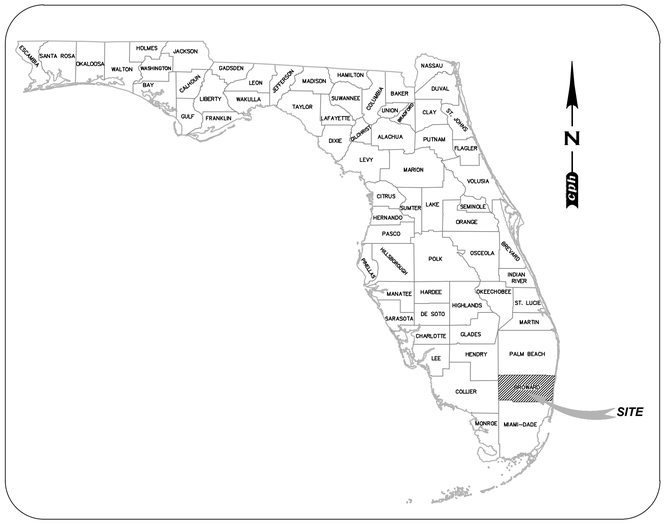
CONTRACT DOCUMENTS

Appendix I

Raw Water Supply Line Plans



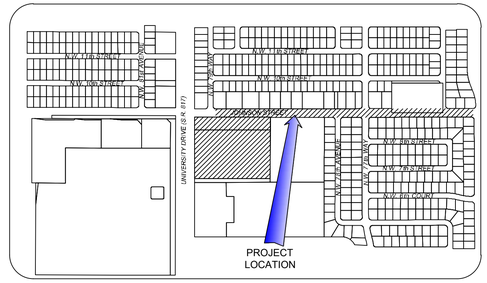
LOCATION MAP
NOT TO SCALE

CITY OF PEMBROKE PINES

RAW WATER SUPPLY LINE
BID SET

AT

7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024
LYING IN
BROWARD COUNTY, FLORIDA



VICINITY MAP
SCALE: NOT TO SCALE

CITY COMMISSION	
FRANK C. ORTIZ	MAYOR
JAY D. SCHWARTZ	VICE-MAYOR
THOMAS GOOD, Jr	COMMISSIONER
ANGELO CASTILLO	COMMISSIONER
IRIS A. SIPLE	COMMISSIONER

SHEET INDEX	
G.0	COVER SHEET
S.1-S.5	SURVEY
G.1	GENERAL NOTES
C.1	WTP SITE PLAN
C.2-C.6	JOHNSON ST. RAW WATER MAIN
C.7	WELLFIELD SITE PLAN
C.8-C.9	DETAILS

LEGEND:

- S — EXISTING FM
- PROPOSED RAW WM
- RWM — EXISTING RAW WM
- W — EXISTING WM
- G — EXISTING GAS
- TC — EXISTING TELECOM
- WTP FENCE
- EC — ELECTRIC
- ABANDONED IN PLACE

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KYLE MICHAEL BECHTELHEIMER LICENSE No. 86673 STATE OF FLORIDA PROFESSIONAL ENGINEER

No.	Date	Revision	By

Designed by: K.B.
Drawn by: K.B./Y.S.
Checked by: T.H.H.
Approved by: T.H.H.
Scale:
Date:
Job No.: P19701

Plans Prepared By:
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Survey L.B. No. 7143
Arch. Lic. No. AA2600926
Lndscp. Lic. No. LC0000298

COVER

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
G.0

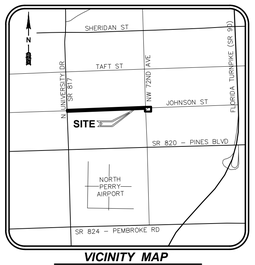
TOPOGRAPHIC SURVEY
FOR
CITY OF PEMBROKE PINES
AT
JOHNSON STREET
LYING IN
SECTIONS 10 & 15-TOWNSHIP 51 SOUTH-RANGE 41 EAST
BROWARD COUNTY, FLORIDA

Surveyed Area:

4,960± FEET OF RIGHT OF WAY OF JOHNSON STREET AND 200± FEET OF NW 72nd AVENUE SOUTH OF JOHNSON STREET TO INCLUDE A 10' OVERLAP ON EACH SIDE WHERE ACCESSIBLE AND THE NORTH 200± FEET OF FOLIO NUMBER 514114070010 (BROWARD COUNTY PROPERTY APPRAISER)

Reference Material

1. A. J. BENDLE SUBDIVISION, PLAT BOOK 1, PAGE 57 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA
2. BOULEVARD HEIGHTS SECTION 2, PLAT BOOK 44, PAGE 42 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
3. BOULEVARD HEIGHTS SECTION 3, PLAT BOOK 45, PAGE 28 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
4. BOULEVARD HEIGHTS SECTION 'A', PLAT BOOK 46, PAGE 34 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
5. BOULEVARD HEIGHTS SECTION FIVE, PLAT BOOK 50, PAGE 44 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
6. "MILLER ESTATES, SECTION 'B'", PLAT BOOK 52, PAGE 21 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
7. BOULEVARD HEIGHTS SECTION EIGHT, PLAT BOOK 57, PAGE 9 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
8. BOULEVARD HEIGHTS SECTION ELEVEN, PLAT BOOK 59, PAGE 48 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
9. REPLAT OF BOULEVARD HEIGHTS SECTION FOURTEEN, PLAT BOOK 61, PAGE 23 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
10. PEMBROKE PINES WATER TREATMENT PLAT, PLAT BOOK 160, PAGE 29 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.
11. "SCHOOL SITE 0970", PLAT BOOK 156, PAGE 18 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.



VICINITY MAP
NOT TO SCALE

Survey Notes:

1. COPIES OF THIS SURVEY ARE NOT VALID WITHOUT THE ORIGINAL SIGNATURE AND SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.
2. ADDITIONS OR DELETIONS TO SURVEY MAPS OR REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED WITHOUT WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.
3. THIS SURVEY IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD '88)

   THE SITE BENCHMARKS FOR THIS TOPOGRAPHIC SURVEY ARE DISPLAYED ON THE RESPECTIVE SURVEY FILE. THESE BENCHMARKS ARE BASED ON A CLOSED VERTICAL CONTROL LOOP HAVING AN ACTUAL ERROR OF CLOSURE OF 0.016' WHICH MEETS THE ALLOWABLE CLOSURE OF 0.08'. THIS FIELDWORK WAS PERFORMED USING A TOPCON LEVEL MODEL #DL502, AND REFERENCES THE FOLLOWING PUBLISHED BENCHMARKS AS ESTABLISHED BY THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD '88) AND ALL VERTICAL INFORMATION INCLUDING SPOT ELEVATIONS, NOTATIONS AND THE CONTOUR LINES DERIVED THEREFROM ARE BASED ON AND MATCHED TO VERTICAL CONTROL BENCHMARKS SUPPLIED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION, (FP ID#421659-1-52-01) AS FOLLOWS:

   a) DESIGNATION #DOT BM 5, CONCRETE MONUMENT WITH A DISK, ON THE NORTH SIDE OF SR 810, AT THE NORTHEAST CORNER OF AIRPORT (NORTH PERRY).
   (NAVD '88) ELEVATION = 5.846

   b) DESIGNATION #DOT BM 6, CONCRETE MONUMENT WITH A DISK, ON THE SOUTH SIDE OF SR 820, 150 FEET± EAST OF SW 72ND AVENUE.
   (NAVD '88) ELEVATION = 7.150

   SITE BENCHMARKS ARE AS SHOWN ON SURVEY SHEETS 3 THROUGH 6 OF 6.
4. THIS SURVEY IS NOT VALID WITHOUT SURVEY SHEETS 1 THROUGH 6 OF 6.
5. THE LAST DAY FIELD WORK WAS PERFORMED WAS 11/25/2020.
6. HAVING CONSULTED THE NATIONAL FLOOD INSURANCE PROGRAM, FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NO. 120053 0563 H (CITY OF PEMBROKE PINES) AND 125113 0563 H, (CITY OF HOLLYWOOD), (EFFECTIVE) DATE AUGUST 18, 2014, THE SUBJECT PROPERTY APPEARS TO LIE IN ZONE X, WHICH ARE AREAS OF 0.2% ANNUAL CHANCE FLOODPLAIN, AND LIES IN ZONE AH, WHICH ARE SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100 YEAR FLOOD WITH BASE FLOOD ELEVATIONS DEPICTED AS 7 FEET (NAVD '88), THIS DETERMINATION WAS BASED ON A GRAPHIC INTERPOLATION OF SAID MAP AND NOT ON ACTUAL FIELD MEASUREMENTS.
7. THE APPARENT USE OF THE LAND, AS CLASSIFIED BY THE STANDARDS OF PRACTICE SET FORTH IN RULE CHAPTER 5J-17 OF THE FLORIDA ADMINISTRATIVE CODE, PURSUANT TO FS 472.027, ESTABLISHES THAT THE MINIMUM RELATIVE ACCURACY FOR THIS TYPE OF SURVEY MEET THE HORIZONTAL CONTROL ACCURACY OF 1'/10,000 FEET FOR A HIGH RISK SURVEY. THE MEASUREMENTS AND CALCULATIONS OF THE CLOSED GEOMETRIC FIGURES WERE FOUND TO MEET THIS ACCURACY REQUIREMENT. THE EQUIPMENT USED TO VERIFY THE HORIZONTAL CONTROL ON THE SUBJECT SURVEY WAS A TOPCON GPS HIPER V.
8. HORIZONTAL WELL-IDENTIFIED FEATURES IN THIS SURVEY AND MAP HAVE BEEN MEASURED TO AN ESTIMATED HORIZONTAL POSITIONAL ACCURACY OF 0.05 (FT). THE EQUIPMENT USED TO LOCATE THE FEATURES WAS A LEICA SCANSTATION C10, AND TOPCON GPS HIPER V.
9. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF AN ABSTRACT OR OPINION OF TITLE. NO INSTRUMENTS OF RECORD REFLECTING EASEMENTS, RIGHTS-OF-WAY, AND/OR OWNERSHIP WERE FURNISHED TO THIS SURVEYOR EXCEPT AS NOTED BELOW:
   BROWARD COUNTY PROPERTY APPRAISER INFORMATION DISPLAYED HEREON IS PER THE BROWARD COUNTY PROPERTY APPRAISER'S WEBSITE (BCPA.NET) AS OF NOVEMBER 25, 2020.
10. NO UNDERGROUND UTILITIES, FOUNDATIONS OR IMPROVEMENTS, IF ANY, HAVE BEEN LOCATED EXCEPT AS SHOWN.
11. THIS SURVEY DOES NOT IDENTIFY THE LIMITS OR EXTENT OF POTENTIAL JURISDICTIONAL WETLAND BOUNDARIES.
12. FENCES AND WALLS EXISTING ON, OVER OR ADJACENT TO SUBJECT PROPERTY, ARE DISPLAYED HEREON; OWNERSHIP WHETHER SINGULAR OR JOINT WAS NOT DETERMINED BY THIS SURVEY.
13. VERTICAL FEATURE ACCURACY: "ELEVATIONS OF WELL-IDENTIFIED FEATURES CONTAINED IN THIS SURVEY AND MAP HAVE BEEN MEASURED TO AN ESTIMATED VERTICAL POSITIONAL ACCURACY OF 0.05 (FT)."
14. THE UNDERGROUND UTILITIES LABELED TC, UFO, UE, UG, UNK UT, UW, URW LINES DISPLAYED ON SURVEY SHEETS 3 THROUGH 6 ARE A RESULT OF AN ELECTRONIC FILE CREATED BY SOUTHEASTERN SURVEYING & MAPPING CORP. (6500 ALL AMERICAN BOULEVARD, ORLANDO FL 32810, [407] 292-8580), AND MATCHED TO DIAGRAMS AND DETAIL SHEETS PREPARED BY SOUTHEASTERN SURVEYING & MAPPING CORP..
15. STATE PLANE INFORMATION SHOWN HEREON IS BASED ON THE NORTH AMERICAN DATUM OF 1983 (1990) USING CONTROL POINTS FROM THE NGS DATA SHEETS PUBLISHED AT WWW.LABINS.ORG AND ARE AS FOLLOWS:

    FLORIDA EAST ZONE

    a) DESIGNATION # WALDREP, PID #AJ2431 = N 618466.55 FEET, E 895288.42 FEET

    b) DESIGNATION # FLGPS 70, PID #AD7904 = N 610211.97 FEET, E 914536.33 FEET

    THE EQUIPMENT USED TO TRANSFER THE STATE PLANE INFORMATION FROM THE ABOVE REFERENCED CONTROL POINTS TO THE SUBJECT SURVEY WAS A TOPCON GPS HIPER V.
16. DIMENSIONS ARE SHOWN RELATIVE TO UNITED STATES STANDARD FEET AND DECIMALS THEREOF, UNLESS THE OBJECT SHOWN IS COMMONLY IDENTIFIED IN INCHES, I.E. TREE DIAMETER, PIPE DIAMETER, ETC. TREES DEPICTED ARE COMMON NAMES AND MEASURED AND LABELED AS DIAMETER AT BREAST HEIGHT IN INCHES.
17. THE UNDERGROUND UTILITIES DEPICTED BY PIPE LINETYPES ARE APPROXIMATE IN NATURE BASED UPON AN INSPECTION OF THE MANHOLE, GRATE, ETC. OF EACH FACILITY. EXISTING PIPES WERE NOT LAMPED OR REMOTELY VIEWED FOR DIRECTION, OBSTRUCTIONS OR CONNECTIVITY.

Abbreviation Legend:

(A)	– ACTUAL	MBX	– MAILBOX
A/C	– AIR CONDITIONER	MES	– MITERED END SECTION
ACSM	– AMERICAN CONGRESS ON SURVEYING & MAPPING	MH	– MANHOLE
ADA	– AMERICANS WITH DISABILITIES ACT	MLP	– METAL LIGHT POLE
ALTA	– AMERICAN LAND TITLE ASSOCIATION	MPH	– MILES PER HOUR
APPROX	– APPROXIMATE	MPP	– METAL POWER POLE
ARV	– AIR RELEASE VALVE	N/A	– NOT APPLICABLE
AVE	– AVENUE	NAVD	– NORTH AMERICAN VERTICAL DATUM
AVG	– AVERAGE	NAD	– NORTH AMERICAN DATUM
(BB)	– BEARING BASIS	NG	– NATURAL GROUND
BFP	– BACK FLOW PREVENTER	NGS	– NATIONAL GEODETIC SURVEY
BLK	– BLOCK	NGVD	– NATIONAL GEODETIC VERTICAL DATUM
BLDG	– BUILDING	N & D	– NAIL AND DISK
BLVD	– BOULEVARD	NO.	– NUMBER
BM	– BENCH MARK	NR	– NON-RADIAL
BOC	– BACK OF CURB	NSPS	– NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS
BOW	– BACK OF WALK		
BSL	– BUILDING SETBACK LINE	NT	– NON-TANGENT
BWF	– BARBED WIRE FENCE	NTS	– NOT TO SCALE
C-X	– DENOTES SHEET NUMBERING FOR ENGINEERING PLANS	OD	– OUTSIDE DIAMETER
(C)	– CALCULATED	ORB	– OFFICIAL RECORDS BOOK
C	– CHORD	OR	– OFFICIAL RECORDS
CATV	– CABLE TELEVISION RISER	OUL	– OVERHEAD UTILITY LINES
CB	– CHORD BEARING	OTL	– OVERHEAD TRAFFIC LINES
CBS	– CONCRETE BLOCK STRUCTURE	(P)	– PLAT
C.A.R.	– CERTIFIED CORNER RECORD	PB	– PLAT BOOK
C&G	– CURB & GUTTER	PC	– POINT OF CURVATURE
CI	– CATCH INLET	PCC	– POINT OF COMPOUND CURVATURE
C/L	– CENTERLINE	PCP	– PERMANENT CONTROL POINT
CLF	– CHAIN LINK FENCE	PFF	– PROPOSED FINISHED FLOOR
CM	– CONCRETE MONUMENT	PG	– PAGE
CMP	– CORRUGATED METAL PIPE	PGS	– PAGES
CO	– CLEANOUT	PI	– POINT OF INTERSECTION
CONC	– CONCRETE	PIV	– POST INDICATOR VALVE
COR	– CORNER	PK	– PARKER KAYLON
CRPP	– CORRUGATED PLASTIC PIPE	POB	– POINT OF BEGINNING
CUE	– COUNTY UTILITY EASEMENT	POC	– POINT OF COMMENCEMENT
CVS	– CAN'T VERIFY SIZE	POL	– POINT ON LINE
CVS&T	– CAN'T VERIFY SIZE & TYPE	PP	– POWER POLE
CWS	– CROSSWALK SIGNAL	PRC	– POINT OF REVERSE CURVATURE
Δ	– DELTA	PRM	– PERMANENT REFERENCE MONUMENT
(D)	– DESCRIPTION	PSM	– PROFESSIONAL SURVEYOR & MAPPER
DB	– DEED BOOK	PT	– POINT OF TANGENCY
DBH	– DIAMETER AT BREAST HEIGHT IN INCHES	PVC	– POLYVINYL CHLORIDE PIPE
DE	– DRAINAGE EASEMENT	PVMT	– PAVEMENT
DEPT	– DEPARTMENT	R41E	– RANGE 41 EAST
DIP	– DUCTILE IRON PIPE	R	– RADIUS
DR	– DRIVE	RAD	– RADIAL
D/U	– DRAINAGE AND UTILITY EASEMENT	RCP	– REINFORCED CONCRETE PIPE
(E)	– ENGINEERING PLAN	REC	– RECOVERED
E.J.B	– ELECTRIC JUNCTION BOX	REV	– REVISION
EL	– UNDERGROUND ELECTRICAL LINES	RP	– RADIUS POINT
ELEC	– ELECTRIC	R/W	– RIGHT-OF-WAY
ELEV	– ELEVATION	RLS	– REGISTERED LAND SURVEYOR
ELLIP	– ELLIPTICAL	RP	– RADIUS POINT
EOI	– END OF INFORMATION	RWL	– UNDERGROUND RECLAIM WATER LINE
EOP	– EDGE OF PAVEMENT	RWM	– RECLAIMED WATER METER
FB	– FIELD BOOK	SE	– SPECIAL EASEMENT
FDC	– FIRE DEPARTMENT CONNECTION	SEC 10	– SECTION 10
FDOT	– FLORIDA DEPARTMENT OF TRANSPORTATION	SMH	– SANITARY SEWER MANHOLE
FF	– FINISH FLOOR	(SP)	– STATE PLANE
FGI	– FLAT GRATE INLET	SQ	– SQUARE
FHYD	– FIRE HYDRANT	SQ FT	– SQUARE FEET
FM	– FORCE MAIN	ST	– STREET
FND	– FOUND	STMH	– STORM DRAINAGE MANHOLE
FP&L	– FLORIDA POWER AND LIGHT	S/W	– SIDEWALK
FP	– FINANCIAL PROJECT ID	TB	– TANGENT BEARING
FS	– FLORIDA STATUTES	T51S	– TOWNSHIP 51 SOUTH
(G)	– GRID (STATE PLANE)	TELE	– TELEPHONE
GL	– UNDERGROUND GAS LINES	TL	– OVERHEAD TRAFFIC SIGNAL LINES
GOV'T	– GOVERNMENT	TOB	– TOP OF BANK
GPR	– GROUND PENETRATING RADAR	TOE	– TOE OF SLOPE
GTMH	– GREASE TRAP MANHOLE	TR	– TELEPHONE RISER
HDPE	– HIGH DENSITY POLYETHYLENE PIPE	TRANS	– TRANSFORMER
HWF	– HOG WIRE FENCE	TSB	– TRAFFIC SIGNAL BOX
ID	– IDENTIFICATION	TSSP	– TRAFFIC SIGNAL SUPPORT POLE
ICV	– IRRIGATION CONTROL VALVE	TVL	– UNDERGROUND CABLE TV LINES
INFO	– INFORMATION	(TYP)	– TYPICAL
INV	– INVERT	UE	– UTILITY EASEMENT
IP	– IRON PIPE	UNK	– UNKNOWN
IP&C	– IRON PIPE & CAP	UTL	– UNDERGROUND TELEPHONE LINES
IR	– IRON ROD	W/	– WITH
IR&C	– IRON REBAR & CAP	WIF	– WROUGHT IRON FENCE
IRR	– IRRIGATION	WL	– UNDERGROUND WATER LINE
L	– ARC LENGTH	WLP	– WOOD LIGHT POLE
LB#	– LICENSED BUSINESS NUMBER	WM	– WATER METER
LP	– LIGHT POLE	WP	– WORK PROGRAM
(M)	– MEASURED	WPF	– WOOD POST FENCE
MB	– MAP BOOK	WPP	– WOOD POWER POLE
		WV	– WATER VALVE

Line Legend:

NOT TO SCALE

- = 1 FOOT CONTOURS
- = 5 FOOT CONTOURS
- = ADJOINER PROPERTY LINES
- = BARBED WIRE FENCE
- = BROKEN LINE
- = BURIED CABLE
- = BURIED CABLE TELEVISION
- = BURIED ELECTRIC
- = BURIED FIBER OPTICS
- = BURIED GAS
- = BURIED RECLAIMED WATER LINE
- = BURIED SANITARY LINES
- = BURIED SANITARY SEWER FORCE MAIN LINE
- = BURIED TRAFFIC CONTROL
- = BURIED TELEPHONE LINE
- = BURIED WATER LINES
- = CENTER LINE R/W
- = CHAIN LINK FENCE
- = EASEMENT LINES (EXISTING)
- = EASEMENT LINES (PROPOSED)
- = EDGE OF WATER LINES
- = EXISTING DRAINAGE PIPES
- = EXISTING DRAINAGE PIPES (TERMINUS & ANGLE UNKNOWN)
- = FIRE WATER MAIN LINES
- = HOT WATER SUPPLY LINES
- = IRRIGATION LINES
- = OVERHEAD TRAFFIC LINES
- = OVERHEAD UTILITY LINES
- = NON-VEHICULAR ACCESS LINE (PLATTED)
- = RIGHT-OF-WAY LINES
- = SECTION LINES
- = STONE WALL LINES
- = TOP OF BANK LINES
- = TOE OF SLOPE LINES
- = TREE LINES
- = TRAVERSE LINES
- = UNKNOWN BURIED LINES
- = VINYL FENCE
- = WOOD FENCE
- = WETLAND LINE
- = ORANGE PAINT LINE
- = GREEN PAINT LINE
- = RED PAINT LINE
- = WHITE PAINT LINE
- = PURPLE PAINT LINE
- = BLUE PAINT LINE
- = YELLOW PAINT LINE

Symbol Legend:

NOT TO SCALE

- – AIR RELEASE VALVE
- – BORING HOLE LOCATION
- – BRICK PAVERS
- – CABLE TV RISER
- – CENTRAL ANGLE
- – CLEAN OUT
- – COMMUNICATION MANHOLE
- – CONCRETE
- – CONCRETE LIGHT POLE
- – CONCRETE LIGHT POLE (DUAL)
- – CONCRETE LIGHT POLE (TRIPLE)
- – CONCRETE LIGHT POLE (QUAD)
- – CONCRETE MITERED END SECTION
- – CONCRETE PAVERS
- – CONCRETE RIP RAP
- – CONCRETE UTILITY POLE
- – COUNTY ROAD SYMBOL
- – CROSSWALK SIGNAL POLE
- – DETECTABLE WARNING AREA
- – DUAL SUPPORT SIGN
- – ELECTRICAL MANHOLE
- – ELECTRIC METER
- – ELECTRICAL JUNCTION BOX
- – ELECTRIC OUTLET
- – ELECTRIC RISER
- – FIBER OPTIC MARKER
- – FIRE DEPARTMENT CONNECTION
- – FIRE HYDRANT
- – FLOOD LIGHT
- – FOUND CONCRETE MONUMENT (AS NOTED)
- – FOUND IRON PIPE (AS NOTED)
- – FOUND IRON REBAR (AS NOTED)
- – FOUND/SET NAIL (AS NOTED)
- – GARBAGE CAN
- – GAS MARKER
- – GAS VALVE
- – GOPHER TORTOISE HOLE
- – GRATE INLET
- – GRAVEL/DIRT
- – GREASE TRAP MANHOLE
- – GROUND LIGHT
- – GUY ANCHOR
- – HANDICAP PARKING SPACE
- – INTERSTATE SYMBOL
- – IRRIGATION CONTROL VALVE
- – LIGHT POLE
- – LIGHT POLE (DUAL)
- – LIGHT POLE (TRIPLE)
- – LIGHT POLE (QUAD)
- – MAILBOX
- – MONITOR WELLS
- – NAIL & DISC (AS NOTED)
- – PARKING SPACES (2)
- – POST INDICATOR VALVE
- – PULL BOX (AS NOTED)
- – REVISION NUMBER (3)
- – RECLAIMED WATER METER
- – RECLAIMED WATER VALVE
- – ROOF DRAIN
- – SANITARY SEWER MANHOLE
- – SANITARY SEWER VALVE
- – TITLE OR REPORT ITEM NUMBER
- – SECTION CORNER
- – 4" X 4" CM LB #7143
- – 5/8" IR&C LB #7143
- – SIGN
- – SITE BENCH MARK
- – STORM SEWER MANHOLE
- – STRIPING (DIRECTIONAL)
- – TELEPHONE CABLE RISER
- – TELEPHONE MANHOLE
- – TELEPHONE LINE MARKER
- – TELEPHONE JUNCTION BOX
- – TEST HOLE
- – TRAFFIC SIGNAL BOX
- – TRAFFIC SIGNAL SUPPORT POLE
- – UNKNOWN MANHOLE
- – UNKNOWN UTILITY MARKER
- – UNKNOWN RISER
- – UNKNOWN VALVE
- – UTILITY FLAG (AS NOTED)
- – VENT (AS NOTED)
- – WATER METER
- – WATER RISER
- – WATER SERVICE
- – WATER SPIGOT
- – WATER SPRINKLER
- – WATER VALVE
- – WELL
- – WETLAND FLAG
- – WOOD UTILITY POLE
- – WATER LINE MARKER
- – WIRE HEIGHTS (SEE CHART)

Sign Legend:

NOT TO SCALE

- (R1) – ROW NUMBER SIGN
- (B) – BUS STOP SIGN
- (DE) – DEAD END SIGN
- (DNE) – DO NOT ENTER SIGN (R5-1)
- (HC) – HANDICAP SIGN
- (HC) – DUAL HANDICAP SIGN
- (FDC) – FIRE DEPARTMENT CONNECTION
- (INFO) – INFORMATION SIGN
- (KR) – KEEP RIGHT SIGN
- (LTO) – LEFT TURN ONLY
- (ME) – MEDIAN SIGN
- (ND) – NO DUMPING SIGN
- (NL) – NO LEFT TURN SIGN (R3-2)
- (NLI) – NO LITTERING SIGN
- (NO) – NO OUTLET SIGN
- (FL) – NO PARKING FIRE LANE SIGN
- (NOR) – NO RIGHT TURN SIGN (R3-1)
- (NTT) – NO THRU TRAFFIC SIGN
- (NOT) – NO TRUCKS (R5-2)
- (NP) – NO PARKING SIGN
- (1W) – ONE WAY SIGN (R6-2)
- (PE) – PEDESTRIAN CROSSING SIGN
- (RTO) – RIGHT TURN ONLY
- (SL) – SPEED LIMIT SIGN
- (ST) – STOP SIGN (R1-1)
- (SS) – STREET SIGN
- (TZ) – TOW AWAY ZONE SIGN
- (TE) – TRUCK ENTRANCE SIGN
- (U) – UNKNOWN SIGN
- (WL) – WEIGHT LIMIT SIGN
- (WW) – WRONG WAY SIGN
- (Y) – YIELD SIGN

Index of Survey Sheets

Surveyor's Certification:

I hereby certify that the attached "Topographic Survey" of the hereon-described property is true and correct to the best of my knowledge, information and belief as surveyed in the field on November 25, 2020. I further certify that this "Topographic Survey" meets the standards of practice set forth in Rule Chapter 5J-17 of the Florida Administrative Code, pursuant to FS 472.027.

THE ELECTRONIC SIGNATURE HEREON IS IN COMPLIANCE WITH THE FLORIDA ADMINISTRATIVE CODE (FAC) 5J-17.062(3) AND THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY PAUL J. KATREK, PSM, 6233 ON __/__/__ PER 5J17-062(2)

For the Firm By: _____
Paul J. Katrek
Professional Surveyor and Mapper
Florida Registration No. 6233

TITLE BLOCK ABBREVIATIONS
Eng. = ENGINEERING L.B. = LICENSED BUSINESS
C.O.A. = CERTIFICATE OF AUTHORIZATION Arch.= ARCHITECTURAL
Landscp. = LANDSCAPE N/A = NOT APPLICABLE Lic. = LICENSED
No. = NUMBER P.O. = POST OFFICE © = COPYRIGHT

No.	Date	Revision	By
1			
2			
3			
4			

No.	Date	Revision	By
5			
6			
7			
8			

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A Full Service A & E Firm
500 West Fulton Street
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Ph: 407.322.6841
www.cphcorp.com

Date: 11/25/2020 © 2021

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State of Florida Licenses:
Engineer No. 3215
Surveyor No. LB7143
Architect. No. AA26000926
Landscape No. LC000298

Field Crew:	E. Hatecke
Drawn By:	J. Fleming
Checked By:	R. Roberts
Approved By:	P. Katrek
Job No.	P19701

CITY OF PEMBROKE PINES
RAW WATER SUPPLY LINE - JOHNSON RD
SECTIONS 10 & 15-TOWNSHIP 51 SOUTH-RANGE 41 EAST
BROWARD COUNTY, FLORIDA

TOPOGRAPHIC SURVEY

Sheet No.
V0.1

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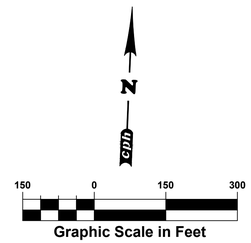
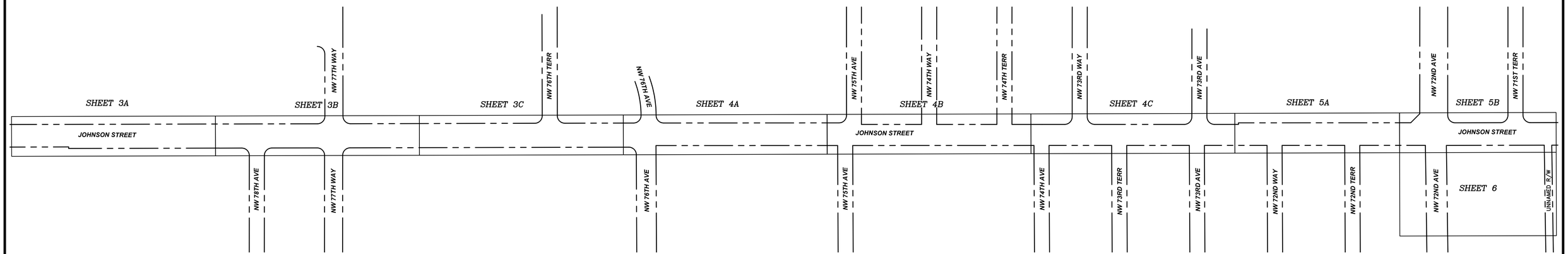
Survey Sheet 2





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BROWARD COUNTY, FLORIDA

KEY SHEET

Sheet No.
V1.1

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Survey Sheet 3

Graphic Scale in Feet (20 0 20 40)

Sheet 3A

BEGIN SURVEY AREA

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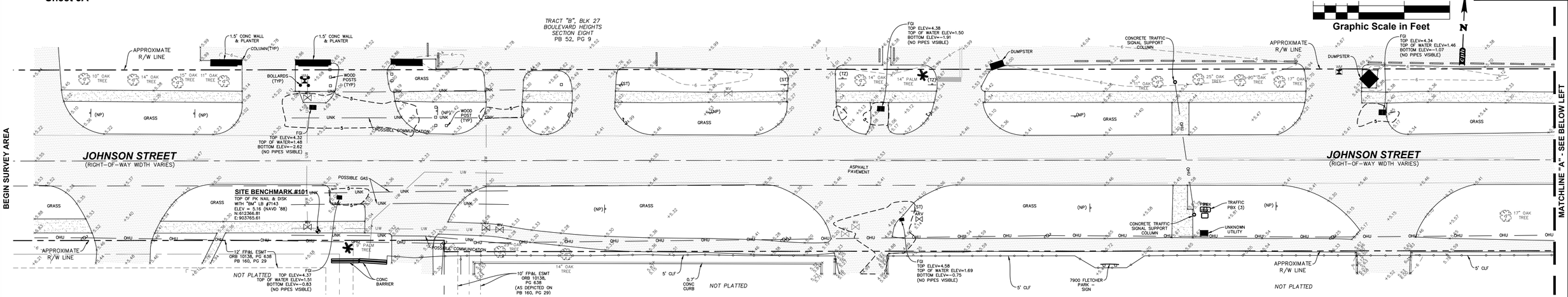

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Sheet 3B

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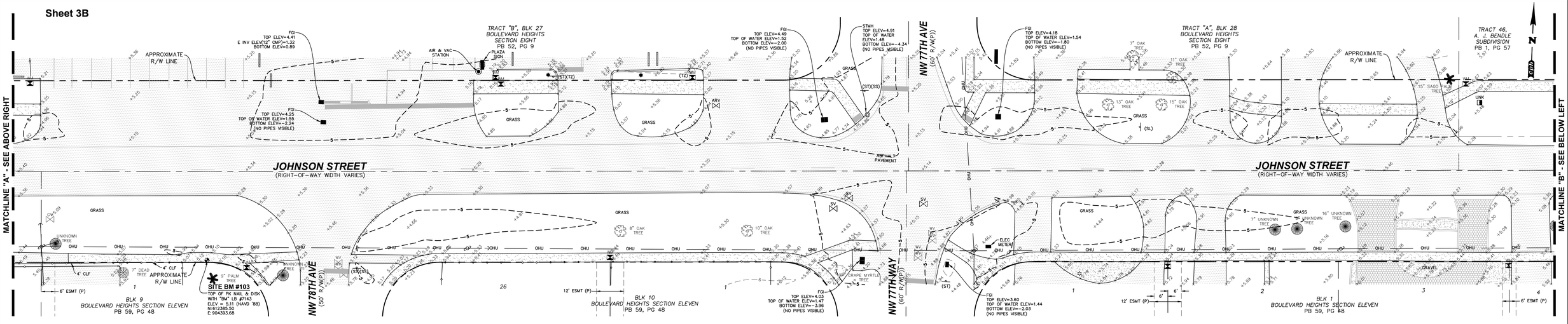

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Sheet 3C

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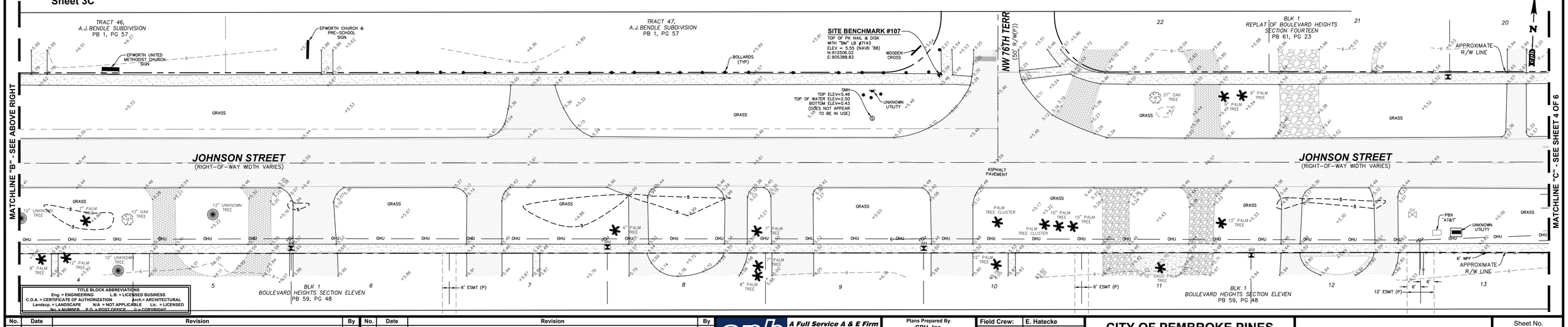

MATCHLINE "C" - SEE SHEET 4 OF 6

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SECTIONS 10 & 15-TOWNSHIP 51 SOUTH-RANGE 41 EAST
BROWARD COUNTY, FLORIDA

TOPOGRAPHIC SURVEY

Sheet No. V1.2

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Survey Sheet 4

Sheet 4A

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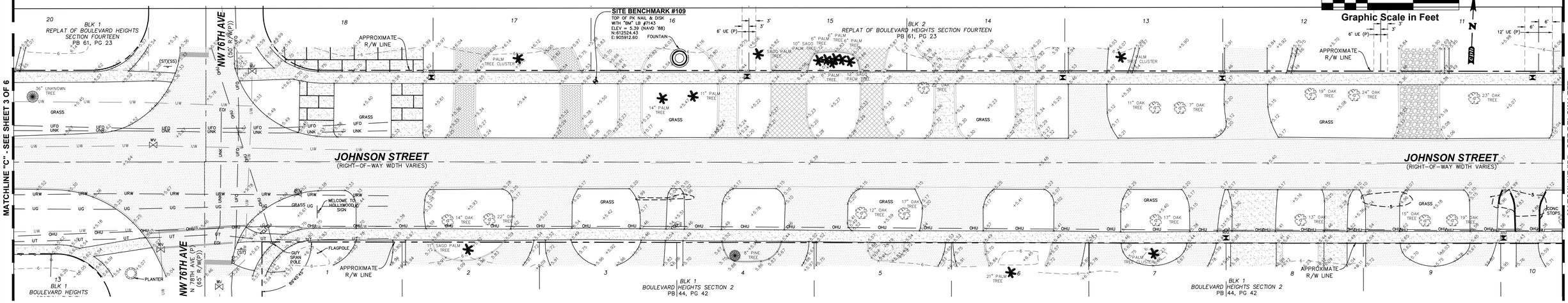
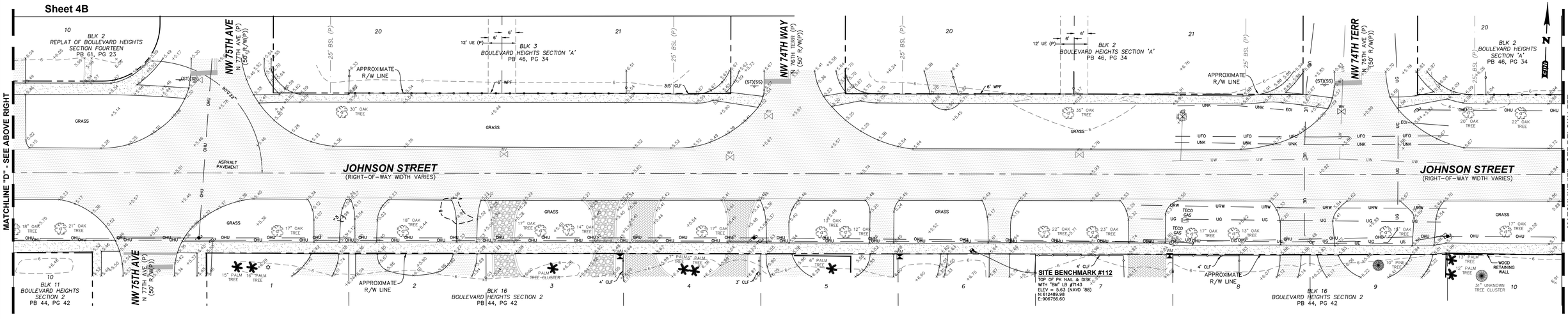
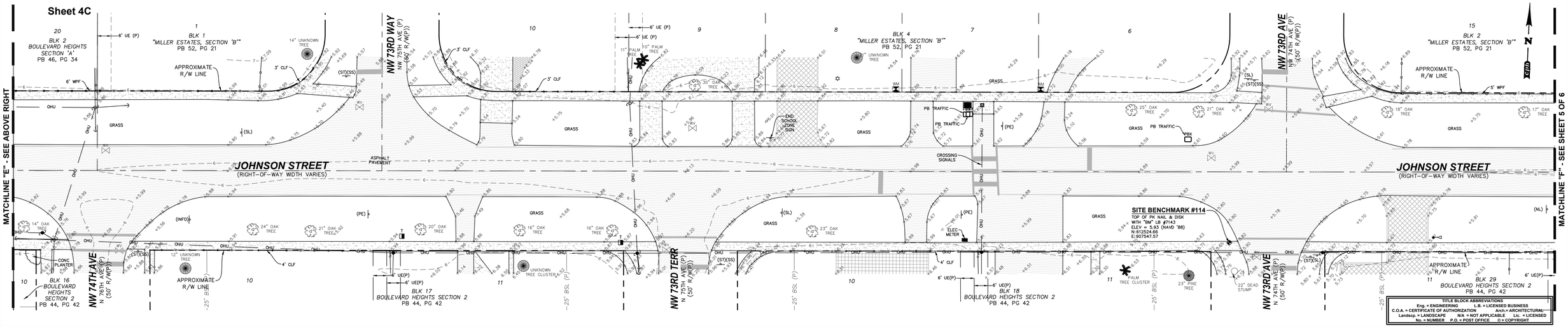
Graphic Scale in Feet



Sheet 4B



Sheet 4C



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BROWARD COUNTY, FLORIDA

TOPOGRAPHIC SURVEY

Sheet No.
V1.3

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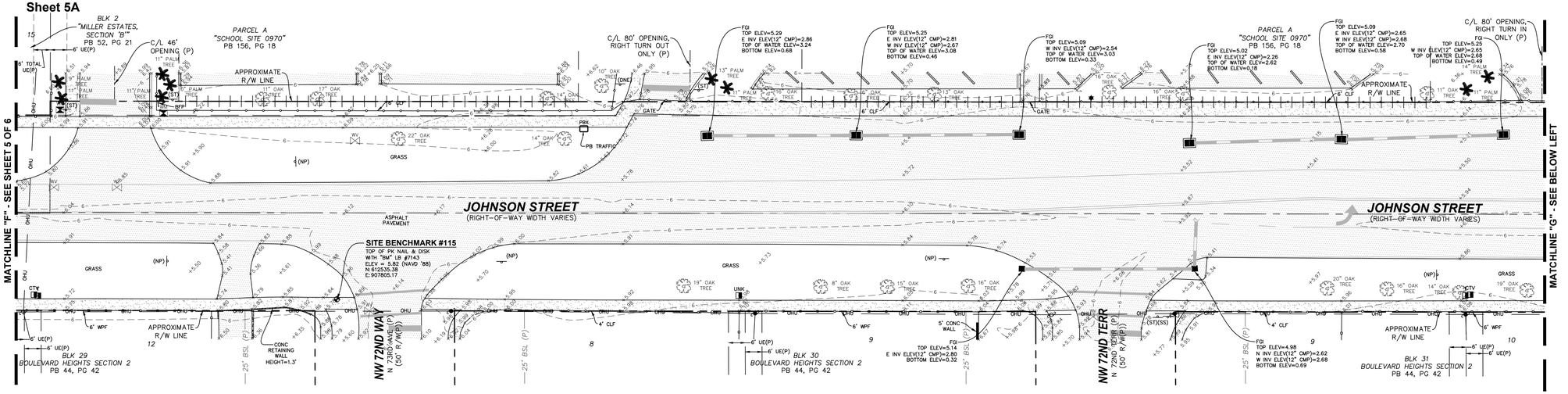
Survey Sheet 4

Sheet 5A



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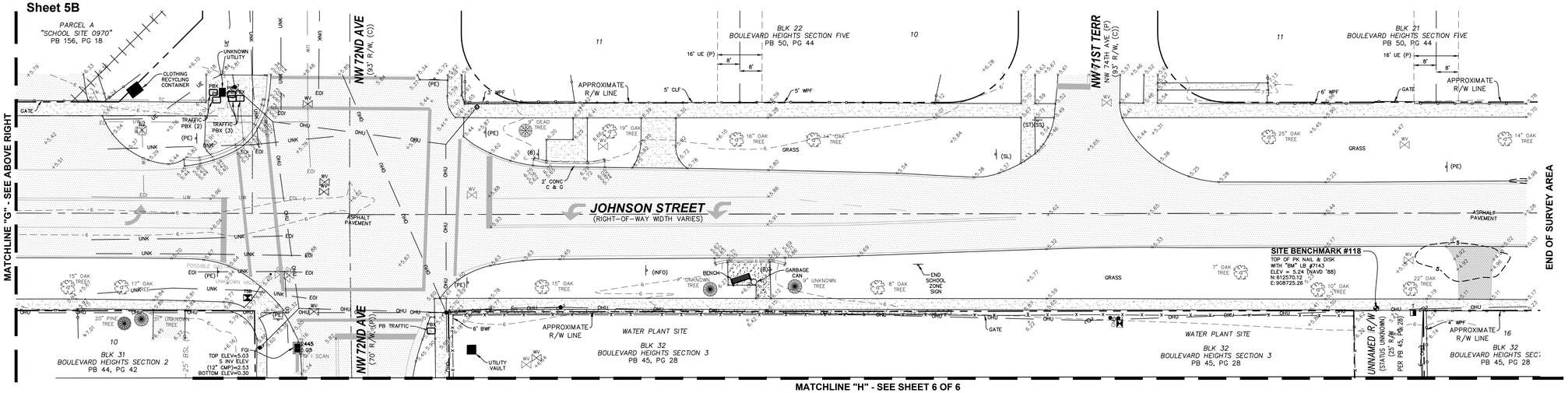
Sheet 5B



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CITY OF PEMBROKE PINES

RAW WATER SUPPLY LINE - JOHNSON ST

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BROWARD COUNTY, FLORIDA

TOPOGRAPHIC SURVEY

Sheet No. V1.4

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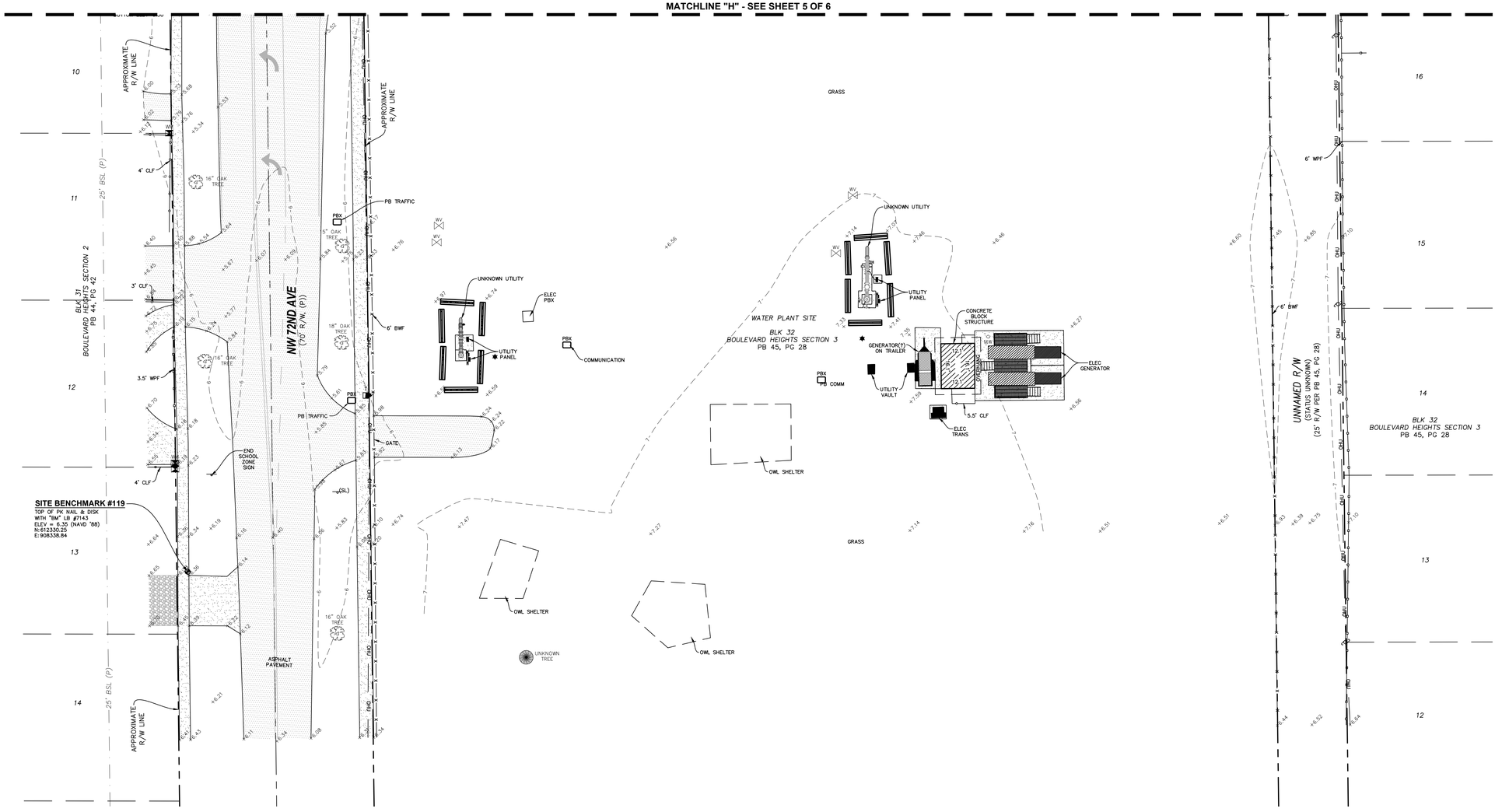

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TOPOGRAPHIC SURVEY

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GENERAL CONSTRUCTION NOTES

ALL WORK AND REQUIREMENTS FROM THE NOTES IN THIS PAGE SHALL BE A REQUIREMENT OF THE CONTRACT AND EXECUTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO CITY OF PEMBROKE PINES.

1. ALL CONSTRUCTION CONNECTING TO CITY OF PEMBROKE PINES SYSTEM SHALL CONFORM TO THE CONTRACT DOCUMENTS AND CITY'S STANDARDS.
2. THE UTILITIES IMPROVEMENTS AND ADJUSTMENTS SHOWN ON THESE DRAWINGS ARE INTENDED TO MAINTAIN THE INTEGRITY OF THE CITY'S WATER, WASTEWATER, AND RAW WATER SYSTEMS. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. LOCATIONS OF EXISTING UTILITIES AS SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD VERIFY THE EXISTENCE AND LOCATION OF ALL ABOVE GROUND AND UNDERGROUND UTILITIES. CONTRACTOR SHALL CONTACT SUNSHINE ONE CALL PER STATE LAW PRIOR TO EXCAVATION. ALL EXISTING UTILITIES SHALL REMAIN AND ARE TO BE PROTECTED AND SUPPORT AS NEEDED FOR WATER MAIN INSTALLATION.
4. ALL EXISTING AND NEW WATER AND SEWER VALVES, VALVE BOXES, AND MANHOLES SHALL BE PROTECTED AND ADJUSTED TO FINISHED GRADE AS SHOWN ON THE DRAWINGS. VALVE AND VALVE BOXES SHALL REMAIN ACCESSIBLE AT ALL TIMES. ANY VALVES THAT MIGHT BE COVERED DURING CONSTRUCTION SHALL BE MARKED WITH A MARKER (GREEN FOR SEWER AND BLUE FOR WATER), A MINIMUM OF FOUR (4) FEET ABOVE GRADE. ALL VALVES UNDER CONSTRUCTION ARE TO REMAIN CLOSED DURING CONSTRUCTION AND REMAIN CLOSED UNTIL DIRECTION TO OPEN IS ISSUED BY CITY.
5. THE CONTRACTOR SHALL PROTECT EXISTING SERVICE CONNECTIONS AND MAINS DURING CONSTRUCTION AND SHALL COORDINATE THE RELOCATION OF SERVICES WITH CITY AND EOR PROJECT REPRESENTATIVE. THE CONTRACTOR WILL RELOCATE EXISTING SERVICES AS NECESSARY AND AS DIRECTED BY CITY PERSONNEL.
6. SEE DETAIL SHEET FOR SEPARATION REQUIREMENTS BETWEEN WATER MAINS, SEWER MAINS AND OTHER PIPELINES AND MAINS. NO CONCRETE ENCASEMENT OF PIPES WILL BE PERMITTED.
7. WHEN USING SCALED DATA CONSIDER THAT THESE PLANS MAY HAVE BEEN ALTERED IN SIZE DURING REPRODUCTION.
8. LOCATIONS AND DIMENSIONS OF EXISTING RIGHT-OF-WAYS AND EASEMENTS ARE BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY AND STAKE THE LIMITS OF THE RIGHT-OF-WAYS AND EASEMENTS IN ORDER TO AVOID ENCROACHMENTS BEFORE CONSTRUCTION.
9. WHEN OBTAINING DATA AND INFORMATION FROM THE PLANS, NUMERICAL FIGURES SHALL BE USED IN PREFERENCE TO SCALED DIMENSIONS AND LARGER SCALE DRAWINGS IN PREFERENCE TO SMALLER SCALE DRAWINGS.
10. PIPE LENGTHS SHOWN ON PLANS ARE APPROXIMATE. ACTUAL LENGTHS ARE TO BE DETERMINED DURING CONSTRUCTION.
11. NOTIFY FIBER OPTICS COMPANIES SEVEN (7) DAYS AND GAS & ELECTRIC COMPANIES FOURTEEN (14 DAYS) PRIOR TO ANY CONSTRUCTION. EXTREME CAUTION SHALL BE EXERCISED IN THE AREAS OF FIBER OPTICS, GAS, AND ELECTRIC MAINS.
12. ALL STATIONS AND OFFSETS REFER TO THE BASELINE OF STATIONING.
13. MAINTAIN ACCESS TO ALL BUSINESSES AND RESIDENCES AT ALL TIMES.
14. ALL FITTINGS ON EXISTING MAINS ARE ASSUMED TO HAVE THRUST BLOCKS. CONTRACTOR SHALL USE CAUTION WHEN WORKING IN THESE AREAS.
15. LOCAL RESIDENTIAL ACCESS SHALL BE MAINTAINED AT ALL TIMES. PROVIDE WRITTEN NOTIFICATION TO RESIDENTS SEVEN (7) DAYS PRIOR TO IMPLEMENTING ANY ROADWAY OR DRIVEWAY CLOSURE. A SECOND NOTICE WILL BE GIVEN 24 HOURS IN ADVANCE OF CLOSURE.
16. SUPPORT & PROTECT ALL EXISTING UTILITIES. CONTRACTOR SHALL CONTACT UTILITY OWNERS FOR LOCATION OF ALL EXISTING FACILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH UTILITY OWNERS AND BE RESPONSIBLE FOR PROVIDING TEMPORARY SUPPORT FOR UTILITY POLES AND ALL OTHER UTILITIES.
17. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING IN PROXIMITY OF WATER MAINS, WASTEWATER FORCE MAINS, GRAVITY MAINS, AND RECLAIMED WATER MAINS. MAIN LOCATIONS SHOWN ON PLANS ARE NOT EXACT OR GUARANTEED. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING EXISTING UTILITY LOCATIONS.
18. ALL WATER MAINS SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS. A MINIMUM COVER OF 42 INCHES SHALL BE MAINTAINED ON ALL WATER MAINS UNDER ASPHALT, WHERE IT IS NOT OTHERWISE SPECIFIED ON PLANS OR DIRECTED BY THE ENGINEER. ALL DIRECTION CHANGES IN THE PIPE BOTH HORIZONTAL AND VERTICAL SHALL BE BY JOINT DEFLECTION UNLESS OTHERWISE NOTED OR DIRECTED BY THE ENGINEER. JOINT DEFLECTION SHALL NOT EXCEED 50% OF THE MANUFACTURER'S RECOMMENDED DEFLECTION.
19. ALL PIPE AND FITTINGS SHALL BE RESTRAINED. NO THRUST BLOCKS SHALL BE PERMITTED UNLESS SHOWN. (RESTRAIN EXISTING PIPE JOINTS IN ACCORDANCE WITH THE RESTRAINT TABLES).
20. COMPLETE ALL CONSTRUCTION WITHIN RIGHT OF WAY LIMITS AND EASEMENT LIMITS.
21. PIPE SIZES SHOWN ON PLANS ARE MINIMUM NOMINAL INSIDE DIAMETER.
22. ALL CONNECTIONS TO EXISTING MAINS SHALL BE MADE BY THE CONTRACTOR ONLY AFTER THE PROPOSED CONNECTION PROCEDURE AND WORK SCHEDULE HAVE BEEN REVIEWED AND ACCEPTED BY THE OWNER. THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST TO THE OWNER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO SCHEDULING ANY CONNECTIONS. ALL CONNECTIONS TO BE COMPLETED IN THE PRESENCE OF AUTHORIZED CITY PERSONNEL. THE REQUEST SHALL REFERENCE THE PROFESSIONAL LAND SURVEYOR CERTIFIED COMPLETED AS-BUILT RECORD DRAWINGS PREVIOUSLY SUBMITTED AND SHALL OUTLINE THE FOLLOWING:

    a. POINTS OF CONNECTION, FITTINGS TO BE USED, METHODS OF FLUSHING AND DISINFECTION AND VERIFICATION OF RESTRAINT ON EXISTING PIPE.
    b. ESTIMATED CONSTRUCTION TIME FOR THE CONNECTIONS.

    THE OWNER SHALL REVIEW THE SUBMITTAL WITHIN FIVE (5) WORKING DAYS AFTER RECEIVING IT AND INFORM THE CONTRACTOR REGARDING APPROVAL OR DENIAL OF THE REQUEST. IF THE OWNER REJECTS THE REQUEST, THE CONTRACTOR SHALL RESUBMIT THE REQUEST MODIFYING IT IN A MANNER ACCEPTABLE TO THE OWNER. ALL CONNECTIONS SHALL ONLY BE MADE ON THE AGREED UPON DATE AND TIME.
    SHOULD THE CONTRACTOR NOT INITIATE AND COMPLETE THE CONNECTION WORK IN THE AGREED UPON MANNER, HE SHALL BE REQUIRED TO RESCHEDULE THE CONNECTION BY FOLLOWING THE PROCEDURE OUTLINED ABOVE.
23. THE CONTRACTOR SHALL NOT OPERATE ANY VALVES IN THE SYSTEM WITHOUT THE PRESENCE AND AUTHORIZATION OF CITY PERSONNEL.
24. MAINS SHALL NOT BE PLACED IN SERVICE UNTIL CLEARANCE IS RECEIVED FROM FDEP.
25. PROTECT EXISTING IMPROVEMENTS TO THE MAXIMUM EXTENT POSSIBLE.
26. RESTORE ALL EXISTING IMPROVEMENTS AND DISTURBED AREAS TO ORIGINAL OR BETTER CONDITION. PAVEMENT TO BE RESTORED IN ACCORDANCE WITH THE PAVEMENT RESTORATION DETAILS SHOWN ON THE CONSTRUCTION DETAIL SHEETS. CONTRACTOR TO PROVIDE OWN SURVEY AS NEEDED TO MATCH EXISTING CONDITIONS.
27. ASPHALTIC CONCRETE RESURFACING SHALL BE COMPLETED TO THE ORIGINAL EDGE OF PAVEMENT. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE EXISTING PAVEMENT OUTSIDE OF RESURFACING LIMITS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL DAMAGE TO THE EXISTING ROADWAY OUTSIDE THE LIMITS OF THE RESURFACING.
28. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SATISFYING ALL REQUIREMENTS OF REGULATORY AGENCY PERMITS FOR CONSTRUCTION ACTIVITIES AND RELATED ACTIVITIES.
29. BENCHMARK LOCATIONS AND ELEVATION ARE SHOWN IN THE PLANS AS REPRESENTED BY SURVEYOR AT THE TIME OF SURVEY. CONTRACTOR SHALL INSTALL HIS OWN TEMPORARY BENCHMARKS AS DEEMED NECESSARY. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE CITY INSPECTOR.
30. IMMEDIATELY AT ONSET OF CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES CRITICAL TO COMPLETING THE PROJECT (INCLUDING WATER, SEWER, POWER, TELEPHONE, GAS, AND CABLE TV) AND SHALL EVALUATE POTENTIAL CONFLICTS IN A WRITTEN REPORT. ANY CONFLICTS SHALL BE REPORTED TO ENGINEER/OWNER IMMEDIATELY UPON DISCOVERY AND DETAILED IN THE REPORT. CONTRACTOR SHALL ASSUME ALL EXISTING UTILITIES SHALL REMAIN AND WILL BE SUPPORTED BY THE CONTRACTOR DURING CONSTRUCTION.
31. NO VALVE BOXES, METERS, PORTIONS OF MANHOLES, OR OTHER APPURTENANCES OF ANY KIND RELATING TO ANY UNDERGROUND UTILITIES SHALL BE LOCATED IN ANY PORTION OF A CURB-AND-GUTTER OR SIDEWALK SECTION. CONTRACTOR SHALL ADVISE ENGINEER IMMEDIATELY UPON DISCOVERY OF A POTENTIAL CONFLICT.
32. WHERE REQUIRED, AT NO ADDITIONAL COST TO CITY, THE CONTRACTOR SHALL USE TEMPORARY SHEETING OR TRENCH BOXES TO MINIMIZE THE SIZE OF EXCAVATIONS AND PROTECT EXISTING ROADWAYS, UTILITIES, STORM WATER SYSTEMS AND OTHER FACILITIES. CONTRACTOR TO COMPLY WITH OSHA TRENCH SAFETY REQUIREMENTS AT ALL TIMES. CITY PERSONNEL ARE AUTHORIZED TO SHUT DOWN ANY UNSAFE OPERATIONS IF WITNESSED, WITHOUT REPERCUSSION OR LIABILITY FOR DELAY, OR COST IMPACT.
33. THE CONTRACTOR SHALL RECOGNIZE AND ABIDE BY ALL OSHA EXCAVATION SAFETY STANDARDS, INCLUDING THE FLORIDA TRENCH SAFETY ACT (90-96, LAWS OF FLORIDA). ANY MATERIAL, CONSTRUCTION METHODS, OR MATERIAL COST TO COMPLY WITH THESE LAWS SHALL BE INCIDENTAL TO THE CONTRACT.
34. ALL COMPACTION SHALL BE 98% OF AASHTO T-180.
35. PAVED / CONCRETE DRIVEWAYS SHALL BE TEMPORARILY RESTORED WITHIN 24 HOURS WITH AN ALL WEATHER PATCH. ALL DIRT DRIVEWAYS SHALL BE RESTORED TO SAME TYPE OR BETTER CONDITION WITHIN 24 HOURS.
36. CONTRACTOR SHALL PROVIDE A DETAILED RESTORATION SCHEDULE WHICH SHALL BE SUBMITTED FOR REVIEW PRIOR TO THE CITY PERMITS BEING ISSUED.
37. CONTRACTOR SHALL MAINTAIN DRAINAGE IN DITCHES AND SWALES AT ALL TIMES. THIS INCLUDES ALL TURBIDITY BARRIERS, SYNTHETIC HAY BAILS, ADDITIONAL FILL MATERIAL, BYPASS PUMPING AND SWALE RESTORATION INCLUDING SODDING. ALL DITCH WORK SHALL MEET THE TEMPORARY EROSION AND SEDIMENT CONTROL REQUIREMENT OF INDEX 102 AND INDEX 103 OF THE LATEST FDOT DESIGN STANDARDS. PAYMENT FOR DITCH AND SWALE MAINTENANCE SHALL BE INCLUDED IN THE PRICE OF THE PIPE AND NO SEPARATE PAYMENT WILL BE CONSIDERED.
38. PRIOR TO THE CONNECTION TO ANY EXISTING MAIN, THE PROPOSED MAIN SHALL BE FLUSHED, PIGGED, PRESSURE TESTED, AND HAVE FDEP CLEARANCE. REFER TO FDEP PERMIT FOR ANY ADDITIONAL REQUIREMENTS. ALL CONNECTIONS SHALL BE MADE IN THE PRESENCE OF CITY PERSONNEL.
39. ALL EXISTING TRAFFIC SIGNS WITHIN THE PROPOSED CONSTRUCTION LIMITS ARE TO BE PROTECTED. CAUTION SHOULD BE EXERCISED WHILE RELOCATING EXISTING SIGNS WHERE DIRECTED. IF THE SIGNS ARE DAMAGED BEYOND USE, AS DETERMINED BY THE ENGINEER, THE DAMAGED SIGNS SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
40. DIRECTIONAL DRILL OPERATION SHALL MEET THE REQUIREMENTS OF FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION, SECTION 555, DIRECTIONAL BORE.
41. BORE TRACKING AND MONITORING: AT ALL TIMES DURING THE PILOT BORE THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A BORE TRACKING SYSTEM THAT IS CAPABLE OF ACCURATELY LOCATING THE POSITION OF THE DRILL HEAD IN THE X, Y, AND Z AXES. THE CONTRACTOR SHALL RECORD THESE DATA AT LEAST ONCE PER DRILL PIPE LENGTH OR EVERY THIRTY (30) FEET, WHICHEVER IS LESS. DOWNHOLE AND SURFACE GRID TRACKING SYSTEM: CONTRACTOR SHALL MONITOR AND RECORD X, Y, AND Z COORDINATES RELATIVE TO AN ESTABLISHED SURFACE SURVEY BENCHMARK, FROM DOWNHOLE SURVEY DATA USING A DOWNHOLE WIRELINE SYSTEM. "TRU-TRACKER" ENERGIZED SURFACE GRID, OR EQUIVALENT, SHALL BE INSTALLED AND USED TO SUPPLEMENT THE WIRELINE SYSTEM. THE GRIDS SHALL BE SURVEYED TO ESTABLISH HORIZONTAL AND VERTICAL POSITION TO 0.1 FEET ACCURACY. DATA TO BE RECORDED MUST INCLUDE CLOCK AND PITCH INFORMATION, DEPTH, TRANSMITTER TEMPERATURE, BATTERY STATUS, AND POSITION (X, Y) THE DATA SHALL BE CONTINUOUSLY MONITORED AND RECORDED AT LEAST ONCE PER DRILL PIPE LENGTH.
42. CONTRACTOR SHALL PROVIDE ALL TEMPORARY FILL AND STORM PIPING NECESSARY TO INSTALL NEW CONSTRUCTION. RESTORE ALL DISTURBED AREAS TO PRE EXISTING CONDITIONS OR BETTER.
43. ALL DISTURBED SOD SHALL BE REPLACED WITH SOD. NO SEEDING IN ALLOWED.
44. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SURVEYING DURING CONSTRUCTION. AS-BUILTS SHALL BE ELECTRONICALLY SUBMITTED TO EOR FOR REVIEW PRIOR TO ACCEPTANCE AND FINAL COMPLETION OF WORK.

WATER - TESTING:

1. WATER LINE SHALL BE INSTALLED, CLEANED, FLUSHED, DISINFECTED AND BACTERIOLOGICALLY TESTED AND CLEARED FOR SERVICE IN ACCORDANCE WITH THE LATEST AWWA STANDARDS, FDEP RULES AND REGULATIONS AND CITY STANDARDS AND SPECIFICATIONS WHICH EVER IS MOST STRINGENT.
2. ALL WATER DISTRIBUTION SYSTEMS SHALL BE FLUSHED CLEAN OF ALL DELETERIOUS MATERIAL PRIOR TO ANY TESTING, BY USE OF AN APPROVED "PIG".
3. WATER LINE SHALL BE PRESSURE TESTED IN ACCORDANCE WITH AWWA-C600 (DUCTILE IRON PIPE) AND AWWA-C605/M23 (PVC PIPE) SPECIFICATIONS AT 150 PSI WITH NO ALLOWED PRESSURE LOSS, AND WITNESSED BY EOR PERSONNEL. SCHEDULE TEST A MINIMUM OF 48 HOURS IN ADVANCE.
4. ALL WATER MAINS SHALL BE DISINFECTED IN ACCORDANCE WITH THE LATEST VERSION OF AWWA C651 AND WITNESSED BY EOR PERSONNEL.
5. ALL BACTERIOLOGICAL SAMPLES SHALL TAKEN BY CONTRACTOR AT NO ADDITIONAL COST TO THE CITY. EOR TO REVIEW RESULTS PRIOR TO ACCEPTANCE.

WATER - MATERIALS:

1. DIP PIPE: 4 INCHES THROUGH 64 INCHES SHALL BE AWWA C150/151 WITH A MINIMUM WORKING PRESSURE CLASS 150 PIPE.
    A. ANY FITTINGS REQUIRED SHALL BE MECHANICAL JOINT DUCTILE IRON CONFORMING TO ANSI/AWWA A21.10/C110, 250 PSI MINIMUM PRESSURE RATING.
    B. JOINTS FOR DUCTILE IRON PIPE SHALL BE PUSH-ON OR MECHANICAL JOINTS CONFORMING TO ANSI/AWWA A21.11/C111. ABOVE GROUND JOINTS SHALL BE FLANGED WITH T5 CADMIUM PLATED BOLTS, NUTS, AND WASHERS. FLANGED JOINTS SHALL CONFORM TO ANSI STANDARD B 16.1-125 LB.
    C. WHERE DUCTILE IRON PIPE AND FITTINGS ARE TO BE BELOW GROUND OR INSTALLED IN A CASING PIPE, THE COATING SHALL BE A MINIMUM 1.0 MIL THICK IN ACCORDANCE WITH ANSI/AWWA A21.51/C151, RANDOM SPARK TESTING MAY BE CONDUCTED.
    D. WHERE DUCTILE IRON PIPE AND FITTINGS ARE TO BE INSTALLED ABOVE GROUND, PIPE, FITTINGS AND VALVES SHALL BE THOROUGHLY CLEANED TO BARE METAL IF ANY COATING BESIDES PRIMER AND GIVEN ONE FIELD COAT (MINIMUM 1.5 MILS DRY THICKNESS) OF RUST INHIBITOR PRIMER.
    E. ALL DUCTILE IRON PIPE AND FITTINGS SHALL HAVE AN INTERIOR PROTECTIVE LINING OF CEMENT-MOTAR WITH A SEAL COAT OF ASPHALTIC MATERIAL IN ACCORDANCE WITH ANSI/AWWA A21.4/C104.
2. POLYETHYLENE PIPE: 4 INCHES THROUGH 63 INCHES SHALL BE AWWA STANDARD C-906, LATEST EDITION. THE POLYETHYLENE PIPE SHALL HAVE A MINIMUM WORKING PRESSURE RATING OF 160 PSI AND SHALL HAVE A DIMENSION RATIO (DR) OF 11 AND BE PE 3408/PE 3608 AND NSF CERTIFIED FOR POTABLE WATER USE. PIPE SHALL BE THE SAME OD AS DUCTILE IRON PIPE.
    A. POLYETHYLENE PIPE SHALL HAVE FUSION BONDED JOINTS.
    B. FITTINGS USED WITH POLYETHYLENE PIPE SHALL BE FUSION FITTINGS IN ACCORDANCE WITH AWWA STANDARD C906.
4. SERVICE PIPES: ALL SERVICE LINES SHALL BE 1", 1-1/2" OR 2" BLUE, PC200, DR9, POLYETHYLENE TUBING CONFORMING TO SPECIFICATIONS IN AWWA C901, PC3608. LARGER SERVICE PIPE SHALL BE PVCP, DIP OR POLYETHYLENE PIPE.
3. 5. ALL WATER SERVICE LINES TO LIFT STATIONS MUST CONNECT TO A WATER METER. CONTRACTOR TO VERIFY TIE-IN LOCATIONS AND THAT METERS HAVE BEEN PROVIDED FOR ALL SERVICE LINES. CONTRACTOR TO COORDINATE METER LOCATION W/ TOHO PERSONNEL.

M.O.T. NOTES

1. THE MAINTENANCE OF TRAFFIC FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH U.S. DEPARTMENT OF TRANSPORTATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD), LATEST EDITION, AND THE FLORIDA DEPARTMENT OF TRANSPORTATION'S "ROADWAY AND TRAFFIC DESIGN STANDARDS" LATEST EDITION. CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING A M.O.T. PLAN IN ACCORDANCE WITH FDOT GUIDELINES, REGULATIONS AND STANDARDS TO THE CITY OR COUNTY(WHICHEVER IS APPLICABLE) FOR APPROVAL PRIOR TO COMMENCING WORK. THE CONTRACTOR'S M.O.T. PLAN SHALL BE SEALED BY A FLORIDA REGISTERED CIVIL ENGINEER WITH KNOWLEDGE OF PREPARING TRAFFIC CONTROL PLANS.
2. THE POSTED SPEED LIMITS ALONG THE ROADWAYS UNDER CONSTRUCTION SHALL BE IN FORCE, UNLESS IT IS DEEMED APPROPRIATE THAT THE SPEED BE REDUCED.
3. THE CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE PATTERNS DURING CONSTRUCTION ACTIVITIES.
4. THE CONTRACTOR SHALL NOTIFY BUSINESSES AND RESIDENCES WITHIN THE CONSTRUCTION AREA AT LEAST (5) WORKING DAYS PRIOR TO CONSTRUCTION AND SHALL MAINTAIN ACCESS AT ALL TIMES.
5. THE CONTRACTOR SHALL ADJUST THE MAINTENANCE OF TRAFFIC SIGNS AND BARRICADES AS NEEDED PER FIELD CONDITIONS.
6. CONTRACTOR SHALL MAINTAIN PEDESTRIAN AND VEHICULAR TRAFFIC PER FDOT REQUIREMENTS. CONTRACTOR SHALL PROVIDE ALL WARNING SIGNALS, SIGNS, LIGHTS AND FLAG MEN AS REQUIRED BY FDOT IN THE "MANUAL OF TRAFFIC CONTROL AND SAFE PRACTICES" (FDOT INDEXES 600 - 8501, TO ENSURE SAFE PASSAGE OF VEHICULAR AND PEDESTRIAN TRAFFIC DURING CONSTRUCTION ACTIVITIES.

EROSION AND SEDIMENT CONTROLS

1. AN EROSION CONTROL PLAN SHALL BE PREPARED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE PRE-CONSTRUCTION MEETING. THE CONTRACTOR SHALL EXECUTE ALL MEASURES NECESSARY TO LIMIT THE TRANSPORT OF SEDIMENTS OUTSIDE THE LIMITS OF THE PROJECT TO THE VOLUME AND AMOUNT AS THAT ARE EXISTING PRIOR TO THE COMMENCEMENT OF CONSTRUCTION PERIOD. PROVISION MUST BE MADE TO PRESERVE THE INTEGRITY AND CAPACITY OF CHECK WEIRS, SEDIMENT BASINS, SLOPE DRAINS, GRADING PATTERNS, ETC. REQUIRED TO MEET THIS PROVISION THROUGHOUT THE LIFE OF THE CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE HAY BALES, SILT BARRIERS, TEMPORARY GRASSING, ETC. AS REQUIRED TO FULLY COMPLY WITH THE INTENT OF THIS SPECIFICATION. PROVIDE STORM WATER BY-PASS PIPING OF PUMPING TO MAINTAIN DRAINAGE IN ALL LOCATIONS NECESSARY FOR EQUIPMENT STAGING.

    A. STOCKPILING MATERIAL
    NO EXCAVATED MATERIAL SHALL BE STOCKPILED IN SUCH A MANNER AS TO DIRECT RUNOFF DIRECTLY OFF THE PROJECT SITE OR INTO ANY ADJACENT WATER BODY OR STORMWATER COLLECTION FACILITY.

A. EXPOSED AREA LIMITATION
    THE SURFACE AREA OF OPEN, RAW ERODABLE SOIL EXPOSED BY CLEARING AND GRUBBING OPERATIONS OR EXCAVATION AND FILLING OPERATIONS SHALL BE CONTROLLED, SO THAT THIS OPERATION WILL NOT SIGNIFICANTLY AFFECT OFFSITE DEPOSIT SEDIMENTS.

    C. INLET PROTECTION
    INLETS AND CATCH BASINS SHALL BE PROTECTED FROM SEDIMENT LADEN STORMWATER RUNOFF UNTIL THE COMPLETION OF THE ALL CONSTRUCTION OPERATIONS THAT MAY CONTRIBUTE SEDIMENT TO THE INLET.

    D. TEMPORARY SEEDING
    AREAS OPENED BY CONSTRUCTION OPERATIONS THAT ARE NOT ANTICIPATED TO BE DRESSED OR RECEIVE FINAL GRASSING TREATMENT WITHIN THIRTY (30) DAYS SHALL BE SEEDED WITH A QUICK GROWING GRASS SPECIES WHICH WILL PROVIDE AN EARLY COVER, DURING THE SEASON IN WHICH IT IS PLANTED. TEMPORARY SEEDING SHALL BE CONTROLLED SO AS TO NOT ALTER OR COMPETE WITH PERMANENT GRASSING. THE RATE OF SEEDING SHALL BE 30 POUNDS PER ACRE.

    E. TEMPORARY SEEDING AND MULCHING
    SLOPES STEEPER THAN 6:1 THAT FALL WITHIN THE CATEGORY ESTABLISHED IN 4 ABOVE, SHALL ADDITIONALLY RECEIVE MULCHING OF APPROXIMATELY TWO (2) INCHES, LOOSE MEASURE, OF MULCH MATERIAL CUT INTO THE SOIL OF THE SEEDED AREA TO A DEPTH OF FOUR (4) INCHES.

    F. TEMPORARY GRASSING
    SEEDED OR SEEDED AND MULCHED AREA(S) SHALL BE ROLLED AND WATERED AS REQUIRED TO ASSURE OPTIMUM GROWING CONDITIONS FOR THE ESTABLISHMENT OF A GOOD GRASS COVER.

    G. TEMPORARY RE-GRASSING
    IF, AFTER 14 DAYS, THE TEMPORARY GRASSED AREAS HAVE NOT ATTAINED A MINIMUM OF 75% GOOD GRASS COVER, THE AREA WILL BE REWORKED AND ADDITIONAL SEEDS APPLIED TO ESTABLISH THE DESIRED VEGETATION COVER.

    H. MAINTENANCE
    ALL FEATURES OF THE PROJECT SHALL BE CONSTRUCTED TO PREVENT EROSION AND SEDIMENT AND SHALL BE MAINTAINED DURING THE LIFE OF THE CONSTRUCTION SO AS TO FUNCTION PROPERLY WITHOUT THE TRANSPORT OF SEDIMENTS OUTSIDE THE LIMITS OF THE PROJECT.

2. TEMPORARY SILT FENCES AND STAKED SILT BARRIERS, SHALL BE IN ACCORDANCE WITH F.D.O.T. STANDARD SPECIFICATION, SEC. 104.6, 104.7 AND SEC. 985 AND SHALL BE INSTALLED ALONG THE WESTERN LIMITS OF THE PROJECT.
3. ALL DISTURBED AREAS SHALL BE RESTORED WITH SOD (NO SEED AND MULCH) WITH THE SAME TYPE OF SOD UNLESS NOTED OTHERWISE ON PLANS.
4.

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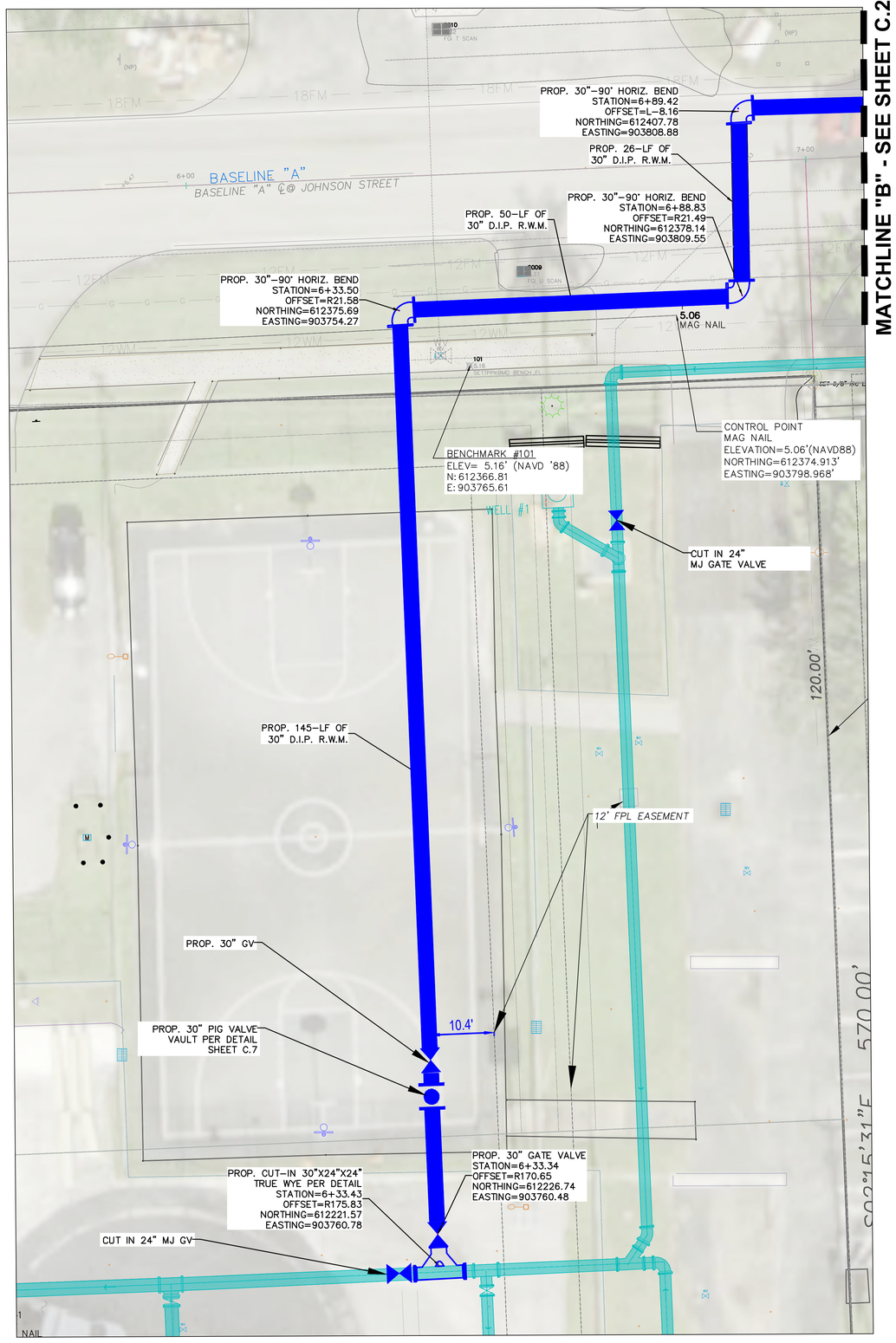
GENERAL NOTES

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7100-7900 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
G.1



PLAN VIEW

GRID N

GRAPHIC SCALE
0 5 10 20
(IN FEET)
1 inch = 10 ft.

STORMWATER BY-PASS NOTES

1. CONTRACTOR TO COORDINATE WITH CITY OF PEMBROKE PINES PUBLIC WORKS ON BY-PASS OF STORMWATER MAINS FOR CONSTRUCTION OF NEW RAW WATER MAIN (APPROX. STA 7+83 TO STA 8+43)
2. EXISTING STORMWATER ASSUMED TO BE 24" RCP.
3. CONTRACTOR TO PLUG MAINS AT NEAREST INLETS, CUT AND REMOVE STORM MAIN AS NEEDED TO PERFORM CONSTRUCTION OF NEW RAW WATER MAIN. INSTALL NEW STORMWATER MAIN AND UNPLUG ENDS. BY-PASS OF CUT SECTION SHALL BE REQUIRED AS-NEEDED TO PREVENT OVERFLOWS OF INLETS. CONTRACTOR TO SUBMIT BY-PASS PLAN TO EOR FOR REVIEW.

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WTP SITE PLAN

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
C.1

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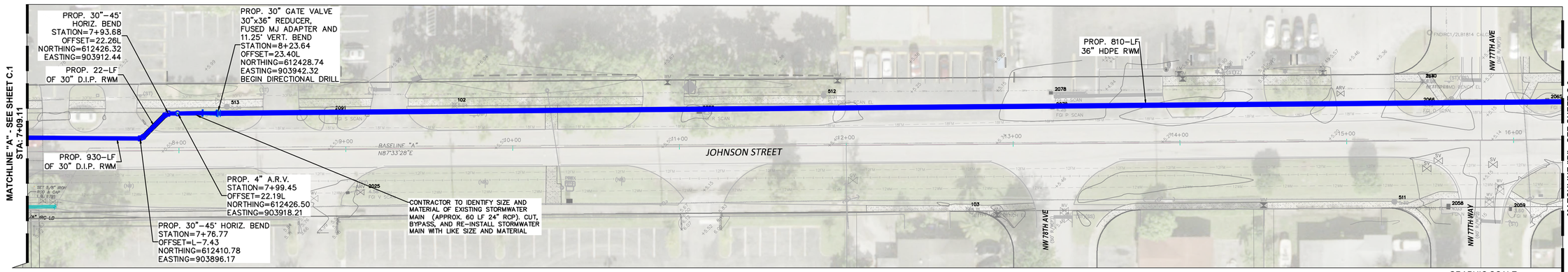

PLAN VIEW

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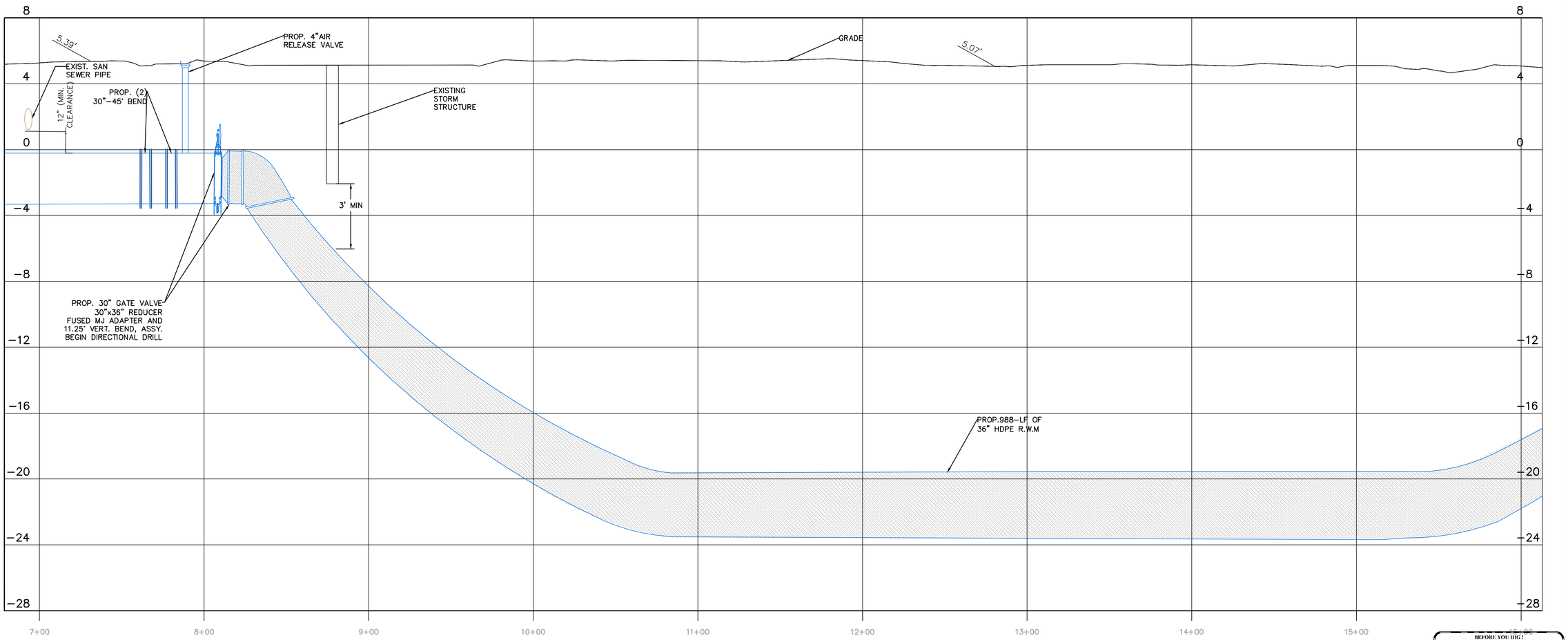
(IN FEET)
1 inch = 30 ft.



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JOHNSON ST. RAW WATER MAIN

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
C.2

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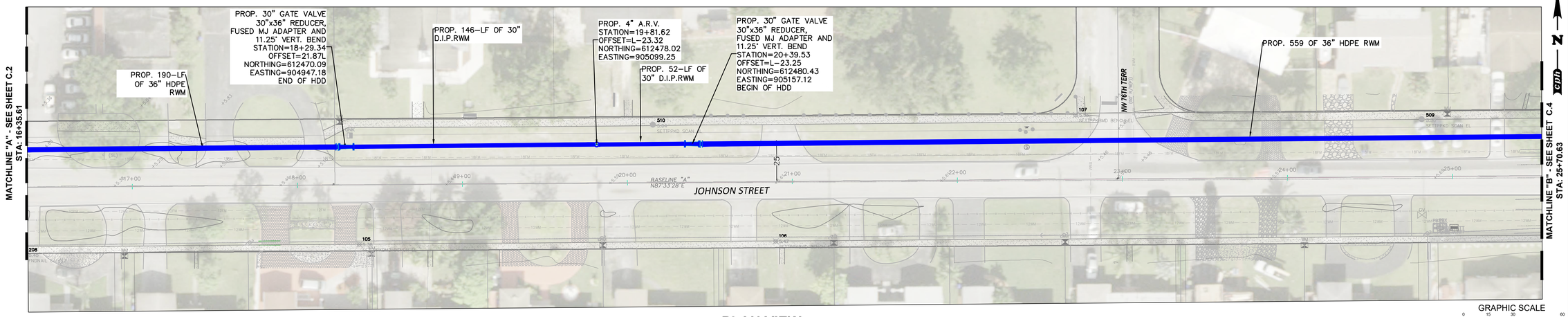
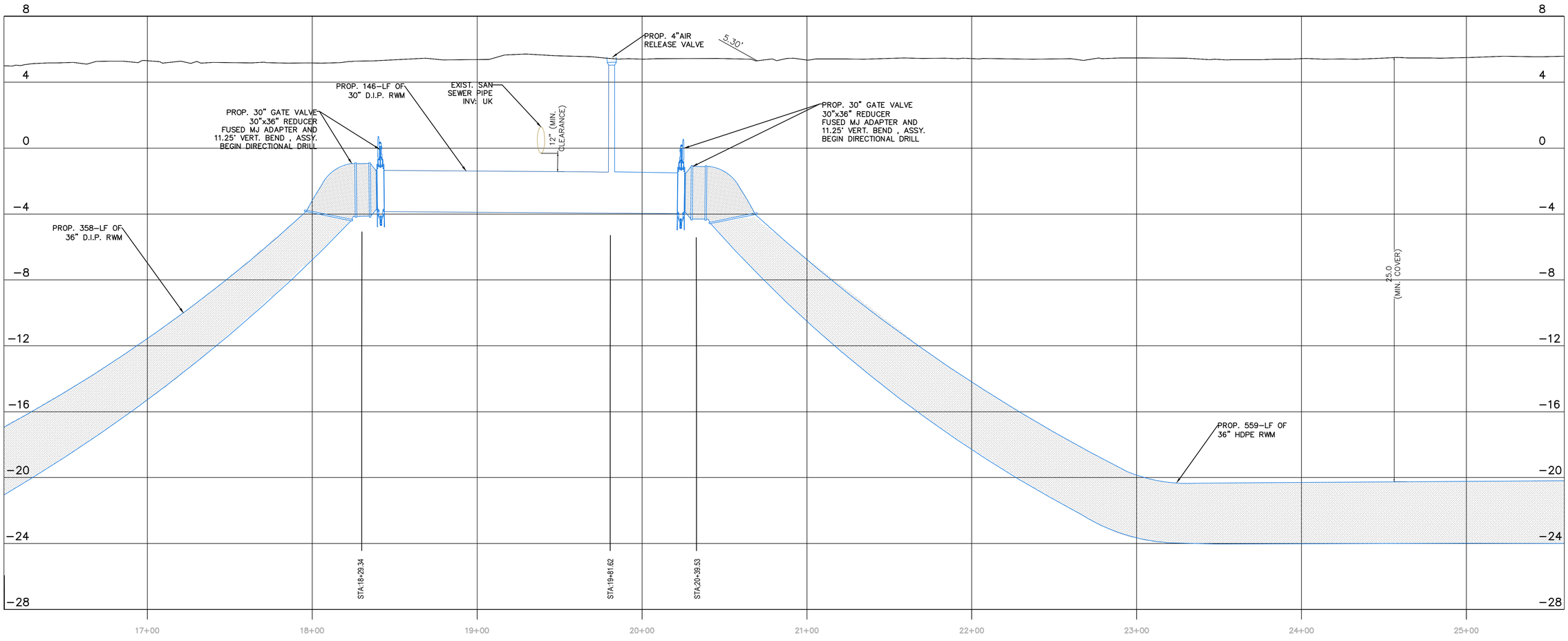


PLAN VIEW



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PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7360 JOHNSON STREET
PEMBROKE PINES, FL 33024

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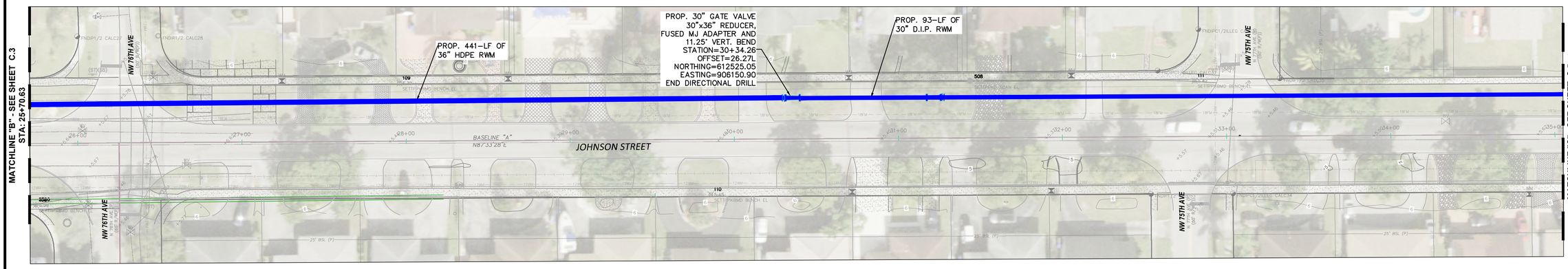

PLAN VIEW

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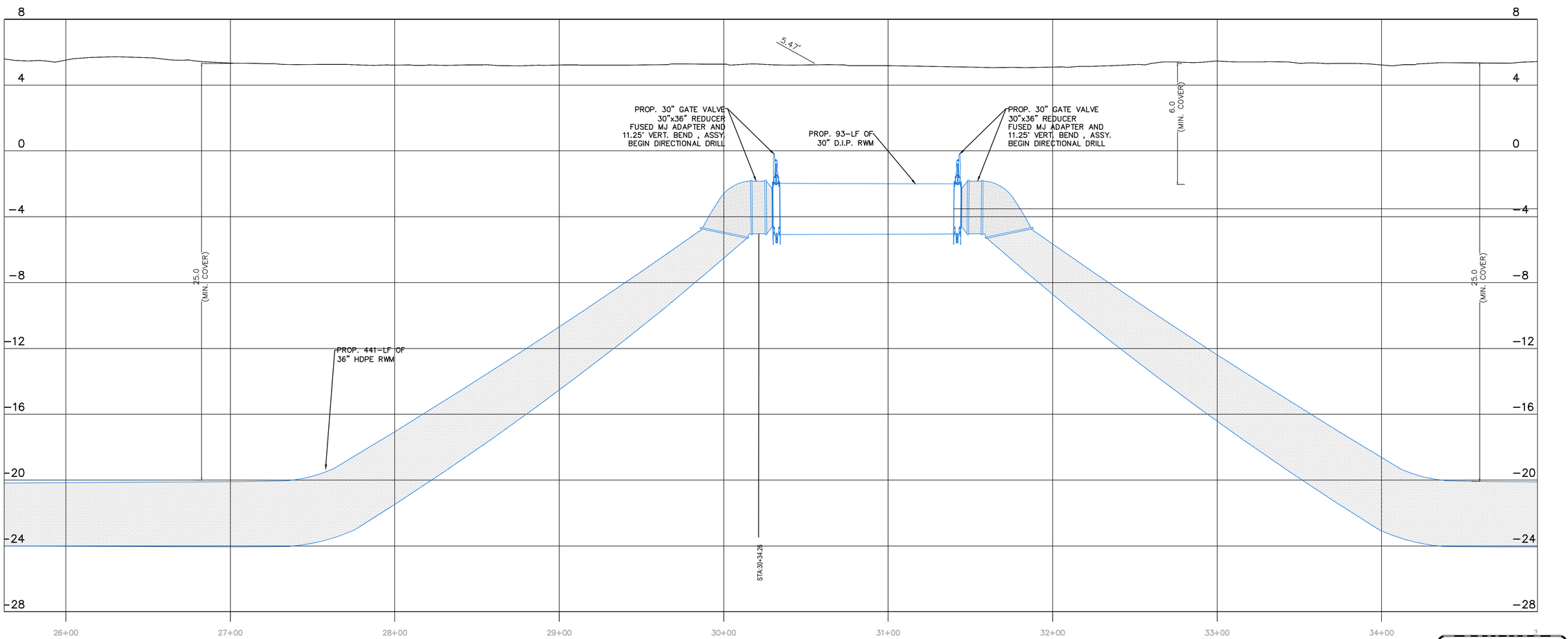

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7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

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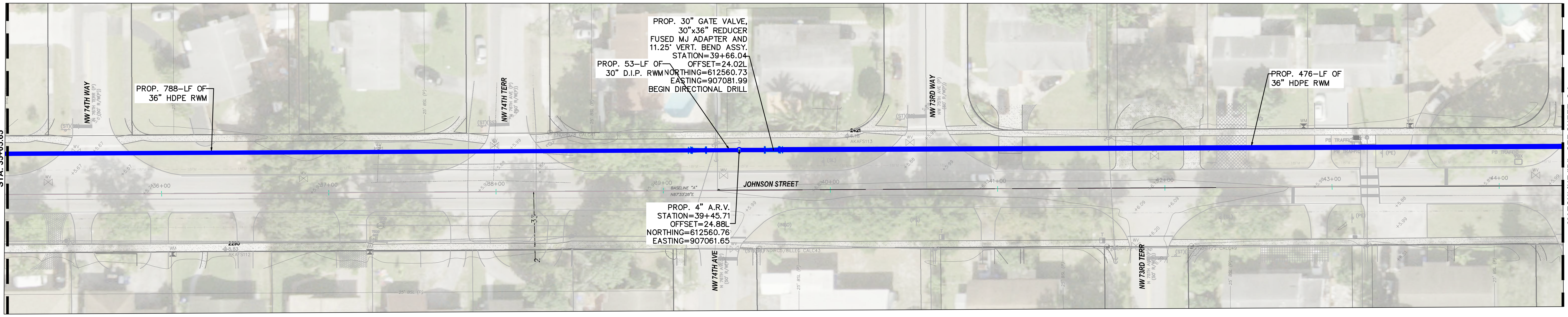

PLAN VIEW

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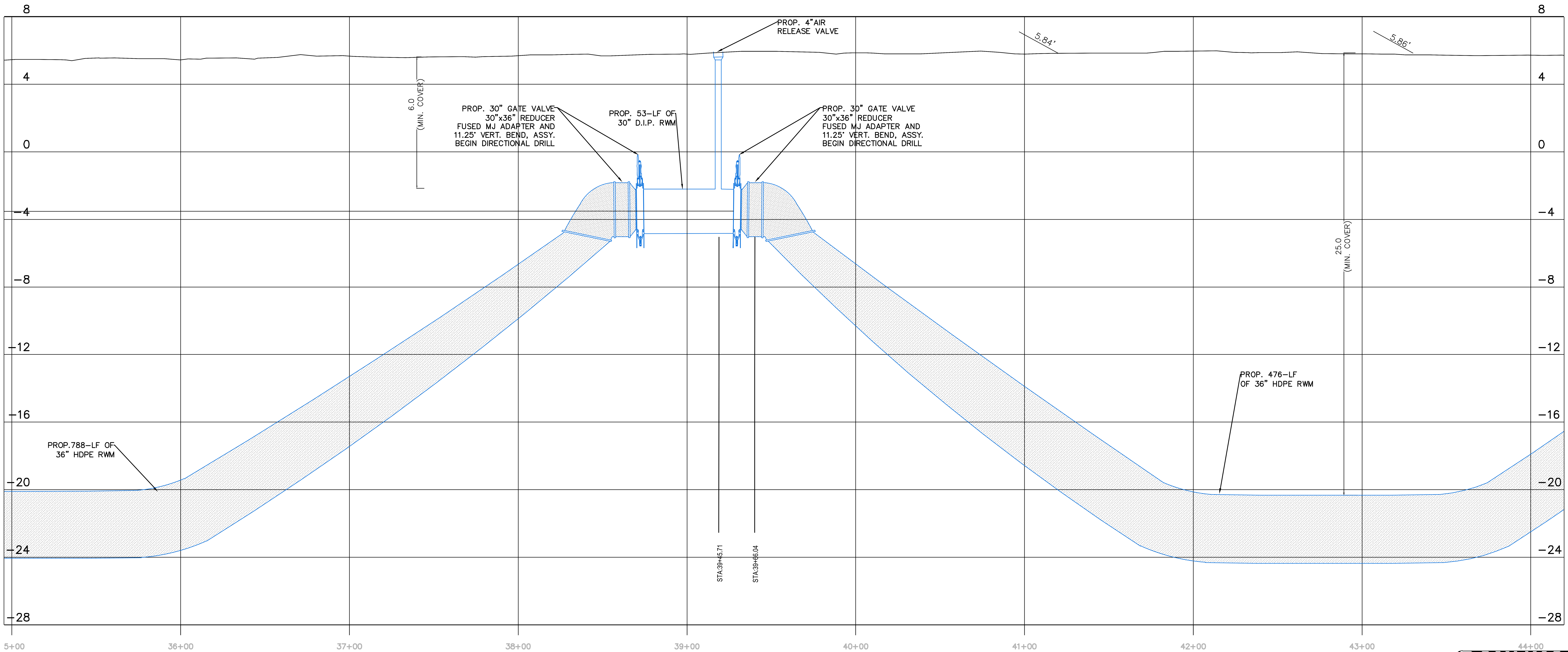

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JOHNSON ST. RAW WATER MAIN

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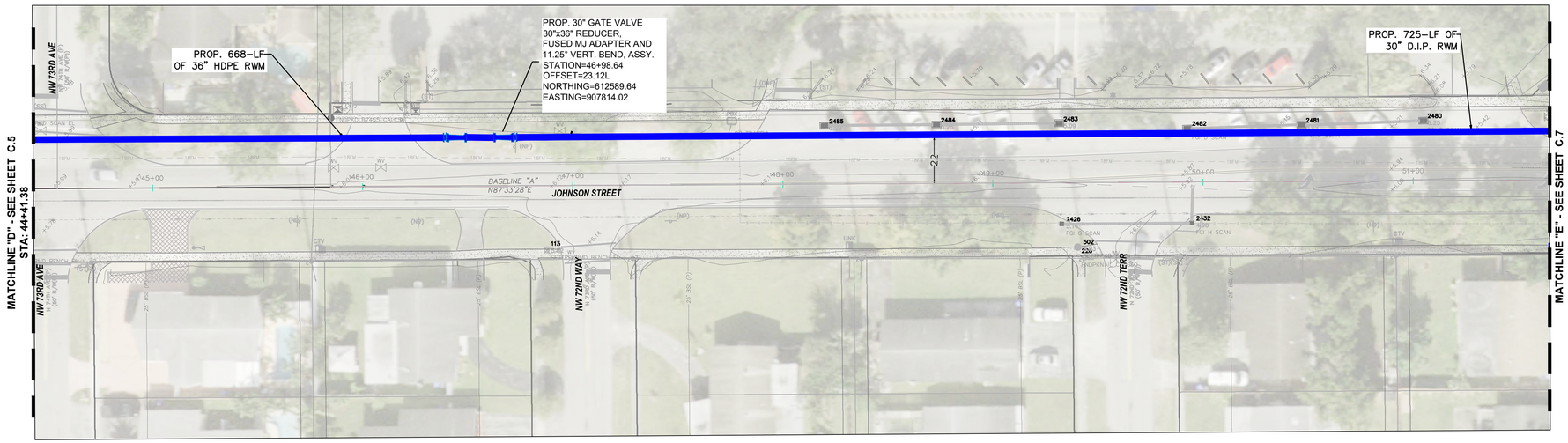

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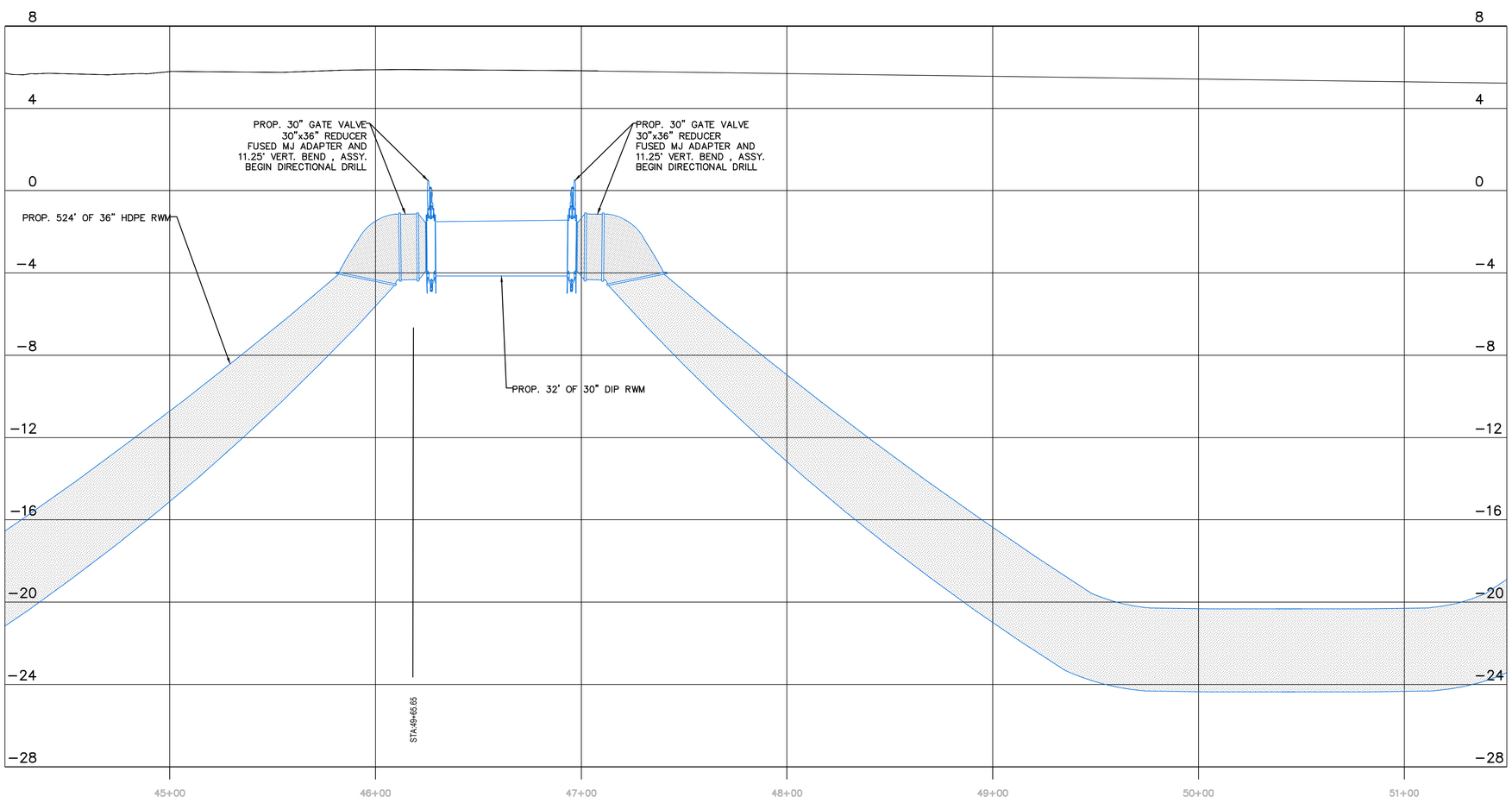

PROFILE

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1"=30' HORIZ.

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1 inch = 30 ft.

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KYLE MICHAEL BECHTELHEIMER LICENSE No. 86673 STATE OF FLORIDA PROFESSIONAL ENGINEER

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7			

Designed by: K.B.
Drawn by: K.B./Y.S.
Checked by: T.H.H.
Approved by: T.H.H.
Scale:
Date:
Job No.: P19701

Plans Prepared By.
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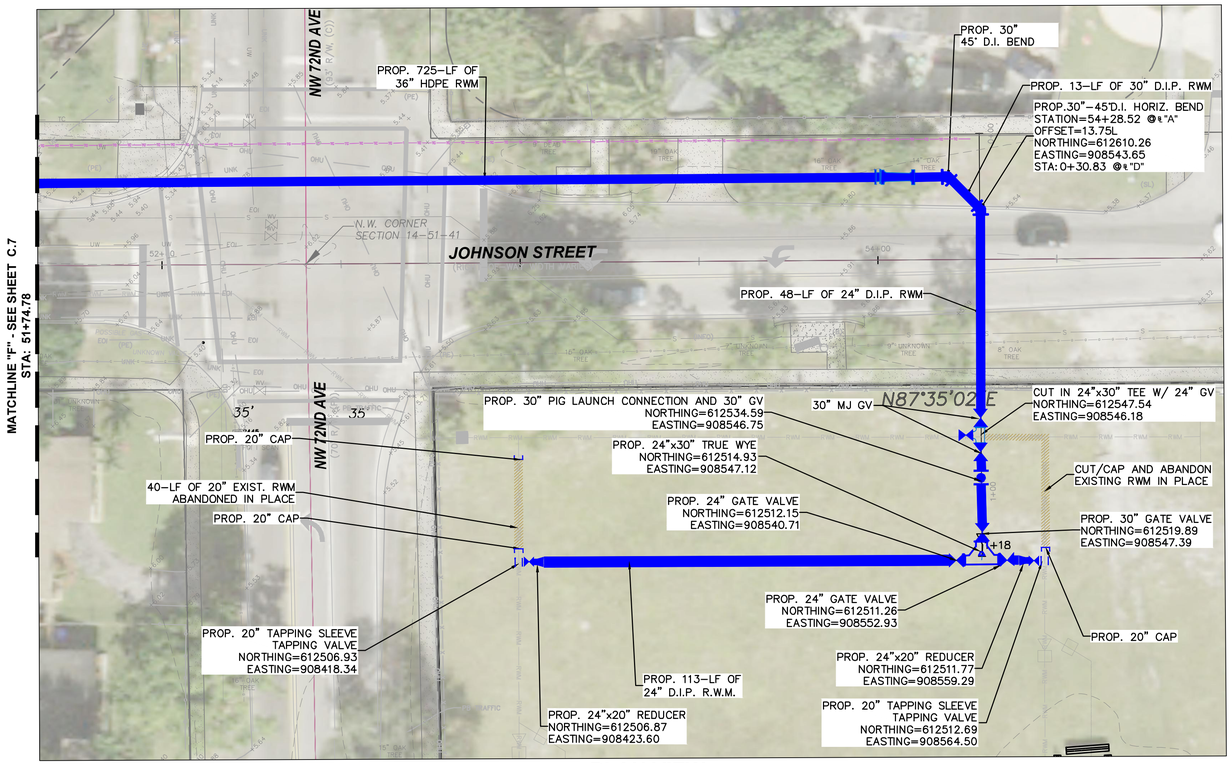
Miami, FL 33135
Ph: 305.274.4805
Licenses:
Eng. C.O.A. No. 3215
Survey L.B. No. 7143
Arch. Lic. No. AA2600926
Lndscp. Lic. No. LC0000298

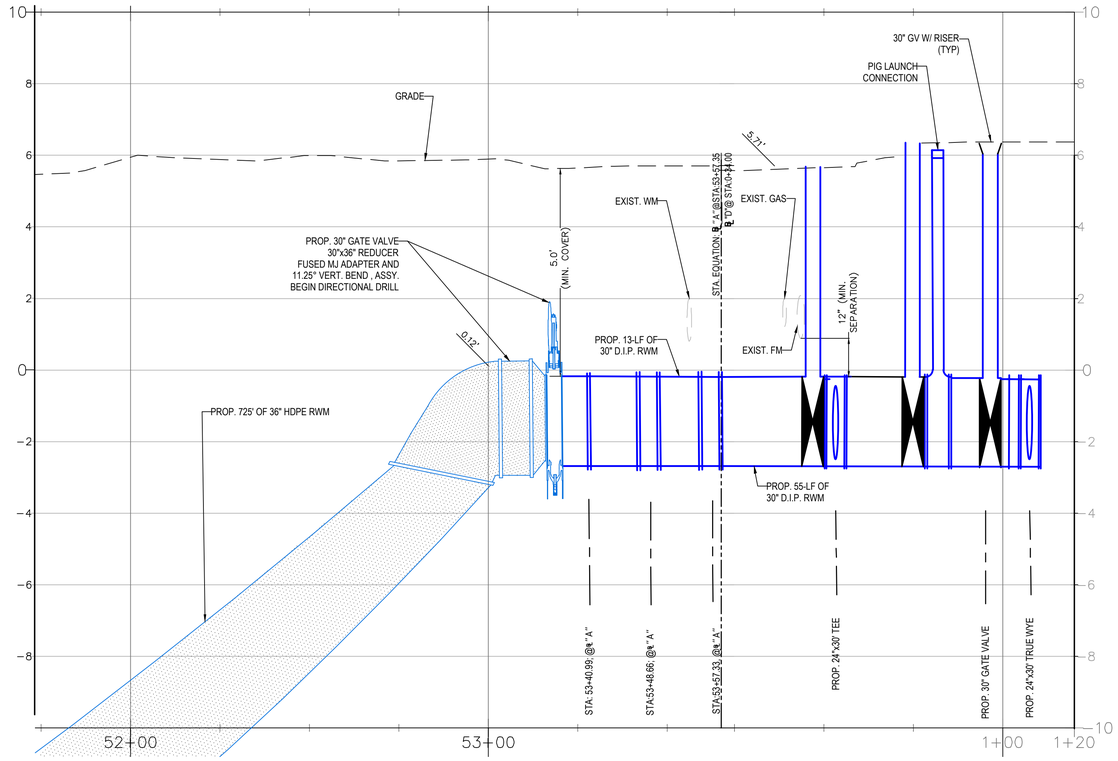
JOHNSON ST. RAW WATER MAIN

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

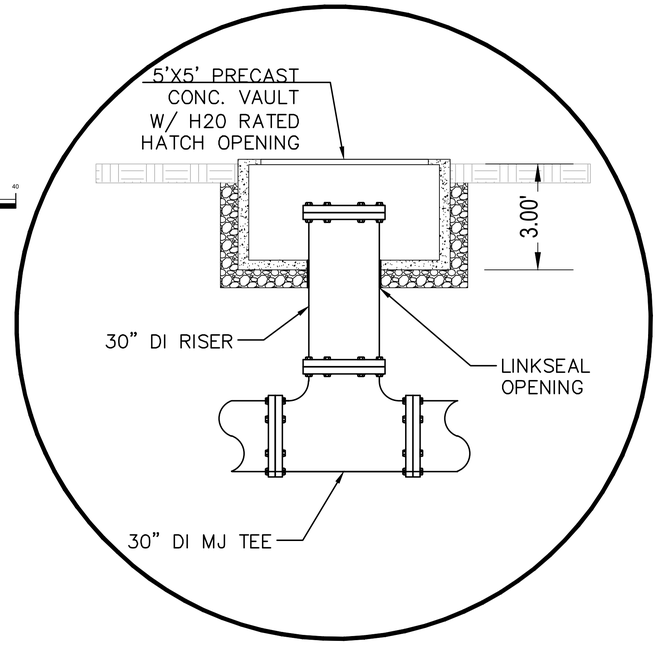
Sheet No.
C.6



PLAN VIEW



GRAPHIC SCALE
0 10 20 40
(IN FEET)
1 inch = 20 ft.



PIG LAUNCH DETAIL
N.T.S.

PIG VAULT NOTES:

1. THIS VAULT IS NOT FOR ELECTRICALLY OPERATED VALVES
2. 6" MINIMUM GRANULAR BEDDING
3. VAULT LID SHALL BE H20 RATED. CONTRACTOR TO SUBMIT SHOP DRAWINGS TO CITY AND EOR FOR REVIEW AND APPROVAL
4. REINFORCING STEEL: ASTM A615, GRADE 60
5. PRECAST CONCRETE: f'c=5,000PSI @ 28 DAYS

RAW WATER CONNECTION NOTES

1. CONTRACTOR TO COORDINATE SHUT DOWN OF WELLS WITH CITY OF PEMBROKE PINES TO FACILITATE FINAL CONNECTIONS TO NEW HEADER.
2. CONTRACTOR SHALL UTILIZE TEMPORARY LINE STOPS AS REQUIRED TO MAKE CONNECTIONS.

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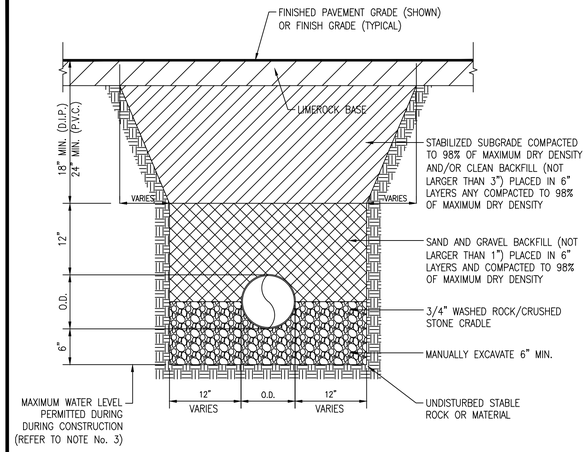
WELLFIELD SITE PLAN

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
C.7

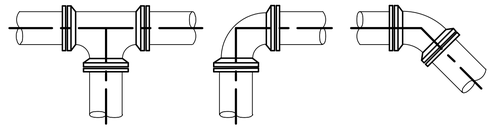
J:\P19701\Civil\DWG_Current_Plan_Set\Working\P19701_C7.dwg Nov 17, 2021 - 6:58am kbechtelheimer



NOTES:

1. MAXIMUM DENSITY SHALL BE DETERMINED BY AASHTO T-180.
2. MAXIMUM DEPTH TO BOTTOM OF PRESSURE MAINS SHALL NOT EXCEED SIX (6) FEET UNLESS OTHERWISE APPROVED BY THE CITY OF PEMBROKE PINES UTILITY DEPARTMENT.
3. MAXIMUM WATER LEVEL IN TRENCH SHALL BE MAINTAINED AT BOTTOM OF 'BEDDING MATERIAL' UNLESS SOI LAND WATER TABLE CONDITIONS DICTATE OTHERWISE, THEN AN ALTERNATE METHOD OF CONTROLLING THE WATER LEVEL IN THE TRENCH AND/OR ALTERNATE METHOD OF INSTALLATION IN "WET CONDITIONS" SHALL BE PROPOSED BY CONTRACTOR AND ENGINEER AND APPROVED BY CITY'S FIELD REPRESENTATIVE FOR FIELD USE.

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD GENERAL DETAIL	G-1
APPROVED: J.M.	REVISED:	WATER AND SEWER TRENCH BACKFILL	
DATE: 11/05/99	6/15/20		



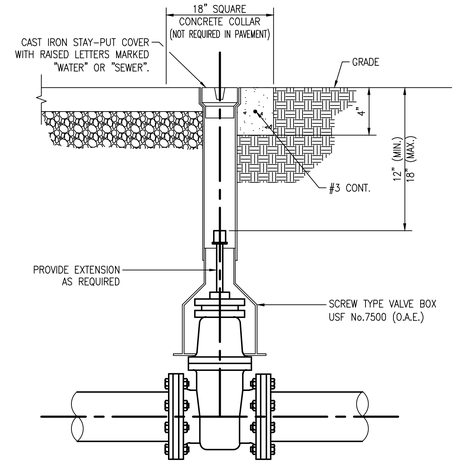
TEE & WYE 90° BEND 45° & 22 1/2° BEND

RESTRAINED PIPE LENGTH (LINEAL FEET)					
PIPE SIZE	TEE & WYE	90°BEND	45°BEND	22 1/2°BEND	11 1/4°BEND
6"	27	27	16	9	5
8"	34	34	20	11	6
10"	41	41	24	14	7
12"	48	48	28	16	8
14"	55	55	32	18	10
16"	62	62	35	20	11
18"	69	69	39	22	12
20"	75	75	42	24	13
24"	87	87	49	27	14
30"	104	104	57	31	17
36"	120	120	65	35	19
42"	134	134	72	39	21
48"	147	147	79	42	22
54"	160	160	85	45	24

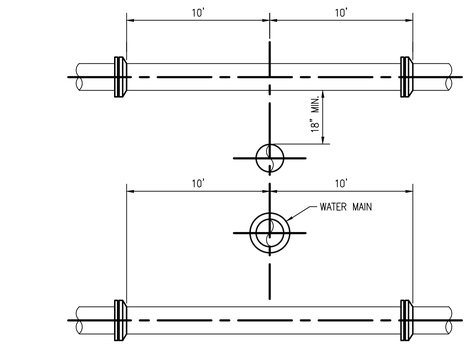
NOTE:

THE FIGURES IN THIS TABLE ARE BASED ON 150 PSI TEST PRESSURE WITH 2.5 FEET OF COVER AND 2000 POUNDS PER SQUARE FOOT SOIL BEARING AGAINST UNDISTURBED TRENCH. A 20% SAFETY FACTOR HAS BEEN ADDED.

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD GENERAL DETAIL	G-2
APPROVED: J.M.	REVISED:	RESTRAINED JOINTS	
DATE: 11/05/99			



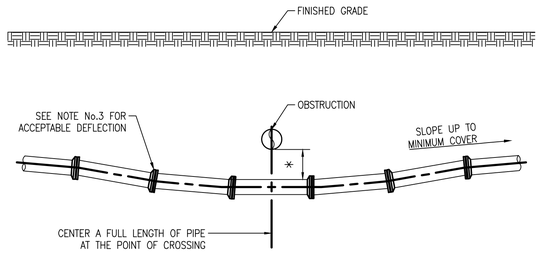
CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD GENERAL DETAIL	G-3
APPROVED: J.M.	REVISED:	VALVE AND BOX	
DATE: 11/05/99			



NOTES:

1. A WATER MAIN SHOULD CROSS OVER PIPES WHEREVER POSSIBLE MAINTAINING A 36 INCH COVER FOR PVC, 30 INCH COVER FOR D.I.P. AND 18 INCH SEPARATION AS MINIMUMS.
2. WHEREVER A WATER MAIN CROSSES UNDER A SEWER MAIN, OR CROSSES OVER WITH LESS THAN 18 INCHES VERTICAL SEPARATION, THEN D.I.P. SHALL BE USED FOR BOTH PIPES FOR A DISTANCE OF 20 FEET CENTERED ON CROSSING WITH NO JOINTS WITHIN 10 FEET OF THE CROSSING.
3. 18 INCH SEPARATION SHOULD BE MAINTAINED BETWEEN ALL PIPES (STORM, SEWER, WATER) WHENEVER POSSIBLE. 12 INCHES IS THE ABSOLUTE MINIMUM SEPARATION WITH D.I.P. REQUIRED FOR ANY SEPARATION LESS THAN 18 INCHES.
4. MAINTAIN 10 FEET HORIZONTAL SEPARATION BETWEEN WATER AND SEWER AS A MINIMUM.
5. 3 FOOT HORIZONTAL CLEARANCE SHALL BE PROVIDED BETWEEN UTILITIES AND ANY OBSTRUCTIONS (CATCH BASINS, CONCRETE POLES, ETC.)
6. 5 FOOT HORIZONTAL CLEARANCE SHALL BE PROVIDED BETWEEN UTILITIES AND TREES.

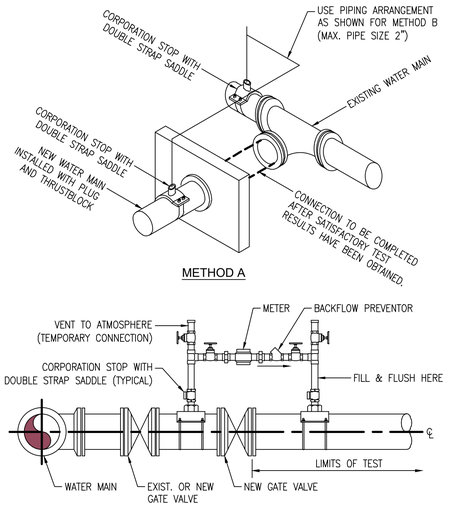
CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD GENERAL DETAIL	G-4
APPROVED: J.M.	REVISED:	UTILITY CROSSING GENERAL REQUIREMENTS	
DATE: 11/05/99			



NOTES:

1. (*) 18" MINIMUM CLEARANCE REQUIRED FOR WATER AND SEWER MAIN CROSSINGS, 12" MINIMUM CLEARANCE REQUIRED FOR OTHER UTILITY CROSSINGS.
2. THE DEFLECTION TYPE CROSSING SHALL BE USED WHENEVER POSSIBLE. ONLY UNDER SPECIFIC ORDERS BY THE ENGINEER SHALL THE FITTING TYPE CROSSING BE ALLOWED.
3. CONSTRUCT CROSSING USING 75% OF MANUFACTURES MAXIMUM JOINT DEFLECTION (MAXIMUM).

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD GENERAL DETAIL	G-5
APPROVED: J.M.	REVISED:	UTILITY CROSSING DEFLECTION TYPE	
DATE: 11/05/99			



METHOD A

METHOD B

NOTES:

1. WATER MAIN TO BE PRESSURE TESTED AND DISINFECTED ACCORDING TO BROWARD COUNTY PUBLIC HEALTH UNIT REGULATIONS, AWWA, AND MUNICIPAL SPECIFICATIONS IN EFFECT.
2. BACTERIOLOGICAL TESTS ARE TO BE PERFORMED BY THE CONTRACTOR AND AN APPROVED TESTING LABORATORY.
3. REMOVE TEMPORARY CONNECTION AT SADDLE ON NEW MAINS AFTER FILLING AND FLUSHING HAS BEEN COMPLETED AND REPLACE WITH BRASS PLUG.
4. PROVIDE ALL NECESSARY THRUST BLOCKS OR OTHER RESTRAINTS.
5. FILLING AND FLUSHING LOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR, ENGINEER, AND CITY.
6. VENT TO ATMOSPHERE SHALL REMAIN OPEN DURING ALL PHASES OF PRESSURE TESTING.

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD WATER DISTRIBUTION DETAIL	W-2
APPROVED: J.M.	REVISED:	FILLING AND FLUSHING	
DATE: 11/05/99			

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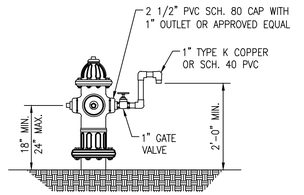
Lndscp. Lic. No. LC0000298

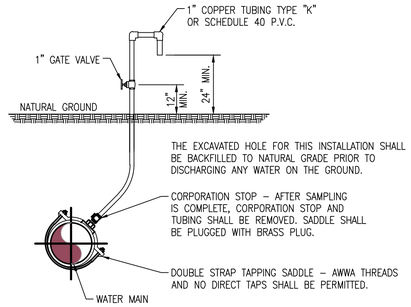
DETAILS

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
C.8



HYDRANT CONNECTION

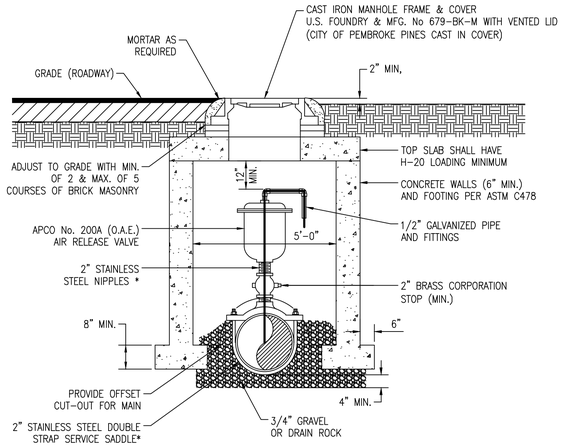


MAIN CONNECTION

NOTE:

1. SEE 2" TERMINAL BLOW-OFF ALSO.

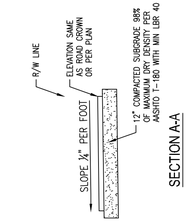
CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD WATER DISTRIBUTION DETAIL	W-3
APPROVED: J.M.	REVISED:	TYPICAL SAMPLE POINTS	
DATE: 11/05/99			



NOTES:

1. INSIDE DIAMETER OF MANHOLE SHALL BE 6'-0" IF FORCE MAIN IS LARGER THAN 24" DIAMETER.
2. PRECAST CONCRETE MANHOLE ENCLOSURE WITH DOGHOUSE TYPE OPENINGS AND NO BOTTOM.
3. ACTUAL LOCATION OF MANHOLE SHALL BE DETERMINED BY ENGINEER IN THE FIELD.
4. * FITTINGS MAY BE 1" FOR WATER MAIN 12" OR LESS.

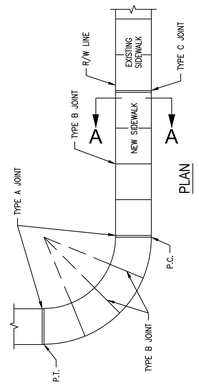
CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD WATER DISTRIBUTION DETAIL	W-7
APPROVED: J.M.	REVISED:	WATER AIR RELEASE VALVE	
DATE: 11/05/99			



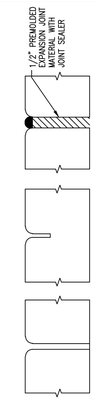
SECTION A-A

TABLE OF SIDEWALK JOINTS		LOCATION/APPLICATION
	A	P.C. AND P.T. OF CURVES AND ADJOINING PORTION OF EXISTING AND NEW SIDEWALK.
	B	5'-0" CENTER TO CENTER ON SIDEWALK.
	C	WHERE SIDEWALK ABUTS CONCRETE CURB, DRIVEWAY, WALL OR STRUCTURES AND WHERE RUN OF SIDEWALK EXCEEDS 120'

TABLE OF SIDEWALK THICKNESS - "T"	
LOCATION	T
RESIDENTIAL AREAS	4"
AT DRIVEWAYS AND OTHER AREAS	6"



PLAN



SIDEWALK JOINTS

NOTES:

1. CONCRETE SHALL BE CLASS 1 WITH MINIMUM COMPRESSIVE STRENGTH OF 3,500 PSI AT 28 DAYS.
2. PLACE #10/10 6x6 WIRE MESH IN THE PORTION OF THE SIDEWALK THAT CROSSES A DRIVEWAY.
3. SIDEWALK LONGITUDINAL AND CROSS SLOPES SHALL MEET A.D.A. STANDARDS.
4. SIDEWALK CURB RAMPS SHALL BE PROVIDED AT ALL DESIGNATED PEDESTRIAN CROSSING AT INTERSECTIONS PER F.D.O.T. STANDARD PLANS INDEX NO. 522-002.
5. THE VERTICAL DEVIATION OF THE COVER/LID OF A GIVEN UTILITY BOX/STRUCTURE SHALL NOT BE MORE THAN A ¼" DIFFERENCE IN HEIGHT/ELEVATION OF THE FINISHED SIDEWALK SURFACE AND SHALL BE "PEDESTRIAN FRIENDLY APPROVED".

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD ROAD DETAIL	R-28
APPROVED: J.M.	REVISED: 12/01/20 2/05/20	SIDEWALK CONSTRUCTION	
DATE: 11/05/99			

PROCEDURE FOR RESTORATION OF FLEXIBLE PAVEMENT

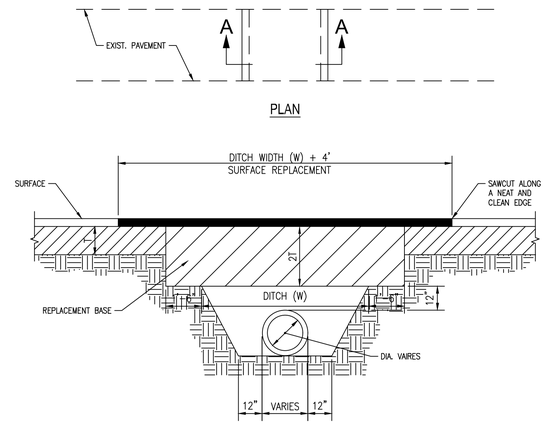
THE PROCEDURE FOR BACKFILL AND PAVEMENT RESTORATION SHALL BE AS FOLLOWS:

DENSITY TESTS OF COMPACTED FILL, BACKFILL AND/OR BASE SHALL BE TAKEN AT EACH SIX-INCH LIFT, PRIOR TO PLACEMENT OF THE SUCCEEDING LIFT OF MATERIAL ACCORDING TO THE FOLLOWING SCHEDULE.

1. FOR ANY ROAD CROSSING IN WHICH THE ROAD IS CUT AND RESTORED ONE LANE AT A TIME, ONE DENSITY TEST SHALL BE TAKEN IN EACH LANE AT EACH SIX-LIFT.
2. FOR ANY ROAD CROSSING IN WHICH THE ROAD IS CUT AND RESTORED TWO LANES AT A TIME, DENSITIES SHALL BE TESTED IN ONE LANE PER LIFT, ALTERNATING LANES WITH EACH LIFT.
3. FOR ANY ROAD CROSSING IN WHICH THE ROAD IS CUT AND RESTORED THREE LANES AT A TIME, DENSITIES SHALL BE TESTED IN TWO LOCATIONS PER SIX-INCH LIFT, STAGGERING LOCATIONS WITH EACH SUCCESSIVE LIFT.
4. CUTS ACROSS ROADS SHALL NOT BE LEFT OPEN OVERNIGHT UNLESS ABSOLUTELY NECESSARY. TRENCHES SHALL BE BACKFILLED AND TEMPORARY ASPHALT APPLIED TO MAKE A SMOOTH LEVEL PATCH. THE TRENCHES SHALL THEN BE EXCAVATED THE NEXT DAY AND PERMANENT BACKFILL AND PAVEMENT INSTALLED IN ACCORDANCE WITH THESE STANDARDS. THE ONLY EXCEPTION WILL BE WHEN THE INSTALLED FACILITY MUST BE TESTED BEFORE THE ROAD IS RESTORED. IN THESE CASES, THE PERMANENT RESTORATION MUST BE PERFORMED ON THE DAY OF TESTING OR THE NEXT DAY.
5. WHEN THE INSTALLATION PARALLELS THE ROADWAY AND DAMAGES THE PAVEMENT, THE DENSITY TESTS SHALL BE MADE EVERY 100 L.F. AT SIX-INCH LAYERS, WITH TEST LOCATIONS STAGGERED 25 INCHES EACH LIFT. A COPY OF ALL PROCTOR AND FIELD DENSITY TESTS SHALL BE FURNISHED TO THE ENGINEERING DIVISION UPON REQUEST.
6. ROADWAY BASE MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 98% OF MAXIMUM DRY DENSITY, AS DETERMINED BY AASHTO T-180 (MODIFIED PROCTOR TEST). SUBGRADE MATERIAL UNDER PAVED AREAS SHALL BE COMPACTED TO A MINIMUM OF 100% OF MAXIMUM DRY DENSITY. SHOULDER AREAS AND SWALE AREAS BEYOND SHOULDERS SHALL BE COMPACTED TO A MINIMUM OF 98% OF MAXIMUM DRY DENSITY, AS DETERMINED BY AASHTO T-99-C (STANDARD PROCTOR TEST).
7. RESTORATION OF STRIPING, SIGNING AND SIGNALIZATION DEVICES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER PAVEMENT RESTORATION IS COMPLETED.

NOTE: THE ABOVE LISTED REPRESENTS THE MINIMUM PROCEDURE. THE INSPECTOR MAY REQUIRE ADDITIONAL TESTING IF, IN HIS OPINION, CONDITIONS OR PRIOR TEST RESULTS WARRANT THEM.

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD ROAD DETAIL	R-33
APPROVED: J.M.	REVISED:	PROCEDURE FOR RESTORATION OF FLEXIBLE PAVEMENT	
DATE: 11/05/99			



PLAN

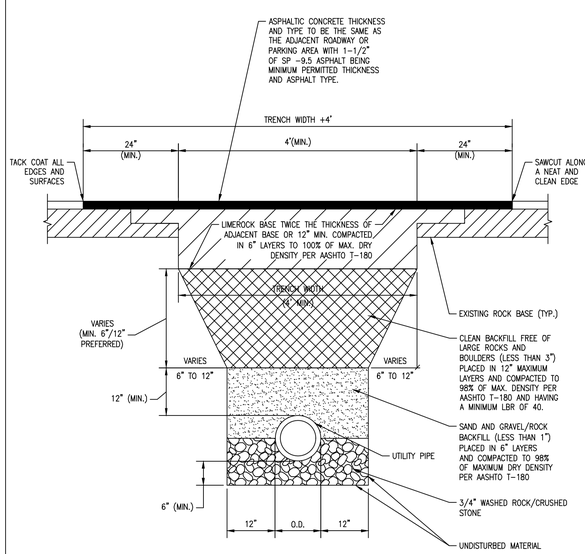
SECTION A-A

NOTES:

1. REPLACED BASE MATERIAL OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE. MINIMUM 8", MAXIMUM 18".
2. BASE MATERIAL SHALL BE PLACED IN 6" MAXIMUM (LOOSE MEASUREMENT) LAYERS AND EACH LAYER THOROUGHLY ROLLED OR TAMPED TO 98% OF MAXIMUM DENSITY. PER AASHTO T-180.
3. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
4. SURFACED TREATED PAVEMENT JOINTS SHALL BE LAPPED AND FEATHERED.
5. SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE.
6. BASE MATERIAL SHALL HAVE A MINIMUM LBR. OF 100 AND A MINIMUM CARBONATE CONTENT OF 70% (60% FOR LOCAL STREETS).
7. IF THE DITCH IS FILLED TEMPORARILY, IT SHALL BE COVERED WITH A 2" ASPHALTIC CONCRETE PATCH TO KEEP THE FILL MATERIAL FROM RAVELING UNTIL REPLACED WITH A PERMANENT PATCH.
8. BACKFILL SHALL BE IN ACCORDANCE WITH DETAIL R- 33, EXCEPT AS SHOWN ABOVE.

RE: B.C.P.W.D. PLATE No.6

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD ROAD DETAIL	R-34
APPROVED: J.M.	REVISED:	FLEXIBLE PAVEMENT RESTORATION PERPENDICULAR UTILITY INSTALLATION	
DATE: 11/05/99			



NOTES:

1. REFER TO CITY STANDARDS G-1 AND R-44 FOR ADDITIONAL INFORMATION ON TRENCH BACKFILL.

CITY OF PEMBROKE PINES ENGINEERING/UTILITIES DIVISION		STANDARD ROAD DETAIL	R-38
APPROVED: J.M.	REVISED: 6/16/20 11/06/19	PAVEMENT RESTORATION FOR LOCAL ROADS AND PARKING LOTS	
DATE: 11/05/99			

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LICENSE
No. 86673
STATE OF FLORIDA
PROFESSIONAL ENGINEER

No.	Revision	Date	By
1			
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4			
5			

Designed by: K.B.
Drawn by: K.B./Y.S.
Checked by: T.H.H.
Approved by: T.H.H.
Scale:
Date:
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Eng. C.O.A. No. 3215
Survey L.B. No. 7143
Arch. Lic. No. AA2600926
Lndscp. Lic. No. LC0000298

DETAILS

PEMBROKE PINES RAW WATER SUPPLY LINE AND 30" FM RELOCATION
7190-7960 JOHNSON STREET
PEMBROKE PINES, FL 33024

Sheet No.
C.9

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Appendix II

Project Specifications

CITY OF PEMBROKE PINES
RAW WATER SUPPLY LINE

PROJECT SPECIFICATIONS

VOLUME I

Prepared for:

City of Pembroke Pines

8300 S. Palm Drive

Pembroke Pines, FL 33025

Prepared by:

CPH, Inc.

1992 SW 1st St.

Miami FL, 33135

November 2021

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City of Pembroke Pines

Raw Water Supply Line

November 2021

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SECTION 01001

GENERAL WORK REQUIREMENTS

SECTION 01001

GENERAL WORK REQUIREMENTS

PART 1 - GENERAL

1.01 NOTICES

A. All notices or other papers required to be delivered by the Contractor to the City shall be delivered to the office of Utilities, 8300 South Palm Drive, Pembroke Pines FL 33025.

1.02 WORK TO BE DONE

A. The Contractor shall furnish all labor, materials, equipment, tools, services, and incidentals to complete all work required by these specifications and as shown on the Drawings, at a rate of progress which will ensure completion of the Work within the Contract Time stipulated.

B. The Contractor shall perform the Work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean up, replacements, and restoration required as a result of damages caused during this construction.

C. The Contractor shall comply with all City, County, State, Federal, and other codes, which are applicable to the proposed Work.

D. All newly constructed Work shall be carefully protected from injury in any way. No wheeling, walking, or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at his own expense.

E. Scope of Work: See Section 01010 "Summary of Work" and the Bid Schedule for details.

1.03 DRAWINGS AND PROJECT MANUAL

A. The Work shall be performed in accordance with the Drawings and Specifications prepared by the City/Professional. All work and materials shall conform to the City Utilities Standards and Construction Specifications Manual, latest edition or as indicated in these Specifications or Drawings.

B. The Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the City/Professional, and shall notify same, in writing, of all errors, omissions, conflicts and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory Work, faulty construction or improper operation resulting there from, nor from rectifying such conditions at his own expense.

C. All schedules are given for the convenience of the City and the Contractor and are not

guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in the Work to be done under this Contract.

D. Intent:

1. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified either in the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the Work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
2. Items of material, equipment, machinery, and the like may be specified on the Drawings and not in the Specifications. Such items shall be provided by the Contractor in accordance with the specification on the Drawings.
3. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

E. Refer to the Contract for the order of precedence of items and documents.

1.04 PROTECTION AND RESTORATION

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every means of protection necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or the Contractor shall make good the damage in other manner acceptable to the City/Professional.

B. Protection of Trees and Shrubs

1. Protect with boxes or other barricades.
2. Do not place excavated material so as to injure trees or shrubs.
3. Install pipelines in short tunnels between and under root systems.
4. Support trees to prevent root disturbance during nearby excavation.

C. Tree and Limb Removal

1. Tree limbs, which interfere with equipment operation and are approved for pruning, shall be neatly trimmed and the tree cut coated with tree paint.
2. The City may order the Contractor, for the convenience of the City, to remove trees along the line or trench excavation. The Contractor shall obtain any permits required for removal of trees. Ordered tree removal shall be paid for under the appropriate Contract Items.

D. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by the Contractor with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.

E. Lawn Areas: All lawn areas disturbed by construction shall be replaced with like kind to a condition similar or equal to that existing before construction. Where sod is to be removed, it shall be carefully removed, and the same re-sodded, or the area where sod has been removed shall be restored with new sod in the manner described in the applicable section.

F. Where fencing, walls, shrubbery, grass strips or area must be removed or damaged incident to the construction operation, the Contractor shall, after completion of the work, replace or restore to the original condition.

G. The cost of all labor, materials, equipment, and work for restoration shall be deemed included in the appropriate Contract Item or items, or if no specific item is provided therefore, as part of the overhead cost of the Work, and no additional payment will be made therefore.

1.05 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.

B. . It shall be unlawful between the hours of 6:00 p.m. of one day and 7:30 a.m. of the next day for any person to perform any construction or repair work on buildings, structures, or projects, at a noise level of more than ten dBA in excess of the ambient noise level, when measured at the property line of such project, except to perform emergency work. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance. This shall not apply in cases of urgent necessity in the interest of the public health and safety, if a permit is granted by the Director of the Building and Zoning Department. Such a permit may be granted for a period not to exceed three days or less while the emergency continues, and may be renewed for periods of three days or less while the emergency continues; however, dewatering pumps and other equipment which is required to be operated 24 hours per day may be granted a permit to operate for a period of time in excess of three days if the operation of such equipment does not create a noise in excess of 80 dBA when measured at the property line.

1.06 MAINTENANCE OF SERVICE

A. Unless noted otherwise on the plans, the operation of the existing water, reclaimed water or wastewater facility on each of the respective locations shall remain in service until the transfer of service has been completed. The Contractor shall, prior to interrupting any utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the City and make arrangements for the interruption which will be satisfactory to the City.

B. Utility lines that are damaged during construction shall be repaired by the Contractor

and service restored within 4-hours of the breakage. The City retains the option of repairing any damage to utility pipes in order to expedite service to the customers. The Contractor will remain responsible for all costs associated with the repair.

1.07 TRANSFER OF SERVICE

A. When the City has accepted a proposed facility and placed it into operation, the transfer of service is complete. The Contractor may begin the work of removing the existing or temporary facilities.

1.08 LABOR

A. Supervision: The Contractor shall supervise and direct the Work efficiently and with his best skills and attention. The Contractor shall have a competent, English speaking superintendent or representative, who shall be on the site of the Project at all working hours, and who shall have full authority by the Contractor to direct the performance of the Work and make arrangements for all necessary materials, equipment, and labor without delay.

B. Jurisdictional Disputes: It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the Work shown on the Drawings or specified herein to avoid any work stoppages due to jurisdictional disputes. The basis for subletting work in question, if any, shall conform to precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, dated June, 1973, including any amendments thereto.

C. Apprenticeship: The Contractor shall comply with all of the requirements of Section 446, Florida Statutes, for all contracts in excess of $25,000 excluding roadway, highway or bridge contracts and the Contractor agrees to insert in any subcontract under this Contract the requirements of this Article.

1.09 MATERIALS AND EQUIPMENT

A. MANUFACTURER

1. All transactions with the manufacturers or Subcontractors shall be through the Contractor, unless the Contractor and the City/Professional request that the manufacturer or Subcontractor communicate directly with the City/Professional. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
2. All workmanship and materials shall be of the highest quality. The equipment shall be the product of manufacturers who are experienced and skilled in the field with an established record of research and development. No equipment will be considered unless the manufacturer has designed and manufactured equipment of comparable type and size and have demonstrated sufficient experience in such design and manufacture.
3. No material shall be delivered to the Site without prior approval of the City/Professional.

4. All apparatus, mechanisms, equipment, machinery, and manufactured articles for incorporation into the Project shall be the new (most current production at time of bid) and unused standard products of recognized reputable manufacturers.
5. Manufactured and fabricated products:
   a. Design, fabricate and assemble in accord with the best engineering and shop practices.
   b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
   c. Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.
   d. Products shall be suitable for service conditions as specified and as stated by manufacturer.
   e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
   f. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.10 MANUFACTURER'S SERVICE

A. Where service by the manufacturer is specified to be furnished as part of the cost of the item of equipment, the Work shall be at the Contractor's expense.

B. The services provided shall be by a qualified manufacturer's service representative to check and verify the completed installation, place the equipment in operation, and instruct the City's operators in the operation and maintenance procedures. Such services are to be for period of time and for the number of trips specified. A working day is defined as a normal 8-hour working day on the job and does not include travel time.

C. The services shall further demonstrate to the City/Professional's complete satisfaction that the equipment will satisfactorily perform the functions for which it has been installed.

1.11 INSPECTION AND TESTING

A. General
1. All materials and equipment furnished by the Contractor shall be subject to the inspection, review and acceptance of the City and meet the requirements as outlined in the City Utilities Standards and Construction Specifications Manual. If in the testing of any material or equipment it is ascertained by the City/Professional that the material or equipment does not comply with the Contract, the Contractor shall be notified thereof, and the Contractor will be directed to refrain from delivering said material or equipment, or to remove it promptly from the Site or from the Work and not accepted by the City shall be replaced with acceptable material, without cost to the City.
2. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEE, except as may otherwise be stated herein.
3. The Contractor shall give notice in writing to the City sufficiently in advance of his

intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the City shall arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials; or the City will notify the Contractor that the inspection will be made at a point other than the point of manufacture; or the City will notify the Contractor that inspection will be waived.

4. When inspection is waived or when the City/Professional so requires, the Contractor shall furnish to the City authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include five (5) copies of the results of physical tests and chemical analysis, where necessary, that have been made directly on the product or on similar products of the manufacturer.
5. The Contractor must comply with these provisions before shipping any material. Such inspections by the City shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

B. Cost

1. City shall employ and pay for the services of an independent testing laboratory to perform testing indicated on the Contract Documents, or at the City's discretion to ensure conformity with the Contract Documents.
2. The cost of field leakage and pressure tests and shop tests of materials and equipment specifically called for in the Contract Documents shall be borne by the Contractor. Such costs shall be deemed to be included in the Contract price.
3. The Contractor shall notify the City laboratory a minimum of 48-hours in advance of operations for scheduling of tests. When tests or inspections cannot be performed after such notice, the Contractor shall reimburse City for expenses incurred.
4. The Contractor shall pay for all work required to uncover, remove, replace, retest, etc., any work not tested due to the Contractor's failure to provide the 48-hours advance notice or due to failed tests. The Contractor shall also provide compensation for the City/Professional's personnel for required re-testing due to failed or rescheduled testing.

C. Shop Testing

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the manufacturer in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the worksite until the City/Professional notifies the Contractor, in writing, that the results of such tests are acceptable.
2. The manufacturing company shall provide five (5) copies of the manufacturer's actual shop test data and interpreted results signed by a responsible official of the manufacturing company and notarized, showing conformity with the Contract Documents as a prerequisite for the acceptance of any equipment. The cost of shop

tests (excluding cost of City's representative) and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor and shall be included in the Contract price.

D. Field Testing:

1. The City shall employ and pay for services of an independent testing laboratory to perform testing specifically indicated in the Contract Documents. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract. The Contractor shall provide compensation for retesting of all failed tests.
2. The City may at any time during the progress of the Work, request additional testing beyond that which is specified in the Contract. This testing will be at the City's expense. Contractor shall:
   a. Cooperate with laboratory personnel, provide access to the Project.
   b. Secure and deliver to the laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
   c. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes, which require control by the testing laboratory.

E. Demonstration Tests: Upon completion of the Work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance or demonstration tests as specified or required to provide compliance with the Contract Documents. The Contractor shall furnish all labor, fuel, energy, water and all other equipment necessary for the demonstration tests at no additional cost to the City.

F. Final Inspection: Prior to preparation of the final payment application, a final inspection will be performed by the City to determine if the Work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents. See also Section 01700 "Project Closeout."

G. Inspection by existing utility owners: The Contractor shall pay for all inspections during the progress of the work required and provided by the owner of all existing public utilities paralleling or crossing the Work, as shown on the Drawings. All such inspection fees shall be deemed included in the appropriate Contract Item or items, or if no specific item is provided therefore, as part of the overhead cost of the Work, and no additional payment will be made therefore.

H. Inspection by Other Agencies: The Florida Department of Transportation, the Florida Department of Environmental Protection, and other authorized governmental agencies shall have free access to the site for inspecting materials and work, and the Contractor shall afford them all necessary facilities and assistance for doing so. Any instructions to the Contractor resulting from these inspections shall be given through the City. These rights of inspections shall not be construed to create any contractual relationship between the Contractor and these agencies.

1.12 PROJECT SITE AND ACCESS

A. RIGHT-OF-WAY AND EASEMENTS

1. The use of public streets and alleys shall be such as to provide a minimum of inconvenience to the public and to other traffic. Any earth or other excavated material shall be removed by the Contractor and the streets cleaned to the satisfaction of the City.
2. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the property owner.
3. At the time of the Pre-Construction meetings, the Contractor shall become fully acquainted with the status of all easements. Should easements not be acquired by the City in specific areas of the Work, the Contractor shall sequence and schedule his work therein so as not to interfere with the progress of work in other areas of the Project. Any rescheduling of work due to easement acquisitions shall be performed by the Contractor at no additional cost to the City. The City agrees that it will make every effort to acquire all remaining easements with all speed and diligence possible so as to allow the completion of the Work within the Contract time.

B. ACCESS

1. Neither the material excavated nor the materials or equipment used in the construction of the Work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.
2. Access to businesses located adjacent to the project site must be maintained at all times. Contractor may prearrange the closing of business access with the business Owner. Such prearranged access closing shall not exceed two (2) hours. Property drainage and grading shall be restored and all construction debris removed within 48-hours of backfilling trench.
3. Contractor agrees that representatives of the City and any governmental agents will have access to the Work wherever it is in preparation or progress and that the Contractor shall provide facilities for such access and inspection.

1.13 UTILITIES

A. UTILITY CONSTRUCTION

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto, whether owned or controlled by governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage or water. Other public or private property, which may be affected by the Work, shall be deemed included hereunder.
2. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.
3. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits described by the City. If any excavation becomes a hazard, or if it excessively restricts traffic at any point, the City may require special construction procedures. As a minimum, the Contractor shall conform

to the following restoration procedures:

a. Interim Restoration: All excavations shall be backfilled and compacted as specified by the end of each working day. For excavations within existing paved areas; limerock base or soil cement base (match existing) shall be spread and compacted to provide a relatively smooth surface free of loose aggregate material. At the end of each workweek, the S-I asphaltic surface course shall be completed and opened to traffic. Contractor shall coordinate his construction activity including density tests and inspections to allow sufficient time to achieve this requirement. All driveway cuts shall be backfilled, compacted, and limerock base spread and compacted immediately after installation. Contractor shall coordinate with the individual property owners prior to removing the driveway section. Any utility crossing an existing roadway, parking lot or other paved area shall be patched by the end of the working day.

b. All pipe and fittings shall be neatly stored in a location, which will cause the least disturbance to the public. All debris shall be removed and properly disposed of by the end of each working day.

c. Final Restoration Overlay: After completing all installations, and after testing of the pipe (but no sooner than 30-days after applying the S-I asphaltic surface), final restoration shall be performed. In no event shall final restoration begin after substantial completion. Final restoration shall provide an S-III asphaltic overlay as specified in an uninterrupted continuous operation until completion. Any additional restoration required after testing shall be repaired in a timely manner at no additional cost to the City.

d. Maintenance of all restored facilities shall be the Contractor's responsibility. This maintenance shall be performed on an on-going basis during the course of construction. The Contractor's Progress Schedule shall reflect the above restoration requirements.

e. Additional Restoration for Work in Business or Commercial Districts: The Contractor shall restore all private property, damaged by construction, to its original condition. Access to businesses located adjacent to the project site must be maintained at all times. Contractor may prearrange the closing of business accesses with the business owner. Such prearranged access closing shall not exceed two (2) hours. Property drainage and grading shall be restored within 24-hours of backfilling trench.

B. EXISTING UTILITIES

1. The locations of all existing underground piping, structures and other facilities are shown based on information received from the respective owner. The locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping, conduit and cables to be encountered. It is the Contractor's responsibility to verify all existing underground piping, structures and other facilities.
2. The Contractor shall, at all times, employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of existing utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, utility services; and shall cooperate fully with the owners thereof to that end.
3. When existing facilities are found to be in conflict with the Work, the City reserves

the right to modify alignments to avoid interference with existing facilities.

4. All utilities, which do not interfere with the work, shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the City. Any existing facilities, which require operation to facilitate repairs, shall be operated only by the owner of the respective utility.
5. It is the responsibility of the Contractor to ensure that all utility and/or poles, the stability of which may be endangered by the proximity of excavation, be temporarily stayed and/or shored in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation.

C. NOTICES

1. All governmental utility departments and other owners of public utilities, which may be affected by the Work, will be informed in writing by the Contractor two (2) weeks after the execution of the Contract or Contracts covering the Work. Such notice will be sent out in general, and directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.
2. The Contractor shall comply with Florida Statute 553.851 regarding protection of underground gas pipelines. Evidence of notification to the gas pipeline owner shall be furnished to the City within two (2) weeks after the execution of the Contract.
3. It shall be the Contractor's responsibility to contact utility companies at least 72-hours in advance of breaking ground in any area or on any unit of the work so maintenance personnel can locate and protect facilities, if required by the utility company.
4. The Contractor shall give a minimum five (5) working day notice to utility personnel prior to interrupting a utility service (water, sewer, etc.).

D. EXPLORATORY EXCAVATIONS

1. Exploratory excavations shall be conducted by the Contractor for the purpose of locating underground pipelines or structures in advance of the construction. Test pits shall be excavated in areas of potential conflicts between existing and proposed facilities and at piping connections to existing facilities a minimum of 48-hours or 1,000-feet in advance of work. If there is a potential conflict, the Contractor shall notify the City/Professional immediately. Information on the obstruction to be furnished by the Contractor shall include: Location, Elevation, Utility Type, Material and Size. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the City.

E. UTILITY CROSSINGS

1. It is intended that wherever existing utilities must be crossed, deflection of the pipe within specified limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the City this procedure is not feasible, the City may direct the use of fittings for a utility crossing or conflict transition as detailed on the Drawings.

F. RELOCATIONS

1. Relocations shown on the Drawings: Public utility installations or structures,

including but not limited to poles, signs, fences, piping, conduits and drains that interfere with the positioning of the work which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as part of the general cost of doing the Work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.

2. Relocations not shown on the Drawings

   a. Where public utility installations or structures are encountered during the course of the work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the City, removal, relocation, replacement or rebuilding is necessary to complete the Work, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the City, for the Contractor to accomplish.

   b. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required.

   c. If such work is accomplished by the Contractor, it will be paid for as a Change Order.

3. All existing castings, including valve boxes, junction boxes, manholes, hand holes, pull boxes, inlets and similar structures in the areas of construction that are to remain in service and in areas of trench restoration and pavement replacement, shall be adjusted by the Contractor to bring them flush with the surface of the finished work.
4. All existing utility systems which conflict with the construction of the work herein, which can be temporarily removed and replaced, shall be accomplished at the expense of the Contractor. Work shall be done by the utility unless the utility approves in writing that the Work may be done by the Contractor.

1.14 RELATED CONSTRUCTION REQUIREMENTS

A. TRAFFIC MAINTENANCE

1. Refer to Section 01570 – Maintenance of Traffic

B. BARRIER AND LIGHTS

1. The Contractor shall exercise extreme care in the conduct of the Work to protect health and safety of the workmen and the public. The Contractor shall provide all protective measures and devices necessary, in conformance with applicable local, state and federal regulations. Protective measures shall include but are not limited to barricades, warning lights/flashers and safety ropes.
2. All equipment and vehicles operating within 10-feet of the roadway shall have flashing strobe lights attached.

C. DEWATERING AND FLOTATION

1. The Contractor, with his own equipment, shall do all pumping necessary to dewater any part of the work area during construction operations to insure dry working conditions. The Contractor shall take the necessary steps to protect on-site and off-site structures. Damage to any structures due to dewatering shall be repaired or the structures replaced at the Contractor's expense.
2. The Contractor shall be completely responsible for any tanks, wetwells or similar

structures that may become buoyant during the construction and modification operations due to the ground water or floods and before the structure is put into operation. The proposed final structures have been designed to account for buoyancy; however the Contractor may employ methods, means and techniques during construction which may affect the buoyancy of structures. The Contractor shall take the necessary steps to protect structures. Damage to any structures due to floating or flooding shall be repaired or the structures replaced at the Contractor's expense.

3. Contractor shall be responsible for any required permits for the discharge of ground water.

D. DUST AND EROSION CONTROL

1. The Contractor shall prevent dust nuisance from his operations or from traffic.
2. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.
3. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, watering and reseeding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the City, FDEP and any other agency having jurisdiction.
4. Temporary sedimentation controls include, but are not limited to; silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the City, FDEP and any other agency having jurisdiction.
5. The construction of temporary erosion and sedimentation control facilities shall be in accordance with the technical provision of section 104 “Prevention, Control, and Abatement of Erosion and Water Pollution” of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

E. LINES AND GRADES

1. All Work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the City/Professional.
2. When the location of the Work is dimensioned on the Drawings, it shall be installed in that location; when the location of the Work is shown on a scaled drawing, without dimensions, the Work shall be installed in the scaled location unless the City approves an alternate location for the piping. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve the Contractor from laying and jointing different or additional items where required. The City/Professional may require detailed pipe laying drawings and schedules for project control.
3. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the project control points set by the City, and shall be solely responsible for the accuracy thereof.
4. Water main and forcemain shall be installed to provide long uniform gradient or slope to pipe to minimize air pockets and air release valves. The stationing shown on the Drawings for air and vacuum release valve assemblies are approximate and the Contractor shall field adjust these locations to locate these valves at the highest point

in the pipeline installed. All locations must be accepted by the City.

5. To insure a uniform gradient for gravity pipe and pressure pipe, all lines shall be installed using the following control techniques as a minimum:
   a. Gravity lines; continuous control, using laser beam technology.
   b. Pressure lines; control stakes set at 50-foot intervals using surveyors' level instrument.

F. TEMPORARY CONSTRUCTION

1. Temporary fences: If, during the course of the Work, it is necessary to remove or disturb any fencing, the Contractor shall at his own expense, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced.
2. Responsibility for Temporary Structures: In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance or operation.

G. DAILY REPORTS

1. The Contractor shall submit to the City's Representative daily reports of construction activities including non-work days. The reports shall be complete in detail and shall include the following information:
   a. Days from Notice to Proceed; Days remaining to substantial and final completion.
   b. Weather information
   c. Work activities with reference to the Critical Path Method (CPM) schedule activity numbers (including manpower, equipment and daily production quantities for each individual activity).
   d. Major deliveries
   e. Visitors to site
   f. Test records
   g. New problems, and
   h. Other pertinent information
2. A similar report shall be submitted for/by each Subcontractor.
3. The report(s) shall be submitted to the City Representative within 2 days of the respective report date. Each report shall be signed by the Contractor's Superintendent or Project Manager. Pay request will not be processed unless daily reports are current.
4. If a report is incomplete, in error, or contains misinformation, a copy of the report shall be returned by the City Representative to the Contractor's Superintendent or Project Manager with corrections noted. When chronic errors or omissions occur, the Contractor shall correct the procedures by which the reports are produced.

H. CLEANING

1. During Construction
   a. During construction of the Work, the Contractor shall, at all times, keep the Site free from material, debris and rubbish as practicable and shall remove the same from any portion of the Site if, in the opinion of the City, such material, debris, or rubbish constitutes a nuisance or is objectionable.

b. Provide on-site containers for the collection of waste materials, debris and rubbish and remove such from the Site periodically by disposal at a legal disposal area away from the Site.

c. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished. Use cleaning materials which will not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by the manufacturer of the surface material. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

d. The Contractor shall remove from the site all surplus materials and temporary structures when no longer necessary to the Work at the direction of the City.

2. Final Cleaning

a. At the conclusion of the Work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and the Contractor shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances. Employ skilled workmen for final cleaning. Thoroughly clean all installed equipment and materials to a bright, clean, polished and new appearing condition. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

b. The Work shall be left in a condition as shown on the Drawings and the remainder of the site shall be restored to a condition equal or better than what existed before the Work.

c. Prior to final completion, or City occupancy, Contractor shall conduct an inspection of interior and exterior surfaces, and all work areas to verify that the entire Work is clean. The City will determine if the final cleaning is acceptable.

1.15 CONSTRUCTION NOT PERMITTED

A. USE OF EXPLOSIVES

1. No blasting shall be done except as approved by the City and the governmental agency or political subdivision having jurisdiction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Summary of work, other contracts, work sequence, working hours, operation of existing facilities, use of premises, OWNER furnished products, coordination, cutting and patching.

1.02 SUMMARY OF WORK

A. The Utility work shown on the drawings prepared by CPH, Inc. include the installation of a parallel raw water main between the City's East Wellfield and the Water Treatment Plant. Project includes approximately 1 mile of raw water main, including open cut of 20" to 30" DIP and Horizontal Directional Drilling 36" OD DR 11 HDPE. Work includes connection to the City's existing raw water system at the Wellfield and at the Water Treatment Plant.

B. The work associated with this project involves active water mains that are within the Rights-Of-Way (ROW) or property owned by the City, or ROW owned by City of Hollywood. All work activities shall be required to be in accordance with the permits issued by the respective agencies. All work performed will be required to be done while maintaining the functional operation of the utility lines.

C. All materials, equipment, skills, tools, and labor which is reasonably and properly inferable and necessary for the proper completion of the Work and in compliance with the requirements stated or implied by these Specifications or Drawings shall be furnished and installed by the CONTRACTOR without additional compensation, whether specifically indicated in the Contract Documents or not.

D. Repair, replace, or otherwise settle with the OWNER or OWNER'S Representative, if damage to property or existing facilities occurs, including damage to pavements, utilities, lawns, structures, etc.

E. Construct the Project under a Unit Price Contract.

F. The CONTRACTOR shall perform the work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean up, replacements, and restoration required as a result of disruptions caused during this construction.

F. Any damage that occurs through the fault of the CONTRACTOR, shall be completely restored at the expense of the CONTRACTOR, based upon current City standards.

G. Pipe Manufacturer shall provide training for CONTRACTOR's personnel on the proper methods of handling, installing, joining and backfilling of all mains.

H. Contractor shall verify location and depth of existing utilities there proposed storm will be installed to determine actual need for utility line transitions. If existing mains are not in conflict with proposed storm lines, then the transitions will not be required.

1.03 WORK SEQUENCE

A. The CONTRACTOR's sequence of work may be of his choosing in order to complete the work in the allowed time frame and in conjunction with all Work Activities. The CONTRACTOR shall submit a schedule and work sequence to the OWNER at least five (5) days prior to the Notice to Proceed. Due to the critical nature of the utilities systems in this area, shut downs of any existing City utility systems will not be allowed. Contractor shall be responsible for keeping all utility services to customers active throughout the duration of the project. See Special Project Procedures in this section for Suggested Sequence of Construction.

1.04 CITY WORKING HOURS

A. Normal working hours for the project shall be an eight (8) hour period between the hours of 7:00 a.m. – 7:00 p.m., Monday through Friday. Should the CONTRACTOR request, and the City approve the CONTRACTOR to work periods greater than 8 hours a day, he shall make such requests in writing a minimum of 48 hours prior to such work periods. The CONTRACTOR shall pay the cost of $50.00 per hour for inspection by the City's inspection representatives for any hours worked in excess of 8 hours per day or 40 hours per week worked outside the normal work hours for the project.

B. The CONTRACTOR may be required to perform certain work at times of the day or night when system flows, vehicular traffic and pedestrian traffic are at diminished levels and at times appropriate to other activities which are occurring that may affect the project. The CONTRACTOR shall comply with requirements to alter his schedule of work as requested or required by City without change to the contract price or time.

1.05 OPERATION OF EXISTING FACILITIES

A. The proposed work for this project involves the installation of new water mains as well as the removal/abandonment and replacement of operating water mains in Rights-Of-Way with both vehicular and pedestrian traffic. The CONTRACTOR shall perform their work taking all proper precautions and safety measures to insure a safe work area. The work shall be so conducted to maintain existing

utility systems in operation. All utilities that occupy or are adjacent to the subject construction site are to remain in operation. The CONTRACTOR shall coordinate all construction activities with the City Resident Inspectors.

1.06 CONTRACTOR USE OF PREMISES

A. Confine operations at the site to areas permitted by applicable laws, ordinances, permits, and by the Contract Documents. Do not unreasonably encumber the site with materials or equipment. The CONTRACTOR shall assume full responsibility for protection and safekeeping of products stored on the job site.

1.07 COORDINATION

A. The CONTRACTOR shall be fully responsible for the coordination of his work and the work of his employees, subcontractors, and suppliers and to assure compliance with schedules.

B. The coordination requirements of this Section are in addition to the requirements of this Specification Document.

C. It is the CONTRACTOR's responsibility to coordinate with all the utilities regarding locates, protection of existing facilities, testing, or relocations.

1.08 CUTTING AND PATCHING

A. Cutting and patching for inspection and testing and the payment therefore shall be as specified in the General Conditions and Supplementary Conditions.

B. The CONTRACTOR shall, at no additional expense to the OWNER, perform cutting and patching necessary for the completion of the Project. Perform cutting and patching in a manner to prevent damage to the facilities or previously completed work.

C. Refinish surfaces as necessary to provide an even finish. Refinish continuous surfaces to the nearest intersection.

1.09 DRAWINGS AND PROJECT MANUAL

A. The Utility Work associated with the new raw water main along Johnson St. shall be performed in accordance with the Drawings and Specifications prepared by CPH, Inc.

B. The CONTRACTOR shall verify all dimensions, quantities and details shown on the Utility Drawings and Roadway Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the ENGINEER, and shall notify the same, in writing, of all errors, omissions, conflicts and discrepancies found therein with adequate notice. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the CONTRACTOR of full responsibility for

unsatisfactory Work, faulty construction or improper operation resulting there from, nor from rectifying such conditions at his own expense.

C. All schedules are given for the convenience of the ENGINEER and the CONTRACTOR and are not guaranteed to be complete. The CONTRACTOR shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in the Work to be done under this Contract.

D. Intent:

1. All work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their implied intent, or in the complete and proper execution of the Work, is required and shall be performed by the CONTRACTOR as though it were specifically delineated or described.

2. Items of material, equipment, machinery, and the like may be specified on the Drawings and not in the Specifications. Such items shall be provided by the CONTRACTOR in accordance with the specification on the Drawings.

3. The apparent silence of the Specifications to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

1.11 WEATHER

A. During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. The orders and decisions of the ENGINEER as to suspensions shall be final and binding. During suspension of the Work from any cause, the Work shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise; and, if the ENGINEER will so direct, the rubbish and surplus materials shall be removed.

1.12 PROTECTION AND RESTORATION

A. The CONTRACTOR shall be responsible for the preservation of all public and private property, and shall use every means of protection necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the CONTRACTOR, such property shall be restored by the CONTRACTOR, at his expense, to a condition equal to or better

than that existing before the damage was done, or he shall make good the damage in other manner acceptable to the ENGINEER.

B. Protection of Trees and Shrubs

1. Protect with boxes or other barricades.
2. Do not place excavated material so as to injure trees or shrubs.
3. Support trees to prevent root disturbances during nearby excavation.

C. Tree and Limb Removal

1. Tree limbs that interfere with equipment operation and are approved for pruning shall be neatly trimmed and the tree cut coated with tree paint. Trimming and removal of tree limbs shall be incidental.

2. The OWNER may order the CONTRACTOR, for the convenience of the OWNER, to remove trees along the line or trench excavation. The CONTRACTOR shall obtain any permits required for removal of trees. Ordered tree removal shall be paid for under the appropriate Contract Items.

D. Trees or shrubs destroyed by negligence of the CONTRACTOR or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the CONTRACTOR.

E. Lawn Areas – All lawn areas disturbed by construction shall be replaced with like kind to a condition similar or equal to that existing before construction. Where sod is to be removed, it shall be carefully removed, and the same re-sodded, or the area where sod has been removed shall be restored with new sod in the manner described in the applicable section.

F. The CONTRACTOR shall be responsible for locating and protecting and/or relocating all utilities lines, including irrigation lines, in the areas of the construction activities. If any existing lines are broken or damaged as a result of construction activities, the CONTRACTOR shall be responsible for repairing the lines at no additional cost to the OWNER.

1.13 DELIVERY AND STORAGE

A. General

1. The CONTRACTOR shall be responsible for all material, equipment and supplies sold and delivered to the OWNER under this Contract until final inspection of the Work and acceptance thereof by the OWNER.

2. All materials and equipment to be incorporated in the Work shall be handled and stored by the CONTRACTOR before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever

to the material or equipment.

3. Any materials that, in the opinion of the ENGINEER, become damaged to a point where they are unfit for their intended or specified use shall be promptly removed from the site of the Work, and the CONTRACTOR shall receive no compensation for the damaged material or its removal.

4. In the event any such material, equipment or supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the CONTRACTOR shall replace the same without additional cost to the OWNER.

B. Delivery – The CONTRACTOR shall

1. Deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.

2. Coordinate deliveries in order to avoid delay in or impediment of, the progress of the Work of any related CONTRACTOR.

3. Schedule deliveries to the site not more than one month prior to scheduled installation without written authorization from the ENGINEER.

4. Arrange deliveries of products in accordance with construction schedules coordinated to avoid conflict with work and conditions at the site.

5. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

6. Immediately upon delivery, inspect shipments with the OWNER'S field representative to ensure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

7. Provide equipment and personnel to handle products by methods recommended by the manufacturer to prevent soiling or damage to products or packaging.

8. Submit operation and maintenance data to the ENGINEER for review prior to shipment of equipment.

C. Storage

1. The CONTRACTOR shall be responsible for securing a location for on-site storage of all material and equipment necessary for completion of this project.

2. All material delivered to the job site shall be protected from dirt, dust,

dampness, water and any other condition detrimental to the life of the material from the date of delivery to the time of installation of the material and acceptance by the OWNER.

3. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

4. When required or recommended by the manufacturer, the CONTRACTOR shall furnish a covered, weather protected storage structure providing a clean, dry, non-corrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project.

5. The CONTRACTOR shall arrange the storage area in a manner to provide easy access for inspection. Periodic inspections of stored products shall be done to assure that products are maintained under specified conditions and free from damage or deterioration.

6. The CONTRACTOR shall carefully review and comply with the manufacturer's storage instructions. These instructions shall be carefully followed and a written record of this kept by the CONTRACTOR.

7. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding".

8. Mechanical equipment to be used in the Work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and start-up, at no extra cost to the OWNER.

D. Specific Material Storage Requirements

1. Loose Granular Materials: Store in a well-drained area on solid surfaces to prevent mixing with foreign matter.

2. Cement, Sand and Lime: Stored under a roof and off the ground and kept completely dry at all times.

3. Brick, Block and Similar Masonry Products: Handle and store in a manner to reduce breakage, chipping, cracking and spilling to a minimum.

4. All structural and miscellaneous steel and reinforcing steel: Store off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting.

Should the CONTRACTOR fail to take proper action on storage and handling of equipment supplied under this Contract, within seven days after written notice to correct the deficiencies, the OWNER retains the right to correct all deficiencies

noted in previously transmitted written notice and deduct the cost associated with these corrections from the CONTRACTOR's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, and Engineering and any other costs associated with making the necessary corrections. In any event, equipment and materials not properly stored will not be included in a payment estimate. Any materials not suitable for use will be removed from the site and replaced with new materials.

1.14 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. Comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including two copies for the ENGINEER's use. Maintain one set of complete instructions at the job site during installation and until completion. Copies of all instructions shall also be included in the Operation and Maintenance Manuals, which are provided to the OWNER at the close of the contract.

B. Contractor shall install all pipes per manufacturer's requirements. The pipe manufacturer will provide at no cost to the Contractor a preconstruction meeting to go over the general assembly requirements and provide certification of training to Contractors personnel. The Contractor must provide proof of the workers certification to the City that all crews installing pipe have been trained and that all pipe has been installed as instructed by the manufacturer.

C. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with the manufacturer's instructions, consult with the ENGINEER for further instructions. Do not proceed with Work without clear instructions.

D. Perform Work in strict accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

E. The CONTRACTOR shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the installation of the Work and to handle all emergencies normally encountered in Work of this character.

F. Equipment shall be installed in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise in writing by the ENGINEER during installation.

G. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

H. The CONTRACTOR shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the

devices included in the equipment specified. Anchor bolts shall be as approved by the ENGINEER and made of ample size and strength for the purposes intended. The manufacturer shall furnish substantial templates and working drawings for installation.

1.15 CONSTRUCTION FIELD ENGINEERING

A. Registered Land Surveyor: The CONTRACTOR shall retain the services of a registered land surveyor licensed in the State of Florida for the following specific services as applicable to the Work:

1. Identify existing rights-of-ways and property lines along or adjacent to the Work;

2. Locate all existing utilities and structures as may be affected by the Work;

3. Locate control points prior to starting the Work;

4. Replace control points or reference points which may be lost or destroyed.

5. CONTRACTOR is to provide a preliminary set of Record Drawings that reflect any changes to the alignment or connections to existing facilities for the purpose of Certification of Construction Completion to FDEP for clearance of the lines. This As-built information is to be provided to the City prior to the pressure testing of the new line.

6. Prepare a certified survey of the actually constructed facilities based on information concurrent with the construction progress. This site survey shall be in accordance with Section 01720.

B. CONTRACTOR shall protect control points prior to starting the Work and shall preserve all permanent reference points during construction. Report to the OWNER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

The CONTRACTOR shall bear the cost of re-establishing project control points if disturbed, and bear the entire expense of rectifying Work improperly installed due to not maintaining or protecting and removing without authorization such established points, stakes, and marks.

C. Submittals

1. Certificate signed by a Registered Surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

2. Certified, signed and sealed drawings, including a PDF file of the signed drawings, showing locations of all structures, piping conduits and other improvements. These drawings are referenced as the Project Record

Drawings and shall be included with the Project Record Documents.

3. Completed Record Drawing Tables.

4. Documentation to verify accuracy of field engineering work when requested by the ENGINEER.

5. Electronic version of record drawing survey in the latest version of AutoCAD.

1.16 UTILITIES

A. Utility Construction

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto, whether owned or controlled by governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage or water. Other public or private property, which may be affected by the work shall be deemed included hereunder.

2. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The CONTRACTOR shall, at their own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.

3. The length of open trench will be controlled by the particular surrounding conditions, but shall always be no more than 300 feet. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the OWNER may require special construction procedures. As a minimum, the CONTRACTOR shall conform to the following restoration procedures:

a. Interim Restoration: All excavations shall be backfilled and compacted as specified by the end of each working day. For excavations within existing paved areas, concrete base or soil cement base shall be spread and compacted to provide a relatively smooth surface free of loose aggregate material.

All pipe and fittings shall be stored in a location inside the easement area, which will cause the least disturbance to the public. All debris shall be removed and properly disposed of by the end of each working day.

b. Maintenance of all restored facilities shall be the CONTRACTOR's responsibility. This maintenance shall be performed on an on-going basis during the course of construction.

The CONTRACTOR's Progress Schedule shall reflect the above restoration requirements.

B. Existing Utilities

1. The locations of all existing underground piping, structures and utilities have been taken from information received from the respective OWNER. The locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered.

2. The CONTRACTOR shall, at all times in performance of the Work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of existing public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services; and shall cooperate fully with the Owners thereof to that end.

3. Pipelines shall be located substantially as indicated on the Drawings, but the OWNER reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. When the location of piping is dimensioned on the Drawings, it shall be installed in that location; when the location of piping is shown on a scaled drawing, without dimensions, the piping shall be installed in the scaled location unless the OWNER approves an alternate location for the piping. Where fittings are noted on the Drawings, such notation is for the CONTRACTOR's convenience and does not relieve him from laying and jointing different or additional items where required. The ENGINEER may require detailed pipe laying drawings and schedules for project control.

4. The CONTRACTOR shall exercise care in any excavation to locate all existing piping and utilities. All utilities, which do not interfere with the completed work shall be carefully protected against damage. Any existing utilities damaged in any way by the CONTRACTOR shall be restored or replaced by the CONTRACTOR at his expense as directed by the OWNER. Any existing facilities that require operation to facilitate repairs shall be performed only by the OWNER of the respective utility.

5. It is the responsibility of the CONTRACTOR to ensure that all utility or other poles, the stability of which may be endangered by the proximity of excavation, be temporarily stayed and/or shored in position while Work

proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the CONTRACTOR.

C. Notices

1. All governmental utility departments and other owners of public utilities which, may be affected by the Work will be informed in writing by the CONTRACTOR within two weeks after the execution of the Contract or Contracts covering the Work. Such notice will be sent out in general, and directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.

2. The CONTRACTOR shall also comply with Florida Statute 553.851 regarding notification of existing gas and oil pipeline company owners. Evidence of such notice shall be furnished to the OWNER within two weeks after the execution of the Contract.

3. It shall be the CONTRACTOR's responsibility to contact utility companies at least 48 hours in advance of breaking ground in any area or on any unit of the Work so maintenance personnel can locate and protect facilities, if required by the utility company.

4. The CONTRACTOR shall, not be allowed to interrupt a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes.

D. Exploratory Excavations

Exploratory excavations shall be conducted by the CONTRACTOR for the purpose of locating underground pipelines, other utilities or structures in advance of the construction. Test pits shall be excavated in areas of potential conflicts between existing and proposed facilities and at piping connections to existing facilities a minimum of 48 hours or 1,000 feet in advance of Work. If there is a potential conflict, the CONTRACTOR is to notify the ENGINEER immediately. Information on the obstruction to be furnished by the CONTRACTOR shall include: Location, Elevation, Utility Type, Material and Size. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the ENGINEER.

E. Utility Crossings

It is intended that whatever existing utilities must be crossed, deflection of the pipe within specified limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the OWNER this procedure is not feasible, he may direct the use of

fittings for a utility crossing or conflict transition as detailed on the Drawings.

F. Relocations

1. Relocations shown on the Drawings – Public utility installations or structures, including but not limited to light poles, signs, fences, piping, conduits and drains that interfere with the positioning of the Work which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the CONTRACTOR shall be considered as part of the general cost of doing the Work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.

2. Relocation not shown on the Drawings

   a. Where public utility installations or structures are encountered during the course of the Work, and <u>are not</u> indicated on the Drawings or in the Specifications, and when, in the opinion of the OWNER, removal, relocation, replacement or rebuilding is necessary to complete the Work under this contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the OWNER, for the CONTRACTOR to accomplish.

   b. If such Work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the CONTRACTOR shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such Work is accomplished by the CONTRACTOR, it will be paid for as a Change Order.

3. All existing utility castings, including valve boxes, junction boxes, manholes, hand holes, pull boxes, inlets and similar structures in the areas of construction that are to remain in service and in areas of trench restoration and pavement replacement, shall be adjusted by the CONTRACTOR to bring them flush with the surface of the finished Work.

4. All existing utility systems which conflict with the construction of the Work herein, which can be temporarily removed and replaced, shall be accomplished at the expense of the CONTRACTOR. Work shall be done by the utility unless the utility approves in writing that the Work may be done by the CONTRACTOR.

G. Lines and Grades

1. All Work under this Contract shall be constructed in accordance with the line and grades shown on the Drawings, or as given by the ENGINEER.

The full responsibility for keeping alignment and grade shall rest upon the CONTRACTOR.

2. The CONTRACTOR shall, at his own expense, establish all working or construction lines and grades as required from the project control points set by the OWNER, and shall be solely responsible for the accuracy thereof.

3. Force mains shall have a minimum of 48-inches of cover over the top of the pipe. Cover shall vary to provide long uniform gradient or slope to pipe to minimize air pockets and air release valves. The stationing shown on the Drawings for air and vacuum release valve assemblies are approximate and the CONTRACTOR shall field adjust these locations to locate these valves at the highest point in the pipeline installed. All locations must be approved by the OWNER.

4. To insure a uniform gradient for gravity pipe and pressure pipe, all lines shall be installed using the following control techniques as a minimum:

   a. Gravity Lines: continuous control, using laser beam technology.

   b. Pressure Lines: control stakes set at 50 ft intervals using surveyors level instrument.

1.17 SPECIAL PROJECT PROCEDURES

A. Maintenance of Traffic

1. CONTRACTOR shall provide MOT in accordance with FDOT Standards. CONTRACTOR shall adjust the schedule and/or MOT to provide for utility installations at no additional cost to City.

2. Fourteen (14) days prior to closing a lane, the permittee shall notify the respective City, City of Pembroke Pines PM, and EOR.

B. Operation of existing Utility Systems

Due to the utility systems providing service to residents and businesses, all City Utility systems shall be required to remain in service and not be shut down to accommodate construction activities. Contractor to sequence all work so that water and sewer service is maintained at all times.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01021

SOILS REPORT AND OTHER INFORMATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Identification of reports of existing conditions.

Bidder's/Contractor's responsibilities for investigating and working with existing conditions.

1.02 LAND IN-ADDITION TO THE SITE

A. Contractor is responsible for obtaining any lands, areas, properties, facilities and easements, in addition to those furnished by the City, that the Contractor considers necessary for temporary facilities, storage, disposal of spoil or waste material or other purposes the Contractor determines necessary to complete the Work. Contractor shall provide written documentation from owner to use such land or facilities. The City/ Professional and the Geotech do not assume any responsibility for existing conditions at such lands, areas, properties, facilities and /or easements obtained by the Contractor.

1.03 SUBSURFACE CONDITIONS AND OTHER PHYSICAL CONDITIONS

A. This Section identifies reports of explorations and tests of subsurface conditions, and drawings of physical conditions of existing surface and subsurface structures that have been used in the preparation of the Contract Documents. Contractor may rely upon any technical information and data in those reports found in Appendix A, "Geotechnical Report (includes geotechnical investigation and dewatering ground water quality values per Chapter 62-621, paragraph 62-621.300(2), F.A.C.)." The Report(s) in Appendix A is designated as Authorized Technical Data, but those reports and drawings are not part of the Contract Documents.

B. Any conclusions or interpretations made by the Contractor based on any Authorized Technical Data will be at the Contractor's own risk. Contractor's reliance on any non-technical information, data, interpretations or opinions also will also be at Contractor's own risk. The City/Professional assume no responsibility for any understanding reached or representation made about subsurface conditions and physical conditions of existing structures, except as otherwise expressly shown in or represented by the Authorized Technical Data provided.

C. The only information or data contained in the geotechnical report and used in the preparation of the Contract Documents that may be properly considered authorized technical data concerning subsurface conditions is found in Appendix A "Geotechnical Report". Such technical data are made available to allow the Contractor to have access to the same information available to the City. The City/Professional do not warrant the accuracy or completeness of any such information or that the Contract Documents identify all the existing relevant reports and/or documents.

1.04 UNDERGROUND UTILITIES

A. Information or data about physical conditions of Underground Utilities, which have been used in the preparation of the Contract Documents, is shown or indicated in the Drawings and technical specifications. Such information and data is based on information and data obtained from record documents or furnished to the City by the owners of those Underground Utilities or by others.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXISTING GROUND SURFACE AND UNDERGROUND CONDITIONS; GENERALLY

A. Where existing ground conditions are shown on the plans hereto attached, the elevations are believed to be reasonably correct but are not guaranteed to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy itself, however, by actual examination of the site of the Work, as to the existing elevations and the amount of work required under the Contract.

B. Where test pits and borings have been dug, the results supplied to the City/ Professional by the soils Engineer may be given on the plans or are on file in the City/Professional's office and available for review . The City does not guarantee the accuracy or correctness of this information. If the Contractor desires any additional information relating to the soils investigation, contact the City/Professional to obtain such information. City does not guarantee the accuracy or correctness of any such information supplied to the Contractor.

C. If, upon notice of a differing subsurface or latent physical condition from the Contractor, the City determines there was no unforeseen condition and unnecessary tests and investigations were conducted solely at the Contractor's request, any unnecessary expenses may be deducted from the Final Payment for the Contract. No increase in Contract Amount or Contract Time will be made if the differing site conditions were known or could have been discovered by the types of examinations that the Contractor, as Bidder, was responsible for. Claims based on groundwater table conditions will not be considered unforeseen subsurface conditions and will not be allowed. Any information indicated in the Contract Documents as to the groundwater table conditions has been provided for general information purposes only and is not intended to represent that the same conditions will exist during the execution of the Work. Further, no increase in Contract Amount or Contract Time will be made for costs incurred prior to the Contractor's written notice as required by the Contract Documents. The City will be allowed at least 10-days to investigate any alleged differing site conditions and to take appropriate action, before the Contractor is entitled to any adjustment in Contract Amount or Contract Time for Delay.

3.02 UNDERGROUND UTILITIES:

A. The Contractor will be responsible for the safety and protection of, and providing for the repair of any damage done to the Work and existing surface and subsurface structures. The Contractor will be responsible for any damages and injury resulting from the failure to excavate in a careful and prudent manner.

B. Contractor shall have full responsibility for locating all underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, stormwater, other liquids or chemicals, or traffic or other control systems, shown or indicated in the Contract Documents, in advance of construction, coordinating the Work with the actual locations found and making note of the actual locations on the record Drawings. Contractor shall exercise extreme caution when locating underground facilities to minimize the risk of damage from Contractor's activities. The Contractor will immediately notify the City and the owner of any Underground Utilities that are inaccurately identified or located on the Drawings.

C. The Contractor will be responsible for any delay and all costs relating to the obligations set forth in this Section, except as provided by allowances specific to Underground Utilities.

D. The Contractor will promptly notify the City, in writing, whenever the Contractor discovers that actual physical conditions of Underground Utilities differ materially from those indicated by the Contract Documents or Authorized Technical Data provided with the Contract Documents. Further, the Contractor promptly will notify the City, in writing, whenever the Contractor encounters Underground Utilities not shown or indicated in/through the Contract Documents, and which could not reasonably have been foreseen.

E. The City and Contractor will follow the provisions of the General Conditions with respect to any conclusions reached by the City after the City compares the actual underground utility conditions with those included in the information provided to the Contractor.

3.03 ENVIRONMENTAL PROCEDURES FOR HAZARDOUS MATERIALS

A. The Contractor will not, at any time, cause or permit any Hazardous Materials to be brought upon, stored, manufactured, blended, handled, or used in, on, or about the Project or the Site for any purpose except as lawful and necessary and in accordance with the Contract Documents. The Contractor will not cause or permit Hazardous Materials to be brought on Site unless they have been specifically pre-identified by the Contractor, and approved in writing in advance by the City.

B. The Contractor will defend, save, indemnify and hold harmless the City, their agents and employees from and against all liabilities, claims, damages, losses and expenses including attorneys' fees, which arise at any time during or after completion of the Work as a result of or in connection with:
   1. The Contractor's breach of any prohibition or requirement set forth in this Section or,
   2. Any Hazardous Materials discharged, released, deposited or introduced in the soil or surface or groundwater in, on, under, or about the Work, the Site or other properties as a result of the activities of the Contractor, the Subcontractors and their respective agents and employees in connection with the Work.

C. This Contractor's indemnity obligation includes without limitation, costs incurred in connection with any investigation of site conditions or any cleanup, remediation, removal, or restoration required by the City or any federal, State, or local Public Agency because of:
   1. The occurrence of any Hazardous Materials present in the soil or surface or groundwater in, on, under, or about the Work or the Site;
   2. The diminution in value of the Work or the Site;
   3. Damages for the loss or restriction on use of the Work or of any amenity of the Work or the Property; and/or
   4. Amounts paid in settlement of claims, penalties, attorneys' fees, court costs, consultant and laboratory fees and experts' fees.

D. The Contractor will immediately notify the City in writing of any significant release of Hazardous Materials at the Project or the Site, specifying the nature and quantity of the release, the location of the release, and the measures taken to contain and clean up the release and ensure that future releases do not occur.

E. The Contractor agrees that insulation and any other construction materials containing asbestos or urea formaldehyde will not be used on the Work, and that all Sub-agreements will prohibit the use of construction materials (including, but not limited to, insulation) containing asbestos or urea formaldehyde.

3.04 DIFFERING HAZARDOUS MATERIAL CONDITIONS:

A. If the Contractor unexpectedly encounters material reasonably believed to be Hazardous Material, the Contractor will immediately stop all affected Work, give written notice to the City and take appropriate health and safety precautions. Unless the Contract Documents require otherwise, the Contractor will conduct an investigation. If upon due investigation, the Contractor determines the material a Hazardous Material that may present a danger to persons or the surroundings, the Contractor will recommend a solution to the City. In any such case, the affected Work will be considered to have been under a suspension of Work.

B. If the Hazardous Material is not required Work under the Drawings and/or Specifications, the City will proceed to have the Hazardous Material removed or rendered harmless through a Change Order or by means of another contract or as the City otherwise deems expedient. Alternatively, the City will terminate the affected Work or Contract for the City's convenience.

C. If the City did not elect termination, once the Hazardous Material has been removed or rendered harmless, the affected Work will be resumed as directed in writing by the City. Any determination by the Florida Department of Community Health or the Department of Environmental Quality that the Hazardous Material has been removed or rendered harmless will be binding upon the City and Contractor for the purposes of resuming the affected Work.

D. If the Contractor is responsible for the Hazardous Material, the Contractor will bear its proportionate share of the delay and costs involved in cleaning up the Site and removing and rendering it harmless to the satisfaction of the City and all Political Subdivisions with jurisdiction. The Contractor will be solely responsible if the Hazardous Material was brought to the Site by the Contractor, or results in whole or in part from any violation by the Contractor of any applicable Laws.

E. If the Contractor is responsible, but fails to take appropriate action, and the City acts accordingly, the Contractor will defend, save, indemnify and hold harmless the City from and against all claims arising from the City's exercise of appropriate action.

F. If the Contractor is not responsible, the City will issue a Change Order with the necessary changes. The Change Order will adjust Contract Amount and/or Contract Time as made necessary by the changes and resulting unreasonable delay under the circumstances attributable to the City /Professional.

3.05 INCIDENTS WITH ARCHAEOLOGICAL FEATURES:

A. The Contractor will immediately notify in writing, the City and all Federal, State and local agencies with jurisdiction of any Archaeological Feature deposits encountered or unearthed. The Contractor will protect such Archaeological Features in a proper and satisfactory manner. No further disturbance of the Archaeological Features will take place until work is allowed to resume in the affected areas.

B. If the City concludes that the Contract Documents require changes because of Archaeological Feature deposits encountered, the City will issue a Change Order with the necessary changes in the Work. The Change Order also will adjust Contract Amount and/or Contract Time as made necessary by those changes and by any resulting unreasonable delay under the circumstances attributable to the City/Professional.

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. This Section specifies administrative and procedural requirements to define pay items and determine payable amounts, and includes but is not limited to:
   1. General Provisions
   2. Cash Allowances
   3. Work Not Paid for Separately
   4. Measurement for Payment
   5. Partial Payment for Stored Materials and Equipment

1.02 GENERAL PROVISIONS

A. This specification includes standard descriptions for all bid items. This Contract's specific bid items are listed in the Bid Schedule.

B. The total Contract Amount shall cover the Work required by the Contract Documents. All costs in connection with the successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

C. If used, all estimated quantities stipulated in the Bid Schedule or other Contract Documents are approximate and are to be used only (a) for the purpose of comparing the bids submitted for the Work, and (b) as a basis for determining an initial Contract Amount. The actual amounts of Work completed and materials furnished under unit price items may differ from the estimated quantities. The City does not expressly or by implication represent that the actual quantities involved will correspond exactly to the quantities stated in the Bid Schedule; nor shall the Contractor plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the Work. Payment to the Contractor will be made only for the actual quantities of work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or decreased as provided in the General Conditions.

D. If used, the unit prices listed in the Bid Schedule shall include all services, obligations, responsibilities, labor, materials, devices, equipment, royalties and license fees, supervision, temporary facilities, construction equipment, bonds, insurance, taxes, clean up, traffic control, control surveys, field offices, close out, overhead and profit and all connections, appurtenances and any other incidental items of any kind or nature, as are necessary to complete the Work in accordance with the Contract Documents.

E. Except for mobilization/demobilization and project record documents, payment for Work will be based on the percent of completed work of each item in the Schedule of Values, including stored materials, as determined by the City. Progress of work in each item of the Schedule of Values will be determined separately by the City. However, the City will issue a single payment certificate for progress on the Contract.

F. The Contractor agrees that it will make no claim for damages, anticipated profits, or otherwise because of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts therefore.

G. Where payment by scale weight is specified under certain items, the Contractor shall provide suitable weighing equipment which shall be kept in accurate adjustment at all times and certified. The weighing of all material shall be performed by the Contractor in the presence and under the supervision of the City.

H. All schedules included in the Contract Documents are given for convenience and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in work to be done under this Contract.

I. Where pipe fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve the Contractor from laying and jointing different or additional items where required.

J. All contracts shall be subject to 10% minimum retainage as defined in the General Conditions and the Agreement.

1.03 CASH ALLOWANCES

A. The Contractor shall include in the Total Bid Amount, all cash allowances stated in the Contract Documents. Items covered by these allowances shall be supplied for such amounts and by such persons as the City may direct.

B. The Contractor will obtain the City’s written acceptance before providing equipment, materials or other Work under a cash allowance. Payments under a cash allowance will be made based on actual costs, excluding costs of general conditions, handling, unloading, storage, installation, testing, etc., which will be considered to be included within the Contract Price. Payments within the limits of any Allowance will exclude overhead and profit and bond and insurance premiums, since those costs will be considered to be included within the Contract Amount. The Contractor shall submit appropriate documentation to validate the actual cost of the item.

C. The amount of the allowance shall be adjusted accordingly by Change Order to recognize the allowable cost incurred by the Contractor.

1.04 WORK NOT PAID FOR SEPARATELY

A. Delivery: Payment for equipment delivery, storage or freight shall be included in the pay items including their installation and no other separate payment will be made therefore.

B. Bonds: Payment for bonds required by the Contract shall be included in the pay items for the Work covered by the required bonds and no separate payment will be made.

C. Preparation of Site: Payment for preparation of site shall be included in pay items proposed for the various items of Work and no separate payment will be made therefore. Preparation of site includes setting up construction plant, offices, shops, storage areas, sanitary and other facilities required by the specifications or state law or regulations; providing access to the site; obtaining necessary permits and licenses; payments of fees; general protection, temporary heat and utilities including electrical power; providing shop and working drawings, certificates and schedules; providing required insurance; preconstruction photographs and videos; clearing and grubbing; removal of existing pavements, sidewalks and curbs; trench excavation, sheeting, shoring and bracing; dewatering and disposal of surplus water; structural fill, backfill, compaction and grading; testing materials and apparatus; maintenance of drainage systems; appurtenant work; record drawing and close-out documentation; cleaning up; and all other work regardless of its nature which may not be specifically referred to in a Bid Item but is necessary for the complete construction of the project set forth by the Contract.

D. Permitting & Permit Fees.
   1. Payment for City permits (Section 01065) shall be based on a fixed percentage of the total base bid amount.

E. The City reserves the right to delete any item included in the Schedule of Values and decrease the Contract Price by the scheduled amount for the item deleted.

1.05 MEASUREMENT FOR PAYMENT

A. Methods of Measurement - Generally:
   1. Units of measurement shall be defined in general terms as follows:
      a. Linear Feet (LF)
      b. Square Feet (SF)
      c. Square Yards (SY)
      d. Cubic Yards (CY)
      e. Each (EA)
      f. Sacks (SK)
      g. Lump Sum (LS)

2. Unit Price Contracts/Items:
    a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified. Pipe shall be measured along the length of the completed pipeline, regardless of the type of joint required, without deduction for the length of valves or fittings. Pipe included within the limits of lump sum items will not be measured.
    b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Sacks (SK) shall be measured as the amount of the unit of measure installed and compacted within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured using land-surveying equipment. Contractor shall provide supporting documentation (i.e. drawings, delivery tickets, invoices, survey calculations, etc.) to verify actual installed quantities.

B. Lump Sum Contracts/Items - Generally:
1. Quantities provided in the Schedule of Values are for the purpose of estimating the completion status for progress payments. Payment will be made for each individual item on a percentage of completion basis as estimated by the Contractor and approved by the City.
2. Adjustments to costs provided in the accepted Schedule of Values may be made only by Change Order.
3. The City reserves the right to delete any item included in the Schedule of Values and decrease the Contract Price by the scheduled amount for the item deleted.

1.06 MEASUREMENT AND PAYMENT ITEMS

A. Measurement: Measurement for all items shall be based on units outlined in the bid tabulation and on satisfactory progress of the Contractor to provide Project Record Documents in accordance with the City requirements.

B. Payment: Payment of the applicable sum expressed as lump sum or unit price as stated in the proposal will be full compensation for furnishing all labor, materials, and equipment necessary to create the Project Record Drawings, including the certified as-built survey, in accordance with the City requirements and specifications. Payment will be made monthly upon submittal and acceptance of pay application and relevant backup materials.

END OF SECTION

SECTION 01027
APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENT

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1.02 FORMAT

A. Format and Content: Use the accepted Schedule of Values.
   1. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
      a. Generic name
      b. Related specification section
      c. Name of subcontractor
      d. Name of manufacturer or fabricator
      e. Name of supplier
      f. Dollar value
   2. Round amounts off to the nearest whole dollar. The total shall equal the Contract Amount.

1.03 PREPARATION OF APPLICATION

A. Each Application for Payment shall be consistent with previous applications for payments as certified and paid for by the City.

B. Payment Application Times: As stated in the General Conditions, Payment Applications shall be submitted monthly on a day of the month established by the City at the Pre-Construction Conference.

C. Application Preparation: Contractor shall complete every entry on the Pay Application form. The form shall be executed by a person authorized to sign legal documents on behalf of the Contractor and the signature notarized. Incomplete applications will be returned without action. The following procedure shall be followed by the Contractor:
   1. Submit applications typed on forms provided by the City.
   2. Use data on Bid Form and approved Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for stored products.
   3. List each authorized Change Order and use additional sheets if necessary, list Change Order number and dollar amount for the original item of work.
   4. Each item shall have an assigned dollar value for the current pay period and a cumulative value for the project to-date.

5. Submit stored material log, partial waivers of claims and mechanic liens, and Consent of Surety with each application, as further explained below.

D. Contractor shall submit a stored material log with each application for payment that identifies the type, quantity, and value of all stored material that tracks when the stored materials were installed and deducts the installed material from the stored quantity at that time. Include original invoices for all stored materials for which payment is requested.

E. Waivers of Claims and Mechanics Lien (Waivers): With each Application for Payment the Contactor shall submit waivers of claims and mechanic liens from Subcontractors, Sub-subcontractors, and suppliers for the construction period covered by the previous application.
   1. The Contractor shall submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   2. When an application shows completion of an item, the Contractor shall submit final or full waivers.
   3. The Contractor shall submit the final Application for Payment with, if not already submitted, the final waivers from every entity involved with performance of work covered by the Application that could lawfully be entitled to a payment claim or lien.
   4. Format of Waiver Forms: The Contractor shall submit executed waivers of claims and liens on forms acceptable to the City.
   5. The City reserves the right to designate which entities involved in the Work must submit waivers.

F. Transmittal of Pay Applications: Contractor shall submit four (4) executed copies of each Application for Payment to the City. One (1) copy shall include all waivers of lien and similar attachments.
   1. The Contractor shall transmit each Pay Application package with a transmittal form that lists attachments and all appropriate information related to the application. The transmittal form shall be acceptable to the City.
   2. The Contractor shall include a certification with each application stating that all previous payments received from the City under the Contract have been applied by the Contractor to discharge, in full, all obligations of the Contractor in connection with the Work covered by prior applications for payment. The Contractor shall also certify that all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest, and encumbrances.

G. Initial Application for Payment Submittal: Administrative actions and submittals that must precede or coincide with submittal of the initial Application for Payment include the following:
   1. List of Subcontractors
   2. List of principal suppliers and fabricators
   3. Schedule of Values
   4. Contractor's Construction Progress Schedule (accepted)
   5. List of Contractor's staff assignments
   6. Copies of building permits

7. Copies of authorizations and licenses from governing authorities for performance of the Work
8. Certificates of insurance and insurance polices
9. Performance and Payment bonds (if required)
10. Data needed to acquire City's insurance

H. Monthly Application for Partial Payment Submittals: Administrative actions and submittals that must precede or coincide with submittal of Monthly Applications for Partial Payment include the following, as applicable:
1. Relevant tests
2. Progressive As-builts (one (1) paper copy and electronic copy)
3. Table 01050-2 Asset Attribute Data Form Examples (one (1) paper copy and electronic copy)
4. Table 01050-3 Pipe Deflection Table (one (1) paper copy and electronic copy)
5. Table 01050-4 Gravity Main Table (one (1) paper copy and electronic copy)
6. An electronic copy of all survey field notes
7. Partial Release of Lien
8. Partial Consent of Surety
9. Site photographs
10. Updated Progress Schedule: submit one (1) electronic copy and five (5) copies
11. Summary of Values
12. Pay Request
13. On-Site Storage of materials

I. Substantial Completion Application for Payment Submittal: Following issuance of the Certificate of Substantial Completion, Contractor shall submit an Application for Payment. This Application shall reflect any Certificates of Partial Substantial Completion issued previously for the City’s occupancy of designated portions of the Work.
1. Administrative actions and submittals that shall precede or coincide with this application include:
    a. Occupancy permits and similar approvals
    b. Warranties (guarantees) and maintenance agreements
    c. Test/adjust/balance records
    d. Maintenance instructions
    e. Meter readings
    f. Start-up performance reports
    g. Change-over information related to the City's occupancy, use, operation and maintenance
    h. Final Cleaning
    i. Application for reduction of retainage and consent of surety
    j. Advice on shifting insurance coverage
    k. List of incomplete Work, recognized as exceptions to City’s Certificate of Substantial Completion

J. Final Completion Application for Payment Submittal: Administrative actions and

submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Prior to submitting a request for final payment or the City issuing a Certificate of Completion for the Work, the Contractor shall submit the final Record Documents to the City for approval. Retainage funds will be withheld at the City's discretion based on the quality and accuracy of the final Record Documents.
2. Written signed statements by the Contractor
   a. Completion of project close-out requirements
   b. Completion of items specified for completion after Substantial Completion
   c. Assurance that unsettled claims are settled
   d. Assurance that work not complete and accepted is now completed
3. Transmittal of Record Documents to the City
4. Proof that taxes, fees, and similar obligations have been paid
5. Removal of temporary facilities and services has been completed
6. Removal of surplus materials, rubbish, and similar elements
7. Prepare Application for Final Payment as required in General Conditions

1.04 PAY APPLICATION SUBSTANTIATING DATA

A. When the City requires substantiating data for a Pay Application, submit data justifying Pay Application line item amounts in question.

B. Provide one (1) copy of data with a transmittal letter for each copy of Pay Application submittal. The Pay Application number, date, and line item by number and description shall be clearly stated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01050
SURVEYING AND FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Professional Surveyor: Provide professional surveying and mapping work required for the execution of the Contract, including verification of existing survey data, construction layout, and production of the As-Built Drawings. This Work shall be performed by a Surveyor that is licensed by the State of Florida as a Professional Surveyor and Mapper pursuant to Chapter 472, F.S.

B. Professional Engineer: The Contractor shall provide the services of a Registered Professional Engineer currently licensed in the State of Florida for the required field engineering services as applicable to the work.

1.02 REQUIREMENTS

A. Survey Services
   1. The Contractor shall retain the services of a registered Surveyor and Mapper licensed in the State of Florida to provide professional surveying and mapping services necessary for the construction including a control survey and an as-built survey during construction. The Surveyor will identify control points (monuments and benchmarks noted on the Drawings). The construction layout survey shall be established from the control points shown on the Construction Drawings. The control points shall be confirmed by the contractor prior to start of construction. The accuracy of any method of staking shall be the responsibility of Surveyor. All staking shall be done to provide for easy verification of the work by the City.

B. Field Engineering Services
   1. The Engineer shall be of the discipline required for the work.
   2. The Engineer shall be responsible for duties during Construction to include, but not limited to:
      a. Inspections, testing, witnessing requiring a licensed Professional Engineer.
      b. Design of temporary shoring, bridging, scaffolding or other temporary construction, formwork and protection of existing structures.
      c. Other requirements as specified herein.
   3. Engineering related designs and inspections shall be signed by the licensed Professional Engineer as required by the City.

1.03 SUBMITTALS

A. Provide qualifications of the Surveyor or Engineer.
   1. A Florida Registered Professional Engineer or Registered Surveyor and Mapper, who is proposed by the Contractor to provide services for the work, shall be acceptable to

the City prior to field services being performed.

2. Submit name, address and telephone number of the Surveyor and/or Engineer, as appropriate to the City for acceptance before starting survey or engineering work.
3. Submit written acknowledgement from the Surveyor stating that he has the hardware, software and adequate scope of services in his agreement with the Contractor to fully comply with the requirements of this specification.

B. On request, submit documentation verifying accuracy of survey work.

C. Surveyor shall submit certified Tables 01050 – 2, 3 and 4.

PART 2 - PRODUCTS

2.01 SURVEY DOCUMENTS

A. Survey documents shall comply with the Minimum Technical Standards of Chapter 5J-17 of the Florida Administrative Code (FAC) and Table 01050-1 Minimum Survey Accuracies, whichever are more stringent. All coordinates shall be geographically registered in the Florida State Plane Coordinate System using the contract Drawings control points for horizontal and vertical controls.

B. The Surveyor shall not copyright any of their work related to this project.

C. For ease of calculating pipe deflections in Table 01050-3, begin by providing a unique asset ID for each utility (water, wastewater or reclaimed water) type, numbered sequentially along the pipe run (including changes in direction) from start to finish of the pipe in Table 01050-2 (Pipe Worksheet). Then branches and services of the same utility type can be numbered. It is recommended that each utility numbering format be distinguishable from the other. This will allow organization and convenient sorting after the individual asset table worksheet tabs are combined in the spreadsheet program prior to copying and pasting to the deflection table spreadsheet. The Microsoft Excel spreadsheet template shall be provided by the City. The numbering system shall be approved by the City before commencing with production of the spreadsheet.

Table 01050-1
Minimum Survey Accuracies

Type	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: Horizontal Center and Vertical Top, unless otherwise specified
Bench Marks	0.01	0.01	Point
Baseline Control Locational Accuracy	0.01	N/A	Point
Tract and Easement Corners	*	N/A	Survey Monuments
Pipe, at 100-feet maximum intervals	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Pipe, (PVC) >16-inch at every pipe joint	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Fittings, Sleeves, Tapping Saddle, Service Saddles, Cap or Plugs.	0.1	0.1	
Pipe, Restrained	0.1	0.1	Restrained Joint Limits
Connections	0.1	0.1	Pipe
Bore & Jack Casing	0.1	0.1	Top of Casing at the Casing Limits
Directional Drill	0.1	0.1	10-foot intervals during the directional drill operation or intervals not to exceed the drilling rod length
Hydrants	0.1	0.1	Operating Nut
Valves (Operating Nut)	0.1	0.1	Operating Nut
Valve (Pipe Location)	0.1	0.1	Top of Pipe at Valve location
Air Release, Blow off, and Backflow Valves	0.1	0.1	Valve Enclosure
Master Meters, Deduct Meters & Wastewater Meters	0.1	0.1	Register
Meter Box	0.1	0.1	
Clean out -	0.1	0.1	
Manhole Rim	0.1	0.1	Manhole – top of rim
Manhole Inverts	N/A	0.01	Pipe Inverts
Pump Station (Public & Private)	0.1	0.01	Wetwell top of slab and Pipe Inverts
Production Well or Monitoring Well	0.1	0.1	Well – top of casing
Grease Interceptor	0.1	0.1	
Oil / Water Separators	0.1	0.1	
Pipe, abandoned in place or removed	0.1	0.1	Limits of Abandoned or Removed Pipe
Existing Utilities and appurtenant structures**	0.1	0.1	underground feature or structure

* Shall conform to the requirements of the "Chapter 5J-17, 'Minimum Technical Standards', FAC", certified by a SURVEYOR.

** Existing utilities including but not limited to water, wastewater, reclaimed water, stormwater, fiber optic cable, electric, gas and structures within the limits of construction.

*** Fittings rotated in X,Y,Z plane or vertical shall be shot to maintain flowline for the horizontal and vertical locations of the coordinate

Note: All survey values to be reported to second decimal point (x.xx)

TABLE 01050-2
Asset Attribute Data Examples

Valves Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	Actuator Manufacturer	Comments
2	ARV-1	C300	518060.09	1483231.33	81.72	ARV - Combination	Water Main	2	Brand H	100XT						
3	ARV-1	C303	518083.55	1483280.50	81.15	ARV - Vacuum	Force Main	4	Brand G	1000						
4	BFP-1	C303	518086.00	1483282.88	78.21	Backflow Preventer	Reclaimed Water Main	8	Brand F	2000 fgs						
5	BO-9	C405	518088.83	1483289.43	78.20	Blowoff	Water Main	2	Brand E	14 turbo						
6	BFV-1	C405	518088.11	1483295.00	81.95	Butterfly	Water Main	30	Brand D	230 xls	200	Yes	3 to 1	Yes	Brand C	
7	GV-3	C405	518132.54	1483372.75	81.23	Gate	Water Main	16	Brand C	2225846	300	Yes	3 to 1	NO		
8	LS-W1	C405	576779.36	1539706.97	64.30	Line Stop	Water Main	16	Brand B	7r6r44						
9	PV-22	C405	576880.60	1539718.32	64.52		Force Main	12	Brand A	Z100	200	Yes	3 to 1	Yes	Brand A	
10																

General Info | Hydrant | **Valve** | Manhole | Meter | Fitting | Cleanout | Pipe | Pumpstation | Well | Property of

Fitting Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Comments
2	FM-1	C-3	572399.28	1539339.13	46.27	Force Main	Bend 11 1/4°	
3	FM-2	C-3	574840.74	1539856.91	51.73	Force Main	Bend 22-1/2°	
4	RW-1	C-4	574887.22	1539849.64	51.75	Reclaimed Water Main	Cross	
5	RW-2	C-4	574904.30	1539849.56	48.98	Reclaimed Water Main	Reducer	
6	WM-1	C-5	572532.38	1539848.16	54.42	Water Main	Tapping Saddle	
7	WM-2	C-5	572631.00	1539337.10	45.27	Water Main	Tee	
8								

General Info | Hydrant | Valve | Manhole | Meter | **Fitting** | Cleanout | Pipe | Pumpstation | Well | Property or Easeme

Pipes Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I	J	K	L	M
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Type of Shot	Construction Method	Material	Pressure Class	Manufacturer	Comments
2	CSNG-1	C-4	517827.57	1482195.46	78.83	Force Main	Bore & Jack (Casing)		PVC	DR18	Brand A	
3	CSNG-2	C-4	517848.20	1482195.31	78.38	Force Main	Bore & Jack (Casing)		PVC	DR18	Brand A	
4	RW-1	C-7	517731.98	1482237.24	80.42	Reclaimed Water Main	Restraint Joint Limit	Open Cut	DIP	Class 250	Brand B	
5	RW-2	C-7	517732.85	1482338.10	80.94	Reclaimed Water Main	Restraint Joint Limit	Open Cut	DIP	Class 250	Brand B	
6	WM-1	C-9	573309.07	1539372.90	56.10	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
7	WM-2	C-9	573308.75	1539375.00	54.66	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
8	FMDD-1	C-4	504345.94	1488969.20	114.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
9	FMDD-2	C-4	504360.86	1488970.50	112.74	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
10	FMDD-3	C-4	504377.19	1488971.20	106.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
11	FM-9	C-4	504480.47	1488952.90	105.24	Force Main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
12												

General Info | Hydrant | Valve | Manhole | Meter | Fitting | Cleanout | **Pipe** | Pumpstation | Well | Property or Easemen

Easements Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Boundary Corner Type	Comments
2	Corner-1	C-8	463484.59	1511029.72		Pump Station Tract	N.W. CORNER
3	Corner-2	C-8	463523.24	1511040.01		Pump Station Tract	N.E. CORNER
4	Corner-3	C-8	463480.45	1511015.23		Pump Station Tract	S.W. CORNER
5	Corner-4	C-8	463526.97	1511025.49		Pump Station Tract	S.E. CORNER
6						Easement	
7						Property	
8							

Meter | Fitting | Cleanout | Pipe | Pumpstation | Well | **Property or Easement Corner** | Existing OC Utility Crossing | Grease Interceptor

Existing Utility Crossing

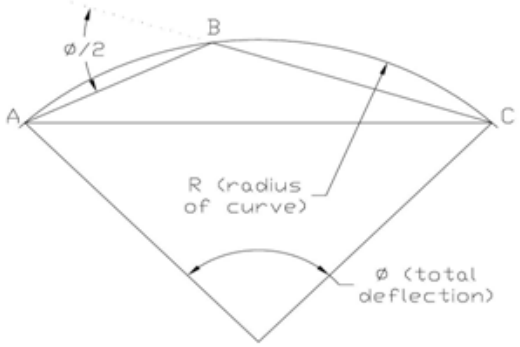
Asset Attribute Table Examples

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Existing Pipe Elevation	Proposed Crossing Elevation	Existing Main Type	Comments
2								
3	CR-02	AT-1	474767.95	1500585.09	98.20	106.20	Force Main	
4	CR-03	AT-1	475239.63	1500596.35	99.10	113.88	Force Main	
5	CR-04	AT-1	475239.61	1500588.49	94.30	112.45	Reclaimed Water Main	
6	Conf-1	C-750	463464.47	1511013.75	100.54	104.88	Water main	
7	Conf-2	C-750	463163.91	1510693.49	98.32	103.57	Storm Main	
8								

Pipe / Pumpstation / Well / Property or Easement Corner / **Existing OC Utility Crossing** / Grease Interceptor

TABLE 01050-3
Pipe Deflection Data EXAMPLE

Project:			
Contractor:			
Progress Mtg Date:			
Contract #			
Dwg Sheet #			
Utility Type		FM	
Pipe Manufacturer		National Pipe	
Pipe size & material		16" PVC C905	
PVC Manufacturer Deflection		6	inches
County Allowable Deflection	75%	4.5	inches
Allowable Angle of Offset		1.5	degrees
Allowable Radius of Curvature		764	feet
Laying Length of Pipe		20	feet



ID	Size and Type	Northing	Easting	Elev.	Calculations Including Elevation (XYZ)						
					Distance between points AB	Distance between points BC	Distance between points AC	Total Deflection Ø'	Radius of Curve**	Average Offset Angle***	Average Offset****
					Length AB	Length BC	Length AC	XYZ (w/ elevation)	XYZ (w/ elevation)	per laying length	per laying length
					ft	ft	ft	degrees	ft	degrees	inches
14041	16" FM	1505131.50	468948.53	107.68	-	-	-	-	-	-	-
7000	16" FM	1505059.60	468932.08	108.15	73.76	38.93	112.66	5.48	1,178.35	0.97	4.07
2128	16" FM	1505022.11	468921.60	108.55	38.93	39.61	78.54	2.29	1,961.65	0.58	2.45
2127	16" FM	1504983.85	468911.35	108.29	39.61	38.35	77.96	1.78	2,505.50	0.46	1.92
2126	16" FM	1504946.67	468901.96	107.81	38.35	39.13	77.42	8.79	505.16	2.27	9.51
2125	16" FM	1504908.11	468895.31	107.48							

Data that has be inputted

Values in yelloware over spec

*Uses law of cosines to determine angle ABC and Ø.
angle ABC = arccos((AB²+BC²-AC²)/(2*AB*BC))
180-Ø/2 = angle ABC
Calculate the total deflection Ø.
to the outer point (A or C) is equal in angle to
the approach from the next point along the

** Uses law of sines, using the chord length AC and radius R.
Since sin((Ø/2)*(PI/180))=(Chord/2)/R and length AC=Chord
R=AC/(2*sin(Ø*PI/360)
This calculation assumes an average radius over the bend between three points.

*** Adds the lengths of AB + BC / 20ft to get an approximate number of bends over the span.
This value is divided by the total deflection
angle to calculate the average bend angle of
This assumes that the bend angle consistent across the entire length.

**** Uses average offset angle and laying length of pipe.

PART 3 - EXECUTION

3.01 SURVEY FIELD WORK

A. Locate, reference, and preserve existing horizontal and vertical control points and property corners shown on the Drawings prior to starting any construction. If the Surveyor performing the work discovers any discrepancies that will affect the Project, the Contractor must immediately report these findings to the City. All survey work shall meet the requirements as defined in Florida Administrative Code 5J-17. Reference and preserve all survey pins/monuments during Construction. If survey pins/monuments are disturbed, it is the responsibility of the Surveyor to reset the pins/monuments at the Contractor's expense. If the monuments are disturbed, any Work that is governed by these monuments shall be held in abeyance until the monuments are reestablished by the Surveyor and approved by the City. The accuracy of all the Contractor's stakes, alignments and grades is the responsibility of the Contractor. However, the City has the discretionary right to check the Contractor's stakes, alignments, and grades at any time. Copies of the Surveyor's field notes and/or electronic files for point replacement shall be provided to the City.

B. The construction layout shall be established from the reference points shown or listed on the Drawings. The accuracy of any method of staking shall be the responsibility of the Contractor. All construction layout staking shall be done such as to provide for easy verification of the Work.

C. The Surveyor shall locate all improvements for the project As-Built Asset Attribute Data using State Plane Coordinates as the horizontal datum and the benchmark referenced on the Drawings as the vertical datum. The City will provide electronic files of the Drawings to be used by the Surveyor.

D. Use survey control points to layout such work tasks including but not limited to:
   1. Clearing, grubbing, work limits, right-of-way lines and easements
   2. Locations for pipelines and all associated structures and appurtenances

E. The Surveyor shall reference and replace any project control points, boundary corners, benchmarks, section corners, and right-of-way monuments that may be lost or destroyed, at no additional cost to the City based on the original survey control.

3.02 SURVEY DOCUMENTS DELIVERABLES

A. All survey documents required under Section 01720 Project Record Documents, Part 2 – Products, paragraphs 2.01 and 2.02.

END OF SECTION

SECTION 01065
PERMITS AND FEES

PART 1 - GENERAL

1.01 REQUIREMENT

A. General
1. Upon Notice of Award, obtain and pay for all appropriate and applicable permits and licenses as provided for in the General Conditions, except as otherwise provided herein.
2. Schedule all inspections and obtain all written approvals of the agencies required by the permits and licenses.
3. Strictly adhere to the specific requirements of the governmental unit(s) or agency(cies) having jurisdiction over the Work. Whenever there is a difference in the requirements of a jurisdictional body and the Contract Documents, the more stringent shall apply.
4. A copy of the permits obtained by the City are furnished in Appendix C "Permits Obtained by City" of these specifications.
5. Unless otherwise specified, the cost of work specified in the various sections of Division 1, will not be paid for separately but the cost therefore shall be considered incidental to and included in the bid prices of the various Contract items.

B. Building Permit, If Applicable (City)
1. The City will pay the general building permit fee and any related impact fees or assessments to be paid to the City for the issuance of that permit only.
2. The Contractor shall pay all fees associated with obtaining City trade permits and any and all inspection fees for the City Building Department providing inspections for this project. The Contractor shall apply for and obtain the building permits from the City and schedule and obtain final approval from the building inspectors.
3. Information on City Building Department fees are available online.
4. The Contractor shall be responsible for scheduling all permit inspections and obtaining inspection approval from the City, as required by the building and sub-discipline construction permits.

C. Construction Dewatering Permit

The Contractor shall apply and pay for all fees associated with obtaining Florida Department of Environmental Protection District Office construction dewatering permits, if required. The Contractor shall provide all materials and equipment to comply with the permit requirements at no additional cost to the City.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Reference to the following standards of any technical society, organization or body shall be construed to mean the latest standard, code or specification or tentative specification adopted and published at the date of advertisement for bids, even though reference has been made to an earlier standard. Such reference is hereby made a part of the Contract the same as if herein repeated in full and in the event of any conflict between any of these specifications, standard codes or tentative specifications and the Contract Documents, the most stringent shall govern.

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	American Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	American Standards Association (now ANSI)
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWBP	American Wood Preservers Board
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute

CS	Commercial Standard
DOT Spec	Standard Specification for Road and Bridge Construction –
FDOT	Florida Department of Transportation
FAC	Florida Administrative Code
FS	Federal Standard
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electrical Code
NECA	National Electrical Contractor's Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Threads
NSF	National Science Foundation
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Structural Steel Painting Council
UL	Underwriter's Laboratories, Inc.
USASI	United States of American Standards Institute (Now ANSI)

UNITS OF MEASUREMENT

CU FT	cubic feet
CU IN	cubic inch(es)
CY	cubic yard(s)
DegC	degree(s) Centigrade
DegF	degree(s) Fahrenheit
F	Fahrenheit
FT	feet, foot
G	gram(s)
GA	gage
GAL	gallon(s)
GPH	gallon(s) per hour
GPM	gallon(s) per minute
GPS	gallon(s) per second

HR	hour(s)
IN	inch(es)
IPS	iron pipe size
KG	kilogram(s)
L	liter(s)
LB	pound(s)
LBF-IN	pound (force) inch
LF	linear foot, linear feet
MIN. min.	minute(s), minimum
ml	milliliter
MO	month(s)
OZ	ounce(s)
QT	quart
RH	relative humidity
SF	square foot, square feet
SQ IN	square inch(es)
YD	yard(s)
YR	year(s)

TERMINOLOGY

@	at
AB	anchor bolt
ADJ	adjust, adjustable
ADMIN	administration
AFG	above finished grade
AGGR	aggregate
AL	aluminum
ALT	alternate
APPX	appendix
APX	approximate
ART	article
ASPH	asphalt
ASSY	assembly
AUTO	automatic
AUX	auxiliary
AVE	avenue
AVG	average
AWG	American Wire Gauge
BAR	barrier
BCCMP	bituminous coated corrugated metal pipe
BL	base line
BLDG	building
BLKG	blocking
BM	beam

C to C	center to center
CCB	concrete block, masonry
CEM	cement
CIP	cast iron pipe, cast in place
CJ	construction joint
CL	center line, clearance
CM	Construction Manager
CMP	corrugated metal pipe
CO	cleanout
CONC	concrete
CONN	connection
CONST	construction
CONT	continuous
CONTR	contractor
CU, COP	copper
ORR	corridor
CRIT	critical
CTD	coated
CTR	center
CULV	culvert
d	delta
DBL	double
DEM	demolition, demolish
DEPT	department
DET	detail
DIA, D	diameter
DIAG	diagonal
DIM	dimension
DWG	drawing
FEM	female
FUT	future
FV	field verify
FM	force main
FH, HYD	fire hydrant
ID	inside diameter
MAS	masonry
MATL	material
MAX	maximum
MFD	manufactured
MFG	manufacturing
MFR	manufacturer
MH	manhole, metal hallide
MIN	minimum
MISC	miscellaneous
MTL	material

NAT	natural
NATL	national
NOM	nominal
NTS	not to scale
OD	outside diameter
PP	power pole
R	radius
Rd	road
REIN	reinforce
REL A	relief air
REQD	required
REV	revision
RR	railroad
R/W	right-of-way
RWM	reclaimed water main
RY	railway
SAN	sanitary
SCH	schedule
SECT	section
SLV	sleeve
SQ	square
SST	stainless steel
ST	street
STA	station
STD	standard
SURF	surface
SUSP	suspend(ed)
SYM	Symbol, symmetrical
SYS	system
TEMP	Temperature, temporary
TYP	typical
UTIL	utility
W	West
WLD	welded
WM	water main
W/O	without
WT	weight
YD	yard
YR	year
Y W	wye

END OF SECTION

SECTION 01091
REFERENCE SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

A. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of or omission from said standards or requirements.

B. Assignment of Specialists: In certain instances, specification test requires (or implies) that specific work is to be assigned to specialist or expert entities who must be engaged for the performance of the Work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work. They are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of Work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all Work specified herein shall conform to or exceed the requirements of such referenced documents which are not in conflict with the requirements of these Specifications or applicable codes.

B. References herein to "Building Code" shall mean the Florida Building Code. The latest edition of the code shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall bid the most stringent requirements.

D. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor participation in pre-construction conferences, progress meetings and specially called meetings.

1.02 MEETINGS CALLED BY THE CITY

A. The City will schedule and administer a pre-construction conference, periodic progress meetings and specific topic meetings throughout the progress of the Work. The City will:
   1. Prepare and distribute a notification of the meeting to required attendees.
   2. Establish, prepare and distribute an agenda with the notification.
   3. Make physical arrangements for the meetings.
   4. Preside at meetings.
   5. Prepare and distribute minutes of meetings including significant proceedings and decisions, within 15 working days after each meeting. Minutes will be forwarded to all participants and to parties affected by decisions made at the meeting.

B. Representatives of the Contractor, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The meeting location will generally be a central site, convenient for all parties, designated by the City.

D. All meetings shall be digitally recorded with files provided to all requesting parties.

1.03 PRE-CONSTRUCTION CONFERENCE

A. Attendance:
   1. City
   2. Contractor and superintendent
   3. Subcontractors as appropriate to the agenda
   4. Representatives of suppliers and manufacturers as appropriate to the agenda
   5. City MBE/WBE representative
   6. Other agency representatives (FDEP, EPA, City, etc.)
   7. Surveyor – recommended but required if Surveyor has not previously performed work for the City
   8. Others as requested by the City or Contractor

B. Suggested Agenda:
   1. Distribution and discussion of:
      a. List of major Subcontractors and suppliers
      b. Construction schedules
      c. Contact information
   2. Organizational arrangement of Contractor's forces and personnel, and those of Subcontractors, material and equipment suppliers, and the City
   3. Critical work sequencing
   4. Major equipment deliveries
   5. Project coordination
      a. Designation of responsible personnel
      b. Channels and procedures for communication
   6. Procedures and processing of:
      a. Field decisions
      b. Proposal requests
      c. Submittals
      d. Change orders
      e. Applications for payment/Schedule of Values
      f. Contractor quality control
      g. Submittal of Shop Drawings, project data and samples
   7. Adequacy of distribution of Contract Documents
   8. Procedures for maintaining as built and record documents
   9. Use of premises:
      a. Office, work and storage areas
      b. City's requirements
      c. Housekeeping
   10. Temporary construction facilities
   11. Temporary utilities
   12. Safety and first aid procedures
   13. Rules and regulations
   14. Security procedures
   15. Place, date and time for regular progress meetings
   16. Completion time for Contract and liquidated damages

1.04 PROGRESS MEETINGS

A. The City shall schedule progress meetings at least once per month as required by progress of the Work with the first meeting approximately one (1) month after the pre-construction meeting.

B. Attendance:
   1. City
   2. Contractor
   3. Subcontractors as appropriate to the agenda
   4. Suppliers as appropriate to the agenda
   5. Others as appropriate

C. The Contractor's representative is to attend the project meetings and have the authority to act on behalf of the entity represented on field related matters. Contractor's representative is to study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics and provide specific information including but not limited to:
   1. Status of submittals and actions necessary to expedite them
   2. Status of activities behind schedule and actions necessary to regain the approved schedule
   3. Status of materials and equipment deliveries and action necessary to expedite materials and equipment and maintain the approved schedule
   4. Status of open RFI's and actions necessary to address them

D. To the maximum extent practicable, the Contractor is to assign the same personnel to represent the Contractor at Progress Meetings throughout the progress of the work.

E. The Contractor is to provide a current Shop Drawing submittal log at each progress meeting.

F. The Contractor is to provide copies of the updated Progress Schedule at each project meeting in accordance with the General Conditions including a 3 week look ahead schedule for upcoming events.

G. Suggested Agenda:
   1. Review and approve minutes from previous meeting
   2. Review of work progress since previous meeting to include current As-Builts
   3. Contractor's/Subcontractor's workforce and equipment
   4. Progressive As-Built Drawings
   5. Surveyor's submittals
   6. Field observations, problems and conflicts
   7. Construction progress and problems which impede construction schedule
   8. Shop Drawing submittal status
   9. Requests for Information (RFI) status
   10. Change Order status
   11. Review of off site fabrication and delivery schedules
   12. Corrective measures and procedures to regain approved schedule
   13. Revisions to construction schedule
   14. Job progress and schedule for succeeding work period
   15. Coordination of schedules
   16. Maintenance of quality standards
   17. Review submittal schedule; expedite as required
   18. Pending requests for information, changes and substitutions
   19. Review proposed changes for effect on construction schedule and completion date
   20. Pay application status
   21. Other business

H. Revision to Minutes:
   1. Unless minutes are challenged, in writing, prior to the next regularly scheduled Progress Meeting, they will be accepted as properly summarizing the discussions and decisions of the meeting.
   2. Persons challenging minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
   3. Challenge to minutes shall be settled as priority portion of "old business" at next regularly scheduled meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. Pre-construction Meeting: At the pre-construction meeting the Contractor shall be provided with a blank electronic version of the spreadsheets for: Asset Attribute Data and Pipe Deflection tables. The Contractor's Surveyor shall use these tables to input the data and shall not alter the table format or formulas.

3.02 CONSTRUCTION PROGRESS MEETINGS

A. Contractor shall provide the following:
   1. Progressive As-Built Drawings
   2. Surveyor submittals
      a. As-Built Asset Attribute Data Table (see Specification Section 01050 "Surveying and Field Engineering" Table 01050-2)
      b. Pipe Deflection Table (see Specification Section 01050 "Surveying and Field Engineering" Table 01050-3)
      c. Gravity Main Table (see Specification Section 01050 "Surveying and Field Engineering" Table 01050-4)
      d. Boundary Surveys of fee simple and permanent easements for pump stations, treatment facilities, and constructed pipe in easements
   3. Construction Contract, As-Built Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents
   4. Specifications and Addenda: Record manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed as well as any changes made by Field Order, Change Order or other
   5. Change orders, verbal orders, and other modifications to Contract
   6. Written instructions by the City as well as correspondence related to Requests for Information (RFIs).
   7. Accepted Shop Drawings, samples, product data, substitution and "or-equal" requests.
   8. Field test records, inspection certificates, manufacturer certificates and construction photographs.

9. As-Built Asset Attribute Data: Surveyor shall obtain field measurements of vertical and horizontal dimensions of constructed improvements. The monthly submittal shall include the Surveyor's certified statement regarding the constructed improvements being within the specified accuracies as described in Specification Section 01050 "Surveying and Field Engineering", Table 01050-1 Minimum Survey Accuracies or if not, indicating the variances.
10. Gravity Main Table: Surveyor shall prepare and update a Gravity Main Table to include as a minimum the pipe segment identification, pipe lengths, manhole inverts and tops, and slopes for gravity mains. Surveyor shall certify the data entered are correct and indicate if the minimum slopes have not been met.
11. Pipe Deflection Table: Surveyor shall input the type of pipe, pipe manufacturer, PVC manufacturer deflection allowance, allowable angle of offset and radius of curvature, laying length of pipe, and coordinates. Surveyor shall certify the data entered are correct and indicate if the deflection allowance, offset or radius of curvature exceeds the manufacturer's recommendations.

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

Work completed without approved Shop Drawings and/or samples shall be considered installed at the Contractor's risk.

1.01 SHOP DRAWINGS AND DATA

A. Shop Drawings defined in the General Conditions, shall complement design and construction Drawings, and shall contain sufficient detail to clearly define all aspects of the Construction. These Drawings shall be complete and detailed.

B. Contractor and Supplier's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data shall be clearly marked with specification title and numbers to identify pertinent materials, product or models. Delete information which is not applicable to the Work by striking or cross-hatching.

C. If Shop Drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in the letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, the Contractor shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such Drawings have been reviewed.

D. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, verification of conformance with applicable standards or codes, materials of construction and similar descriptive material. Materials and equipment list shall, for each item, give the name and location of the Supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

E. For all equipment furnished, the Contractor shall provide a list including the equipment name and address and telephone number of the Supplier's representative and service company so that service and/or spare parts can be readily obtained.

F. The Contractor will obtain an installation list from suppliers and equipment suppliers who propose to furnish equipment or products for submittal to City/Professional along with the required Shop Drawings. The installation list shall include at least 5 installations where identical equipment has been installed and has been in operation for a period of at least 1-year.

1.02 REVIEW OF SHOP DRAWINGS AND SAMPLES

A. The City /Professional's review of Shop Drawings, Data, and Samples as submitted by the Contractor will be to determine if the items(s) generally conform(s) to the information in the Contract Documents and is/are compatible with the design concept. The City/Professional's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules will be general, and shall not be construed:
   1. As permitting any departure from the Contract Documents
   2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials
   3. As approving departures from details furnished by the City/Professional, except as otherwise provided herein

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract Documents which the City/Professional finds to be in the interest of the City and to be so minor as not to involve a change in Contract Price or Contract Time, the City/Professional may return the reviewed drawings without noting an exception.

D. "Approved As Noted": Contractor shall incorporate City/Professional's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the City/Professional acknowledging the comments and their incorporation into the Shop Drawing.

E. "Amend and Resubmit": Contractor shall resubmit the Shop Drawing to the City/Professional. The resubmittal shall incorporate the City/Professional's comments highlighted on the Shop Drawing.

F. "Rejected": Contractor shall correct, revise and resubmit Shop Drawing for review by City/Professional.

G. Resubmittals will be handled in the same manner as first submittals. For resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by City/Professional on previous submissions. The Contractor shall make any corrections required by the City/Professional.

H. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Drawings or Specifications, the Contractor shall give written notice thereof to the City/Professional.

I. When the Shop Drawings have been completed to the satisfaction of the City/Professional, the Contractor shall carry out the Construction in accordance therewith and shall make no further changes therein except upon written instructions from the City/Professional.

J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the City/Professional, make all submittals in groups containing all associated items for:
   1. Systems
   2. Processes
   3. As indicated in specific Specifications Sections
      All drawings, schematics, manufacturer's product data, certifications, and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interfaces checking.

K. Only the City/Professional shall utilize the color "red" in marking Shop Drawing submittals.

L. Failure to comply with any of the above may result in the rejection of Shop Drawings.

1.03 PRODUCT DATA

A. Submit not less than 6-copies, unless approved by the City/Professional. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information unique to the Work.

1.04 MANUFACTURERS' INSTRUCTIONS

A. When required in an individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing, in quantities specified for product data.

1.05 SAMPLES

A. Submit full range of manufacturers' standard colors, textures and patterns for the City's selection. Submit samples for selection of finishes within 30-days after Award of Contract. All color and finish selections must be submitted by the Contractor in a single submission, properly labeled and identified.

B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.

C. Submit the number of samples specified in the respective Specification section, but no less than two (2). After review one (1) will be retained by the City. Reviewed samples that may be used in the Work are indicated in the Specification Section.

D. Samples shall be delivered to the City as directed. The Contractor shall prepay shipping charges on samples. Materials or equipment for which samples are required shall not be used in the Work until approved by the City/Professional.

E. Samples shall be of sufficient size to clearly illustrate:
   1. Functional characteristics of the product, with integrally related parts and attachment devices
   2. Full range of color, texture and pattern
   3. Each sample shall have a label indicating:
      a. Name of Project
      b. Name of Contractor and Subcontractor
      c. Material or equipment represented
      d. Place of origin
      e. Name of product and brand (if any)
      f. Location in Project
      g. Specification title and number
      h. Submittal number
      i. Note: Samples of finished materials shall have additional marking that will identify them under the finished schedules.

F. The Contractor shall prepare a transmittal letter, in triplicate (3) for each shipment of samples containing the information required in paragraph herein. The Contractor shall enclose a copy of this letter with the shipment and send a copy of this letter to the City/Professional. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

G. Approved samples not destroyed in testing shall be sent to the City or stored at the site of the Work. Approved samples of the hardware in good condition may be incorporated in the Work if requested in writing by the Contractor and approved in writing by the City/Professional. Samples that failed testing or were not approved will be returned to the Contractor at the Contractor's expense, if so requested at time of submission.

1.06 FIELD SAMPLES

A. Provide field samples of finishes as required by individual Specifications sections. Install the sample completely and finished. Acceptable samples in place may be retained in completed Work.

1.07 DRAWINGS, PRODUCT DATA AND CERTIFICATES

A. Each letter of transmittal shall identify each and every item transmitted by title, drawing number, revision number and date.

B. The City generally will not check dimensions, quantities or schedules, except in cases where the information is lacking in the Specifications.

C. The following is applicable to submitted drawings, data and certificates:
   1. Show relation to adjacent structures or materials.
   2. Clearly identify field dimensions.
   3. Show required dimensions and clearances.
   4. Performance characteristic and capabilities shall accompany original Shop Drawing submittals.
   5. Wiring diagrams and controls shall accompany original Shop Drawing submittals.
   6. Installation instructions shall accompany original Shop Drawing submittals.
   7. Each submittal shall identify applicable Standards, such as ASTM number or Federal Specification number.
   8. All information not pertinent shall be removed from the submittal, or shall be crossed out.

D. When resubmission is required, the City/Professional will return only two (2) marked up copies. A third submission from the same manufacturer will not be accepted.

1.08 SUBSTITUTIONS

A. The substitution requirements of this Section are in addition to the requirements of the General Conditions and Supplementary Conditions.

B. When a particular product is specified or called for, it is intended and shall be understood that the proposal tendered by the Bidder includes those products in his Bid. Substitutions will only be considered in cases where original materials are unavailable or in an instance where substitute can be proven superior in its planned application

C. The intent of these specifications is to provide the City with a quality facility without discouraging competitive bidding. For products specified only by reference standards, performance and descriptive methods, without naming manufacturer's products, the Contractor may provide the products of any manufacturer complying with the Contract Documents, subject to the review of product data by the City/Professional as specified herein.

D. The City/Professional's approval is required for substitutions.

E. The Contract is based on the materials, equipment and methods described in the Contract Documents.

F. The City/Professional will consider proposals for substitution of materials equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by the City/Professional to evaluate the proposed substitution.

G. Do not substitute materials, equipment or methods unless such substitution has been specifically approved for this Work by the City/Professional in writing. The Contractor must provide a submittal per this Section specifically requesting approval of the substitution. Failure to specifically identify the requested substitution may invalidate approval of a submittal.

1.09 AVAILABILITY OF SPECIFIED ITEMS

A. Verify prior to bidding that all specified items will be available in time for installation during Construction for orderly and timely progress of the Work.

B. In the event that specified items will not be available, notify the City/Professional prior to receipt of proposals.

1.10 OPERATING MANUALS

A. Submit all manuals in accordance with requirements of Divisions 2 through 16 of the Contract Specifications and Section 01700 "Project Closeout."

1.11 WARRANTIES, GUARANTEES AND BONDS

A. Provide as required by Technical Sections of the Specifications and Sections 01700 "Project Closeout" and Section 01740 "Warranties and Bonds."

1.12 CADD FILES

A. The Professional's CADD files will be available on a limited basis to qualified firms at the City’s prerogative. The procedure for requesting such files is noted elsewhere in these documents and there is a cost associated with handling and reproduction. Recipients are cautioned that these files may not accurately show actual conditions as constructed. Users are responsible to verify actual field conditions.

B. The Professional’s Drawings are to be used only for background information. If the Professional’s Drawings are just reproduced and resubmitted (e.g. for ductwork drawings) they will be rejected.

C. Copies of data furnished by the City/Professional to Contractor or Contractor to City/Professional that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

D. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60-days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

E. When transferring documents in electronic media format, the transferring party makes no representations as to long-term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

1.13 PROGRESS PHOTOGRAPHS

A. Photographs and digital pictures shall be in color. Provide 1 copy of each digital picture on each of three (3) CDs and provide 1 print of each photograph in two (2) separate albums.

B. Photographs shall be from locations to illustrate the condition of Construction and state of progress adequately.

C. Provide up to 12 digital photographs of views randomly selected by the City, taken prior to any construction and prior to each scheduled Application for Payment.

D. Deliver electronic images, prints, and negatives to the City.

E. Each print shall be single weight paper with glossy finish and the overall dimension shall be 7-1/2-inch x 10-inches (19.05 x 25.4 cm). The print shall be clear, sharp and free of distortion after the enlargement from the negative.

F. Provide loose-leaf albums for each set of photographs to hold prints with a maximum of 50-leaves per binder.

G. Each print shall be protected by flexible, transparent acetate or plastic sheet protector leaves with metal reinforced holes. Two (2) extra leaves shall be provided in each binder.

H. Capture and provide digital, ortho-rectified, true-color, aerial photographs of the complete project site prior to start of Construction and at final completion. A final 6-inch or less ground pixel resolution is required. If using traditional photography, the photos will need to be captured at an appropriate scale and scanned at a high enough dpi to yield a final ground pixel size of 6-inches or less. If captured digitally, a final 6-inches or less ground sample distance is required. The final orthorectified photos shall use a projection of NAD 27, State Plane West and all vertical reference shall be NAVD 88, US feet. All orthophoto mosaics shall meet a final accuracy of plus or minus 5-feet.

I. Provide a total of four (4) true-color, color balanced orthophoto mosaic prints. Three (3) prints each of the pre and post construction (final completion) orthophoto mosaics, for a total of six (6). Each orthophoto mosaic print shall be on double-weight paper with glossy finish and shall have overall dimensions of 36-inches x 58-inches. Two (2) copies of each of the digital orthophoto mosaics shall be supplied in Geotiff format on disk for each time period (pre and post construction). The final color balanced, true-color orthophoto mosaics will be projected in NAD 27, State Plane West and all vertical reference shall be NAVD 88, US feet and shall meet a final accuracy of plus or minus 5-feet.

J. The Contractor shall provide before and after photographs of each portion of the site. The below ground facilities shall include all equipment, walls, floor, piping, supports and entrance. At major locations, photographs shall include before, during, and after prints and all prints shall be placed in binders in ascending date order to show the Work as it progresses.

K. Descriptive Information:
   1. Each photograph shall have a permanent title block on the back and shall contain the typed information and arrangement as follows:
      a. CITY, FLORIDA
      b. (ENTER PROJECT NAME)
      c. BID No. (Enter Bid Number)
      d. CONTRACTOR: (Name of Contractor)
      e. DATE: (When photo was taken)
      f. PHOTO NO.: (Consecutive Numbers)
      g. PHOTO BY: (Firm Name of Photographer)
      h. LOCATION: (Description of Location and View)
   2. The Contractor shall provide the Professional with a written description of each photograph. This description shall be included in the binders and a copy shall be submitted with the CDs.

1.14 PROJECT RECORD DOCUMENTS

Project Record Documents shall be submitted in accordance with Section 01720 "Project Record Documents" of these specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURES

A. Article 9 of the General Conditions contains additional provisions regarding submittals.

B. Preliminary Shop Drawing Data: Within 20-days after the Award of the Contract or before the Pre-Construction Meeting, the Contractor shall submit to the City/Professional a complete listing of manufacturers for all items for which Shop Drawings are to be submitted.

C. Shop Drawing Submittal Schedule: Within 30-days after the Notice to Proceed, the Contractor shall submit to the City/Professional a complete schedule of Shop Drawings submittals with the respective dates for submission, the beginning of manufacture, testing and installation of materials, supplies and equipment, noting those submittals critical to the progress schedule.

D. Submittal Log: An accurate updated log of submittals will be maintained by the Contractor and subject to review by the City/Professional at each scheduled progress meeting.

E. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Contract Drawings or specifications, the Contractor shall give written notice thereof to the City/Professional. This does not constitute a change order until accepted by the City.

F. Shop Drawing and submittal data shall be reviewed by the City/Professional for each original submittal and first resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor. The Contractor shall reimburse the City for services rendered by the City/Professional at the rate multiplied by the City's Professional multiplier based on the fee schedule provided to the City for this Project. If a City engineer is performing any portion of the review, this fee is based upon the hourly rate of the engineer times the City's multiplier for overhead, benefits, and expenses. The Contractor agrees that the City shall deduct such charges from the Contract Amount by a deductive Change Order.

G. Contractor Shop Drawing and Sample submittals shall include 5 copies in addition to any other copies that the Contractor wants returned. The City will retain 5 copies of approved submittals.

H. Identify Project, Project Number, date, dates of previous submittals, Contractor, Sub-Contractors, suppliers with their addresses, pertinent Drawings by sheet and detail number, and Specification Section number, as appropriate. Identify all deviations from the Contract Documents. Provide space for Contractor and Professional review stamps.

I. Contractor's delivery of Shop Drawings for review shall follow a reasonable sequence, as is necessary to support the dates on the Progress Schedule and avoid an overload of Shop Drawings awaiting review at any one time. Coordinate submittal of related items.

J. Submit Shop Drawings per the schedule of Shop Drawing submittals, inserted in 1 loose-leaf binder, with tabs and index to the City/Professional. All individual submittal sheets inserted in said binder must be clearly marked and referenced to proper paragraph and subparagraph of specifications. Cross out any items on sheets which constitute information not pertaining to equipment specified. Clearly mark all components that are provided as "optional" by manufacturer. Shop Drawings shall be approved by the Contractor prior to submittal to the City/Professional. Shop Drawings will be reviewed by the City/Professional. After City/Professional approval, reproduce and distribute in accordance with requirements herein.

K. All submissions of Shop Drawings, brochures and catalog cuts shall be accompanied by a transmittal letter listing the Drawings submitted by number and title.

L. When engineering calculations and/or professional certification of performance criteria of materials, systems, and/or equipment are required, the City is entitled to rely upon the accuracy and completeness of such calculations and certifications submitted by the Contractor. Calculations, when required, shall be submitted in a neat, clear and in an easy to follow format. Such calculations and/or certifications shall be signed and sealed by a Professional Engineer registered in the State of Florida.

M. Distribute copies of reviewed submittals to concerned parties. Instruct recipients to promptly report any inability to comply with provisions.

N. Prior to submission of Shop Drawings and samples, the Contractor shall stamp and sign the submittals. Any submission which, upon examination by the City, shows evidence of not having been thoroughly checked, or is not in compliance with the provisions of this Section will be returned to the Contractor for completion before it will be considered for review.

O. Notify the City of the need for making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the material or equipment Contactor proposes to supply.

P. On resubmittals, direct specific attention in writing or on the revised Drawings or sample to revisions other than the corrections required by City on previous submissions.

Q. All drawings, schematics, manufacturer’s product data, certifications and other drawing submittals required for a system specification shall be submitted at one time as a package to facilitate interface checking.

R. The City will distribute Shop Drawings as follows for the indicated action taken:

SHOP DRAWING SUBMITTAL DISTRIBUTION

Representative Party	No Exception Taken or Make Correction Noted			Rejected or Revise & Resubmit		
	Submittal Transmittal	Shop Drawing	Review Comment Sheet	Submittal Transmittal	Shop Drawing	Review Comment Sheet
Engineer	2 Copies	File Copy	1 Copy	Original	File Copy	1 Copy
Contractor (see Note 1)	2 Copies	1 Copy Each Submittal	1 Copy	1 Copy	All Copies Except Engineers	1 Copy
City	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
Inspector	2 Copies	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
Project Record Data (see Note 2)	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy

NOTES:
1. Contractor shall distribute additional copies to Subcontractors as required.
2. Stored by Contractor to be furnished to City upon closeout.

S. All Shop Drawings shall be accompanied with a transmittal letter providing the following information:
   1. Project Title and Contract Number
   2. Date
   3. Contractor's name and address
   4. The number of each Shop Drawing, project data, and sample required
   5. Notification of Deviations from Contract Documents
   6. Submittal Log Number conforming to specification section numbers
      a. Submit each specification section separately.
      b. Identify each Shop Drawing item required under respective specification section.
      c. Identify resubmittal using specification section followed by A (first resubmittal), B (second resubmittal)…etc.

3.02 CONTRACTOR'S REVIEW

A. Contractor's Responsibility for Coordination: Where the dimension, size, shape, location, capacity or other characteristic affects another item, and where the Contractor selects, fabricates or installs related or adjacent products to be used, the Contractor shall be responsible for coordination of related items. The Contractor shall insure that a proper exchange of information takes place prior to or during preparation of each submittal and that submittals reflect such coordination. The notation "verify" or "coordinate" on the Drawings indicates the necessity for Contractor coordination in the particular instances used.

B. Contractor’s Checking: When checking submittals from Subcontractors and suppliers, the Contractor shall mark all sets, indicating his corrections and comments in blue or green. Copies marked in red may be returned for revision.

C. The Contractor is responsible to deliver and pick-up all submittals in a timely manner at the City/Professional's designated office. The Contractor is responsible for all related costs and expenses for the transmittal of such submittals.

3.03 CITY’S / PROFESSIONAL’S REVIEW

A. Corrections or comments made on Shop Drawings during review do not relieve the Contractor from compliance with the requirements of Drawings and Specifications. This check is only for review of general conformance with the design concept of this Project and general compliance with information given in Contract Documents. Any substitutions or changes shall be properly noted.

B. No action will be taken on "rough-in" Shop Drawings for plumbing and electrical connections when the items of equipment are not included in the same submittal.

C. Review Time:
   1. On a normal basis, each submittal will be returned to the Contractor within 15 working days of the date it is received. Some submittals may require additional time.
   2. If, for any reason, the above schedule cannot be met, the Contractor will be so informed within a reasonable period and the Schedule of Submittals revised. If the specific submittal affects the critical path, the Contractor shall immediately notify the City/Professional in writing. In the event of separate submittals of individual components of a system, these submittals may be held until all components of the system are submitted, and the Contractor will be so notified.

END OF SECTION

SECTION 01301
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. General
   1. Base all bids on materials and equipment specified in the Appendix D City Utilities List of Approved Products.
   2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers.
      a. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog numbers, provided said products are "or-equals," as determined by City/Professional.
   3. Other types of equipment and kinds of material may be acceptable substitutions under the following conditions:
      a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,
      b. Contractor proposes a cost and/or time reduction incentive to the Owner.

1.02 QUALITY ASSURANCE

A. In making request for substitution or in using an approved product, Contractor:
   1. Has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform the function for which it is intended.
   2. Will provide same guarantee for substitute item as for product specified.
   3. Waives all claims for additional costs related to substitution which subsequently arise.

1.03 DEFINITIONS

A. Product: Manufactured material or equipment.

1.04 PROCEDURE FOR REQUESTING SUBSTITUTION

A. Substitution shall be considered only:
   1. After award of Contract
   2. Under the conditions stated herein

B. Written request through Contractor only.

C. Transmittal Mechanics
   1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification Section 01300 "Submittals."
      a. Product substitution will include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in Paragraph D below.

D. Transmittal Contents
   1. Product identification:
      a. Manufacturer's name
      b. Telephone number and representative contact name
      c. Specification Section or Drawing reference of originally specified product, including discrete name or tag number assigned to original product in the Contract Documents.
   2. Manufacturer's literature clearly marked to show compliance of proposed product with Contract Documents.
   3. Itemized comparison of original and proposed product addressing product characteristics including but not necessarily limited to:
      a. Size
      b. Composition or materials of construction
      c. Weight
      d. Electrical or mechanical requirements
   4. Product experience
      a. Location of past projects utilizing product.
      b. Name and telephone number of persons associated with referenced projects knowledgeable concerning proposed product.
      c. Available field data and reports associated with proposed product.
   5. Data relating to changes in construction schedule.
   6. Data relating to changes in cost.
   7. Samples
      a. At request of City/Professional.
      b. Full size if requested by City/Professional.
      c. Held until substantial completion.
      d. City/Professional is not responsible for loss or damage to samples.

1.05 APPROVAL OR REJECTION

A. Written approval or rejection of substitution to be given by the Engineer.

B. Engineer reserves the right to require proposed product to comply with color and pattern of specified product if necessary to secure design intent.

C. In the event the substitution is approved, the resulting cost and/or time reduction will be documented by Change Order in accordance with the General Conditions.

D. Substitution will be rejected if:
   1. Submittal is not through the Contractor with his stamp of approval.
   2. Request is not made in accordance with this Specification Section.

3. In the City/Professional's opinion, acceptance will require substantial revision of the original design.
4. In the City/Professional's opinion, substitution will not perform adequately the function consistent with the design intent.

E. Contractor shall reimburse the City for the cost of the evaluation whether or not substitution is approved.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01310
PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 REQUIREMENT

A. The Contractor will submit precedence method cost loaded Critical Path Method (CPM) Progress Schedules to the City depicting the approach to prosecution and completion of the Work. This requirement includes, but is not limited to the Contractor's approach to Activity cost loading, recovering schedule and managing the effect of changes, substitutions and Delays on Work sequencing.

B. The Progress Schedule shall show how the Contractor's priorities and sequencing for the Work (or Work remaining) conform to the Contract requirements and the sequences of Work indicated in or required by the Contract Documents; reflect how the Contractor anticipates foreseeable events, site conditions and all other general, local and prevailing conditions that may affect cost, progress, schedule, furnishing and performance of the Work; and show how the Contractor's Means and Methods translate into Activities and logic.

C. The Progress Schedule will consist of the Initial Submittal, Payment Submittals and Revision Submittals. Upon acceptance by the City, the Initial submittal will become the As-Planned Schedule for the Work. Revision submittals upon acceptance will become the As-Planned Schedule for the Work remaining to be completed as of the submittal date for that Revision.

D. References to the Critical Path Method (CPM) are to CPM construction industry standards that are consistent with the requirements of this Section.

1.02 GLOSSARY OF TERMS

A. The following terms, whether or not already defined elsewhere in the Contract Documents, have the following intent and meanings within this Section:
   1. Activity Value (Value): That portion of the Contract Price representing an appropriate level of payment for the part of the Work designated by the Activity.
   2. As-Planned Schedule: The first, complete Initial Progress Schedule submitted by the Contractor with the intent to depict the entire Work as awarded and accepted by the City or returned as no resubmittal required.
   3. Contract Float: Days between the Contractors anticipated date for completion of the Work, or of a specified portion of the Work, if any, and the corresponding Contract Time.

4. CPM Schedule: The Progress Schedule based on the Critical Path Method (CPM) of scheduling. The term Critical Path means any continuous sequence of Activities in the Progress Schedule controlling, because of their sum duration, the Early Date of a pertinent, specified Contract Time.
5. Early/Late Dates: Early/late times of performance, based on CPM calculations, for an Activity in the Progress Schedule. Early Dates will be based on proceeding with all or part of the Work on the date when the corresponding Contract Time commences to run. Late Dates will be based on completing all or part of the Work on the corresponding Contract Time, even if the Contractor plans early completion.
6. Milestones: Key, pre-determined points of progress in the completion of a facility, denoting interim targets in support of the Contract Times. Milestones may pinpoint targets for key excavation and substructure events, significant deliveries, critical path transition from superstructure to piping and electrical rough in and building enclosure. Also, hook-up of mechanical and electrical equipment, availability of power for testing, equipment shakedown, training of City personnel, start□-up, Substantial Completion and other events of like import.
7. Official Schedule: The Initial or most recent Revision Submittal accepted by the City or returned as no resubmittal required and the basis for Payment Submittals until another Revision Submittal is submitted and accepted. The accepted Initial Submittal is also the As-Planned Schedule.
8. Payment Submittal: A monthly Progress Schedule update reflecting progress and minor adjustments on the Activities, sequencing and restraints for Work remaining.
9. Total Float: Days by which an activity may slip from its Early Dates without necessarily extending a pertinent Contract Time. Total Float at least equals Contract Float. Total Float may also be calculated and reported in working Days. When an activity is delayed beyond Early Dates by its Total Float it becomes a Critical Path activity and if delayed further will impact a Contract Time.

1.03 QUALITY ASSURANCE

A. The Contractor may self-perform the Work covered by this Section or employ a Subcontractor, subject to the City's consent. Employment of a scheduling Subcontractor shall not in any way alter or reduce the Contractor's obligations under the Contract Documents.

B. The Contractor will obtain a written interpretation from the City, if the Contractor believes that the selection of activities, logic ties and/or restraints requires a written interpretation of the Contract Documents. With each submission, the Contractor will point out by specific, written notation, any Progress Schedule feature that may reflect variations from any requirements of the Contract Documents.

C. It is the Contractor's responsibility to obtain information directly from each Subcontractor and Supplier when scoping their respective Activities, Values, logic ties and restraints.

D. Neither Acceptance nor Review of any Progress Schedule will relieve the Contractor from the obligation to comply with the Contract Times and any sequence of Work indicated in or required by the Contract Documents and to complete, within the Contract Times, any Work omitted from that Progress Schedule.

E. Neither Acceptance nor Review of any Progress Schedule will imply approval of any interpretation of or variation from the Contract Documents, unless expressly approved by the City through a written interpretation or by a separate, written notation on the returned Progress Schedule Submittal.

1.04 MILESTONES AND SCHEDULE RECOVERY

A. The City will select Milestones and Milestone Dates on the basis of the As-Planned Schedule. As the Official Schedule is revised, Milestone Dates will be revised accordingly. Milestone Dates will serve as target dates.

B. Whenever any Activity slips by 14 or more Days from the Late Date for an activity in the Official Schedule, Milestone Dates selected by the City, or a pertinent Contract Time, the Contractor will deliver a Revision Submittal documenting the Contractor's schedule recovery plan and/or a properly supported request for an extension in the Contract Time. The narrative will identify the Delay and actions taken by the Contractor to recover schedule, whether by adding labor, Subcontractors or construction equipment, activity re-sequencing, expediting of submittals and/or deliveries, overtime or shift Work, and so forth. Activity shortening and overlapping shall be explained as to their basis (and be supported by increases in resources).

C. Upon evaluation of that Revision Submittal, if the City determines there is sufficient cause, the City may withhold liquidated damages or provide a notice of intent to do so, if schedule is indeed not recovered, and/or may give a notice of default.

1.05 PROGRESS SCHEDULE SOFTWARE

A. The scheduling software employed by the Contractor to process the Progress Schedule will be the current version of Primavera P6.0®, or Primavera® Contractor 5.0 CPM scheduling software.

B. If the Contractor intends to use companion schedule reporting, analysis or graphics software tools, the Contractor will furnish to the City descriptive materials and samples describing such software tools.

1.06 NON-PERFORMANCE

A. The City may refuse to recommend all or any part of any payment, if the Contractor fails, refuses or neglects to provide the required Progress Schedule information on a timely basis. Partial payments without a properly updated Progress Schedule shall be returned to the Contractor as non-conforming.

B. If justified under the circumstances, the City also may prepare alternate Progress Schedules, as appropriate, and deduct from the Contract Amount all related costs by Change Order and/or take other action commensurate with the breach.

1.07 REPORTS, SCHEDULES AND PLOTS

A. Schedule Reports will include Activity (ID) code and description, duration, calendar, Early Dates, Late Dates and Total Float. Separate Schedule Reports will tabulate, for each Activity, all preceding and succeeding logic types and lead times, whether CPM Plots displaying logic ties are appended or not.

B. CPM Schedule Plots will be plotted on a suitable time scale and identify the Contract Times, Critical Paths, phases and work areas on 24-inch x 36-inch or smaller sheets. Activities will be shown on the Early Dates with Total Floats noted by Late Date flags. For Payment and Revision Submittals plot a target comparison based on the current Official Schedule.

C. The Activity Value report will tabulate Activity code and description and Activity Value, percent complete and earned value as calculated by the scheduling software. Cash flow plots shall be provided showing the monthly and cumulative actual and planned earned values with curves shown for Early and Late Dates in the schedules. For Payment and Revision Schedule submittals, the cash flow curves shall also plot the most current Official Schedule planned earnings curves.

D. Each submittal shall include listings of all added and deleted activities, logic, constraints, Activity Value changes and update information vs. the previous Progress Schedule submittal. This list may be manually prepared or generated by accessory software that will generate such listings.

1.08 NARRATIVE REQUIREMENTS

A. The Initial Submittal narrative will describe the Contractor’s approach to prosecution of the Work and the basis for determination of activity durations, sequence and logic, including the Contractor's management of the site, e.g., lay down, staging, parking, etc.; Contractor’s phasing of the Work; use of crewing and construction equipment; identification of non-work City/Professional’s, shifts, weekend Work and multiple calendars applied to activities and an explanation of the basis for restraint dates.

B. Revision and Payment Submittal narratives will explain any changes to the approach or planning referred to in Paragraph A above on account of any change, delay, schedule recovery, substitution and/or Contractor-initiated revision occurring since the previous submittal.

C. Each narrative will list the Critical Path Activities and compare Early and Late Dates against Contract Times and Milestone Dates. Narratives shall also recap progress and Days gained or lost vs. the current Official Schedule, and identify delays, their extent and causes.

D. The Initial Submittal narrative will describe all delays occurring since Contract Award and all pending and anticipated "or equal" and substitution proposals. Payment and Revision Submittal narratives will describe any new delays and shall certify that the Contractor has not been delayed, as of the cut off date, by any acts or omissions of the City, except as otherwise specifically stated.

1.09 ACTIVITY REQUIREMENTS

A. Separate activities will identify permits, design when included in the Work, construction, Submittal preparation and review (and resubmission and re-review), deliveries (site or storage), testing, start-up, commissioning and Punch List.

B. Activities will be detailed to the extent required to show the transition of trade Work. Activities will delineate the progression of the Work.

C. Activities will not combine separate or non-concurrent items of Unit Price or lump sum Work.

D. Activity durations will equal the Work Days required to sufficiently complete the Work designated by the Activity, (i.e., when finish-to-start successors could start, even if the Activity is not quite 100% complete). Installation Activities will last from 10 to 40 workdays. Submittal review activity durations shall conform to specified timeframes.

E. Activities will be assigned consistent descriptions and identification codes. Sort codes will group Activities by meaningful schemes.

F. Activities will be assigned Activity Values as appropriate and needed to reasonably allocate the Contract Amount to the time periods that they will be earned and eligible for payment based on the Progress Schedule and Schedule of Values. Separate pay activities may be used to simplify cost loading of the Progress Schedule. When used, pay activities shall be loaded with the cost of Work that is included, at no cost, in related (generally, concurrent) CPM activities. Pay activities shall not control the rate of progress; however, their start and finish dates shall be consistent with those of their related CPM activities to ensure accurate Early Date and Late Date cash-flow plots.

1.10 FLOAT TOLERANCES AND FLOAT OWNERSHIP

A. Any Progress Schedule with Early Dates after a Contract Time will yield negative Total and Contract Floats, whether shown/calculated or not. Any Revision Submittal with less than negative 20-days of Float will be returned as "Revise and Resubmit," unless a time extension is requested or the City assesses liquidated damages or gives notice of intent to do so, in the event schedule is not recovered.

B. Float calculated from the definitions given in this Section supersede any conflicting Float values in any early completion Progress Schedule.

C. Neither the City nor the Contractor own the Float time, the Project owns the Float time. Neither the City nor the Contractor use of positive Total Float will impact a Contract Completion Date or justify an extension of Contract Time.

1.11 SUBMITTALS

A. Each Progress Schedule Submittal will consist of a narrative, 5 copies of the required reports and plots and an optical ROM data disk with the Contractor's corresponding schedule and schedule layout files in Primavera ".XER" format.

B. The City will review Progress Schedule Submittals and return a review copy within 14-days after receipt and the Contractor shall, if required, resubmit within 7-days after return of the review copy.

C. Requirements for the Initial Submittal:
   1. Within 20-days after receipt of Notice to Proceed and prior to commencing Work on the Project, prepare and submit to the City the Initial Submittal of the Progress Schedule for the Work. The Initial Submittal will show the Work as awarded, without delays, Change Orders or substitutions.
      a. Activity Values will prorate Schedule of Values costs and/or pay items through to Activities. Provide a cross-reference listing with two parts; a part that will list each activity with the respective amounts allocated from each Schedule of Values and Unit Price Item making up the total value of each activity and a second part that will list the Schedule of Values and Unit Price Items with the respective amounts allocated from each activity that make up the total value of each item.
   2. After the As-Planned Schedule is established, the City will select Milestones and record the Milestone Early and Late Dates. As the Official Schedule evolves, Milestone Dates will be revised accordingly.
   3. If the City refuses to endorse the Initial Submittal (or a resubmission) as "Resubmittal Not Required," the As-Planned Schedule will not be established. In that event, the Contractor will continue to submit Payment and Revision Submittals reflecting progress and the Contractor's approach to remaining Work. The City will rely on the available Payment and Revision Submittals, subject to whatever adjustments it determines appropriate.

D. Requirements for Payment Submittals:
   1. Payment Submittals with progress up to the closing date and updated Early Dates and Late Dates for progress and remaining Activities will be due with each Progress Payment. As-built data will consist of actual dates, percent complete, earned payment, changes, Delays and other significant events occurring before the closing date.
   2. Activity percent complete and earned value should indicate a level of completion that corresponds to the Application for Progress Payment for the same period. The earned value should be calculated by the scheduling software as Activity Value times percent complete. Explanation should be provided whenever the cumulative earned value of activities in a Payment Submittal is not within 10% of the value of Work completed as represented in the corresponding Application for Progress for Payment.

3. At the Contractor's option, a Payment Submittal may overlay minor adjustments on activities and sequencing for Work remaining. This excludes Activity re-scoping to reflect Delays, changes, schedule recovery or substitutions.

E. Requirements for Revision Submittals:
   1. Revision Submittals will be submitted when necessary because of major changes or delays affecting activities, sequencing or restraints for Work remaining and/or to put forth a schedule recovery plan. Revision Submittals may also be required because of Contractor-initiated re-planning, or when Contractor plans to perform Work ahead or out-of-sequence that will require additional testing or inspection personnel, or when requested by the City when Work is performed out-of-sequence from the current Official Schedule such that the number of Days gained or lost can not be determined or the scheduled dates of completion of the Work in a Payment Submittal are not viewed as reliable.
   2. If requesting a time extension, the Revision Submittal should show the impact of the delay after incorporating reasonable mitigation to minimize the impact and illustrate how the number of Days requested time extension was determined. The delay should be determined as the change in the forecast Contract Completion Date(s) resulting solely from delays that entitle the Contractor to a time extension as provided in the General Conditions. Any and all Contractor slippage and delay occurring prior to and concurrent with the delay potentially entitling the Contractor to a time extension shall be incorporated in the Revision and explained such that the concurrent and non-concurrent periods of delay are indicated. If the Contractor does not follow the procedures contained in this Section or, if the Contractor's analysis is not verifiable by an independent, objective evaluation by the City using the electronic files and data furnished by the Contractor, any such extension in Contract Time will not be granted.

F. Retrospective Delay Analysis.
   1. If the City/Professional refuses to endorse any Revision Submittal as "Resubmittal Not Required," the Contractor and City will use the latest Official Schedule when evaluating the effect of Delays on Contract Time and/or Contract Price. The procedure to be used will consist of progressively updating the latest Official Schedule at key closing dates corresponding to starting and finishing dates of the delays and/or dates the delays became critical or dates the Critical Path may have changed for other reasons. For each Progress Schedule iteration, slippage between actual Milestone Dates and Initial Milestone Dates will be correlated to Delays occurring solely in that iteration.
   2. For each iteration, revisions in Activities, logic ties and restraints affecting Work after the closing date will be included in that Progress Schedule only if they meet any of the following conditions. First, they are Progress Schedule revisions that the City consented to contemporaneously (i.e., before the closing date) in writing. Second, they reflect comments or objections raised by or on behalf of the City and that were actually confirmed by the as-built progress. Lastly, they represent Contractor's schedule recovery plans or other Progress Schedule revisions that were actually confirmed by the as-built progress.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DEFINITION

A. Schedule of Values: Schedule that divides the Contract Amount into pay items, such that the sum of all pay items equals the Contract Amount for the Work, or for any portion of the Work having a separate specified Contract Amount.

1.02 REQUIREMENT

A. The Schedule of Values established as provided in the General Conditions will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the City. Progress payments on account of Unit Price Work will be based on the number of units completed and shall be prorated by the percent complete on the number of units installed not meeting all requirements of the Contract including testing

B. No payment will be made for Work performed on a lump sum contract or a lump sum item until the appropriate Schedule of Values is approved by the City.

C. The equitable value of Work deleted from a lump sum contract or lump sum item shall be determined from the approved Schedule of Values.

1.03 SUBMITTALS

A. Submit 3 copies of a Preliminary Schedule of Values within 15-days after the recommended award of the Contract.

B. Submit 3 copies of a proposed final Schedule of Values within 20-days after receipt of Notice to Proceed as per the General Conditions.

C. Submit the Schedule of Values, typed, on EJCDC 1910-8-E form or City forms or spreadsheets provided by City. The Contractor's standard form or electronic media printout will be considered for acceptability by the City.

D. List installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar.

E. Coordinate listings with the Progress Schedule.

F. For items on which payments will be requested for stored materials or equipment, list sub-values for cost of stored products with taxes paid and provide corresponding schedule of value item number. Stored materials quantities shall not exceed installed quantities on bid tab or as required by the Contract Documents.

G. Submit a sub-schedule for each separate stage of Work specified in Section 01010 "Summary of Work."

H. The sum of values listed shall equal the total Contract Amount for the Work or the Contract Amount for a part of the Work with a separate Contract Amount provided for by the Contract Documents.

I. When the City requires substantiating information, submit data justifying line item amounts in question.

1.04 UNIT PRICE CONTRACTS

A. For unit price contracts, the bid item prices on the Project Bid Schedule shall be used as the basis for the schedule of values. The Contractor shall resubmit the bid item prices in the format described herein, and may, at its option, or if requested by the City, divide the items in the Project Bid Schedule into sub-items to provide a more detailed basis of payment.

1.05 LUMP SUM CONTRACTS

A. For lump sum contracts, if the Work involves separate facilities, e.g. multiple pump stations, the cost of the Work shall be separated by each facility and into schedule of value items. Break principal subcontract amounts down into these items; The lump sum cost for each facility shall be submitted individually and split into the schedule of values listed in items 1 through 17.
   1. Mobilization/Demobilization at 5% of the base bid for the pump station.
   2. Project Record Documents at 1% of the base bid for the pump station.
   3. Indemnification at $100.00 divided by the number of pump stations in the project.
   4. Demolition of existing pump station
   5. Bypass pumping
   6. Wetwell structure, liner, top slab, hatch covers and appurtenances
   7. Valve vault structure, hatch covers and appurtenances, drain piping and appurtenances
   8. Wetwell (mechanical): 316 stainless steel piping and appurtenances, pumps and base plates
   9. Valve vault (mechanical): piping, valves, and appurtenances
   10. Yard piping, fittings, valves, and appurtenances (outside of structures)
   11. Site work and access drive
   12. Chain link fence and gates
   13. Masonry walls and gates
   14. Odor control equipment, related piping, monitoring equipment, etc.
   15. Generator, fuel storage tank and related piping
   16. Electrical control panel, wiring, and connections
   17. Start-up and testing

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01380
AUDIO – VISUAL DOCUMENTATION

PART 1 - GENERAL

1.01 PURPOSE AND DESCRIPTION OF WORK

A. The purpose of the audio - visual documentation is to provide the City with regularly documented audio - visual records of the Construction process from the existing conditions through final completion.

1.02 PRE-CONSTRUCTION VIDEO REQUIREMENTS INCLUDED

A. The Contractor shall employ a professional videographer to take a Pre-Construction video of the entire site including the areas of adjacent properties within 100-feet of the limits of Work and shall be made within 30-days of Work beginning. Special attention shall be made to show the existing paved roads, shoulders, signs, and other existing features.

B. The Contractor shall submit a quality audio-video recording documenting Pre-Construction field conditions for the entire project. When the Work includes construction of water, wastewater, reuse, or other lines in the vicinity of any street or road, the Contractor shall take digital audio-video recordings of existing conditions along both sides of the street or road. The Pre-Construction video shall be submitted to the City and accepted prior to commencing any Work or using any Contractor laydown areas.

C. Electronic digital photography shall also be used as necessary to record and facilitate resolution of on-site issues through the transmission of electronic photographs by e-mail from the site to the Professional's and City's offices.

PART 2 - PRODUCTS

2.01 AUDIO-VIDEO RECORDING

A. Each audio-video recording shall be saved on appropriate DVD media viewable on standard DVD players or computer.

B. Each DVD shall contain the following information and arrangement at the beginning as a title screen:

City, Florida
PROJECT NAME
PROJECT NUMBER
CONTRACTOR: (Name of Contractor)
DATE: (When photo was taken)
VIDEO BY: (Firm Name of Videographer)
LOCATION: (Description of Location(s) and View(s))

C. Each DVD recording section shall begin with an audio description of the City's name, Contract name and number, Contractor's name, date and location information such as street name, direction of travel, viewing side, etc.

D. Information appearing on the video recording must be continuous and run simultaneously by computer generated transparent digital information. No editing or overlaying of information at a later date will be acceptable.

E. Digital information to appear in the upper left corner shall be as follows:
1. Name of Contractor
2. Day, date and time
3. Name of Project & Specification Number

F. Time must be accurate and continuously displayed on the video record

G. Written documentation must coincide with the information on the DVD so as to make easy retrieval of locations at a later date.

H. The video system shall have the capability to transfer individual frames of video electronically into hard copy prints or photographic negatives.

I. Audio shall be recorded at the same time as the video recording and shall have the same information as on the viewing screen. Special commentary shall be given for unusual conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery, structures, equipment, pavement, etc.

J. All DVDs and boxes shall bear labels with the following information:
1. DVD Number
2. City's Name
3. Date of Recording
4. Project Name and Number
5. Location and Standing Limit of Video

2.02 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall employ a competent photographer to take construction record photographs periodically during the course of the Work.

B. Prints: Date imprinted 8-inch x 10-inch high resolution glossy single weight color print paper; 5 sets, bound in 3-ring binders to be provided to the City with each respective Application for Payment and distributed by the City as follows:
   1. City (2 sets)
   2. Engineer (1 set)
   3. Contractor (1 set)
   4. Project Record Data (1 set stored by Contractor to be furnished to City upon Closeout)

PART 3 - EXECUTION

3.01 VIDEO VIEWS REQUIRED

A. Complete coverage shall include all surface features within 100-feet of the Work area to be used by the Contractor and shall be supported by appropriate audio description made simultaneously with video coverage. Such coverage shall include, but not be limited to, all existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culverts, headwalls, and retaining walls, equipment, structures, pavements, manholes, vaults, handrails, etc. located within the work zone. Video coverage shall extend to the maximum height of all structures within this zone.

B. The video recorder shall take special efforts to point out and provide audio commentary on cracking, breakage, damage, and other defects in existing features.

C. All video recording shall be done during times of good visibility. No video recording shall be done during periods of visible precipitation, or when more than 10% of the ground area is covered with standing water, unless otherwise authorized by City.

D. Prior to commencement of audio-video recording, the Contractor shall notify the City in writing within 48-hours of the audio-video recording. The City may provide a designated representative to accompany and observe all video recording operations. Audio-video recording completed without a City Representative present will be unacceptable unless specifically authorized by the City.

3.02 AUDIO-VIDEO REQUIREMENTS

A. Major Locations:
   1. The Contractor shall provide color digital video of each major facility and structures and facilities adjacent to the Construction before construction starts.
   2. All videos shall be recorded with character generator operating with date, time, and location on screen. During video recording, the Contractor shall narrate video explaining what is being shown. All master videos shall be delivered to the City.

3. The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views of all visible house and business addresses shall be used. In areas where the proposed construction location will not be readily apparent to the video recording viewer, highly visible yellow flags shall be placed, by the Contractor, in such a fashion as to clearly indicate the proposed centerline of Construction. When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed 10-feet. The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.
4. All video recording shall be done during time of good visibility. No video recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.
5. The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size and value of the surface features within that construction area's zone of influence. The rate of speed in the general direction of travel of the vehicle used during taping shall not exceed 44-feet per minute.

3.03 PHOTOGRAPHS

A. A minimum of 3 views (top, upstream, and downstream) each shall generally be taken prior to backfilling pipelines or structures. Photographs shall be provided for:
   1. Utility conflicts/relocations
   2. Manholes
   3. Pump stations
   4. Boring and jacking
   5. Directional drilling pipe entrance and exit
   6. Valve installation
   7. Air release valve installation
   8. Fire hydrant assembly

B. Photo Identification
   1. Name of Project
   2. Name of Structure
   3. Orientation of View
   4. Date & Time of Exposure
   5. Film numbered identification of exposure

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 SITE INVESTIGATION AND CONTROL

A. Contractor shall verify all dimensions in the field and check field conditions continuously during construction. Contractor shall be solely responsible for any inaccuracies built into the Work due to Contractor's failure to comply with this requirement.

B. Contractor shall inspect related and appurtenant Work and report in writing to City any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at Contractor's sole cost and expense.

1.02 INSPECTION OF THE WORK

A. The Work shall be conducted under the general observation of representatives of the City acting on behalf of the City to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The City shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated. Inspection by the City are in addition to the inspections required of Contractor by his QC Representatives.

B. The presence of the City, however, shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the City. Further, no requirement of this Contract may be waived or modified except by change order or formal (written) substitution approval.

C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the City. No Work shall be backfilled, buried, cast in concrete, hidden, or otherwise covered until it has been inspected. Any Work so covered in the absence of inspection shall be subject to uncovering. Where uninspected Work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal, and reconstruction under proper inspection and no additional payment will be allowed therefore.

D. The Contractor is responsible for the Quality of his own work and shall designate a qualified individual, to be approved by the City, who will ensure that all work is performed in strict accordance with the Contract Documents. This quality representative shall inspect the work for the Contractor and provide to the City and the Contractor a report outlining all work accomplished, all inspections, and all testing performed for all days when work is performed. The objective of this report is to provide "Objective Evidence of Compliance" by the Contractor with the requirements of the Contract.

1.03 TIME OF INSPECTION AND TESTS

A. Samples and testing required under these Specifications shall be furnished and prepared in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. Except as otherwise provided in the Contract Documents, performance of the required tests will be by the Contractor and all costs therefore will be borne by the Contractor at no cost to the City. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover any Work under this Contract, the City shall be notified not less than 24-hours in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the City at least 24-hours in advance of any such inspections shall be reasonable cause for the City to order a sufficient delay in the Contractor's schedule to allow time for such inspection, any remedial, or corrective work required, and all costs of such delays, including its impact on other portions of the Work, shall be borne by the Contractor.

1.04 SAMPLING AND TESTING

A. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered. However, the City reserves the right to use any generally accepted system of inspection which, in the opinion of the City, will ensure the City that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief form the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the City shall reserve the right to make independent investigations and tests as specified in the following paragraph and, upon failure of any portion of the Work to meet any of the qualitative requirements of the Contract Documents, shall be reasonable cause for the City to require the removal or correction and reconstruction of any such Work.

D. In addition to any other inspection or quality assurance provisions that may be specified, the City shall have the right to independently select, test, and analyze, at the expense of the City, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed provided that wherever any portion of the Work is discovered, as a result of such independent testing or investigation by the City which fails to meet the requirements of the Contract Documents, all costs of such independent inspection and investigation and all costs of removal, correction, reconstruction, or repair of any such Work shall be borne by the Contractor.

1.05 RIGHT OF REJECTION

A. The City shall have the right at all times and places to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the City or inspector, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such material, no matter in what stage or condition of manufacture, delivery, or erection, may be rejected by City.

B. Contractor shall promptly remove rejected articles or materials from the site of the Work after notification or rejection.

C. All costs of removal and replacement of rejected articles or materials, as specified herein, shall be borne by the Contractor.

D. If the Contractor fails to remove or replace defective work after notification to do so, the City may have the work removed and replaced by others and deduct all costs from the Contractor's pay requests.

1.06 TESTING LABS

A. All geotechnical testing laboratory services for field testing will be paid by the City. The lab(s) shall function as independent lab(s) and report independently to the City and the Contractor. The test lab(s) may not approve or allow any deviation from the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:
   1. City will employ and pay for services of an Independent Testing Laboratory to perform Testing specifically indicated on the Contract Documents or specified in the Specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
   2. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
   3. Employment of laboratory by City shall in no way relieve Contractor's obligations to perform the Work.

B. Related Requirements Described Elsewhere:
   1. Conditions of the Contract.
   2. Respective section of Specifications: Certification of products.
   3. Each Specification section listed: Laboratory tests required and standards for testing.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with City's personnel; provide access to work and manufacturer's operations.

B. Secure and deliver to the City adequate representational samples of materials proposed to be used and which require testing.

C. Provide to the City the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.

D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. The City may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the City shall be allowed on account of such testing and certification.

E. Contractor shall not have direct contact with laboratory or laboratory personnel. All testing shall be coordinated through City.

F. Furnish incidental labor and facilities:
   1. To provide access to work to be tested.
   2. To obtain and handle samples at the Project site or at the source of the product to be tested.
   3. To facilitate inspections and tests.
   4. For storage and curing of test samples.

G. Notify City sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse City for laboratory personnel and travel expenses incurred.. The following field testing schedule summarizes the responsibilities of various tests that may be required by the Contract Documents.

TEST	**NOTES**	**PAID FOR**
Soil Compaction	A. Pipe Work: Every 300 ft. at each lift of compaction B. Structures: As a minimum one test per 2000 SF of fill area per lift, or at least 2 tests per structure, per lift. As specified in material specifications sections	City
Low Pressure Air Exfiltration	Each section of gravity sewer pipe between manholes or lift station	Contractor
Hydrostatic Pressure	All segments of pressure piping (24-hour test).	Contractor
Hydrostatic Leakage	All segments of pressure piping (2-hour test).	Contractor
Bacteriological	As required by local and state agencies	City
Asphaltic Concrete Paving	As required by City	City
LBR	Each 600 SY of pavement	City
Concrete	Slump test each delivery, cylinders every 20 CY	City
Asbestos	Environmental testing of materials	City
All Other Testing	As specified in various sections of the Project Manual	As Indicated

H. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience.

I. If the test results indicate the material or equipment complies with the Contract Documents, the City shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the Contractor shall pay for the laboratory costs directly to the City or the total costs shall be deducted from any payments due to the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01560
EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as necessary to protect the Work and prevent sedimentation from the Contractor's activities from entering water bodies or enter other parts of the City's or other property owners sites outside the Construction limits.

B. Temporary erosion controls include, but are not limited to; grassing, mulching, netting, watering and reseeding on-site surfaces and soil and borrow area surfaces, and providing interceptor ditches at end of berms and at those locations which will ensure that erosion during Construction will be either eliminated or maintained within acceptable limits as established by the regulatory agencies having jurisdiction.

C. Temporary sedimentation controls include, but are not limited to; silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the regulatory agencies having jurisdiction.

1.02 REQUIREMENTS

A. The Contractor is responsible for providing effective temporary erosion and sediment control measures during Construction or until final controls become effective.

B. The Contractor shall be responsible for filing Notice of Intent for Construction Activities with regulatory agencies (SJRWMD, SFWMD, and FDEP) as required by law, if thresholds are expected to be exceeded.

C. The areas of unstabilized soil cover shall be minimized at all times to limit erosion and sedimentation.

1.03 SUBMITTALS

A. The Contractor shall prepare and submit an Erosion and Sedimentation Control Plan (Stormwater Pollution Prevention Plan) for City review and approval. The Plan shall be in effect throughout the Construction duration.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

A. Seed: Scarified Argentine Bahia.

B. Sod: Bermuda grass, Argentine Bahia grass, Pensacola Bahia grass or St. Augustine. Grassing and Sodding Materials: As specified in Section 981 FDOT Specification for Road & Bridge Construction.

C. Netting: Polypropylene mesh netting 5/8-inch x 3/4-inch (16 x 19mm) mesh with interwoven curlex fibers as manufactured by American Excelsior Company or equal. Netting: Fabricated of material in conformance with Section 985 FDOT Specification for Road & Bridge Construction.

2.02 SEDIMENTATION CONTROL

A. Bales: Clean, synthetic hay type. Minimum dimensions of 14-inch by 18-inch by 36-inches at the time of placement.

B. Netting: Fabricated of material in conformance with Section 985 FDOT Specification for Road & Bridge Construction.

C. Sediment Control Fencing (Silt Fencing): As manufactured by American Excelsior Company or equal.

D. Filter stone: Crushed stone conforming to Florida Department of Transportation Specifications.

E. Concrete block: Hollow, non-load bearing type.

F. Concrete: Exterior grade not less than 1-inch thick.

G. Turbidity Barriers: Floating or staked as required.

PART 3 - EXECUTION

3.01 TEMPORARY EROSION CONTROL

A. See Section 02578 "Solid Sodding."

3.02 SEDIMENTATION CONTROL

A. Install and maintain silt fences and dams, traps, barriers, and appurtenances as shown on the approved descriptions and working Drawings. Replace deteriorated hay bales and dislodged filter stone. Repair portions of any devices damaged at no additional expense to the City.

B. Install all sediment control devices in a timely manner to ensure the control of sediment. At sites where exposure to sensitive areas is likely, complete installation of all sediment control devices before starting earthwork.

C. Use approved temporary erosion control features to correct conditions that develop during Construction that were not foreseen when the Erosion and Sedimentation Control Plan was first approved.

3.03 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results that comply with the requirements of the Regulatory agency having jurisdiction, the City or the Professional, the Contractor shall immediately take whatever steps necessary to correct the deficiency at its own expense to protect the Work and any adjacent property to the site, as well as to prevent contamination of any river, stream, lake, tidal waters, reservoir, canal or other water impoundments.

B. The side slope areas with unstabilized or unprotected soil cover shall be minimized at all times to limit erosion and sedimentation.

C. Incorporate permanent erosion control features into the Project at the earliest practical time.

D. Remove temporary erosion and sedimentation controls when the Work is complete and in accordance with the Erosion and Sedimentation Control Plan (Stormwater Pollution Prevention Plan) and the Notice of Intent for Construction Activities filed with regulatory agencies.

3.04 MAINTENANCE OF EROSION AND CONTROL FEATURES

A. Provide routine maintenance of permanent and temporary erosion control features, at no expense to the City, until the Project is complete and accepted.

END OF SECTION

SECTION 01570
MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes identifying safety hazards and then furnishing all necessary labor, materials, tools, and equipment including, but not limited, to signs, barricades, traffic drums, cones, flashers, construction fencing, flag persons, variable message boards, uniformed police officers, warning devices, temporary pavement markings, temporary sidewalk, delineators, etc., to maintain vehicular and pedestrian traffic through and adjacent to the project area. These measures and actions shall be taken to safely maintain the accessibility of public and construction traffic by preventing potential construction hazards. All materials, work and incidental costs related to Maintenance of Traffic will be paid for at the contract lump sum price.

1.02 REQUIREMENTS

A. The Traffic Control Plan shall conform to the following standards:
   1. Standard Specifications for Road and Bridge Construction, latest edition including all subsequent supplements issued by the Florida Department of Transportation, (FDOT).
   2. Manual on Uniform Traffic Control Devices for Streets and Highways by U.S. Department of Transportation, Federal Highway Administration.
   3. Right-of-Way Utilization Regulations, City, Florida, latest edition.

B. All references to the respective agencies in the above referenced standards shall be construed to also include the municipality as applicable for this Work.

C. Sequence the Work in a manner that will minimize disruption of vehicular and pedestrian access through and around the construction area.

D. Traffic planning and control for the maintenance and protection of pedestrian and vehicular traffic affected by the Contractor's Work includes, but is not limited to:
   1. Construction and maintenance of any necessary detour equipment and facilities.
   2. Providing necessary facilities for access to residences and businesses.
   3. Furnishing, installing, and maintenance of traffic control and safety devices (e.g. signage, barricades, barriers, message boards, etc.), and flag persons as appropriate during Construction.
   4. Control of water runoff, dust and any other special requirements for safe and expeditious movement of traffic.

E. Planning, maintenance and control of traffic shall be provided at the Contractor's expense. The Contractor will bear all expense of maintaining the vehicle and pedestrian traffic throughout the work area.

F. The Contractor will ensure all personnel involved in traffic control are and capable of communicating with the public. The Contractor may be required to hire off-duty uniformed police officers, in addition to flag persons, to direct and maintain traffic. Locations and conditions requiring such uniformed police officers shall be as directed by the City. The Contractor shall be required to utilize uniformed police officers for work within FDOT maintained ROW, road closures affecting school traffic and during all night work involving a road closure or crossing on nonresidential roads.

G. The Contractor will remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.03 SUBMITTALS

A. Submit at Contractor's own expense a Traffic Control Plan for approval by the controlling roadway agency (FDOT, City Public Works or other local government) having jurisdiction over the road for approval.
   1. The Traffic Control Plan will detail procedures and protective measures proposed by the Contractor to provide for protection and control of traffic affected by the Work consistent with the following applicable standards:
      a. Standard Specifications for Road and Bridge Construction, latest edition including all subsequent supplements issued by the Florida Department of Transportation, (FDOT Spec.).
      b. Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations, FDOT.
      c. Right-of-Way Utilization Regulations, City, Florida, latest edition.

B. All references to the respective agencies in the above referenced standards shall be construed to also include the municipality as applicable for this Work.

C. The Traffic Control Plan will be signed and sealed by a Professional Engineer registered in the state of Florida and shall include proposed locations and time durations of the following, as applicable:
   1. Pedestrian and public vehicular traffic routing.
   2. Lane and sidewalk closures, other traffic blockage and lane restrictions and reductions anticipated to be caused by construction operations. Show and describe the proposed location, dates, hours and duration of closure, vehicular and pedestrian traffic routing and management, traffic control devices for implementing pedestrian and vehicular movement around the closures, and details of barricades.
   3. Location, type and method of shoring to provide lateral support to the side of an excavation or embankment parallel to an open travel-way.
   4. Allowable on-street parking within the immediate vicinity of worksite.
   5. Access to buildings immediately adjacent to worksite.
   6. Driveways blocked by construction operations.

7. Temporary traffic control devices, temporary pavement striping and marking of streets and sidewalks affected by construction
8. Temporary commercial and industrial loading and unloading zones.
9. Construction vehicle reroutes, travel times, staging locations, and number and size of vehicles involved.

D. Obtain and submit prior to erection, or otherwise impacting traffic, all required permits from all authorities having jurisdiction, including City Public Works, if applicable.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The Contractor shall furnish, erect, and maintain all necessary traffic control devices, including flag person, in accordance with the Manual of Uniform Traffic Control Devices for Streets and Highways published by the U.S. Department of Transportation, Federal Highway Administration.
   1. FLAG PERSONS
      a. All flag persons used on this Project will adhere to the following requirements:
      b. Any person acting as a flag person on this Project will have attended a training session taught by a Contractor's qualified trainer before the start date of this Contract.
      c. The Contractor's qualified trainer will have completed a "Flag person Train the Trainer Session" in the 5-years previous or before the start date of this Contract and will be on file as a qualified flag person trainer.
      d. The flag person trainer's name and Qualification Number will be furnished by the Contractor at the Pre-Construction meeting. The Contractor will provide all flag persons with the Flag Person Handbook and will observe the rules and regulations contained therein. This handbook will be in the possession of all flag person while flagging on the Project.
      e. Flag persons will not be assigned other duties while working as authorized flag persons.
      f. Any person replacing flag person for break shall have the same training.

PART 3 - EXECUTION

3.01 NOTIFICATIONS

A. The Contractor will notify individual owners, owner's agents, and tenants of buildings affected by the construction, with copies to the City, 72-hours in advance of any construction activities.

B. The Contractor shall notify residents and pedestrians via variable message boards no later than 10 days prior to the closure of any road, lane or pedestrian thoroughfare.

C. The Contractor shall notify Emergency Management Services agencies, Lynx and OCPS

no less than 7 days prior to such closures or whenever roads are impassable.

D. Implement closing of vehicle or pedestrian thoroughfare in accordance with the construction drawings and the approved Traffic Control Plan.

E. The Contractor will immediately notify the City of any vehicular or pedestrian safety or efficiency problems incurred as a result of the construction of the Project.

3.02 GENERAL TRAFFIC CONTROL

A. The Contractor will sequence and plan construction operations and will generally conduct Work in such a manner as not to unduly or unnecessarily restrict or impede normal traffic.

B. Unless otherwise provided, all roads within the limits of the Work will be kept open to all traffic by the Contractor. The Contractor will keep the portion of the project being used by public traffic, whether it is through or local traffic, in such condition that traffic will be adequately accommodated.

C. The Contractor will be responsible for installation and maintenance of all traffic control devices and requirements for the duration of the construction period. Necessary precautions for traffic control will include, but not be limited to, warning signs, signals, lighting devices, markings, barricades, canalizations, and hand signaling devices.

D. The Contractor will provide and maintain in a safe condition temporary approaches or crossings and intersections with trails, roads, streets, businesses, parking lots, residences, garages and farms.

E. The Contractor will provide emergency access to all residences and businesses at all times. Residential and business access will be restored and maintained at all times outside of the Contractor’s normal working hours.

F. Traffic is to be maintained on one section of existing pavement, proposed pavement, or a combination thereof. Alternating one-way traffic may be utilized and limited to a maximum length of 500-feet during construction hours. Lane width for alternating one-way traffic will be kept to a minimum width of 10-feet, or as directed by the City.

G. Travel lanes and pedestrian access will be kept reasonably smooth, dry, and in a suitable condition at all times.

H. The Contractor will make provisions at all "open cut" street crossings to allow for free passage of vehicles and pedestrians, either by bridging or other temporary crossing structures. Such structures will be of adequate strength and proper construction and will be maintained by the Contractor in such a manner as not to constitute an undue traffic hazard.

I. The Contractor will keep all signs in proper position, clean, and legible at all times. Care will be taken so that weeds, shrubbery, construction materials, equipment, and soil are not allowed to obscure any sign, light, or barricade. Signs that do not apply to construction conditions should be removed or adjusted so that the legend is not visible to approaching traffic.

J. The City may determine the need for, and extent of, additional striping removal and restriping.

K. Excavated material, spoil banks, construction materials, equipment and supplies will not be located in such a manner as to obstruct traffic, as practicable. The Contractor will immediately remove from the site all demolition material, exercising such precaution as may be directed by the City. All material excavated shall be disposed of so as to minimize traffic and pedestrian inconvenience and to prevent damage to adjacent property.

L. During any suspension, the Contractor will make passable and open to traffic such portions of the Project and/or temporally roadways as directed by the City for accommodation of traffic during the anticipated period of suspension. Passable conditions will be maintained until issuance of an order for the resumption of construction operations. When Work is resumed, the Contractor will replace or renew any Work or materials lost or damaged because of such temporary use in every respect as though its prosecution had been continuous and without interferences.

3.03 TEMPORARY SHORING

A. Use shoring to maintain traffic when it is necessary to provide lateral support to the side of an excavation or embankment parallel to an open travel-way. Provide shoring when a theoretical 2:1 or steeper slope from the bottom of the excavation or embankment intersects the existing ground line closer than 5-feet (1.5 m) from the edge of pavement of the open travel-way.

B. The Contractor will furnish, install, and remove sheeting, shoring, and bracing necessary to maintain traffic at locations shown on the Traffic Control Plan and other locations determined during construction.

END OF SECTION

SECTION 01580
PROJECT IDENTIFICATION AND SIGNS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall furnish, install, and maintain all sign materials including sign posts, weighted stands, brackets, any required mounting hardware, and miscellaneous materials required for temporary signs for the purpose of:
   1. Project Identification.
   2. Informational signs to direct traffic
   3. On-site safety signs as appropriate for the Work

B. Remove temporary signs on completion of Construction prior to obtaining Certificate of Occupancy and Substantial Completion.

C. Allow no other signs to be displayed without written approval of the City.

1.02 SUBMITTALS

A. Submit complete Shop Drawings identifying locations, material, layout, sign content, font type and size, and sample colors. Make sign and lettering to scale, clearly indicating condensed lettering if used. The sign details will be submitted to the City for approval prior to fabrication.

B. Submit method of erection to include materials, fasteners, and other items to assure compliance with the requirements for wind pressures as required by the authorities having jurisdiction.

C. Submit signs in accordance with any details provided in the Drawings.

D. Prior to erection obtain and submit all required permits from the authorities having jurisdiction.

1.03 PROJECT IDENTIFICATION SIGN

A. Provide 1 painted sign at the site, or at each end of the Work if a linear project, or at each of the separate sites of Work, if applicable. The sign will be not less than 32-square feet area, with a minimum dimension of 4-feet and painted graphics with content to include:
   1. Title of Project
   2. City Government name and logo
   3. Names and titles of the Board of City Commissioners, City Administrator, Director of City Utilities Department, the Consulting Engineer, and the Contractor

B. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the City. The sign must be located 5-feet from all rights-of-way and 20-feet from all property lines.

1.04 INFORMATIONAL SIGNS

A. All signs and other traffic control devices shall conform to the requirements for shape, color, size, and location as specified in the latest Manual on Uniform Traffic Control and Safe Streets and Highways and the Florida Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations. Information as to the above may be obtained from FDOT Division engineers.

PART 2 - PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New construction grade lumber, structurally adequate and suitable for exterior application and specified finish.

B. Sign Panels: New A-B Grade, exterior type, APA DF plywood with inset hardwood edges and mitered corners, standard large sizes to minimize joints.
   1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles, minimum 3/4-inch.

C. Rough Hardware: Galvanized steel, of sizes and types to enable sign assemblies to resist wind pressures as required by the authorities having jurisdiction but not less than a wind velocity of 50-mph.
   1. Use minimum 1/2-inch diameter button head carriage bolts to fasten sign panels to supporting structures. Bolt heads to be painted to match sign face.

D. Paint: Exterior quality, as specified in Division 9 or as a minimum as specified herein.
   1. Primer and finish coat: exterior, semi-gloss, alkyd enamel.
   2. Colors for structure, framing, sign surfaces, and graphics: As shown on the Drawings or as selected by the City.

E. Safety Sign Number Tags
   1. Removable aluminum or galvanized steel, with 4-inch high, blue numerals and steel tag hooks.

PART 3 - EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

A. Install project identification signs within 10-days of the Notice to Proceed date. Failure to erect the signs may be reason to delay approval of the initial Application for Payment.

B. Paint exposed surfaces of supports, framing, and surface material; one (1) coat of primer and two (2) coats of finish paint.

C. Set signs plumb and level and solidly brace as required to prevent displacement during the Construction period. If mounted on posts, sink posts 3-feet to 4-feet below grade, leaving a minimum of 8-feet of each post above grade for mounting the sign.

D. Install informational signs at a height for optimum visibility, on ground mounted poles or attached to temporary structural surfaces.

3.02 MAINTENANCE

A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing, or sign.

B. Relocate informational signs as required by the progress of the Work.

C. Poorly maintained, defaced, damaged, or dirty signs shall be replaced, repaired, or cleaned without delay.

D. Special care must be taken to ensure that construction materials and dust are not allowed to obscure the face of a sign.

E. Signs not in effect shall be covered or removed.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at Substantial Completion of the Work.

B. Leave areas clean and patch as required to remove any traces of temporary signs.

END OF SECTION

SECTION 01610
DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the Work.

B. Deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means that will prevent damage, deterioration, and loss including theft and protect against damage from climatic conditions. Control delivery schedules to minimize long-term storage of products at the site and overcrowding of construction spaces. In particular, provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss. Damaged or defective items, in the opinion of the City, will be replaced at no cost to the City.

1.02 REQUIREMENTS

A. The Contractor is responsible for all material, equipment and supplies sold and delivered to the City under this Contract until final inspection of the Work and acceptance thereof by the City.

B. All materials and equipment to be incorporated in the Work will be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

C. All materials and equipment, which in the opinion of the City, have become so damaged as to be unfit for the use intended or specified, will be promptly removed from the site of the Work, and the Contractor will receive no compensation for the damaged materials or equipment or for its removal.

D. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor will replace same without additional cost to the City.

1.03 DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. The City and the Contractor's project superintendent must be on-site to accept all deliveries shipped directly to the job site. If the project superintendent is not present for a delivery, that delivery may be rejected by the City. If any delivery is rejected due to non-availability of the Contractor's project superintendent, delivery shall be rescheduled at no additional cost to the City.

C. Schedule delivery to reduce long-term on-site storage prior to installation and/or operation. Under no circumstances will materials or equipment be delivered to the site more than 1-month prior to installation without written authorization from the City.

D. Coordinate deliveries in order to avoid delay in, or impediment of, the progress of the Work.

E. Schedule deliveries to the site not more than 1-month prior to scheduled installation without written authorization from the City.

F. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

G. All items delivered to the site will be unloaded and placed in a manner that will not hamper the Contractor's normal construction operation or those of Subcontractors and other Contractors and will not interfere with the flow of necessary traffic.

H. Deliver products in undamaged condition, in manufacturer’s original containers or packaging, with identifying labels intact and legible. Maintain packaged materials with seals unbroken and labels intact until time of use.

I. Immediately on delivery, inspect shipments with the City to ensure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged. If the Contractor does not notify the City regarding the delivery and the City rejects any part of the delivery, there will be no additional cost to the City for the material to be returned. For items furnished by others (i.e. City), perform inspection in the presence of the City. Provide written notification to the City of any problems.

J. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the City.

1.04 STORAGE AND HANDLING

A. Provide equipment and personnel to handle products by methods recommended by the manufacturer to prevent soiling or damage to products or packaging, with seals and labels intact and legible.

B. The Contractor is responsible for securing a location for on-site storage of all material and equipment necessary for completion of the Work. The location and storage layout will be submitted to the City at the Pre-Construction conference.

C. Manufacturer's storage instructions will be carefully studied by the Contractor and reviewed with the City. These instructions will be carefully followed and a written record of this kept by the Contractor.

D. All material delivered to the job site will be protected from dirt, dust, dampness, water, and any other condition detrimental to the life of the material from the date of delivery to the time of installation of the material and acceptance by the City.

E. When required or recommended by the manufacturer, the Contractor will furnish a covered, weather protected storage structure providing a clean, dry, non-corrosive environment for all mechanical equipment valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this Project.

F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and free from damage or deterioration.

G. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within 7-days after written notice to do so has been given, the City retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contract Amount. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

1.05 SPECIFIC STORAGE AND HANDLING

(Additional specific storage and handling requirements may be found in the specification sections addressing the material requirements.)

A. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) will be stored in a weather tight building to prevent damage. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the City. The building will be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.
   1. All equipment will be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer. Mechanical equipment to be used in the Work, if stored for longer than 90-days, will have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the City.
   2. Moving parts will be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding." Upon installation of the equipment, the Contractor will start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

3. Lubricants will be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants will be put into the equipment at the time of acceptance. Prior to acceptance of the equipment, the Contractor will have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer will be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment will be judged to be defective. It will be removed and replaced at the Contractor's expense.
4. Electric motors provided with heaters will be temporarily wired for continuous heating during storage. Upon installation of the equipment, the Contractor will start the equipment, at least half load, and once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.

B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

C. Cement and lime will be stored under a roof and off the ground and will be kept completely dry at all times.

D. Brick, block and similar masonry products will be handled and stored in a manner to minimize breakage, chipping, cracking and spilling to a minimum.

E. Precast Concrete will be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking.

F. All structural and miscellaneous steel and reinforcing steel will be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams will be stored with the webs vertical.

G. Metals will be stored dry, all under cover and vented to prevent build-up of humidity, all off ground to provide air circulation.

H. Lumber will be stacked to provide air circulation. Store materials for which maximum moisture content is specified in an area where moisture content can be maintained.

I. Gypsum wallboard systems will be stored to protect all metal studs, furring, insulation boards, batts, accessories and gypsum board to prevent any type of damage to these materials. Rusted material components, damp or wet insulation or gypsum boards will not be accepted.

J. Acoustical materials will be delivered to the job site in unbroken containers labeled and clearly marked. Materials will not be removed from containers until ready to install, but will be stored in dry area with cartons neatly stacked. Before installation, acoustical board will be stored for not less than 24-hours in the Work area at the same temperature and relative humidity.

K. Linear items will be stored in dry area with spacers to provide ventilation. Stack linear items to prevent warping, complying with manufacturer's instructions.

L. Paints and other volatile materials will be stored within approved safety containers. No glass jugs will be permitted. Storage areas will be equipped with not less than 2 fire extinguishers (C02 type) sufficient to discharge a distance of 25-feet when fully charged and have current tags. No other building materials will be stored in this area. Used rags will be removed daily. Clean rags will be stored in metal closed containers.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

The term "Project Closeout" is defined to include requirements near the end of the Contract Time, in preparation for Substantial Completion acceptance, occupancy by the City, release of retainage, final acceptance, final payment, and similar actions evidencing completion of the Work. Time of closeout is directly related to "Substantial Completion"; therefore, the time of closeout may be either a single period for the entire Work or a series of time periods for individual elements of Work that has been certified as substantially complete at different dates. This time variation, if any, will be applicable to the other provisions of this section.

1.02 SCOPE OF WORK

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   1. Final Cleaning
   2. Substantial Completion
   3. Final Acceptance

1.03 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

C. Section 01720 "Project Record Documents"

D. Section 01740 "Warranties and Bonds"

1.04 PREREQUISITES FOR SUBSTANTIAL COMPLETION.

When the Contractor considers the Work as substantially complete, submit to the City a written notice stating so and requesting an inspection to determine the status of completion. The Contractor will attach to the notice a list of items known to be incomplete or yet to be corrected. Complete the following before requesting the City’s inspection for certification of substantial completion.

A. In the progress payment request that coincides with or is the first request following, the date substantial completion is claimed, show 100% completion or list incomplete items, the value of incomplete Work, and reasons for the Work being incomplete. Inspection procedures include supporting documentation for completion as indicated in these Contract Documents.

B. Submit a statement showing an accounting of changes to the Contract Sum.

C. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents in accordance with Section 01740 "Warranties and Bonds."

D. Obtain and submit lien releases enabling the City's full, unrestricted use of the Work and access to services and utilities.

E. Consult with City before submitting Record Documents in accordance with Section 01720 "Project Record Documents."

F. Submit Operation and Maintenance Manuals.

G. Make final changeover of permanent locks. Submit keys and keying schedule.

H. Deliver tools, spare parts, extra stock, and similar items.

I. Complete final cleaning requirements necessary for Substantial Completion.

1.05 FINAL CLEANING.

Complete the following cleaning operations prior to Substantial Completion or Owner occupancy.

A. Remove from job site all tools, surplus materials, construction equipment, storage sheds, debris, waste and temporary services.

B. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Structures:
   1. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.
   2. Remove all traces of splashed materials from adjacent surfaces.
   3. Ensure exterior surfaces have a uniform degree of cleanliness.
   4. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.
   5. Remove paint droppings, spots, stains and dirt from finished surfaces.
   6. Remove labels that are not permanent labels.
   7. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

8. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Leave concrete floors broom clean.
9. Wipe surface of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
10. Clean permanent filters of ventilating systems and replace disposable filters if units were operated during construction. Clean ducts, blowers and coils if units were operated without filters during construction.

1.06 OPERATION AND MAINTENANCE MANUALS

A. The Contractor will submit the proposed format, content and tab structure for all Operating and Maintenance Manuals for the City's review and approval. The tab structure for Operating and Maintenance Manuals will follow specification division format as accepted by the Construction Specification Institute. After the City approves the proposed format, content, and tab structure for the Operating and Maintenance Manuals, the Contractor will create and deliver 5 complete sets.

B. Operation and Maintenance documentation is required for each piece of mechanical, electrical, communications, instrumentation and controls, pneumatic, hydraulic, conveyance, and special construction. If required by the technical specifications, provide Operation and Maintenance documentation for any other product not listed in the foregoing.

C. The requirements of this Section are separate, distinct and in addition to product submittal requirements that may be established by other Sections of the Specifications. Owner's manuals, manufacturer's printed instructions, parts lists, test data and other submittals required by other Sections of the Specifications may be included in the Operating and Maintenance Manuals provided that they are approved and are formatted in a manner consistent with the requirements of this Section.

D. Deliver Operation and Maintenance Manuals directly to the City.

E. Operating and Maintenance Manual documents must include, but are not limited to, table of contents, approved submittals, manufacturer's operating and maintenance instructions, brochures, Shop Drawings, performance curves and data sheets annotated to indicate equipment actually furnished (e.g. identifying impeller size, model, horsepower, etc), procedures, wiring and control diagrams, records of factory and field tests and device/controller settings and calibration, program lists or data compact discs, maintenance and warranty terms and contact information, spare parts listings, inspection procedures, emergency instructions, and other Operating and Maintenance documentation that may be useful to the City. The material and equipment data required by this Section must include all data necessary for the proper installation, removal, normal operation, emergency operation, startup, shutdown, maintenance, cleaning, adjustment, calibration, lubrication, assembly, disassembly, repair, inspection, trouble-shooting, and warranty service of the equipment or materials.

F. The Contractor must bind the Operating and Maintenance Manual documents in heavy-duty, 3-ring vinyl-covered binders including pocket folders for folded sheet information. Mark binder identification on both the front and spine of each binder. Binder information must list the project title, identify separate structures or locations as applicable, identify the general subject matter covered in the manual and must include the words "OPERATING AND MAINTENANCE INSTRUCTIONS".
   1. The Contractor must submit the Operating and Maintenance documents on three-hole punched, 8-1/2-inch x 11-inch sheets or on three-hole punched sheets that are foldable in multiples of 8-1/2-inch x 11-inch. The three-hole punched edge will be the left 11-inch edge.
   2. The Contractor may request waivers to the size requirement for specific instances. The Contractor's waiver request must be in writing to the City. The Contractor's waiver request must include a justification for seeking the waiver.

G. The Contractor must provide an electronic version of the complete and final Operating and Maintenance Manuals in original electronic file format on compact disc or DVD. The Contractor must also provide one (1) electronic pdf file of each bound Operating and Maintenance Manual that represents each Manual's content. The electronic pdf file must match the Operating and Maintenance Manual content and organizational structure.

1.07 SUBSTANTIAL COMPLETION INSPECTION PROCEDURES

A. Upon receipt of the Contractor's request for inspection, the City will either proceed with inspection or advise the Contractor of incomplete prerequisites.

B. Following the initial inspection, the City will either prepare the certificate of Substantial Completion, or advise the Contractor of Work which must be performed before the certificate will be issued. The City will repeat the inspection when requested in writing and when assured that the Work has been substantially completed.

C. Results of the completed inspection will form the initial "punch list" for final acceptance.

1.08 PREREQUISITES FOR FINAL ACCEPTANCE.

Complete the following before requesting the City's final inspection for certification of final acceptance, and final payment. List known exceptions, if any, in the request.

A. Submit the final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates for insurance for products and completed operations where required.

B. Submit written certification that:
   1. The City's final punch list of itemized Work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
   2. The Contract Documents have been reviewed and Work has been completed in accordance with Contract Documents.

3. Equipment and systems have been tested in the presence of the City and are operational.
4. Work is completed and ready for final inspection.

C. Submit consent of surety.

D. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

1.09 FINAL ACCEPTANCE INSPECTION PROCEDURES

A. The City will re-inspect the Work upon receipt of the Contractor's written notice that the Work, including punch list items resulting from earlier inspections, has been completed, except for those items for which completion has been delayed because of circumstances that are acceptable to the City.

B. Upon completion of re-inspection, the City will either prepare a certificate of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled, which are required for final acceptance.

C. If necessary, the re-inspection procedure will be repeated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The purpose of the Project Record Documents is to provide the City with factual information regarding all aspects of the Work, both concealed and visible.

B. To ensure the Work was constructed in conformance with the Contract Drawings, the following survey documents are required to be prepared and certified by a Surveyor as per Spec Section 01050 Surveying and Field Engineering:
   1. Asset Attribute Data Form
   2. Pipe Deflection Table
   3. Gravity Main Data
   4. Boundary Survey and Survey Map Report for pump stations and easements with constructed improvements

   The Asset Attribute Data and Pipe Deflection Table forms can be found on the City's web site.

1.02 DEFINITIONS

A. Boundary Survey: Boundary survey, map and report certified by a Surveyor shall be provided that meets the requirements of Chapter 5J-17 'Minimum Technical Standards', FAC.

B. Surveyor: Contractor's Surveyor that is licensed by the State of Florida as a Professional Surveyor and Mapper pursuant to Chapter 472, F.S.

1.03 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of the Record Documents to one person on the Contractor's staff as approved by the City.

B. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications and each sheet of Drawings and other documents where such entry is required to show progress and changes properly.

C. Make entries within 24-hours after receipt of information has occurred.

1.04 RECORD DOCUMENTS AT SITE

A. Maintain at the site and always available for City's use one (1) record copy of:
   1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents
   2. Change Orders, Verbal Orders, and other modifications to Contract
   3. Written instructions by the City as well as correspondence related to Requests for Information (RFIs)
   4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests
   5. Field test records, inspection certificates, manufacturer certificates and construction photographs
   6. Paper copies of the Progressive As-Built Drawings
   7. Current Surveyor's tables for the Assets Attribute Data, Pipe Deflection Data, and Gravity Main Data

B. Maintain the documents in an organized, clean, dry, legible condition and protected from deterioration, loss and damage until completion of the Work, transfer of all record data to the final As-built Drawings for submittal to the City.

C. Store As-Built Documents and samples in Contractor's office apart from documents used for construction. Do not use As-Built document for construction purposes. Label each document "AS-BUILT" in neat large printed letters. File documents and samples in accordance with CSI/CSC format.

D. Record information concurrently with construction progress. Do not conceal any Work until required information is recorded.

PART 2 - PRODUCTS

2.01 AS-BUILT SURVEY DRAWINGS

A. Maintain the electronic As-Built Drawings to accurately record progress of Work and change orders throughout the duration of the Contract.

B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.

C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected or other means. In the event of overlapping changes, use different colors for entries of the overlapping changes.

D. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated "AB") and be shown in a bolder text that is completely legible.

E. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As a

minimum, make entries to also record:

1. Depths of various elements of foundation in relation to finish floor datum and State Plane Coordinates and elevations.
2. As-Built Asset Attribute Data tables shall be completed in the Drawings.
3. When electrical boxes, or underground conduits and plumbing are involved as part of the Work, record true elevations and locations, dimensions between boxes.
4. Actually installed pipe or other work materials, class, pressure-rating, diameter, size, specifications, etc. Similar information for other encountered underground utilities, not installed by Contractor, their owner and actual location if different than shown in the Contract Documents.
5. Details, not on original Contract Drawings, as needed to show the actual location of the Work completed in a manner that allows the City to find it in the future.
6. The Contractor shall mark all arrangements of conduits, circuits, piping, ducts and similar items shown schematically on the construction documents and show on the As-Built Drawings the actual horizontal and vertical alignments and locations.
7. Major architectural and structural changes including relocation of doors, windows, etc. Architectural schedule changes according to Contractor's records and Shop Drawings.

2.02 RECORD DOCUMENTS

A. Three (3) paper copy sets and three (3) digital media sets of the following final Record Documents below.
   1. The following documents shall be signed and sealed by the Surveyor:
      a. As-built survey drawings as previously described in paragraph 2.01.
      b. As-built Asset Attribute Data (see Specification Section 01050 "Surveying and Field Engineering," Table 01050-2 for an example)
      c. Boundary Survey on a 81/2"x11" format of fee simple and/or permanent easement sites for pump stations, treatment facilities, etc.. As a minimum the Boundary Survey shall show all above ground and underground structures or equipment, pipe, and conduit. All property or easement corners and the center of wetwell shall be shown with GPS coordinates. The Boundary Survey field work shall be dated after the Work has been completed.
      d. Boundary Survey on a 81/2"x11" format for Work related to constructed pipes within any permanent easements. As a minimum the Boundary Survey shall show the location of the pipe centerline and property corners with GPS coordinates. The Boundary Survey field work shall be dated after the Work has been completed within the easements.
      e. Gravity Main Table (see Specification Section 01050 "Surveying and Field Engineering", Table 01050-4 for an example)
      f. Pipe Deflection Table (see Specification Section 01050 "Surveying and Field Engineering" Table 01050-3 for an example). An electronic blank table will be supplied by the City.
   2. Provide an encompassing digital AutoCAD file in the Engineer's current version of AutoCAD and the file shall be saved under in the format dwg. The file includes all the information of the As-Built Survey and any other graphical information in the As-Built Drawings. It shall include the overall Work, utility system layout and

associated parcel boundaries and easements. Feature point, line and polygon information for new or altered Work and all accompanying geodetic control and survey data shall be included. The Surveyor's certified As-Built Asset Attribute Data shall be added to the As-Built Drawings.

3. Provide Scanned "As-Built" Drawing sets complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the As-Built Drawings shall be included in the electronic drawings, with each sheet being converted into an individual tif (tagged image file). The plan sheets shall be scanned in tif format Group 4 at minimum of 400 dpi resolution to maintain legibility of each drawing. Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set.
4. Provide Scanned Record Documents reflecting changes from the Contract Documents.

PART 3 - EXECUTION

3.01 FINAL RECORD DOCUMENTS SUBMITTAL

A. Submit the Final Record Documents within 20-days after Substantial Completion.
   1. Participate in review meetings as required and make required changes and promptly deliver the Final Record Documents to the City.

END OF SECTION

SECTION 01740
WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 RELATED WORK

A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.

B. General closeout requirements are included in Section 01700 "Project Closeout."

C. Specific requirements for warranties for the Work and products and installations that are specified to be warranted are included in the individual Sections of Division 2 through 16.

1.03 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the City.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the City.

1.04 SUBMITTALS

A. Submit written warranties to the City prior to requesting a Substantial Completion Inspection as outlined in Section 01700 "Project Closeout." If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the City.

B. When a designated portion of the Work is completed and occupied or used by the City, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the City within 15-days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the City for approval prior to final execution.

D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

E. Prior to Substantial Completion Inspection, submit to the City two (2) copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, Subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents and sized to receive 8-1/2-inch by 11-inch three-hole punched paper.
   2. Table of Contents will be neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified and the name of the product or work item.
   3. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of the installer, supplier and manufacturer.
   4. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the project title or name and the name, address and telephone number of the Contractor.
   5. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.05 WARRANTY REQUIREMENT

A. The Contractor will warrant all equipment in the Contractor's one-year warranty period even though certificates of warranty may not be required. For all major pieces of equipment, the Contractor shall submit a warranty from the equipment manufacturer. "Major" equipment is defined as a device having a 5 HP or larger motor or which lists for more than $1,000.00.

B. In the event that an equipment manufacturer or supplier is unwilling to provide a one-year warranty commencing at Substantial Completion, the Contractor will obtain from the manufacturer a warranty of sufficient length commencing at the time of equipment delivery to the job site, such that the warranty will extend to at least 1-year past substantial completion.

C. If an individual specification section requires a particular warranty more stringent than that required by this Section or the General Conditions, the more stringent requirements will govern for the applicable portion of the Work.

D. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty will be equal to the original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the City has benefited from use of the Work through a portion of its anticipated useful service life.

G. City's Recourse: Written warranties made to the City are in addition to implied warranties, and will not limit the duties, obligations, rights and remedies otherwise available under the law, nor will warranty periods be interpreted as limitations on time in which the City can enforce such other duties, obligations, rights, or remedies.

H. Rejection of Warranties: The City reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

I. The City reserves the right to refuse to accept Work for the project where a special warranty, certification, or similar commitment is required on such work or part of the Work, until evidence is presented that entities required to counter-sign such commitments are willing to do so.

J. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DELIVERABLES

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and Subcontractors, and bind into a commercial quality standard 3-ring binder; submit 5 copies of the warranties and bonds to the City for review.
   1. The warranties and bonds shall include:
      a. Equipment or product description
      b. Manufacturer's name, principal, address and telephone number

c. Contractor, name of responsible principal, address and telephone number
d. Local supplier's or representatives name and address
e. Scope of warranty or bond
f. Proper procedure in case of failure
g. Instances which might affect the validity of warranty or bond
h. Date of beginning of warranty, bond or service and maintenance contract
i. Duration of warranty, bond or service maintenance contract

B. Warranties
1. Furnish an extended warranty for sanitary sewer main liner certified by the manufacturer for specified material properties for a particular job. The manufacturer warrants the liner to be free from defects in raw materials for 1-year from the date of acceptance. During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the Contractor's expense in a manner acceptable to the City.
2. Furnish an extended warranty for sanitary lateral liner certified by the manufacturer for specified material properties for a particular job. The manufacturer warrants the liner to be free from defects in raw materials for 1-year from the date of acceptance. During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the Contractor's expense in a manner acceptable to the City.

END OF SECTION

SECTION 02050
DEMOLITION OF EXISTING STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work
   1. This Section specifies the labor, materials, equipment, and incidentals required for the demolition, relocation, and/or disposal of all structures, building materials, equipment, and accessories to be removed as shown on the Drawings and as specified herein.
   2. There may be existing and active stormwater, wastewater, water, and other facilities on site as indicated on the Drawings. It is essential that these facilities, when encountered, remain intact and in service during the proposed demolition. Consequently, the Contractor shall be responsible for the protection of these facilities and shall diligently direct all his activities toward maintaining continuous operation of the existing facilities and minimizing operational inconvenience.
   3. Demolition may include:
      a. Complete demolition and removal of piping and associated infrastructure.
      b. Complete demolition and removal of all above and below ground structures, concrete slabs and foundations, vaults, and underground utilities (water, wastewater, electrical, etc.) needed to complete the Work, as encountered in the field.
      c. All material, equipment, rubble, debris, and other products of the demolition shall become the property of the Contractor for his disposal off-site in accordance with all applicable laws and ordinances at the Contractor's expense. The sale of salvageable materials by the Contractor shall only be conducted off-site. The sale of removed items on the site is prohibited by the City.
   4. The Contractor shall examine the various Drawings, visit the site, determine the extent of the Work, the extent of work affected therein, and all conditions under which he is required to perform the various operations.
   5. The Contractor shall fill and compact all voids left by the removal of pipe, structures, etc. with materials described herein to a grade that will provide for positive drainage of the disturbed area to drain run-off in direction consistent with the surrounding area. The Contractor shall provide all fill materials to the site as needed. Compaction of fill shall match the compaction of adjacent undisturbed material.

1.02 QUALITY ASSURANCE

A. Permits and Licenses: Contractor shall obtain all necessary permits and licenses for performing the Work and shall furnish a copy of same to the City prior to commencing the Work. The Contractor shall comply with the requirements of the permits.

B. Notices: Contractor shall issue written notices of planned demolition to companies or local authorities owning utility conduit, wires, or pipes running to or through the project site. Copies of said notices shall be submitted to the City.

C. Utility Services: Contractor shall notify utility companies or local authorities furnishing gas, water, electrical, telephone, or sewer service to remove any equipment in the structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. Submit to the City for their approval, 2 copies of proposed methods and operations of demolition or relocation of the structures specified below prior to the start of Work. Include in the schedule the coordination of shut-off, capping, and continuation of utility service as required.

C. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the City's operations.

D. Before commencing demolition work, all structure relocation, bypassing, capping, or modifications necessary will be completed. Actual work will not begin until the City has inspected and approved the prerequisite work and authorized commencement of the demolition work.

E. The above procedure must be followed for each individual demolition operation.

1.04 SITE CONDITIONS

A. Prior to demolition, the Contractor shall obtain written verification from the utility owner(s) that the existing utilities, including stormwater, wastewater, and/or water facilities, are not operational and are ready for demolition.

B. The City assumes no responsibility for the actual condition of the structures to be demolished or relocated.

C. Conditions existing at the time of inspection for bidding purposes will be maintained by the City insofar as practicable. However, variations within each site may occur prior to the start of demolition work.

D. No additional payment will be made for pumping or other difficulties encountered due to water.

E. Certain information regarding the reputed presence, size, character and location of

existing underground structures, pipes and conduit has been shown on the Drawings. There is no certainty of the accuracy of this information, and the location of underground structures shown may be inaccurate and other obstructions than those shown may be encountered. The Contractor hereby distinctly agrees that the City is not responsible for the correctness or sufficiency of the information given; that in no event is this information to be considered as a part of the Contract; that he shall have no claim for delay or extra compensation on account of incorrectness of information regarding obstructions either revealed or not revealed by the Drawings; and that he shall have no claim for relief from any obligation or responsibility under this Contract in case the location, size, or character of any pipe or other underground structure is not as indicated on the Drawings, or in case any pipe or other underground structure is encountered that is not shown on the Drawings.

1.05 RESTRICTIONS

A. No building, tank or structure, or any part thereof, shall be demolished until an application has been filed by the Contractor with the Building Department Inspector and a permit issued if a permit is required. The fee for this permit shall be the Contractor's responsibility. Demolition shall be in accordance with applicable provisions of the Building Code of the State of Florida.

B. No explosives shall be used at any time during the demolition. No burning of combustible material will be allowed.

1.06 DISPOSAL OF MATERIAL

A. All salvageable or useable material or equipment to be retained by the City shall be shown on Drawings, and shall be moved to a designated area by Contractor for pick up by City. The Contractor shall promptly remove all other materials from the site as indicated or shown on the Drawings.

B. All materials not retained by the City shall become the Contractor's property and shall be removed off-site.

C. The on-site storage of removed items is prohibited by the City. Off-site sale of salvageable material by the Contractor is acceptable.

1.07 TRAFFIC AND ACCESS

A. Conduct work to ensure minimum interference with on-site and off-site roads, streets, sidewalks, and occupied or used facilities.

B. Special attention is directed towards maintaining safe and convenient access to the existing facilities remaining in operation by plant personnel and plant associated vehicles, including trucks and delivery vehicles.

C. Do not close or obstruct streets, sidewalks, or other occupied or used facilities without permission from the City. Provide alternate routes around closed or obstructed traffic in access ways.

1.08 PROTECTION

A. Conduct operations to minimize damage by falling debris or other causes to adjacent buildings, structures, roadways, other facilities, and persons. Provide interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.09 DAMAGE

A. Promptly repair damage caused to adjacent facilities by demolition operations as directed by the City at no cost to the City.

1.10 UTILITIES

A. Maintain existing utilities as directed by the City to remain in service and protect against damage during demolition operations.

B. Do not interrupt existing utilities serving occupied or operational facilities, except when authorized by City. Provide temporary services during interruptions to existing utilities as acceptable to the City.

C. The Contractor shall cooperate with the City to shut off utilities serving structures of the existing facilities as required by demolition operations.

D. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the interruption of all public and private utilities or services.

E. All utilities being abandoned shall be terminated at the service mains in conformance with the requirement of the utility companies or the municipality owning or controlling them.

1.11 EXTERMINATION

A. If required, before starting demolition, the Contractor shall employ a certified rodent and vermin exterminator and treat the facilities in accordance with governing health laws and

regulations. Any rodents, insects, or other vermin appearing before or during the demolition shall be killed or otherwise prevented from leaving the immediate vicinity of the demolition work.

1.12 POLLUTION CONTROL

A. For pollution control, use water sprinkling, temporary enclosures, and other suitable methods as necessary to limit the amount of dust rising and scattering in the air to the lowest level of air pollution practical for the conditions of work. The Contractor shall comply with the governing regulations.

B. Clean adjacent structures and improvements of all dust and debris caused by demolition operations as directed by the City. Return areas to conditions existing prior to the start of Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

A. The sequence of demolition and relocation of existing facilities shall be in accordance with the approved critical path schedule as specified in paragraph 1.03 above.

3.02 REMOVAL OF EXISTING PROCESS EQUIPMENT, PIPING, AND APPURTENANCES

A. Equipment to be retained by the City will be designated for retention by the City prior to bidding as specified in Paragraph 1.06 above. Subject to the constraints of maintaining existing facilities in operation as shown on the Drawings, all other process equipment, non-buried valving and piping, and appurtenances shall be removed from the site.

3.03 DEMOLITION PROCEDURES

The Contractor shall adhere to the following demolition procedures as referenced on the Drawings:

A. TO BE DEMOLISHED: Demolition shall be the breaking up, cutting, filling of any holes resulting, final grading of the area, performing any other operations required, and the removal from the site of all structures and equipment (structures, substructures, floor slabs, equipment, tanks, pipes, fittings, electrical systems, light poles, wiring, underground conduits and wiring, isolated slabs, and sidewalks) as indicated on the Drawings. All pieces of concrete, metal, and any other demolished material shall be removed to a depth of at least 5-feet below existing grade. Broken pieces of concrete may be size reduced by an on-site crusher, but in any event must be removed from the project site.

Before commencing structural demolition, remove all mechanical, electrical, piping, and miscellaneous appurtenances. Completely remove the structure by thoroughly breaking up concrete into pieces no more than 2-feet across the largest dimension.

B. TO BE REMOVED: Where indicated on the Drawings, the structures and equipment shall be completely removed from the site with all associated connecting piping or electrical service. The item shall be taken whole or in parts to be salvaged or disposed of by the Contractor.

C. TO BE ABANDONED: Where indicated on the Drawings, the structures and equipment shall be left in place, drained, and the contents properly disposed. The upper 4-feet of the structure shall be cut and removed, including the cover slab and access port, frame, and cover. All structures to be abandoned with bottom slabs shall be drilled (2 holes minimum, 2.0-inch diameter each) or hole punched to prevent flotation and filled with common fill.

D. PIPING TO BE REMOVED: Where indicated on the Drawings, pipe (and conduit) shall be drained and the contents properly disposed. The pipe (or conduit) shall then be completely removed from the site, including fittings, valves, and other in-line devices. Connections to existing piping to remain shall be plugged by mechanical means (M.J. plugs, tie-rods, or thrust blocks). Piping shall be removed in accordance with Specification Section 02080 "Abandonment, Removal and Salvage or Disposal of Existing Pipe."

E. PIPING TO BE ABANDONED: Where indicated on the Drawings, piping (or conduit) shall be left in place. All such piping shall be drained and the contents properly disposed. The pipe (or conduit) shall then be filled with grout (flowable fill) and each end of the pipe (or conduit) shall be plugged using a concrete plug in a manner acceptable to the City. Piping shall be abandoned in accordance with Specification Section 02080 "Abandonment, Removal and Salvage or Disposal of Existing Pipe."

F. TO BE PROTECTED: Where indicated on the Drawings, the utility service, fence, structure, tree, or device so designated shall be temporarily protected during the prosecution of the demolition work as specified in Division 1.

G. TO REMAIN: Where indicated on the Drawings, the designated facilities shall remain intact and in service during the prosecution of the demolition work.

3.04 DEWATERING OF EXISTING PROCESS UNITS AND DISPOSAL OF RESIDUE

The Contractor shall notify the City prior to beginning the dewatering work on any existing process units which contain wastewater, grit, or sludge. The Contractor, at his own expense, shall remove the entire contents of each structure and dispose off site. The proper transport and disposal of all residues shall remain the responsibility of the Contractor.

END OF SECTION

SECTION 02080

ABANDONMENT, REMOVAL, AND SALVAGE OR DISPOSAL OF EXISTING PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section specifies the furnishing of all labor, materials, equipment, and incidentals required to abandon, remove, salvage, and/or dispose of existing pipelines and appurtenances as shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

A. Permits and Licenses: Contractor shall obtain and pay respective fees for all necessary permits and licenses for performing the Work and shall furnish a copy of same to the City prior to commencing the Work. The Contractor shall comply with the requirements of the permits. All removal or abandonment of asbestos pipe material shall be performed by a licensed asbestos abatement Contractor or Subcontractor registered in the State of Florida.

B. Notices: Contractor shall issue written notices of planned Work to companies or local authorities owning utility conduit, wires, or pipes running to or through the project site. Copies of said notices shall be submitted to the City.

C. Standards:
   1. Florida Administrative Code, Chapter 62-204.800
   2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR Part 61, Subpart M, latest revision
   3. Occupational Safety and Health Act, 29 CFR
   4. The Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule
   5. Florida Statute 455.300
   6. Asbestos pipe handling best management practices provided at the end of this section

D. Quality Control
   1. It shall be the responsibility of the Contractor to provide supervision and inspections to ensure that the existing piping is removed and disposed, salvaged, or abandoned as designated in the Drawings and as specified herein.
   2. Asbestos Pipe
      a. All removal or abandonment of pipe material containing asbestos shall be performed by a licensed asbestos abatement Contractor or Subcontractor.

b. The asbestos abatement Contractor or Subcontractor shall contact the City Environmental Protection Division (407-836-1400) prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices as required by the City Environmental Protection Division. The Contractor shall be responsible for all fees associated with permits, licenses, and notices to the governing regulatory agencies.
c. The asbestos abatement Contractor shall perform Work in accordance with all applicable standards referenced in paragraph 1.02.C of this section.
d. The asbestos abatement Contractor shall have experience performing asbestos removal similar to this Project.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Shop Drawings
1. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
2. Shop Drawings shall be submitted to the City for review and acceptance prior to construction in accordance with these specifications for the following:
a. Grout
b. Caps and plugs
c. Credentials of licensed asbestos abatement Contractor including current certification.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 REMOVAL, ABANDONMENT, SALVAGE, AND DISPOSAL

A. General: Existing piping designated on the Drawings to be removed shall be exposed and removed by the Contractor.

B. Removal and Disposal
1. Pipe designated to be removed shall be completely drained and the contents properly disposed. The piping system including fittings and valves shall then be completely removed from the site.
2. Existing services and/or connections not shown on the Drawings shall be removed in accordance with this section at no additional cost. Existing live services encountered shall be maintained.
3. Asbestos: Pipe material containing asbestos shall be removed and disposed by a licensed asbestos abatement Contractor or Subcontractor.
4. Structures shall be removed in accordance with Section 02050 "Demolition of Existing Structures."

C. Removal of material to be salvaged
   1. Pipe designated on the Drawings to be removed and salvaged shall be completely drained and the contents properly disposed. The pipe shall then be thoroughly pressure washed, palletized on wooden skids to a dimension not exceeding the recommendation of the manufacturer, and conveyed to the City at the location designated by the City.
   2. Items to be salvaged:
      a. Air release valves
      b. Sanitary manhole rings and covers
      c. Isolation valves
      d. Valve boxes
      e. Fire hydrant and valve assemblies

D. Abandonment
   1. Pipe designated on the Drawings to be abandoned (or retired in place) shall be left in place, drained, and its contents properly disposed. Pipe requires end caps or plugs. All air release valves and vaults, valve boxes, fire hydrants, manholes, and manhole rings and covers shall be removed and disposed of or salvaged as specified above.
   2. All pipe 4-inches or larger to be abandoned in place shall be completely filled with grout and each end of the pipe shall be plugged in a manner acceptable to the City.
   3. Plugs: Pipe to be abandoned shall be capped or plugged with a mechanical joint fitting that will prevent soil or other deposits form entering the pipe.

E. Asbestos Pipe Handling Best Management Practices
   1. Projects will require worker documentation before entering the regulated Work area. A copy of: their current training certificate (workers and their supervisor); current medical condition showing the doctor approved their working with asbestos and wearing a respirator; signed acknowledgment forms; and current record (6-months) of each workers respirator fit test will be required from all workers.
   2. Projects also require air monitoring. OSHA will accept historic data on air monitoring within 12-months of the Project, provided the data is from a project of like material and conditions with a crew of the same experience, supervision, and training. Otherwise, monitoring is required throughout the Project. OSHA requires two (2) types of personnel air monitoring, full shift and 30-minute excursion level (when highest levels are anticipated).
   3. Some provisions should be made for worker showering or otherwise washing following work before removing respirators, etc. Even if direct exposure is not anticipated, and at a minimum, a source of water to rinse the respirators, wash workers faces and hands, and (in the event of unanticipated direct exposure) some place to shower is required. The workers will also need a change room and some place to keep their street clothes and personal possessions.
   4. Proposals to remove asbestos pipe sections by cutting must address how the cutting debris will be captured and kept from becoming airborne. Soil that could be considered contaminated may also have to be removed.
   5. Licensed asbestos abatement Contractors or Subcontractors should have a pollution endorsement in their liability insurance in case of asbestos fiber release. A

contingency plan, in case the project does not run as smoothly as expected, should be developed and include emergency phone numbers kept on site during the Project.

6. Daily logs of the asbestos removal work should be kept, and should include sign in sheets for the workers and whatever air monitoring was done. Accident reports and other reports or correspondence if something unusual happened should also be included.
7. Waste receipts must be kept through all stages of transport from the site to, and including, the acceptance at the dumpsite where the material will be abandoned. Amount of material removed must be equal to the amount of material to be turned into to the dump.
8. The primary Contractor will give "approval for tear down" at project completion, indicating that all asbestos removal operations are complete and whether there is a need for any air monitoring. Air monitoring, if not required by any governing agency or approved permit as discussed previously, may also be required by the City if documentation to the general public pertaining to contamination is deemed necessary. This air monitoring is normally done by collecting area samples downwind of the project at the barrier tape or just inside it. It requires a source of electricity to run the pumps, which is often provided by a generator.

END OF SECTION

SECTION 02100
TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work
   1. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion, sedimentation and turbidity controls as necessary.
   2. Temporary erosion controls include, but are not limited to, grassing, mulching, setting, watering and reseeding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the City.
   3. Temporary sedimentation controls include, but are not limited to; silt fence, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the City.
   4. Temporary turbidity controls include, but are not limited to, floating or staked turbidity barriers which will ensure that turbidity pollution will be either eliminated or maintained within acceptable limits as established by Federal, state, and local requirements and by the City.
   5. Contractor is responsible for providing effective temporary erosion, sediment, and turbidity control measures during construction or until permanent controls become effective.

B. Related Work Described Elsewhere: South Florida Building Code and Standard Building Code, FDOT Standard Specifications and FDOT Design Standards.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

A. Netting Fence: fabricated of material acceptable to the City.

B. Sod is specified in Section 02578, "Solid Sodding."

2.02 SEDIMENTATION CONTROL

A. Bales: clean, seed-free cereal hay type.

B. Netting: fabricated of material acceptable to the City.

C. Filter stone: crushed stone conforming to Florida Department of Transportation

specifications.

D. Concrete block: hollow, non-load bearing type.

E. Concrete: exterior grade not less than 1-inch thick.

F. Rock Bags: conforming to FDOT Specifications.

2.03 TURBIDITY CONTROL

A. Conforming to FDOT Design Standards Index 103 - Turbidity Barriers.

PART 3 - EXECUTION

3.01 EROSION CONTROL

A. Minimum Procedures for Grassing Are:
   1. Scarify slopes to a depth of not less than 6-inches and remove large clods, rock, stumps and roots larger than 1/2-inch in diameter and debris.
   2. Sow seed within 24-hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
   3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2-inches.
   4. Apply netting over mulched areas on sloped surfaces.
   5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

A. Install and maintain silt fence, silt dams, traps, barriers and appurtenances as shown on the approved descriptions and working Drawings. Hay bales which deteriorate and filter stone which is dislodged shall be replaced.

3.03 TURBIDITY CONTROL

A. Install and maintain turbidity barriers daily and as described in FDOT Index #103.

3.04 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Florida, the Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

END OF SECTION

SECTION 02140
DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This Section specifies the furnishing of equipment; labor and materials necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth, as shown on the Drawings, and/or geotechnical report.

1.02 QUALITY ASSURANCE

A. Qualifications: The Contractor shall engage a Geotechnical Engineer registered in the State of Florida, to design the temporary dewatering system. The Contractor shall submit conceptual plan for the dewatering system prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan and certification of this shall be provided by the Geotechnical Engineer. The dewatering system shall be designed by a firm who regularly engages in the design of dewatering systems and who is fully experienced, reputable and qualified in the design of such dewatering systems.

B. The dewatering of any excavation areas and the disposal of the water shall be in strict accordance with the latest revision of all local and state government rules and regulations.

C. Permits: The Contractor shall obtain and pay respective fees for all local, state, and federal permits (including the City, SFWMD, and/or SBDD) required for the withdrawal, treatment and disposal/discharge of water from the dewatering operation, prior to start of work.

D. Comply with Florida Administrative Code, Chapter 62-621.300 (2).

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. In accordance with FAC 62-621.300(2), submit analytical test results from a certified laboratory for the parameters listed in the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" to the FDEP and the City. The submitted information shall show the location of the work, where the water will be going to, as well as an estimate for the amount, rate and duration of discharge being proposed.

C. Provide notification to all jurisdictional permitting agencies in accordance with the requirements of the respective agency.

D. Provide a detailed plan and operation schedule for dewatering of excavations.
   1. Provide descriptive literature of the dewatering system.
   2. Provide a plan for erosion and sedimentation control during dewatering.
   3. Provide copies of all permits/approvals for disposal/discharge of water during dewatering.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall have on-site and available the analytical test results performed in accordance with the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" (FAC 62-621.300(2)).

B. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate within the excavation.

C. The Contractor's attention is directed to the water surface elevations discussed in the report(s) on subsurface investigations. Water levels will normally vary from season to season.

D. The Contractor shall be required to monitor the performance of the dewatering system during the progress of the Work and make such modifications as may be required to assure that the systems will perform satisfactorily. The dewatering system shall be designed in such a manner as to preserve the undisturbed bearing capacity of the sub-grade soils at the bottom of the trench or excavation.

E. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the City. Approval of the dewatering plan shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

F. If subsurface water is encountered, the Contractor shall utilize suitable equipment to adequately dewater the excavation. A wellpoint system or other City acceptable dewatering method shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. Within and adjacent to residential areas and other areas as required by the City, engines driving dewatering pumps shall be equipped with residential type mufflers and the noise shall not exceed 55 decibels within 50-feet.

3.02 DEWATERING AND DISPOSAL

A. The Contractor shall construct and place all pipelines, structures, concrete work, structural fill, backfill and bedding material in-the-dry. In addition, the Contractor shall make the final 24-inches of excavation in-the-dry and not until the water level is a minimum of 2-foot below proposed bottom of excavation. For purposes of this Contract, in-the-dry is defined as ±2% of the optimum moisture content of the soil.

B. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of all water entering excavations. Contractor shall keep excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

C. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

D. It is expected that dewatering will be required for pre-drainage of the soils prior to final excavation for most of the in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed so that the structure, pipeline or fill will not be floated or otherwise damaged.

E. If wellpoints are used, Contractor shall adequately space wellpoints to maintain the necessary dewatering. Provide suitable filter sand and/or other means to prevent pumping of fine sands and silts. A continual check shall be maintained by the Contractor to ensure that the subsurface soil is not being removed by the dewatering operations. Pumping from wellpoints shall be continuous and standby pumps shall be provided.

F. The Contractor's proposed method of dewatering shall include groundwater observation wells to determine the water level during construction. Observation wells shall be installed along pipelines as required to verify depth to water level and at locations approved by the City.

G. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from the surface shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped or drained by gravity to maintain an excavation bottom free from standing water.

H. Flotation shall be prevented by the Contractor by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible for all damages which may result from failure to adequately keep excavations dewatered.

I. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent properties or facilities. No water shall be discharged without appropriate treatment for adverse contaminants. No water shall be drained in work built or under construction without prior consent from the City. Water shall be filtered to

remove sand and fine soil particles before disposal into any drainage system.

J. Dewatering of excavations shall be considered incidental to the construction of the Work and all costs shall be included in the various Contract prices in the Bid Form, unless a separate bid item has been established for dewatering.

3.03 GROUNDWATER TREATMENT (IF REQUIRED)

A. If concentrations of tested groundwater quality parameters exceed those allowable in the FDEP Generic Permit for the Discharge of Produced Groundwater from any Non-Contaminated Site Activity (62-621.300(2), F.A.C.), the Contractor shall treat the effluent.

B. The Contractor shall immediately notify the City and discuss the parameters that exceed allowable limits.

C. The Contractor shall meet with the FDEP to determine alternatives that are acceptable to the FDEP.

D. The Contractor shall apply for and obtain any and all permits and/or treatment approvals that FDEP requires including but not limited too:
   1. Generic Permit for Discharges from Petroleum Contaminated Sites (62-621.300(1)). Allows discharges from sites with automotive gasoline, aviation gasoline, jet fuel, or diesel fuel contamination; or
   2. Permit for all Other Contaminated Sites (62-04; 62-302; 62-620 & 62-660). The coverage is available only through the individual NPDES permit issued by FDEP, allows discharges from sites with general contaminant issues i.e. ground water and/or soil contamination other than petroleum fuel contamination; or
   3. Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity (62-621.300(2), F.A.C.); or
   4. Generic Permit for Stormwater Discharge from Large or Small Construction Activities (62-621.300(4)(a), F.A.C.); or
   5. An Individual Wastewater Permit (62-604.300(8) (a)

E. The Contractor shall implement the appropriate treatment that is acceptable to FDEP and City to attain compliance for all excess limits encountered during dewatering activities. Treatment may include, but is not limited to: Chemical, Biological, Electrolysis or any combination of the three.

F. The Contractor shall make every effort to minimize the spread of contamination into uncontaminated areas. Provide for the health and safety of all workers at the job site and make provisions necessary for the health and safety of the public that may be exposed to any potentially hazardous conditions. Ensure provision adhere to all applicable laws, rules or regulations covering hazardous conditions and will be in a manner commensurate with the level of severity of the conditions.

G. If necessary, provide contamination assessment and remediation personnel to handle site

assessment, determine the course of action necessary for site security and perform the necessary steps under applicable laws, rules and regulations for additional assessment and/or remediation work to resolve the contaminations issue.

H. Delineate the contamination area(s) and any staging or holding area required and develop a work plan that will provide the schedule of projected completion dates for the final resolution of the contamination issue.

I. Maintain jurisdiction over activities inside any delineated contamination areas and any associated staging or holding areas. Be responsible for the health and safety of workers within the delineated areas. Provide continuous access to representatives of regulatory or enforcement agencies having jurisdiction.

3.04 REMOVAL

Immediately upon completion of the dewatering system, the Contractor shall remove all of his equipment, materials, and supplies from the site of the Work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started. The site shall be thoroughly cleaned and approved by the City.

END OF SECTION

SECTION 02215
FINISH GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Provide finish grading to all areas within the limits of construction.

B. Grade sub-soil. Cut out areas to receive stabilizing base course materials for paving and sidewalks. Place, finish grade, and compact topsoil.

1.02 PROTECTION

A. Prevent damage to existing fencing, trees, landscaping, natural features, benchmarks, pavement, and utility lines. Correct damage at no cost to the City.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

PART 2 - PRODUCTS

2.01 MATERIALS

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

B. Topsoil: Friable loam free from subsoil, roots, grass, excessive amount of weeds, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter. The topsoil shall be suitable for the proposed plant growth shown on the Drawings and specified. Use topsoil stockpiles on site if conforming to these requirements. If there is not sufficient topsoil available at the project site, the Contractor shall furnish additional topsoil as required to complete the Work at no additional cost to the City.

PART 3 - EXECUTION

3.01 SUB SOIL PREPARATION

A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches,

stones, etc. Remove sub-soil that has been contaminated with petroleum products.

B. Cut out areas to subgrade elevation which are to receive stabilizing base for paving and sidewalks.

C. Bring sub soil to required levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.

D. Slope grade away from building a minimum of 2-inches in 10-feet unless indicated otherwise on the Drawings.

E. Cultivate subgrade to a depth of 3-inches where topsoil is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted sub-soil.

3.02 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, and planting is to be performed. Place to the following minimum depths, up to finished grade elevations.
   1. 6-inches for seeded areas
   2. 4-1/2-inches for sodded areas
   3. 24-inches for shrub beds
   4. 18-inches for flower beds

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of subgrades.

D. Remove stones, roots, grass, weeds, debris, and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, and buildings to prevent damage which may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

A. Remove surplus sub soil and topsoil from site.

B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 02220
EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Excavate, backfill, and compact as required for the construction of the utility system consisting of piping and appurtenances, and structural construction as shown on the Drawings and specified herein. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, compaction, grading, and slope protection to complete the Work. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, all under ground utilities locations and appurtenances shown on the construction Drawings.

B. Definitions:
   1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material as determined by AASHTO T-180 (ASTM D155).
   2. Optimum Moisture: Percentage of water in a specific material at maximum density.
   3. Rock Excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
   4. Suitable: Suitable materials for fills shall be non-cohesive, non-plastic granular local sand and shall be free from vegetation, organic material, marl, silt, or muck. The Contractor shall furnish all additional fill material required.
   5. Unsuitable: Unsuitable materials are highly organic soil (peat or muck) classified as A-8 in accordance with AASHTO Designation M 145.

C. Plan For Earthwork: The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work under this Contract. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations, including maintenance of traffic, to the City for review. The Contractor shall consider, and his plan for excavation shall reflect, the equipment and methods to be employed in the excavation. The prices established in the Proposal for the Work to be done will reflect all costs pertaining to the Work.

1.02 QUALITY ASSURANCE

A. Testing laboratory employed by the City will make such tests as are deemed advisable. The Contractor shall schedule his work to permit a reasonable time for testing before placing succeeding lifts and shall keep the laboratory informed of his progress. Costs for initial testing shall be paid by the City; however, tests which have to be repeated because of the failure of the tested material to meet specification shall be paid for by the Contractor and the cost of re-testing shall be deducted from payments due the Contractor.

B. Standards
   1. AASHTO: American Association of State Highway and Transportation Officials
   2. ANSI: American National Standards Institute
   3. ASCE: American Society of Civil Engineers
   4. ASTM: American Society for Testing and Materials
   5. AWWA: American Water Works Association
   6. OSHA 29 CFR Subpart P – Excavations and Trenches a) 1926.650, 1926.651, 1926.652
   7. OSHA 29 CFR Subpart J - a) 1910.146 for Confined Space Entry

1.03 JOB CONDITIONS

A. Existing Utilities
   1. The Contractor is responsible for subsurface verification of existing utilities prior to construction. Locate existing utilities in the area of work in accordance with Sunshine State One Call regulations, Chapter 556, "Underground Facility Damage Prevention and Safety Act", FS.
   2. Should uncharted or incorrectly charted piping or other utility be encountered during excavation, notify the City. Keep all facilities in operation and repair damaged utilities to the satisfaction of the City.
   3. Damage and repair costs to such piping or utilities are the Contractor's responsibility.
   4. If utilities are to remain in place, the Contractor shall provide adequate means of protection.

B. Test borings and the sub-surface exploration data if previously done on the site will be made available upon request and are for the Contractor's information only.

1.04 PROTECTION

A. Sheeting and Bracing
   1. Requirements of the Trench Safety Act shall be adhered to at all times.

2. Furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, to protect adjacent structures and power poles from undermining, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other acceptable methods. If the City is of the opinion that at any point sufficient or proper supports have not been provided, the City may order additional supports put in at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the City.
3. The Contractor shall construct the sheeting outside the neat lines of the foundation unless indicated otherwise for the method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall be adequate to withstand all pressure to which the structure or trench will be subjected. Any movement or bulging which may occur shall be corrected by the Contractor at their own expense so as to provide the necessary clearances and dimensions.
4. Where sheeting and bracing is required to support the sides of excavations for structures, the Contractor shall engage a Professional Geotechnical Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design, and the Professional Engineer shall provide certification of this.
5. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.
6. The Contractor shall leave in place to be embedded in the backfill all sheeting and bracing not shown on the Drawings but which the City may direct him in writing to leave in place at any time during the progress of the Work for the purpose of preventing damage to structures, utilities, or property, whether public or private. The City may direct that timber used for sheeting and bracing be cut off at any specified elevation.
7. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, or otherwise as may be directed by the City.
8. The right of the City to order sheeting and bracing left in place shall not be construed as creating any obligation on the City's part to issue such orders, and their failure to exercise this right shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the Work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

9. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than 1-foot above the top of any pipe.

B. Pumping and Drainage:
   1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing the water level to return to the natural level as stipulated in Section 02140 "Dewatering." The Contractor shall engage a Professional Geotechnical Engineer registered in the State of Florida to design the dewatering systems. The Contractor shall submit to the City for a plan for dewatering systems prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan, and the Professional Engineer shall provide certification of this. The Professional Engineer shall be required to monitor the performance of the dewatering systems during the progress of the Work and require such modifications as may be required to assure that the systems are performing satisfactorily.
   2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the proposed bottom of excavation and to preserve the integrity of adjacent structures. Dewatering by trench pumping will not be permitted if migration of fine grained natural material from bottom, sidewalls, or bedding material will occur.
   3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.
   4. The Contractor shall take all additional precautions to prevent uplift of any structure during construction.
   5. Permission to use any storm sewers or drains for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. However, the Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the City or the authority having jurisdiction, at no cost to the City.
   6. The Contractor shall prevent flotation by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
   7. Removal of dewatering equipment shall be accomplished after compaction/density testing has been completed and the system is no longer required. The Contractor shall remove the material and equipment constituting the system.
   8. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, or other contaminates in order to prevent adverse effects on groundwater quality.

1.05 TESTING AND INSPECTION SERVICE

A. The City will provide a geotechnical testing and inspection service. The services include testing soil materials and quality control testing during filling and backfilling operations. Samples of soil materials shall be furnished to the testing service by the Contractor. The City shall pay costs of initial geotechnical testing. The Contractor shall pay for any subsequent testing required due to failure and laboratory stand-by charges incurred.

B. The Contractor shall provide monthly density testing reports to the City during backfilling activities. Density testing reports not submitted in a timely manner shall result in rejection of the pipe installed and rejection of the density testing reports until such time that density re-testing is coordinated and repeated at the Contractors expense.

C. Density testing scheduled subsequent to backfilling activities shall be coordinated with, and witnessed by the City. Failure by the Contractor to coordinate or have the City present shall result in rejection of the submitted density testing reports and re-testing at the Contractor's expense.

D. Dewatering systems shall not be removed until compaction/density testing has been completed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:
   1. All fill material shall be subject to the review and acceptance of the City.
   2. All fill material shall be free of organic material, trash, or other objectionable material. The Contractor shall remove excess or unsuitable material from the job site.

B. Common Fill Material: Common fill shall consist of mineral soil, substantially free of clay, organic material, muck, loam, wood, trash, and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger than 3-1/2-inches in any dimension in the top 12-inches or 6-inches in any dimension in the balance of fill area. Common fill shall not contain asphalt, broken concrete, masonry, rubble or other similar materials. It shall have physical properties that allow it to be easily spread and compacted during filling. Additional common fill shall be no more than 12 % by weight finer than the No. 200 mesh sieve, unless finer material is approved for use in a specific location by the City. Select Common Fill shall be as specified as above from common fill, except that the material shall contain no stones larger than 1/2-inches in largest dimension, and shall be no more than 5 % by weight finer than the No. 200 mesh sieve.

C. Structural Fill: Structural fill shall be reasonably well graded sand to gravelly sand having the following gradation:

US Sieve Size	Percent Passing By Weight
No. 1	100
No. 4	75 - 100
No. 40	15 - 80
No. 100	0 - 30
No. 200	0 - 12

D. Class 1 Soils*: Manufactured angular, granular material, 1/4 to 1-1/2-inches (6 to 4 mm) size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming to ASTM C33 stone size No. 89 and with particle size limits as follows:

U.S. Sieve Size	% Passing By Weight
½	100
3/8	100
No. 4	20 – 25
No. 8	5 – 30
No. 16	0 - 10
No. 50	0 - 2

E. Class II Soils**:
1. GW: Well graded gravels and gravel-sand mixtures, little or no fines. Fifty percent or more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty percent or more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
3. SW: Well graded sands and gravelly sands, little or no fines. More than passes No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
4. SP: Poorly graded sands and gravelly sands, little or no fines. More than 50 % passes No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.

*Soils defined as Class I materials are not defined in ASTM D2487.
**In accordance with ASTM D2487, less than 5 % pass No. 200 sieve.

F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

U.S. Sieve Size	Percent Passing By Weight
3/8	100
No. 10	85 – 100
No. 40	20 – 40
No. 200	0 - 12

G. Other Material: All other material, not specifically described, but required for proper completion of the Work shall be selected by the Contractor and acceptable by the City.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clearing:
   1. The construction areas shall be cleared of all obstructions and vegetation including large roots and undergrowth within 10-feet of the lines of the excavation.
   2. Strip and stockpile topsoil on the site at the location to be determined by the City.

3.02 EXCAVATION

A. General: Excavations for roadways, structures, and utilities must be carefully executed in order to avoid interruption of utility service.

B. Excavating for Roadways/Structures/Utilities:
   1. Excavation shall be made to such dimensions as will give suitable room for building the foundations and the structures, for bracing and supporting, for pumping and draining, and for all other work required.
      a. Excavation for precast or prefabricated structures shall be carried to an elevation 2-feet lower than the proposed outside bottom of the structure to provide space for the select backfill material. Prior to placing the select backfill, the excavation shall be measured by the City to verify that the excavation has been carried to the proper depth and is reasonably uniform over the area to be occupied by the structure.
      b. Excavation for structures constructed or cast in place in dewatered excavations shall be carried down to the bottom of the structure where dewatering methods are such that a dry excavation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavations shall be replaced with Class B concrete.
      c. Footings: Cast-in-place concrete footing sides shall be formed immediately after excavation.
   2. Immediately document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of

construction.

3. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of the Work.
4. Encounters with subsurface obstructions shall be hand excavated.
5. Excavation and dewatering shall be accomplished by methods that preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the City at the Contractor's expense.
6. The bottom of excavations shall be rendered firm and dry before placing any piping or structure.
7. All pavements shall be cut with saws or approved power tools prior to removal.
8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered. Excavated material not suitable for backfill shall be removed from the site and disposed of by the Contractor.

3.03 DRAINAGE

A. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition. The dewatering method used shall prevent disturbance of earth below grade.

B. All water pumped or drained from the Work shall be disposed of in a suitable manner without undue interference with other work, without damage to surrounding property, and in accordance with pertinent rules and regulations.

C. No construction, including pipe laying, shall be allowed in water. No water shall be allowed to contact masonry or concrete within 24-hours after being placed. The Contractor shall constantly guard against damage due to water and take full responsibility for all damage resulting from his failure to do so.

D. The Contractor will be required at his expense to excavate below grade and refill with crushed stone (gradation 57 or 89) or other acceptable fill material if the City determines that adequate dewatering has not been provided.

3.04 UNDERCUT

A. If the bottom of any excavation is below that shown on the Drawings or specified because of Contractor error, convenience, or unsuitable subgrade due the Contractor's excavation methods, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be approved by the City.

3.05 FILL AND COMPACTION

A. Compact and backfill excavations and construct embankment according to the following schedule. (Modified Proctor standard shall be ASTM D-1557):

STRUCTURES AND ROADWORK

Area	Material	Compaction
Beneath Structures	Structural Fill	12-inch lifts, compacted to 98% maximum density as determined by AASHTO T-180. Fill Should not be placed over any in-place soils until those deposits have been compacted to 98% Modified Proctor.
Around Structures	Structural Fill	12-inch lifts, 95% of maximum density as determined by AASHTO T-180. Rubber Tire or vibratory plate compactors shall be used
Beneath Paved Surfaces	Common Fill	12-inch lifts, 98% by maximum density as determined by AASHTO T-180 or as required by the FDOT Standards.
Open Areas	Common Fill	12-inch lifts, 95% by maximum density as determined by AASHTO T-180.

B. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents.

C. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. The backfill operation shall be performed to comply with all rules and regulations and in such a manner that it does not create a nuisance or safety hazard.

D. Embankments shall be constructed true to lines, grades, and cross sections shown on the plans or ordered by the City. Embankments shall be placed in successive layers of not more than 8-inches in thickness, loose measure, for the full width of the embankment. As far as practicable, traffic over the Work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.

E. If the Contractor requests approval to backfill material utilizing lifts and/or methods other than those specified herein, such request shall be in writing to the City. Acceptance will be considered only after the Contractor has performed tests, at the Contractor's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The City's acceptance shall be in writing.

F. One compaction test location shall be required for each 300 linear feet of pipe and for every 100 square feet of backfill around structures as a minimum. The City may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of the compaction tests within the trench shall be in conformance with the following schedule:
   1. At least one test at the spring line of the pipe.

2. At least one test for each 12-inch layer of backfill within the pipe bedding zone for pipes 24-inches and larger.
3. One test at an elevation of 1-foot above the top of pipe.
4. One test for each 2-feet of backfill placed from 1-foot above the top of the pipe to finished grade elevation.
5. Density testing is required for sanitary sewer manholes. Tests shall be staggered around the manhole within 3-feet of the structure's outside diameter.
   a. First test shall be 1-foot above the structure base.
   b. Second test shall be 2-feet above the first test and subsequent tests every 2-feet up the finished grade.
6. The Contractor shall provide additional compaction and testing prior to commencing further construction if the City's testing reports and inspection indicate that the fill has been placed below specified density.
7. The Contractor shall coordinate testing with the City approved testing laboratory and shall provide monthly test results to the City in a timely manner during construction activities. Density testing scheduled subsequent to backfilling activities shall be coordinated with the City and witnessed by the City representative. Failure by the Contractor to coordinate or have the City representative present shall result in rejection of the submitted density testing reports and re-testing at the Contractor's expense. Density testing reports not submitted in a timely manner shall result in rejection of the pipe installed and rejection of the density testing reports until such time that density re-testing is coordinated and repeated at the Contractor's expense as deemed necessary by the City's representative.
8. Dewatering systems shall not be removed until compaction/density testing has been completed.

END OF SECTION

SECTION 02570
STABILIZED SUBGRADE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: All labor, materials, and equipment required to install stabilized subgrade.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO) latest edition:
   1. AASHTO T-180 – Moisture-Density Relations of Soils Using a 10-lb Rammer and 18-in Drop

B. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition:
   1. Section 914 – Stabilization Materials

1.03 QUALITY ASSURANCE

A. Field compaction density, stability, and thickness testing frequencies of the subgrade shall be tested once every 300 linear feet of paving per 24-foot wide strip, staggered left, center, and right of centerline. Where less than 300 linear feet of asphalt is placed in 1-day, provide minimum of 1 test for each per day's construction at a location designated by the City.

1.04 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. Materials certificates signed by material producer and Contractor, certifying that each material item complies with specified requirements.

1.05 SYSTEM DESCRIPTION

A. Stabilize the roadbed below the proposed base to provide a firm and unyielding subgrade.

B. Provide a finished roadbed section that meets the bearing value requirements regardless of the quantity of stabilizing materials necessary to be added.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the approved products.

B. The Contractor may choose the type of stabilizing material.

C. Materials may be lime rock, shell rock, cemented coquina, or shell-base sources approved by the FDOT.

D. At least 97% by weight of the total material shall pass a 3-1/2-inch (90-mm) sieve. Material having a plasticity index greater than 10 or a liquid limit greater than 40 shall not be used as a stabilizer.

2.02 LIMEROCK

A. For limerock, carbonates of calcium and magnesium shall be at least 70%.

2.03 CRUSHED SHELL

A. Crushed shell for this use shall be mollusk shell (i.e., oysters, mussels, clams, cemented coquina). Steamed shell will not be permitted.

B. At least 50% by weight of the total material shall be retained on the No. 4 (4.75 µm) sieve.

C. Not more than 20% by weight of the total material shall pass the No. 200 (75 µm) sieve. The determination of the percentage passing the No. 200 (75 µm) sieve shall be by washing only.

2.04 LOCAL MATERIALS

A. Local materials used for this stabilizing may be soils or recyclable materials such as crushed concrete, roof tiles, asphalt coated base, or reclaimed pavement. However, no materials that deteriorate over time, cause excessive deformations, contain hazardous substances, contaminates, or do not improve the bearing capacity of the stabilized material may be used.

PART 3 - EXECUTION

3.01 GENERAL

A. Prior to the beginning of stabilizing operations, construct the area to be stabilized to an elevation such that, upon completion of stabilizing operations, the completed stabilized subgrade will conform to the lines, grades, and cross-section shown in the plans. Prior to spreading any additive stabilizing material, bring the surface of the roadbed to a plane approximately parallel to the plane of the proposed finished surface.

B. Process the subgrade to be stabilized in 1 course, unless the equipment and methods being used do not provide the required uniformity, particle size limitation, compaction, and other desired results, in which case, the City will direct that the processing be done in more than 1 course.

3.02 APPLICATION OF STABILIZING MATERIAL

A. When additive stabilizing materials are required, spread the designated quantity uniformly over the area to be stabilized.

B. When materials from an existing base are to be used in the stabilizing at a particular location, place and spread all of such materials prior to the addition of other stabilizing additives.

C. Spread commercial stabilizing material by the use of mechanical material spreaders, except that where use of such equipment is not practicable, use other means of spreading, but only upon written approval of the proposed alternate method.

3.03 MIXING

A. Perform mixing using rotary tillers or other equipment meeting the approval of the City. The Contractor may mix the materials in a plant of an approved type suitable for this Work. Thoroughly mix the area to be stabilized throughout the entire depth and width of the stabilizing limits.

B. Perform the mixing operations as specified (either in place or in a plant) regardless of whether the existing soil, or any select soils placed within the limits of the stabilized sections, have the required bearing value without the addition of stabilizing materials.

3.04 MAXIMUM PARTICLE SIZE OF MIXED MATERIALS

A. At the completion of the mixing, ensure that the gradation of the material within the limits of the area being stabilized is such that 97% will pass a 3-1/2-inch sieve and that the material does not have a plasticity index greater than 8 or liquid limit greater than 30. Note that clay balls or lumps of clay size particles (2 microns or less) cannot be considered as individual particle sizes. Remove any materials not meeting the plasticity requirements from the stabilized area. The Contractor may break down or remove from the stabilized area materials not meeting the gradation requirements.

3.05 COMPACTION

A. Compact the materials at a moisture content permitting the specified compaction. If the moisture content of the material is improper for attaining the specified density, either add water or allow the material to dry until reaching the proper moisture content for the specified compaction.

3.06 FINISH GRADING

A. Shape the completed stabilized subgrade to conform to the finished lines, grades, and cross-section indicated in the Drawings. Check the subgrade using elevation stakes or other means approved by the City.

3.07 CONDITION OF COMPLETED SUBGRADE

A. After completing the stabilizing and compacting operations, ensure that the subgrade is firm and substantially unyielding to the extent that it will support construction equipment and will have the bearing value required by the Drawings.

B. Remove all soft and yielding material, and any other portions of the subgrade that will not compact readily. Replace yielding material with suitable material so that the whole subgrade is brought to line and grade with proper allowance for subsequent compaction.

3.08 MAINTENANCE OF COMPLETED SUBGRADE

A. After completing the subgrade, maintain it free from ruts, depressions, and any damage resulting from the hauling or handling of materials, equipment, and tools. The Contractor is responsible for maintaining the required density until the subsequent base or pavement is in place including any repairs or replacement of curb and gutter or sidewalk which might become necessary in order to recompact the subgrade in the event of underwash or other damage occurring to the previously compacted subgrade. Perform any such recompaction at no expense to the City. Construct and maintain ditches and drains along the completed subgrade section.

3.09 FIELD QUALITY CONTROL

A. When proper moisture conditions are attained, compact the material to not less than 98% of maximum density determined by AASHTO T-180, and a minimum LBR of 40.

END OF SECTION

SECTION 02573
ASPHALT PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Mill or remove existing asphalt pavement and base materials and install asphalt paving on a prepared base or as an overlay to existing asphalt pavement sections. Provide Maintenance of Traffic and coordinate and install temporary and permanent replacement of traffic signalization and pavement striping and markings.

1.02 REFERENCES

A. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, 2000 and 2004 editions.
   1. Section 300 – Prime and Tack Coats for Base Courses (2000 and 2004 Editions)
   2. Section 320 – Hot Bituminous Mixtures – Plant, Methods, and Equipment (2000 and 2004 Editions)
   3. Section 327 – Milling of Existing Asphalt Pavement (2000 and 2004 Editions)
   4. Section 330 – Hot Bituminous Mixtures – General Construction Requirements (2000 and 2004 Editions)
   5. Section 331 – Type S Asphalt Concrete (2000 Edition)
   6. Section 334 – Superpave Asphalt Concrete (2004 Edition)
   7. Section 901 – Coarse Aggregate (2000 and 2004 Editions)
   8. Section 902 – Fine Aggregate (2000 and 2004 Editions)
   9. Section 916 – Bituminous Materials (2000 and 2004 Editions)
   10. Section 917 – Mineral Filler (2000 and 2004 Editions)

B. Florida Department of Transportation (FDOT) Design Standards, 2000 and 2004 editions.

1.03 QUALITY ASSURANCE

A. Asphalt pavements shall be plant-mixed hot bituminous mixtures. Plant operations shall not begin unless all weather conditions are suitable for laying operations. A prime and tack coat shall be first applied to newly constructed bases. A tack coat shall be applied on existing pavements that are to be overlayed with an asphalt mix and between successive layers of asphalt mix. Apply prime and tack coats when ambient or base surface temperature is above 40°F, and when temperature has been above 35ºF for 12-hours immediately prior to application. Construct asphaltic concrete paving when ambient temperature is above 45°F. Do not apply when base is wet, contains excess moisture, or during rain. Establish and maintain required lines and elevations.

B. Do not spread the mixture when the wind is blowing to such an extent that proper and adequate compaction cannot be maintained or when sand, dust, etc., are being deposited on the surface being paved to the extent that the bond between layers will be diminished.

C. Field compaction density and thickness testing frequencies of the asphalt shall be tested once every 300-linear feet of paving per 24-foot wide strip, staggered left, center, and right of centerline. Where less than 300-linear feet of asphalt is placed in 1-day, provide minimum of 1 test for each per day's construction at a location designated by the City.

D. Asphalt extraction gradation shall be tested from grab samples collected once every 1,800-square yards of asphalt delivered to the site, or a minimum of once per day. Obtain the results in a timely manner (no later than the end of the day) so that adjustments can be made if necessary.

E. On initial use of a Type S mix design at a particular plant, as a minimum, run an additional extraction gradation analysis if more than 500-tons [450-metric tons] of mixture are produced on the first day of production.

F. Tolerances for Quality Control Tests (Extraction Gradation Analysis) shall be in accordance with FDOT Specification Section 331.

1.04 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. Submit for each proposed design mix the Gradation analysis; Grade of asphalt cement used; and Marshall Stability in pounds flow.
   2. Provide a single percentage of asphalt by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%. For structural mixes (S-1, S-3) establish the optimum asphalt content at a level corresponding to a minimum of 4.5% air voids. Provide the laboratory density of the asphalt mixture for all mixes except Open-Graded Friction Courses.
   3. Identify source and description of the materials to be used.
   4. Provide certification that the mix design conforms to specification requirements.
   5. Field compaction density and thickness testing.
   6. Field asphalt extraction gradation.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

B. Type S Asphalt Concrete (Type S-1 or S-3) is required. The equivalent fine Type SP (Superpave) Asphalt Concrete mixture (Traffic Level C) meeting the requirements of FDOT Specification Section 334 may be selected as an alternate at no additional cost to the City. The equivalent mixes are as follows:
   1. Type S-1: Type SP-12.5
   2. Type S-3: Type SP-9.5

C. Asphalt plant and equipment shall meet the requirements in FDOT Specification Section 320.

2.02 AGGREGATE

A. Coarse Aggregate, Stone, Slag, or Crushed Gravel shall meet the requirements in FDOT Specification Section 901.

B. Fine Aggregate shall meet the requirements in FDOT Specification Section 902.

C. Aggregate gradation shall meet the following:

Table 02573-1
Bituminous Concrete Mixtures
(Gradation Design Range)

Type	Total Aggregate Passing Sieves1							
	3/4-inch [19.0 mm]	1/2-inch [12.5 mm]	3/8-inch [9.5 mm]	No. 4 [4.75 mm]	No. 10 [2.0 mm]	No. 40 [425 µm]	No. 80 [180 µm]	No. 200 [75 µm]
S-1[4]	100	88-98	75-93	47-75	31-53	19-35	7-21	2-6
S-3[4]		100	88-98	60-90	40-70	20-45	10-30	2-6
ABC-1		100						0-12
ABC-2		100			55-90			0-12
ABC-3[2]	70-100			30-70	20-60	10-40		2-10
FC-2[3]		100	85-100	10-40	4-12			
FC-3[4]		100	88-98	60-90	40-70	20-45	10-30	2-6

1. In inches [mm] or sieves [µm].
2. 100% passing 1-1/2-inch [37.5 mm] sieve.
3. The City may increase the design range for the No. 10 [200 mm] sieve for lightweight aggregates.
4. The City may retain up to 1% on the maximum sieve size.

D. Use clean aggregate containing no deleterious substances. Do not use coarse or fine aggregate which contains more than 0.5% of phosphate.

E. In laboratory tests, and for the purpose of proportioning the paving mixture, consider all material passing the No. 10 [2.00-mm] sieve and retained on the No. 200 [75 µm] sieve as fine aggregate, and the material passing the No. 200 [75 µm] sieve as mineral filler.

F. Do not use any screenings in the combination of aggregates containing more than 15% of material passing the No. 200 [75 μm] sieve. When two screenings are blended to produce the screening component of the aggregate, one of such screenings may contain up to 18% of material passing the No. 200 [75 μm] sieve, as long as the combination of the two does not contain over 15% material passing the No. 200 [75 μm] sieve. Screenings may be washed to meet these requirements.

2.03 ASPHALT CEMENT

A. Superpave PG Asphalt Binder or Recycling Agent shall meet the requirements in FDOT Specification Section 916.

B. Mineral Filler shall meet the requirements in FDOT Specification Section 917.

C. Marshall design mix shall be in accordance with the following:

Table 02573-2
Marshall Design Properties For Bituminous Concrete Mixes

Mix Type	Minimum Marshall Stability (lbs.)	Flow* (0.01 in)	Minimum VMA (%)	Air Voids (%)	Minimum Effective Asphalt Content (%)	VFA Voids Filled with Asphalt (%)
S-1	1,500	8-13	14.5	4-5	**	65-75
S-3	1,500	8-13	15.5	4-6	**	65-75
ABC-1	500	7-15	15	5-16	6.0	-
ABC-2	750	7-15	15	5-14	5.5	-
ABC-3	1,000	8-13	14	4-7	**	65-78
FC-2	-	-	-	-	-	-
FC-3	1,500	8-13	15.5	4-6	**	65-75

* The maximum Flow value during production shall not exceed one point more than shown in the Table.
** The ratio of the percentage by weight of total aggregate passing the No. 200 sieve to the effective asphalt content expressed as a percentage by weight of total mix shall be in the range of 0.6 to 1.2.

2.04 BITUMINOUS MIXTURE

A. Use a bituminous mixture composed of a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and bituminous material. Ensure that no more than 20% by weight of the total aggregate used is silica sand or local materials as defined in FDOT Specification Section 902. Size, grade, and combine the several aggregate fractions in such proportions that the resulting mixture meets the grading and physical properties of the verified mix design.

PART 3 - EXECUTION

3.01 GENERAL

A. Set up, install and maintain temporary traffic control devices and detours as necessary in accordance with Specification Section 1570 "Maintenance of Traffic."

B. Asphalt pavements, including all surface courses and base courses, where shown to be open cut and removed on the Drawings or specified in the Project Manual, shall be removed to a line back from each edge of the trench, other excavation, or to the limits indicated on the Drawings. Pavements shall be cut straight, clean and square with a power saw or other tools and equipment suitable for the Work.

C. Asphalt pavements, where shown to be milled on the Drawings or specified in the Project Manual, shall be milled according to FDOT Specification Section 327.

D. Asphalt mixtures shall meet the general construction requirements specified in FDOT Specification Section 330.

E. Spread the mixture only when the surface upon which it is to be laid has been previously prepared, is intact, firm, and properly cured, and is dry. Do not spread mixture that cannot be finished and compacted during daylight hours.

F. Deliver the asphalt cement from the asphalt plant at a temperature not to exceed 350°F and equip the transport tanks with sampling and temperature sensing devices meeting the requirements of FDOT. Maintain the asphalt cement in storage within a range of 230°F to 350ºF in advance of mixing operations. Maintain constant heating within these limits, and do not allow wide fluctuations of temperature during a day's production.

G. Produce a homogeneous mixture, free from moisture and with no segregated materials, that meets all specification requirements for the mixture, including compliance with the Marshall Properties. Also apply these requirements to all mixes produced by the drum mixer process and all mixes processed through a hot storage or surge bin, both before and after storage.

3.02 PREPARATION OF APPLICATION SURFACES

A. Prior to the laying of the mixture, clean the surface of the base or pavement to be covered of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary.

B. Where an asphalt mix is to be placed on an existing pavement or old base that is irregular, and wherever the plans indicate, bring the existing surface to proper grade and cross-section by the application of patching or leveling courses.

C. Where an asphalt mix is to be placed over a newly constructed surface treatment, sweep and dispose of all loose material from the paving area.

D. Paint all structures which will be in actual contact with the asphalt mixture, with the exception of the vertical faces of existing pavements and curbs or curb and gutter, with a uniform coating of asphalt cement to provide a closely bonded, watertight joint.

E. Apply a prime and tack coat on newly constructed bases and apply a tack coat, as specified in FDOT Specification Section 300, on existing pavement structures that are to be overlaid with an asphalt mix and between successive layers of all asphalt mixes.

3.03 PLACING MIXTURE

A. Lay all asphaltic concrete mixtures, including leveling courses, other than adjacent to curb and gutter or other true edges, by the string line method to obtain an accurate, uniform alignment of the pavement edge.

B. For each paving machine operated, use a separate crew, each crew operating as a full unit. The Contractor's Certified Paving Technician in charge of the paving operations may be responsible for more than one crew but must be physically accessible to the City at all times when placing mix.

C. Check the depth of each layer at frequent intervals, and make adjustments when the thickness exceeds the allowable tolerance. When making an adjustment, allow the paving machine to travel a minimum distance of 32-feet to stabilize before the second check is made to determine the effects of the adjustment.

D. In limited areas where the use of the spreader is impossible or impracticable, the Contractor may spread and finish the mixture by hand.

E. Straightedge and back-patch after obtaining initial compaction and while the material is still hot.

F. Upon arrival, dump the mixture in the approved mechanical spreader, and immediately spread and strike-off the mixture to the full width required, and to such loose depth for each course that, when the Work is completed, the required weight of mixture per square yard [square meter], or the specified thickness, is secured. Carry an excess amount of mixture ahead of the screed at all times. Hand-rake behind the machine as required.

G. Construct each course in layers of the thickness as shown on FDOT Design Standards Index No. 513.

H. Before starting any rolling, check the surface; correct any irregularities; remove all drippings, fat sandy accumulations from the screed, and fat spots from any source; and replace them with satisfactory material. Do not skin patch. When correcting a depression while the mixture is hot, scarify the surface and add fresh mixture.

3.04 APPLICATION OF LEVELING COURSES

A. Before spreading any leveling course, fill all depressions in the existing surface more than 1-inch deep by spot patching with leveling course mixture, and then compact them thoroughly.

B. Place all courses of leveling by the use of two (2) motor graders; equip one with a spreader box. Use other types of leveling devices after they have been approved by the City.

C. When the total asphalt mix provided for leveling exceeds 50-lb/yds² [27-kg/m²], place the mix in two or more layers, with the average spread of any layer not to exceed 50-lb/yd² [27-kg/m²]. When using Type S-3 Asphaltic Concrete for leveling, do not allow the average spread of a layer to be less than 50-lb/yd² [27-kg/m²] or more than 75-lb/yd² [40-kg/m²]. The Contractor may vary the rate of application throughout the Project as directed by the City. When leveling in connection with base widening, the City may require placing all the leveling mix prior to the widening operation.

3.05 COMPACTING MIXTURE

A. The coverage is the number of times the roller passes over a given area of pavement. Regardless of the rolling procedure used, complete the final rolling before the surface temperature of the pavement drops below 160°F.

B. Seal Rolling: Provide two (2) coverages with a tandem steel-wheeled roller (either vibratory or static), weighing 5 to 12-tons, following as close behind the spreader as possible without pick-up, undue displacement, or blistering of the material. Use vibratory rollers in the static mode for layers of 1-inch or less in thickness.

C. Intermediate Rolling: Provide five (5) coverages with a self-propelled pneumatic-tired roller, following as close behind the seal rolling operation as the mix will permit.

D. Final Rolling: Provide one (1) coverage with a tandem steel-wheeled roller (static mode only), weighing 5 to 12-tons, after completing the seal rolling and intermediate rolling, but before the surface pavement temperature drops below 160ºF.

E. Operate the self-propelled, pneumatic-tired roller at a speed of 6 to 10-mph. For each roller, do not exceed an area of coverage of 4,000 yd²/hour; if rolling Type S Asphaltic Concrete, do not exceed an area of coverage of 3,000 yd²/hour.

F. Use a sufficient number of self-propelled pneumatic-tired rollers to ensure that the rolling of the surface for the required number of passes does not delay any other phase of the laying operation and does not result in excessive cooling of the mixture before completing the rolling. In the event that the rolling falls behind, discontinue the laying operation until the rolling operations are sufficiently caught up.

G. Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, headers, gutters, manholes, etc.

H. Use self-propelled pneumatic-tired rollers to roll all patching and leveling courses. Where placing the initial leveling course over broken concrete pavement, use a pneumatic-tired roller that weighs at least 15-tons. For Type S-3 Asphaltic Concrete leveling courses, use a steel-wheeled roller to supplement the traffic rollers. On other leveling courses, use a steel-wheeled roller to supplement the traffic rollers on all passes after the first pass.

I. Do not allow the rollers to deposit gasoline, oil, or grease onto the pavement. Remove and replace any areas damaged by such deposits as directed by the City. While rolling is in progress, test the surface continuously, and correct all discrepancies to comply with the surface requirements. Remove and replace all drippings, fat or lean areas, and defective construction of any description. Remedy depressions that develop before completing the rolling by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after obtaining the final compaction, remove the full depth of the mixture, and replace it with sufficient new mixture to form a true and even surface. Correct all high spots, high joints, and honeycombing as directed by the City. Remove and replace any mixture remaining unbonded after rolling. Correct all defects prior to laying the subsequent course.

J. Use a self-propelled pneumatic-tired roller on the first structural layer placed on a milled surface. Compact with a minimum of three passes.

3.06 JOINTS

A. Place the mixture as continuously as possible. Do not pass the roller over the unprotected end of the freshly laid mixture except when discontinuing the laying operation long enough to permit the mixture to become chilled. When thus interrupting the laying operation, construct a transverse joint by cutting back on the previous run to expose the full depth of the mat.

B. For all layers of pavement except the leveling course, place each layer so that longitudinal construction joints are offset 6-inches to 12-inches laterally between successive layers.

C. When laying fresh mixture against the exposed edges of joints (trimmed or formed as provided above), place it in close contact with the exposed edge to produce an even, well-compacted joint after rolling.

3.07 SURFACE REQUIREMENTS

A. Obtain a smooth surface on all pavement courses placed, and then straightedge all intermediate and final courses with a 15-foot rolling straightedge. Furnish a 15-foot [4.572-m] manual straightedge, and make it available at the job site at all times during the

paving operation for checking joints and surface irregularities.

B. Produce a finished surface of uniform texture and compaction with no pulled, torn, or loosened portions and free of segregation, sand streaks, sand spots, or ripples.

3.08 ACCEPTANCE REQUIREMENTS

A. Upon completion of the final surface or friction course, the City will test the finished surface with a 15-foot rolling straightedge. Correct all deficiencies in excess of 3/16-inch.

B. If correction is made by removing and replacing the pavement, remove the full depth of the course and extend at least 50-feet on either side of the defective area for the full width of the paving lane.

C. If correction is made by overlaying, cover the length of the defective area and taper uniformly to a featheredge thickness at a minimum distance of 50-feet on either side of the defective area. Extend the overlay the full width of the roadway. Maintain the specified cross slope. The City may adjust, as necessary, the mix used for the overlay for this purpose.

D. The maximum deficiency from the specified thickness as follows:
   1. For pavement of a specified thickness of 2-1/2-inches or more: 1/2-inch
   2. For pavement of a specified thickness less than 2-1/2-inches: 1/4-inch

E. Where the deficiency in thickness is: (1) in excess of 3/8-inch for pavement of less than 2-1/2-inches in specified thickness, or (2) in excess of 3/4-inch for pavement of specified thickness of 2-1/2-inches or more, correct the deficiency either by replacing the full thickness for a length extending at least 50-feet from each end of the deficient area.

F. For any case of excess deficiency of the pavement, if approved by the City for each particular location, correct the deficient thickness by adding new surface material, and compact it to the same density as the adjacent surface. The City will determine the area to be corrected and the thickness of new material added.

3.09 REPAIR AND RESTORATION

A. Replace asphalt pavement or roadway surfaces cut or damaged to equal or better condition than the original, including stabilization, base course, surface course, curb and gutter, and other appurtenances.

3.10 SIGNALIZATION, PAVEMENT STRIPING AND MARKING

A. The Contractor shall be responsible for coordinating, repairing or replacing all traffic signalization devices and traffic loops damaged during the pavement milling, removal and replacement process.

B. The Contractor shall be responsible for coordinating, inventorying, and replacing all temporary and permanent pavement striping and markings damaged during the asphalt pavement milling, removal, and replacement process.

C. Temporary pavement striping and markings shall be paint or reinforced retro-reflective removal tape. Foil back tape is not acceptable. Permanent pavement striping and markings shall be alkyd thermoplastic tape and raised reflective pavement markers.

END OF SECTION

SECTION 02576
CONCRETE SIDEWALKS AND DRIVEWAYS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Constructing new concrete sidewalks, driveways, and curb and gutters as shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Codes and Standards: Comply with applicable sections of F.D.O.T. Specifications and local governing regulations.

B. The mixture, placement, and curing of all concrete work shall be in accordance with F.D.O.T. Specifications.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. Furnish manufacturer's product data, design mixes, test reports, and materials certifications.

1.04 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities, as specified under Section 01570 "Maintenance of Traffic."

B. Utilize flagman, barricades, warning signs, and warning lights as required.

1.05 GUARANTEE

A. All restored areas within the public right-of-way shall be guaranteed for 1-year after final acceptance. In the event of cracked or broken concrete surfaces, the Contractor shall make the necessary repairs to restore the concrete within 10-calendar days after notification by the City. The cost of such repairs shall be paid by the Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the approved products.

2.02 CONCRETE MATERIALS

A. Forms: Steel or wood for each type of use of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
   1. Use flexible spring steel forms or laminated boards to form radius bends as required.
   2. Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.

B. Fibermesh Reinforcement: Fibermesh reinforcement fibers shall be 2-inches to 3-inches collated polypropylene fibers. Fibers shall be in strict accordance with the manufacturer recommendations and within the time as specified in ASTM C94, Type III 4.13 and applicable building codes.

C. Concrete Materials: Comply with requirements of F.D.O.T. Section 347 for concrete materials, admixtures, bonding materials, curing materials, and others as required.

D. Epoxy Resin Grout: Type N as specified in F.D.O.T. Section 926.

E. Aggregate, brick, or other material required to match existing driveway or walk shall be as approved by the City.

2.03 CONCRETE MIX, DESIGN, AND TESTING

A. Comply with requirements of applicable F.D.O.T. Section 347 for concrete mix design, sampling and testing, and quality control, and as herein specified.

B. Design the mix to produce standard weight concrete consisting of Portland cement, aggregate, air entraining admixture, and water to produce the following properties.
   1. Compressive Strength: Class B, 3,000 psi for walks and curbs.
   2. Compressive Strength: Class A, 4,000 psi for driveways.
   3. Air Content: 3% to 6% .

C. Concrete slump shall not exceed plus or minus 1-inch from approved design slump.

PART 3 - EXECUTION

3.01 CONCRETE SIDEWALK, DRIVEWAY, AND CURB AND GUTTER

A. Surface Preparation:
   1. Remove loose material from the compacted sub base surface immediately before placing concrete.
   2. Proof-roll prepared sub base surface to check for unstable areas and the need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

B. Form Construction:
   1. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of the Work and so that forms can remain in place at least 24-hours after concrete placement.
   2. Check completed form work for grade alignment to the following tolerances:
      a. Top of forms not more than 1/8-inch in 10-feet.
      b. Vertical face on longitudinal axis, not more than 1/4-inch in 10-feet.
   3. Clean forms for reuse immediately after use, and coat with form release agent as often as required to ensure separation from concrete without damage.

C. Concrete Placement:
   1. Do not place concrete until sub base and forms have been checked for line and grade. Moisten if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are completed to required finish elevation and alignment. Use special colors or aggregate as required to match existing material.
   2. Place concrete using methods which prevent segregation of the mix. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices. Do not use vibrators to push or move concrete in forms or chute.
   3. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.
   4. An automatic machine may be used for sidewalk or curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed the minimum herein specified. Machine placement must produce sidewalks and/or curbs and gutters to the required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

5. Joints: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of the concrete, unless otherwise indicated. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures place transverse joints to align with previously placed joints, unless otherwise indicated.
    a. Weakened-Plane Joints: Provide weakened-plane (contraction) joints sectioning concrete into areas as shown on the Drawings. Construct weakened plane joints for a depth equal to at least 1/4 concrete thickness, by sawing within 24-hours of placement or formed during finishing operations. Place joints at intervals not to exceed 10-feet if not otherwise indicated.
    b. Construction Joints: Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such pours terminate at expansion joints. Construction joints shall be as shown or, if not shown, use standard metal keyway-section form of appropriate height.
    c. Expansion Joints:
        (1) Provide premolded joint filler for expansion joints abutting concrete curbs, catch basin, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.
        (2) Locate expansion joints at 12-feet on center for concrete walks unless otherwise indicated.
        (3) Extend joint fillers full-width and depth of joint, and not less than 1/2-inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
        (4) Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Pieces shorter than 4-inches shall not be used unless specifically shown as such.
        (5) Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
        (6) Fillers and Sealants: Comply with the requirements of these specifications for preparation of joints, materials installation, and performance, and as herein specified.

D. Concrete Finishing:
1. After striking-off and consolidating concrete, smooth the surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.
2. After floating, test surface for trueness with a 20-foot straightedge. Variations exceeding 1/3-inch for any two points within 10-feet shall not be acceptable. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
3. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round 10-1/2-inch radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.

4. After completion of floating and when excess moisture or surface sheen has disappeared, broom finish sidewalks by drawing a fine-hair broom across concrete surface, perpendicular to a line of pedestrian traffic. If the existing material has another finish, match existing finish.
5. Do not remove forms for 24-hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas.

E. Curing:

Protect and cure finished concrete paving and walks, complying with applicable requirements of F.D.O.T. Section 350. Use moist-curing methods for initial curing of approved concrete curing compounds whenever possible.

F. Repairs and Protections:
1. Repair or replace broken or defective concrete, as directed by the City.
2. Drill test cores where directed by the City, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy resin grout.
3. Protect concrete from damage until acceptance of work. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
4. Sweep concrete pavement and wash free of stains and discolorations, dirt, and other foreign material just prior to final inspection.

3.02 FIELD QUALITY CONTROL

A. General: Repair or remove and replace unacceptable concrete sidewalk, driveways, or curb and gutter as directed by the City.

B. Surface Elevation: Actual surface elevations shall be within ± 0.05 feet of specified or indicated elevations an any given point. Surface elevations between any 2 given points shall be interpolated from a direct line between the 2 points. Surfaces exceeding actual elevation tolerances of more than ± 0.05 feet at any 2 points within a distance of 15-feet will not be acceptable.

END OF SECTION

SECTION 02578
SOLID SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Establishing a stand of grass by furnishing and placing grass sod. Included are fertilizing, watering, and maintenance as required to assure a healthy stand of grass. Solid sodding shall be placed on all slopes greater than 4:1, within 10-feet of all proposed structures, and in all areas where existing grass or sod (regardless of it's condition) is removed or disturbed by Contractor's operation unless otherwise specified or shown on the Drawings.

1.02 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. A certification of sod quality by the producer shall be delivered to the City ten days prior to use.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 GRASS SOD

A. Grass sod for the road rights-of-way shall be of variety to match the existing adjacent area and shall be well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.

B. Grass sod for restoration of new construction sites and/or areas disturbed by construction on existing sites shall be St. Augustine well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.

C. It shall be reasonably free of weeds and other grasses and shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. The sod shall be planted as soon as possible after being dug and shall be shaded and kept moist until it is planted.

2.03 FERTILIZER

A. Commercial fertilizers shall comply with the state fertilizer laws.

B. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash contained in the fertilizer.

C. The chemical designation of the fertilizer shall be 6-6-6. At least 50% of the nitrogen shall be derived from organic sources. At least 50 % of the phosphoric acid shall be from normal super phosphate or an equivalent source, which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container.

2.04 WATER FOR GRASSING

A. The water used in the sodding operations shall be by the Contractor as approved by the City.

PART 3 - EXECUTION

3.01 PREPARATION OF GROUND

A. The area over which the sod is to be placed shall be scarified or loosened to a depth and then raked smooth and free from debris. Where the soil is sufficiently loose and clean, the City, at its discretion, may authorize the elimination of ground preparation.

3.02 APPLICATION OF FERTILIZER

A. Before applying fertilizer, the soil pH shall be brought to a range of 6.0 - 7.0.

B. The fertilizer shall be spread uniformly over the area to be sodded at the rate of 700-pounds per acre, or 16-pounds per 1,000 square feet, by a spreading device capable of uniformly distributing the material at the specified rate. Immediately after spreading, the fertilizer shall be mixed with the soil to a depth of approximately 4-inches.

C. On steep slopes, where the use of a machine for spreading or mixing is not practicable, the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a depth of approximately 2-inches.

3.03 PLACING SOD

A. The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.

B. Where sodding is used in drainage ditches, or on slopes of 4:1 or greater, the setting of the pieces shall be staggered to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6-inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.

C. On slopes greater than 2:1, the Contractor shall, if necessary, prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth at suitable intervals.

D. Sod which has been cut for more than 72-hours shall not be used unless specifically authorized by the City after the inspection thereof. Sod which is not planted within 24-hours after cutting shall be stacked in an approved manner, maintained, and properly moistened. Any pieces of sod that, after placing, show an appearance of extreme dryness shall be removed and replaced by fresh, uninjured pieces.

E. Sodding shall not be performed when weather and soil conditions are, in the City's opinion, unsuitable for proper results.

3.04 WATERING

A. The areas on which the sod is to be placed shall contain sufficient moisture, as determined by the City, for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2-weeks. Thereafter, the Contractor shall apply water as needed until the sod roots and starts to grow for a minimum of 60-days (or until final acceptance, whichever is latest).

3.05 MAINTENANCE

A. The Contractor shall maintain, at his expense, the sodded areas in a satisfactory condition until final acceptance of the Project. Such maintenance shall include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

B. Replanting or repair necessary due to the Contractor's negligence, carelessness, or failure to provide routine maintenance shall be at the Contractor's expense.

END OF SECTION

SECTION 02660
POTABLE WATER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Provide a complete system for water transmission/distribution pressure piping and appurtenant items.

1.02 QUALITY ASSURANCE

A. Design Requirements
   1. Piping shall be laid with a minimum cover of 36-inches below finished grade for mains sized 12-inch and below and a minimum cover of 48-inches for mains sized 16-inch and greater. Pipe located within Local roadways (subdivisions) or within an easement, shall be laid with a minimum cover of 30-inches.
   2. Pipelines shall be constructed of the materials indicated in this specification and on the Drawings.

B. Pipe Inspection:
   1. The Contractor shall obtain a certificate of inspection from the pipe manufacturer stating that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications.
   2. The entire product of any plant may be rejected when, in the opinion of the City, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.
   3. All pipe and fittings shall be subjected to a visual inspection at the time of delivery and before being lowered into the trench. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.
   4. The City reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

C. Prevention of electrolysis is required in accordance with AWWA C105 and when crossing, or adjacent to, a power easement, gas easements, any location where induced currents may be present, in areas where aggressive soils exist, and where shown on Drawings. Electrolytic action through the contact of dissimilar metals shall be prevented by either:
   1. The separation of one material from the other by means of an insulating or dielectric coupling (polyethylene wrap), or
   2. The use of alternative materials, as directed by the City.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. Mill test certificates or certified test reports on pipe
   2. Details of restrained and flexible joints
   3. Detailed laying schedule for pipe
   4. Valves and valve boxes

1.04 JOB CONDITIONS

A. Water in Excavation
   1. Dewatering shall be in accordance with. Section 02140 "Dewatering." Water shall not be allowed in the trenches while the pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the City. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working.
   2. In no case shall the pipelines being installed be used as drains. The ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment.
   3. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the Work any such material has entered the pipelines, it must be cleaned as directed by the City so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

A. Pipe, Fittings, Valves, and Ancillary Equipment shall be installed as shown on the Drawings and as specified in Division 15.

B. Additional Work: Additional items of construction, necessary for the complete installation of the systems, shall conform to specific details shown on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Bedding:
   1. Pipe Cradle: Upon satisfactory installation of the pipe bedding material as specified in Section 02220 "Excavating, Backfilling and Compacting", a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.
   2. Cleanliness: The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying operations by means of plugs or other methods approved by the City. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

3.02 INSTALLATION

A. Pipe Identification/Location
   1. All PVC water mains shall be solid blue. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use.
   2. All ductile iron water mains shall be color coded blue with tape. The tape (minimum 2-inches) shall be permanently affixed to the top and each side of the pipe (3 locations parallel to the axis of the pipe). For pipes less than 24-inches in diameter, a single tape may be used along the top of the pipe.
   3. All HDPE water mains shall be a solid blue or black with 4 co-extruded equally spaced blue stripes of the same material as the pipe. Stripes painted on the pipe outside surface shall not be acceptable.
   4. If main is located over 30-feet from the edge of the pavement or in an easement, the Contractor shall install 4-inch diameter schedule 80 PVC utility pipe line markers over the pipe alignment at 1,000-feet intervals, at all valves, and at all locations where fittings deflect the pipe alignment in the horizontal plane. Utility pipeline markers shall include a decal and shall be colored blue for water service.
   5. All mains (PVC, HDPE, and DI) shall be installed with a continuous, insulated 10-gauge copper wire installed directly above the pipe for location purposes. Locate wire shall terminate in a test station box and be capable of extending 12-inches above the top of the box. Directionally drilled pipe shall be installed with 2 insulated 10-gauge copper wires.

B. Pipe: The color stripe and pipe text shall be located on the top of the pipe when installed. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.
   1. Gradient: Pipe shall be laid straight and depth of cover shall vary to provide uniform gradient or slope to pipe, whether grading is completed or proposed at time of pipe

installation. When a grade or slope is shown on the Drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade.

2. Pipe Joint Deflection
   a. Ductile Iron Pipe: Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed 75% of the maximum limits as shown in AWWA Standard C600 for ductile iron pipe.
   b. PVC Pipe: Joint deflection or pipe bending shall not be permitted. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.
3. Rejects: Any pipe found defective shall be immediately removed and replaced with sound pipe at the Contractor's expense.
4. Joint Compounds: No sulfur base joint compound shall be used.
5. Thrust restraints shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein. Restraining devices shall be specified in Sections 15062 "Ductile Iron Pipe and Fittings" and 15064 "Polyvinyl Chlorine (PVC) Pipe and Fittings", respectfully.

C. Installing Valves and Boxes
   1. Valves: Valves shall be carefully inspected, fully opened, and then tightly closed and the various nuts and bolts shall be tested for tightness. Any valve that does not operate correctly shall be removed and replaced.
   2. Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the valves so as to permit a valve key to be fitted easily to the operating nut. In unpaved areas, valve boxes shall be set to conform to the level of the finished surface and held in position by a concrete collar placed under the support flange as shown on the Drawings. The letter "V" shall be etched in the curb at each valve location. The valve box shall not transmit surface loads to the pipe or valve but be supported by bedding rock as shown on the Drawings. Extensions or risers for valve boxes shall be an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in extending the box to its proper height. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.
   3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or collar as shown in the Drawings.
   4. Identification Disc: Each 16-inch or larger valve (unless otherwise shown on the Drawings) installed shall be identified by a 3-inch diameter bronze disc anchored in the concrete pad or collar in unimproved areas and/or anchored on a 4-inch by 4-inch by 18-inch long concrete post set flush with the pavement surface in improved areas. The disc shall be stamped with the following information as shown on the Drawings:
      a. Size of the valve
      b. Type of valve

c. Service
d. Direction and number of turns to open

D. Concrete Encasement
1. Concrete encasement shall be constructed in accordance with details shown on the Drawings and shall be constructed of Class C concrete. Encasement shall be constructed where;
a. Indicated on the Drawings
b. The City orders the pipe encased
2. The points of beginning and ending of pipe encasement shall be not more than 6-inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.

E. Flush Out Connections: Flush out connections shall be installed at the locations as determined by the City and be full pipe size.

F. Service Connections: Service connections shall be installed at the locations determined by the City and in the manner shown on the Drawings. No service line shall terminate under a driveway.

G. Backfilling: Backfilling shall be in accordance with Section 02220 "Excavating, Backfilling and Compacting" of these specifications.

3.03 CLEANING

A. General: At the conclusion of the Work, the Contractor shall thoroughly clean the new pipelines by flushing with water or other means to remove all dirt, stones, or other material which may have entered the line during the construction period. Flushing is permitted for pipes less than or equal to 12-inch diameter.

B. Correction of Non-Conforming Work: All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the City. Non-conforming work shall be defined as failure to adhere to any specific or implied directive of this Project Manual and/or the Drawings, including but not limited to pipe not laid straight, true to the lines and grades as shown on the Drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, visible or detectable leakage, or failure to pass any specified test or inspection.

3.04 FIELD QUALITY CONTROL

A. Flushing
1. All pipelines less than or equal to 12-inches shall be flushed to remove all sand and other foreign matter. After initial slow-fill, pipe shall sit full for 24-hours to facilitate cleaning and collection of debris from interior of pipe. Flushing shall be accomplished through full pipe size connections at full pipe depth. The velocity of the flushing water shall be at least 2.5-feet per second. Flushing shall be terminated

at the direction of the City. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. The Contractor shall arrange with the City and pay for the source of flushing water.

2. In lieu of flushing, new water mains may be hydraulically or pneumatically cleaned with a polypropylene swabbing device in accordance with " City Utilities Standards and Construction Specifications Manual."
   a. The Contractor is responsible to provide temporary access and egress points.
   b. Passage of the cleaning swabs through the system shall be constantly monitored, controlled, and all poly swabs entered into the system shall be individually marked and identified.
   c. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test.
   d. The Contractor is responsible for collection of debris, water, and the swab. Considerations shall be made for protecting surrounding property and personnel.
   e. Swabbing speed shall range between 2 and 5-feet per second.

B. Pressure and Leakage Tests of Pressure Piping
   1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all pressure piping. Tests shall be made between valves and shall not exceed 2,000-feet. Each side of all valves shall be pressure tested. Multiple sections of main may be tested simultaneously providing there are non-pressurized sections in between each pressure-tested section.
   2. Standard: AWWA C600, Section 4, with the exceptions required herein and the exception that the Contractor shall furnish all gauges, meters, pressure pumps, and other equipment needed to test the lines.
   3. Hydrostatic Pressure Test
      a. Test Pressure: Pressure test at 50% above the normal working pressure, but not less than 150-psi, unless otherwise noted on the Drawings.
      b. Test Duration: Duration is 2-hours. If during the test, the integrity of the tested line is in question, the City may require a 6-hour pressure test.
      c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser, and angle globe valves shall be provided at each dead-end to bleed air from the line.
   4. Hydrostatic Leakage Test
      a. General: Following the pressure test, the Contractor shall perform the leakage test. The line shall be filled with water and all air removed for the test. The Contractor shall provide a pump to maintain the test pressure for the entire test period.
      b. Test Pressure: Maximum operating pressure as determined by the City but not less than 150-psi unless otherwise noted.
      c. Test duration: 2-hours.
      d. Allowable leakage: $$L = \frac{SD(P)0.5}{148{,}000}$$

         L = Allowable leakage (gallons per hour)
         S = Length of pipe tested (feet)
         D = Nominal diameter of pipe (inches)
         P = Average test pressure maintained (psig)

e. Visible Leakage: All leaks evident at the surface shall be repaired and leakage eliminated regardless of the measured total leakage.
f. Leakage Measurement: The amount of water required to maintain the test pressure is the leakage.

C. Wire Continuity Check: The Contractor shall perform a continuity check of the 10-gauge locating wire for the entire length of the main by performing a continuity test at each valve test station box.

3.05 DISINFECTING POTABLE WATER PIPELINES

A. General: Before being placed in service, all potable water pipelines shall be disinfected by chlorination. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required. The disinfection procedure shall be approved by the City.

B. Standard: AWWA 651, "Standard Procedures for Disinfecting Water Mains."

C. Procedure
1. Flush all dirty or discolored water from the line and introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line.
2. The chlorine solution shall remain in the pipeline for 24-hours.
3. Following the chlorination period, all treated water shall be flushed from the line and replaced with water from the distribution system.
4. Bacteriological sampling and analysis shall be made in full accordance with AWWA Manual C651 and the appropriate FDEP permit. If necessary, the Contractor will be required to re-chlorinate.
5. Sampling and analysis shall be done by the City.

D. Approval: The line shall not be placed in service until the requirements of the State and City Public Health Department are met and the bacteriological test results are approved by the Department of Environmental Protection.

3.06 CONNECTION TO EXISTING SYSTEM

A. All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the City. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the City. The cost of the Work in making the connections shall be paid for by the Contractor.

B. In the event the proposed main is to be connected to a main which has one or more active services between the point of connection and the first existing line valve, a temporary plug or cap shall be installed on the new main until the pressure tests and disinfecting are completed. Upon satisfactory completion, the cap or plug shall be removed from both mains and the connection made with pipe which has been swabbed out with a solution of chlorine and water. The connection shall be made as swiftly as possible and any water in

the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in service by the City's personnel.

C. In the event any existing users will be without water while a connection is being made, the Contractor shall notify the City 72-hours prior to disconnection. The City shall notify the affected user(s) when the water will be turned off and when the service is estimated to be resumed. In some instances, these connections may have to be made at night. No user shall be without water service for more than 3-hours.

3.07 SUPPLIER'S FIELD SERVICE:

A. The Contractor shall, at no additional cost to the City, arrange for a pipe supplier's field representative to be on-site to provide instruction to each crew working on the installation for a minimum of 4 push-on joints (PVC, DIP). The supplier's field representative shall certify that the installations observed were satisfactorily completed and all pipe installation crews were familiar with the proper methods and procedures for the pipeline installations.

3.08 WATER FOR USE IN FLUSHING, TESTING, AND DISINFECTION:

A. The Contractor shall arrange with the City for water required for pressure testing, flushing, and disinfection required by the Contractor. The Contractor shall provide meter and backflow preventer.

END OF SECTION

SECTION 02665

HORIZONTAL DIRECTIONAL DRILLING OF PRESSURE MAINS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish and install underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring for pressure pipe. This Work shall include all piping services, equipment, materials, and labor for the complete and proper installation testing, restoration of underground utilities, and environmental protection and restoration.

1.02 QUALITY ASSURANCE

A. Qualifications
   1. Directional drilling Contractor or Subcontractor shall have a minimum of 4-years experience constructing water, wastewater, or reclaimed water experience to include pipelines of the same or larger diameter and the same or greater lengths. All pipe and appurtenances of similar type and material shall be furnished by a single manufacturer.
   2. The Contractor's operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer's guidelines and recommendations.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. Work Plan
   2. Pipe
   3. Couplings
   4. HDPE mechanical joint adapters
   5. Training and experience of directional boring machine operator
   6. Directional drilling equipment Specifications including calibration records

B. Prior to beginning Work, the Contractor must submit a work plan to the City detailing the procedure and schedule to be used to execute the Project. The Work plan should include the following:
   1. A description of all equipment to be used
   2. Down-hole tools
   3. A list of personnel and their qualifications and experience
   4. List of Subcontractors
   5. A schedule of work activity

6. A safety plan and traffic control plan (if applicable)
7. An environmental protection plan and
8. Contingency plans for possible problems

C. Equipment
   1. The Contractor will submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the Project. Equipment shall include but not be limited to the following:
      a. Drilling rig
      b. Mud system
      c. Mud motors (if applicable)
      d. Down-hole tools
      e. Guidance system and
      f. Rig safety systems

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

B. The directional drilling equipment shall consist of the following:
   1. A directional drilling rig of sufficient capacity to perform the bore and pullback operations.
   2. A drilling fluid mixing, delivery, and recovery system of sufficient capacity to complete the crossing.
   3. A drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused.
   4. A magnetic guidance system to accurately guide boring operations.
   5. A vacuum truck of sufficient capacity to handle the drilling fluid volume and
   6. Trained and competent personnel shall operate the system.

C. All equipment shall be in good, safe operating condition with sufficient supplies, materials, and spare parts on hand to maintain the system in proper working order.

2.02 DRILLING SYSTEM

A. The directional drilling machine shall consist of a hydraulically powered system to rotate, push, and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing, and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pullback pressure during pullback operations. The rig shall be grounded during drilling and pullback

operations. There shall be a system to detect electrical current from the drilling string and an audible alarm that automatically sounds when an electrical current is detected.

2.03 PIPE

A. Pipe shall be HDPE pipe with ductile iron pipe outside diameters in accordance with AWWA C900 (C905) or C906 respectively. The dimension ratio shall be verified by the Contractor based on the pipe, joint, and material pull strength required for the directional drilling.

B. HDPE Pipe
   1. HDPE pipe and related fittings shall be made with prime virgin resins exhibiting a minimum cell classification as defined in ASTM D3350 and meeting the PE 3408 code designation with maximum dimension ratios equal to the following.

Table 02665-3
Maximum Dimension Ratios for HDPE Pipe

Type of Pipe System	Maximum Dimension Ratio
Wastewater	11
Water	11
Reclaimed Water 11	11

   2. HDPE pipe 4-inch and larger nominal diameter shall be joined by means of zero leak-rate butt (thermal heat) fusion welds and/or approved flanged joints. Joints shall provide axial pullout resistance. Pipe shall meet the requirements of ANSI/AWWA C906, and have an outside diameter dimension of ductile iron pipe. Flanged joints shall not be used below finished grade for horizontal directional drilling applications.
   3. HDPE pipe shall have been continuously marked by the manufacturer with permanent printing indicating at a minimum the following:
      a. Nominal size (inches)
      b. Dimension ratio (DR)
      c. Pressure rating (psi)
      d. Trade name
      e. Material classification (PE 3408)
      f. Plant, extruder, and operator codes
      g. Resin supplier code
      h. Date produced and
      i. HDPE pipe used for portable water mains shall bear the NSF Seal of Approval.
   4. HDPE pipe shall be black in color with permanent colored stripes extruded into the pipe length or shall be 1 solid-color, per the applicable service.

Table 02665-4
Pipe Color

Pipe Use	Color Coding
Potable Water	Blue
Wastewater	Green
Reclaimed Water	Purple

5. Installation Curvature
   The pipeline curvature shall not have a radius less than as shown in Table 02665-5.

Table 02665-5
HDPE Pipe Deflection Information

Pipe Diameter (inches)	Minimum Radius of Curvature (feet)	Offset per 20-ft Length (inches)
4	23	9.3
6	34	6.1
8	44	4.6
10	56	3.5
12	67	3.0
16	88	2.3

2.04 LOCATING WIRE

A. Locating wire shall be 10-gauge continuous single strand solid core copper wire with non-metallic insulation.

B. Color-coding shall be similar to pipeline identification colors.

C. A minimum of 3 locating wires shall be attached with nylon wire ties at different radial locations around the pipe to ensure continuity in at least 1 wire subsequent to installation. Contractor shall be required to provide as many wires as necessary to maintain continuity throughout the length of the directional bore. Failure of continuous continuity in the locating wire shall result in abandonment and reinstallation of the directional drill, at the discretion of the City.

2.05 DRILLING FLUIDS

A. Drilling fluids shall consist of a mixture of potable water and gel-forming colloidal material, such as bentonite or a polymer surfactant mixture producing a slurry of custard-like consistency.

PART 3 - EXECUTION

3.01 PERSONNEL REQUIREMENTS

A. Responsible representatives of the Contractor and Subcontractor(s) shall be present at all times during directional drilling operations. A responsible representative as specified herein is defined as a person experienced in the type of work being performed and who has the authority to represent the Contractor in a routine decision making capacity concerning the manner and method of carrying out the Work.

B. The Contractor and Subcontractor(s) shall have sufficient number of competent workers on the Project at all times to ensure the utility placement is made in a timely, satisfactory manner. Adequate personnel for carrying out all phases of the directional drilling operation (where applicable: tunneling system operators, operator for removing spoil material, and laborers as necessary for various related tasks) must be on the job site at the beginning of Work. A competent and experienced supervisor representing the Contractor or Subcontractor that is thoroughly familiar with the equipment and type of work to be performed, must be in direct charge and control of the operation at all times. In all cases, the supervisor must be continually present at the project site during the directional drilling operation.

3.02 WORK PLAN

A. Work plan should be comprehensive, realistic, and based on actual working conditions for this particular Project. Plan should document the requirements to complete the Project.
   1. Calibration records for guidance equipment shall be included. Specifications for any drilling fluid additives that the Contractor intends to use or might use shall be submitted.

3.03 COORDINATION OF THE WORK

A. The Contractor shall notify the City at least 3-days in advance of starting Work. In addition, the actual crossing operation shall not begin until the City is present at the project site and agrees that proper preparations for the crossing have been made. The City's approval for beginning the crossing shall in no way relieve the Contractor from the ultimate responsibility for the completion of the Work.

B. The Contractor and the City shall select a mutually convenient time for the crossing operation to begin in order to avoid schedule conflicts.

3.04 PROCEDURE

A. The installation of appropriate safety and warning devices in accordance with the "FDOT Manual on Traffic Control and Safe Practices" shall be completed prior to beginning Work.

3.05 INSTALLATION

A. Erosion and sedimentation control measures and on-site containers shall be installed to prevent drilling mud from spilling out of entry and/or exit pits. Drilling mud shall be disposed of off-site in accordance with local, state, and federal requirements and/or permit conditions.
   1. No other chemicals or polymer surfactant shall be used in the drilling fluid without written consent of the City and after a determination is made that the chemicals to be added are not harmful or corrosive to the facility and are environmentally safe.

B. Pilot Hole: Pilot hole shall be drilled on bore path with no deviations greater than 2% of depth over a length of 100-feet. In the event that pilot does deviate from bore path more than 2% of depth in 100-feet, the Contractor shall notify the City. The City may require the Contractor to pullback and re-drill from the location along bore path before the deviation.

C. Reaming: Upon successful completion of pilot hole, the Contractor will ream borehole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

D. Pullback: After successfully reaming borehole to the required diameter, Contractor shall put the pipe through the borehole. In front of the pipe shall be a swivel and barrel reamer to compact bore hole walls. Once pullback operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole. During pullback operations, the Contractor shall not apply more than the maximum safe pipe pull pressure at any time. A break away head rated at the maximum safe pull pressure shall be utilized.

E. As-built variance from the designed bore path shall not exceed ± (plus or minus) 1-foot in the vertical plane and ± 2-feet in the horizontal plane. The Contractor shall submit any proposed deviations from the design bore path with Shop Drawings.

F. The pipe entry area shall be graded to provide support for the pipe to allow free movement into the borehole. The pipe shall be guided in the borehole to avoid deformation of, or damage to, the pipe.

G. If unexpected subsurface conditions are encountered during the bore, the procedure shall be stopped. The installation shall not continue until the City has been consulted.

H. The pipe shall be pulled back through the borehole using the wet insertion construction technique. The pipe shall be installed full of water.

I. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, movement or distortion of surface features.

J. A boring log shall be kept with horizontal and vertical location every 10-feet. The

horizontal location of the bore shall be marked in the field during the bore. The Surveyor shall locate these marks and include this information with the bore depths in the Record Drawings. The Surveyor may make a note on the drawing page containing the directional drill and provide an exception for the directional drill only, as the directional drill route cannot be uncovered and physically located.

K. The pipe shall be installed at a depth of no more than 15-feet below pavement, as measured from the top of pipe.

3.06 FIELD TESTING

A. PVC Pipe

Perform hydrostatic testing for leakage following installation in accordance with the applicable test sections.

B. HDPE Pipe
1. Perform hydrostatic testing for leakage following installation of the directional drill.
   a. Test Duration: The total test time including initial pressurization, initial expansion, and time at test pressure must not exceed 8-hours. If the test is not completed due to leakage, equipment failure, etc., the test section shall be depressurized and allowed to "relax" for a minimum of 8-hours before it is brought back up to test pressure. The test procedure consists of the initial expansion phase and leakage test phase.
   b. Initial Expansion Phase: During the initial expansion phase, the test section is pressurized to the test pressure and enough make-up liquid is added each hour for 3-hours to return to test pressure.
   c. Leakage Test Phase: The leakage test phase follows immediately and shall be either 2 or 3-hours in duration. At the end of the time test, the test section shall be returned to test pressure by adding a measured amount of liquid. The amount of make-up liquid added shall not exceed the values provided in Table 02665-6 plus allowable leakage.

Table 02665-6
Allowance for Make-up Water Under Pressure*

Test Duration (hours)	2	4	6	8	12	16	20	24
	Allowance/100-feet of Pipeline (gallons)							
2	0.11	0.25	0.60	1.00	2.30	3.30	5.50	8.90
3	0.19	0.40	0.90	1.50	3.40	5.50	8.00	13.30
*Applies to test period and not to initial expansion phase								

C. Pressure Testing
1. The test pressure for the pipe shall be 150-psi for water and reclaimed water and 100-psi for wastewater.

D. Mandrel Testing
   1. Perform mandrel testing through the entire length of the installed pipe. The mandrel size shall be 90% of the inside diameter of the pipe.

END OF SECTION

SECTION 02670

PRESSURE MAIN SAMPLE COLLECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE:

1. Where an existing pressure main is being tapped, connected to a new constructed main, or being prepared for abandonment, a pipe sample shall be collected in order for the City to perform a condition assessment of the pipe. This section specifies the procedures for collecting pipe samples and does not address the work involved in the tapping, the repair, or the actual abandonment of the pipeline.

A. GENERAL SAMPLE REQUIREMENTS:

1. The pipe samples shall be taken from all existing pipe connections or abandoned pipe that is ductile iron pipe, cast iron pipe, asbestos cement pipe, and prestressed concrete cylinder pipe.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION

1.02 PIPE SAMPLE COLLECTION

A. Contractor shall be responsible for obtaining coupons or sections from pressure mains being tapped, removed, or abandoned, digital photos, and completing the Pressure Main Sample Collection Submittal Form (see Appendix B). As indicated on the drawings, the Contractor shall collect coupons taken from line-stop operations, line taps, dry connection, or from any other operations such as where the pipe will be disconnected, removed or abandoned.

B. The submittal requirements are not considered complete unless all of the requirements described below are complete for each sample of pipe.

1. Complete the Pressure Main Sample Collection Submittal Form.

2. If applicable, note in the comments section of the form:
   a. The condition of the DIP external polyethylene wrap.
   b. Site observations relevant to work site of the sample (e.g. gas main in close proximity, AC pipe with areas of softness, etc.)
   c. Visually inspect the exposed asbestos cement pipe and note if there are areas of softness

3. Pipe sample unique identification number as shown on the drawings:
   a. Shall be printed on a sturdy waxed tag affixed to each whole piece of pipe sample or legibly marked on the pipe sample with permanent marking pen.
   b. Wet-tap samples shall have a legibly written ID number on the exterior side and top of the sample.
   c. An additional digit will be added at the end to indicate where multiple samples were taken from a pipe with the same ID number.
4. Pipe sample requirements:
   a. Wet-taps from a tapping sleeve - the complete tapping coupon
   b. Dry connection – 12" length of pipe
   c. Abandoned pipe – 12" length of pipe at the beginning and the end if applicable
   d. Pipe repair – 12" length of pipe that was cut from the existing pipe representative of damage or typical conditions.
5. GPS coordinates of where the sample was taken shall be noted on the Submittal Form

6. Provide digital photographs for the following views:
   a. Overall Work site
   b. Exposed pipe before tap or abandonment
   c. Sample exterior
   d. Close-up of the edge (thickness of pipe)
   e. All photos shall bear the unique sample ID number shown on the drawings, date, and time.

C. Prior to submitting a monthly pay request that includes payment for taps, connections, replacement or abandonment of pipe, the Contractor's requirements as specified herein shall be acceptable to the City.

END OF SECTION

SECTION 02784
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section specifies aluminum coated steel chain link fence, nominally 6-feet high, complete with gates to be constructed around the area indicated on the Drawings.

1.02 QUALITY ASSURANCE

A. Chain link fences and gates shall be constructed in accordance with specified standards, as well as all pertinent codes and regulations. Where provisions of pertinent codes conflict with the specifications, the more stringent provisions shall govern.

B. Chain link fences and gates shall be manufactured by established, reputable manufacturers that have been engaged in the manufacture of chain link fencing for at least 10-years.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. The Contractor shall submit layout drawings of all fence and gate installations along with details and manufacturer's literature of all fence and gate materials in the Project.

C. The Contractor shall submit all motor data, connection diagrams, wiring diagrams, and O&M instructions for all gate operators in the Project.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

A. Fabric: The fabric shall be aluminum coated steel chain link, 72-inches high, No. 9-gauge wire woven in a 2-inch mesh. The fabric shall conform to the requirements of ASTM Designation A491. The aluminum coating shall be a minimum of 0.40-ounces per square foot of wire surface for No. 9-gauge fabric. The fabric shall have a minimum tensile strength of 75,000-psi. The weight of the coating shall be determined by the strip test as defined in ASTM Designation A428. The fabric shall be coated with an ultra violet stable black PVC coating which meets ASTM standards F688 Class I.

B. Post and Other Appurtenances: All posts and other appurtenances used in the construction of this fence shall be hot dipped galvanized with a minimum of 1.8-ounces per square foot of surface. Pipe sections shall conform to the requirements of ASTM Designation A120. All posts, rails, and fittings shall be coated with an ultra violet stable black PVC coating which meets ASTM standards F688 Class I.

C. Sizes of Posts, Gate Frames, and Rails:

COMPONENT	DIMENSIONS	
	Nominal Diameter	NPS Pipe Schedule
1. End, corner & pull posts	3-inch	40
2. Gateposts (one leaf width 8-feet or less)	3-inch	40
3. Intermediate posts	2-3/8-inch	40
4. Gate Frames	1-5/8-inch	40
5. Braces	1-5/8-inch	40
6. Top Rails	1-5/8-inch	20

D. Gates
   1. Swing Gates: Gates shall be complete with latches, stops, keepers, and hinges. Gate frames shall be constructed of round tubular members continuously welded at all corners or assembled with fittings. Welds shall be painted with aluminum or zinc based paint prior to application of PVC coating. Gate filler shall be of the same fabric as specified for the fence and shall be attached securely to the gate frame with No. 9 tie wires at intervals not exceeding 12-inches. Hinges shall be of adequate strength for the gate and with large bearing surfaces for clamping in position. The hinges shall not twist or turn under the action of the gate. The gates shall be easily operable by one person. Latches, stops, and keepers for all gates, along with 1-inch stainless steel chain and padlock, shall be provided.
   2. Sliding Gates: Sliding gates shall be complete with latches, stops, keepers, rollers, and roller tracks. Gate shall ride on a double wheel carrier. Gateposts shall be 3-inch Sch. 40 and frame shall be 1-5/8-inch Sch. 40. Slide pipe tracks shall be 1-5/8-inch Sch. 40. Safety post (outside of gatepost) shall be 3-inch Sch. 40. Fabric shall match fence.

3. Gate padlocks shall be the City standard, case brass, shackle-case hardened steel, 1-inch links with 12-inch chain, 606 finish and keyed alike when more than one.

E. Top Rail: The top rail shall be provided with couplings approximately every 20-feet. Couplings are to be the outside sleeve type, at least 6-inches long.

F. Concrete: Concrete shall have a minimum compressive strength of 2,500-psi at 28-days.

G. Hardware: Miscellaneous hardware shall be of steel, malleable iron or ductile iron of standard design and conform to the requirements of the Chain Link Fence Manufacturer's Institute. All parts shall be galvanized except ties and clips may be aluminum.

H. Power Gate Operators: The operators for sliding gates shall be Robot Industries, Inc. Model LSG-100, Venco Model SJH, or acceptable equal units designed for use on cantilever sliding gates. Operator motors shall be 1 horsepower and shall be wound for 208 volt, 3 phase, and 60 Hz power supply. Units shall provide gate speed of not less than 75-feet per minute. Units shall be arranged for ground level mounting on 6-inch concrete pads. A quick disconnect for manual operation with a padlock control shall be provided. The cover for the operator shall be of galvanized steel, and the units shall be provided with electric overload protection.

PART 3 - EXECUTION

3.01 ARRANGEMENT

A. Posts: Posts shall be uniformly spaced, not to exceed 10-feet on centers. Intermediate posts shall have waterproof tops, which have integrally cast openings through which the top rails shall pass. Terminal posts shall consist of end, corner, and pull posts.

B. Braces: Braces shall be provided at each gate, corner, pull, and end post.

C. Top Rails: The top rails shall pass through the line post tops and form a continuous brace from end to end of each stretch of fence. The top rail shall be securely fastened to the terminal posts by heavy pressed steel brace bands and malleable end connections.

D. Bottom Tension Wire: The bottom tension wire shall be No. 7-gauge aluminum coated spring coil or crimped wire. Minimum weight of aluminum coating shall be 0.40-ounces per square foot of wire surface. The tension wire shall be stretched taut between terminal posts and securely fastened to each intermediate post 2-inches above the finish grade line. Tension wire shall be attached to the fence fabric with aluminum hog rings every 24-inches.

E. Stretcher Bars: Stretcher bars shall be no less than 3/16-inch by 3/4-inch in cross section and shall have minimum length 2-inches longer than the fabric height. Stretcher bars shall be used for attaching the fabric to all terminal posts by threading through the fabric and being attached to the posts with No. 9-gauge tension bands, or other positive mechanical means, spaced at 24-inch centers. One (1) stretcher bar shall be provided for each gate and end post and 2 for each corner and pull post.

F. Ties and Clips: Fabric shall be fastened to all intermediate posts with 9-gauge tie wires, spacing not to exceed 12-inches apart. Fabric shall be tied to top rail with 9-gauge tie wires, spacing not to exceed 24-inches on centers.

3.02 INSTALLATION

A. Post Setting: Line and terminal posts shall be set in holes 12-inches in diameter, 42-inches deep with 36-inch post embedment. After the post has been set and plumbed, the hole shall be filled with concrete. The exposed surface of the concrete shall be crowned to shed water.

B. Terminal and Gateposts: Terminal and gateposts shall be set as specified above and shall be braced to the nearest post with a galvanized horizontal brace used as a compression member and a galvanized 3/8-inch steel truss rod and turnbuckle used as a tension member.

C. Fabric: Fabric shall not be stretched until concrete footings have cured a minimum of 3-days. Chain link fabric shall be placed on the side designated by the City and shall be stretched taut approximately 2-inches above finish grade and securely fastened to all posts. Rolls of wire fabric shall be joined by weaving a single strand into the ends of the rolls to form a continuous mesh.

END OF SECTION

SECTION 02931 –

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction. Contractor shall engage and pay a Certified Arborist who will be responsible for supervising implementation of tree, shrub and plant protection throughout construction.

1.02 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4- inch size.

B. DBH (Diameter at Breast Height): The diameter at breast height of a tree's trunk measured at a height four and one-half (4 ½) feet above grade. In the case of multiple trunk trees, the DBH shall mean the sum of each trunk's diameter measured at a height of four and one-half (4 ½) feet above grade.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated on the Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.03 SUBMITTALS

A. Certified Arborist: Submit evidence contract with acceptable Certified Arborist prior to commencing site mobilization activities.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

B. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction prior to the work.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.

Description of maintenance following pruning.

C. Qualification Data: For qualified arborist and tree service firm.

D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

F. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by International Society of Arboriculture (ISA) or registered by the American Society of Consulting Arborists. In addition, Certified Arborist shall have experience in tree risk assessments, preferably TRAQ Qualified

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.

2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: 80 percent sand and 20 percent muck thoroughly mixed with a commercial shredder/blender or equivalent. Material shall be proportioned by volume rather than weight and site mixing is not allowed. Mixture shall be free from rocks greater that ½" in size, limbs, roots, and other deleterious matter. The Landscape Architect reserves the right to reject topsoil, at any time, used during the execution of the work not meeting specifications.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded Melaleuca, Grade A.
2. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position as indicated on the Drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated with flagging tape.

B. Protect tree root systems from damage caused by runoff or spillage of chemically injurious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Above-ground surface runoff shall not be directed into the tree canopy area from

adjacent areas. Ensure that sidewalks or other construction do not trap water near the tree.

D. Protect existing plant materials from unnecessary cutting, breaking and skinning of roots and branches, skinning and bruising of bark.

E. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.

1. Apply 3-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.2 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin.

B. Maintain protection zones free of weeds and trash.

C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by City.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.3 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to specifications.

B. Trenching near Trees: Where trenching for utilities is required within drip lines, tunnel under and around roots of 2-1/2 inches diameter or larger by hand digging. Do not cut main lateral roots that are two inches or larger. Cut smaller roots that are smaller than two inches that interfere with installation of new Work. Use sharp, approved pruning tools.

C. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

D. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning. . Treat and cover cut ends as directed by Certified Arborist.

E. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover, pack with wet peat moss or four layers of wet untreated burlap and temporarily support and protect roots from damage until permanently relocated and covered with backfill. Irrigate to eliminate voids and air pockets.

3.4 ROOT PRUNING

A. Certified Arborist shall direct tree root pruning and relocation work that are affected by temporary and permanent construction. Procedure for each tree may vary and shall be subject to approval by Certified Arborist and prior to commencing Work.

B. Prune as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, mutilate, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible in accordance with specifications.

C. Root Pruning at Edge of Protection Zone: Prune 6 inches outside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

D. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.5 PRUNING

A. Certified Arborist shall direct removal of branches from trees and large shrubs and correctional pruning and cabling that are affected by temporary and permanent construction. Procedure for each tree may vary and shall be subject to approval by Certified Arborist and prior to commencing Work.

B. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting

root system. Provide subsequent maintenance during Contract period as recommended by arborist.

2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
3. Tree limbs shall be trimmed or removed only under direction of skilled and experienced supervisor, according to directions of Arborist.

C. Chip removed branches and dispose of off-site.

3.6 REGRADING

A. Grade changes shall be limited to six inches of cut or fill from original grade and shall be accomplished by hand.

B. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

D. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

E. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.7 REPAIR AND REMOVAL OF TREES

A. Repair and Removal of Trees: Certified Arborist will determine whether trees shall be restored or removed. Treat and restore trees damaged by construction operations in a manner acceptable to City and owner of the tree, shrub, landscaping and other vegetation. Perform restoration and pruning promptly after damage occurs to prevent progressive deterioration of damaged trees. If trees cannot be restored, Replace trees and plants which are damaged or destroyed due to work operations at no cost to the City.

1. Remove dead and damaged trees that are determined by Certified Arborist to be incapable of restoration to normal growth pattern.

2. Contractor shall be liable for all damage and necessary restoration actions to existing

trees, including trunk, branches, or roots. Restoration shall be performed under direction of Certified Arborist.

3.8 REPAIR AND REPLACEMENT OF SHRUBS AND GROUND COVER

A. Repairs and Replacements of Shrubs and Ground Cover: Repair shrubs and other vegetation damaged by construction operation in manner acceptable to the City.

1. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged plant. Remove and replace all dead and damaged plants up to six inch diameter which are determined by the Certified Arborist as being incapable of restoration to normal growth pattern.

2. Provide new shrubs of same size and species as those replaced or as acceptable to the City.

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and properly dispose of them off Owner's property.

END OF SECTION

SECTION 15062
DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and install, all ductile iron piping, ductile iron fittings, and appurtenances as shown on the Drawings and as specified herein.

B. General Design: The equipment and materials specified herein are intended to be standard types of ductile iron pipe and cast or ductile iron fittings for use in transporting wastewater, potable water, and reclaimed water.

1.02 QUALITY ASSURANCE

A. Qualifications: All of the ductile iron pipe and ductile or cast-iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

B. Standards:
   1. ANSI A 21.50/AWWA C150
   2. ANSI A-21.51/AWWA C151
   3. ANSI A-21.41/AWWA C104

C. Factory Tests: The manufacturer shall perform the factory tests described in ANSI A-21.51/AWWA C151.

D. Quality Control
   1. The manufacturer shall establish the necessary quality control and inspection practice to ensure compliance with the referenced standards. All pipe on this Project shall be supplied by a single manufacturer unless otherwise accepted in writing by the City.
   2. In addition to the manufacturer's quality control procedures, the City may select an independent testing laboratory to inspect the material at the foundry for compliance with these specifications. The cost of foundry inspection requested by the City will be paid for by the City.

1.03 SUBMITTALS

A. Materials and Shop Drawings
   1. Submit Shop Drawings and piping layouts, including areas within and under buildings and structures. Shop Drawings shall include dimensioning, methods and locations of supports and all other pertinent technical specifications. Show locations of all field cuts. Shop Drawings shall be prepared by the pipe manufacturer. Shop Drawings for piping within and under buildings and structures shall be submitted within 30-days of Execution of Contract.

B. Operating Instructions: Submit Operation and Maintenance Manuals in accordance with Section 01001 "General Work Requirements."

C. Manufacturer's Certification
   1. Submit manufacturer's sworn certification of factory tests and test results.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

The Contractor shall be responsible for all materials furnished and stored until the date of project completion. The Contractor shall replace, at his expense, all materials found to be defective or damaged in handling or storage. The Contractor shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, samples or check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with the manufacturer's recommendations. Stored pipe shall be covered for protection against contamination and UV light. Joint gaskets shall be stored in clean, dark and dry location until immediately before use.

B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage to the pipe and fittings and their respective coatings. Pipe or fittings shall not be rolled off the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All pipe or fittings shall be examined before installation and no piece shall be installed which is found to be defective. Pipe shall be handled to prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of the City or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on level ground, graded to eliminate all rock points and to provide uniform support along the full pipe length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of the City, is damaged beyond repair by the Contractor shall be removed from the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ductile Iron Pipe
   1. Standards: ANSI A-21.50, AWWA C150 and ANSI A-21.51, AWWA C151
   2. Thickness/Pressure Class:
      a. Below ground piping: Class 350 (4-inch to12-inch), Class 250 (16-inch to 24-inch) and Class 200 (30-inch to 64-inch) unless otherwise noted or specified.
      b. Above ground piping: Flanged, Class 350 (minimum) unless otherwise noted or specified.
   3. Joints
      a. Push-on or Mechanical Joints (below ground piping)
         (1) Standards: ANSI A21.11, AWWA C111
         (2) Class: 350-psi working pressure rating
         (3) Gaskets
            (a) Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type.
            (b) Wastewater Service: Neoprene rubber ring type.
      b. Flanged (above ground or inside below ground vaults)
         (1) Standards: ANSI A21.15, ANSI B16.1
         (2) Class: 125-pound factory applied screwed long hub flanges, plain faced without projection.
         (3) Gaskets
            (a) Spans less than 10-feet: full-face 1/8-inch thick neoprene rubber
            (b) Spans greater than 10-feet: Toruseal gaskets as manufactured by American Cast Iron Pipe or acceptable equal.
      c. Restrained Joints
         (1) Manufacturers: Lok-Ring system (all sizes) or locking type gasket systems (for 16-inch diameter and smaller) as manufactured by American Ductile Iron Pipe; MEGALUG System as manufactured by EBBA Iron; or acceptable equal.
         (2) Class: 250-psi minimum design pressure rating.
         (3) Standard mechanical joint retainer glands shall not be acceptable.
      d. Joint Accessories
         (1) Mechanical joint bolts, washers and nuts: Ductile iron or Corten steel.
         (2) Flanged joint bolts, washers and nuts: 316 stainless steel with bolts and nuts conforming to ASTM A193 Grade B8M.
      e. Pipe Length (below ground installation): 20-feet maximum nominal length.
   4. Pipe Identification
      a. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant, and the class or strength classification of the pipe. The markings shall be plainly visible on the pipe barrel. Pipe which is not clearly marked is subject to rejection. The Contractor shall remove all rejected pipe from the project site within five NORMAL WORKING DAYS.

B. Fittings
   1. Ductile iron fittings 4-inch through 24-inch shall be pressure rated at 350-psi minimum, except flanged joint type fittings which shall be rated at 250-psi minimum. All 30-inch and larger fittings shall be pressure rated to 250-psi minimum. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron only. All fittings shall be cast and machined allowing the bolt holes to straddle the vertical centerline. All fittings shall be designed to be capable to withstand, without bursting, hydrostatic tests of three times the rated water working pressure. All fittings shall have a date code cast (not printed or labeled) with identification of date, factory, and the factory unit from which it was cast and machined. Fittings shall have the pressure rating, nominal diameter of openings, manufacturer's name, and the country where cast and number of degrees or fraction of the circle distinctly cast on them. Ductile iron fittings shall have the letter "DI" or "Ductile" cast on them.
   2. Joints shall be as described for ductile iron pipe for above ground/exposed and buried service.
   3. All potable water main fittings shall have NSF 61 certification, and ISO 9001 certification for both the foundry and manufacturer. The NSF 61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.

2.02 COATINGS, LININGS AND IDENTIFICATION MARKINGS

A. Exterior Coatings
   1. Below ground/buried or in a casing pipe:
      a. Type: Asphaltic coating, 1.0-mil DFT in accordance with ANSI/AWWA A21.51/C151.
      b. Markings: (continuous 3-inch wide strip within top 90 degrees of pipe - min. drying time 30-minutes before backfill).
      c. Color:
         (1) Raw Wastewater: Safety Green
         (2) Reclaimed Water: Purple (Pantone 522C)
         (3) Potable Water: Safety Blue
   2. Above ground/Exposed/In vaults
      a. Coatings and coating testing for ductile iron pipe and fittings for above ground/exposed applications shall be accordance with Division 9. Primer, intermediate and final coats whether shop or field applied shall be compatible and applied in ac cordance with the coating system manufacturer's recommendations. Refer to Appendix D "List of Approved Products" for approved coating system suppliers. Asphaltic seal coat applied to the exterior of above ground piping and fittings shall be blasted and completely removed prior to coating per NACE-3/SSPC-SP6 commercial blast cleaning minimum angular anchor profile of 1.5-mils.

b. Color
   (1) Raw Wastewater: Safety Green
   (2) Reclaimed Water: Purple (Pantone 522C)
   (3) Potable Water: Safety Blue

3. Inside Wetwell
   a. All piping inside of wastewater wetwell shall be 316 stainless steel.

B. Interior Lining (Applied by pipe manufacturer)
   1. Wastewater: Interior coating shall be Protecto 401 (amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment) for all pipe and fittings. All ductile iron pipe and fittings shall be delivered to the manufacturer certified applicator without asphalt, cement lining, or any other lining on the interior surface and no coating shall have been applied to the first 6-inches of the exterior of the DIP spigot ends. Minimum surface preparation shall be SSPC-SP 1 Solvent Cleaning method to remove oil and grease followed by NACE-4 / SSPC-SP7 Brush-Off Blast Cleaning. Protecto 401 shall be applied within 12-hours of surface preparation to the interior of the pipe and fittings so as to obtain a continuous and relatively uniform and smooth integral lining with a total minimum dry film thickness of 40-mils for the complete system. No lining shall take place when the substrate or ambient temperature is below 40°F. The lining shall not be used on the face of the flange of fittings or flanged pipe. The system shall be holiday free and holiday testing (minimum 2000 volts) shall be conducted and pinholes shall be repaired prior to shipping.
   2. Potable Water and Reclaimed Water: Interior coating shall be fusion-bonded epoxy (FBE) or Cement Mortar lined with asphaltic seal coat.
      a. FBE for Fittings: Fittings shall be supplied with a FBE coating, both inside and outside for total protection including flanged and buried fittings. The exterior of flanged fittings for above ground assemblies shall adhere to final exterior coating requirements per 3119 2.04 A. The FBE coating system shall meet or exceed ANSI/AWWA C-550 and C116/A21.116 requirements and shall have NSF 61 certification. FBE coating thickness shall be 6 to 8-mils dry film thickness, shall be applied for secure adhesion, shall have a smooth surface and shall be holiday free.
      b. Cement mortar lining with a seal coat of asphaltic material shall be in accordance with ANSI/AWWA A21.4/C104.

C. Polyethylene Encasement is required when pipe is within 10-feet of a gas main or as indicated on the Drawings:
   1. Standard: ANSI A 21.5/AWWA C105, 8-mil minimum thickness.

2.03 LOCATION MARKERS AND LOCATION WIRE

A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)
   1. Markers: Markers shall consist of a passive device capable of reflecting a specifically designated repulse frequency tuned to the utility (service) being installed. Markers shall be color coded in accordance with American Public Works Association's "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be installed directly above the centerline of the respective pipeline at intervals not to exceed 100-feet, at each fitting (tees, wyes, crosses, reducers, plugs, caps and bends) or change in horizontal direction and at each valve along the pipeline. Markers shall be hand backfilled to 1-foot above the pad and have a finished depth of burial of not less than 2-feet or more than 6-feet. No separate payment shall be made for furnishing and installing the respective frequency and color-coded electronic pad type marker.
   2. Locator System: Marker locator set shall be the Scotch Mark EM II Electronic Marker Locator Path Tracing Receiver, or acceptable equal. The Contractor shall furnish 1-locator set for each type of service piping installed on the project (i.e.: reclaimed water, wastewater) to the City. Each unit shall incorporate the following features and accessories:
      a. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.
      b. Field strength meter that provides visual indication of the return signal.
      c. Function switch for selection of operation mode.
      d. Sensitivity control to adjust the receiver gain.
      e. Audio speaker for signal response.
      f. Battery access panel containing condensed operating instructions.
      g. Auxiliary headset and heads set jack.
      h. Permanently attached shoulder straps.
      i. Rugged shockproof and weatherproof storage/carrying case.
   3. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

B. Location Detection Wire
   1. Materials: Continuous, insulated 10-gauge copper wire (color to match pipe identification).
   2. Installation: Directly above (1-inch maximum) centerline of pipe terminating at top of each valve box collar and be capable of extending 12-inches above top of box (stored inside the 2-inch brass pipe through the valve box collar) in a manner so as not to interfere with valve operation. For direction drilling installations, a minimum of 2 (two) 10-gauge wires shall be pulled along with the pipe.
   3. Continuity: Continuity of wire to be tested using Metrotech 810/9860 or acceptable equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ductile iron pipes shall be installed in accordance with AWWA C600 and AWWA Manual M-42. When a restraining type gasket is used, the bell shall be painted red.

B. Underground Ductile Iron Pipe and Fittings.
   1. Bedding firm, dry and even bearing of suitable material. Blocking under the pipe will not be permitted.
   2. Placement
      a. Alignment: In accordance with lines and grades shown on the Drawings. Deflection of joints shall not exceed 75% of the values recommended by the pipe manufacturer.
      b. The Contractor shall provide line and grade stakes at a 100-foot maximum spacing and at all line and/or grade change locations. The Contractor shall provide temporary benchmarks at a maximum of 1,000-foot intervals. The minimum pipe cover shall be 30-inches below the finished grade surface or 30-inches below the elevation of the edge of pavement of the road surface whichever is greater.
      c. All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken or otherwise defective materials are being used. All homing marks shall be checked for the proper length so as to not allow a separation or over homing of connected pipe. Homing marks incorrectly marked greater than 1-inch shall result in rejection of pipe and removal from site. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
      d. Proper implements, tools and facilities shall be used for the safe and proper protection of the Work. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.
      e. Trench Dewatering and Drainage Control: Contractor shall prevent water from entering trench during excavation and pipe-laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.
      f. Pipe Laying in Trench: Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and re-laid. Pigging of pipe may be used to remove foreign materials in lieu of flushing. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the City to ensure absolute cleanliness inside the pipe. The pipe shall be installed with the color stripe and pipe text on the top of pipe.

3. Cutting: When required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of the pipe to be used with a push-on bell shall be beveled. Bare metal exposed at ends of the pipe shall be field coated in accordance with pipe manufacturer's recommendations. Cut pipe for wastewater service shall have exposed bare metal ends repaired with Protecto 401 using the coating system manufacturer's field repair kit.
4. Joints
    a. Joint Placement
        (1) Push on joints: Pipe shall be laid with the bell facing upstream. The gasket shall be inserted and the joint surfaces cleaned and lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.
        (2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

C. Thrust Restraint
1. General: Thrust restraint shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein.
2. Length of Restrained Joints: In accordance with the lengths listed in the table as shown on the Drawings.

D. Installation of Pipes on Curves
1. Maximum deflections at pipe joints, fittings and laying radius for the various pipe lengths shall not exceed 75% (percent) of the pipe manufacturer's recommendation.

3.02 CLEANING AND FIELD TESTING

A. General: At the conclusion of the Work, the Contractor shall provide all associated cleaning and field testing as specified in other related sections of these specifications.

END OF SECTION

SECTION 15066

HIGH-DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

Scope of Work: Provide and install high-density polyethylene (HDPE) pipe and fittings of the sizes and in the locations shown on the Drawings and as specified for use in directional drilling.

1.02 STANDARDS

A. Pipe 1/2-inches (13-mm) through 3-inches (76-mm) shall conform to AWWA C901 and the Specifications.

B. Pipe and fittings 4-inches (102-mm) through 60-inches (1,524-mm) shall conform to AWWA C906 and the Specifications.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and Section 01300 "Submittals."

B. Submit manufacturers recommended method for butt-fusing joints.

C. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific product. Certification shall include a stress life curve per ASTM D2837.

D. Provide certification that the material is listed by the Plastic Pipe Institute in PPI TR-3 with a hydrostatic design basis of 1,600-psi (11 MPa) at 73°F. The PPI listing shall be in the name of the pipe manufacturer and shall be based on ASTM D2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe. Not sure this exists

E. Pipe Manufacturer shall be in listed and in good standing on the Plastic Pipe Institute website.

F. The manufacturer's certification shall state that the pipe was manufactured from 1 specific resin in compliance with these Specifications. The certificate shall state the specific resin used, its source, and list its compliance to these specifications.

G. Submit certified lab data to verify specified physical properties. Certify that tests are representative of pipe supplied for this project.

H. Submit affidavit of compliance with referenced standards (e.g., AWWA C901, C906, etc.).

I. Submit qualification certificates for operators of heat fusion equipment.

J. Submit schedule for placement of and removal of test bulkheads.

K. Submit certification that materials intended to contact potable water are listed under NSF 61.

1.04 INSPECTION

All materials and installation furnished under this specification are subject to inspection by the City.

1.05 QUALITY AND WORKMANSHIP

A. The pipe and fitting manufacturer's production facilities shall be open for inspection by the City or his designated agents. During inspection, the manufacturer shall demonstrate that the facilities are capable of manufacturing the pipe and fittings required by this specification, that a quality control program meeting the minimum requirements of ASTM D3035 and ASTM F714 is in use, and that facilities for performing the tests required by this specification are in use.

1.06 QUALIFICATION OF FUSION OPERATORS

A. Each operator performing fusion joining shall be qualified in the use of the manufacturer's recommended fusion procedure(s) by the following:

Appropriate training or experience in the use of the fusion procedure.

1. Making a sample joint according to the procedure that passes the following inspections and tests:
    a. The joint shall be visually examined during and after joining and found to have the same appearance as a photograph or sample of an acceptable joint that was joined in accordance with the procedure; and
    b. The joint shall be tested or examined by 1 of the following methods:
        (1) Pressure and tensile test as described in 49 CFR 192.283
        (2) Ultrasonic inspection and found to be free of flaws that would cause failure
        (3) Cut into at least 3 longitudinal straps, each of which is:
            (a) Visually examined and found to be free of voids or unbonded areas on the cut surface of the joint, and
            (b) Deformed bending, torque, or impact and if failure occurs, it must not initiate in the joint area.
2. Each operator shall be re-qualified under the procedure if during any 12-month period:
    a. Operator has not made any joints under the procedure; or
    b. Operator has 3 joints or 3% of the joints made, whichever is greater, that are found unacceptable by testing according to 49 CFR 192.513.

1.07 DELIVERY, STORAGE, AND HANDLING

A. On site pipe storage shall meet all manufacturers' requirements.

B. Transport individual pipe lengths to the job site on padded bunks with nylon tie-down straps or padded bonding to protect the pipe. Coiled HDPE pipe shall be stored in a manner to ensure safety. Protect the pipe from sharp objects. Anchor pipe securely to prevent slippage.

C. Store individual pipe lengths on earth berms or timber cradles in the numerical order of installation. Stack the heaviest series of pipe at the bottom. Do not stack pipe in excess of 10-rows high.

D. Protect the pipe from stones and sharp objects.

E. Store fittings in their original cartons.

F. Lift pipes with handling beams or wide belt slings near the middle of joints as recommended by the pipe manufacturer. Do not use cable slings, chains, or hooks.

G. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting. Remove any pipe section containing defects by cutting out the damaged section in a complete cylinder.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 PIPE

A. Pipe shall have a nominal ductile iron pipe size (DIP) OD. The dimension ratio shall be verified by the Contractor based on the pipe pull strength and the pressure rating of the pipe supplied shall be (DR 11) pressure class 200 for water main and reclaimed water main, and (DR 11) 200 for wastewater force main, in accordance with Table 5 of AWWA C906. The pipe shall be homogenous throughout and free of visible cracks, holes, voids, foreign inclusions, or other deleterious defects and shall be identical in color, density, melt index, and other physical properties throughout.

B. Pipe shall have a minimum hydrostatic design basis (HDB) of 1,600-psi (11 MPa), as determined in accordance with ASTM D2837.

C. Pipe Material
   1. Pipes shall be marked in accordance with AWWA requirements (C901 Section 2.4 or C906 Section 3.1, as appropriate).
   2. AWWA C901 pipe (1/2-inch (13-mm) through 3-inches (76-mm)) shall be PE 3408

OR PE 4710 DR 9, colored blue for water, purple (Pantone 522C lavender) for reclaimed water, and green for wastewater.

3. AWWA C906 pipe [(4-inches (102-mm) through 60-inches (1,524-mm)] shall be color coded as above with 4 not sure this is true for all sizes co-extruded equally spaced stripes of the same material as the pipe. Stripes printed on the pipe outside surface shall not be acceptable.
4. Materials used for the manufacture of polyethylene pipe and fittings shall be very high molecular weight, high-density ethylene/hexene copolymer PE 3408 or PE 4710 polyethylene resin meeting the requirements of Table 15066-1.

Table 15066-1
Physical Property and Pipe Performance Requirements

Property	Specification	Units	Minimum Values
Material Designation	PPI/ASTM	---	PE3408
Material Classification	ASTM D1248	---	III C 5 P34
Cell Classification	ASTM D3350	---	345434C
Hardness	ASTM D2240	Shore D	64
Compressive Strength (Yield)	ASTM D695	psi	1,600
Tensile Strength @ Yield (Type IV Spec.)	ASTM D638 (2%/min)	psi	3,200
Elongation @ Yield	ASTM D638	%, min	8
Tensile Strength @ Break (Type IV Spec.)	ASTM D638	psi	3,500
Elongation @ Break	ASTM D638	%, min.	600
Modulus of Elasticity	ASTM D638	psi	110,000
ESCR:			
(Cond A, B, C: Mold. Slab)	ASTM D1693	Fo, Hrs	Fo>5,000
(Compressed Ring)	ASTM F1248	F50, Hrs	F50>1,000
Slow Crack Growth	Battelle		Fo>32
	Method	Days to Failure	Minimum Values
Impact Strength			
(IZOD) (0.125-inch thick)	ASTM D256	in-lb/in	
	(Method A)	Notch	42
Linear Thermal			
Expansion Coef	ASTM D696	in/in/°F	1.2 x 10-4
Thermal Conductivity	ASTM C177	BTU, in/	2.7
		Ft2/hrs/°F	
Brittleness Temp	ASTM D746	°F	<-180
Vicat Soft. Temp	ASTM D1525	°F	+257
NSF Listing	Standard 61	---	Listed

Note: * Standard deviation 0.01.

5. The pipe shall be extruded from pre-compounded resin. In-plant blending of resin is unacceptable.

2.03 NIPPLES AND FLANGED STUB ENDS

Short nipples and stub ends shall be of the same material as the HDPE pipe.

2.04 FITTINGS

A. Fittings shall be made from material meeting the same requirements as the pipe.

B. Fittings shall meet the appropriate AWWA standard for the size involved (C901 or C906) and shall be minimum Pressure Class 200 for all mains.

C. Molded fittings shall be manufactured in accordance with ASTM D3261 and shall be so marked.

D. Mechanical fittings, when used, shall be specifically designed for, or tested and found to be acceptable for use with HDPE pipe.

E. Fittings used to connect with dissimilar pipe materials shall be provided as per Section 15062 "Ductile Iron Pipe and Fittings."

2.05 JOINTS

A. Sections of polyethylene pipe shall be joined into continuous lengths on the job site above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer.

B. Butt fusion joining shall result in joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used. Flanges, unions, grooved-couplers, transition fittings, and some mechanical couplers may be used to connect HDPE pipe mechanically without butt-fusion only where shown in the Drawings.

C. Ductile Iron and PVC to HDPE Connections
   1. Flanged connections between ductile iron pipe or fittings and HDPE pipe or fittings shall meet all requirements of Section 15062 "Ductile Iron Pipe and Fittings." HDPE pipe stiffeners shall be constructed of stainless steel and shall be flanged on one end to prevent over-insertion into the receiving pipe.
   2.
   3. Mechanical joint connections between ductile iron pipe or fittings and HDPE pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Mechanical joints shall be fully thrust restrained. Gaskets, bolts, and hexagonal nuts shall be standard rubber gaskets conforming to AWWA C111. Follower gland shall match class 350 compact fittings. HDPE MJ Adapter shall be fused to make the transistion between HDPE and PVC or DIP.

2.06 LOCATION DETECTION WIRES

A. Materials: three continuous, insulated 10-gauge copper wires or copper clad steel wires.

B. Installation: Wires shall be attached to the centerline of the HDPE pipe every 5-feet. Wires shall terminate at top of each valve box and be capable of extending 12-inches (305-mm) above the top of the box in a manner so as not to interfere with valve operation.

PART 3 - EXECUTION

3.01 HEAT FUSION

A. Use fusion equipment specially designed for heat fusion of HDPE. The equipment utilized shall be regulated for the different melt strength materials. Compatibility fusion techniques shall be used when polyethylene of different melt indexes are fused together.

B. Use the following procedure to butt fused HDPE pipe. If a procedure noted below contradicts manufacturer's recommendations, follow the manufacturer's recommendation.
   1. Maintain the proper temperature of the heater plate as recommended by the pipe manufacturer. Check it with a tempilstik or pyrometer for correct surface temperature.
   2. Clean pipe ends inside and outside with a clean cotton cloth to remove dirt, water, grease, and other foreign materials.
   3. Square (face) the pipe ends using the facing tools on the fusion machine. Remove all burrs, chips, and fillings before joining pipe or fittings.
   4. Check the line-up of pipe ends in the fusion machine to see that pipe ends meet squarely and completely over the entire surface to be fused. The clamps shall be tight so that the pipe does not slip during the fusion process.
   5. Insert the clean heater plate between the aligned ends and bring the ends firmly in contact with the plate but do not apply pressure while achieving the melt pattern. Allow the pipe ends to heat and soften. Softening depths shall be per the manufacturer's recommendation.
   6. Carefully move the pipe ends away from the heater plate and remove the plate (if the softened material sticks to the heater plate, discontinue the joint, clean heater plate, square pipe ends, and start over).
   7. The melted ends shall be connected rapidly but not slammed together. Apply enough pressure to form a double rollback bead to the body of the pipe around the entire circumference of the pipe about 1/8-inch (3.175-mm) to 3/16-inch (4.763-mm) wide. Pressure is necessary to cause the heated material to flow together.
   8. Allow the joint to cool and solidify properly. Remove the pipe from the clamps and inspect the joint appearance.

3.02 OPERATIONS INCIDENTAL TO JOINT COMPLETION

A. Plan joint completion to accommodate temporary test bulkheads for hydrostatic testing on the day of installation.

3.03 ASSEMBLING JOINTS

A. Flanged Joints
   1. Flange adapters shall be pressure rated the same as the pipe. Flange adapters shall be heat fused to the pipe as outlined in the heat fusion section.
   2. Gaskets shall be used between the polyethylene flange adapters when recommended by the HDPE pipe manufacturer. Sufficient torque shall be applied evenly to the bolts to prevent leaks. After initial installation and tightening of flanged connections, allow the connections to set for a few hours then conduct a final tightening of the bolts.
   3. Lubricate nuts and bolts with oil or graphite prior to installation.
   4. Check operation of valves connected to molded stub end flange adapters. Insert polyethylene spacer if recommended by pipe manufacturer for clearance.

B. Mechanical Joints
   1. Wipe the socket and the plain end clean. Lubrication and additional cleaning should be provided by brushing both the gasket and plain end with an approved pipe lubricant just prior to slipping the gasket onto the plain end for joint assembly. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end.
   2. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
   3. Push the gland toward the socket and center it around the pipe with the gland lip against the gasket. Insert bolts and hand tighten nuts. Make deflection after assembly but before tightening bolts.
   4. Tighten the bolts to the normal range of bolt torque as indicated in AWWA C-600 while maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
   5. When connection is being made to HDPE pipe or fittings use a welded flange to connect to fittings.

3.04 INSTALLATION

A. Installation of High-Density Polyethylene Pipe
   1. All high-density polyethylene (HDPE) pipe shall be handled, stored, assembled, and installed in accordance with AWWA C906, manufacturer's recommendations, and these Specifications.
   2. HDPE pipe shall be installed using directional drilling method of construction in accordance with Section 02665 "Horizontal Directional Drilling of Pressure Mains."

B. Installation of HDPE Service Connections
   1. HDPE AWWA C901 (1/2-inch through 3-inch) water and reclaimed water service connections crossing roads shall be installed in a PVC casing pipe. PVC casing pipe may be installed by push/pull (reaming) methods as approved by the City. PVC casing pipe shall be Schedule 40 and meet the requirements of ASTM D1785. PVC fittings shall be Schedule 40 and shall meet the requirements of ASTM D2466. Casing pipe/carrier pipe size shall be as follows:

Carrier Pipe (Nominal Dia.)	Casing Pipe (Nominal Dia.)			
	Size	O.D	Wall	I.D
1-inch	2-1/2-inches	2.875	0.203	2.469
1-1/4-inch	3-inches	3.50	0.216	3.068
1-1/2-inch	3-1/2-inches	4.00	0.226	3.548
2-inch	4-inches	4.5	0.237	4.026

2. Casing pipe shall be air pressure tested for leaks immediately upon completion of each crossing at a minimum test pressure of 20-psi (.138 MPa).
3. Following installation of carrier pipe within casing, install a plug in each open end of casing. Plugs shall be suitable for restraining against external earth load.

3.05 DISINFECTION OF PIPE

A. Flush and disinfect potable water pipe in accordance with Section 02660 "Potable Water System."

3.06 HYDROSTATIC TESTING

A. Perform hydrostatic testing for leakage prior to installation and following installation in accordance with manufacturer's written recommendations.

B. All pressure piping shall be hydrostatically tested at a pressure equivalent to 1-1/2 times the working pressure, but not less than 150-psi (1.034 MPa), unless otherwise noted. No high-density polyethylene pipe section under test will be accepted if the make-up water amount is greater than that specified in applicable specification Section 02660 "Potable Water System", Section 02661 "Wastewater Force Mains", and Section 02662 "Reclaimed Water System."

3.07 MANDREL TESTING

A. Perform mandrel testing through the entire length of the installed HDPE pipe. The mandrel size shall be 90% of the inside diameter of the pipe.

END OF SECTION

SECTION 15111
GATE VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish and install gate valves of the type and size and in the locations as shown on the Drawings and/or specified herein.

B. General Design
   1. Resilient seat non-rising stem (NRS) gates valves shall be used for underground service and for aboveground service where shown on the Drawings.
   2. Resilient seat Outside Stem and Yoke (OS&Y) gate valves shall be used for aboveground service only where shown on the Drawings.

1.02 QUALITY ASSURANCE

A. All gate valves of same type and style shall be manufactured by one (1) manufacturer.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City/Professional for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. Shop Drawings and submittals shall be submitted to the City/Professional Engineer for review and acceptance prior to construction for the following:
   1. Certified Shop Drawings showing details of construction, dimensions (including laying length), and weight.
   2. Descriptive literature, bulletins, and/or catalogs showing all valve parts and describing material of construction by material and specification, e.g., AISI.
   3. Valve coatings and linings, if any.
   4. A complete bill of materials for all equipment.
   5. See individual sections for additional requirements.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Shipping
   1. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed.
   2. Factory assembled parts and components shall be dismantled for shipment unless permission is received in writing from the City/Professional Engineer.

3. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built and securely bolted thereto.
4. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
5. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage, and handling.
6. Each box or package shall be properly marked to show its net weight in addition to its contents.

B. Storage
1. Store valves and accessories in an area on the construction site protected from weather, moisture, or possible damage.
2. Do not store valves or accessories directly on the ground.

C. Handling
1. Handle valves and accessories to prevent damage of any nature.
2. Carefully inspect all materials for:
a. Defects in workmanship and materials.
b. Removal of debris and foreign material in valve openings and seats.
c. Proper functioning of all operating mechanisms.
d. Tightness of all nuts and bolts.

1.05 WARRANTY AND GUARANTEES

A. The manufacturer's warranty period shall be concurrent with the Contractor's for 1-year, unless otherwise specified, commencing at the time of final acceptance by the City.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all equipment which lists for more than $500.00 (major equipment). The City reserves the right to request warranties for equipment not classified as "major". The Contractor shall still warrant equipment not considered to be "major" in the Contractor's 1-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide a 1-year warranty commencing at the date of substantial completion, the Contractor shall obtain from the manufacturer a 2-year warranty commencing at the time of equipment delivery to the job site. This 2-year warranty from the manufacturer shall not relieve the Contractor of the 1-year warranty starting at the time of City acceptance of the equipment.

D. The City shall incur no labor or equipment cost during the guarantee period.

E. Guarantee shall cover all necessary labor, equipment, and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage, or other failure of equipment or components furnished by the manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

A. Gate valves shall be resilient seat gate valves, manufactured to meet or exceed the requirements of AWWA C509/C515, latest revision, and these Specifications. All valves are to be tested in strict accordance with AWWA C509/C515.

B. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

C. The minimum design working water pressure shall be minimum 250-psig.

D. Gate valves shall be installed vertically per the Drawings and with minimum depth of cover per Table 15111-1.

Table 15111-1
Minimum Pipe Cover Required for Valves

Pipe Diameter (Inches)	Vertical Gate Valve Cover	
	LOCAL Roadway	Non-LOCAL Roadway*
4-inch – 8-inch	30-inch	36-inch
12-inch	36-inch	36-inch
16-inch	44-inch	48-inch
20-inch	-	50-inch
24+-inch	-	54-inch
* Additional 12-inches of cover is required for all vertical valves 16-inches and greater located in the pavement		

E. Valves 16-inches and larger shall be AWWA C515 resilient seated only (16-inches through 30-inches no gearing required).

F. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B for C509 valves and ductile iron ASTM A536 for C515 valves. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating in accordance with AWWA C 550.

G. A 2-inch wrench nut shall be provided for operating the valve. Valves 30-inches and larger shall be provide with spur gear actuators. Side actuated gate valves are not acceptable. All valves shall open left or counter clockwise.

H. The valves shall have non-rising stems with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two (2) stem seals shall be provided and shall be of the O-ring type. The stem nut must be independent of the gate.

I. The resilient sealing mechanism shall provide zero leakage at test and normal working pressure when installed with the flow from either direction.

J. Tapping valves shall be placed vertical where possible for Water and Reclaimed Water. When tapping existing mains, valves 24-inches and above shall be furnished with NPT pipe plugs for flushing the tracks.

K. All materials shall be in accordance with Appendix D "List of Approved Products."

PART 3 - EXECUTION

3.01 PREPARATION

A. All valves shall be inspected upon delivery in the field to insure proper working order before installation. Valves shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished. All buried gate valves shall be connected using restrained joints. All valves and appurtenances shall be installed true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the City before installation.

3.02 INSTALLATION

A. Install valves and accessories in strict accordance with manufacturer's instruction and recommendations as shown on the Drawings and as directed by the City.

B. Carefully erect all valves and support them in their respective positions free from distortion and strain.

C. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

D. Support all valves connected to pumps and equipment and in piping systems that cannot support valves.

E. Repair any scratches, marks and other types of surface damage with original coating as supplied by the factory.

F. Valves shall be carefully inspected, opened wide and then tightly closed and the nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Any valve that does not operate correctly shall be removed and replaced.

3.03 INSPECTION AND TESTING

A. Check and adjust all valves and accessories for smooth operation.

B. Test valves for leakage at the same time that connecting pipelines are tested. Protect or isolate any parts of valves, operators, or control and instrument systems whose pressure rating is less than the pressure tests.

END OF SECTION

CITY OF PEMBROKE PINES
RAW WATER SUPPLY LINE

APPENDIX A

GEOTECHNICAL REPORT

UNIVERSAL ENGINEERING SCIENCES
Consultants In: Geotechnical Engineering • Environmental Sciences
Geophysical Services • Construction Materials Testing • Threshold Inspection
Building Inspection • Plan Review • Building Code Administration

LOCATIONS:
- Atlanta, GA
- Daytona Beach, FL
- Fort Myers, FL
- Fort Pierce, FL
- Gainesville, FL
- Jacksonville, FL
- Miami, FL
- Ocala, FL
- Orlando, FL (Headquarters)
- Palm Coast, FL
- Panama City, FL
- Pensacola, FL
- Rockledge, FL
- Sarasota, FL
- Tampa, FL
- Tifton, GA
- West Palm Beach, FL

January 21, 2021

Kyle Bechtelheimer, P.E.
Senior Project Engineer
CPH, Inc.
500 West Fulton Street
Sanford, FL 32771

Reference: Geotechnical Exploration Services
Pembroke Pines Raw Water Main
7190 to 7960 Johnson Street
Pembroke Pines, Broward County, Florida
UES Project No. 0630.2000071
UES Report No. 17330

Dear Mr. Bechtelheimer:

In accordance with your request, Universal Engineering Sciences (UES) has completed a subsurface exploration for the above referenced project in Pembroke Pines, Broward County, Florida. The scope of this exploration was conducted in general accordance with UES Opportunity No. 0630.0620.00009 dated June 10, 2020, and Subconsultant Agreement authorized on October 19, 2020. This exploration was performed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

PROJECT DESCRIPTION

Based on the supplied information, UES understands that this project consists of the construction of raw water main piping via horizontal directional drilling along Johnson Street from 7190 to 7960 in Pembroke Pines, Florida; and relocation of a 30-inch sewer force main in the vicinity of the water treatment plant at 7960 Johnson Street in Pembroke Pines, Florida. A boring location plan has been supplied for UES's use.

UES's recommendations are based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, please inform Universal Engineering Sciences so that UES may review these recommendations.

FIELD EXPLORATION

At the client's request, the subsurface conditions at the sites were explored with a total of seven (7) soil borings designated B01 through B07. UES's drilling crew located the borings based on the provided boring location plan. A general location map of the project area appears in Appendix A: Site Location Map. The approximate locations of the soil borings are presented in Appendix B: Boring Location Plan.

The SPT borings were advanced to depths of 15 to 25 feet below existing grade using the rotary wash method; samples were collected while performing the SPT at regular intervals. UES completed the SPT in general accordance with ASTM D-1586 guidelines. Continuous sampling was conducted from 0 to 10 feet and then at 5-foot sampling intervals. The upper 4 feet of borings B05 and B06 were hand augered to clear underground utilities. The SPT test consists of driving a standard split-barrel sampler (split-spoon) into the subsurface using a 140-pound hammer free-falling 30 inches. The number of hammer blows required to drive the sampler 12 inches, after first seating it 6 inches, is designated the penetration resistance, or SPT-N value. This value is used as an index to soil strength and consistency. SPT soil borings were performed with the use of a safety hammer.

Soil samples collected during the SPT were placed in clean sample containers and transported to UES's laboratory where they were visually classified by a member of UES's geotechnical engineering staff in accordance with ASTM D-2488. These soil samples will be held in UES's laboratory for your inspection for 90 days, after which time they will be discarded unless UES is otherwise notified.

SUBSURFACE CONDITIONS

The results of UES's field exploration are shown on the boring logs included in Appendix B. The Key to Boring Logs is also included in Appendix B. The stratification lines shown on the boring logs represent the approximate boundaries between soil types. The actual soil boundaries may be more transitional than depicted. Generalized profiles of the soils found at the boring location are presented in Tables 1 through 7. The soil profiles were prepared from the field logs after the recovered soil samples were visually classified by a member of UES's geotechnical staff.

TABLE 1: SOIL PROFILE (B01)

Depth (feet)	Soil Description
0 – 2	Medium dense, brown, fine to medium grained SAND (SP) with LIMESTONE fragments.
2 – 6	Medium dense to loose, brown to dark brown, fine to medium grained SAND (SP) with trace of limestone fragments.
6 – 13	Loose, tan, fine to medium grained SAND (SP) with LIMESTONE fragments.
13 – 15*	Loose, tan, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater at 5.5 feet below ground surface at boring B01. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3.5 feet below existing grade.

TABLE 2: SOIL PROFILE (B02)	
Depth (feet)	**Soil Description**
0 – 2	Dense, brown, fine to medium grained SAND (SP) with LIMESTONE fragments.
2 – 6	Medium dense, tan to brown to dark brown, fine to medium grained SAND (SP).
6 – 13	Loose to medium dense, light brown to brown, fine to medium grained SAND (SP) with LIMESTONE fragments.
13 – 15*	Loose to dense, brown to tan, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 5.5 feet below ground surface at boring B02. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3.5 feet below existing grade.

TABLE 3: SOIL PROFILE (B03)	
Depth (feet)	**Soil Description**
0 – 2	Loose, gray, fine to medium grained SAND (SP) with LIMESTONE fragments.
2 – 13	Very loose to loose, brown to tan, fine to medium grained SAND (SP) with trace of limestone fragments.
13 – 25*	Medium dense, tan to gray, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 5 feet below ground surface at boring B03. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3 feet below existing grade.

TABLE 4: SOIL PROFILE (B04)	
Depth (feet)	**Soil Description**
0 – 4	Medium dense, gray, fine to medium grained SAND (SP).
4 – 18	Very loose to loose, brown to tan, fine to medium grained SAND (SP).
18 – 25*	Medium dense to dense, gray, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 5 feet below ground surface at boring B04. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3 feet below existing grade.

TABLE 5: SOIL PROFILE (B05)	
Depth (feet)	**Soil Description**
0 – 4	Gray, fine to medium grained SAND (SP).
4 – 13	Very loose to loose, gray, fine to medium grained SAND (SP).
13 – 25*	Medium dense, tan to light tan, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 5 feet below ground surface at boring B05. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3 feet below existing grade.

TABLE 6: SOIL PROFILE (B06)	
Depth (feet)	**Soil Description**
0 – 4	Gray, fine to medium grained SAND (SP).
4 – 13	Very loose to loose, brown to tan, fine to medium grained SAND (SP).
13 – 25*	Medium dense, light tan, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 5.5 feet below ground surface at boring B06. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 3.5 feet below existing grade.

TABLE 7: SOIL PROFILE (B07)	
Depth (feet)	**Soil Description**
0 – 4	Medium dense, gray, fine to medium grained SAND (SP) with LIMESTONE fragments.
4 – 13	Loose, gray to tan, fine to medium grained SAND (SP) with trace of limestone fragments.
13 – 25*	Medium dense, brown to gray, fine to medium grained SAND (SP).
* Boring Termination depth	

The test boring found groundwater about 6 feet below ground surface at boring B07. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is 4 feet below existing grade.

SOIL PARAMETERS

Tables 8 through 14 show estimated geotechnical soil parameters for the materials found in the test borings B01 through B07.

TABLE 8: RECOMMENDED SOIL DESIGN PARAMETERS (B01)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 6	7 – 13	30	0	0.33	3.0	0.5	110	--
6 – 15	4 – 6	29	0	0.35	2.88	0.52	115	52.6

TABLE 9: RECOMMENDED SOIL DESIGN PARAMETERS (B02)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 6	9 – 25	32	0	0.31	3.26	0.47	110	--
6 – 18	7 & 10	29	0	0.35	2.88	0.52	115	52.6
18 – 25	8 – 26	30	0	0.33	3.0	0.5	115	52.6

TABLE 10: RECOMMENDED SOIL DESIGN PARAMETERS (B03)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 4	8	29	0	0.35	2.88	0.52	105	--
4 – 13	1 – 6	28	0	0.36	2.77	0.53	115	52.6
13 – 25	12 – 19	31	0	0.32	3.12	0.48	115	52.6

TABLE 11: RECOMMENDED SOIL DESIGN PARAMETERS (B04)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 4	10 & 13	31	0	0.32	3.12	0.48	105	--
4 – 18	3 – 8	29	0	0.35	2.88	0.52	115	52.6
18 – 25	19 & 25	33	0	0.29	3.39	0.46	115	52.6

TABLE 12: RECOMMENDED SOIL DESIGN PARAMETERS (B05)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 5	--	--	0	--	--	--	105	--
5 – 13	2 – 7	28	0	0.36	2.77	0.53	115	52.6
13 – 25	9 – 17	31	0	0.32	3.12	0.48	115	52.6

TABLE 13: RECOMMENDED SOIL DESIGN PARAMETERS (B06)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Wet	Submerged
0 – 4	--	--	0	--	--	--	105	--
4 – 13	3 – 7	29	0	0.35	2.88	0.52	115	52.6
13 – 25	11 – 18	31	0	0.32	3.12	0.48	115	52.6

TABLE 14: RECOMMENDED SOIL DESIGN PARAMETERS (B07)								
Layer Depth (Feet)	SPT "N" Range	Phi	c (PSF)	k_a	k_p	K_o	Unit Weight (PCF)	
							Saturated	Submerged
0 – 6	7 – 18	31	0	0.32	3.12	0.48	105	--
6 – 25	7 – 24	31	0	0.32	3.12	0.48	115	52.6

UTILITY LINES EXCAVATION AND BACKFILL RECOMMENDATIONS

The following are UES's recommendations for the construction of the proposed utility lines.

1. As appropriate, install a temporary dewatering system capable of maintaining the groundwater level at least 2 feet below the bottom of the utility invert.

2. After excavation to design invert elevations, the in-situ bedding soils should be compacted to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557) to a depth of 12 inches below the bedding level. Compaction in confined areas can probably be achieved using jumping jacks or lightweight walk-behind vibratory sleds and/or rollers. However, contractor is responsible for selecting the appropriate compaction equipment. Any unsuitable soils (i.e. organics, excessively soft, highly plastic soils, etc.) encountered at trench bottom level should be removed and replaced with compacted approved backfill.

3. If difficult compaction operations are encountered for the soils beneath the utility invert elevations due to excessive fines content and/or saturated soil conditions, contractor may use aggregate/stone to stabilize the of bottom the excavation. This can be accomplished by undercutting 6 inches of the subgrade, placing coarse aggregate (FDOT 57 stone) in 6 inch loose lifts in the bottom of the excavation, and "beating" or "pounding" each lift of the stone into the saturated subgrade with compaction equipment (i.e. jumping jack) until it is absorbed, and another 6" 'lift of stone is pounded into the subgrade. Repeat until a firm, non-yielding subgrade is achieved. The non-yielding aggregate/soil subgrade should be probed to verify compaction (i.e. firm and stable) in lieu of density testing.

4. After stabilizing the bedding level soils and constructing the utility line, backfill the excavation with suitable native soils or imported fill placed in maximum 6 inch thick compacted lifts. Suitable native soils or imported fill material should consist of relatively clean sandy soils containing less than 12 percent passing the No. 200 sieve. Soils with greater than about 5 percent passing the No. 200 sieve will be sensitive to even slight changes in moisture content and may prove difficult to compact if the in-situ moisture contents are greater than about 2 percent above or below the optimum moisture content as determined by the laboratory proctor test. Each lift of backfill should be compacted to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557). Beneath pavement areas, the top 12 inches of backfill should be compacted to at least 98 percent. Additionally, local jurisdictional compaction requirements should be followed when stricter than the recommendations herein.

All excavation work must meet OSHA Excavation Standard Subpart P regulations. Either a trench box, braced sheet pile structure or an excavation with temporary side slopes should be designed according to OSHA requirements for the on-site soils. Provisions for maintaining workman safety within excavations is the sole responsibility of the contractor.

LIMITATIONS

The test borings completed for this report were widely spaced and are not considered sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on UES's boring information to negate the presence of anomalous materials or for estimation of material quantities. Therefore, UES will not be responsible for any extrapolation or use of UES's data by others beyond the purpose(s) for which it is applicable or intended.

During construction, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An (ASFE) publication, "Important Information about Your Geotechnical Engineering Report" appears in Appendix C, and will help explain the nature of geotechnical issues. Further, UES presents documents in Appendix C: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

This report is for the exclusive use of UES's client and the client's design team for this specific project. Information contained in this report may not be used or relied on by others without the expressed written consent of UES.

CLOSURE

UES appreciates the opportunity to have worked with you on this project and look forward to a continued association. Please contact UES if you have any questions, or if UES may further assist you as your plans proceed.

Respectfully submitted,
UNIVERSAL ENGINEERING SCIENCES, INC.
Certificate of Authorization No. 549

Allan G. Abubakar, P.E.
Project Engineer

Estela G. León Aguilar, M.S., P.E.
Geotechnical Department Manager
Professional Engineer # 83307
State of Florida

This item has been digitally signed and sealed by [Estela G. León Aguilar] on the date adjacent to the seal.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Enclosures: Appendix A: Site Location Map
Appendix B: Boring Location Plan
Boring Logs
Key to Boring Logs
Appendix C: Important Information About Your Geotechnical Engineering Report
Appendix D: General Conditions

Dist: Client (PDF)

APPENDIX A

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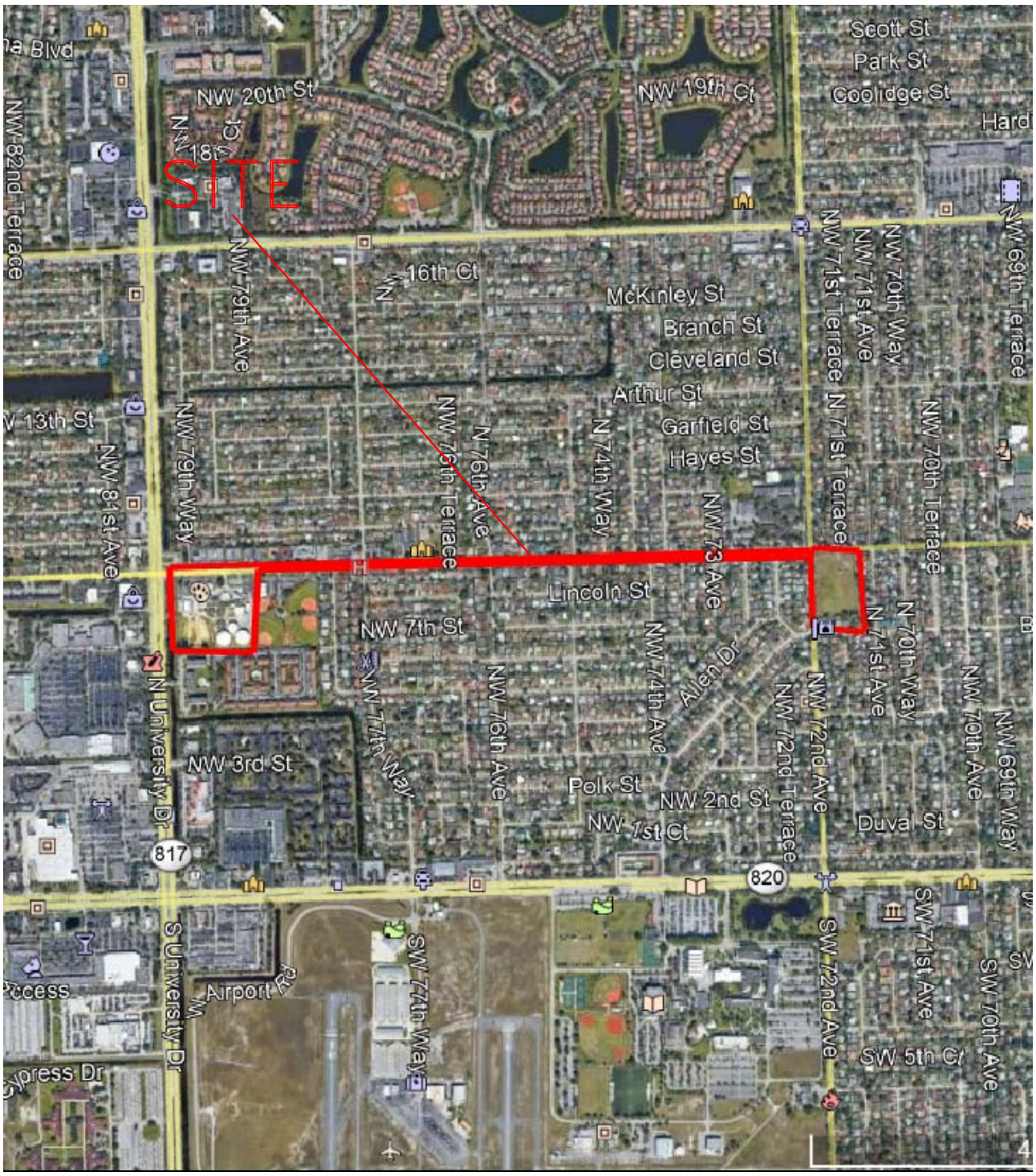

UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
PEMBROKE PINES WATERMAIN
PEMBROKE PINES, BROWARD COUNTY, FLORIDA

SITE LOCATION MAP

DRAWN BY:	A.G.A.	DATE:	01/19/2021	CHECKED BY:	E.L.A.	DATE:	01/19/2021
SCALE:	N.T.S.	PROJECT NO:	0630.2000071	REPORT NO:	17330	PAGE NO:	A–1

APPENDIX B

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GEOTECHNICAL EXPLORATION SERVICES
PEMBROKE PINES WATERMAIN
PEMBROKE PINES, BROWARD COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	A.G.A.	DATE:	01/19/2021	CHECKED BY:	E.L.A.	DATE:	01/19/2021
SCALE:	NTS	PROJECT NO:	0630.2000071	REPORT NO:	17330	PAGE NO:	B–1

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B01

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 15 ft
HOLE DIAMETER
DRILLER Rakesh Mahadeo
DATE STARTED 12/28/20
COMPLETED 12/28/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.50 ft / Elev 0.50 ft
METHOD SPT
LATITUDE 26.015605
LONGITUDE -80.24782
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
	5		Medium dense, brown, fine to medium grained SAND (SP) with LIMESTONE fragments.	1	90	4 9 9 11	18		
			2.0 Medium dense, brown, fine to medium grained SAND (SP) with trace of limestone fragments.	2	90	8 6 7 9	13		
			4.0 Loose, dark brown, fine to medium grained SAND (SP) with trace of limestone fragments.	3	90	4 4 3 2	7		
5	0		▽ 6.0 Loose, tan, fine to medium grained SAND (SP) with LIMESTONE fragments.	4	90	2 2 2 1	4		
				5	90	2 2 2 2	4		
10	-5		13.0						
			Loose, tan, fine to medium grained SAND (SP).	6	90	2 2 4 5	6		
15			15.0 Bottom of borehole at 15.0 feet.						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B02

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER Todd Beale
DATE STARTED 12/28/20
COMPLETED 12/28/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.50 ft / Elev -0.50 ft
METHOD SPT
LATITUDE 26.016349
LONGITUDE -80.246269
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
5								
		Dense, brown, fine to medium grained SAND (SP) with LIMESTONE fragments.	1	90	30 15 10 7	25		
	2.0							
		Medium dense, tan, fine to medium grained SAND (SP).	2	90	9 9 9 9	18		
	4.0							
5	0	Medium dense, brown, fine to medium grained SAND (SP).	3	90	7 5 4 2	9		
	▽ 6.0							
		Loose, brown, fine to medium grained SAND (SP) with LIMESTONE fragments.	4	90	1 3 4 1	7		
	8.0							
		Medium dense, light brown, fine to medium grained SAND (SP) with LIMESTONE fragments.	5	90	4 4 6 10	10		
10	-5							
	13.0							
		Loose, brown, fine to medium grained SAND (SP).	6	90	3 4 4 5	8		
15	-10							
	18.0							
		Medium dense, tan, fine to medium grained SAND (SP).	7	90	6 10 10 11	20		
20	-15							
		Dense, tan, fine to medium grained SAND (SP).	8	90	8 11 15 17	26		
25	-20							
	25.0							

Bottom of borehole at 25.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B03

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER John Wade
DATE STARTED 12/29/20
COMPLETED 12/29/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.00 ft / Elev 1.00 ft
METHOD SPT
LATITUDE 26.016703
LONGITUDE -80.242406
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
0	5	0.5 TOPSOIL.						
		Loose, gray, fine to medium grained SAND (SP) with LIMESTONE fragments.	1	90	3 3 5 5	8		
		2.0 Loose, light gray, fine to medium grained SAND (SP).	2	90	5 4 4 3	8		
		4.0 ▽ Very loose, brown, fine to medium grained SAND (SP) with trace of limestone fragments.	3	90	1 0 1 1	1		
5	0	6.0 Very loose, tan, fine to medium grained SAND (SP) with trace of limestone fragments.	4	90	2 1 1 2	2		
		Loose, tan, fine to medium grained SAND (SP) with trace of limestone fragments.	5	90	2 2 4 5	6		
10	-5	13.0 Medium dense, tan, fine to medium grained SAND (SP).	6	90	5 6 6 5	12		
15	-10	18.0 Medium dense, gray, fine to medium grained SAND (SP).	7	90	6 5 8 8	13		
20	-15		8	90	9 9 10 11	19		
25		25.0 Bottom of borehole at 25.0 feet.						

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B04

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER John Wade
DATE STARTED 12/29/20
COMPLETED 12/29/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.00 ft / Elev 0.00 ft
METHOD SPT
LATITUDE 26.016787
LONGITUDE -80.23981
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
	5		0.5 TOPSOIL.						
			Medium dense, gray, fine to medium grained SAND (SP).	1	90	2 4 6 8	10		
				2	90	7 7 6 3	13		
			4.0						
5	0		Very loose, brown, fine to medium grained SAND (SP). ▽	3	90	2 2 1 1	3		
				4	90	1 1 2 3	3		
			8.0						
			Loose, tan, fine to medium grained SAND (SP) with trace of roots.	5	90	2 2 3 4	5		
10	-5								
			13.0						
			Loose, tan, fine to medium grained SAND (SP).	6	90	3 3 5 6	8		
15	-10								
			18.0						
			Medium dense, gray, fine to medium grained SAND (SP).	7	90	5 8 11 10	19		
20	-15								
			Dense, gray, fine to medium grained SAND (SP).	8	90	10 12 13 14	25		
25	-20		25.0						

Bottom of borehole at 25.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B05

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER John Wade
DATE STARTED 12/29/20
COMPLETED 12/29/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.00 ft / Elev 1.00 ft
METHOD SPT
LATITUDE 26.016886
LONGITUDE -80.236584
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
	5	0.5 TOPSOIL.						
		Gray, fine to medium grained SAND (SP).	1	90				
			2	90				
		Very loose, gray, fine to medium grained SAND (SP). ▽	3	90	2 1 1 1	2		
5	0	6.0 Very loose, brown, fine to medium grained SAND (SP).	4	90	1 1 2 2	3		
		8.0 Loose, tan, fine to medium grained SAND (SP) with trace of roots.	5	90	3 4 3 4	7		
10	-5	13.0 Medium dense, tan, fine to medium grained SAND (SP).	6	90	4 5 6 6	11		
15	-10		7	90	4 5 4 6	9		
20	-15	23.0 Medium dense, light tan, fine to medium grained SAND (SP).	8	90	6 8 9 11	17		
25		25.0 Bottom of borehole at 25.0 feet.						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B06

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER John Wade
DATE STARTED 12/29/20
COMPLETED 12/29/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 5.50 ft / Elev 0.50 ft
METHOD SPT
LATITUDE 26.016961
LONGITUDE -80.233616
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)
	5	Gray, fine to medium grained SAND (SP) with LIMESTONE fragments, with ROOTS.	1	90				
		1.0 Gray, fine to medium grained SAND (SP).	2	90				
		4.0 Loose, brown, fine to medium grained SAND (SP).	3	90	2 2 2 2	4		
5	0	▽ 6.0 Very loose, brown, fine to medium grained SAND (SP) with trace of roots.	4	90	2 2 1 1	3		
		8.0 Loose, tan, fine to medium grained SAND (SP).	5	90	2 2 5 4	7		
10	-5							
		13.0 Medium dense, light tan, fine to medium grained SAND (SP).	6	90	5 5 6 5	11		
15	-10							
			7	90	5 6 6 5	12		
20	-15							
			8	90	6 8 10 10	18		
25		25.0 Bottom of borehole at 25.0 feet.						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

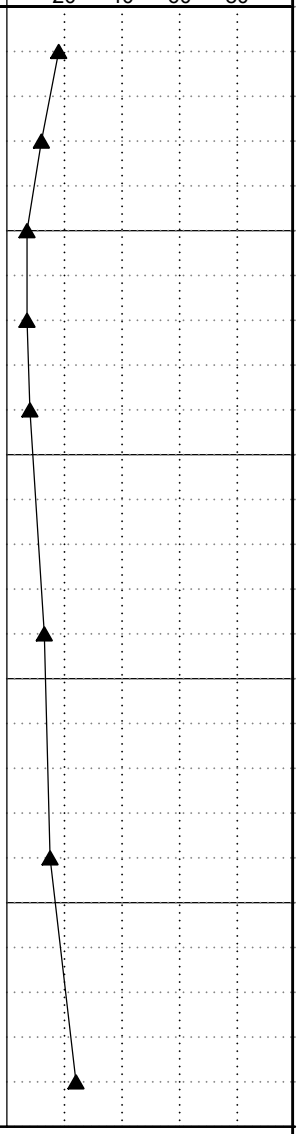
GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

LOG OF BORING B07

CLIENT CPH, Inc.
PROJECT NAME Pembroke Pines Raw Water Main
PROJECT NUMBER 0630.2000071.0000
PROJECT LOCATION 7190 to 7960 Johnson St., Pembroke, FL
DRILLING CONTRACTOR Universal Engineering Sciences
HOLE DEPTH 25 ft
HOLE DIAMETER
DRILLER Todd Beale
DATE STARTED 12/28/20
COMPLETED 12/28/20
DRILL RIG CME-45
GROUND WATER LEVEL: ▽ **AT TIME OF DRILLING** 6.00 ft / Elev 0.00 ft
METHOD SPT
LATITUDE 26.016791
LONGITUDE -80.231096
NOTE:
HAMMER TYPE 140# with 30 in Drop - Manual Hammer

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	N VALUE
0	5	Medium dense, gray, fine to medium grained SAND (SP) with LIMESTONE fragments.	1	90	8 9 9 11	18
	2.0					
		Mediumd ense, gray, fine to medium grained SAND (SP) with trace of limestone fragments.	2	90	8 8 4 6	12
	4.0					
5		Loose, tan, fine to medium grained SAND (SP) with LIMESTONE fragments.	3	90	2 3 4 3	7
	0 6.0 ▽					
		Loose, tan, fine to medium grained SAND (SP).	4	90	2 3 4 3	7
			5	90	3 3 5 7	8
10	-5					
	13.0					
		Medium dense, brown, fine to medium grained SAND (SP).	6	90	5 5 8 8	13
15	-10					
	18.0					
		Medium dense, gray, fine to medium grained SAND (SP).	7	90	6 6 9 10	15
20	-15					
			8	90	8 8 16 14	24
25	25.0					

Bottom of borehole at 25.0 feet.



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KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
NP	Non-Plastic (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Firm – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

APPENDIX C

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Important Information about This

Geotechnical-Engineering Report

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

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

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

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

Read the Full Report

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

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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

CONSTRAINTS & RESTRICTIONS

The intent of this document is to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of exploration. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

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APPENDIX D

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Universal Engineering Sciences, LLC
GENERAL CONDITIONS

SECTION 1: RESPONSIBILITIES **1.1** *Universal Engineering Sciences, LLC*, and its subsidiaries and affiliated companies ("UES"), is responsible for providing the services described under the Scope of Services. The term "UES" as used herein includes all of UES's agents, employees, professional staff, and subcontractors. **1.2** The Client or a duly authorized representative is responsible for providing UES with a clear understanding of the project nature and scope. The Client shall supply UES with sufficient and adequate information, including, but not limited to, maps, site plans, reports, surveys, plans and specifications, and designs, to allow UES to properly complete the specified services. The Client shall also communicate changes in the nature and scope of the project as soon as possible during performance of the work so that the changes can be incorporated into the work product. **1.3** The Client acknowledges that UES's responsibilities in providing the services described under the Scope of Services section is limited to those services described therein, and the Client hereby assumes any collateral or affiliated duties necessitated by or for those services. Such duties may include, but are not limited to, reporting requirements imposed by any third party such as federal, state, or local entities, the provision of any required notices to any third party, or the securing of necessary permits or permissions from any third parties required for UES's provision of the services so described, unless otherwise agreed upon by both parties in writing.

SECTION 2: STANDARD OF CARE **2.1** Services performed by UES under this Agreement will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of UES's profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty, express or implied, is made. **2.2** Execution of this document by UES is not a representation that UES has visited the site, become generally familiar with local conditions under which the work is to be performed, or correlated personal observations with the requirements of the Scope of Services. It is the Client's responsibility to provide UES with all information necessary for UES to provide the services described under the Scope of Services, and the Client assumes all liability for information not provided to UES that may affect the quality or sufficiency of the services so described.

SECTION 3: SITE ACCESS AND SITE CONDITIONS **3.1** Client will grant or obtain free access to the site for all equipment and personnel necessary for UES to perform the work set forth in this Agreement. The Client will notify any possessors of the project site that Client has granted UES free access to the site. UES will take reasonable precautions to minimize damage to the site, but it is understood by Client that, in the normal course of work, some damage may occur, and the correction of such damage is not part of this Agreement unless so specified in the Scope of Services. **3.2** The Client is responsible for the accuracy of locations for all subterranean structures and utilities. UES will take reasonable precautions to avoid known subterranean structures, and the Client waives any claim against UES, and agrees to defend, indemnify, and hold UES harmless from any claim or liability for injury or loss, including costs of defense, arising from damage done to subterranean structures and utilities not identified or accurately located. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

SECTION 4: BILLING AND PAYMENT **4.1** UES will submit invoices to Client monthly or upon completion of services. Invoices will show charges for different personnel and expense classifications. **4.2** Payment is due 30 days after presentation of invoice and is past due 31 days from invoice date. Client agrees to pay a finance charge of one and one-half percent (1 ½ %) per month, or the maximum rate allowed by law, on past due accounts. **4.3** If UES incurs any expenses to collect overdue billings on invoices, the sums paid by UES for reasonable attorneys' fees, court costs, UES's time, UES's expenses, and interest will be due and owing by the Client.

SECTION 5: OWNERSHIP AND USE OF DOCUMENTS **5.1** All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, as instruments of service, shall remain the property of UES. Neither Client nor any other entity shall change or modify UES's instruments of service. **5.2** Client agrees that all reports and other work furnished to the Client or his agents, which are not paid for, will be returned upon demand and will not be used by the Client for any purpose. **5.3** UES will retain all pertinent records relating to the services performed for a period of five years following submission of the report or completion of the Scope of Services, during which period the records will be made available to the Client in a reasonable time and manner. **5.4** All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, are prepared for the sole and exclusive use of Client, and may not be given to any other entity, or used or relied upon by any other entity, without the express written consent of UES. Client is the only entity to which UES owes any duty or duties, in contract or tort, pursuant to or under this Agreement.

SECTION 6: DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS **6.1** Client represents that a reasonable effort has been made to inform UES of known or suspected hazardous materials on or near the project site. **6.2** Under this agreement, the term hazardous materials include hazardous materials, hazardous wastes, hazardous substances (40 CFR 261.31, 261.32, 261.33), petroleum products, polychlorinated biphenyls, asbestos, and any other material defined by the U.S. EPA as a hazardous material. **6.3** Hazardous materials may exist at a site where there is no reason to believe they are present. The discovery of unanticipated hazardous materials constitutes a changed condition mandating a renegotiation of the scope of work. The discovery of unanticipated hazardous materials may make it necessary for UES to take immediate measures to protect health and safety. Client agrees to compensate UES for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous materials. **6.4** UES will notify Client when unanticipated hazardous materials or suspected hazardous materials are encountered. Client will make any disclosures required by law to the appropriate governing agencies. Client will hold UES harmless for all consequences of disclosures made by UES which are required by governing law. In the event the project site is not owned by Client, Client it is the Client's responsibility to inform the property owner of the discovery of unanticipated hazardous materials or suspected hazardous materials. **6.5** Notwithstanding any other provision of the Agreement, Client waives any claim against UES, and to the maximum extent permitted by law, agrees to defend, indemnify, and save UES harmless from any claim, liability, and/or defense costs for injury or loss arising from UES's discovery of unanticipated hazardous materials or suspected hazardous materials including any costs created by delay of the project and any cost associated with possible reduction of the property's value. Client will be responsible for ultimate disposal of any samples secured by UES which are found to be contaminated.

SECTION 7: RISK ALLOCATION **7.1** Client agrees that UES's liability for any damage on account of any breach of contract, error, omission, or professional negligence will be limited to a sum not to exceed $50,000 or UES's fee, whichever is greater. If Client prefers to have higher limits on contractual or professional liability, UES agrees to increase the limits up to a maximum of $1,000,000.00 upon Client's written request at the time of accepting UES's proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or $400.00, whichever is greater. If Client prefers a $2,000,000.00 limit on contractual or professional liability, UES agrees to increase the limits up to a maximum of $2,000,000.00 upon Client's written request at the time of accepting UES's proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or $800.00, whichever is greater. The additional charge for the higher liability limits is because of the greater risk assumed and is not strictly a charge for additional professional liability insurance. **7.2** Client shall not be liable to UES and UES shall not be liable to Client for any incidental, special, or consequential damages (including lost profits, loss of use, and lost savings) incurred by either party due to the fault of the other, regardless of the nature of the fault, or whether it was committed by Client or UES, their employees, agents, or subcontractors; or whether such liability arises in breach of contract or warranty, tort (including negligence), statutory, or any other cause of action. **7.3** As used in this Agreement, the terms "claim" or "claims" mean any claim in contract, tort, or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or any other act giving rise to liability.

SECTION 8: INSURANCE **8.1** UES represents it and its agents, staff and consultants employed by UES, is and are protected by worker's compensation insurance and that UES has such coverage under public liability and property damage insurance policies which UES deems to be adequate. Certificates for all such policies of insurance shall be provided to Client upon request in writing. Within the limits and conditions of such insurance, UES agrees to indemnify and save Client harmless from and against loss, damage, or liability arising from negligent acts by UES, its agents, staff, and consultants employed by it. UES shall not be responsible for any loss, damage or liability beyond the amounts, limits, and conditions of such insurance or the limits described in Section 7, whichever is less. The Client agrees to defend, indemnify, and save UES harmless for loss, damage or liability arising from acts by Client, Client's agents, staff, and others employed by Client. **8.2** Under no circumstances will UES indemnify Client from or for Client's own actions, negligence, or breaches of contract. **8.3**

To the extent damages are covered by property insurance, Client and UES waive all rights against each other and against the contractors, consultants, agents, and employees of the other for damages, except such rights as they may have to the proceeds of such insurance.

SECTION 9: DISPUTE RESOLUTION **9.1** All claims, disputes, and other matters in controversy between UES and Client arising out of or in any way related to this Agreement will be submitted to mediation or non-binding arbitration, before and as a condition precedent to other remedies provided by law. **9.2** If a dispute arises and that dispute is not resolved by mediation or non-binding arbitration, then: (a) the claim will be brought in the state or federal courts having jurisdiction where the UES office which provided the service is located; and (b) the prevailing party will be entitled to recovery of all reasonable costs incurred, including staff time, court costs, attorneys' fees, expert witness fees, and other claim related expenses.

SECTION 10: TERMINATION **10.1** This agreement may be terminated by either party upon seven (7) days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof, or in the case of a force majeure event such as terrorism, act of war, public health or other emergency. Such termination shall not be effective if such substantial failure or force majeure has been remedied before expiration of the period specified in the written notice. In the event of termination, UES shall be paid for services performed to the termination notice date plus reasonable termination expenses. **10.2** In the event of termination, or suspension for more than three (3) months, prior to completion of all reports contemplated by the Agreement, UES may complete such analyses and records as are necessary to complete its files and may also complete a report on the services performed to the date of notice of termination or suspension. The expense of termination or suspension shall include all direct costs of UES in completing such analyses, records, and reports.

SECTION 11: REVIEWS, INSPECTIONS, TESTING, AND OBSERVATIONS **11.1** Plan review, private provider inspections, and building inspections are performed for the purpose of observing compliance with applicable building codes. Threshold inspections are performed for the purpose of observing compliance with an approved threshold inspection plan. Construction materials testing ("CMT") is performed to document compliance of certain materials or components with applicable testing standards. UES's performance of plan reviews, private provider inspections, building inspections, threshold inspections, or CMT, or UES's presence on the site of Client's project while performing any of the foregoing activities, is not a representation or warranty by UES that Client's project is free of errors in either design or construction. **11.2** If UES is retained to provide construction monitoring or observation, UES will report to Client any observed work which, in UES's opinion, does not conform to the plans and specifications provided to UES. UES shall have no authority to reject or terminate the work of any agent or contractor of Client. No action, statements, or communications of UES, or UES's site representative, can be construed as modifying any agreement between Client and others. UES's performance of construction monitoring or observation is not a representation or warranty by UES that Client's project is free of errors in either design or construction. **11.3** Neither the activities of UES pursuant to this Agreement, nor the presence of UES or its employees, representatives, or subcontractors on the project site, shall be construed to impose upon UES any responsibility for means or methods of work performance, superintendence, sequencing of construction, or safety conditions at the project site. Client acknowledges that Client or its contractor is solely responsible for project jobsite safety. **11.4** Client is responsible for scheduling all inspections and CMT activities of UES. All testing and inspection services will be performed on a will-call basis. UES will not be responsible for tests and inspections that are not performed due to Client's failure to schedule UES's services on the project, or for any claims or damages arising from tests and inspections that are not scheduled or performed.

SECTION 12: ENVIRONMENTAL ASSESSMENTS Client acknowledges that an Environmental Site Assessment ("ESA") is conducted solely to permit UES to render a professional opinion about the likelihood or extent of regulated contaminants being present on, in, or beneath the site in question at the time services were conducted. No matter how thorough an ESA study may be, findings derived from the study are limited and UES cannot know or state for a fact that a site is unaffected by reportable quantities of regulated contaminants as a result of conducting the ESA study. Even if UES states that reportable quantities of regulated contaminants are not present, Client still bears the risk that such contaminants may be present or may migrate to the site after the ESA study is complete.

SECTION 13: SUBSURFACE EXPLORATIONS **13.1** Client acknowledges that subsurface conditions may vary from those observed at locations where borings, surveys, samples, or other explorations are made, and that site conditions may change with time. Data, interpretations, and recommendations by UES will be based solely on information available to UES at the time of service. UES is responsible for those data, interpretations, and recommendations, but will not be responsible for other parties' interpretations or use of the information developed or provided by UES. **13.2** Subsurface explorations may result in unavoidable cross-contamination of certain subsurface areas, as when a probe or boring device moves through a contaminated zone and links it to an aquifer, underground stream, or other hydrous body not previously contaminated. UES is unable to eliminate totally cross-contamination risk despite use of due care. Since subsurface explorations may be an essential element of UES's services indicated herein, Client shall, to the fullest extent permitted by law, waive any claim against UES, and indemnify, defend, and hold UES harmless from any claim or liability for injury or loss arising from cross-contamination allegedly caused by UES's subsurface explorations. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

SECTION 14: SOLICITATION OF EMPLOYEES Client agrees not to hire UES's employees except through UES. In the event Client hires a UES employee within one year following any project through which Client had contact with said employee, Client shall pay UES an amount equal to one-half of the employee's annualized salary, as liquidated damages, without UES waiving other remedies it may have.

SECTION 15: ASSIGNS Neither Client nor UES may delegate, assign, sublet, or transfer its duties or interest in this Agreement without the written consent of the other party.

SECTION 16: GOVERNING LAW AND SURVIVAL **16.1** This Agreement shall be governed by and construed in accordance with the laws of the jurisdiction in which the UES office performing the services hereunder is located. **16.2** In any of the provisions of this Agreement are held illegal, invalid, or unenforceable, the enforceability of the remaining provisions will not be impaired and will survive. Limitations of liability and indemnities will survive termination of this agreement for any cause.

SECTION 17: INTEGRATION CLAUSE **17.1** This Agreement represents and contains the entire and only agreement and understanding among the parties with respect to the subject matter of this Agreement, and supersedes any and all prior and contemporaneous oral and written agreements, understandings, representations, inducements, promises, warranties, and conditions among the parties. No agreement, understanding, representation, inducement, promise, warranty, or condition of any kind with respect to the subject matter of this Agreement shall be relied upon by the parties unless expressly incorporated herein. **17.2** This Agreement may not be amended or modified except by an agreement in writing signed by the party against whom the enforcement of any modification or amendment is sought.

SECTION 18: WAIVER OF JURY TRIAL Both Client and UES waive trial by jury in any action arising out of or related to this Agreement.

SECTION 19: INDIVIDUAL LIABILTY PURSUANT TO FLORIDA STAT. 558.0035, AN INDIVIDUAL EMPLOYEE OR AGENT OF UES MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.