

Appendix P. Relevant Permitting Documentation

DRAFT



P.1 SWFWMD ERP Pre-Application Meeting Minutes

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THIS FORM IS INTENDED TO FACILITATE AND GUIDE THE DIALOGUE DURING A PRE-APPLICATION MEETING BY PROVIDING A PARTIAL "PROMPT LIST" OF DISCUSSION SUBJECTS. IT IS NOT A LIST OF REQUIREMENTS FOR SUBMITTAL BY THE APPLICANT.



**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
RESOURCE REGULATION DIVISION
PRE-APPLICATION MEETING NOTES**

**FILE
NUMBER:
PA 412612**

Date:	7/24/25		
Time:	11 am		
Project Name:	BAR PA 412612 - South Howard Flood Relief and Streetscape Project		
District Engineer:	Bob Dasta, Amber Smith		
District ES:	Russell Martin, John Clarke		
Attendees:	Brett Sillman, Amanda Serra, Christian Chandler, Cristina Jackson		
County:	Hillsborough	Sec/Twp/Rge:	26,27/29/18
Total Land Acreage:		Project Acreage:	Acres

Prior On-Site/Off-Site Permit Activity:

- ERP - 20724, 6550
- Pre App 404594

Project Overview:

- Comments provided - Project aims to alleviate roadway and structural flooding within the Parkland Estates and Palma Ceia Pines neighborhoods in South Tampa by constructing at least 5000 linear feet of new box culvert outfall to Hillsborough Bay
- W Swann Avenue at S Audubon Avenue
- If any localized closed basins (up to 100-year, 24-hour storm) are now being conveyed to the bay, address pollutant loading and may need treatment to ensure no increasing of pollutants to the bay.
- Tidal receiving waterbody
- THEA South Selmon Capacity Project. Taking in runoff from Albany Pond, Waltrous Ave overpass
- Taking some runoff that originally went to a pond today. Some of this runoff is to ERP permitted ponds (i.e., Swann Pond, etc). Will need to provide compensatory water quality treatment for this runoff which will now bypass its treatment pond and go to the bay.
- Anticipate submittal in spring 2026
- Discussed that South Selmon Capacity project currently under review (Application ID 915140) will be conditioned that construction cannot occur until permitting and construction of this trunkline project occurs. May modify current application for South Selmon to remove portion discharging to trunkline as we cannot transfer to operation portions of South Selmon separately.

Environmental Discussion: (Wetlands On-Site, Wetlands on Adjacent Properties, Delineation, T&E species, Easements, Drawdown Issues, Setbacks, Justification, Elimination/Reduction, Permanent/Temporary Impacts, Secondary and Cumulative Impacts, Mitigation Options, SHWL, Upland Habitats, Site Visit, etc.)

- FWC Manatee conditions for in water work. Possible surface water impacts from riprap installation at existing outfall into Hillsborough Bay.
- Provide the limits of jurisdictional wetlands and surface waters. Roadside ditches or other water conveyances, including permitted and constructed water conveyance features, can be claimed as surface waters per Chapter 62-340 F.A.C. if they do not meet the definition of a swale as stated under Rule 403.803 (14) F.S.
- Notice of changes to Florida Statutes: Be advised that Senate Bill 492 provides changes to the Mitigation Banking statute and Senate Bill 180 provides changes to the tolling period of permits and formal determinations related to emergency orders.
Link to Senate Bill 492: <https://www.flsenate.gov/Session/Bill/2025/492/?Tab=BillText>.
Link to Senate Bill 180: <https://www.flsenate.gov/Session/Bill/2025/180/?Tab=BillText> .
- A site visit by District staff will be required to verify the presence or absence of wetlands and/or surface waters. Prior to the site visit, District staff will contact the applicant or authorized agent to provide an approximate date of the site visit and to ensure that the project area is accessible. If wetlands or surface waters are discovered during the site visit, additional information may be required. A site visit will not be scheduled until the appropriate signatures on the application and the fee is submitted.

- On February 15, 2024, the U.S. District Court for the District of Columbia issued a decision vacating the U.S. Environmental Protection Agency's approval of Florida's application to assume Clean Water Act Section 404 permitting responsibilities in certain waters in Florida. In light of this decision, the U.S. Army Corps of Engineers (USACE) is currently the only entity in the State of Florida with authority to issue permits under Section 404 of the Clean Water Act. The USACE recognizes that either the District Court or an Appellate Court may issue a full or partial stay of the February 15th order at some point. In the interim, applicants may submit applications to the USACE for activities involving the discharge of dredged or fill material into formerly state-assumed waters. The USACE will begin processing any applications it receives, however applicants and stakeholders should recognize the uncertainty surrounding the current litigation. Further information can be found at these two links:

<https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/state-404-program>

<https://www.saj.usace.army.mil/Missions/Regulatory/>

Site Information Discussion: (SHW Levels, Floodplain, Tailwater Conditions, Adjacent Off-Site Contributing Sources, Receiving Waterbody, etc.)

- WBIDs need to be independently verified by the consultant
 - WBID 1609 discharges directly to Tampa Bay.
 - Tampa Bay is impaired for nutrients.
- Document/justify SHWE's at pond locations
- Stormwater retention and detention systems are classified as moderate sanitary hazards with respect to public and private drinking water wells. Stormwater treatment facilities shall not be constructed within 100 feet of an existing public water supply well and shall not be constructed within 75 feet of an existing private drinking water well. Subsection 4.2, A.H.V.II.
- Any wells on site should be identified and their future use/abandonment must be designated.

Water Quantity Discussions: (Basin Description, Storm Event, Pre/Post Volume, Pre/Post Discharge, etc.)

- Storage modeling will be required to demonstrate no increase in flood stages will occur on off-site properties, using the mean annual, 10-year, 25-year, and 100-year storm events.
- Demonstrate that site will not impede the conveyance of contributing off-site flows.
- Demonstrate that the project will not increase flood stages up- or down-stream of the project area(s).
- Watershed Model information may be available for download using the following link:
<https://watermatters.sharefile.com/d-s8c9019e00fd243908654e733a6b2016c>
- Provide equivalent compensating storage for all 100-year, 24-hour riverine floodplain impacts if applicable. Providing cup-for-cup storage in dedicated areas of excavation is the preferred method of compensation; if no impacts to flood conveyance are proposed and storage impacts and compensation occur within the same basin. In this case, tabulations should be provided at 0.5-foot increments to demonstrate encroachment and compensation occur at the same levels. Otherwise, storage modeling will be required to demonstrate no increase in flood stages will occur on off-site properties, using the mean annual, 10-year, 25-year, and 100-year storm events for the pre- and post-development conditions.
- Please be aware that if there is credible historical evidence of past flooding or the physical capacity of the downstream conveyance or receiving waters indicates that the conditions for issuance will not be met without consideration of storm events of different frequency or duration, applicants shall be required to provide additional analyses using storm events of different duration or frequency than the 25-year 24-hour storm event, or to adjust the volume, rate or timing of discharges. [Section 3.0 Applicant's Handbook Volume II]
- On June 28, 2024, Senate Bill 7040, which updates Florida's stormwater rules and design criteria, was signed into law. The updates affect the water quality treatment performance standards, Operation & Maintenance (O&M) requirements, and Dam Safety requirements. Further information regarding the updated rules and design criteria, implementation timeline and grandfathering provisions can be found at the following link: <https://floridadep.gov/water/engineering-hydrology-geology/content/erp-stormwater-resource-center>

Water Quality Discussions: (Type of Treatment, Technical Characteristics, Non-presumptive Alternatives, etc.)

- Provide water quality treatment for entire project area and all contributing off-site flows.
- If any localized closed basins (up to 100-year, 24-hour storm) are now being conveyed to the bay, address pollutant loading and may need treatment to ensure no increasing of pollutants to the bay.

- Taking some runoff that originally went to a pond today. Some of this runoff is to ERP permitted ponds (i.e., Swann Pond, etc). Will need to provide compensatory water quality treatment for this runoff which will now bypass its treatment pond and go to the bay.
- On June 28, 2024, Senate Bill 7040, which updates Florida's stormwater rules and design criteria, was signed into law. The updates affect the water quality treatment performance standards, Operation & Maintenance (O&M) requirements, and Dam Safety requirements. Further information regarding the updated rules and design criteria, implementation timeline and grandfathering provisions can be found at the following link: <https://floridadep.gov/water/engineering-hydrology-geology/content/erp-stormwater-resource-center>

Sovereign Lands Discussion: (Determining Location, Correct Form of Authorization, Content of Application, Assessment of Fees, Coordination with FDEP)

- Coordination with the Tampa Port Authority for projects located in Hillsborough County is recommended.

Operation and Maintenance/Legal Information: (Ownership or Perpetual Control, O&M Entity, O&M Instructions, Homeowner Association Documents, Coastal Zone requirements, etc.)

- The permit must be issued to entity that owns or controls the property.
- Provide evidence of ownership or control by deed, easement, contract for purchase, etc. Evidence of ownership or control must include a legal description. A Property Appraiser summary of the legal description is NOT acceptable.

Application Type and Fee Required:

- SWERP – Sections A, C, and E of the ERP Application.
- Consult the [fee schedule](#) for different thresholds.

Other: (Future Pre-Application Meetings, Fast Track, Submittal Date, Construction Start Date, Required District Permits – WUP, WOD, Well Construction, etc.)

- An application for an individual permit to construct or alter a dam, impoundment, reservoir, or appurtenant work, requires that a notice of receipt of the application must be published in a newspaper within the affected area. Provide documentation that such noticing has been accomplished. Note that the published notices of receipt for an ERP can be in accordance with the language provided in Rule 40D-1.603(10), F.A.C.
- Provide a copy of the legal description (of all applicable parcels within the project area) in one of the following forms:
 - a. Deed with complete Legal Description attachment.
 - b. Plat.
 - c. Boundary survey of the property(ies) with a sketch.
- The plans and drainage report submitted electronically must include the appropriate information required under Rules 61G15-23.005 and 61G15-23.004 (Digital), F.A.C. [Note: digital signature notes were revised in a rule update on April 21, 2025] The following text is required by the Florida Board of Professional Engineers (FBPE) to meet this requirement when a digitally created seal is not used and must appear where the signature would normally appear:

ELECTRONIC (Manifest): *[NAME] State of Florida, Professional Engineer, License No. [NUMBER] This item has been electronically signed and sealed by [NAME] on the date indicated here using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies*

DIGITAL: *[NAME] State of Florida, Professional Engineer, License No. [NUMBER]; This item has been digitally signed and sealed by [NAME] on the date indicated here. Signature must be verified on any electronic copies.*

- Provide soil erosion and sediment control measures for use during construction. Refer to ERP Applicant's Handbook Vol. 1 Part IV Erosion and Sediment Control.
- Demonstrate that excavation of any stormwater ponds does not breach an aquitard (see Subsection 2.1.1, A.H.V.II) such that it would allow for lesser quality water to pass, either way, between the two systems. In those geographical areas of the District where there is not an aquitard present, the depth of the pond(s) shall

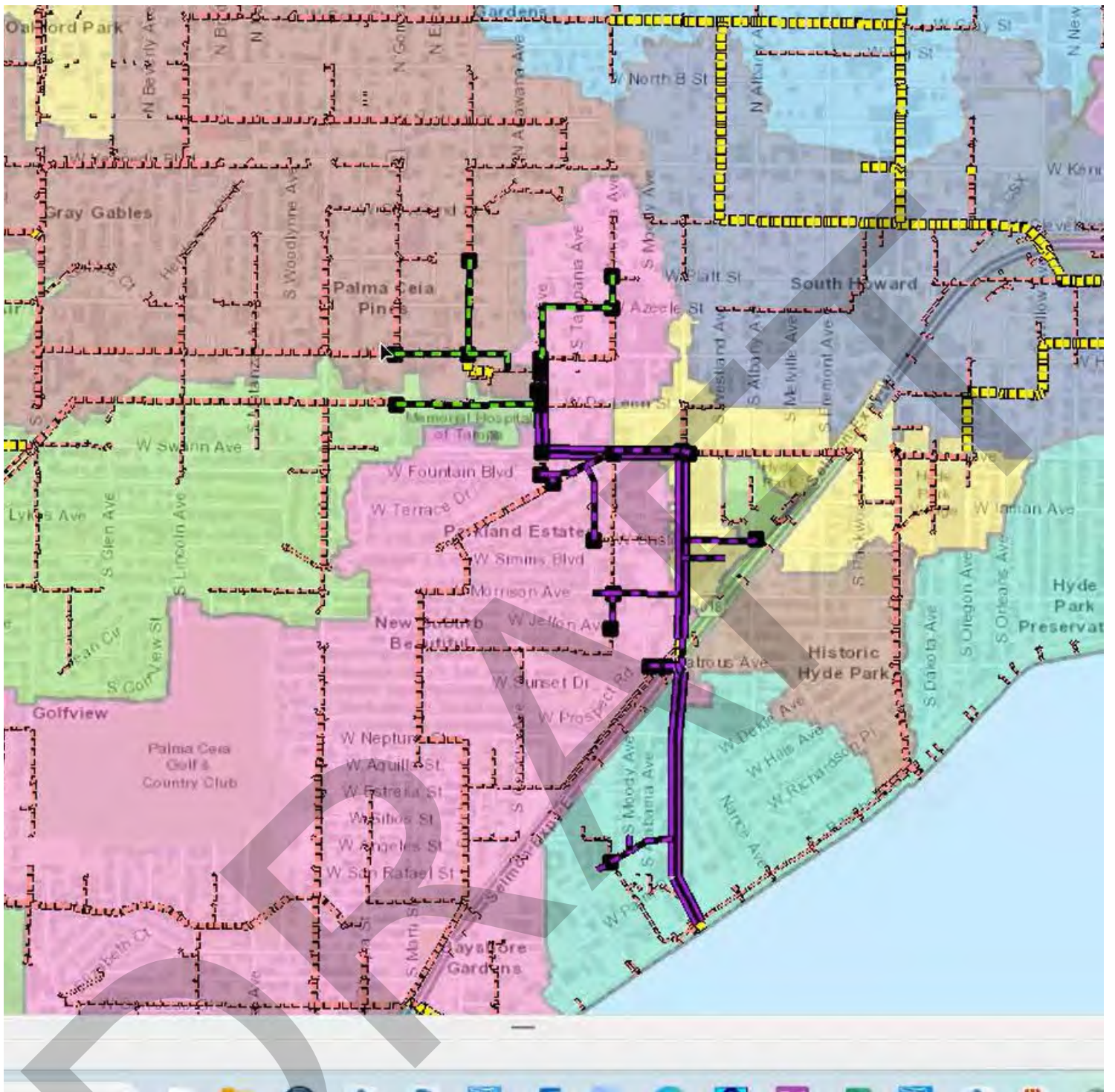
not be excavated to within two (2) feet of the underlying limestone which is part of a drinking water aquifer. [Refer to Subsection 5.4.1(b), A.H.V.II]

- If lowering of SHWE is proposed, then burden is on Applicant to demonstrate no adverse onsite or offsite impacts as per Subsection 3.6, A.H.V.II. Groundwater drawdown 'radius of influence' computations may be required to demonstrate no adverse onsite or offsite impacts. Please note that new roadside swales or deepening of existing roadside swales may result in lowering of SHWE. Proposed ponds with control elevation less than SHWE may result in adverse lowering of onsite or offsite groundwater.
- On February 15, 2024, the U.S. District Court for the District of Columbia issued a decision vacating the U.S. Environmental Protection Agency's approval of Florida's application to assume Clean Water Act Section 404 permitting responsibilities in certain waters in Florida. In light of this decision, the U.S. Army Corps of Engineers (USACE) is currently the only entity in the State of Florida with authority to issue permits under Section 404 of the Clean Water Act. The USACE recognizes that either the District Court or an Appellate Court may issue a full or partial stay of the February 15th order at some point. In the interim, applicants may submit applications to the USACE for activities involving the discharge of dredged or fill material into formerly state-assumed waters. The USACE will begin processing any applications it receives, however applicants and stakeholders should recognize the uncertainty surrounding the current litigation. Further information can be found at these two links:

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<https://www.saj.usace.army.mil/Missions/Regulatory/>

Disclaimer: The District ERP pre-application meeting process is a service made available to the public to assist interested parties in preparing for submittal of a permit application. Information shared at pre-application meetings is superseded by the actual permit application submittal. District permit decisions are based upon information submitted during the application process and Rules in effect at the time the application is complete.



P.2 AMI Pond ERP Documentation

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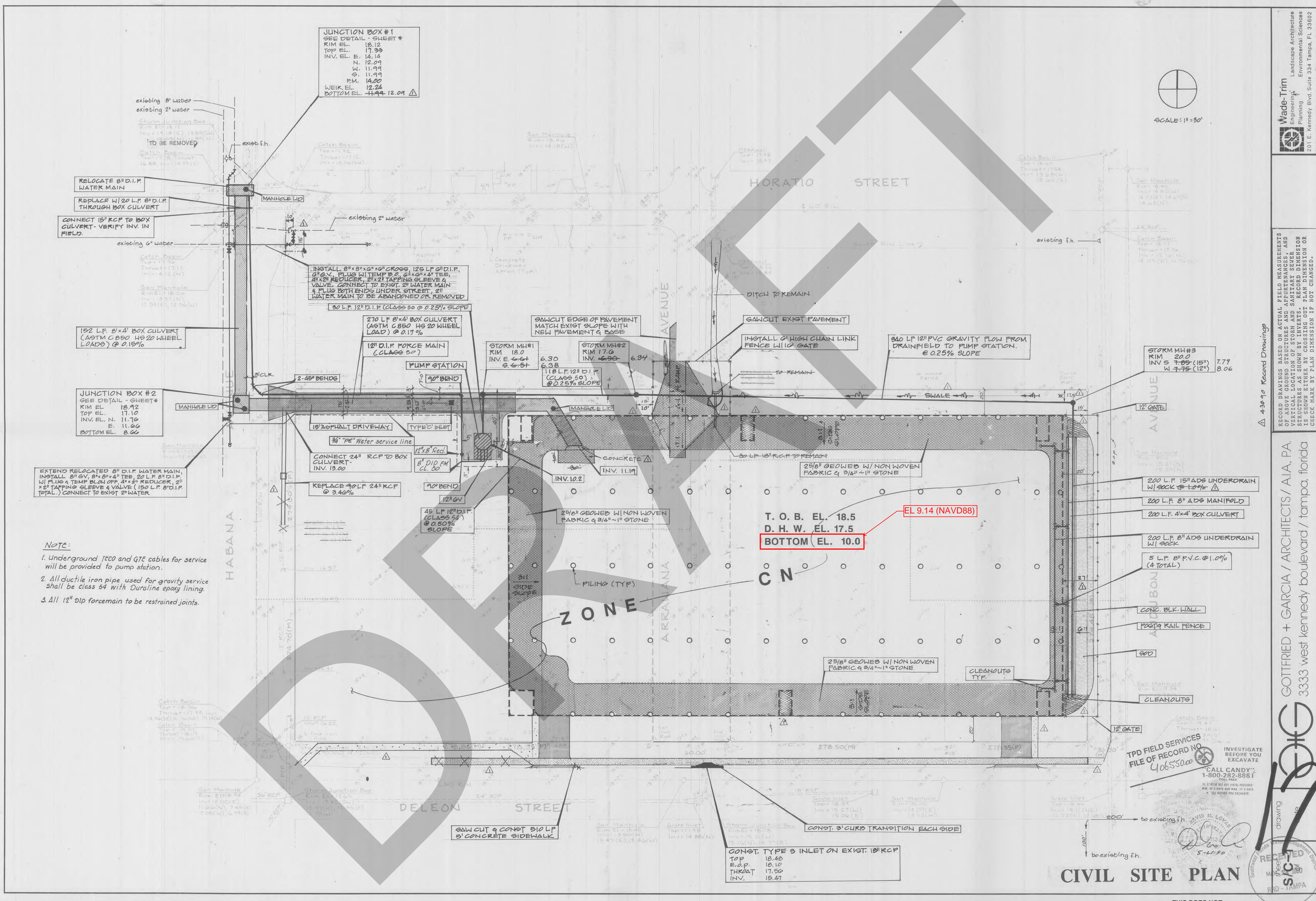
RECORD DRAWINGS
 4-30-10 Record Drawings

GOTTFRIED + GARCIA / ARCHITECTS / A.I.A. PA
 3333 West Kennedy boulevard / Tampa, Florida

RECEIVED
 MAY 10 2010
 RPD - TAMPA



SCALE: 1" = 50'



JUNCTION BOX #1
 SEE DETAIL - SHEET #
 RIM EL. 18.12
 TOP EL. 17.33
 INV. EL. E. 14.14
 N. 12.09
 W. 11.99
 S. 11.99
 P.M. 14.00
 WEIR EL. 12.24
 BOTTOM EL. 11.44-12.09

RELOCATE 8" D.I.P. WATER MAIN
 REPLACE W/ 20 L.F. 8" D.I.P. THROUGH BOX CULVERT
 CONNECT 15" RCP TO BOX CULVERT - VERIFY INV. IN FIELD

INSTALL 8" x 8" x 6" CROSS 125 L.F. 8" D.I.P. 2" G.V. PLUS W/ TEMP. 2" 2" x 2" x 4" TEE, 2" x 2" REDUCER, 2" x 2" TAPPING GLEEVE & VALVE. CONNECT TO EXIST. 2" WATER MAIN & PLUG BOTH ENDS UNDER STREET. 2" WATER MAIN TO BE ABANDONED OR REMOVED
 30 L.F. 12" D.I.P. (CLASS 50 @ 0.25% SLOPE)

152 L.F. 8" x 4" BOX CULVERT (ASTM C 890 HG 20 WHEEL LOADS) @ 0.15%
 270 L.F. 8" x 4" BOX CULVERT (ASTM C 850 HG 20 WHEEL LOAD) @ 0.17%
 12" D.I.P. FORCE MAIN (CLASS 50)

JUNCTION BOX #2
 SEE DETAIL - SHEET #
 RIM EL. 18.92
 TOP EL. 17.10
 INV. EL. N. 11.70
 E. 11.66
 BOTTOM EL. 8.66

EXTEND RELOCATED 8" D.I.P. WATER MAIN, INSTALL 8" G.V., 8" x 8" x 4" TEE, 20 L.F. 8" D.I.P. W/ PLUG & TEMP. PLUG OFF 8" x 2" REDUCER, 2" x 2" TAPPING GLEEVE & VALVE (150 L.F. 8" D.I.P. TOTAL.) CONNECT TO EXIST. 2" WATER

- NOTE:
- Underground TECO and QTE cables for service will be provided to pump station.
 - All ductile iron pipe used for gravity service shall be class 54 with Duraline epoxy lining.
 - All 12" D.I.P. forcemain to be restrained joints.

T. O. B. EL. 18.5
 D. H. W. EL. 17.5
 BOTTOM EL. 10.0

TPD FIELD SERVICES
 FILE OF RECORD NO. 40655000
 INVESTIGATE BEFORE YOU EXCAVATE
 CALL CANDY
 1-800-282-8881
 TOLL FREE
 PLEASE SEE BY (107) REQUIRED
 HOW TO EXCAVATE AND HOW TO EXCAVATE

CIVIL SITE PLAN

THIS DOES NOT CONTAIN EXEMPT INFO

CONST. TYPE 3 INLET ON EXIST 18" RCP W 3' CURB TRANSITION EACH SIDE
 TOP 18.48
 5.0'P 18.10
 THROAT 17.50
 INV. 15.47

San Manhole
 Rim El = 18.45
 Inv = 13.50 (N)
 13.45 (E), 13.46 (W)

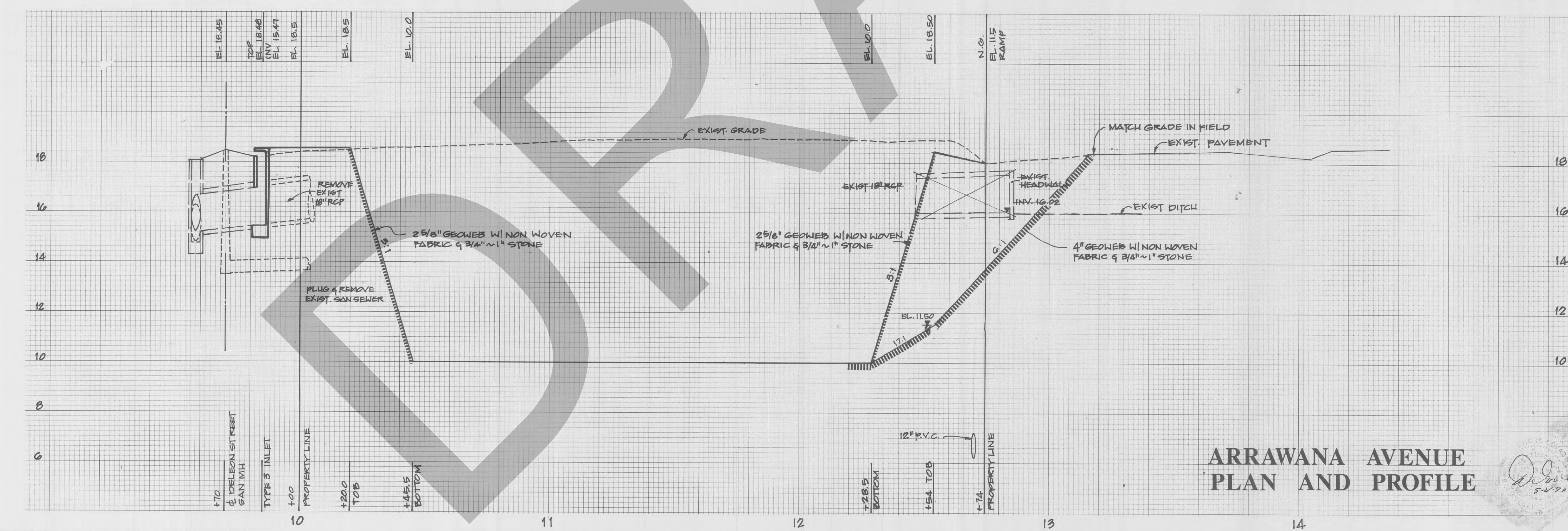
Grate Inlet
 Top = 17.98
 Inv = 14.98 (N)

Storm Junction Box
 Top = 18.08
 Inv = 15.21 (N)
 15.11 (N), 14.77 (E)

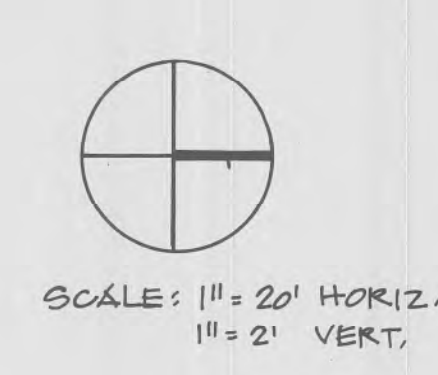
Catch Basin
 Inv = 16.91 (E)

5.87 (N), 15.70 (S)

5.96 (W)



**ARRAWANA AVENUE
 PLAN AND PROFILE**



INVESTIGATE BEFORE YOU EXCAVATE
 "CALL CANDY"
 1-800-282-8881
 TOLL FREE

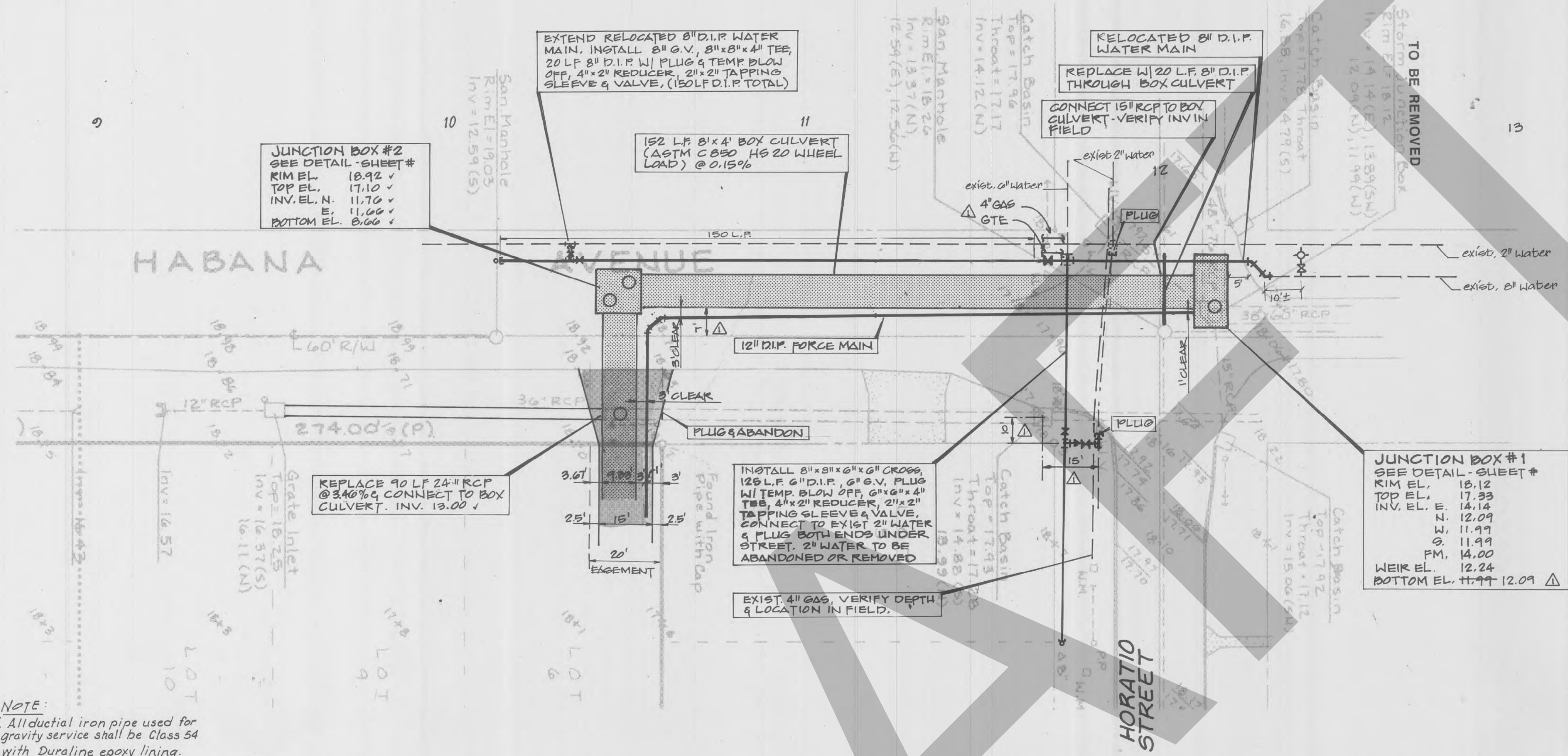
4.30.19 Record Drawings

RECORD DRAWINGS BASED ON ACTUAL FIELD MEASUREMENTS OF ABOVE GROUND STRUCTURES AND APPURTENANCES, AND SPECIFICATIONS AS SHOWN BY DIMENTS. RECORD DIMENSION IS SHOWN EITHER BY CROSSING OUT PLAN DIMENSION OR CHECK MARK BY PLAN DIMENSION IF NOT CHANGED.

GOTTFRIED + GARCIA / ARCHITECTS / AIA, PA.
 3333 west kennedy boulevard / tampa, florida

Professional Engineer Seal for S/C 2, State of Florida, License No. 1880, dated 12/24/18.

Wade-Trim
 Landscape Architecture
 Engineering
 Planning
 Environmental Sciences
 201 E. Kennedy Blvd. Suite 334 Tampa, FL 33602



JUNCTION BOX #2
SEE DETAIL SHEET #
RIM EL. 18.92 ✓
TOP EL. 17.10 ✓
INV. EL. N. 11.70 ✓
BOTTOM EL. 8.00 ✓

152 LF 8" x 4" BOX CULVERT
(ASTM C890 HG 20 WHEEL
LOAD) @ 0.15%

RELOCATED 8" D.I.P.
WATER MAIN
REPLACE W/ 20 LF 8" D.I.P.
THROUGH BOX CULVERT

CONNECT 15" RCP TO BOX
CULVERT - VERIFY INV IN
FIELD

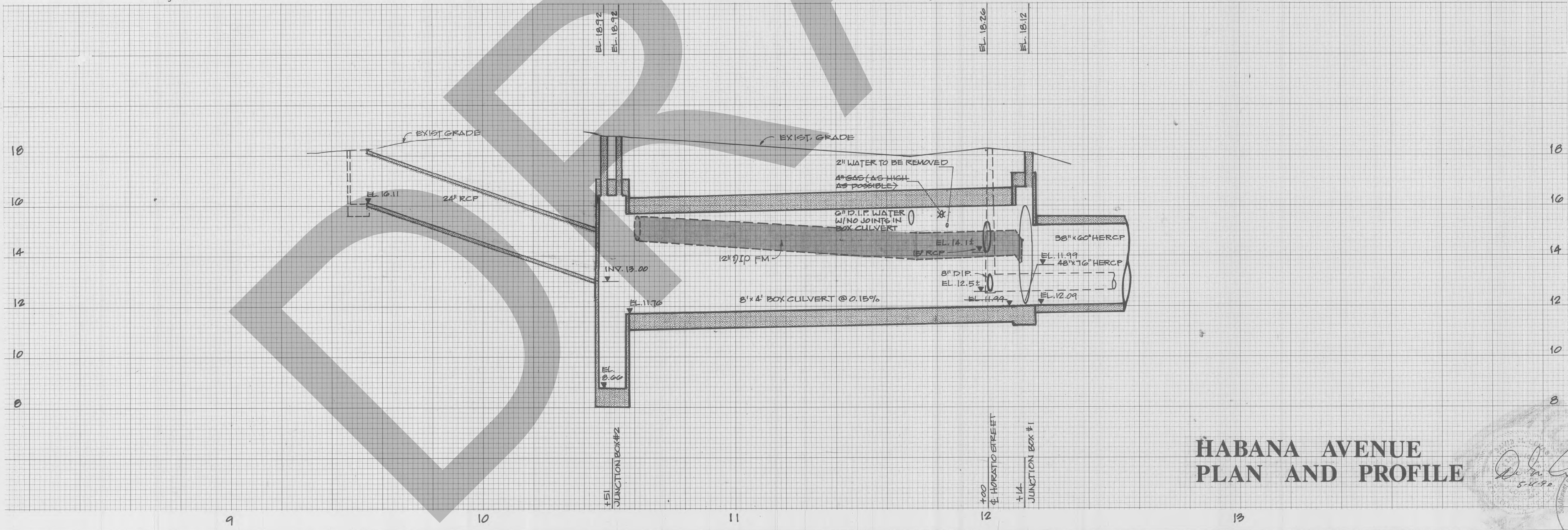
REPLACE 90 LF 24" RCP
@ 3.40% & CONNECT TO BOX
CULVERT. INV. 13.00 ✓

INSTALL 8" x 8" x 8" CROSS
125 LF 6" D.I.P., 6" G.V., PLUG
W/ TEMP. BLOW OFF, 6" x 6" x 4"
TEE, 4" x 2" REDUCER, 2" x 2"
TAPPING SLEEVE & VALVE.
CONNECT TO EXIST 2" WATER
& PLUG BOTH ENDS UNDER
STREET. 2" WATER TO BE
ABANDONED OR REMOVED

JUNCTION BOX #1
SEE DETAIL SHEET #
RIM EL. 18.12
TOP EL. 17.33
INV. EL. E. 14.14
N. 12.09
S. 11.99
FM, 14.00
WEIR EL. 12.24
BOTTOM EL. 11.99 12.09 Δ

NOTE:
1. All ductile iron pipe used for
gravity service shall be Class 54
with Duraline epoxy lining.
2. All 12" Dip forcemain to be restrained
joints.

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



**HABANA AVENUE
PLAN AND PROFILE**

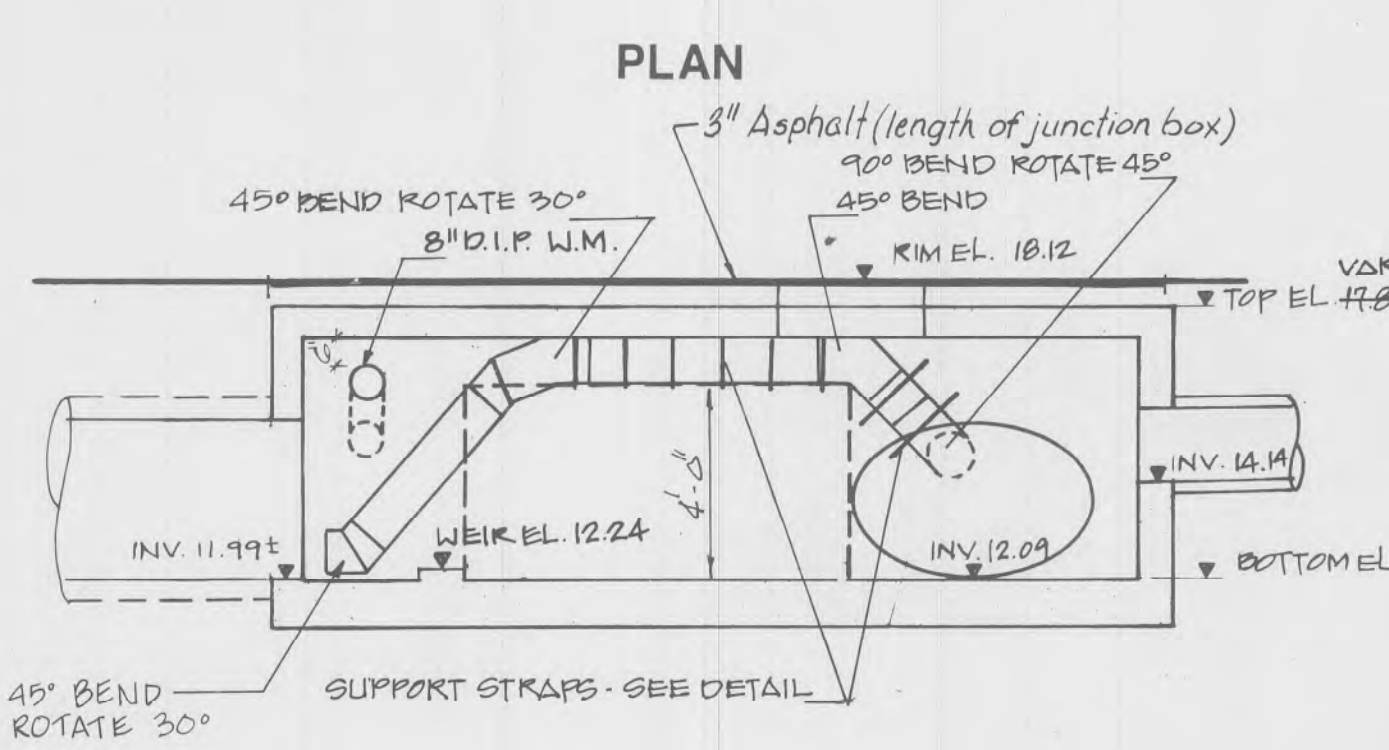
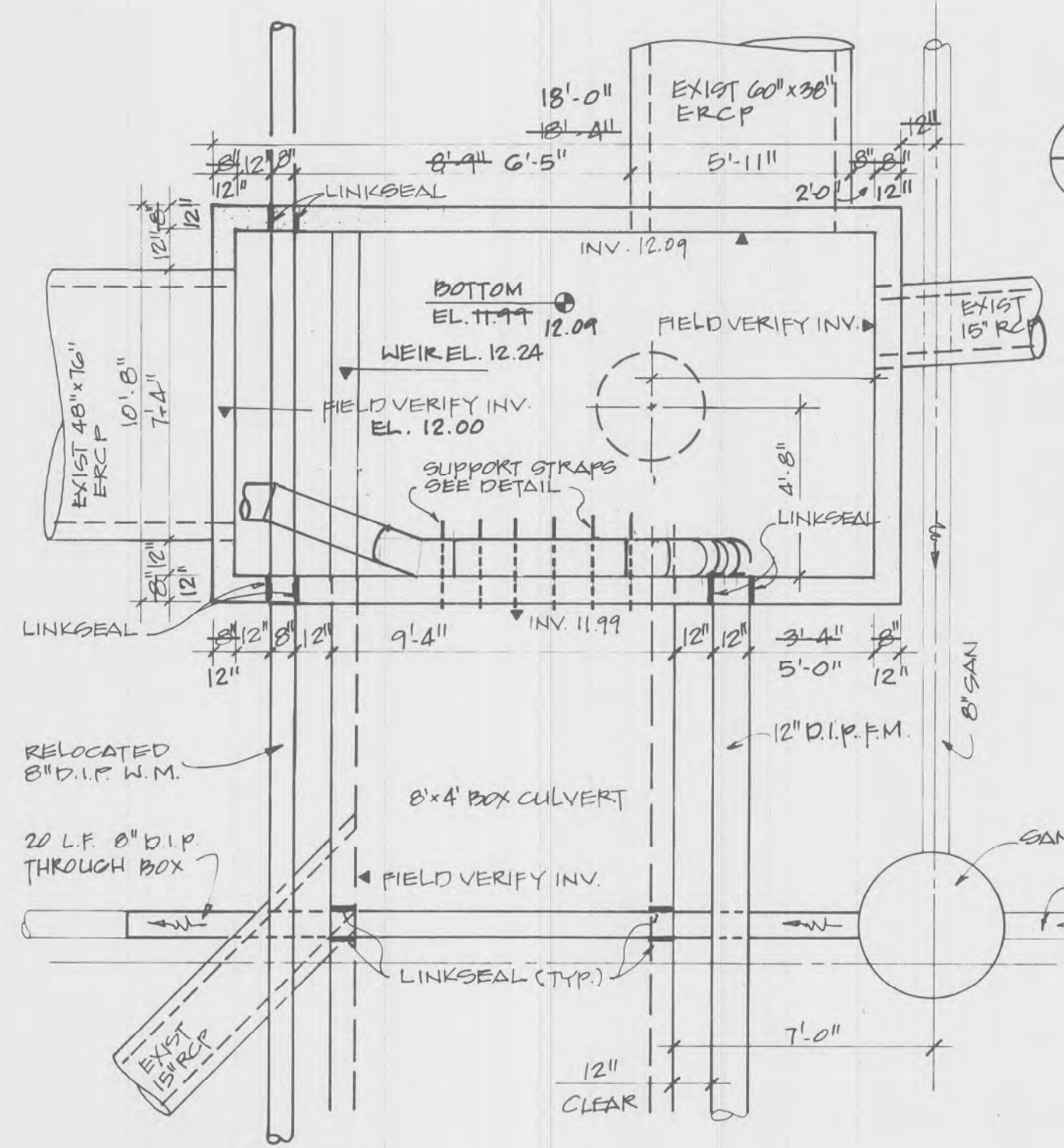
INVESTIGATE
BEFORE YOU
EXCAVATE
"CALL CANDY"
1-800-282-8881
FL STATUTE 626.801 (1975) REQUIRES
MIN. OF 2 DAYS AND MAX. OF 5 DAYS
NOTICE BEFORE YOU EXCAVATE.

Δ 4-30-90 Record Drawings

GOTTFRIED + GARCIA / ARCHITECTS / AIA, P.A.
3333 west kennedy boulevard / tampa, florida

Wade-Trim
Landscape Architecture
Engineering
Environmental Sciences
201 E. Kennedy Blvd., Suite 334 Tampa, FL 33602

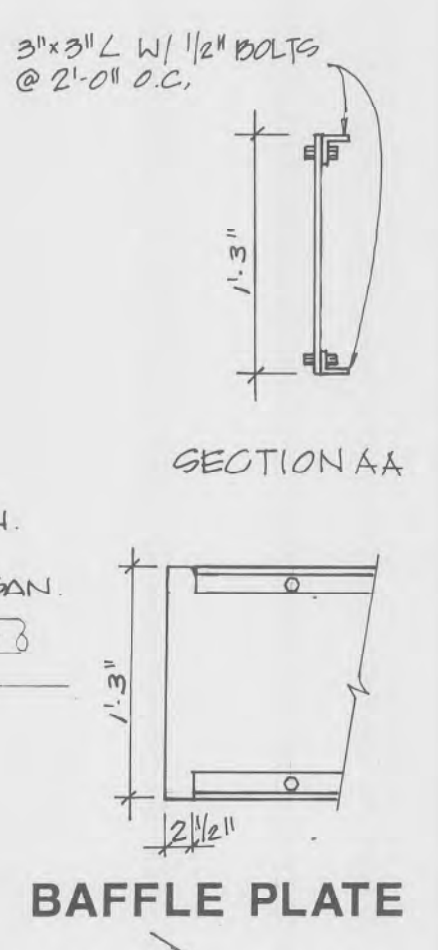




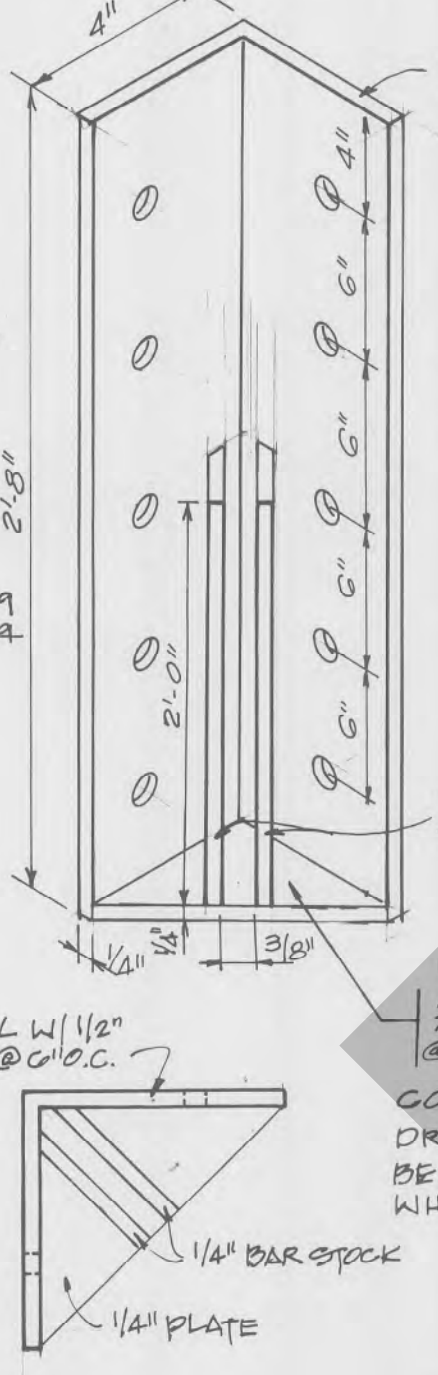
JUNCTION BOX NO. 1
SCALE: 1/4" = 1'-0"

CONTRACTOR TO PROVIDE THE ENGINEER WITH SHOP DRAWINGS. JUNCTION BOX & BOX CULVERT SHALL BE BUILT IN ACCORDANCE WITH ASTM C-850 (HS20 WHEEL LOADS)

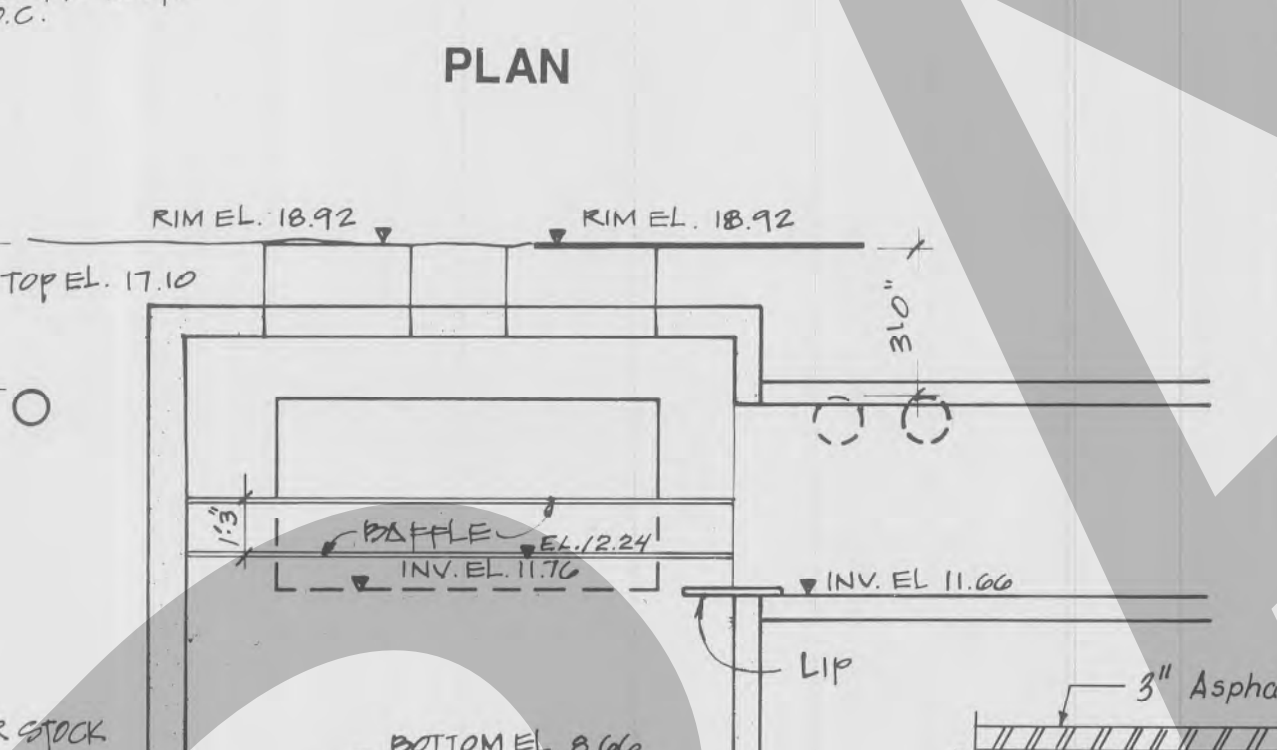
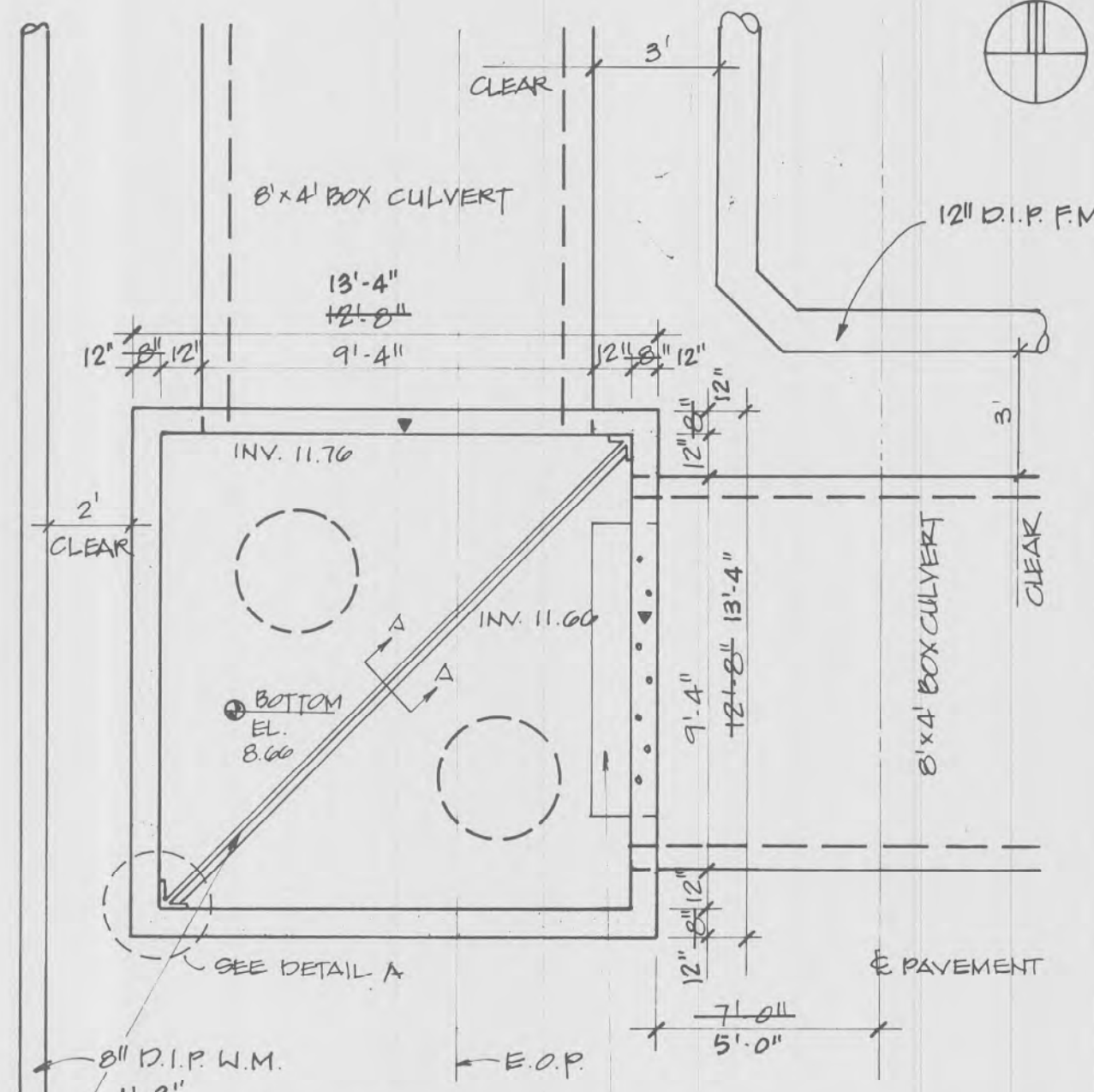
NOTE: RELOCATED WATER MAINS AND SANITARY SEWER THROUGH JUNCTION BOXES AND BOX CULVERT SHALL NOT HAVE A JOINT WITHIN THE STRUCTURES. THE CONTRACTOR SHALL INSTALL LINK SEAL AT EACH OPENING AS REQUIRED.



BAFFLE PLATE

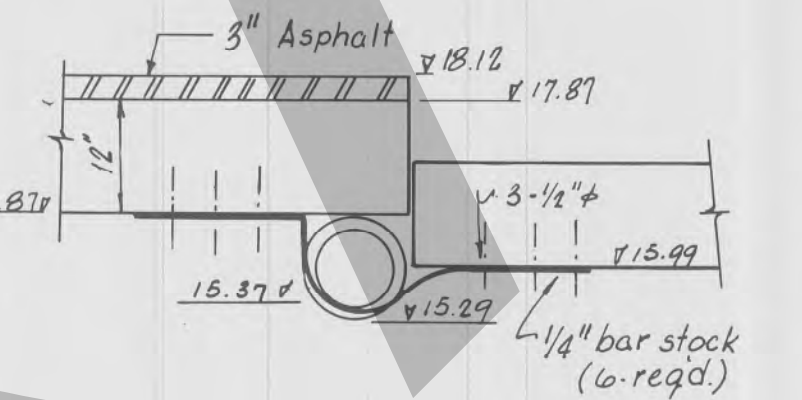


BAFFLE PLATE BRACKET

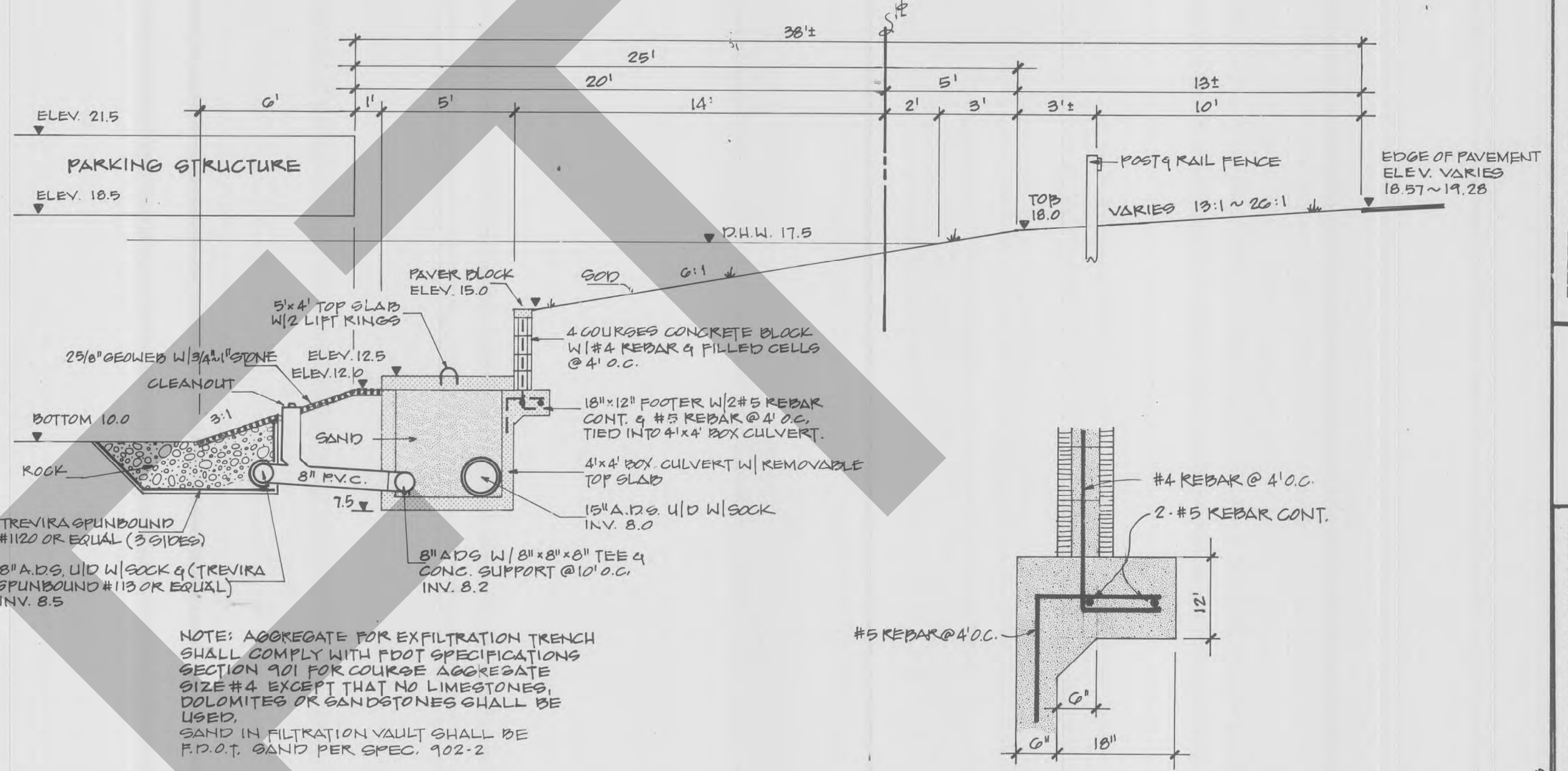


JUNCTION BOX NO. 2
SCALE: 1/4" = 1'-0"

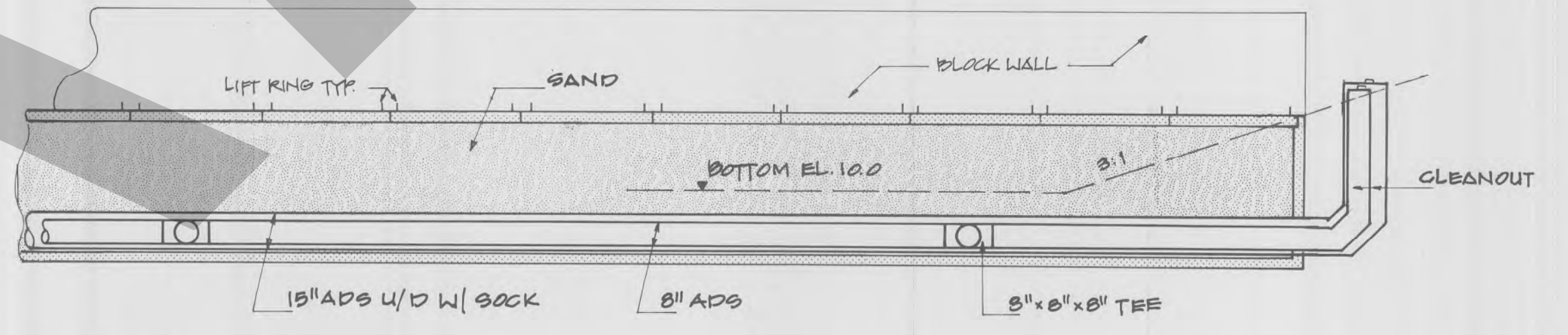
CONTRACTOR TO PROVIDE THE ENGINEER WITH SHOP DRAWINGS. JUNCTION BOX & BOX CULVERT SHALL BE BUILT IN ACCORDANCE WITH ASTM C-850 (HS20 WHEEL LOADS)



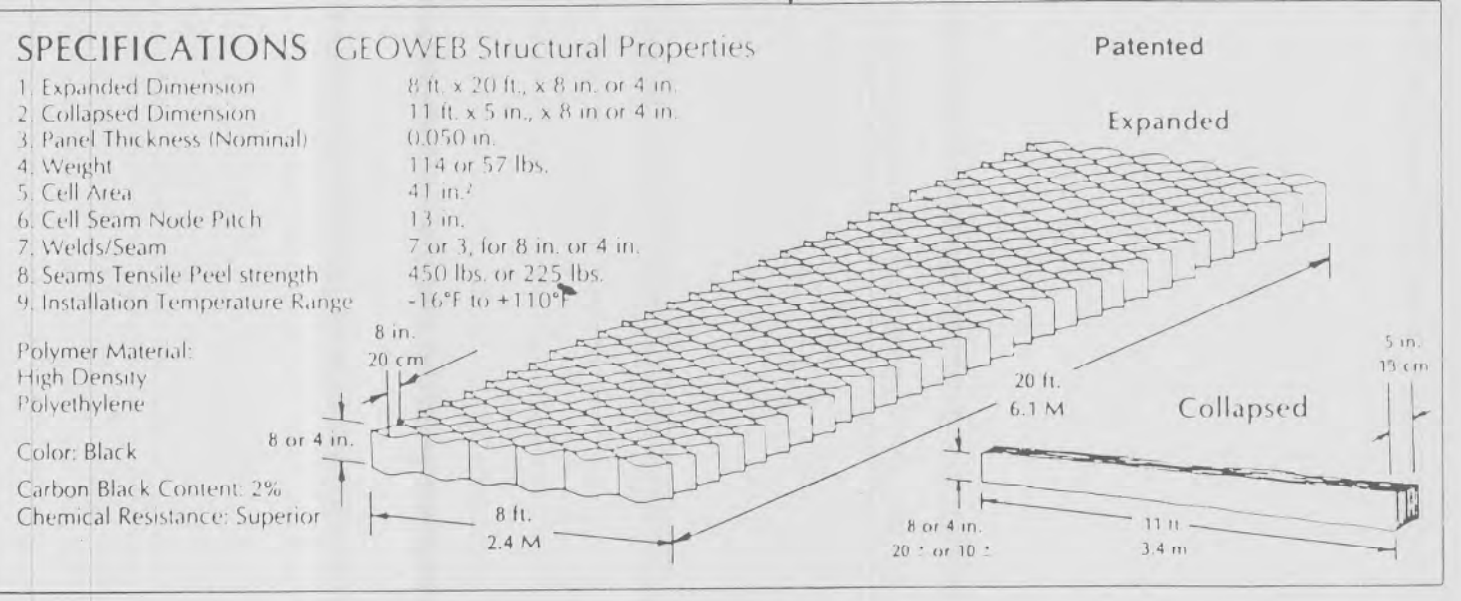
PIPE SUPPORT STRAPS



NOTE: AGGREGATE FOR EXFILTRATION TRENCH SHALL COMPLY WITH PDOT SPECIFICATIONS SECTION 901 FOR COLLOIDAL AGGREGATE SIZE #4 EXCEPT THAT NO LIMESTONES, DOLOMITES OR SANDSTONES SHALL BE USED. SAND IN FILTRATION VAULT SHALL BE F.P.O.T. SAND PER SPEC. 902-2



FILTRATION VAULT
SCALE: 1/4" = 1'-0"



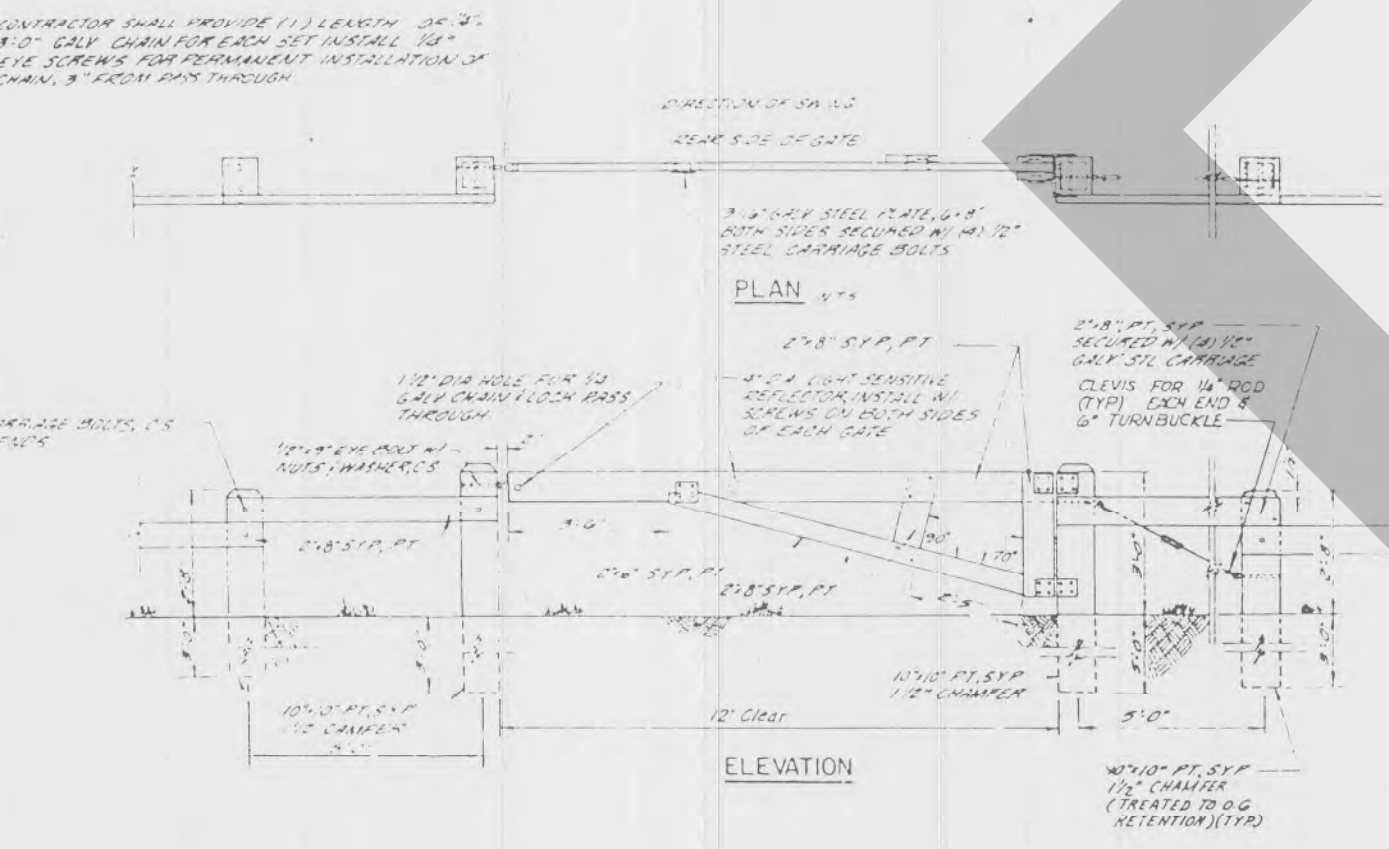
GEOWEB DETAIL
NTS

- SPECIFICATIONS** GEOWEB Structural Properties
- Expanded Dimension: 8 ft x 20 ft, x 8 in. or 4 in.
 - Collapsed Dimension: 13 ft x 5 in, x 8 in or 4 in.
 - Panel Thickness (Nominal): 1.13 in or 57 lbs.
 - Weight: 43 in²
 - Cell Area: 13 in²
 - Cell Seam Node Patch: 7 in x 3 in for 8 in. or 4 in.
 - Seams Tensile Peel strength: 450 lbs. or 225 lbs.
 - Installation Temperature Range: -14°F to +110°F
- Polymer Material: High Density Polyethylene
Color: Black
Carbon Black Content: 2%
Chemical Resistance: Superior

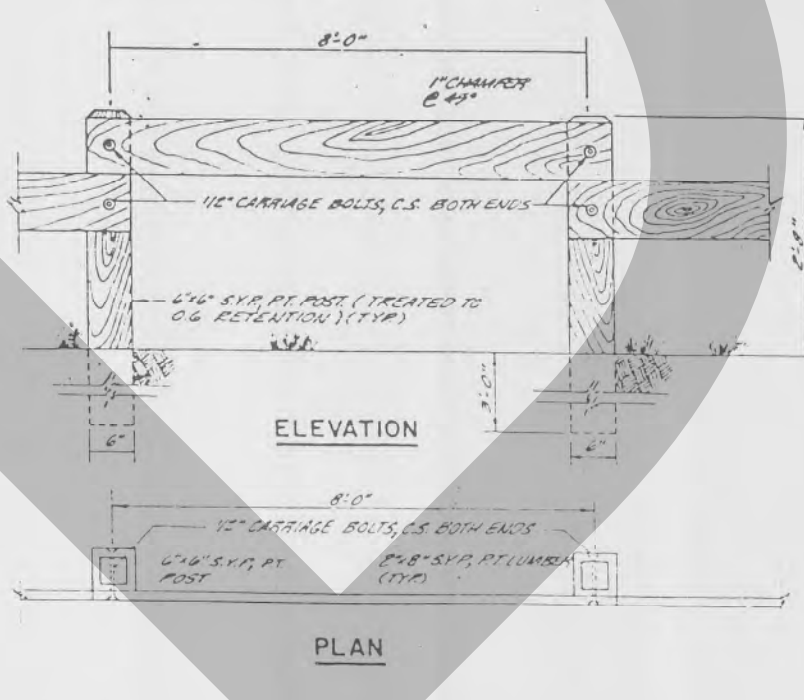
Construction Fabrics by TerraTex
Typical Physical Properties

FABRIC PROPERTY	SD	ND1	GS	GS-150	SC	HD	EP
Grab Strength (lb)	125	110	200	150	120	300	250
ASTM D-1682							
Elongation (%)	65	65	24	26	21	24	30
ASTM D-1682							
Trapezoid Tear (lb)	59	60	150	125	130	170	65
ASTM D-2263							
Mullen Burst (psi)	275	250	475	350	300	600	500
ASTM D-751							
Coef. of Permeability (1/100 in/sec)	0.2	0.2	0.007	0.01	0.08	0.08	0.02
Equivalent Opening Size (U.S. Sieve)	80	70-110	49-70	50-70	25-45	40-70	70-100
Weight (oz/sq yd)	4.5	3.0	4.0	2.6	2.5	6.9	6.3
ASTM D-3776							
APPLICATIONS							
Soil Stabilization			**	**	**	**	**
Drainage Protection	**	**					
Sediment Control							
Embankment Protection						**	**
** Primary ** Secondary							
ROLL DIMENSIONS							
Width (ft)	12.5/15	12.5/15	12.5/16.7	12.5	3	12.5	6
Length (ft)	260	350	432	432	VAR	360	300
Area (sq yd)	500/600	500/600	600	600	VAR	500	200
Weight (lb)	150/195	135/170	170	160	VAR	185	85

FABRIC SPECIFICATIONS (NO 4)
(TO BE PLACED UNDER GEOWEB AS DIRECTED)



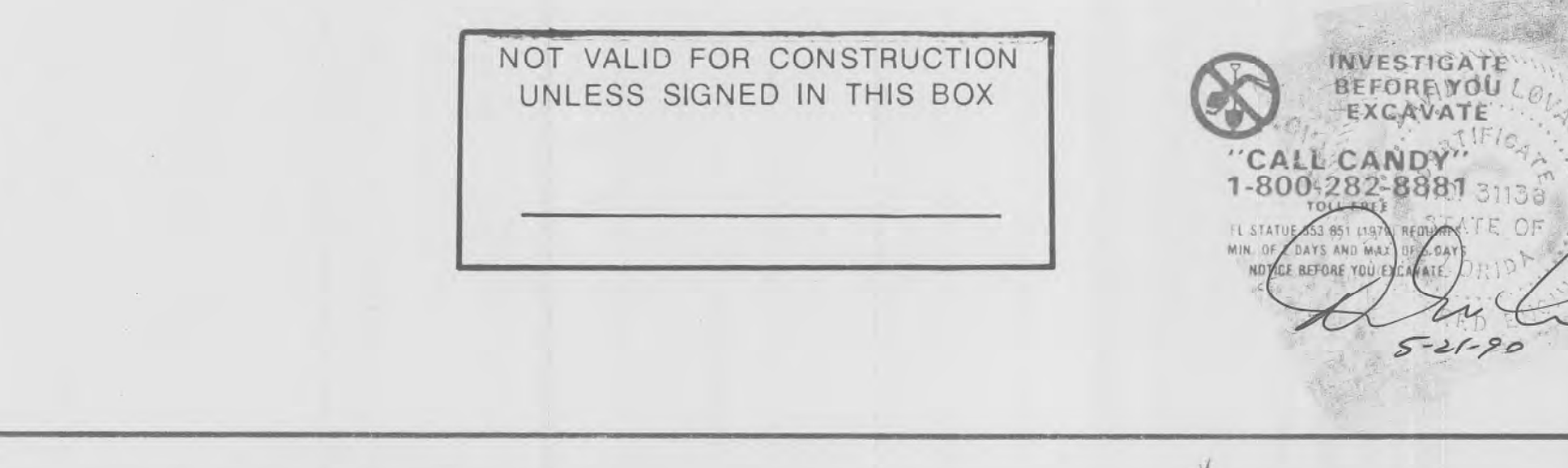
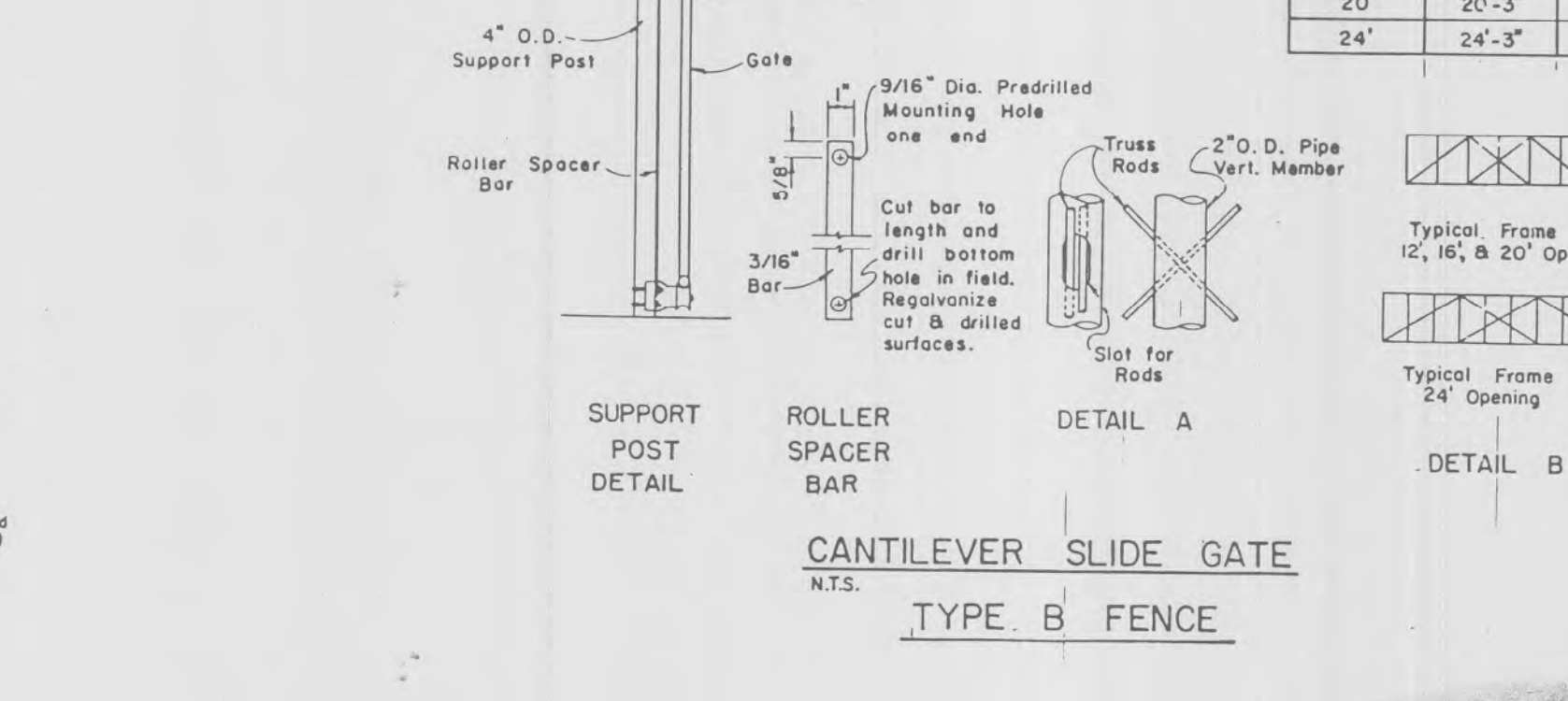
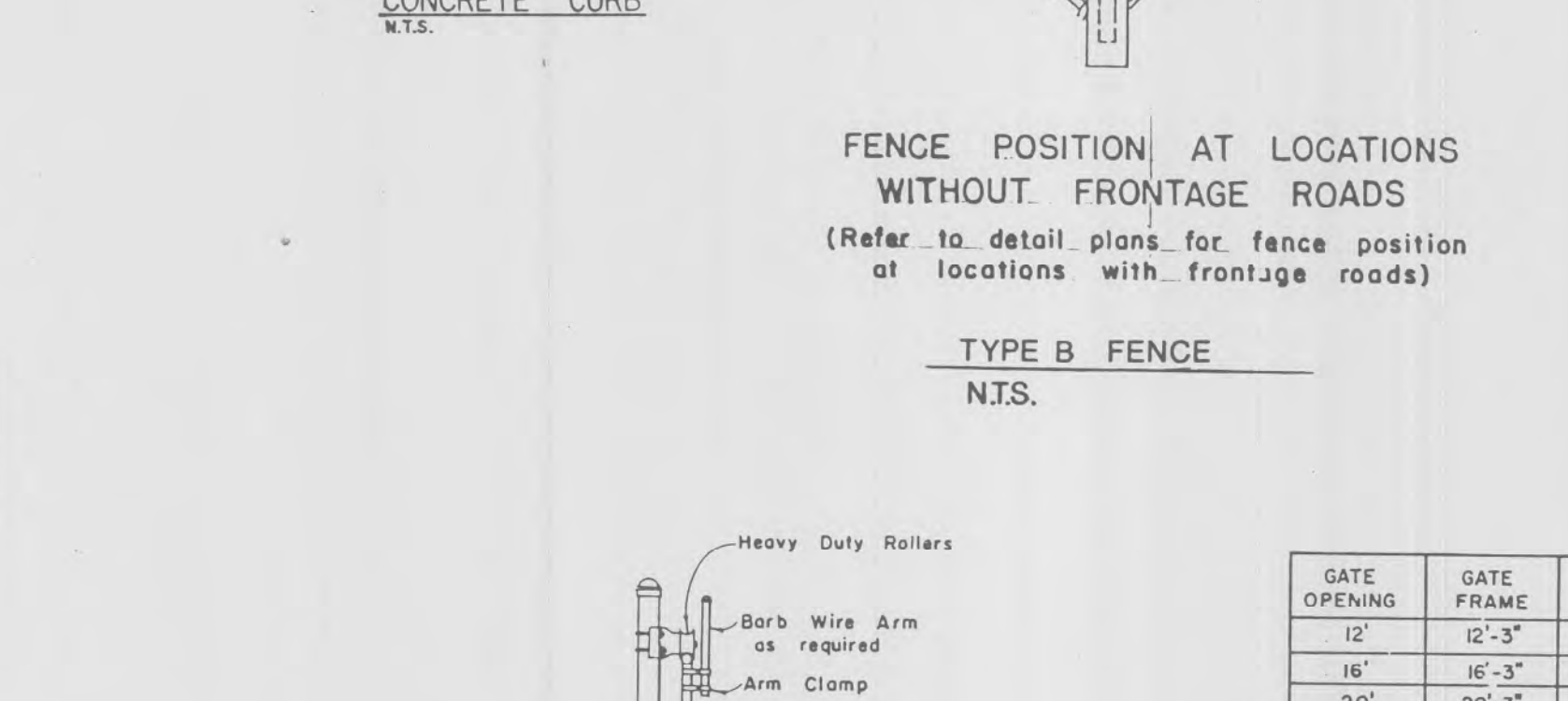
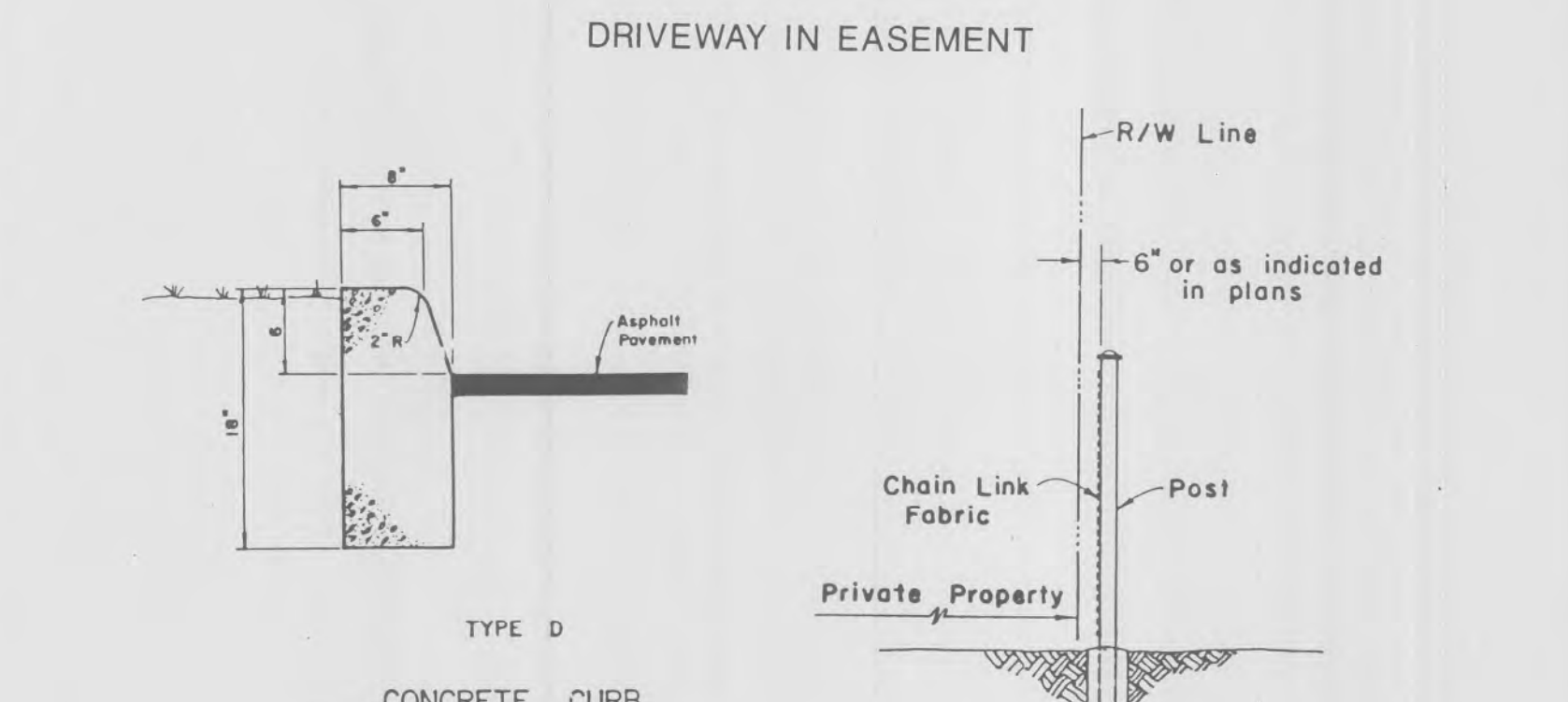
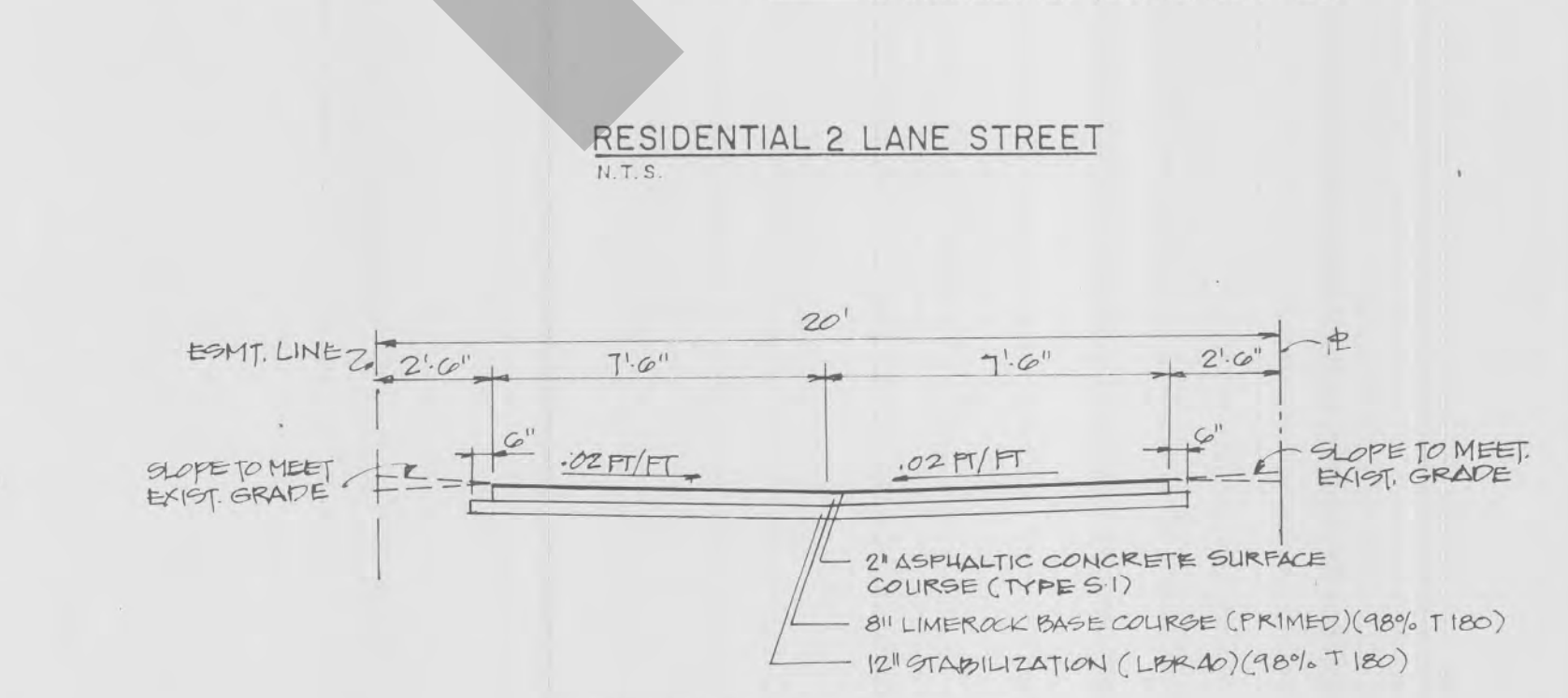
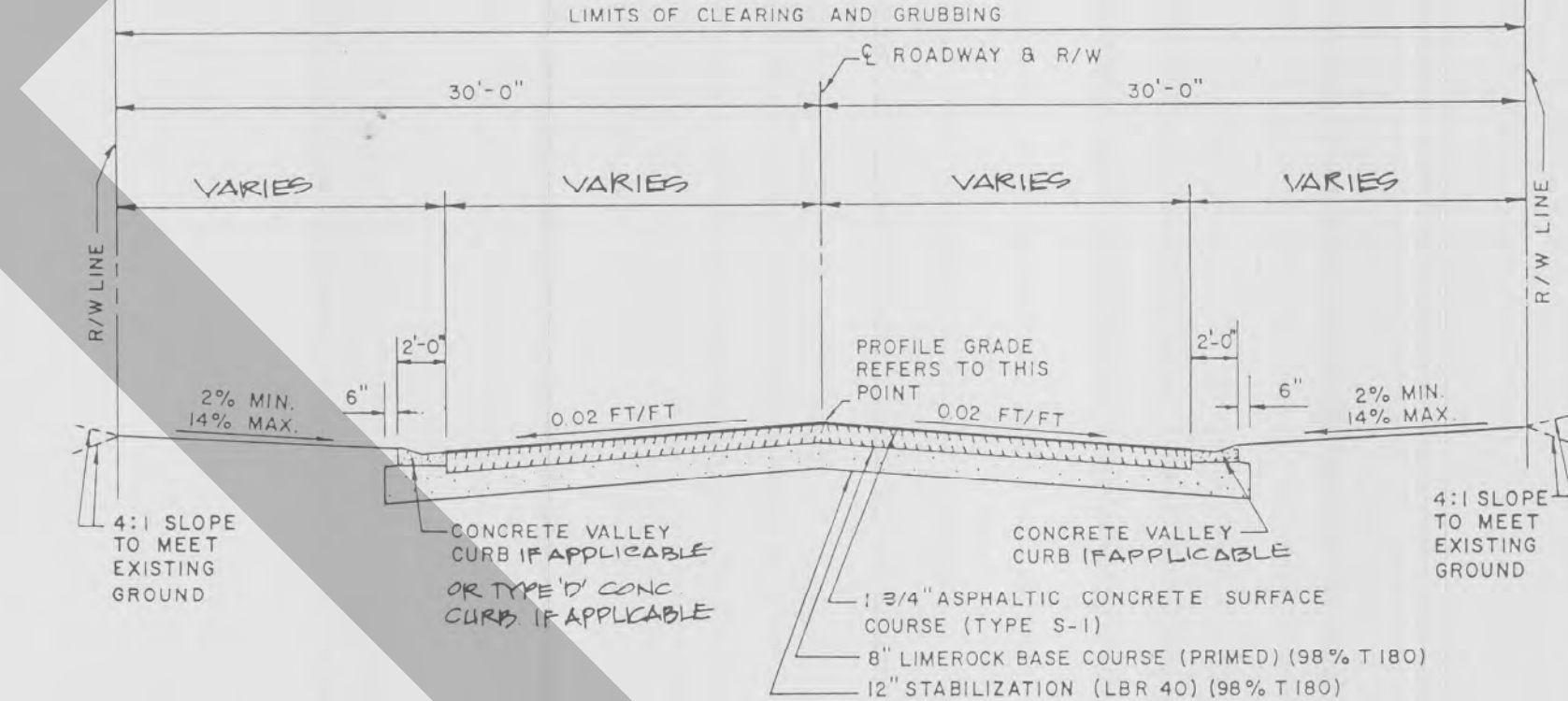
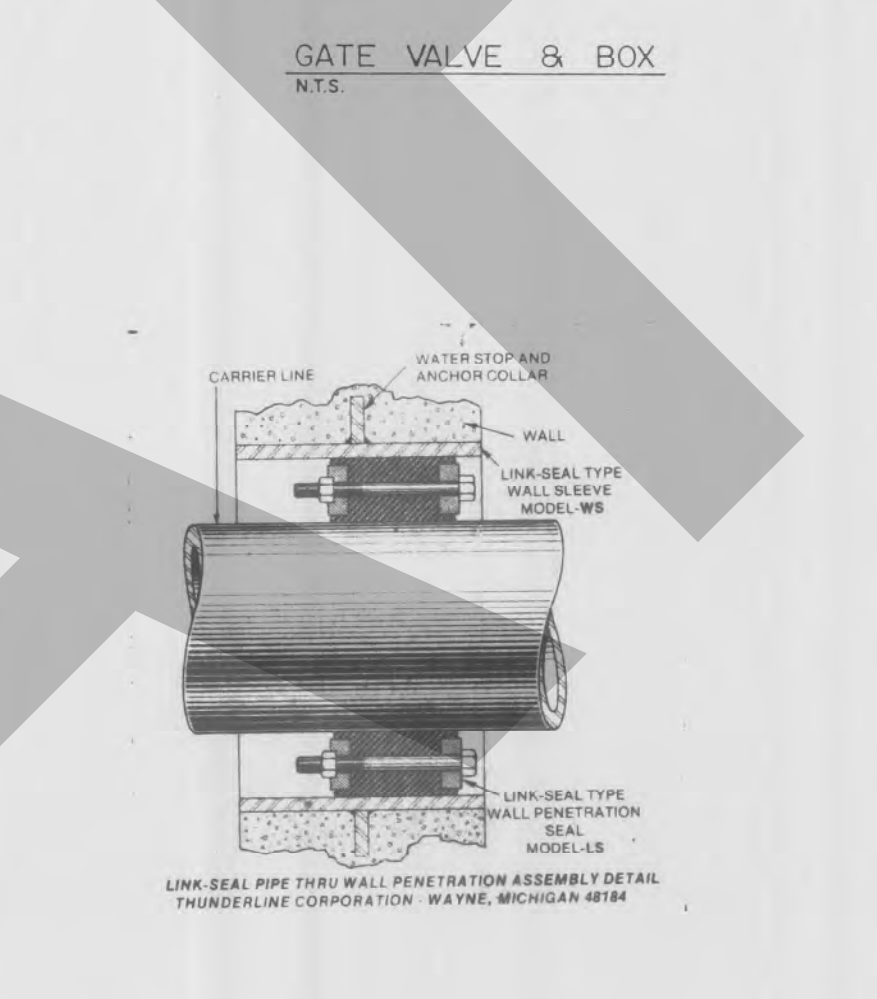
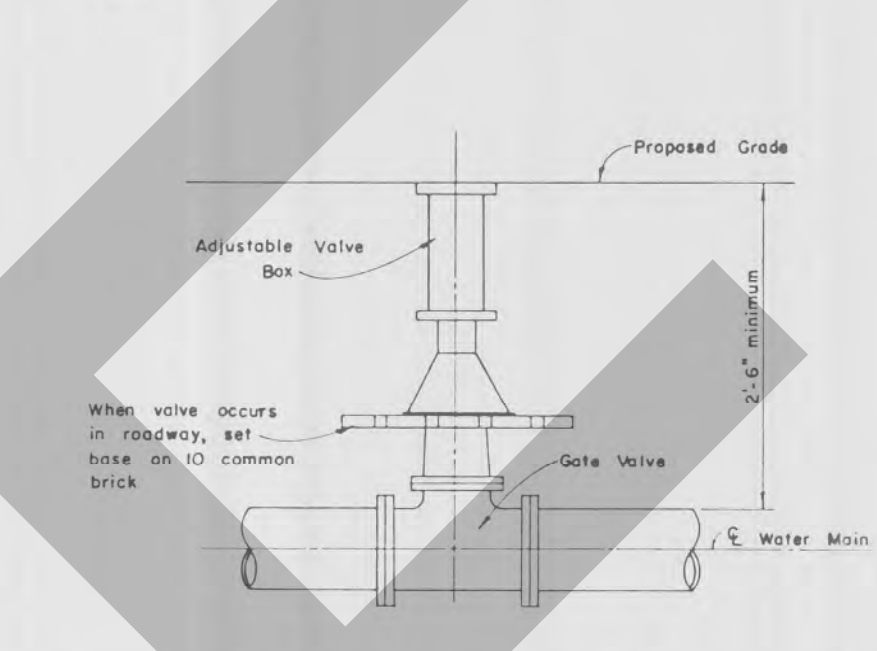
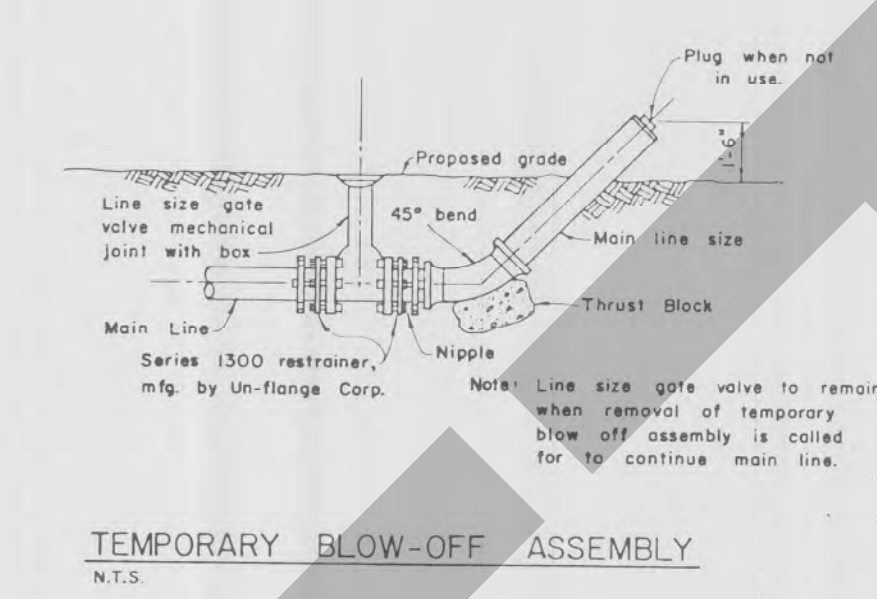
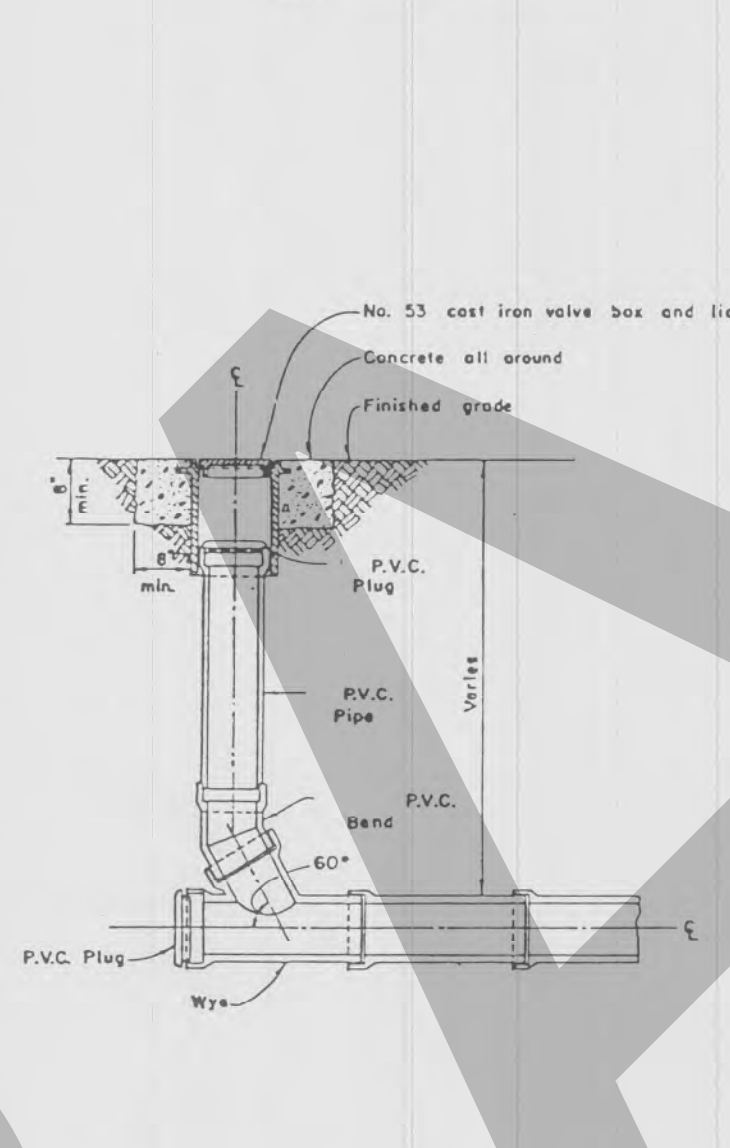
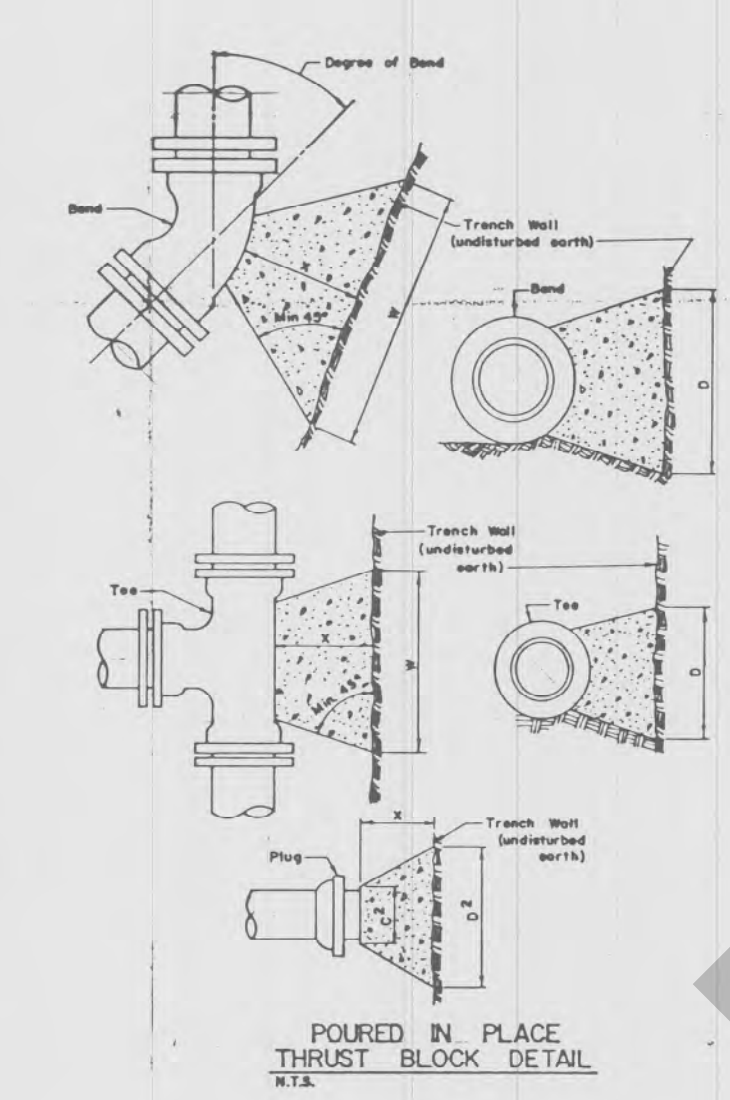
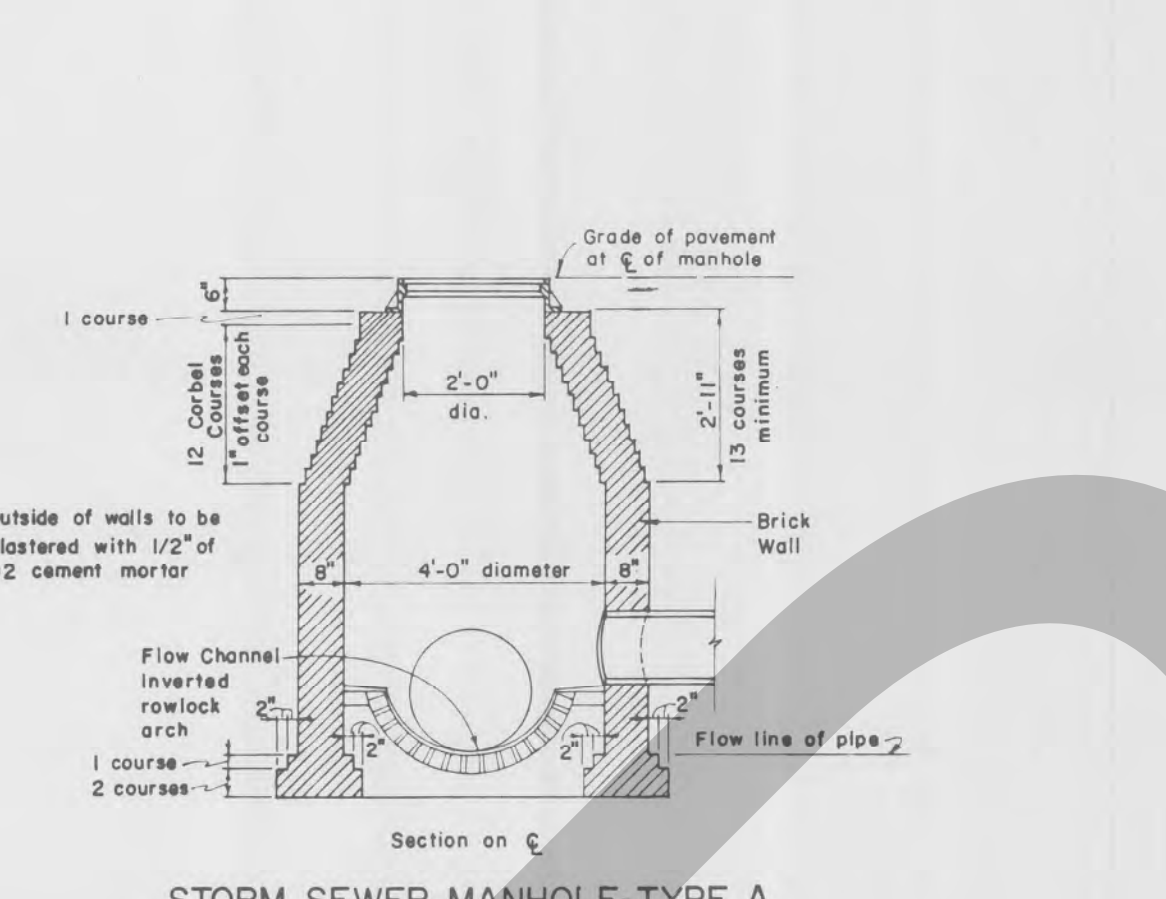
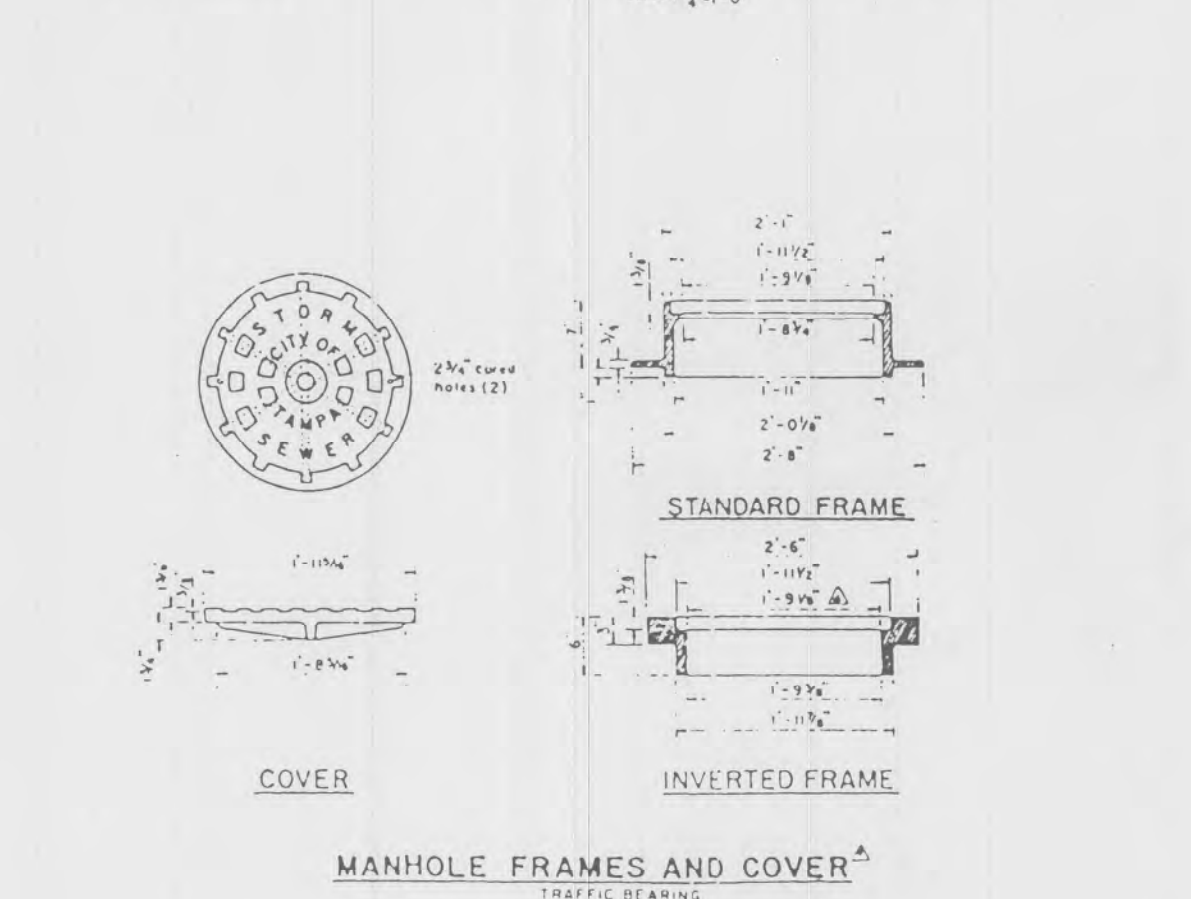
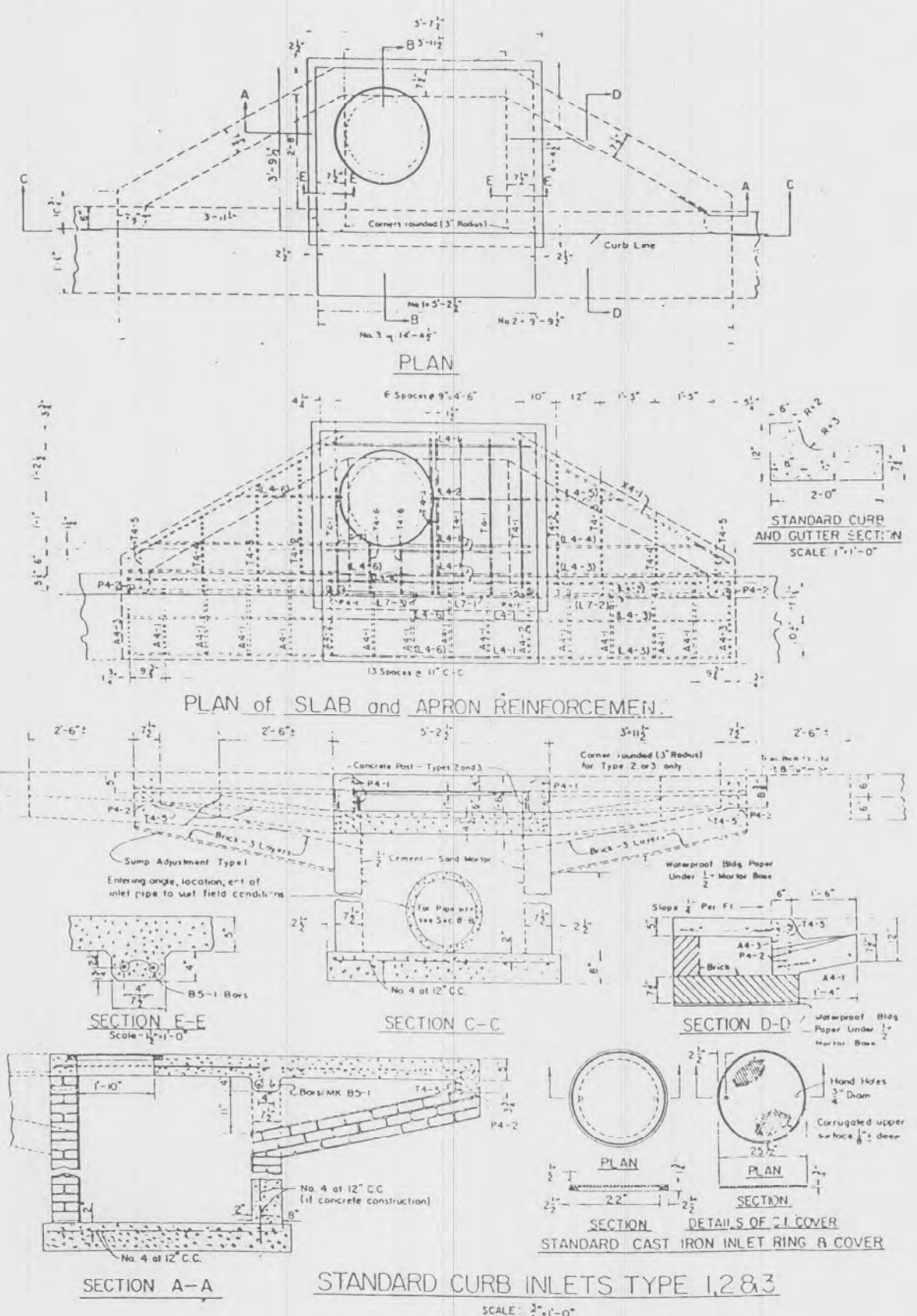
TYPICAL 12' POST AND RAIL GATE
NTS



TYPICAL POST AND RAIL FENCE DETAIL
NTS

NOT VALID FOR CONSTRUCTION UNLESS SIGNED IN THIS BOX

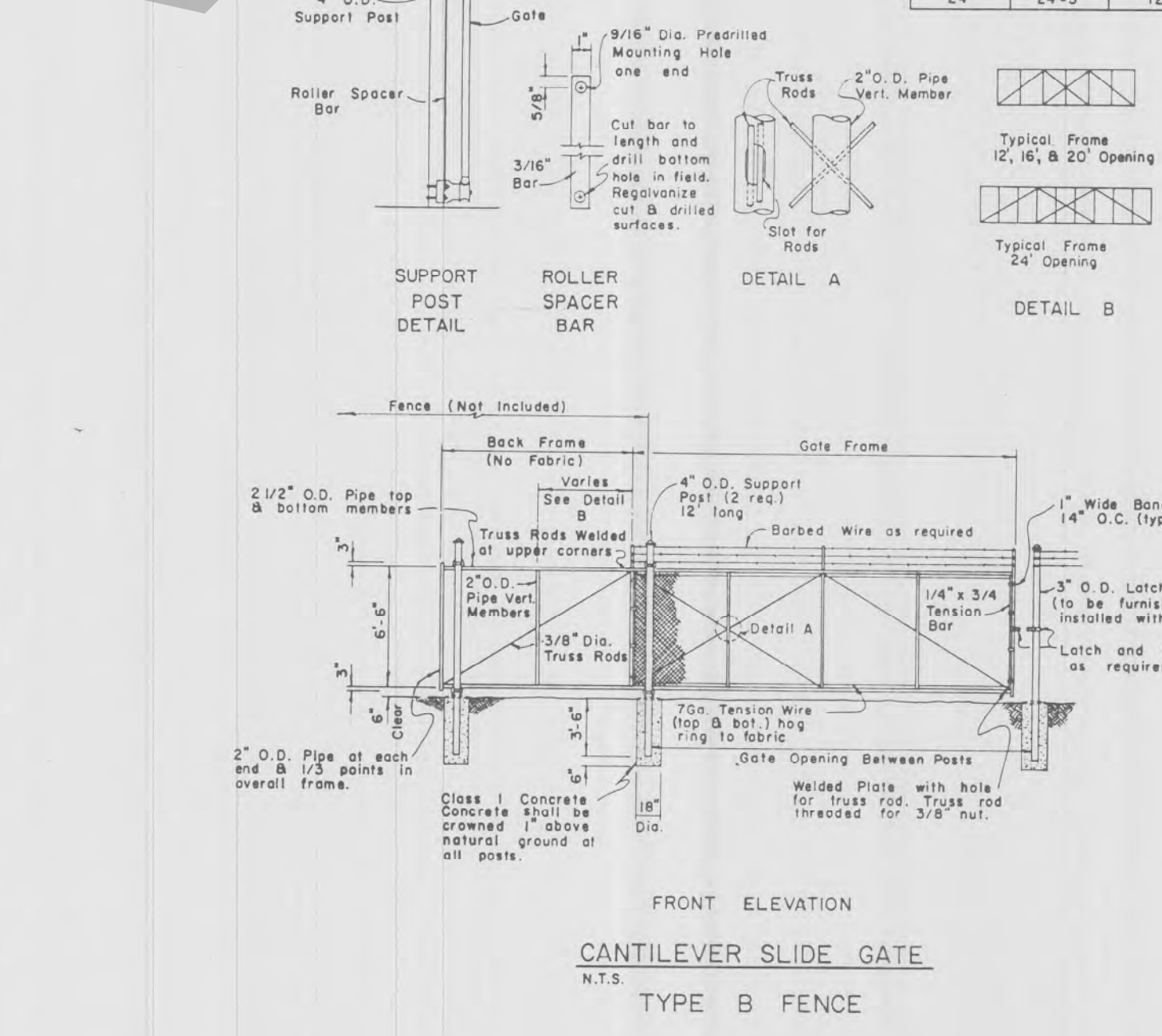
INVESTIGATE BEFORE YOU EXCAVATE
"CALL CANDY"
1-800-282-8881
TOLL FREE
FL STATUTE 320.04(1)(b) REQUIRES MIN. OF 3 DAYS AND MAX. OF 5 DAYS NOTICE BEFORE YOU EXCAVATE.



- GENERAL SITE NOTES**
- THE CONTRACTOR SHALL PROVIDE FOR MAINTENANCE OF TRAFFIC DURING CONSTRUCTION. TRAFFIC MAINTENANCE PRACTICES AND SIGNAGE SHALL BE IN ACCORDANCE WITH FOOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGES.
 - EROSION/SEDIMENTATION CONTROL:**
THE CONTRACTOR IS TO PROVIDE EROSION CONTROL/SEDIMENTATION BARRIERS (HAY BALES OR SILTATION CURTAIN). IF REQUIRED, TO PREVENT SILTATION OF ADJACENT PROPERTY, STREETS, STORM SEWERS AND WATERWAYS. IN ADDITION, THE CONTRACTOR SHALL PLACE STRAW, MULCH OR OTHER SUITABLE MATERIAL ON THE GROUND, AS REQUIRED, IN AREAS WHERE CONSTRUCTION RELATED TRAFFIC IS TO ENTER AND EXIT THE SITE. IF, IN THE OPINION OF THE ENGINEER AND/OR LOCAL AUTHORITIES, EXCESSIVE QUANTITIES OF EARTH ARE TRANSPORTED OFFSITE, EITHER BY NATURAL DRAINAGE OR BY VEHICLE TRAFFIC, THE CONTRACTOR IS TO REMOVE AND CLEAN SAID EARTH TO THE SATISFACTION OF THE ENGINEER AND/OR LOCAL AUTHORITIES.
PRIOR TO BEGINNING THE CLEARING AND GRUBBING OF THE PROPERTY, HAY BALES SHALL BE STACKED TO THE GROUND ALONG THE ALL AROUND THE SITE PROPERTY LINE TO PREVENT STORMWATER FROM WASHING ERODED SOILS FROM THE PROPERTY INTO THE EXISTING STORMWATER SYSTEM.
 - LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE PLANS BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS, ELEVATIONS AND DIMENSION OF ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING HIS WORK PRIOR TO CONSTRUCTION.
 - IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO NOTIFY "CANDY" FORTY-EIGHT (48) HOURS BEFORE DIGGING, BORING, OR ANY OTHER CONSTRUCTION ACTIVITY AT 1-800-282-8881. UNDERGROUND UTILITY NOTIFICATION CENTER* SO THAT UNDERGROUND UTILITIES MAY BE FIELD LOCATED. SUCH LOCATIONS SHALL BE OBTAINED PRIOR TO STARTING CONSTRUCTION AND SHALL BE MAINTAINED DURING CONSTRUCTION.
 - IN AREAS WHERE FILL MATERIAL IS REQUIRED, THE EXISTING VEGETATION AND ROOTS SHALL BE REMOVED PRIOR TO PLACING ANY FILL MATERIAL. THE FILL SHALL BE PLACED IN LIFTS NO GREATER THAN 12" AS MEASURED LOOSE, AND COMPACTED TO A UNIFORM DENSITY ASTM D698. THE MATERIAL SHALL BE COMPACTED AT A MOISTURE CONTENT PERMITTING THE SPECIFIED COMPACTION. THE FILL SHALL BE TESTED BY AN INDEPENDENT TESTING LABORATORY AND THE RESULTS SUPPLIED TO THE ENGINEER.
 - ALL GRASSED AREAS DISTRIBUTED BY CONTRACTOR SHALL BE SEED AND MULCHED.

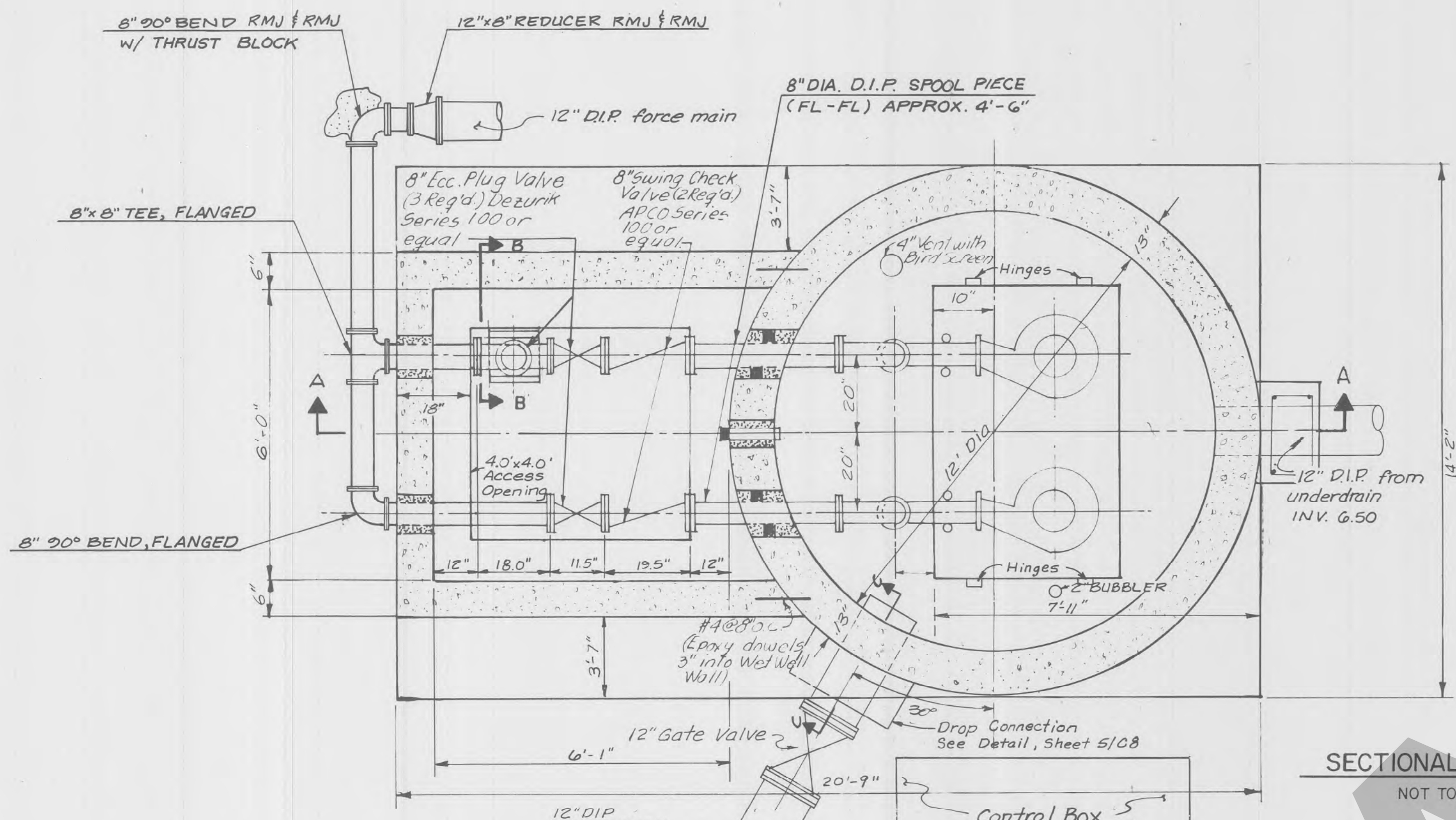
- REPAIR AND REPLACEMENT OF ALL PRIVATE AND PUBLIC PROPERTY AFFECTED BY THIS WORK SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN EXISTED BEFORE COMMENCING CONSTRUCTION UNLESS SPECIFICALLY EXEMPTED BY THE PLANS. COST TO THE INCIDENTOR AND OTHER CONSTRUCTION OR NO EXTRA COMPENSATION TO BE ALLOWED.
- CONTRACTOR SHALL SPRINKLE OR OTHERWISE APPLY WATER TO AFFECTED CONSTRUCTION AREA TO CONTROL BOTH SIGNIFICANT WIND EROSION AND FUGITIVE DUST.
- CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. PORTLAND CEMENT SHALL CONFORM TO ASTM C150. AGGREGATE SHALL CONFORM TO ASTM C33. WIRE FABRIC SHALL CONFORM TO ASTM A186. READY MIXED CONCRETE SHALL CONFORM TO ASTM C-94. SIX INCH MESH, 10 GAUGE WIRE FABRIC SHALL BE USED IN SLABS FOUR INCHES THICK. SIX INCH MESH, 6 GAUGE SHALL BE USED IN SLABS THICKER THAN 4". SURFACES SHALL BE FREE FROM TROWEL OR MACHINE MARKS. SURFACE VARIATIONS SHALL NOT EXCEED 1/4 INCH UNDER A 10 FOOT STRAIGHTEDGE. EDGE OF SLABS SHALL HAVE A SMOOTH FINISH. SIDEWALKS SHALL HAVE A BROOM FINISH.
- COORDINATION WITH THE TELEPHONE COMPANY SHALL BE DONE WITH GENERAL TELEPHONE COMPANY, P.O. BOX (MC1886), TAMPA, FLORIDA, 33611, (813) 228-4111.
- ELECTRIC POWER INSTALLATION SHALL BE COORDINATED BY CONTRACTOR WITH TAMPA ELECTRIC COMPANY, P.O. BOX 111, TAMPA, FLORIDA, 33601, (813) 228-4111.
- THE CONTRACTOR SHALL CONTACT THE ENGINEERS OFFICE IMMEDIATELY ON ANY CONFLICTS ARISING DURING CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONSULT WITH THE ENGINEER FOR MAKING ANY AND ALL REQUIRED INTERPRETATIONS OF THE PLANS, HOWEVER, THIS IN NO WAY RELIEVES THE CONTRACTOR OF HIS RESPONSIBILITY FOR CONSTRUCTING THE PROJECT TO ACCOMPLISH THE INTENT OF THE PLANS.
- ALL UNDERGROUND UTILITIES MUST BE INSTALLED AND/OR RELOCATED AS REQUIRED PRIOR TO CONSTRUCTION OF PAVEMENT.
- ALL CONSTRUCTION SHALL CONFORM TO THE APPLICABLE CITY OF TAMPA, FLORIDA, CODES, ORDINANCES AND REGULATIONS.
- AS PER FEDERAL FLOOD MAPS, THIS PROPERTY IS LOCATED IN ZONE C. COMMUNITY 120114, PANEL NO. 0014C, WATER SEPTEMBER 3, 1982.
- WHERE EXISTING PAVEMENT MATCHES NEW PAVEMENT, EXISTING PAVEMENT SHALL BE SAW CUT AT EDGES. NEW CONSTRUCTION TO MATCH EXISTING.

- UTILITY NOTES**
- ALL SANITARY SEWER CONSTRUCTION SHALL CONFORM TO THE CITY OF TAMPA CONSTRUCTION STANDARDS, LATEST EDITION.
 - A SEPARATION OF 10' HORIZONTALLY AND 18" VERTICALLY MUST BE MAINTAINED BETWEEN WATER AND SANITARY SEWER LINES.
 - WATER SYSTEM CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF TAMPA CONSTRUCTION STANDARDS, LATEST EDITION.
 - LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE PLANS BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING HIS WORK PRIOR TO CONSTRUCTION.
 - ALL NEW WATER AND FIRE LINES SHALL HAVE A MINIMUM OF 3'-0" COVER. THRUST BLOCKING SHALL BE PROVIDED FOR ALL WATER AND FIRE LINES.
 - SANITARY SEWER PIPE SHALL BE PVC CONFORMING TO ASTM D3034, SDR 35.
 - ALL WATER MAINS SHALL BE PVC CONFORMING TO ASTM C-900, 200 PSI PIPE WITH PUSH ON "O" RING JOINT UNLESS OTHERWISE NOTED.
 - ALL SEWER LATERALS TO BE CONNECTED TO SEWER MAIN BY 4" WYE CONNECTION. ALL WERE LATERALS SHALL BE 4" PVC UNLESS OTHERWISE APPROVED BY ENGINEER.
 - ALL WATER SERVICE CONNECTIONS SHALL BE 3/4" UNLESS OTHERWISE APPROVED BY ENGINEER.
 - MINIMUM DENSITY OF MODIFIED PROCTOR (ASTM 1557) SUBGRADE ELEVATION ABOVE ALL PIPE CROSSING OF ROAD.
 - ANY WATER OR SANITARY SEWER PIPE HAVING LESS THAN 36" OF COVER WHICH MUST SUPPORT VEHICLE WEIGHT, SHALL BE CAST IRON PIPE, DUCTILE IRON PIPE, CONCRETE ENCASED VITRIFIED CLAY PIPE, SCHEDULE 80 PVC OR C-900 PVC.
 - CONTRACTOR SHALL CONTROL RUNOFF AND EROSION DURING CONSTRUCTION THROUGH THE USE OF SEDIMENT BASINS, STRAW OR HAY BALES AS APPROPRIATE.
 - CONTRACTOR SHALL SPRINKLE OR OTHERWISE MANUALLY APPLY WATER TO AFFECTED CONSTRUCTION AREA TO CONTROL BOTH SIGNIFICANT WIND EROSION AND FUGITIVE DUST.

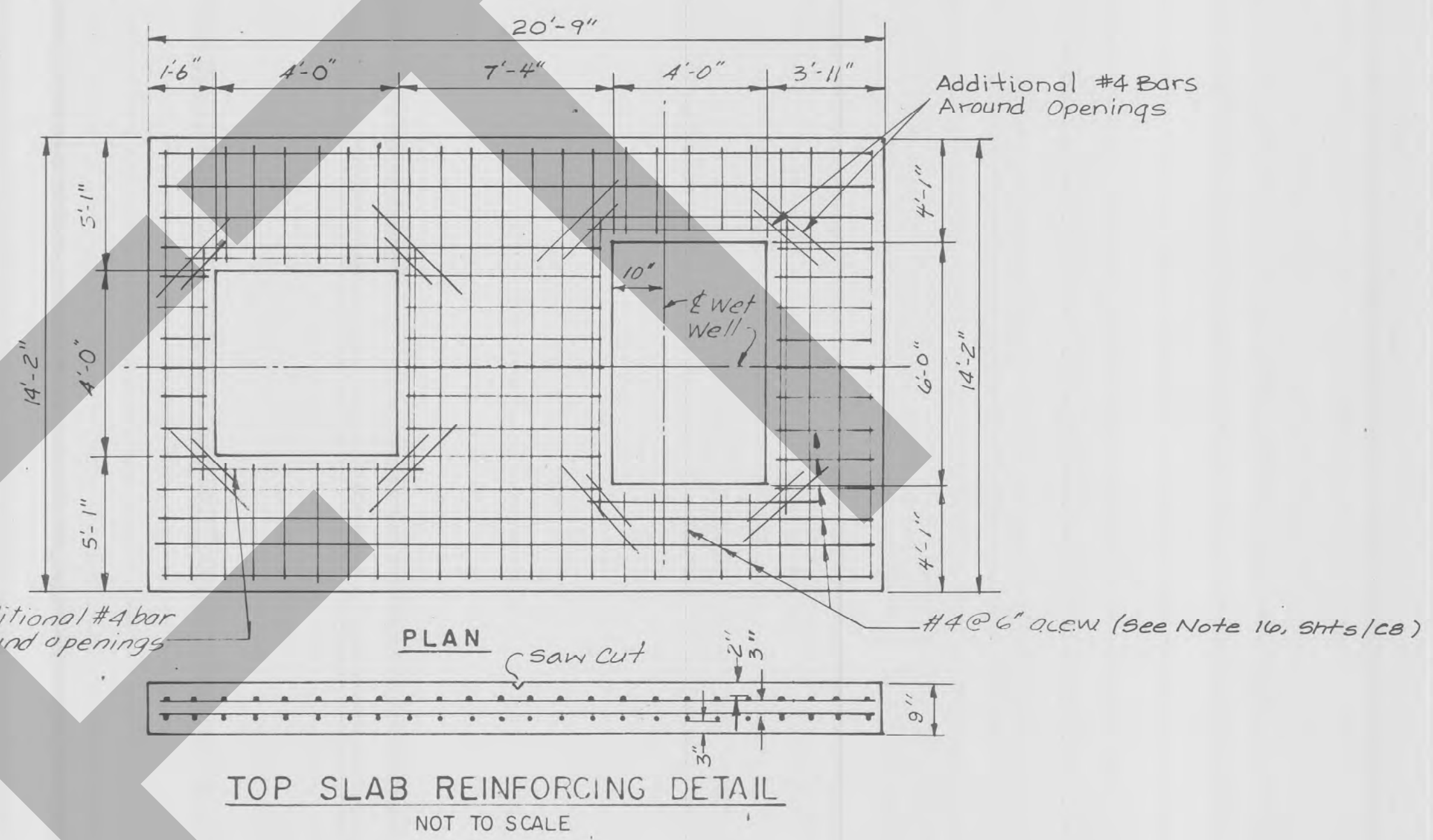


NOT VALID FOR CONSTRUCTION UNLESS SIGNED IN THIS BOX

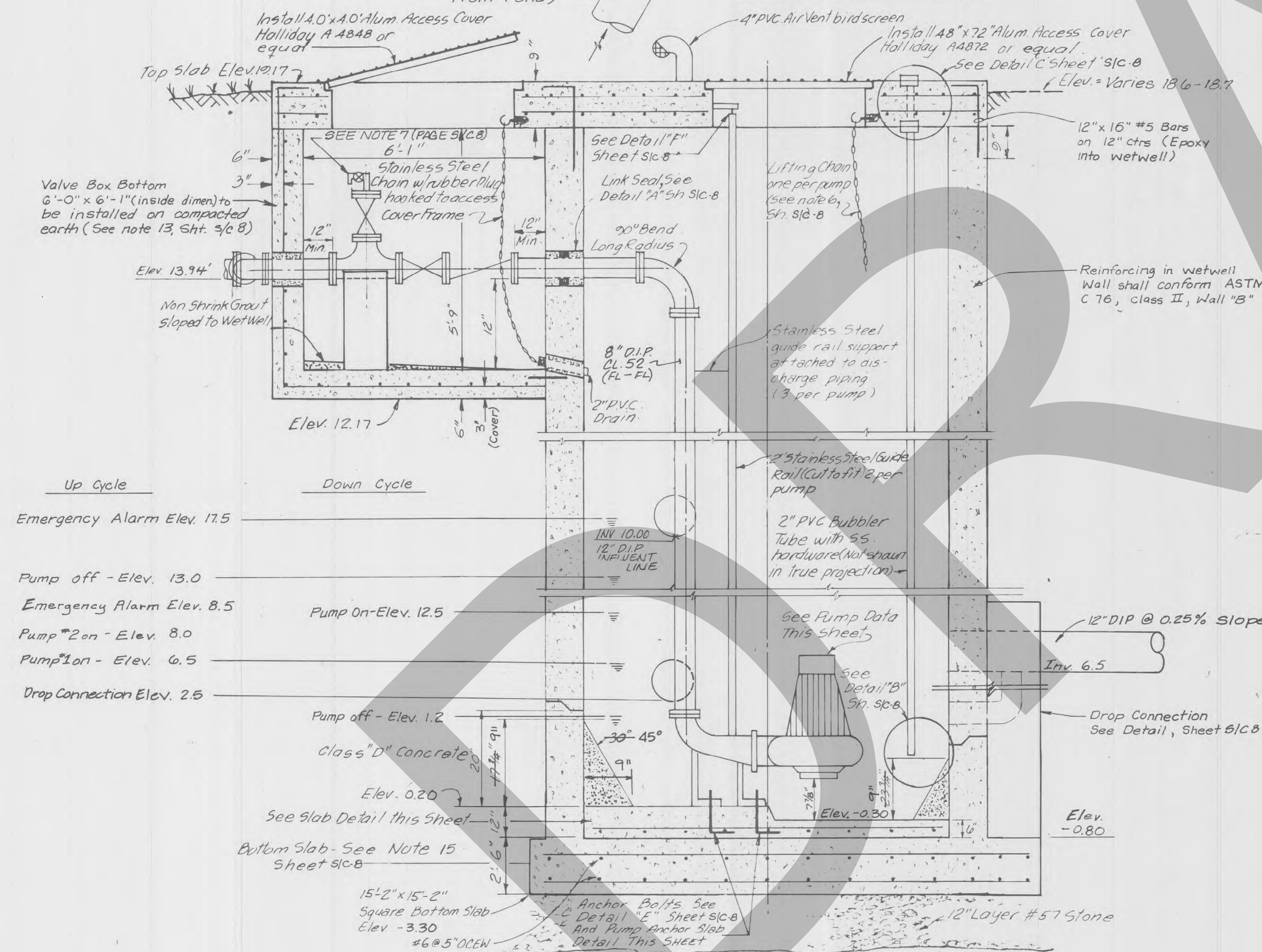
INVESTIGATE BEFORE YOU EXCAVATE
CALL CANDY
1-800-282-8881
MAY 24 1990
SC 16
PRD



SECTIONAL PLAN
NOT TO SCALE

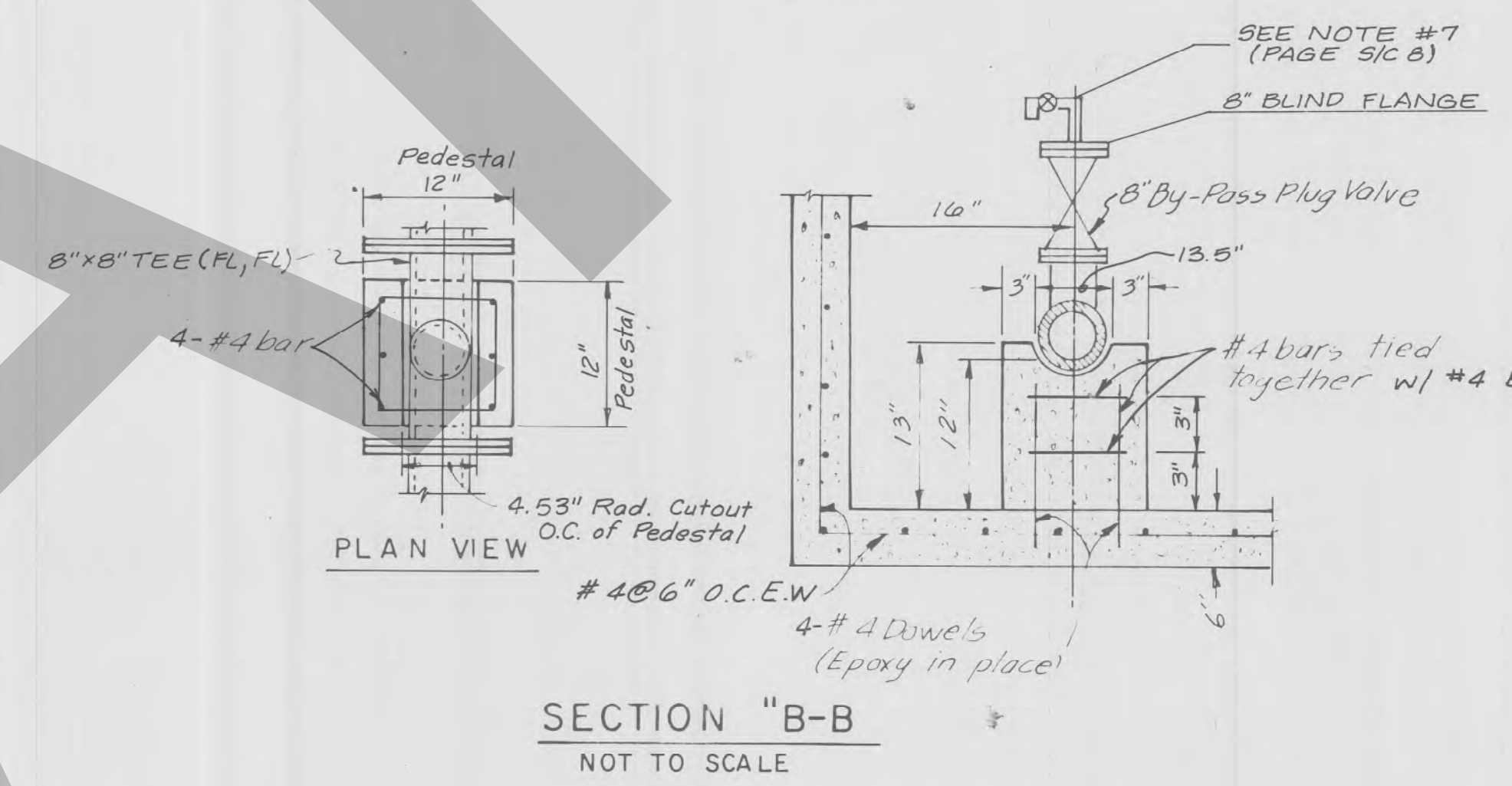


TOP SLAB REINFORCING DETAIL
NOT TO SCALE

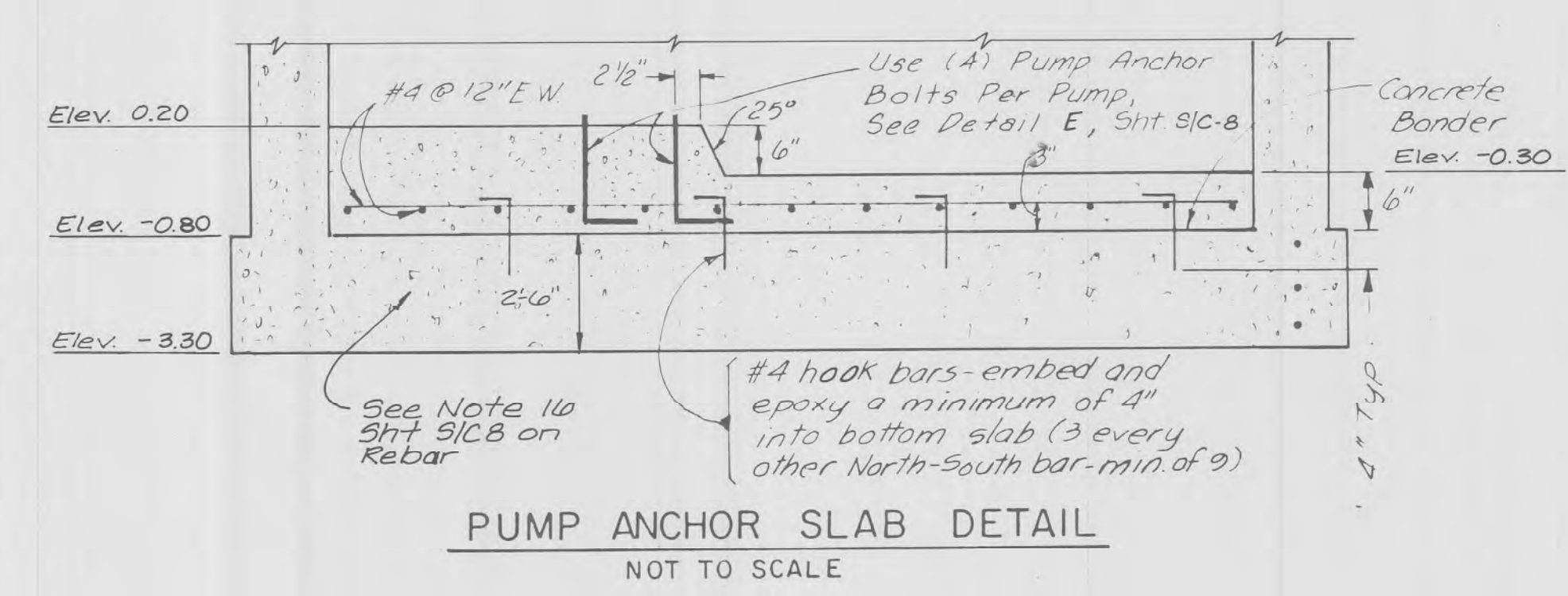


SECTION A-A
NOT TO SCALE

NOTE: Concrete shall be Class 'C' unless otherwise shown.



SECTION "B-B"
NOT TO SCALE



PUMP ANCHOR SLAB DETAIL
NOT TO SCALE

PUMP DATA	
Install	KSB
(2)	6RTU-16 or equal
	200/315
280 mm Discharge Impeller	
No. 17HP	1160 RPM
3 Ø	230/460 Volts
1000 GPM @ 26 TDH	
68% Efficiency	

CALL
CANDY
1-800-282-8881
48 HOURS BEFORE DIGGING

NOT VALID FOR CONSTRUCTION
UNLESS SIGNED IN THIS BOX.

RECEIVED
DATE
5-11-99

430-1e Record Drawings

RECORD DRAWINGS BASED ON ACTUAL FIELD MEASUREMENTS
AND VERTICAL LOCATION OF STORM AND SANITARY SEWER
STRUCTURES AS SHOWN BY INVERTS. RECORD DIMENSION
IS SHOWN EITHER BY CROSSING OUT PLAN DIMENSION OR
CHECK MARK BY PLAN DIMENSION IF NOT CHANGED.

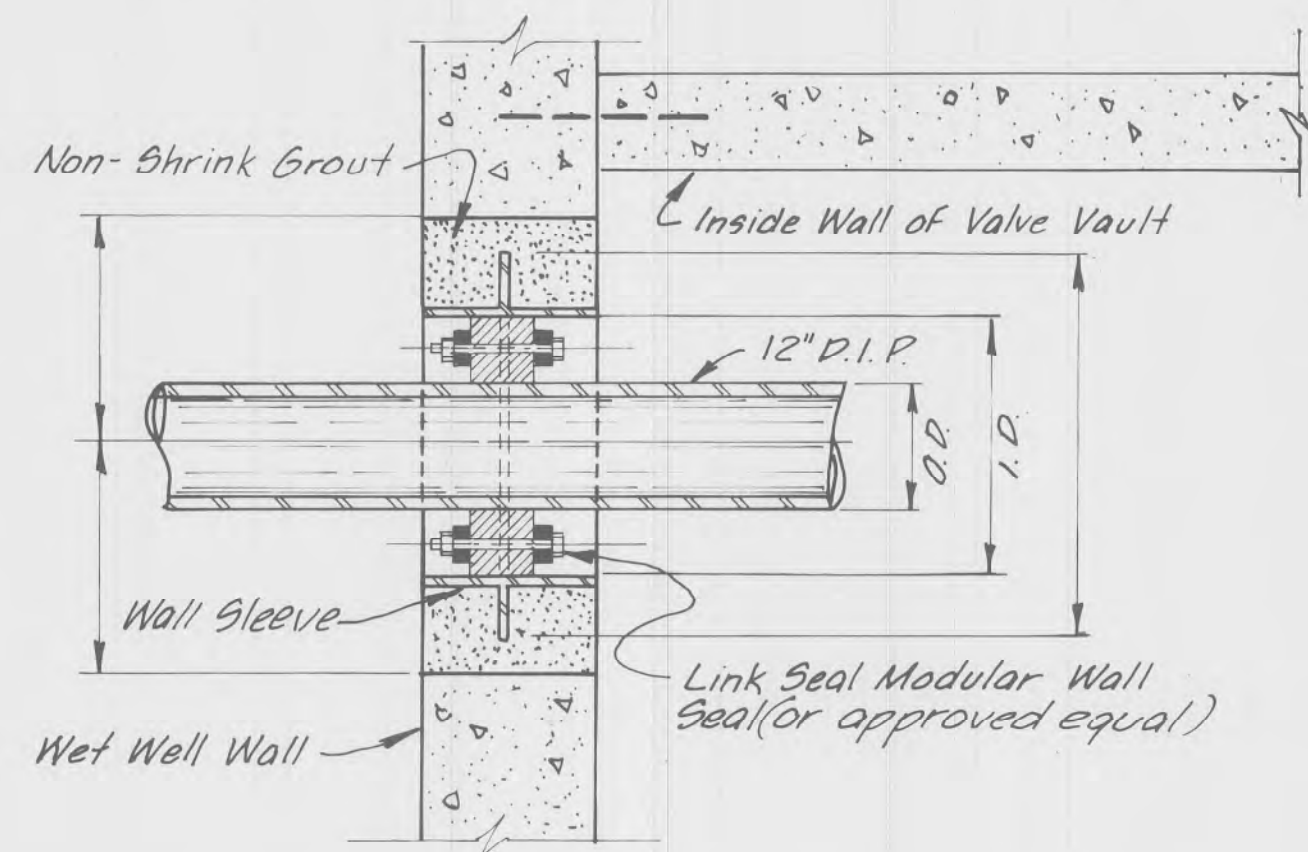
GOTTFRIED + GARCIA / ARCHITECTS / AIA, PA.
3333 west kennedy boulevard / tampa, florida

RECEIVED
DATE
5-11-99

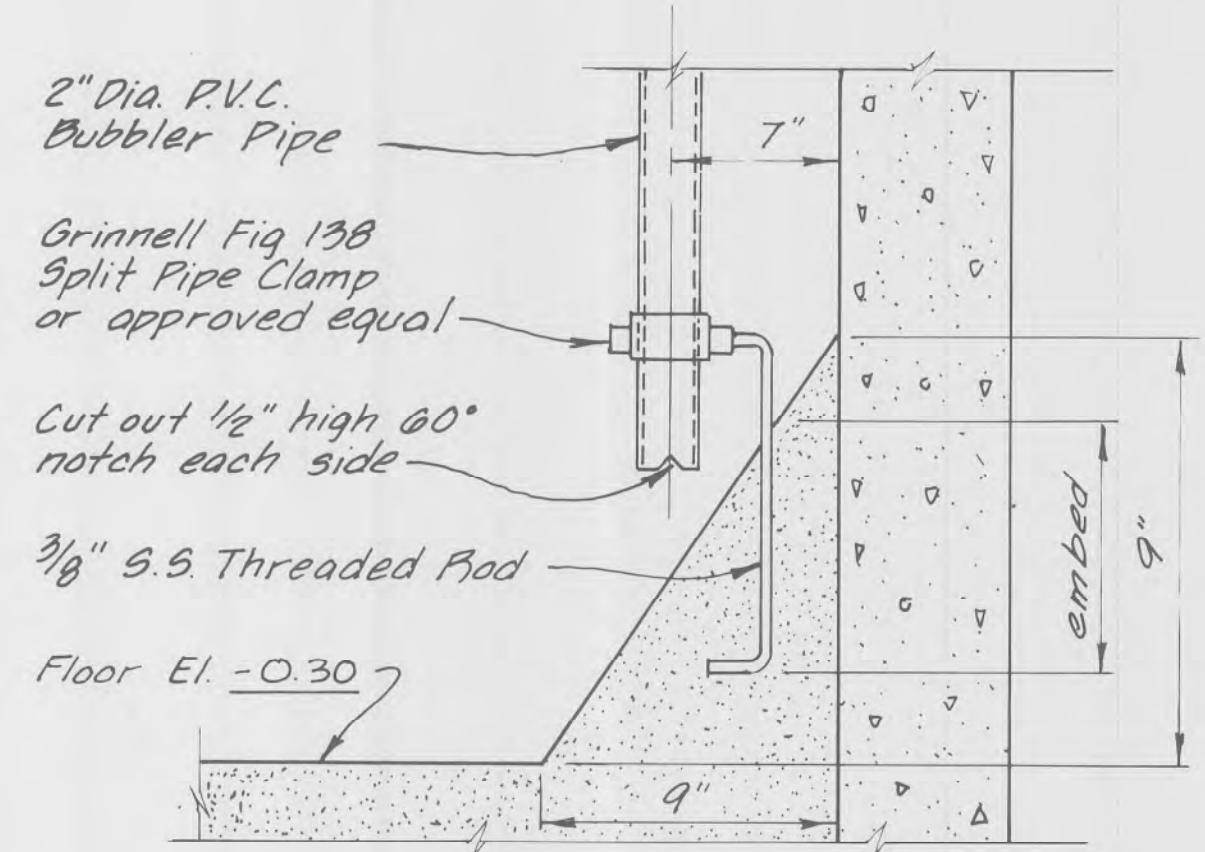
Wade-Trim
Landscape Architecture
Engineering
Environmental Sciences
201 E. Kennedy Blvd. Suite 334 Tampa, FL 33602

ZZZ ROBT.01

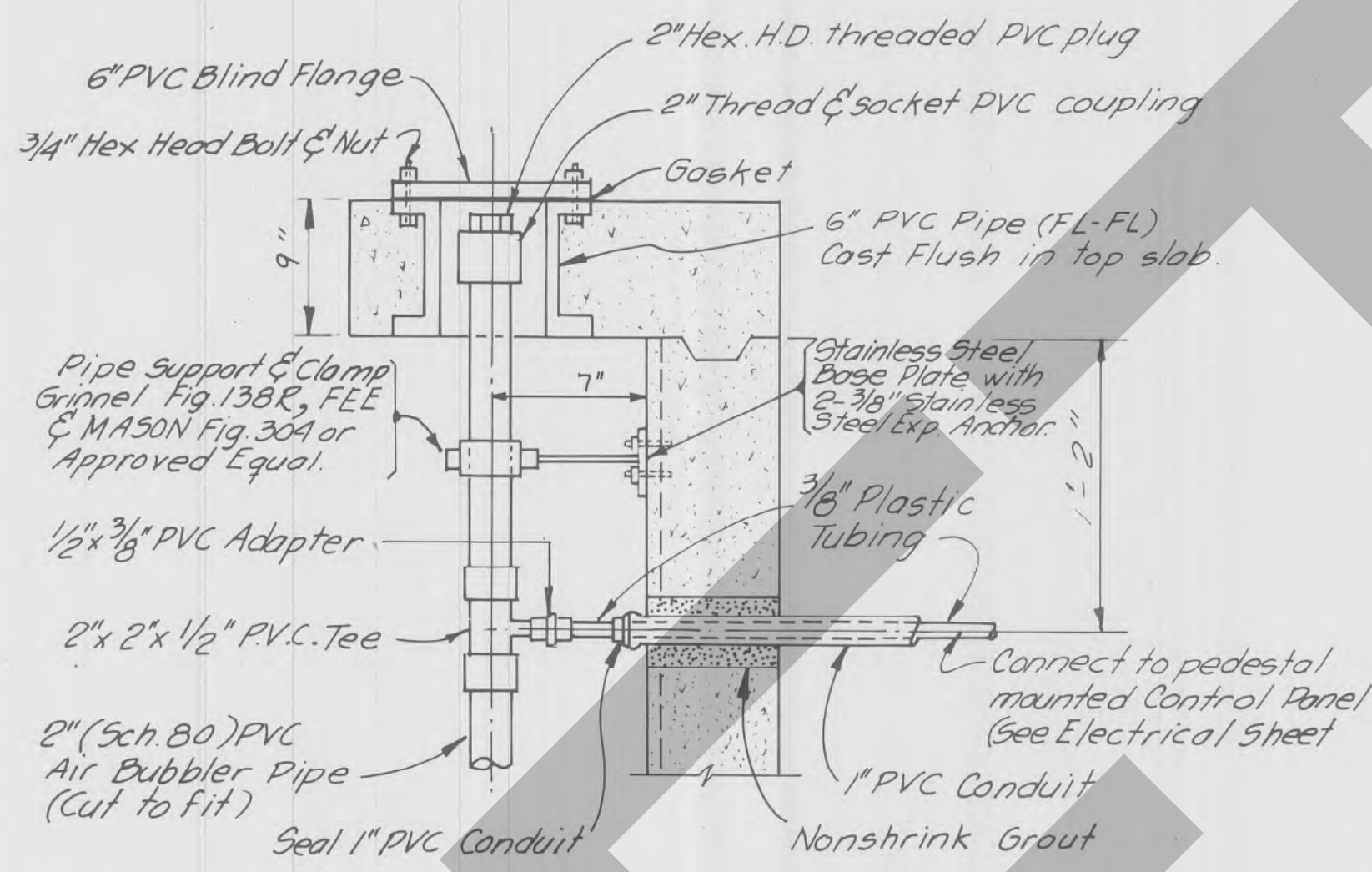
REVISIONS 8-3-89



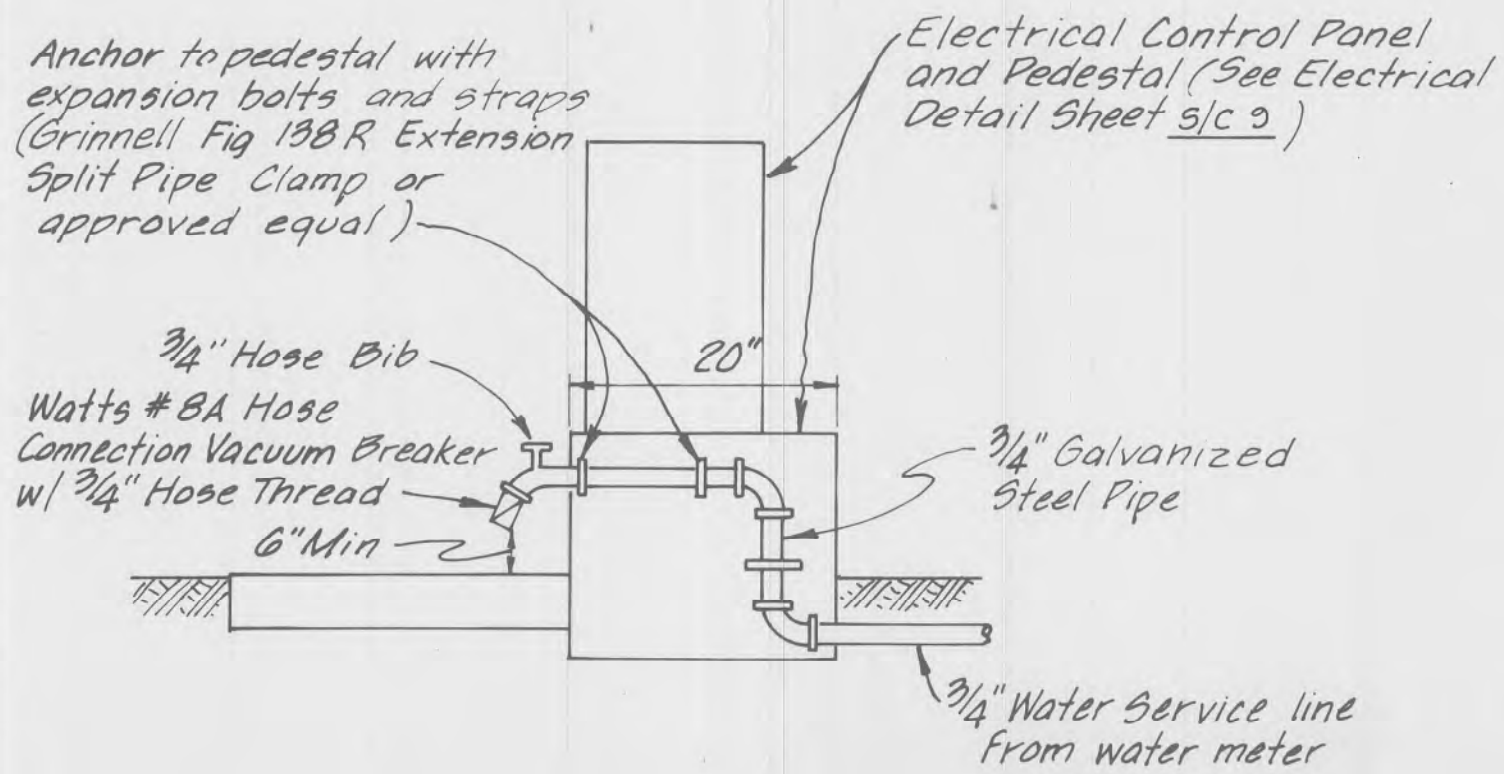
VALVE VAULT DETAIL A
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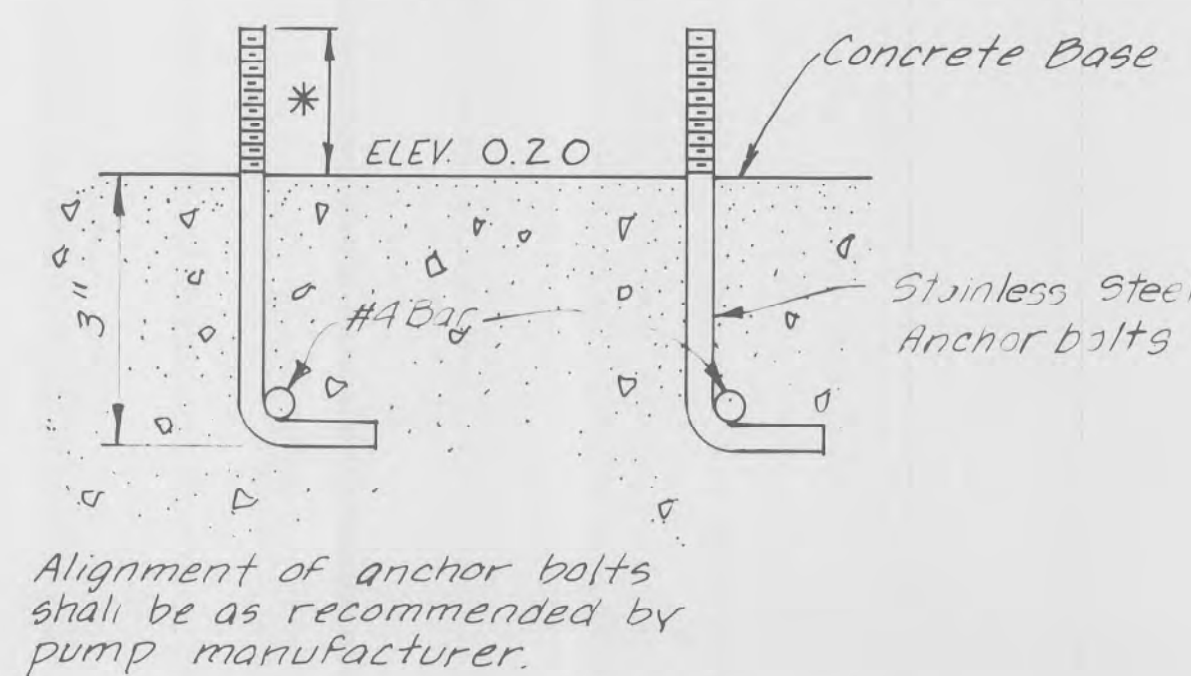
DETAIL B
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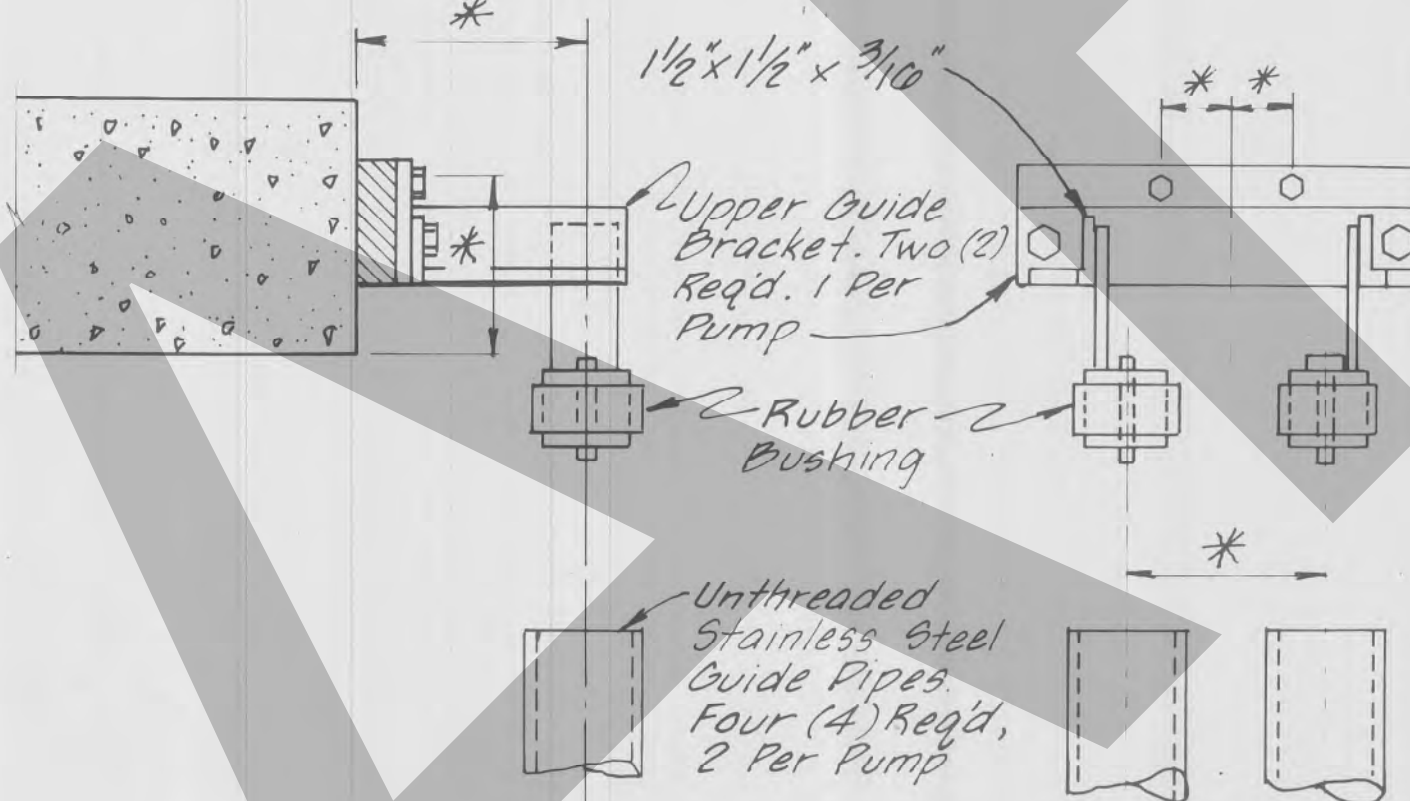
DETAIL C
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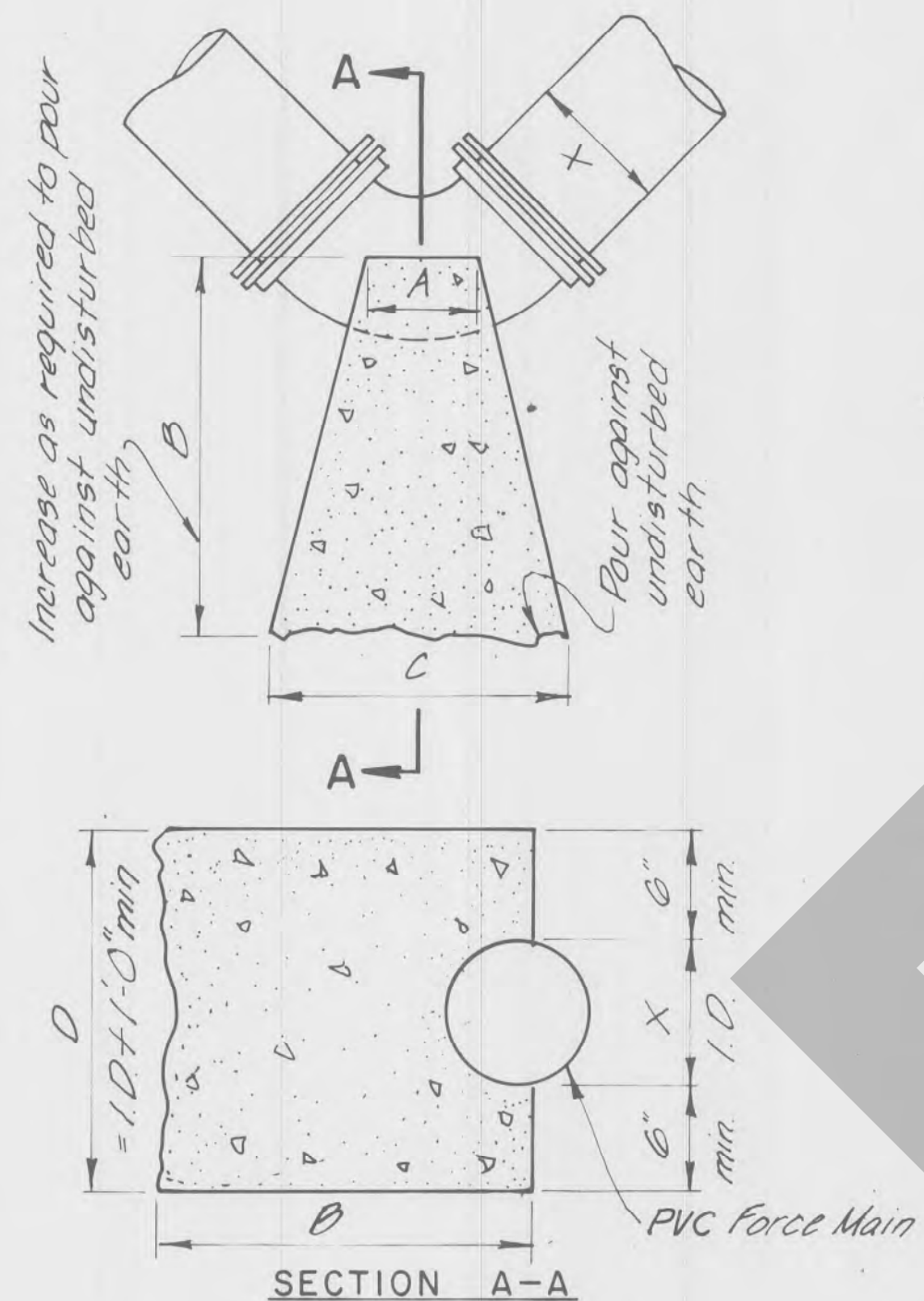
WATER SERVICE RISER, DETAIL D
NOT TO SCALE



ANCHOR BOLT DETAIL E
NOT TO SCALE

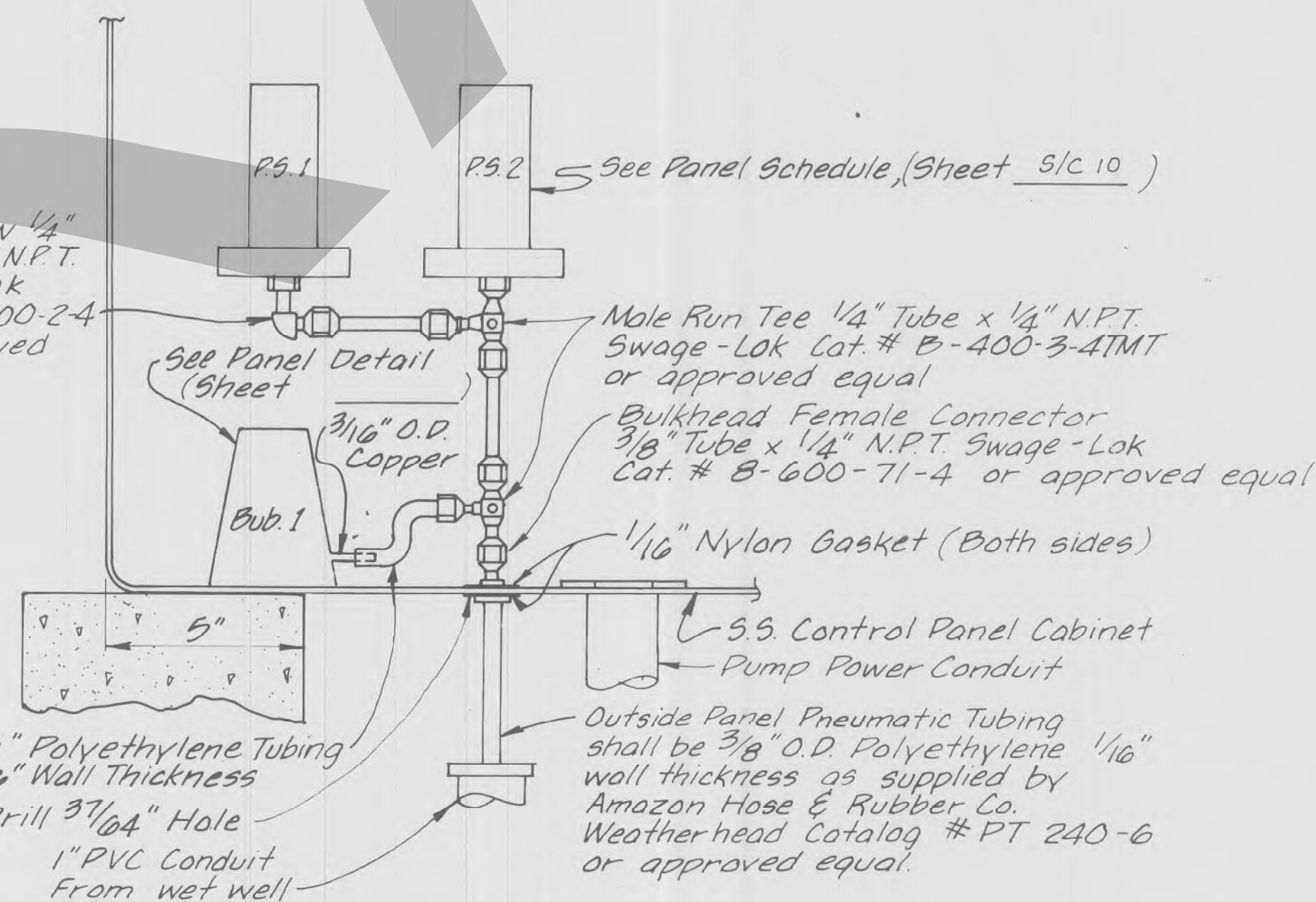


GUIDE BRACKET DETAIL F (SUPPLIED WITH PUMPS)
NOT TO SCALE



FORCE MAIN THRUST BLOCKING DETAIL G
NOT TO SCALE

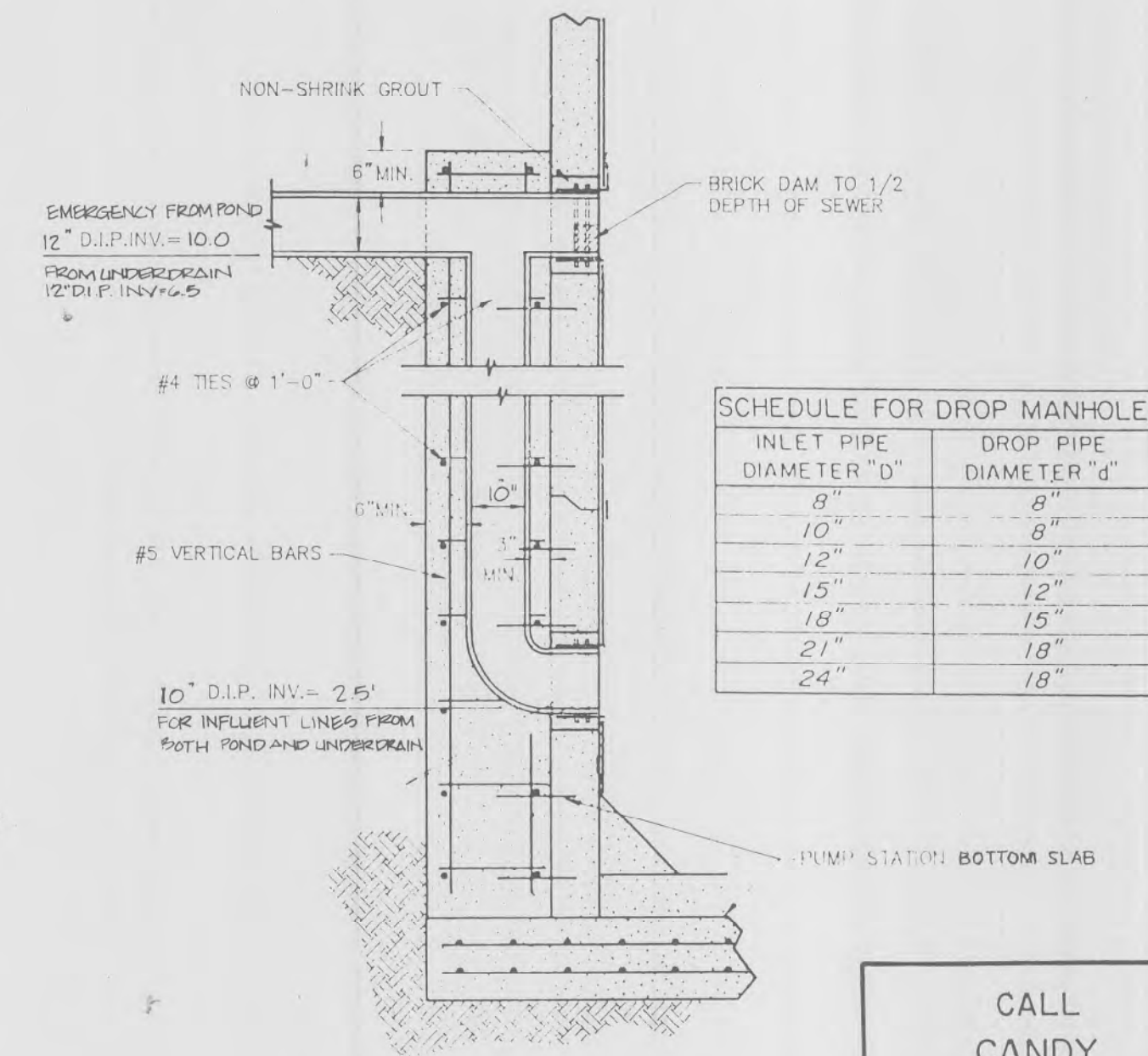
SCHEDULE BLOCKING DIMENSIONS				
X	A	B	C	D
90° Bend				
12"	10"	2'-6"	3'-6"	2'-3"
10"	10"	2'-0"	3'-0"	2'-0"
8"	8"	2'-0"	2'-0"	2'-0"
6"	6"	1'-8"	1'-8"	1'-8"
4"	4"	1'-4"	1'-4"	1'-4"
45° Bend				
12"	6"	2'-0"	2'-2"	2'-2"
10"	6"	1'-9"	1'-6"	2'-0"
8"	5"	1'-0"	1'-3"	1'-4"
6"	4"	1'-6"	1'-3"	1'-6"
4"	3"	1'-4"	1'-0"	1'-4"
22 1/2° Bend				
12"	6"	2'-0"	1'-6"	2'-0"
10"	6"	1'-6"	1'-0"	2'-0"
8"	4"	1'-6"	1'-0"	1'-8"
6"	4"	1'-6"	1'-0"	1'-6"
11 1/4° Bend				
12"	6"	2'-0"	1'-0"	2'-0"
10"	6"	2'-0"	8"	1'-10"
8"	5"	2'-0"	9"	1'-8"
6"	6"	1'-6"	6"	1'-6"



BUBBLER PIPE FITTINGS DETAIL H
NOT TO SCALE

GENERAL NOTES

- ALL SHOWN DIMENSIONS ARE APPROXIMATE. TRUE DIMENSIONS SHOULD BE DETERMINED IN THE FIELD.
- FORCE MAIN FITTINGS SHALL BE THRUST BLOCKED OR USE R.M.J.
- FORCE MAIN PIPE SHALL BE DIP CLASS 50
- FILL ALL OPENINGS AROUND PIPES WITH NON-SHRINK GROUT EXCEPT WHERE OTHERWISE SPECIFIED.
- BOLTS, WASHERS, NUTS, SCREWS, HINGES, ETC., SHALL BE STAINLESS STEEL TYPE 316 UNLESS OTHERWISE SPECIFIED OR APPROVED BY ENGINEER.
- STAINLESS STEEL, TYPE 304, WELDED LINK CHAIN WITH A 1240# (PUMP WT x 1.5) LIFTING CAPACITY
- DRILL AND TAP BY-PASS VALVE BLIND FLANGE, INSTALL 3/4" BRASS VALVE AND PIPE DOWNWARD TO VALVE VAULT FLOOR.
- ECCENTRIC PLUG VALVES SHALL BE DEZURIK SERIES 100, OR APPROVED EQUAL.
- CHECK VALVES SHALL BE APCO SERIES 100, OR APPROVED EQUAL.
- ALL PIPE, FITTINGS, SUPPORTS, VALVES, ETC. SHALL RECEIVE THE FOLLOWING SYSTEM COATING:
 - SHOP COAT - ONE, 1.5 MILS, MOFT SIKAGARD #62 (THINNED 10-15%)
 - FIELD COAT - TWO COATS, 10 MILS, MOFT EACH SIKAGARD #62 NO. 300 M, OR APPROVED EQUAL.
- VALVE VAULT AND WET WELL ACCESS COVERS SHALL BE ALUMINUM WITH STAINLESS STEEL HARDWARE AND SHALL WITHSTAND A LIVE LOAD OF 150 PSF. CONTRACTOR TO SUBMIT SHOP DRAWINGS DETAILING INSTALLATION.
- ALL STEEL REINFORCING SHALL BE DETAILED ACCORDING TO THE "MANUAL OF STANDARD PRACTICE FOR DETAILED REINFORCED CONCRETE STRUCTURES," ACI STANDARD 315-65. THE ACTUAL PLACEMENT OF STEEL REINFORCING SHALL BE SHOWN ON SHOP DRAWINGS. ALL LAPS AND SPLICES SHALL BE AT LEAST 32 BAR DIAMETERS OR 24 INCHES.
- BACKFILL SHALL BE COMPACTED IN 8 INCH LAYERS TO 95% OF THE MAXIMUM DRY DENSITY IN CONFORMANCE WITH AASHTO T-180, METHOD A.
- THE EXTERIOR OF EACH WET WELL SHALL BE PAINTED WITH TWO (2) COATS OF KOPPERS "BITUMASTIC 300-M" OR AN APPROVED EQUAL, APPLIED IN ACCORDANCE WITH MANUFACTURERS DIRECTIONS.
- BOTTOM SLAB AND FIRST BARREL TO BE MONOLITHICALLY POURED AS ONE INTEGRAL PART / COMPONENT.
- REINFORCING IN THE WET PIT BASE AND BASE AND TOP SLABS SHALL BE AS SHOWN ON THE PLANS. REINFORCING SHALL COMPLY WITH ASTM C 478 EXCEPT THAT REINFORCING SHALL CONSIST ONLY OF BARS MEETING THE REQUIREMENTS OF ASTM A 615 GRADE 60.



DROP CONNECTION TO PUMP STATION
SECTION C-C
N.T.S.

SCHEDULE FOR DROP MANHOLE	
INLET PIPE DIAMETER "d"	DROP PIPE DIAMETER "d"
8"	8"
10"	8"
12"	10"
15"	12"
18"	15"
21"	18"
24"	18"

CALL CANDY
1-800-282-8881
48 HOURS BEFORE DIGGING

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4-30-90 Record Drawings

Wade-Trim
 Engineering
 Planning
 Landscape Architecture
 Environmental Sciences
 201 E. Kennedy Blvd. Suite 334 Tampa, FL 33602

GOTTFRIED + GARCIA / ARCHITECTS / AIA, PA
 3333 west kennedy boulevard / tampa, florida



P.3 Swann Pond ERP Documentation

DRAFT



THIS CONTRACT PLAN SET INCLUDES:

- ROADWAY PLANS
- SANITARY SEWER CONSTRUCTION PLANS
- UTILITY ADJUSTMENT PLANS
- SIGNING AND PAVEMENT MARKING PLANS
- SIGNALIZATION PLANS
- MAINTENANCE OF TRAFFIC PLANS

CITY OF TAMPA

ROADWAY AND DRAINAGE IMPROVEMENTS

SWANN AVENUE

ARMENIA AVENUE TO PACKWOOD AVENUE

APPLICABLE CITY STANDARD DRAWINGS

DPW D-2	STANDARD INLET TYPES 1,2,3,D,E,&H
DPW D-4	STANDARD CURB INLETS TYPES B-S-1, B-V-1, B-R-1, & B-R-2
DPW D-8	MODIFIED GRATE INLETS AND TRAFFIC BEARING MANHOLE FRAME AND COVER
DPW D-13	MISCELLANEOUS DRAINAGE DETAILS
DPW P-3	CURB AND GUTTER JOINT DETAILS
DPW P-4	DRIVEWAY DETAILS

APPLICABLE F.D.O.T. STANDARDS (1988)

102	BALED HAY OR STRAW BARRIERS AND SILT FENCES
200	STRUCTURE BOTTOMS TYPES J AND P
201	SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS
250	STRAIGHT CONCRETE ENDWALLS
280	MISCELLANEOUS DRAINAGE DETAILS
282	BACK OF SIDEWALK DRAINAGE

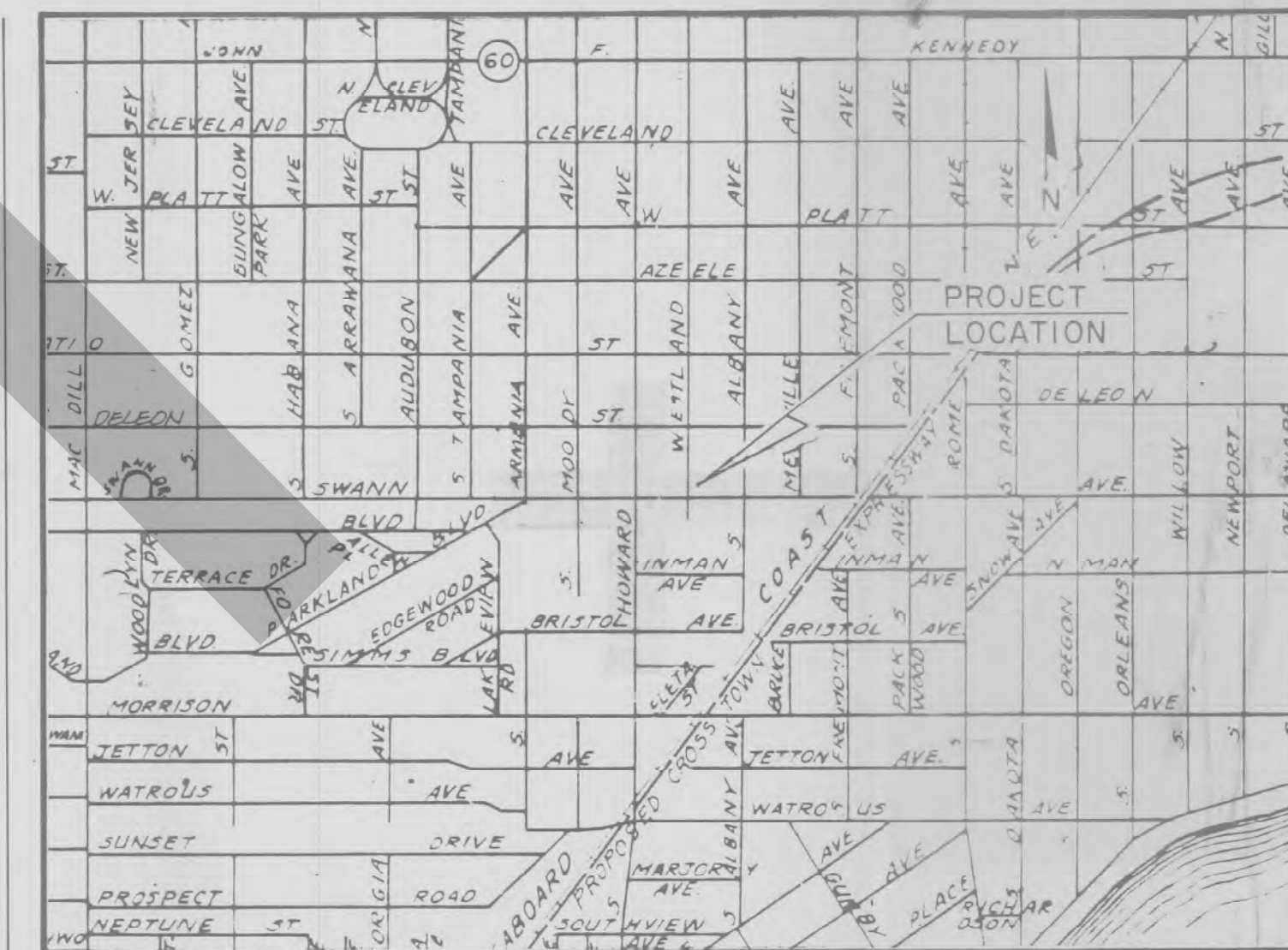
FILE No. A-2-73

JOB No. 6895

Department of Public Works
City of Tampa, Florida

AS-BUILT PLANS PREPARED FROM COMPLETED CONSTRUCTION INFORMATION SUBMITTED BY CONSTRUCTION ENGINEER AND REVIEWED FOR CONFORMATION OF GENERAL SITE CONDITIONS

Project Engineer _____ Date _____
Construction Engineer _____ Date _____



VICINITY MAP
Scale 1" = 1000'

INDEX OF SHEETS

Sheet No.	Description
1	Cover Sheet and Vicinity Map
2	General Notes and Legend
3	Drainage Map
4	Typical Sections
5	Special Pond Details
6	Summary of Quantities
7	Summary of Drainage Structures
8-14	Plan and Profile
15	Existing Pond Modification Plan
16	Soil Borings
17-35	Cross Sections
36-43	Sanitary Sewer Construction Plans
44-48	Utility Adjustment Plans
49-50	Maintenance of Traffic Plan

THIS FILE DOES NOT
CONTAIN EXEMPT INFO

Southwest Florida
Water Management District
RECEIVED
JUN 29 1992
TAMPA
Permitting Dept.

PREPARED BY: **FLD&E**
Florida Land Design & Engineering, Inc.
planning / engineering / landscape architecture / surveying
one north dale mabry suite seven hundred tampa, florida 33609 tampa (813) 875-1115 pinellas (813) 443-6827

Jerry A. Dabkowski
JERRY A. DABKOWSKI, P.E.
REG. No. 34810

8-7-89
DATE

APPROVED BY THE CITY OF TAMPA

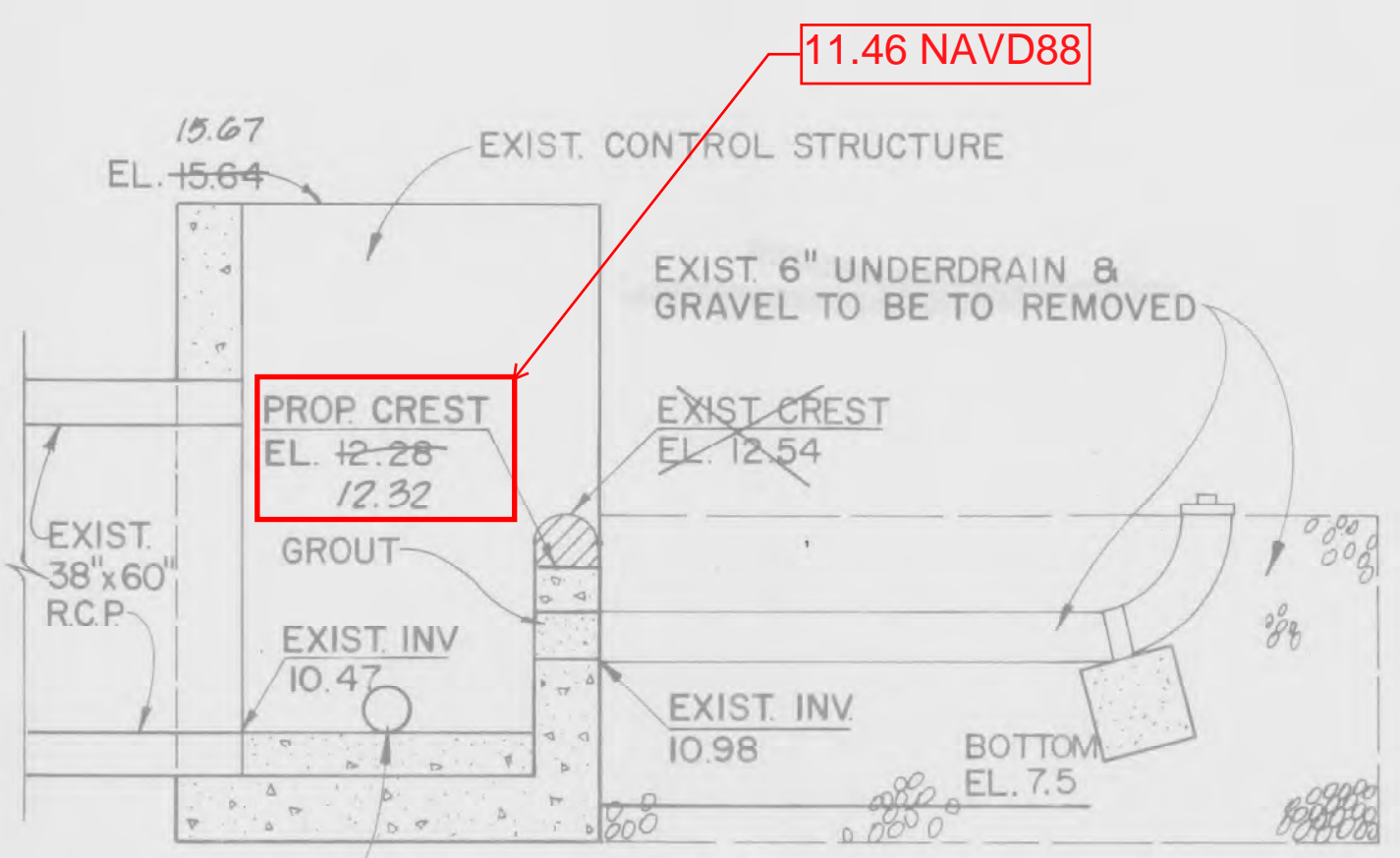
Transportation Manager

DATE

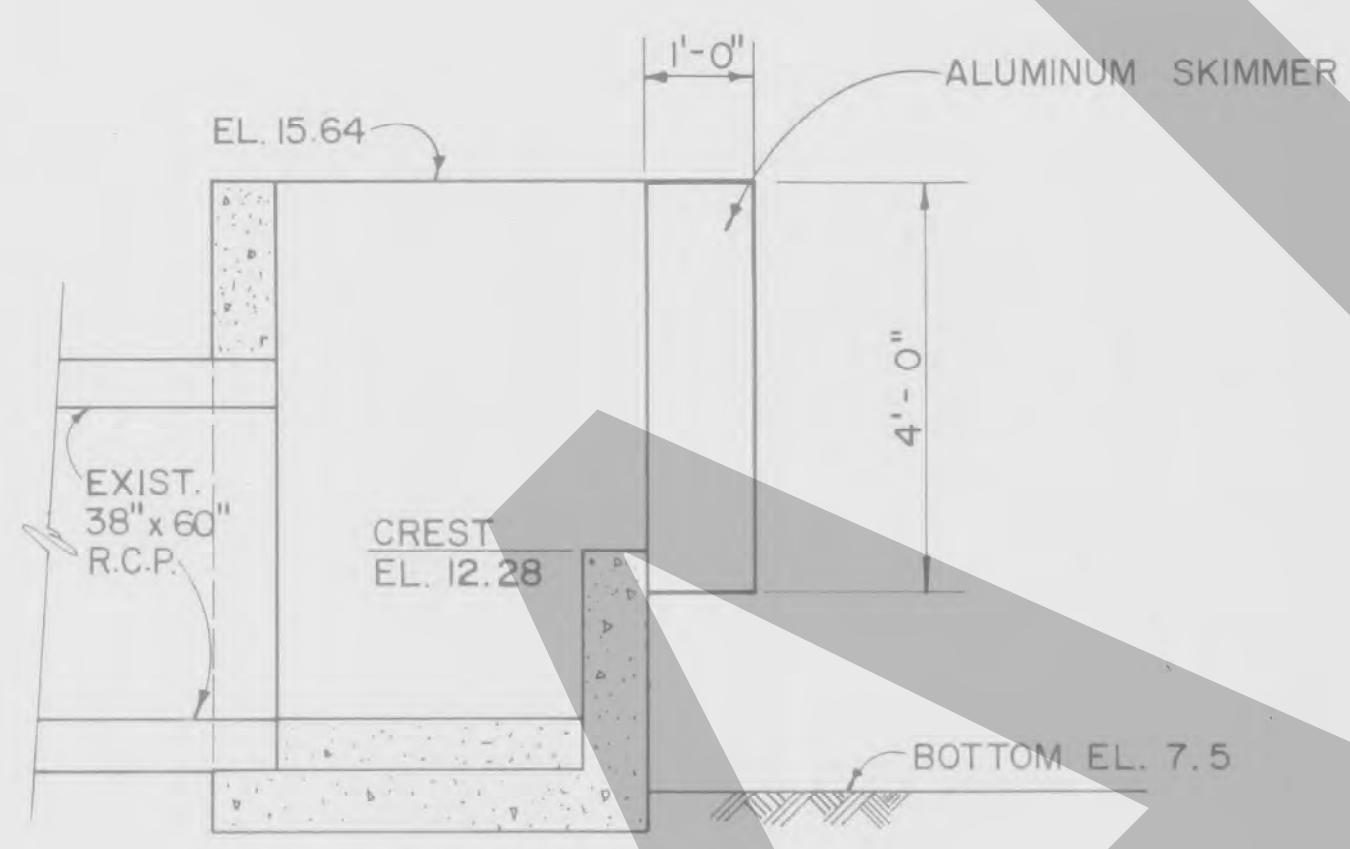
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402417.01
Imaged As Is

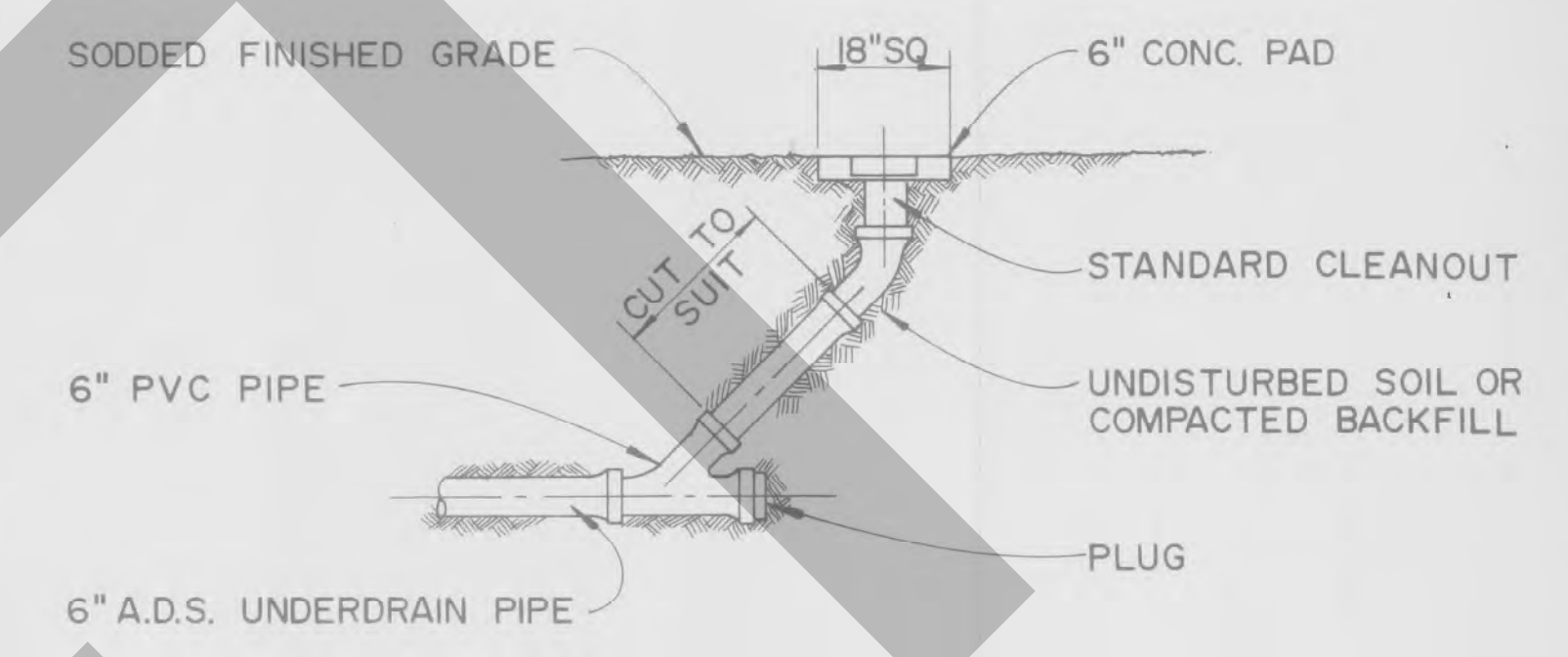
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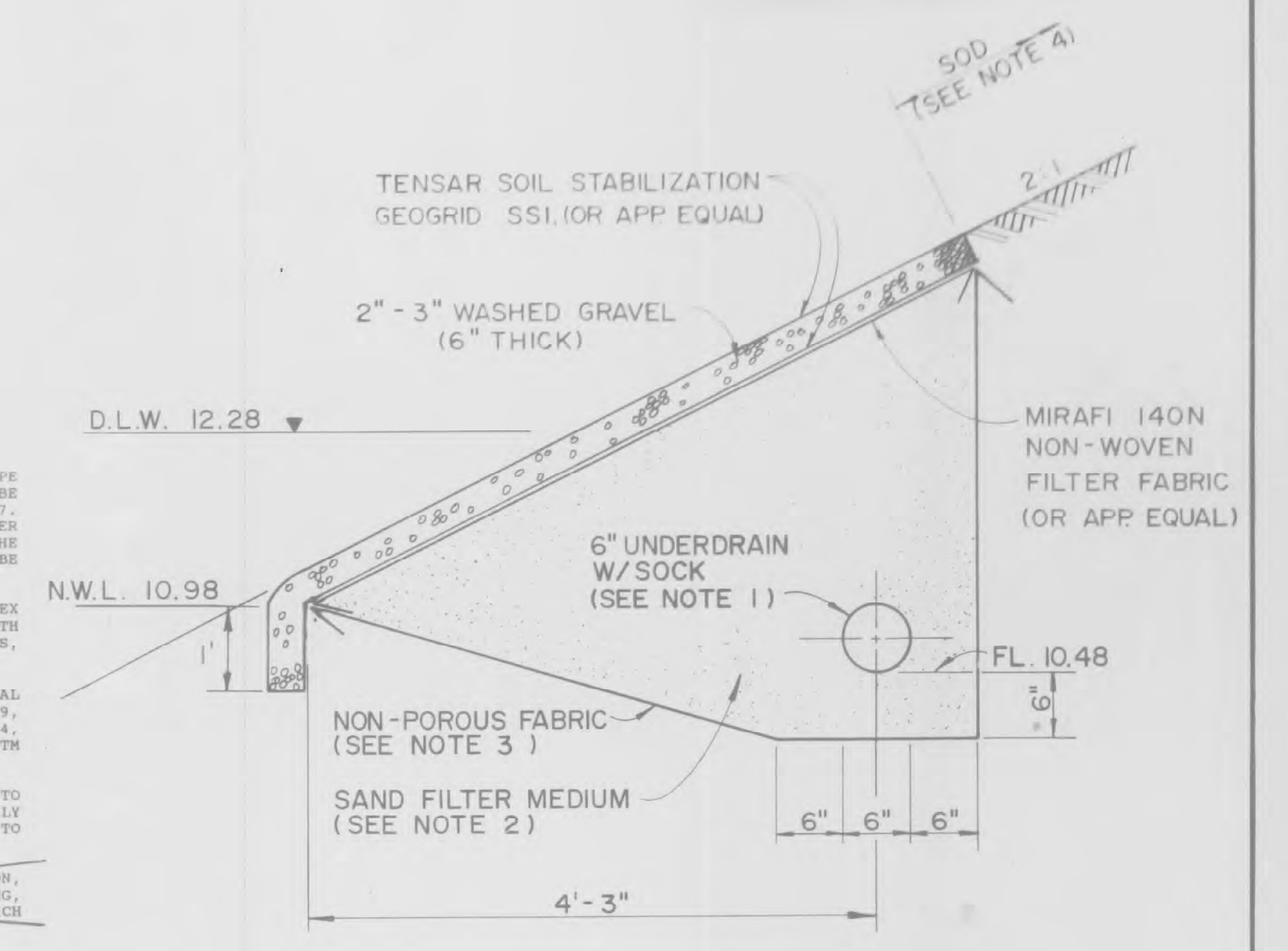
SECTION VIEW



SECTION 'A-A'

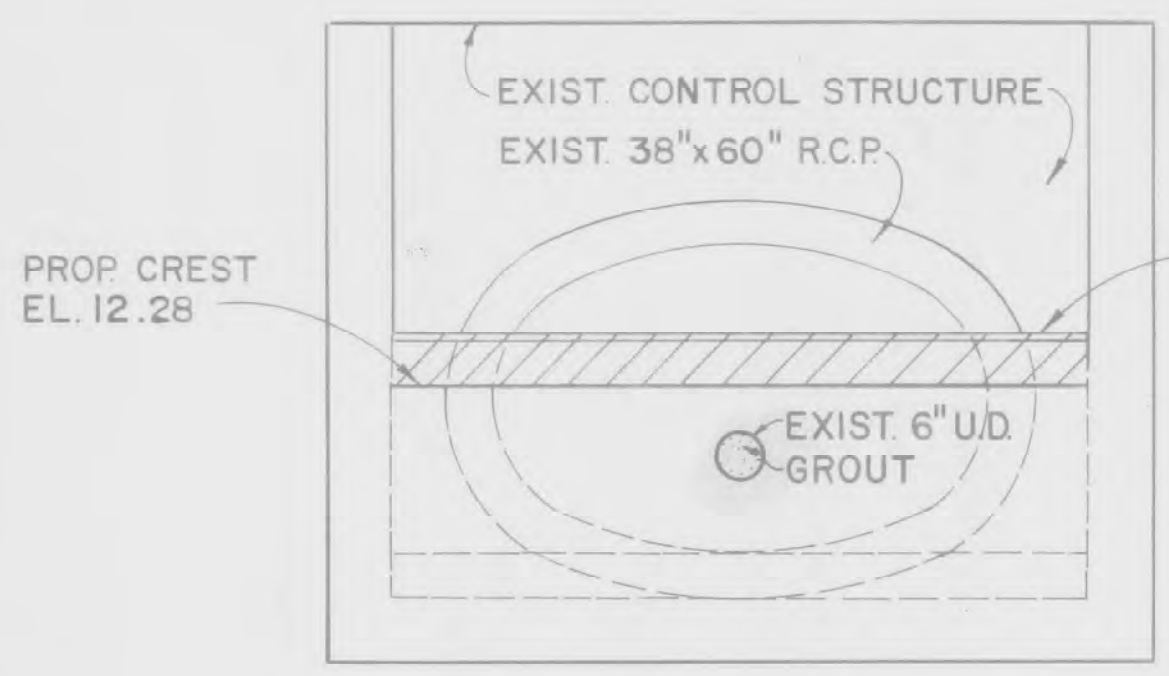


UNDERDRAIN CLEANOUT DETAIL



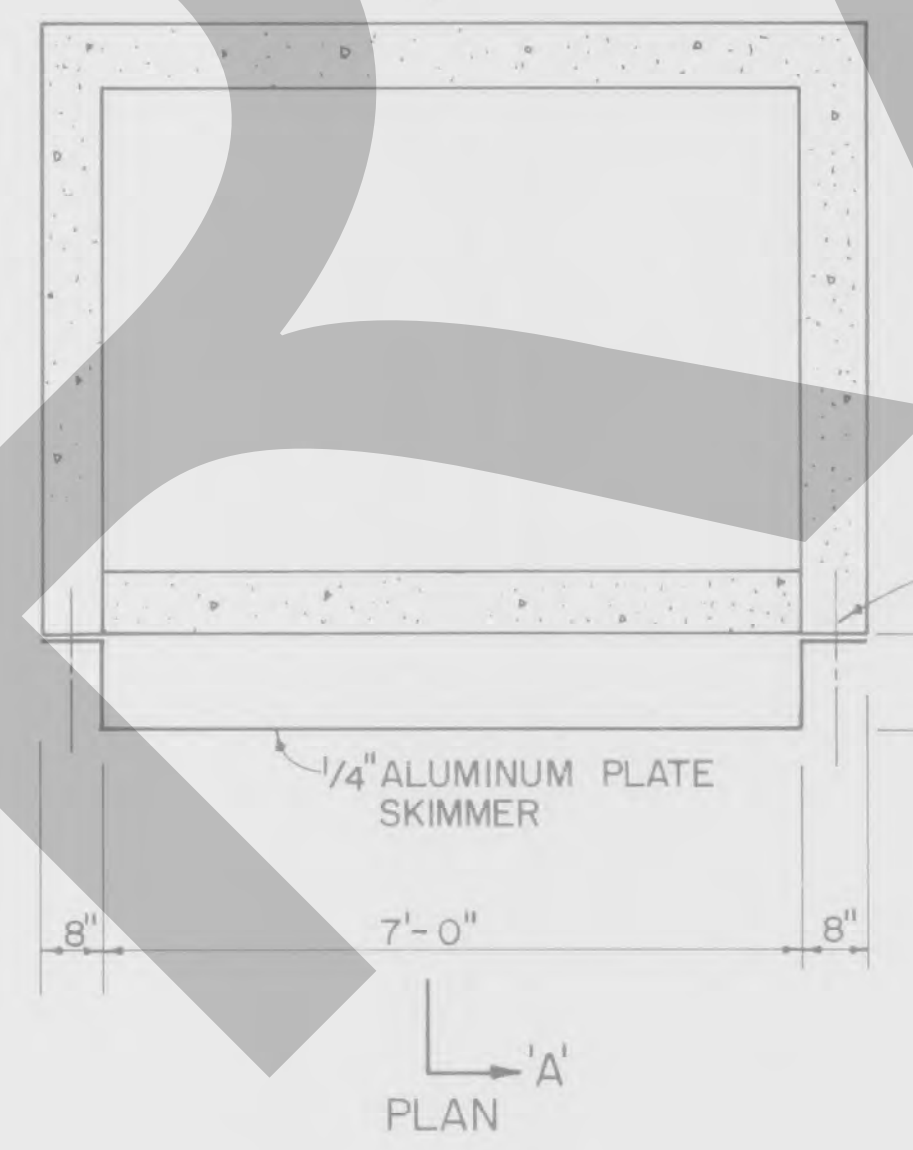
POND UNDERDRAIN DETAIL

N.T.S.



ELEVATION

CONTROL STRUCTURE MODIFICATION



SKIMMER DETAIL

CONTROL STRUCTURE MODIFICATION DETAILS

S-43

AS-BUILT

REVIEWED BY _____ DATE _____

JUN 29 1988

TAMPA Permitting Dept.

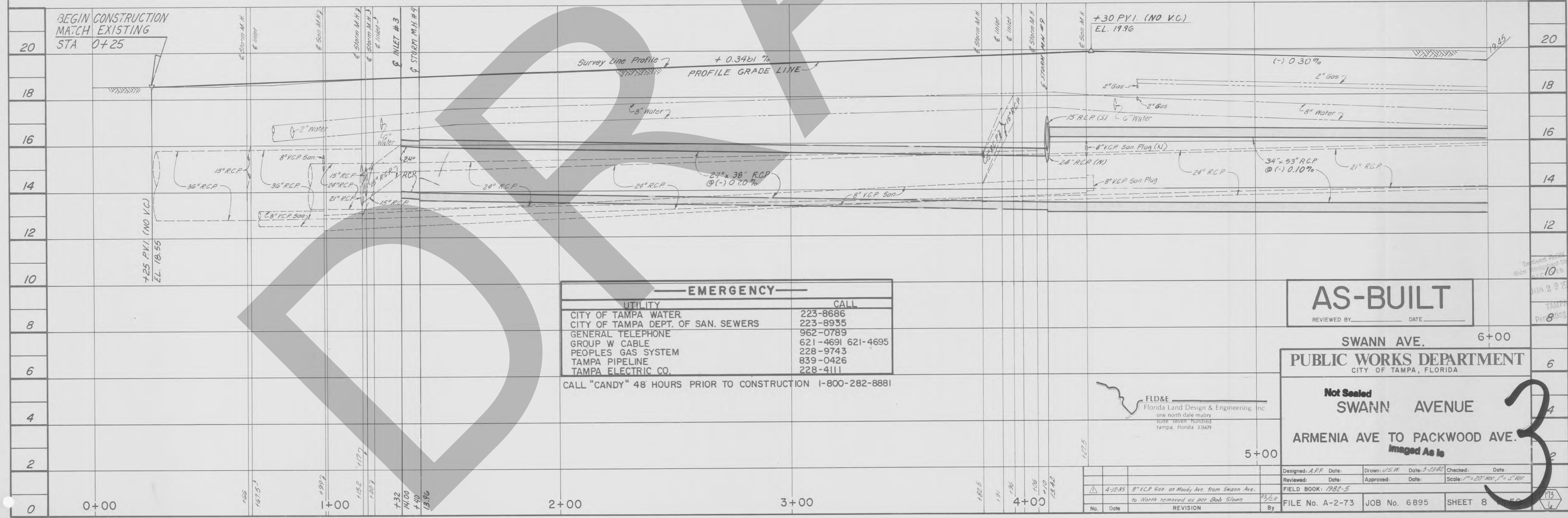
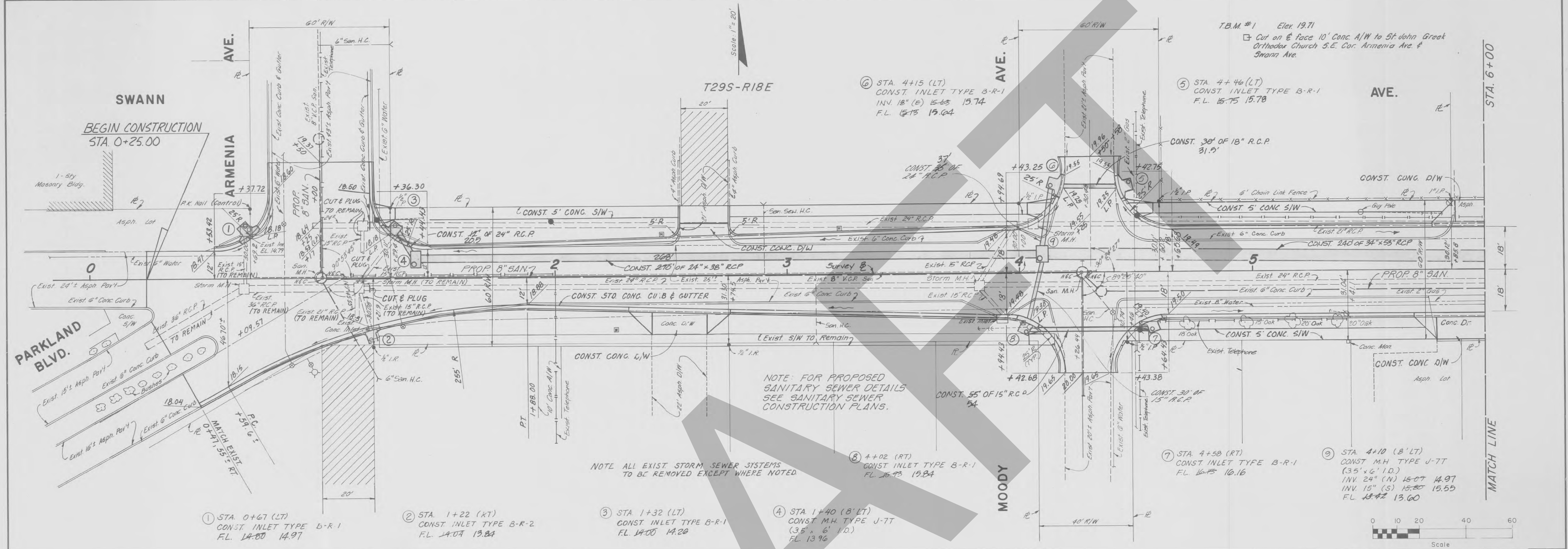
SPECIAL POND DETAILS
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

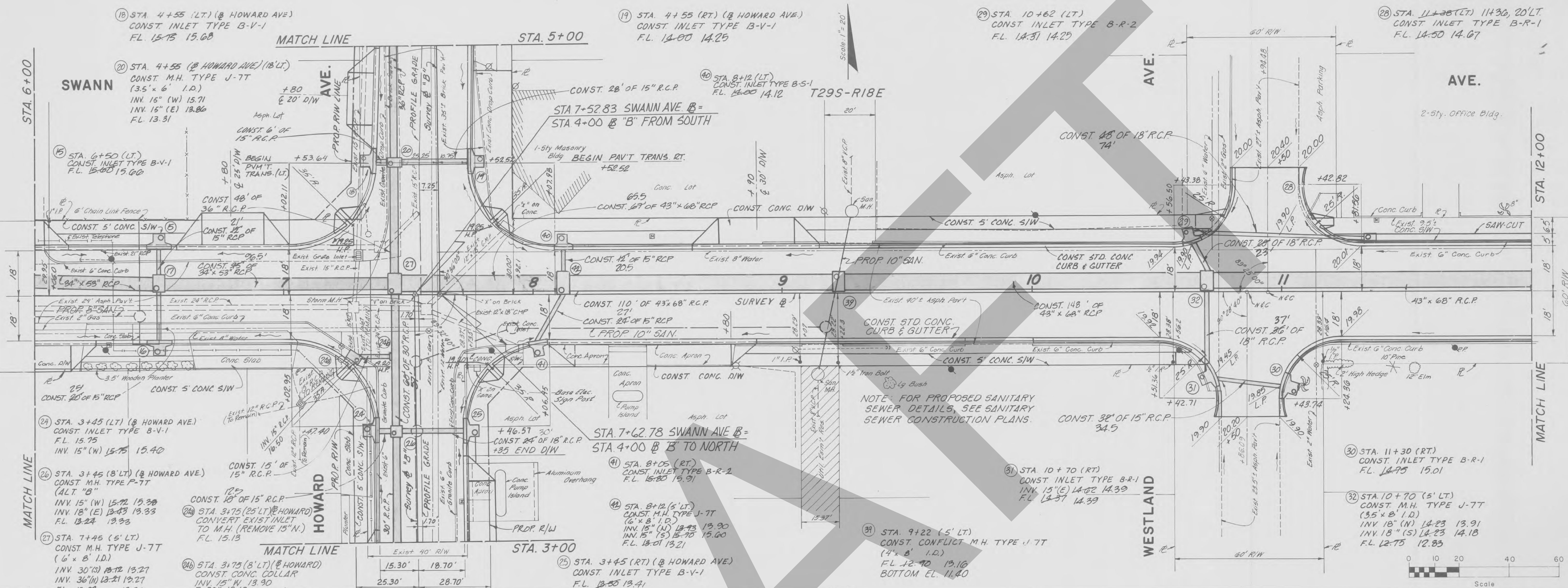
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SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE

Not Sealed

Designed: APF	Date: 5/88	Drawn: CLC	Date: 5/88	Checked: _____	Date: _____
Reviewed: _____	Date: _____	Approved: _____	Date: _____	Scale: _____	_____
Field Book: _____					
FILE No. A-2-73	JOB No. 6895	SHEET 5 of 50			





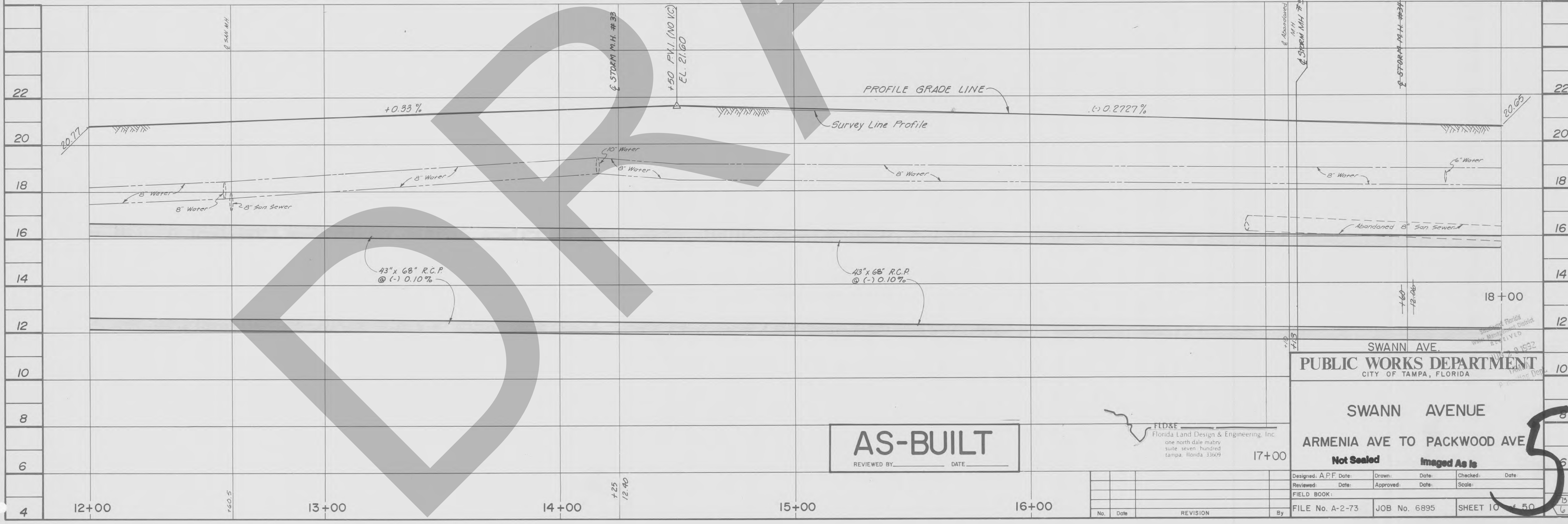
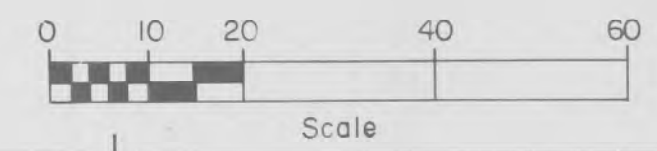
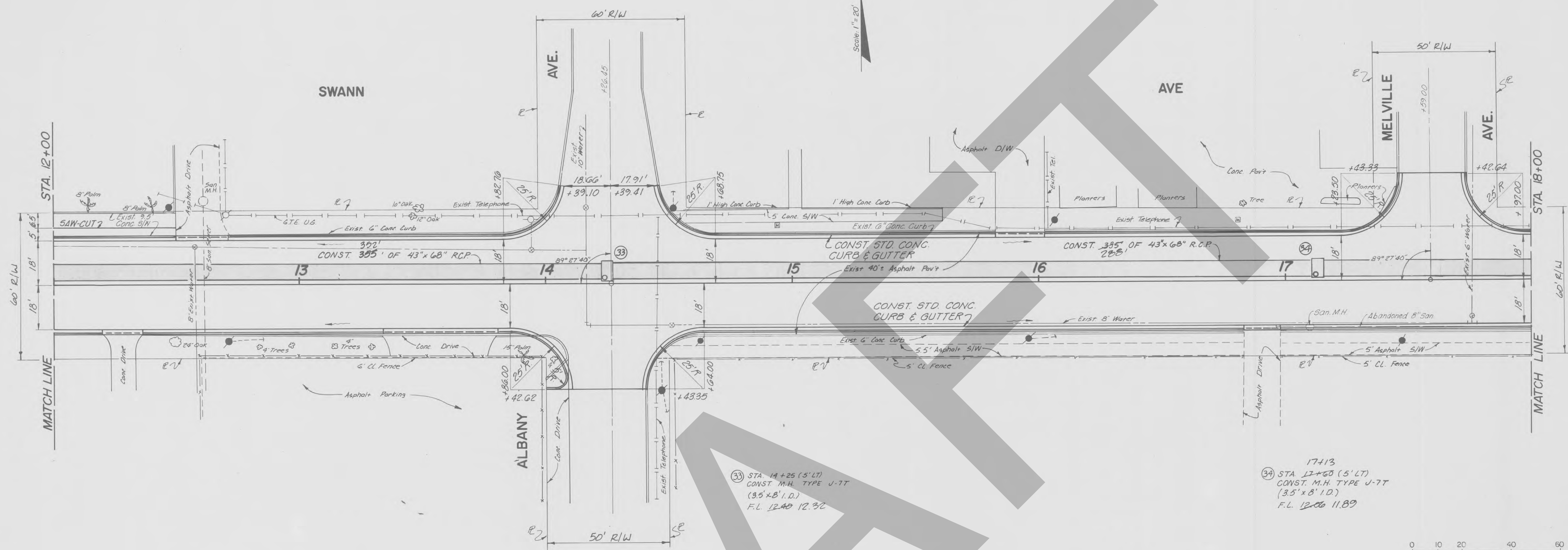
AS-BUILT
 REVIEWED BY: _____ DATE: _____

SWANN AVE. 12+00
PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA
 Not Sealed
SWANN AVENUE
 ARMENIA AVE TO PACKWOOD AVE
 Imaged As Is

Designed: A.P.F.	Date:	Drawn: J.S.W.	Date: 3-29-02	Checked:	Date:
Reviewed:	Date:	Approved:	Date:	Scale:	1" = 20' HOR, 1" = 2' VERT
FIELD BOOK: 1982-5					
FILE No. A-2-73		JOB No. 6895		SHEET 9 of 50	

FLD&E
 Florida Land Design & Engineering, Inc.
 one north dale mabry
 suite seven hundred
 tampa, florida 33629

Received Florida
 Water Management District
 JUN 29 1982
 TAMPA
 District



AS-BUILT
 REVIEWED BY _____ DATE _____

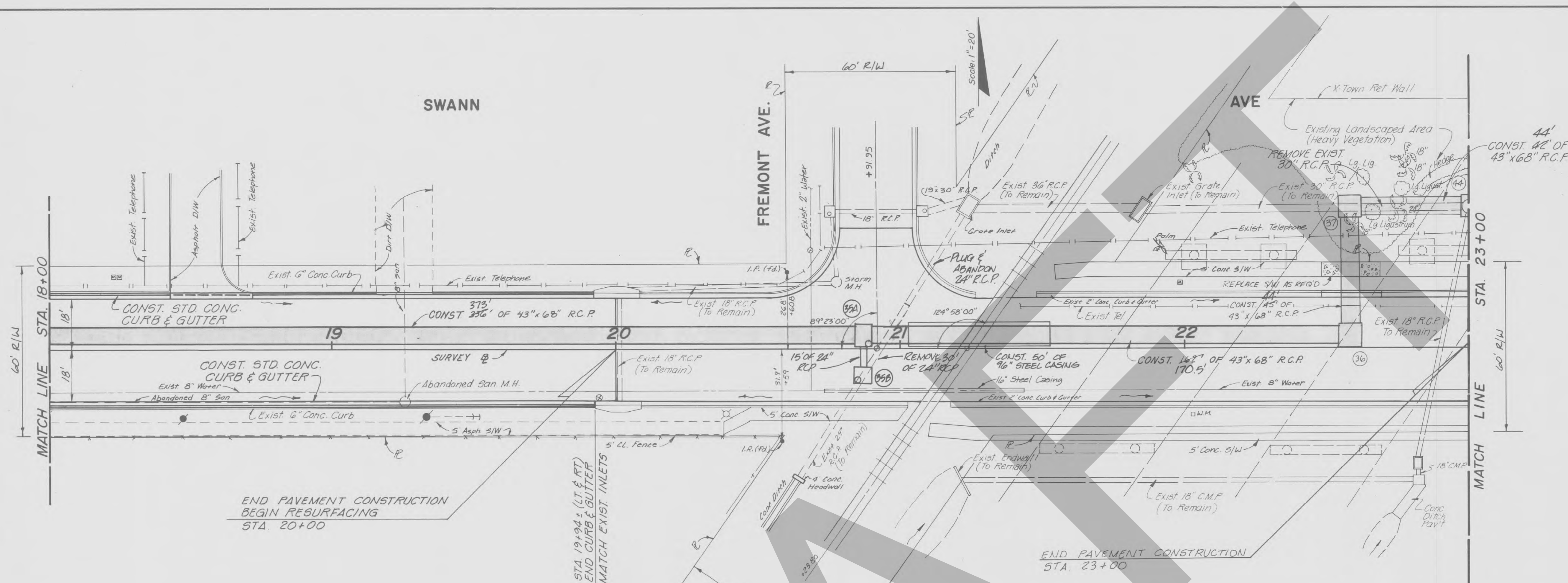
FLD&E
 Florida Land Design & Engineering, Inc.
 one north dale mabry
 suite seven hundred
 tampa, florida 33629

SWANN AVE.
PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA

SWANN AVENUE
 ARMENIA AVE TO PACKWOOD AVE
 Not Sealed Imaged As Is

Designed: A.P.F.	Date:	Drawn:	Date:	Checked:	Date:
Reviewed:	Date:	Approved:	Date:	Scale:	
FIELD BOOK:					
FILE No. A-2-73	JOB No. 6895	SHEET 10	OF 50		

No.	Date	REVISION	By



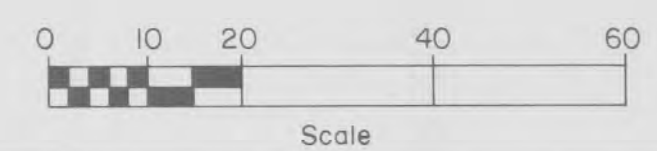
35A STA 91+89, 3' LT.
J-7T MH
F.L. 11.63 (E & W)
F.L. 14.95 (S)

35B STA 91+86, 11' ET
J-7T MH
F.L. 15.71 (S.W.)
F.L. 16.03 (N)

36 STA 20+96 (S LT)
CONST. M.H. TYPE J-7T
(3.5' X 12' I.D.)
F.L. EXIST 24' 15.35 (THRU-M.H.)
F.L. 73

36 STA 22+58 (S' LT)
CONST. M.H. TYPE J-7T
(7' X 7' I.D.)
F.L. 11.53

37 STA 22+58 (50' LT)
CONST. M.H. TYPE J-7T
(7' X 7' I.D.)
F.L. EXIST 30" 13.40 15.57
F.L. 11.33 11.30



AS-BUILT
REVIEWED BY _____ DATE _____
JUN 8 9 1992
TAMPA
Permitting Dept

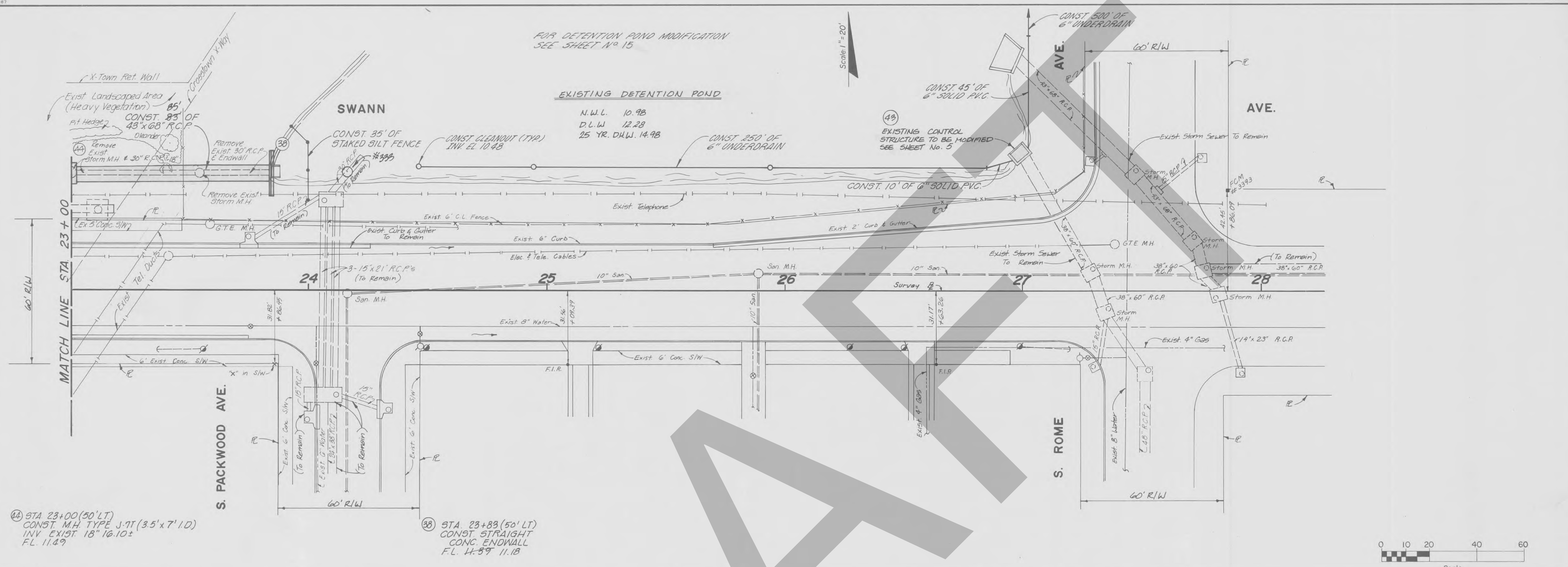
SWANN AVE.
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Not Sealed
Imaged As Is

Designed: A.R.F. Date:	Drawn: S.A.N. Date:	Checked:	Date:
Reviewed: Date:	Approved: Date:	Scale:	
FIELD BOOK:			
FILE No. A-2-73	JOB No. 6895	SHEET 11	of 12

No.	Date	REVISION	By

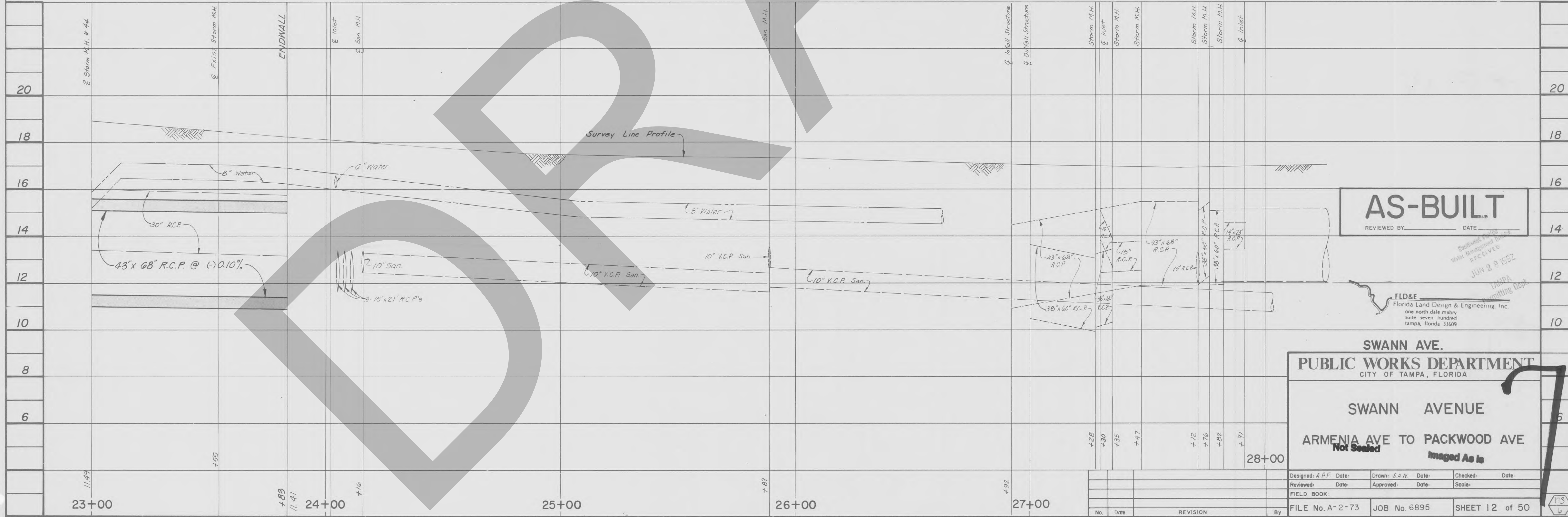
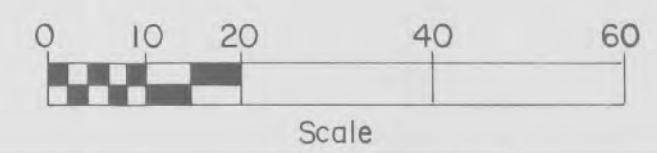
FOR DETENTION POND MODIFICATION
SEE SHEET No 15

Scale 1"=20'



44 STA 23+00 (50' LT)
CONST. M.H. TYPE J-7T (3.5'x7' I.D.)
INV. EXIST. 18" 16.10±
FL. 11.49

38 STA. 23+83 (50' LT)
CONST. STRAIGHT
CONC. ENDWALL
FL. 11.59 11.18



AS-BUILT
REVIEWED BY: _____ DATE: _____

RECEIVED
JUN 20 2022
TAMPA
Engineering Dept.

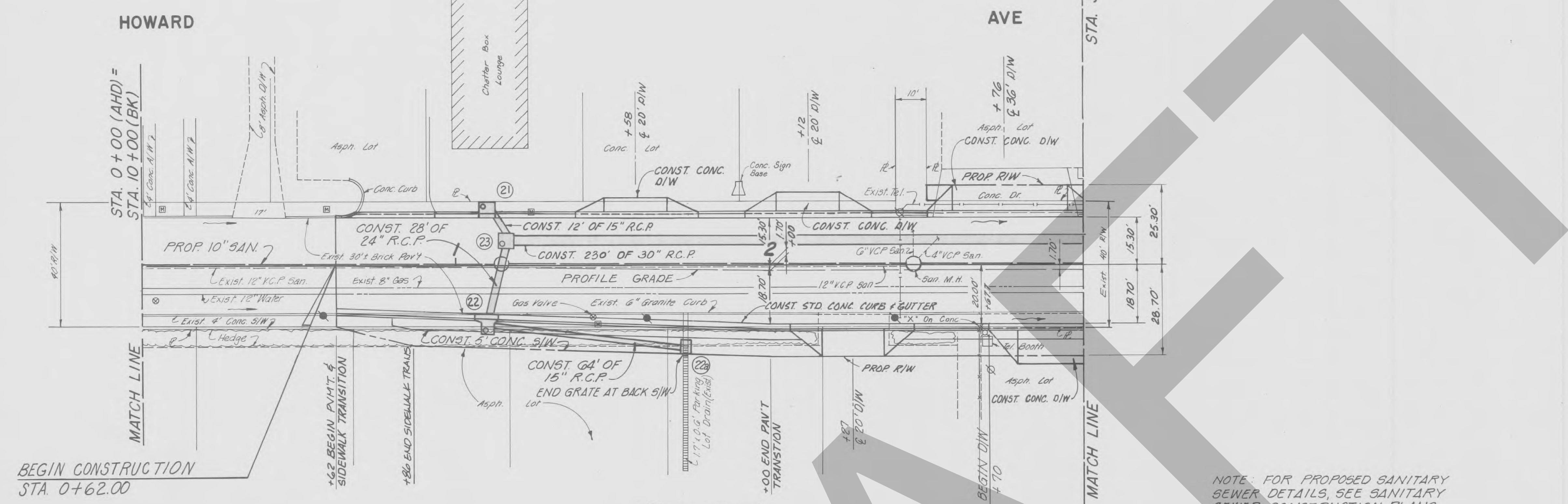
FLD&E
Florida Land Design & Engineering, Inc.
one north dale mabry
suite seven hundred
tampa, florida 33609

SWANN AVE.
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Not Sealed
Imaged As Is

Designed: A.P.F.	Date:	Drawn: S.A.N.	Date:	Checked:	Date:
Reviewed:	Date:	Approved:	Date:	Scale:	
FIELD BOOK:					
FILE No. A-2-73		JOB No. 6895		SHEET 12 of 50	

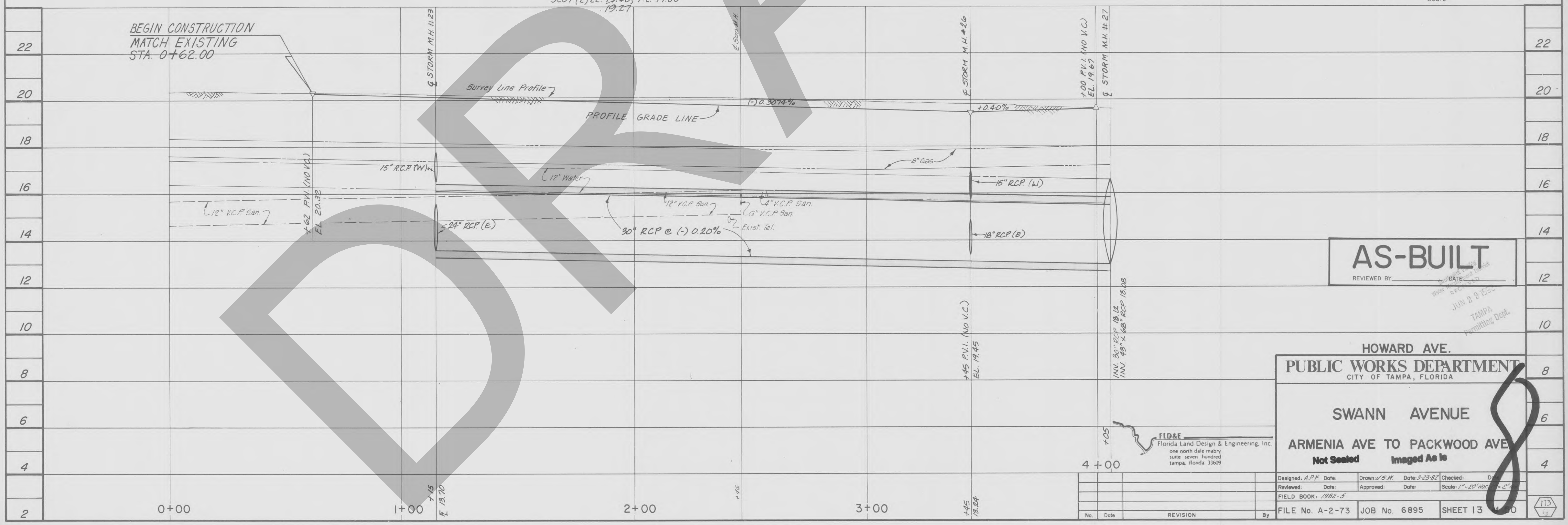
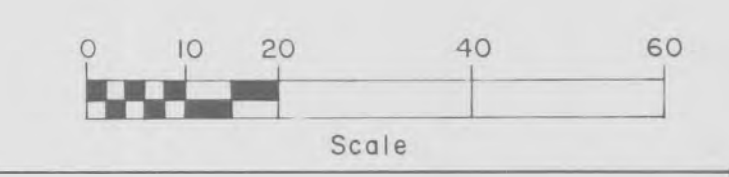
Scale: 1" = 20'
Sec. 26-T29S-R18E



BEGIN CONSTRUCTION STA. 0+62.00

NOTE: FOR PROPOSED SANITARY SEWER DETAILS, SEE SANITARY SEWER CONSTRUCTION PLANS.

- (21) STA. 1+10 (LT) CONST. INLET TYPE 1 F.L. 16.55 17.42
- (22) STA. 1+10 (RT) CONST. INLET TYPE B-5-1 INV. 15" (N) 16.00 15.70 F.L. 13.80 13.66
- (23a) STA. 1+13 (RT) CONST. INLET TYPE "C" (MODIFIED) w/HANDRAIL F.D.O.T. INDEX No. 282 SLOT (E) EL. 13.40, F.L. 17.00 13.27
- (23) STA. 1+15 (RT) CONST. M.H. TYPE P-7T INV. 15" (W) 16.51 16.21 INV. 24" (E) 13.78 13.63 F.L. 13.70 13.63



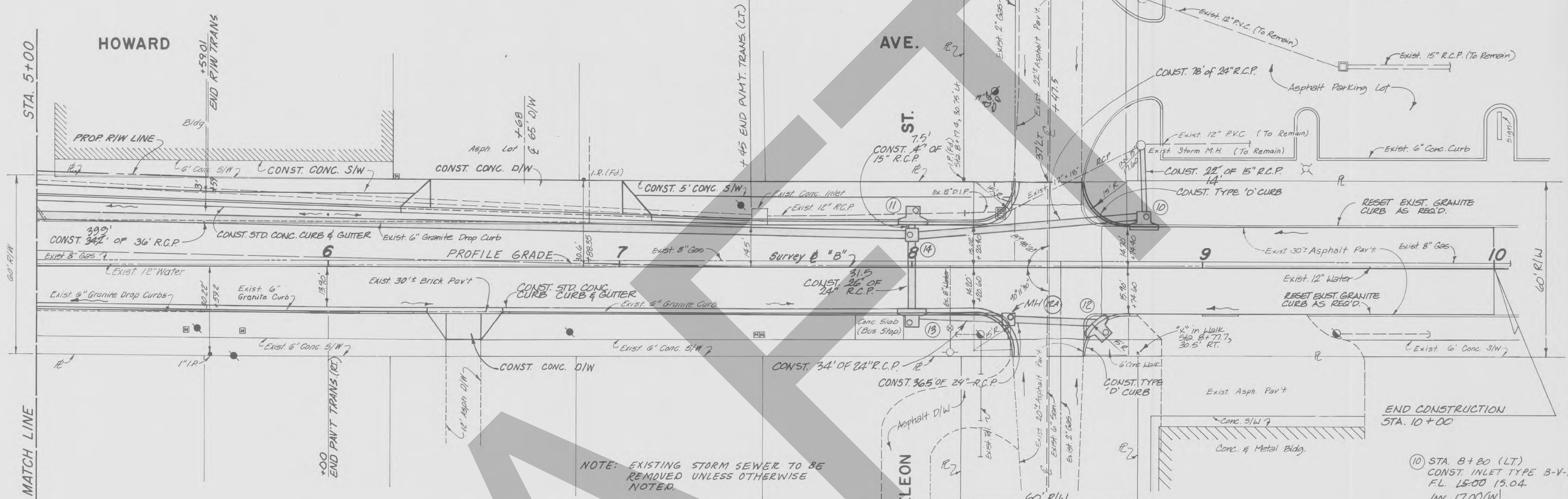
AS-BUILT

HOWARD AVE. PUBLIC WORKS DEPARTMENT CITY OF TAMPA, FLORIDA

SWANN AVENUE ARMENIA AVE TO PACKWOOD AVE Not Sealed Imaged As Is

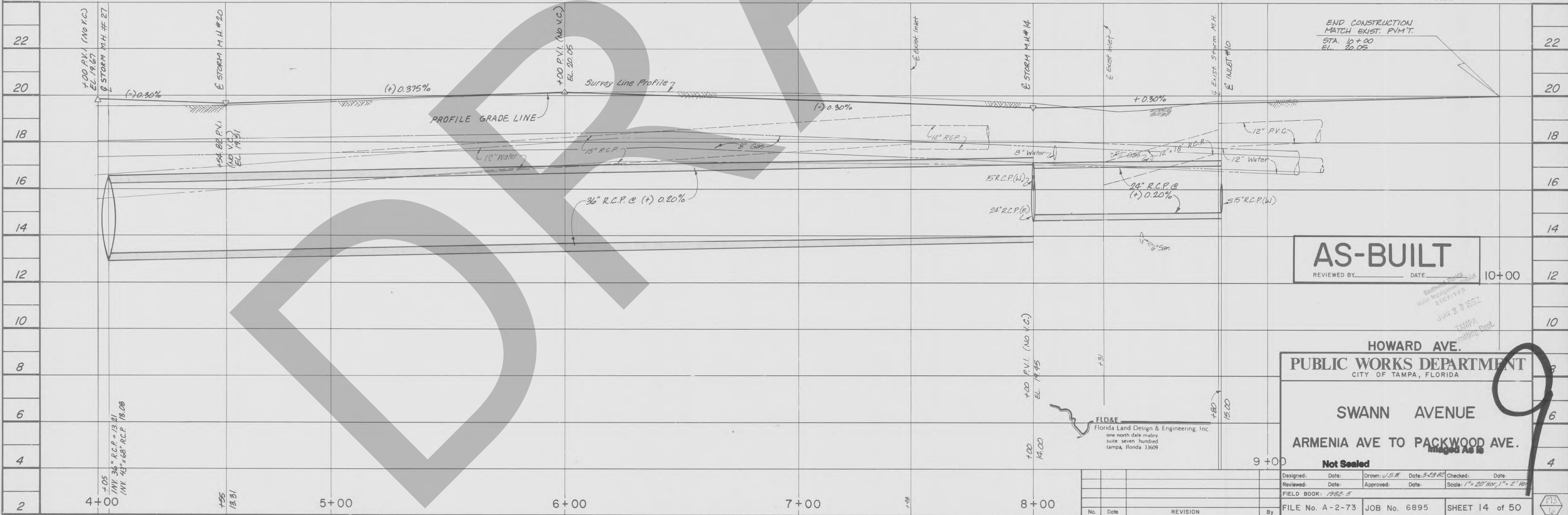
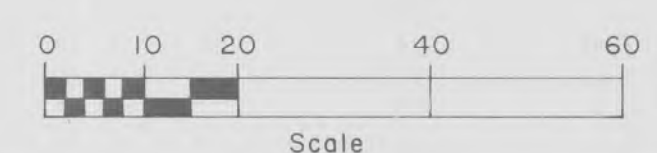
Designed: A.P.F. Date:	Drawn: S.W. Date: 3-23-82	Checked:	Date:
Reviewed: Date:	Approved: Date:	Scale: 1" = 20' (Plan) 1" = 4' (Profile)	
FIELD BOOK: 1982-5			
FILE No. A-2-73	JOB No. 6895	SHEET 13	13

Scale 1"=20'
 Sec. 23-T29S-R18E



NOTE: EXISTING STORM SEWER TO BE REMOVED UNLESS OTHERWISE NOTED.

- (1A) STA. 8+00 (RT) INV. 15.30 (NFS)
- (14) STA. 8+00 (12' LT) CONST. M.H. TYPE P-77 INV. 24" (N) 14.87 14.04 INV. 24" (E) 14.87 14.40 INV. 15" (W) 15.87 15.76 F.L. 14.05 14.07
- (13) STA. 8+00 (RT) CONST. INLET TYPE B-V-1 INV. 24" (N) 15.57 15.22 F.L. 14.55 14.48
- (12) STA. 8+05 (RT) CONST. INLET TYPE B-V-1 F.L. 16.50 15.67
- (11) STA. 8+00 (LT) CONST. INLET TYPE B-V-1 F.L. 15.75 15.74



AS-BUILT

REVIEWED BY: _____ DATE: _____

HOWARD AVE.
 PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA

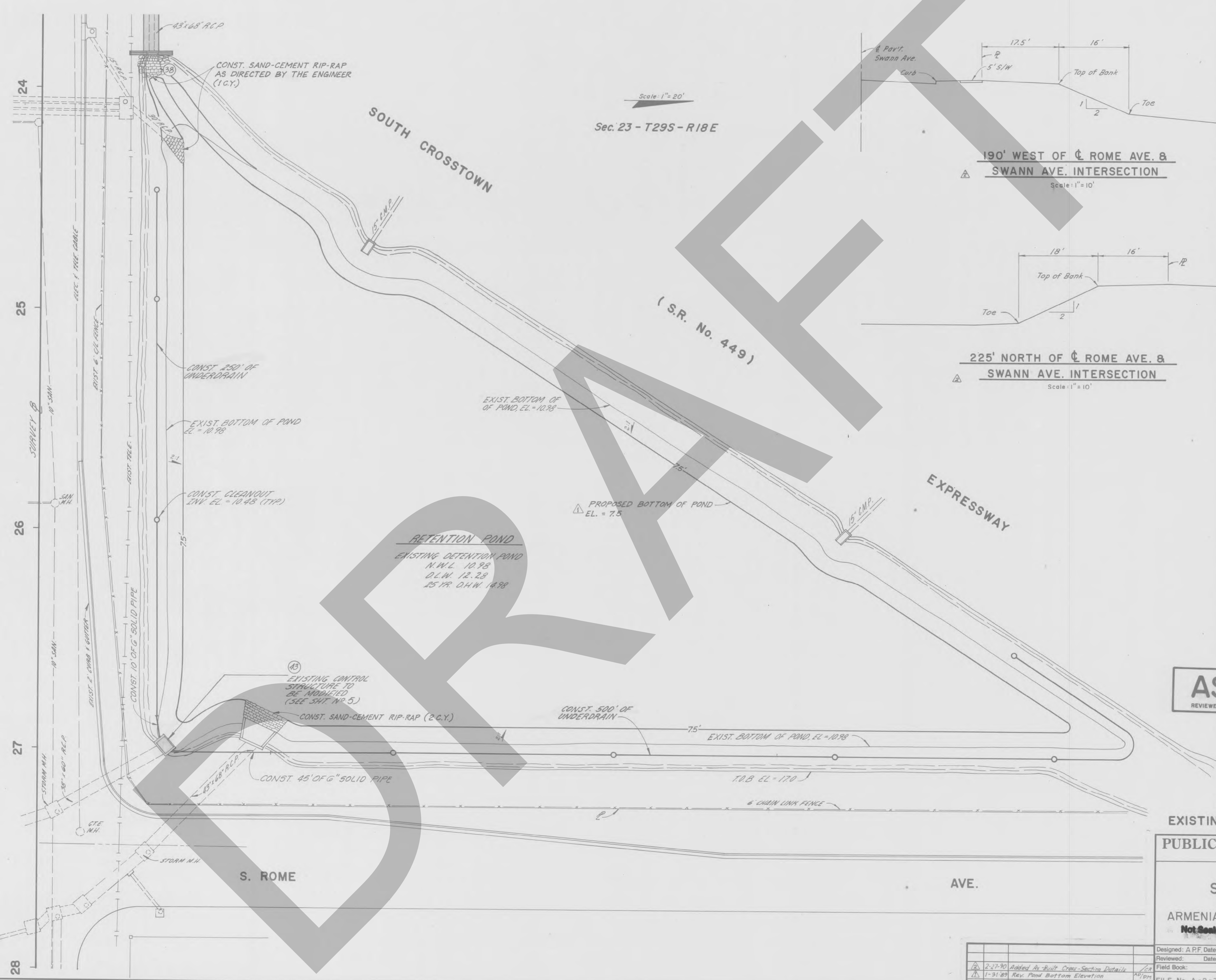
SWANN AVENUE
 ARMENIA AVE TO PACKWOOD AVE.

Not Sealed
 Designed: _____ Date: _____
 Reviewed: _____ Date: _____
 FILE NO. A-2-73 JOB NO. 6895 SHEET 14 OF 50

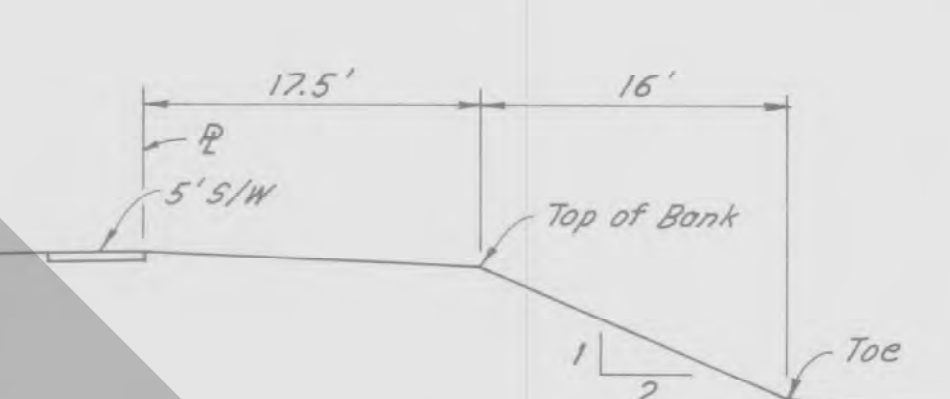
No.	Date	REVISION	By

SWANN AVE.

24
25
26
27
28



Scale: 1" = 20'
Sec. 23 - T29S - R18E



190' WEST OF \bar{C} ROME AVE. & SWANN AVE. INTERSECTION
Scale: 1" = 10'



225' NORTH OF \bar{C} ROME AVE. & SWANN AVE. INTERSECTION
Scale: 1" = 10'

RETENTION POND
EXISTING DETENTION POND
N.W.L. 10.98
D.L.W. 12.28
25' PR. D.H.W. 14.98

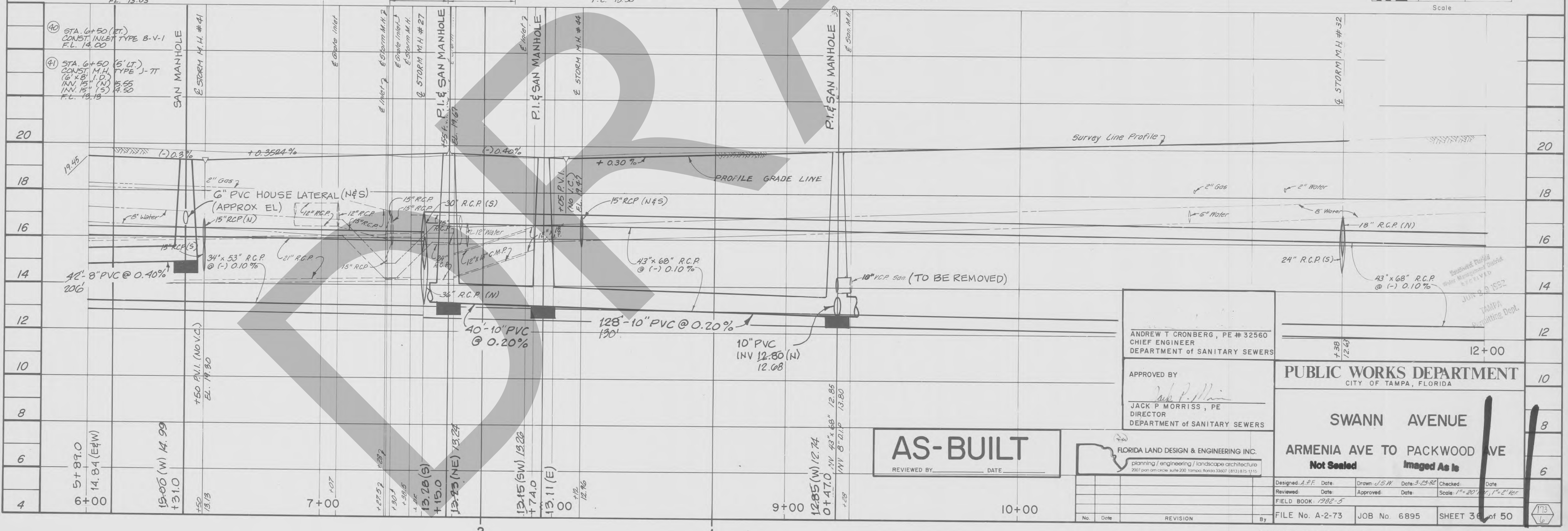
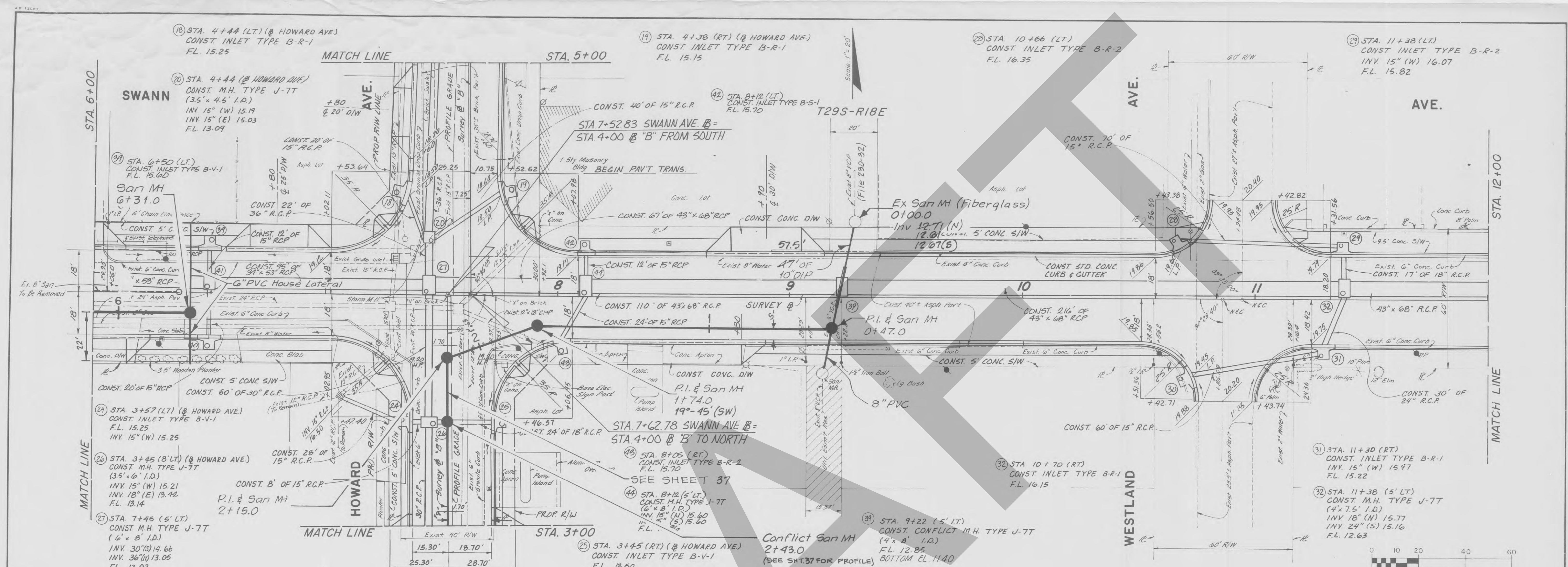
AS-BUILT
REVIEWED BY: [Signature] DATE: 6-17-13

Southwest Florida
Water Management District
RECEIVED
JUN 20 9 15 AM
TAMPA
Permitting Dept.

EXISTING POND MODIFICATION
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Not Sealed Imaged As Is

Designed: A.P.F. Date: 6/88	Drawn: J.R.E. Date: 6/88	Checked: []	Date: []
Reviewed: []	Date: []	Approved: []	Date: []
Field Book: []			
No. []	Date []	REVISION []	By []
FILE No. A-2-73		JOB No. 6895	SHEET 10 of 50



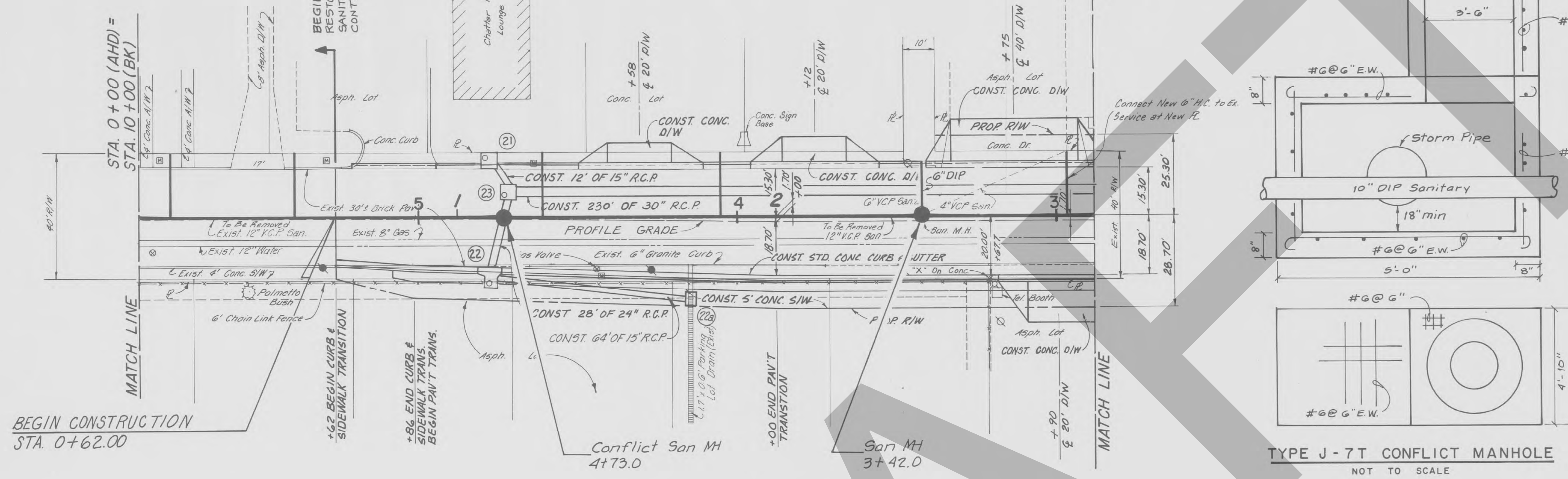
ANDREW T. CRONBERG, PE #32560 CHIEF ENGINEER DEPARTMENT OF SANITARY SEWERS		PUBLIC WORKS DEPARTMENT CITY OF TAMPA, FLORIDA
APPROVED BY <i>Jack P. Morris</i> JACK P. MORRIS, PE DIRECTOR DEPARTMENT OF SANITARY SEWERS		
AS-BUILT REVIEWED BY: _____ DATE: _____		SWANN AVENUE ARMENIA AVE TO PACKWOOD AVE Not Sealed Imaged As Is
FLORIDA LAND DESIGN & ENGINEERING, INC. planning / engineering / landscape architecture 2007 palm cove circle suite 200 tampa, florida 33607 (813) 875-1110		
Designed: A.F.F. Date: _____ Drawn: J.S.W. Date: 3-25-92 Checked: _____ Date: _____ Reviewed: _____ Date: _____ Approved: _____ Date: _____ Scale: 1" = 20' (V), 1" = 2' (H) FIELD BOOK: 1982-5		SHEET 36 of 50

Scale: 1" = 20'

Sec. 26-T29S-R18E

HOWARD

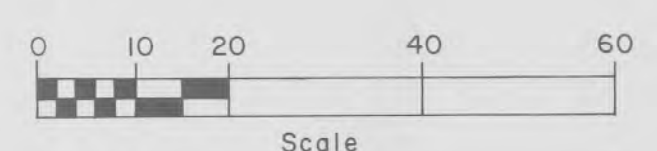
AVE



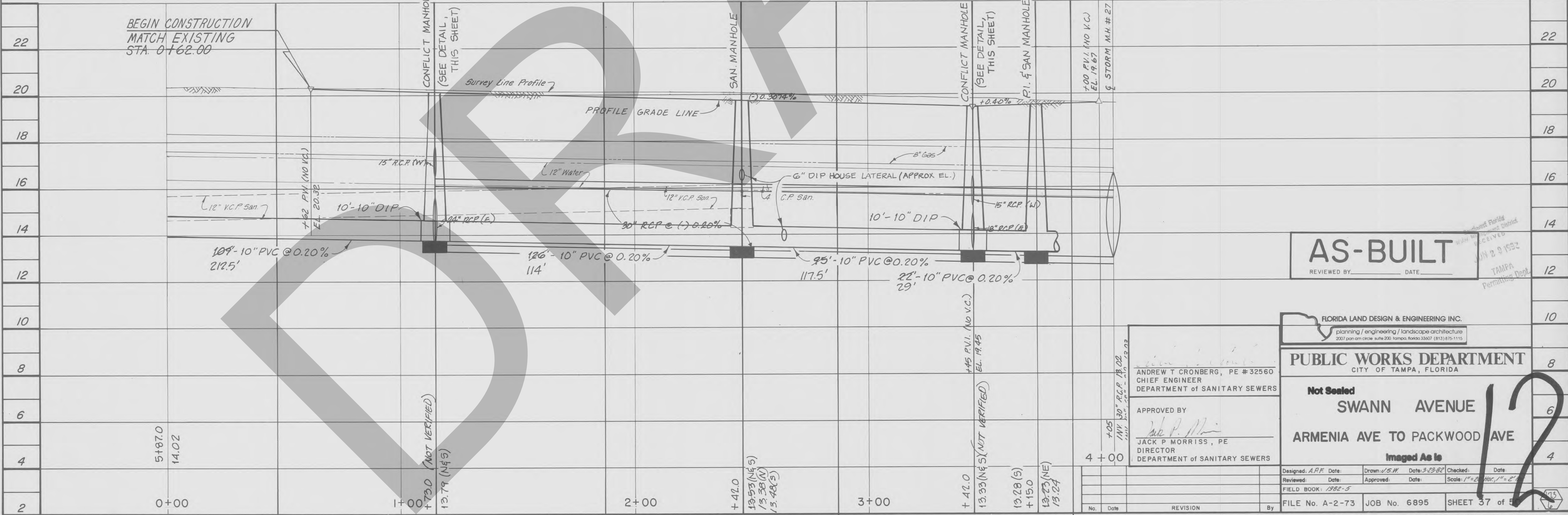
- GENERAL NOTES**
1. Remove existing pipe and manhole as necessary to install new pipe -
 2. All connections between existing and proposed pipe shall be made with flexible coupling -
 3. All pipe bedding shall be Class C -

BEGIN CONSTRUCTION
STA. 0+62.00

- (22) STA. 1+73 (RT) CONST. INLET TYPE "C" (MODIFIED) W/HANDRAIL F.O.D.T. INDEX No. 282 SLOT (E) EL. 19.50, FL. 17.50
- (21) STA. 1+10 (LT) CONST. INLET TYPE 1 FL. 16.55
- (20) STA. 1+10 (RT) CONST. INLET TYPE B-S-1 INV. 15" (N) 17.00 FL. 13.80
- (23) STA. 1+15 (8' LT) CONST. M.H. TYPE P-77 INV. 15" (W) 16.51 INV. 24" (E) 13.72 FL. 13.70



SEE SHEET I FOR PLAN VIEW



AS-BUILT
REVIEWED BY _____ DATE _____

FLORIDA LAND DESIGN & ENGINEERING INC.
planning / engineering / landscape architecture
2007 pan am circle suite 200, tampa, florida 33607 (813) 875-1115

PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Imaged As Is

APPROVED BY
Jack P. Morriss
JACK P. MORRISS, PE
DIRECTOR
DEPARTMENT OF SANITARY SEWERS

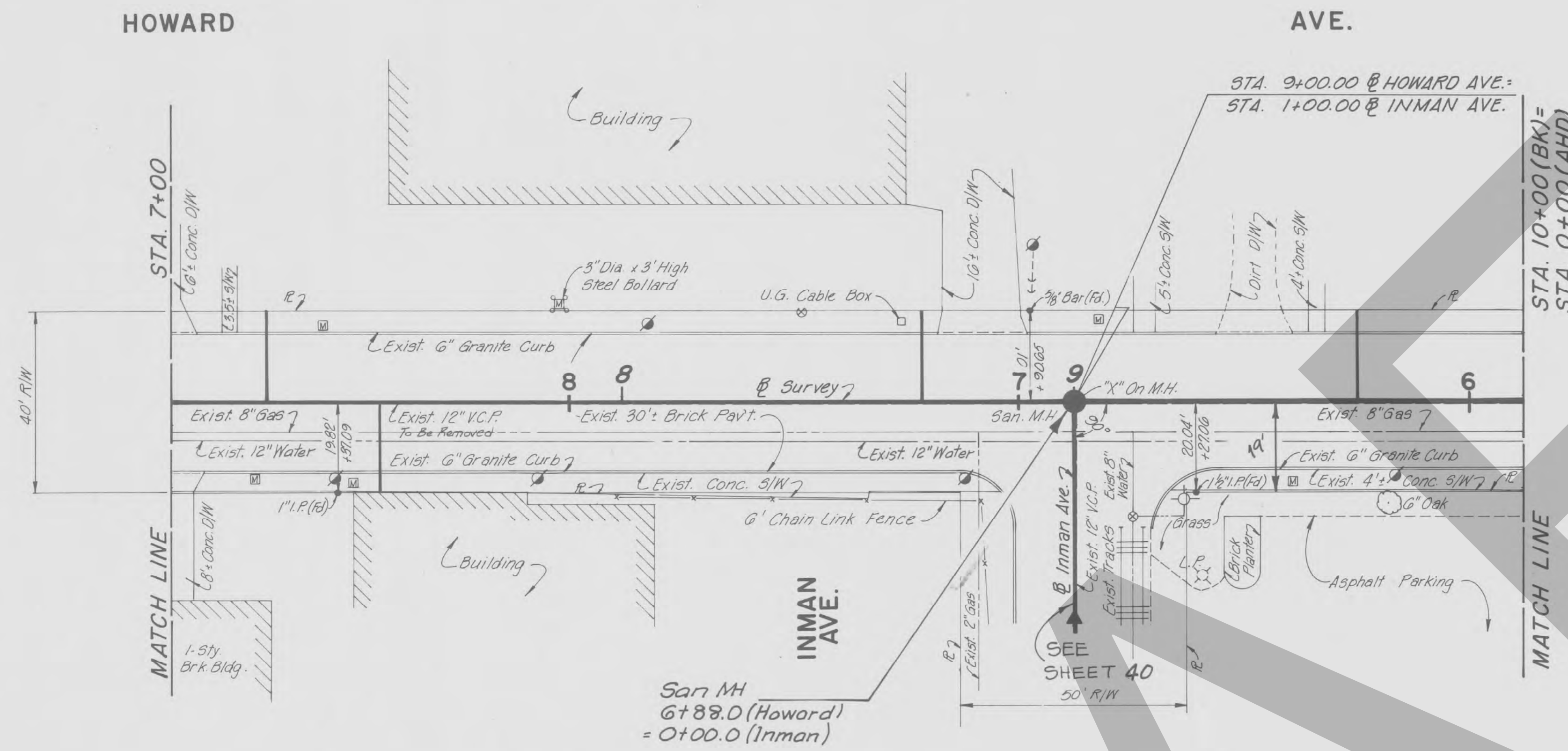
DESIGNED: A.R.F. DATE: _____ DRAWN: C.S.W. DATE: 3-23-82 CHECKED: _____ DATE: _____
REVIEWED: _____ DATE: _____ APPROVED: _____ DATE: _____ SCALE: 1" = 20' HORIZ., 1" = 2' VERT.
FIELD BOOK: 1982-5

No. _____ Date _____ REVISION By _____

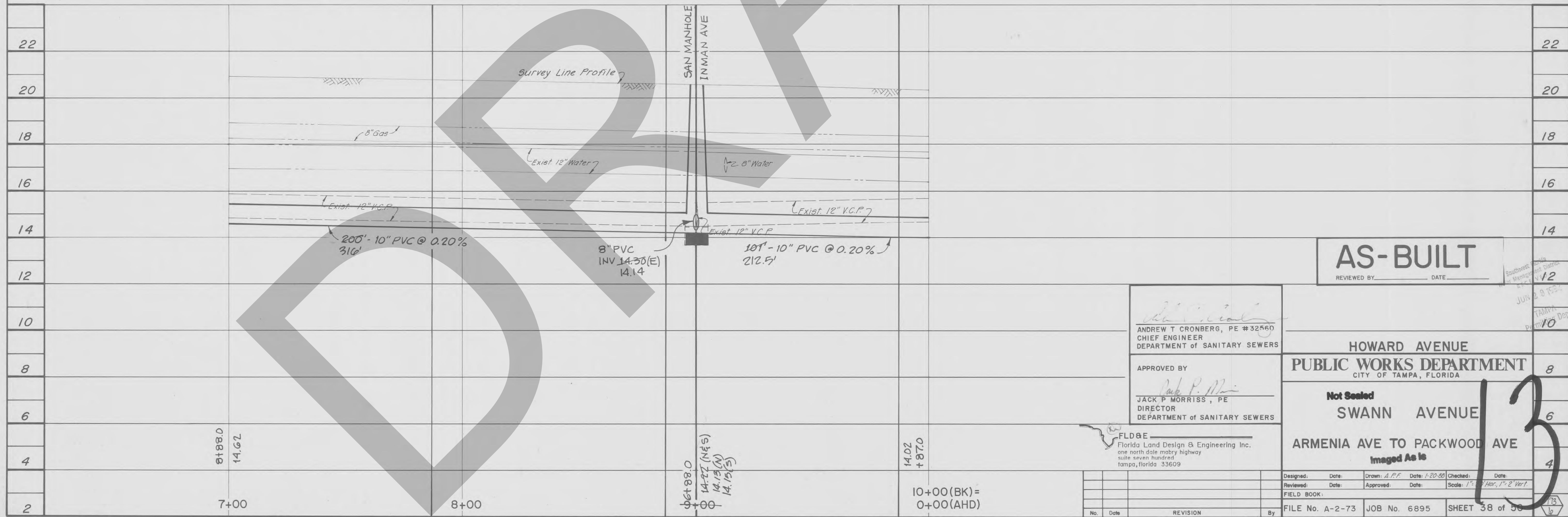
FILE No. A-2-73 JOB No. 6895 SHEET 37 of 50

Scale: 1"=20'
Sec. 26-T29S-R18E

Benchmark Elev. 20.58
Cut in N.E. Cor. Conc. Sign Foundation
Of Union 76 Sign S.E. Cor 5wann Ave.
And Howard Ave.



NOTE: WATER AND GAS LOCATIONS ARE APPROXIMATE AS SHOWN.



AS-BUILT
REVIEWED BY _____ DATE _____

ANDREW T. CRONBERG, PE #32560
CHIEF ENGINEER
DEPARTMENT OF SANITARY SEWERS

APPROVED BY
JACK P. MORRIS, PE
DIRECTOR
DEPARTMENT OF SANITARY SEWERS

HOWARD AVENUE
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

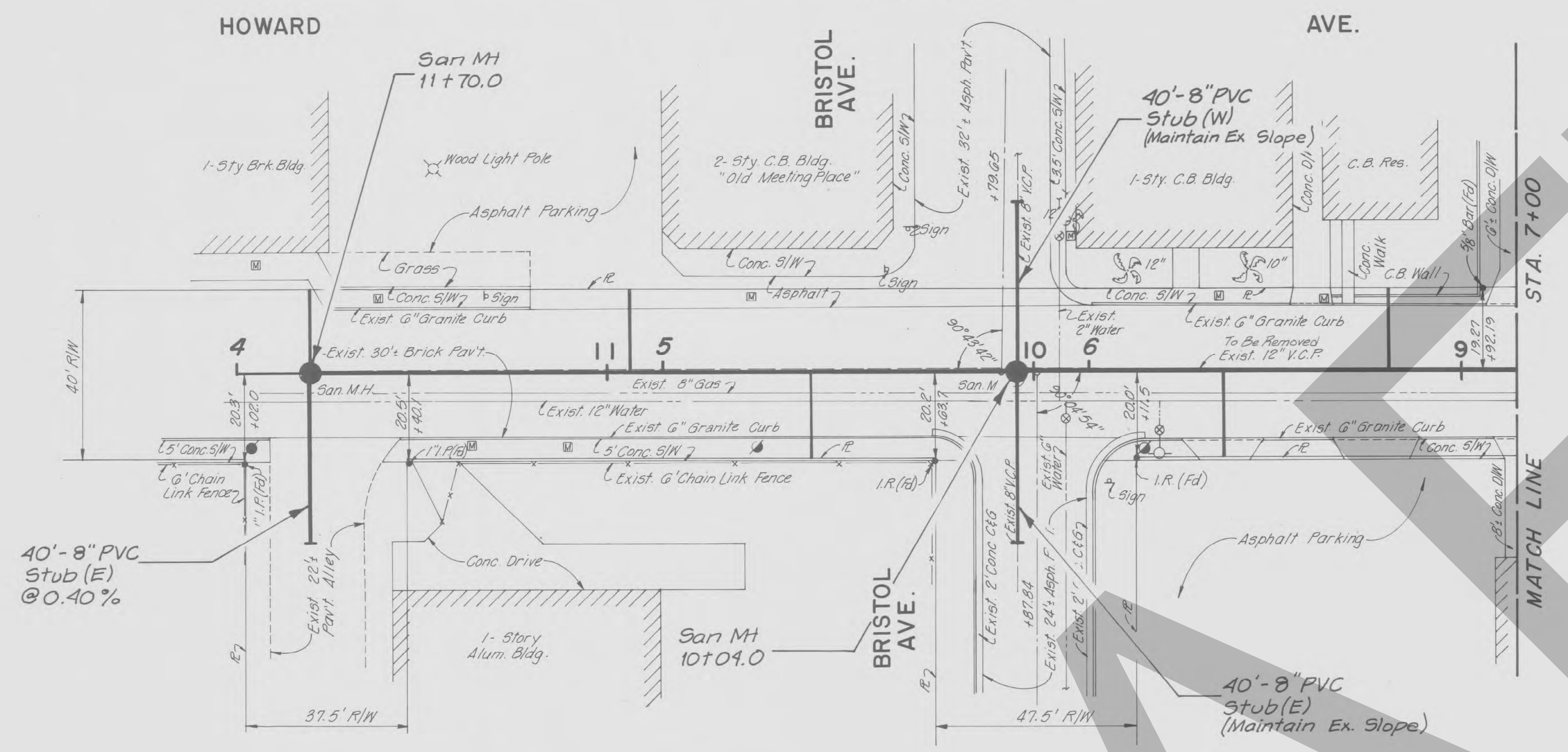
Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Imaged As Is

FLD&E
Florida Land Design & Engineering Inc.
one north dale mobry highway
suite seven hundred
tampa, florida 33609

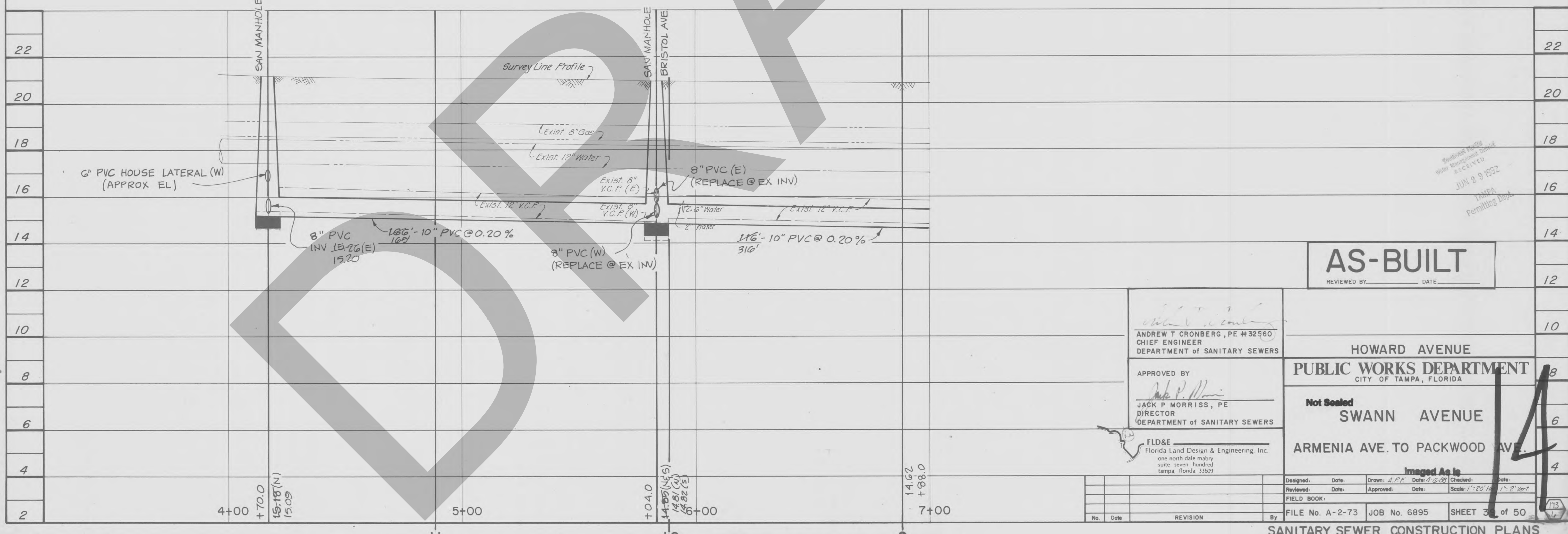
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Reviewed: _____	Date: _____	Approved: _____	Date: _____	Scale: 1"=2' Hor., 1"=2' Vert.	
FIELD BOOK:					
FILE No. A-2-73		JOB No. 6895		SHEET 38 of 38	

Scale - 1"=20'
 Sec. 26-T29S-R18E

Benchmark Elev. 20.58
 □ Cut in N.E. Cor. Conc. Sign Foundation
 Of Union 76 Sign S.E. Cor. Swann Ave.
 And Howard Ave.



NOTE:
 WATER AND GAS LOCATIONS ARE
 APPROXIMATE AS SHOWN.



AS-BUILT
 REVIEWED BY _____ DATE _____

ANDREW T. CRONBERG, PE #32560
 CHIEF ENGINEER
 DEPARTMENT OF SANITARY SEWERS

APPROVED BY
 JACK P. MORRIS, PE
 DIRECTOR
 DEPARTMENT OF SANITARY SEWERS

FLD&E
 Florida Land Design & Engineering, Inc.
 one north dale mabry
 suite seven hundred
 tampa, florida 33609

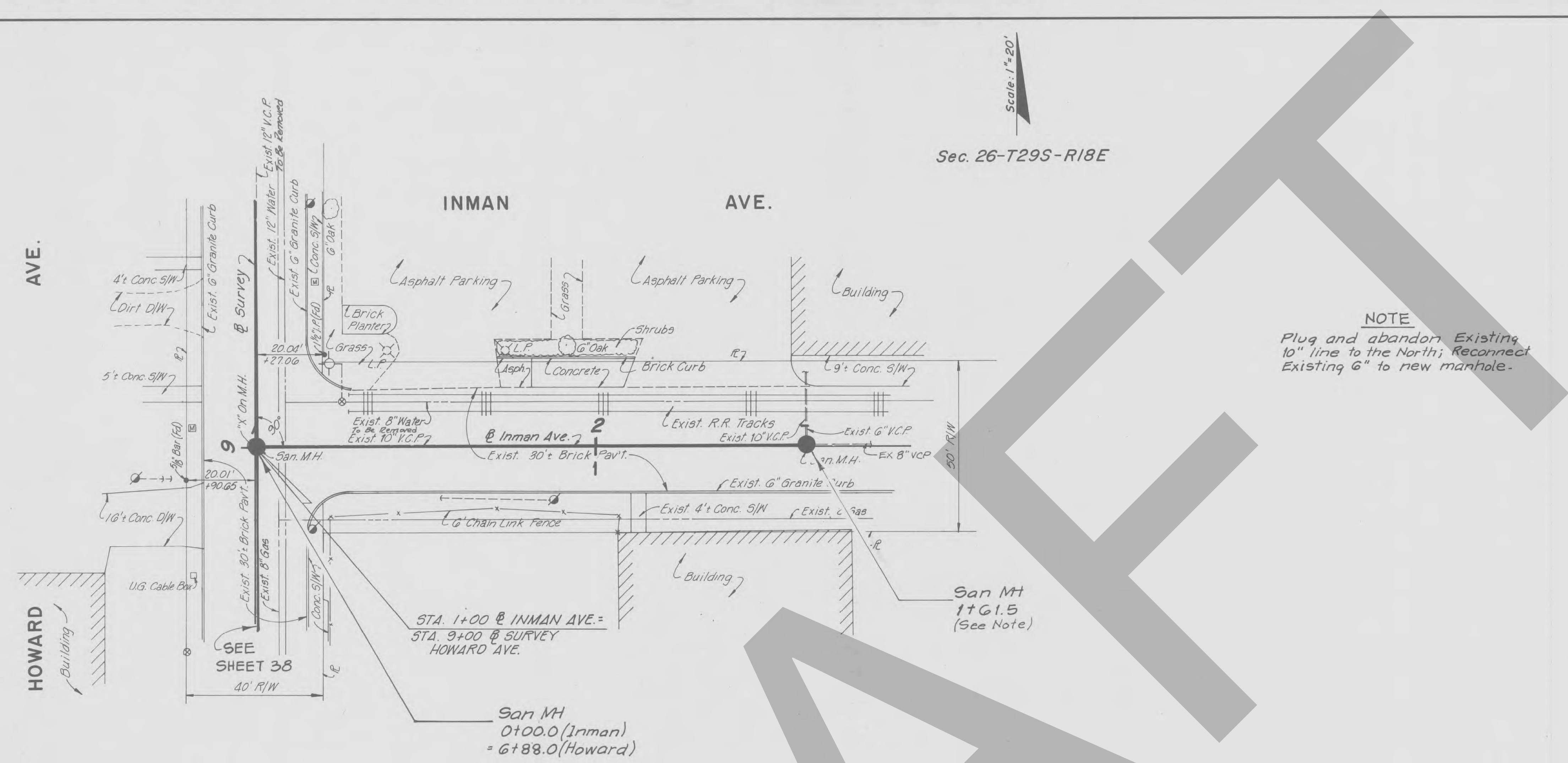
HOWARD AVENUE
 PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA
 Not Sealed
 SWANN AVENUE
 ARMENIA AVE. TO PACKWOOD AVE.

Imaged As Is
 Design: Date: Draw: A.P.F. Date: 4-28-88 Checked: Date:
 Reviewed: Date: Approved: Date: Scale: 1"=20' Vert. 1"=2' Hor.
 FIELD BOOK:

FILE No. A-2-73 JOB No. 6895 SHEET 38 of 50

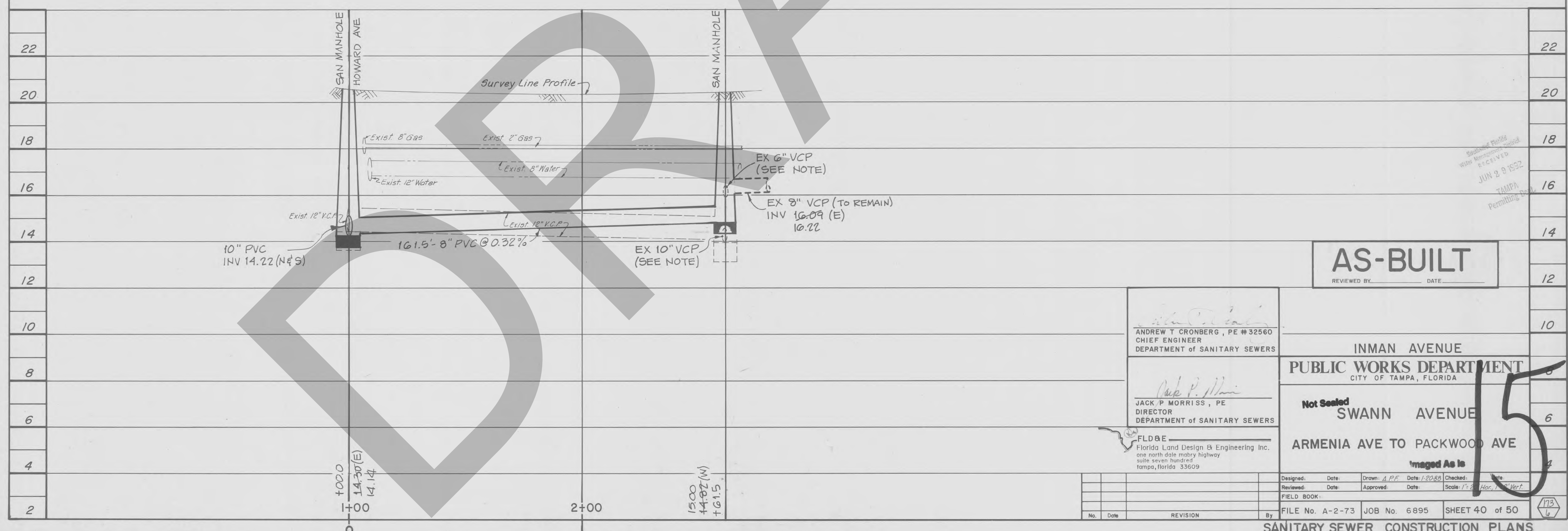
Benchmark Elev. 20.58
Cut In N.E. Cor. Conc. Sign Foundation
Of Union TG Sign S.E. Cor. Swann Ave
And Howard Ave.

Sec. 26-T29S-R18E



NOTE
Plug and abandon Existing 10" line to the North; Reconnect Existing 6" to new manhole.

NOTE:
WATER AND GAS LOCATIONS ARE APPROXIMATE AS SHOWN.



AS-BUILT
REVIEWED BY: _____ DATE: _____

ANDREW T. CRONBERG, PE #32560
CHIEF ENGINEER
DEPARTMENT OF SANITARY SEWERS

JACK P. MORRIS, PE
DIRECTOR
DEPARTMENT OF SANITARY SEWERS

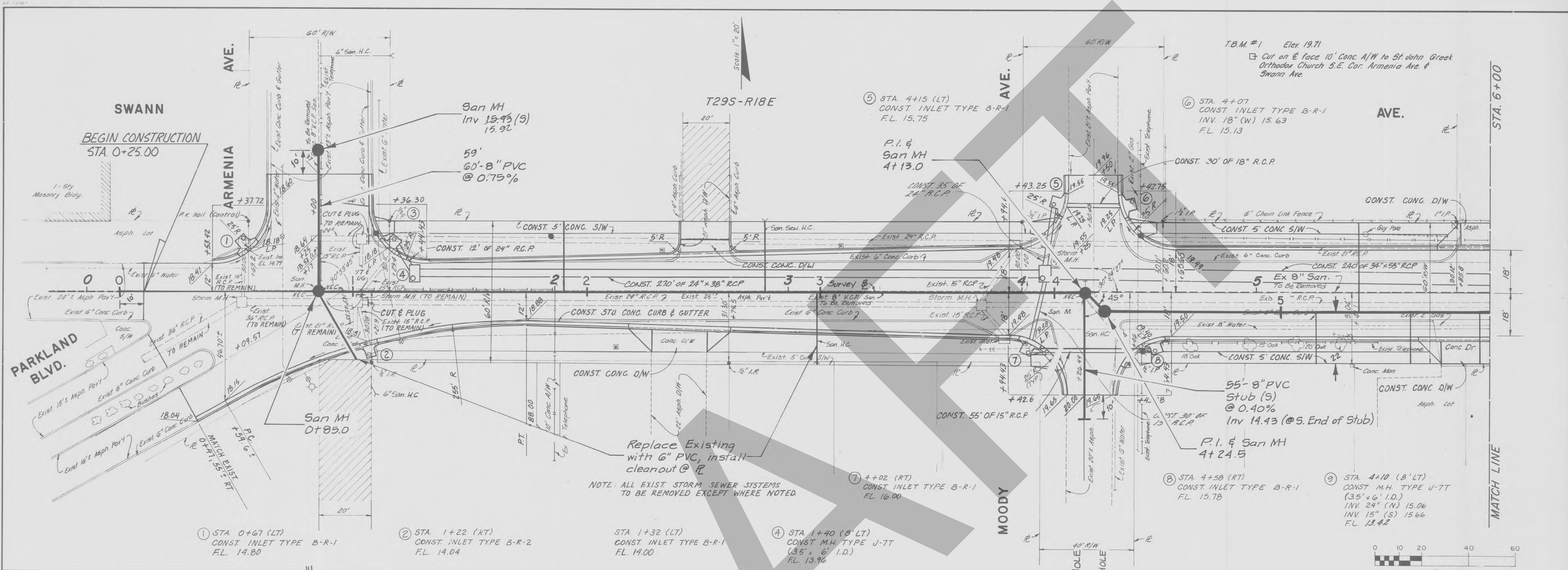
FLD&E
Florida Land Design & Engineering Inc.
one north dale mabry highway
suite seven hundred
tampa, florida 33609

INMAN AVENUE
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE

Designed: _____ Date: _____ Drawn: A.P.F. Date: 1/22/88 Checked: _____
Reviewed: _____ Date: _____ Approved: _____ Date: _____ Scale: 1" = 8' Hor., 1" = 4' Vert.

FILE No. A-2-73 JOB No. 6895 SHEET 40 of 50



AS-BUILT
REVIEWED BY: _____ DATE: _____

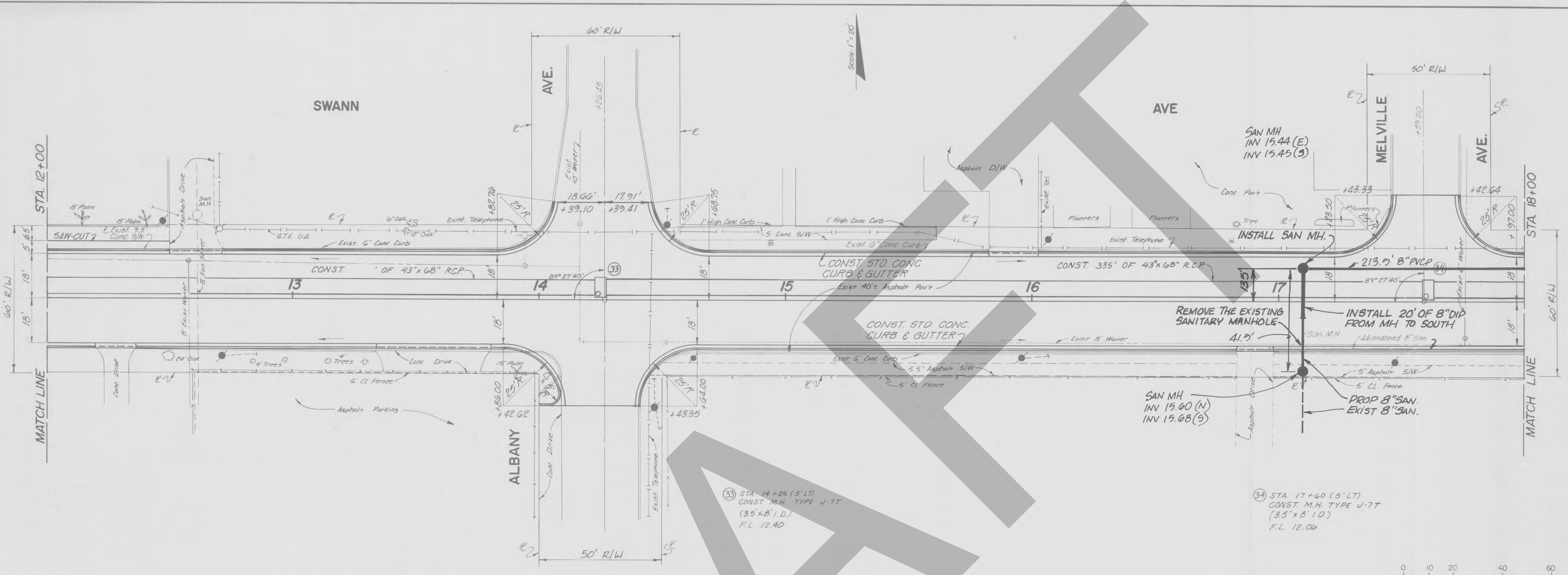
APPROVED BY
Jack P. Morriss
JACK P. MORRISS, PE
DIRECTOR
DEPARTMENT OF SANITARY SEWERS

FLORIDA LAND DESIGN & ENGINEERING INC.
planning / engineering / landscape architecture
2007 POOL CIRCLE SUITE 200 TAMPA, FLORIDA 33607 (813) 976-1115

PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

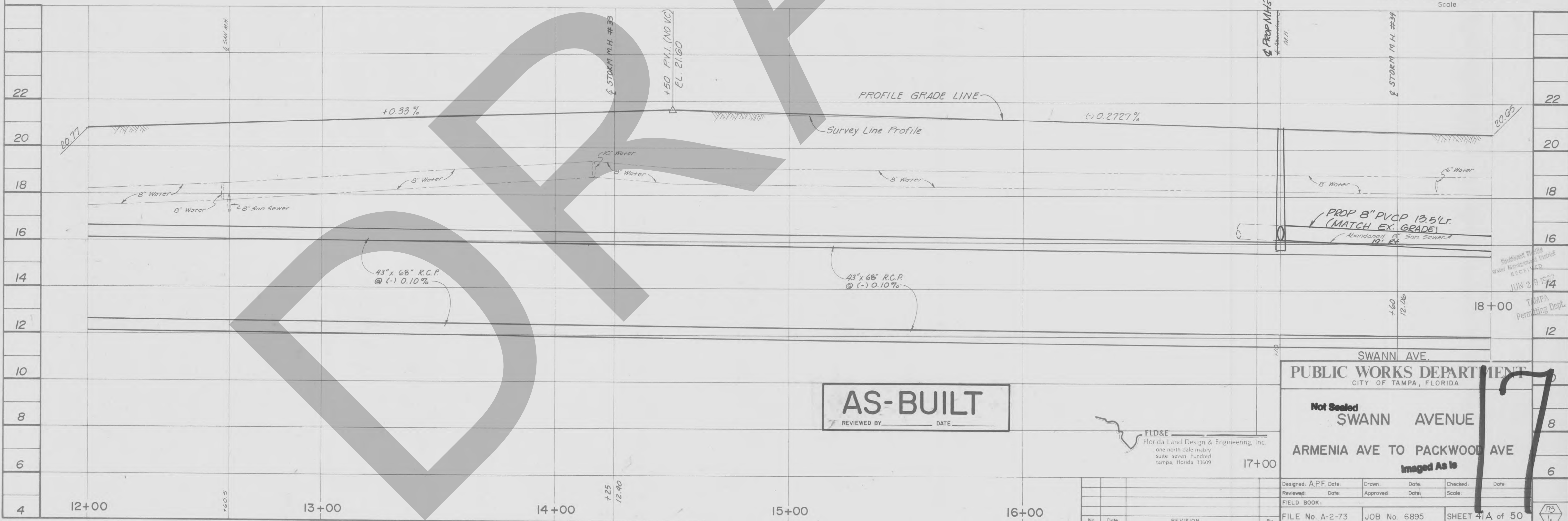
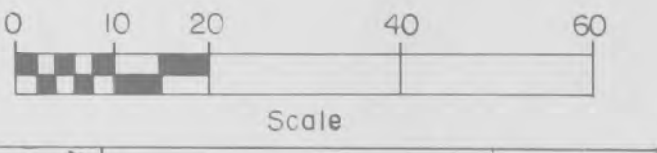
Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Imaged As Is

Designed: A.P.E. Date: 4-18-89	Drawn: J.S.W. Date: 3-28-92	Checked: D.P.C.
Reviewed: Date: _____	Approved: Date: _____	Scale: 1"=20' HORIZ. 1"=4' VERT.
FIELD BOOK: 1982-5	FILE No. A-2-73	JOB No. 6895
		SHEET 41 of 50



33 STA 14+25 (5' LT)
CONST. M.H. TYPE J-7T
(3.5' x 8' I.D.)
F.L. 12.40

34 STA 17+60 (5' LT)
CONST. M.H. TYPE J-7T
(3.5' x 8' I.D.)
F.L. 12.00



AS-BUILT
REVIEWED BY: _____ DATE: _____

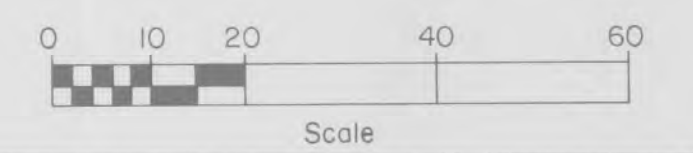
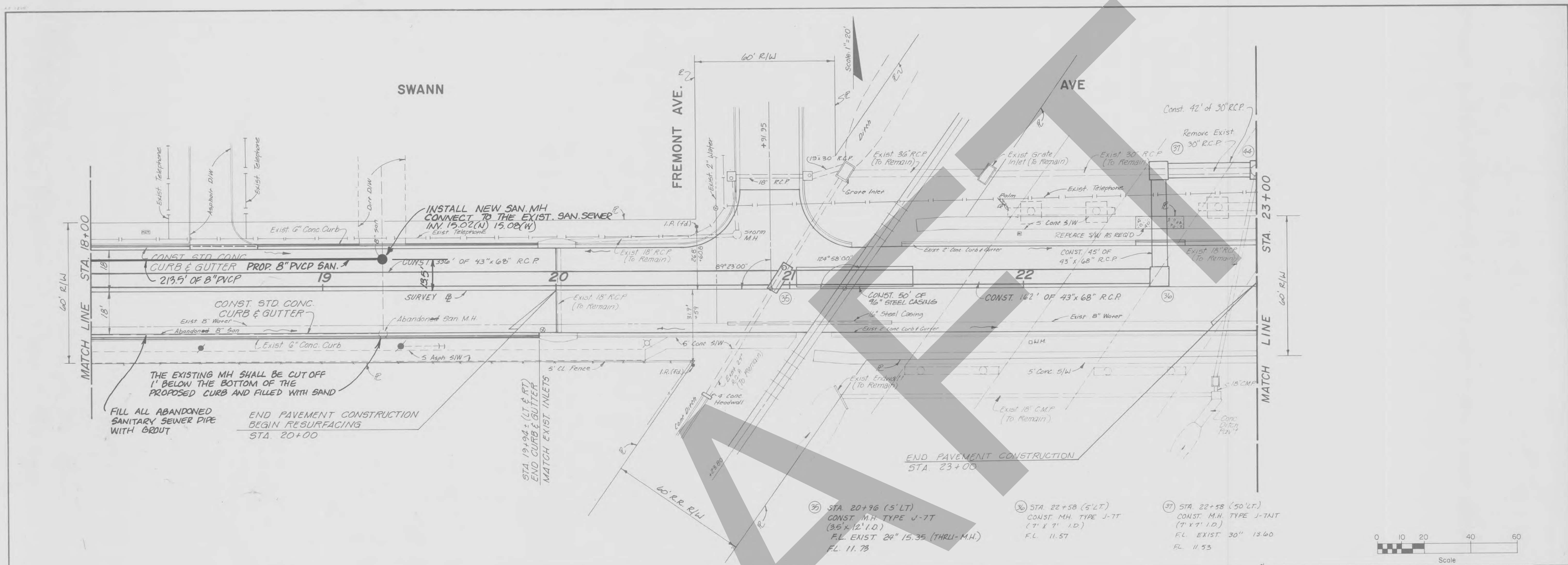
FLD&E
Florida Land Design & Engineering, Inc.
one north dale murray
suite seven hundred
tampa, florida 33629

SWANN AVE.
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE
Imaged As Is

Designed: A.P.F. Date: _____	Drawn: _____ Date: _____	Checked: _____ Date: _____
Reviewed: _____ Date: _____	Approved: _____ Date: _____	Scale: _____
FIELD BOOK:		
FILE No. A-2-73	JOB No. 6895	SHEET 41A of 50

Received by
Water Management District
ASCEIVED
JUN 20 1974
TAMPA
Permitting Dept.



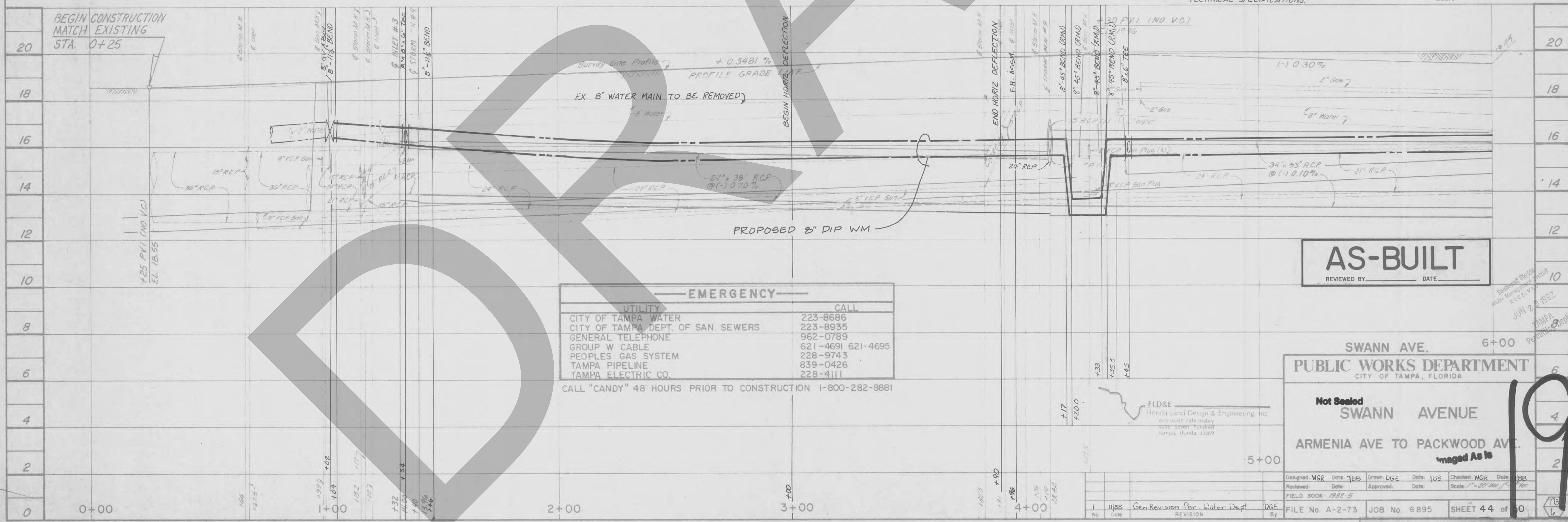
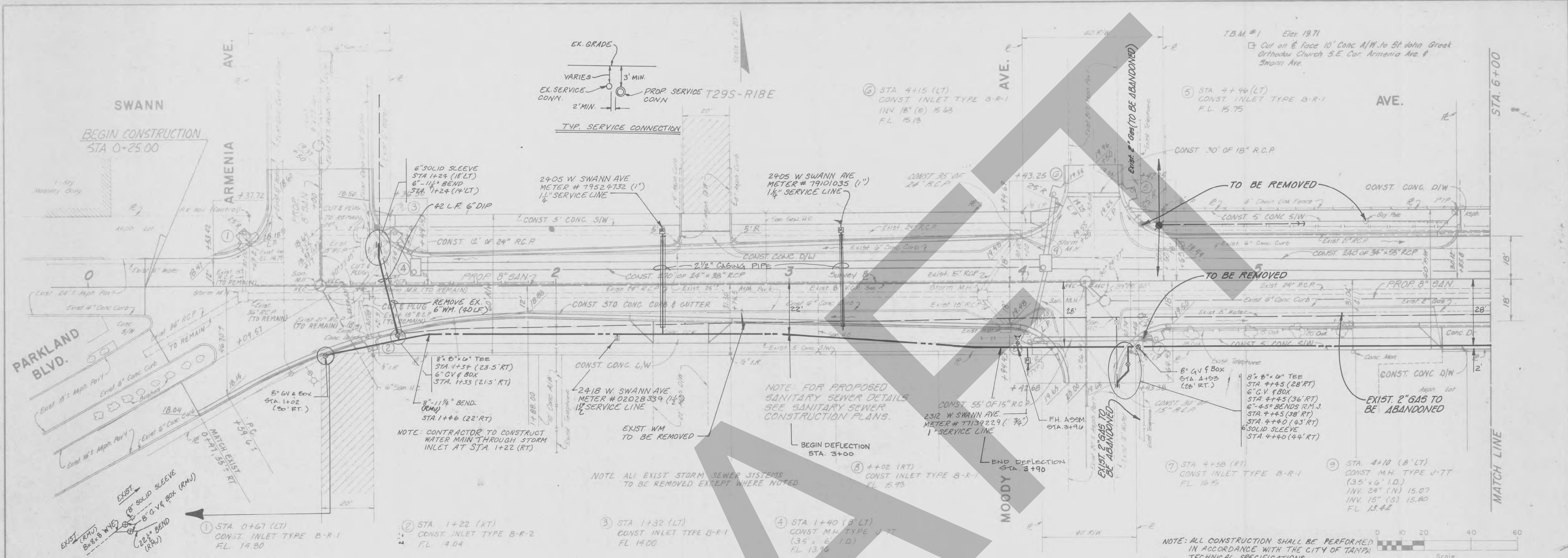
AS-BUILT
 REVIEWED BY _____ DATE _____
 RECEIVED JUN 20 1973
 TAMPA Permitting Dept

SWANN AVE.
PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA
 Not Sealed
SWANN AVENUE
 ARMENIA AVE TO PACKWOOD AVE
 Imaged As Is

FLD&E
 Florida Land Design & Engineering, Inc.
 one north date mabry
 suite seven hundred
 tampa, florida 33629

DESIGNED	DATE	BY	REVIEWED	DATE	BY	CHECKED	DATE	SCALE

FILE No. A-2-73 JOB No. 6895 SHEET 41B of 50



EMERGENCY	
UTILITY	CALL
CITY OF TAMPA WATER	223-8686
CITY OF TAMPA DEPT. OF SAN. SEWERS	223-8935
GENERAL TELEPHONE	962-0789
GROUP W CABLE	621-4691 621-4695
PEOPLES GAS SYSTEM	228-9743
TAMPA PIPELINE	839-0426
TAMPA ELECTRIC CO.	228-4111

CALL "CANDY" 48 HOURS PRIOR TO CONSTRUCTION 1-800-282-8881

AS-BUILT
REVIEWED BY _____ DATE _____

SWANN AVE. 6+00
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

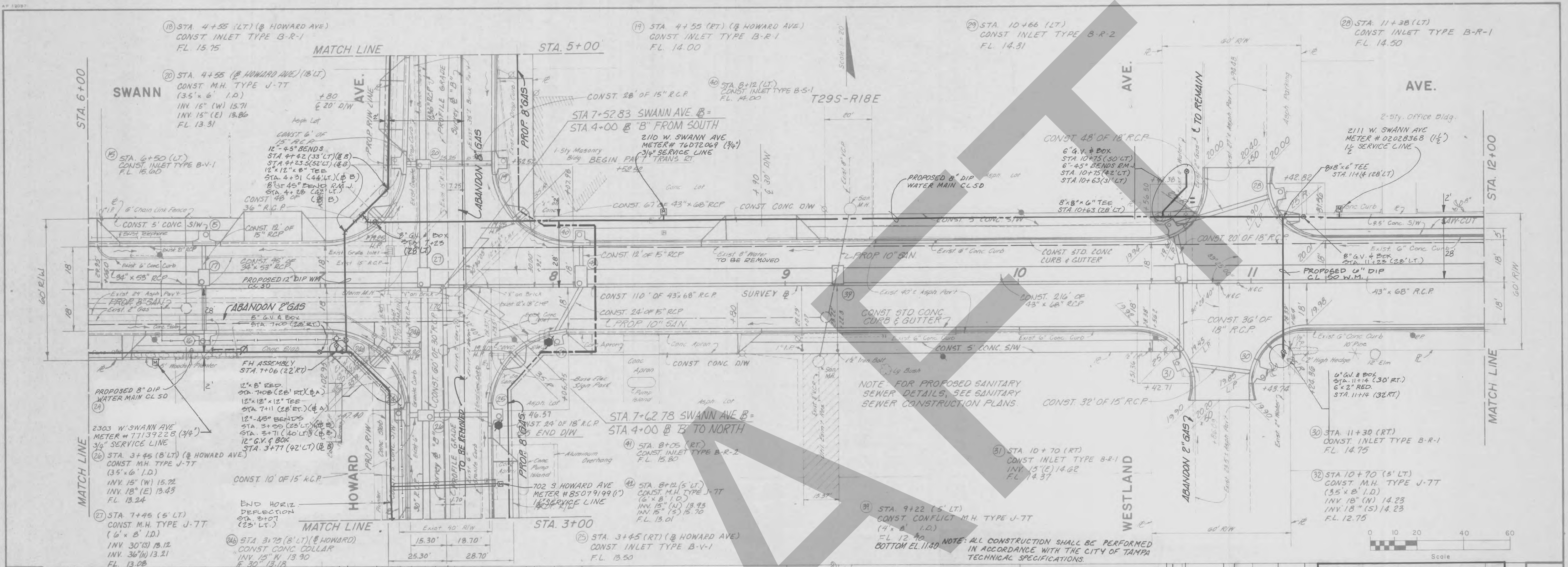
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SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE.
As Shown

Designed: WGR	Date: 7/28/88	Drawn: DGE	Date: 7/28/88	Checked: WGR	Date: 7/28/88
Reviewed: _____	Date: _____	Approved: _____	Date: _____	Scale: 1" = 20' Hor., 1" = 4' Ver.	
FIELD BOOK: 1982-5		FILE No. A-2-73	JOB No. 6895	SHEET 44 of 50	

UTILITY ADJUSTMENT PLANS

Stamp: Received JUN 21 1988 TAMPA Permitting Dept.

Large handwritten number: 19



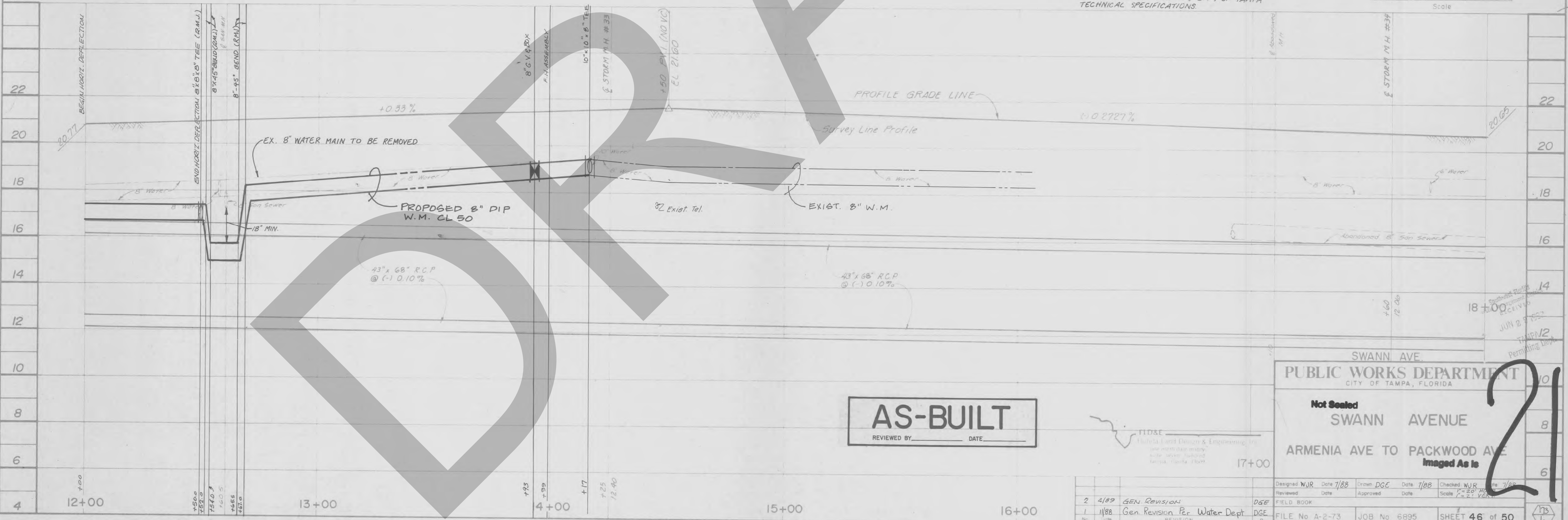
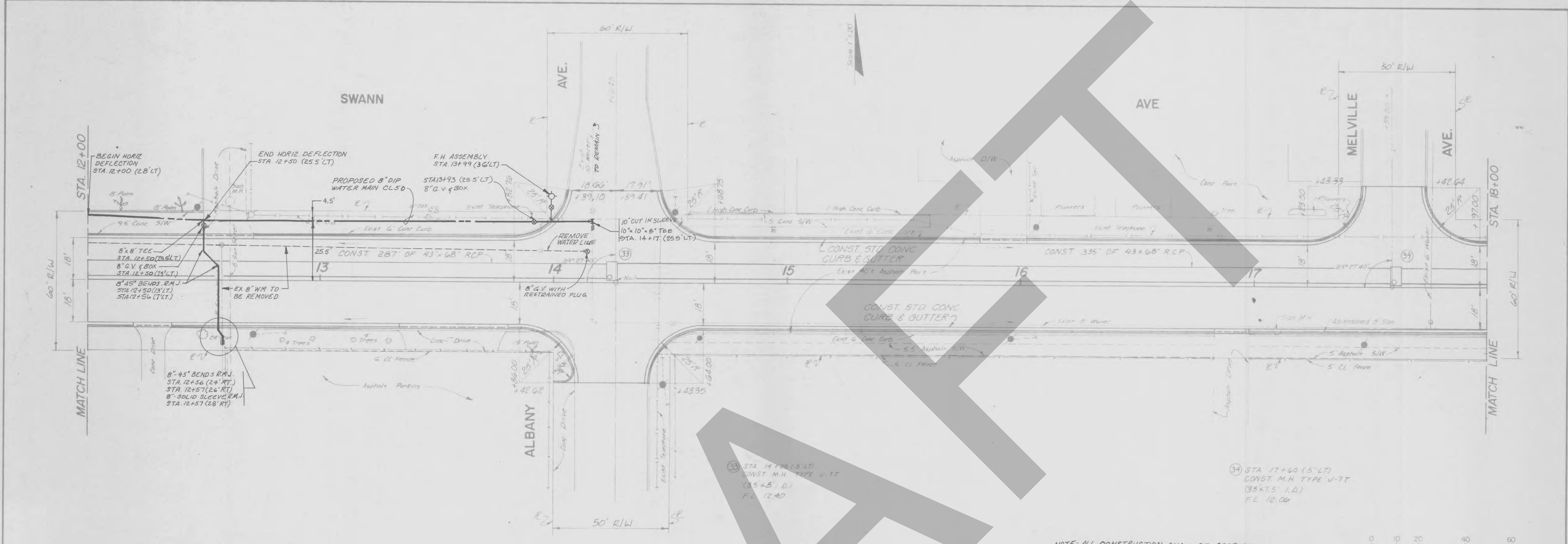
AS-BUILT
REVIEWED BY: _____ DATE: _____

PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE

Imaged As Is
Designed: WGR Date: 7/88 Drawn: DGE Date: 7/88 Checked: WGR Date: 11/88
Reviewed: _____ Date: _____ Approved: _____ Date: _____ Scale: 1"=20'
FIELD BOOK: 7982-5
FILE No. A-2-73 JOB No. 6895 SHEET 45 OF 50

UTILITY ADJUSTMENT PLANS



AS-BUILT
 REVIEWED BY: _____ DATE: _____

TIDE
 Florida Land Design & Engineering, Inc.
 17+00

SWANN AVE.
PUBLIC WORKS DEPARTMENT
 CITY OF TAMPA, FLORIDA

Not Sealed
 SWANN AVENUE
 ARMENIA AVE TO PACKWOOD AVE
 Imaged As Is

21

JUN 23 2011
 TAMPA 12
 Permitting Dept

Designed WJR	Date 7/08	Drawn DGE	Date 7/08	Checked WJR	Date 7/08
Reviewed	Date	Approved	Date	Scale	1" = 20' HORIZ 1" = 2' VERT
FIELD BOOK		DGE		FILE No A-2-73	
No. 1		Date 11/08		JOB No 6895	
Gen Revision Per Water Dept		REVISION		SHEET 46 of 50	

UTILITY ADJUSTMENT PLANS

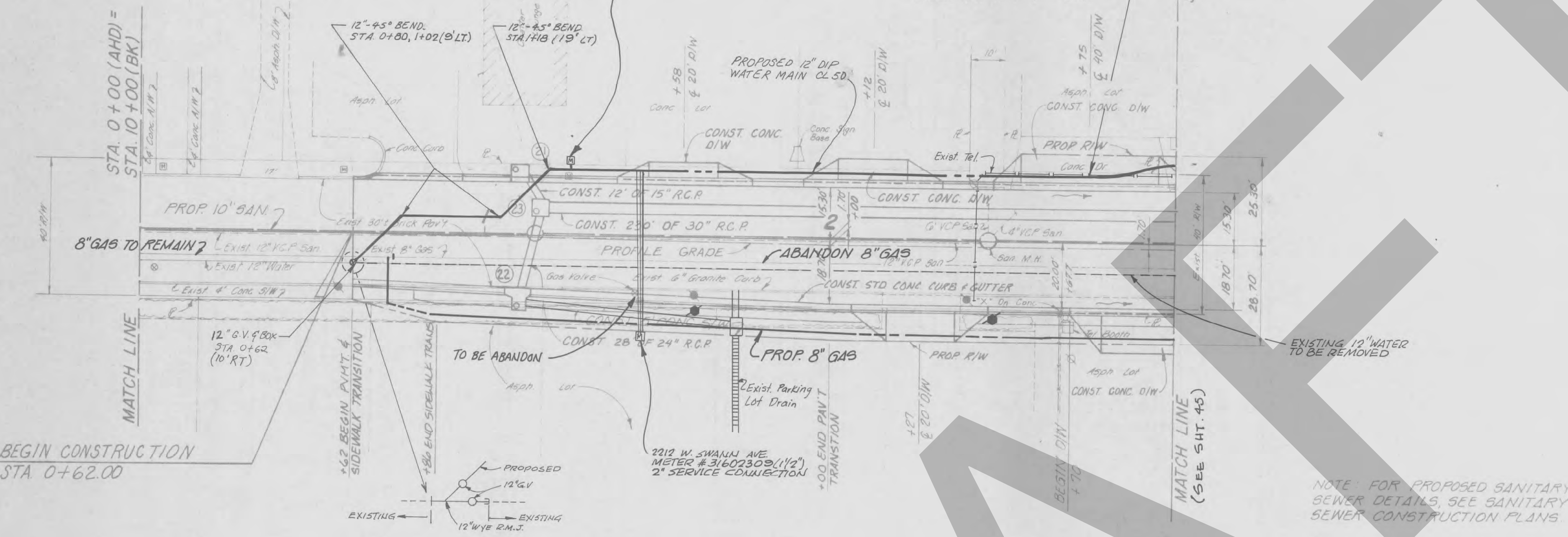
Scale 1" = 20'

Sec. 26-T29S-R18E

HOWARD

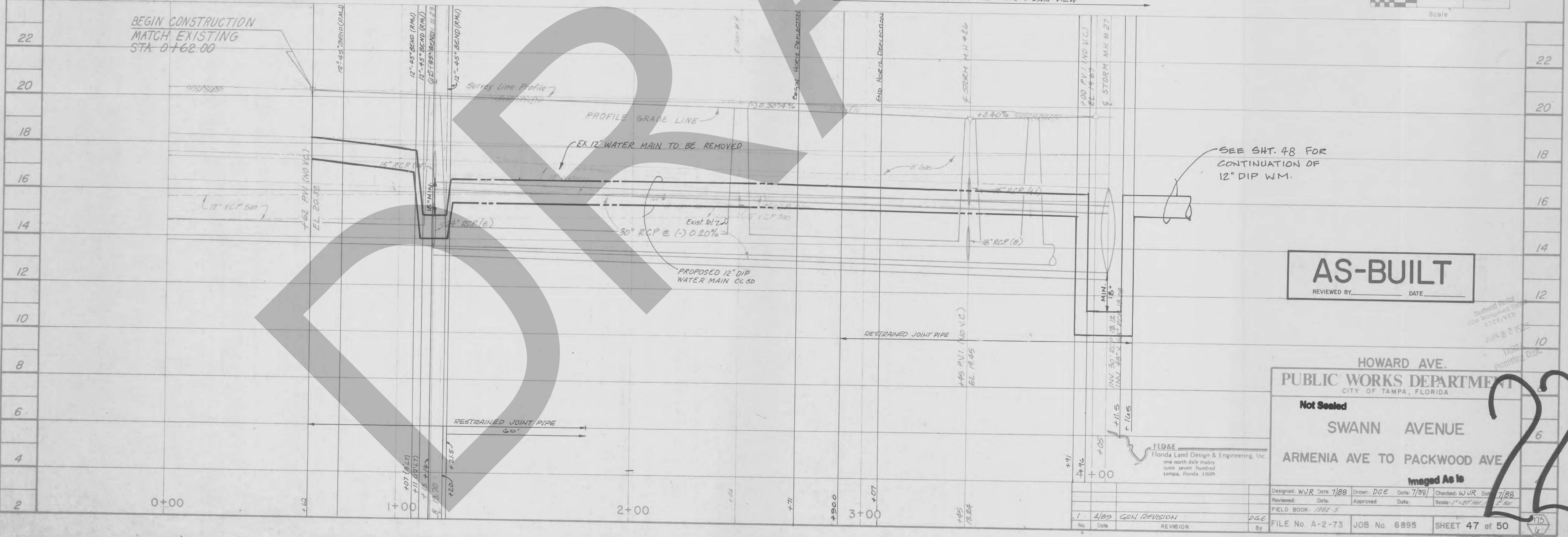
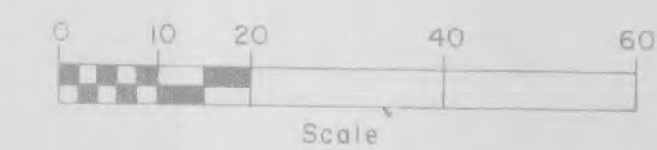
AVE

STA. 3+00



NOTE: ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY OF TAMPA TECHNICAL SPECIFICATIONS.

NOTE: FOR PROPOSED SANITARY SEWER DETAILS, SEE SANITARY SEWER CONSTRUCTION PLANS.



AS-BUILT
REVIEWED BY _____ DATE _____

HOWARD AVE.
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

Not Sealed

SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE

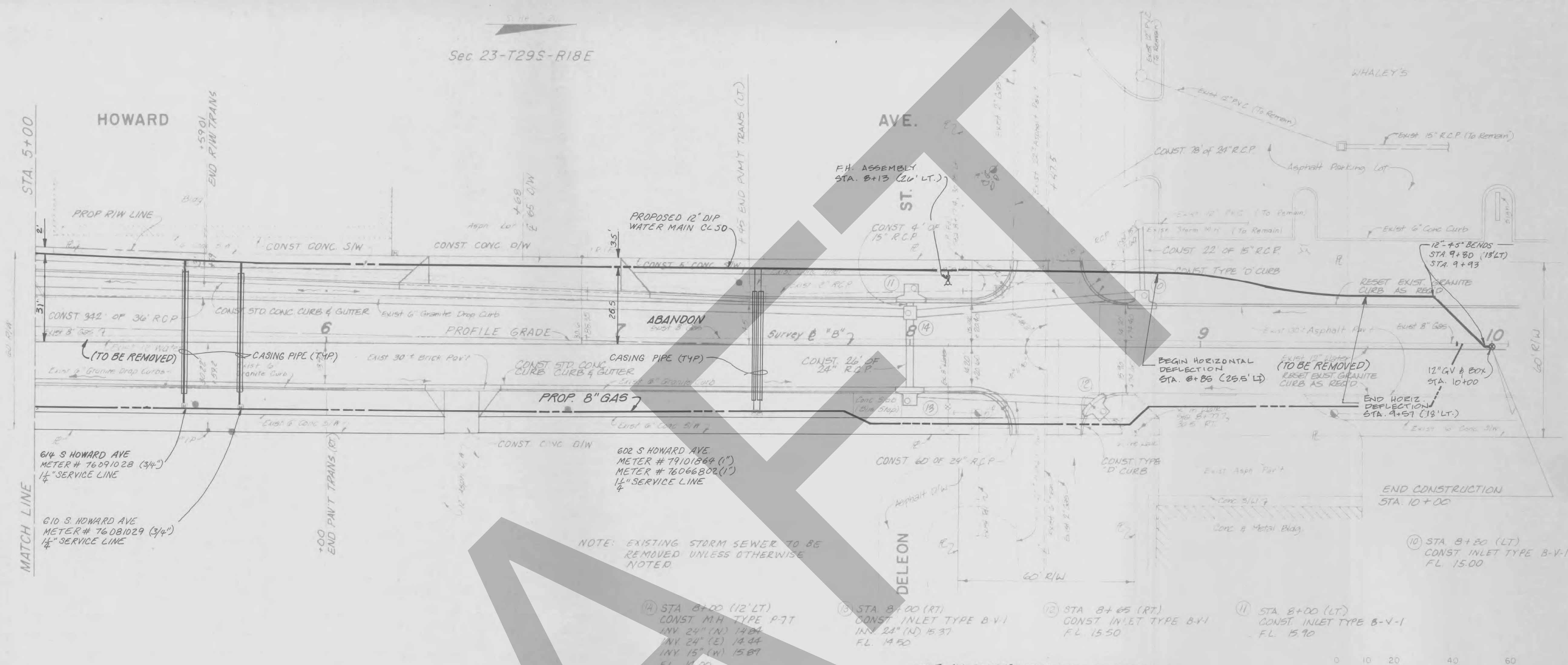
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Designed: WJR Date: 7/88 Drawn: DGE Date: 7/88 Checked: WJR Date: 7/88
Reviewed: _____ Date: _____ Approved: _____ Date: _____ Scale: 1" = 20' H.C. 2" Air
FIELD BOOK: 1988-5
FILE No. A-2-73 JOB No. 6895 SHEET 47 of 50

UTILITY ADJUSTMENT PLANS

HOSSOFF

Sec 23-T29S-R18E



SEE SHEET 45 FOR PLAN VIEW



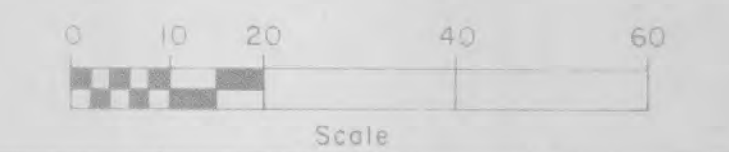
AS-BUILT
REVIEWED BY _____ DATE _____

FLDAE
Florida Land Design & Engineering, Inc.
one north dale mabry
suite seven hundred
tampa, florida 33604

HOWARD AVE.
PUBLIC WORKS DEPARTMENT
CITY OF TAMPA, FLORIDA

Not Sealed
SWANN AVENUE
ARMENIA AVE TO PACKWOOD AVE.
Imaged As Is

Designed: WBR	Date: 7/88	Drawn: DeE	Date: 7/88	Checked: WBR	Date: 11/88
Reviewed: _____	Date: _____	Approved: _____	Date: _____	Scale: 1" = 40'	Sheet: 48 of 50
FILE BOOK: 1988-5	FILE No: A-2-73	JOB No: 6895	SHEET: 48 of 50	UTILITY ADJUSTMENT PLANS	



NOTE: ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY OF TAMPA TECHNICAL SPECIFICATIONS.

NOTE: EXISTING STORM SEWER TO BE REMOVED UNLESS OTHERWISE NOTED.

- (14) STA 8+00 (12' LT) CONST MH TYPE P-7
INV 24" (N) 14.04
INV 24" (E) 14.44
INV 15" (W) 15.87
FL 14.00
- (15) STA 8+00 (RT) CONST INLET TYPE B-V-1
INV 24" (N) 15.37
FL 14.50
- (16) STA 8+05 (RT) CONST INLET TYPE B-V-1
FL 15.50
- (11) STA 8+00 (LT) CONST INLET TYPE B-V-1
FL 15.70

23

P.4 ZOM Pond ERP Documentation

DRAFT



TS0642

SW

CITY of TAMPA



MAY 10 2000
SOUTHWEST FLORIDA WATER
MANAGEMENT DISTRICT
PERMITTED CONSTRUCTION
DRAWINGS

FILE OF RECORD
PERMIT NO. 4420724 00



DEPARTMENT OF SANITARY SEWERS

PLANS FOR

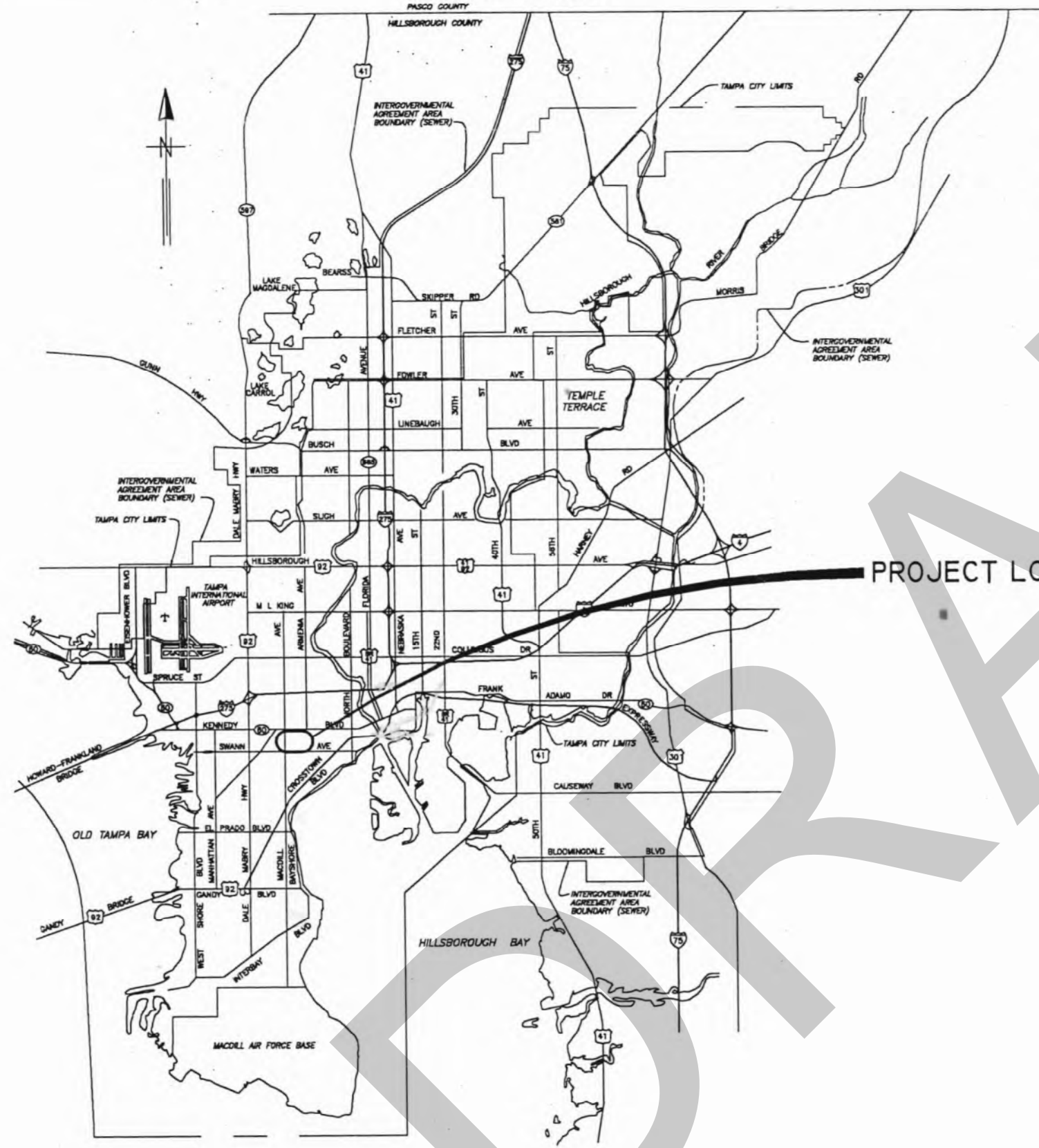
PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND

CONTRACT 10-00

THIS DOES NOT
CONTAIN EXEMPT INFO

Henry L. Dorzback
10/29/00
11/1/00

LOCATION MAP



PROJECT LOCATION

1=1
C:\DWG\STORM\5697-1

HENRY DORZBACK, P.E. #39449 CHIEF ENGINEER DEPARTMENT OF SANITARY SEWERS	RALPH L. METCALF II, P.E. DIRECTOR DEPARTMENT OF SANITARY SEWERS
--	--

DES: A.D.	No.	DATE	REVISIONS
DRN: <i>BB</i>	3		
CKD:	2		
DATE:	1		

CITY of TAMPA
DEPARTMENT OF SANITARY SEWERS
STORMWATER DIVISION

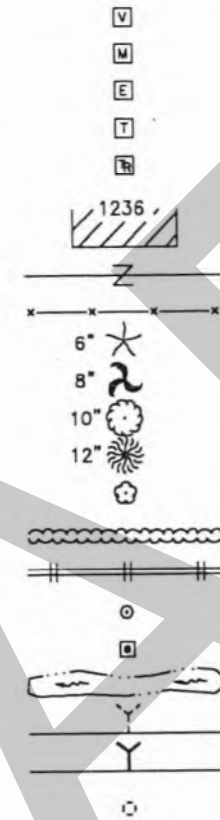
COVER SHEET

W.O. 5697
SHEET
1
OF 28

LEGEND

EX SEWERS	UP to 36" & SMALLER	36" & LARGER
EX FORCE MAIN		
EX SAN SEWER & MANHOLES		
EX STORM SEWER & MANHOLES		
PROP SEWERS		
PROP FORCE MAIN		
PROP SANITARY SEWER & MANHOLES		
PROP STORM SEWER & MANHOLES		
OTHER FEATURES		
RIGHT of WAY LINE		
EDGE of PAVEMENT		
WATER LINE		
GAS LINE		
ELECTRICAL CABLE or DUCT		
TELEPHONE CABLE or DUCT		
TV CABLE		
VALVE		
HYDRANT		
CATCH BASIN, GRATE		
POWER POLE		
TELEPHONE POLE		
GUY POLE		
GUY WIRE		

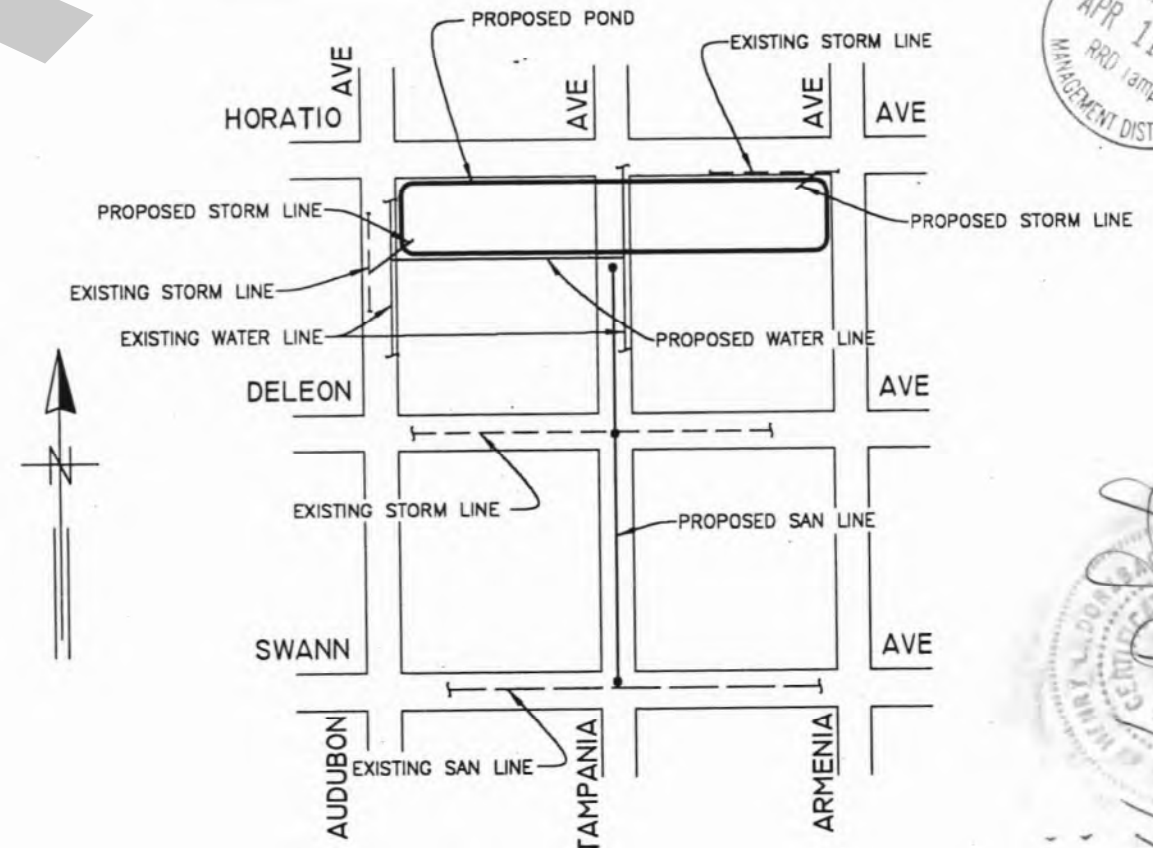
VALVE VAULT	
WATER METER	
ELECTRICAL MANHOLE or VAULT	
TELEPHONE MANHOLE or VAULT	
TRAFFIC BOX or VAULT	
BUILDING LIMIT	
PROPERTY OWNERSHIP	
FENCE	
CONIFER	
PALM	
OAK	
OTHER	
SHRUB	
HEDGE	
RAILROAD TRACKS	
IRON PIPE	
CONCRETE MONUMENT	
OPEN DITCHES	
EXISTING WYE	
PROPOSED WYE	
CLEAN OUT	



INDEX			
SH No	DESCRIPTION	FROM	TO
1	COVER SHEET		
2	PROJECT MAP, LEGEND & INDEX		
3	NOTES		
4	PROPOSED POND AREA	AUDUBON	ARMENIA
5	PLAN & PROFILE(STORMWATER)	DELEON	HORATIO
6	PLAN & PROFILE(STORMWATER)	TAMPANIA	ARMENIA
7	PLAN(SANITARY)	SWANN	DELEON
8	PROFILE(SANITARY)	SWANN	DELEON
9	PLAN(SANITARY)	DELEON	HORATIO
10	PROFILE(SANITARY)	DELEON	HORATIO
11	PROPOSED WATER PLANS	AUDUBON	TAMPANIA
12	STORMWATER DETAILS		
13	MANHOLE DETAILS		
14	HOUSE CONNECTION DETAILS		
15	MISCELLANEOUS DETAILS		
16	PLANTING PLAN		
17-28	CROSS SECTIONS		

ABBREVIATIONS

TOP of PIPE	TP	DUCTILE IRON PIPE	DIP
INVERT ELEVATION	IE or INV EL	REINFORCED CONCRETE PIPE	RCP
RIGHT of WAY	R/W	CONCRETE PIPE	CP
MANHOLE	MH or MH	APPROXIMATE LOCATION	AL
POLYVINYL CHLORIDE PIPE	PVCP	BENCH MARK	BM
VITRIFIED CLAY PIPE	VCP	POINT of INTERSECTION	PI
ADVANCED DRAINAGE SYSTEM	ADS		



PROJECT MAP 4420724 00

C:\DWG\STORM\5697-2

No.	DATE	REVISIONS	No.	DATE	REVISIONS	DES: A.D.	CITY of TAMPA DEPARTMENT OF SANITARY SEWERS STORMWATER DIVISION	PALMA CEIA DRAINAGE BASIN IMPROVEMENTS ARMENIA AND HORATIO STORMWATER DETENTION POND PROJECT MAP, LEGEND & INDEX	W.O. 5697
3			6			SHEET			
2			5			2			
1			4			OF 28			

SW

NOTES

1. ALL ELEVATIONS ARE BASED ON NOS DATUM UNLESS OTHERWISE NOTED.
2. LOCATIONS OF EXISTING UNDERGROUND UTILITIES WERE PREPARED FROM THE MOST RELIABLE INFORMATION AVAILABLE. VERIFY THE LOCATION AND DEPTH OF ALL PERTINENT UTILITIES PRIOR TO CONSTRUCTION. NOTIFY UTILITY COMPANIES AT LEAST 48 HOURS BEFORE BEGINNING CONSTRUCTION.
3. NEW HOUSE CONNECTION LOCATIONS ARE APPROXIMATE ONLY. REQUIRED LOCATION AND DEPTH WILL BE COORDINATED WITH THE HOMEOWNER AT THE TIME OF CONSTRUCTION BY THE D.S.S. CONSTRUCTION CREWS.
4. WHERE AN EXISTING SEWER IS TO BE REMOVED OR ABANDONED AND REPLACED WITH A NEW SEWER, CONTINUOUS SEWER SERVICE MUST BE MAINTAINED AT ALL TIMES, WHILE CONNECTING THE LATERALS TO THE NEW SEWER IN PLACE.
5. THE MINIMUM CLEARANCE BETWEEN HOUSE LATERALS AND WATER LINES SHALL BE 6" UNDER ALL CIRCUMSTANCES. IF THE HOUSE LATERAL IS BELOW A WATER LINE AND HAS BETWEEN 6" AND 18" OF CLEARANCE, OR IF THE LATERAL IS ABOVE THE WATER LINE REGARDLESS OF CLEARANCE, THEN A NOMINAL 20' LENGTH OF GREEN AWWA CLASS 150 C900 PVC PIPE SHALL BE CENTERED OVER/UNDER THE WATER LINE.



4420724 00

1=1

C:\DWG\STORM\5697-3

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

DES: A.D.
 DRN: *BB*
 CKD:
 DATE:

CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 STORMWATER DIVISION

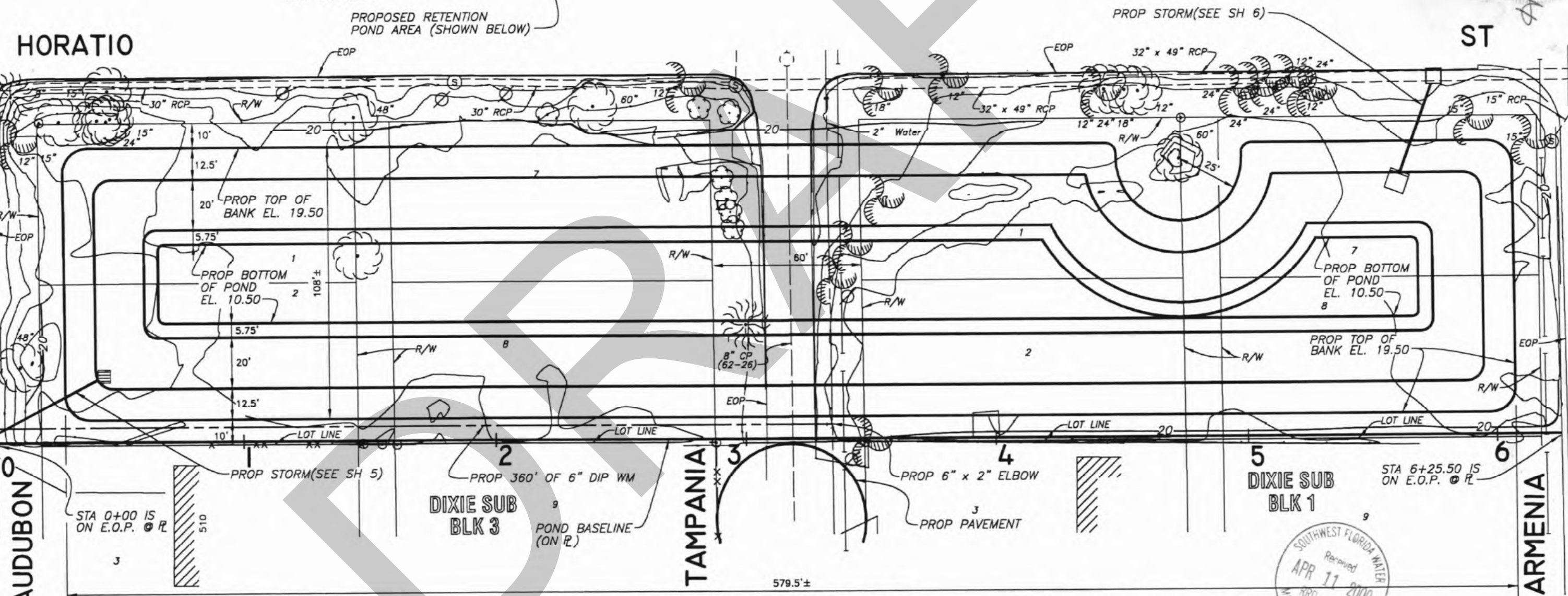
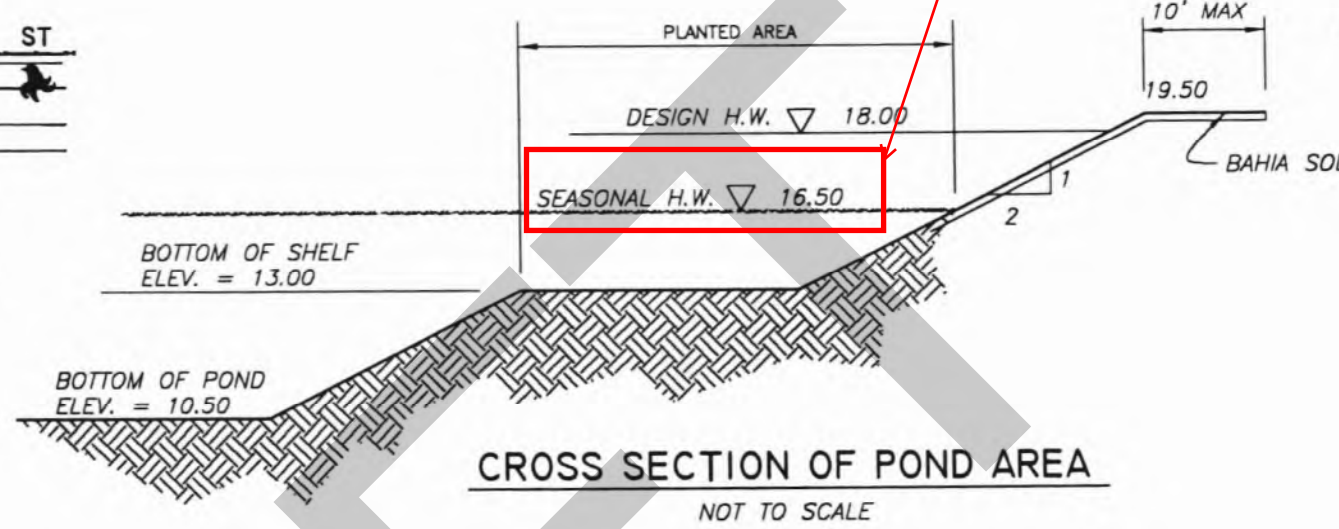
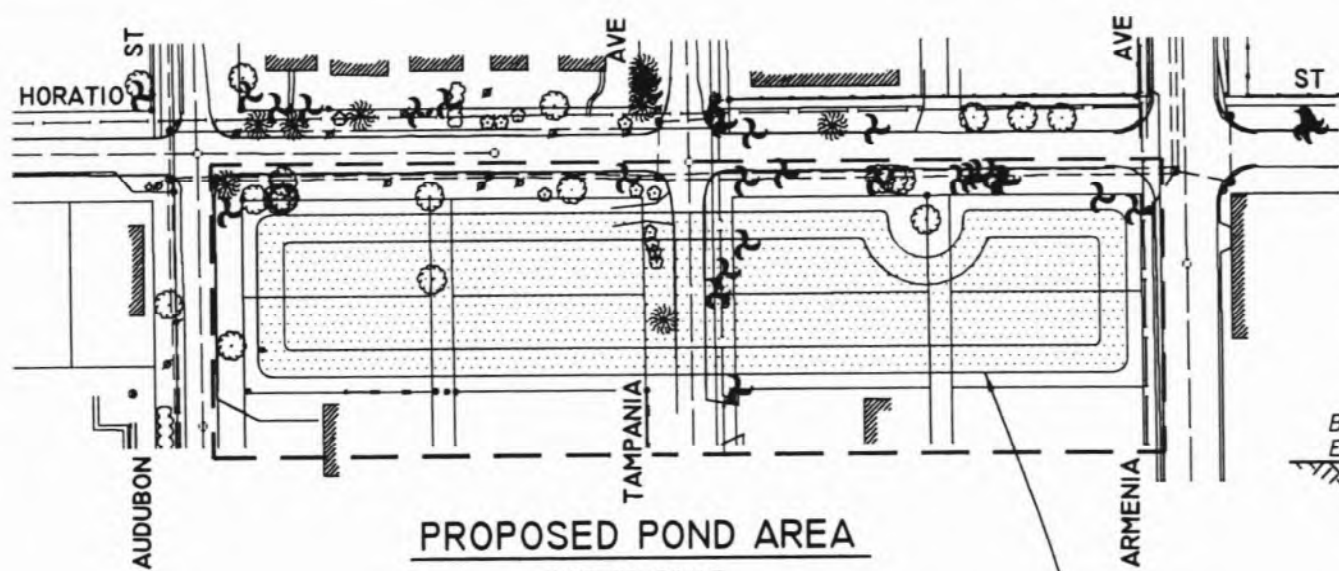
PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
 ARMENIA AND HORATIO STORMWATER DETENTION POND
 PROJECT MAP, LEGEND & INDEX

W.O. 5697
 SHEET
3
 OF 28

3

EL 15.64 NAVD88

SW



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No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

DES: A.D.
 DRN: BB
 CKD:
 DATE:

CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 STORMWATER DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
 ARMENIA AND HORATIO STORMWATER DETENTION POND
 PROPOSED POND

W.O. 5697
 SHEET
4
 OF 28



4

AUDUBON

AVE

SEC. 22 T29S R18E

ST

SW

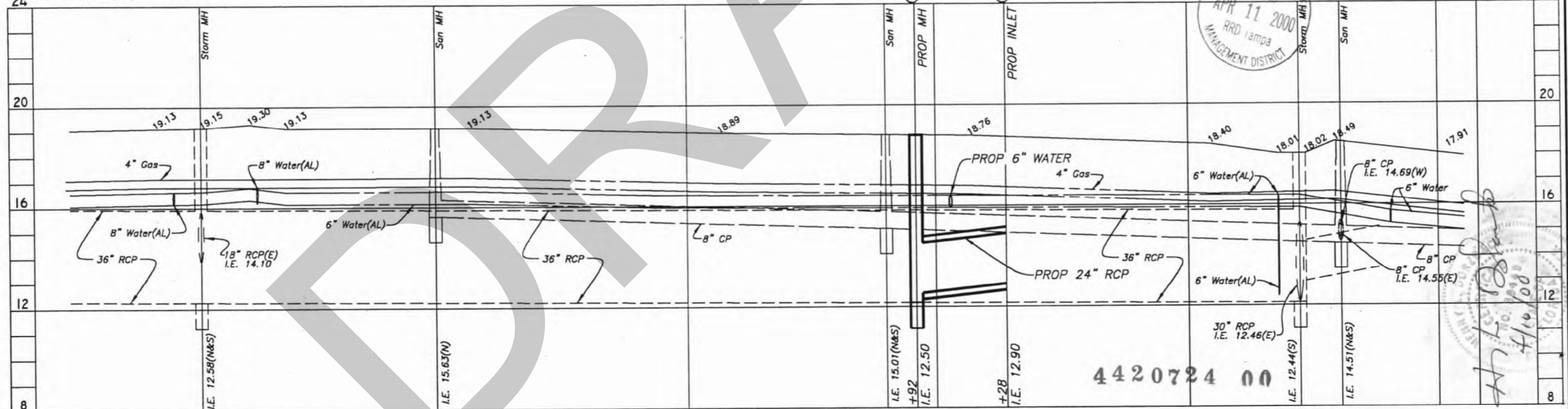
DIXIE SUB PLAN

SOUTHWEST FLORIDA WATER
 Received
 APR 11 2000
 RRD Tampa
 MANAGEMENT DISTRICT

SCALE:
 1"=40' HORIZ.
 1"=4' VERT.

(S-1) PROP STD MH TYPE J-7T(4'x6')
 STA 1+92, 15.28' LT
 TOP EL
 INV. 36" N & S = 12.50
 INV. 24" RCP(NE) = 12.50

(S-2) PROP STD INLET TYPE "E"
 WITH SKIMMER
 STA 2+28, 56.00' RT
 (SEE DETAIL, SH)
 INV. 24" RCP = 12.90



0 1 PROFILE 2 3 4

C:\DWG\STORM\5697-4 1=40

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

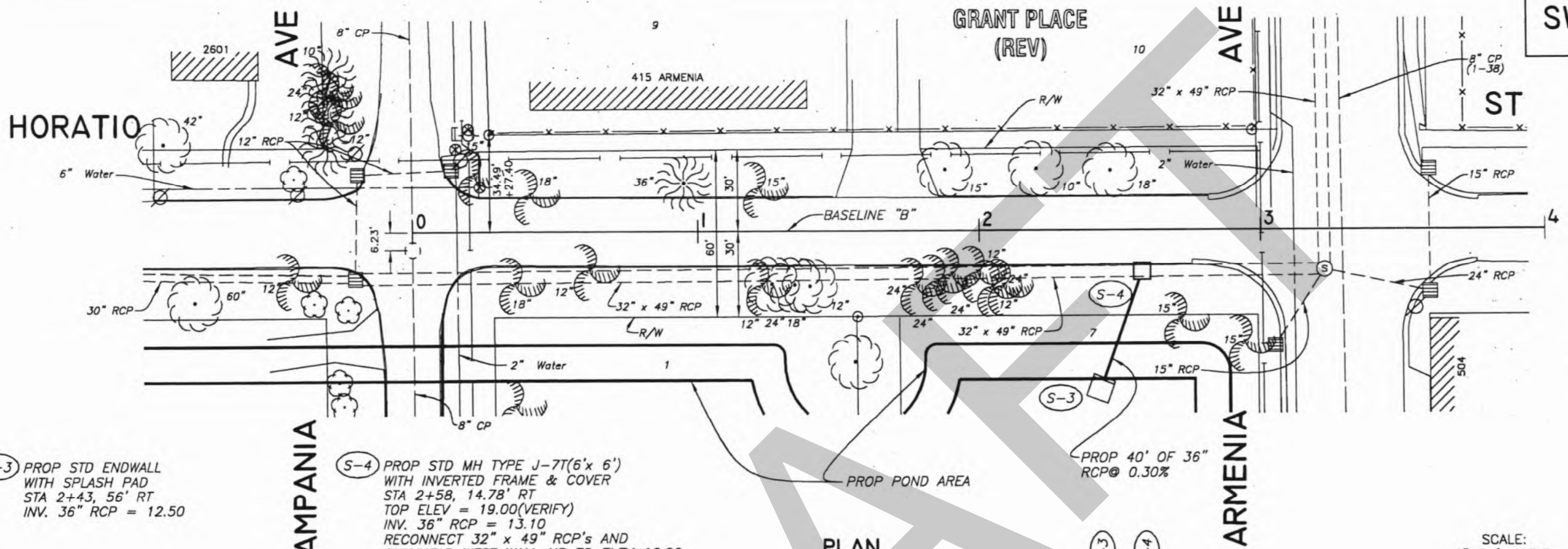
DES: A.D.
 DRN: BB
 CKD:
 DATE:

CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 STORMWATER DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
 ARMENIA AND HORATIO STORMWATER DETENTION POND
 PLAN AND PROFILE

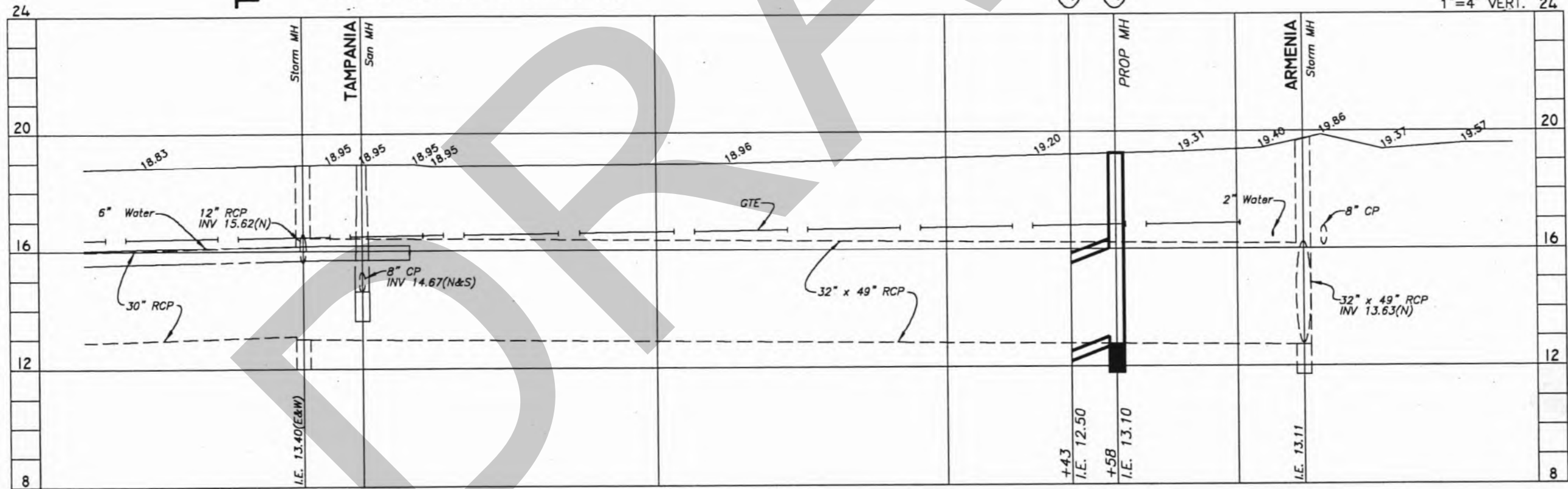
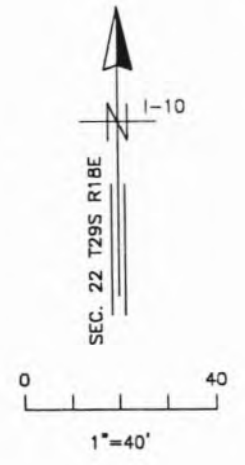
W.O. 5697
 SHEET
5
 OF 28

5



(S-3) PROP STD ENDWALL WITH SPLASH PAD
 STA 2+43, 56' RT
 INV. 36" RCP = 12.50

(S-4) PROP STD MH TYPE J-7T(6'x 6') WITH INVERTED FRAME & COVER
 STA 2+58, 14.78' RT
 TOP ELEV = 19.00(VERIFY)
 INV. 36" RCP = 13.10
 RECONNECT 32" x 49" RCP'S AND BULKHEAD WEST WALL UP TO ELEV 16.90



SCALE:
 1"=40' HORIZ.
 1"=4' VERT. 24



Handwritten signature and date: 4/15/00

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No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

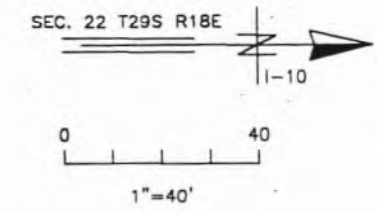
DES: A.D.
 DRN: BB
 CKD:
 DATE:

CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 STORMWATER DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
PLAN AND PROFILE

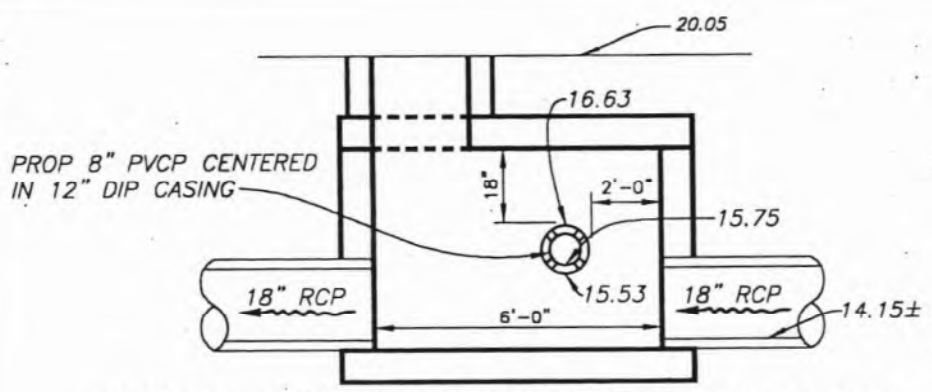
W.O. 5697
 SHEET
6
 OF 28

SW

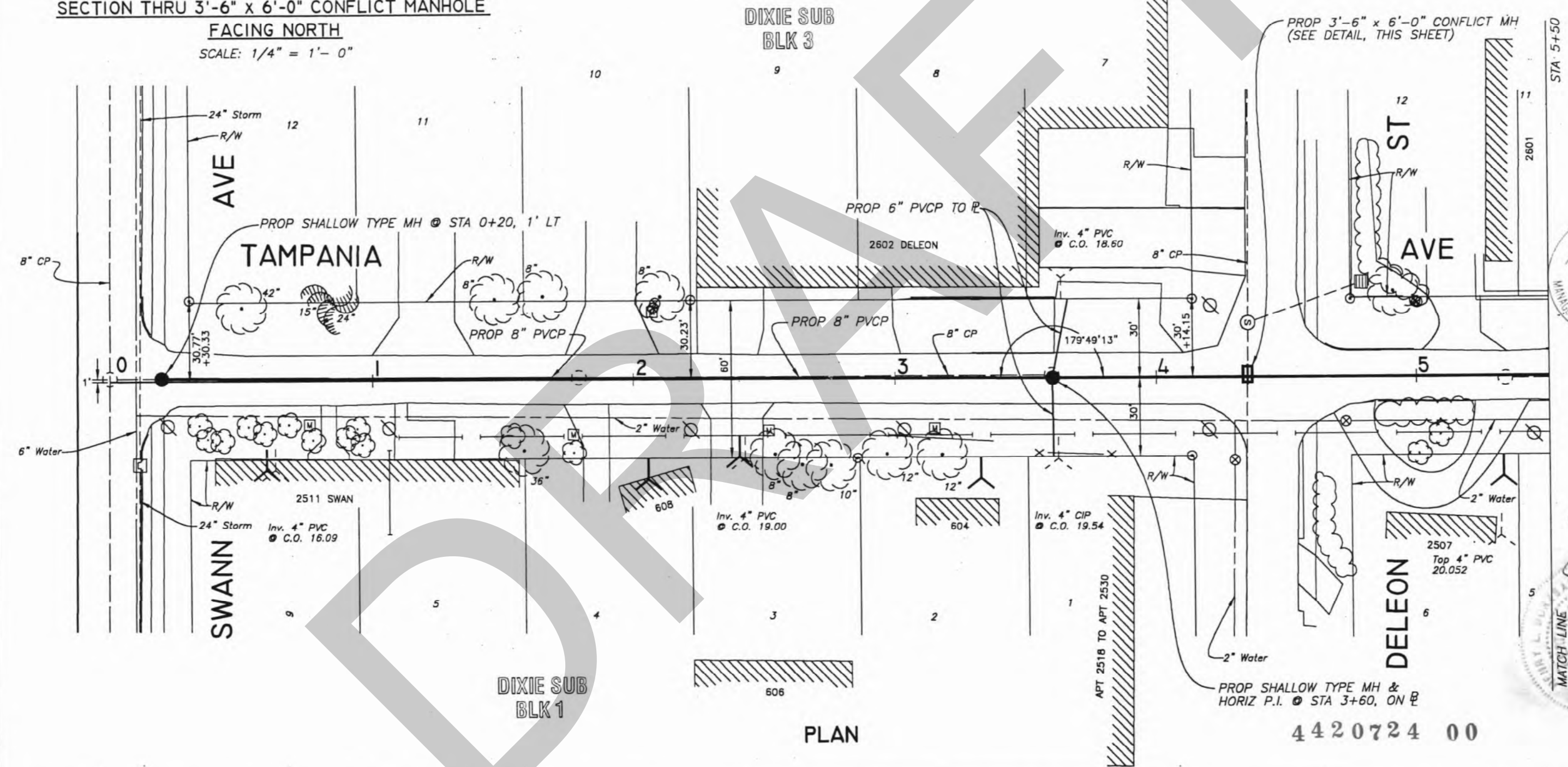


NOTES:

1. DO NOT CONSTRUCT PAVED INVERT / BENCHING IN CONFLICT STRUCTURES.
2. USE 12" DIA., CLASS 52 DIP, MINIMUM OF 7'-10" LONG, CENTERED ON CONFLICT STRUCTURE AS CASING.
3. CENTER 8" DIA. PVCP WITHIN DIP CASING WITH TWO STAINLESS STEEL, CASCADE WATERWORKS MFG. CO. CASING SPACERS.
4. SEAL ENDS OF CASING WITH NON-SHRINK GROUT.



**SECTION THRU 3'-6" x 6'-0" CONFLICT MANHOLE
FACING NORTH**
SCALE: 1/4" = 1'-0"



PLAN

SOUTHWEST FLORIDA WATER
RECEIVED
APR 11 2000
RRD Iamda
MANAGEMENT DISTRICT

MATCH LINE
H. J. P. W.
F. J. P. W.
4420724 00

C:\DWG\STORM\5697-5

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

DES: J.P.W.
DRN: BB
CKD:
DATE:

CITY of TAMPA
DEPARTMENT OF SANITARY SEWERS
SANITARY SEWERS DIVISION

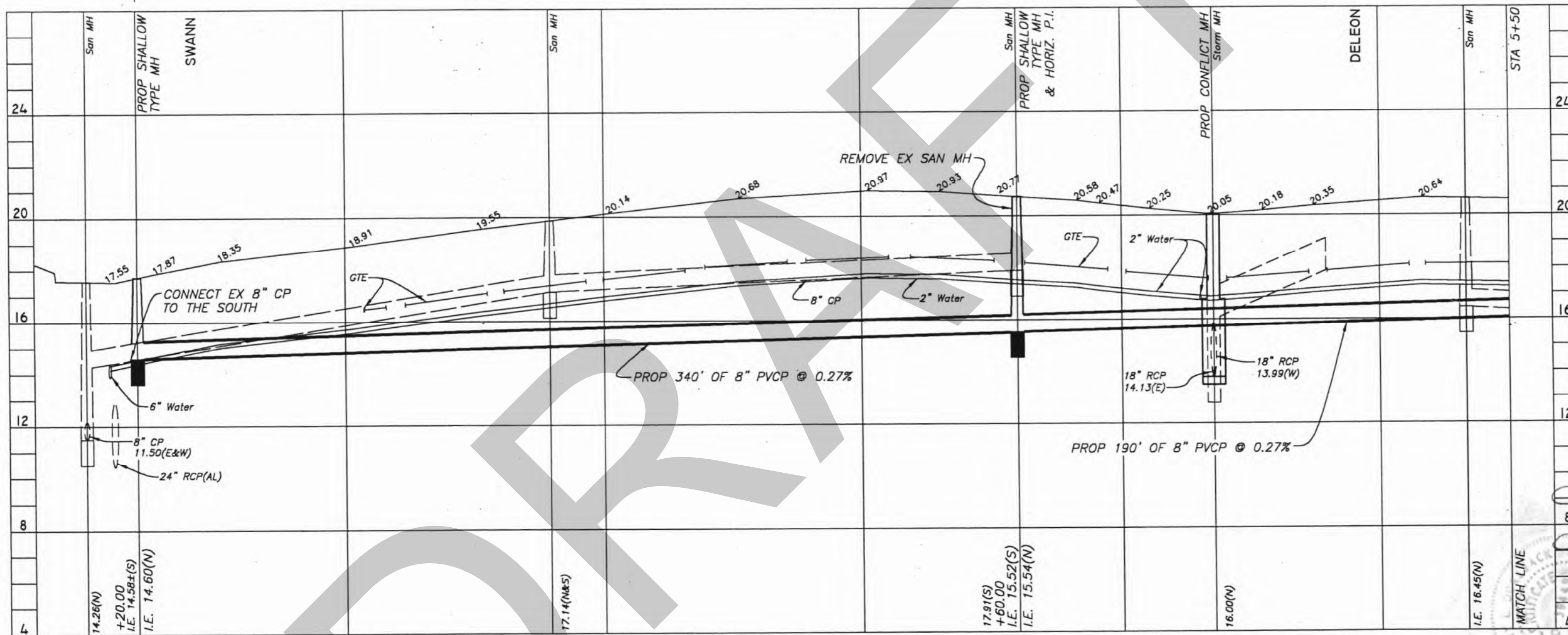
PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
PLAN SHEET

W.O. 5697
SHEET
7
OF 28

SW

CLASS "C" BEDDING

PROP 530' OF 8" PVC @ 0' - 6' CUT



PROFILE



4420724 00

SCALE:
1"=40' HORIZ.
1"=4' VERT.

No.	DATE	REVISIONS	No.	DATE	REVISIONS
3			6		
2			5		
1			4		

DES: J.P.W.
DRN: BB
CKD:
DATE:

CITY of TAMPA
DEPARTMENT OF SANITARY SEWERS
SANITARY SEWERS DIVISION

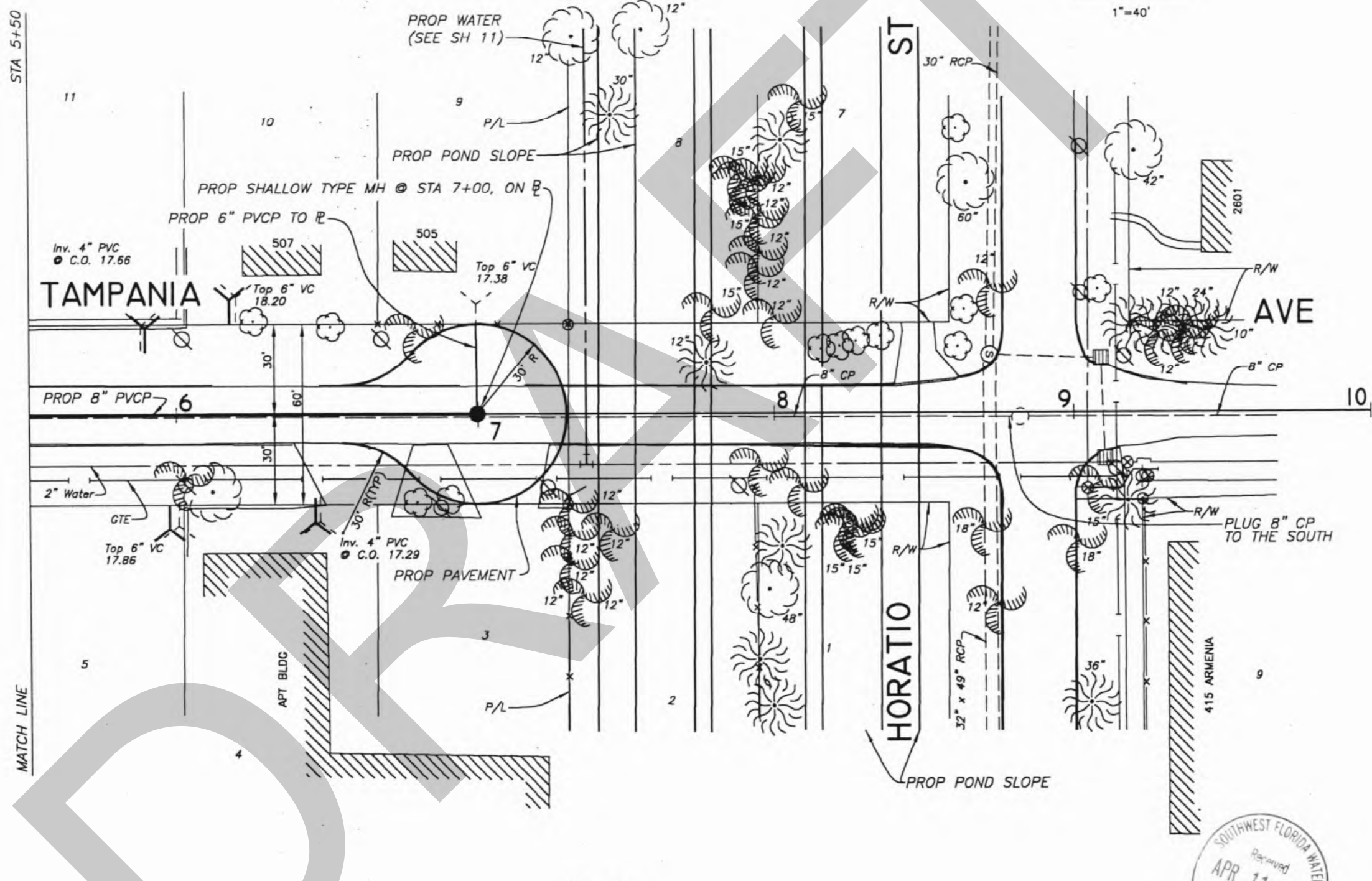
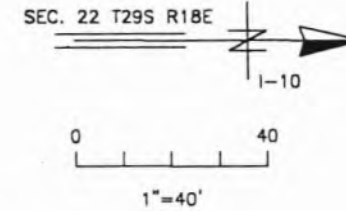
PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
PROFILE SHEET

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PLAN



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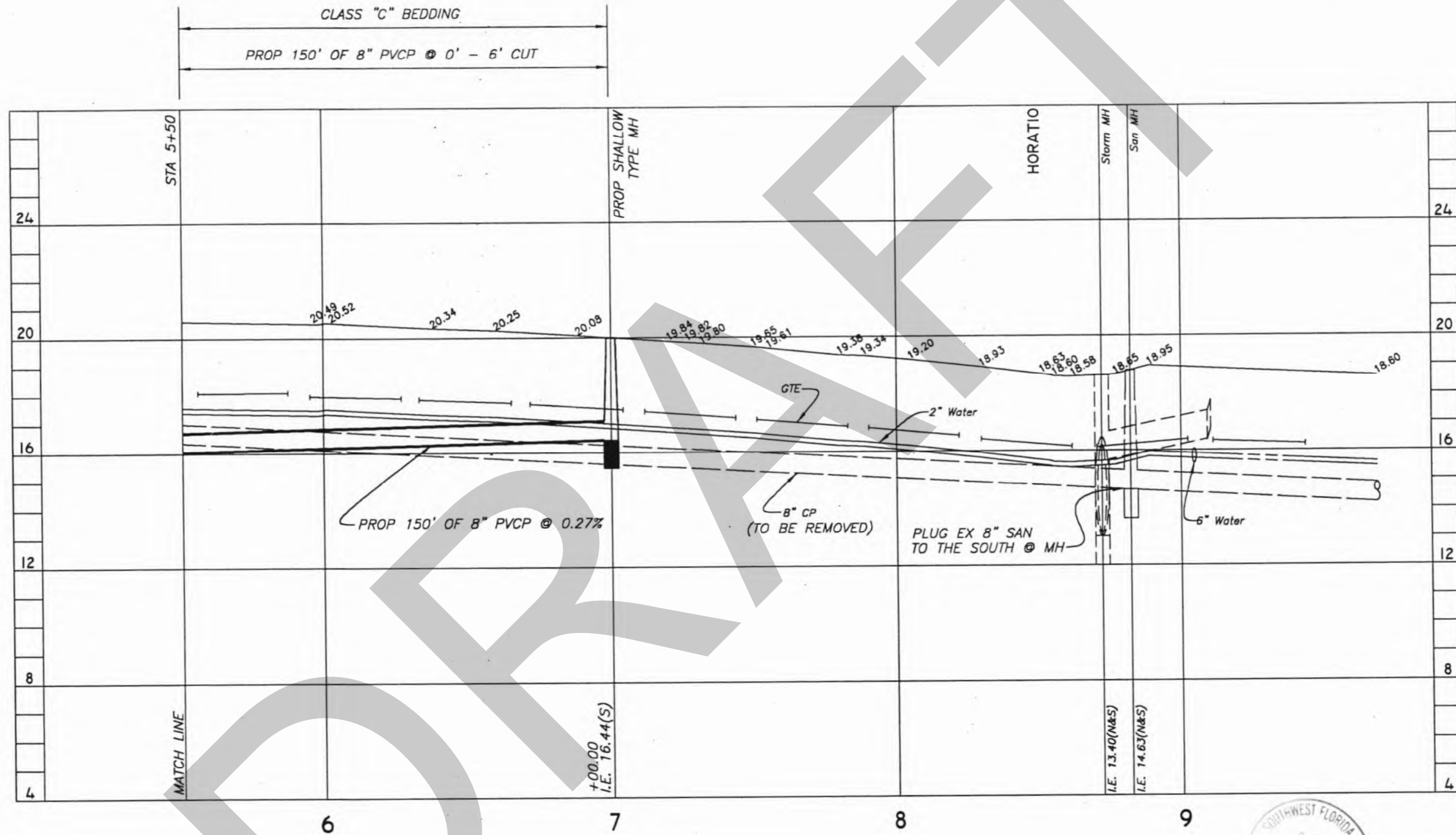
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CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 SANITARY SEWERS DIVISION

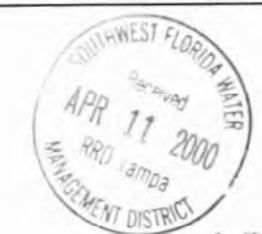
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ARMENIA AND HORATIO STORMWATER DETENTION POND
PLAN SHEET

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SW



PROFILE



4420724 00

SCALE:
1"=40' HORIZ.
1"=4' VERT.

[Handwritten Signature]
 PROFESSIONAL ENGINEER
 STATE OF FLORIDA
 No. 11817
 10/18/08

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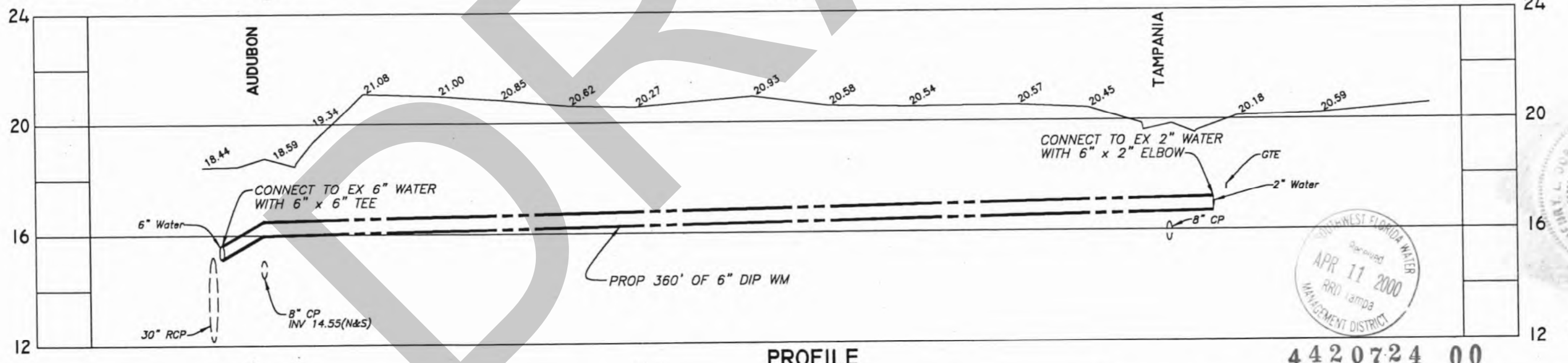
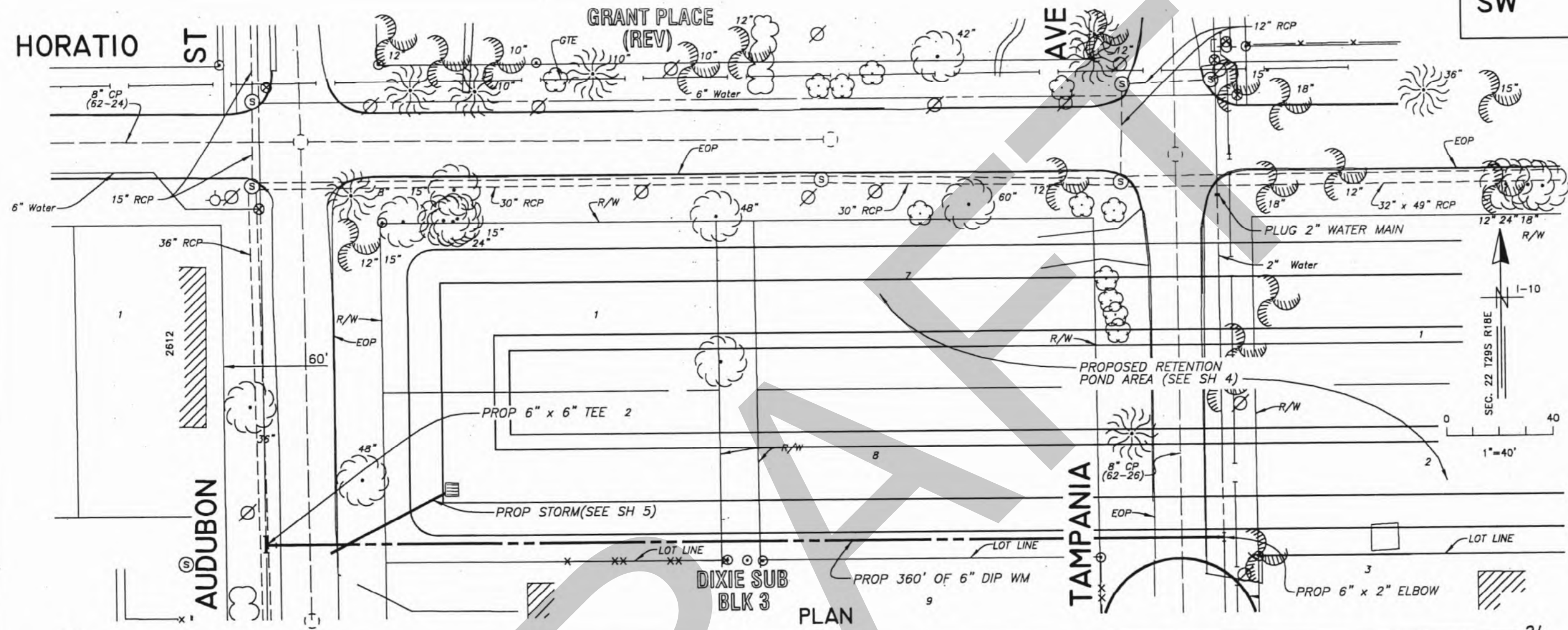
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CITY of TAMPA
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PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
PROFILE SHEET

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PROFILE



SCALE:
1"=40' HORIZ.
1"=4' VERT.

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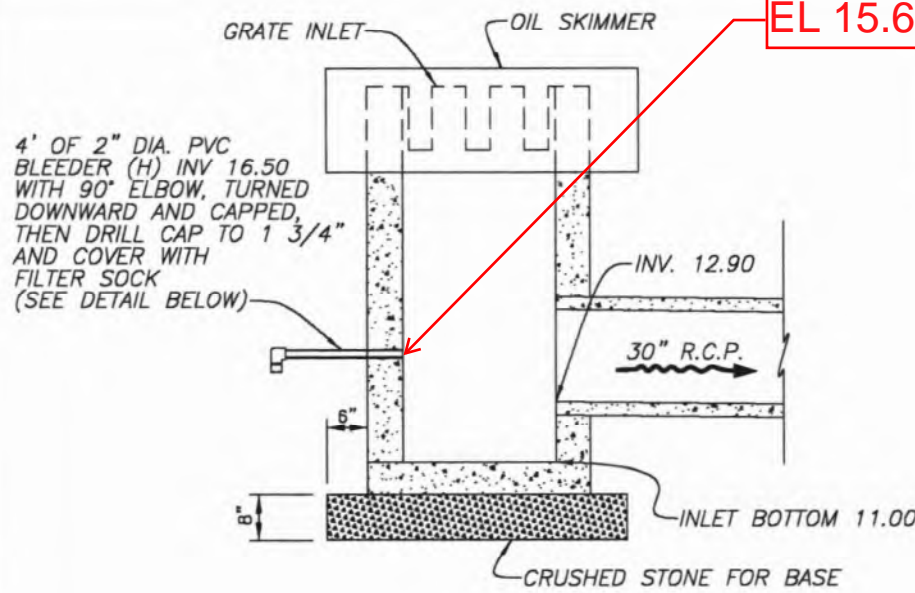
CITY of TAMPA
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STORMWATER DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
PROPOSED WATER PLANS

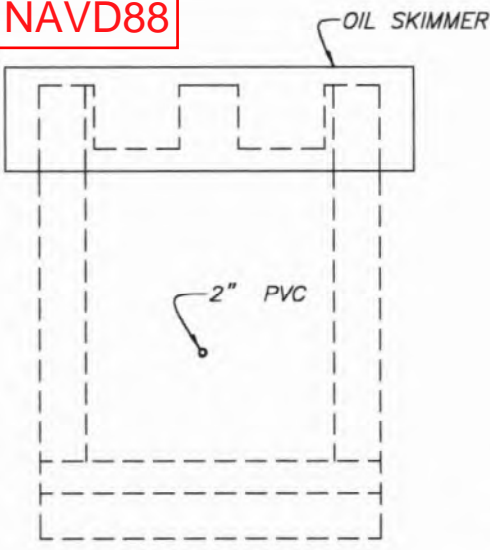
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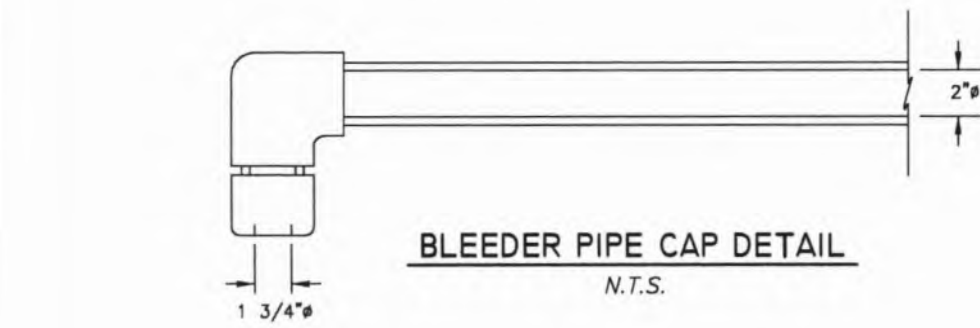
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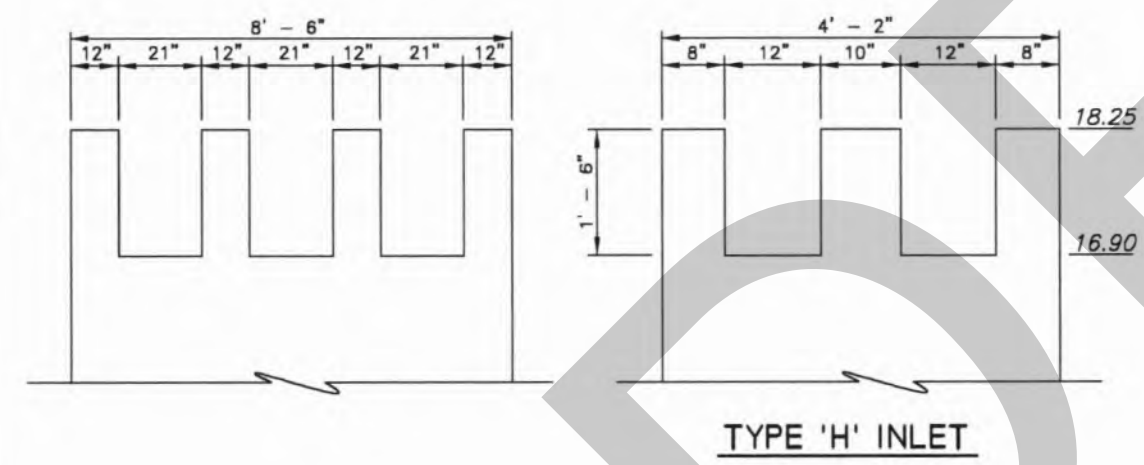
SECTION A-A
N.T.S.



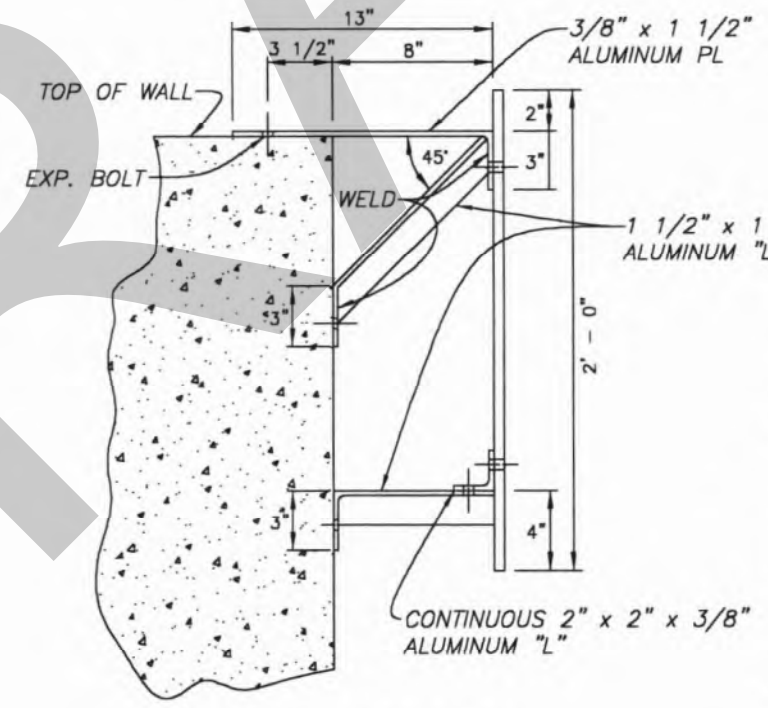
SECTION B-B
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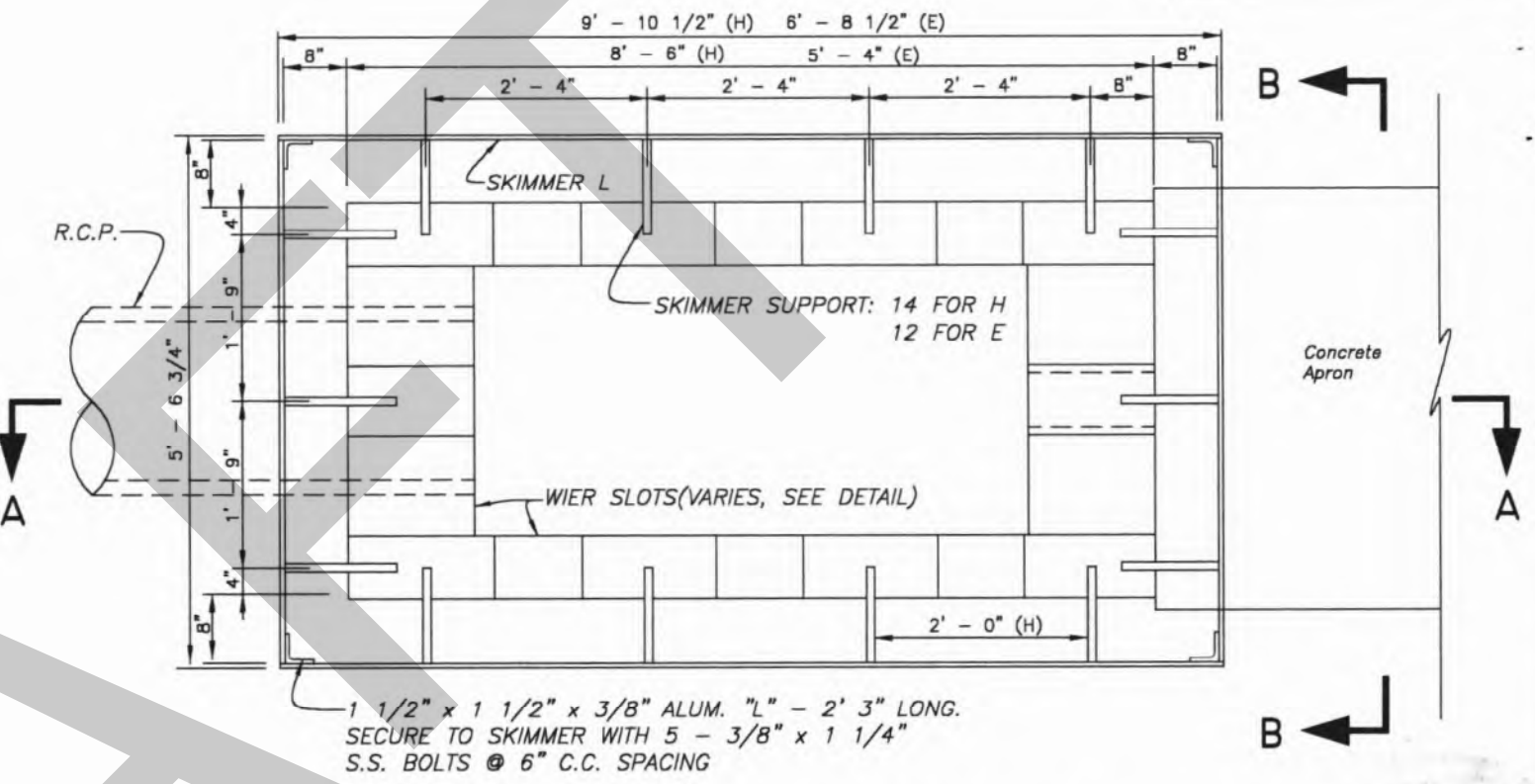
BLEEDER PIPE CAP DETAIL
N.T.S.



WEIR DETAILS FOR MODIFIED INLET OUTFALL STRUCTURE
(MODIFIED TYPE "H" INLET)
N.T.S.



SUPPORT DETAIL
N.T.S.



PLAN VIEW - OUTLET STRUCTURE
(MODIFIED TYPE "H" INLET)
N.T.S.

NOTES:

1. ALL ANCHORS TO CONCRETE ARE 3/8" x 4" STAINLESS STEEL EXPANSION BOLTS AND WASHERS (42 REQUIRED)
2. ALL DRILL HOLES ARE 1/2" DIAMETER.
3. ALL STRUCTURAL FASTENERS ARE 3/8" x 1 1/4" STAINLESS STEEL BOLTS AND WASHERS (62 REQUIRED).
4. USE U.S. FOUNDRY TYPE U.S.F. 4641 FRAME AND U.S.F. 6492 GRATE OR EQUAL.
5. PAYMENT FOR GRATE AND SKIMMER STRUCTURE SHALL BE INCLUDED IN THE PRICE OF MODIFIED INLET.



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1/4"=1'-0"

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CITY of TAMPA
DEPARTMENT OF SANITARY SEWERS
STORMWATER DIVISION

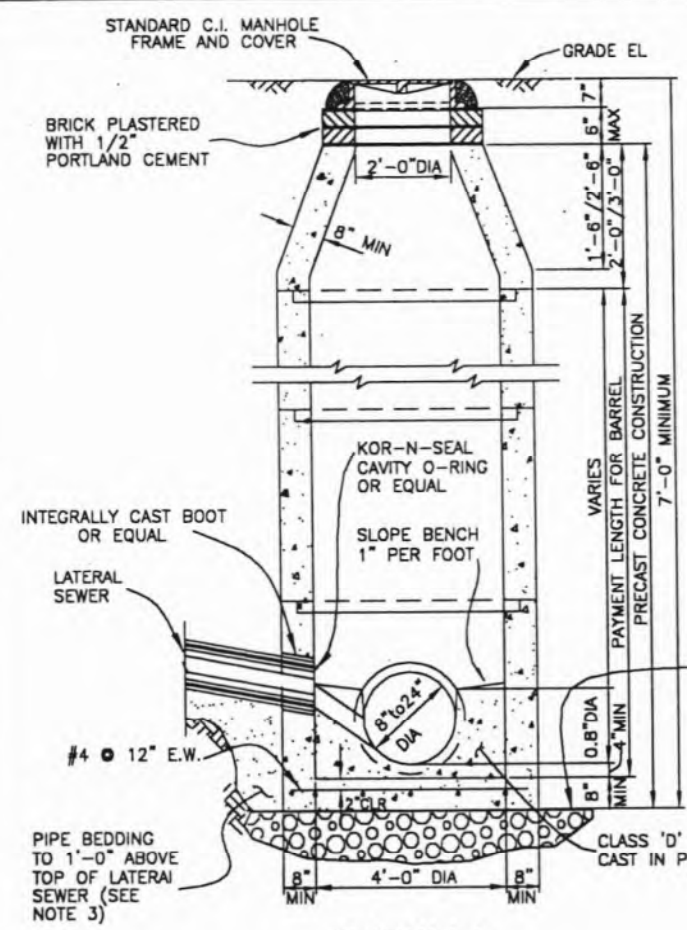
PALMA CEIA DRAINAGE BASIN IMPROVEMENTS:
ARMENIA AND HORATIO STORMWATER DETENTION POND
DETAILS

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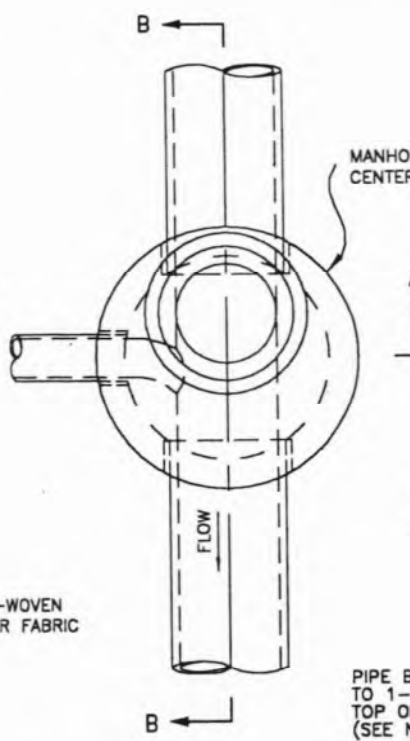
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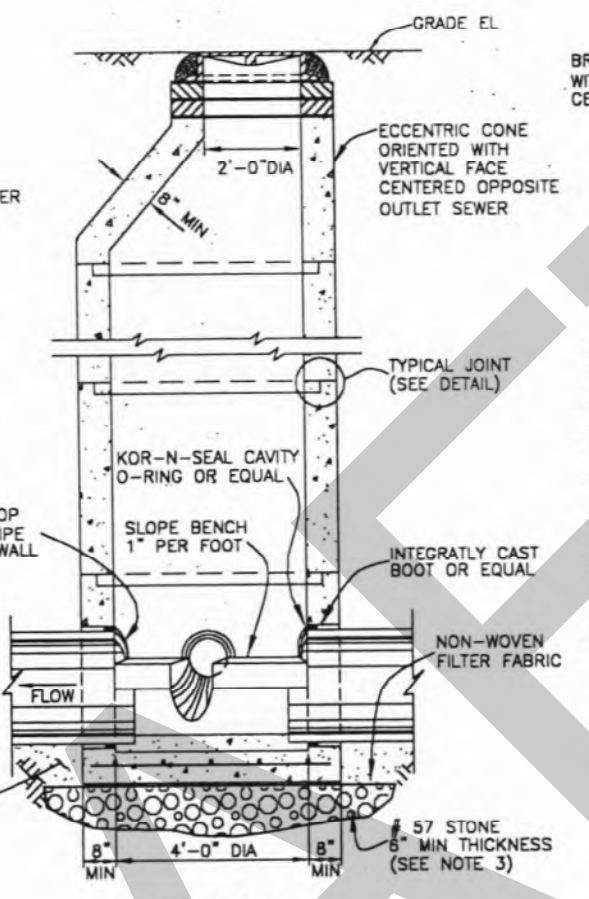


SECTION A-A



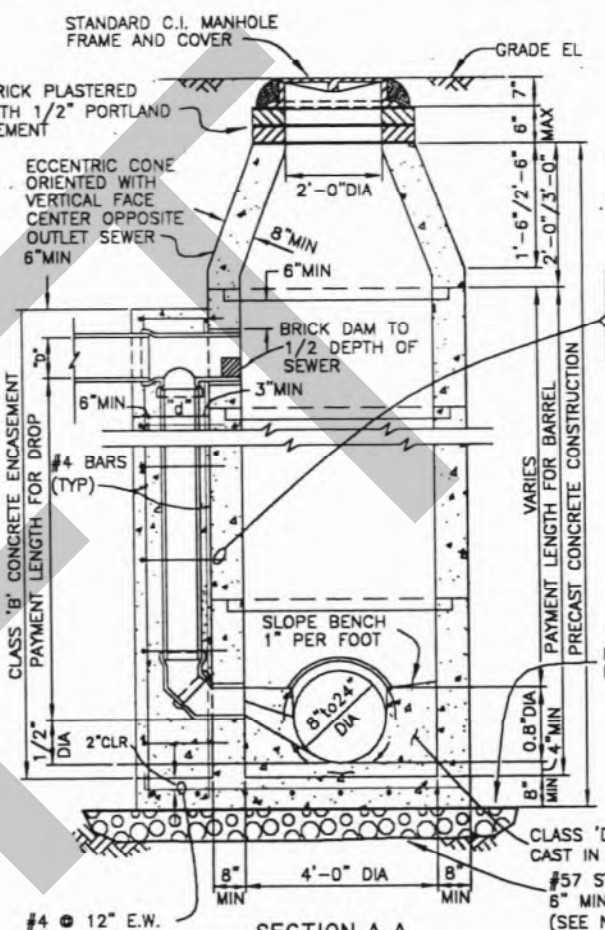
PLAN

STANDARD MANHOLE - DEEP TYPE FOR SEWERS 24" OR LESS IN DIAMETER



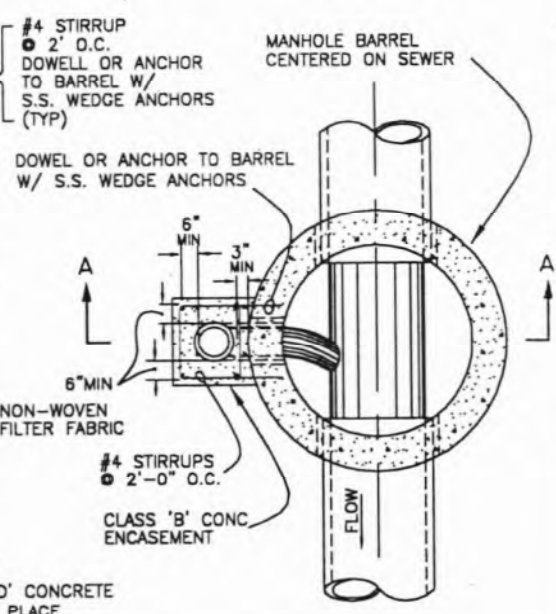
SECTION B-B

STANDARD MANHOLE - DEEP TYPE FOR SEWERS 24" OR LESS IN DIAMETER

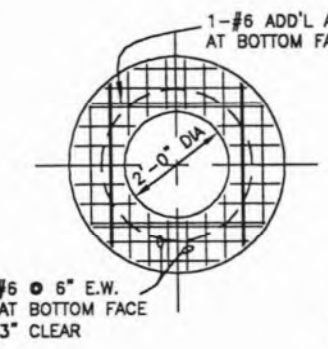


SECTION A-A

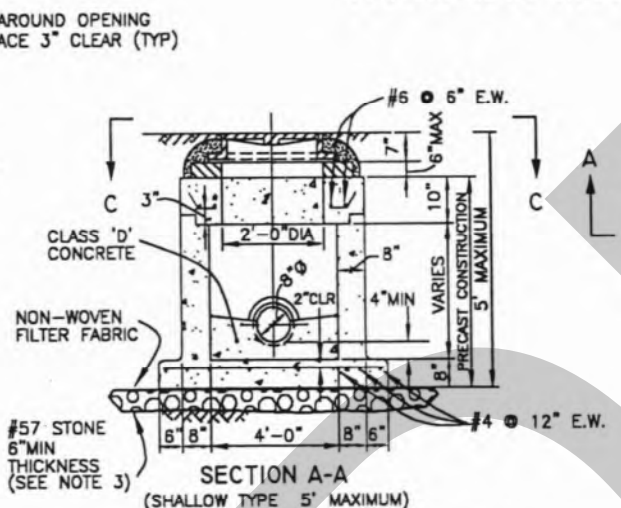
STANDARD DROP MANHOLE FOR SEWERS 24" OR LESS IN DIAMETER



SECTIONAL PLAN

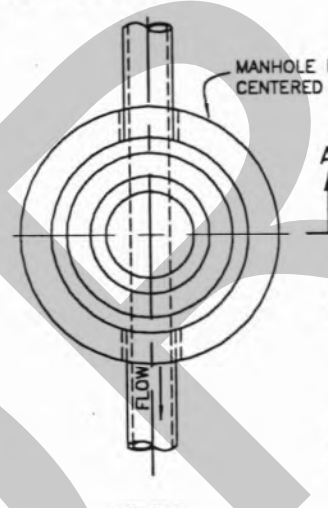


CONCRETE SLAB DETAIL SECTION C-C

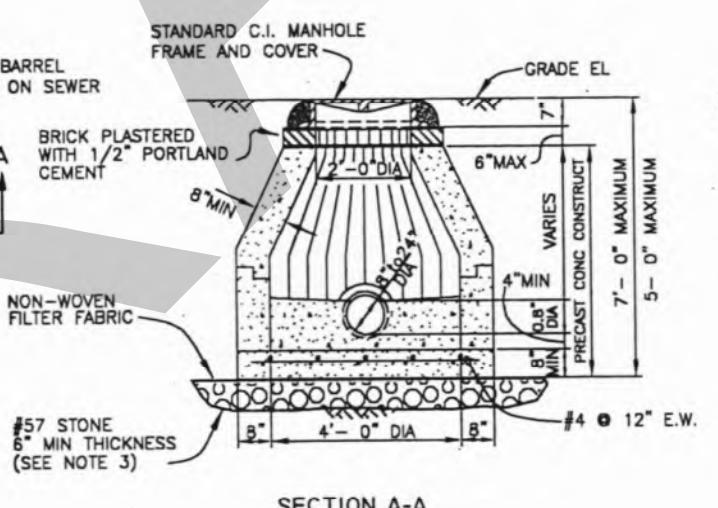


SECTION A-A (SHALLOW TYPE 5' MAXIMUM)

STANDARD MANHOLE - SHALLOW TYPE FOR SEWERS 24" OR LESS IN DIAMETER



PLAN

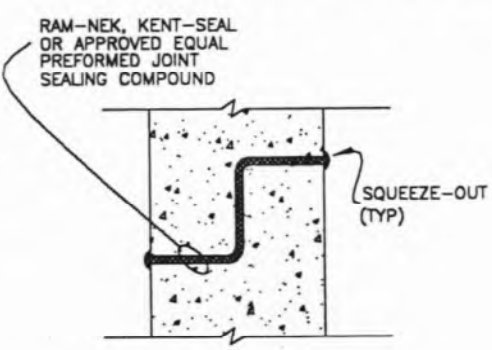


SECTION A-A

5'-0" TO 7'-0" DEEP (SEE NOTE 4)

NOTES

1. REINFORCING STEEL FOR ALL MANHOLES SHALL CONFORM TO ASTM-DES: C-48 AND PLACED AS DESCRIBED IN THE SPECIFICATIONS.
2. ALL PIPE STUBS FROM MANHOLES FOR FUTURE CONNECTIONS OR OTHER CONTRACT DIVISIONS SHALL BE PROVIDED WITH WATER TIGHT PLUGS PLACED FROM WITHIN THE MANHOLE.
3. SEE SPECIFICATIONS FOR MATERIALS REQUIREMENTS AND PLACEMENTS AND COMPACTION OF PIPE AND STRUCTURE BEDDING.
4. STANDARD SHALLOW-TYPE MANHOLES WITH DEPTHS BETWEEN A MAXIMUM OF 7'-0" AND A MINIMUM OF 5'-0" MUST HAVE A CONCRETE CONE FOR THE TOP SECTION.
5. ALL MANHOLE JOINTS MUST BE SEALED WITH AN ACCEPTABLE JOINT SEALING COMPOUND REGARDLESS OF WHETHER AN O-RING GASKET IN A PREFORMED GROOVE IS USED.
6. FILTER FABRIC SHALL BE NON-WOVEN FABRIC PER D.O.T. SPECIFICATION SECTIONS 514 AND 985 AND SHALL BE WRAPPED ENTIRELY AROUND THE #57 STONE.

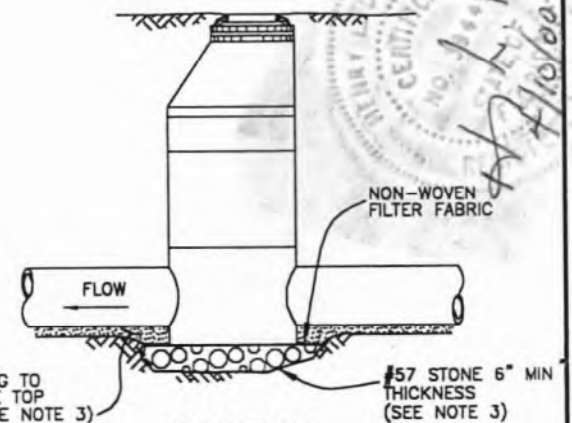


MANHOLE BARREL JOINT DETAIL

NOT TO SCALE (SEE NOTE 5)

SCHEDULE FOR DROP MANHOLE	
INLET PIPE DIAMETER "D"	DROP PIPE DIAMETER "d"
8"	8"
10"	8"
12"	10"
15"	12"
18"	15"
21"	18"
24"	18"

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ELEVATION

FOR SEWERS 24" OR LESS IN DIAMETER

NOT TO SCALE

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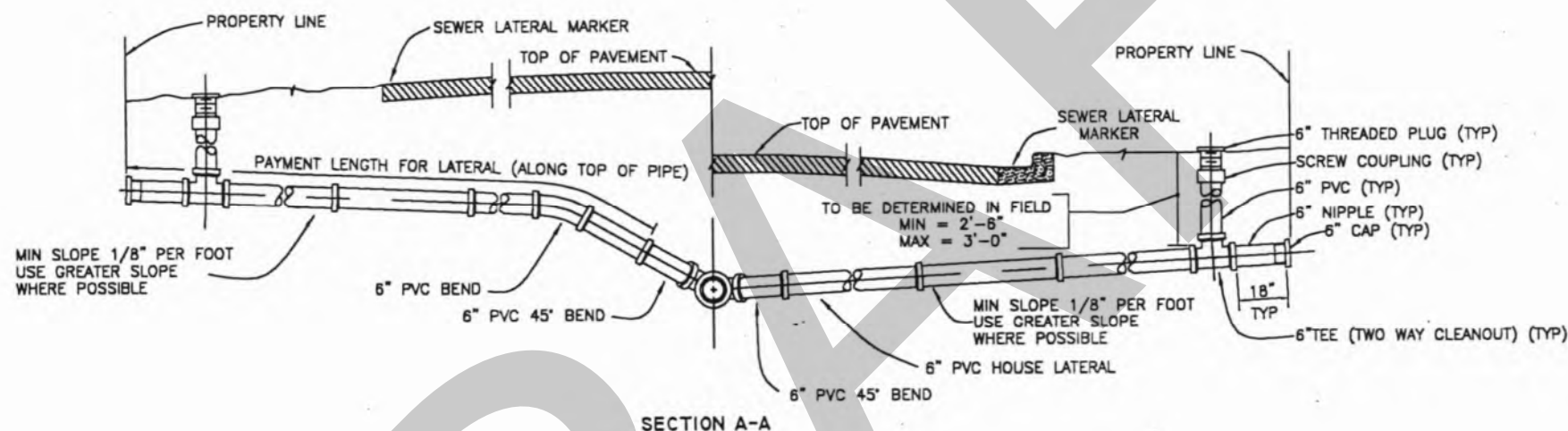
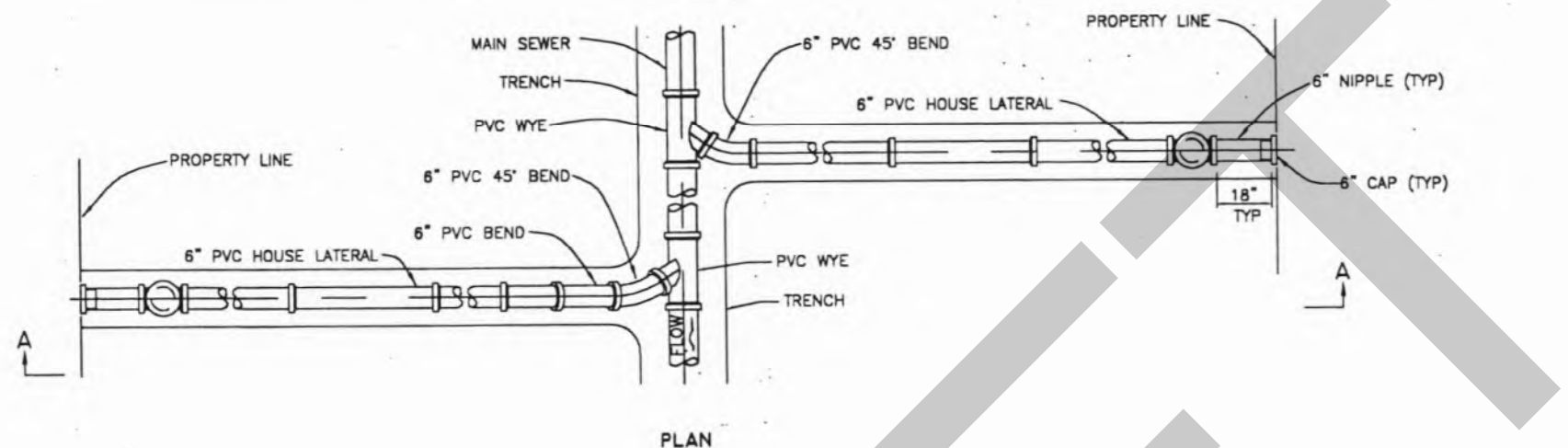
CITY of TAMPA
 DEPARTMENT OF SANITARY SEWERS
 SANITARY SEWERS DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
 ARMENIA AND HORATIO STORMWATER DETENTION POND
 MANHOLE DETAILS (NOT TO SCALE)

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TYPE A HOUSE LATERAL DETAIL
NOT TO SCALE

NOTES

1. THE LOCATIONS OF HOUSE LATERALS BY SYMBOLS ON PLANS ARE APPROXIMATE ONLY AND THE ACTUAL LOCATION AND SLOPES WILL BE DETERMINED IN THE FIELD BY THE CONTRACTOR WITH THE APPROVAL OF THE ENGINEER.
2. THE MINIMUM DIAMETER OF ALL HOUSE LATERALS SHALL BE 6".
3. HOUSE LATERALS WHICH PASS UNDER DRAINAGE DITCHES WITH LESS THAN 18" OF COVER OR WHICH HAVE LESS THAN 30" OF COVER UNDER PAVEMENT, SHALL BE CLASS 54 POLY-LINED DIP PER SPECIFICATIONS.
4. THE DEPARTMENT'S STANDARD REGARDING VERTICAL PERPENDICULAR CONFLICTS REQUIRES THAT THERE BE A MINIMUM OF 18" CLEARANCE BETWEEN HOUSE LATERALS AND ALL CROSSING UTILITIES. IF, HOWEVER, CONDITIONS DICTATE THAT IT IS IMPOSSIBLE TO MEET THIS STANDARD, THE FOLLOWING NOTES ARE INTENDED TO ADDRESS THE MOST COMMON CONFLICT CONDITIONS.
5. THE MINIMUM CLEARANCE BETWEEN HOUSE LATERALS AND WATER LINES SHALL BE 6" UNDER ALL CIRCUMSTANCES. IF THE HOUSE LATERAL IS BELOW A WATER LINE AND HAS BETWEEN 6" AND 18" OF CLEARANCE OR IF THE LATERAL IS ABOVE THE WATER LINE REGARDLESS OF CLEARANCE, THEN A NOMINAL 20' LENGTH OF GREEN AWWA CLASS 150 C900 PVC PIPE SHALL BE CENTERED OVER/UNDER THE WATER LINE.
6. IF THE HOUSE LATERAL MUST PASS OVER ANY UTILITY OTHER THAN A WATER LINE WITH LESS THAN 18" CLEARANCE, THE LATERAL SHALL REMAIN SDR 35 PVC PIPE.
7. IF THE HOUSE LATERAL MUST PASS UNDER ANY UTILITY OTHER THAN A WATER LINE WITH LESS THAN 18" CLEARANCE, THE LATERAL SHALL REMAIN SDR 35 PVC PIPE UNLESS THE UTILITY POSES A STRUCTURAL LOAD TOO GREAT FOR THE PVC LATERAL. IF THE UTILITY POSES SUCH A STRUCTURAL LOAD AS DETERMINED BY THE ENGINEER, EACH CONFLICT WILL BE REVIEWED ON A CASE BY CASE BASIS.
8. TRANSITIONS FROM SDR 35 PVC TO EITHER C900 OR DUCTILE IRON PIPES SHALL BE MADE WITH PVC RIGID ADAPTORS. TRANSITIONS FROM SDR 35 PVC TO EITHER EXISTING CLAY OR CONCRETE PIPES SHALL BE MADE WITH FERNCO FLEXIBLE ADAPTORS OR EQUAL.



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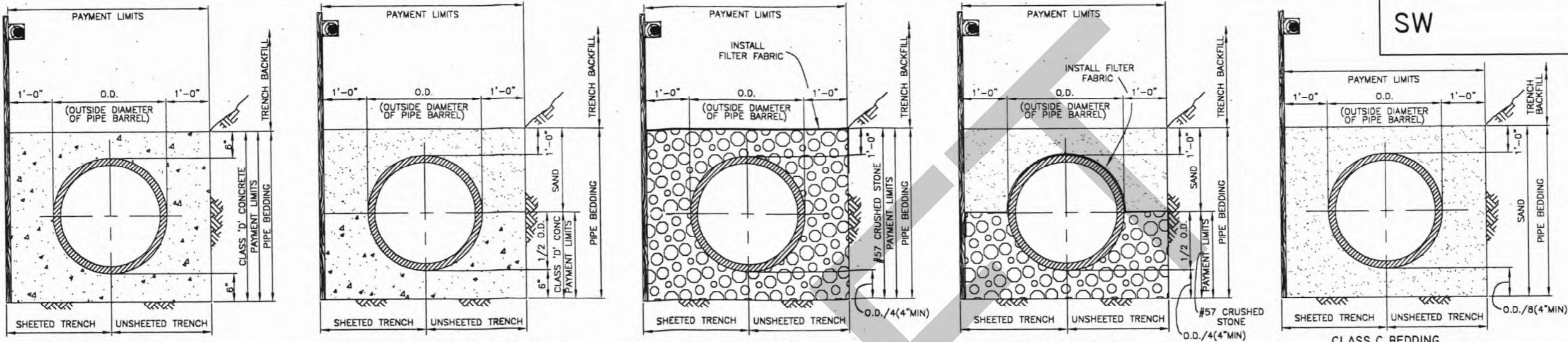
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CITY of TAMPA
DEPARTMENT OF SANITARY SEWERS
SANITARY SEWERS DIVISION

PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
HOUSE CONNECTION DETAILS (NOT TO SCALE)

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CONCRETE ENCASEMENT

CLASS A BEDDING (CONCRETE CRADLE)

CLASS B-1 BEDDING

CLASS B BEDDING

CLASS C BEDDING

NOTES:

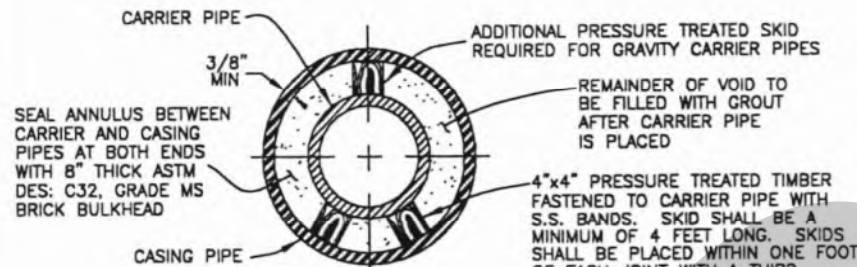
1. ALL TYPES OF PIPE BEDDING SHALL EXTEND TO UNDISTURBED EARTH AT SIDES AND BOTTOM OF THE TRENCH.
2. SAND AND CRUSHED STONE PIPE BEDDING SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH SPECIFICATIONS.

PIPE BEDDING DETAILS

QUANTITIES FOR PAYMENT FOR ADDITIONAL PIPE BEDDING MATERIALS ORDERED IN WRITING BY THE ENGINEER

NOMINAL INSIDE PIPE DIAMETER (INCHES)	6	8	10	12	14	15	16	18	20	21	24	27	30	36	42	48	54	60	66	72
CUBIC YARDS OF CONCRETE PER LINEAR FOOT OF PIPE IN CONCRETE ENCASEMENT	0.141	0.167	0.181	0.218	0.229	0.256	0.252	0.299	0.300	0.340	0.383	0.427	0.472	0.588	0.890	0.797	0.909	1.027	1.150	1.279
CUBIC YARDS OF CONCRETE PER LINEAR FOOT OF PIPE IN CLASS A BEDDING (CONCRETE CRADLE)	0.071	0.084	0.098	0.108	0.115	0.128	0.128	0.150	0.150	0.170	0.192	0.214	0.236	0.294	0.345	0.399	0.455	0.514	0.575	0.640
CUBIC YARD OF CRUSHED STONE PER LINEAR FOOT OF PIPE IN CLASS B-1 BEDDING	0.172	0.201	0.228	0.225	0.268	0.304	0.298	0.382	0.383	0.419	0.478	0.542	0.608	0.781	0.936	1.103	1.281	1.471	1.673	1.887
CUBIC YARDS OF CRUSHED STONE PER LINEAR FOOT OF PIPE IN CLASS B BEDDING	0.055	0.068	0.078	0.088	0.094	0.111	0.108	0.143	0.143	0.173	0.207	0.243	0.280	0.381	0.475	0.578	0.690	0.810	0.939	1.078

NOTE: STAINLESS STEEL CASING SPACERS AS MANUFACTURED BY CASCADE OR EQUAL MAY BE USED RATHER THAN A TIMBER SKID SYSTEM



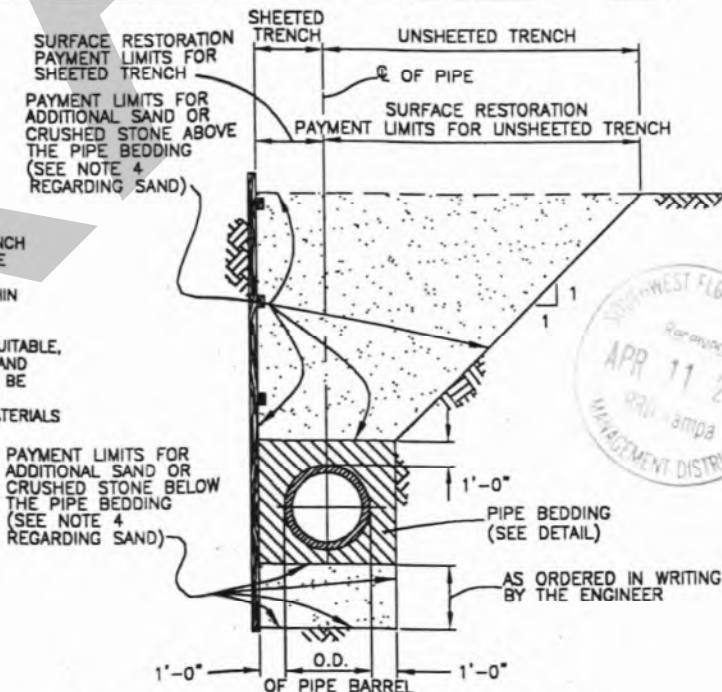
NOTE: ALL CASING PIPES SHALL BE WELDED STEEL PIPE CONFORMING TO ASTM DES A139 GRADE B OR ASTM DES A53 GRADE B, HAVING A MINIMUM INSIDE DIAMETER AS INDICATED ON PLANS. THE MINIMUM WALL THICKNESS SHALL BE 3/8\"/>

CORRESPONDING CARRIER AND CASING PIPE SIZES	
NOMINAL INSIDE DIAMETER OF CARRIER PIPE (INCHES)	4 6 8 10 12 14 15 18 18 20 21 24 27 30 36 42 48 54 60 66 72
MINIMUM INSIDE DIAMETER OF CASING PIPE (INCHES)	12 18 20 24 30 30 30 30 36 36 36 48 48 60 60 66 78 84 90 96 102

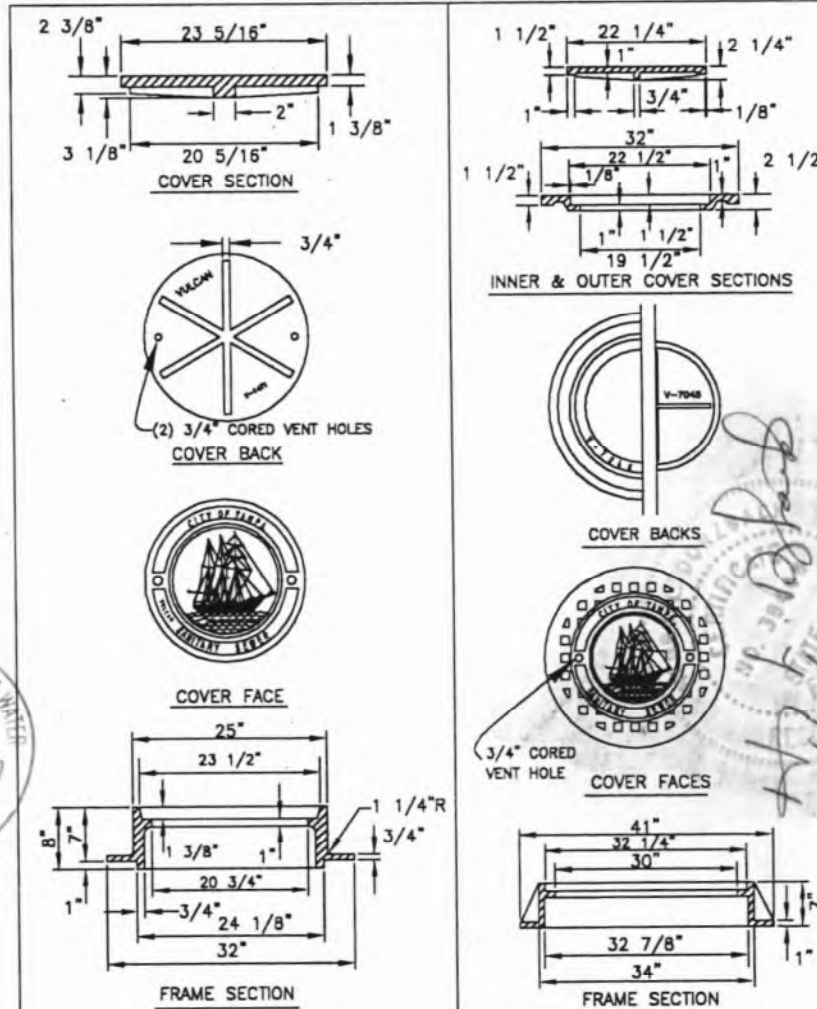
DETAIL OF JACKED CROSSINGS

NOTES:

1. PAYMENT FOR ADDITIONAL CRUSHED STONE OR CLASS D CONCRETE PIPE BEDDING MATERIALS WILL BE MADE ONLY FOR PIPE BEDDING NOT SHOWN IN THE PLANS AND ORDERED IN WRITING BY THE ENGINEER.
2. PAYMENT FOR SURFACE RESTORATION WILL BE MADE FOR THE ACTUAL QUANTITIES, AS DETERMINED BY THE ENGINEER, OF SURFACE RESTORED WITHIN THE PAYMENT LIMITS SHOWN.
3. PAYMENT FOR ADDITIONAL SAND OR CRUSHED STONE FOR TRENCH STABILIZATION, ORDERED IN WRITING BY THE ENGINEER, WILL BE MADE FOR THE ACTUAL COMPACTED VOLUME, AS DETERMINED BY THE ENGINEER, OF SAND OR CRUSHED STONE PLACED WITHIN THE PAYMENT LIMITS SHOWN.
4. CONTRACTOR SHALL USE ALL SURPLUS SAND, APPROVED AS SUITABLE, FROM EXCAVATIONS IN THIS CONTRACT PRIOR TO SUPPLYING SAND FROM OTHER SOURCES. PAYMENT FOR ADDITIONAL SAND WILL BE MADE ONLY FOR SAND SUPPLIED FROM SOURCES OTHER THAN EXCAVATIONS IN THIS CONTRACT. SEE SPECIFICATIONS FOR MATERIALS REQUIREMENTS.



PAYMENT LIMITS FOR SURFACE RESTORATION AND ADDITIONAL SAND OR CRUSHED STONE FOR TRENCH STABILIZATION



FOR MH'S OF SEWERS 24\"/>

HEAVY DUTY CAST IRON MANHOLE FRAME & COVER DETAILS

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PALMA CEIA DRAINAGE BASIN IMPROVEMENTS
ARMENIA AND HORATIO STORMWATER DETENTION POND
MISCELLANEOUS DETAILS


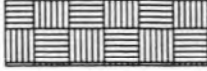
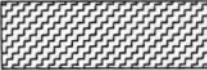

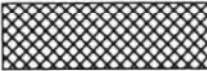

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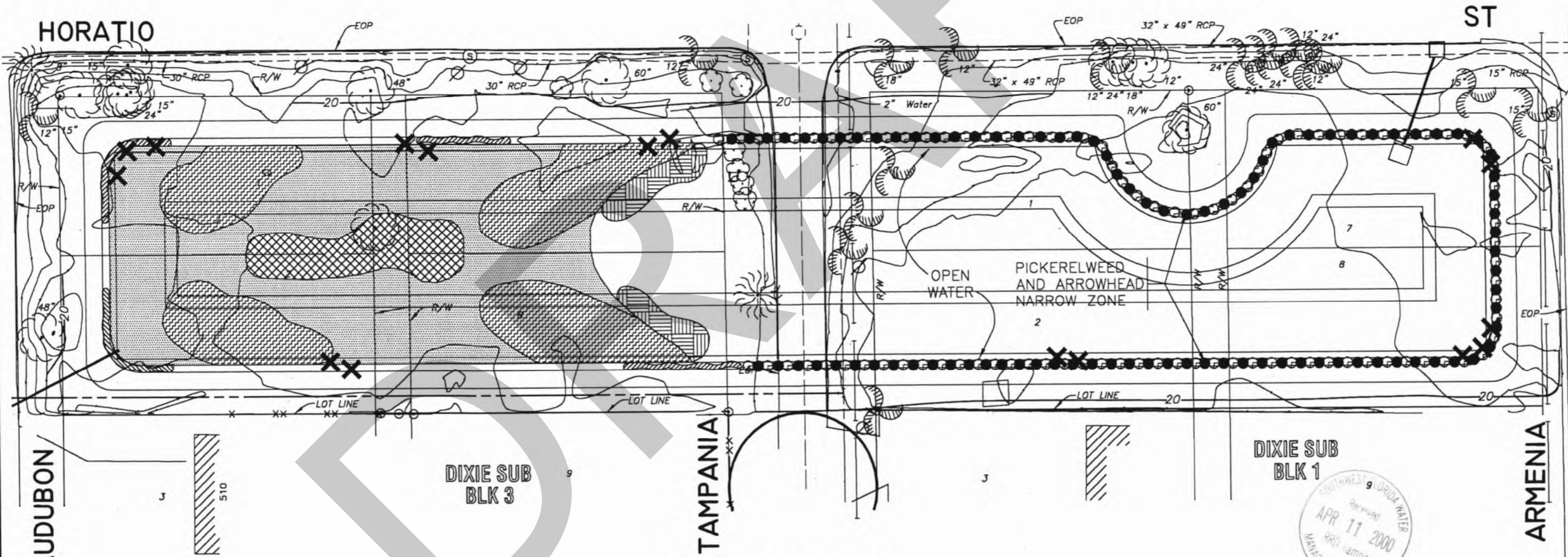
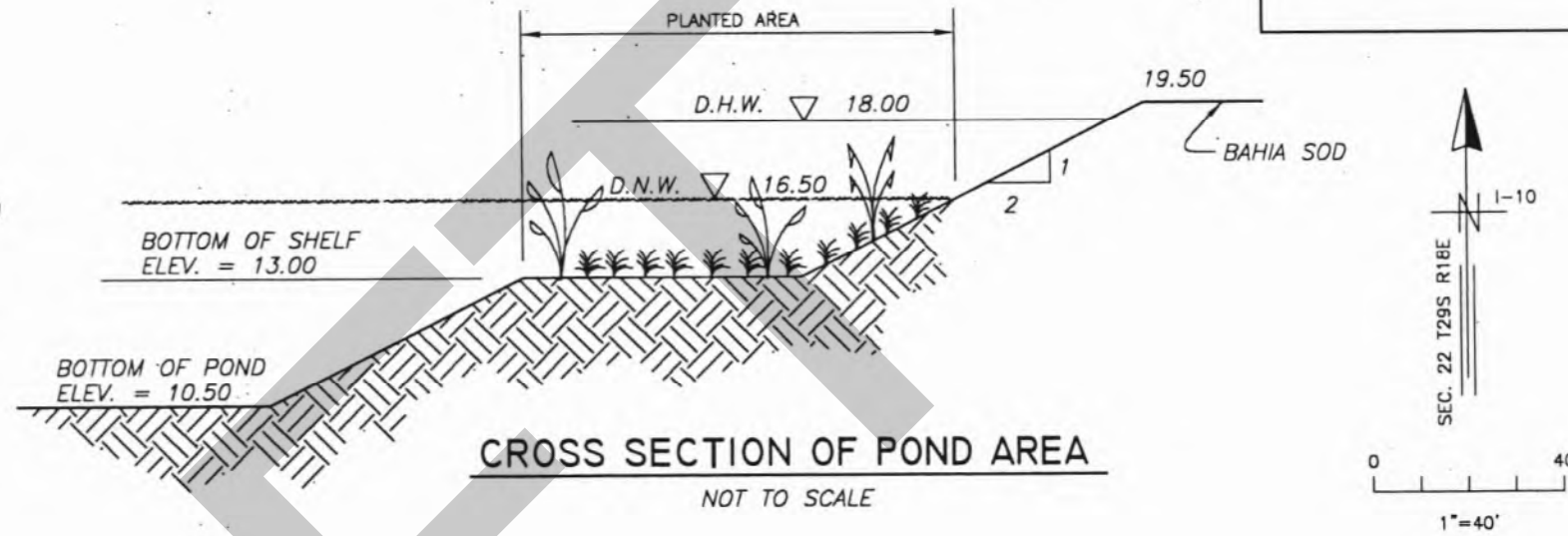
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LEGEND

- | | | | |
|---|---|--|--|
|  | 650 PICKERELWEED (PONTEDERIA SPP.)
4" POT OR BARE ROOT EQUIVALENT;
3'-4' O.C. TYP. |  | 40 WHITE WATER LILY (NYMPHAEA ODORATA)
ONE GALLON POT; 5' O.C.± |
|  | 500 ARROWHEAD (SAGITTARIA LANCIFOLIA)
4" POT OR BARE ROOT EQUIVALENT;
3'-4' O.C. TYP. |  | 400 CORDGRASS (SPARTINA BAKERI)
ONE GALLON POT; DOUBLE STAGGERED
ROWS, EACH 3' O.C.± (UNDULATE, JUST
ABOVE WATER'S EDGE |
|  | 220 BULRUSH (SCIRPUS VALIDUS)
4" POT OR BARE ROOT EQUIVALENT;
3'-4' O.C. TYP. |  | 20± CYPRESS (TAXODIUM DISTICHUM)
15 GALLON± POT |

NOTE: FOR BAND AROUND OPEN WATER AREA: USE 220 PICKERELWEED (60%)
AND 150 ARROWHEAD (40%), STAGGERED 2' O.C.



PROPOSED PLANTING PLAN

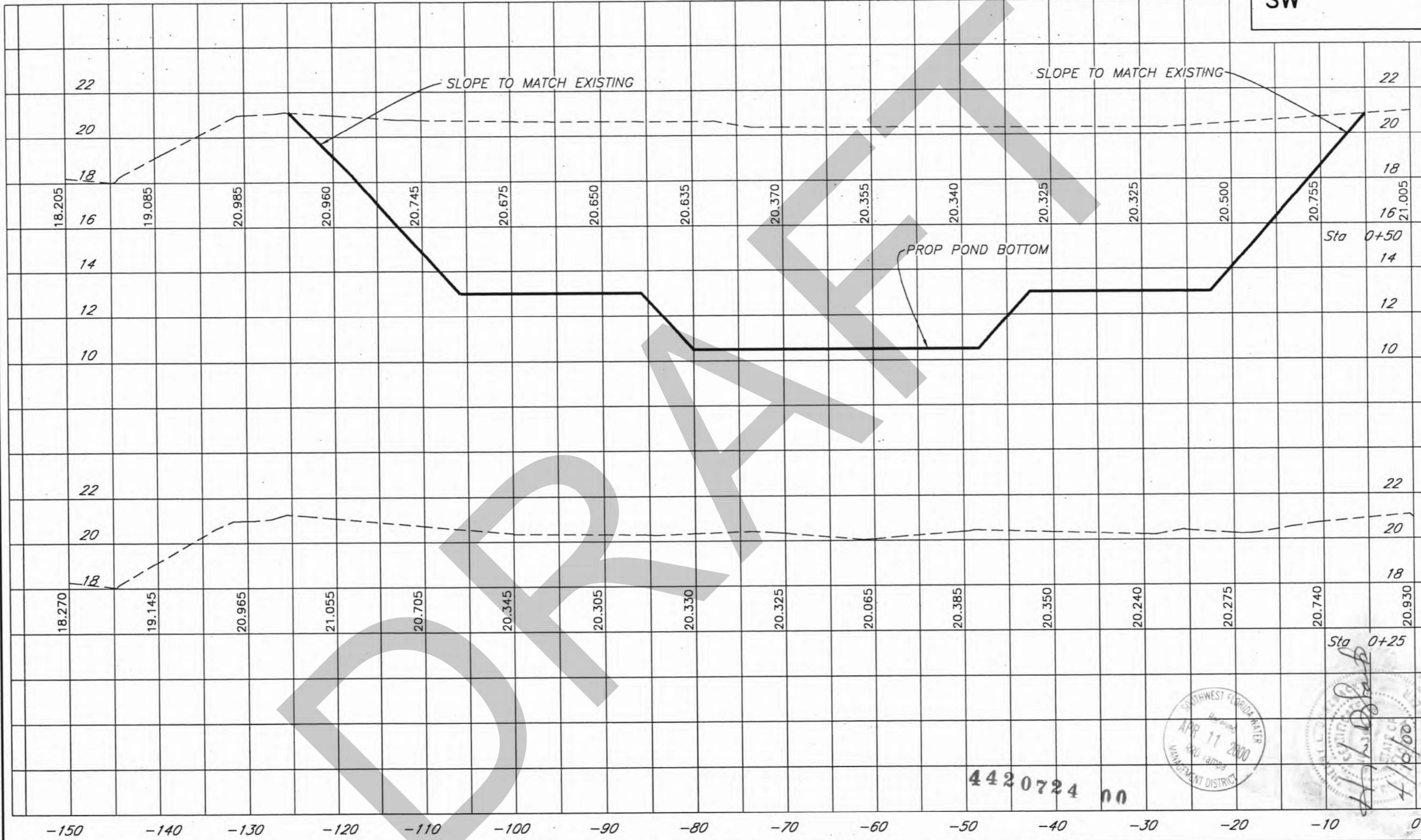
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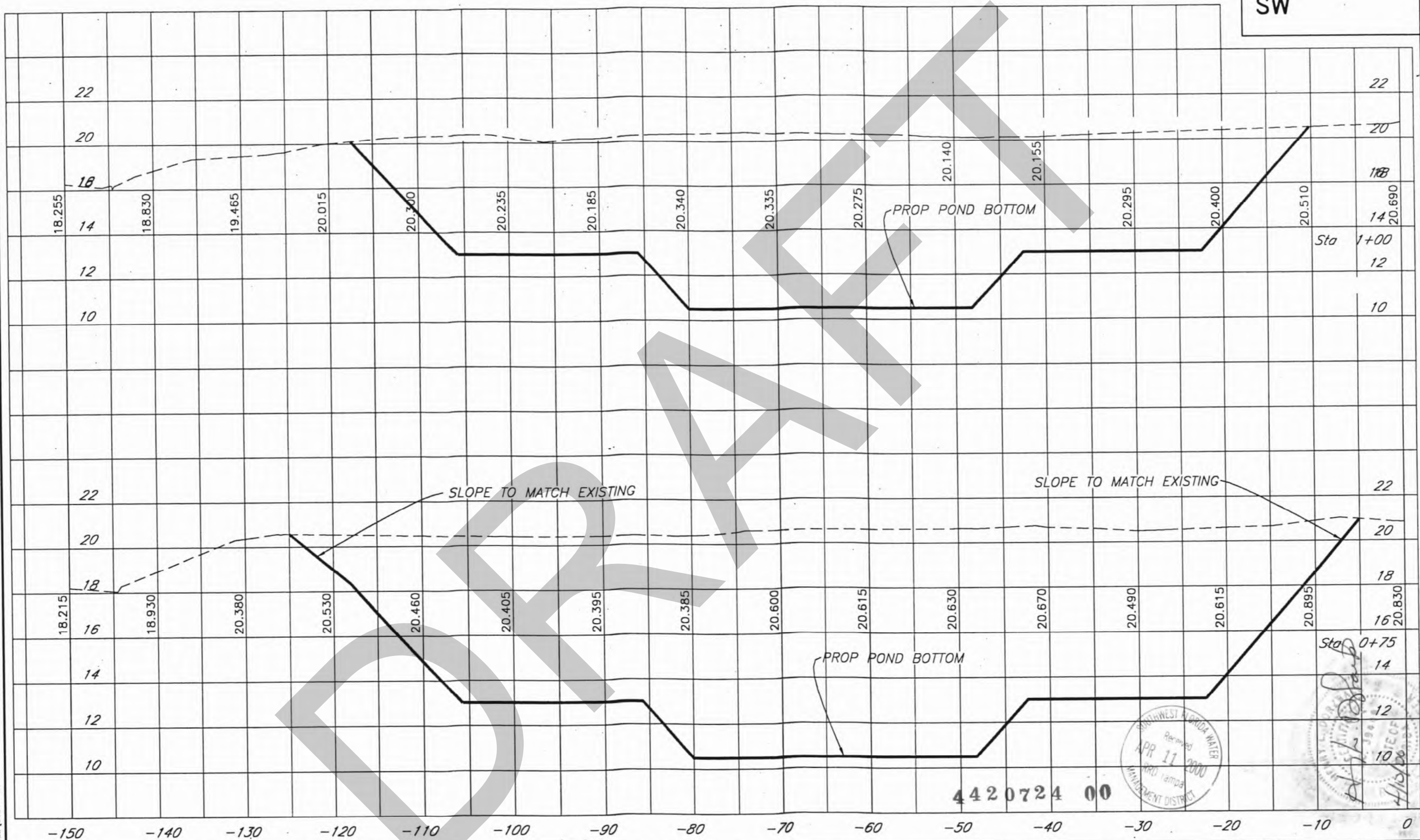
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 STORMWATER DIVISION

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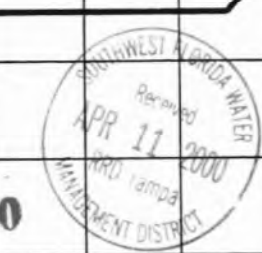
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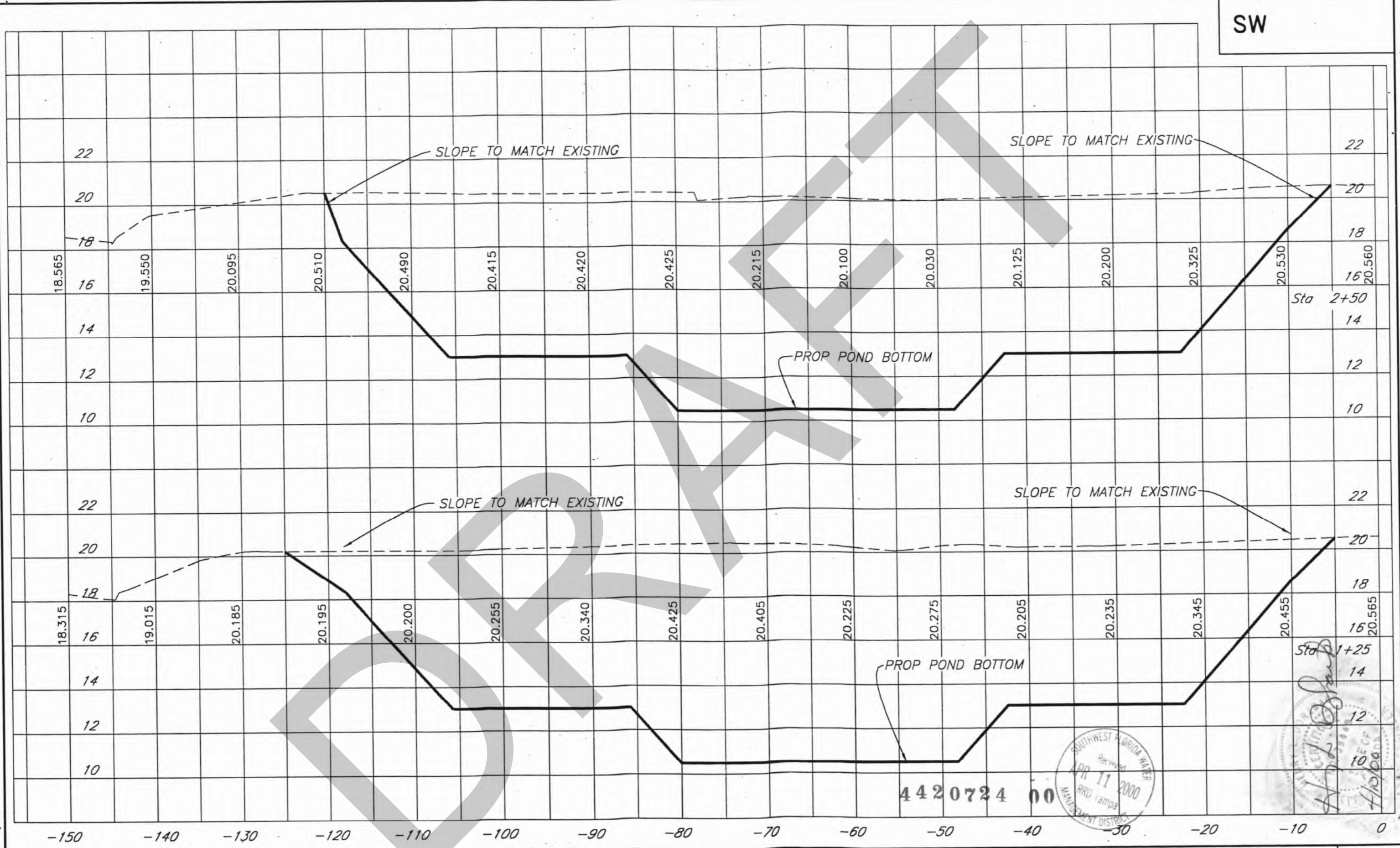
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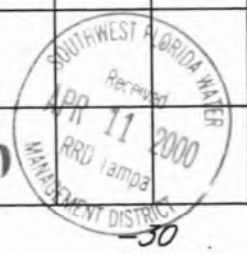
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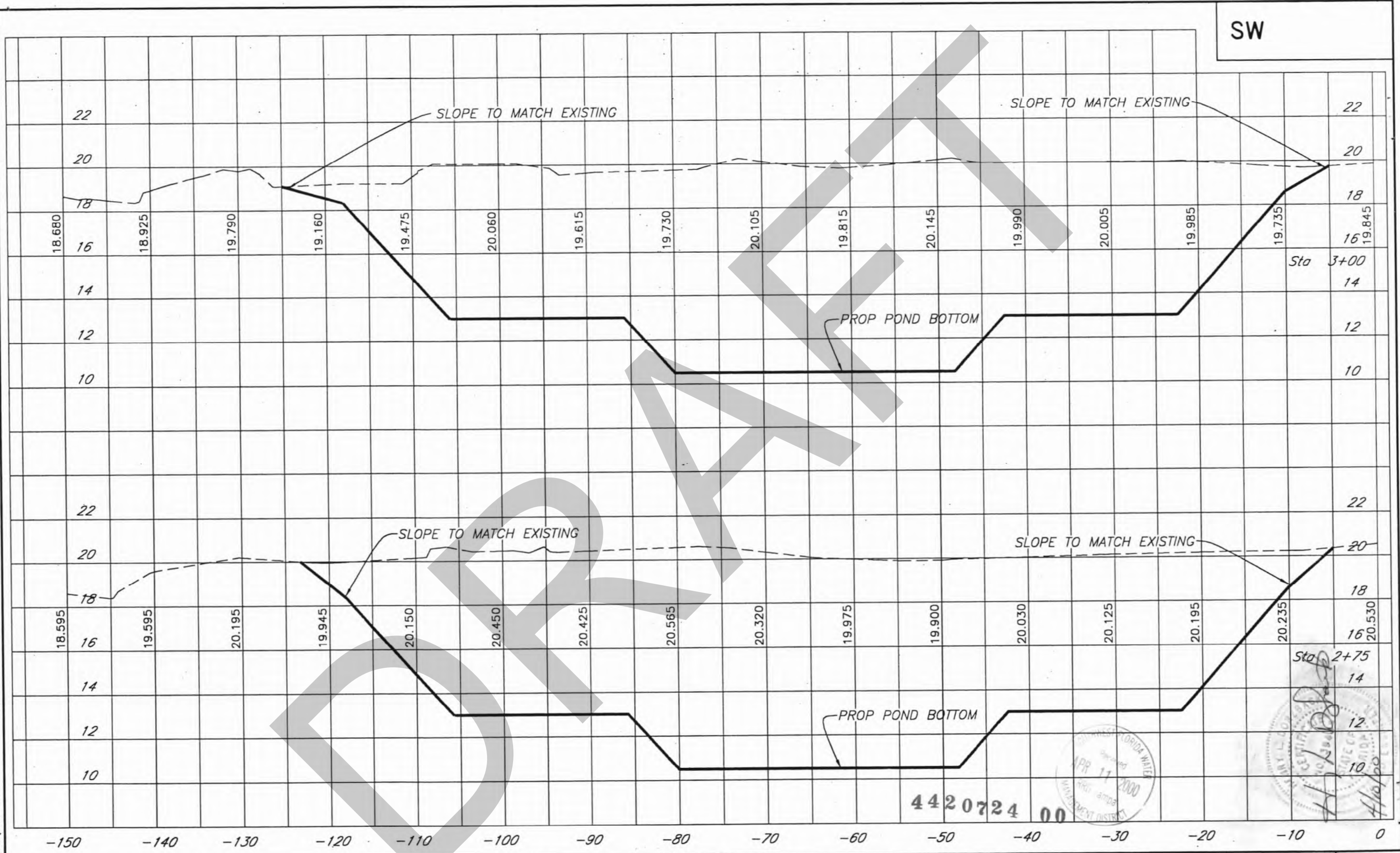
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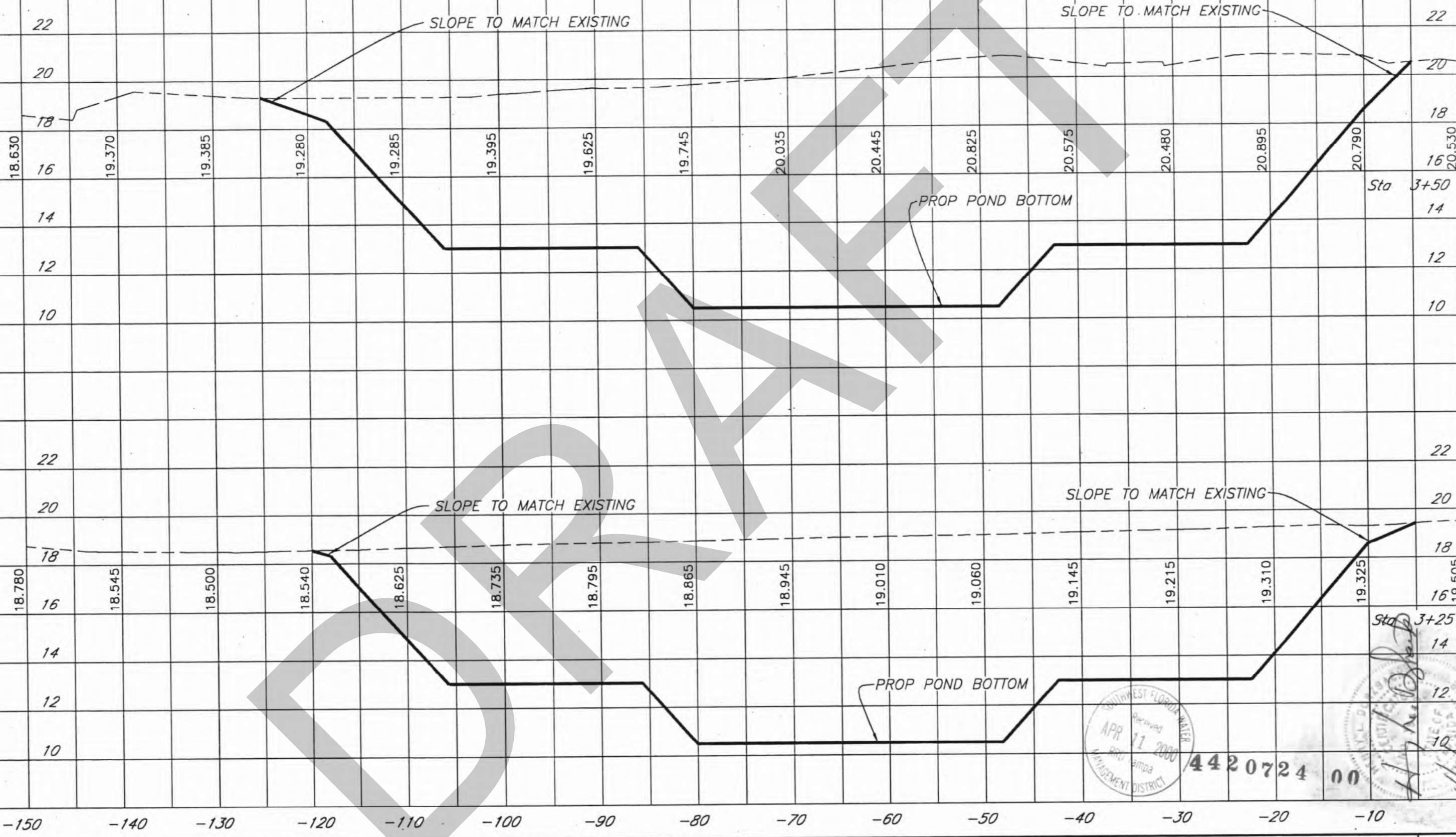
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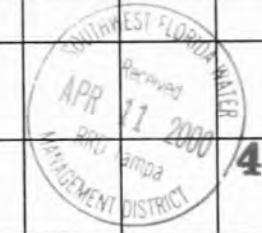
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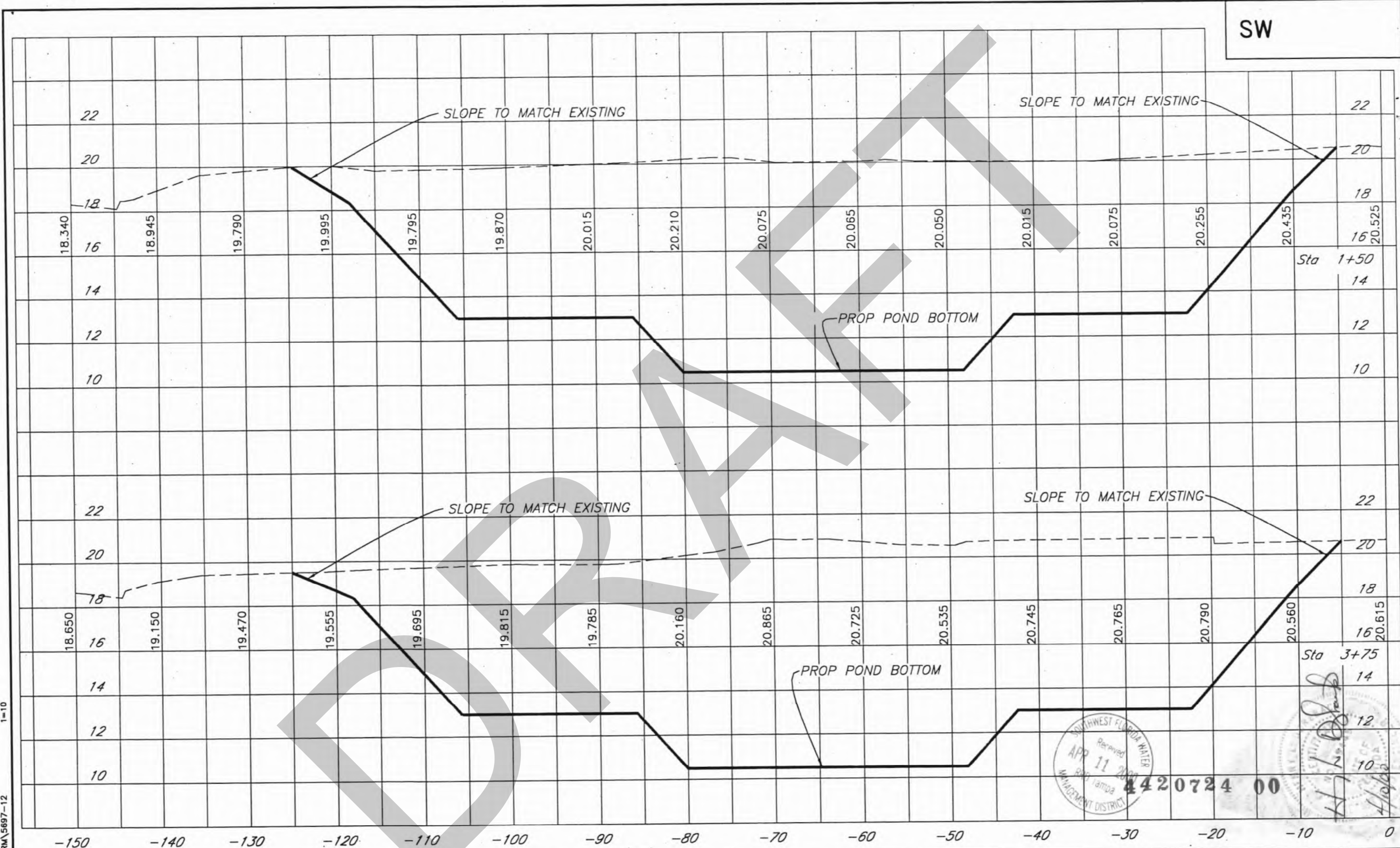


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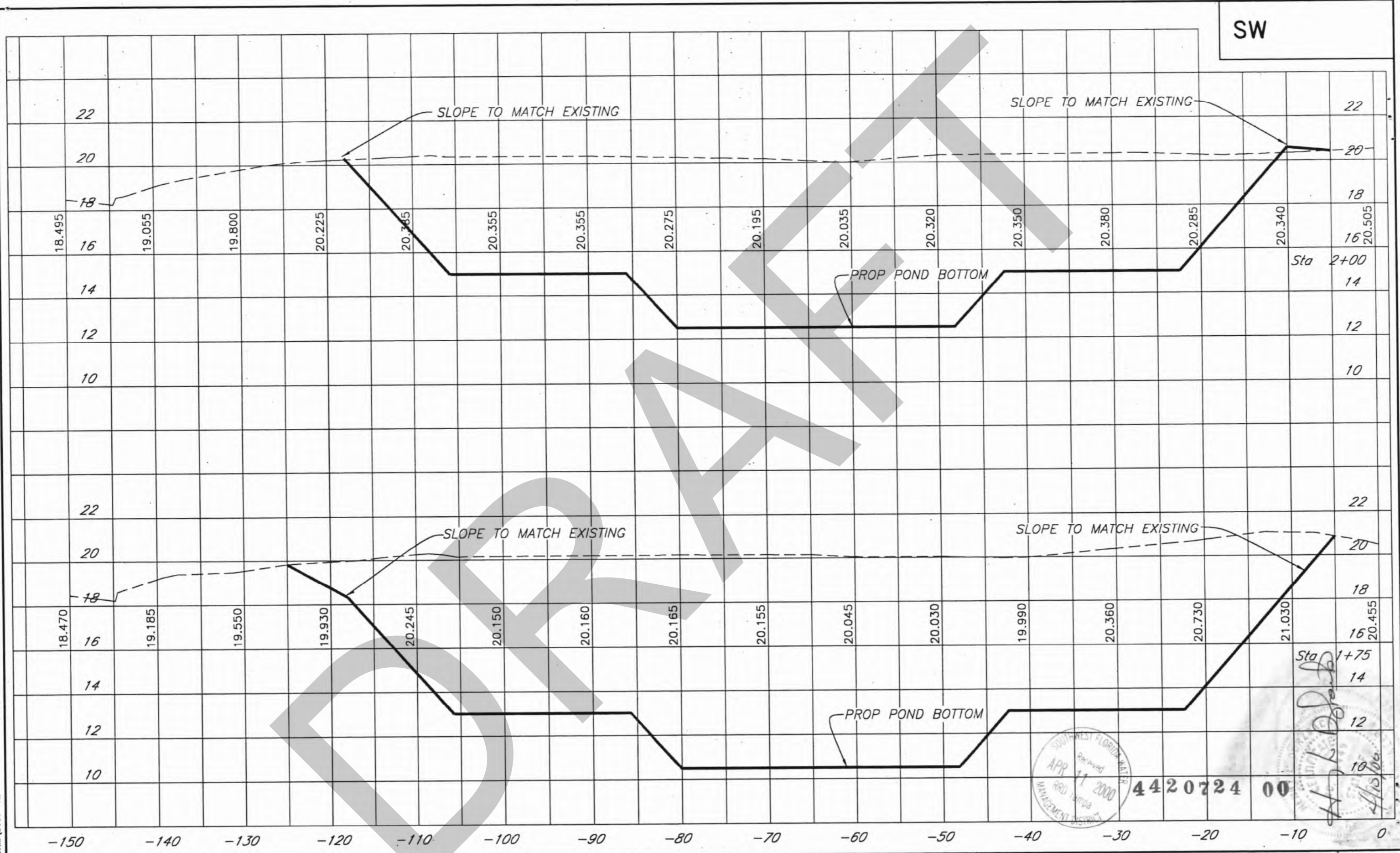
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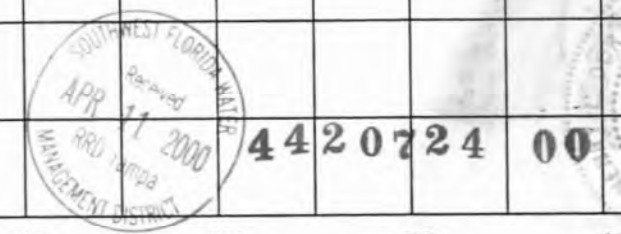
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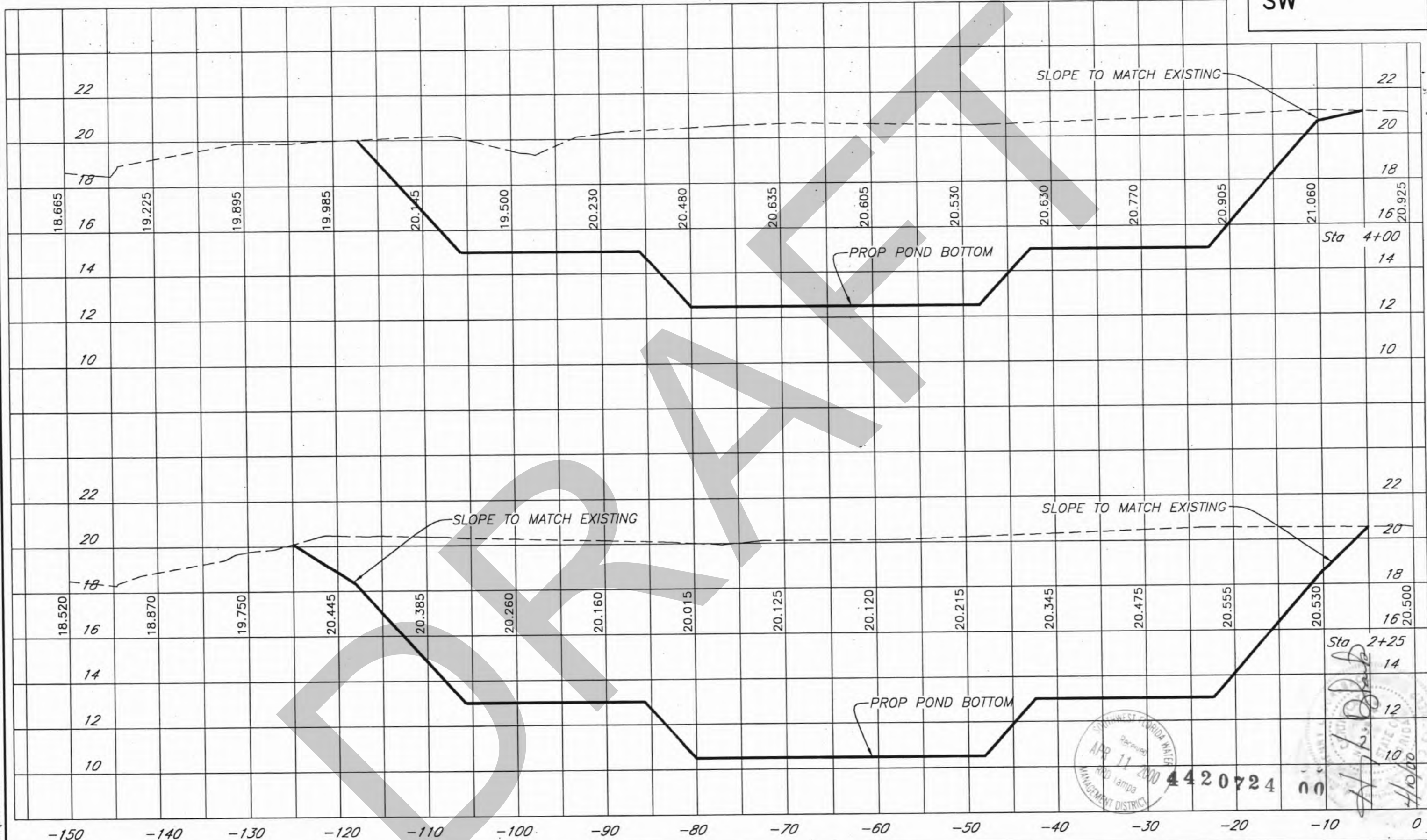
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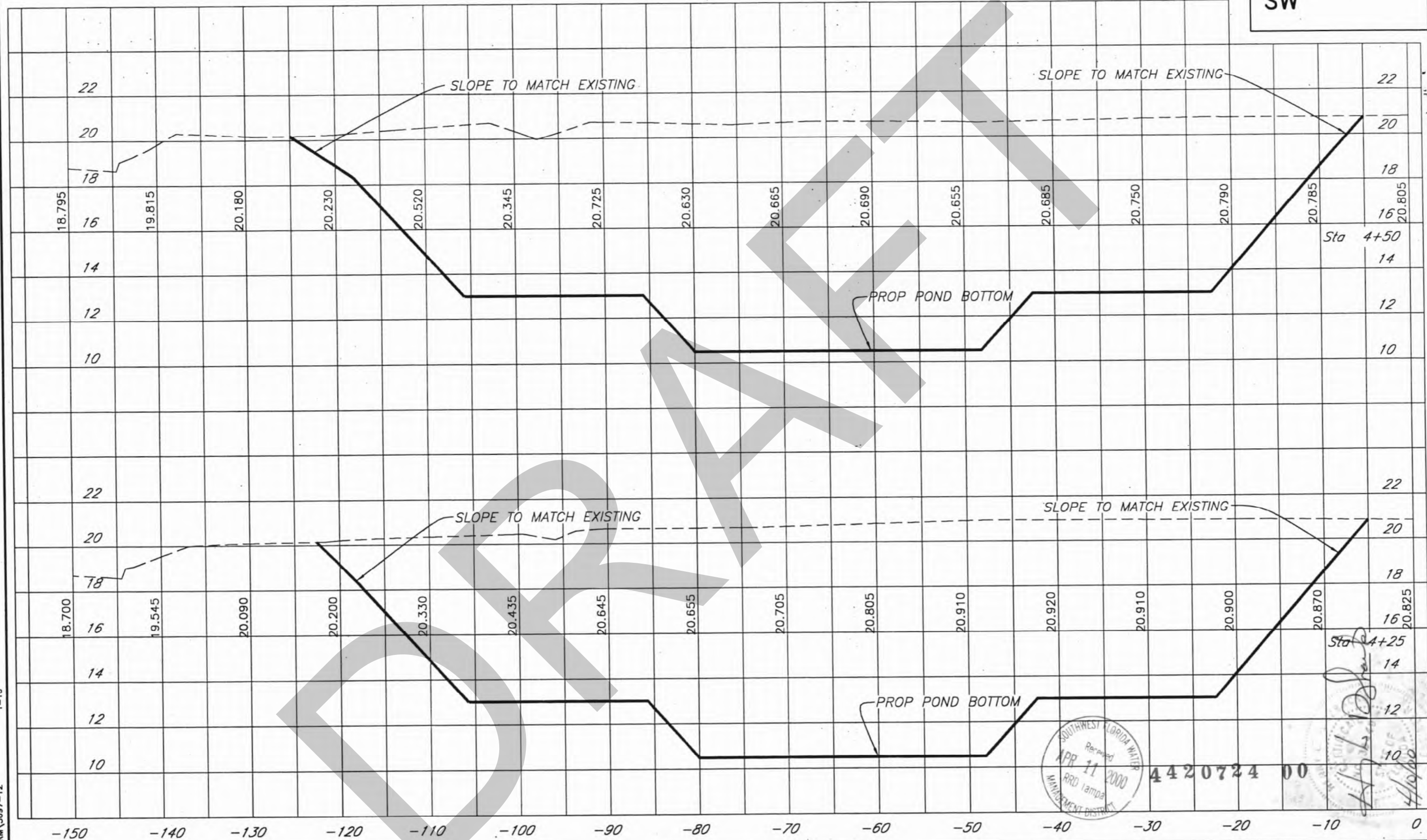
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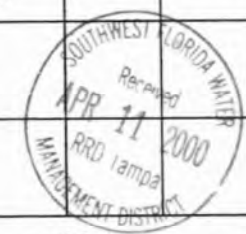
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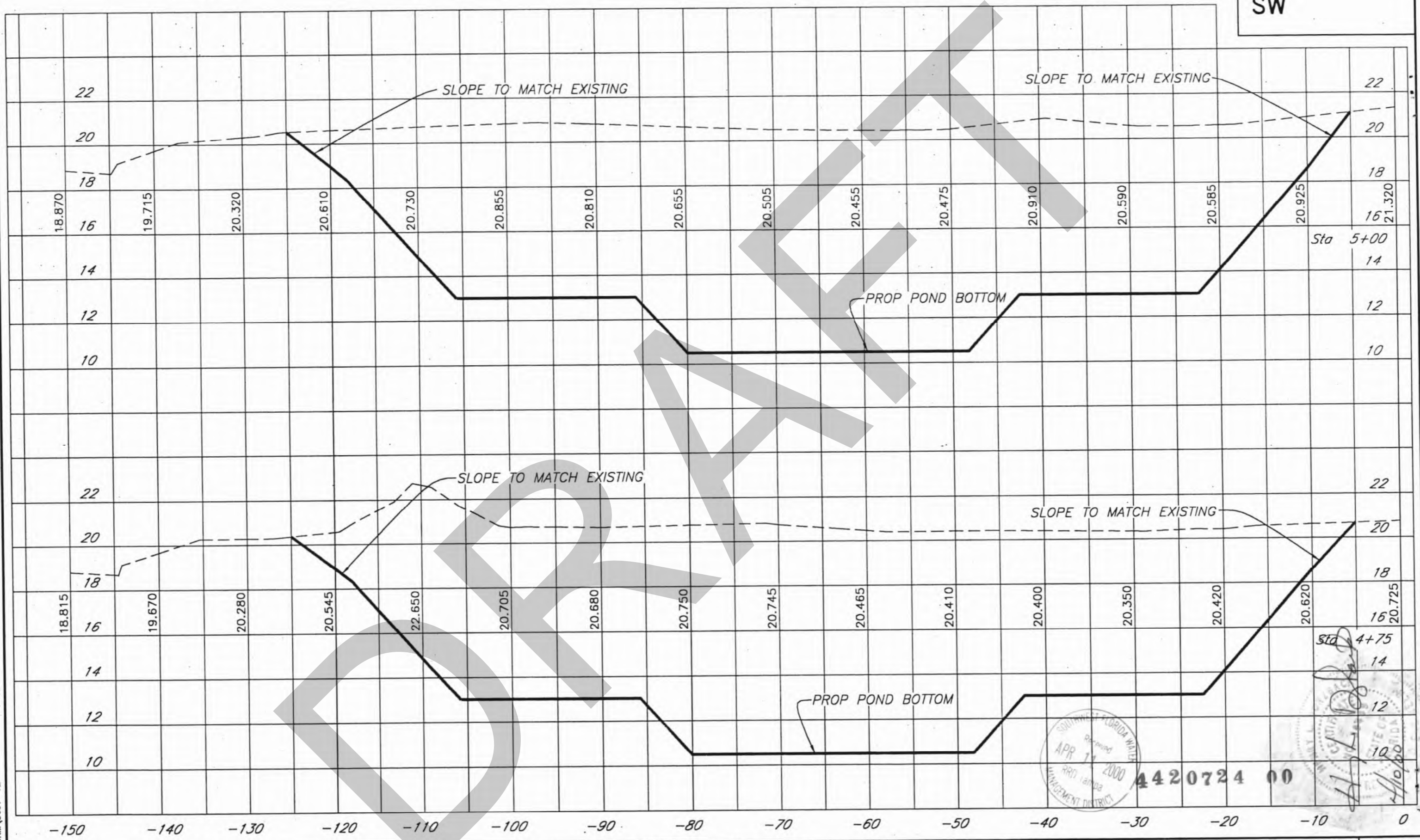


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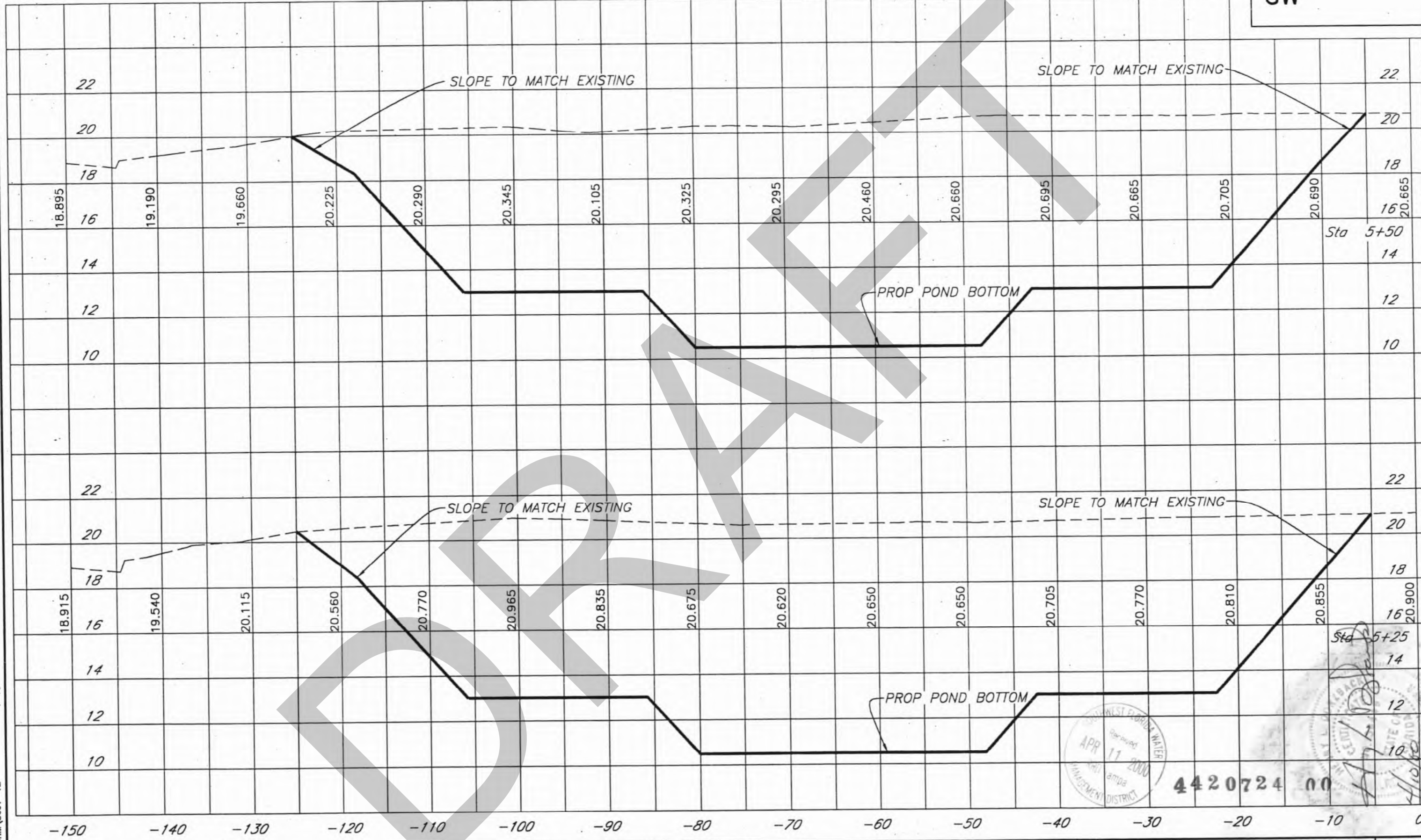
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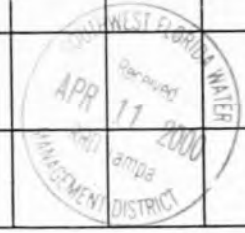
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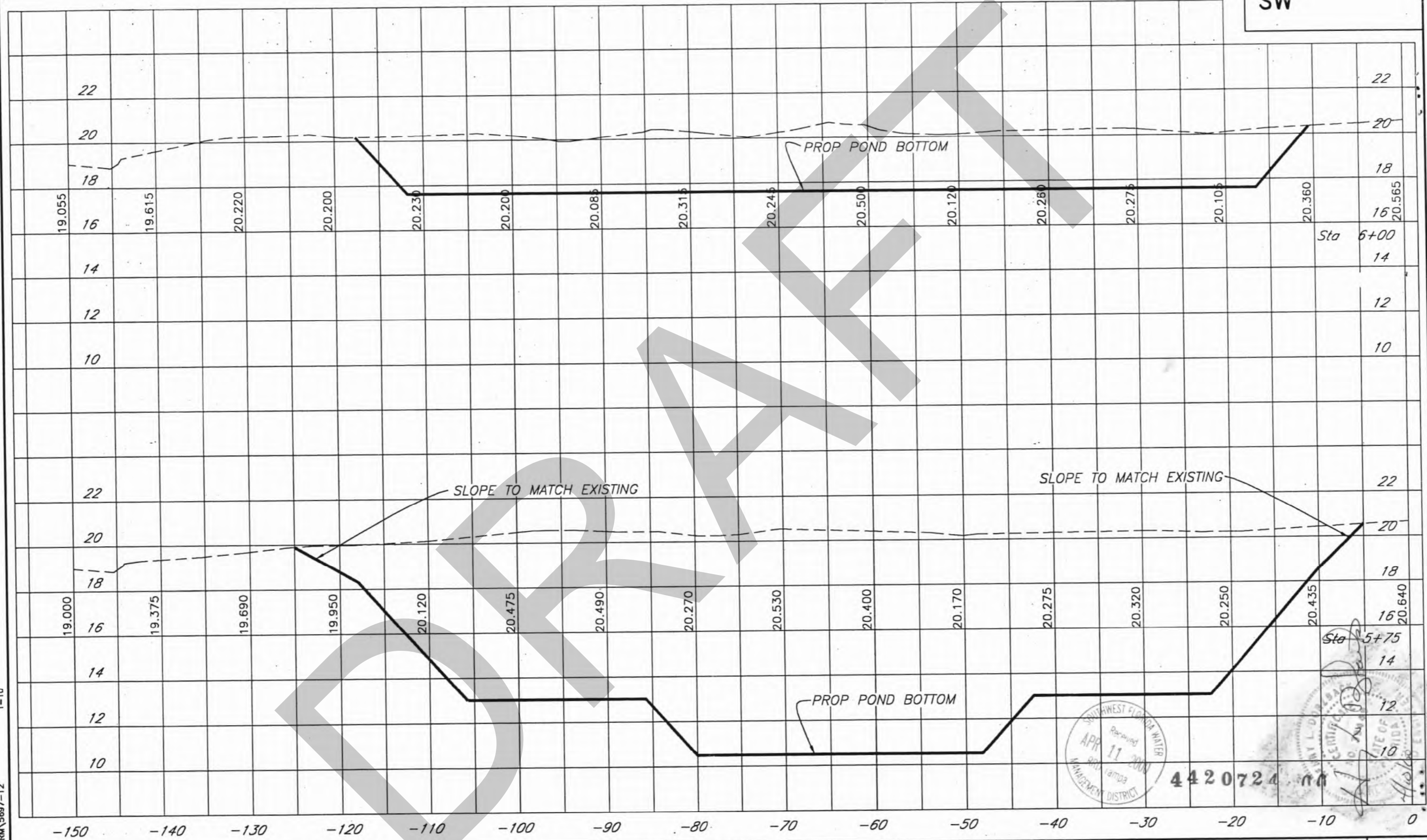
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P.5 Cypress Street Outfall ERP Report

DRAFT





TETRA TECH

Cypress Street Outfall Regional Stormwater Improvements
SECTIONS 22 & 23, TOWNSHIP 29S, RANGE 18E
TAMPA, HILLSBOROUGH COUNTY, FLORIDA

ENVIRONMENTAL RESOURCE PERMIT (ERP) DRAINAGE DESIGN REPORT

Submitted to:

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Prepared for:



306 East Jackson Street
Tampa, Florida 33602

Prepared by:

TETRA TECH
5201 West Kennedy Boulevard, Suite 620
Tampa, Florida 33609

March 2021


Tt #: 200-55595-18001

CERTIFICATION BY A REGISTERED PROFESSIONAL ENGINEER

PROJECT NAME: Cypress Street Outfall Regional Stormwater Improvements

____ I hereby certify that the material and data contained in this document was prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer in the State of Florida is affixed below.

NAME: Michael D. Thatcher, P.E.
COMPANY NAME: Tetra Tech
ADDRESS: 201 E. Pine Street, Suite 1000
Orlando, FL 32801
TELEPHONE NO.: (407) 839-3955

Signature of Professional: 
Florida Registration No.: 83331
Engineering Business No.: 2429

**CYPRESS STREET OUTFALL REGIONAL STORMWATER IMPROVEMENTS
ENVIRONMENTAL RESOURCE PERMIT (ERP)
DRAFT DRAINAGE DESIGN REPORT – REVISION LOG**

This revised drainage design report is intended to make changes to the stormwater connection at the intersection of W. Gray Street at N. Westland Avenue. The revision log below depicts sections in the report which have been modified, since the previous ERP submittal in April, 2019.

Report Section	Description of Changes
Section 1.0. Introduction	Section modified to depict revised project limits.
Figure 1. Aerial Location Map	Figure modified to depict revised project limits.
Figure 2. Modified Existing Conditions Basin	Figure modified to depict revised project limits.
Figure 3. Modified Proposed Conditions Basin	Figure modified to depict revised project limits.
Table 2. Modified Proposed Model Hydrological Parameters	Table modified to reflect revised basin names, due to the changes outlined in Section 1.0.
Table 3. Modified Proposed Combined Model Hydrological Parameters	Table modified to reflect revised basin names, due to the changes outlined in Section 1.0.
Figure 5. Existing Basin Node/Link Map	Figure modified to depict revised project limits.
Figure 6. Proposed Basin Node/Link Map	Figure modified to depict revised project limits.
Table 4. Proposed Box Culvert Locations and Dimensions	Table modified to reflect revised project limits and updated maximum flowrates.
Section 2.7. Model Results	Section modified to reflect revised project limits.
Table 5. Peak Stages at Nodes	Table modified to reflect revised project limits and updated peak stages.



Figures 7A, 7B, and 7C. Existing Flooding Conditions	Figures modified to reflect revised project limits.
Figures 8A, 8B, and 8C. Proposed Flooding Conditions	Figures modified to reflect revised project limits and updated flooding conditions.
Section 3.2.1. Nutrient Separating Baffle Boxes	Section modified to reflect revised baffle box locations due to revised project limits.
Table 7. Estimated Nutrient Reductions	Table modified to reflect revised baffle box locations due to revised project limits.
Figure 9. Proposed Water Quality Improvements Map	Figure modified to reflect revised project limits and revised baffle box locations.
Appendix B. HGL Profiles	Appendix modified to reflect revised project limits and updated modeling results.

DRAFT

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EXECUTIVE SUMMARY

The Cypress Street Outfall Regional Stormwater Improvements project consists of approximately 11.6 acres of project area. The project site is part of an approximately 220-acre watershed, located west of the Hillsborough River, within the West Tampa and Hyde Park neighborhoods, in the City of Tampa, Hillsborough County, Florida (Sections 22 and 23, Township 29 South, Range 18 East). The location of the project area and contributing watershed are shown in **Figure 1** and **Figure 2**, respectively.

The City of Tampa is implementing these stormwater infrastructure improvements to reduce flooding at both a regional and local level. The Cypress Street Outfall Regional Stormwater Improvements project is the second phase of a regional box culvert system, aimed at this flood reduction.

This project will be implemented by routing stormwater through a box culvert system along W. Gray Street, N. Rome Avenue, and W. Cass Street, where this project will connect to the first phase, which routes this stormwater north along North Boulevard, and east along Cypress Street, where it ultimately discharges into the Hillsborough River.

1.0 INTRODUCTION

The City of Tampa (City) has retained the Woodruff & Sons / Tetra Tech Design-Build team for the design and construction of the Cypress Street Outfall Regional Stormwater Improvements project. In addition to the stormwater improvements proposed in the executive summary, this project also makes improvements to potable water distribution and transmission mains, sanitary sewer, fiber optic, as well as roadway, signing, and signalization upgrades. The stormwater portion of the project connects to an existing box culvert at the intersection of W. Gray Street at N. Westland Avenue and it travels east to N. Rome Avenue; N. Rome Avenue from W. Kennedy Boulevard north to W. Cass Street; and W. Cass Street from N. Rome Avenue east to North Boulevard.

This multi-phase regional box culvert system received an Environmental Resource Permit (ERP) through the Southwest Florida Water Management District (SWFWMD) in February, 2015 (permit # 43041855.000). This permit consisted of an ERP for phase I (North Boulevard and the outfall at the Hillsborough River, W. Cass Street, and N. Rome Avenue), as well as a conceptual ERP for phase II (W. Gray Street) and phase III (N. Westland Avenue).

This report has been modified to remove modeling assumptions for the proposed phase III improvements along N. Westland Avenue and the proposed box culvert west of N. Westland Avenue, as the City of Tampa no longer intends to construct these infrastructure improvements. Connections to the existing box culverts are proposed at these locations. In the case that the City of Tampa wishes to construct these improvements in the future, the City will apply for a permit modification.

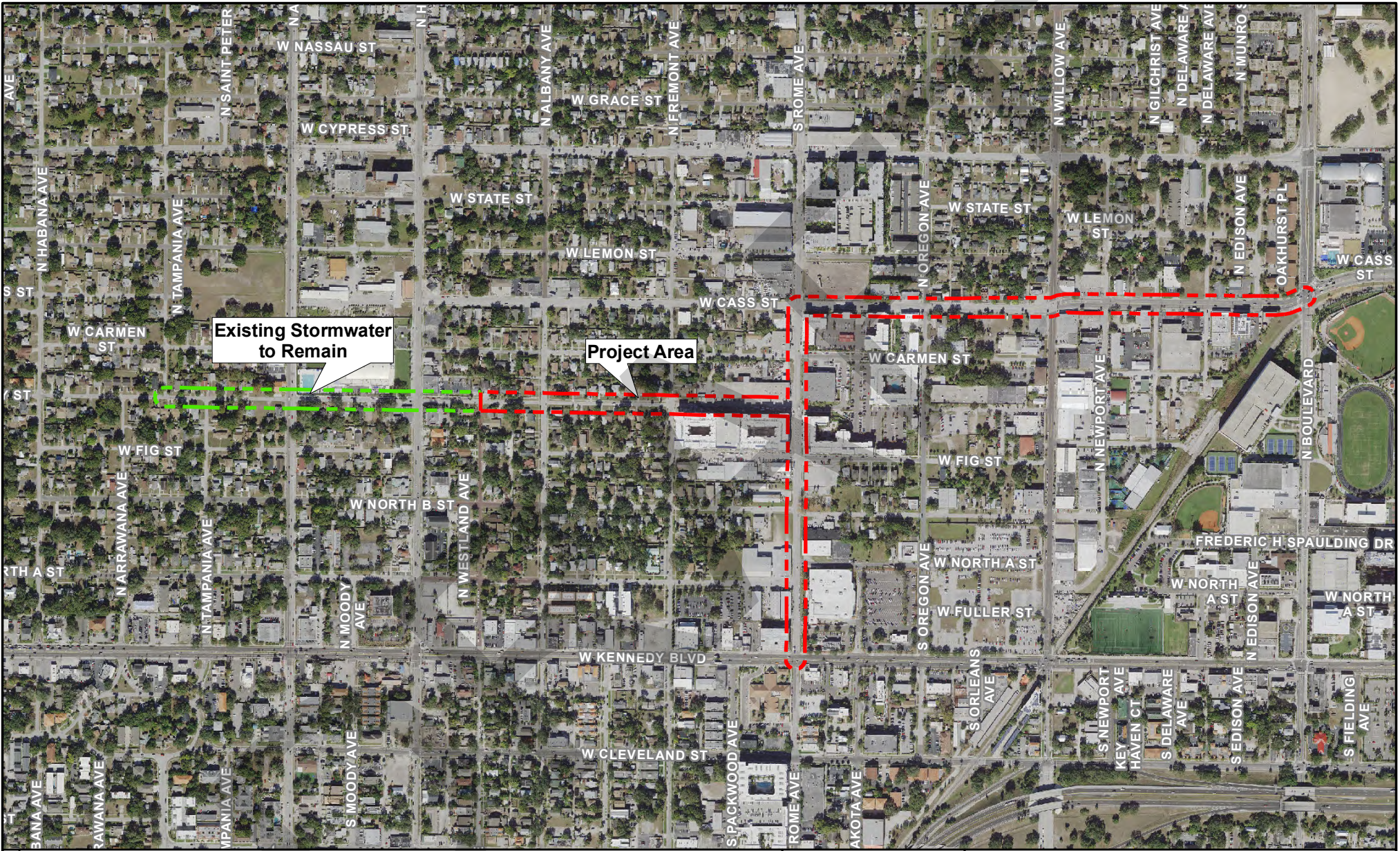
Tetra Tech has prepared the refined Hydrologic and Hydraulic (H&H) Modeling for this project to document the H&H modeling effort for the stormwater improvements.

Three design storms (mean annual, 5-year / 24-hour and 25-year / 24-hour) have been modeled and evaluated, based upon the unique needs of the project. The mean-annual storm and the 5-year / 24-hour storm were evaluated to address City standards, and to ensure that the flooding attributed to more frequent storms was addressed. The 25-year / 24-hour storm was also evaluated to meet the conditions of the Cooperative Funding Agreement set forth between both the City and SWFWMD. These design storms were modeled using the proposed stormwater improvements, including box culverts along W. Gray Street, N. Rome Avenue, and W. Cass Street, which convey water to the outfall on W. Cypress Street, and ultimately discharge into the Hillsborough River (**Figure 1**).

The project requires a detailed review and refinement of the previous stormwater conceptual model performed by Dyer, Riddle, Mills, and Precourt, Inc. (DRMP) for the City. The conceptual models (existing and proposed) were developed in the Expert Stormwater and Wastewater Model (XP-SWMM) 2D platform and used 'large sub-basin' concepts. The conceptual models' full watershed encompasses approximately two (2) square miles, which is bound on the north by I-275, on the south by W. Swann Avenue, on the west by S. Habana Avenue, and on the east by the Hillsborough River. The refinement of the conceptual model divides some of the drainage basins to distribute flows along the proposed primary conveyance system.

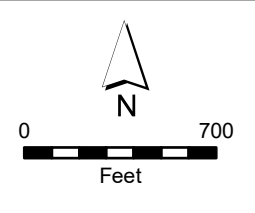
For the refinement of the H&H models in XP-SWMM, the following tasks were performed:

- a. Further delineation of the basins to establish drainage divides and flow through the conveyance system from the conceptual models (existing and proposed);
- b. Refinement of the land use and soil data, as well as other hydraulic inputs (existing and proposed models) within the areas draining to the corridor for the Cypress Street Outfall;
- c. Model simulation for the mean-annual, 5-year / 24-hour, and 25-year / 24-hour storms and analysis of the results; and
- d. Verification of the proposed primary and secondary conveyance systems.



LEGEND

-  Project Area
-  Existing Stormwater to Remain



CITY OF TAMPA, FLORIDA
 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS

LOCATION MAP


 TETRA TECH

FIGURE 1

2.0 H&H MODEL REFINEMENT

Tetra Tech received the conceptual model in version 10.5 of XP-SWMM 2000 on June 15, 2018. Tetra Tech utilized version 15.0 [12.0] of XP-SWMM 2014 for the refinement. ArcGIS 10.4 was utilized for the refinement of the hydrological and hydrodynamic data.

2.1 DELINEATION OF BASINS

Tetra Tech delineated the basins based upon the best available information, including aerial photography, LiDAR topography, field observations, and survey data. The LiDAR topography is a combination of the years 2004 and 2008 and covers the existing model basin area (Source: Florida Division of Emergency Management). The elevation of the project area ranges from 23 ft. NAVD (west) to 9 ft. NAVD (east). Arc-Hydro (used in ArcGIS) was initiated to delineate the basins from the LiDAR topography. The new basins in the project boundary were verified and adjusted using the contours, aerial photography, field observations, and survey data. The existing basins, inside the Cypress street corridor and abutting it, were created as larger basins with each collection of stormwater inlets receiving runoff from the associated basin.

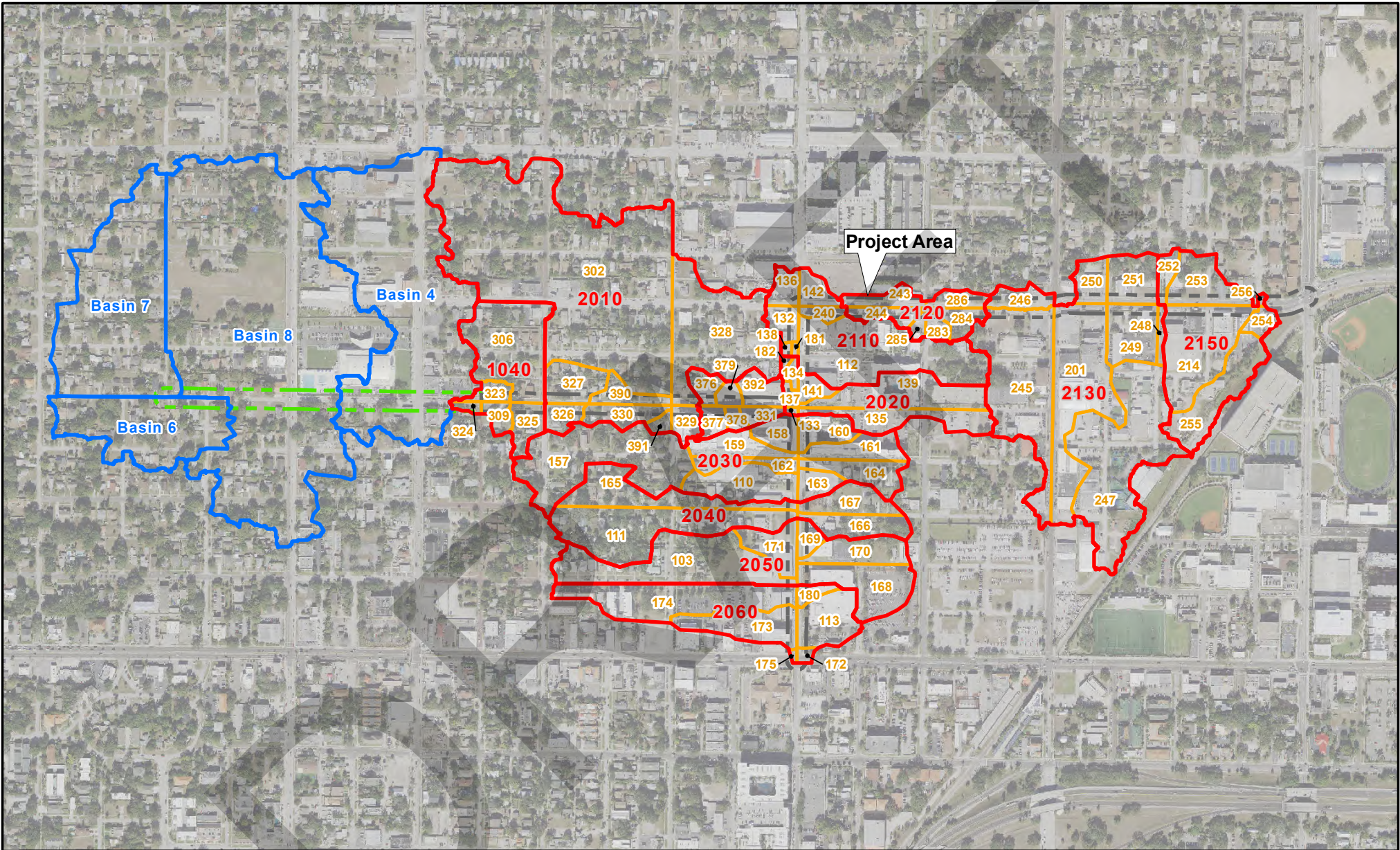
In XP-SWMM, surface runoff from a watershed is routed to the stormwater system via nonlinear reservoir technology. The flow rate from a catchment is directly related to the watershed slope, overland flow surface roughness, depression storage, and width parameter. The watershed width for a given basin is found by dividing the watershed area by the longest flow path (SWMM user manual, 2014). This methodology was adopted for this model refinement.

The full watershed area was delineated to the watershed which drains to the project area. The project area watershed was divided into 13 basins for the existing conditions (**Figure 2**). The drainage basin is defined as the system associated with road and parcel drainage: the stormwater pipes, catch basins, curbs and gutters, storm leads, and service connections.

The proposed basins were further delineated with the use of LiDAR topography, field observations, and survey data, and are displayed in **Figure 3**. The project area was divided into 81 basins for the proposed conditions. The existing and proposed basins include business and commercial development, residential homes, paved roads, parks, and institutional developments.

2.2 HYDROLOGICAL COMPONENT

Land cover within a watershed affects the quantity and timing of runoff. Each land use generates a different quantity of runoff due primarily to the amount of impervious area within that land cover. The land use map for this project area is shown in **Figure 4**. The impervious area input into the XP-SWMM model is, by definition, hydraulically connected to the drainage systems being analyzed. This directly connected impervious percentage includes driveways, rooftops, and parking areas that are directly connected to the stormwater collection system. Runoff from the portion of a rooftop draining onto adjacent pervious areas was not treated as connected impervious area.



LEGEND

Project Area	Catchment Basin
Existing Stormwater to Remain	Catchment Sub-Basin
Modified Existing Basin	

0 700
Feet

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STORMWATER IMPROVEMENTS

PROPOSED MODIFIED BASIN

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FIGURE 3

Land use information obtained from SWFWMD was utilized to represent the imperviousness of the site. The percentage of imperviousness is referenced from TR-55 for the urban areas. There are three types of land use for the existing basin: 'commercial and services', 'open land/space,' and 'residential high density'. For the proposed basin, 'open land/space' was changed to 'commercial and services', as most of these locations are developed as apartment complexes. **Tables 1** and **2** show the modified hydrological parameters.

To directly compare peak stages between the conceptual model and the updated proposed model, the nodes along the streets in the project area remained the same as in the conceptual model. The delineated basins were combined and assigned to the closest node, and the hydrological parameters were averaged on a weighted basis. **Table 3** reflects the hydrological parameters for the merged basins.

The average watershed slope was calculated in GIS using Arc-Hydro tools. The methodology for calculating the watershed slope for the updated areas is the same methodology that was used in the conceptual XP-SWMM model. The area-weighted average watershed slope (feet/feet) for each basin for proposed conditions was estimated using GIS and a digital elevation model (DEM) using the same basin.

Table 1. Modified Existing Model Hydrological Parameters

Basin Name	Group	Node Name	Area (ac)	Width (ft)	Impervious Area (%)
7	A	G-98	12.49	438	38
6	B	G-91	6.27	293	38
8	C	G-84	36.26	748	41
4	D	G-62	19.34	558	71
9	E	G-53	1.14	145	50
5	F	G-41	4.32	293	38
2	G	G-23	33.23	728	44
3	H	R-40	20.08	463	67
13	I	R-31	10.70	251	47
10	J	R-24	16.74	350	61
11	K	C-71	17.62	504	85
1	L	C-29	27.07	639	84
12	M	C-69	16.27	450	68

Table 2. Modified Proposed Model Hydrological Parameters

Basin Name	Group	Node Name	Area (ac)	Width (ft)	Impervious Area (%)	Average Slope (%)
7	A	G-98	12.49	438	38	1.0
6	B	G-91	6.27	293	38	1.0
8	C	G-84	36.26	748	41	1.0
4	D	G-62	19.34	558	71	1.0
103	H	2050	5.25	176	46	0.64
110	J	2030	2.25	160	74	0.84
111	I	2040	5.11	170	44	0.90
112	K	2110	6.17	265	57	0.63
113	H	2060	1.90	245	85	0.92
132	K	2110	0.66	153	85	0.78
133	K	2020	0.06	39	85	0.75
134	K	2020	0.23	56	85	0.72
135	K	2020	1.97	85	85	0.88
136	K	2110	0.65	115	85	0.68
137	K	2020	0.20	54	85	0.85
138	K	2110	0.09	57	85	0.77
139	K	2020	2.94	128	85	0.92
141	K	2020	0.49	98	85	0.87
142	K	2110	0.69	149	85	0.73
157	J	2030	6.00	278	39	0.61
158	J	2030	0.85	146	85	0.77
159	J	2030	1.24	91	85	0.91
160	J	2030	1.06	136	85	0.94
161	J	2030	1.33	110	85	0.40
162	J	2030	0.73	57	83	0.79
163	J	2030	0.69	115	85	0.73
164	J	2030	1.42	107	56	0.79
165	I	2040	2.73	94	43	0.95
166	I	2040	1.43	102	57	0.73
167	I	2040	1.43	119	53	0.78

Basin Name	Group	Node Name	Area (ac)	Width (ft)	Impervious Area (%)	Average Slope (%)
168	H	2050	2.61	186	85	0.76
169	H	2050	0.48	101	85	0.76
170	H	2050	1.61	121	56	0.44
171	H	2050	1.30	139	85	1.03
172	H	2060	0.16	57	85	0.47
173	H	2060	2.15	139	85	0.66
174	H	2060	4.20	143	61	0.90
175	H	2060	0.05	31	85	0.76
180	H	2060	0.36	66	85	0.76
181	K	2110	0.06	35	85	0.83
182	K	2020	0.08	39	85	0.56
201	L	2130	5.75	217	85	0.56
214	M	2150	4.04	310	85	0.79
240	K	2110	0.37	63	85	0.80
243	*	2120	0.78	74.05	85	0.50
244	*	2120	0.62	67	85	0.60
245	L	2130	6.44	249	85	0.74
246	*	2130	0.80	95	39	0.85
247	L	2130	7.89	304	85	0.75
248	M	2130	0.27	37	85	0.87
249	L	2130	1.89	199	85	0.73
250	L	2130	0.90	128	85	0.63
251	L	2130	1.57	187	85	0.85
252	M	2150	0.50	72	68	0.99
253	M	2150	1.88	172	79	1.16
254	M	2150	0.46	116	84	1.01
255	M	2150	2.68	166	85	1.00
256	M	2150	0.05	33	38	0.85
283	*	2120	0.36	73	85	0.83
284	*	2120	0.69	89	82	1.05
285	*	2120	0.24	54	85	0.87

Basin Name	Group	Node Name	Area (ac)	Width (ft)	Impervious Area (%)	Average Slope (%)
286	*	2120	0.58	73	65	0.34
302	G	2010	22.42	558	39	0.46
306	F	1040	4.32	294	38	0.74
309	E	1040	0.47	95	38	1.03
323	E	1040	0.49	63	47	0.92
324	E	1040	0.18	45	85	0.38
325	J	1040	0.93	120	38	0.74
326	G	2010	0.64	151	38	0.39
327	G	2010	1.41	209	38	0.44
328	G	2010	6.37	348	60	1.00
329	G	2010	0.62	116	84	0.93
330	G	2010	1.00	90	38	1.07
331	K	2011	0.39	72	85	0.72
376	K	2011	0.57	102	70	0.87
377	K	2011	0.50	102	85	0.81
378	K	2011	0.26	66	85	0.72
379	K	2011	0.36	95	85	0.84
390	G	2010	0.78	79	38	1.08
391	G	2010	0.25	68	38	1.42
392	K	2011	0.88	131	85	0.82

Table 3. Modified Proposed Model Hydrological Parameters (Combined)

Node Name	Area (ac)	Width (ft)	Impervious Area (%)	Average Slope (%)
G-98	12.49	438	38	1.0
G-91	6.27	293	38	1.0
G-84	36.26	748	41	1.0
G-62	19.34	558	71	1.0
1040	1.14	73	0.50	0.85
2010	33.49	459	0.44	0.83
2011	2.95	103	0.82	0.67
2020	5.97	104	0.85	0.75
2030	20.80	202	0.57	0.74
2040	10.70	135	0.47	0.89
2050	11.25	163	0.63	0.89
2060	8.82	158	0.74	0.86
2110	8.70	223	0.65	0.75
2120	3.25	74	0.81	0.81

2.3 HYDRAULIC ROUGHNESS

Hydraulic roughness was incorporated into the model using Manning's roughness coefficients across the basin model. The conceptual existing model considers a global value of 0.02. In the modified existing and proposed models, the roughness coefficients were unchanged.

2.4 HYDRAULIC MODEL PARAMETERS

2.4.1 Existing Conditions

A node-link network approach was set up in the XP-SWMM model to simulate the stormwater collection and conveyance system throughout the project area. **Figure 5** shows the existing basin node and link map for the entire basin. The existing conditions XP-SWMM model includes the structures from structural inventory (surveyed by City of Tampa Stormwater Division, summarized in "Spanishtown Creek Basin Study, 2004"). Inlets inventory were extracted from the City's GIS database program. For this project, Hyatt Survey Services, Inc., has conducted a stormwater, sewer, and utility survey within the project boundary. This information was incorporated in the model.

2.4.2 Proposed Conditions

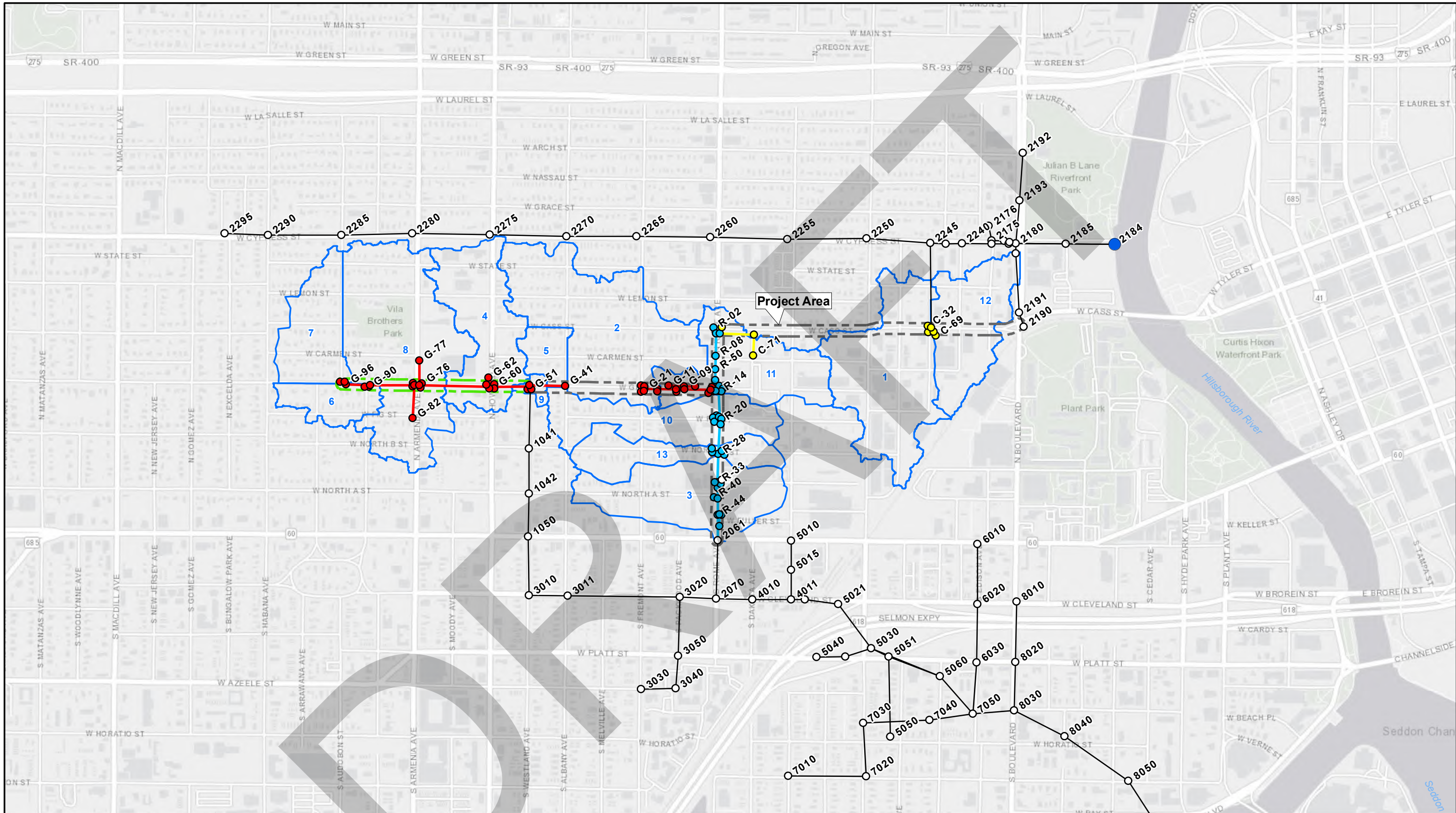
The proposed conditions model includes the proposed box culvert structures for the project area. The proposed link/node map for the project area is shown in **Figure 6**. The proposed box culvert locations proposed along W. Gray Street, N. Rome Avenue, and W. Cass Street are represented in **Figure 6**.

2.5 DESIGN RAINFALL

The model refinement was conducted based upon the 25-year / 24-hour storm event which was required by the City to meet the contractual obligation under the cooperative funding agreement with SWFWMD. The design rainfall was implemented for the processing of iterative model runs to ensure that the results concur with known flood conditions that have been provided by the City. The model also simulated the mean annual and 5-year / 24-hour rainfall events.

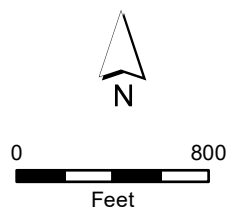
2.6 BOUNDARY CONDITION

The boundary conditions for the modified existing and proposed models were taken from the conceptual models provided by the City. The main north-south stormwater trunk lines located along N. Oregon Avenue and N. Rome Avenue flow south and connect to the W. Cleveland Street trunkline, which ultimately flows southeast to the Hillsborough River / Hillsborough Bay. This project changes that flow from south to north by connecting to the existing system at the intersection of W. Cass Street and North Boulevard, with the outfall on W. Cypress Street discharging into the Hillsborough River.



Source: XPSWMM Model

LEGEND	
	Project Area
	Existing Stormwater to Remain
	Modified Existing Basin
	Outfall
	Modified Nodes W. Cass St.
	Modified Nodes W. Gray St.
	Modified Nodes S. Rome Ave.
	Existing Nodes from City
	Modified Links W. Cass St.
	Modified Links W. Gray St.
	Modified Links S. Rome Ave.
	Existing Links from City

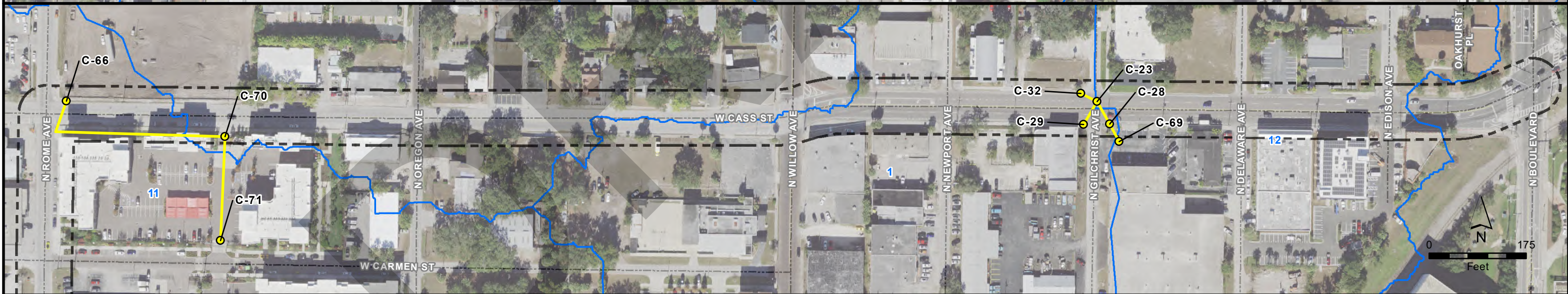
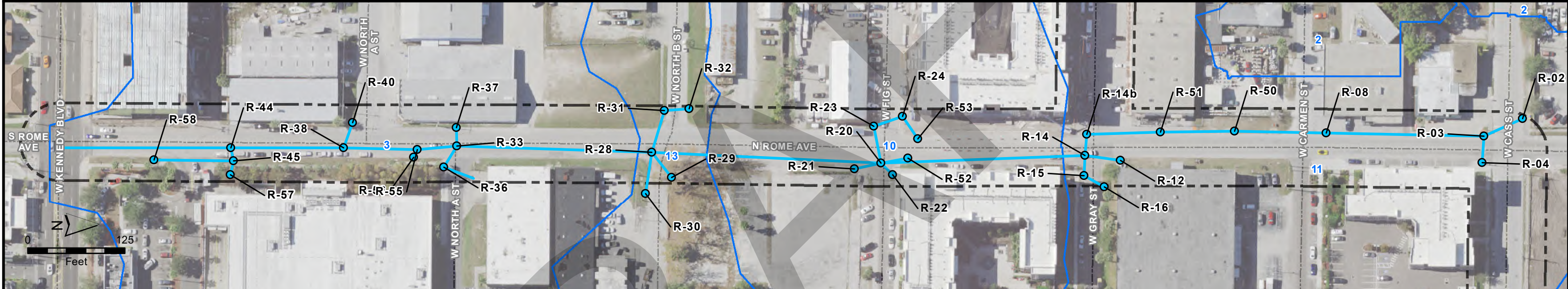
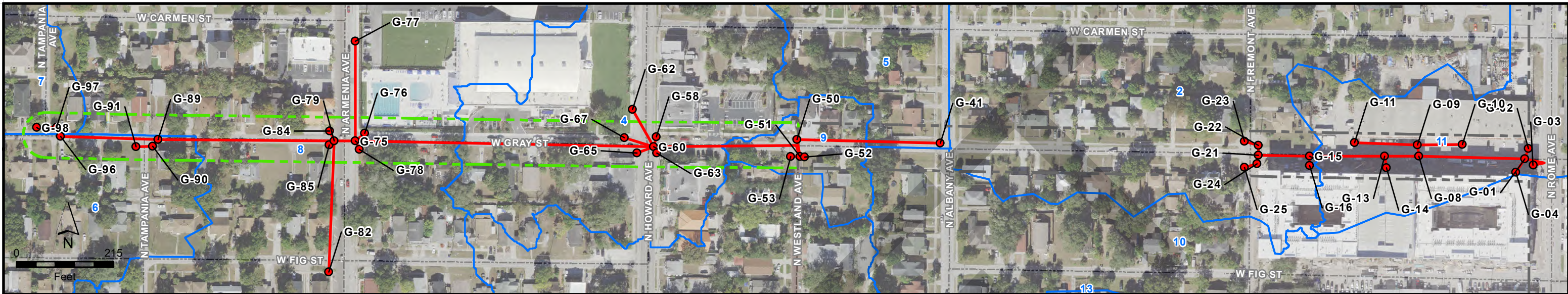


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 STORMWATER IMPROVEMENTS
 EXISTING MODIFIED MODEL FEATURES



FIGURE 5

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Source: Hillsborough County 2017 Imagery; XPSWMM Model

LEGEND	
	Project Area
	Existing Stormwater to Remain
	Modified Existing Basin
	Modified Nodes
	W. Cass St.
	W. Gray St.
	S. Rome Ave.
	Existing Nodes
	from City
	Modified Links
	W. Cass St.
	W. Gray St.
	S. Rome Ave.
	Existing Links
	from City

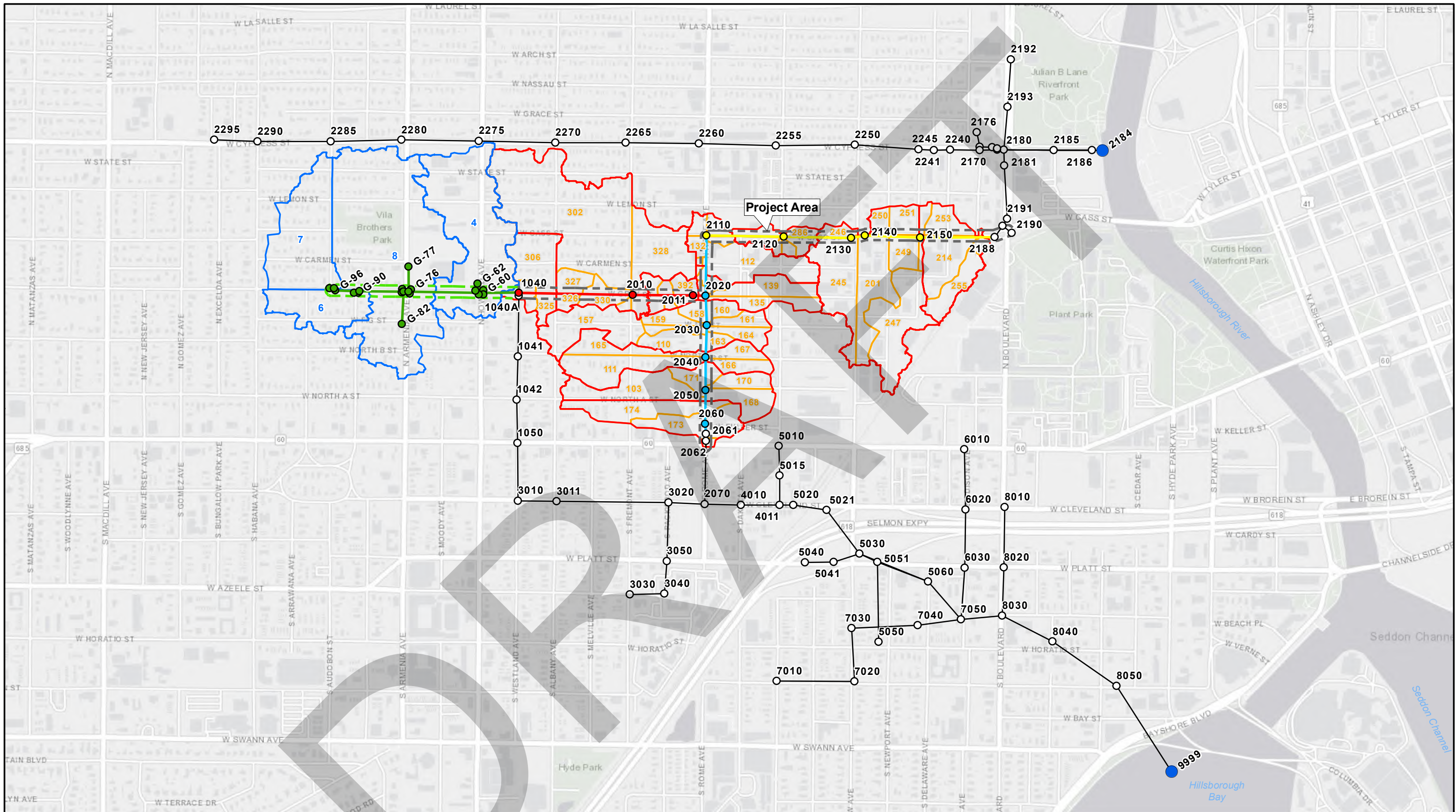
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CYPRESS STREET OUTFALL REGIONAL
STORMWATER IMPROVEMENTS

EXISTING MODIFIED MODEL FEATURES

TETRA TECH







FIGURE 5 cont'd






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Source: XPSWMM Model

LEGEND

-  Project Area
-  Existing Stormwater to Remain
-  Catchment Basin
-  Catchment Sub-Basin
-  Modified Existing Basin
-  Outfall

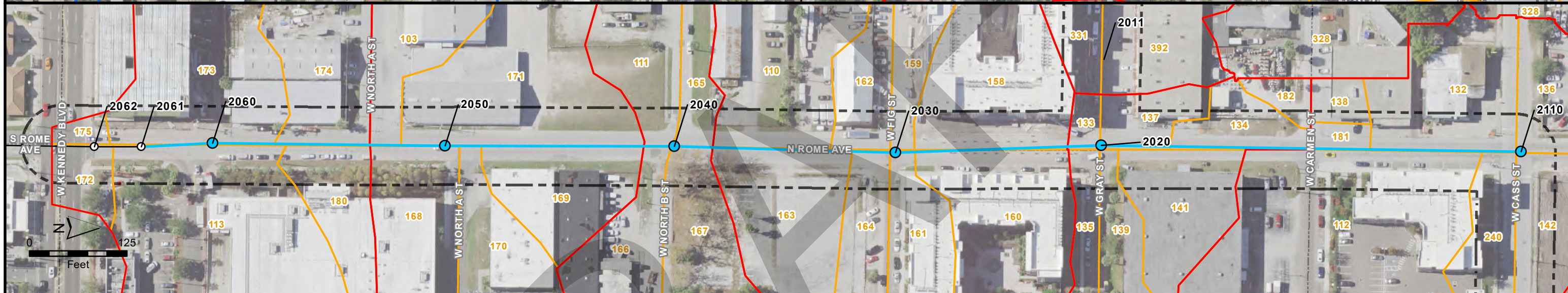
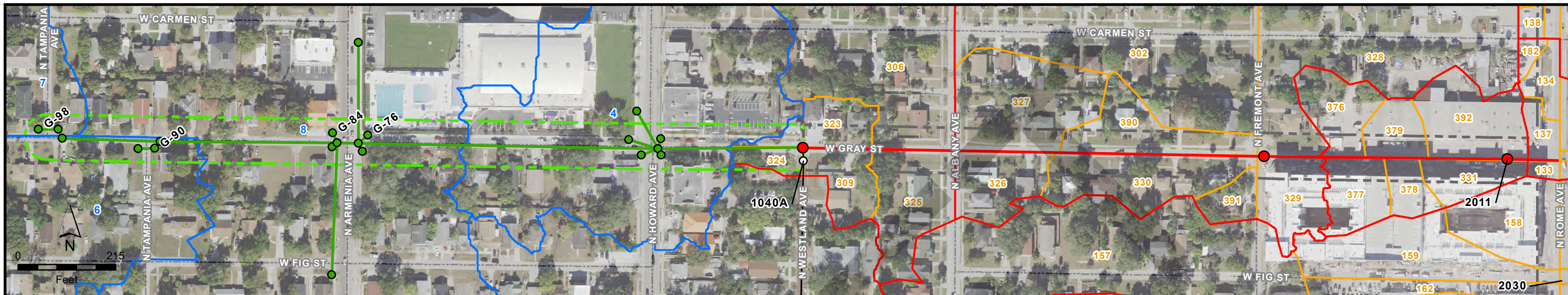
- Proposed Modified Nodes**
-  W. Cass St.
-  W. Gray St.
-  S. Rome Ave.
- Modified Nodes**
-  W. Gray St.
- Existing Nodes**
-  from City

- Proposed Modified Links**
-  W. Cass St.
-  W. Gray St.
-  S. Rome Ave.
- Modified Link**
-  W. Gray St.
- Existing Links**
-  from City

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 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS
PROPOSED MODIFIED MODEL FEATURES



FIGURE 6




Source: Hillsborough County 2017 Imagery; XPSWMM Model

LEGEND	
	Existing Stormwater to Remain
	Catchment Basin
	Catchment Sub-Basin
	Modified Existing Basin
	Proposed Modified Nodes W. Cass St.
	W. Gray St.
	S. Rome Ave.
	Modified Nodes W. Gray St.
	Existing Nodes O from City
	Proposed Modified Links W. Cass St.
	W. Gray St.
	S. Rome Ave.
	Modified Link W. Gray St.
	Existing Links from City

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STORMWATER IMPROVEMENTS

PROPOSED MODIFIED MODEL FEATURES



TETRA TECH

FIGURE 6 cont'd

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2.7 MODEL RESULTS

Tables 4 and **5** indicate the modeling results for the project area. **Figure 7a**, **Figure 7b**, **Figure 7c**, **Figure 8a**, **Figure 8b**, and **Figure 8c** indicate the flood depth for the project area, for the given storm event.

The City of Tampa no longer intends to construct the future phase III (N. Westland Avenue) improvements or upsize the existing box culvert west of N. Westland Avenue. The intent of phase III was to replace the existing 36" x 54" box culvert flowing east along W. Gray Street, then south along N. Westland Avenue, and reversing the flow with a proposed 10' x 5' box culvert flowing from south to north and connecting to the 10' x 7' box culvert flowing from west to east along W. Gray Street. Presently, there is minor flooding at the intersection of W. Gray Street at N. Westland Avenue. This project proposes to connect an overflow manhole to the upstream side of the existing 36" x 54" box culvert flowing from north to south along N. Westland Avenue. This overflow manhole will be utilized during rain events when the existing 36" x 54" box culvert backs up, allowing stormwater to overflow into the proposed box culvert system and help to reduce flooding at this intersection. Connections to the existing box culverts are proposed at this intersection. In the case that the City of Tampa wishes to construct these improvements in the future, the City will apply for a permit modification.

There is an existing 4'x4' box culvert flowing from north to south along N. Rome Avenue, and south through the intersection of W. Kennedy Boulevard. This project proposes to replace a portion of this existing box culvert along N. Rome Avenue, and reversing the flow with a proposed 10' x 5' box culvert flowing from south to north. Presently, there is minor flooding present at the intersection of N. Rome Avenue at W. Kennedy Boulevard. This project proposes to connect an overflow manhole to the upstream side of the existing 4'x4' box culvert flowing from north to south along N. Rome Avenue. This overflow manhole will be utilized during rain events when the existing 4' x 4' box culvert backs up, allowing stormwater to overflow with a short section of 48" RCP flowing north. This 48" RCP will connect to the proposed 10' x 5' box culvert flowing from south to north along N. Rome Avenue, and help to reduce flooding at this intersection.

These proposed overflow connections were modeled as a part of this report, and no adverse impacts are anticipated.

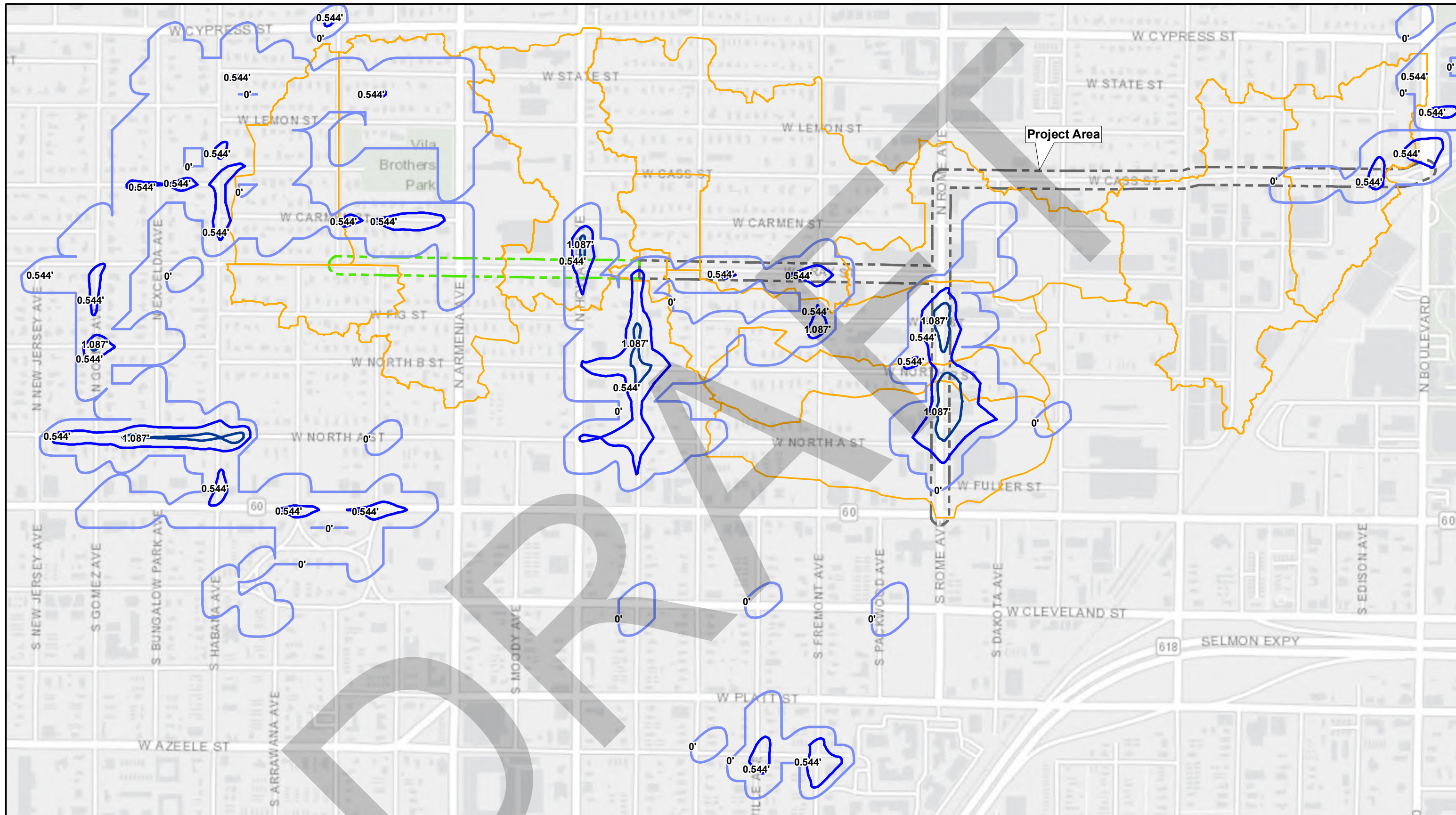
Due to inclusion of box culverts and inlets in the proposed conditions, the flooding condition is improved, and no significant flooding is observed. As previously mentioned, the conceptual stormwater models (existing and proposed) were developed by others for the City, using 'large sub-basin' concepts. Tetra Tech refined these conceptual models by further delineating the basins, as well as verifying and modifying the proposed conveyance systems. As shown in the flood depth figures, the existing and proposed flooding conditions are close to that of the conceptual modeling. **Tables 4** and **5** reiterate this fact, and actually show a slight reduction in most flooding conditions in the refined models. **Appendix B** depicts the proposed hydraulic grade line (HGL) profiles for the 25-year / 24-hour storm for W. Gray Street, N. Rome Avenue, and W. Cass Street. These HGL profiles are indicative towards flooding improvement and show that for even the 25-year 24-hour storm event, all grade lines stay within the proposed box culvert system, and therefore, no adverse impacts are anticipated.

Table 4. Proposed Box Culvert Locations and Dimensions

Link Name	Location	Box Culvert Dimensions		Max Flow (cfs)		
		Width (ft) x Height (ft)	Length (ft)	Mean Annual	5-year / 24-hour	25-year / 24-hour
CL-23	Cass Street	Dual 8 x 8	664.77	198.6	252.6	427.3
CL-31	Cass Street	Dual 8 x 8	491.92	189.0	240.9	405.6
CL-47	Cass Street	Dual 8 x 8	121.35	188.9	240.9	405.0
CL-56	Cass Street	Dual 8 x 8	601.17	169.9	216.6	357.8
CL-59	Cass Street	Dual 8 x 8	688.75	167.3	213.6	351.5
GL-06	Gray Street	10 x 7	110.85	89.3	116.1	177.4
GL-21	Gray Street	10 x 7	536.21	86.3	112.5	169.8
GL-50	Gray Street	10 x 7	1017.49	68.9	90.4	129.2
RL-08	Rome Avenue	Dual 8 x 8	537.92	161.0	205.9	337.2
RL-17	Rome Avenue	10 x 5	264.51	67.1	83.8	149.0
RL-25	Rome Avenue	10 x 5	283.67	56.6	70.3	123.8
RL-33	Rome Avenue	10 x 5	293.73	50.3	62.4	109.4
RL-38	Rome Avenue	10 x 5	297.46	41.8	51.6	89.6
RL-44	Rome Avenue	10 x 5	91.92	33.8	41.4	71.1

Table 5. Peak Stages at Nodes for Existing and Proposed Conditions

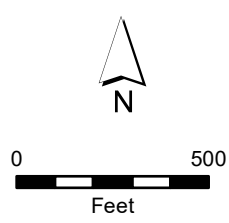
Tt Existing Node Name	Node Name	Location	Existing Condition (ft. NAVD)			Proposed Condition (ft. NAVD)		
			Mean Annual	5-Year / 24-Hour	25-Year / 24-Hour	Mean Annual	5-Year / 24-Hour	25-Year / 24-Hour
G-98	1010	Gray Street	19.52	20.14	22.17	19.44	19.66	21.80
G-75	1020	Gray Street	18.72	18.99	19.76	17.24	17.48	18.22
G-60	1030	Gray Street	18.61	18.86	19.24	16.84	17.09	17.72
G-50	1040	Gray Street	18.43	18.63	18.83	7.27	7.62	8.46
G-21	2010	Gray Street	16.61	16.85	17.25	6.04	6.49	7.77
G-01	2011	Gray Street	16.26	16.42	17.10	5.58	6.07	7.48
R-14	2020	Rome Avenue	16.23	16.37	17.10	5.54	6.03	7.46
R-20	2030	Rome Avenue	16.12	16.35	17.09	7.23	7.41	8.05
R-28	2040	Rome Avenue	16.11	16.34	17.09	7.76	7.95	8.60
R-33	2050	Rome Avenue	16.10	16.34	17.09	8.13	8.31	8.94
R-44	2060	Rome Avenue	15.53	15.88	16.94	8.81	8.94	9.42
2061	2061	Rome Avenue	15.51	15.87	16.87	9.18	9.29	9.68
R-03	2110	Cass Street	18.21	18.25	18.39	5.23	5.70	7.11
C-66	2120	Cass Street	18.39	18.42	18.55	4.67	5.12	6.54
N/A	2130	Cass Street	N/A	N/A	N/A	3.78	4.28	5.88
N/A	2140	Cass Street	N/A	N/A	N/A	3.92	4.47	6.04
N/A	2150	Cass Street	N/A	N/A	N/A	3.69	4.22	5.73
2190	2188	Cass Street	6.50	6.59	6.74	3.26	3.75	5.16



Source: XPSWMM Model

- LEGEND**
- Project Area
 - Existing Stormwater to Remain
 - Modified Existing Basin

- Max Flood Depth (FT/NAVD88)**
- 0 - 0.543
 - 0.544 - 1.086
 - 1.087+

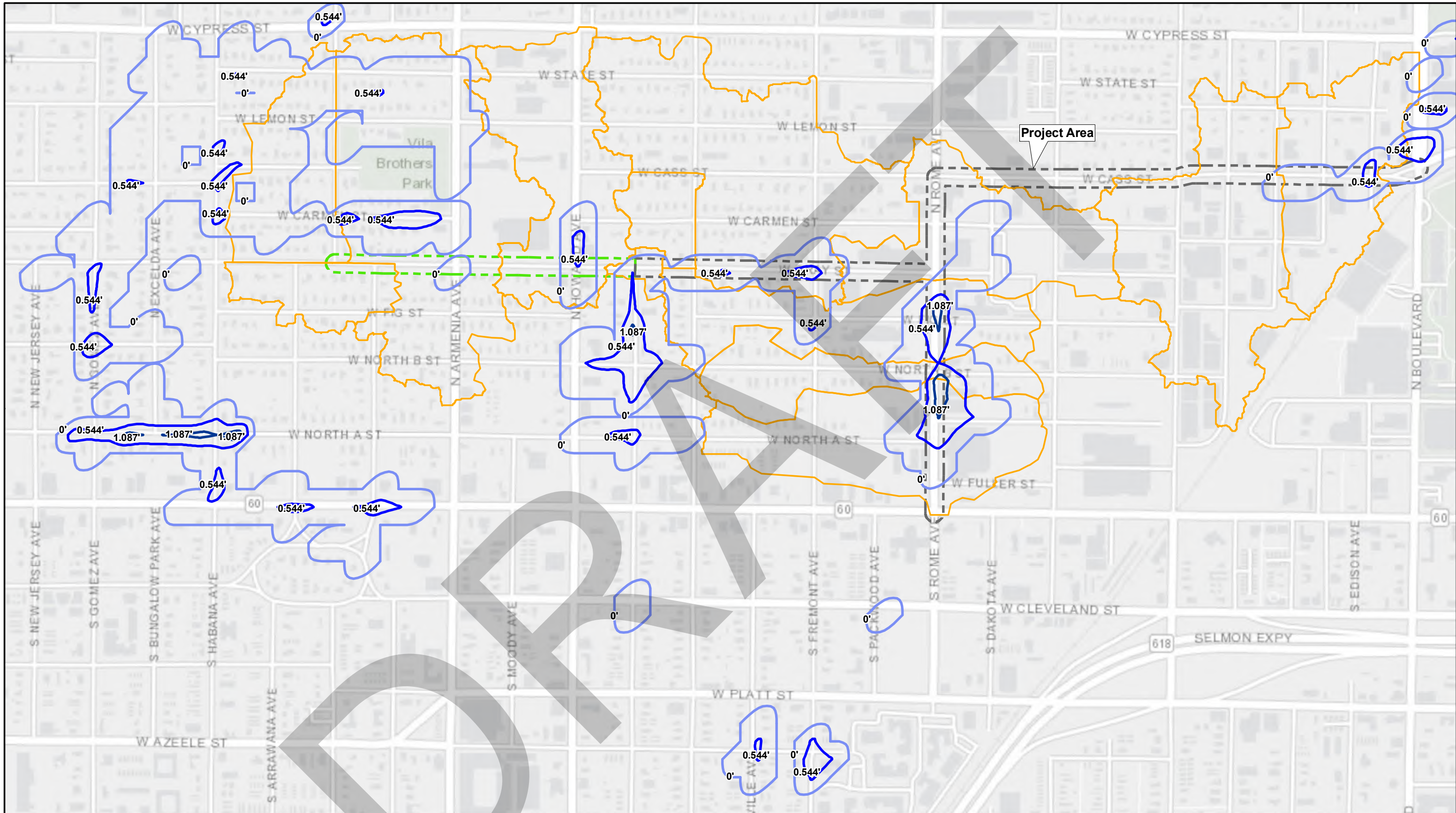


CITY OF TAMPA, FLORIDA
 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS




EXISTING FLOODING CONDITION
 5-YEAR / 24 HOUR STORM EVENT





FIGURE 7A

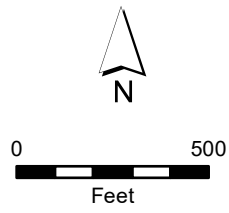


Source: XPSWMM Model

- LEGEND**
-  Project Area
 -  Existing Stormwater to Remain
 -  Modified Existing Basin

Mean Annual Flood Depth (FT/NAV88)

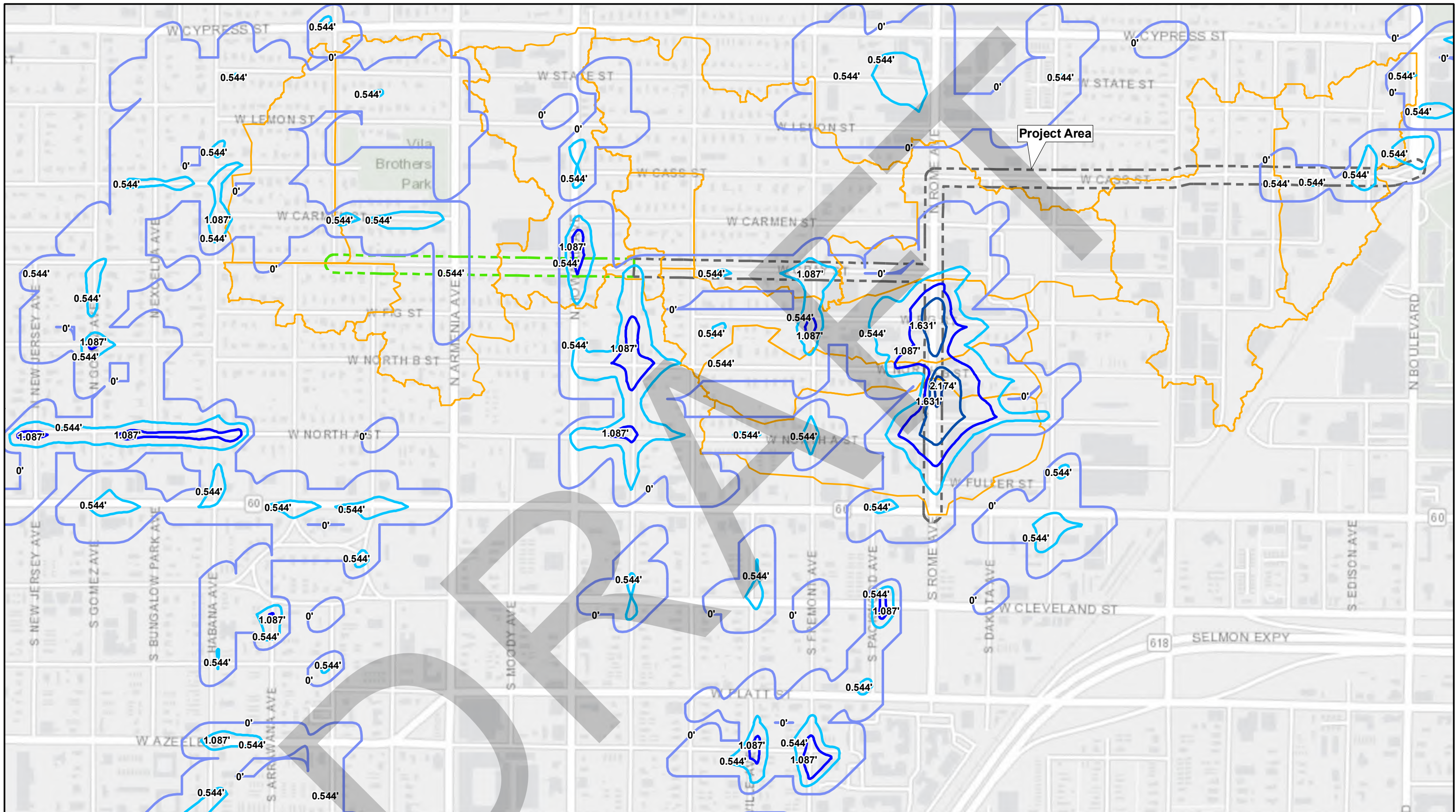
-  0 - 0.543
-  0.544 - 1.086
-  1.087+



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 EXISTING FLOODING CONDITION
 MEAN ANNUAL






FIGURE 7B



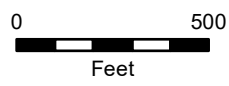
Source: XPSWMM Model

LEGEND

-  Project Area
-  Existing Stormwater to Remain
-  Modified Existing Basin

**Max Flood Depth
(FT/NAV88)**

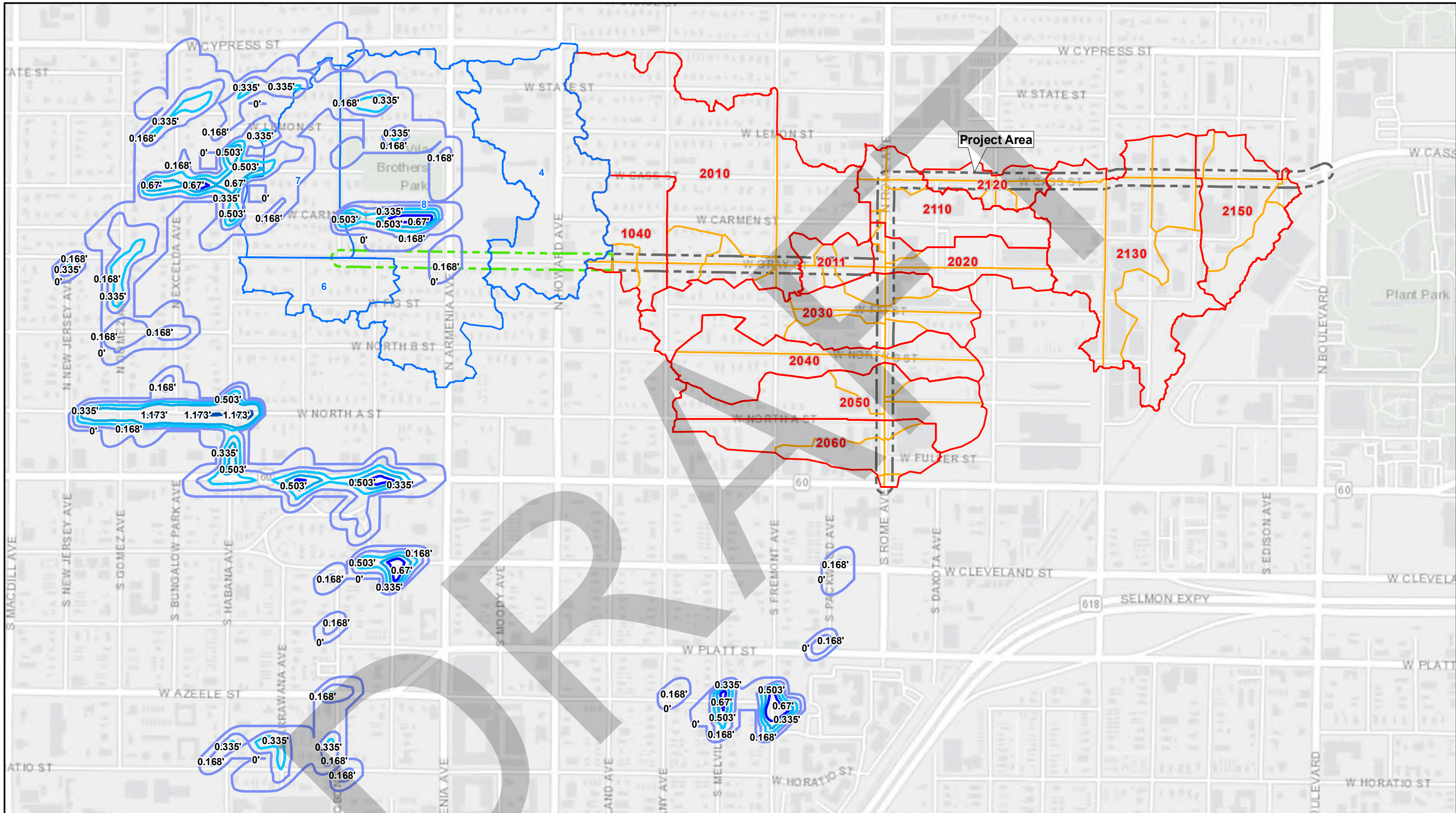
-  0 - 0.543
-  0.544 - 1.086
-  1.087 - 1.630
-  1.631 - 2.173
-  2.174+



CITY OF TAMPA, FLORIDA
 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS
 EXISTING FLOODING CONDITION
 25-YEAR / 24 HOUR STORM EVENT



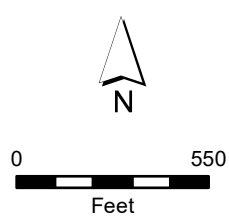
FIGURE 7C



Source: XPSWMM Model

- LEGEND**
- Project Area
 - Existing Stormwater to Remain
 - Catchment Basin
 - Catchment Sub-Basin
 - Modified Existing Basin

Max Flood Depth (FT/NAVD88)	
	0.000 - 0.195
	0.196 - 0.392
	0.393 - 0.588
	0.589 - 0.785
	0.786 - 1.173

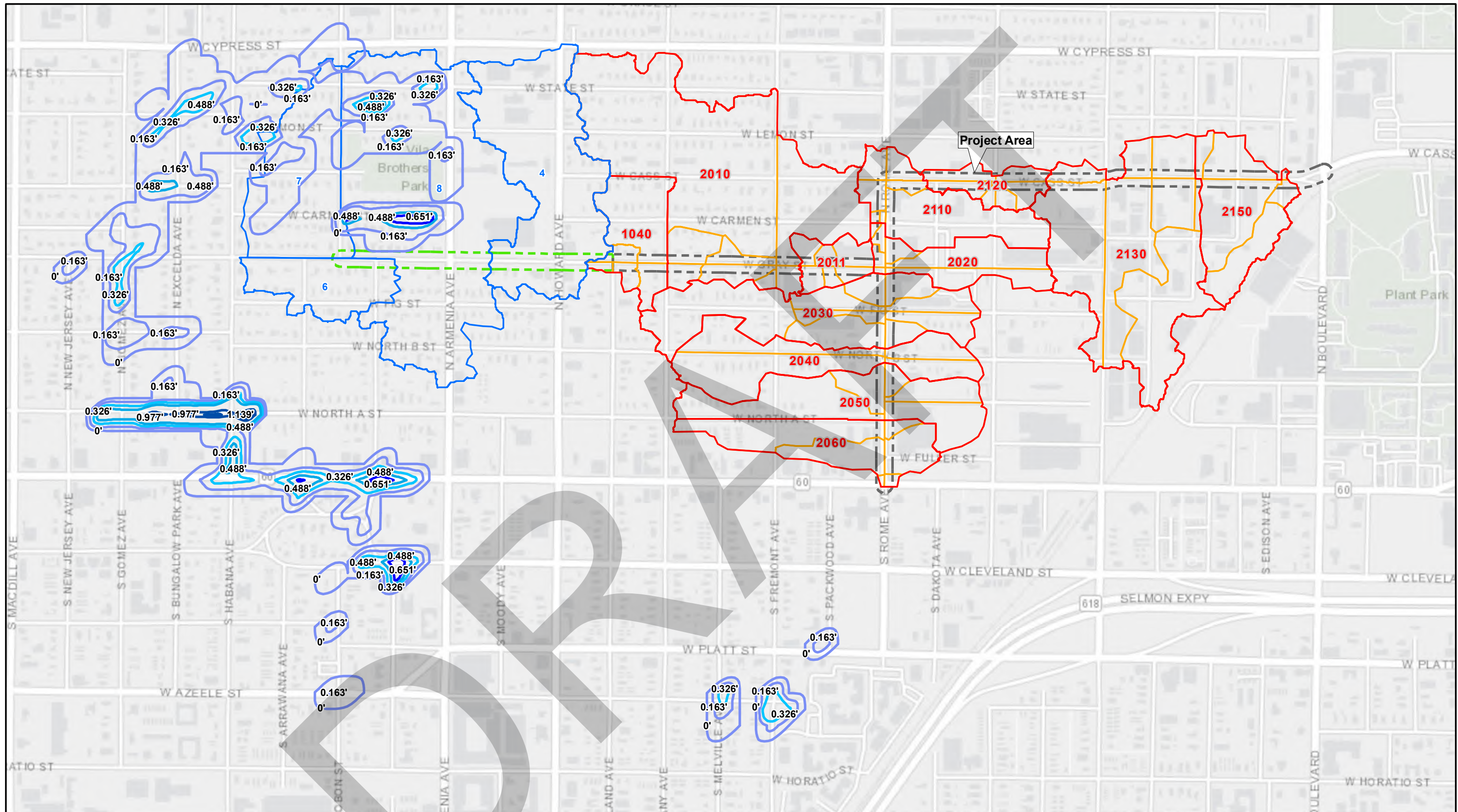


CITY OF TAMPA, FLORIDA
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 STORMWATER IMPROVEMENTS
 PROPOSED FLOODING CONDITION
 5-YEAR / 24 HOUR STORM EVENT



FIGURE 8A

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Source: XPSWMM Model

- LEGEND**
- Project Area
 - Existing Stormwater to Remain
 - Catchment Basin
 - Catchment Sub-Basin
 - Modified Existing Basin

Mean Annual Flood Depth (FT/NAVD88)

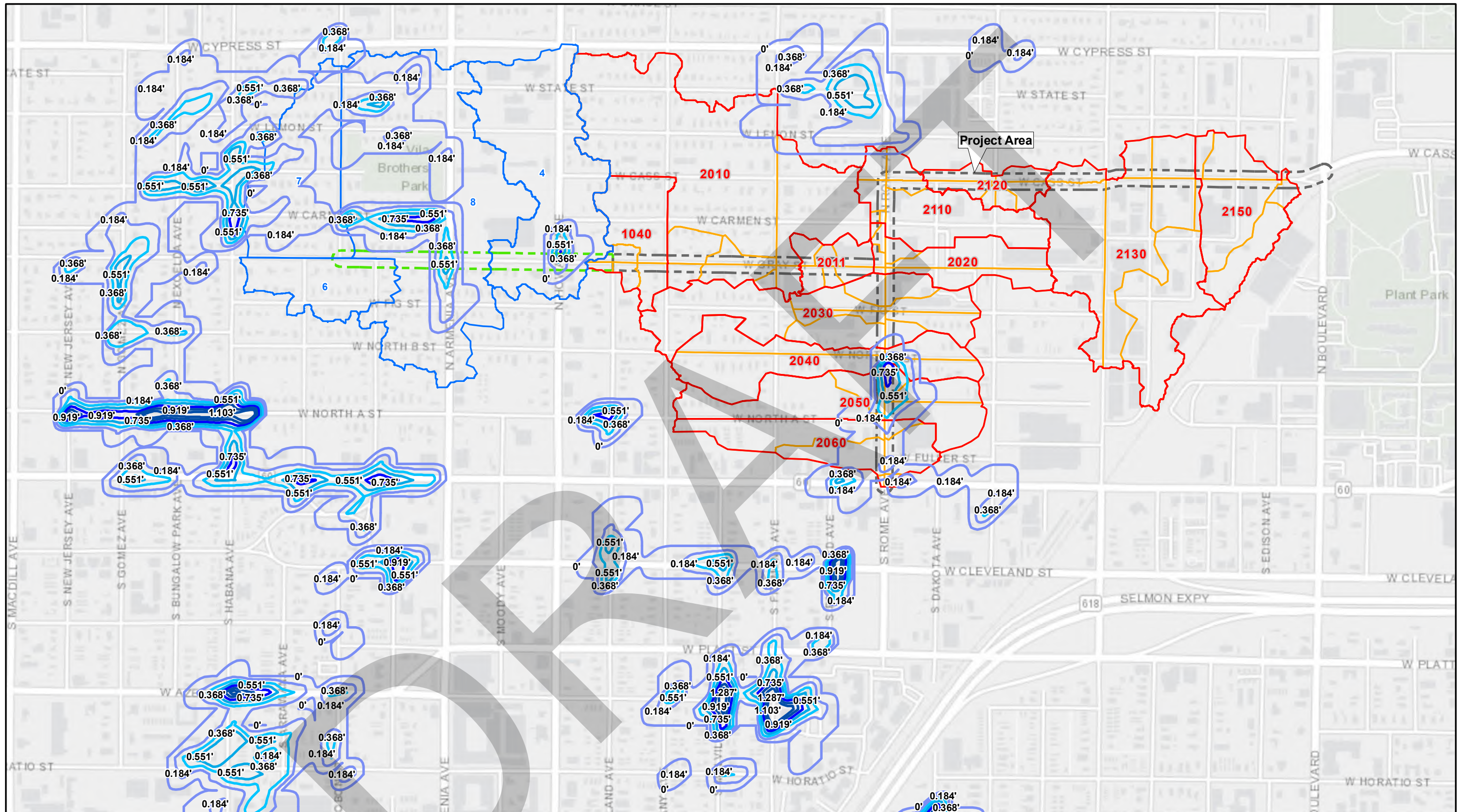
- 0.000 - 0.195
- 0.196 - 0.392

- 0.393 - 0.588
- 0.589 - 0.785
- 0.786 - 1.173

CITY OF TAMPA, FLORIDA
 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS
 PROPOSED FLOODING CONDITION
 MEAN ANNUAL



FIGURE 8B

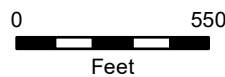


Source: XPSWMM Model

LEGEND

- Project Area
- Existing Stormwater to Remain
- Catchment Basin
- Catchment Sub-Basin
- Modified Existing Basin

- Max Flood Depth (FT/NAVD88)**
- 0.393 - 0.588
 - 0.589 - 0.785
 - 0.000 - 0.195
 - 0.196 - 0.392
 - 0.786 - 1.173



CITY OF TAMPA, FLORIDA
 CYPRESS STREET OUTFALL REGIONAL
 STORMWATER IMPROVEMENTS
 PROPOSED FLOODING CONDITION
 25-YEAR / 24 HOUR STORM EVENT



FIGURE 8C

3.0 WATER QUALITY

3.1 SUMMARY

This project is a retrofit design aimed at flood protection. As a part of this project, road-dieting and multi-modal transportation were implored. As a result, the typical roadway sections differ between the existing and proposed conditions. The comparison between the existing and proposed conditions are summarized in **Table 6**.

Table 6. Impervious and Semi-Impervious Areas Summary

Area	Existing Conditions (SY)	Proposed Conditions (SY)	Difference (SY)
Vehicular Use Area (VUA)	33,380	24,880	- 8,500
Sidewalk	5,240	8,780	+ 3,540
Parking (Impervious)	1,990	0	- 1,990
Parking (Pervious Pavement)	0	1,620	+1,620
Cycle Track/Bike Lanes	0	5,330	+ 5,330
Traffic Separator and Misc.	0	560	+ 560
Total	40,610	41,170	+ 560

Although the total impervious area for the project has increased slightly, there is an immense reduction in the project's Vehicular Use Area (VUA), which would incline to a reduction in the project's overall pollutant area.

As part of this retrofit and flood protection project, Best Management Practices (BMP), including low-impact development (LID), were employed to aid in the reduction of peak flowrates, and increase water quality by serving to achieve nutrient load reductions for discharges into the Hillsborough River.

3.2 TYPES OF PROPOSED TREATMENT BMP'S

3.2.1 Nutrient Separating Baffle Boxes

Nutrient separating baffle boxes, otherwise known as second generation baffle boxes, have chambers with partitions connected to a storm drain. Stormwater flows into the first section of the box through the inflow pipe, where most pollutants settle out. Water then overflows into the next section to allow further settling before the water ultimately overflows to the stormwater outflow pipe. Floating trays within the baffle box capture leaves, grass clippings, and litter to prevent them from dissolving in the stormwater. Bold and Gold® media is added to the baffle box to create a denitrification environment, which increases total nutrient removal. The use of this media can increase efficiencies and nutrient removals as summarized in **Table 7**.

The Suntree nutrient separating baffle box is recommended for this project. Model NSBB-5-10 accommodates pipe sizes from 12 inches to 30 inches, which fits the 24-inch stormwater pipes which are proposed at the Freemont and Willow locations. We are proposing a model NSBB-8-16 for the Westland location to accommodate the 54-inch stormwater pipe. The Florida Department of Environmental Protection approved nutrient removal efficiencies for a nutrient separating baffle box are 19.05% for TN and 15.5% for TP. To maximize water quality benefits, Tetra Tech recommends adding Bold and Gold® to the baffle boxes.

Table 7. Estimated Nutrient Reductions from Proposed Baffle Boxes

Location	Acres Treated	TN Existing Load (lbs/yr)	TN Efficiency	TN Reduction (lbs/yr)	TP Existing Load (lbs/yr)	TP Efficiency	TP Reduction (lbs/yr)	Inflow Pipe (in)	Outflow Pipe (in)
N. Westland Avenue	73.2	806.2	19.05%	154	159.3	15.50%	25	54	54
N. Westland Avenue plus Bold and Gold®	73.2	806.2	55.00%	443	159.3	65.00%	104	54	54
N. Freemont Avenue	28.8	356.5	19.05%	68	75.1	15.50%	12	24	24
N. Freemont Avenue plus Bold and Gold®	28.8	356.5	55.00%	196	75.1	65.00%	49	24	24
N. Willow Avenue	12.2	211.1	19.05%	40	30.4	15.50%	5	24	24
N. Willow Avenue plus Bold and Gold®	12.2	211.1	55.00%	116	30.4	65.00%	20	24	24

3.2.2 Pervious Pavement

Pervious pavement is an asphalt with increased void space, which allows for surface water to percolate through the pavement rather than accumulate atop it. This provides a water quality benefit by reducing stormwater discharge to the Hillsborough River, as well as reducing pollutants in the stormwater runoff by allowing it to naturally filter into the ground.





This project proposes replacing all existing impervious parking area within the project limits, with new pervious pavement.

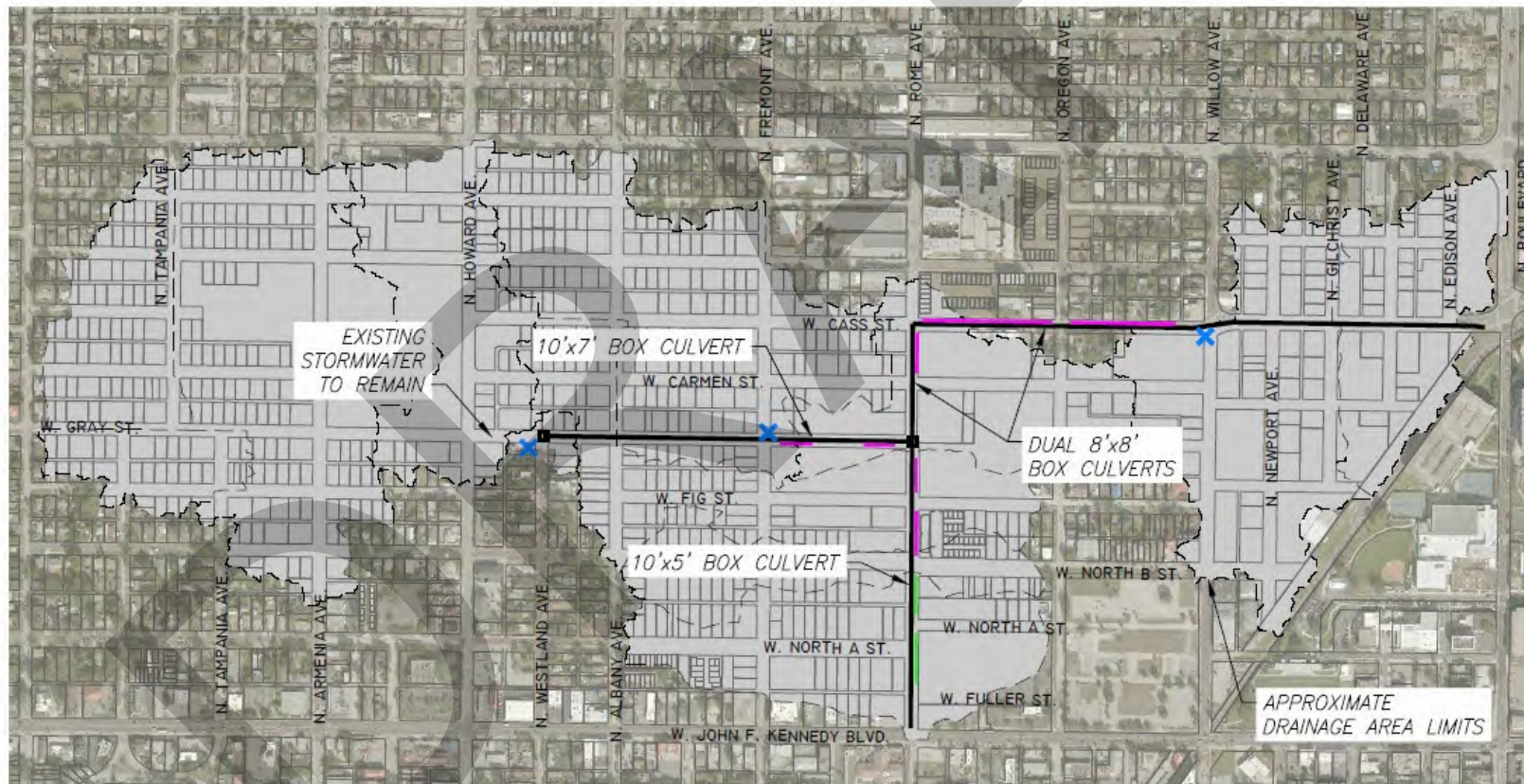
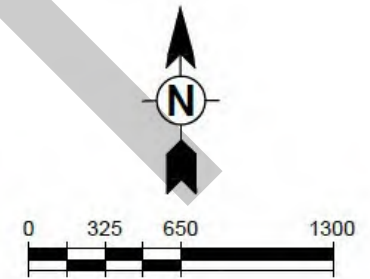
3.2.3 Grass Swales

This project proposes grass-lined swales along portions of N. Rome Avenue for additional treatment and nutrient removal. The swales provide a water quality benefit by reducing pollutants in the stormwater runoff by allowing it to attenuate and naturally filter into the ground.

Figure 9. Proposed Water Quality Improvements Map

LEGEND

-  BOX CULVERT SYSTEM
-  PERVIOUS PAVEMENT AREA
-  BAFFLE BOX LOCATION
-  GRASS SWALES



4.0 CONCLUSION

The proposed drainage improvements associated with the Cypress Street Outfall Regional Stormwater Improvements project were designed to properly capture and convey stormwater runoff to reduce structural, yard, and street flooding for the design storm events. Existing and proposed H&H models were refined from conceptual models developed by others for the City, using the XP-SWMM Version 10.5 modeling software. Hydrologic and hydraulic parameters were updated to more accurately represent the project site. The proposed stormwater improvements include box culvert structures that run along the streets of W. Gray Street, N. Rome Avenue, and W. Cass Street. This new system will connect to the existing stormwater system on W. Cass Street, and ultimately discharge at the Cypress Street outfall into the Hillsborough River.

DRAFT

Appendix A

Geotechnical Engineering Services Report

DRAFT

Geotechnical Engineering Services Report

**Cypress Street Outfall Regional Stormwater Improvements
City of Tampa, Florida**

Prepared for: **Woodruff & Sons, Inc.**
6450 – 31st Street East
Bradenton, Florida 34203

Prepared by: **MC Squared, Inc.**
5808-A Breckenridge Parkway
Tampa, Florida 33603

MC² Project No. T041704.066
August 8, 2018



**GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING**



August 8, 2018

Mr. Matt Anderson, PE
Woodruff & Sons, Inc.
6450 – 31st Street East
Bradenton, Florida 34203

Subject: Geotechnical Engineering Services Report
Cypress Street Outfall Regional Stormwater Improvements
City of Tampa, Florida
MC² Proposal No. T041704.066

Dear Mr. Anderson:

MC Squared, Inc. (MC²) has completed our Geotechnical Engineering Services Report for the proposed improvements associated with the referenced project. This study was performed in general accordance with **MC²** Proposal No. T041704.066 dated September 25, 2017 (Revised October 17, 2017). These services included a subsurface exploration, laboratory testing, and our evaluation of the data and geotechnical recommendations for project design and construction.

We trust that this report will assist you in further design development and construction of the subject project. We appreciate the opportunity to be of service to you on this project. Should you have any questions and/or require further information, please do not hesitate to contact us.

Respectfully submitted,
MC Squared, Inc.

Bradley A. Crowson, EI
Associate Project Manager

Jeffery L. Hooks, PE
Project Engineer
Florida PE License No. 67882

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Vice President/Chief Engineer
Florida PE License No. 81643

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APPENDIX

- Summary of Pavement Cores – Table 9
- Pavement Core Summary Reports – (10 Sheets)
- Summary of Soil Parameters – Table 10 (3 Sheets)
- Project Location Map (Sheet 1)
- Boring Location Map (Sheet 2)
- USDA Soil Survey and USGS Topographic Maps (Sheet 3)
- Subsurface Boring Profiles (Sheets 4 through 6)
- Report of Core Borings (Sheet 7)
- Individual Soil Profiles (25 Sheets)
- Test Procedures

1 PROJECT INFORMATION

1.1 Project Authorization

Authorization to proceed with this project was issued by **Woodruff & Sons, Inc. (Woodruff)** through a Professional Services Agreement dated May 21, 2018. Our services were performed in general accordance with MC² Proposal No. T041704.066.

1.2 Project Description

Project information was provided by Mr. Matt Anderson, PE of **Woodruff** and Mr. Thomas Cross, PE from **Tetra Tech** through e-mailed and verbal communications. Based on our understanding, the purpose of our services is to provide geotechnical data and information to aid in the design of the Cass Street/Rome Avenue/Gray Street Stormwater Line Design-Build Project to alleviate flooding in the area. The project is located entirely within the City of Tampa, Florida and consists of two (2) segments of reinforced concrete box (RCB) culverts with varying dimensions and configurations. The combined length of the two (2) segments is approximately 8,750-LF. Two (2) junction boxes have been assumed, one (1) each at the intersections of Cass Street and Rome Avenue and Rome Avenue and Gray Street. Other features of the project include water mains (36" and 8" diameter) that will run parallel to the RCB culverts, and signalization modifications including up to four (4) mast arms at the intersection of West Cass Street and North Willow Avenue. The project also includes the replacement of the impacted roadways and utilities and maintaining existing traffic throughout the project limits.



Figure 1: Project Alignment (Google Earth, photographed on January 11, 2017)

If any of this project description is incorrect or has changed, please inform **MC²** so that we may amend, if appropriate, the recommendations presented in this report.

1.3 Scope of Services

To achieve our assigned objectives, we performed the following services:

1. Reviewed printed literature and readily available published documents pertaining to the project site including topographic maps, aerial photographs and groundwater information. **MC²** has included summaries of our review of the United States Geological Services (USGS) Topographical maps, United States Department of Agriculture (USDA) Soil Survey and Southwest Florida Water Management District (SWFWMD) Potentiometric Surface Data.
2. Conducted a visual reconnaissance of the project site. Cleared utilities in the vicinity of the proposed boring locations through Sunshine811. Attained required permits through the City of Tampa (COT) in order to perform our field exploration.
3. Performed a total of ten (10) pavement cores with a subsequent hand auger to explore the thicknesses of the base course along the project alignment at locations approved by **Woodruff** and **Tetra Tech** personnel.
4. Performed a total of twenty-one (21) Standard Penetration Test (SPT) borings to depths ranging from 25 to 40-ft. below the ground surface (bgs) along the project alignment at locations approved by **Woodruff** and **Tetra Tech** personnel. Information regarding subsurface conditions are contained in **Section 5** and in the **Appendix**.
5. Visually examined recovered soil samples and performed laboratory tests on selected representative samples to develop the soil legend for the project using the American Association of State Highway and Transportation (AASHTO) classification system and Unified Soil Classification System (USCS), as appropriate. Shelby tubes were used to collect samples where cohesive material was encountered. Testing included natural moisture content, grain size analysis (-200 sieve), organic content, Atterberg Limits, corrosion and consolidation.
6. Prepared a summary of results, along with evaluations and recommendations for the proposed construction and design.

The scope of our services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of our Client. Additionally, this was not a sinkhole investigation. Accordingly, our field exploration was not designed to address sinkhole-related issues. Any mention of geological characteristics in relation to karst conditions is for information purposes only.

2 SITE CONDITIONS

2.1 Site Features

The project site is located within the City of Tampa, Florida. The project alignment is along paved roadways with sidewalks along the majority of the roads and is generally clear of obstructions. Overhead trees and power lines are scattered along the project alignment. The project is lined primarily with residential homes and commercial businesses.



Figure 2: Intersection of W. Gray Street and Tampania Avenue (photographed July 2, 2018)

2.2 Hillsborough County Soil Survey

We reviewed the USDA Soil Conservation Service's *Soil Survey of Hillsborough County, Florida* for general information on the shallow soils in the vicinity of the site. The survey area data is Version 16 dated October 4, 2017, with aerial images photographed from December 19, 2013 to January 17, 2014. The USDA Soil Conservation Service Soil Survey outlines approximate areas dominated by a particular shallow soil type. Small areas of other soils may occur within the mapping unit.

The project area is within four (4) mapping units: Immokalee-Urban land complex (22), Myakka-Urban land complex (32), Tavares-Urban land complex, 0 to 5 percent slopes (55) and Urban land (56).

Immokalee-Urban land complex (22) has a parent material of sandy marine deposits with a typical profile of fine sand from zero to 80-in. bgs. The material is poorly drained and has a moderately high to high capacity to transmit water. The depth to water table is about 6 to 18 inches.

Myakka-Urban land complex (32) has a parent material of sandy marine deposits with a typical profile of fine sand from zero to 80-in. bgs. The material is poorly drained and has a moderately high to high capacity to transmit water. The depth to the groundwater table is about 6 to 18 inches.

Tavares-Urban land complex, 0 to 5 percent slopes (55) has a parent material of eolian or sandy marine deposits with a typical profile of fine sand from zero to 80-in. bgs. The material is moderately well drained and has a very high capacity to transmit water. The depth to the groundwater table is about 42 to 72 inches.

Urban land (56) is land that has been heavily impacted by development and construction. Because of this, general soil characteristics cannot be assigned due to the high variability throughout the area.

The USDA Soil Survey is not necessarily an exact representation of the soils on the site. The mapping is based on interpretation of aerial maps with scattered shallow borings for confirmation. Accordingly, borders between mapping units are approximate and the change may be transitional. Differences may also occur from the typical stratigraphy, and small areas of other similar and dissimilar soils may occur within the soil-mapping unit. Additionally, urban development and drainage features may also affect soil types encountered and groundwater table depths. As such, there may be differences in the mapped description and the boring descriptions obtained for this report. The survey is, however, a good basis for evaluating the shallow soil conditions of the area. The USDA Soil Map is contained in the **Appendix**. The following **Table 1** summarizes the soil survey data within the project area.

Table 1: Summary of USDA Soil Survey

Roadway Name	Approximate Station Limits*	USDA Soil Classifications	USDA SHW Depth (in)
W. Gray Street	80+00 to 90+00	Tavares-Urban land complex (55)	42 to 72
	90+00 to 106+00	Myakka-Urban land complex (32)	6 to 18
	106+00 to 115+00	Urban land (56)	-
N. Rome Avenue	9+50 to 30+00	Urban land (56)	-
W. Cass Street	40+00 to 47+00	Urban land (56)	-
	47+00 to 53+50	Myakka-Urban land complex (32)	6 to 18
	53+50 to 55+00	Urban land (56)	-
	55+00 to 60+00	Immokalee-Urban land complex (22)	6 to 18
	60+00 to 69+00	Urban land (56)	-

*Stationing is based on site plans provided by **Woodruff** dated April 11, 2017. Areas near station limits are prone to variation in the soil characteristics due to transitioning between mapping units.

2.3 Topographic Survey

We reviewed readily available published USGS historical topographic maps titled “Tampa Quadrangle Florida-Hillsborough Co. 7.5-Minute Series” for the project alignment. These indicated a gradual change in elevation along the project alignment where the site is generally sloped downwards going east as summarized in the following **Table 2**. Based on our review of the

historical topographical maps, there appears to be no distinctive change in elevation over time that would require further investigation.

Table 2: Summary of USGS Topographic Maps

Roadway Name	Approximate Station Limits*	USGS Approximate Surface Elevation Range** (ft)
W. Gray Street	80+00 to 100+00	20 to 25
	100+00 to 114+00	15 to 20
N. Rome Avenue	9+50 to 31+29	15 to 20
W. Cass Street	40+00 to 63+00	15 to 20
	63+00 to 72+12	10 to 15

*Stationing is based on site plans provided by **Woodruff** dated April 11, 2017.

**Elevations are referenced to the NGVD 1929 datum

2.4 Potentiometric Information

The SWFWMD database for potentiometric information shows that the potentiometric surface in 2011 is at approximately 10-ft. in elevation along the project alignment. Artesian flow conditions were not encountered within the borings performed during the field exploration. The contractor should be prepared to handle potentiometric surface levels up to an elevation of 10-ft.

3 FIELD EXPLORATION PROGRAM

3.1 General

The field exploration program consisted of performing twenty-one (21) SPT borings, two (2) at the proposed junction boxes locations, fifteen (15) along the proposed culvert alignment approximately every 500-ft., and four (4) to support the design of the new signalization mast arms. Ten (10) pavement cores were also performed along the project corridor to determine the existing pavement conditions. The SPT borings were performed from July 2, 2018 to July 10, 2018; and, the pavement cores were performed from July 6, 2018 to July 9, 2018. The field exploration services were performed, observed and/or documented by **MC²'s** qualified staff geotechnical engineers and overseen by its Florida State licensed professional geotechnical engineers.

3.2 Standard Penetration Test Borings

The SPT borings were completed at the site in general accordance with ASTM D-1586 (Standard Test Method for Penetration Test and Split Barrel Sampling of Soils) using a track-mounted drill rig, automatic hammer and wet-rotary procedure. Representative soil samples were obtained using the split-barrel sampling procedure. In this procedure, a 2-in. outer-diameter split-barrel sampler is driven into the soil by a 140-lb hammer operating over a free-fall of 30-in. The number of blows required to drive the sampler through a 12-in. interval, after initial penetration of 6-in., is termed the Standard Penetration Resistance, or "N" value, and is indicated for each sample on the boring log. The "N" value provides an empirical assessment of the relative density

(cohesionless soils) or consistency (cohesive soils) of soils in-situ. The first 4 to 6-ft. in the borings were augered by hand in order to avoid encountering potentially unmarked utilities and to help in the determination of the SHWT.



Figure 3: Performing SPT Borings (photographed July 2, 2018)

During design, the N-values obtained using an automatic hammer should be corrected for overburden pressure, as the actual input driving energy is different between safety and automatic hammers. However, when using FB-Deep, the N-Values should not be corrected since the design methodology is based on uncorrected N-values. Based on the results of an **FDOT** study, a multiplier of 1.24 shall be applied when correcting N-values obtained using an automatic hammer on all projects. The corrected N-values shall be indicated as N_{ES} . The N-Values obtained in the field are represented on the **Boring Profiles** while the N_{ES} -Values are presented on the **Summary of Soil Parameters** in the **Appendix** of this report.

3.3 Pavement Core Borings

The pavement cores were performed using a 4-in. diameter core barrel that was advanced through the asphalt layer. This was followed by Hand-Auger (HA) borings through the base course and into the subbase. Information regarding these pavement cores, base course and subgrade materials is summarized in the **Appendix**. In addition, **Pavement Core Summary Reports** with photographs of the pavement cores are contained in the **Appendix**. Pavement Core CB-08 had to be removed from the core barrel in pieces.

4 LABORATORY TESTING

A representative set of soil samples were tested in the laboratory to assist in the classification and determination of engineering characteristics of the soils based on their mechanical and physical behavior. Laboratory testing was accomplished in general accordance with applicable AASHTO and ASTM procedures. Laboratory tests completed on soil samples retrieved for this project include:

- Twenty-three (23) moisture content determinations (ASTM D-2216/AASHTO T-265),
- Twenty-three (23) percent passing No. 200 sieve tests (ASTM D-1140/AASHTO T-11),
- Eleven (11) Atterberg limit determination tests (ASTM D-4318/AASHTO T-89/T-90),
- Three (3) organic content determination tests (ASTM D-2974/AASHTO T-267),
- Visual classification in general accordance with applicable procedures.

Results for each of these laboratory tests are summarized in the following **Table 3** and are presented on the individual **Soil Profile** logs provided in the **Appendix**.

Table 3: Summary of Laboratory Testing

Boring No. (Depth) (ft.)	Moisture Content (%)	Percent Passing -200 (%)	Organic Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS/ AASHTO Group
C-10 (0.5-1)	142.1	25.4	58.7	-	-	-	PT
CB-01 (6-8)	21.2	22.1	-	-	-	-	SC/A-2-7
CB-02 (2-4)	58.8	14.0	9.8	-	-	-	SM/A-2-4
CB-02 (28.5-30)	45.2	67.7	-	45	22	23	CL/A-7
CB-04 (13.5-15)	31.0	28.3	-	48	18	30	SC/A-2-7
CB-06 (23.5-25)	41.9	49.2	-	57	19	38	CH/A-7
CB-07 (8-10)	21.6	29.7	-	-	-	-	SC/A-2-7
CB-08 (13.5-15)	39.7	29.3	-	-	-	-	SC/A-2-7
CB-09 (28.5-30)	38.9	30.5	-	48	18	30	SC/A-2-7
CB-09 (33.5-35.5)	69.6	25.8	-	-	-	-	SC/A-2-7
CB-10 (6-8)	18.6	23.7	-	-	-	-	SC/A-2-4
CB-10 (8-10)	20.6	23.6	-	-	-	-	SC/A-2-7
CB-11 (4-6)	18.6	23.8	-	-	-	-	SC/A-2-4
CB-11 (6-8)	44.3	88.7	-	57	27	30	CH/A-7
CB-12 (23.5-25)	27.3	23.5	-	NP	NP	NP	SM/A-2-4
CB-13 (23.5-25)	28.6	31.2	-	35	18	17	SC/A-2-6
CB-13 (33.5-35)	28.2	17.8	-	-	-	-	SC/A-2-6
CB-15 (28.5-30)	31.5	33.6	-	NP	NP	NP	SM/A-2-4
JB-01 (8-10)	21.5	23.2	-	-	-	-	SC/A-2-4
JB-02 (2-3)	27.0	6.1	2.7	-	-	-	SP-SM/A-3
JB-02 (13.5-15)	41.6	38.0	-	52	17	35	SC/A-2-7
SB-03 (13.5-15)	36.9	29.1	-	50	20	30	SC
SB-03 (15.5-17.5)	25.9	19.0	-	30	24	6	SC
SB-04 (18.5-20.5)	90.6	46.2	-	82	26	56	CH

NP = Non-Plastic

In addition to the physical property tests performed, which are summarized in **Table 3** herein, one (1) one-dimensional, incremental loading consolidation test was conducted in accordance with

ASTM D-2435. Incremental loading up to 8-tsf was applied to the sample to gauge the amount of displacement for each load increment. The results of the consolidation test were used to help determine the estimated total and differential settlements of the box culvert.

In addition to the above laboratory testing, environmental corrosion tests were conducted on selected representative soil samples in accordance with the FDOT test designations FM 5-550, FM 5-551, FM 5-552 and FM 5-553. Environmental corrosion tests measure parameters such as pH, resistivity, sulfate content and chloride content. Test results obtained are presented in **Table 4** herein below. Based on the laboratory test results and the FDOT Structures Design Guidelines, January 2018, the subsurface soil conditions range from Slightly Aggressive to Moderately Aggressive. This classification was based on Section 1.3.2 and 1.3.3 of the Structures Design Guidelines. We recommend using the applicable provisions in the FDOT Structures Design Guidelines and FDOT Standard Specifications for corrosion protection.

Table 4: Summary of Environmental Corrosion Test Results

Sample ID and Depth (ft)	pH	Resistivity (ohms-cm)	Sulfates (ppm)	Chlorides (ppm)	Individual Environmental Classification*	
					Steel	Concrete
CB-01 (4-6)	8.27	3,610	7.6	2.9	Moderately Aggressive	Slightly Aggressive
CB-02 (8-10)	7.47	7,649	0.37	1.1	Slightly Aggressive	Slightly Aggressive
CB-03 (8-10)	7.68	5,020	1.1	5.2	Slightly Aggressive	Slightly Aggressive
CB-05 (13.5-15)	7.30	4,656	7.2	3.4	Moderately Aggressive	Slightly Aggressive
CB-06 (8-10)	7.51	6,556	1.3	4.8	Slightly Aggressive	Slightly Aggressive
CB-07 (6-8)	7.48	4,656	4.9	5.1	Moderately Aggressive	Slightly Aggressive
CB-10 (4-6)	7.34	1,339	0.44	49	Moderately Aggressive	Moderately Aggressive
CB-13 (13.5-15)	7.30	8,924	1.4	1.6	Slightly Aggressive	Slightly Aggressive
CB-14 (13.5-15)	7.43	3,780	8.6	6.2	Moderately Aggressive	Slightly Aggressive
JB-02 (15.5-17.5)	8.37	2,295	15	2.1	Moderately Aggressive	Moderately Aggressive
Notes:	*As per FDOT Structures Design Guidelines (Version 2018) Section 1.3.2, Table 1.3.2-1					
pH (FM-5-550); Resistivity (FM-5-551); Sulfates (FM-5-553); Chlorides (FM-5-552)						

5 SUBSURFACE CONDITIONS

5.1 Subsurface Conditions

The descriptions presented herein are of a generalized nature to highlight the major subsurface

stratification features and material characteristics. The soil profiles included in the **Appendix** should be reviewed for specific information at individual boring locations. These profiles include soil description, stratification, penetration resistances (N-values), and laboratory test results. The stratification shown on the boring profiles represents the conditions only at the actual boring location. Variations may occur and should be expected between boring locations. The soil’s relative density or consistency is based on the recorded N-Value and is summarized in the following **Table 5**.

Table 5: Relative Density Description vs. N-Value

Granular Materials-Relative Density	Automatic Hammer SPT (Blows/FT)
Very Loose	< 3
Loose	3 – 8
Medium	8 – 24
Dense	24 – 40
Very Dense	> 40
Silts and Clays Consistency	Automatic Hammer SPT (Blows/FT)
Very Soft	< 1
Soft	1 – 3
Firm	3 – 6
Stiff	6 – 12
Very Stiff	12 – 24
Hard	> 24
SPT Spoon Inside Diameter 1 3/8” SPT Spoon Outside Diameter 2”	ASTM Standard Drop Safety Hammer Average Hammer Drop Height 30” Hammer Weight 140-lbs

Proposed Junction Boxes (Borings JB-01 and JB-02)

In general, the subsurface conditions encountered at the junction box borings JB-01 and JB-02, performed at Stations 114+50 (Rome Avenue) and 40+75 (Cass Street) respectively, consisted of loose to medium dense, poorly-graded fine SAND to fine SAND with silt (SP-SM/A-3) from the surface to 8-ft. bgs. Loose to medium dense, clayey fine SAND (SC/A-2-4) was encountered from 8-ft. to 18-ft. bgs in JB-01 and from 8 to 10-ft bgs in JB-02. The SC/A-2-4 soil encountered in JB-02 was followed by very loose to medium dense clayey fine SAND (SC/A-2-7) from 10 to 18.5-ft. bgs. Firm, lean CLAY (CL/A-7) was encountered at JB-01 from 25 to 30-ft. bgs. Highly weathered to competent LIMESTONE was penetrated in JB-01 from depths of 18 to 25-ft. bgs and 30 to 40-ft. bgs and in JB-02 from 18.5 to 40-ft. bgs. A complete (100%) loss of circulation (LOC) occurred at 23-ft. bgs at boring JB-01 and a partial (50%) LOC occurred at 37-ft. bgs at boring JB-02. It is not uncommon to have LOC events in LIMESTONE because of its porous matrix as in the case at these borings. The borings were terminated in LIMESTONE at a depth of 40-ft. bgs.

Signalization Mast Arms (Borings SB-01 through SB-04)

The conditions encountered at the signalization mast arm borings consisted of loose to medium dense, poorly-graded fine SAND to fine SAND with silt (SP-SM) from the surface to depths ranging from 8 to 15-ft. bgs. Very loose to medium dense, clayey fine SAND (SC/A-2-7) and very soft, fat CLAY (CH/A-7) was encountered to depths ranging from 13.5 to 22-ft. bgs where highly weathered to competent LIMESTONE was encountered. Borings SB-01 and SB-02 were performed to a depth of 25-

ft. bgs while SB-03 and SB-04 were performed to a depth of 30-ft. bgs to delineate the very loose/soft soil conditions encountered from 10 to 20-ft. and 15 to 23-ft. bgs, respectively. All four (4) signalization borings were terminated in competent LIMESTONE.

Cass Street (Borings CB-04 through CB-07)

The subsurface conditions encountered at the borings performed along Cass Street generally consisted of very loose to dense, poorly-graded fine SAND to fine SAND with silt (SP-SM/A-3) from the surface to depths ranging from 8 to 20-ft. bgs. Loose to medium dense, clayey fine SAND (SC/A-2-7) and very soft to very stiff, plastic CLAY (CH/A-7) was encountered beneath the surficial sands in each boring except CB-05 until highly weathered to competent LIMESTONE was penetrated at a depth ranging from 8 to 29-ft. bgs. Boring CB-05 penetrated very loose to medium dense, poorly-graded fine SAND to fine SAND with silt (SP-SM/A-3) to a depth of 8.5-ft. bgs before transitioning into competent LIMESTONE to the boring termination depth of 30-ft. bgs. The borings were terminated at depths of 30 and 35-ft. bgs in competent LIMESTONE.

Gray Street (Borings CB-09 through CB-15)

The subsurface conditions encountered at the borings performed along Gray Street consisted of very loose to medium dense, poorly-graded fine SAND to fine SAND with silt (SP-SM/A-3) from the surface to depths ranging from 4 to 25-ft. bgs. Some of the borings had layers of clayey fine SAND (SC/A-2-4, A-2-7) in-between layers of the SP-SM/A-3 soil. Underlying the SP-SM/A-3 soils, very loose to medium dense, clayey fine SAND (SC/A-2-4, A-2-6 and A-2-7), very soft to stiff, plastic CLAY (CH/A-7) and loose, silty SAND (SM/A-2-4) were encountered until highly weathered to competent LIMESTONE was encountered, ranging from 15.5 to 37.5-ft. bgs. Weight of Hammer (WOH) conditions were encountered in CB-09 (28.5 to 30-ft. and 33.5 to 36.5-ft.), CB-10 (18.5 to 24-ft.), CB-11 (13.5 to 15.5-ft.) and CB-13 (28.5-29.5-ft. and 33.5 to 34.5-ft.). The borings were terminated in competent LIMESTONE at depths of 30, 32, 35, 37 and 45-ft. bgs. The borings were extended beyond their planned depths due to loose/soft soil conditions.

Rome Avenue (Borings CB-01 through CB-03 and CB-08)

The subsurface conditions encountered at the borings performed along Rome Avenue generally consisted of loose to medium dense, poorly-graded fine SAND to fine SAND with silt (SP-SM/A-3) from the surface to depths ranging from 8 to 25-ft. bgs. Loose to medium dense, clayey fine SAND (SC/A-2-7) was encountered from 6 to 10-ft. bgs in CB-01 and from 8 to 15-ft. bgs in CB-08. Soft, plastic CLAY (CH, A-7) was encountered in CB-08 from 15 to 19-ft. bgs. Soft, lean CLAY with sand (CL, A-7) was encountered in CB-02 from 25 to 35-ft. bgs. Highly weathered to competent LIMESTONE was encountered in the borings ranging from 13.5 to 35-ft. bgs. The borings were terminated at depths of 35 and 35.5-ft. bgs in competent LIMESTONE.

5.2 Groundwater Conditions

The depth to groundwater measured in the SPT borings ranged between 3.5 to 6-ft. bgs. A summary of the borings and the estimated SHWT depth is presented in **Table 6**.

Table 6: Summary of Groundwater Information

Boring ID	Approximate Station and Offset (ft)	Depth to Groundwater (ft)	SHWT Depth (ft)
CB-01	11+00, 15 LT	4	2
CB-02	16+00, 10 LT	3 ½	2
CB-03	21+00, 5 LT	4	2
CB-04	46+00, 15 RT	4	3
CB-05	51+00, 10 RT	4	3
CB-06	59+00, 20 LT	6	3 ½
CB-07	64+00, 20 LT	6	3
CB-08	27+00, 10 LT	3 ½	2 ½
CB-09	80+00, 5 RT	4	2 ½
CB-10	84+00, 5 RT	3 ½	2
CB-11	89+00, 10 RT	5	2 ½
CB-12	94+00, 5 RT	6	3 ½
CB-13	98+00, 5 RT	5	2 ½
CB-14	103+00, 5 RT	4	2
CB-15	108+00, 10 LT	4	2
SB-01	53+50, 40 LT	4	2
SB-02	54+50, 35 LT	3 ½	2
SB-03	54+50, 20 RT	4	2
SB-04	53+50, 40 RT	3 ½	2
JB-01	114+50, 5 LT	5	3 ½
JB-02	40+75, 15 RT	3 ½	2 ½

The SHWT data is based upon our review of the SPT borings performed near the project alignment; USDA soil survey; and, hand-auger borings performed as a part of this project.

5.3 Pavement Information

Ten (10) pavement cores were performed along the project alignment and labelled C-01 through C-10. Pavement information along the project roadways is summarized in the **Pavement Core Summary** sheets in the **Appendix** and includes thickness of the asphalt and base course materials.

6 EVALUATION AND CONCLUSIONS

The following evaluations and conclusions have been developed based on the previously described project characteristics, our review of published data, our site reconnaissance and the results of our subsurface exploration and associated laboratory testing:

1. We compared the USDA soil survey information with the shallow subsurface information collected in our test borings. The data provided in the soil survey indicates SAND from zero to 80-in. bgs. Our test borings indicated that poorly-graded fine SAND to silty SAND (A3, A-2-4) was encountered in at least the first 6-ft. in the borings. The soil survey data generally appeared similar to the soil data collected from the borings performed, taking into account site development activities over the years.

2. Our review of the USGS topographic maps did not indicate any readily visible unusual changes nor anything that appeared out of the ordinary that would require any further clarification.
3. Artesian flow conditions were not encountered within the borings performed during the field exploration. However, the contractor should be prepared to handle potentiometric surface levels up to an elevation of 10-feet.
4. Groundwater was encountered in all of the SPT borings performed. The SHWT was estimated to range from 2 to 3 ½-ft. bgs (see **Table 6** for SHWT determinations at individual boring locations and in the **Appendix** for the encountered water table depths at the individual SPT boring locations). The contractor should be prepared to address groundwater conditions during construction. General groundwater control recommendations are provided in **Section 7.2.1 herein**.
5. Based on our review of the data collected from the SPT borings performed, it is our opinion that the subsurface soils are suitable for supporting the proposed culvert improvements. Some densification of these soils will likely be required, and/or structural fill used to support the trunk line. In addition, we noted the following:
 - LIMESTONE was encountered in all of the SPT borings. In some borings, the LIMESTONE was encountered as shallow as 13.5-ft. bgs, which may make it difficult to perform the required open-trench excavations. The **Individual Boring Logs** in the **Appendix** and **Table 7** of this report should be reviewed to anticipate locations where LIMESTONE may be encountered, so that the contractor comes prepared with the appropriate excavation equipment.
 - Significant amounts of Weight of Hammer (WOH) conditions were encountered in borings CB-05 (8 to 9.5-ft.), CB-06 (23.5 to 25.5-ft.), CB-08 (13.5 to 16-ft.), CB-09 (28.5 to 30-ft.), CB-10 (18.5 to 24-ft.), CB-11 (13.5 to 15.5-ft.) and CB-13 (28.5-29.5-ft. and 33.5 to 34.5-ft.). Depending on the depth of the culvert compared to the depth of the WOH material, more than 1-ft. of over-excavation and replacement of the weak soils with structural fill may be necessary in order to obtain compaction in the bedding layer beneath the culvert.
 - The possibility of other variations in subsurface conditions, other than what was encountered in the SPT borings may exist along the project alignment.
6. Although we anticipate limited over excavation and replacement of foundation bearing soils within the footprint of the proposed trunk line, the potential that variable amounts of unsuitable soils may be encountered during construction must be accounted for and planned, as indicated herein. Clean structural fill will be required to backfill against structures. See **Section 7.2** for further recommendations on structural fill and trench preparation.

7. **Table 7** below summarizes the encountered materials and conditions at the proposed approximate invert depths and elevations of the box culvert. This table should be used to anticipate what could be encountered at the bottom of the culvert excavation and develop what soil improvements will be needed, if any. We have included herein below, recommendations on how unsuitable soils should be treated, if encountered during construction. It should be noted that **Table 7** indicates the actual subsurface soil conditions that were encountered at the specific SPT boring locations. Based on our experience, variations in these subsurface conditions in-between the SPT boring locations are quite possible and should be anticipated.

Table 7: Summary of Expected Conditions at Bottom of Box Culvert

SPT Boring ID	Approximate Station and Offset	Approximate Invert Elevation of Box Culvert (ft)/(NAVD 88)	Expected Conditions	Notes
CB-01	11+00, 15 LT	7	Loose SP-SM/A-3	-
CB-02	16+00, 10 LT	5.5	Loose SP-SM/A-3	-
CB-03	21+00, 5 LT	3	Medium SP-SM/A-3	-
CB-04	46+00, 15 RT	0	Competent LS	-
CB-05	51+00, 10 RT	0	Competent LS	-
CB-06	59+00, 20 LT	-0.5	Medium SP-SM/A-3	-
CB-07	64+00, 20 LT	-1	Stiff CH/A-7	unsuitable
CB-08	27+00, 10 LT	0	Soft CH/A-7	unsuitable
CB-09	80+00, 5 RT	N/A to box (13)	Medium SP-SM/A-3	-
CB-10	84+00, 5 RT	8.5	Loose SC/A-2-7	-
CB-11	89+00, 10 RT	7.5	Very Soft CH/A-7	unsuitable
CB-12	94+00, 5 RT	4	Medium SP-SM/A-3	-
CB-13	98+00, 5 RT	3.5	Medium SP-SM/A-3	-
CB-14	103+00, 5 RT	2	Medium SC/A-2-6	-
CB-15	108+00, 10 LT	1	Medium SP-SM/A-3	-
SB-01	53+50, 40 LT	0	Weathered LS	-
SB-02	54+50, 35 LT	-0.5	Competent LS	-
SB-03	54+50, 20 RT	-0.5	Very Loose SC/A-2-7	-
SB-04	53+50, 40 RT	0	Very Soft CH/A-7	unsuitable
JB-01	114+50, 5 LT	0	Medium SC/A-2-4	-
JB-02	40+75, 15 RT	-1	Competent LS	-

LS = Limestone

- Granular Soils:** Very loose to loose granular soils will require compacting in order to create a competent/level bed for supporting the box culvert. Granular soils include A-1, A-2 and A-3 soils. Soils should be compacted to 95% of its modified Proctor value while within +/- 2% of the optimum moisture content. Some materials, such as the A-2's, may be difficult to dry out to optimum moisture content or to compact as needed. If these materials prove too difficult, they should be over-excavated at least 1-ft. and backfilled in accordance with **Section 7.2.5** of this report and **FDOT Standard Indexes**.
- Clays and Silts:** These soils behave very differently when saturated or dry. The in-situ material encountered during excavation will be saturated due to the anticipated

shallow groundwater table, but will need to be dry in order to create suitable working conditions. Soils classified as A-4, A-5, A-6 or A-7 will likely be very difficult to dry out and may have an ability to shrink and swell depending on its moisture content. Because of this, these materials should be over-excavated at least 1-ft. and backfilled with either clean fill, a lean concrete or course stone (No. 57) wrapped in a geotextile fabric.

- **Limestone:** This material, if adjacent to suitable soils should be over-excavated a minimum of 4-in. and backfilled in accordance with **Section 7.2.3** in order to provide a level bed for supporting the box culvert, as well as to prevent differential settlement.
8. We calculated the maximum allowable bearing capacity of each section of the box culvert to be 2,000 psf. Using this as the loading, the total estimated settlement of the box culvert was determined to be less than 1-in., and the anticipated differential settlements about half this amount. These estimated settlements were corroborated by the results of the consolidation testing, which showed the total settlement to be approximately ½-inch. Any differential settlement will likely occur at the joints of the individual box culvert sections, so due care should be exercised during construction. The values for bearing capacity and settlement assume that the recommendations in this report are followed.
 9. We calculated the maximum allowable bearing capacity of each of the proposed junction boxes to be 2,500 psf. Using this as the loading and, the total estimated settlement of the junction boxes was determined to be less than 1-in., and the anticipated differential settlements about half this amount. Again, these estimated settlements were confirmed by the results of the consolidation testing. The majority of any settlement is expected to occur during construction. All connections to the junction boxes should be made after box construction is completed.
 10. Once the box culvert and junction boxes are in place, clean fill should be used as backfill and compacted in 12-in. loose lifts up to 18-in. beneath the bottom of the base course of the roadway in accordance with **FDOT Standard Indexes** and the recommendations within this report.

Soil Parameters are presented in the **Appendix** to aid in the design of the signalization mast arms and junction boxes. Additionally, lateral earth pressures are discussed in **Section 7.3** for the design of the culvert excavations.

7 RECOMMENDATIONS

7.1 General

The following recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project locations on the site, a review must be made by **MC²** to

determine if any modifications to the recommendations would be required. The findings of such a review would be presented in a supplemental report.

Once final design plans and specifications are available, a general review by MC² is strongly recommended, as a means to check that the evaluations made in preparation of this report are correct and that recommendations are properly interpreted and implemented.

7.2 Construction Considerations

7.2.1 Dewatering Considerations

Surface water and groundwater control will likely be needed, depending on groundwater depths at the time of construction, to establish a stable excavation base. Dewatering equipment consisting of sump pumps and/or well points have been used successfully in the past. Dewatering must be conducted with care to avoid settlement of nearby structures, roads or utilities.

Depending upon the groundwater levels and the effectiveness of dewatering at the time of construction, seepage may enter the excavated areas from the bottom as well as the sides of the excavations. Such seepage will act to loosen soils and create difficult working conditions, and therefore groundwater levels should be determined immediately prior to construction. Groundwater levels should be kept at least 12-in. below the working area to facilitate proper material placing and compaction. In some instances, it may be necessary to lower the ground water even further, if adequate compaction and stability of the base of the excavation cannot be achieved with the groundwater lowered to only 12-in. below the base.

7.2.2 Temporary Slopes

Side slopes for temporary excavations may stand near one (1) horizontal to one (1) vertical (1H:1V) for short dry periods of time and a maximum excavation depth of four (4) feet, so long as the groundwater table is at least 1-ft. below the bottom of the excavation. Where restrictions do not permit slopes to be constructed as recommended above, the excavation should be shored in accordance with current OSHA requirements. In addition, any open cut excavations adjacent to existing structures should be evaluated by a geotechnical engineer on a case by case basis. During construction, excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

Excavation slopes should conform to OSHA, State of Florida and any other local regulations. The dewatering system chosen for use on this project should consider the nature of the permeable upper sands encountered at the project site. The contractor should also assess equipment loads and vibrations when considering slopes or excavations.

7.2.3 Excavations

We understand the trunk line will be predominantly installed using open-cut trench excavations along the project alignment. All open excavations, if applicable, should be observed by the geotechnical engineer or his representative to explore the extent of any fill and excessively loose, soft, or otherwise undesirable materials. Lateral Earth Pressures are presented in **Section 7.3** for use in design of the culvert trenches. In addition to this, **Soil Parameters** are presented in the **Appendix** of this report for use in the design of the signalization mast arms and junction boxes.

During excavation, any dense, hard or lumpy material, as well as any rock or boulders encountered below the bedding zone should be removed. The contractor should have specialized equipment, such as a ripper tooth, on site in the event that LIMESTONE is needed to be excavated. It is extremely unlikely that a need to blast the rock to advance any excavations will be needed. If any voids are encountered within LIMESTONE excavations, they should be filled in with either a fine gravel, compacted fill or lean concrete in order to provide a level platform to work upon.

If the exposed soils in the excavation appear suitable as load bearing materials, they should be prepared for construction by compaction as recommended in **Section 7.2.5**.

If loose soils or yielding soils are encountered in the bottom of the excavations, the unsuitable materials should be removed and the proposed bearing elevation re-established by backfilling after the undesirable material has been removed. This backfilling may be done with a very lean concrete or with a well compacted, suitable fill such as clean sand, gravel, or compacted No. 57 or No. 67 stone wrapped in a filter fabric.

7.2.4 Structural Fill and General Backfill

All materials to be used for general backfill or compacted, structural fill should be evaluated and, if necessary, tested by MC² prior to placement to determine if they are suitable for the intended use. Based on the borings performed, the majority of the shallow on site sandy materials encountered that will be excavated in order to install the box culvert (SP, SP-SM/A-3, A-2-4) are suitable for use as structural fill, and as general subgrade fill and backfill. Suitable fill materials should consist of fine to medium Sand with less than 12% passing the No. 200 sieve (SP, SP-SM/A-3, and some A-2-4) and be free of rubble, organics, clay, debris and other unsuitable material.

The non-organic clean fine SAND and slightly silty or clayey fine SAND (A-3 and A-2-4) encountered at the project site are considered suitable for backfill soils for roadway construction. A-2-4 soils should only be used above the SHWT in accordance with **FDOT Standard Index 505**.

Table 3 contains a summary of the laboratory test results performed indicating depths and locations of soils with percent passing the No. 200 sieve, as well as the boring profiles

contained in the **Appendix**. Soils not classified as SP or SP-SM should not be considered suitable for use as structural fill. As before, the data presented applies to the specific locations and depths from which the samples were collected and tested. Again, variations in the characteristics and properties of the soils could occur in other locations where no borings were performed.

7.2.5 Compaction Criteria

The subgrade soils should be firm and stable prior to placement of any utilities, junction boxes and culvert sections. The soils that will support the junction boxes and culvert sections should be proof-rolled, if accessible, and checked for heaving prior to placing the structures on top. Unstable soils should be treated as described in this report.

The bearing surface of the culvert should be compacted to a minimum of 95% of the modified Proctor (AASHTO T180) maximum dry density while within $\pm 2\%$ of the material's optimum moisture content. If these compaction requirements are not achievable then the material must be over-excavated at least 1-ft. and backfilled with either clean fill, lean concrete or course stone wrapped in a geotextile.

The upper 18-in. beneath the junction boxes should be compacted to at least 98% of the modified Proctor maximum dry density while within $\pm 2\%$ of the material's optimum moisture content. If these compaction requirements are not achievable then the material must be over-excavated at least 1-ft. and backfilled with either clean fill, lean concrete or course stone wrapped in a geotextile.

A minimum density of 92% of the modified Proctor maximum dry density while within $\pm 2\%$ of the material's optimum moisture content should be required for backfill around the culvert sections and junction boxes up to 3-ft. above the top of these structures. Heavy machinery should not be placed on top of these structures until at least 3-ft. of cover is in place.

Any fill between 3-ft. from the top of the box culvert and below 18-in. of the bottom of the base course should be compacted to a minimum density of 95% of the modified Proctor maximum dry density while within $\pm 2\%$ of the material's optimum moisture content.

Material within 18-in. of the bottom of the base material, or higher, should be compacted to 98% of the modified Proctor maximum dry density. Placement of stabilized subgrade, base course and asphalt should be in accordance with applicable FDOT Standard Indexes.

Soils suspected of containing organic materials should be tested and contain less than 5% organics before they can be considered for use as backfill or structural fill. Some contractors like to place a gravel working bed in wet areas. Fine gravel, such as No. 57 and No. 67 stone may be used, as long as the gravel is wrapped in a filter fabric (Mirafi N 140 or equivalent) to reduce the risk of fines filtering into the open voids in the gravel. The

gravel, where used, should be compacted and the compaction confirmed by visual observation.

7.2.6 Directional Drilling

If horizontal directional drilling (HDD) is utilized during construction, the materials that might be penetrated during HDD, dependent upon the location and depth, might be very loose/soft soils or weathered/competent LIMESTONE. Care will be required during the HDD to limit the hydraulic head associated with the drilling fluid to reduce the risk of fracout and heave.

7.2.7 Signalization Foundations

The approximate locations of the SPT borings are shown on the **Boring Location Maps** as well as on the **Report of Core Borings** in the **Appendix**. Due to past developmental activities (such as roadway construction, underground utilities excavations, etc.), the previously disturbed soils may not have been properly backfilled and compacted; and, as a result, the degree of compaction and composition of the soils may vary considerably within a small area. These conditions should be field-verified at the time of construction.

The soils encountered at the location of the borings are suitable for the installation of the proposed structures, provided the recommendations included in this report are followed. Based on our understanding, the signalization mast arms will be designed in accordance with FDOT Standard Indexes.

Based on the SPT N-values and soil types at various depths, we have estimated the strength and unit weight parameters for design of the pole structures. These parameters were obtained from the SPT borings performed at or near the specified locations. We used empirical correlations between the N_{ES} -Value and the types of soils to arrive at the internal friction angle, cohesion, dry and wet densities, etc. The results are contained in **Table 10**, which is presented in the **Appendix**. The soil parameters shown are for the different soil strata encountered at the boring locations using the USCS soil classification system.

Once the final loads are known, the foundation system may be designed using the soil parameters provided in this report. The foundation designs should also consider torsional loads created by wind action.

7.3 Lateral Earth Pressures

Temporary shoring may be required for portions of the open-cut trench excavations and will be subjected to lateral earth pressures. Several earth pressure theories could be utilized, however, one of the most straightforward is the equivalent fluid pressure or Rankine Theory.

Walls, which are restrained at the top and bottom, will be subjected to at-rest soil pressures equivalent to a fluid density of 55 pounds per cubic foot (pcf). Walls, which are not restrained at

the top and where sufficient movement may mobilize active earth pressures, an equivalent fluid density of 36 pcf, can be used. At locations where the base of the walls extends below the groundwater table, soil pressures can be calculated using half (½) the equivalent fluid densities. However, hydrostatic and seepage forces must then be included. These equivalent fluid pressures do not include any surcharge effects for sloped backfill, point or area loads behind the walls and assume that adequate drainage provisions have been incorporated. Passive resistance could be neglected for a safer design (due to possible excavation or erosion in front of the wall at a future time). **Table 8** below provides a summary of the lateral earth pressure parameters for the three conditions described herein.

Table 8: Lateral Earth Pressure

Earth Pressure Condition	Coefficient of Earth Pressure (K)	Unsubmerged Fluid Density (1) (pcf)	Submerged Fluid Density (2) (pcf)
At-Rest (K_o)	0.50	55	24
Active (K_a)	0.33	36	16
Passive (K_p)	3.00	330	143

(1) These fluid densities are based on a clean sand backfill with an average internal friction angle of 30 degrees and a moist unit weight of 110 pcf.
(2) Hydrostatic and seepage forces should be added to the submerged fluid densities when calculating total forces acting on retaining walls.

8 REPORT LIMITATIONS

The evaluations and observations detailed herein are based on the available limited soil information obtained by MC² and information provided by **Woodruff** and **Tetra Tech** for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, MC² should be notified immediately to determine if changes or additional testing are required for this project. In the event that MC² is not retained to perform these functions, MC² cannot be responsible for the impact of those conditions on the performance of the project.

The geotechnical engineer warrants that the findings or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be provided the opportunity to review the final design plans and specifications to assess that our findings have been properly incorporated into the design documents. At that time, it may be necessary to submit recommendations for supplementary information. This report has been prepared for the exclusive use of **Woodruff, Tetra Tech, and their client.**

APPENDIX

Summary of Pavement Cores – Table 9
Pavement Core Summary Reports – (10 Sheets)
Summary of Soil Parameters – Table 10 (3 Sheets)
Project Location Map (Sheet 1)
Boring Location Map (Sheet 2)
USDA Soil Survey and USGS Topographic Maps (Sheet 3)
Subsurface Boring Profiles (Sheets 4 through 6)
Report of Core Borings (Sheet 7)
Individual Soil Profiles (25 Sheets)
Test Procedures

Cypress Street Outfall Regional Stormwater Improvements

City of Tampa, Florida

MC² Proposal No. T041704.066

Table 9 – Summary of Pavement Core Information

Boring ID	Roadway / Lane / Approximate Stationing & Offset	Asphalt Thickness (in)	Paver Thickness (in)	Base Material and Thickness (in)	Subbase Material	Water Table Depth (ft)
C-01	Cass Street / Outside EB Lane / Sta. 64+00, 15RT	4	3*	Shell – 7	A-3	GNE
C-02	Cass Street / Outside WB Lane / Sta. 57+50, 15LT	4 ¾	2 ¾*	Shell – 3	A-3	GNE
C-03	Cass Street / EB Lane / Sta. 51+00, 10RT	2	3*	Shell – 3	A-3	GNE
C-04	Cass Street / WB Lane / Sta. 43+00, 10LT	2	3*	Shell – 6	A-3	GNE
C-05	Gray Street / WB Lane / Sta. 109+00, 10LT	3	-	Shell – 5	A-3	GNE
C-06	Gray Street / EB Lane / Sta. 103+00, 10RT	3	-	Shell – 7	A-3	GNE
C-07	Gray Street / WB Lane / Sta. 99+00, 10TL	8	-	Black – 2 Shell – 6	A-3	GNE
C-08	Gray Street / EB Lane / Sta. 85+00, 10RT	8**	-	Black – 2	A-3	GNE
C-09	Rome Avenue / SB Lane / Sta. 13+00, 10LT	7	-	Black & Shell Mixed – 8	A-3	GNE
C-10	Rome Avenue / NB Lane / Sta. 22+00, 10RT	4	-	Limerock – 4	Organic Peat	GNE

*A thin layer of SAND with silt (A-3) was encountered between the paver and base course, possibly placed for leveling

**Core destroyed removing from core barrel

GNE = Groundwater Not Encountered within the borehole



PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-01</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Cass Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>Outside EB</u>
DATE PERFORMED:	<u>7/9/18</u>	LOCATION:	<u>Station 64+00, 15' RT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	4	4	Asphalt
4	7	3	Paver
7	8	1	SAND with silt (A-3)
8	15	7	Shell Base
15	21	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material



PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-02</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Cass Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>Outside WB</u>
DATE PERFORMED:	<u>7/9/18</u>	LOCATION:	<u>Station 57+50, 15' LT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	4 ¾	4 ¾	Asphalt
4 ¾	7 ½	2 ¾	Paver
7 ½	10	2 ½	SAND with silt (A-3)
10	13	3	Shell Base
13	19	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-03</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Cass Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>EB</u>
DATE PERFORMED:	<u>7/9/18</u>	LOCATION:	<u>Station 51+00, 10' RT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	2	2	Asphalt
2	5	3	Paver
5	6	1	SAND with silt (A-3)
6	9	3	Shell Base
9	15	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-04</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Cass Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>WB</u>
DATE PERFORMED:	<u>7/9/18</u>	LOCATION:	<u>Station 43+00, 10' LT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	2	2	Asphalt
2	5	3	Paver
5	6	1	SAND with silt (A-3)
6	12	6	Shell Base
12	18	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-05</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Gray Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>WB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 109+00, 10' LT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	3	3	Asphalt
3	8	5	Shell Base
8	14	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-06</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Gray Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>EB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 103+00, 10' RT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	3	3	Asphalt
3	10	7	Shell Base
10	16	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-07</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Gray Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>WB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 99+00, 10' LT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	8	8	Asphalt
8	10	2	Black Base
10	16	6	Shell Base
16	22	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-08</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Gray Street</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>EB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 85+00, 10' RT</u>



*core destroyed removing from core barrel

PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	8	8	Asphalt
8	10	2	Black Base
10	16	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-09</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Rome Avenue</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>SB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 13+00, 10' LT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	7	7	Asphalt
7	15	8	Mixed Shell & Black Base
15	21	6	SAND with silt (A-3)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

PAVEMENT CORE SUMMARY

PROJECT NAME:	<u>Cypress Street Outfall</u>	CORE ID:	<u>C-10</u>
PROJECT NO.:	<u>T041704.066</u>	STREET:	<u>Rome Avenue</u>
CLIENT:	<u>Woodruff & Sons, Inc.</u>	LANE:	<u>NB</u>
DATE PERFORMED:	<u>7/6/18</u>	LOCATION:	<u>Station 22+00, 10' RT</u>



PAVEMENT AND SUBSURFACE CONDITIONS

Layer Depth (in)		Thickness (in)	Description
From	To		
0	4	4	Asphalt
4	8	4	Limerock Base
8	14	6	Organic PEAT (PT)

Water Table Depth (ft): GNE Notes: Borehole Terminated in Subbase Material

Cypress Street Outfall Regional Stormwater Improvements

City of Tampa, Florida

MC² Proposal No. T041704.066

Table 10 (1 of 3) Summary of Soil Parameters Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Florida MC ² Project No. T041704.066										
Boring ID	Depth range (ft)	SPT N _{ES} -Value Average	USCS Group	Approx. Soil Unit Weight* (pcf)		Soil Angle of Friction (degrees)	Cohesion (psf)	Earth Pressure Coefficient		Ultimate Shear Strength (psf)
				Saturated	Submerged			Active (K _a)	Passive (K _p)	
Signalization Borings										
SB-01	0-13.5	10	SP-SM	105.0	42.6	29	0	0.347	2.88	-
	13.5-17	9	SC, CL	120.0	57.6	0	900	1	1	-
	17-20	48	LS	135.0	72.6	0	0	1	1	8,000
	20-25	50+	LS	135.0	72.6	0	0	1	1	15,000
SB-02	0-8	14	SP-SM	110.0	47.6	30	0	0.333	3	-
	8-13.5	14	SC	110.0	47.6	0	1,400	1	1	-
	13.5-25	50+	LS	135.0	72.6	0	0	1	1	15,000

*Values are for level (non-sloping) backfill; no surcharge loads on backfill

**Hand-auger borings were performed in the top 4 to 6-ft. at all test boring locations to avoid utilities. We assumed that the soils within this area have similar relative density as the immediately underlying strata.

LS = Limestone, WOH = Weight of Hammer

Cypress Street Outfall Regional Stormwater Improvements

City of Tampa, Florida

MC² Proposal No. T041704.066

Table 10 (2 of 3) Summary of Soil Parameters Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Florida MC ² Project No. T041704.066										
Boring ID	Depth range (ft)	SPT N _{ES} -Value Average	USCS Group	Approx. Soil Unit Weight* (pcf)		Soil Angle of Friction (degrees)	Cohesion (psf)	Earth Pressure Coefficient		Ultimate Shear Strength (psf)
				Saturated	Submerged			Active (K _a)	Passive (K _p)	
Signalization Borings										
SB-03	0-10	20	SP-SM	110.0	47.6	30	0	0.333	3	-
	10-18.5	2	SC	100.0	37.6	0	200	1	1	-
	18.5-25	13	LS	135.0	72.6	0	0	1	1	4,000
	25-30	50+	LS	135.0	72.6	0	0	1	1	15,000
SB-04	0-15	12	SP-SM	110.0	47.6	30	0	0.333	3	-
	15-22	WOH	CH	105.0	42.6	0	300	1	1	-
	22-24	42	LS	135.0	72.6	0	0	1	1	8,000
	24-30	10	LS	135.0	72.6	0	0	1	1	2,000

*Values are for level (non-sloping) backfill; no surcharge loads on backfill

**Hand-auger borings were performed in the top 4 to 6-ft. at all test boring locations to avoid utilities. We assumed that the soils within this area have similar relative density as the immediately underlying strata.

LS = Limestone, WOH = Weight of Hammer

Cypress Street Outfall Regional Stormwater Improvements

City of Tampa, Florida

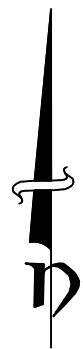
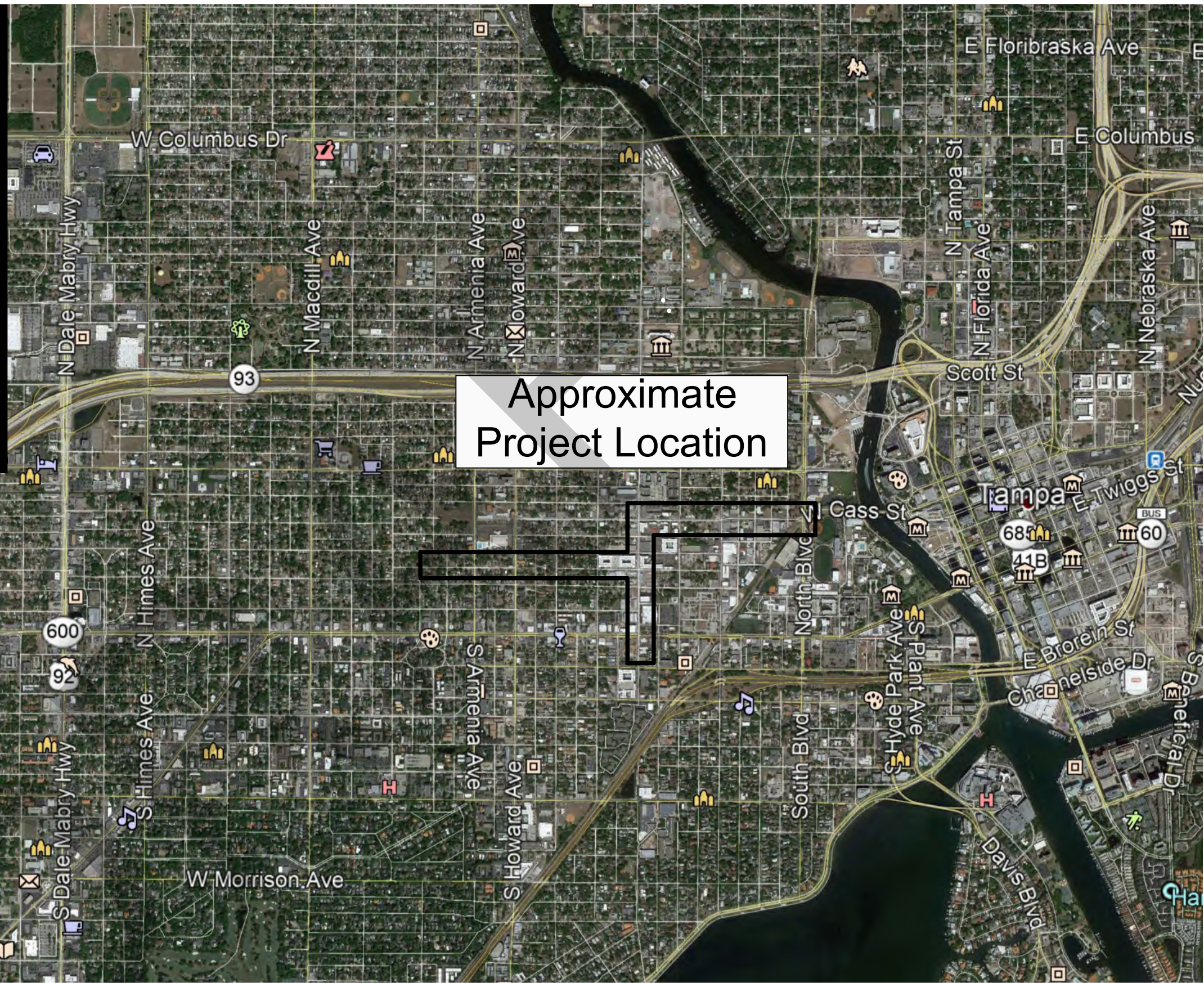
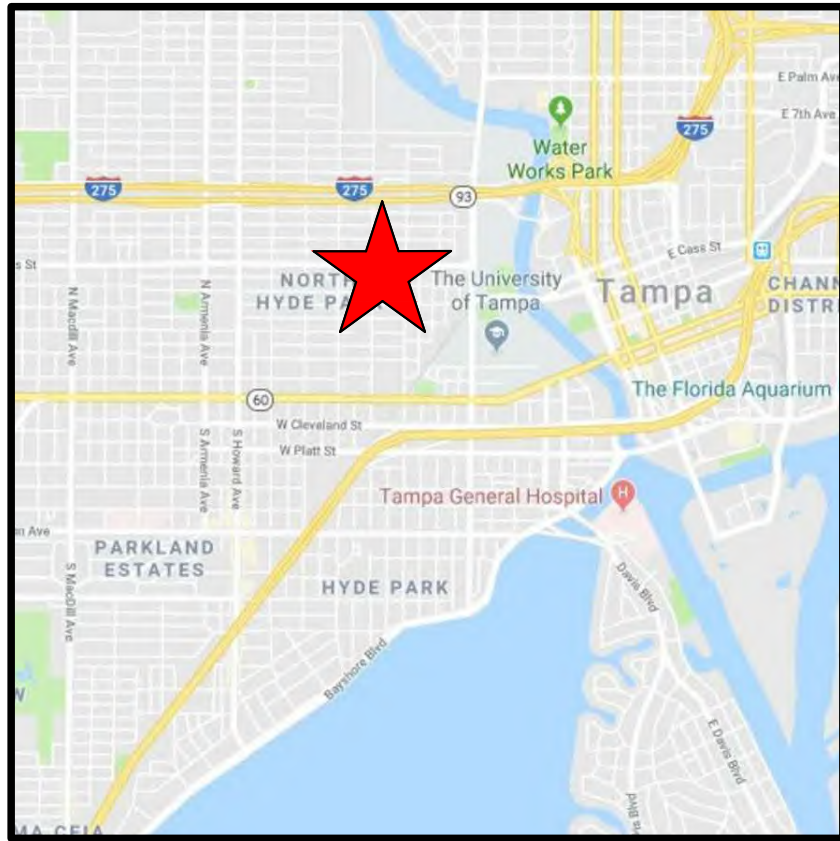
MC² Proposal No. T041704.066

Table 10 (3 of 3) Summary of Soil Parameters Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Florida MC ² Project No. T041704.066										
Boring ID	Depth range (ft)	SPT N _{ES} -Value Average	USCS Group	Approx. Soil Unit Weight* (pcf)		Soil Angle of Friction (degrees)	Cohesion (psf)	Earth Pressure Coefficient		Ultimate Shear Strength (psf)
				Saturated	Submerged			Active (K _a)	Passive (K _p)	
Junction Box Borings										
JB-01	0-18	12	SP-SM, SC	110.0	47.6	30	0	0.333	3	-
	18-25	50+	LS	135.0	72.6	0	0	1	1	15,000
	25-30	6	CL	115.0	52.6	0	750	1	1	-
	30-40	50+	LS	135.0	72.6	0	0	1	1	15,000
JB-02	0-10	7	SP-SM, SC	105.0	42.6	29	0	0.347	2.88	-
	10-18.5	12	SC	115.0	47.6	0	1,200	1	1	-
	18.5-40	50+	LS	135.0	72.6	0	0	1	1	15,000

*Values are for level (non-sloping) backfill; no surcharge loads on backfill

**Hand-auger borings were performed in the top 4 to 6-ft. at all test boring locations to avoid utilities. We assumed that the soils within this area have similar relative density as the immediately underlying strata.

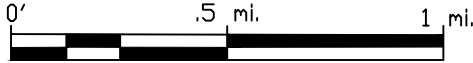
LS = Limestone, WOH = Weight of Hammer



Approximate Project Location

★ Approximate Project Location

Source: Google Earth
Image Date: 3/15/2018



Graphic Scale (miles)

DATE	NAME	REVISION	APPROVED BY:



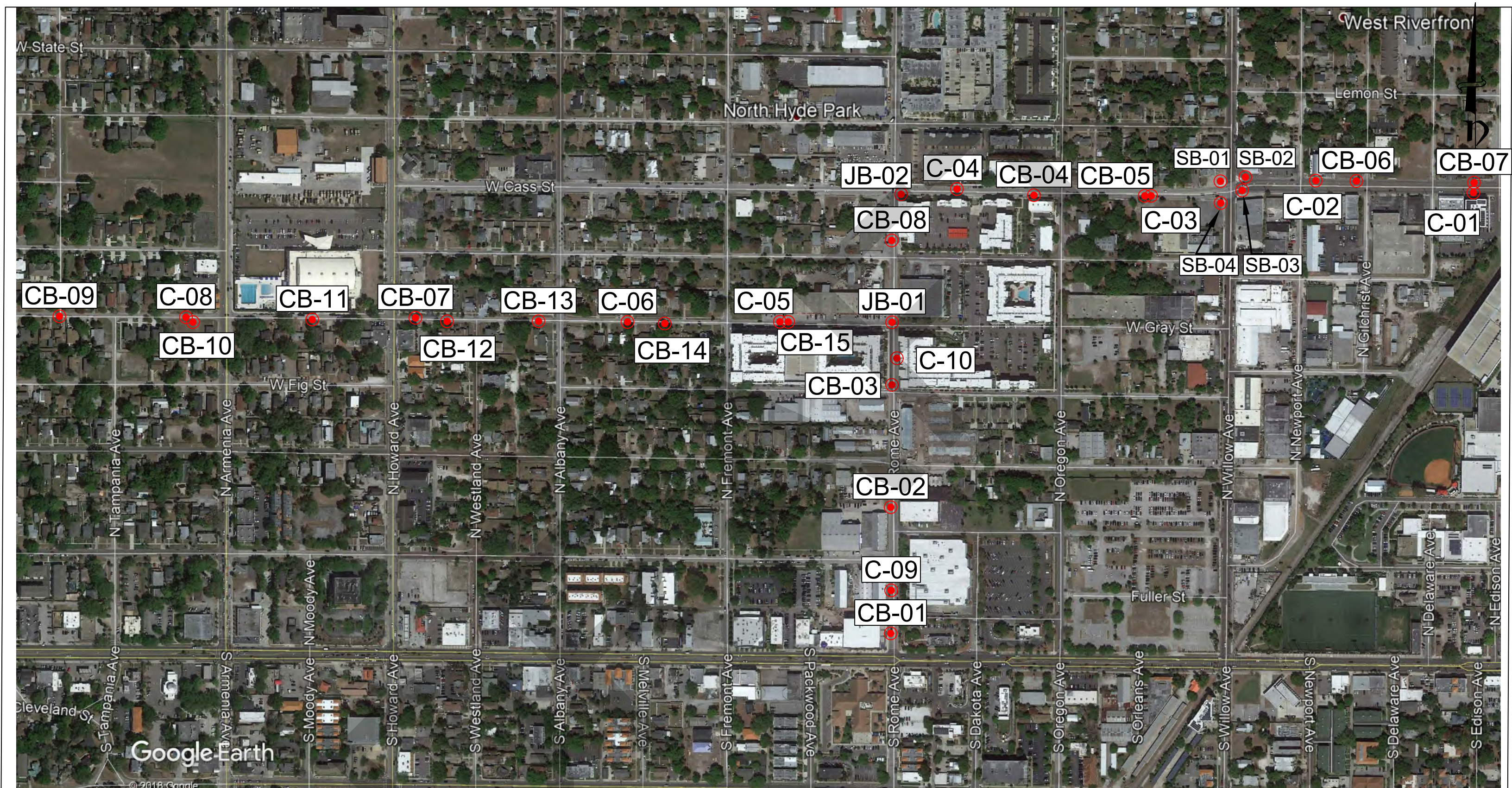
MC SQUARED, INC.
Geotechnical Consultants
5808 Breckenridge Parkway Suite - A
Tampa, FL 33610
Ph:813-623-3399 Fax:813-623-6636

FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191
Jeffery L. Hooks, P.E.
FLORIDA LICENSE No. 67882

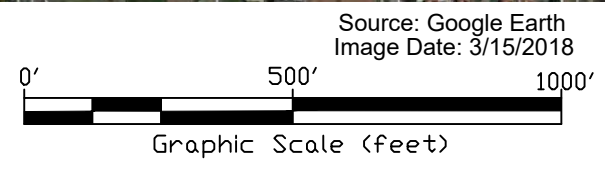
DESIGNED BY:	NAME	DATE
	TC	8/7/17
DRAWN BY:	KH	7/13/2018
CHECKED BY:	JH	7/16/2018
SUPERVISED BY:	WS	

PROJECT LOCATION MAP
Cypress Street Outfall Stormwater Improvements
City of Tampa, Hillsborough County, FL

MC² PROJ. NO.	SHEET NO.
T041704.066	1



LEGEND:
 Approximate Boring Location



DATE	NAME	REVISION	APPROVED BY:



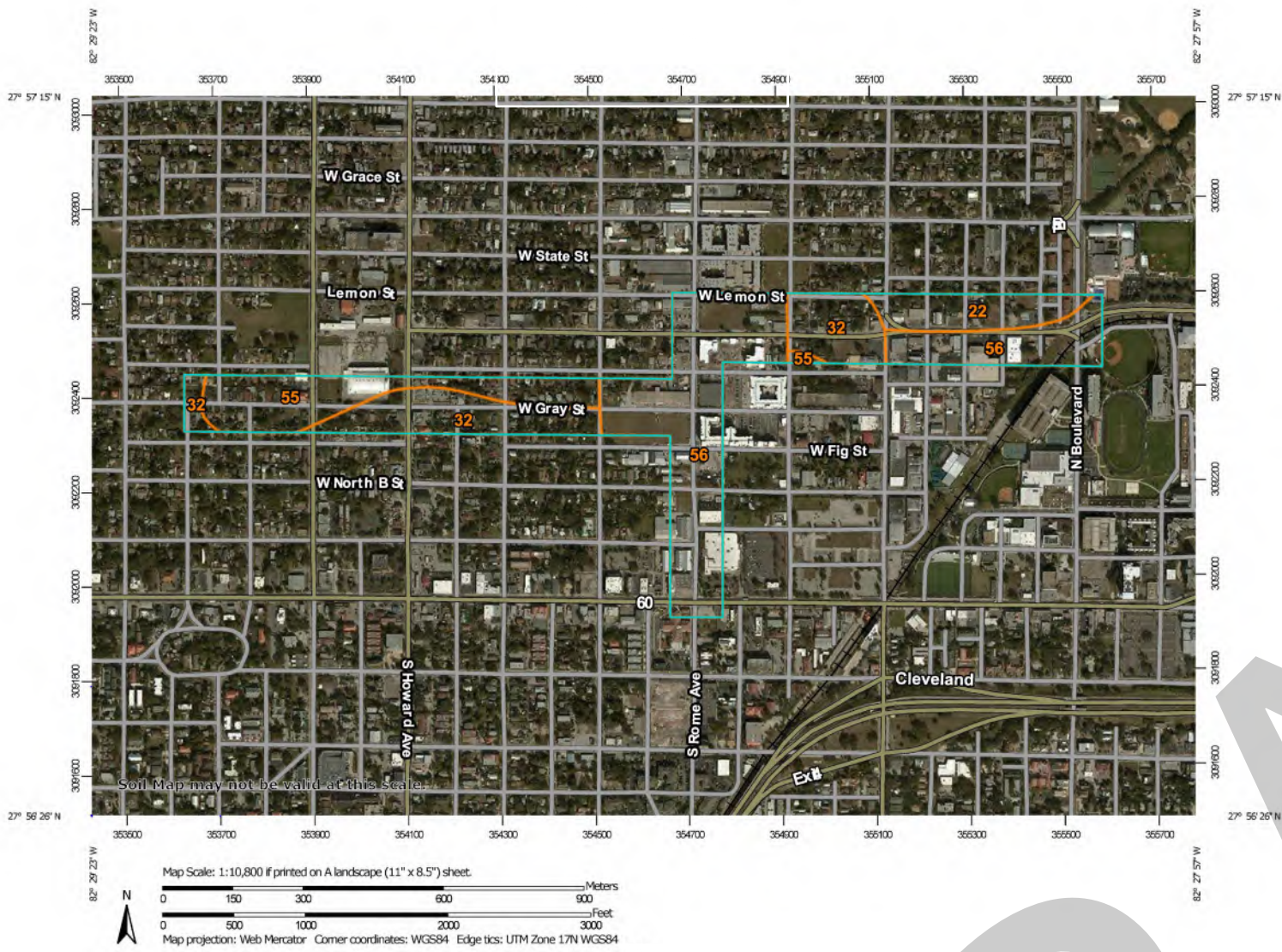
MC SQUARED, INC.
 Geotechnical Consultants
 5808 Breckenridge Parkway Suite - A
 Tampa, FL 33610
 Ph: 813-623-3399 Fax: 813-623-6636

FLORIDA ENGINEERING CERTIFICATE OF
 AUTHORIZATION No. 9191
 Jeffery L. Hooks, P.E.
 FLORIDA LICENSE No. 67882

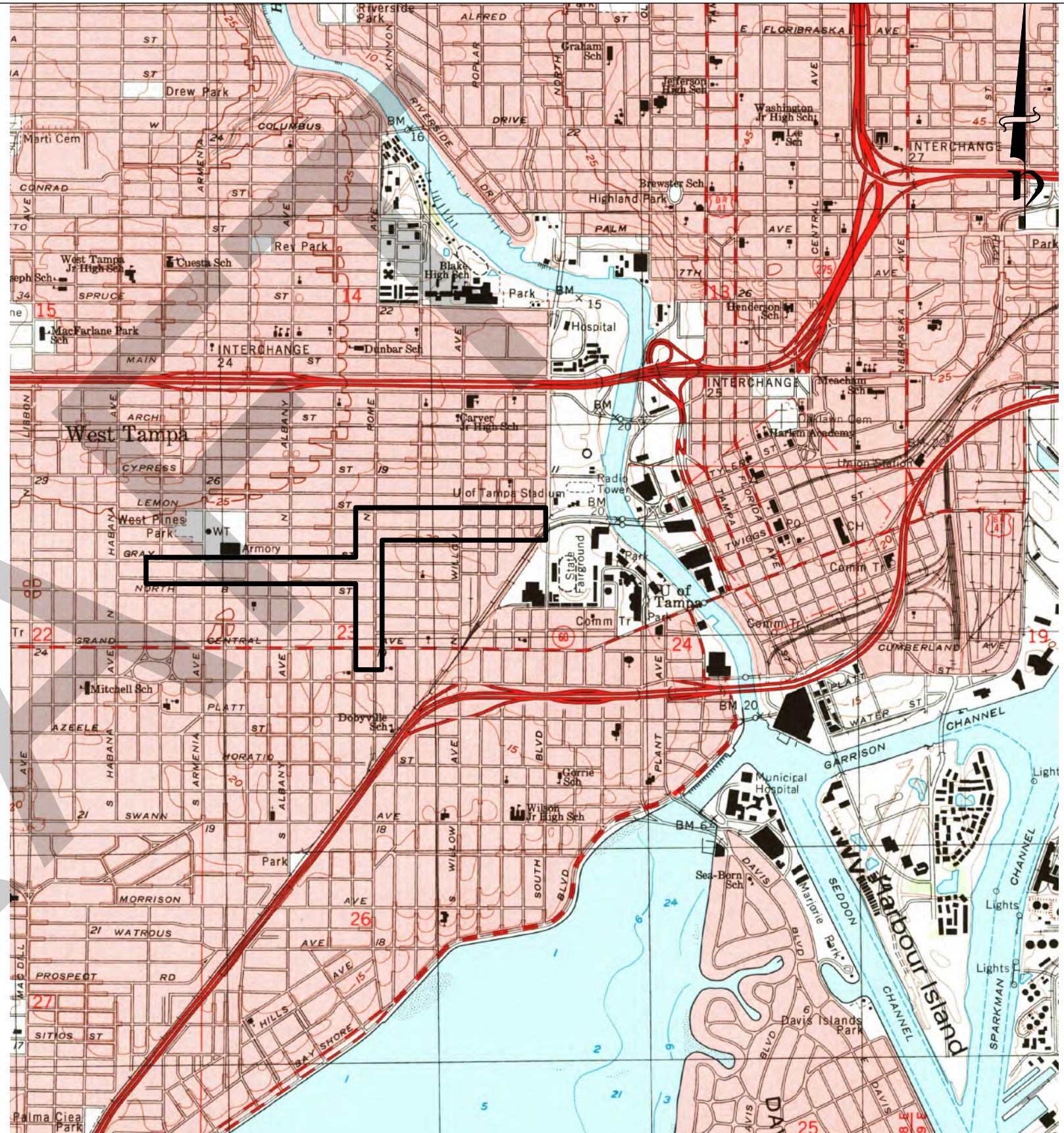
	NAME	DATE
DESIGNED BY:	TC	8/7/17
DRAWN BY:	KH	7/13/2018
CHECKED BY:	JH	7/16/2018
SUPERVISED BY:	WS	

BORING LOCATION MAP
 Cypress Street Outfall Stormwater Improvements
 City of Tampa, Hillsborough County, FL

MC ² PROJ. NO.	SHEET NO.
T041704.066	2



Hillsborough County, Florida			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
22	Immokalee-Urban land complex	7.8	9.8%
32	Myakka-Urban land complex	19.0	23.8%
55	Tavares-Urban land complex, 0 to 5 percent slopes	14.8	18.5%
56	Urban land	38.2	47.9%
Totals for Area of Interest (AOI)		79.8	100.0%



TAMPA QUADRANGLE, 1995 FLORIDA
7.5 - MINUTE SERIES, NAVD 1929

SOURCE: United States Department of Agriculture

SOURCE: United States Geological Survey

DATE	NAME	REVISION	APPROVED BY:



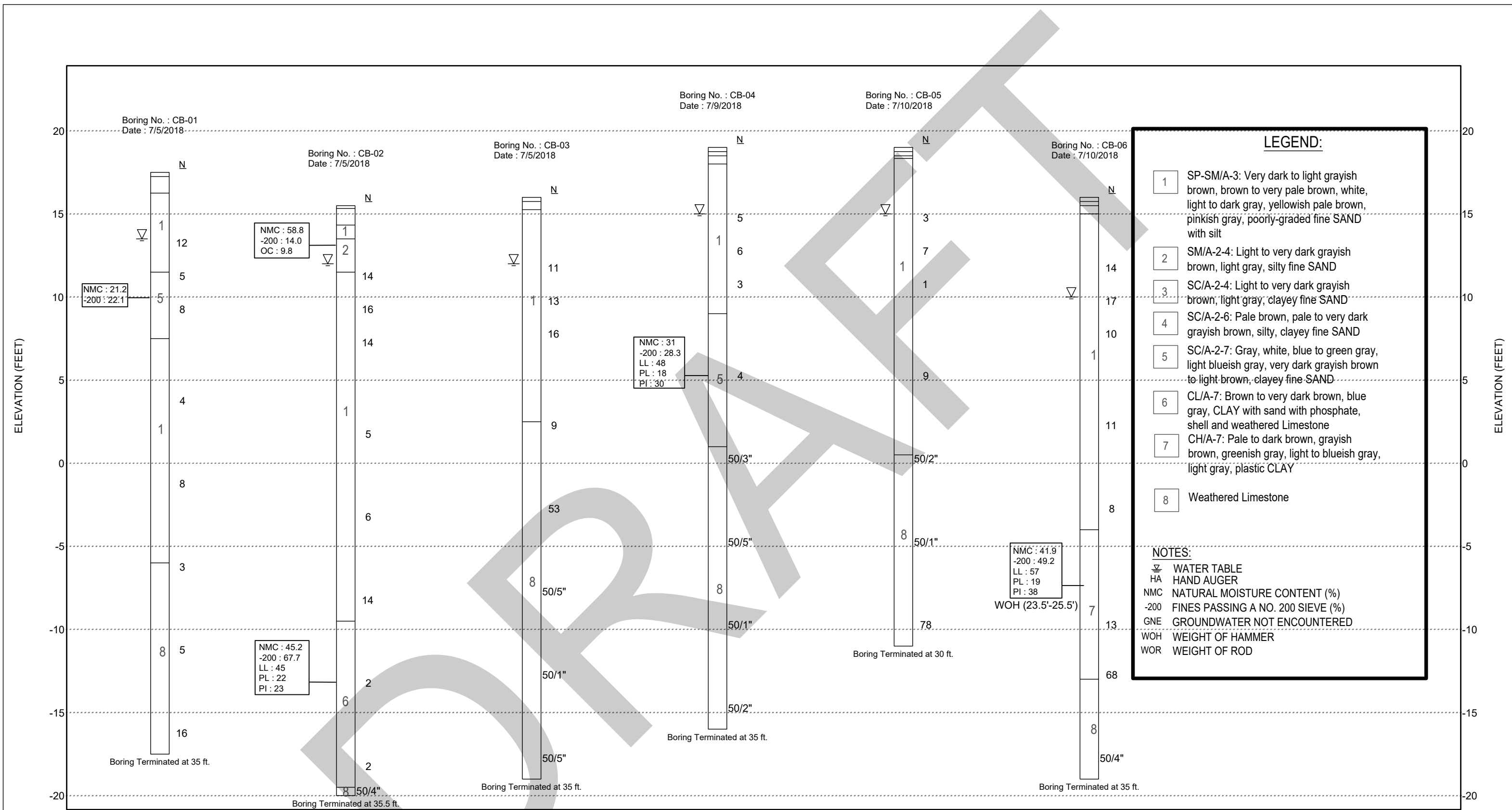
MC SQUARED, INC.
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5808 Breckenridge Parkway Suite - A
Tampa, FL 33610
Ph:813-623-3399 Fax:813-623-6636

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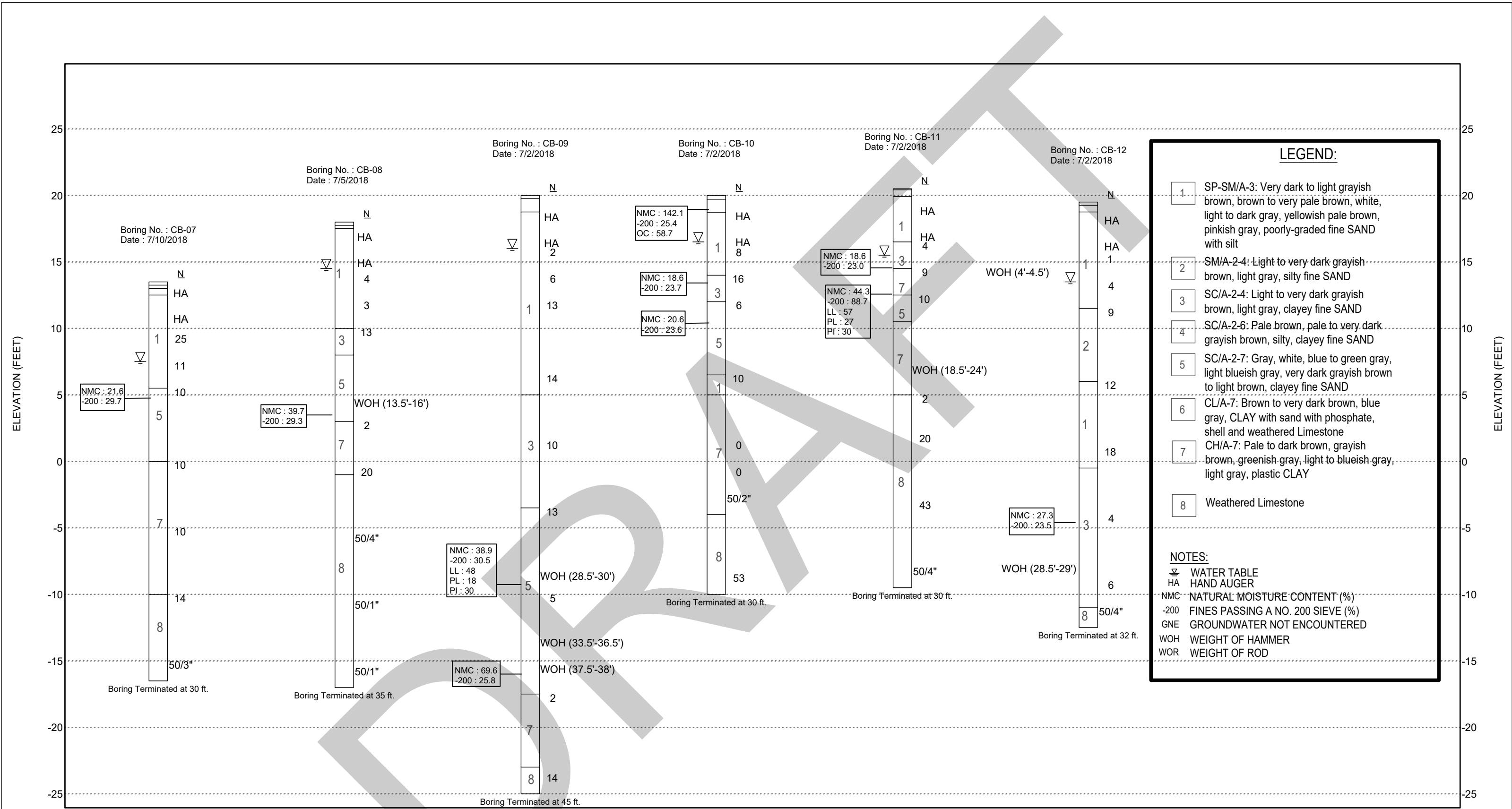
	NAME	DATE
DESIGNED BY:	TC	8/7/17
DRAWN BY:	KH	7/13/2018
CHECKED BY:	JH	7/16/2018
SUPERVISED BY:	WS	

USDA/USGS MAPS
Cypress Street Outfall Stormwater Improvements
City of Tampa, Hillsborough County, FL

MC ² PROJ. NO.	SHEET NO.
T041704.066	3



DATE	NAME	REVISION	APPROVED BY	MC SQUARED INC. Geotechnical Consultants			SUBSURFACE BORING PROFILES		MC ² PROJ. NO.	SHEET NO.	
				 <p>MC SQUARED INC. Geotechnical Consultants 5808-A Breckenridge Parkway Tampa, FL 33610 Ph : 813-623-3399 Fax : 813-623-6636</p>	<p>FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191 Jeffery L. Hooks, P.E. FLORIDA LICENSE No. 67882</p>	DESIGNED BY:	TC	8/7/17	Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Hillsborough County, FL	T041704.066	4
			DRAWN BY:			KH	7/12/2018				
			CHECKED BY:			JH	7/13/2018				
			SUPERVISED BY:			ws					



LEGEND:

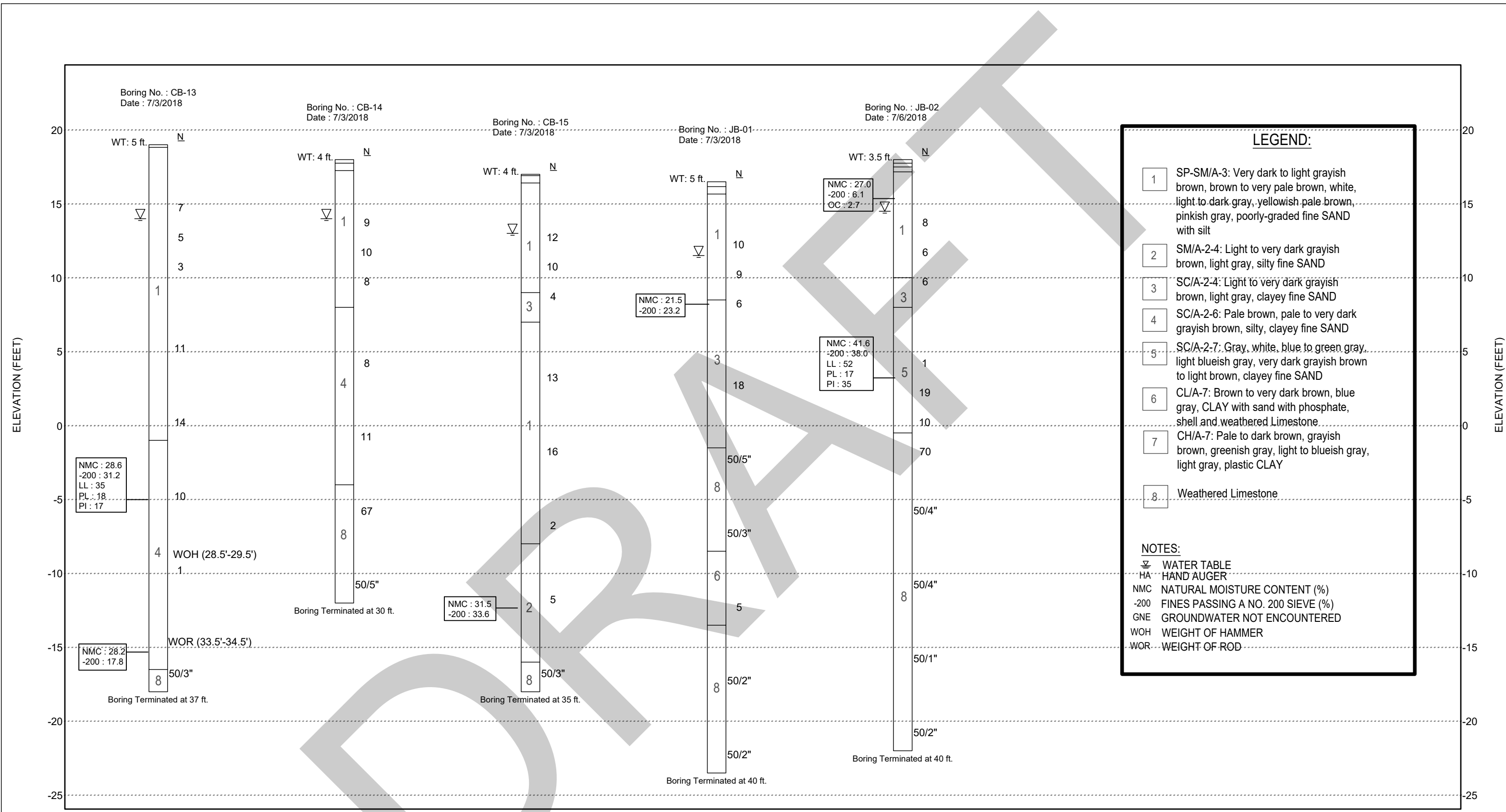
- 1 SP-SM/A-3: Very dark to light grayish brown, brown to very pale brown, white, light to dark gray, yellowish pale brown, pinkish gray, poorly-graded fine SAND with silt
- 2 SM/A-2-4: Light to very dark grayish brown, light gray, silty fine SAND
- 3 SC/A-2-4: Light to very dark grayish brown, light gray, clayey fine SAND
- 4 SC/A-2-6: Pale brown, pale to very dark grayish brown, silty, clayey fine SAND
- 5 SC/A-2-7: Gray, white, blue to green gray, light blueish gray, very dark grayish brown to light brown, clayey fine SAND
- 6 CL/A-7: Brown to very dark brown, blue gray, CLAY with sand with phosphate, shell and weathered Limestone
- 7 CH/A-7: Pale to dark brown, grayish brown, greenish gray, light to blueish gray, light gray, plastic CLAY
- 8 Weathered Limestone

NOTES:

- ▽ WATER TABLE
- HA HAND AUGER
- NMC NATURAL MOISTURE CONTENT (%)
- 200 FINES PASSING A NO. 200 SIEVE (%)
- GNE GROUNDWATER NOT ENCOUNTERED
- WOH WEIGHT OF HAMMER
- WOR WEIGHT OF ROD

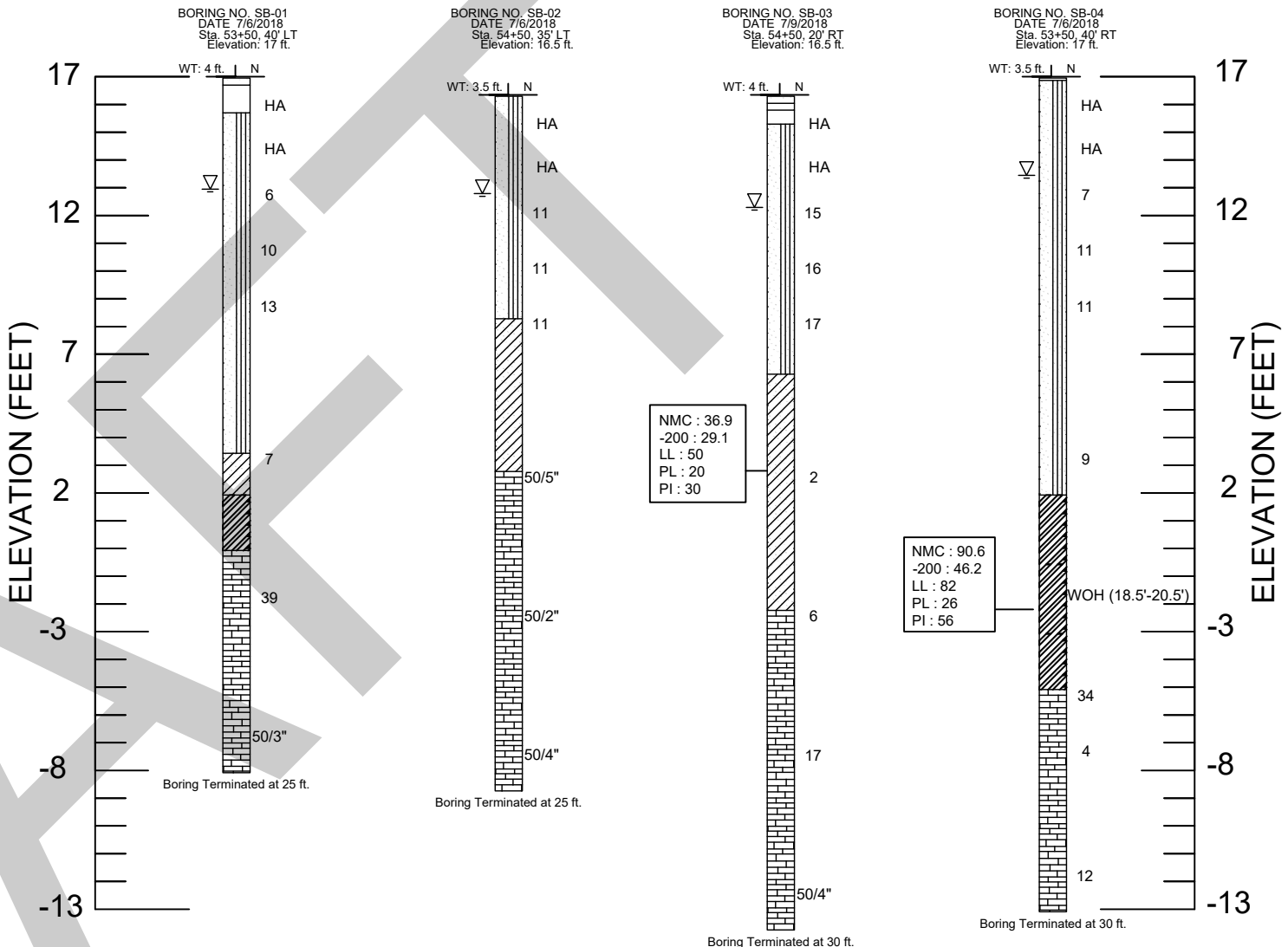
*N Values Drawn At Top Of Interval

DATE	NAME	REVISION	APPROVED BY		NAME	DATE	SUBSURFACE BORING PROFILES	MC ² PROJ. NO.	SHEET NO.	
				 MC SQUARED INC. Geotechnical Consultants 5808-A Breckenridge Parkway Tampa, FL 33610 Ph : 813-623-3399 Fax : 813-623-6636	FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191 Jeffrey L. Hooks, P.E. FLORIDA LICENSE No. 67882	DESIGNED BY:	TC	8/7/17	Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Hillsborough County, FL	T041704.066 5
					DRAWN BY:	KH	7/12/2018			
					CHECKED BY:	JH	7/13/2018			
					SUPERVISED BY:	ws				



*N Values Drawn At Top Of Interval

DATE	NAME	REVISION	APPROVED BY	MC SQUARED INC. Geotechnical Consultants			SUBSURFACE BORING PROFILES			MC ² PROJ. NO.	SHEET NO.					
				 MC SQUARED INC. Geotechnical Consultants 5808-A Breckenridge Parkway Tampa, FL 33610 Ph : 813-623-3399 Fax : 813-623-6636			FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191 Jeffery L. Hooks, P.E. FLORIDA LICENSE No. 67882			Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Hillsborough County, FL			T041704.066	6		
			DESIGNED BY:												TC	8/7/17
			DRAWN BY:												KH	7/12/2018
			CHECKED BY:												JH	7/13/2018
				SUPERVISED BY:	ws											



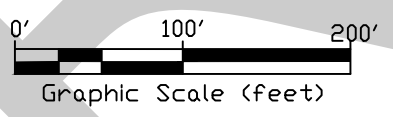
LEGEND

- (CH) Fat Clay (A-7)
- (CL) Lean Clay (A-7)
- (SP-SM) Poorly Graded Sand With Silt (A-3)
- (SC) Clayey Sand (A-2-4, A-2-7)
- (WLS) Weathered Limestone

- NOTES:**
- WATER TABLE
 - HA HAND AUGER
 - NMC NATURAL MOISTURE CONTENT (%)
 - 200 FINES PASSING A NO. 200 SIEVE (%)
 - GNE GROUNDWATER NOT ENCOUNTERED

LEGEND

- Approximate Boring Location



GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT)
VERY LOOSE	LESS THAN 3
LOOSE	3-8
MEDIUM DENSE	8-24
DENSE	24-40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT)
VERY SOFT	LESS THAN 1
SOFT	1-3
FIRM	3-6
STIFF	6-12
VERY STIFF	12-24
HARD	GREATER THAN 24
SPT Spoon Inside Diameter 1 3/8"	ASTM Auto Hammer
SPT Spoon Outside Diameter 2"	Average Hammer Drop Height 30" Hammer Weight 140 lbs

DATE	NAME	REVISION	APPROVED BY:	DESIGNED BY:	NAME	DATE	Report of Core Borings	MC ² PROJ. NO.	SHEET NO.
				TC	TC	09/01/2017	Cypress Street Outfall Regional Stormwater Improvements City of Tampa, Hillsborough County, FL	T041704.066	7
				KH	KH	7/12/2018			
				JH	JH	7/13/2018			
				WS	WS				



MC SQUARED, INC.
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Tampa, FL 33610
Ph: 813-623-3399 Fax: 813-623-6636

FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 9191
Jeffery L. Hooks, P.E.
FLORIDA LICENSE No. 67882



Soil Profile

BORING ID: CB-01

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/5/18 **COMPLETED** 7/5/18 **GROUND ELEVATION** 17.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 13.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 11+00, 15' LT (N. Rome Ave) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●				
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0				3 inches of ASPHALT								
16				12 inches of LIMEROCK base								
14			SP-SM, (A-3)	Medium dense, very dark grayish brown, pale brown, light gray, poorly-graded fine SAND with silt	HA 1							
5	12				SS 2	4-5-7-6 (12)						
10	10		SC, (A-2-7)	Loose, gray, clayey fine SAND	SS 3	4-2-3-3 (5)						
10	8				SS 4	3-3-5-3 (8)						
15	6			Loose, gray to light gray, poorly-graded fine SAND with silt								
15	2				SS 5	3-2-2 (4)						
20	0		SP-SM, (A-3)									
20	-2				SS 6	1-2-6 (8)						
25	-6			Weathered LIMESTONE								
25	-8				SS 7	2-2-1-5 (3)						
30	-12		WLS									
30	-10				SS 8	0-1-4 (5)						
35	-16											
35	-14				SS 9	3-6-10 (16)						

Bottom of hole at 35.0 feet.

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-02

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/5/18 **COMPLETED** 7/5/18 **GROUND ELEVATION** 15.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 3.5 ft / Elev 12.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 16+00, 10' LT (N. Rome Ave) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●				
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0				2 inches of ASPHALT								
14				12 inches of LIMEROCK base								
			SP-SM, (A-3)	Light gray, poorly-graded fine SAND with silt	HA 1							
			SM, (A-2-4)	Very dark grayish brown, silty fine SAND								
5				Loose to medium dense, light to very dark grayish brown, pale brown, poorly-graded fine SAND with silt with shell and Limestone	SS 2	5-7-7-6 (14)						
					SS 3	5-7-9-11 (16)						
					SS 4	5-6-8-10 (14)						
10												
			SP-SM, (A-3)		SS 5	3-2-3 (5)						
15												
					SS 6	2-3-3 (6)						
20												
					SS 7	5-8-6 (14)						
25				Soft, dark to very dark brown, CLAY with phosphate and shell								
			CL, (A-7)		SS 8	1-1-1 (2)						
30												
					SS 9	1-0-2 (2)						
35												
			WLS	Weathered LIMESTONE	SS	50/4"						

Bottom of hole at 35.5 feet.

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-03

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/5/18 **COMPLETED** 7/5/18 **GROUND ELEVATION** 16 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 12.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 21+00, 5' LT (N. Rome Ave) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●								
								⊕ ORGANIC CONTENT % ⊕								
								PL	MC	LL	FINES CONTENT (%) □					
								20	40	60	80					
0				3 inches of ASPHALT												
				6 inches of LIMEROCK base												
14				Medium dense, grayish to dark grayish brown, pale brown, poorly-graded fine SAND with silt	HA 1											
12																
5					SS 2	6-5-6-8 (11)										
10			SP-SM, (A-3)		SS 3	7-6-7-8 (13)										
8				SS 4	11-9-7-5 (16)											
10																
4																
2				Weathered LIMESTONE	SS 5	2-4-5 (9)										
15																
0																
-2																
20					SS 6	5-16-37 (53)										
-4																
-6																
-8					SS 7	50/5"									>>	
25			WLS													
-10																
-12																
-14					SS 8	50/1"									>>	
30																
-16																
-18					SS 9	50/5"									>>	
35																

Bottom of hole at 35.0 feet.

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-04

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/9/18 **COMPLETED** 7/9/18 **GROUND ELEVATION** 19 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 15.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 46+00, 15' RT (W. Cass St) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●					
								⊕ ORGANIC CONTENT % ⊕					
								PL	MC	LL			
								☐ FINES CONTENT (%) ☐					
								20	40	60	80		
0				3 inches of ASPHALT 3 inches of PAVER 6 inches of SHELL and SAND base	HA 1								
18				Loose, light to very dark grayish brown, poorly-graded fine SAND with silt									
16													
14			SP-SM, (A-3)		SS 2	1-2-3-4 (5)							
12					SS 3	1-2-4-3 (6)							
10					SS 4	1-1-2-5 (3)							
8				Loose, gray, clayey fine SAND									
6													
4			SC, (A-2-7)		SS 5	1-2-2 (4)							
2													
0				Weathered LIMESTONE	SS 6	50/3"							>>
-2													
-4													
-6					SS 7	29-32-50/5"							>>
-8			WLS										
-10					SS 8	50/1"							>>
-12													
-14													
-16					SS 9	50/2"							>>

Bottom of hole at 35.0 feet.

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-05

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/10/18 **COMPLETED** 7/10/18 **GROUND ELEVATION** 19 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 15.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 51+00, 10' RT (W. Cass St) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●						
								⊕ ORGANIC CONTENT % ⊕						
								PL	MC	LL	□ FINES CONTENT (%) □			
								20	40	60	80			
0				3 inches of ASPHALT 3 inches of PAVER 2 inches of SHELL and SAND base Very loose to medium dense, light gray, poorly-graded fine SAND with silt	HA 1									
5	14				SS 2	1-1-2-3 (3)								
10	12				SS 3	4-3-4-3 (7)								
10	10		SP-SM, (A-3)		SS 4	0-1-0-2 (1)								
15	4				SS 5	4-4-5 (9)								
20	0			Weathered LIMESTONE	SS 6	40-50/2"								>>
25	-6		WLS		SS 7	50/1"								>>
30	-10				SS 8	25-35-43 (78)								
	-12			Bottom of hole at 30.0 feet.										

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-06

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/10/18 **COMPLETED** 7/10/18 **GROUND ELEVATION** 16 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 6.0 ft / Elev 10.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 59+00, 15' RT (W. Cass St) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●			
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL
								□ FINES CONTENT (%) □			
								20	40	60	80
0				3 inches of ASPHALT 3 inches of PAVER 6 inches of SHELL and SAND base	HA 1						
5				Loose to medium dense, light gray, white, grayish brown, poorly-graded fine SAND with silt	SS 2	4-5-9-10 (14)					
10				▽	SS 3	7-7-10-9 (17)					
15					SS 4	4-5-5-6 (10)					
20			SP-SM, (A-3)								
25				Very soft to very stiff, brown, plastic CLAY with weathered Limestone	SS 5	4-5-6 (11)					
30					SS 6	5-4-4 (8)					
35			CH, (A-7)	Weight of Hammer (23.5'-25.5')	SS 7	0-0-0 (0)					
35					SS 8	2-4-9-10 (13)					
35				Weathered LIMESTONE	SS 9	16-30-38 (68)					
35			WLS		SS 10	50/4"					

Bottom of hole at 35.0 feet.

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-07

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/10/18 **COMPLETED** 7/10/18 **GROUND ELEVATION** 13.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 6.0 ft / Elev 7.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 64+00, 20' LT (W. Cass St) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●					
								PL	MC	LL			
								⊕ ORGANIC CONTENT % ⊕					
								□ FINES CONTENT (%) □					
								20	40	60	80		
0				3 inches of ASPHALT 3 inches of PAVER 6 inches of SHELL and SAND base	HA 1								
12				Medium dense to dense, gray to light gray, white, pale brown, poorly-graded fine SAND with silt	SS 2	6-12-13-13 (25)							
5	8		SP-SM, (A-3)		SS 3	7-6-5-6 (11)							
6				Medium dense, blue gray, clayey fine SAND	SS 4	1-5-5-4 (10)							
10	4		SC, (A-2-7)										
2				Stiff, pale brown to brown, plastic CLAY	SS 5	1-3-7 (10)							
15	-2												
4			CH, (A-7)		SS 6	16-2-8 (10)							
20	-6												
8				Weathered LIMESTONE	SS 7	17-10-4-7 (14)							
25	-12		WLS										
14					SS 8	50/3"							
30	-16			Bottom of hole at 30.0 feet.									>>
	-18												
	-20												

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-08

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/5/18 **COMPLETED** 7/5/18 **GROUND ELEVATION** 18 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 3.5 ft / Elev 14.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 27+00, 10' LT (N. Rome Ave) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●			
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL
								□ FINES CONTENT (%) □			
								20	40	60	80
0				3 inches of ASPHALT							
				3 inches of LIMEROCK base							
16				Loose, brown to very pale brown, light gray, poorly-graded fine SAND with silt	HA 1						
14		SP-SM, (A-3)			SS 2	2-2-2-1 (4)					
12					SS 3	1-2-1-2 (3)					
10				Medium dense, pale brown, clayey fine SAND	SS 4	4-7-6-6 (13)					
10	8	SC, (A-2-4)									
6				Very loose, green gray, clayey fine SAND							
4		SC, (A-2-7)									
15				Weight of Hammer (13.5'-16') Very soft to soft, greenish gray, plastic CLAY	SS 5	0-0-0 (0)					
2		CH, (A-7)			SS 6	0-0-2-2 (2)					
20				Weathered LIMESTONE	SS 7	3-11-9 (20)					
25					SS 8	50/4"					
30				WLS	SS 9	50/1"					
35					SS 10	50/1"					

Bottom of hole at 35.0 feet.

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-09

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/2/18 **COMPLETED** 7/2/18 **GROUND ELEVATION** 20 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 16.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 80+00, 5' RT (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●			
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL
								□ FINES CONTENT (%) □			
								20	40	60	80
0				3 inches of ASPHALT							
				12 inches of LIMEROCK and SHELL base							
18				Very loose to medium dense, gray, brown, grayish brown, poorly-graded fine SAND with silt	HA 1						
16											
5						SS 2	2-1-1-3 (2)				
14						SS 3	1-1-4-5 (5)				
12			SP-SM, (A-3)			SS 4	5-6-7-8 (13)				
10											
8											
6											
15				Medium dense, gray, clayey fine SAND	SS 5	7-8-6 (14)					
4											
2											
20			SC, (A-2-4)		SS 6	6-5-5 (10)					
-2											
-4				Very loose to medium dense, gray, clayey fine SAND	SS 7	7-5-8 (13)					
25											
-6											
-8											
30			SC, (A-2-7)	Weight of Hammer (28.5'-30')	SS 8	0-0-0 (0)					
-10					SS 9	1-3-2 (5)					
-12											
-14											
35					SS 10	0-0-0-0 (0)					

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18

(Continued Next Page)



Soil Profile

BORING ID: CB-09

CLIENT Woodruff & Sons, Inc.

PROJECT NAME Cypress Street Outfall Regional Stormwater Improvements

PROJECT NUMBER T041704.066

PROJECT LOCATION City of Tampa, Hillsborough County, FL

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●					
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL		
								□ FINES CONTENT (%) □					
								20	40	60	80		
35	-16	SC, (A-2-7)		Very loose to medium dense, gray, clayey fine SAND	SS 11	0-0-1-2 (1)							
	-18			Soft, greenish gray, brown, light yellowish brown, plastic CLAY				SS 12	0-1-1 (2)				
40	-20	CH, (A-7)		Weight of Hammer (37.5'-38')									
	-22												
	-24	WLS		Weathered LIMESTONE	SS 13	24-9-5 (14)							
45	-26	Bottom of hole at 45.0 feet.											
	-28												
	-30												
	-32												
	-34												
	-36												
	-38												
	-40												
	-42												
	-44												
	-46												
	-48												
	-50												
	-52												
	-54												

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-11

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/2/18 **COMPLETED** 7/2/18 **GROUND ELEVATION** 20.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 5.0 ft / Elev 15.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 89+00, 10' RT (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●					
								PL	MC	LL			
								⊕ ORGANIC CONTENT % ⊕					
								□ FINES CONTENT (%) □					
								20	40	60	80		
0	20			1 inch of ASPHALT									
				6 inches of BLACK base									
	18		SP-SM, (A-3)	Pale to grayish brown, poorly-graded fine SAND with silt	HA 1								
5	16		SC, (A-2-4)	Loose, gray, clayey fine SAND	SS 2	1-2-2-3 (4)							
	14		CH, (A-7)	Stiff, blueish gray, plastic CLAY	SS 3	3-4-5-5 (9)							
	12		SC, (A-2-7)	Medium dense, light blueish gray, clayey fine SAND	SS 4	1-5-5-6 (10)							
10	10		CH, (A-7)	Very soft, light blueish gray, plastic CLAY with weathered Limestone									
	8												
	6			Weight of Hammer (13.5'-15.5')	SS 5	0-0-0-0 (0)							
15	4			Weathered LIMESTONE	SS 6	1-1-1-3 (2)							
	2												
	0			100% Loss of Circulation at 18.5'	SS 7	6-10-10 (20)							
20	-2		WLS										
	-4				SS 8	18-17-26 (43)							
25	-6												
	-8				SS 9	50/4"							
30	-10			Bottom of hole at 30.0 feet.									
	-12												
	-14												

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-12

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/2/18 **COMPLETED** 7/2/18 **GROUND ELEVATION** 19.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 6.0 ft / Elev 13.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 94+00, 5' RT (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●										
								⊕ ORGANIC CONTENT % ⊕										
								PL	MC	LL								
0				3 inches of ASPHALT														
18				6 inches of LIMEROCK base														
16				Very loose to loose, light gray, brown to grayish brown, poorly-graded fine SAND with silt	HA 1													
5	14		SP-SM, (A-3)	Weight of Hammer (4'-4.5')	SS 2	0-1-0-0 (1)												
12					SS 3	1-1-3-3 (4)												
10	10		SM, (A-2-4)	Medium dense, light gray, silty fine SAND	SS 4	3-5-4-6 (9)												
15	4		SP-SM, (A-3)	Medium dense, light gray, light brownish gray, poorly-graded fine SAND with silt	SS 5	5-5-7 (12)												
20	0				SS 6	5-9-9 (18)												
25	-2		SC, (A-2-4)	Loose, light blueish gray, clayey fine SAND	SS 7	2-1-3 (4)												
30	-10			Weight of Hammer (28.5'-29')	SS 8	0-2-4-0 (6)												
-12			WLS	Weathered LIMESTONE	SS 9	15-50/4"												
-14				Bottom of hole at 32.0 feet.														

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-13

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/3/18 **COMPLETED** 7/3/18 **GROUND ELEVATION** 19 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 5.0 ft / Elev 14.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 98+00, 5' RT, (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	SPT N VALUE ●								
								⊕ ORGANIC CONTENT % ⊕								
								PL	MC	LL	□ FINES CONTENT (%) □					
								20	40	60	80					
0				2 inches of ASPHALT												
18				Loose to medium dense, light gray, grayish to pale brown, poorly-graded fine SAND with silt	HA 1											
16					SS 2	2-3-4-5 (7)										
5	14				SS 3	3-2-3-4 (5)										
12					SS 4	1-2-1-4 (3)										
10			SP-SM, (A-3)													
10																
8																
6																
15	4				SS 5	1-4-7 (11)										
2																
0																
20					SS 6	5-7-7 (14)										
-2				Very loose to medium dense, pale brown, pale to very dark grayish brown, silty, clayey fine SAND												
-4																
25	-6				SS 7	4-5-5 (10)										
-8																
30	-10		SC, (A-2-6)	Weight of Hammer (28.5'-29.5')	SS 8	0-0-1-2 (1)										
-12																
-14				50% Loss of Circulation at 33'												
35	-16			Weight of Rod (33.5'-34.5')	SS 9	0-0-1-4 (1)										

(Continued Next Page)



Soil Profile

BORING ID: CB-13

CLIENT Woodruff & Sons, Inc.

PROJECT NAME Cypress Street Outfall Regional Stormwater Improvements

PROJECT NUMBER T041704.066

PROJECT LOCATION City of Tampa, Hillsborough County, FL

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●			
							⊕ ORGANIC CONTENT % ⊕	PL	MC	LL
							□ FINES CONTENT (%) □			
							20	40	60	80
35										
	-18	WLS	Weathered LIMESTONE	SS 10	20-23- 50/3"					
			Bottom of hole at 37.0 feet.							>>
	-20									
	-22									
	-24									
	-26									
	-28									
	-30									
	-32									
	-34									
	-36									
	-38									
	-40									
	-42									
	-44									
	-46									
	-48									
	-50									
	-52									
	-54									
	-56									

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18

DRAFT



Soil Profile

BORING ID: CB-14

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/3/18 **COMPLETED** 7/3/18 **GROUND ELEVATION** 18 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 14.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 103+00, 5' RT, (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●												
							⊕ ORGANIC CONTENT % ⊕												
							PL	MC	LL										
0			3 inches of ASPHALT 6 inches of LIMEROCK base																
5	14	SP-SM, (A-3)	Medium dense, light to dark grayish brown, poorly-graded fine SAND with silt with shell and wood fragments	HA 1															
10	8			SS 2	5-5-4-5 (9)														
12				SS 3	4-5-5-6 (10)														
15	4	SC, (A-2-6)	Medium dense, gray, silty, clayey fine SAND	SS 4	2-4-4-5 (8)														
20	-2			SS 5	4-5-3 (8)														
25	-6	WLS	Weathered LIMESTONE	SS 6	2-5-6 (11)														
30	-12			SS 7	26-33-34 (67)														
				SS 8	23-50/5"														
			Bottom of hole at 30.0 feet.																

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: CB-15

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/3/18 **COMPLETED** 7/3/18 **GROUND ELEVATION** 17 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **▽ AT TIME OF DRILLING** 4.0 ft / Elev 13.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 108+00, 10' LT, (W. Gray St.) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●			
								⊕ ORGANIC CONTENT % ⊕			
								PL	MC	LL	
								□ FINES CONTENT (%) □			
								20	40	60	80
0				1 inch of ASPHALT							
16				6 inches of LIMEROCK base							
14				Medium dense, light to dark brown, grayish brown, poorly-graded fine SAND with silt	HA 1						
5	12		SP-SM, (A-3)	▽	SS 2	4-5-7-5 (12)					
10					SS 3	4-5-5-2 (10)					
8			SC, (A-2-4)	Loose, gray, clayey fine SAND Weight of Hammer (8'-8.5')	SS 4	0-2-2-4 (4)					
10											
6				Very loose to medium dense, gray to light gray, poorly-graded fine SAND with silt							
15	2				SS 5	5-6-7 (13)					
0											
20	-2		SP-SM, (A-3)		SS 6	6-7-9 (16)					
25	-8				SS 7	1-1-1 (2)					
30	-12		SM, (A-2-4)	Loose, dark grayish brown, silty fine SAND with shell fragments	SS 8	1-1-4 (5)					
35	-18		WLS	Weathered LIMESTONE	SS 9	50/3"					>>

Bottom of hole at 35.0 feet.

MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: JB-01

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/3/18 **COMPLETED** 7/3/18 **GROUND ELEVATION** 16.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 5.0 ft / Elev 11.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 114+50, 5' LT (N. Rome Ave) **AFTER DRILLING** ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●				
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL	
								□ FINES CONTENT (%) □				
								20	40	60	80	
0	16			4 inches of ASPHALT								
				6 inches of LIMEROCK base								
	14			Medium dense, light gray, brown to pale brown, poorly-graded fine SAND with silt	HA 1							
5	12		SP-SM, (A-3)	▽	SS 2	5-5-5-6 (10)						
	10				SS 3	5-4-5-5 (9)						
	8			Loose to medium dense, white, gray to light gray, clayey fine SAND	SS 4	2-2-4-4 (6)						
10	6											
	4		SC, (A-2-4)									
15	2				SS 5	8-8-10 (18)						
	0											
	-2			Weathered LIMESTONE	SS 6	50/5"						>>
20	-4		WLS									
	-6			100% Loss of Circulation at 23'	SS 7	50/3"						>>
25	-8											
	-10			Firm, blue gray, CLAY with sand								
	-12		CL, (A-7)		SS 8	5-1-4 (5)						
30	-14			Weathered LIMESTONE								
	-16		WLS									
	-18				SS 9	50/2"						>>
35												

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18

(Continued Next Page)



Soil Profile

BORING ID: JB-01

CLIENT Woodruff & Sons, Inc.

PROJECT NAME Cypress Street Outfall Regional Stormwater Improvements

PROJECT NUMBER T041704.066

PROJECT LOCATION City of Tampa, Hillsborough County, FL

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (ROD)	● SPT N VALUE ●					
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL		
								□ FINES CONTENT (%) □					
								20	40	60	80		
35				Weathered LIMESTONE									
	-20		WLS										
	-22												
40	-24			Bottom of hole at 40.0 feet.	SS 10	50/2"							>>●
	-26												
	-28												
	-30												
	-32												
	-34												
	-36												
	-38												
	-40												
	-42												
	-44												
	-46												
	-48												
	-50												
	-52												
	-54												
	-56												
	-58												

MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: JB-02

CLIENT Woodruff & Sons, Inc.

PROJECT NAME Cypress Street Outfall Regional Stormwater Improvements

PROJECT NUMBER T041704.066

PROJECT LOCATION City of Tampa, Hillsborough County, FL

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS/AASHTO Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	● SPT N VALUE ●						
								⊕ ORGANIC CONTENT % ⊕	PL	MC	LL			
								□ FINES CONTENT (%) □						
								20	40	60	80			
35	-18			Weathered LIMESTONE										
	-20		WLS											
40	-22			Bottom of hole at 40.0 feet.	SS 12	2-13-50/2"								>>
	-24													
	-26													
	-28													
	-30													
	-32													
	-34													
	-36													
	-38													
	-40													
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	-48													
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	-52													
	-54													
	-56													

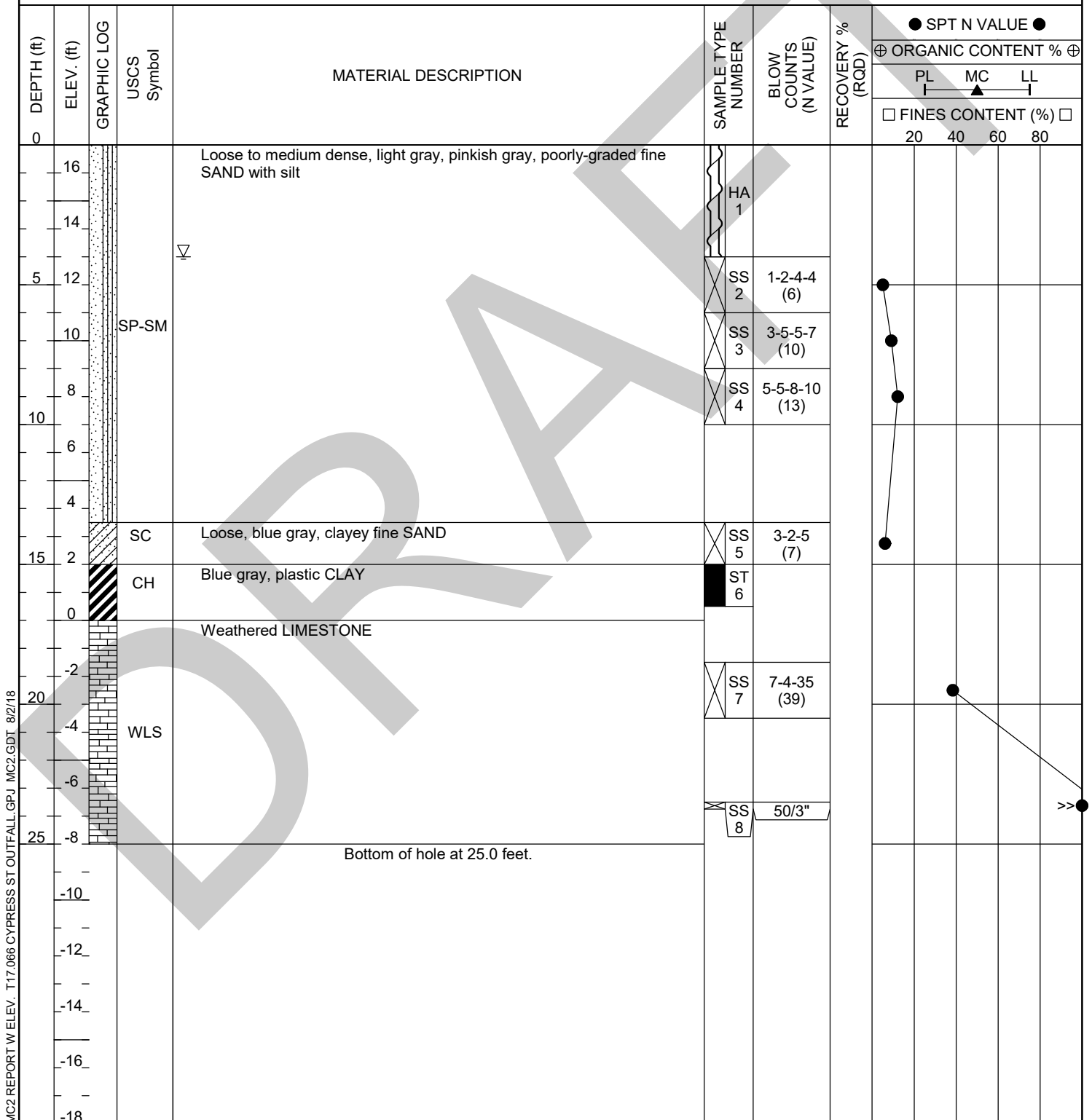
MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: SB-01

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/6/18 **COMPLETED** 7/6/18 **GROUND ELEVATION** 17 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary ∇ **AT TIME OF DRILLING** 4.0 ft / Elev 13.0 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 53+50, 40' LT (W. Cass St.) **AFTER DRILLING** ---



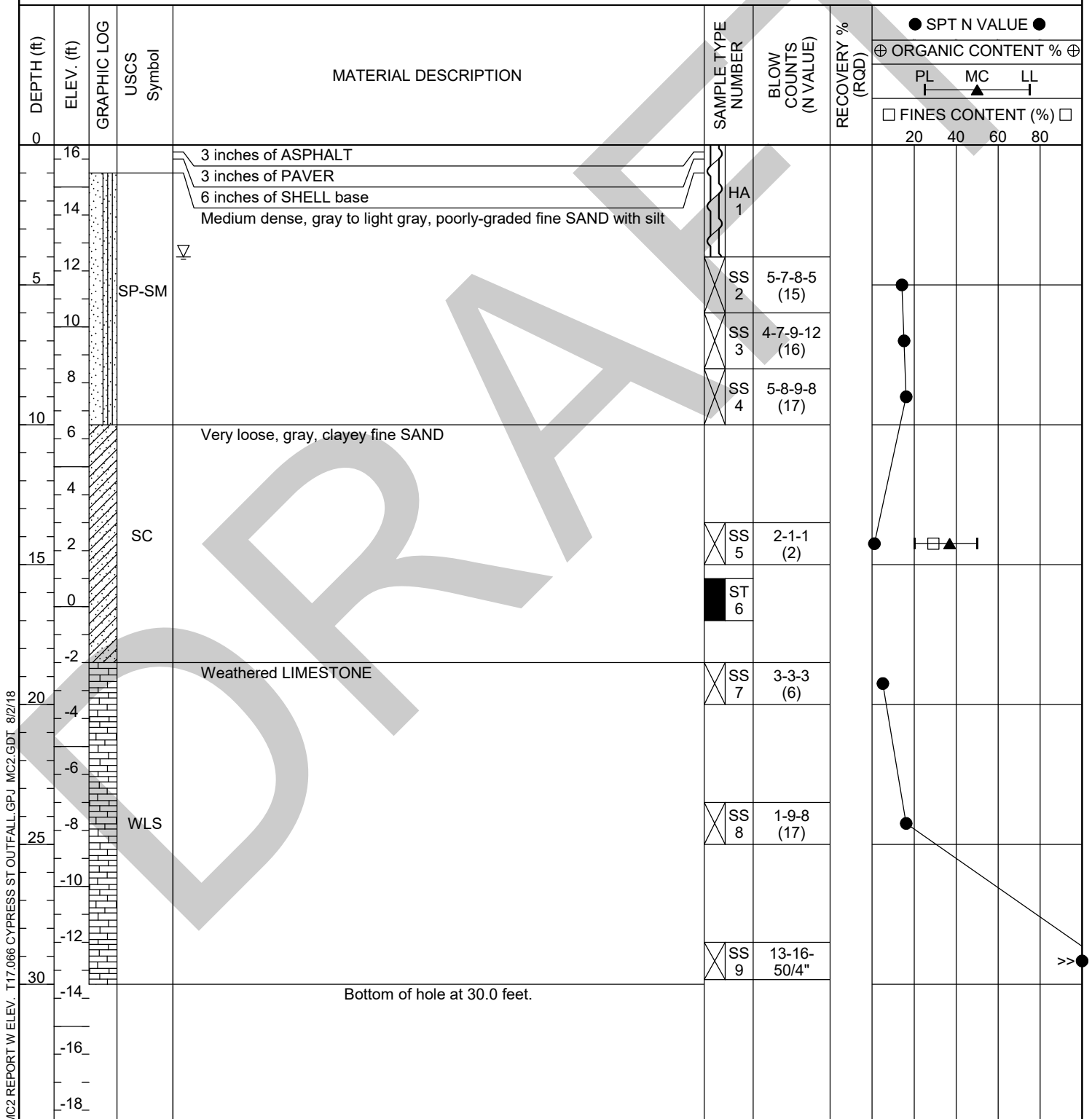
MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: SB-03

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/9/18 **COMPLETED** 7/9/18 **GROUND ELEVATION** 16.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 4.0 ft / Elev 12.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 54+50, 20' RT (W. Cass St.) **AFTER DRILLING** ---



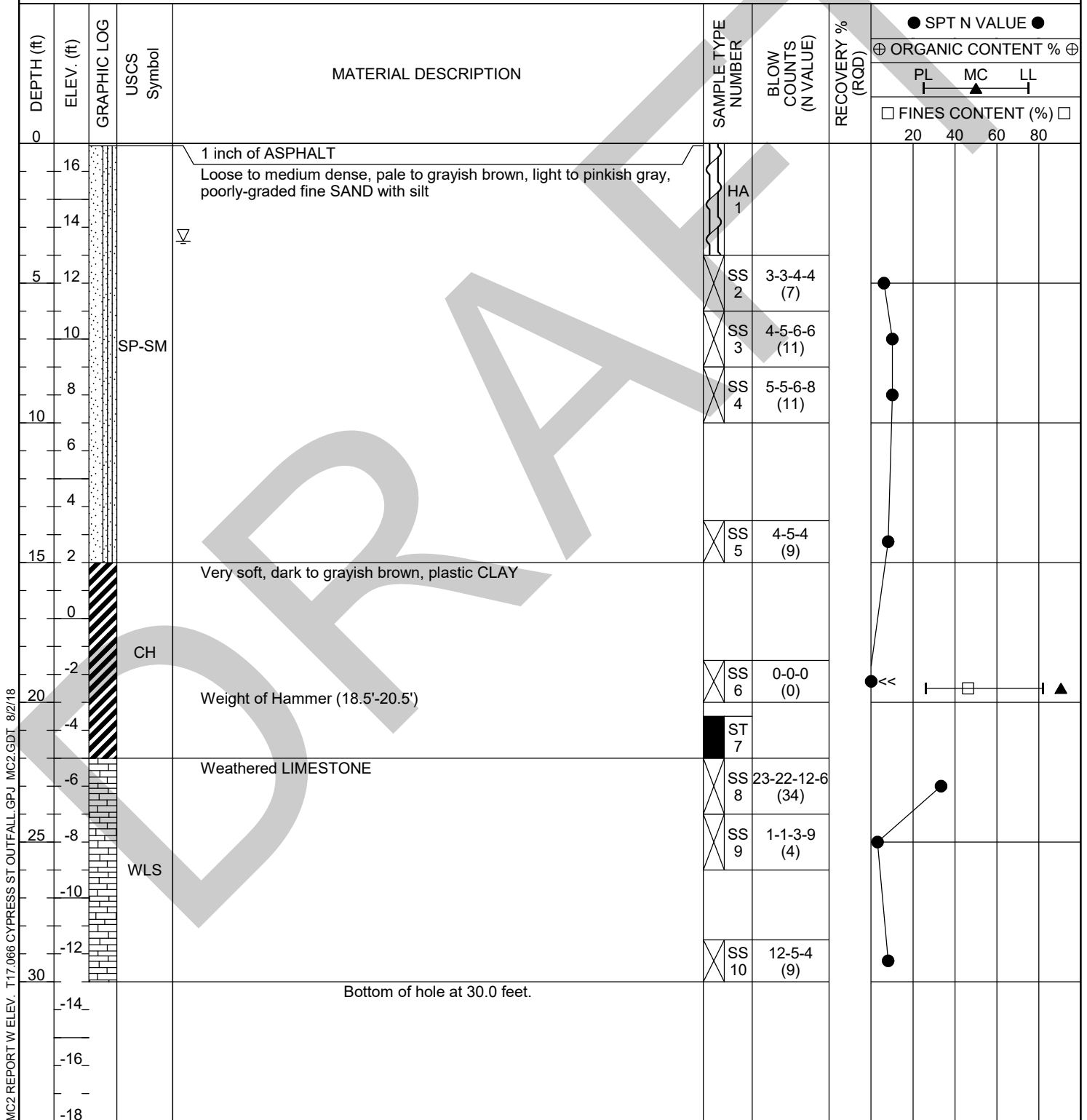
MC2 REPORT W/ ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18



Soil Profile

BORING ID: SB-04

CLIENT Woodruff & Sons, Inc. **PROJECT NAME** Cypress Street Outfall Regional Stormwater Improvements
PROJECT NUMBER T041704.066 **PROJECT LOCATION** City of Tampa, Hillsborough County, FL
DATE STARTED 7/6/18 **COMPLETED** 7/6/18 **GROUND ELEVATION** 17 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Independent Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Wet Rotary **AT TIME OF DRILLING** 3.5 ft / Elev 13.5 ft
LOGGED BY S. Nason **CHECKED BY** J. Hooks **AT END OF DRILLING** ---
NOTES Sta. 53+50, 40' RT (W. Cass St.) **AFTER DRILLING** ---



MC2 REPORT W ELEV. T17.066 CYPRESS ST OUTFALL.GPJ MC2.GDT 8/2/18

TEST PROCEDURES

The general field procedures employed by MC Squared, Inc. (MC²) are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as boring.

Standard Drilling Techniques

To obtain subsurface samples, boring are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

- a) Continuous hollow stem augers.
- b) Rotary boring using roller cone bits or drag bits, and water or drilling mud to flush the hole.
- c) "Hand" augers.

In Rock:

- a) Core drilling with diamond-faced, double or triple tube core barrels.
- b) Core boring with roller cone bits.

Hollow Stem Augering: A hollow stem auger consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Mud Rotary: In situations where unconsolidated materials are anticipated, the direct-rotary or "mud" rotary method may be used as a more effective method for obtaining soil samples. The fluid used, which is typically stored in an aluminum tub (also known as a "mudtub"), is a mix of water and bentonite, also known as a bentonite slurry or "mud". This fluid circulates into the borehole and then returns to the mudtub using a pump system. A loss of circulation, partially or otherwise, may signify a void at that sample depth. The key advantage of using this drilling method is that it stabilizes the borehole wall while drilling in unconsolidated formations, due to the buildup of a filter cake on the wall.

Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemented soil, weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound, continuous rock. Material which cannot be penetrated by auger or rotary soil-drilling methods at a reasonable rate is designated as "refusal material". Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils, to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D-2113 using a diamond-studded bit fastened to the end of a hollow, double or triple tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovery is measured, and the core is placed, in sequence, in boxes for storage and transported to our laboratory.

Sampling and Testing in Boreholes

Several techniques are used to obtain samples and data in soils in the field; however the most common methods in this area are:

- a) Standard Penetrating Testing
- b) Undisturbed Sampling
- c) Dynamic Cone Penetrometer Testing
- d) Water Level Readings

The procedures utilized for this project are presented below.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Logs. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water level readings are normally taken in the boring and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water level at the time of our field exploration. In clayey soils, the rate of water seepage into the boring is low and it is generally not possible to establish the location of the hydrostatic water level through short-term water level readings. Also, fluctuation in the water level should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the boring are completed, if possible. The time lag is intended to permit stabilization of the groundwater level that may have been disrupted by the drilling operation.

Occasionally the boring will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone.

BORING LOGS

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the Driller. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed a geotechnical professional classifies the soil samples and prepares the final Boring Logs, which are the basis for our evaluations and recommendations.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

The following table presents criteria that are typically utilized in the classification and description of soil and rock samples for preparation of the Boring Logs.

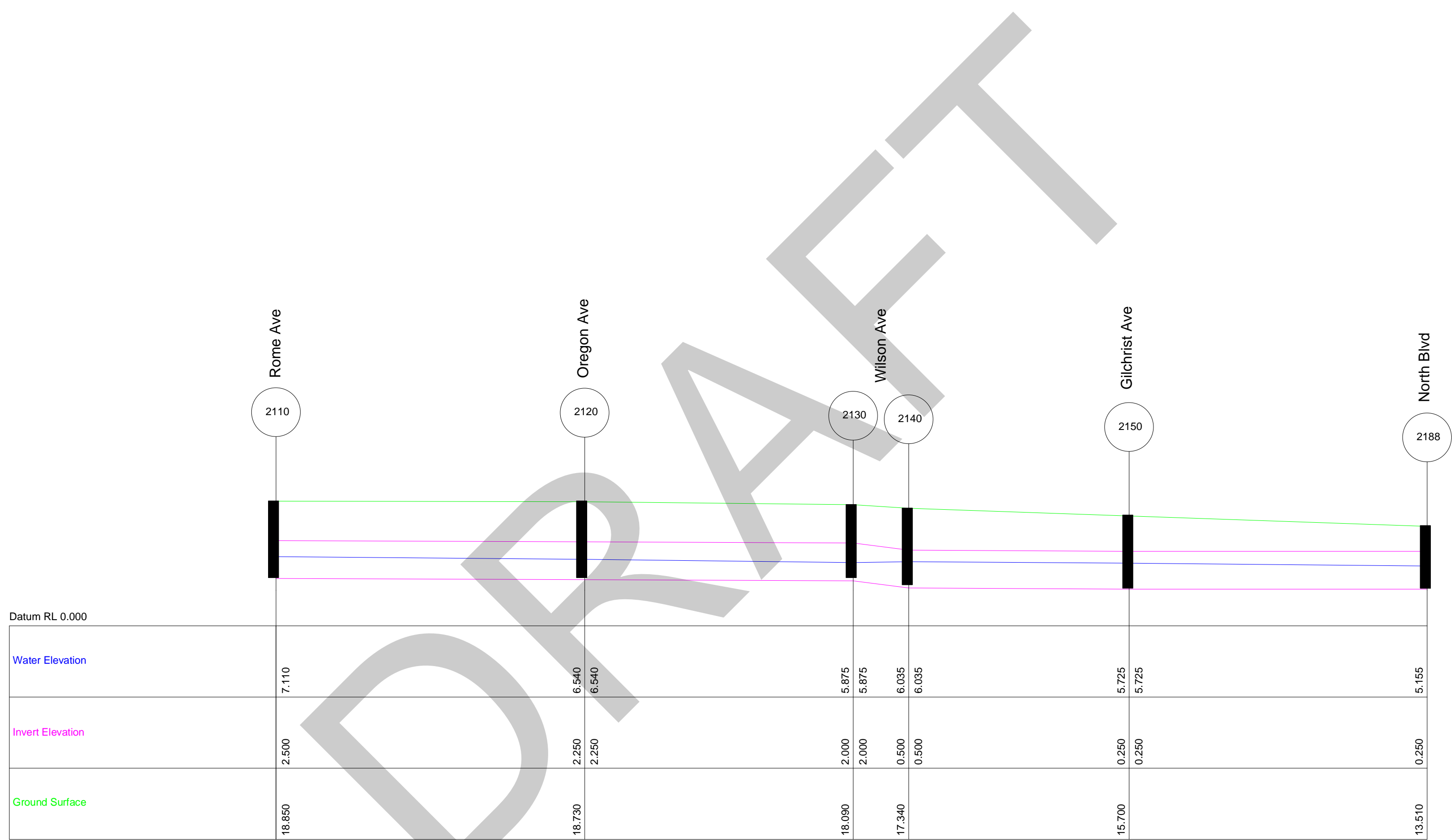
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Relative Density of Cohesionless Soils From Standard Penetration Test		Consistency of Cohesive Soils	
Very Loose	≤ 4 bpf	Very Soft	≤ 2 bpf
Loose	5 - 10 bpf	Soft	3 - 4 bpf
Medium Dense	11 - 30 bpf	Firm	5 - 8 bpf
Dense	31 - 50 bpf	Stiff	9 - 15 bpf
Very Dense	> 50 bpf	Very Stiff	16 - 30 bpf
		Hard	30 - 50 bpf
		Very Hard	> 50 bpf
(bpf = blows per foot, ASTM D 1586)			
Relative Hardness of Rock		Particle Size Identification	
Very Soft	Very soft rock disintegrates or easily compresses to touch; can be hard to very hard soil.	Boulders	Larger than 12"
Soft	May be broken with fingers.	Cobbles	3" - 12"
Moderately Soft	May be scratched with a nail, corners and edges may be broken with fingers.	Gravel	
		Coarse	3/4" - 3"
		Fine	4.76mm - 3/4"
Moderately Hard	Light blow of hammer required to break samples.	Sand	
		Coarse	2.0 - 4.76 mm
		Medium	0.42 - 2.00 mm
		Fine	0.42 - 0.074 mm
Hard	Hard blow of hammer required to break sample.	Fines (Silt or Clay)	Smaller than 0.074 mm
Rock Continuity		Relative Quality of Rocks	
RECOVERY = $\frac{\text{Total Length of Core}}{\text{Length of Core Run}} \times 100\%$		RQD = $\frac{\text{Total core, counting only pieces > 4" long}}{\text{Length of Core Run}} \times 100\%$	
<u>Description</u>	<u>Core Recovery %</u>	<u>Description</u>	<u>RQD %</u>
Incompetent	Less than 40	Very Poor	0 - 25 %
Competent	40 - 70	Poor	25 - 50 %
Fairly Continuous	71 - 90	Fair	50 - 75 %
Continuous	91 - 100	Good	75 - 90 %
		Excellent	90 - 100 %

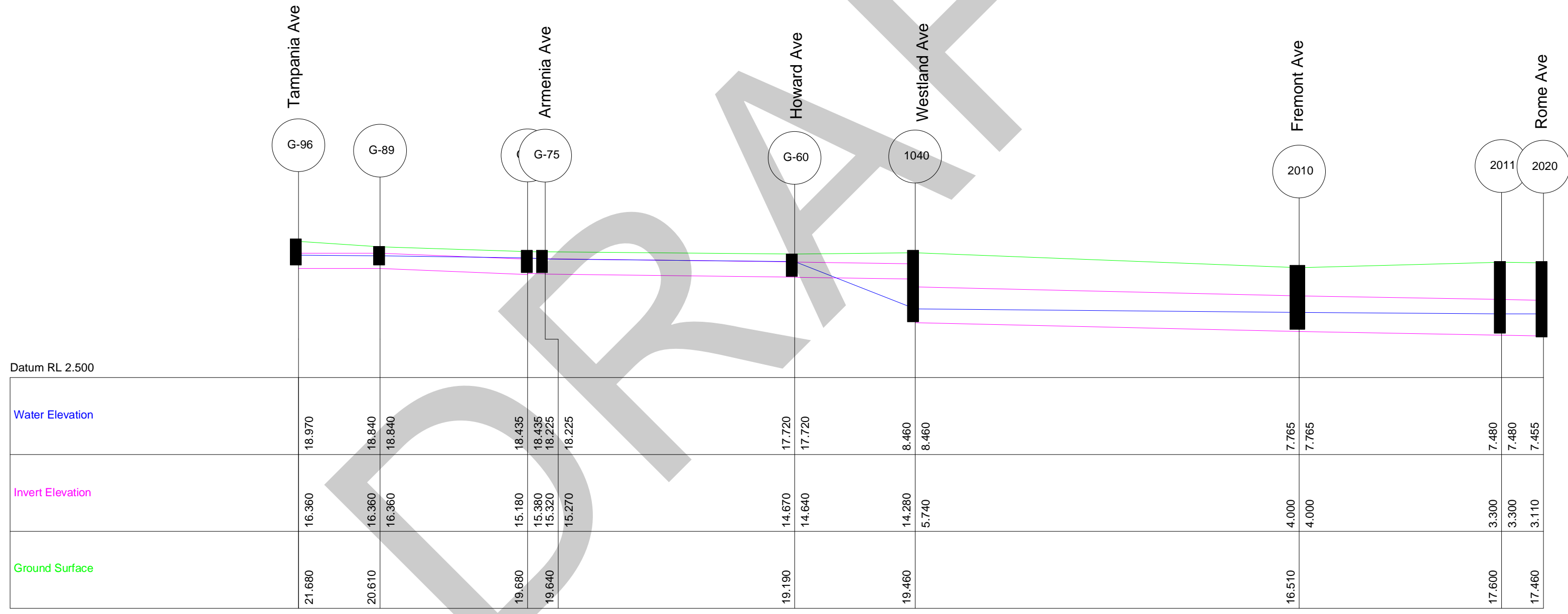
Appendix B

Proposed Hydraulic Grade Line (HGL) Profiles for the 25-year / 24-hour Storm Event

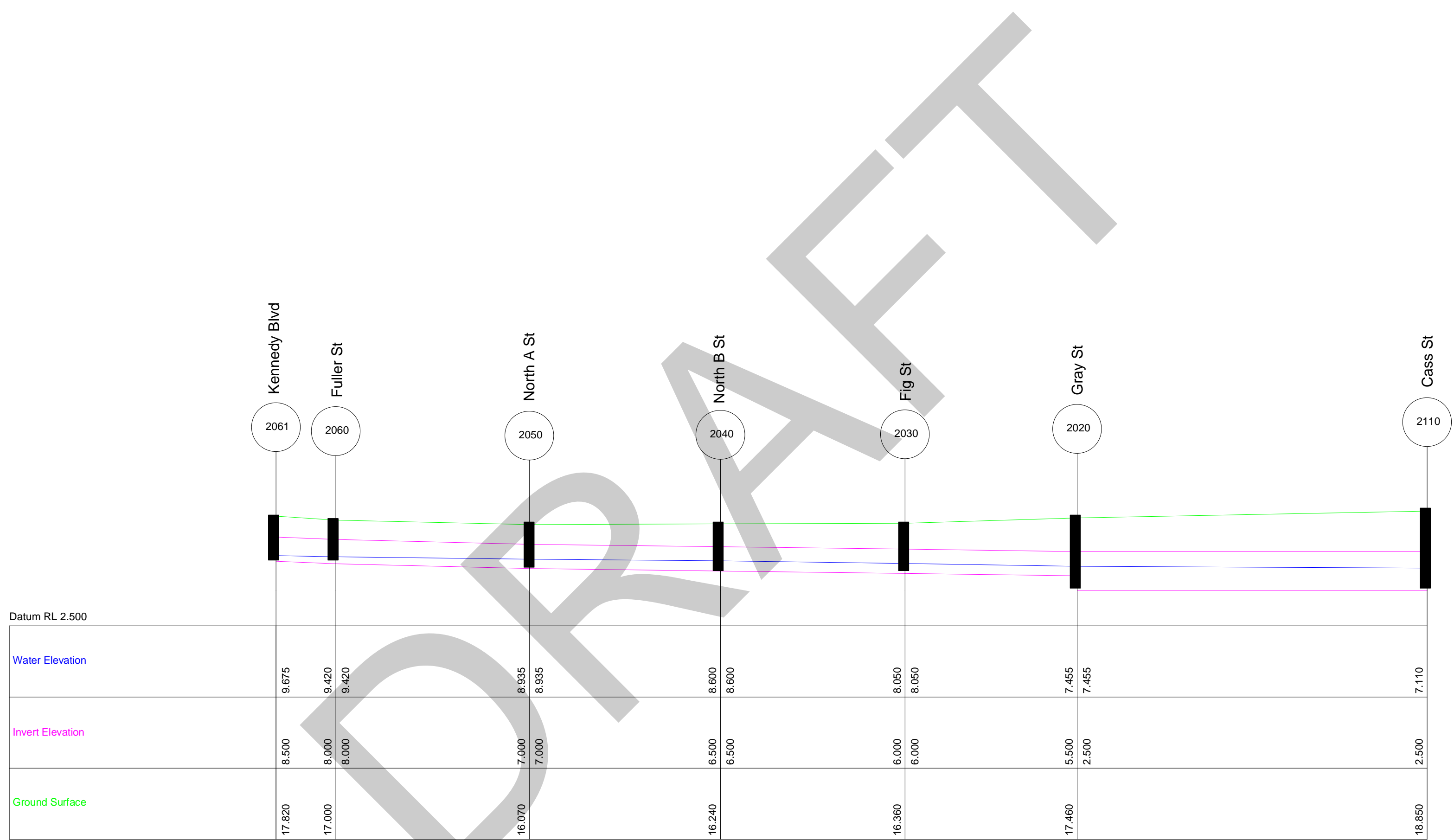
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Cass - 25-year/24-hour



Gray - 25-year/24-hour



Rome - 25-year/24-hour