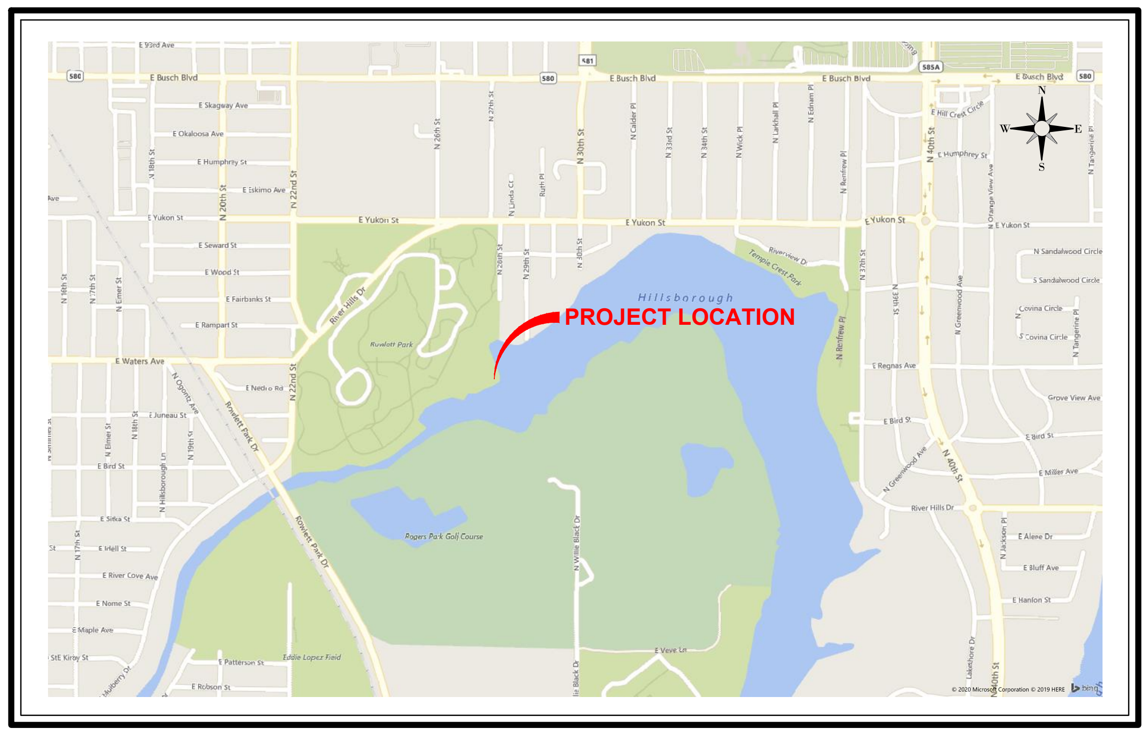
HILLSBOROUGH RIVER DAM
NORTH EMBANKMENT REMEDIATION PROGRAM
CITY OF TAMPA WATER DEPARTMENT
TAMPA, HILLSBOROUGH COUNTY, FLORIDA

WOOD PROJECT NUMBER: 301079X1



SITE LOCATION MAP

HILLSBOROUGH COUNTY, FLORIDA
SECTION 29, TOWNSHIP 28 SOUTH, RANGE 19 EAST

LIST OF DRAWINGS	
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01	COVER
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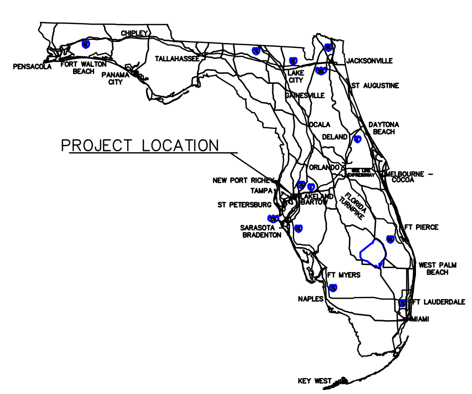

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LUIS A. GARCIA
LICENSE
No. 76613
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

Luis Garcia

Digitally signed by Luis Garcia
DN: c=GB, l=Aberdeen, o=JOHN WOOD GROUP PLC, cn=Luis Garcia, email=luis.garcia@woodplc.com
Date: 2020.09.23 09:35:00 -04'00'

ON THE DATE ADJACENT TO THE SEAL

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WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.
1101 CHANNELSIDE DRIVE, SUITE 200
TAMPA, FLORIDA 33602
CERTIFICATE OF AUTHORIZATION 5392
LUIS GARCIA, P.E. NO. 76613

ENGINEER OF RECORD

I HEREBY CERTIFY THAT I AM REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF FLORIDA PRACTICING WITH WOOD ENVIRONMENTAL & INFRASTRUCTURE SOLUTIONS, INC., 1101 CHANNELSIDE DRIVE 200 TAMPA, FL. 33602. A CORPORATION AUTHORIZED TO OPERATE AS BUSINESS PROVIDING ENGINEERING CONSULTING SERVICES (184003962-001) BY THE STATE OF FLORIDA DEPARTMENT OF FINANCE AND PROFESSIONAL REGULATIONS. I FURTHER CERTIFY THAT I, OR OTHERS UNDER MY DIRECT SUPERVISION, HAVE PREPARED THE ENGINEERING EVALUATIONS, FINDINGS, OPINIONS, CALCULATIONS, CONCLUSIONS OR TECHNICAL ADVICE HEREBY REPRESENTED IN THIS REPORT.

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS-C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_Cover.dwg LAYOUT: 01 SAVED: 8/20/2020 3:30 PM PLOTSTYLETABLE: CIVIL-MASTER.CTB PLOTTED: 8/20/2020 3:32 PM BY: VIVES, MARTIN

UTILIZATION OF LIMITED MOBILITY GROUTING (LMG)
TO REMEDIATE UNSTABLE SOIL CONDITIONS

DESIGN CRITERIA

1.0 DESIGN AND CONSTRUCTION

1.1 THE FLORIDA BUILDING CODE AND THE EXISTING FLORIDA BUILDING CODE, 5TH EDITION.

1.2 NATIONAL DESIGN SPECIFICATIONS FOR WOOD CONSTRUCTION DESIGN CODES AND GUIDELINES.

1.3 ASTM GUIDELINES AND SPECIFICATIONS.

1.4 SUBSTITUTE PRODUCTS SUBMITTED SHALL BE REVIEWED BY THE ENGINEER OF RECORD (EOR). IF THEY ARE ACCEPTABLE, THEY WILL BE APPROVED.

2.0 LOW MOBILITY GROUTING (LMG) PROGRAM

2.1 LOW MOBILITY GROUTING (LMG) IS A PROCESS IN WHICH LOW-SLUMP CEMENTITIOUS MATERIAL (GROUT) IS INJECTED UNDER HIGH PRESSURE INTO THE KARST FEATURE IN ORDER TO FILL VOIDS AND COMPACT THE SOIL.

2.2 THE PROPOSED GROUTING PROGRAM SHALL BE SUFFICIENT TO FILL VOIDS IN THE LIMESTONE AND TO DENSIFY VERY SOFT OR LOOSE SOILS TO MINIMIZE FUTURE SETTLEMENTS ASSOCIATED WITH SINKHOLE ACTIVITY. THE METHOD OF GROUTING (COMPACTION VS. INTRUSION) SHALL BE BASED UPON THE INSTALLATION DEPTH. INJECTION POINTS THAT ENCOUNTER LIMESTONE OR VERY LOOSE/SOFT SOILS (WOR, WOH) WITHIN 20 FEET OF THE GROUND SURFACE SHOULD BE TREATED THROUGH INTRUSION GROUTING. ALL OTHER POINTS SHOULD BE TREATED THROUGH A COMPACTION GROUTING PROGRAM.

3.0 SUBMITTALS

3.1 PRIOR TO THE COMMENCEMENT OF WORK, THE GENERAL CONTRACTOR SHALL PROVIDE A LIST OF MAJOR COMPONENTS ESSENTIAL TO THE GROUTING PROGRAM. THE LIST IS TO BE SUBMITTED TO THE ENGINEER OF RECORD (EOR) FOR APPROVAL AND SHALL INCLUDE:

3.1.1 GROUT PROPORTIONING AND STRENGTH DATA FROM A SIMILAR PREVIOUS PROJECT FOR REVIEW BY THE EOR.

3.1.2 PUMPS, HOSES, PIPE, FITTINGS, DRILLING EQUIPMENT INCLUDING MANUFACTURER'S DATA AS TO SIZE, TYPE, PRESSURE RATING, CAPACITY AND OTHER CRITICAL CHARACTERISTICS FOR EACH ITEM FOR THE EOR'S REVIEW PRIOR TO THE COMMENCEMENT OF WORK.

3.1.3 THE GENERAL CONTRACTOR SHALL PROVIDE A DETAILED WORK SCHEDULE OUTLINING MOBILIZATION, DRILLING, GROUTING, TESTING, AND DEMOBILIZATION.

4.0 GENERAL CONTRACTOR'S RESPONSIBILITY

4.1 IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO CONTACT THE APPROPRIATE UTILITY LOCATING SERVICES TO IDENTIFY AND LOCATE ALL UNDERGROUND LINES AND CONDUITS PRIOR TO CONSTRUCTION.

4.2 THE GENERAL CONTRACTOR SHALL DETERMINE OVERHEAD CLEARANCE REQUIREMENTS AND INJECTION POINTS THAT REQUIRE RELOCATIONS TO AVOID OVERHEAD AND UNDERGROUND OBSTRUCTIONS. IT REQUIRES PRIOR APPROVAL BY THE ENGINEER OF RECORD (EOR).

4.3 THE GENERAL CONTRACTOR SHALL MAKE REASONABLE EFFORTS TO LOCATE ALL OTHER UNDERGROUND UTILITIES INCLUDED BUT NOT LIMITED TO DRAIN FIELDS, SEPTIC TANKS, IRRIGATION SYSTEMS, ETC.

4.4 SUBMIT A DETAILED GROUTING PROGRAM, INCLUDING A DESCRIPTION OF THE METHOD TO BE USED TO INSTALL GROUT CASINGS, TO THE EOR AT LEAST TEN (10) DAYS BEFORE MOBILIZATION TO THE SITE.

4.5 INSTALL AND REMOVE GROUT INJECTION PIPES AT LOCATIONS SHOWN ON THE DRAWINGS, UNLESS REVISED BY EOR.

4.6 MONITOR GROUND MOVEMENTS DURING GROUTING OPERATIONS IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

4.7 PERFORM GROUTING PROGRAM UNDER SUPERVISION OF A GEOTECHNICAL ENGINEER OR GEOLOGIST.

4.8 SITE CLEAN-UP AND RESTORATION DURING AND AFTER GROUTING AS SPECIFIED HERE IN.

5.0 MATERIALS

5.1 THE LMG MATERIALS SHALL CONSIST OF A COMBINATION OF PORTLAND CEMENT, FINE AGGREGATE AND WATER. FLY-ASH AND/OR BENTONITE MAY BE ADDED PROVIDED THE GROUT MIXTURE MEETS STRENGTH AND SLUMP REQUIREMENTS.

5.2 FOR COMPACTION GROUTING THE GROUT MIX SHALL HAVE A SLUMP OF 3 TO 5 INCHES WHEN MEASURED WITH THE ASTM SLUMP TEST (ASTM C143) AT THE POINT OF INJECTION.

5.3 FOR INTRUSION GROUTING THE GROUT MIX SHALL HAVE A SLUMP OF 7 TO 9 INCHES WHEN MEASURED WITH THE ASTM SLUMP TEST (ASTM C143) AT THE POINT OF INJECTION

5.4 THE GROUT SHALL HAVE A MINIMUM UNCONFINED COMPRESSIVE STRENGTH OF 400 PSI AT 28 DAYS.

5.5 NO GROUT SHALL BE PUMPED MORE THAN 3 HOURS AFTER THE BATCH TIME SHOWN ON THE DELIVERY TICKET, UNLESS PROPOSED BY THE GENERAL CONTRACTOR AND ACCEPTED BY THE ENGINEER OF RECORD (EOR).

5.6 WATER SHALL NOT BE ADDED TO ANY DELIVERED MATERIAL WITHOUT NOTIFICATION AND APPROVAL OF THE ENGINEER OF RECORD (EOR) OR THEIR REPRESENTATIVE. IF WATER IS ADDED TO A LOAD WHILE ON SITE WITHOUT APPROVAL, THE ENGINEER OF RECORD (EOR) RESERVES THE RIGHT TO REFUSE THE MATERIAL AT THE GENERAL CONTRACTOR'S EXPENSE.

5.7 THE PORTLAND CEMENT SHALL BE TYPE I OR II AND CONFORM TO ALL OF THE REQUIREMENTS OF ASTM C150. ALTERNATIVE TYPES OF CEMENT MAY BE USED PROVIDED THEY ARE APPROVED IN ADVANCE BY THE ENGINEER OF RECORD (EOR).

5.8 FINE AGGREGATES SHALL BE NATURAL SILICEOUS MATERIAL, CONSISTING OF HARD, CLEAN, STRONG, DURABLE, AND UN-COATED PARTICLES, CONFORMING TO ASTM C144 FOR AGGREGATE FOR MASONRY MORTAR. THE AGGREGATES SHALL HAVE FINES CONTENT (PASSING NO. 200 SIEVE) OF NOT LESS THAN 10 PERCENT AND NOT MORE THAN 30 PERCENT.

5.9 THE GRADATION OF THE FINE AGGREGATE SHALL BE SUCH THAT SAND BLOCKING IS ELIMINATED AT THE SPECIFIED GROUT WORKING PRESSURES.

5.10 THE GROUT MIX DESIGN SHALL BE SUBMITTED TO THE ENGINEER OF RECORD (EOR) FOR REVIEW PRIOR TO CONSTRUCTION.

5.11 WATER USED IN THE GROUT SHALL BE FREE OF EXCESSIVE AMOUNTS OF SALTS, OR OTHER DELETERIOUS AND ORGANIC MATERIAL WHICH MAY ADVERSELY AFFECT THE SET OF HYDRATION OF THE CEMENT IN THE GROUT MIXTURE PER ASTM C1602.

5.12 NO ADMIXTURE SHALL BE USED WITHOUT THE EOR'S REVIEW OF THE PROPOSED MIX, BASED ON PREVIOUS TESTING AND EXPERIENCE SUBMITTED BY THE GENERAL CONTRACTOR.

5.13 THE GENERAL CONTRACTOR SHALL DETERMINE THE SOURCE, KIND AND QUALITY OF THE WATER, CEMENT AND AGGREGATES TO BE USED IN THE WORK. THE ADJACENT HILLSBOROUGH RIVER RESERVOIR WATER IS ACCEPTABLE FOR USE. THE GENERAL CONTRACTOR SHALL MAKE THIS EVALUATION AT LEAST 10 DAYS IN ADVANCE OF THE TIME SCHEDULED FOR STARTING THE WORK AND SHALL SUBMITT SUCH INFORMATION FOR REVIEW TO THE EOR.

6.0 GROUT PIPE INSTALLATION

6.1 THE DRILLING EQUIPMENT SHALL INSTALL MINIMUM 2.5-INCH INSIDE DIAMETER FLUSH JOINT STEEL CASING GROUT PIPES IN SECTIONS OF 5 FEET OR LESS TO MINIMIZE FLOW RESTRICTIONS AND PREVENT PLUGGING WHEN INJECTING THE LOW-SLUMP MATERIAL.

6.2 THE CASING SHALL BE INSTALLED TO DEPTHS INDICATED BY THE TEST BORINGS IN THE GEOTECHNICAL REPORT, UNLESS UNEXPECTED FOUNDATION CONDITIONS ARE ENCOUNTERED AND VERIFIED BY THE EOR. THE INTENT WILL BE TO TERMINATE THE GROUTING IN HARD LIMESTONE BEDROCK. HOWEVER, CARE SHOULD ALSO BE TAKEN TO IDENTIFY THE ROCK CHARACTERISTICS TO ENSURE THE GROUT PIPES ARE NOT INSTALLED TO DEPTHS SIGNIFICANTLY BELOW THE HARD LIMESTONE SURFACE.

6.3 THE STEEL CASING SHOULD HAVE ADEQUATE STRENGTH TO STABILIZE THE HOLE AND TO WITHSTAND THE NECESSARY JACKING AND PUMPING PRESSURES.

6.4 THE CASING SHALL BE INSTALLED USING ROTARY WASH DRILLING SUCH THAT THERE IS INTIMATE CONTACT WITH THE DRILLED HOLE IN ORDER TO PREVENT GROUT LEAKAGE AND/OR PREMATURE UPWARD MOVEMENT OF THE CASING DURING INJECTION OF HIGH-PRESSURE COMPACTION GROUT.

6.5 THE ENGINEER OF RECORD (EOR) SHALL CONFIRM THE ACTUAL DEPTH OF AN OPEN GROUT POINT BY SOUNDING WITH A WEIGHTED MEASURING TAPE.

7.0 GROUT INJECTION PROCEDURES

7.1 THE SEQUENCE IN WHICH THE GROUT POINTS ARE DRILLED AND GROUTED MAY CHANGE DURING THE COURSE OF THE WORK BASED ON DIRECTION OR PRIOR APPROVAL BY THE ENGINEER OF RECORD (EOR).

7.2 UNLESS OTHERWISE DIRECTED BY THE ENGINEER OF RECORD (EOR), THE INITIAL GROUT PUMPING SEQUENCE SHALL CONSIST OF GROUTING THE INJECTION PIPES IN A "PRIMARY/SECONDARY" PATTERN WITHIN THE REMEDIATION AREA AS DESIGNATED BY THE ENGINEER OF RECORD (EOR). THIS METHOD GENERALLY USES EVERY OTHER GROUT POINT AS "PRIMARY" GROUT INJECTION POINT, WITH THE INTERMEDIATE GROUT INJECTION POINTS AS THE "SECONDARY" POINTS. AFTER GROUT HAS BEEN INJECTED AT THE "PRIMARY" INJECTION POINT LOCATIONS, THE GROUTING LOGS AND DATA SHALL BE REVIEWED AND A DETERMINATION SHALL BE MADE BY THE ENGINEER OF RECORD (EOR) AS TO HOW THE GROUTING SEQUENCE SHALL CONTINUE MOVING FORWARD.

7.3 THE GENERAL CONTRACTOR SHALL CONTINUOUSLY MONITOR GROUTING PRESSURE AT THE HOLE AND THE PUMP WITH SUITABLY PROTECTED AND CALIBRATED GAUGES.

7.4 LMG SHALL BE INJECTED AT EACH LOCATION IN ASCENDING STAGES, STARTING AT THE BOTTOM AND MOVING UPWARDS. INDIVIDUAL STAGE LENGTHS SHALL BE 5 FEET OR LESS.

7.5 GROUTING SHOULD NOT BE PERFORMED AT DEPTHS SHALLOWER THAN 15 FEET AND NO SHALLOWER THAN 20 FEET WHEN THE GROUT POINT IS LOCATED NEAR A STRUCTURE, OR VULNERABLE UTILITIES, UNLESS OTHERWISE DIRECTED OR AUTHORIZED IN ADVANCE BY THE ENGINEER OF RECORD (EOR).

7.6 THE REQUIRED GROUT PUMPING RATE SHALL BE 3 TO 7 CUBIC FEET PER MINUTE.

7.7 GROUT QUANTITIES SHALL BE CONTINUOUSLY MONITORED AND RECORDED BY THE GENERAL CONTRACTOR.

7.8 THE GROUT PUMP COUNTER (IF USED) SHALL BE IN GOOD WORKING CONDITION.

7.9 COMPACTION GROUT OF 3 TO 5 INCHES OF SLUMP SHALL BE INJECTED INTO THE CASING. A HIGHER SLUM (UP TO 9 INCHES) MAY BE USED DURING INITIAL STAGES OF GROUTING AT THE SOIL ROCK INTERFACE OR FOR POINTS SHALLOWER THAN 20 FEET, IF PROPOSED BY THE GENERAL CONTRACTOR AND ACCEPTED BY EOR.

7.10 THE CRITERIA FOR RAISING THE GROUT PIPE TO THE NEXT INCREMENT WILL BE WHEN ONE OF THE FOLLOWING OCCURS:

7.10.1 FOR 3 TO 5-INCH SLUMP/COMPACTION GROUTING:

7.10.1.1 THE MAXIMUM GROUT PRESSURE AT THE GAGE LOCATED NEAR THE HEADER IS ACHIEVED. MAXIMUM GROUT PRESSURE IS DEFINED AS AT LEAST 150 PSI OVER THE NECESSARY PRESSURE TO INITIATE GROUT TAKE. HOWEVER, LOWER GROUT PRESSURES MAY BE USED WHEN GROUTING AT SHALLOWER DEPTHS TO REDUCE THE POTENTIAL FOR HEAVING AT THE GROUND SURFACE AND TO ALLOW FOR GROUT STABILIZATION OF SHALLOW LOOSE SOIL ZONES.

7.10.1.2 IF THE GROUT TAKE EXCEEDS 10 CUBIC YARDS, THE INJECTION POINT SHALL BE FLUSHED WITH A MINIMAL AMOUNT OF WATER AND THE INITIAL (INJECTED) AMOUNT OF GROUT SHALL BE ALLOWED TO SET. IF THE GROUT TAKE CONTINUES TO EXCEED 10 CUBIC YARDS (PER INTERVAL, NOT TO EXCEED 5 FEET) THE PROCESS IS TO BE REPEATED. AT THE ENGINEER OF RECORD'S (EOR) DISCRETION, A PROPOSED CHANGE IN THE ALLOWABLE QUANTITY PER INTERVAL PER DAY MAY BE ACCEPTED. A MAXIMUM GROUT QUANTITY OF 50 CUBIC YARDS PER INJECTION POINT IS RECOMMENDED.

7.10.2 FOR 3 TO 5-INCH SLUMP/COMPACTION GROUTING:

7.10.2.1 IF THE GROUT PRESSURE AT THE GATE LOCATED AT THE HEADER EXCEEDS 100 PSI OVER THE NECESSARY PRESSURE TO INITIATE GROUT TAKE. HOWEVER, PROGRESSIVELY LOWER PRESSURES SHOULD BE USED WHEN GROUTING AT SHALLOWER DEPTHS TO REDUCE THE POTENTIAL FOR HEAVING AT THE GROUND SURFACE AND TO ALLOW FOR GROUT STABILIZATION OF SHALLOW LOOSE SOIL ZONES.

7.10.2.2 WHEN MORE THAN 5 CUBIC YARDS OF GROUT HAS BEEN INJECTED PER 5-FOOT INTERVAL. IF THE GROUT TAKE EXCEEDS 5 CUBIC YARDS, THE INJECTION POINT SHALL BE RAISED AND FLUSHED, AND THE INITIAL (INJECTED) AMOUNT OF GROUT SHALL BE ALLOWED TO SET. SUBSEQUENTLY, THE GROUT CASING SHALL BE RE-DRIVEN TO THE TARGET DEPTH AND GROUT INJECTION RESUMED. IF THE GROUT TAKE CONTINUES TO EXCEED 5 CUBIC YARDS (PER 5-FOOT INTERVAL), THE PROCESS IS TO BE REPEATED. THE EOR MAY AT HIS DISCRETION ACCEPT A PROPOSED CHANGE IN THE ALLOWABLE QUANTITY AS DEEMED NECESSARY. A MAXIMUM GROUT QUANTITY OF 10 CUBIC YARDS PER INJECTION POINT IS RECOMMENDED.

7.10.2.3 WHEN ANY SURFACE HEAVE OCCURS GREATER THAN 1/8-INCH.

7.11 ANY GROUT POINT THAT IS LOST OR DAMAGED, DOES NOT EXTEND TO THE REQUIRED DEPTH, OR IS NOT COMPLETED ADEQUATELY AS A RESULT OF EQUIPMENT DEFICIENCIES, MECHANICAL FAILURE, POOR WORKMANSHIP, IMPROPER GROUT MIX, IMPROPER DRILLING, MIXING, OR INJECTION, SHALL BE FILLED AND REPLACED BY A PROPERLY INSTALLED HOLE AT NO ADDITIONAL COST TO THE OWNER.

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LUIS A. GARCIA
FL. REG. NO.
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PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:

GENERAL NOTES & SPECIFICATIONS (1 of 2)

SHEET NUMBER:	REV. #
02	

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS-C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_General Notes.dwg LAYOUT: 02 SAVED: 8/20/2020 3:26 PM PLOTSTYLETABLE: --- PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN

UTILIZATION OF LIMITED MOBILITY GROUTING (LMG)
TO REMEDIATE UNSTABLE SOIL CONDITIONS

8.0 TESTING AND QUALITY CONTROL

8.1 A MINIMUM OF THREE SAMPLES OF THE GROUTING MATERIAL MAY BE TAKEN BY THE ENGINEER OF RECORD (EOR) FOR EACH LOAD OF GROUT DELIVERED.

8.2 UNCONFINED COMPRESSION TESTS MAY BE PERFORMED BY THE EOR AT 7 AND 28 DAYS.

8.3 SLUMP TESTS WILL BE PERFORMED BY THE ENGINEER OF RECORD (EOR) IN THE FIELD ON EACH LOAD OF GROUT DELIVERED TO THE SITE. THE COST OF SAMPLING AND TESTING SHALL BE PAID BY THE OWNER.

8.4 FAILURE OF ANY SAMPLES TO MEET THE MINIMUM PERFORMANCE CRITERIA DEFINED IN THESE SPECIFICATIONS SHALL RESULT IN THE GENERAL CONTRACTOR NOT BEING COMPENSATED FOR THE MATERIAL PUMPED AND FOOTAGE DRILLED. ADDITIONALLY, THE GENERAL CONTRACTOR SHALL AT THEIR EXPENSE BE RESPONSIBLE FOR RE-GROUTING THE AREA AS DETERMINED NECESSARY BY THE EOR PRIOR TO CERTIFICATION OF COMPLETION.

8.5 ALL DAILY DRILLING, GROUTING, AND TESTING REPORTS SHALL BE SUBMITTED TO THE EOR WITHIN 24 HOURS. DRILLING REPORTS SHALL BE REQUIRED AND SHOULD CONTAIN AT A MINIMUM THE FOLLOWING INFORMATION: NAME OF DRILLER, TYPE OF DRILL AND METHOD USED, DATE STARTED, DATE COMPLETED, LOCATION OF HOLE, TYPE OF MATERIAL ENCOUNTERED, AND TOTAL DEPTH OF THE DRILL HOLE.

8.6 GROUTING REPORTS SHALL CONTAIN AT LEAST THE FOLLOWING INFORMATION: NAME OF GROUTING TECHNICIAN, SUPPLIER'S NAME, GROUT CONSISTENCY (SLUMP), DESIGN MIX VERIFICATION, COPIES OF GROUT TICKETS (FROM SUPPLIERS), STROKE COUNTS, INJECTION VOLUME PER DAY PER POINT, INJECTION PRESSURES, ANY GROUND MOVEMENT AND NOTATIONS OF ANY ABNORMALITIES THAT OCCUR DURING THE GROUTING OPERATIONS.

8.7 MONITORING OF GROUND MOVEMENT SHALL BE PERFORMED BY THE GENERAL CONTRACTOR THROUGHOUT THE PROJECT BY A SURVEYOR'S LEVEL AND VARIOUS MARKERS PLACED TO A DISTANCE OF 30 FEET FROM THE NEAREST ACTIVE GROUT INJECTION POINT AS APPROVED BY THE EOR. STANCHIONS AND MARKERS SHALL BE PLACED NEAR THE GROUT INJECTION POINT AS NEEDED TO MONITOR SURFACE HEAVE ADJACENT TO THE STRUCTURE. OTHER MONITORING DEVICES MAY BE NEEDED FOR SENSITIVE STRUCTURES.

9.0 SAFETY, PROTECTION AND CLEANUP

9.1 GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AN ADEQUATE PROTECTION AND CLEANUP PLAN IN THE PROPOSAL PACKAGE. THIS PLAN SHALL BE REVIEWED BY THE OWNER AND THE EOR.

9.2 GENERAL CONTRACTOR SHALL FOLLOW ALL APPLICABLE OSHA STANDARDS THROUGHOUT THE COURSE OF THE WORK.

9.3 INSTALLERS SHALL WEAR CLOTHING AND SAFETY EQUIPMENT APPROPRIATE FOR THE WORK, AND/OR AS DICTATED BY PROJECT SPECIFIC GUIDELINES.

9.4 ALL GROUTING EQUIPMENT AND MATERIAL WHICH MAY POSE A HAZARD SHALL BE BARRICADED WHEN THE GENERAL CONTRACTOR IS NOT ACTIVELY WORKING IN THAT AREA.

9.5 DURING WORK OPERATIONS THE GENERAL CONTRACTOR SHALL TAKE SUCH PRECAUTIONS AS MAY BE NECESSARY TO PREVENT DRILL CUTTINGS, EQUIPMENT EXHAUST, OIL, WASH WATER AND GROUT FROM ENTERING THE RESERVOIR OR RIVER. THE GENERAL CONTRACTOR SHALL FURNISH ALL NECESSARY EQUIPMENT TO CARE FOR WASTEWATER AND GROUT FROM THEIR OPERATIONS AND CLEAN UP ALL WASTE RESULTING FROM THEIR OPERATIONS.

9.6 ANY DAMAGES TO THE SUBJECT PROPERTY, AND ADJACENT PROPERTIES, FROM THESE ACTIVITIES SHALL BE REPAIRED AT THE GENERAL CONTRACTOR'S EXPENSE.

9.7 THE GROUTING WORKS ARE LIKELY TO DISTURB THE PROTECTIVE GRASS COVER. GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING ACCESS TO THEIR EQUIPMENT AND MINIMIZE THE PROTECTIVE GRASS DISTURBANCE. AT THE END OF THE WORKS, GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING THE PROTECTIVE GRASS AREA AS IT WAS PRIOR TO THE REMEDIATION WORKS.

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IN CHARGE:	L. GARCIA
DATE:	8/20/2020

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GENERAL NOTES & SPECIFICATIONS (2 of 2)

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03	

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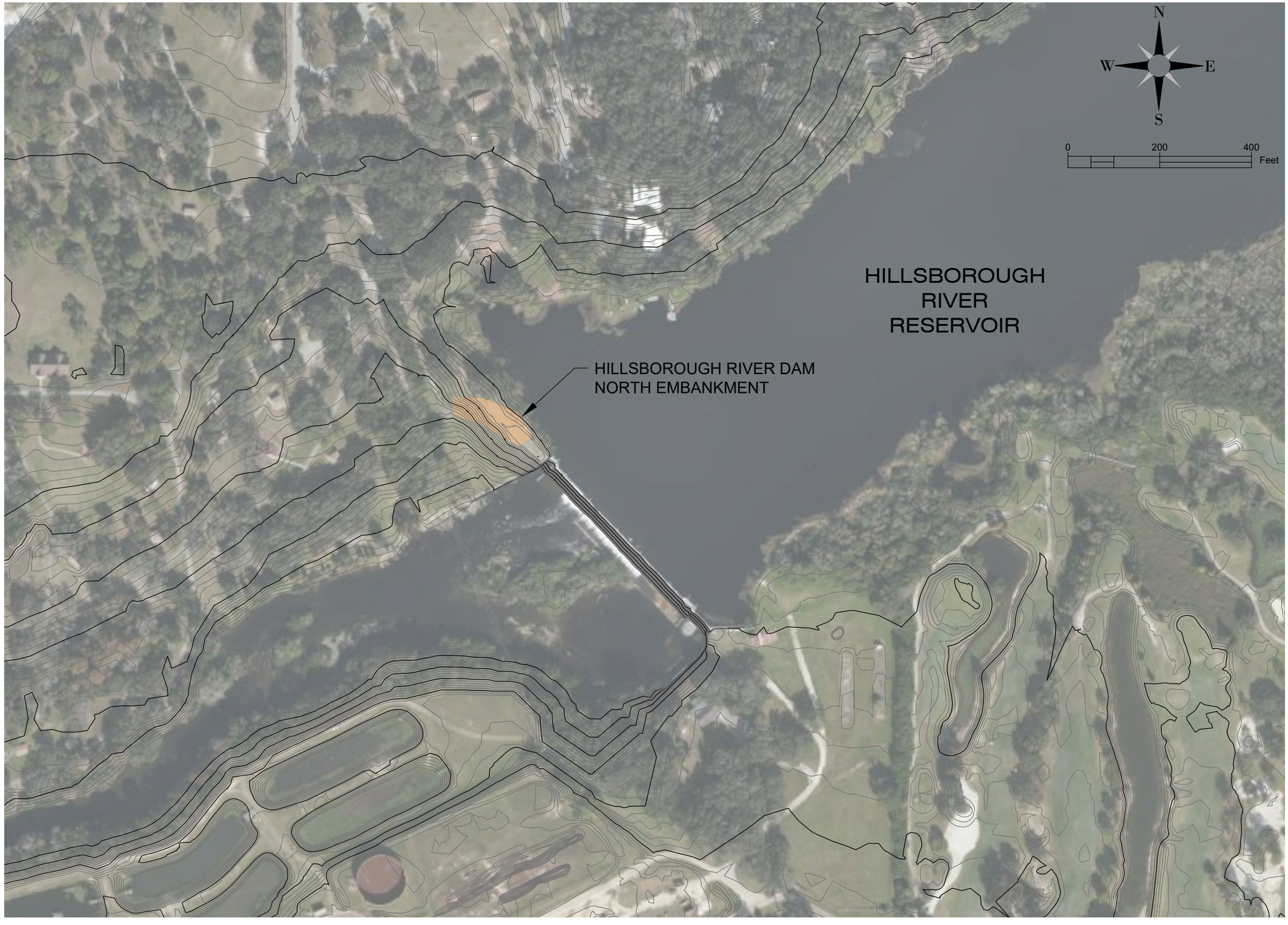

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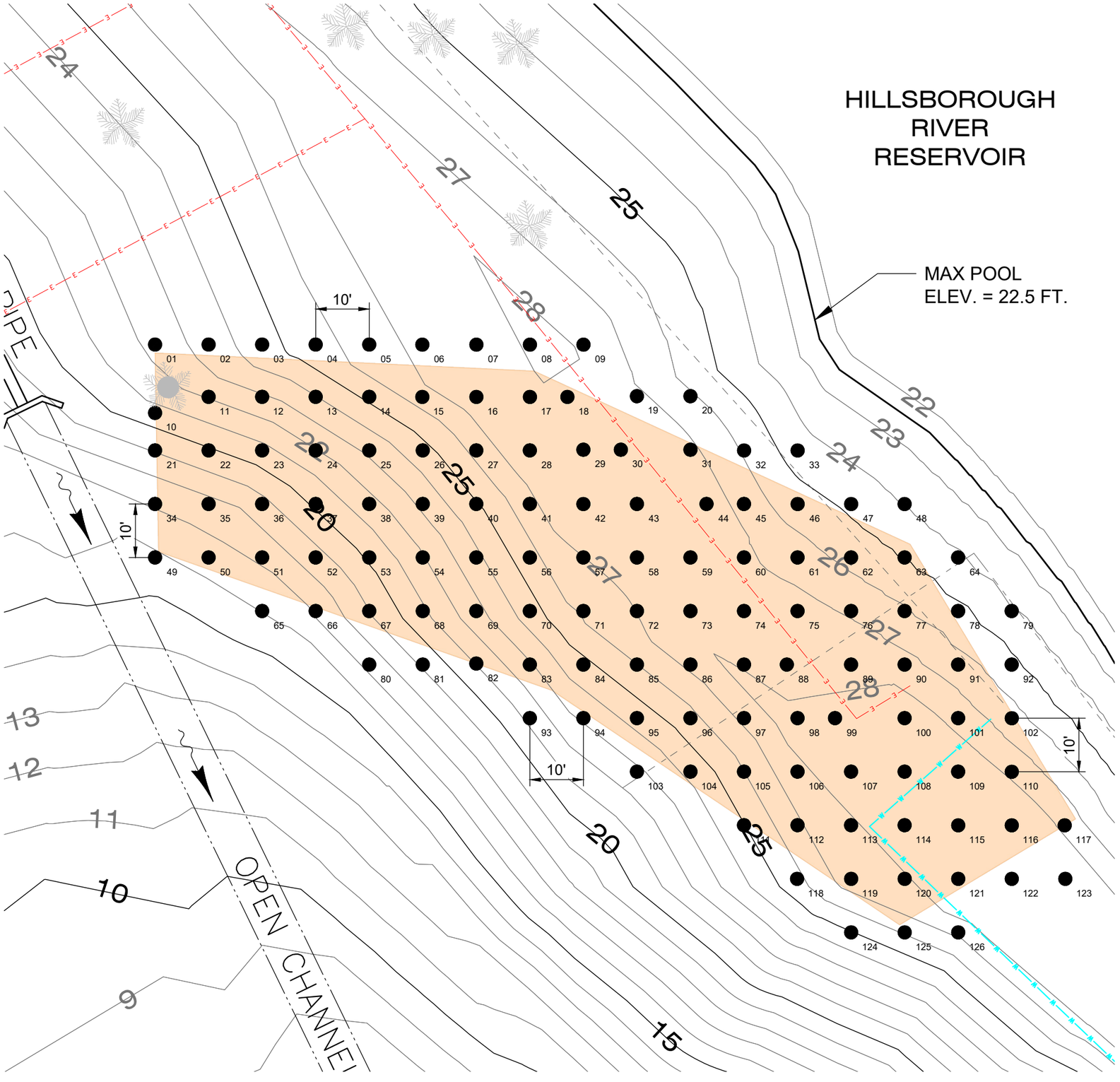
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:

SITE LAYOUT PLAN

SHEET NUMBER:	REV. #
04	

PROJECT NUMBER: 3010079X1 CITY: TAMPA
F:\PROJECTS-C3D\3010079x1 Hillsborough River Dam\Aug_2020\3010079x1_HR Dam_SP.dwg LAYOUT: 04 SAVED: 8/20/2020 3:26 PM PLOTSTYLETABLE: — PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN



LEGEND:

- AREA OF REMEDIATION
- PRIMARY GROUTING POINT LOCATION
- UNDERGROUND WATER LINE
- UNDERGROUND ELECTRICAL LINE

NOTES:

1. CONTOUR LINES WERE OBTAINED FROM THE CITY'S GIS DATABASE.
2. THIS LAYOUT CONSIDERS ONLY PRIMARY GROUT POINTS, IN CASE SECONDARY AND TERTIARY GROUT POINTS ARE REQUIRED, A REVISED LAYOUT WILL BE PROVIDED.
3. CONTRACTOR SHALL CONDUCT EXPLORATORY EXCAVATIONS USING HAND TOOLS TO LOCATE EXISTING WATER AND ELECTRIC UTILITIES SHOWN HEREON. CONTACT CITY OF TAMPA FIELD INSPECTOR PRIOR TO CONDUCTING EXCAVATIONS. UTILITIES MUST BE LOCATED AND STACKED BEFORE GROUTING PROGRAM IS INITIATED.

N
W E
S

0 20 40 Feet

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LUIS A. GARCIA LICENSE No. 76613 STATE OF FLORIDA PROFESSIONAL ENGINEER

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LUIS A. GARCIA
FL. REG. NO.
76613

PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:

LOW MOBILITY GROUT (LMG) LAYOUT

SHEET NUMBER:	REV. #
05	

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS~C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_PRP.dwg LAYOUT: 05 SAVED: 8/20/2020 3:25 PM PLOTSTYLETABLE: ---- PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN

LOW MOBILITY GROUT POINT LOCATIONS (LMG)

Grout Point	Easting (ft.)	Northing (ft.)
1	517622.61	1342151.25
2	517632.61	1342151.25
3	517642.61	1342151.25
4	517652.61	1342151.25
5	517662.61	1342151.25
6	517672.53	1342151.23
7	517682.63	1342151.23
8	517692.63	1342151.23
9	517702.63	1342151.23
10	517622.61	1342138.49
11	517632.61	1342141.49
12	517642.61	1342141.49
13	517652.61	1342141.49
14	517662.61	1342141.49
15	517672.53	1342141.47
16	517682.63	1342141.47
17	517692.63	1342141.47
18	517652.63	1342141.47
19	517712.61	1342141.61
20	517722.61	1342141.61
21	517622.61	1342131.49
22	517632.61	1342131.49
23	517642.61	1342131.49
24	517652.61	1342131.49
25	517662.61	1342131.49
26	517672.61	1342131.49
27	517682.61	1342131.49
28	517692.61	1342131.49
29	517702.61	1342131.61
30	517672.61	1342141.61
31	517722.61	1342131.61
32	517732.63	1342131.47
33	517742.63	1342131.47
34	517622.61	1342121.49
35	517632.61	1342121.49
36	517642.61	1342121.49
37	517652.61	1342121.49
38	517662.61	1342121.49
39	517672.61	1342121.49
40	517682.61	1342121.49
41	517692.61	1342121.49
42	517702.61	1342121.47
43	517712.61	1342121.49
44	517692.61	1342081.49
45	517732.61	1342121.49
46	517742.63	1342121.47
47	517752.63	1342121.47
48	517762.61	1342121.47
49	517622.61	1342111.49
50	517632.61	1342111.49
51	517642.61	1342111.49
52	517652.61	1342111.49
53	517662.61	1342111.49
54	517672.61	1342111.49
55	517682.61	1342111.49
56	517692.61	1342111.49
57	517702.61	1342111.49
58	517712.61	1342111.49
59	517722.61	1342111.49
60	517732.61	1342111.49

Grout Point	Easting (ft.)	Northing (ft.)
61	517742.61	1342111.49
62	517752.61	1342111.49
63	517762.61	1342111.49
64	517772.61	1342111.49
65	517642.61	1342101.49
66	517652.61	1342101.49
67	517662.61	1342101.49
68	517672.61	1342101.49
69	517682.61	1342101.49
70	517692.61	1342101.49
71	517702.61	1342101.49
72	517712.61	1342101.49
73	517722.61	1342101.49
74	517732.61	1342101.49
75	517742.61	1342101.49
76	517752.61	1342101.49
77	517762.61	1342101.49
78	517772.61	1342101.49
79	517782.61	1342101.49
80	517662.61	1342091.49
81	517672.61	1342091.49
82	517682.61	1342091.68
83	517692.61	1342091.49
84	517702.61	1342091.49
85	517712.61	1342091.49
86	517722.61	1342091.49
87	517732.61	1342091.49
88	517740.61	1342091.49
89	517752.61	1342091.49
90	517762.61	1342091.49
91	517772.61	1342091.49
92	517782.61	1342091.49
93	517692.61	1342081.49
94	517702.61	1342081.49
95	517712.61	1342081.49
96	517722.61	1342081.49
97	517732.61	1342081.49
98	517742.61	1342081.49
99	517749.61	1342041.49
100	517749.61	1342081.49
101	517772.61	1342081.49
102	517782.63	1342081.47
103	517712.61	1342071.49
104	517722.61	1342071.49
105	517732.61	1342071.49
106	517742.61	1342071.49
107	517752.61	1342071.49
108	517762.61	1342071.49
109	517772.61	1342071.49
110	517782.63	1342071.47
111	517732.61	1342061.49
112	517742.61	1342061.49
113	517752.61	1342061.49
114	517762.61	1342061.49
115	517772.63	1342061.47
116	517782.63	1342061.47
117	517792.51	1342061.47
118	517742.53	1342051.47
119	517752.63	1342051.47
120	517762.63	1342051.47

Grout Point	Easting (ft.)	Northing (ft.)
121	517772.63	1342051.47
122	517782.63	1342051.47
123	517792.63	1342051.47
124	517752.63	1342041.47
125	517762.63	1342041.47
126	517772.63	1342041.47

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LUIS A. GARCIA
FL. REG. NO.
76613

PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:

LOW MOBILITY GROUT (LMG) POINT COORDINATES

SHEET NUMBER:	REV. #
06	

PLOTSTYLETABLE: --- PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN
PROJECT NUMBER: 301079X1 CITY: TAMPA
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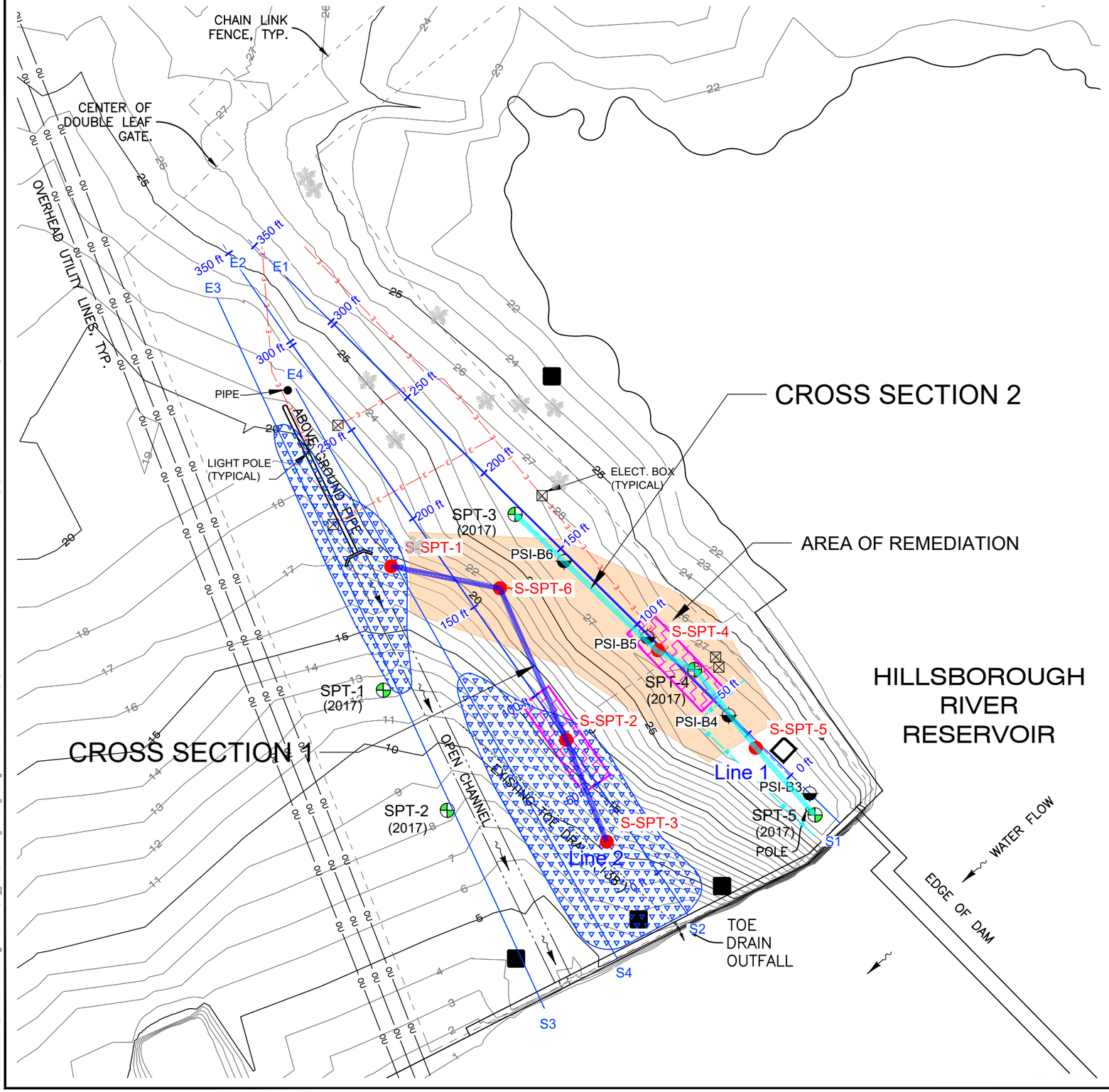

N

W E

S

0 50 100 Feet

LEGEND:

- SUPPLEMENTAL SPT BORING (WOOD 2019)
- SPT BORING LOCATIONS (WOOD 2017)
- CPT SOUNDING LOCATIONS (WOOD 2017)
- HAND AUGER BORING LOCATIONS (WOOD 2017)
- 1998 PSI SPT BORING LOCATIONS
- ERI ANOMALY FEATURE
- MASW ANOMALY FEATURE
- AREA OF REMEDIATION

NOTES:

1. CONTOUR LINES OBTAINED FROM THE CITY'S GIS DATABASE.
2. CONTRACTOR SHALL CONDUCT EXPLORATORY EXCAVATIONS USING HAND TOOLS TO LOCATE EXISTING WATER AND ELECTRIC UTILITIES SHOWN HEREON. CONTACT CITY OF TAMPA FIELD INSPECTOR PRIOR TO CONDUCTING EXCAVATIONS. UTILITIES MUST BE LOCATED AND STAKED BEFORE THE GROUTING PROGRAM IS INITIATED.

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LUIS A. GARCIA
FL. REG. NO.
76613

PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

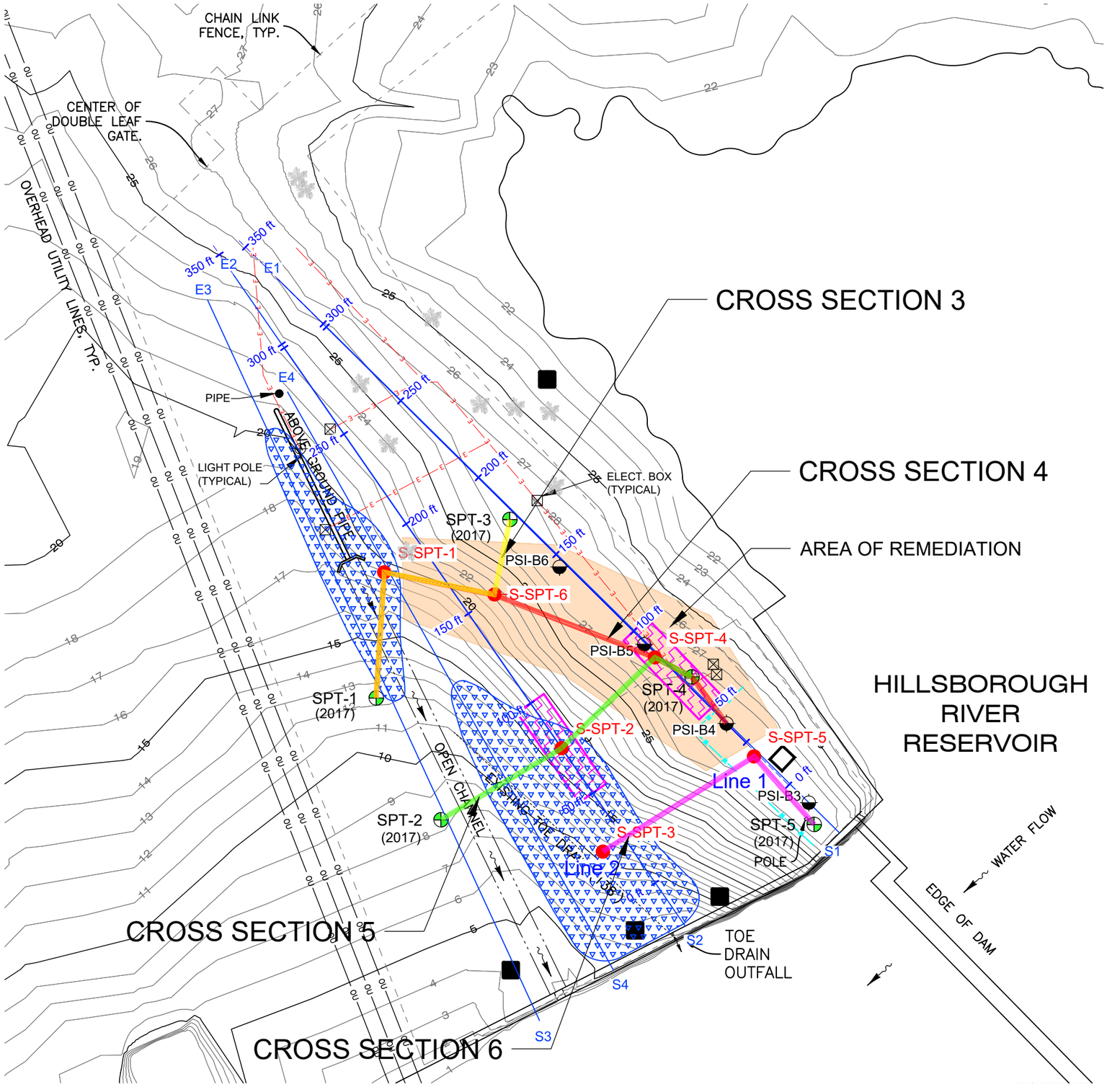
DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

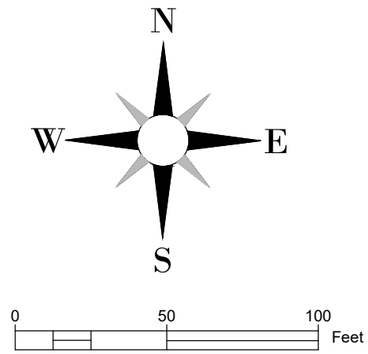
SHEET TITLE:

SOIL PROFILES 1 & 2

SHEET NUMBER:	REV. #
07	

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS-C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_BL.dwg LAYOUT: 07 SAVED: 8/20/2020 3:24 PM PLOTSTYLETABLE: — PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN





LEGEND:

- SUPPLEMENTAL SPT BORING (WOOD 2019)
- SPT BORING LOCATIONS (WOOD 2017)
- CPT SOUNDING LOCATIONS (WOOD 2017)
- HAND AUGER BORING LOCATIONS (WOOD 2017)
- 1998 PSI SPT BORING LOCATIONS
- ERI ANOMALY FEATURE
- MASW ANOMALY FEATURE
- AREA OF REMEDIATION

NOTES:

1. CONTOUR LINES OBTAINED FROM THE CITY'S GIS DATABASE.
2. CONTRACTOR SHALL CONDUCT EXPLORATORY EXCAVATIONS USING HAND TOOLS TO LOCATE EXISTING WATER AND ELECTRIC UTILITIES SHOWN HEREON. CONTACT CITY OF TAMPA FIELD INSPECTOR PRIOR TO CONDUCTING EXCAVATIONS. UTILITIES MUST BE LOCATED AND STAKED BEFORE THE GROUTING PROGRAM IS INITIATED.

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LUIS A. GARCIA
FL. REG. NO.
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PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:

SOIL PROFILES 3, 4, 5 & 6

SHEET NUMBER:	REV. #
08	

PROJECT NUMBER: 301079X1 CITY: TAMPA
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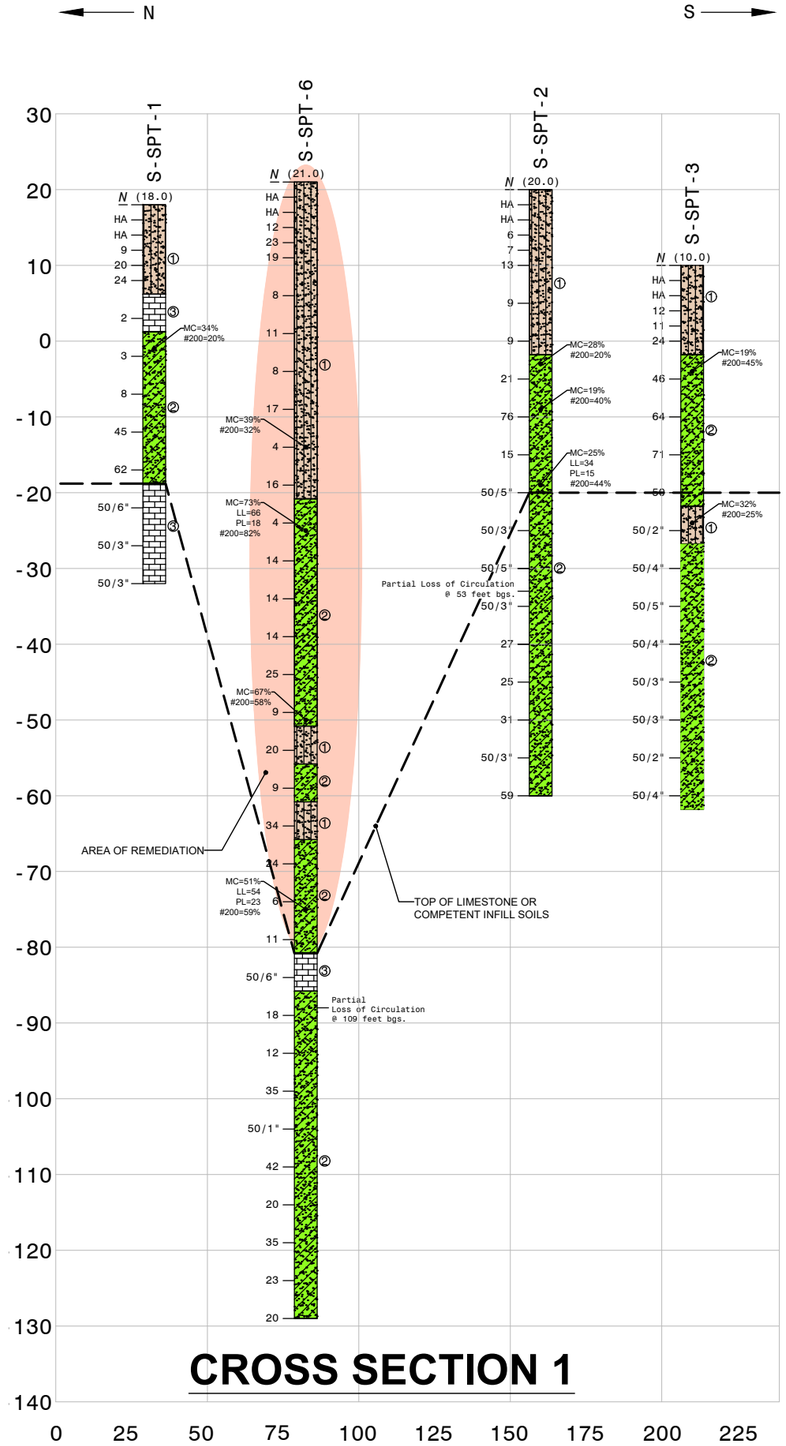

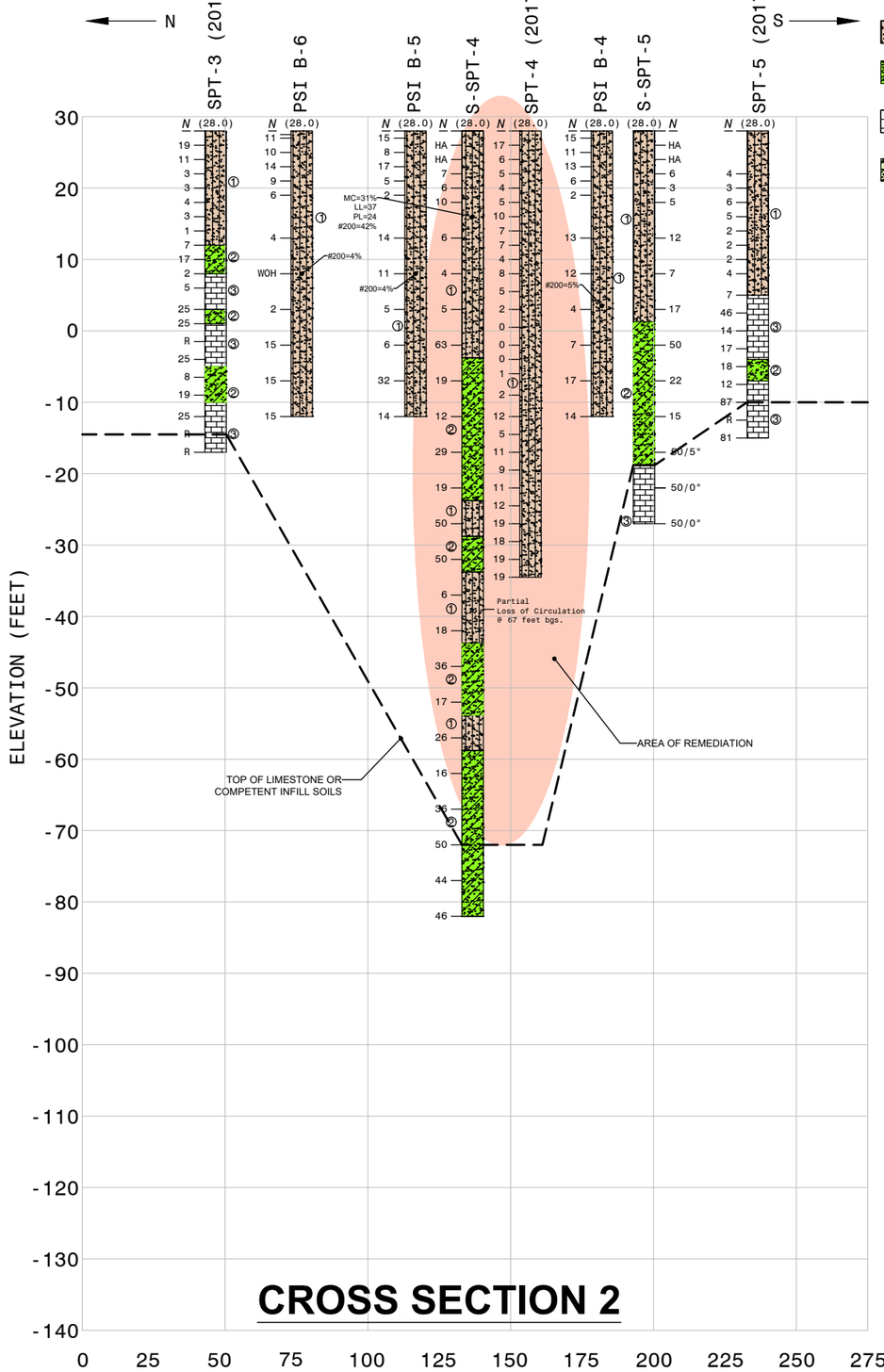

LEGEND

1. EMBANKMENT FILLS AND UNDIFFERENTIAL SURFICIAL SOILS
2. CLAYEY SANDS (SC) AND SANDS (SP)
3. LIMESTONE WITH TRACE CALCAREOUS CLAYS (CL)
4. INFILL CLAYS: CALCAREOUS SANDY CLAYS (CL) AND CLAYS (CL) WITH LIMESTONE FRAGMENTS

(28.0)	APPROXIMATE GROUND ELEVATION (NAVD88)
R	REFUSAL
▼	DEPTH OF WATER TABLE
WOH	WEIGHT OF HAMMER

NOTE:
ELEVATIONS ARE APPROXIMATED BASED ON CONTOUR MAP PROVIDED BY CITY OF TAMPA WATER DEPARTMENT

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LUIS A. GARCIA
FL. REG. NO.
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PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS

NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:
SUBSURFACE PROFILE (1 OF 3)

SHEET NUMBER:	REV. #
09	

PROJECT NUMBER: 301079X1 CITY: TAMPA
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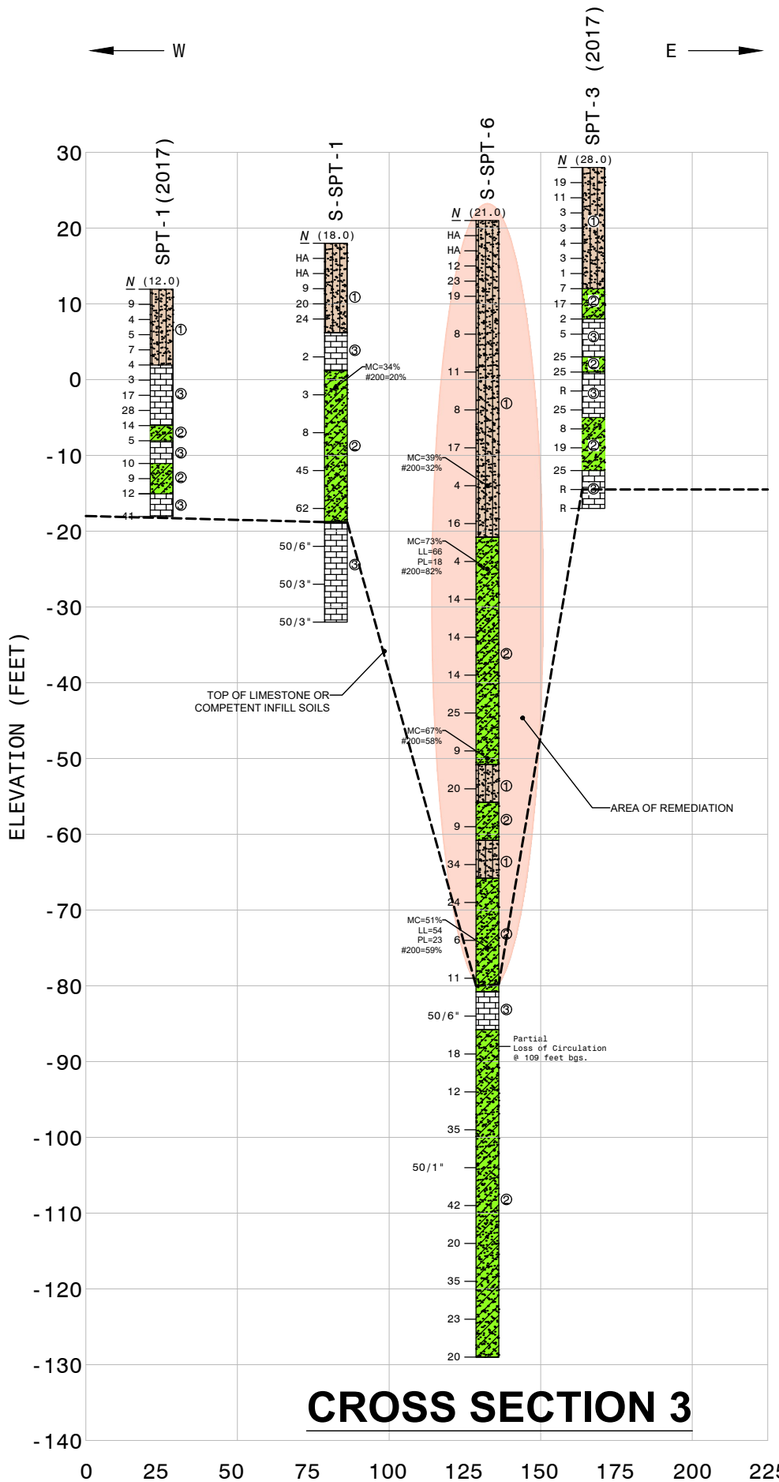
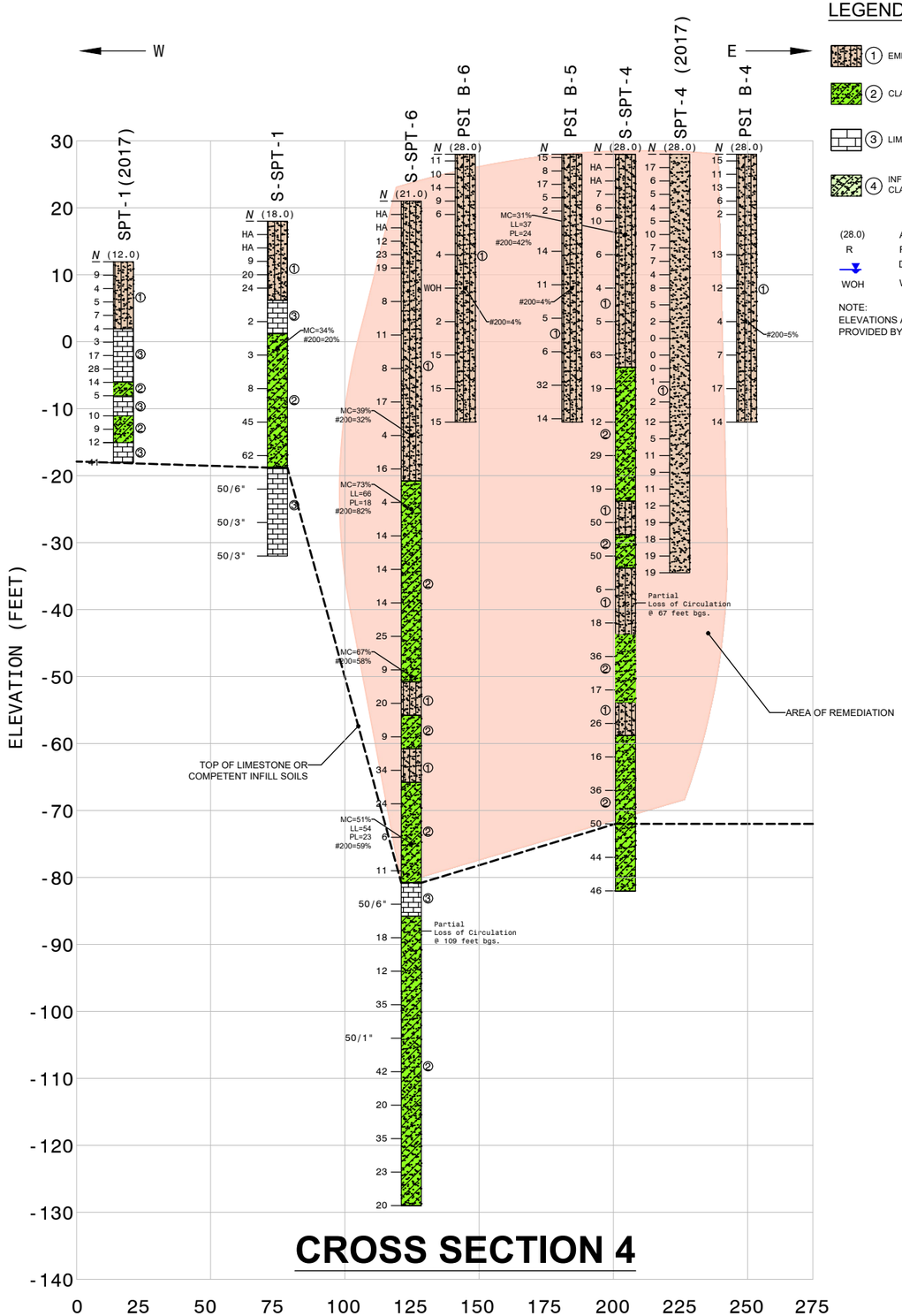


CROSS SECTION 3



CROSS SECTION 4

LEGEND

1. EMBANKMENT FILLS AND UNDIFFERENTIAL SURFICIAL SOILS
2. CLAYEY SANDS (SC) AND SANDS (SP)
3. LIMESTONE WITH TRACE CALCAREOUS CLAYS (CL)
4. INFILL CLAYS: CALCAREOUS SANDY CLAYS (CL) AND CLAYS (CL) WITH LIMESTONE FRAGMENTS

(28.0)	APPROXIMATE GROUND ELEVATION (NAVD88)
R	REFUSAL
▽	DEPTH OF WATER TABLE
WOH	WEIGHT OF HAMMER

NOTE:
ELEVATIONS ARE APPROXIMATED BASED ON CONTOUR MAP PROVIDED BY CITY OF TAMPA WATER DEPARTMENT

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LUIS A. GARCIA
FL. REG. NO.
76613

PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

SHEET TITLE:
SUBSURFACE PROFILE (2 OF 3)

SHEET NUMBER:	REV. #
10	

PROJECT NUMBER: 301079X1 CITY: TAMPA
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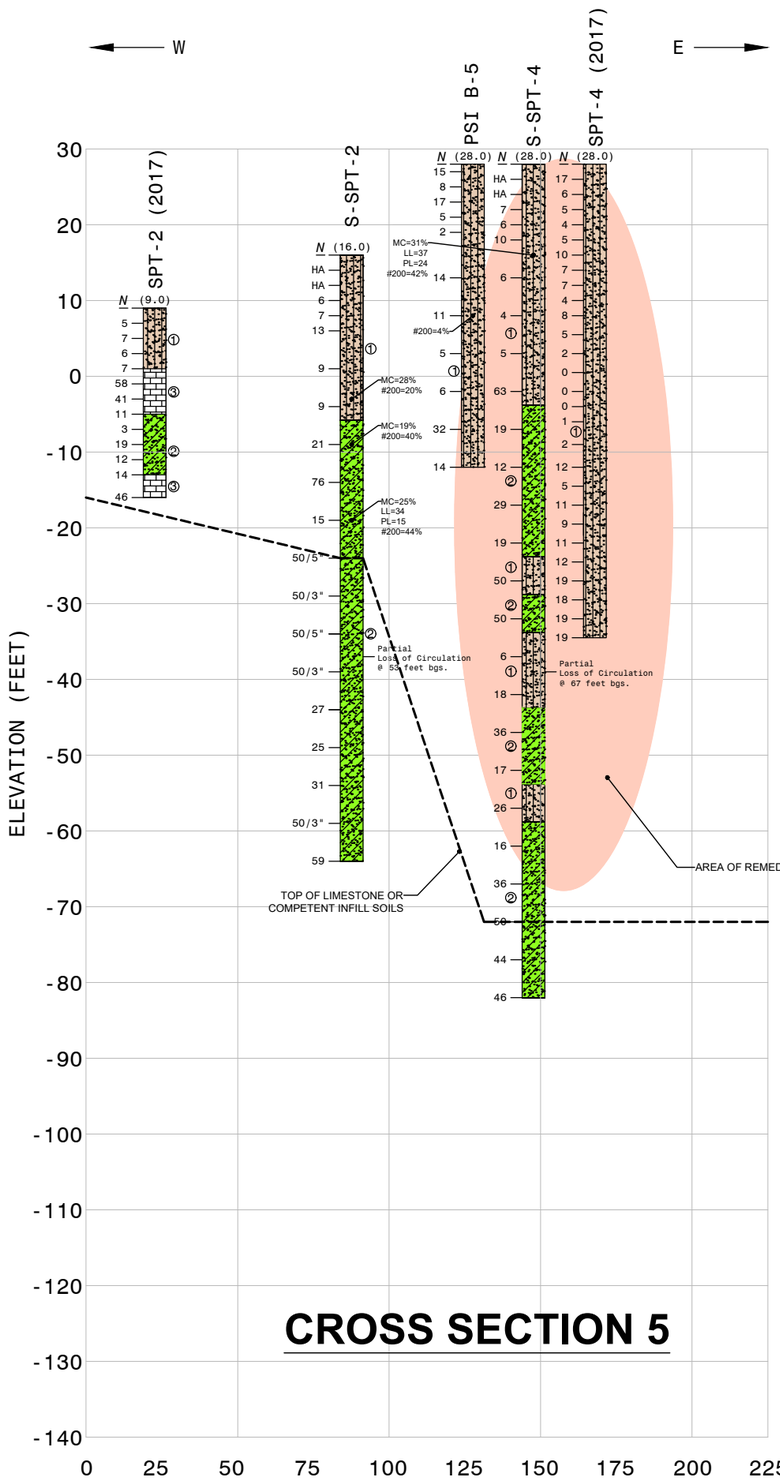
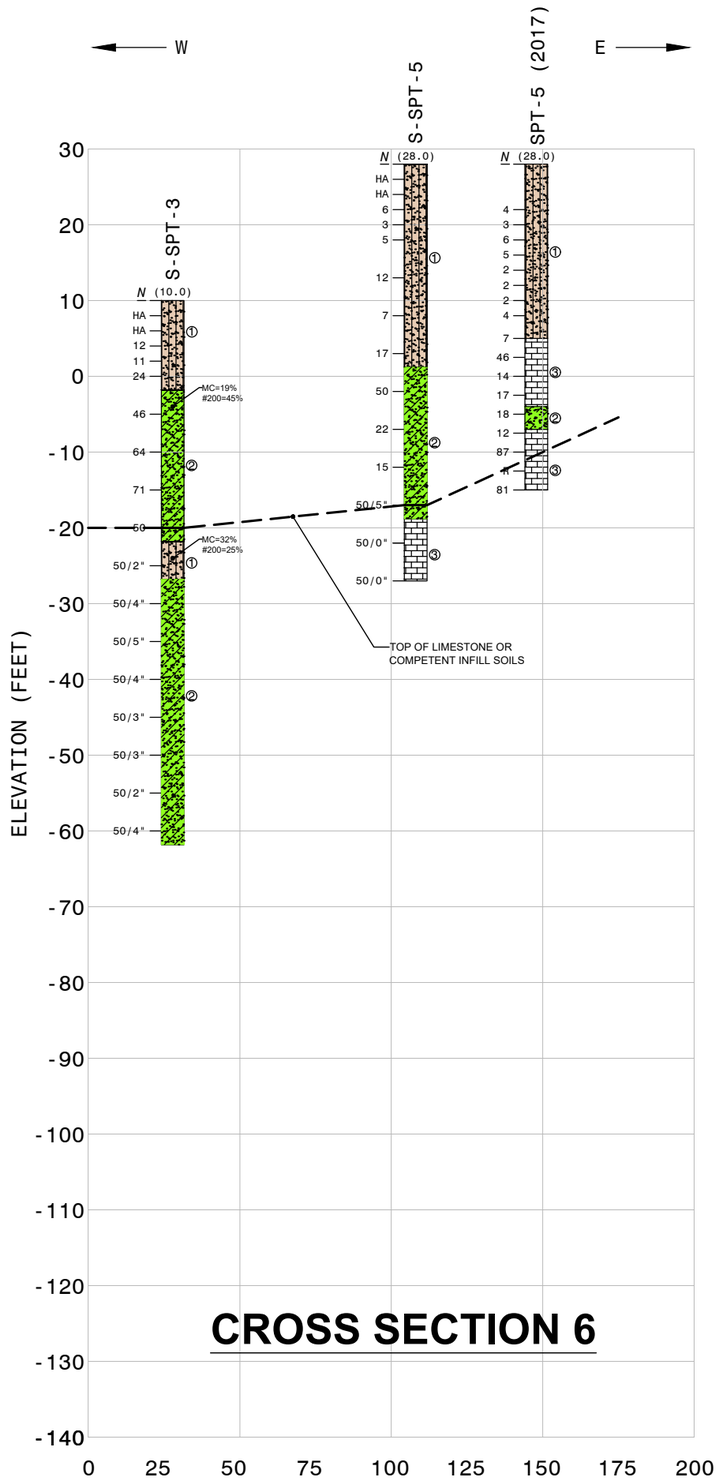


CROSS SECTION 5



CROSS SECTION 6

LEGEND

1. EMBANKMENT FILLS AND UNDIFFERENTIAL SURFICIAL SOILS
2. CLAYEY SANDS (SC) AND SANDS (SP)
3. LIMESTONE WITH TRACE CALCAREOUS CLAYS (CL)
4. INFILL CLAYS: CALCAREOUS SANDY CLAYS (CL) AND CLAYS (CL) WITH LIMESTONE FRAGMENTS

(28.0)	APPROXIMATE GROUND ELEVATION (NAVD88)
R	REFUSAL
▽	DEPTH OF WATER TABLE
WOH	WEIGHT OF HAMMER

NOTE:
ELEVATIONS ARE APPROXIMATED BASED ON CONTOUR MAP PROVIDED BY CITY OF TAMPA WATER DEPARTMENT

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ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.
1101 E. Channelside Dr., Suite 200
Tampa, FL 33602
Phone: 1.813.289.0750
www.woodplc.com
CA-5392

URS
URS CORPORATION SOUTHERN
7650 W. Courtney Campbell Causeway
Waterford Plaza, Suite 700
Tampa, FL 33607 (813) 286-1711
Engineering Business No. 00000002

LUIS A. GARCIA LICENSE No. 76613 STATE OF FLORIDA PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY LUIS GARCIA ON 9/14/20 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.

LUIS A. GARCIA
FL. REG. NO.
76613

PROJECT:
HILLSBOROUGH RIVER DAM

NORTH EMBANKMENT REMEDIATION PLANS

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET, 5E
TAMPA, FLORIDA 34691

WOOD PROJECT No:
301079X1

REVISIONS

NO.	DATE	BY	APPROVED

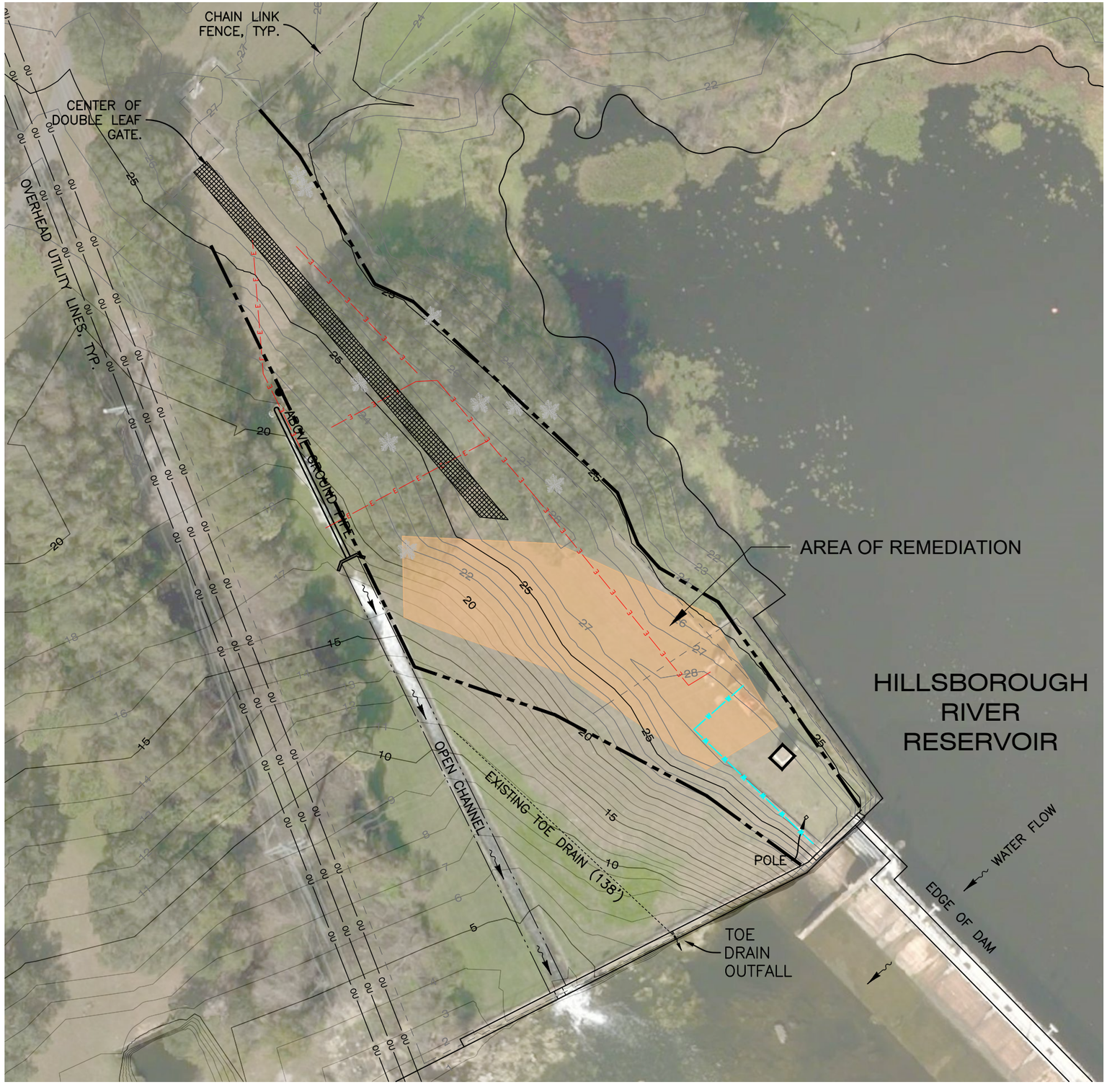
DESIGNED BY:	L. GARCIA
DRAWN BY:	M. VIVES
CHECKED BY:	L. BROMWELL
IN CHARGE:	L. GARCIA
DATE:	8/20/2020

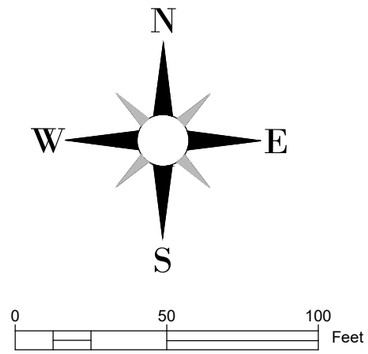
SHEET TITLE:

SUBSURFACE PROFILE (3 OF 3)

SHEET NUMBER:	REV. #
11	

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS-C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_Profiles.dwg LAYOUT: 11 SAVED: 8/20/2020 3:29 PM PLOTSTYLETABLE: --- PLOTTED: 8/20/2020 3:32 PM DRAWN BY: VIVES, MARTIN





LEGEND:

- AREA OF REMEDIATION
- ENVIRONMENTAL PROTECTION BMP SYSTEM
- ACCESS ROAD

NOTES:

1. CONTOUR LINES OBTAINED FROM THE CITY'S GIS DATABASE.
2. CONTRACTOR SHALL CONDUCT EXPLORATORY EXCAVATIONS USING HAND TOOLS TO LOCATE EXISTING WATER AND ELECTRIC UTILITIES SHOWN HEREON AS WELL AS FIBER OPTIC CABLE THAT IS NOT SHOWN BUT IS IN THE GENERAL VICINITY AND RUNNING PARALLEL TO THE ELECTRICAL LINE. THE CITY OF TAMPA WILL ASSIST TO THE EFFORT TO LOCATE THE EXISTING CONDUITS. THE CONDUITS MUST BE LOCATED AND STAKED BEFORE THE GROUTING PROGRAM IS INITIATED.

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SHEET TITLE:

ENVIRONMENTAL PROTECTION PLAN

SHEET NUMBER:	REV. #
12	

PROJECT NUMBER: 301079X1 CITY: TAMPA
F:\PROJECTS-C3D\301079x1 Hillsborough River Dam\Aug_2020\301079x1_HR Dam_BL.dwg LAYOUT: 12 SAVED: 8/20/2020 3:24 PM PLOTSTYLETABLE: — PLOTTED: 8/20/2020 3:33 PM DRAWN BY: VIVES, MARTIN