAMAGE. ANY DAMAGE TO EXISTING DRAINAGE SYSTEMS, WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR AT HIS EXPENSE. THE CONTRACTOR SHALL NOTIFY STORM WATER ENGINEERING AT 210-207-8052 AS SOON AS CONFLICTS WITH UTILITIES ARE ENCOUNTERED OR ANY DRAINAGE SYSTEM IS DAMAGED DURING CONSTRUCTION.

4. CONSTRUCTION SPOILS WILL NOT BE ALLOWED TO BE DEPOSITED ANYWHERE WITHIN A DRAINAGE EASEMENT, RIGHT-OF-WAY OR FLOODPLAIN WITHIN THE LIMITS OF THE PROJECT AND SHALL BE DISPOSED OFFSITE IN COMPLIANCE WITH CURRENT APPLICABLE REGULATIONS.

5. NO STRUCTURE, FENCES, WALLS, LANDSCAPING, OR OTHER OBSTRUCTIONS THAT IMPEDE DRAINAGE SHALL BE PLACED WITHIN THE LIMITS OF THE DRAINAGE EASEMENTS SHOWN ON THE CONSTRUCTION DOCUMENTS.

6. UPON COMPLETION OF TRENCHING, THE AREA WILL BE BACKFILLED AND COMPACTED TO ITS ORIGINAL CONDITION. TRENCHES/BORE PITS TO BE OPEN AND UNATTENDED LONGER THAN 24 HOURS SHALL BE PROTECTED TO WITHSTAND ALL HYDRODYNAMIC AND HYDROSTATIC FORCES AND PREVENT DOWNSTREAM IMPACTS. TRENCHES/BORE PITS TO BE OPEN LONGER THAN 30 DAYS AFTER STARTING EXCAVATION SHALL BE BACKFILLED WITH A SEMI-PERMANENT REPAIR BACKFILL.

7. IMPROVED SECTIONS OF EARTHEN CHANNELS AND/OR WATERWAYS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.

8. THE CONTRACTOR IS REQUIRED TO FURNISH AND INSTALL 3" PVC CONDUITS MEETING THE REQUIREMENTS OF THE CITY OF SAN ANTONIO FOR RELOCATING THE EXISTING METER AND LOW WATER DETECTION CABLES WHICH OPERATE THE EXISTING FLASHING BEACON AT STATION 12+60 RIGHT. CONTACT THE CITY OF SAN ANTONIO TRAFFIC OPERATIONS DEPARTMENT FOR DIRECTION PRIOR TO ORDERING MATERIALS.

9. SIX-DAY WORK WEEK – FOR THIS PROJECT, A WORK WEEK IS DEFINED AS THE WORKING DAYS (MONDAY THROUGH SATURDAY), NOT INCLUDING SUNDAYS OR HOLIDAYS.

ADDITIONAL NOTES

1. EXCESS SOIL DISPOSAL: CONTRACTOR SHALL PROVIDE A SUBMITTAL REGARDING DISPOSAL SITES TO THE CITY ONCE THE CONTRACTOR RECEIVES THE INTENT OF AWARD LETTER, THE CONDITIONS SET FORTH HEREIN ARE SOLELY DUE TO A DESIRE BY THE CITY TO MANAGE AND DOCUMENT THE DISPOSAL OF EXCESS SOILS FROM THIS SITE IN ACCORDANCE WITH THE CITY'S POLICY. ACCORDINGLY, IN THE SOIL DISPOSAL SUBMITTAL, THE CONTRACTOR SHALL:

   CONTRACTOR SHALL CERTIFY AND ASSURE THAT THE NUMBER OF SOIL DISPOSAL SITES DOES NOT EXCEED THREE (3) SITES.

   CONTRACTOR SHALL CERTIFY THAT NO DISPOSAL AREAS ARE WITHIN THE FLOODPLAIN AND PROVIDE OWNER EVIDENCE TO THAT EFFECT.

   CONTRACTOR SHALL PROVIDE TO THE CITY OF SAN ANTONIO THE WRITTEN AUTHORIZATION FROM ALL AFFECTED LANDOWNERS TO DISPOSE OF SOIL FROM THIS PROJECT SITE ON THEIR PROPERTY FOR FUTURE DEVELOPMENT.

   CONTRACTOR SHALL INCLUDE PROVISIONS IN LANDOWNER AGREEMENTS THAT THE CITY RESERVES THE RIGHT TO CONDUCT INDEPENDENT VISUAL INSPECTIONS AND SOIL TESTING ON LISTED PROPERTIES, IF NECESSARY PRIOR TO DISPOSAL OF PROJECT EXCESS SOILS TO DETERMINE BACKGROUND LEVELS OF VARIOUS ELEMENTS AS IDENTIFIED BY THE CITY. SAID LANDOWNER AGREEMENTS WILL PROVIDE AN EFFECTIVE RIGHT OF ENTRY THAT WILL EXPIRE UPON SUBSTANTIAL COMPLETION OF THE PROJECT.

   CONTRACTOR AGREES TO ABIDE BY THE LANDOWNER'S WRITTEN CONDITIONS IN LANDOWNER AGREEMENTS INCLUDING THOSE RELATED TO FOR PLACING, COMPACTING, RESTORATION, AND EROSION CONTROL OF THE SITE(S), AND THAT THE LANDOWNERS WILL BE REQUESTED TO PROVIDE FINAL WRITTEN APPROVAL BEFORE PRIOR TO SUBSTANTIAL COMPLETION, AND THAT ANY COSTS THAT THE CITY INCURS TO ADDRESS LEGITIMATE LANDOWNER CONCERNS WILL BE CONSIDERED AND MAY BE DEDUCTED FROM THE CONTRACTOR'S FINAL PAYMENT AS DETERMINED BY THE CITY.

   CONTRACTOR AGREES TO COMPLY WITH OTHER REGULATORY AUTHORIZATIONS FOR PROPER AND LEGAL IMPLEMENTATION OF TEH REUSE PLAN PRIOR TO SOIL TRANSPORT, AS APPLICABLE, CONTRACTOR NEEDS TO ENSURE AND APPROPRIATE A STORM WATER POLLUTION PREVENTION PLAN DEVELOPED AND IMPLEMENTED IN ACCORDANCE WITH THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM REQUIREMENTS, AS APPLICABLE.

   CONTRACTOR SHALL BE RESPONSIBLE FOR TRACKING EXCESS SOIL DISPOSED OF AT APPROVED DESIGNATED AREAS. CONTRACTOR SHELL TRACK LOADS AND PROVIDE DOCUMENTATON, SUCH AS TRIP TICKETS OR "BILL OF LADING" FOR ALL TRANSPORTED TO EACH APPROVED SITE.

1

STATE OF TEXAS
FERNANDO CAMARILLO
86882
LICENSED
PROFESSIONAL ENGINEER

Fernando Camarillo

9/15/2015
FERNANDO CAMARILLO, P.E. DATE

NO	DATE	DESCRIPTION
		REVISIONS
1	09/15/15	ADDENDUM 1-ADDED "ADDITIONAL NOTES"

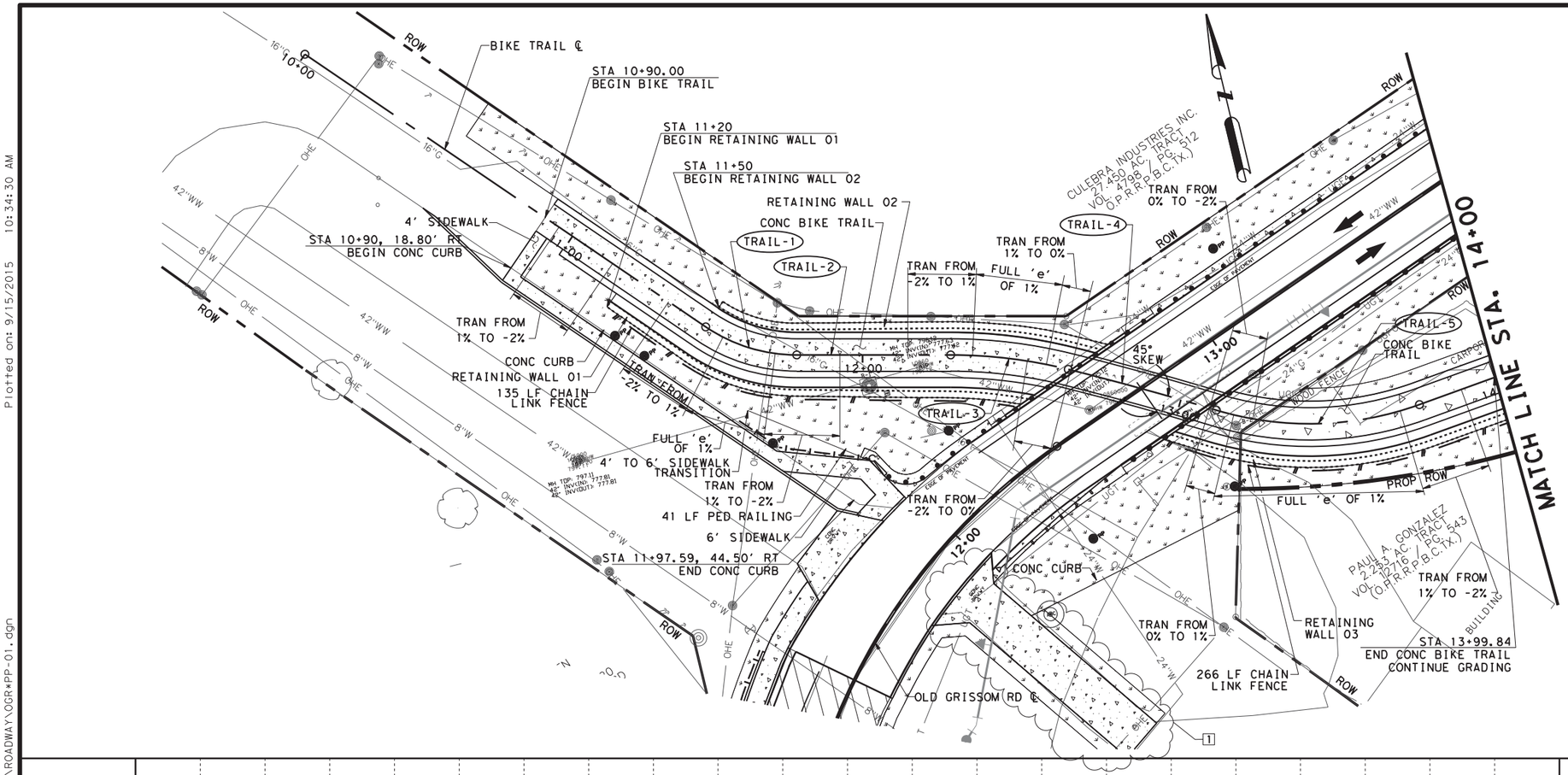
POZNECKI-CAMARILLO, INC
F-483, 5835 CALLAGHAN RD , STE 200
SAN ANTONIO, TEXAS 78253

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

OLD GRISSOM RD

SUPPLEMENTAL GENERAL NOTES

100 % SUBMITTAL			DATE: 9/15/2015
DRWN. BY: CC	DSGN. BY: FC	CHKD. BY: CB	SHEET NO.: 8 OF 72

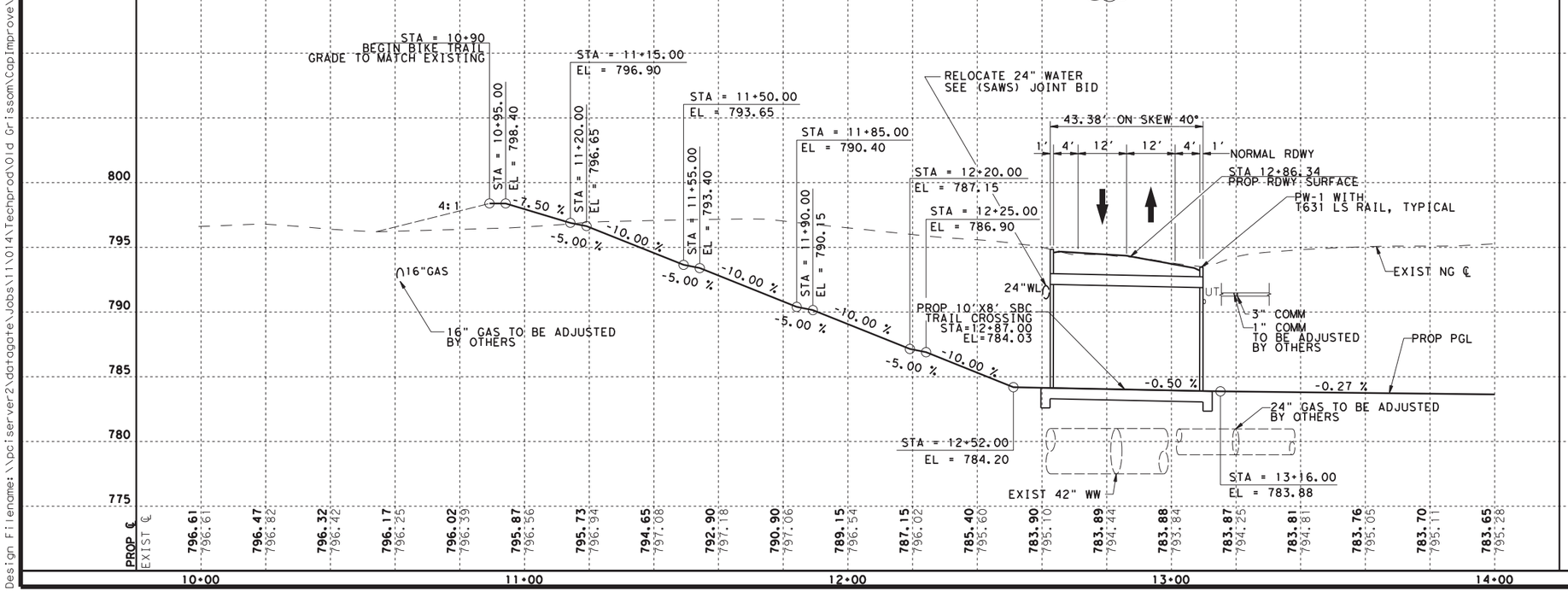


LEGEND

- C-1 — CURVE NUMBER
- PROP. CONCRETE
- MILL & OVERLAY
- OVERLAY
- EXIST PROPERTY LINE
- TRAFFIC FLOW DIRECTION
- PROP RET WALL
- PROP PIPE RAIL
- PROP CHAIN LINK FENCE
- SODDING & TOPSOIL
- ① DRIVEWAY NUMBER
- Ⓐ 4" WIDE WHITE
- Ⓑ 4" WIDE YELLOW
- Ⓒ 24" WIDE WHITE
- Ⓓ 24" WIDE YELLOW
- Ⓔ WORD
- Ⓕ ARROW
- Ⓖ 8" WIDE WHITE
- ●PP APPROX LOCATION OF NEW POWER POLE BY OTHERS

NOTES:

1. ALL CURB (INCLUDING MOUNTABLE AND SAW-TOOTH) WILL BE PAID FOR AS COSA ITEM NO. 500.1 - CONCRETE CURB
2. PAYMENT FOR SGT AND DAT SHALL BE MADE BY THE LINEAR FOOT OF METAL BEAM GUARD RAIL ITEM 509.1
3. ALL EXISTING SIGNS ARE TO REMAIN UNLESS DIRECTED OTHERWISE. RELOCATE EXISTING SIGNS WITHIN THE ROW AS DIRECTED. REPLACE UNSERVICEABLE SIGNS AS DIRECTED.
4. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING THE EXISTING OR PROPOSED LOCATION AND TYPE OF UNDERGROUND AND OVERHEAD UTILITIES IS FOR CONTRACTOR INFORMATION ONLY, FOR THE PURPOSE OF COORDINATION WITH UTILITY COMPANIES, AND IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OR HER OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES PRESENT AND MAKE NECESSARY MEASURES TO AVOID DAMAGE THERETO.
5. CALL THE TEXAS ONE CALL LOCATOR AT 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.
6. DUE TO FEDERAL REGULATION TITLE 49, PART 192.181, CPS MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.
7. THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING CPS OVERHEAD AND UNDERGROUND ELECTRICAL FACILITIES IF ADJACENT TO WORK AREA. PART 192.181.
8. ANY EXISTING POWER POLE TO REMAIN SHALL BE TEMPORARY BRACED AS NECESSARY TO PROTECT THE POLE WHILE EXCAVATING NEAR THE POWER POLE.



STATE OF TEXAS
FERNANDO CAMARILLO
86882
LICENSED
PROFESSIONAL ENGINEER

Fernando Camarillo

9/15/2015
FERNANDO CAMARILLO, P.E. DATE

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

NO	DATE	DESCRIPTION	DWG	CHK
		REVISIONS		
11	09/15/15	ADDENDUM 1-DRIVEWAY UPDATE	RZ	FC

OLD GRISSOM RD

PLAN AND PROFILE BIKE TRAIL

0 10 20 40
SCALE: 1"=40' HORIZ
1"=10' VERT

1 OF 2

POZNECKI CAMARILLO INC
TBPE REG. NO. F-483
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS. 78228
(210) 349-3273
(210) 349-4395 (FAX)
http//www.pozcam.com/

DGN:				
CHK DGN:	CB			
DRG:		STATE	COUNTY	SHEET NO.
CHK DRG:	CB	TEXAS	BEXAR	23 OF 72

Geotechnical Engineering Study

Old Grissom Road
Pedestrian Crossing and Street Reconstruction
San Antonio, Texas

Arias Job No. 2013-792

ARIAS & ASSOCIATES
Geotechnical • Environmental • Testing

Prepared For:

Poznecki Camarillo Associates, Inc.

December 9, 2013

ARIAS & ASSOCIATES
Geotechnical • Environmental • Testing

December 9, 2013
Arias Job No. 2013-792

Ms. Crystal Benavides, PE
Poznecki Camarillo Associates, Inc.
5835 Callaghan Road, Suite 200
San Antonio, Texas 78228

RE: Geotechnical Engineering Study
Old Grissom Road – Pedestrian Crossing and Street Reconstruction
San Antonio, Texas

Dear Ms. Benavides:

Arias & Associates, Inc. (Arias) is pleased to submit this Geotechnical Report with the results of our Geotechnical Engineering Study for the proposed pedestrian crossing beneath Old Grissom Road in San Antonio, Texas. This project was authorized with an Agreement between Poznecki Camarillo Associates, Inc. and Arias, dated November 11, 2013.

The purpose of this geotechnical engineering study was to establish pavement and culvert engineering properties of the subsurface soil and groundwater conditions present at the site. The scope of the study is to provide geotechnical engineering criteria for use by design engineers in preparing the pavement and culvert designs. Our findings and recommendations should be incorporated into the design and construction documents for the proposed development.

The long-term success of the project will be affected by the quality of materials used for construction and the adherence of the construction to the project plans and specifications. The quality of construction can be evaluated by implementing Quality Assurance (QA) testing. As the Geotechnical Engineer of Record (GER), we recommend that the earthwork, pavement and culvert construction be tested and observed by Arias in accordance with the report recommendations. A summary of our qualifications to provide QA testing is discussed in the "Quality Assurance Testing" section of this report. Furthermore, a message to the Owner with regard to QA testing is provided in the ASFE publication included in Appendix F.

We appreciate the opportunity to serve you during this phase of design. If we may be of further service, please call.

Sincerely,
Arias & Associates, Inc.
TBPE Registration No: F-32

STATE OF TEXAS
RENE P. GONZALES
86259
LICENSED
PROFESSIONAL ENGINEER
12/9/13

Rene P. Gonzales, P.E.
Geotechnical Engineer

Spencer A. Higgs, P.E.
Director of Engineering

1295 Thompson Rd
Eagle Pass, Texas 78852
(830) 757-8891
(80) 757-8899 Fax

142 Chula Vista
San Antonio, Texas 78232
(210) 308-5884
(210) 308-5886 Fax

5233 IH 37, Suite B-12
Corpus Christi, Texas 78408
(361) 288-2670
(361) 288-4672 Fax

5213 Davis Boulevard, Suite G
North Richland Hills, TX 76180
(817) 812-3500

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Tables

INTRODUCTION

The results of our Geotechnical Engineering Study for the proposed pedestrian crossing beneath Old Grissom Road in San Antonio, Texas are presented in this Geotechnical Report. This study was authorized though an Agreement between Poznecki Camarillo Associates, Inc. and Arias & Associates, Inc. (Arias), dated November 11, 2013.

SCOPE OF SERVICES

The purpose of this geotechnical engineering study was to conduct subsurface exploration and laboratory testing to establish the engineering properties of the subsurface materials present on the project site. This information was used to develop the geotechnical engineering criteria for use by design engineers to aid in preparing the pavement and culvert designs. Environmental, slope stability, pavement drainage, utility engineering studies of any kind were not a part of our authorized scope of services for this project.

PROJECT AND SITE DESCRIPTION

It is understood that the project involves a new pedestrian crossing structure that will be constructed to provide access for a proposed park trail project. Preliminary plans are to install a reinforced concrete box culvert to provide a crossing under Old Grissom Road at a location east of Culebra Road. The structure will be designed similar to a culvert drainage structure. We understand the existing vertical alignment of Old Grissom Road will be maintained and we anticipate that about 100 lineal feet of pavements will be replaced on each side of the crossing as part of the project. The project will include new retaining wall structures along the trail at locations leading to the culvert crossing.

At the time of our subsurface exploration, the existing pavements were in a generally fair condition with un-improved shoulders. A Vicinity Map and Site Photographs are included in Appendix A.

SOIL BORINGS AND LABORATORY TESTING

Three (3) sample locations were drilled at the approximate locations shown on the Boring Location Plan included as Figure 2 in Appendix A. The testing included 1 soil boring drilled to a depth of about 25 feet below the existing ground surface, and 2 shallow pavement cores to observe the depth of the existing pavement section. Drilling was performed in general accordance with ASTM D 1586 for split spoon sampling techniques, as described in Appendix C. A truck-mounted drill rig using continuous flight augers together with the sampling tools noted were used to secure the subsurface soil samples. After completion of drilling, the boreholes were backfilled with soil cuttings to 3 feet below the street surface, and then grouted and patched in accordance with CoSA repair guidelines.

Samples of encountered materials were obtained by using a split-barrel sampler while performing the Standard Penetration Test (ASTM D 1586). The sample depth intervals are

included on the soil boring logs included in Appendix B. Arias' field representative visually logged each recovered sample and placed a portion of the recovered sampled into a plastic bag with zipper-lock for transport to our laboratory.

Soil classifications and borehole logging were conducted during the exploration by one of our graduate engineers (logger) working under the supervision of the project Geotechnical Engineer. Final soil classifications, as seen on the attached boring logs, were determined in the laboratory based on laboratory and field test results and applicable ASTM procedures.

As a supplement to the field exploration, laboratory testing to determine soil water content, Atterberg Limits, and percent passing the US Standard No. 200 sieve was conducted. The laboratory results are reported in the boring logs included in Appendix B. A key to the terms and symbols used on the logs is also included in Appendix B. The soil laboratory testing for this project was done in accordance applicable ASTM procedures with the specifications and definitions for these tests listed in Appendix C.

Remaining soil samples recovered from this exploration will be routinely discarded following submittal of this report.

Bulk Sample Testing

A bulk sample of the near-surface soils was obtained adjacent to the roadway near the Boring B-1 location to develop a subgrade-support pavement value for use in the pavement design. Laboratory testing performed on the bulk sample included Atterberg limits, moisture-density relationship, and CBR testing. The moisture-density relationship, using the Standard Proctor (ASTM D 698) method, was performed to establish the optimum moisture content and the maximum dry density of the bulk sample when subjected to a specified compactive effort. A laboratory CBR test was performed using the three-point method.

Sulfate Testing Results: Laboratory testing was conducted on a composite sample recovered from the borings drilled at the site to determine the sulfate content. Testing was performed in accordance with TxDOT test method Tex-145-E "Determining Sulfate Content in Soils." The test result indicated that the sulfate contents of the samples retrieved within approximately 2 feet of the existing ground surface are about 120 parts per million (ppm). The results are indicative of low soil sulfate content.

SUBSURFACE CONDITIONS

Geology, generalized stratigraphy, and groundwater conditions at the project site are discussed in the following sections. The subsurface and groundwater conditions are based on conditions encountered at the boring locations to the depths explored.

Geology

The earth materials underlying the project site have been regionally mapped as Fluviatile terrace deposits over chalk and limestone of the Austin Chalk formation. The fluviatile terrace deposits are floodplain deposits and consist primarily of clay containing various amounts of silt, sand, and gravel. The soils encountered in the soil boring and shallow pavement cores included sand and gravel layers, suggesting that the soils are alluvial in nature.

The Austin Chalk consists of a fairly thick-bedded impure chalk, interstratified with marly beds. The rocks are entirely white on the surface, but their subterranean parts have a bluish color, which they lose when dried in air. Lithologies in this formation will vary from a thin veneer of dark brown clays, caliche and limestone rock fragments in the weathering profile, to interbedded hard and soft layers of chalky, marly fossiliferous limestone in the unweathered portion of the formation. The Austin Chalk was not encountered in the soil boring provided for this study. Excavations located away from our soil boring may encounter shallow bedrock.

Existing Pavement Structure

Existing asphalt and flexible base material was observed at the boring locations which were performed within the existing roadway. The subsequent Table 1 indicates the approximate asphalt and flexible base thicknesses encountered at each of the boring locations; variations should be expected away from the boring locations.

Table 1: Existing Pavement Structure

Boring No.	Approximate Asphalt Thickness (inches)	Approximate Flexible Base Thickness (inches)
B-1	7.25	6
C-1	15	13
C-2	7.75	7.5

Notes:

1) The thicker asphalt pavement sections observed along the project alignment suggest that the asphalt pavement sections likely include multiple lifts of asphalt with an asphaltic surface course over an asphaltic base course.

2) The flexible base layer consisted of a clayey sand and clayey gravel aggregate with crushed gravel.

Site Stratigraphy and Engineering Properties

The general stratigraphic conditions at the boring locations are summarized below in Table 2.

Table 2: Generalized Soil Conditions

Stratum	Depth, ft	Material Type	PI range / PI avg.	No. 200 range / No. 200 avg.	N range / N avg
Pavement	0 to (1.1-2.3)	7" to 15" Asphalt over 6" to 13" of Base	15	24	--
I	(1.1 - 1.3) to 13	Silty SAND (SM), tan, reddish brown, medium dense to very dense	NP	17-28	23-63
			NP	21	39
II	13 to 25	Clayey GRAVEL (GC), light tan, dense to very dense	13-19	-	47-**50/2"
			16	17	50+

Where: Depth - Depth from existing ground surface during geotechnical study, feet
PI - Plasticity Index, %
No. 200 - Percent passing #200 sieve, %
N - Standard Penetration Test (SPT) value, blows per foot
** - Blow counts during seating penetration

Localized areas with cemented soils or very hard chalk may occur near this site. Heavy-duty excavation equipment may be required locations away from our soil boring, particularly to excavate very dense gravel, hard soil, and partially cemented soils.

Groundwater

A dry soil sampling method was used to obtain the soil samples at the project site. Groundwater was not observed within the soil borings during soil sampling activities which were performed on November 20, 2013.

It should be noted that water levels in open boreholes may require several hours to several days to stabilize depending on the permeability of the soils. Groundwater levels at the time of construction may differ from the observations obtained during the field exploration because perched groundwater is subject to seasonal conditions, recent rainfall, flooding, drought or temperature affects. Leaking underground utilities can also impact subsurface water levels. Importantly, San Antonio has experienced recent extended drought conditions.

Groundwater levels should be verified immediately prior to construction. Gravels and sand soils, as well as seams of these more permeable type materials, can transmit "perched" groundwater. Granular utility backfills can provide a conduit for water to collect under roadways and can ultimately lead to pavement distress. Provisions to intercept and divert "perched" or subsurface water should be made if subsurface water conditions become problematic.

Dewatering during construction is considered means and methods and is the sole responsibility of the contractor.

Bulk Sample Testing Results

The bulk sample of near-surface clay had a liquid limit (LL) of 46 and a plasticity index (PI) of 25. The clay sample had an optimum moisture content of 25.3 percent and maximum dry unit weight of 90.3 pcf, tested in general accordance with the ASTM D 698 test procedure. At a density of 95 percent of the maximum dry density, the material had a measured soaked California Bearing Ratio (CBR) value of about 2.

IBC Site Classification and Seismic Design Coefficients

Section 1613 of the International Building Code (2012) requires that every structure be designed and constructed to resist the effects of earthquake motions, with the seismic design category to be determined in accordance with Section 1613 or ASCE 7. Site classification according to the International Building Code (2012) is based on the soil profile encountered to 100-foot depth. The stratigraphy at the site location was explored to a maximum 25-foot depth. Materials having similar consistency were extrapolated to be present between 25 and 100-foot depths. On the basis of the site class definitions included in the 2012 Code and the encountered generalized stratigraphy, we characterize the site as Site Class D.

Seismic design coefficients were determined using the on-line software, Seismic Hazard Curves and Uniform Response Spectra, version 5.1.0, dated February 10, 2011 accessed at (http://earthquake.usgs.gov/hazards/designmaps/javacalc.php). Analyses were performed

considering the 2012 International Building Code. Input included coordinates (29.475°N, 98.654°W) and Site Class D. Seismic design parameters for the site are summarized in the following table.

Table 3: Seismic Design Parameters

Site Classification	F_a	F_v	S_s	S_1
D	1.6	2.4	0.101 g	0.026 g

Where: Fa = Site coefficient
Fv = Site coefficient
Ss = Mapped spectral response acceleration for short periods
S1 = Mapped spectral response acceleration for a 1-second period

PEDESTRIAN CROSSING / CULVERT STRUCTURE

A new pedestrian crossing structure will be constructed to provide access for a proposed park trail project by installing a concrete box culvert beneath Old Grissom Road. The structure will be designed similar to a culvert drainage structure. We understand the existing vertical alignment of Old Grissom Road will be maintained and we anticipate that about 100 lineal feet of pavements will be replaced on each side of the crossing as part of the project.

The excavations for the planned culvert structure should preferably be neat-excavated. The excavation may need to be over-excavated to allow for the placement of bedding material that may be required by the project civil engineer. The anticipated bearing depth of the planned culvert will be at about EL 782.86 feet. Based on the results of our borings, Table 4 presented subsequently outlines the net allowable bearing pressures for the strata encountered at this site.

Table 4: Box Culvert Allowable Bearing Pressure Information

Stratum	Description	Allowable Bearing Pressure, psf
I	Silty SAND (SM)	3,000
II	Clayey GRAVEL (GC)	3,500

Heavy-duty excavation equipment may be required at this site, particularly to excavate very dense gravel, hard soil, and partially cemented soils. Rock excavation techniques may be required if very hard marl, chalk, and/or limestone from the Austin Chalk geologic formation is encountered.

Depending on seasonal weather conditions, excavations may encounter free groundwater. Groundwater was not observed during the sampling activities but may be present in the gravelly layers observed in the soil boring. If groundwater is encountered, depending on the

volume, conventional sump and pump methods may be utilized to temporarily dewater the base of the excavation to remain sufficiently dry to allow for concrete placement. Alternately, a more permanent dewatering technique such as the French Drain or Strip Drain system noted above could be utilized. *The means and methods for dewatering the site are solely the responsibility of the contractor.*

Excavation equipment may disturb the bearing soils and loose pockets can occur at the culvert's bearing elevation. Accordingly, we recommend that the upper 6 inches of the base of the excavations be compacted to achieve a density of at least 95 percent of the maximum dry density as determined by TEX 114-E. Using the net allowable bearing pressures provided in Table 4 and assuming that the embedment material and soil backfill is placed and compacted as recommended below, settlement of the culvert system should be less than one (1) inch.

A common bedding and embedment material for culverts consists of 1-inch clean TXDOT concrete gravel Grade #5 (ASTM C-33 #67). Soil backfill above bedding materials and on top of the culverts (below the bridge slab) should consist of select fill material meeting the following criteria: (1) free and clean of organic or other deleterious material, (2) have a plasticity index (PI) between 7 and 20, and (3) do <u>not</u> contain particles exceeding 3 inches in maximum dimension. A filter fabric should be provided between any free-draining gravel and soil backfill to aid in preventing finer-grained soils from infiltrating into the free-draining gravel, which could lead to ground loss and distress to the overlying culvert bridge and pavement. Onsite soils, bedding and embedment materials, and select fill should be placed in lifts not to exceed 8 inches in loose measure and should be moisture conditioned to between -1 and +3 percentage points of optimum moisture content, and compacted to at least 95 percent of the maximum dry density determined by TEX 114-E. A representative of Arias should observe the backfill and compaction processes.

Lateral earth pressures that may act on buried culverts and/or against stem walls or wing walls can be evaluated by using the following equivalent fluid densities (EFDs) provided in Table 5 for the corresponding type of backfill. The values provided below can also be used to analyze retaining wall structures along the trail at locations leading to the below-grade crossing. The equivalent fluid densities are based on "at-rest" earth pressure conditions.

Table 5: Lateral Earth Pressures

Wall Backfill Type	Estimated Total Soil Unit Weight, (pcf)	Effective Soil Unit Weight, (pcf)	At-Rest Earth Pressure Coefficient, (k_o)	EFD - Dry Condition, (pcf)	EFD - Submerged Condition, (pcf)
Select Fill (7≤PI≤20)	125	63	0.50	63	94
Clean Gravel	105	43	0.40	42	80
On-site Sand and Gravels	125	63	0.58	73	99

Notes:

1. The above equivalent fluid densities do not consider surcharge loads. A sloping ground surface behind the wall will act as a surcharge load and should be considered in the wall design.
2. Soil and hydrostatic water pressures behind walls will impose a triangular stress distribution on the walls; surcharge loads will impose a rectangular stress distribution on the walls.
3. We do not recommend the use of clay soils having a PI greater than 20 as backfill behind retaining walls. Clay soils can exert high pressures on the wall as noted above. Furthermore, clay soils can exert swelling forces/pressures significantly greater than those calculated using the EFD values. Swelling forces can result in excessive wall movement and/or distress.

The "EFD - submerged condition" values in the above table should be used if there is a chance for hydrostatic forces to develop; otherwise, the "EFD – dry condition values" can be used. However, we highly recommend that a wall drainage system (e.g. wall drain within free-draining backfill that is wrapped in filter fabric) be designed to prevent hydrostatic conditions from developing behind structural soil-retaining walls. If free-draining backfill is provided behind the wall, we recommend that a positive slope grade coupled with concrete surface paving, or the use of a clay cap, be provided to help reduce the chances for surface water infiltration behind the wall. Furthermore, backflow prevention should be provided for any weep holes if there is a chance that the weep holes could be inundated during flooding.

Surcharge loads including equipment loads, traffic, sloping ground behind the wall, and soil stockpiles should also be considered in the analysis of the culvert or wall.

The planned crossing is located near Culebra Creek. The structure may become inundated during extreme flooding. Measures should be taken to design against buoyancy forces. Some methods to help protect against buoyancy associated with water flowing through the structure. These methods may include reducing the potential for water to migrate beneath and around the sides of the culvert. The weight of the culvert, effective weight of soil backfill, and overlying roadway structure will also aid in resisting potential buoyancy forces.

For calculating the factor of safety against potential sliding due to the lateral pressure acting on structural retaining walls, the ultimate resistance parameters provided below may be used for the friction along the footing base. If additional lateral resistance is required, a shear key

may be considered below the retaining wall footings. Recommended geotechnical design criteria are provided below.

- Bearing soils for planned wall footings may vary from silty sands to clayey gravels depending on the anticipated bearing depth. The recommended allowable bearing pressures presented in Table 4, may be used to size potential footings for planned retaining wall structures.

- The retaining wall should be designed such that the resultant forces acts in the middle third of the footing.

- The sliding resistance along the base of the footing per lineal foot of wall can be calculated by multiplying a sliding resistant factor (ultimate coefficient of friction) of 0.46 times the minimum sustained dead load bearing pressure acting on the footing.

- In addition to the sliding resistance along the base of the footing, an ultimate passive pressure per linear foot of wall based on an EFD of 300 pcf can be used only for the shear key (i.e. not for the side of the footing) to resist lateral pressures on the wall.

Comments Regarding Retaining Walls

The preliminary plan and profile drawings for the planned trail indicate that the new retaining wall structures along the trail at locations leading to the culvert crossing will range from about 4 to 12 feet to achieve the proposed grades. The proposed wall type (i.e. MSE, concrete cantilever wall, etc.) and wall design details of the planned walls have not been determined. The retaining wall design values provided previously can be used by the project structural engineer to aid in developing preliminary retaining wall designs for the project.

The preliminary grading information provided to us at the time of this report indicates that the proposed walls will require cuts to install. Temporary cuts to install retaining walls should be properly sloped in accordance with OSHA requirements. Temporary shoring or temporary wall systems may be required to facilitate the installation of the new walls depending on the wall type. Preliminary planning to ensure that the planned walls can be properly constructed will be a significant consideration in regard to the selection and design of a retaining wall system.

Recommended Design Values

The design values presented in Table 5 provide our recommendations for design lateral earth pressures, bearing pressures, and sliding resistance for use in the design of conventional cantilevered retaining walls. The planned soil retaining structures should be sized to achieve minimum factors of safety of 1.5 and 2.0 against potential sliding and overturning, respectively.

Global Stability Analysis

The design values provided in this report are intended to assist the structural engineer in developing a retaining wall system that can be designed for the anticipated soil pressures to resist the sliding and overturning stability. We recommend a global stability analysis be provided once the structural engineer has finalized the proposed wall design details.

Our project budget includes engineering fees to perform a global stability analysis at two locations where the retaining wall heights exceed 4 feet to meet the CoSA special inspection requirements for retaining walls. As described, the planned retaining wall design details and the proposed structural cross sections were not available at the time of this study to properly evaluate the global stability of the planned walls.

After the cross-sections of the walls have been established to resist the sliding and overturning stability, we should be contacted to perform a global stability analysis.

Additional Comments

As described, the planned structure is located near Culebra Creek in an area that is prone to flash flooding. We recommend that free-draining wall backfill be used to reduce the potential for hydrostatic forces to develop in poorly draining backfill under a rapid-drawdown scenario. It is important that the planned culvert and retaining walls be constructed using a free-draining wall backfill to allow for quick drainage of the water behind the walls so that water behind the wall drains at the same rate as the receding floodwaters in front of the wall (i.e. water levels will be the same in front of and behind the walls at all times).

Excavations

The contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, dated October 31, 1989. Such regulations are strictly enforced and, if not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties. The soils encountered at this site were classified as to type in accordance with this publication and are shown subsequently in Table 6.

Table 6: OSHA Soil Classifications

Stratum	Description	OSHA Classification
I	Silty SAND (SM)	C
II	Clayey GRAVEL (GC)	C

It must be noted that layered slopes cannot be steeper at the top than the underlying slope and that all materials below the water table must be classified as Type "C" soils. The OSHA publication should be referenced for layered soil conditions, benching, etc.

For excavations less than 20 feet deep, the maximum allowable slope for Type "C" soils is 1.5H:1V (34°), for Type "B" soils is 1H:1V (45°) and for Type "A" soils is ¾H:1V (53°). It should be noted that the table and allowable slopes above are for temporary slopes. Permanent slopes at this site should be sloped no steeper than 4H:1V and flatter slopes may be required in gravelly/sandy areas. Flatter slopes may also be desired for mowing purposes.

It should be noted that heavy duty excavating equipment may be required for excavating in the hard and dense, as well as partially-cemented, materials encountered at this site. The contractor should provide such heavy duty excavating equipment.

Appropriate trench excavation methods will depend on the various soil and groundwater conditions encountered. We emphasize that undisclosed soil conditions may be present at locations and depths other than those encountered in our borings. Consequently, flatter slopes and dewatering techniques may be required in these areas.

The soils and rock to be penetrated by excavations may vary significantly across the site. Our preliminary soil classification is based solely on the materials encountered in the single boring. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, we recommend that Arias be contacted immediately to evaluate the conditions encountered.

Trenches less than 5 feet deep are generally not required to be sloped back or braced following federal OSHA requirements for excavations. Sides of temporarily vertical excavations less than 5 feet deep may stay open for short periods of time; however, the soils that will be encountered in trench excavations are subject to random caving and sloughing. If side slopes begin to slough, the sides should be either braced or be sloped back to at least 1V: 1H, or flatter, as needed.

If any excavation, including a utility trench, is extended to a depth of more than twenty (20) feet, it will be necessary to have the side slopes designed by a professional engineer registered in Texas. As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance from the crest of the slope equal to no less than the slope height.

Specific surcharge loads such as traffic, heavy cranes, earth stockpiles, pipe stacks, etc., should be considered by the Trench Safety Engineer. It is also important to consider any vibratory loads such as heavy truck traffic.

It is required by OSHA that the excavations be carefully monitored by a competent person making daily construction inspections. These inspections are required to verify that the excavations are constructed in accordance with the intent of OSHA regulations and the Trench Safety Design. If deeper excavations are necessary or if actual soil conditions vary from the

borings, the trench safety design may have to be revised. It is especially important for the inspector to observe the effects of changed weather conditions, surcharge loadings, and cuts into adjacent backfills of existing utilities. The flow of water into the base and sides of the excavation and the presence of any surface slope cracks should also be carefully monitored by the Trench Safety Engineer.

The bottoms of trench excavations should expose strong competent soils, and should be dry and free of loose, soft, or disturbed soil. If fill soils are encountered at the base of trench excavations, their competency should be verified through probing and density testing. Soft, wet, weak, or deleterious materials should be overexcavated to expose strong competent soils. At locations where soft or weak soils extend for some depth, overexcavation to stronger soils may prove infeasible and/or uneconomical. In the event of encountering these areas of deep soft or weak soils, we recommend that the bottom of the trench be evaluated by the contractor's Trench Safety Engineer and the project Geotechnical Engineer.

PAVEMENT RECOMMENDATIONS

The planned below-grade pedestrian crossing will be constructed using open trench excavations. The planned improvements will include the reconstruction of the existing roadway at the pedestrian crossing in the vicinity of the new structure. The following sections in this report present our pavement recommendations for design and reconstruction of the pavements along Old Grissom Road that may be disturbed by trenching.

Design Parameters and Traffic Conditions

Based on the results of our field study and laboratory testing, it appears likely that the roadway subgrade will consist predominantly of Silty SAND (SM). We obtained a bulk sample of the site soils for laboratory testing to determine the design California Bearing Ratio (CBR). The CBR sample was obtained outside of the existing pavement areas adjacent to the roadway and consisted of clay soils. Our laboratory test results for a clay sample taken near the Boring B-1 location indicated a CBR value of about 2. Clay soils were not observed in the subgrade at the 3 sample location provided as part of this study, suggesting that the clays soils were likely removed as part of the site grading to install the roadway. A design CBR value of 3 was selected to evaluate the proposed pavement section overlying a compacted sandy subgrade condition.

It should be noted that the conditions and recommendations contained herein are based on the materials encountered at the time of field exploration. These conditions may differ if road grading (cut/fill) operations are performed. We recommend that a representative of Arias be retained to observe that our recommendations are followed and to assist in determining the actual subgrade material classification at a particular location. Furthermore, we should be given an opportunity to review the final plan-and-profile sheets to determine if changes to our recommendations are needed.

Recommendations in this section were evaluated in accordance with the 1993 AASHTO Guide for Design of Pavement Structure. Structural material coefficients are provided subsequently in Table 7.

Table 7: Material Coefficients

Material	Structural Coefficient
Hot Mix Asphaltic Concrete – Type "C" Surface Course	0.44
Hot Mix Asphaltic Concrete – Type "B" Base Course	0.38
Flexible Base Course – TxDOT Item 247, Type A, Grades 1 or 2	0.14

Comments Regarding Roadway Widening

The planned re-construction will be limited to 100 feet on either side of the planned culvert structure. *Preliminary design information provided to us indicates that plans are to provide a pavement section to match the existing roadway.*

The three sample locations provided in the vicinity of the project indicated about 7.25 to 15 inches of asphalt pavements. The observed asphalt pavement sections suggest that the asphalt pavement sections likely include multiple lifts of asphalt with an asphaltic surface course over an asphaltic base course.

We understand that preliminary plans are to re-construct the new roadway pavement section to match the pre-existing pavement section. Two of the three locations were very similar with an average asphalt thickness of 7.5 inches over 6 to 7.5 inches of crushed gravel aggregate base. Based on the observations made in our sample locations, we recommend the planned site pavement include the following minimum pavement section.

Table 8: Proposed Pavement Section to Match Existing Site Conditions

Material	Pavement Thickness, inches
Type "C" or "D" HMAC Surface Course	2"
Type "B" HMAC Base Course	6"
Flexible Base Course	6"
Calculated Structural No.	**4.0**

The proposed pavement section presented in Table 8 was selected to provide a pavement thickness to match the existing thickness values observed in the 3 sample locations provided in this study. The proposed pavement section will provide a Structural Number (SN) to support a design traffic value over 2,000,000 design ESAL's for a Local Type roadway over a 20 year design period.

Site Drainage

The favorable performance of any pavement structure is dependent on positive site drainage. This is particularly important at this site due to the expansive soils encountered in the borings. Careful consideration should be provided by the designers to ensure positive drainage of all storm waters away from the planned pavements. Ponding should not be allowed either on or along the edges of the pavements.

Pavements over Box Culverts

At the locations where the pavement crosses a box culvert, we would recommend that the pavement section chosen be continued over the box culvert (*i.e.,* same base and asphalt thicknesses as for the roadway). If crushed limestone or other granular base is placed over the concrete box culvert (either as fill or as part of the base course), we recommend that a non-woven 4oz/yd^2 minimum fabric, such as Mirafi 140N, be installed over all gravel backfill, and over the top of the concrete boxes. All fill should be placed and compacted as outlined below. *Hot mix asphalt, base course or concrete should not be placed directly over the fabric.*

Performance and Maintenance Considerations

Our pavement recommendations have been developed to provide a pavement section to match the existing site pavements. Shrink/swell movements due to moisture variations in the underlying soils should be anticipated over the life of the pavements. The owner should recognize that over a period of time, pavements may crack and undergo some deterioration and loss of serviceability. Deterioration can occur more rapidly as a result of climatic extremes such as drought conditions, or periods that are wetter than normal. We recommend the project budgets include an allowance for maintenance such as patching of cracks, repairing potholes and other distressed areas, or occasional overlays over the life of the pavement.

It has been our experience that pavement cracking will provide a path for surface runoff to infiltrate through the pavements and into the subgrade. Once moisture is allowed into the subgrade, the potential for pavement failures and potholes will increase. We recommend the owners implement a routine maintenance program with regular site inspections to monitor the performance of the site pavements. Cracking that may occur on the asphalt surface due to shrink/swell movements should be sealed immediately using a modified polymer hot-applied asphalt based sealant.

Additional crack sealing will likely be required over the design life of the pavements. Crack sealing is a proven, routine, maintenance practice successfully used by TxDOT, and other government agencies to preserve pavements and reduce accelerated wear and deterioration. Failure to provide routine crack-sealing will increase the potential for pavement failures and potholes to develop.

PAVEMENT CONSTRUCTION CRITERIA

Site Preparation

Topsoil stripping should be performed as needed to remove existing asphalt, concrete, base, organic materials, loose soils, vegetation, roots, and stumps. A minimum depth of 3 to 4 inches should be planned. Additional excavation may be required due to encountering deleterious materials such as concrete, organics, debris, soft materials, etc.

Roadway Fill Requirements

The general fill used to increase sections of the roadway grade should consist of onsite materials meeting or exceeding the existing subgrade CBR value. The general fill should be placed in accordance with City of San Antonio Standard Specifications for Construction, Item 107, "Embankment". The compaction should be performed in accordance with the "Density Control" method. Onsite material may be used provided it is placed in maximum 8" loose lifts and compacted to at least 95 percent of the maximum dry density as evaluated by TEX-114-E to within optimum to plus four (+4) percent of optimum moisture (PI>35). This fill should not have any organics or deleterious materials. When fill material includes rock, the maximum rock size acceptable shall be 3-inches. No large rocks (>3 inches) shall be allowed to nest and all voids must be carefully filled with small stones or earth and properly compacted.

The CBR of all fill materials used should be equal to or exceed the existing subgrade CBR (*i.e.,* assumed to be 3). The suitability of all fill materials should be approved by the Geotechnical Engineer. Conformance testing during construction to assure quality will be necessary for this process. If fill is required to raise paving grades, the above compaction criteria should be utilized with the fill placed in maximum 8-inch thick loose lifts. It should be noted that if fill materials with lower CBR values are placed, then a higher Structural Number and a thicker pavement section would be necessary.

Flexible Base Course

The base material should comply with City of San Antonio Standard Specifications for Construction, Item 200, "Flexible Base", Type A Grade 1 or 2. The compaction should be performed in accordance with the "Density Control" method. The flexible base should be compacted in maximum 8-inch loose lifts to at least 95 percent of the maximum dry density as evaluated by TEX-113-E within plus or minus 3 percent of optimum moisture content. Compaction tests should be performed as outlined in the "Quality Assurance Testing" section of this report.

Asphaltic Base Course

The asphalt should comply with City of San Antonio Standard Specifications for Construction, Item 205, "Hot Mix Asphaltic Concrete Pavement", Type B, Base Course. Compaction tests should be performed as outlined in the "Quality Assurance Testing" section of this report.

Asphaltic Concrete Surface Course

The asphalt should comply with City of San Antonio Standard Specifications for Construction, Item 205, “Hot Mix Asphaltic Concrete Pavement”, Type C or D, Surface Course. Compaction tests should be performed as outlined in the “Quality Assurance Testing” section of this report.

Curb and Gutter

It has been our experience that pavements typically perform at a higher level when designed with adequate drainage including the implementation of curb and gutter systems. Accordingly, we recommend that curb and gutters be considered for this project. Furthermore, to aid in reducing the chances for water to infiltrate into the pavement base course and pond on top of the pavement subgrade, we highly recommend that pavement curbs be designed to extend through the pavement base course penetrating at least 6 inches into the onsite subgrade. If water is allowed to infiltrate beneath the site pavements, frequent and premature pavement distress can occur.

Portions of the existing street currently have concrete curbs and gutters. We understand that the project will include the construction of curbs and gutters. Based on observations made at the time of our site visit, several areas where existing trees are located directly adjacent to the planned site improvements were visible. Tree roots will affect the moisture of the supporting soils and may result in movements to the newly constructed curbs.

Construction Site Drainage

We recommend that areas along the roadways be properly maintained to allow for positive drainage as construction proceeds and to keep water from ponding adjacent to the site pavements. This consideration should be included in the project specifications.

GENERAL COMMENTS

This report was prepared as an instrument of service for this project exclusively for the use of Poznecki Camarillo, CoSA, and the project design team. If the development plans change relative to layout, anticipated traffic loads, or if different subsurface conditions are encountered during construction, we should be informed and retained to ascertain the impact of these changes on our recommendations. We cannot be responsible for the potential impact of these changes if we are not informed.

Design Review

Arias should be given the opportunity to review the design and construction documents. The purpose of this review is to check to see if our recommendations are properly interpreted into the project plans and specifications. Please note that design review was not included in the authorized scope and additional fees may apply.

Subsurface Variations

Soil and groundwater conditions may vary away from the sample boring locations. Transition boundaries or contacts, noted on the boring logs to separate soil types, are approximate. Actual contacts may be gradual and vary at different locations. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions or highly variable subsurface conditions are encountered during construction, we should be contacted to evaluate the significance of the changed conditions relative to our recommendations.

Quality Assurance Testing

The long-term success of the project will be affected by the quality of materials used for construction and the adherence of the construction to the project plans and specifications. As Geotechnical Engineer of Record (GER), we should be engaged by the Owner to provide Quality Assurance (QA) testing. Our services will be to evaluate the degree to which constructors are achieving the specified conditions they're contractually obligated to achieve, and observe that the encountered materials during earthwork for foundation and pavement installation are consistent with those encountered during this study. In the event that Arias is not retained to provide QA testing, we should be immediately contacted if differing subsurface conditions are encountered during construction. Differing materials may require modification to the recommendations that we provided herein. A message to the Owner with regard to the project QA is provided in the ASFE publication included in Appendix E.

Arias has an established in-house laboratory that meets the standards of the American Standard Testing Materials (ASTM) specifications of ASTM E-329 defining requirements for Inspection and Testing Agencies for soil, concrete, steel and bituminous materials as used in construction. We maintain soils, concrete, asphalt, and aggregate testing equipment to provide the testing needs required by the project specifications. All of our equipment is calibrated by an independent testing agency in accordance with the National Bureau of Standards. In addition, Arias is accredited by the American Association of State Highway & Transportation Officials (AASHTO), the United States Army Corps of Engineers (USACE) and the Texas Department of Transportation (TxDOT), and also maintains AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL) proficiency sampling, assessments and inspections.

Furthermore, Arias employs a technical staff certified through the following agencies: the National Institute for Certification in Engineering Technologies (NICET), the American Concrete Institute (ACI), the American Welding Society (AWS), the Precast/Prestressed Concrete Institute (PCI), the Mine & Safety Health Administration (MSHA), the Texas Asphalt Pavement Association (TXAPA) and the Texas Board of Professional Engineers (TBPE).

Standard of Care

Subject to the limitations inherent in the agreed scope of services as to the degree of care and amount of time and expenses to be incurred, and subject to any other limitations contained in the agreement for this work, Arias has performed its services consistent with that level of care and skill ordinarily exercised by other professional engineers practicing in the same locale and under similar circumstances at the time the services were performed.

Information about this geotechnical report is provided in the ASFE publication included in Appendix D.

APPENDIX A: FIGURES AND SITE PHOTOGRAPHS

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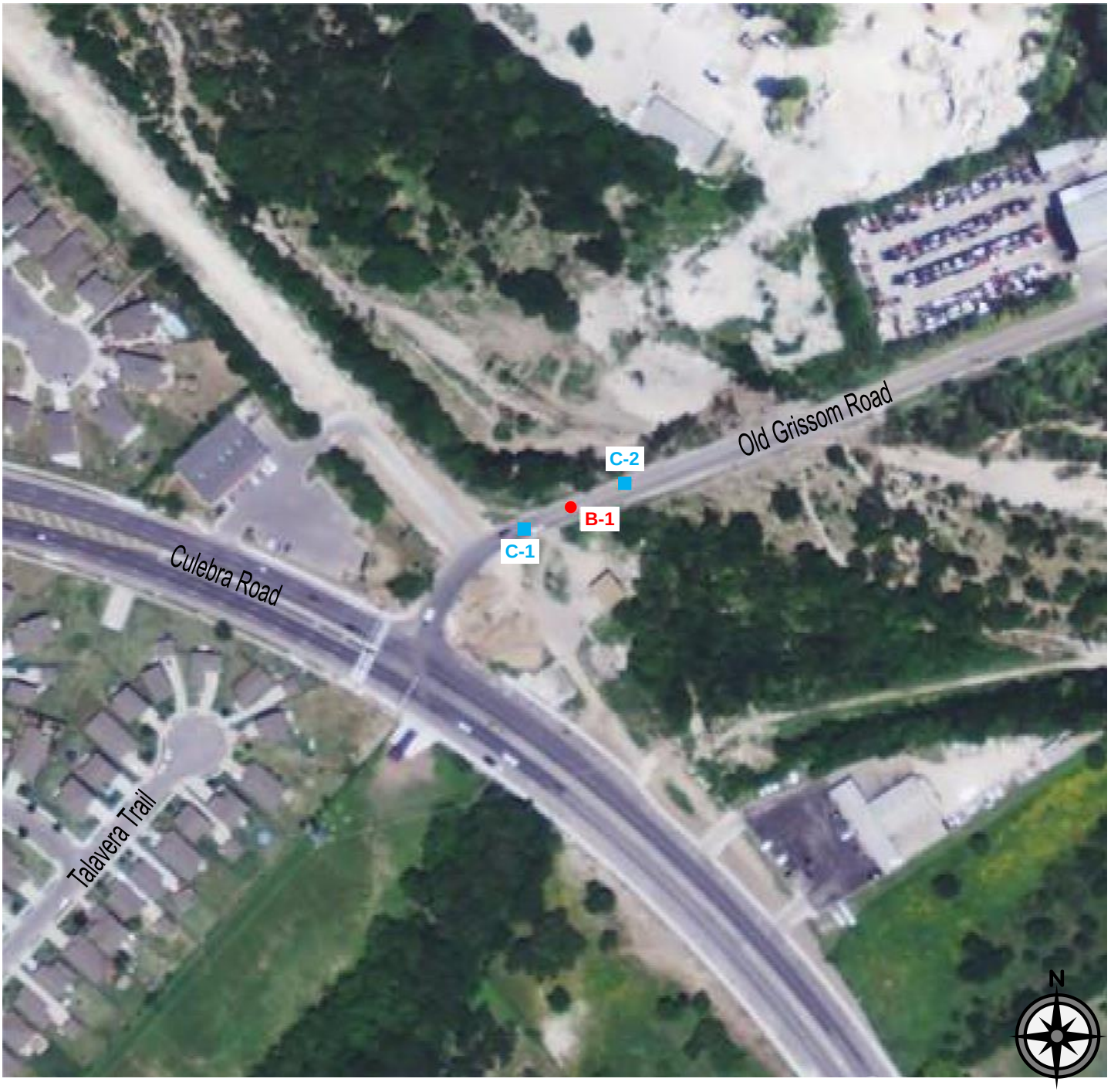
VICINITY MAP

Old Grissom Road
Pedestrian Crossing and Street Reconstruction
San Antonio, Texas

Date: December 10, 2013	Job No.: 2013-792
Drawn By: TAS	Checked By: RPG
Approved By: SAH	Scale: N.T.S.

Figure 1



ARIAS & ASSOCIATES, INC.
Geotechnical • Environmental • Testing
TBPE Registration No. F-32

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BORING LOCATION PLAN

Old Grissom Road
Pedestrian Crossing and Street Reconstruction
San Antonio, Texas

Legend:

- ● - Approximate Bore Location
- ■ - Approximate Core Locations

Date: December 10, 2013	Job No.: 2013-792
Drawn By: TAS	Checked By: RPG
Approved By: SAH	Scale: N.T.S.

Figure 2

APPENDIX B: BORING LOGS AND KEY TO TERMS

Boring Log No. B-1

Project: **New Walking Trail at Old Grissom Road**
San Antonio, Texas

Sampling Date: 11/20/13

Coordinates: N29°28'30.9" W98°39'14.6"

Location: See Boring Location Plan

Backfill: Bentonite to 3-ft, grout and patched

Soil Description	Depth (ft)	SN	WC	PL	LL	PI	N	-200
7.25" ASPHALT								
6" BASE: Brown Clayey Gravel (GC) with sand (partially crushed gravel)		GB	1					17
SILTY SAND (SM), dense, dark tan, with gravel		SS	3				25	
		SS	2	NP	NP	NP	41	28
-light tan, 4' to 8'	5							
-with cobbles, 5' to 6'		SS	1				63	
		SS	2	NP	NP	NP	48	17
-reddish brown below 8'								
	10	SS	2				23	
		SS	3	NP	NP	NP	31	20
CLAYEY GRAVEL (GC), dense, light tan, with sand								
	15	SS	5	14	27	13	48	
	20	SS	4	13	32	19	47	17
-very dense below 23'		SS	8				**50/2"	
Borehole terminated at 23.7 feet								

Groundwater Data:
During drilling: Not encountered

Field Drilling Data:
Coordinates: Hand-held GPS Unit
Logged By: W. Persyn
Driller: Eagle Drilling, Inc.
Equipment: Truck-mounted drill rig

Single flight auger: 0 - 23.7 ft

Nomenclature Used on Boring Log

Grab Sample (GB) Split Spoon (SS)

WC = Water Content (%)
PL = Plastic Limit
LL = Liquid Limit
PI = Plasticity Index
NP = Non-plastic

N = SPT Blow Count
** = Blow Counts During Seating Penetration
-200 = % Passing #200 Sieve

Arias & Associates, Inc.

Job No.: 2013-792

2013-792.GPJ 12/9/13 (BORING LOG SA13-02.ARIASSA12-01.GDT.LIBRARY2013-01.GLB)

Boring Log No. C-1

Project: **New Walking Trail at Old Grissom Road**
San Antonio, Texas

Sampling Date: 11/20/13

Coordinates: N29°28'30.6" W98°39'15.3"

Location: See Boring Location Plan

Backfill: Grout and patched

Soil Description	Depth (ft)		SN	WC	PL	LL	PI	-200
15" ASPHALT	1							
13" BASE: Brown Clayey Sand (SC) with crushed gravel	2	☒	GB	12	13	28	15	24
Borehole terminated at 2.33 feet								

Groundwater Data:
During drilling: Not encountered

Field Drilling Data:
Coordinates: Hand-held GPS Unit
Logged By: W. Persyn
Driller: Eagle Drilling, Inc.
Equipment: Truck-mounted drill rig

Single flight auger: 0 - 2.33 ft

Nomenclature Used on Boring Log

☒ Grab Sample (GB)

WC = Water Content (%)
PL = Plastic Limit
LL = Liquid Limit
PI = Plasticity Index
-200 = % Passing #200 Sieve

Arias & Associates, Inc.

Job No.: 2013-792

Boring Log No. C-2

Project: **New Walking Trail at Old Grissom Road**
San Antonio, Texas

Sampling Date: 11/20/13

Coordinates: N29°28'31.3" W98°39'13.8"

Location: See Boring Location Plan

Backfill: Grout and patched

Soil Description	Depth (ft)	SN	WC
7.75" ASPHALT			
7.5" BASE: Brown Clayey Gravel (GC) with sand (partially crushed gravel)	1	GB	4
SILTY SAND (SM), brown	2		
Borehole terminated at 2 feet			

Groundwater Data:
During drilling: Not encountered

Field Drilling Data:
Coordinates: Hand-held GPS Unit
Logged By: W. Persyn
Driller: Eagle Drilling, Inc.
Equipment: Truck-mounted drill rig

Single flight auger: 0 - 2 ft

Nomenclature Used on Boring Log

☒ Grab Sample (GB)

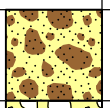
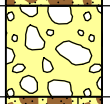
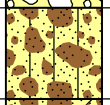
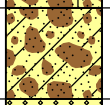
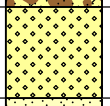
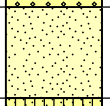
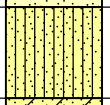
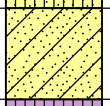
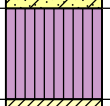
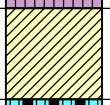
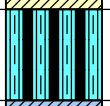
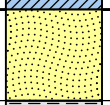
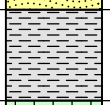
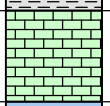
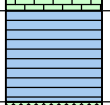
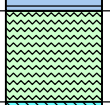
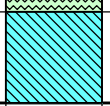
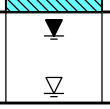
WC = Water Content (%)

2013-792.GPJ 12/9/13 (BORING LOG SA13-02.ARIASSA12-01.GDT.LIBRARY2013-01.GLB)

Arias & Associates, Inc.

Job No.: 2013-792

KEY TO CLASSIFICATION SYMBOLS USED ON BORING LOGS

MAJOR DIVISIONS			GROUP SYMBOLS		DESCRIPTIONS
COARSE-GRAINED SOILS More Than Half of Material LARGER Than No. 200 Sieve size	GRAVELS More Than Half of Coarse Fraction is LARGER Than No. 4 Sieve Size	Clean Gravels (Little or no Fines)	GW		Well-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
			GP		Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
		Gravels With Fines (Appreciable Amount of Fines)	GM		Silty Gravels, Gravel-Sand-Silt Mixtures
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More Than Half of Coarse Fraction is SMALLER Than No. 4 Sieve Size	Clean Sands (Little or no Fines)	SW		Well-Graded Sands, Gravelly Sands, Little or no Fines
			SP		Poorly-Graded Sands, Gravelly Sands, Little or no Fines
		Sands With Fines (Appreciable Amount of Fines)	SM		Silty Sands, Sand-Silt Mixtures
			SC		Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More Than Half of Material is SMALLER Than No. 200 Sieve Size	SILTS & CLAYS	Liquid Limit Less Than 50	ML		Inorganic Silts & Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL		Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
	SILTS & CLAYS	Liquid Limit Greater Than 50	MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sand or Silty Soils, Elastic Silts
			CH		Inorganic Clays of High Plasticity, Fat Clays
FORMATIONAL MATERIALS	SANDSTONE				Massive Sandstones, Sandstones with Gravel Clasts
	MARLSTONE				Indurated Argillaceous Limestones
	LIMESTONE				Massive or Weakly Bedded Limestones
	CLAYSTONE				Mudstone or Massive Claystones
	CHALK				Massive or Poorly Bedded Chalk Deposits
	MARINE CLAYS				Cretaceous Clay Deposits
	GROUNDWATER				Indicates Final Observed Groundwater Level Indicates Initial Observed Groundwater Location

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APPENDIX C: LABORATORY AND FIELD TEST PROCEDURES

FIELD AND LABORATORY EXPLORATION

The field exploration program included drilling at selected locations within the site and intermittently sampling the encountered materials. The boreholes were drilled using either single flight auger (ASTM D 1452) or hollow-stem auger (ASTM D 6151). Samples of encountered materials were obtained using a split-barrel sampler while performing the Standard Penetration Test (ASTM D 1586), using a thin-walled tube sampler (ASTM D 1587), or by taking material from the auger as it was advanced (ASTM D 1452). The sample depth interval and type of sampler used is included on the soil boring log. Arias' field representative visually logged each recovered sample and placed a portion of the recovered sampled into a plastic bag for transport to our laboratory.

SPT N values and blow counts for those intervals where the sampler could not be advanced for the required 18-inch penetration are shown on the soil boring log. If the test was terminated during the 6-inch seating interval or after 10 hammer blows were applied used and no advancement of the sampler was noted, the log denotes this condition as blow count during seating penetration. Penetrometer readings recorded for thin-walled tube samples that remained intact also are shown on the soil boring log.

Arias performed soil mechanics laboratory tests on selected samples to aid in soil classification and to determine engineering properties. Tests commonly used in geotechnical exploration, the method used to perform the test, and the column designation on the boring log where data are reported are summarized as follows:

Test Name	Test Method	Log Designation
Water (moisture) content of soil and rock by mass	ASTM D 2216	WC
Liquid limit, plastic limit, and plasticity index of soils	ASTM D 4318	PL, LL, PI
Amount of material in soils finer than the No. 200 sieve	ASTM D 1140	-200
Particle size analysis of soils (with or without fines fraction)	ASTM D 422	--
Sulfate Content in Soils	TEX 145-E	--
Moisture-Density Relationship	ASTM D 698	--
California Bearing Ratio	ASTM D 1883	--

The laboratory results are reported on the soil boring logs.

APPENDIX D: ASFE INFORMATION – GEOTECHNICAL REPORT

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
THE BEST PEOPLE ON EARTH

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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APPENDIX E: PROJECT QUALITY ASSURANCE

A Message to Owners

Construction materials engineering and testing (CoMET) consultants perform quality-assurance (QA) services to evaluate the degree to which constructors are achieving the specified conditions they're contractually obligated to achieve. Done right, QA can save you time and money; prevent unanticipated-conditions claims, change orders, and disputes; and reduce short-term and long-term risks, especially by detecting molehills before they grow into mountains.

Done right, QA can save you time and money; prevent claims and disputes; and reduce risks. Many owners don't do QA right because they follow bad advice.

Many owners don't do QA right because they follow bad advice; e.g., "CoMET consultants are all the same. They all have accredited facilities and certified personnel. Go with the low bidder." But there's no such thing as a standard QA scope of service, meaning that – to bid low – each interested firms *must* propose the cheapest QA service it can live with, jeopardizing service quality and aggravating risk for the entire project team. Besides, the advice is based on misinformation.

Fact: ***Most CoMET firms are not accredited***, and the quality of those that are varies significantly. Accreditation – which is important – nonetheless means that a facility met an accrediting body's minimum criteria. Some firms practice at a much higher level; others just barely scrape by. And what an accrediting body typically evaluates – management, staff, facilities, and equipment – can change substantially before the next review, two, three, or more years from now.

Most CoMET firms are not accredited. It's dangerous to assume CoMET personnel are certified.

Fact: ***It's dangerous to assume CoMET personnel are certified.*** Many have no credentials at all; some are certified by organizations of questionable merit, while others have a valid certification, but *not* for the services they're assigned.

Some CoMET firms – the "low-cost providers" – *want* you to believe that price is the only difference between QA providers. It's not, of course. Firms that sell low price typically lack the facilities, equipment, personnel, and insurance quality-oriented firms invest in to achieve the reliability concerned owners need to achieve quality in quality assurance.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION
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Fax: 301.589.2017
E-mail: info@asfe.org
Internet: www.asfe.org

Firms that sell low price typically lack the facilities, equipment, personnel, and insurance quality-oriented firms invest in to achieve the reliability concerned owners need to achieve quality in quality assurance.

To derive maximum value from your investment in QA, require the CoMET firm's project manager to serve actively on the project team from beginning to end, a level of service that's relatively inexpensive and can pay huge dividends. During the project's planning and design stages, experienced CoMET professionals can help the design team develop uniform technical specifications and establish appropriate observation, testing, and instrumentation procedures and protocols. They can also analyze plans and specs much as constructors do, looking for the little errors, omissions, conflicts, and ambiguities that often become the basis for big extras and big claims. They can provide guidance about operations that need closer review than others, because of their criticality or potential for error or abuse. They can also relate their experience with the various constructors that have expressed interest in your project.

To derive maximum value, require the project manager to serve actively on the project team from beginning to end.

CoMET consultants' construction-phase QA services focus on two distinct issues: those that relate to geotechnical engineering and those that relate to the other elements of construction.

The geotechnical issues are critically important because they are essential to the "observational method" geotechnical engineers use to significantly reduce the amount of sampling they'd otherwise require. They apply the observational method by developing a sampling plan for a project, and then assigning field representatives to ensure samples are properly obtained, packaged, and transported. The engineers review the samples and, typically, have them tested in their own laboratories. They use the information they derive to characterize the site's subsurface and develop *preliminary* recommendations for the structure's foundations and for the specifications of various "geo" elements, like excavations, site grading, foundation-bearing grades, and roadway and parking-lot preparation and surfacing.

Geotechnical engineers cannot finalize their recommendations until they or their field representatives are on site to observe what's excavated to verify that the subsurface conditions the engineers predicted are those that actually exist.

When unanticipated conditions are observed, recommendations and/or specifications should be modified.

Responding to client requests, many geotechnical-engineering firms have expanded their field-services mix, so they're able to perform overall construction QA, encompassing – in addition to geotechnical issues – reinforced concrete, structural steel, welds, fireproofing, and so on. Unfortunately, that's caused some confusion. Believing that all CoMET consultants are alike, some owners take bids for the overall CoMET package, including the geotechnical field observation. *Entrusting geotechnical field observation to someone other than the geotechnical engineer of record (GER) creates a significant risk.*

Geotechnical engineers cannot finalize their recommendations until they are on site to verify that the subsurface conditions they predicted are those that actually exist. Entrusting geotechnical field observation to someone other than the geotechnical engineer of record (GER) creates a significant risk.

GERs have developed a variety of protocols to optimize the quality of their field-observation procedures. Quality-focused GERs meet with their field representatives before they leave for a project site, to brief them on what to look for and where, when, and how to look. (***No one can duplicate this briefing***, because no one else knows as much about a project's geotechnical issues.) And once they arrive at a project site, the field representatives know to maintain timely, effective communication with the GER, because that's what the GER has trained them to do. By contrast, it's extremely rare for a different firm's field personnel to contact the GER, even when they're concerned or confused about what they observe, because they regard the GER's firm as "the competition."

Divorcing the GER from geotechnical field operations is almost always penny-wise and pound-foolish. Still, because owners are given bad advice, it's commonly done, helping to explain why ***"geo" issues are the number-one source of construction-industry claims and disputes.***

Divorcing the GER from geotechnical field operations is almost always penny-wise and pound-foolish, helping to explain why "geo" issues are the number-one source of construction-industry claims and disputes.

To derive the biggest bang for the QA buck, identify three or even four quality-focused CoMET consultants. (If you don't know any, use the "Find a Geoprofessional" service available free at www.asfe.org.) Ask about the firms' ongoing and recent projects and the clients and client representatives involved; *insist upon receiving verification of all claimed accreditations, certifications, licenses, and insurance coverages.*

Insist upon receiving verification of all claimed accreditations, certifications, licenses, and insurance coverages.

Once you identify the two or three most qualified firms, meet with their representatives, preferably at their own facility, so you can inspect their laboratory, speak with management and technical staff, and form an opinion about the firm's capabilities and attitude.

Insist that each firm's designated project manager participate in the meeting. You will benefit when that individual is a seasoned QA professional familiar with construction's rough-and-tumble. Ask about others the firm will assign, too. There's no substitute for experienced personnel who are familiar with the codes and standards involved and know how to:

- read and interpret plans and specifications;
- perform the necessary observation, inspection, and testing;
- document their observations and findings;
- interact with constructors' personnel; and
- respond to the unexpected.

Important: Many of the services CoMET QA field representatives perform – like observing operations and outcomes – require the good judgment afforded by extensive training and experience, especially in situations where standard operating procedures do not apply. You need to know who will be exercising that judgment: a 15-year "veteran" or a rookie?

Many of the services CoMET QA field representatives perform require good judgment.

Also consider the tools CoMET personnel use. Some firms are passionate about proper calibration; others, less so. Passion is a good thing! Ask to see the firm's calibration records. If the firm doesn't have any, or if they are not current, be cautious. *You cannot trust test results derived using equipment that may be out of calibration.* Also ask a firm's representatives about their reporting practices, including report distribution, how they handle notifications of nonconformance, and how they resolve complaints.

Scope flexibility is needed to deal promptly with the unanticipated.

For financing purposes, some owners require the constructor to pay for CoMET services. ***Consider an alternative approach*** so you don't convert the constructor into the CoMET consultant's client. If it's essential for you to fund QA via the constructor, have the CoMET fee included as an allowance in the bid documents. This arrangement ensures that you remain the CoMET consultant's client, and it prevents the CoMET fee from becoming part of the constructor's bid-price competition. (Note that the International Building Code (IBC) *requires the owner to pay* for Special Inspection (SI) services commonly performed by the CoMET consultant as a service separate from QA, to help ensure the SI services' integrity. Because failure to comply could result in denial of an occupancy or use permit, having a contractual agreement that conforms to the IBC mandate is essential.)

If it's essential for you to fund QA via the constructor, have the CoMET fee included as an allowance in the bid documents. Note, too, that the International Building Code (IBC) requires the owner to pay for Special Inspection (SI) services.

CoMET consultants can usually quote their fees as unit fees, unit fees with estimated total (invoiced on a unit-fee basis), or lump-sum (invoiced on a percent-completion basis referenced to a schedule of values). No matter which method is used, estimated quantities need to be realistic. Some CoMET firms lower their total-fee estimates by using quantities they know are too low and then request change orders long before QA is complete.

Once you and the CoMET consultant settle on the scope of service and fee, enter into a written contract. Established CoMET firms have their own contracts; most owners sign them. Some owners prefer to use different contracts, but that can be a mistake when the contract was prepared for construction services. *Professional services are different.* Wholly avoidable problems occur when a contract includes provisions that don't apply to the services involved and fail to include those that do.

Some owners create wholly avoidable problems by using a contract prepared for construction services.

This final note: CoMET consultants perform QA for owners, not constructors. While constructors are commonly allowed to review QA reports as a *courtesy*, you need to make it clear that constructors do *not* have a legal right to rely on those reports; i.e., if constructors want to forgo their own observation and testing and rely on results derived from a scope created to meet *only* the needs of the owner, they *must do so at their own risk*. In all too many cases where owners have not made that clear, some constructors have alleged that they did have a legal right to rely on QA reports and, as a result, the CoMET consultant – not they – are responsible for their failure to deliver what they contractually promised to provide. The outcome can be delays and disputes that entangle you and all other principal project participants. Avoid that. Rely on a CoMET firm that possesses the resources and attitude needed to manage this and other risks as an element of a quality-focused service. Involve the firm early. Keep it engaged. And listen to what the CoMET consultant says. A good CoMET consultant can provide great value.

For more information, speak with your ASFE-Member CoMET consultant or contact ASFE directly.

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May 27, 2014
Arias Job No. 2013-792

Ms. Crystal Benavides, PE
Poznecki Camarillo Associates, Inc.
5835 Callaghan Road, Suite 200
San Antonio, Texas 78228

RE: Results of Global Stability Analysis
Old Grissom Road – Pedestrian Crossing and Street Reconstruction
San Antonio, Texas

Dear Ms. Benavides:

Arias & Associates, Inc. (Arias) is pleased to provide the results of our global stability analysis performed for the proposed retaining walls planned along the hike and bike trail on either side of the pedestrian crossing below Old Grissom Road. Poznecki Camarillo Associates, Inc. (PCA) provided 95% design drawing submittals, dated April 9, 2014, for the planned retaining walls.

Project Description

Arias performed a geotechnical engineering study for the planned pedestrian crossing below Old Grissom Road in San Antonio, Texas. The findings and recommendations of that study were presented in Arias Report No. 2013-792, dated December 9, 2013. The above-referenced design drawings indicate that the typical wall section will consist of a proprietary retaining wall system (Pavestone Anchorplex or similar). The face of the wall will be constructed with segmental Pavestone blocks and will include a special density backfill consisting of a stabilized aggregate backfill.

Details of the retaining wall alignments, as shown on the retaining wall plan-and-profile sheets, are summarized below in Table 1.

Table 1: Summary of Retaining Wall Details

Wall No.	Approximate Wall Stations		Approximate Wall Length, ft	Approximate Wall Height, ft
	Begin	End		
01	11+20	12+51	131	2 to 11.5
02	11+52	12+68	116	5 to 10
03	13+08	15+50	242	2 to 10

Global Stability Analysis

Design Considerations. Cross-sections of the planned trail alignment are presented on PCA Sheets 1 through 4. These drawings indicate that the retaining walls will have a maximum wall height of about 11.5 feet. Wall heights are defined from the top of wall to the bottom of the blocks. Portions of the planned retaining walls will have slopes behind them. We understand that the wall construction will be permitted through the City of San Antonio (COSA); thus, a minimum factor of safety of 1.5 will be required against global instability.

Soil Parameters. The subsurface conditions were evaluated by drilling one (1) geotechnical boring at the planned pedestrian crossing below Old Grissom Road. Representative samples recovered from the soil borings were tested to determine soil index properties. We reviewed the results from the field exploration and laboratory index testing, and have applied our experience with similar soil conditions to develop parameters for use in our global stability analysis.

Undrained values used in our analysis were estimated from correlations with SPT N-values. Drained values, representing long-term conditions, were selected based on published correlations and test results from previous Arias projects. Table 2 below presents the short-term and long-term, shear strength parameters (Mohr-Coulomb) used in our analysis based on the soil conditions encountered.

Table 2: Parameters used in Global Stability Analysis

Stratum	Description	γ (pcf)	Short-term		Long-term	
			c (psf)	ϕ (degrees)	c' (psf)	ϕ' (degrees)
--	Stacked Pavestone Blocks	140	Infinite strength		Infinite strength	
--	Structural Backfill	115	Infinite strength		Infinite strength	
I	Dense Silty Sand (SM)	125	0	34	0	34
II	Dense to Very Dense Clayey Gravel (GC)	125	600	20	25	32

Where: γ = total soil unit weight (pcf)

c = undrained shear strength (psf)

ϕ = angle of internal friction – undrained (degrees)

c' = drained cohesion intercept (psf)

ϕ'= angle of internal friction – drained (degrees)

The strength parameters for the retaining wall components (i.e. blocks and special density backfill) were defined to have infinite strength to force the potential critical sliding surfaces to pass around the wall when evaluating for global stability. We have assumed that the proprietary wall designer will evaluate the internal wall stability and confirm that the wall system will provide adequate resistance against sliding and overturning.

Global Stability Analysis. Global stability analysis was performed utilizing the SLIDE program with undrained parameters to represent the short-term end-of-construction condition, and drained parameters for the long-term condition. The graphical output from the stability analysis for the undrained and drained soil conditions are attached to this letter. Each plot shows the minimum factor of safety for the critical slip surface shown.

The information provided to us indicates that the width of the planned specialty backfill for the proposed wall-type is typically selected by the designers using width-to-height ratio of 0.3H. Arias performed an initial analysis using a backfill zone the extended a distance of 0.3H behind the RW bocks. The result of our initial analysis (Case 1) are summarized below in Table 3.

Table 3: Case 1 – Global Stability Analyses Based on 0.3H Wall Backfill Zone

Location and Conditions						Factor of Safety	
Nearest Boring	**Station No.**	**Wall No.**	**Wall Height (ft)**	**Embedment Depth (ft)**	**Wall Width (ft)**	**Short-Term**	**Long-Term**
B-1	12+50	RW01	11.8	2	3.54	1.81	1.30
		RW02	10.1	2	3.03	2.10	1.42
	13+50	RW03	11.5	2	3.46	1.78	1.27

Note:

1. Wall height (H) refers to the difference between the top of wall and bottom of wall, including the embedment depth.
2. The embedment depth is the depth of the bottom of wall below finished grade.
3. Wall width is measured as the distance between the face of wall to back of backfill (includes both the block and backfill zone).

The results of our analysis indicate that the planned retaining walls will not meet the minimum factor of safety (FS) of at least 1.5 against global instability.

Arias provided an iterative analysis by increasing the wall backfill thickness for each wall until a FS of 1.5 was achieved. The results of this analysis are presented as Case 2, in Table 4.

Table 4: Case 2 – Global Stability Analyses to Achieve FS>1.5

Location and Conditions						Factor of Safety	
Nearest Boring	**Station No.**	**Wall No.**	**Wall Height (ft)**	**Embedment Depth (ft)**	**Wall Width (ft)**	**Short-Term**	**Long-Term**
B-1	12+50	RW01	11.8	2	5.90	2.02	1.58
		RW02	10.1	2	4.04	2.25	1.53
	13+50	RW03	11.5	2	6.33	2.01	1.51

Note:

1. Wall height refers to the difference between the top of wall and bottom of wall, including the embedment depth.
2. The embedment depth is the depth of the bottom of wall below finished grade.
3. Wall width is measured as the distance between the face of wall to back of backfill (includes both the block and backfill zone).

The critical failure surface passed under the retaining wall in all cases analyzed as part of this study. Changes to the planned wall geometries will change the result of our analysis. If wall heights are increased and/or slopes steepened in the final design, or if changes in wall design are made, we should be contacted to evaluate the changes to determine whether additional global stability analysis is necessary. Arias can provide additional analysis under a separate scope of work. We understand that the proprietary wall design engineer will evaluate the retaining wall system for bearing, sliding, overturning, and internal stability.

Additional Comments

The planned retaining walls will be located along Culebra Creek. It is important to note that overtopping of the retaining walls by floodwaters during extreme flood events may result in erosion and loss of backfill behind the walls. We recommend that the planned site improvements include a review by the project designers to consider the potential effects from flooding. Erosion control and prevention measures should be provided as determined by PCA and the design team.

Shallow sloughing of the slopes near the walls can be expected over time that will require routine maintenance. We recommend that a periodic maintenance schedule be developed to confirm that the erosion and scour protection systems are performing as designed. Routine damage assessments should be completed after significant storm events to identify and correct potential problems as soon as possible. Deficiencies and flood damage should be corrected and repaired as needed.

The favorable performance of any structure is dependent on adequate internal drainage, as well as positive site surface drainage. Careful consideration should be provided by the designers and contractor to maintain adequate internal drainage and positive surface drainage of all storm waters away from the planned improvements both during and after construction.

General Comments

This report was prepared for this project exclusively for the use of PCA and their design team. If the development plans change in regard to retaining walls and slopes, or if different subsurface conditions are encountered, we should be informed and retained to ascertain the impact of these changes on our recommendations. We cannot be responsible for the potential impact of these changes if we are not informed.

The soils at the planned wall footing excavations may vary across the site. Our soil classification is based solely on the materials encountered in one (1) exploratory geotechnical

boring. The Contractor should verify that similar conditions exist throughout the proposed area of construction. If different subsurface conditions are encountered at the time of construction, we recommend that Arias be contacted immediately to evaluate the conditions encountered.

Closing

We appreciate the opportunity to be of service to you.

Sincerely,
ARIAS & ASSOCIATES, INC.
TBPE Registration No: F-32

Priya P. Lad, E.I.T.
Graduate Geotechnical Engineer

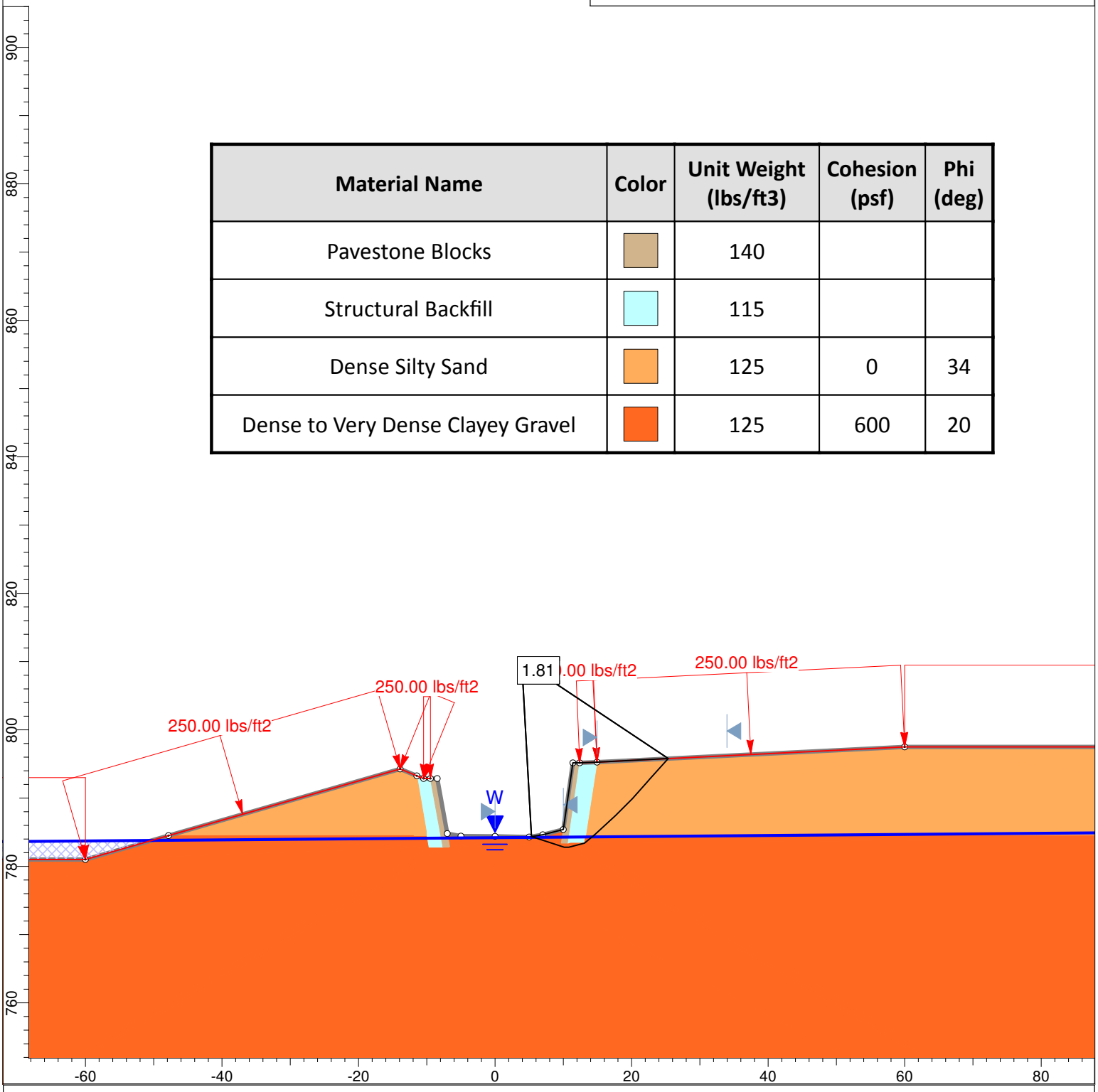
Rene P. Gonzales, P.E.
Senior Geotechnical Engineer

STATE OF TEXAS
RENE P. GONZALES
86259
LICENSED
PROFESSIONAL ENGINEER
5/23/14

Attachments: Results of Global Stability Analysis – Case 1
Results of Global Stability Analysis – Case 2

Global Stability Analysis

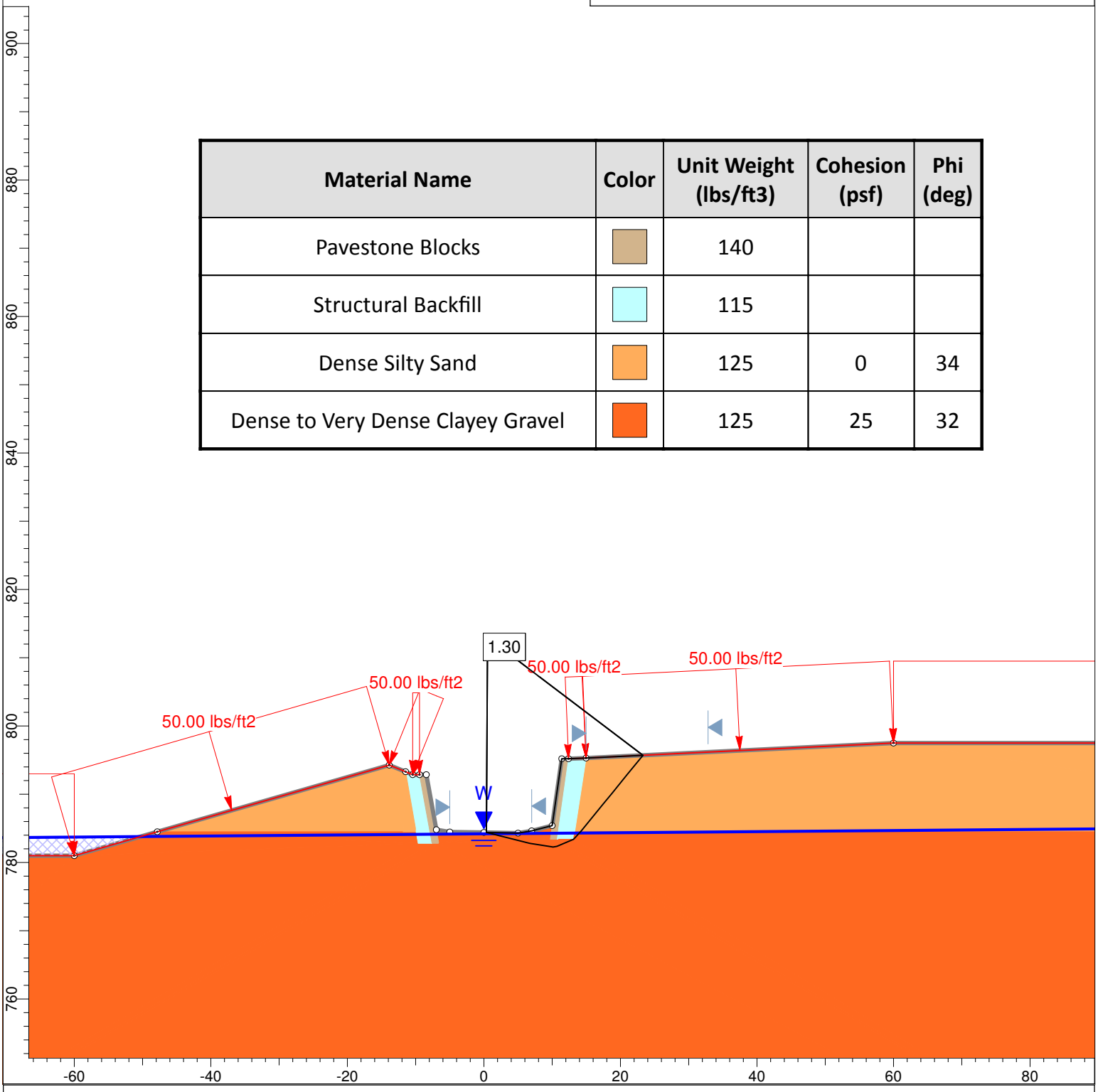
Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	600	20



RW01 - Case 1
Station 12+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

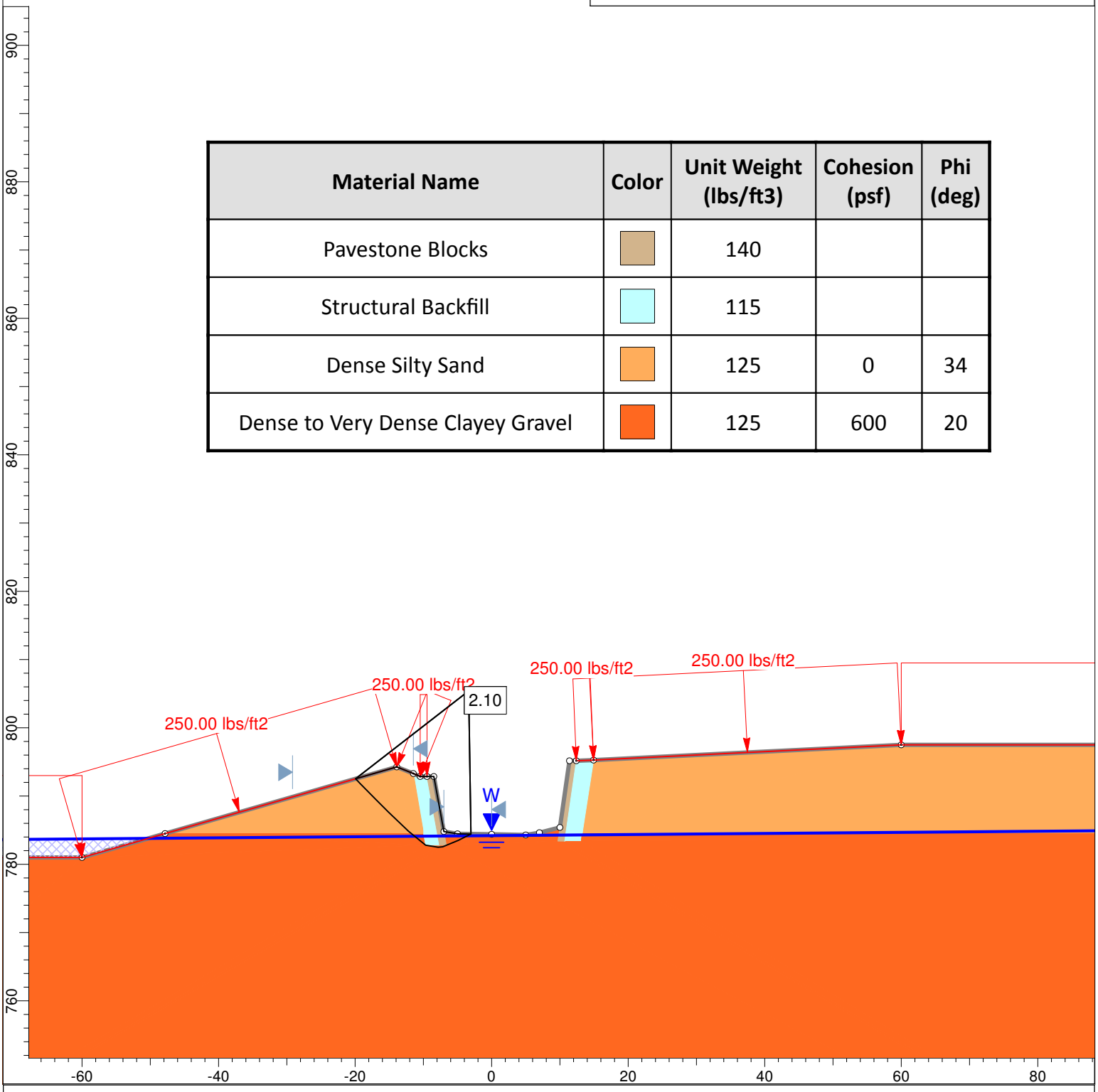
Global Stability Analysis

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	25	32



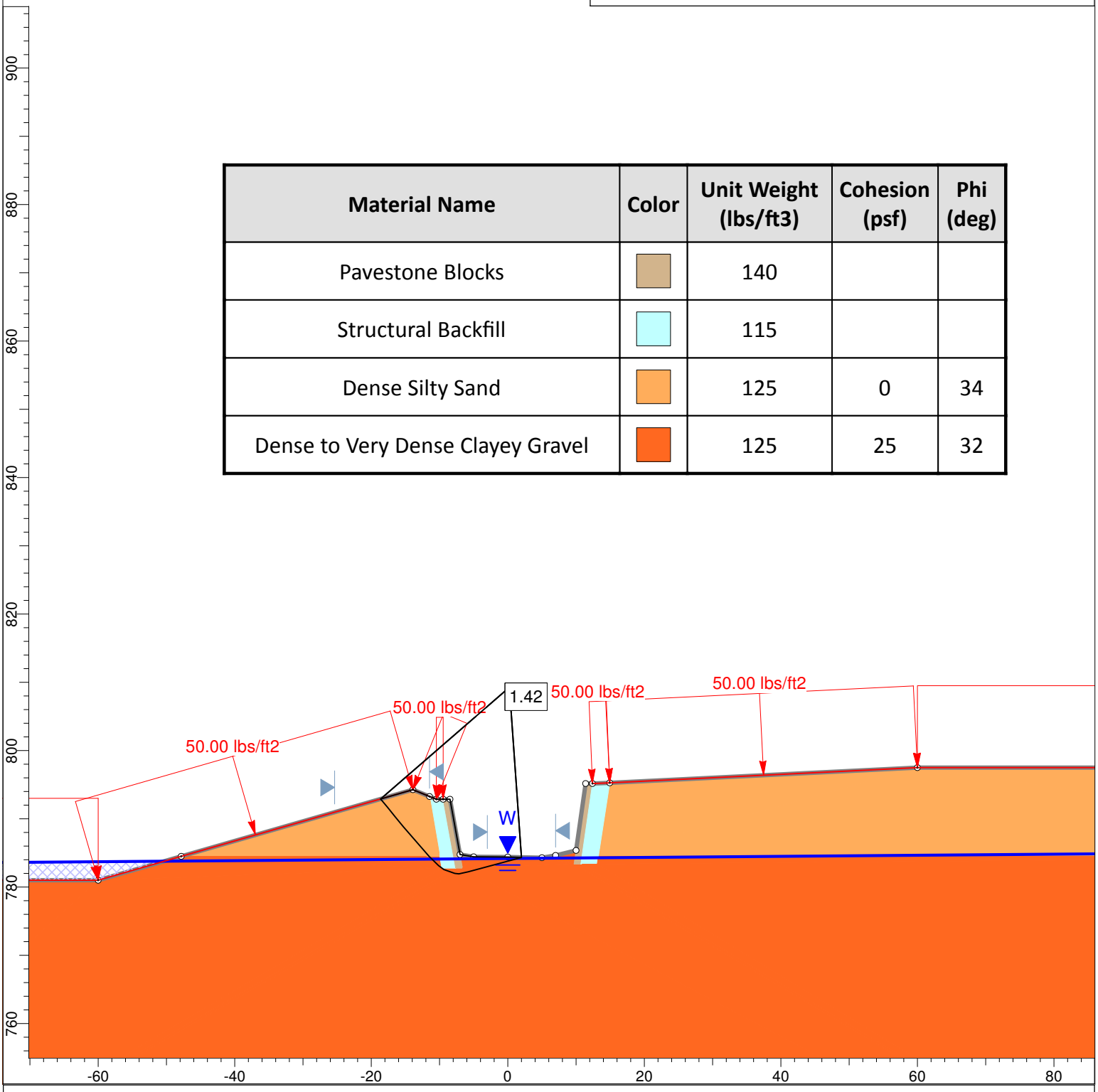
RW01 - Case 1
Station 12+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	600	20



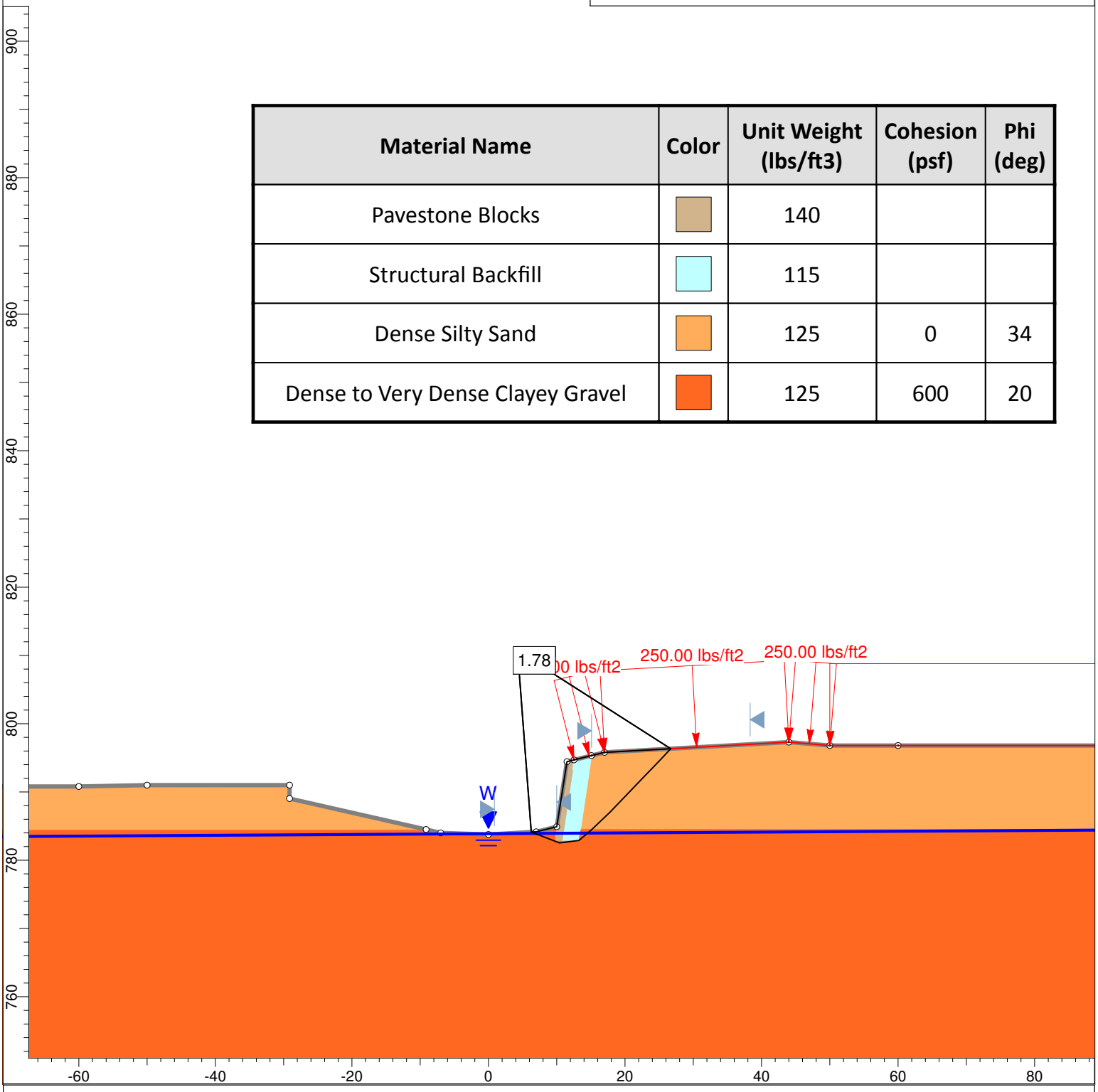
RW02 - Case 1
Station 12+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	25	32



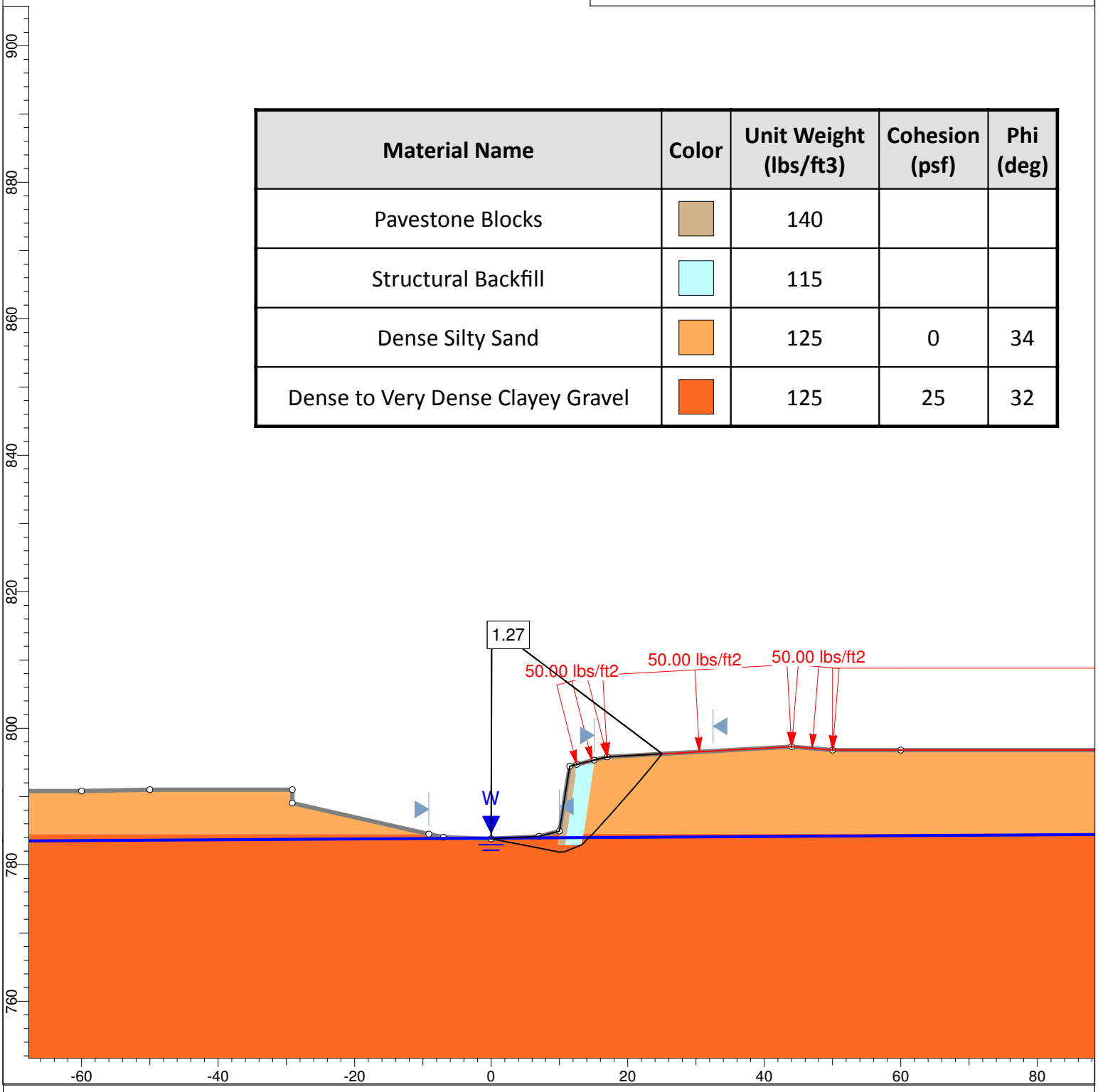
RW02 - Case 1
Station 12+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	600	20



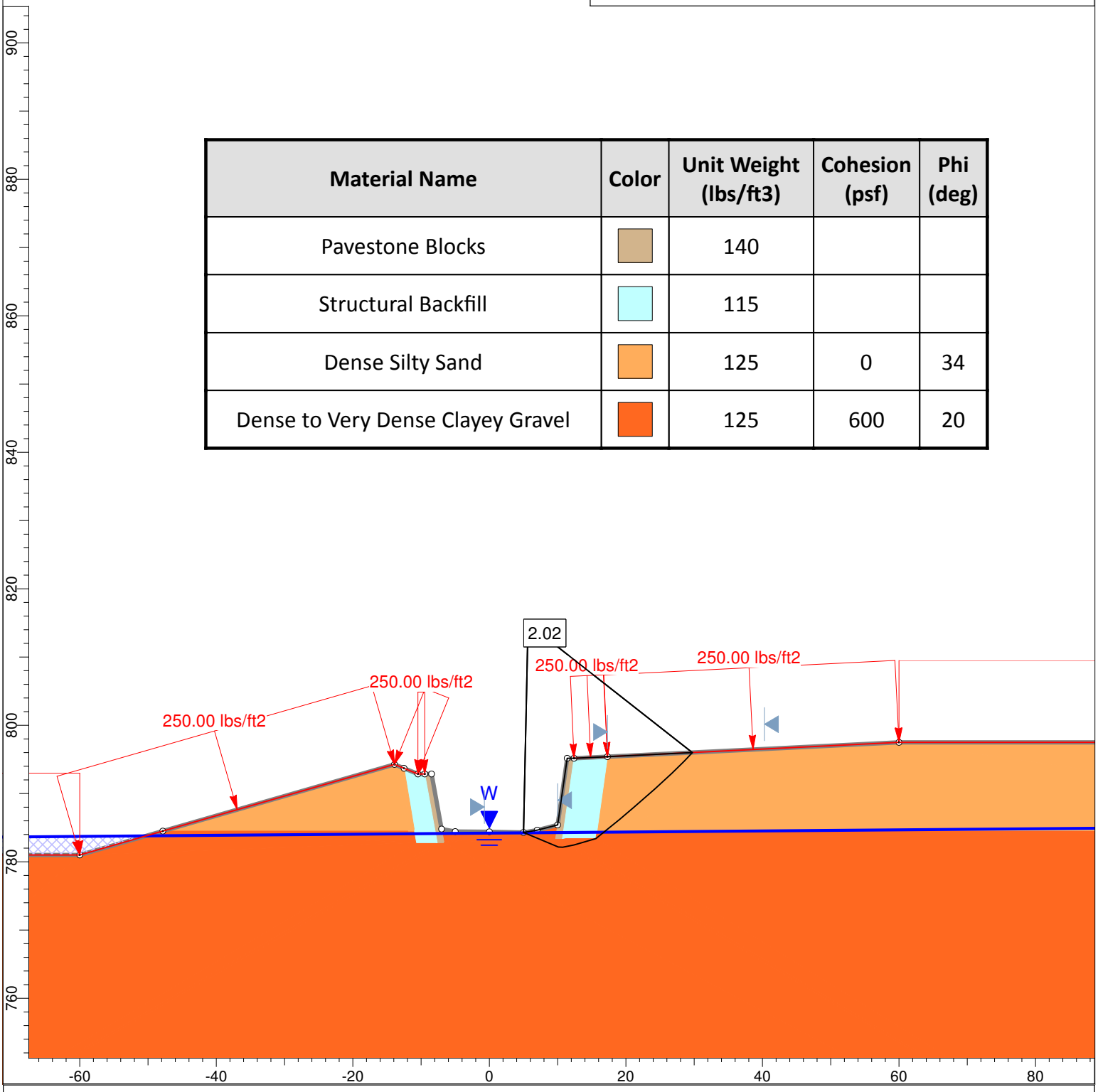
RW03 - Case 1
Station 13+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	25	32



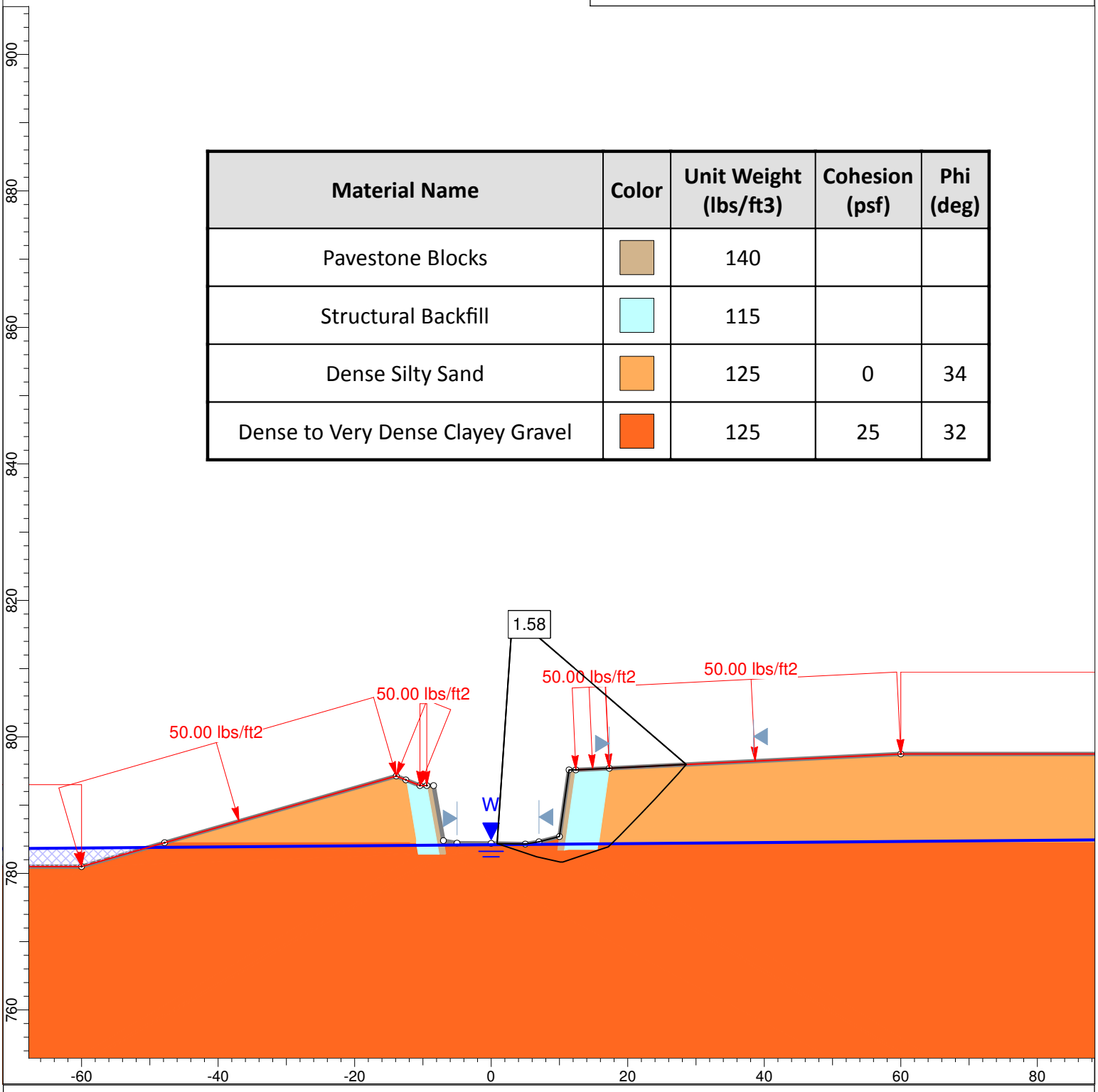
RW03 - Case 1
Station 13+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	600	20



RW01 - Case 2
Station 12+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
Dense Silty Sand		125	0	34
Dense to Very Dense Clayey Gravel		125	25	32



RW01 - Case 2
Station 12+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
Structural Backfill		115		
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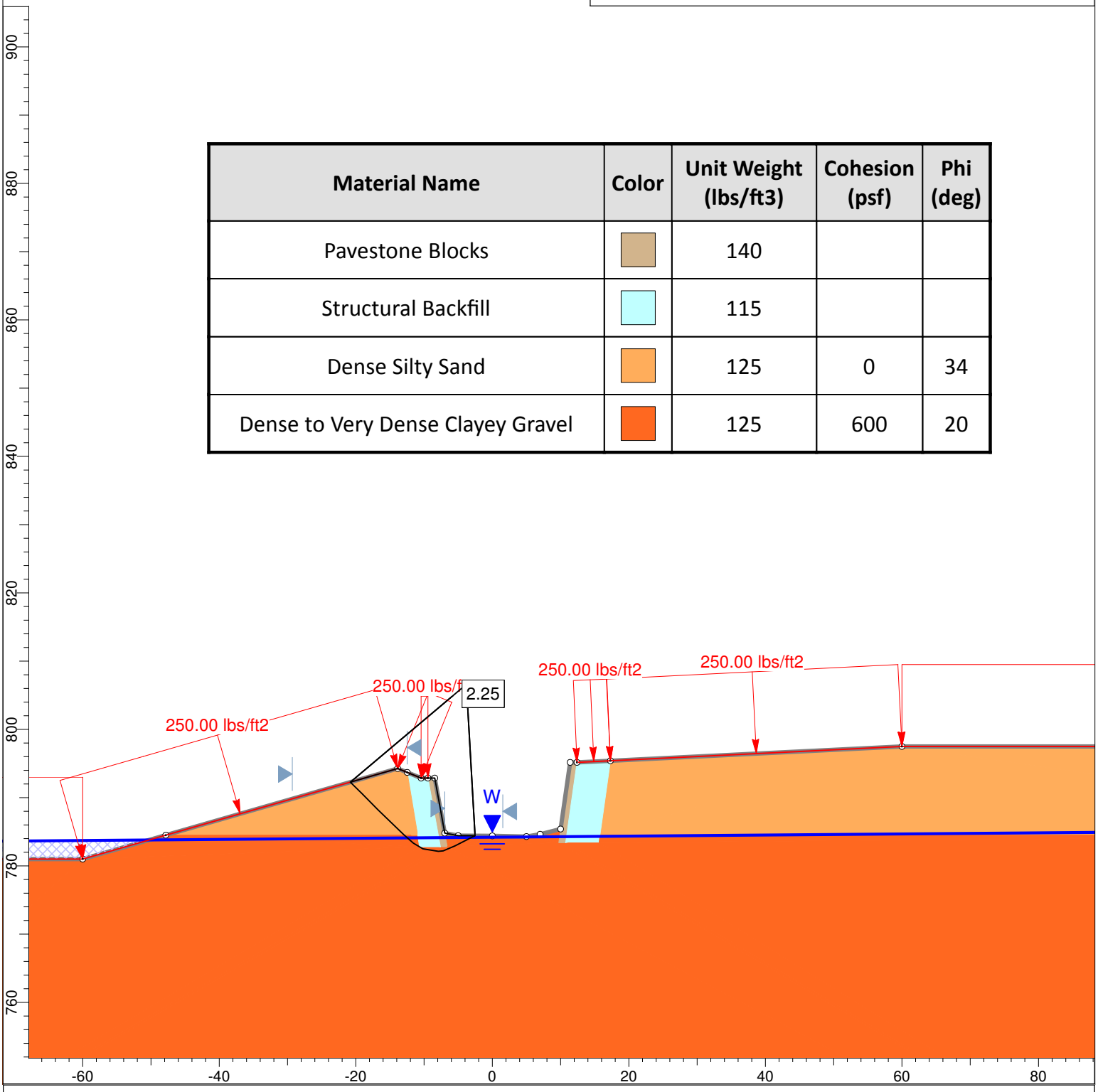

RW02 - Case 2
Station 12+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

Global Stability Analysis

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
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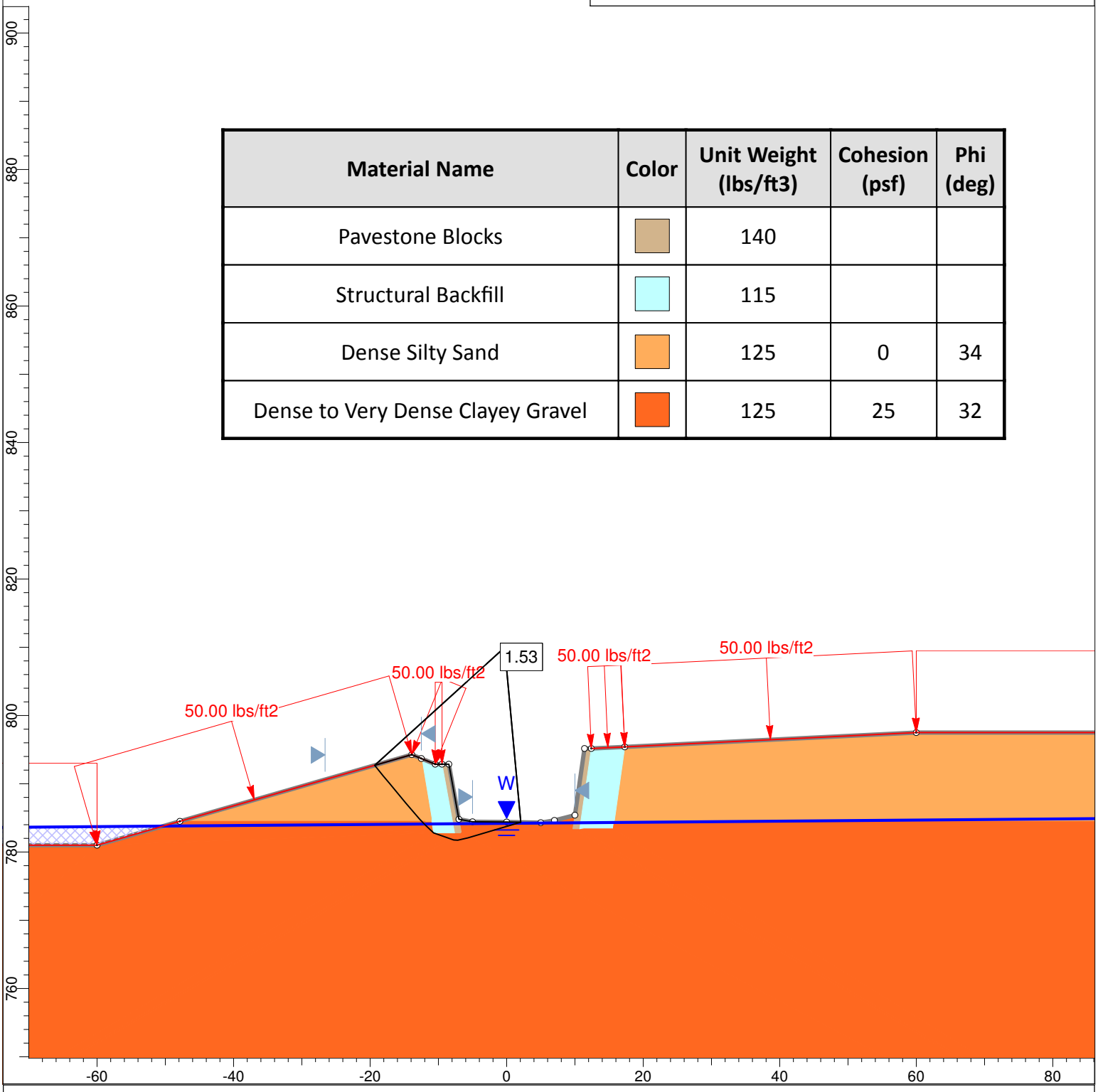

RW02 - Case 2
Station 12+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas

Global Stability Analysis

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
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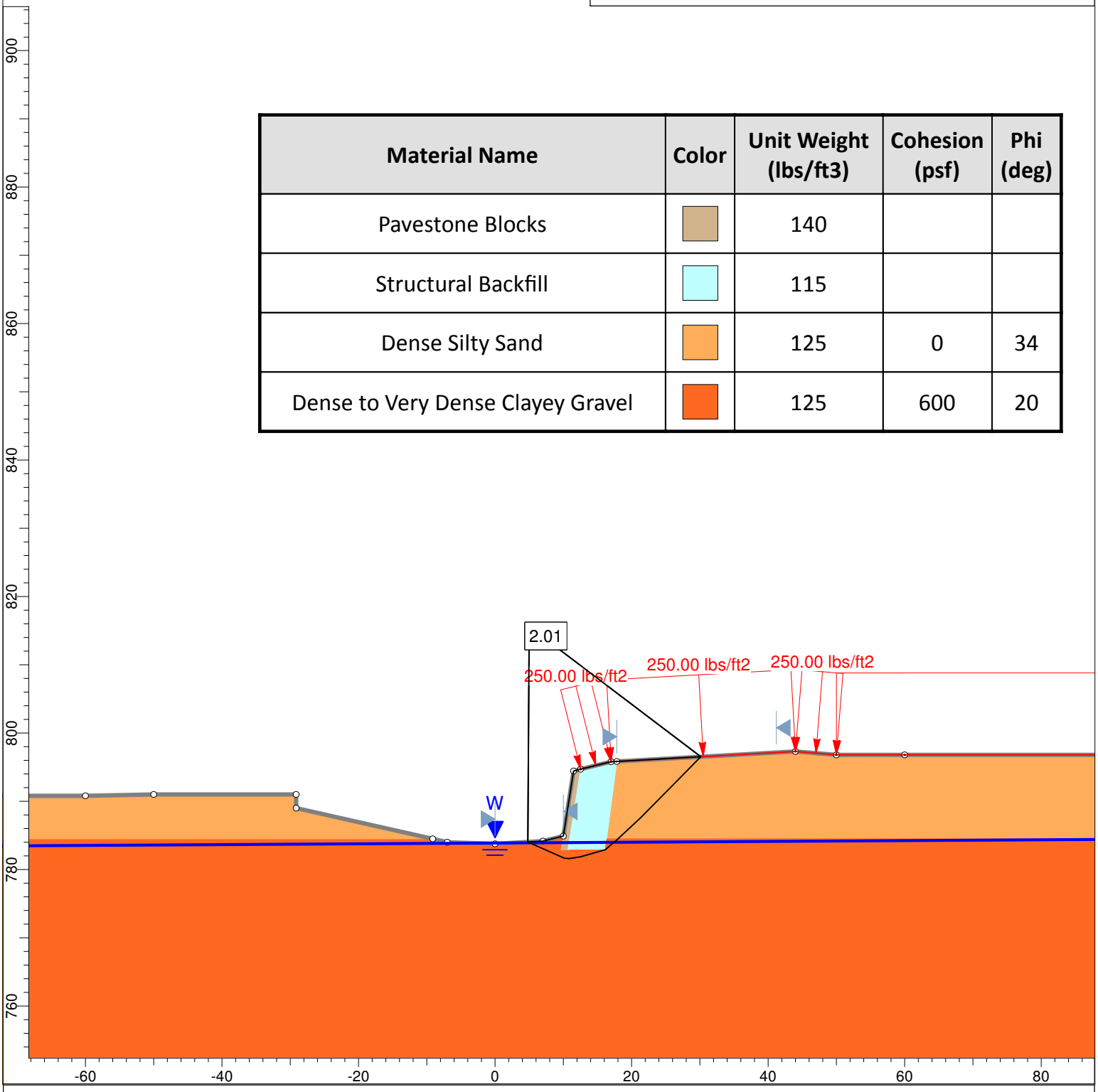

RW03 - Case 2
Station 13+50
Short Term Undrained Condition
Old Grissom Road
San Antonio, Texas

Global Stability Analysis

Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Pavestone Blocks		140		
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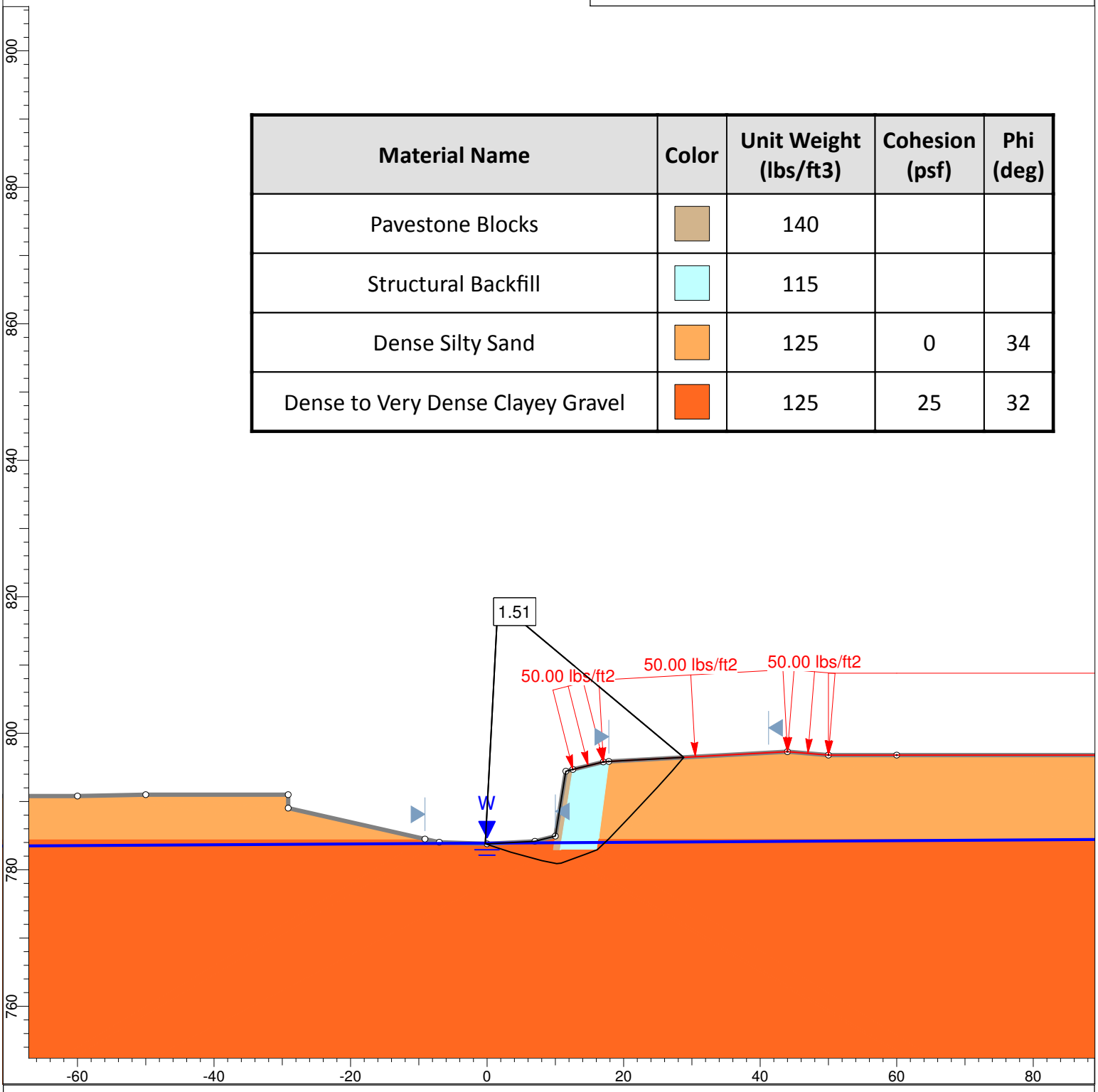
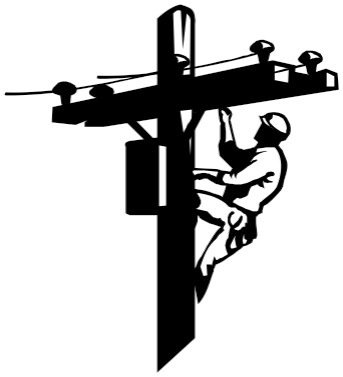
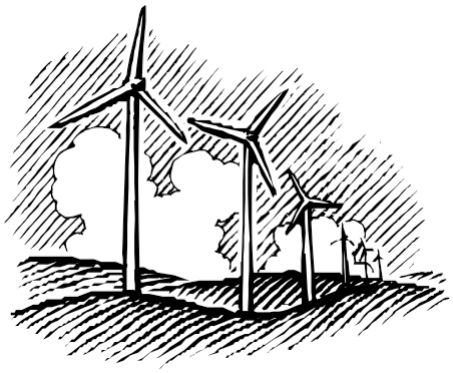


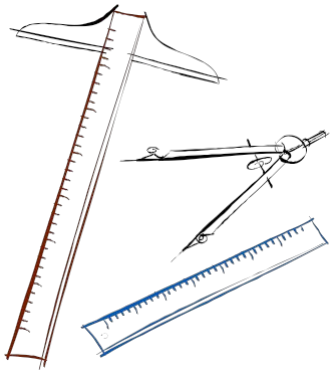
RW03 - Case 2
Station 13+50
Long Term Drained Condition
Old Grissom Road
San Antonio, Texas





Large Commercial Services & Developments

Electric and Gas Service Package



Contents:

The 15-Week Large Commercial Electric Service Process

(For All Pad-Mounted Transformer Services)

Customer's Steps To get your service in the minimum time, please keep these steps on schedule.	Step	Typical Elapsed Time [c]	CPS Energy (CPSE) Steps
Deliver essential documents to CPS Energy[b] • Application • Sealed site plan drawings, sealed loads, and sealed one line	**A**	Clock is not started	• Collect information from customer.
Attend a pre-design meeting[b]	**B**	Clock is not started	• Engineer discusses needs with customer and review drawings.
For new construction, please view the CPSE Web Portal to monitor the project schedule and the transactions between CPSE and you. (The Portal is not available for remodeling jobs.)	**0**	Clock Starts	• Pre-design meeting has been completed. • A complete customer package has been received: Application, sealed site drawings, sealed electric loads, sealed one-line.
Host a site visit[b]	**1**	Week #1	• Evaluate site layout, utility coordination, customer construction coordination, construction access.
Receive and comply with CPSE construction drawings[b]	**2**	Week #2-5	• Design electric service; coordinate with the electric system (circuit capacity, fuses). • Create a cost estimate and bill the customer.
Expedite payment to CPSE [a][b] **Provide third party easements [b][d]**	**3**	Week #6-7	• Receive customer payment.
Form up ductbanks and pads and schedule CPSE inspection. • Call 353-3373. A 24-hr notice is required **Pour concrete and schedule CPSE inspection.** • This might be delayed until early in the next step to coordinate with CPSE construction • A 3-day cure is required to set pad mounted transformers on slabs	**4**	Week #8	• Prep for CPSE construction • Check materials. • Receive dig permits. • Schedule crews. • Inspect the forms for slabs and ductbank. • Inspect concrete.
CPSE crews will leave the site if the following conditions are not satisfactory. • Maintain stakes and visible street address. • Remove debris and maintain construction access to site for CPSE crews. **Notify CPSE[b] that site is ready to install meter** • "Site ready" includes completed installation of meter loop, transformers, conduits, and power cables on the CPSE side of the meter.	**5**	Week #9-13	• Construct CPSE facilities. • Install transformer.
	6	Week #14-15	• Set meter, initiate electric service.

a. If a Customer Step is late, the Clock stops. Please stay on top of payments and meter loop completion.

b. Please view the web portal to determine your CPS Energy representative. You may also call Commercial Services with your **Work Request #** to identify your CPS Energy representative. (210.353.4639 Option 2)

c. Elapsed times are not a guarantee. More than fifteen weeks will probably be needed for long ductbanks or upgrades to CPS Energy's infrastructure.

d. Customer is required to provide CPS Energy with the required easements prior to being energized.

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Documents Required for CPS Energy Pad-Mounted Transformer Service

Documents must be SEALED ENGINEERED DRAWINGS

Utility Site Plan – Hard Copy/PDF and in AutoCAD 2000 format

- Desired Route of Overhead Primary
- Riser Pole Location (inline risers typically not allowed)
- Desired Route of Underground Primary ductbank & manholes
- Detailed transformer location
  - Show Perimeter Clearance
  - Dimension from building/structures
  - Show side the transformer doors will open
- Meter Location (dimension if other than side of transformer)
- Location of main distribution switch and/or tap-box and secondary routes from transformer

Electrical One-line Diagram – Hard Copy/PDF and in AutoCAD 2000 format

- Secondary Cable
  - Size, Number per phase, Total Number of Secondary Cables, Type (Cu or Al), Neutral Size

Secondary exiting transformer by:

  - Conduit (number & size), number of spares
  - Wireway Size
- Cable Tap-Box (Customer to provide cut sheet)
- Auto Throwover Switch for Generator Installation (Customer to provide cut sheet)
- Meter Location (If meter modules are used customer to provide cut sheet and voltage drop calculations from transformer to meter modules)

Electrical Load Summary – Hard Copy/PDF and in AutoCAD 2000 format

- Building Square Footage
- Hours and days of operation
- Customer's Service Voltage
- Connected Load in kVA (Reference Load Information Sheet for Break Down)
  - Existing Load if applicable, A/C & Heat, Lighting, Motor Load, Receptacles, Other, Total
  - Unusual loads require discussion

Electrical Load Panels – Hard Copy/PDF and in AutoCAD 2000 format

Documents must be SEALED ENGINEERED DRAWINGS

Please submit to:
Commercial Services
P.O. Box 1771
Mail Drop # 410101
San Antonio, TX 78296
210-353-4639 Option 2

Commercial Electric/Gas Service Application

Application must be completed and accompanied by the following:
Site Plan, Electric and Gas Load Information, Building Square Footage, Service Voltage, Meter Loop Diagram, Gas Pressure
(Please print or type)

* REQUIRED TO INITIATE WORK REQUEST

* **Date** ____ * **Project Name:** ____

* **Project Address:** ____

* **Electrical Contractor** ____ * **Phone #** ____

* **Email** ____

* **Developer Contact** ____ * **Phone #** ____

* **Email** ____

* **General Contractor Contact** ____ * **Phone #** ____

* **Email** ____

* **Engineer Contact** ____ * **Phone #** ____

* **E-mail** ____

Business Type

Bank	☐	Hospital	☐	Retail Center	☐
Church	☐	Hotel ☐ # of rooms	____	Retirement Center	☐
Comml Office	☐	Industrial/Manufacturing	☐	School	☐
Department Store	☐	*(Specify Type)*	____	Warehouse	☐
Grocery Store	☐	Restaurant	☐	Other ☐ *(Specify Type)*	____

Service Type

Overhead Service	☐	Gas	☐	* **Service Required Date**	____
Underground Service	☐	Meter Only	☐	* **Building Square Footage**	____
3ph Pad Mount Service	☐	Remodel/Upgrade	☐		

(NOTE: 300kva demand load required to qualify for 3ph padmount transformer)

***Remodel/Upgrade Meter Number** ____

* REQUIRED TO INITIATE WORK REQUEST

Customer Information

* Customer of Record ____ Open Charge Yes ☐ No ☐
* Billing Address ____ * Phone # ____
____ * Fax # ____
* Tax ID# ____

Associated WR #'s (CPS Energy Use Only)

Engineer	____	Phone	____		
IDS	____	Designer	____	Phone	____
UG	____	Gas	____	Other	____
OH	____			Other	____

Comments:

Developer/Representative Signature

CPS Energy Representative Signature

Print Name

LOAD INFORMATION

*****LOAD INFORMATION MUST BE SIGNED/SEALED BY A PROFESSIONAL ENGINEER*****

Project\Business: _____

Address: _____

Power Requirements:

Voltage: □ 120/240 1-Phase □ 120/208Y 3-Phase

□ 277/480Y 3-Phase □ Other: _____

ELECTRICAL EQUIPMENT

	kVA
A/C	
LIGHTING	
RECEPTACLES	
HEATING	
WATER HEATER	
COMPUTERS	
REFRIGERATION	
ELEVATORS	
MOTORS	
OTHER	
TOTAL	

GAS EQUIPMENT

Pressure Required _____	**BTU**
FURNACE	
BOILER	
COOKING	
WATER HEATER	
POOL\SPA HEATER	
GAS LIGHTING	
OTHER EQUIPMENT	
TOTAL	

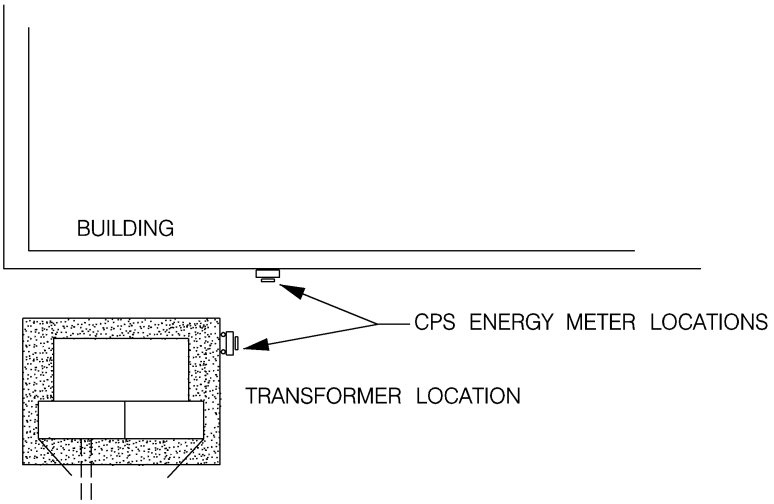
CPS ENERGY

NOTE: FOR INFORMATION ONLY NOT FOR CONSTRUCTION

PADMOUNT TRANSFORMER INSTALLATION, UNDERGROUND SERVICE

ITEMS NEEDED ON UTILITY SITE PLAN:

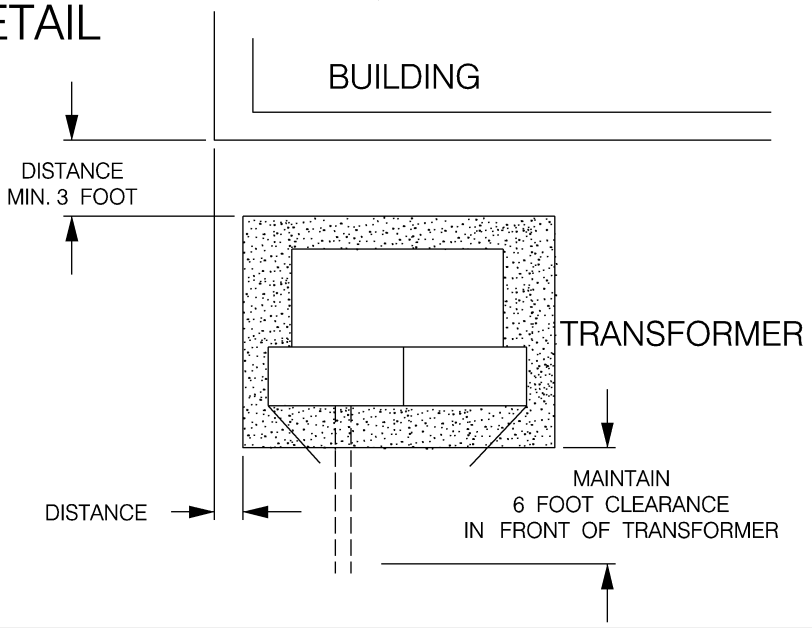
* RISER POLE LOCATION
* TRANSFORMER LOCATION
* CPS ENERGY METER LOCATION
* DUCTBANK ROUTE
* EXISTING UTILITIES



SCALE (Customer to provide documents to engineer scale)

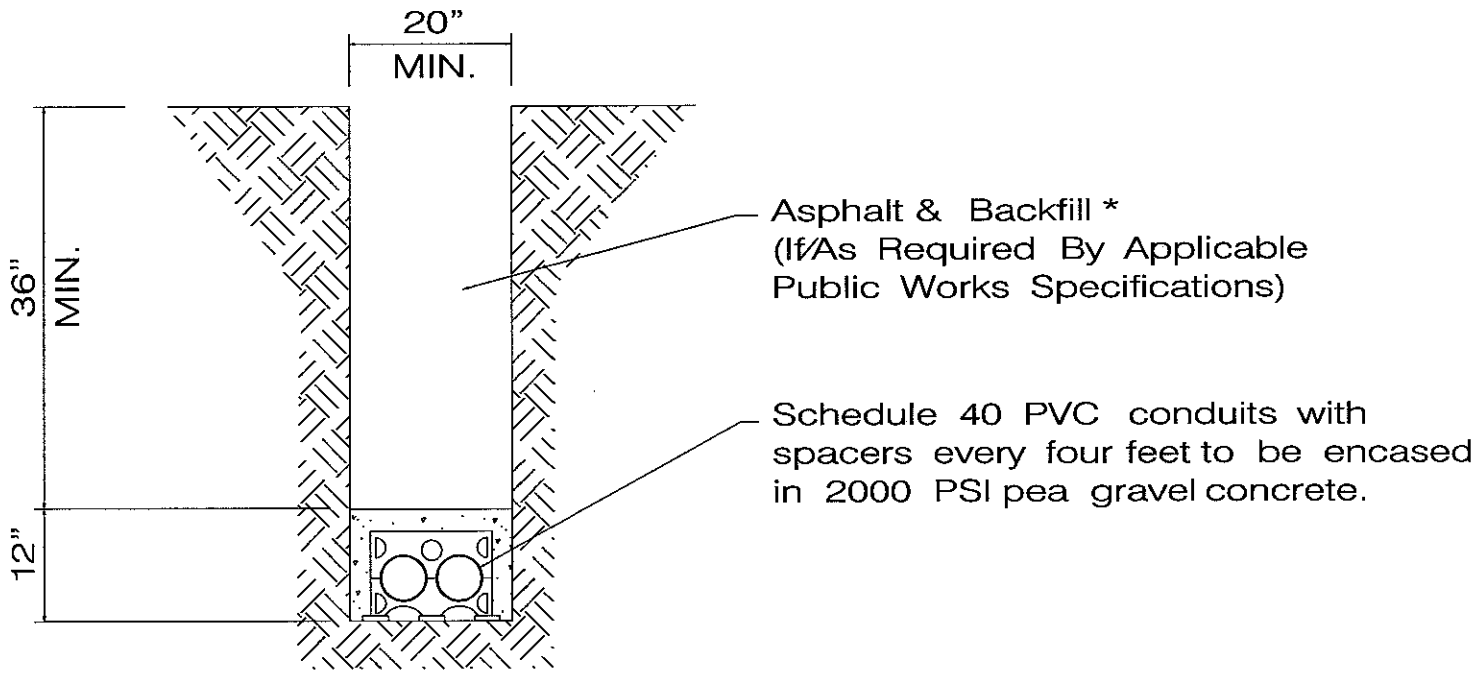
PADMOUNT TRANSFORMER INSTALLATION, DISTANCE DETAIL

PROVIDE DISTANCE FROM FIXED STRUCTURE



NOTE:

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION



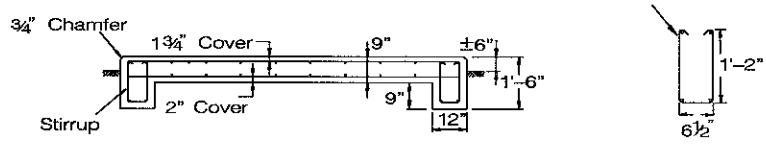
2–4" DUCTLINE DETAIL

NOTE:

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

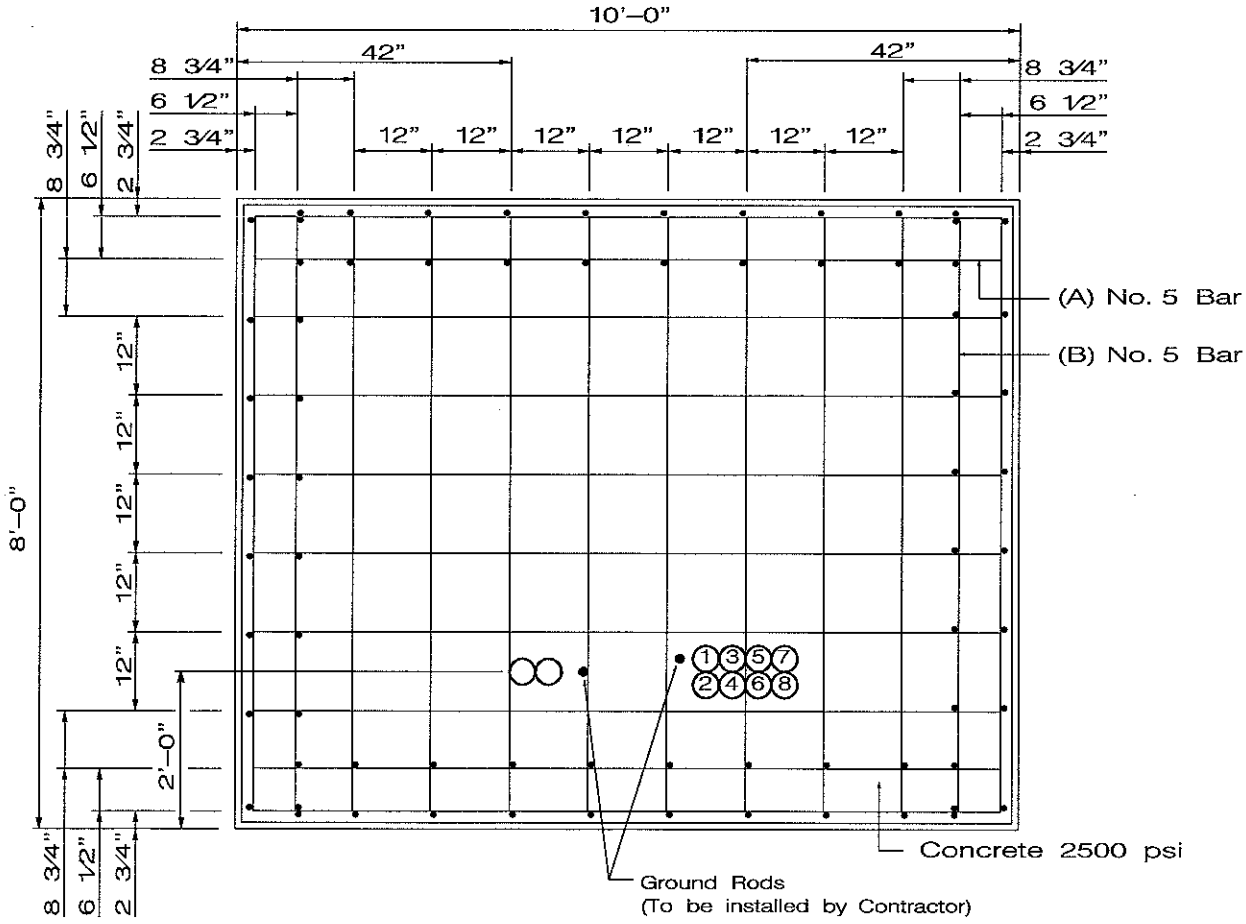
Reinforcing Steel

(A) 20 No. 5 Bars 9'– 8" Long Grade 60
(B) 24 No. 5 Bars 7'– 8" Long Grade 60
(C) 36 No. 3 Bars 3'– 4" Long Grade 60



Stirrup Detail
(C) No. 3 Bar
w /135° Hook

8' X 10' PAD–MOUNT TRANSFORMER SLAB DETAIL (SIDE VIEW) – NTS



THERE SHALL BE NO PIPES, CONDUIT, ETC. UNDER THE SLAB EXCEPT THOSE NECESSARY TO SUPPLY PRIMARY TO THE TRANSFORMER AND THOSE TO SUPPLY THE ELECTRIC LOAD

NOTE:

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

TRANSFORMER SLAB REQUIREMENTS FOR WIREWAY APPLICATIONS:

CUSTOMER'S EQUIPMENT SLAB SHALL INTERFACE WITH THE CPS ENERGY TRANSFORMER SLAB UTILIZING ONE OF THE FOLLOWING OPTIONS TO PREVENT DIFFERENTIAL MOVEMENT:

1. TOP AND BOTTOM SLAB REINFORCEMENT INSTALLED BY CUSTOMER MUST BE LAP SPLICED TO THE No.5 STEEL REINFORCING BARS OF THE CPS ENERGY TRANSFORMER SLAB. THE LAP SPLICES SHALL BE A MINIMUM OF 31 INCHES IN LENGTH.

OR

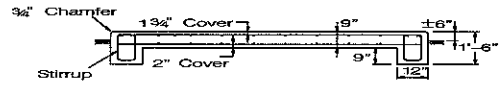
2. TOP AND BOTTOM No.5 STEEL REINFORCING BARS OF THE CPS ENERGY TRANSFORMER SLAB MAY BE INSTALLED OF SUCH LENGTH TO PROVIDE CONTINUOUS REINFORCEMENT ACROSS BOTH SLABS.

CPS ENERGY RECOMMENDS THAT THE CUSTOMER EQUIPMENT SLAB BE SUPPORTED BY A PERIMETER BEAM THAT MATCHES THE DEPTH AND WIDTH OF THE CPS ENERGY TRANSFORMER SLAB BEAM. IF PROVIDED, ALL CUSTOMER PERIMETER BEAM REINFORCING STEEL SHALL BE LAP SPLICED TO THE CPS ENERGY TRANSFORMER SLAB PERIMETER BEAM REINFORCING STEEL A MINIMUM OF 31 INCHES IN LENGTH.

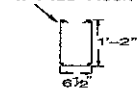
THE CPS ENERGY TRANSFORMER SLAB AND CUSTOMER EQUIPMENT SLAB SHALL BE POURED MONOLITHICALLY.

Reinforcing Steel

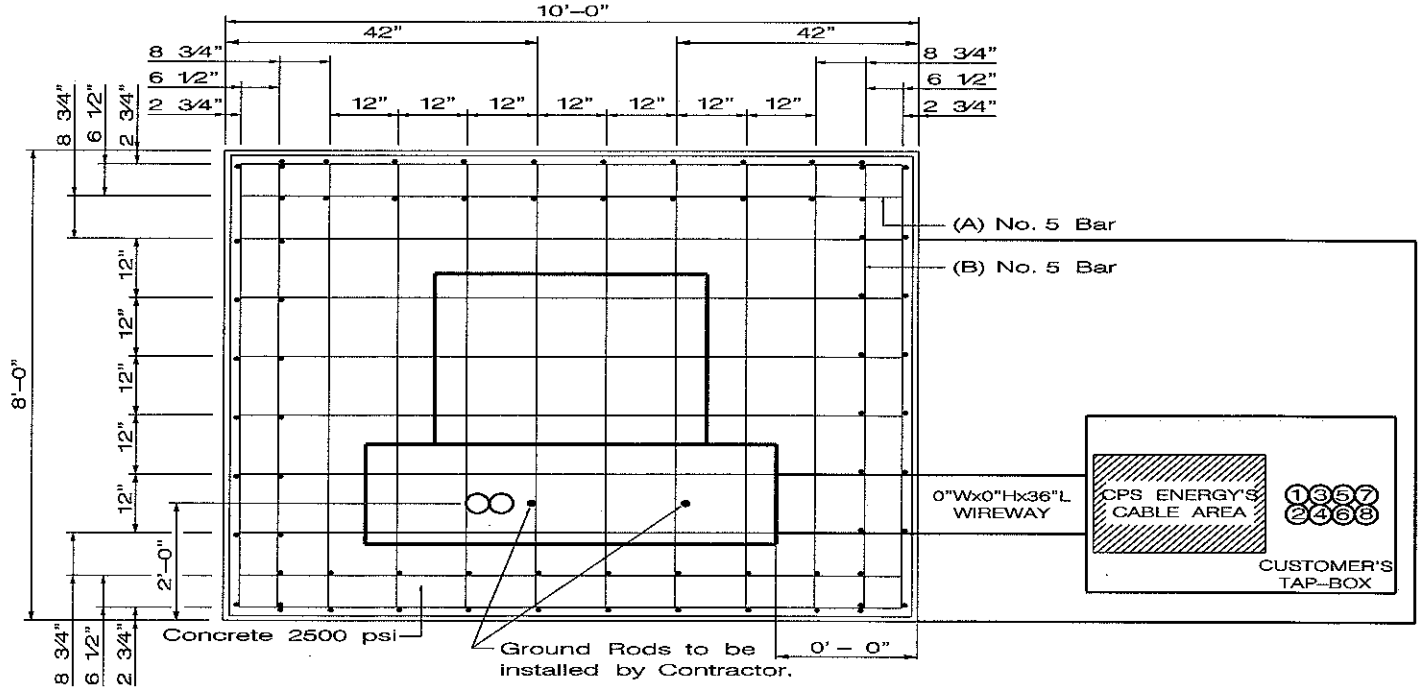
(A) 20 No. 5 Bars 9' – 8" Long Grade 60
(B) 24 No. 5 Bars 7' – 8" Long Grade 60
(C) 36 No. 3 Bars 3' – 4" Long Grade 60



Stirrup Detail
(C) No. 3 Bar w /135° Hook



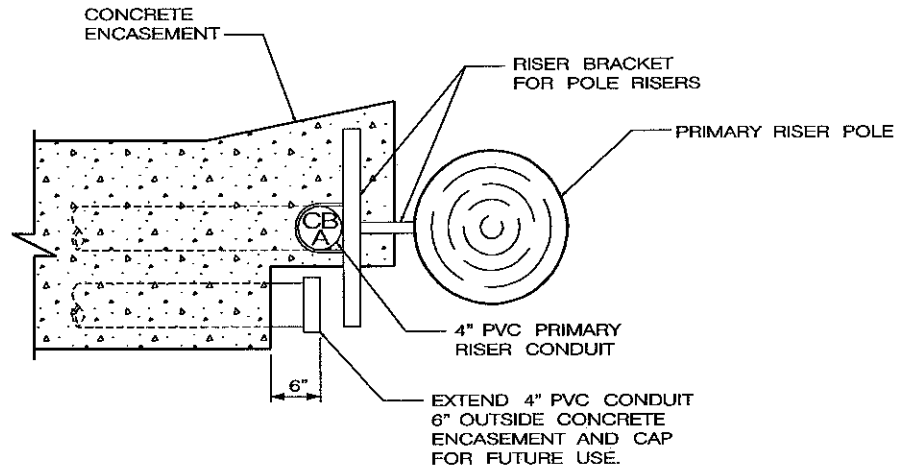
8' X 10' PAD–MOUNT TRANSFORMER SLAB DETAIL (SIDE VIEW) – NTS



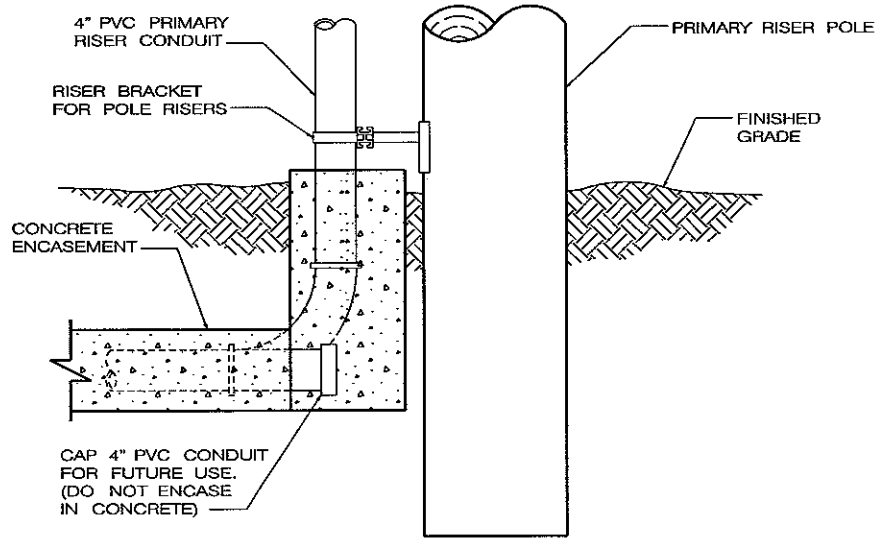
THERE SHALL BE NO PIPES, CONDUIT, ETC. UNDER THE SLAB EXCEPT THOSE NECESSARY TO SUPPLY PRIMARY TO THE TRANSFORMER AND THOSE TO SUPPLY THE ELECTRIC LOAD

NOTE:

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION



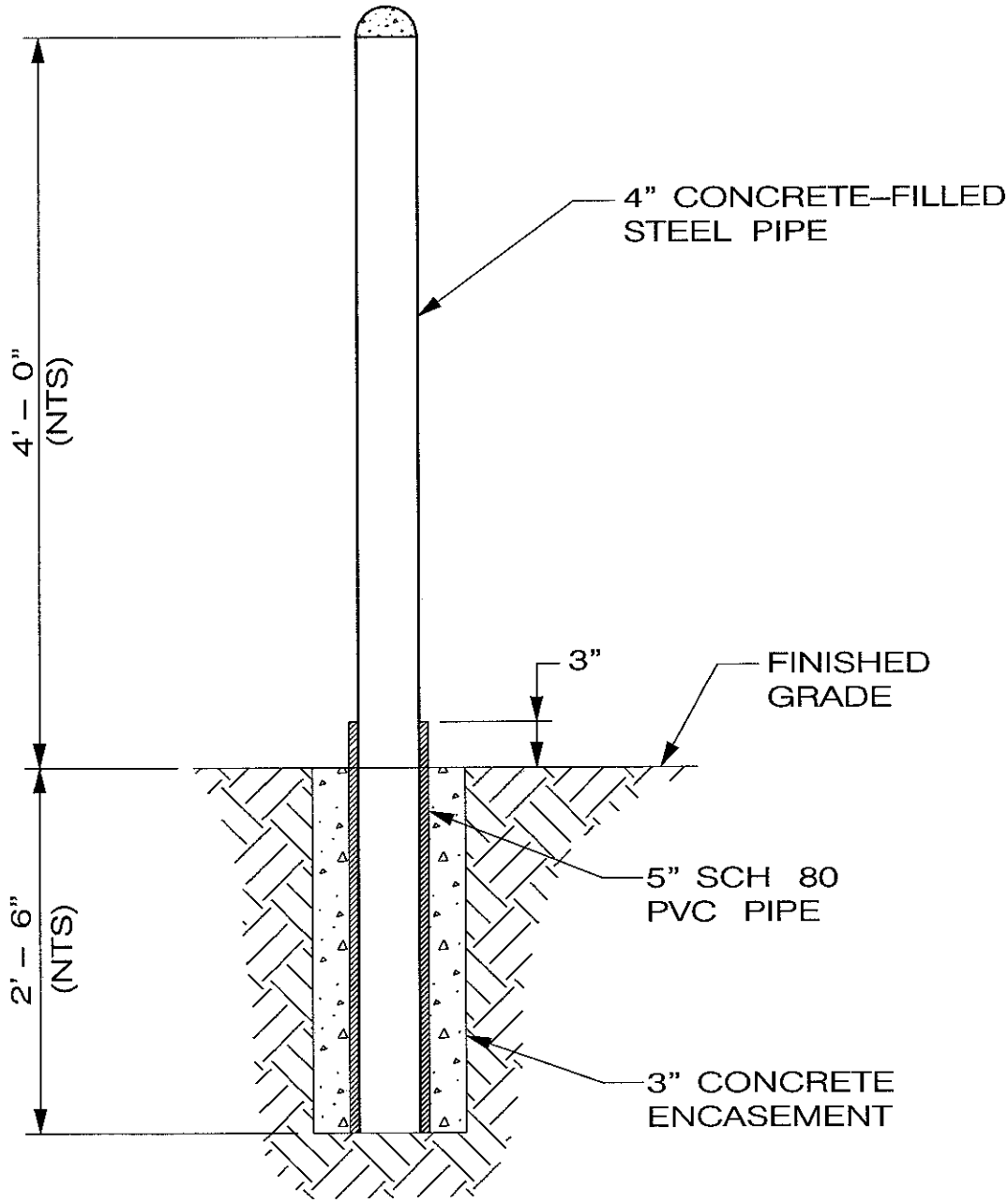
RISER POLE AND CONDUIT ENCASEMENT DETAIL – TOP VIEW
NOT TO SCALE



RISER POLE AND CONDUIT ENCASEMENT DETAIL – SIDE VIEW
NOT TO SCALE

NOTE:

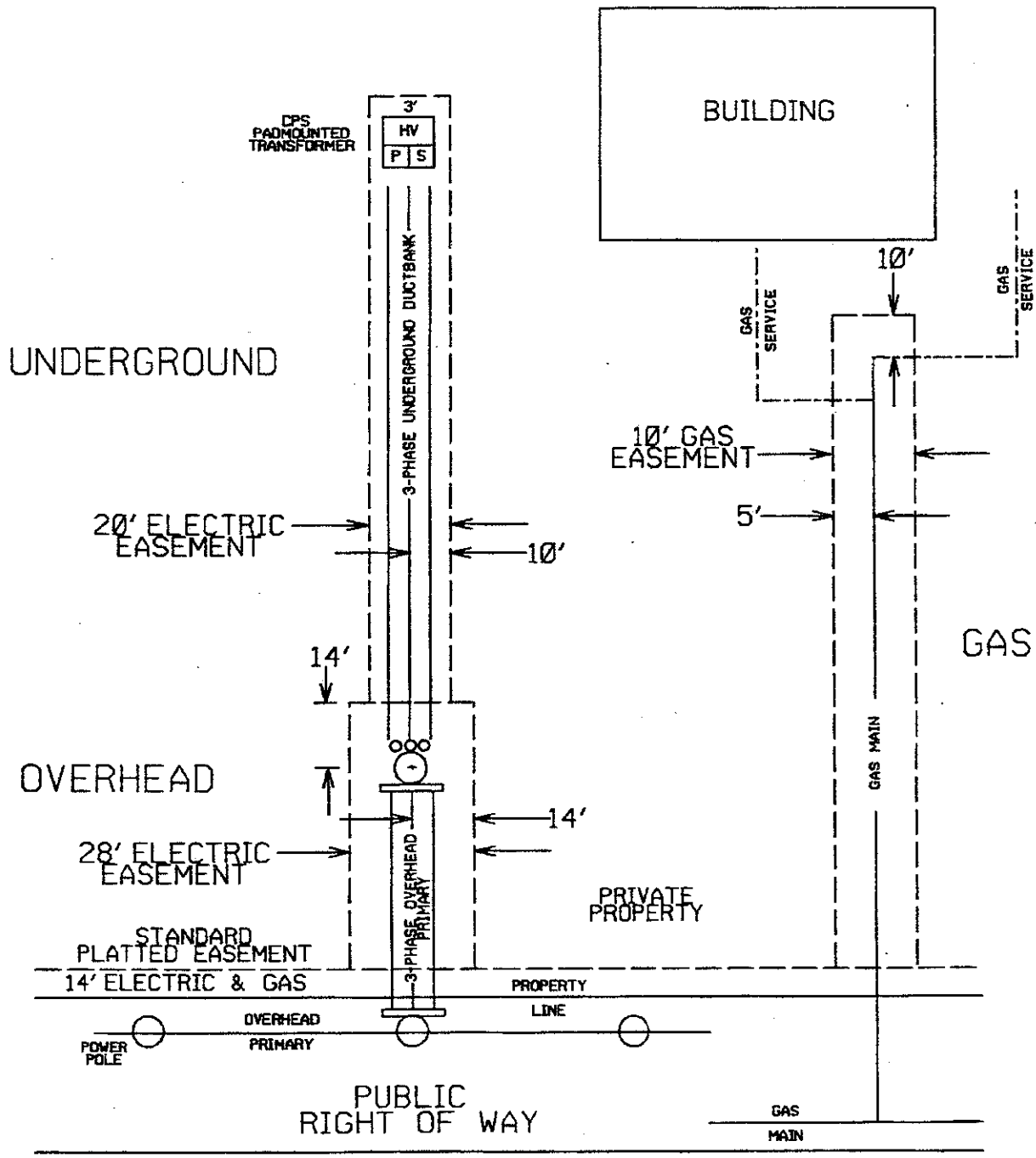
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION



4" REMOVABLE BOLLARD SPECIFICATION

PROFILE VIEW – NOT TO SCALE

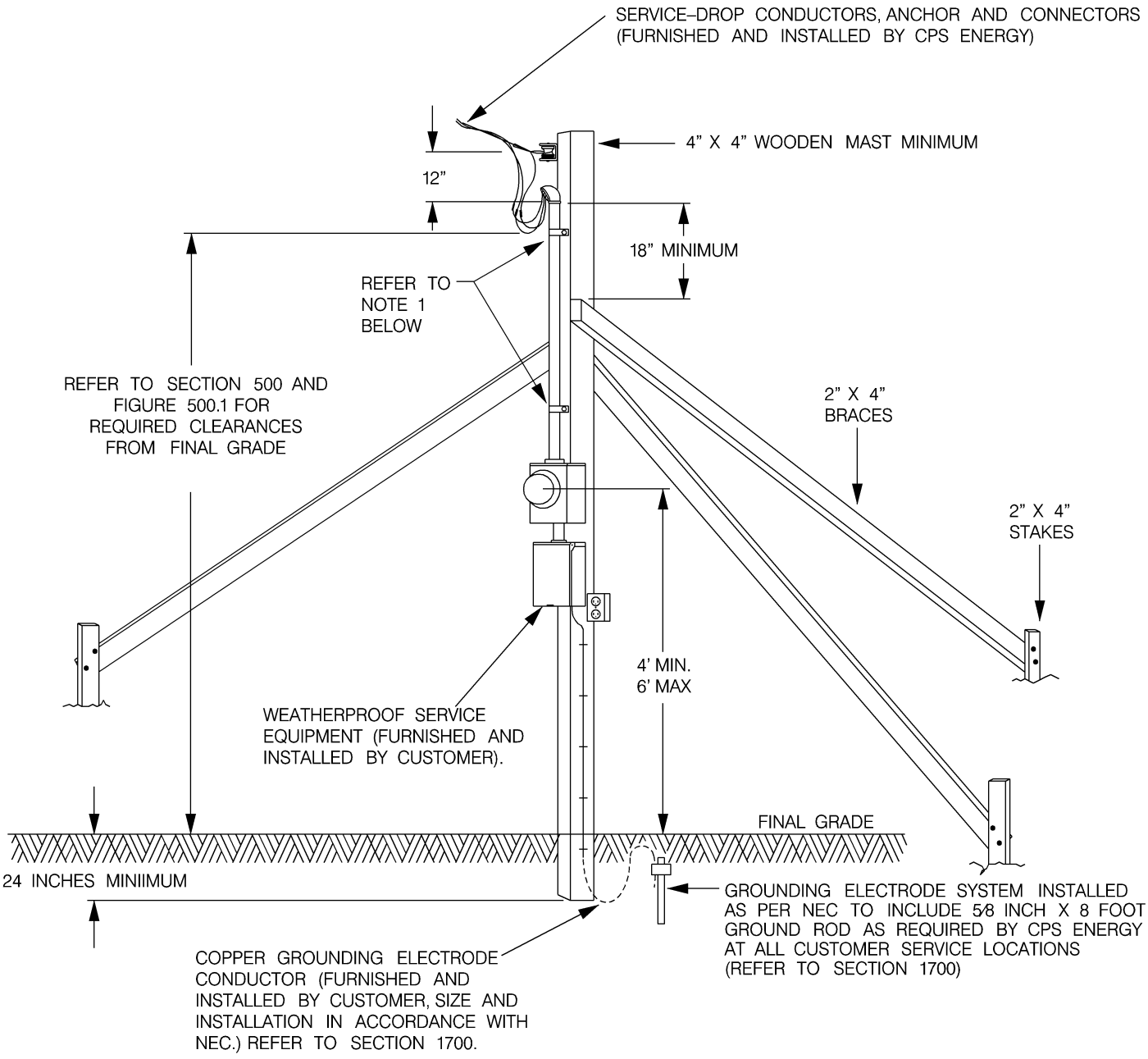
CITY PUBLIC SERVICE
REQUIRED EASEMENTS
(NOT TO SCALE)



CPS ENERGY

NOTE: FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TEMPORARY METER INSTALLATION, OVERHEAD SERVICE



NOTES: (SEE CPS ENERGY ELECTRIC SERVICE STANDARDS BOOK)

1. SERVICE RACEWAY SHALL BE SUPPORTED WITH 2– HOLE STRAPS ATTACHED WITH SCREWS AND INSTALLED WITHIN 6 – 12 INCHES OF SERVICE HEAD AND OF METER ENCLOSURE.
2. 125– AMPERE METER SOCKET WITH 1 1⁄4 INCH HUB FURNISHED, INSTALLED AND WIRED BY CUSTOMER. REFER TO FIGURE 1800.1.
3. SERVICE OUTLET SHALL BE FURNISHED AND INSTALLED BY CUSTOMER. RACEWAY SHALL BE EMT, RMC OR IMC. MINIMUM SIZE OF SERVICE RACEWAY IS 1 1⁄4 INCH.
4. CUSTOMER SHALL CONSTRUCT THE TEMPORARY SERVICE INSTALLATION AS SHOWN ABOVE AND MAINTAIN IT IN A SAFE CONDITION THROUGHOUT ITS PERIOD OF USE. CPS ENERGY RESERVES THE RIGHT TO DISCONNECT DAMAGED OR UNSAFE TML'S.
5. THE TEMPORARY SERVICE INSTALLATION MUST BE IDENTIFIED WITH A PROPER SERVICE ADDRESS BEFORE CPS WILL CONNECT AND INSTALL A METER.


cps
ENERGY

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

RECEIPT OF ADDENDUM NUMBER(S) **1** IS HEREBY ACKNOWLEDGED FOR PLANS AND

SPECIFICATIONS FOR CONSTRUCTION OF **OLD GRISSOM ROAD – 40-00253**

FOR WHICH BIDS WILL BE OPENED ON **TUESDAY, SEPTEMBER 29, 2015 AT 2:00 P.M.**

THIS ACKNOWLEDGEMENT MUST BE SIGNED AND RETURNED WITH THE BID PACKAGE.

Company Name: _____

Address: _____

City/State/Zip Code: _____

Date: _____

_____
Signature

_____
Print Name/Title