City of Tampa
Jane Castor, Mayor

Contract Administration
Michael W. Chucran, Director
306 East Jackson Street, 4N
Tampa, FL 33602

Office (813) 274-8116
Fax: (813) 274-7368

ADDENDUM 1
Via E-Mail
DATE: June 18, 2021

Contract: 21-C-00017 Beach Park Stormwater Improvements

Bidders on the above referenced project are hereby notified that the following addendum is made to the Contract Documents. BIDS TO BE SUBMITTED SHALL CONFORM TO THIS NOTICE.

Item 1: The Bid Opening date is hereby changed to July 13, 2021.

Item 2: Replace Proposal page P-2 with the attached page P-2R.

Item 3: Replace plan sheets 6, 7, 8, 9 and 20 with the attached plan sheets 6, 7, 8, 9 and 20.

Item 4: Attached is the Report of Geotechnical Exploration dated November 23, 2020.

All other provisions of the Contract Documents and Specifications not in conflict with this Addendum shall remain in full force and effect. Questions are to be e-mailed to Contract Administration@tampagov.net.

Jim Greiner

Jim Greiner, P.E., Contract Management Supervisor

Beach Park Stormwater Improvements
Contract; 21-C-00017

Item No.	Description	Unit	Quantity	Unit Price in Words	Unit Price	Total
121.700	Flowable Fill (grout and plug existing stormwater)	CY	14			
160.000	Type B Stabilization - 12"	SY	924			
285.000	OPTIONAL BASE, BASE GROUP 06 (8" crushed concrete)	SY	924			
327.000	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	SY	1720			
334	SUPERPAVE ASPHALTIC CONC, SP12.5 (2")	TN	216			
425.AA	Demo and remove existing concrete structures	EA	5			
425.1	MANHOLES, P-7, <5' deep (4') - doghouse	EA	1			
425.2	MANHOLES, P-7, <10' deep (4')	EA	2			
425.3	MANHOLES, FDOT J-7, <10' deep (8'x8.5') - Conflict S-3	EA	1			
425.4	INLET, COT CURB TYPE 2 modified, <5'	EA	1			
425.44	INLET, COT CURB TYPE 2 modified, <10'	EA	1			
425.450	INLET, COT CURB TYPE 1 modified, TOP Only (replace and tie-into bottom)	EA	2			
430.140	14"x23" ELLIPTICAL STORMWATER PIPE (ERCP) CL V	LF	328			
430.145	14"x23" ELLIPTICAL STORMWATER PIPE (ERCP) CL IV	LF	26			
430.240	24" ROUND STORMWATER PIPE (RCP)	LF	360			
430.241	CONNECT STORMWATER PIPE TO EXISTING STRUCTURE (0-24")	EA	1			
430.244	24" HDPE Stormwater Pipe - F&I casing, spacers for JnB and tie-into RCP and grout annular	LF	260			
520.500	F&I Type "B" mod. concrete curb	LF	493			
520.600	F&I Type "D" concrete curb	LF	275			
522.1	SIDEWALK CONCRETE, 4" THICK (3000 psi)	SY	34			
522.2	CONCRETE, 6" THICK (DRIVEWAYS) (3000psi)	SY	146			
522.300	CONCRETE, 6" THICK (DRIVEWAYS) (3000psi) with border	SY	40			
527.000	ADA Compliant Ramps	EA	3			
528.000	RESET Brick Driveway	SF	450			
1706	6-Inch Diameter PVC Pipe House Lateral (SDR-35) (<30' in length)	EA	6			
1706.2	Standard manhole riser	EA	1			
1707.100	F&I 12-INCH DIA. C-900 PVC Sanitary pipe w Steel Casing, no spacers, grout the annular space, incl all fernco adapters, bypass and connect to ex. VCP (S-3, conflict)	EA	1			
6205.000	8" WM Linestop	EA	1			
6600.000	36" Steel Jack and Bore (0.5in min casing thickness, see specs) with pits and dewatering	LF	260			
8104.000	4" HDPE/DIP RCW offset/adjustment (all inclusive)	EA	2			
8100.000	8" WM DIP Offset (all inclusive)	EA	1			
8110.000	Water 3/4" METER SERVICE (+15-80') adjustment on DIP	EA	2			
8111.000	Water 3/4" METER SERVICE (+15-80') adjustment on HDPE	EA	4			
8901	SOD - AUGUSTINE (within trench)	SF	8465			
105.1	Root Prune	L.F	320			
105.2	Limb Prune	EA	2			
					subtotal	
100	CONTINGENCY	NTE	1	ninety three thousand dollars	$93,000.00	**$93,000.00**
101	MOBILIZATION	NTE	1			
102	MAINTENANCE OF TRAFFIC	NTE	1			
					TOTAL	

SW 2021-05

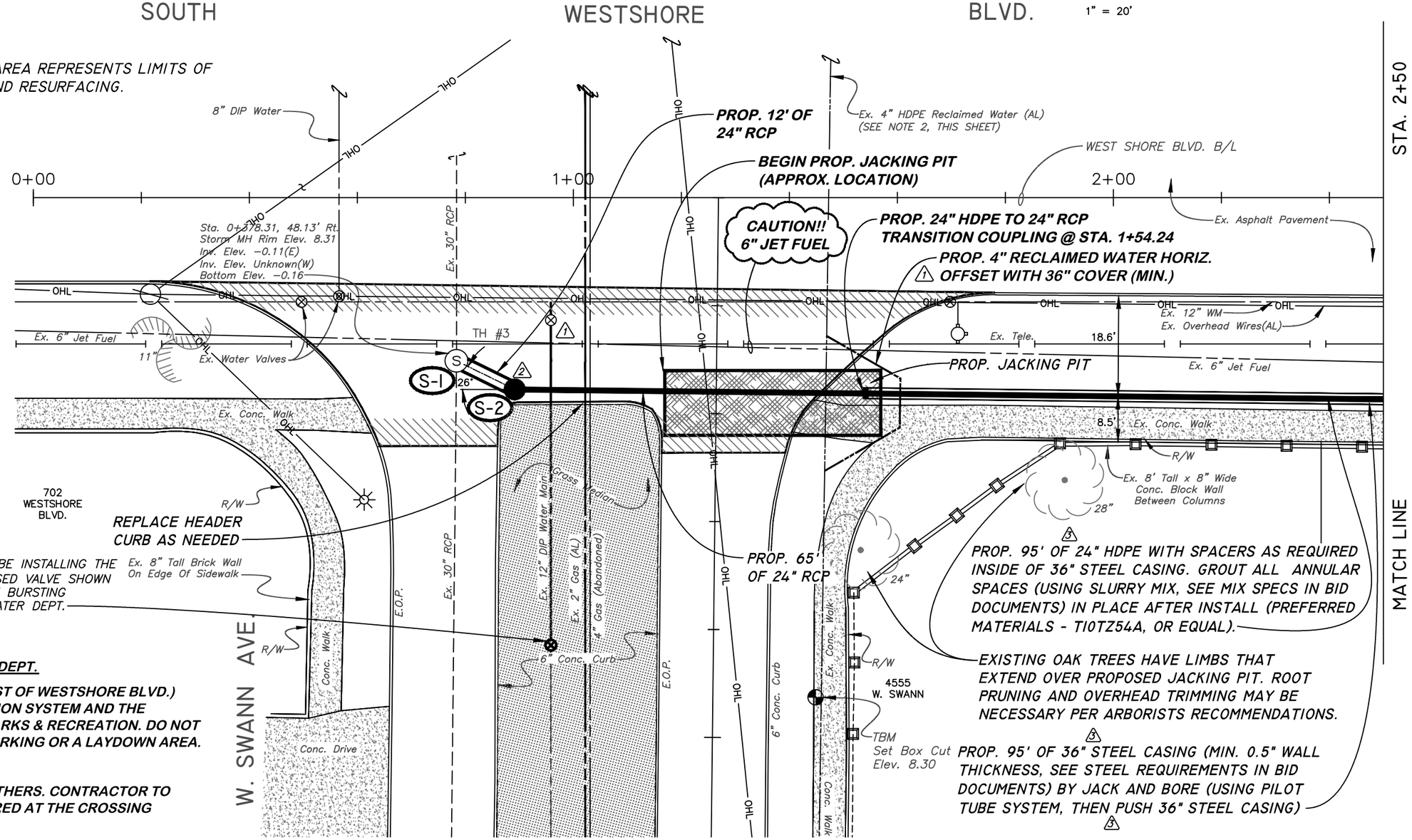
S-1 **STA. 0+78.31, 30.21' RT.**
EX. STORM MH RIM EL. 8.31
PROP. 24" RCP INV. EL. -0.11(N)
PROP. & EX. INV. EL. -0.11 (E&W) 30" RCP
BOTTOM EL. -0.16

S-2 (2) **STA. 0+89.1, 36' RT.**
PROP. STORM WATER MANHOLE
AND HORIZ. P.I. (26°Lt.)
PROP. RIM. ELEV. 8.40
PROP. INV. ELEV. -0.07 (S) 24" RCP
PROP. INV. ELEV. -0.05 (N) 24" RCP

SUE LOCATE TABLE			
I.D.	STATION	OFFSET	T.O.P. ELEVATION
TH #3	0+90.00	35.5' Rt.	5.84

SEC. 20 T29S R18E
I-8
0 20
1" = 20'

HATCHED AREA REPRESENTS LIMITS OF MILLING AND RESURFACING.



ATTENTION:
PER C.O.T. PARKS & RECREATION DEPT.

THE MEDIAN ON SWANN AVE. (EAST OF WESTSHORE BLVD.) HAVE A FULL COVERAGE IRRIGATION SYSTEM AND THE LANDSCAPE IS MAINTAINED BY PARKS & RECREATION. DO NOT USE THE MEDIAN FOR VEHICLE PARKING OR A LAYDOWN AREA.

NOTE:

PROPOSED 12" WATER MAIN BY OTHERS. CONTRACTOR TO SUPPORT WATER MAIN AS REQUIRED AT THE CROSSING

PLAN

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3	06/16/21	REVISED PIPE TO "STEEL," CHANGE "PULL" TO "PUSH"	6		
2	05/06/21	RELOCATED S-2 5' SOUTH	5		
1	05/06/21	WATER LOCATION AND OFFSET, & NOTE REVISED	4		

DES: Y.P.
DRN: BB
CKD:
DATE:

CITY of TAMPA
Mobility Department
Stormwater Engineering Division

BEACH PARK
STORMWATER DRAINAGE IMPROVEMENTS
PLAN VIEW - WESTSHORE BLVD. STA. 0+00 - 2+50

SHEET 6 OF 21

Plot Date: Wednesday, June 16, 2021 PLOT

SW 2021-05

CONNECT TO EX. MH

S-1

PROP. MH

S-2

BEGIN JACK AND BORE

APPROX. LOCATION OF PROP. JACK AND BORE PIT

Ex. Elev. @ ℄ West Shore Blvd.

Ex. Grass Median Swann Ave.

Ex. Storm MH
Rim Elev. 8.31

8.30 8.36 7.80 8.36 7.99 8.73 8.54 8.23 8.40 8.36 8.40 9.20 9.12 9.70 9.70 9.50

STA. 2+50

Ex. 4" Reclaimed Water (AL)

PROP. 4" RECLAIMED WATER
⚠1 OFFSET WITH 36" COVER (MIN.)

Ex. Tele.

Ex. 6" Jet Fuel

Ex. 12" Water(AL) ⚠1

4" Gas (AL)
(Abandoned)

Ex. 6" Jet Fuel

Ex. 12" Water

Ex. 12" Water

PROP. 12' OF 24"
RCP @ 0.30%

Ex. 30" RCP
Inv. Elev. -0.11(E)
Inv. Elev. (W) Unable to Determine

2" Gas(AL)

PROP. 24" HDPE TO 24" RCP
TRANSITION COUPLING
(FERNCO RIGID ADAPTER, OR EQUAL)

PROP. 95' OF 24"
HDPE @ 0.19%

MATCH LINE

PROP. 65' OF 24"
RCP @ 0.19%

⚠3
PROP. 95' OF 36" STEEL
CASING (MIN. 0.5" THICK)

+78.3
INV. EL. -0.11(N)

⚠2
+89.1
INV. EL. -0.07(S)

INV. EL. -0.05(N)

+17.0

+54.24
+57.0

INV. EL. 0.27

SCALE:
1" = 2' VERT.
1" = 20' HORIZ.

12 10 8 6 4 2 0 -2 -4

0 2

PROFILE

Plot Date: Wednesday, June 16, 2021

No.	DATE	REVISIONS	No.	DATE	REVISIONS
⚠3	06/16/21	REVISED PIPE TO "STEEL" FROM STAINLESS	6		
⚠2	05/06/21	RELOCATED S-2 5' SOUTH	5		
⚠1	05/06/21	WATER LOCATION AND OFFSET REVISED	4		

DES: Y.P.
DRN: BB
CKD: BB 6-2021
DATE:

CITY of TAMPA
Mobility Department
Stormwater Engineering Division

BEACH PARK
STORMWATER DRAINAGE IMPROVEMENTS
PROFILE - WESTSHORE BLVD. STA. 0+00 - 2+50

SHEET 7 OF 21

SW 2021-05

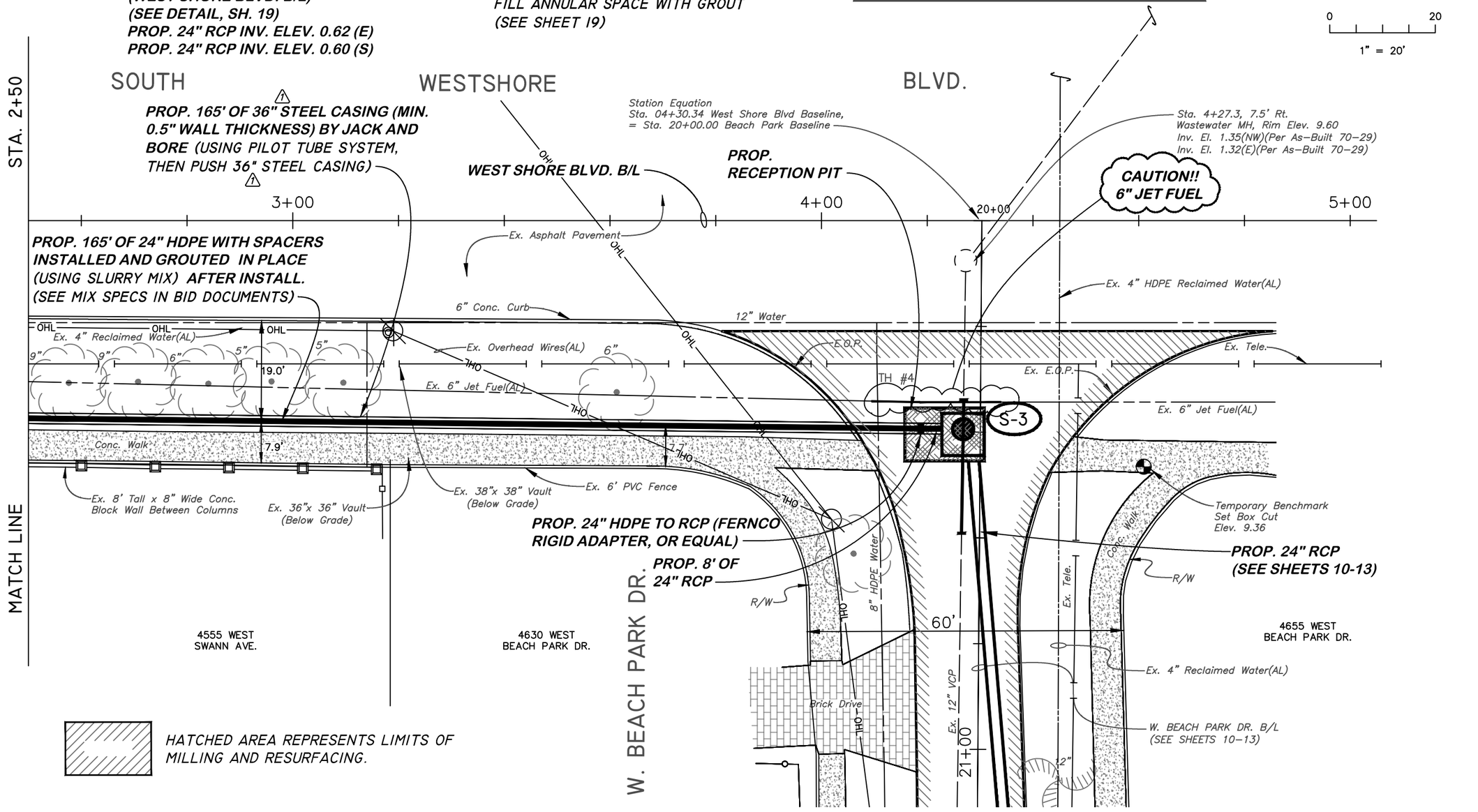
S-3 **PROP. CONFLICT STRUCTURE**
(8'x 8.5' CONC. BOX W/ACCESS & COT MANHOLE RING AND COVER)
STA. 4+27, 39.5' RT. PROP. RIM. ELEV. 9.60
(WEST SHORE BLVD. B/L)
(SEE DETAIL, SH. 19)
PROP. 24" RCP INV. ELEV. 0.62 (E)
PROP. 24" RCP INV. ELEV. 0.60 (S)

NOTE:

REPLACE 12" VCP INSIDE STRUCTURE. TIE-IN OUTSIDE WITH FERNCO ADAPTERS WITH C-900 PVC. INSTALL STEEL CASING WITHIN STRUCTURE, NO SPACERS, AND FILL ANNULAR SPACE WITH GROUT (SEE SHEET 19)

SUE LOCATE TABLE			
I.D.	STATION	OFFSET	T.O.P. ELEVATION
TH #4	4+19.29	34.33' Rt.	4.91

SEC. 20 T29S R18E
I-8
0 20
1" = 20'



HATCHED AREA REPRESENTS LIMITS OF MILLING AND RESURFACING.

PLAN

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1	06/16/21	REVISED PIPE TO "STEEL," CHANGE "PULL" TO "PUSH"	4		

DES: Y.P.
DRN: BB
CKD:
DATE:

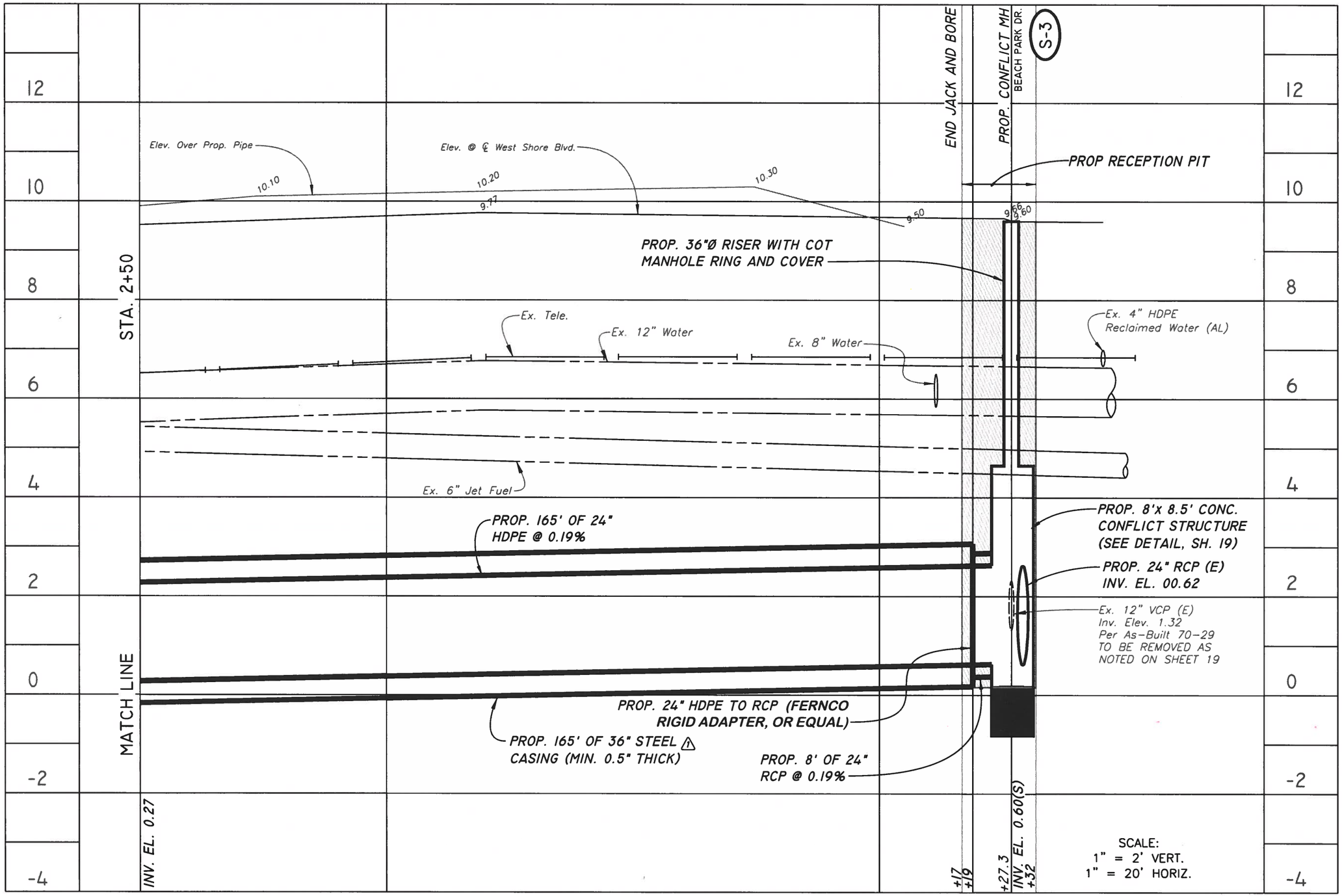
CITY of TAMPA
Mobility Department
Stormwater Engineering Division

BEACH PARK
STORMWATER DRAINAGE IMPROVEMENTS
PLAN VIEW - WESTSHORE BLVD.

SHEET 8 OF 21

Plot Date: Wednesday, June 16, 2021

SW 2021-05



PROFILE

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
⚠	06/16/21	REVISED PIPE TO "STEEL" FROM STAINLESS	4		

DES: Y.P.
DRN: BB
CKD: BDF
DATE: 6-2021

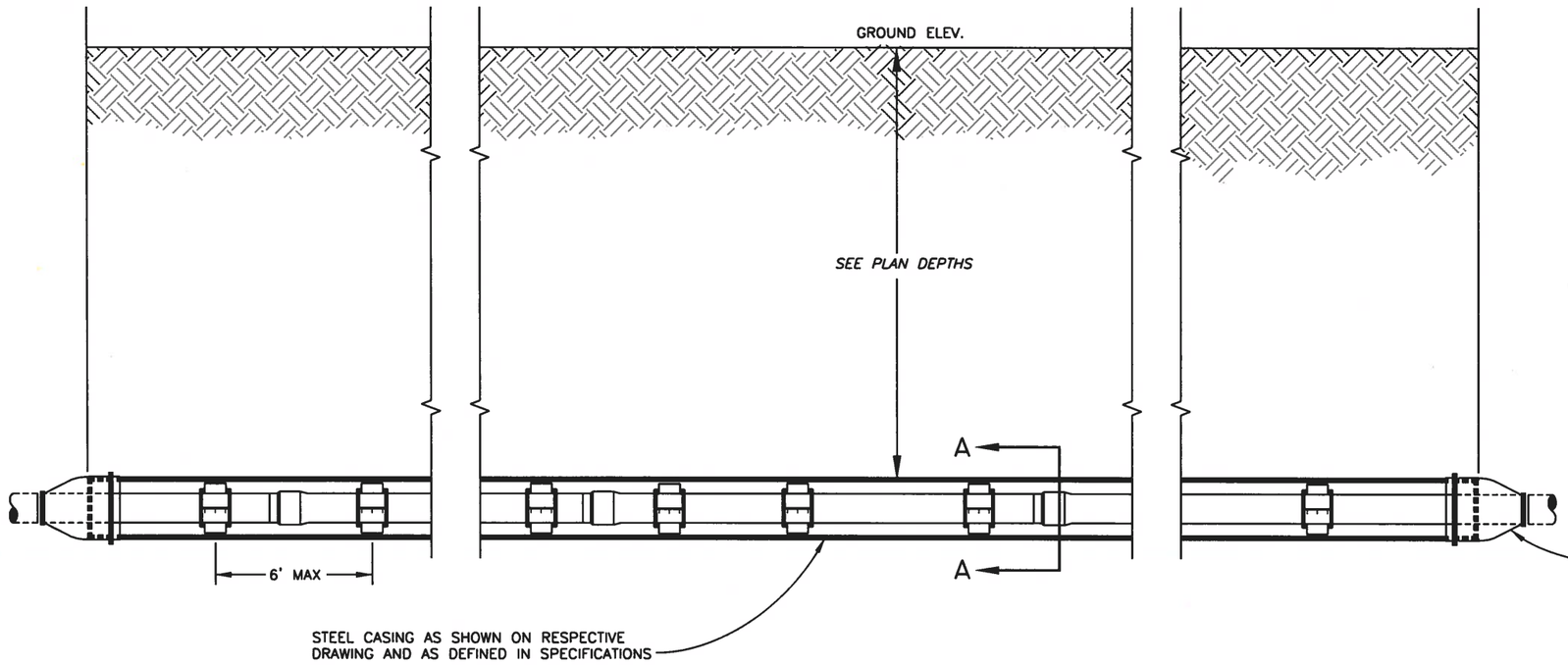
CITY of TAMPA
Mobility Department
Stormwater Engineering Division

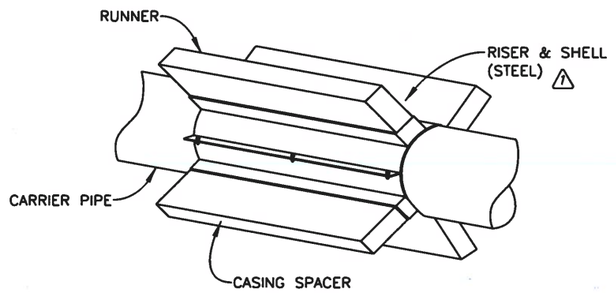
BEACH PARK
STORMWATER DRAINAGE IMPROVEMENTS
PROFILE - WESTSHORE BLVD.

SHEET 9 OF 21

Plot Date: Wednesday, June 16, 2021

SW 2021-05





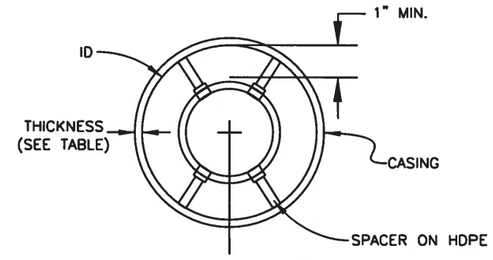
(CASCADE WATERWORKS MFG. CO.; ADVANCE PRODUCTS & SYSTEM, INC. OR APPROVED EQUAL).

1 RUBBER END SEAL SECURED WITH STEEL BANDS AT EACH END OF CASING PIPE. (CASCADE WATERWORKS MFG. CO. MODEL CCES END SEALS, ADVANCE PRODUCTS & SYSTEM, INC. END SEAL OR APPROVED EQUAL)

NOTES:

1. VERTICAL DIMENSIONS TYPICAL FOR CASINGS
2. CASING PIPE SHALL CONFORM TO THE REQUIREMENTS OF AWWA C-200 AND ASTMA-139, GRADE B.
3. CASING PIPE SHALL BE SLOPED TO ONE END, SEE PLAN SHEETS.
4. SEE GROUT AND STEEL PIPE REQUIREMENTS IN BID DOCUMENTS. 1

CORRESPONDING CARRIER AND CASING PIPE SIZE	
NOMINAL INSIDE DIAMETER OF CARRIER PIPE (INCHES)	24"
MINIMUM INSIDE DIAMETER OF CASING PIPE (INCHES)	36"
MIN. CASING THICKNESS CITY, COUNTY & FDOT	½"



SECTION A-A 1

USE A MINIMUM OF 3 STEEL CASING SPACERS CENTERED ON EACH PIPE LENGTH, TIMBER SKIDS ARE OPTIONAL.

Plot Date: Wednesday, June 16, 2021

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1	06/16/21	REVISED PIPE TO "STEEL" FROM STAINLESS	4		

DES: Y.P.
DRN: BB
CKD: BCG
DATE: 6-2021

CITY of TAMPA
Mobility Department
Stormwater Engineering Division

BEACH PARK
STORMWATER DRAINAGE IMPROVEMENTS
JACK AND BORE DETAILS

SHEET 20 OF 21

AREHNA | Engineering, Inc.

REPORT OF GEOTECHNICAL EXPLORATION

BEACH PARK STORMWATER DRAINAGE IMPROVEMENTS
TAMPA, FLORIDA

AREHNA PROJECT NO. B-20-122

November 23, 2020

Prepared For:
City of Tampa
Stormwater Engineering Division
306 East Jackson Street, 6N
Tampa, Florida 33602

Prepared By:
AREHNA Engineering, Inc.
5012 West Lemon Street
Tampa, Florida 33609

AREHNA | Engineering, Inc.

5012 West Lemon Street
Tampa, Florida 33609
Ph 813.944.3464 | Fax 813.944.4959

November 23, 2020

Yvette Pullara
City of Tampa
Stormwater Engineering Division
306 East Jackson Street, 6N
Tampa, Florida 33602

E-mail: Yvette.Pullara@tampagov.net

Subject: **Report of Geotechnical Exploration**
Beach Park Stormwater Drainage Improvements
Tampa, Florida
AREHNA Project B-20-122

Dear Mrs. Pullara,

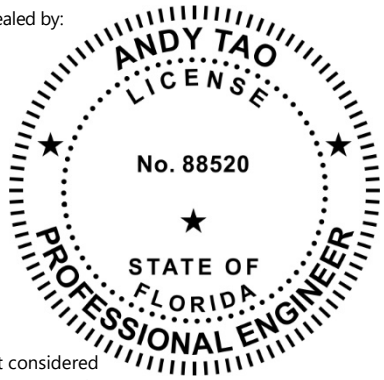
AREHNA Engineering, Inc. (AREHNA) is pleased to submit this report of our geotechnical exploration for the proposed project. Services were conducted in general accordance with AREHNA Proposal B.Prop-20-146, dated October 30, 2020. The purpose of our geotechnical study was to obtain information on the general subsurface conditions for the proposed stormwater drainage improvements.

This report presents our understanding of the project, outlines our exploratory procedures, documents the field data obtained and includes our recommendations for site preparation and foundation for the proposed structure.

AREHNA appreciates the opportunity to have assisted you on this project. Should you have any questions with regards to this report, or if we can be of any further assistance, please contact this office.

Best Regards,

AREHNA ENGINEERING, INC.
FLORIDA BOARD OF PROFESSIONAL ENGINEERS CERTIFICATE OF AUTHORIZATION NO. 28410
This item has been digitally signed and sealed by:



Andy Tao, P.E.
Geotechnical Engineer
Florida Registration 88520
On the date adjacent to the seal.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Sebastian Ropain
Geotechnical Professional

Distribution: 1 – Addressee - Electronic
1 – File

TABLE OF CONTENTS

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LIST OF APPENDICES

APPENDIX

1.0 PROJECT INFORMATION AND SCOPE OF WORK

1.1 Site Description and Project Characteristics

The project site is located along South West Shore Boulevard from West Swann Avenue to West Beach Park Drive in Tampa, Florida, as indicated on the **Boring Location Plan**, **Sheet 2** in **Appendix A**. Based on the provided site plans, we understand that the proposed construction includes stormwater drainage improvements including a new 8′ x 8′ concrete conflict structure and a new 24″ HDPE stormwater pipe. A jack and bore installation is proposed.

1.2 Scope of Work

The purpose of our geotechnical study was to obtain information on the general subsurface conditions at the proposed project site. The subsurface materials encountered were evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

- Identification of the existing groundwater levels and estimated normal seasonal high groundwater fluctuations.
- General site preparation recommendations including the suitability of existing soils for structural fill.
- General location and description of potentially deleterious materials encountered in the borings, which may have impact on the proposed construction.

The following services were performed to achieve the above-outlined objectives:

- Requested utility location services from Sunshine811.
- Performed two Standard Penetration Test (SPT) borings advanced to a depth of 15 feet at the requested locations. Samples were collected, and Standard Penetration Test resistances were measured continuously for the top ten feet and at approximate intervals of five feet thereafter. Upon completion, the boreholes were backfilled with grout.
- Visually classified and stratified soil samples in the laboratory using the Unified Soil Classification System and conduct a laboratory testing program, including natural moisture content, plasticity, and fines testing on selected samples.
- Report the results of the field exploration, lab testing, and engineering analysis. The results of the subsurface exploration are presented in this written report, signed and sealed by a professional engineer specializing in geotechnical engineering.

2.0 FIELD EXPLORATION

2.1 Field Exploration

Our scope included two SPT borings extending to depths of 15 feet below the existing ground surface.

The SPT borings were performed with the use of a Power Drill Rig using Bentonite "Mud" drilling procedures. Samples were collected and Standard Penetration Test resistances were measured continuously for the top ten feet and at approximate intervals of five feet thereafter. The upper four feet was manually augered to avoid any potential conflict with underground utilities. The soil sampling was performed in general accordance with ASTM Test Designation D-1586, entitled "Penetration Test and Split-Barrel Sampling of Soils." The boreholes were backfilled with soil cuttings and bentonite chips.

Representative portions of the soil samples were sealed in glass jars, labeled and transferred to AREHNA's Tampa laboratory for appropriate classification by a geotechnical professional.

Sheet 2 in the **Appendix A** provides a boring location site plan showing the relationship of existing features to the SPT borings. The SPT borings were located in the field by measuring from existing features and using GPS Coordinates.

3.0 SUBSURFACE CONDITIONS

3.1 USGS Topographic Data

The topographic survey map published by the United States Geological Survey was reviewed for ground surface features at the proposed project location (**Sheet 1** in the **Appendix A**). Based on this review, the natural ground surface elevations at the project site are approximately +5 to 10 feet National Geodetic Vertical Datum of 1929 (NGVD).

3.2 USDA Natural Resources Conservation Service Data

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) survey for Hillsborough County indicates that the soils at the project site consist of the following soil unit:

Soil Unit Number	Soil Name	Depth Below Natural Grade to High Water Table (feet)
27	Malabar fine sand, 0 to 2 percent slopes	0 – 1.0
32	Myakka-Urban land complex	0 – 1.0

The soil survey also indicates that the average annual precipitation is 42 to 63 inches. The water table depths shown occur in naturally drained areas. However, developed areas such as this project site are typically artificially drained by storm sewers, gutters, and surface ditches.

The USDA Soil Survey map for the project site is attached as **Sheet 1** in the **Appendix A**.

3.3 Subsurface Conditions

A pictorial representation of the subsurface conditions encountered in the borings is shown on the General Subsurface Profiles, **Sheet 3** in the **Appendix A**. The profile and the following soil conditions highlight the general subsurface stratification. When reviewing the boring records and the subsurface soil profiles, it should be understood that soil conditions may vary between, and away from, boring locations.

The SPT borings generally encountered very loose to loose sands of various fines content (SP) from the existing ground surface to approximate depths between 10 to 15 feet below existing ground surface. Standard Penetration Test Resistances (N-values) ranged between 1 to 6 blows per foot. Underlying the sandy soils, SPT boring B-01 encountered soft weathered limestone with an N-value of 6 blows per foot from 10 to 15 feet below existing ground surface.

3.4 Groundwater Conditions

The groundwater level was encountered at 2 to 2.5 feet below the existing ground surface at the time of exploration. Fluctuations in groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

3.5 Estimated Seasonal High Groundwater Level

The seasonal high groundwater table is the highest average depth of soil saturation during the wet season in a normal year (South Florida Water Management District, SFWMD, Volume IV). The procedures for estimating SHWT include an examination of county soil surveys and field verification by observation and identification of indicators within the soil profile. A review of the Hillsborough County Soil Survey indicated that the project site is located within areas classified as Myakka-Urban land complex and Malabar fine sand, 0 to 2 percent slopes.

Based on the mapping performed by the USDA, soils information obtained from the site, and our experience in the area, we estimate that the normal seasonal high groundwater level will be encountered at a depth of 2 to 2.5 feet below the existing ground surface.

4.0 GENERAL SITE PREPARATION AND RECOMMENDATIONS

4.1 General

Site Preparation includes stripping, excavation, backfilling, and compaction.

The jack and bore installation operation is the responsibility of the specialty contractor (i.e. the selection of jack and bore equipment and operation procedures are the choices of the specialty contractor). We have provided generic guidelines for jack and bore operation below. Our generic installation recommendations have been based on the site conditions encountered during our geotechnical investigation. AREHNA should be notified if the site conditions are different then stated in this report, so we may modify or amend our recommendations.

4.2 On-Site Soil Suitability

The borings indicate that sandy soils classified as SP are present at the site from the ground surface to depths between 10 to 15 feet and are suitable for use as backfill material. Some of the excavated soils may require drying prior to placing and compacting, especially during the wetter times of the year. Suitable backfill materials should consist of fine to medium sand with less than 12 percent passing the No. 200 sieve and be free of rubble, organics, clay, debris and other unsuitable material. Any off-site materials used as fill should be approved by AREHNA prior to acquisition.

4.3 Jack and Bore

Jack and bore is a trenchless method for installing a product (often called a casing) that may serve as a direct conduit or as a duct for carrier products. It is a multi-stage process consisting of constructing a temporary horizontal jacking platform and starting alignment track in an entrance pit at a desired elevation. The product is then jacked by manual controls along the starting alignment track with simultaneous excavation of the soil being accomplished by rotating a cutting head in the leading edge of the product's annular space. The ground up soil (spoils) is transported back to the entrance pit by helical wound auger flights rotating inside the product. This installation method typically provides limited tracking and steering as well as limited support to the excavation face.

Pipe jacking resistance should be estimated based on the contractor's experience in similar subsurface conditions, construction method, and type of installation equipment. Passive resistance of the soil in the walls of the jacking pit will be utilized to develop the necessary jacking thrust reaction to overcome the frictional resistance developed along the pipe. The amount of soil resistance will increase as the reaction block is displaced into the soil surface surrounding the jacking pit. The structural capacity of the jacking put to accommodate lateral displacements will control the selection of allowable passive soil resistance.

4.4 Excavation and Backfill

It is our understanding that the jack and bore installation will require boring and receiving pits for operation. Further, open-cut pipe installation is also proposed.

Excavations, whether they be utility trenches, basement excavations, or footing excavations, should be constructed in accordance with the new OSHA guidelines. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety-regulations.

The soils encountered are consistent with AASHTO Class C soils and will not stand vertically in an open excavation below the ground water level. Soil should not be stockpiled adjacent to excavations unless the stockpile has been included in the analyses of the excavation stability. Excavations below the groundwater level will likely require a combination of sanded wellpoints and pumping from filtered sumps.

Any and all excavations should be backfilled with compacted fill. Fill should generally consist of dry fine sand with less than 12 percent passing the No. 200 sieve and be free of rubble, organics, clay, debris and other unsuitable material. Fill should be tested and approved prior to acquisition. Approved sand fill should be placed in loose lifts not exceeding 12 inches in thickness and should be compacted to a minimum of 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). Prior to beginning compaction, soil moisture contents should be adjusted in order to facilitate proper compaction. A moisture content within 2 percentage points of the optimum indicated by the Modified Proctor Test (ASTM D-1557) is recommended prior to compaction of the fill.

4.5 Soil Parameters

Recommended soil parameters for use in design, including the parameters for backfill utilized for the jacking and receiving pits are presented in the **Appendix**.

The earth pressure coefficient values represent ultimate conditions. We recommend that at-rest conditions be assumed for fixed structures. Also, since the deflection necessary to mobilize the ultimate passive resistance may be more than can be tolerated, an appropriate factor of safety should be applied for design. The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided.

4.5 Dewatering

Construction activities should be accomplished in the "dry" with ground water levels maintained at least 1 foot below the deepest portion of any excavation. The groundwater level was encountered at depths between 2 and 2.5 feet. Dewatering can be accomplished using a sanded wellpoint system supplemented by a gravel bottom layer and pumping from a sump. Actual dewatering means and methods should be the responsibility of the contractor.

Groundwater fluctuations will likely occur due to seasonal variations, runoff, and other factors and should be considered when planning earthwork activities. The impact of runoff from adjacent properties, nearby water bodies, and other site-specific conditions which may affect groundwater recharge are beyond the scope of this exploration and should be considered when planning and designing a dewatering system

4.6 Pipeline Bedding

For the open-cut pipe installation method, we recommend the pipeline be supported on a bedding layer consisting of at least 6 inches of granular soils meeting the previous requirements for structural fill. Any utilities 3 feet or greater in diameter should be supported on at least 12 inches of structural fill/granular soils. The bedding layer should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557).

4.7 General Construction Monitoring and Testing Guidelines

The jack and bore structures should be installed in accordance with Florida Department of Transportation (FDOT) Standard Specifications, Design Standards, and contract documents.

The Contractor should determine actual groundwater levels at the time of construction. Based on project information we anticipate the groundwater will be encountered in both the jacking and receiving pit areas. We recommend the pavement be observed for settlement that may occur as a result of the jack and bore operations.

Prior to initiating compaction operations, we recommend that representative samples of the structural fill material to be used and acceptable exposed in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils and to determine if the fill material is acceptable.

A representative number of in-place field density testes should be performed in the compacted existing soils and in each lift of structural fill or backfill to confirm that the required degree of compaction has been obtained. We recommend that at least one density test be performed for every lift of backfill and for every 100 lineal feet of trench.

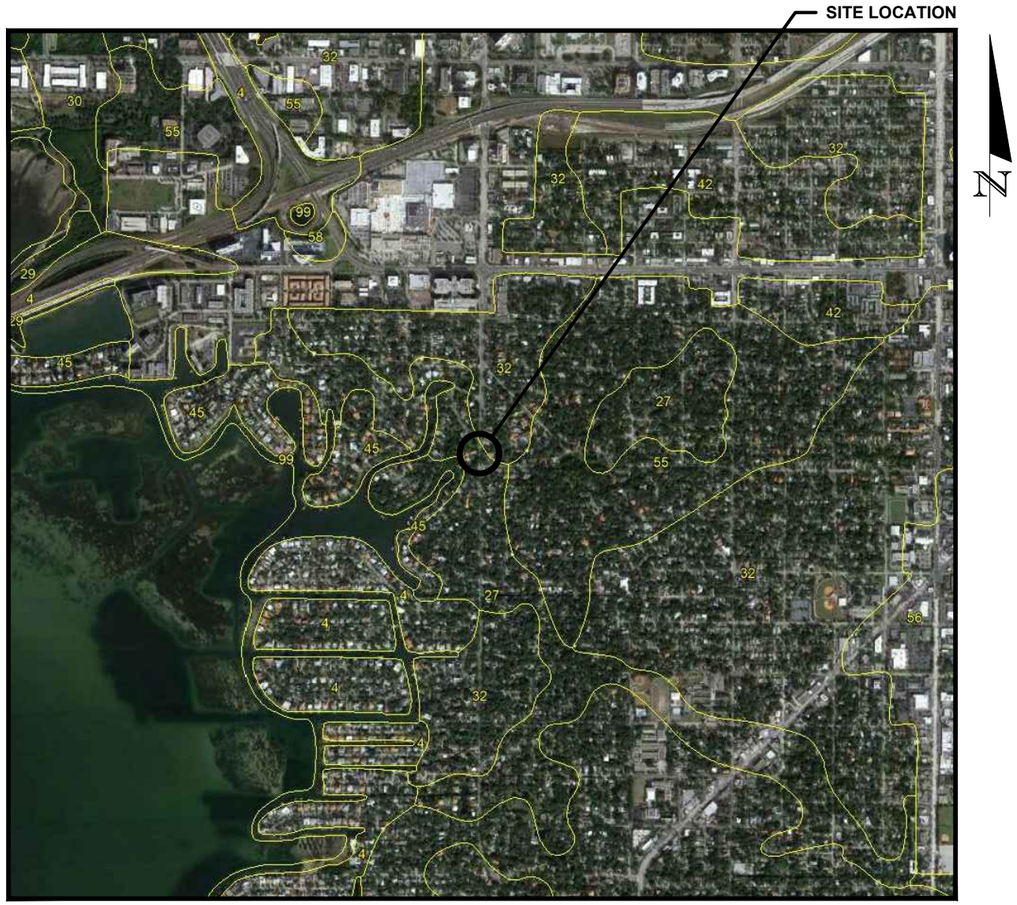
5.0 BASIS FOR RECOMMENDATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions at other locations will be different from those at the specific boring locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process itself may alter soil conditions. AREHNA is not responsible for the conclusions, opinions or recommendations made by others based on the data presented in this report.

APPENDIX

USDA & USGS Vicinity Maps – Sheet 1
Boring Location Plan - Sheet 2
Soil Boring Profiles – Sheet 3
Recommended Soil Parameters
Field Procedures

USDA SOIL SURVEY MAP

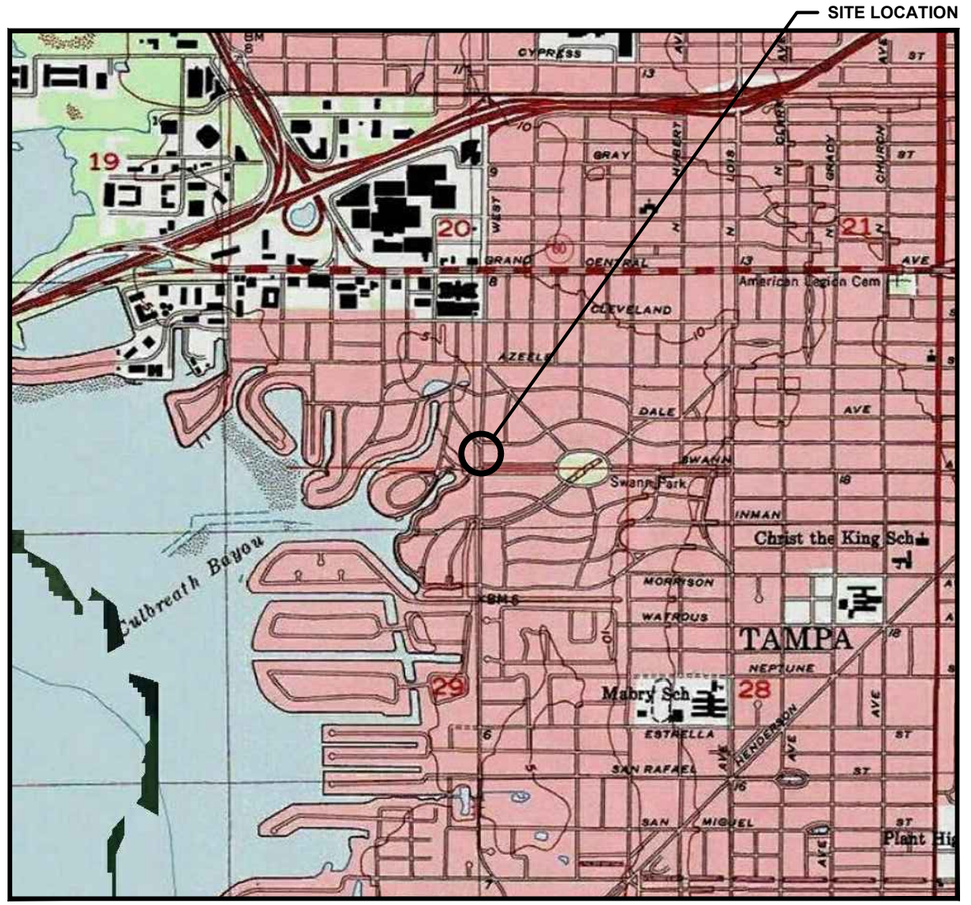


REFERENCE: USDA SOIL SURVEY OF HILLSBOROUGH COUNTY, FLORIDA

0 500 2000
Feet

TOWNSHIP: 29 S
RANGE: 18 E
SECTION: 20 & 29

USGS TOPOGRAPHIC MAP



REFERENCE: "GANDY BRIDGE, FLORIDA" USGS QUADRANGLE MAP

0 500 2000
Feet

TOWNSHIP: 29 S
RANGE: 18 E
SECTION: 20 & 29

REVISIONS			
NO.	DATE	DESCRIPTIONS	APPROVED

PREPARED BY:
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5012 West Lemon Street, Tampa, FL 33609
Phone 813.944.3464 | Fax 813.944.4959
Certificate of Authorization No. 28410

USDA & USGS VICINITY MAPS

	NAME	DATE
DESIGNED BY:	AT	11/2020
DRAWN BY:	DG	11/2020
CHECKED BY:	AT	11/2020
SUPERVISED BY:	Andy Tao, P.E.	

PROJECT NAME	PROJECT NO.	SHEET NO.
BEACH PARK STORMWATER DRAINAGE IMPROVEMENTS TAMPA, FLORIDA	B-20-122	1

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N

0 60
Feet

LEGEND

APPROXIMATE LOCATION OF SPT BORING

REVISIONS			
NO.	DATE	DESCRIPTIONS	APPROVED

PREPARED BY:
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BORING LOCATION PLAN

	NAME	DATE
DESIGNED BY:	AT	11/2020
DRAWN BY:	DG	11/2020
CHECKED BY:	AT	11/2020
SUPERVISED BY:	Andy Tao, P.E.	

PROJECT NAME	PROJECT NO.	SHEET NO.
BEACH PARK STORMWATER DRAINAGE IMPROVEMENTS TAMPA, FLORIDA	B-20-122	2

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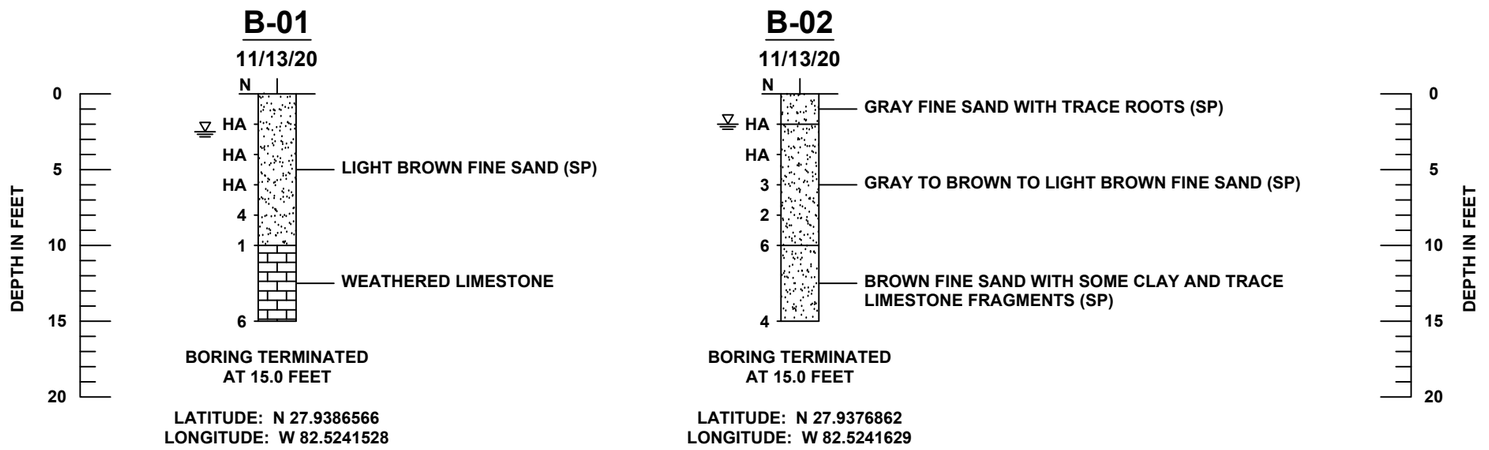

LEGEND

- FINE SAND (SP)
- WEATHERED LIMESTONE
- SP — UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND/OR LABORATORY TESTING
- GROUNDWATER TABLE AT THE TIME OF DRILLING
- N — SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION
- HA — HAND AUGERED TO AVOID UTILITY CONFLICTS AND SAFETY REASONS

	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS-RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 to 10	3 to 8
MEDIUM DENSE	10 to 30	8 to 24
DENSE	30 to 50	24 to 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 to 4	1 to 3
FIRM	4 to 8	3 to 6
STIFF	8 to 15	6 to 12
VERY STIFF	16 to 30	12 to 24
HARD	GREATER THAN 30	GREATER THAN 24
LIMESTONE CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
SOFT	LESS THAN 20	LESS THAN 17
MEDIUM	20 to 50	17 to 41
HARD	51 to 50/3"	42 to 50/6"
VERY HARD	GREATER THAN 50/3"	GREATER THAN 50/6"

Soil Profile Notes:

1. The profiles depicted are of a generalized nature to highlight the major subsurface stratification features and material characteristics. The soil profiles include soil description, stratifications and penetration resistances. The stratifications shown on the boring profiles represent the conditions only at the actual boring location. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual.
2. Groundwater levels generally fluctuate during periods of prolonged drought and extended rainfall and may be affected by man-made influences. In addition, a seasonal effect will also occur in which higher groundwater levels or temporary perched conditions are normally recorded in rainy seasons.
3. The Boring Locations Presented are Approximate and Based on Hand Held GPS with an Accuracy of +/- 10 Feet.

REVISIONS			
NO.	DATE	DESCRIPTIONS	APPROVED

PREPARED BY:
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Certificate of Authorization No. 28410

SOIL BORING PROFILES

	NAME	DATE
DESIGNED BY:	AT	11/2020
DRAWN BY:	DG	11/2020
CHECKED BY:	AT	11/2020
SUPERVISED BY:	Andy Tao, P.E.	

PROJECT NAME	PROJECT NO.	SHEET NO.
BEACH PARK STORMWATER DRAINAGE IMPROVEMENTS TAMPA, FLORIDA	B-20-122	3

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AREHNA Engineering, Inc.
5012 West Lemon Street
Tampa, Florida

Project Name: Beack Park Stormwater Improvements
Project Number: B-20-122

Boring Number: B-01

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	10	-2.2	SP	102	29	0	N/A	0.5	0.5	15.0	15	0.35	2.88	0.52
2	15	-7.2	WLS	105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
3														
4														
5														
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

AREHNA Engineering, Inc.
5012 West Lemon Street
Tampa, Florida

Project Name: Beack Park Stormwater Improvements
Project Number: B-20-122

Boring Number: B-02

RECOMMENDED WALL SOIL PARAMETERS

No.	Approx. Depth (feet)	Approx. Elevation (NAVD 88) (feet)	USCS Soil Type	Total Unit Weight (pcf)	Internal Friction ϕ (deg)	Cohesion, Su (psf)	Adhesion (psf)	Friction Ratio δ/ϕ		Angle of Wall Friction (Degrees) δ		Earth Pressure Coefficients		
								Steel	Concrete	Steel	Concrete	Active (Ka)	Passive (Kp)	At Rest (Ko)
1	15	-7.2	SP	102	29	0	N/A	0.5	0.5	15.0	15	0.35	2.88	0.52
2														
3														
4														
5														
6														
7														
8														
9														
BACKFILL: SAND FILL				105	30	0	N/A	0.5	0.5	15.0	15	0.33	3.00	0.50
BACKFILL: LIMEROCK FILL (Miami-Dade & Monroe Counties Only)				115	34	0	N/A	0.5	0.5	17.0	17	0.28	3.54	0.44

Notes:

(1) The tabulated values assume smooth, formed concrete or concrete sheet piling against granular fill, without appreciable cohesion, compacted to the specifications outlined in the Standard Specifications. In addition, friction ratio for steel interface is also provided. The angle of wall friction was determined using Table 3-2 (after Allen, Duncan, and Snacio 1988) of EM 1110-2-2504, prepared by the US Army Corps of Engineers.

(2) The above earth pressure coefficient values represent ultimate conditions. Therefore, appropriate factor of safety should be applied for design.

(3) If passive pressures are determined using Coulomb Method, the wall friction should to be reduced and not exceed more than 1/3 the soil friction angle (Reference: FHWA NHA-07-071, page 3-21).

(4) Compacted fill placed above the existing grade behind the retaining wall.

(5) Rock with N (manual) less or equal to 10 modelled as cohesionless (SP).

(6) Rock with N (manual) between 11 to 25 was modelled as cohesionless (GW).

Standard Penetration Test (SPT) Borings

The SPT borings are performed in general accordance with ASTM D-1586, "Penetration Test and Split-Barrel Sampling of Soils." A rotary drilling process is used and bentonite drilling fluid is circulated in the boreholes to stabilize the sides and flush the cuttings. At regular intervals, the drilling tools are removed and soil samples are obtained with a standard 2-feet long, 2-inch diameter split-tube sampler. The sampler is first seated 6 inches and then driven an additional foot with blows of a 140-pound hammer falling under its own weight a distance of 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance." The penetration resistance, when properly interpreted, is an index to the soil strength and density.