

**Broward County Integrated Water Resource Program (IWRP) Grant
Joseph Scavo Park Reuse Project**

**Technical Memorandum
March 29, 2013**

Prepared By



**5747 North Andrews Way
Ft. Lauderdale, Florida 33309**

Werner Reinefeld, P.E.
Florida Registration No. 63042

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I. BACKGROUND

The City of Hallandale Beach retained Miller Legg to provide engineering design services for the construction of an eight (8) inch reclaimed water main to provide reuse water from the City of Hollywood to the Joseph Scavo Park, located at 900 Three Islands Boulevard, Hallandale Beach, Broward County, Florida.

The proposed eight (8) inch main will connect to an existing City of Hollywood twenty-four (24) inch reclaimed water main at the intersection of Wiley Street and Diplomat Parkway, within the city limits of the City of Hollywood. The proposed reclaimed water main will continue South on Diplomat Parkway, crossing into the City of Hallandale Beach, and will continue East on Atlantic Shores Boulevard up to Three Islands Boulevard at the location of the Joseph Scavo Park. At this time there will be no properties tying into the proposed system other than the Joseph Scavo Park.

II. PROJECT DESCRIPTION AND REQUIREMENTS

Refer to Appendix A for Preliminary Plans of proposed 8" reclaimed water main. The project includes:

1. Connection to 24" reclaimed water main at Diplomat Parkway and Wiley Street.
2. Installation of approximately 2,640 L.F. of 8" PVC reclaimed water main along Diplomat Parkway and Atlantic Shores Boulevard.
3. Installation of approximately 270 L.F. of 8" DIP reclaimed water main along Atlantic Shores Boulevard, where the pipe is exposed at the crossing over the De Soto Water Way.
4. Installation of 8" propeller flow meter and vault at the City of Hollywood / City of Hallandale Beach boundary on Diplomat Parkway.
5. Installation of 2" water meter at the Joseph Scavo Park property line on Atlantic Shores Boulevard and Three Islands Boulevard.



The design is based on the following requirements:

1. City of Hollywood - Utilities Department Standard Details
2. City of Hallandale Beach - Utilities and Engineering Department Standards
3. Broward County Water and Wastewater Engineering Division Standard Details

III. SITE OBSERVATIONS

Refer to Appendix B for Engineer's site visit photographs.

A. DIPLOMAT PARKWAY

The affected portion of Diplomat Parkway (between Wiley Street and Atlantic Shores Boulevard) is located within a residential area. It is comprised of two (2) 12' travel lanes with residential driveways and landscaping on both sides of the street. There is an existing concrete sidewalk located on both sides of the street within the City of Hallandale Beach only. Diplomat Parkway does not have a curb and gutter.

B. ATLANTIC SHORES BOULEVARD

The affected portion of Atlantic Boulevard / NE 9th Street (between Diplomat Parkway and Three Islands Boulevard) is located within a residential area. It is comprised of four (4) 12' travel lanes separated by a concrete median on the west portion, and a curbed landscaped median on the east portion. East of the bridge crossing over the De Soto Waterway, both sides of the street contain curb and gutter, on-street parking spaces, swales, and concrete sidewalk, as well as a few driveways leading to multi-family residences.

As previously mentioned, there is an existing bridge along Atlantic Shores Boulevard crossing the De Soto Waterway. A 12" DIP water main and a 4" gas line attach to the North side of the bridge structure to cross the waterway.



IV. RECLAIMED WATER SYSTEM ROUTE ANALYSIS

The proposed 8" PVC reclaimed water main will connect to an existing 24" reclaimed water main at the intersection of Wiley Street and Diplomat Parkway with an 8" x 24" tapping sleeve and tapping valve per Broward County Standards Figure 131. The 8" PVC reclaimed water main continues south along Diplomat Parkway, crossing below existing underground utilities such as storm sewer pipes, sanitary sewer laterals, and domestic water services. The approximate length of 8" PVC pipe proposed within Diplomat Parkway is approximately 1,787 L.F., of which 1,137 L.F. is within the City of Hollywood and 650 L.F. is within the City of Hallandale Beach. Directly north of the city limits between the City of Hollywood and the City of Hallandale Beach, an 8" water propeller flow meter is proposed. There are two (2) 45° bends proposed at the intersection of Diplomat Parkway and Atlantic Shores Boulevard which allow the proposed 8" reclaimed water main to continue east on Atlantic Shores Boulevard. At STA 18+71.41, 8" DIP is proposed for the reclaimed water main to anticipate the above-ground crossing over the De Soto Waterway. The 8" DIP reclaimed water main will attach to the north side of the bridge structure with pipe hangers anchored to the existing sidewalk steel. Once the proposed reclaimed water main crosses the De Soto Waterway and continues underground along Atlantic Shores Boulevard, the pipe material proposed is PVC. The approximate length of 8" PVC pipe proposed within Atlantic Shores Boulevard is approximately 853 L.F, and approximately 270 L.F. of 8" DIP at proposed at the De Soto Waterway crossing. The proposed reclaimed water main terminates along Atlantic Shores at the east side of Three Islands Road. A 2" flushing blow-off valve and 2" meter box installation per Broward County Standard Figure 228 is proposed at the termination, adjacent to the Joseph Scavo Park property line.



V. CONCLUSION AND RECOMMENDATIONS

The proposed 8" reclaimed water main will provide reuse water to the Joseph Scavo Park for the purposes of irrigation. Should it be desired by the City of Hollywood and the City of Hallandale Beach, the proposed 8" reclaimed water main may also provide reuse water for residences located along the corridor of the proposed reclaimed water main.

VI. LIST OF REQUIRED PERMITS & AGENCY REVIEWS

1. FDEP Notice of Intent to Use General Permit for Addition of a Major User of Reclaimed Water
2. City of Hollywood
3. City of Hallandale Beach

VII. GENERAL SPECIFICATIONS

Listed below are the applicable specifications for this project. Refer to Appendix C for written specifications.

15000	Piping General
15001	Valves, Services and Miscellaneous Fittings
15006	Ductile Iron Pipe
15007	PVC C-900-C905 Pipe
15009	PVC Pressure Pipe
15056	Pipe Supports
15102	Tapping Sleeves and Valves
15115	Check Valves



VIII. OPINION OF PROBABLE COST

Construction of proposed improvements results in approximately \$284,997. Refer to Appendix D for Preliminary Engineer's Opinion of Probable Cost.

IX. UTILITY RESEARCH AND COORDINATION

We have contacted the local utility agencies listed below to request as-built drawings of their utilities within our project area. Refer to Appendix E for a copy of the Design Ticket placed.

1. Broward County Traffic
2. Comcast Cable
3. City of Hallandale Beach
4. Florida Power & Light
5. City of Hollywood Public Utilities Department
6. City of Hollywood Public Works Department
7. TECO People's Gas South Florida
8. AT&T



APPENDIX A

PRELIMINARY PLANS

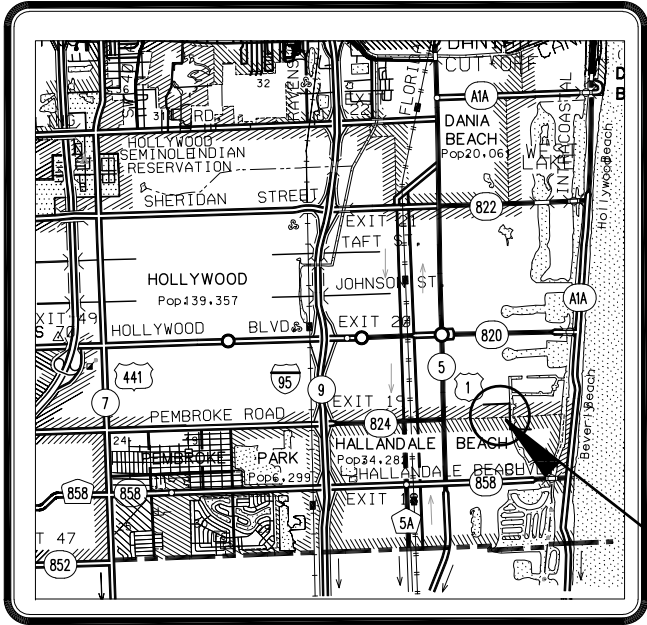
DIPLOMAT PKWY REUSE EXTENSION

FOR:

CITY OF HALLENDALE BEACH HALLENDALE BEACH, FL

INDEX

SHEET NO.	DRAWING NO.	TITLE
1	-	COVER SHEET
2	KEY-1	KEY SHEET
3	GN-1	GENERAL NOTES & LEGENDS
4-6	DET-1 thru DET-3	DETAILS
7	SWPPD-1	STORM WATER POLLUTION PREVENTION DETAILS
8-14	RW-1 thru RW-7	REUSE EXTENSION PLAN & PROFILE



TOWNSHIP 51 - RANGE 42 - SECTION 23
LOCATION MAP
N.T.S.

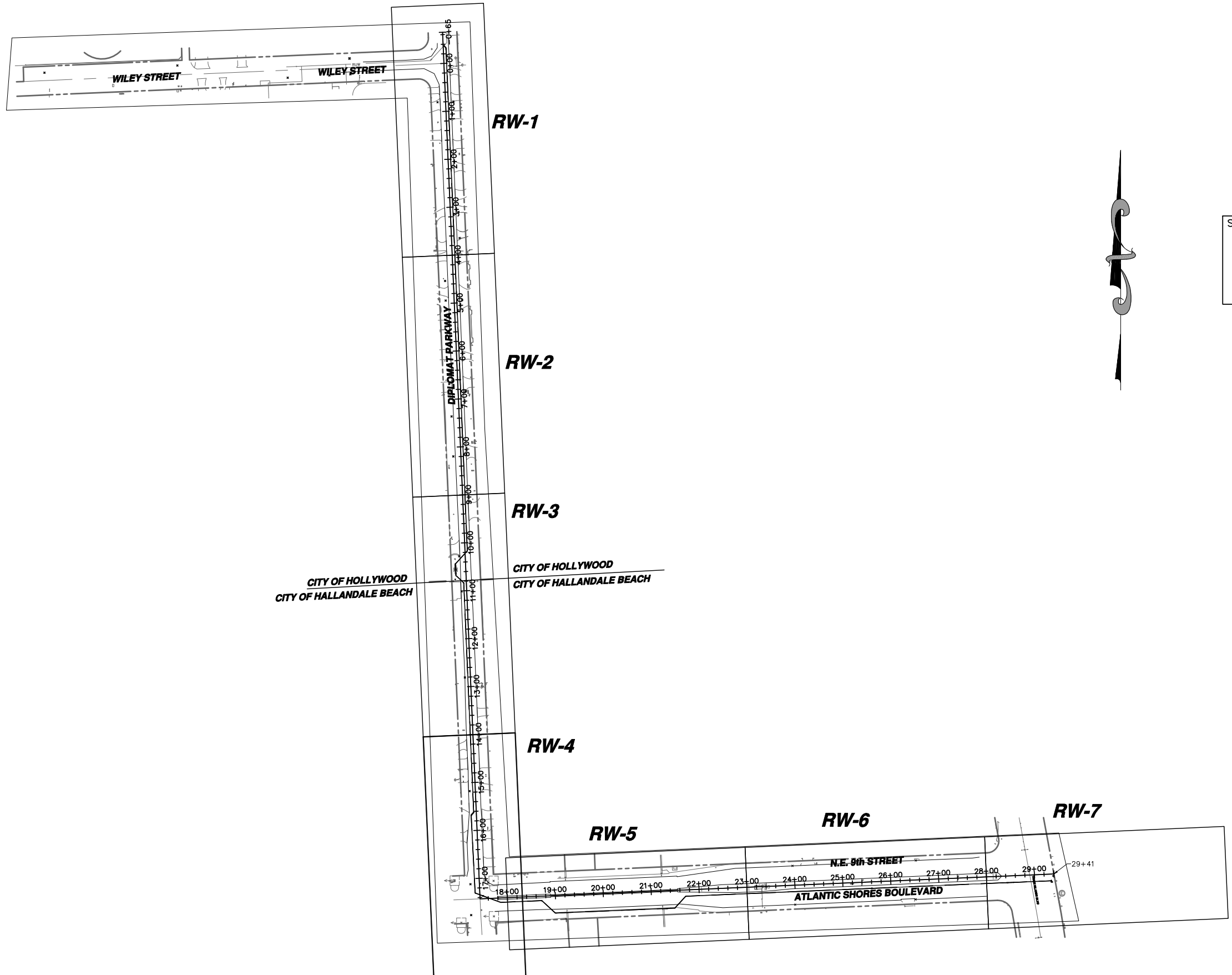
MILLER LEGG

South Florida Office: 5747 N. Andrews Way
Ft. Lauderdale, Florida · 33309-2364
954-436-7000 · Fax: 954-436-8664
www.millerlegg.com

PROJECT SITE

V:\PROJECTS\12-00148 - DIPLOMAT PKWY WATER REUSE EXT\DRAWINGS\ENGINEERING\12-00148_CDD.DWG 4/7/13 by GTURNER

NO.	DATE	REVISIONS



SURVEY NOTES:

1. ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
2. BENCHMARK NGS MONUMENT PID AD2430, ELEVATION=1.68, NAVD88 AT NORTHEAST CORNER OF HOLLYWOOD BOULEVARD AND N. 9TH AVENUE.
3. NORTH ARROW RELATIVE TO ASSUMED S.87°31'53"W. ALONG THE CENTERLINE OF WILEY STREET.

V:\PROJECTS\2012\12-00148 - DIPLOMAT PKWY WATER REUSE EXT\DRAWINGS\ENGINEERING\12-00148_ASY.DWG 4/7/13 BY CTURNER

REVISIONS				REVISIONS			
NO.	DATE	REVISIONS	DES.	NO.	DATE	REVISIONS	DES.

DIPLOMAT PKWY REUSE EXTENSION

FOR: CITY OF HALLENDALE BEACH

APPROVED : _____
FLA. REGISTRATION NO. 63042 DATE : _____

WEINER J. REINEFELD, P.E.



South Florida Office: 5747 N. Andrews Way
Ft. Lauderdale, Florida 33309-2384
954-436-7000 • Fax: 954-436-8864
www.millerlegg.com

CERTIFICATES OF AUTHORIZATION		
EB7318	LB6680	LC0337
SHA	GAT	WR
DES.	DWN.	CHK.
PROJECT / FILE NO.		
12-00148		
DRAWING NO.		
KEY-1		
DATE DRAWN		
10/30/12	2	14

KEY SHEET

GENERAL NOTES

- ALL WORK PERFORMED SHALL BE IN FULL COMPLIANCE WITH THE REQUIREMENTS OF THE CITY OF HALLANDALE BEACH, THE ENGINEER OF RECORD, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) / FLORIDA DEPARTMENT OF HEALTH (DOH), FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT), BROWARD COUNTY (BC) AND ALL OTHER AGENCIES WHICH MAY EXERT JURISDICTION. WHEN CONFLICTS OCCUR BETWEEN REQUIREMENTS SHOWN ON THESE DRAWINGS / SPECIFICATIONS AND REGULATORY CRITERIA, THE MORE STRINGENT REQUIREMENT SHALL PREVAIL. THE CONTRACTOR SHALL VERBALLY BRING ANY CONFLICT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY, FOLLOWED BY AN OFFICIAL WRITTEN NOTIFICATION WITHIN 24 HOURS.
- ALL INFORMATION REGARDING EXISTING SURFACE CONDITIONS SHOWN ON THESE CONSTRUCTION DRAWINGS HAS BEEN FURNISHED TO THE ENGINEER BY GIBBS LAND SURVEYORS INC.
- ALL INFORMATION REGARDING EXISTING (UNDERGROUND) UTILITIES SHOWN ON THESE CONSTRUCTION DRAWINGS IS FOR INFORMATION ONLY. THE INFORMATION IS PROVIDED BY THE RESPECTIVE UTILITY COMPANIES, BUT IS NOT VERIFIED BY THE ENGINEER OF RECORD. DETERMINING THE ACTUAL LOCATION OF ANY EXISTING UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY. BEFORE COMMENCING WORK, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES WHICH MAY HAVE BURIED OR AERIAL UTILITIES WITHIN OR NEAR THE CONSTRUCTION AREA. (PROVIDE 48 HOURS MINIMUM NOTICE TO ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION). THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. THE OWNER AND ENGINEER ASSUME NO LIABILITY FOR ANY DAMAGES SUSTAINED OR COSTS INCURRED BECAUSE OF THE CONTRACTOR'S OPERATIONS IN THE VICINITY OF EXISTING UTILITIES OR STRUCTURES, NOR FOR TEMPORARY BRACING AND SHORING OF SAME, SCHEDULED AND EXECUTE ALL WORK INVOLVING EXISTING UTILITIES IN ORDER TO MINIMIZE INTERRUPTION OF SERVICES. WHENEVER SUCH INTERRUPTION IS NECESSARY FOR COMPLETION OF THE WORK, NOTIFY THE ENGINEER AND THE OWNER AT LEAST 48 HOURS IN ADVANCE. ALL WORK TO REPAIR / RESTORE UTILITY SERVICE SHALL BE PERFORMED AT THE CONTRACTOR'S OWN EXPENSE AS REQUIRED BY THE APPROPRIATE UTILITY. IF IT IS NECESSARY TO SHORE, BRACE, OR SWING A UTILITY, CONTACT THE UTILITY COMPANY OR DEPARTMENT AFFECTED AND OBTAIN THEIR PERMISSION REGARDING THE METHOD TO USE FOR SUCH WORK. ALL COSTS RELATED TO SERVICE MAINTENANCE, INTERRUPTION, REPAIR, RELOCATION, AND RESTORATION ARE TO BE INCLUDED IN THE CONTRACTOR'S BID. ANY DELAY OR INCONVENIENCE CAUSED TO THE CONTRACTOR BY THE VARIOUS UTILITIES SHALL BE INCIDENTAL TO THE CONTRACT, AND NO EXTRA COMPENSATION SHALL BE PAID.
- THE ENGINEER HAS INITIATED A SUNSHINE STATE ONE CALL OF FLORIDA DESIGN TICKET FOR THIS PROJECT WITH TICKET NUMBER 221011557. THE FOLLOWING COMPANIES HAVE BEEN LISTED AS POTENTIALLY OWNING AND/OR OPERATING UTILITIES IN THE AFFECTED AREAS:
 - A&T DISTRIBUTION / CONTACT OTIS KEEVE: 954-723-2540
 - BROWARD COUNTY WATER AND WASTEWATER SERVICES / CONTACT STEVEN UHRICK: 954-831-0931
 - BROWARD COUNTY TRAFFIC / CONTACT GREG LOVALLO: 654-847-2725
 - COMCAST CABLE / CONTACT LEONARD MAXWELL-NEWBOLD: 954-447-5405
 - CITY OF HALLANDALE BEACH / CONTACT RASA ZELDIS: 954-457-1617
 - FLORIDA POWER AND LIGHT BROWARD / CONTACT TRACY STERN: 800-868-9554
 - CITY OF HOLLYWOOD PUBLIC WORKS / CONTACT GREG JEFFRIES: 954-782-8222
 - TECO PEOPLES GAS / CONTACT YVONNE COLEMAN: 954-457-1617
 - FLORIDA GAS TRANSMISSION COMPANY / CONTACT JOSEPH SANCHEZ: 407-838-7171

- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL OTHER PERMITS WHICH MAY BE REQUIRED THAT PERTAIN TO HIS CONTRACTED WORK. SUCH PERMITS SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE CONTRACTOR BEGINNING WORK ON THE PORTION OF THE PROJECT REQUIRING SAID PERMITS.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION STAKING TO INCLUDE HORIZONTAL AND VERTICAL CONTROL FOR ALIGNMENT OF WORK. ALL SURVEY WORK TO ESTABLISH THE HORIZONTAL AND VERTICAL CONTROL SHALL BE UNDER THE GUIDANCE AND DIRECT SUPERVISION OF A FLORIDA REGISTERED PROFESSIONAL SURVEYOR AND MAPPER. PRE, MAINTENANCE, INTERRUPTION, REPAIR, RELOCATION, AND RESTORATION ARE TO BE INCLUDED IN THE CONTRACTOR'S BID. ANY DELAY OR INCONVENIENCE CAUSED TO THE CONTRACTOR BY THE VARIOUS UTILITIES SHALL BE INCIDENTAL TO THE CONTRACT, AND NO EXTRA COMPENSATION SHALL BE PAID.
- THE ENGINEER CANNOT GUARANTEE THAT TEMPORARY BENCH MARKS (TBM'S) OR OTHER SURVEY CONTROL POINTS WILL NOT BE DISTURBED PRIOR TO CONSTRUCTION. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF ALL SURVEY OR EXISTING SITE INFORMATION AS INDICATED IN THE DRAWINGS OR SPECIFICATIONS. SHOULD THE CONTRACTOR DISCOVER ANY ERRORS, INACCURACIES OR OMISSIONS IN THE SURVEY DATA, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER. BEFORE BEGINNING WORK, TAKE CARE TO PRESERVE ALL CONTROL STAKES, BENCH MARKS, REFERENCE POINTS AND PROPERTY CORNERS. THE OWNER WILL GRANT NO CLAIM FOR DAMAGES OR LOSS OF TIME BY THE CONTRACTOR DUE TO LOSS OR DISTURBANCE OF SURVEY CONTROL POINTS, CONTROL STAKES, BENCH MARKS, REFERENCE POINTS, AND PROPERTY CORNERS. DISTURBED BY THE CONTRACTOR SHALL BE REPLACED BY A FLORIDA REGISTERED PROFESSIONAL SURVEYOR AND MAPPER WHO WILL BE SELECTED BY AND PAID BY THE CONTRACTOR. THE OWNER WILL NOT MAKE FINAL PAYMENT TO THE CONTRACTOR UNTIL ALL DISTURBED OR DESTROYED PROPERTY CORNERS AND PERMANENT BENCH MARKS HAVE BEEN REPLACED BY THE FLORIDA REGISTERED SURVEYOR AND MAPPER. THE SURVEYOR SHALL CERTIFY THAT SUCH MARKERS HAVE BEEN REPLACED IN ACCORDANCE WITH THE STATE OF FLORIDA ADMINISTRATIVE CODE, CHAPTER 61G17-6, "MINIMUM TECHNICAL STANDARDS".
- ALL TREES, SHRUBS, ETC., ALONG THE LINES OF CONSTRUCTION SHALL BE PROTECTED UNLESS NOTED OTHERWISE ON THE DRAWINGS. WATER, FERTILIZER AND SUPPLY ALL ITEMS AND CARE NECESSARY TO MAINTAIN THE HEALTH OF ALL EXISTING AND NEW VEGETATION AND VEGETATION REMOVED AND REPLACED, AT NO EXPENSE TO THE OWNER, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- THE CONTRACTOR SHALL MAINTAIN ACCESS TO PRIVATE PROPERTIES AT ALL TIMES.
- ALL AFFECTED GRASSSED AREAS SHALL BE RESTORED WITH THE APPLICATION OF ST. AUGUSTINE SOD ONLY. SOD TO BE Laid/INSTALLED WITH NO SPACES BETWEEN PIECES, PLACING EACH SOD PIECE AGAINST THE ADJOINING PIECE. ANY SOD Laid ON AN INCLINE SHALL BE PROPERLY PINNED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARILY REMOVING AND RELOCATING ALL INFORMATION AND TRAFFIC SIGNS DURING CONSTRUCTION. RELOCATED SIGNS SHALL BE VISIBLE TO MOTORIZED VEHICLES. REPOSITION SIGNS IN PRE-CONSTRUCTION LOCATION IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED IN THE AREA WHERE THE SIGNS WERE REMOVED.
- RESTORE ALL PRIVATE AND PUBLIC PROPERTY AFFECTED BY THIS WORK TO A CONDITION EQUAL TO OR BETTER THAN EXISTING BEFORE COMMENCING CONSTRUCTION WORK, UNLESS SPECIFICALLY EXEMPTED BY THE DRAWINGS. RESTORATION WORK INCLUDES, BUT IS NOT LIMITED TO PAVEMENT, BASE, SUBGRADE, CONCRETE CURBS, THERMOPLASTIC TRAFFIC MARKINGS, SIDEWALKS, STORM WATER PIPE, ETC. ALL RESTORATION WORK SHALL BE PER STANDARDS, SPECIFICATIONS AND PERMITS REQUIREMENTS OF THE ENTITY OWNING THE RIGHT-OF-WAY. IF THERE IS A CONFLICT WITH THE CITY'S REQUIREMENTS AND THE CONTRACT DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN. IF ADDITIONAL TOPOGRAPHY OR ANY OTHER INFORMATION IS NECESSARY FOR THE CONTRACTOR TO RECONSTRUCT ALL FACILITIES TO PRE CONSTRUCTION GRADES AND DIMENSIONS, THE ACQUISITION OF SUCH ADDITIONAL INFORMATION SHALL BE THE CONTRACTOR'S RESPONSIBILITY, AND AT HIS EXPENSE. RECONSTRUCT ALL FACILITIES TO PRECONSTRUCTION GRADES AND DIMENSION, UNLESS OTHERWISE NOTED.
- THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC MAINTENANCE IN ACCORDANCE WITH THE SPECIFICATIONS, U.S. DEPARTMENT OF TRANSPORTATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," FLORIDA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS AND OTHER GOVERNING AGENCIES' SPECIFICATIONS. IN THE EVENT OF A CONFLICT, THE MORE STRINGENT SPECIFICATION OR REQUIREMENT SHALL GOVERN. PROVIDE ALL NECESSARY BARRIAGES, WARNING SIGNS, DELAYATORS, FLAGMEN, PILOT CARS, ETC., REQUIRED FOR TRAFFIC CONTROL AND / OR MAINTENANCE.
- PROVIDE ANY TEMPORARY CONTROLS AND / OR STRUCTURES REQUIRED TO MAINTAIN SUITABLE AND SAFE WORKING CONDITIONS AT ALL TIMES. SUCH ITEMS SHALL BE REMOVED ONCE THAT PORTION OF WORK HAS BEEN COMPLETED.
- STORE CONSTRUCTION EQUIPMENT AND MATERIALS ONLY IN THOSE AREAS APPROVED BY THE OWNER. SECURITY OF CONSTRUCTION EQUIPMENT AND MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR. PUBLIC RIGHTS-OF-WAY MAY NOT BE UTILIZED FOR STORAGE OF EQUIPMENT OR MATERIALS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENTITY WHICH OWNS THE RIGHT-OF-WAY.
- UPON COMPLETION OF THE PROJECT, PROVIDE FINAL CERTIFIED AS-BUILT SURVEY DRAWINGS OF ALL IMPROVEMENTS, ALONG WITH AUTOCAD 2010 FORMAT FILES. THE AS-BUILT SURVEY MUST BE PREPARED BY A FLORIDA REGISTERED SURVEYOR AND MAPPER IN ACCORDANCE WITH THE STATE OF FLORIDA ADMINISTRATIVE CODE, CHAPTER 61G17-6, "MINIMUM TECHNICAL STANDARDS". AS A MINIMUM, AS-BUILT DRAWINGS FOR PIPELINE CONSTRUCTION SHALL SHOW CONSTRUCTED HORIZONTAL AND VERTICAL LOCATIONS WITH ELEVATIONS AT ALL BENDS, FITTINGS AND VALVES AND AT 100-FT INTERVALS ALONG THE TOP OF PIPE. THE AS-BUILT SURVEY SHALL BE TIED INTO THE STATE PLANE COORDINATE SYSTEM. AS-BUILT SURVEY MUST BE PERFORMED ON A DAILY BASIS FOR ALL UNDERGROUND UTILITIES. INTERFER AS BUILTS PLANS FOR COMPLETED WORK MUST BE SUBMITTED TO THE ENGINEER OF RECORD.
- THE STATIONS AND OFFSETS FOR PROPOSED WATER MAIN ARE APPROXIMATE.
- SPECIAL EMPHASIS ON EXCAVATION SAFETY AND TRENCH CONSTRUCTION:
 - OSHA'S EXCAVATION SAFETY STANDARDS 29, CFR PART 1926.650-652 SUBPART P, AS WELL AS FLORIDA'S TRENCH SAFETY ACT (FLORIDA STATUTE 90-96) ARE CONSIDERED AS COMPLEMENTARY TO THESE CONTRACT DOCUMENTS. IF THERE IS ANY DUPLICATION, REDUNDANCY OR CONFLICT BETWEEN THE STIPULATIONS OF THESE CONTRACT DOCUMENTS AND THOSE STANDARDS, THE MOST STRINGENT REQUIREMENT SHALL GOVERN. THE CONTRACTOR SHALL ALSO COMPLETE THE FLORIDA TRENCH SAFETY ACT STATEMENT PROVIDED IN THE CONTRACT DOCUMENTS.
 - IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT EXCAVATIONS DO NOT ENDANGER THE PUBLIC, WORKMEN, EXISTING STRUCTURES, UTILITIES, OR OTHER FACILITIES. IF SUCH CONDITIONS OCCUR WHICH MAY ENDANGER WORKMEN, EXISTING STRUCTURES, UTILITIES, OR OTHER FACILITIES,

- IMMEDIATELY INSTALL AND MAINTAIN ADEQUATE SHEETING AND BRACING PER OSHA SPECIFICATIONS. CEASE ALL WORK UNTIL THE SHEETING AND BRACING HAVE BEEN PROPERLY AND COMPLETELY INSTALLED. INSTALL THE SHEETING AND BRACING IN A MANNER THAT WILL ALLOW REMOVAL WITHOUT INJURING OR ENDANGERING WORKMEN, THE WORK, ADJACENT STRUCTURES, AND THE LIKE. PROMPTLY AND COMPLETELY FILL ALL VOIDS CAUSED BY THE WITHDRAWAL OF SHEETING WITH SAND AND COMPACT TO A DEGREE EQUAL TO THE SURROUNDING SOIL. REMOVE THE SHEETING AS THE WORK PROGRESSES OR, AT THE DISCRETION OF THE ENGINEER, CUT THE SHEETING OFF BELOW FINISHED GRADE AND LEAVE IN PLACE.
- WHERE A CONNECTION IS MADE TO A SEGMENT OF EXISTING WATER MAIN WHICH IS TO REMAIN IN SERVICE, THE EXISTING WATER MAIN SHALL BE RESTRAINED.
- POTABLE WATER SERVICE TO EXISTING CUSTOMERS MUST BE MAINTAINED AT ALL TIMES. EXISTING WATER MAINS ARE TO REMAIN IN SERVICE UNTIL THE NEW WATER MAINS ARE PLACED INTO OPERATION AND THE EXISTING SERVICES ARE TRANSFERRED FROM THE EXISTING WATER MAIN TO THE NEW WATER MAIN.
- ALL TRENCHES MUST BE BACKFILLED BY THE END OF EACH DAY AND COVERED WITH TEMPORARY ASPHALT UPON BACKFILLING. BACKFILL AND TEMPORARY ASPHALT MUST BE MAINTAINED UNTIL FULL RESTORATION IS COMPLETED (ALL ROADS MUST BE IN GOOD DRIVING CONDITIONS)
- ALL CENTERLINES SHOWN IN THE PLANS ARE CENTERLINES OF RIGHT OF WAY UNLESS OTHERWISE NOTED.

GENERAL NOTES FOR UTILITY CONSTRUCTION

- UNDER NO CIRCUMSTANCES SHALL PIPE BE Laid IN A WET TRENCH OR STRUCTURES BE CONSTRUCTED IN A WET EXCAVATION. Dewatering SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE.
- THE PIPE SHALL BE INSTALLED AT 3-FOOT MINIMUM DEPTH OF COVER. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE DURING PIPELINE CONSTRUCTION.
- IF NECESSARY, USE TEMPORARY SHEETING OR TRENCH BOXES TO MINIMIZE THE SIZE OF THE EXCAVATIONS AND TO PROTECT ADJACENT EXISTING ROADWAYS, UTILITIES, AND OTHER FACILITIES. THERE SHALL BE NO ADDITIONAL COST TO THE OWNER UNLESS THE CONTRACTOR IS DIRECTED TO LEAVE THE SHEETING IN PLACE.
- BACKFILL ALL TRENCHES AT THE END OF EACH DAYS WORK. NO TRENCH SHALL BE LEFT OPEN OVERNIGHT. THE ENDS OF ALL PIPE SHALL BE PLUGGED AT THE CLOSE OF EACH DAYS WORK.
- ALL WATER MAIN PIPE, FITTINGS, VALVES, AND FIRE HYDRANTS SHALL BE IN CONFORMANCE WITH APPLICABLE AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS, THE CITY OF HALLANDALE BEACH STANDARDS AND THE CITY OF HOLLYWOOD STANDARDS. IF THERE IS ANY CONFLICT BETWEEN THESE STANDARDS, THE MOST STRINGENT REQUIREMENT SHALL GOVERN. ALL PACKING AND JOINTING MATERIALS USED IN THE JOINTS OF WATER MAIN PIPE SHALL BE IN CONFORMANCE WITH APPLICABLE AWWA STANDARDS.
- PRIOR TO CONNECTION TO ACTIVE MAINS AND BEFORE BEING PLACED IN SERVICE, ALL PRESSURE PIPELINES SHALL BE PRESSURE TESTED AND LEAK TESTED IN ACCORDANCE WITH AWWA STANDARD C600-05 AND THE CONTRACT DOCUMENTS. AFTER PASSING PRESSURE AND LEAKAGE TESTS, ALL PRESSURE PIPELINES SHALL BE FLUSHED. WATER MAINS SHALL BE PIGGED BEFORE THEY ARE FLUSHED.
- NO PIPELINE SHALL BE ACTIVELY CONNECTED TO ANY ACTIVE PIPELINE UNTIL THE NEW LINE HAS BEEN CLEARED IN WRITING FOR SERVICE.
- UNLESS MORE STRINGENT REQUIREMENTS ARE SPECIFIED ON THE DRAWINGS, THE CONTRACTOR SHALL NOTIFY ALL UTILITY OWNERS A MINIMUM OF 48 HOURS PRIOR TO BEGINNING WORK THAT MAY AFFECT THEIR UTILITIES. THE LIST ON THIS SHEET OF UTILITY COMPANIES ARE THOSE THAT HAVE BEEN CONTACTED BY THE ENGINEER. THE LIST ON THIS SHEET IS IN NO WAY INTENDED TO LIMIT THE UTILITY COMPANIES THE CONTRACTOR SHOULD CALL. SUNSHINE ONE (800-432-4770) SHOULD BE CALLED FOR ALL LOCATION WORK.
- INSTALL AIR RELEASE VALVES AS SHOWN IN THE PLANS.
- PERFORM SURFACE RESTORATION IMMEDIATELY FOLLOWING PIPELINE INSTALLATION, INCLUDING ROADWAY, DRIVEWAY, LANDSCAPING, GRASSING OR OTHER. RESHAPE DITCHES TO EXISTING CONTOURS. GRASSING SHALL BE WHERE EXISTING GRASS HAS BEEN DAMAGED BY CONSTRUCTION. PAVED AREAS SHALL BE RESTORED WITH AN ALL WEATHER SURFACE UNTIL FINAL RESTORATION IS COMPLETE.
- WHERE PIPES CANNOT BE INSTALLED WITH A MINIMUM EARTH COVER OF 48 INCHES, CONTACT THE FIELD ENGINEER.
- WHEN WATER MAIN CROSSES A GAS MAIN, MAINTAIN A MINIMUM 12-INCH VERTICAL SEPARATION BETWEEN THE TWO PIPES. PLACE COMPACTED CLEAN SAND BEDDING BETWEEN THE TWO PIPES. CENTER A 20 FOOT SECTION OF WATER MAIN UNDER THE GAS MAIN. NO MACHINE EXCAVATION SHALL BE PERFORMED WITHIN 5 FEET OF A GAS MAIN.
- ALL PROJECT COMPONENTS THAT WILL COME INTO CONTACT WITH POTABLE WATER SHALL BE IN CONFORMANCE WITH AMERICAN NATIONAL STANDARDS INSTITUTE / NSF INTERNATIONAL STANDARD 61.
- ALL PVC PIPE SHALL CONFORM TO ANSI / AWWA C900-97.
- CONTRACTOR TO CHECK SIZE OF EXISTING WATER MAINS TO BE CONNECTED PRIOR TO PURCHASING TAPPING SLEEVE/VALVES AND FITTINGS.
- CONTRACTOR SHOULD PERFORM SOFT DIG ON EXISTING WATER MAINS TO CHECK ACTUAL SIZE, LOCATION AND MATERIAL PRIOR TO CONSTRUCTION.
- TRENCH WIDTH FOR PIPE INSTALLATION SHALL NOT EXCEED 4-FEET WIDE CONTRACTOR SHALL MAINTAIN EXCAVATION TO A MAXIMUM OF 4-FEET WIDE.
- CONTRACTOR SHALL RESTORE ALL SURFACE CONDITIONS WHEN INSTALLING CAPS AT MAINS, INCLUDING ASPHALT DRIVEWAYS, SIDEWALKS AND SOD. CONTRACTOR MUST USE LIGHT EQUIPMENT WHEN WORKING NEAR EXISTING DRIVEWAYS AND SIDEWALKS, AND TAKE MEASURES TO MINIMIZE VIBRATIONS TO NEARBY RESIDENCES.
- LOCATIONS OF PROPOSED FIRE HYDRANTS SHALL BE CONFIRMED IN THE FIELD PRIOR TO CONSTRUCTION.

EROSION CONTROL NOTES

- NO UNAUTHORIZED DISTURBANCE OF EXISTING WETLANDS WILL BE PERMITTED. TEMPORARILY INSTALL SILT FENCES, BARRIERS OR HAY BALES IMMEDIATELY ADJACENT TO AND UPDAND FROM ALL EXISTING WETLANDS PRIOR TO CONSTRUCTION ACTIVITIES WHICH MIGHT IMPACT THE WETLANDS. REMOVE ALL WETLAND PROTECTION MEASURES AFTER THE PROJECT HAS BEEN ACCEPTED BY THE OWNER. PERFORM THIS WORK AT NO EXPENSE TO THE OWNER AND COMPLY WITH FLORIDA DEPARTMENT OF TRANSPORTATION'S "ROADWAY AND TRAFFIC DESIGN STANDARDS", INDEX NO. 102, LATEST EDITION.
- ALL CONSTRUCTION ACTIVITIES SHALL INCORPORATE BEST MANAGEMENT PRACTICES TO CONTROL EROSION, SEDIMENTATION, AND THE POTENTIAL FOR DOWNSTREAM WATER QUALITY DEGRADATION. CONSTRUCTION PRACTICES INCLUDE:
 - CONSTRUCT TEMPORARY SEDIMENTATION BASINS OR EARTHEN BERMIS AT DOWN- GRADIENT ENDS OF NEWLY GRADED AREAS TO PROVIDE FOR SEDIMENT AND TURBIDITY REMOVAL.
 - LIMIT SITE CLEARING TO THOSE AREAS REQUIRED FOR A PARTICULAR PHASE OF CONSTRUCTION. EXISTING TREES AND VEGETATION TO REMAIN WHENEVER POSSIBLE.
 - TURBIDITY BARRIERS, HAY BALES AND OTHER EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THE POTENTIAL FOR EROSION IS ELIMINATED.
- SEED AND MULCH (LAKE, DITCH, AND SWALE BANKS) AS SOON AS POSSIBLE AFTER CONSTRUCTION IN ORDER TO STABILIZE THE SLOPES AND MINIMIZE EROSION. IN AREAS DELINEATED AS "WETLANDS", REVEGETATE IN ACCORDANCE WITH PERMIT CONDITIONS.
- DO NOT EMPLOY SILT FENCES IN A MANNER TO CAUSE THEM TO ACT AS A DAM ACROSS PERMANENTLY FLOWING WATERCOURSES. USE SILT FENCES AT UPDAND LOCATIONS, AND TURBIDITY BARRIERS IN PERMANENT WATER BODIES, REGARDLESS OF WATER DEPTH.
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- DO NOT EMPLOY SILT FENCES IN A MANNER TO CAUSE THEM TO ACT AS A DAM ACROSS PERMANENTLY FLOWING WATERCOURSES. USE SILT FENCES AT UPDAND LOCATIONS, AND TURBIDITY BARRIERS IN PERMANENT WATER BODIES, REGARDLESS OF WATER DEPTH.
- CONSTRUCTION ACTIVITIES SHALL INCORPORATE BEST MANAGEMENT PRACTICES TO CONTROL EROSION, SEDIMENTATION, AND THE POTENTIAL FOR DOWNSTREAM WATER QUALITY DEGRADATION. CONSTRUCTION PRACTICES INCLUDE:
 - CONSTRUCT TEMPORARY SEDIMENTATION BASINS OR EARTHEN BERMIS AT DOWN- GRADIENT ENDS OF NEWLY GRADED AREAS TO PROVIDE FOR SEDIMENT AND TURBIDITY REMOVAL.
 - LIMIT SITE CLEARING TO THOSE AREAS REQUIRED FOR A PARTICULAR PHASE OF CONSTRUCTION. EXISTING TREES AND VEGETATION TO REMAIN WHENEVER POSSIBLE.
 - TURBIDITY BARRIERS, HAY BALES AND OTHER EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THE POTENTIAL FOR EROSION IS ELIMINATED.
- SEED AND MULCH (LAKE, DITCH, AND SWALE BANKS) AS SOON AS POSSIBLE AFTER CONSTRUCTION IN ORDER TO STABILIZE THE SLOPES AND MINIMIZE EROSION. IN AREAS DELINEATED AS "WETLANDS", REVEGETATE IN ACCORDANCE WITH PERMIT CONDITIONS.
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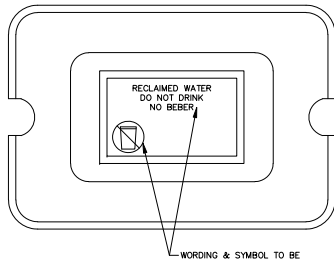
V:\PROJECTS\2012\12-00148 - DIPLOMAT PKWY WATER REUSE EXT\DRAWINGS\ENGINEERING\12-00148 DET.DWG 4/1/13 by GTURNER

DETAILS

APPROVED : WERNER J. REINEFELD, P.E.

CERTIFICATES OF AUTHORIZATION:		
EB7318 LB6680 LC033		
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DES.	DWN.	CHK.
PROJECT / FILE NO.		
12-00148		
DRAWING NO.		
DET-1		
DATE DRAWN:	4	
1 / 30 / 13	1 / 30 / 13	

STANDARD DETAIL

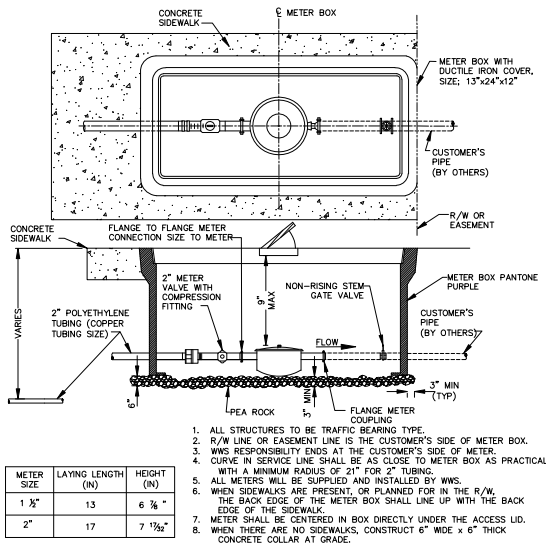


COVER TO BE EPOXY COATED WITH INFUSED PANTONE PURPLE.

RECLAIMED METER BOX COVER

FIGURE
525

STANDARD DETAIL

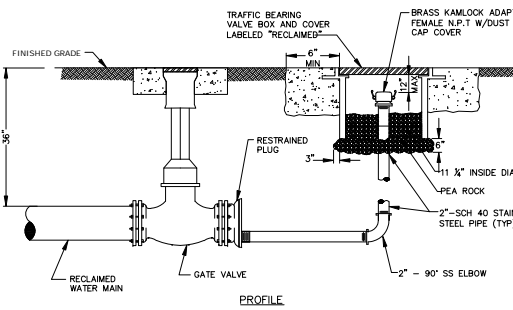


METER SIZE	LAYING LENGTH (IN)	HEIGHT (IN)
1 1/2"	13	6 3/4"
2"	17	7 1/2"

RECLAIMED METER BOX FOR
1 1/2" OR 2" METER

FIGURE
527

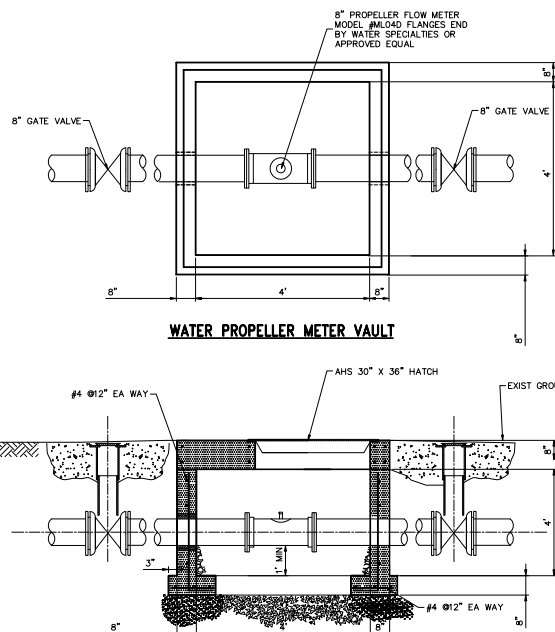
STANDARD DETAIL



1. 2" TAP IN BOTTOM OF PLUG.
2. USE RESTRAINED JOINT PIPE.
3. IN GRASS AREA USE CONCRETE COLLARS, 6" THICK.
4. PIPE AND VALVE BOX SHALL BE EPOXY COATED WITH PANTONE PURPLE.

RECLAIMED WATER MANUAL BLOW OFF

FIGURE
552



WATER PROPELLER METER VAULT

WATER PROPELLER METER VAULT

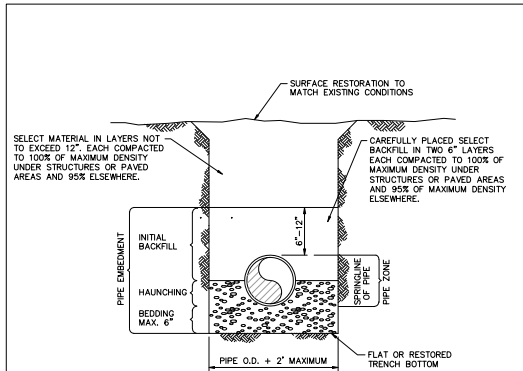
RECLAIMED METER VAULT FOR 8" METER

NOTES RELATED TO VAULT HATCHES

1. FRAME OF HATCH IS NOT SHOWN ON THE TOP VIEWS.
2. FOR 6" x 6" VAULT, USE 48 X 72 ALUMINUM HATCH WITH S.S. VERTICAL COMPRESSION SPRINGS AND S.S. ACCESSORIES.
3. VAULT, USE AHS 30 X 36 ALUMINUM HATCH WITH S.S. VERTICAL COMPRESSION SPRINGS AND S.S. ACCESSORIES.
4. PER MANUFACTURER, U.S. FOUNDRY, (OR APPROVED EQUAL), HATCHES ARE INTENDED FOR USE ON OFF STREET LOCATIONS THAT MAY OCCASIONALLY RECEIVE AASHTO H-20 WHEEL LOADS.

INSTALLATION NOTES

1. PRESSURE REDUCING OR FLOW DISTURBING FITTINGS SHALL NOT BE INSTALLED CLOSER THAN 5-PIPE DIAMETERS UPSTREAM OR DOWNSTREAM FROM THE METERS.
2. ALL PIPES SHALL BE WRAPPED WITH TWO LAYERS OF 30# ROOFING FELT, WHERE THEY PASS THROUGH VAULT WALLS AND THE ANNULAR SPACE FILLED WITH GROUT AFTER PIPE INSTALLATION.
3. CONCRETE VAULTS SHALL BE AS MANUFACTURED BY U.S. PRECAST OR APPROVED EQUAL.
4. CONCRETE TO OBTAIN A MAX. COMPRESSIVE STRENGTH $f'_{c} = 4,000$ psi. AT 28 DAYS.
5. REINFORCEMENT TO COMPLY WITH ASTM-A-615 WITH A MIN. YIELD STRENGTH $F_{y} = 60,000$ psi.
6. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON, CEMENT LINED, UNLESS OTHERWISE CALLED FOR.
7. ALLOW A 1/2" GAP BETWEEN FACE OF FLANGE AND CONNECTING PIPE TO FACILITATE ASSEMBLY/DISASSEMBLY AT ALL MEGAFLANGE ADAPTERS (MARK 5).

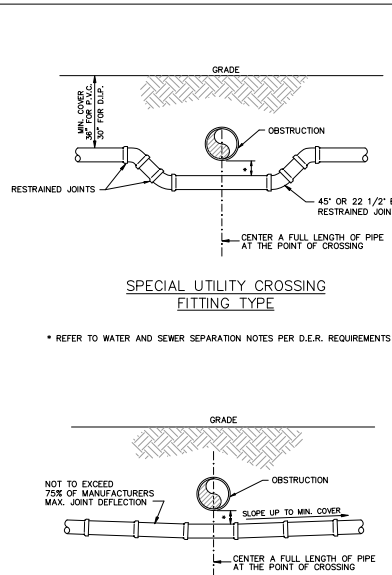


NOTES:

1. BEDDING AND HAUNCHING SHALL BE WELL GRADED 3/4" MAX. SIZE CRUSHED LIMEROCK
2. DENSITY TESTING SHALL BE IN ACCORDANCE WITH AASHTO T-180 AND ASTM D-3017.

CITY OF HOLLYWOOD - UTILITIES DEPARTMENT STANDARD DETAIL
PVC PIPE LAYING CONDITION
TYPICAL SECTION

DATE: 3/01/94
DRAWN: EAM
APPROVED: S-3



SPECIAL UTILITY CROSSING
FITTING TYPE

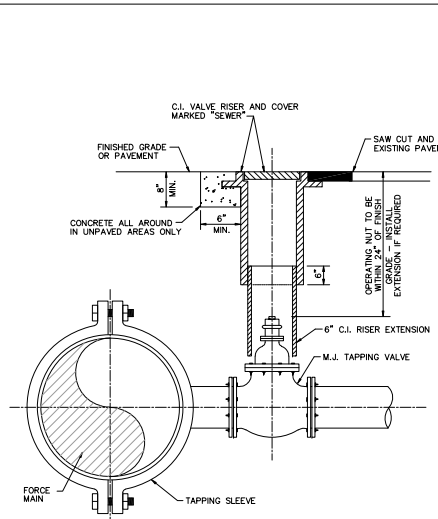
* REFER TO WATER AND SEWER SEPARATION NOTES PER D.E.R. REQUIREMENTS

STANDARD UTILITY CROSSING
DEFLECTION TYPE

* REFER TO WATER AND SEWER SEPARATION NOTES PER D.E.R. REQUIREMENTS

CITY OF HOLLYWOOD - UTILITIES DEPARTMENT STANDARD DETAIL
UTILITY CROSSING DETAIL

DATE: 3/01/94
DRAWN: EAM
APPROVED: S-4

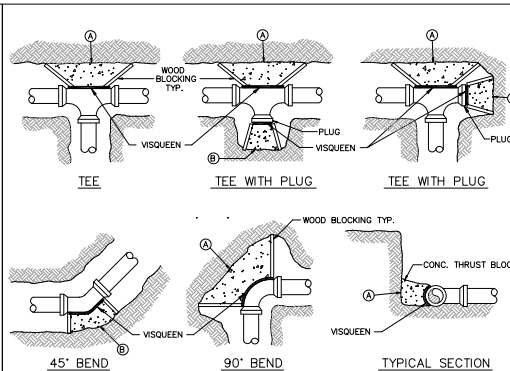


NOTE:

ALSO SEE DETAIL OF PRIVATE FORCE MAIN TIE-IN AT PROPERTY LINE.

CITY OF HOLLYWOOD - UTILITIES DEPARTMENT STANDARD DETAIL
FORCE MAIN CONNECTION

DATE: 3/01/94
DRAWN: EAM
APPROVED: S-16



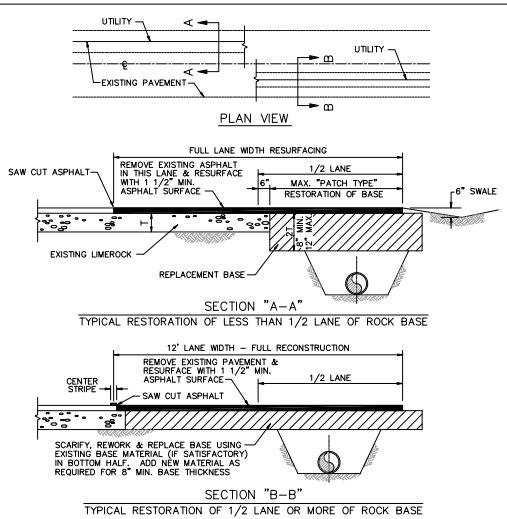
MARK	PIPE SIZE			
	4" OR 6"	8"	10"	12"
A				
B				

NOTES:

1. THE AREAS IN THE TABLE ARE BASED ON _____ POUNDS PER SQUARE FOOT SOIL BEARING AGAINST THE UNDISTURBED TRENCH WALL AND ARE TO REPRESENT THE MINIMUM VERTICAL PROJECTED AREA AT THE THRUST BLOCK IN A PLANE PERPENDICULAR TO THE LINE BISECTING THE INCLUDING ANGLE OF THE FITTING.
2. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL. WHERE TRENCH WALL HAS BEEN DISTURBED, EVACUATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL.
3. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
4. DO NOT COVER COUPLING OR JOINTS WITH CONCRETE.
5. CONCRETE TO BE 2500 P.S.I. MINIMUM 28 DAY STRENGTH.
6. TABLE TO BE COMPLETED BY DESIGN ENGINEER.

CITY OF HOLLYWOOD - UTILITIES DEPARTMENT STANDARD DETAIL
THRUST BLOCK REQUIREMENTS

DATE: 3/01/94
DRAWN: EAM
APPROVED: S-19



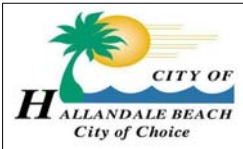
NOTES:

1. BASE MATERIAL SHALL HAVE A MINIMUM L.B.R. OF 100 AND A MINIMUM CARBONATE CONTENT OF 70%.
2. BASE MATERIAL SHALL BE PLACED IN 6" MAXIMUM THICKNESS LAYERS WITH EACH LAYER COMPACTED AS REQUIRED AND TESTED PRIOR TO THE PLACEMENT OF THE SUCCEEDING LAYERS.
3. SUBGRADE MATERIAL SHALL BE GRANULAR AND SHALL HAVE A MINIMUM L.B.R. OF 40.
4. BACKFILL SHALL BE PLACED AND COMPACTED IN 8" LAYERS, BUT TESTING WILL BEGUN 12" ABOVE THE INSTALLED FACILITY.
5. ALL EDGES OF EXISTING ASPHALT PAVEMENT WHERE RESURFACING WILL ABUT SHALL BE SAW CUT TO STRAIGHT LINES, PARALLEL TO OR PERPENDICULAR TO THE ROADWAY, PRIOR TO THE RESURFACING.
6. RESURFACING MATERIAL SHALL BE OF THE SAME MIX AS THE EXISTING SURFACE, AND SHALL BE APPLIED A MINIMUM OF ONE AND ONE-HALF INCHES AND A MAXIMUM OF TWO INCHES IN THICKNESS.
7. REFER TO SPECIFICATIONS FOR DETAILED PROCEDURES.

CITY OF HOLLYWOOD - UTILITIES DEPARTMENT STANDARD DETAIL
FLEXIBLE PAVEMENT RESTORATION
PARALLEL UTILITY INSTALLATION
(CITY STREETS ONLY)

DATE: 3/01/94
DRAWN: EAM
APPROVED: S-21

DETAILS

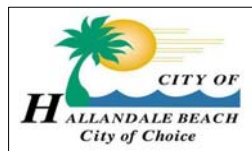


DIPLOMAT PKWY REUSE EXTENSION

FOR: CITY OF HALLENDALE BEACH



CERTIFICATE OF AUTHORIZATION		
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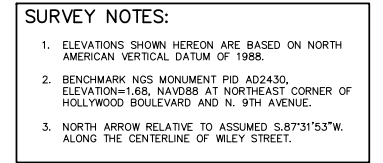
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FOR: CITY OF HALLENDALE BEACH

APPROVED : WERNER J. REINEFELD, P.E.
FLA. REGISTRATION NO. 63042 DATE : _____



CERTIFICATES OF AUTHORIZATION:		
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SHA	GAT	WR
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12-00148		
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DET -3		
DATE DRAWN:	6 / 14 OF	
1/30/13	SH.	



<p>CONTRACTOR NOTE:</p> <p>ALL UTILITIES LISTED WITHOUT PIPE SIZE AND MATERIAL NEED TO BE FIELD VERIFIED.</p>
--



FOR: CITY OF HALLENDALE BEACH

APPROVED : WERNER J. REINEFELD, P.E.
FLA. REGISTRATION NO. 63042 DATE : _____

MILLER LEGG
South Florida Office: 5747 N. Andrews Way
Ft. Lauderdale, Florida • 33309-2364
954-436-7000 • Fax: 954-436-8664
www.millerlegg.com

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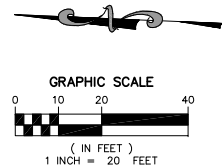
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REFER TO SHEET NO. 8 FOR CONTINUATION

REFER TO SHEET NO. 10 FOR CONTINUATION

DIPLOMAT GOLF ESTATES ADDITION
P.B. 45, PG. 43, B.C.R.

DIPLOMAT GOLF ESTATES ADDITION
P.B. 45, PG. 43, B.C.R.



SURVEY NOTES:

- ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
- BENCHMARK NGS MONUMENT PID AD2430, ELEVATION=1.68, NAVD88 AT NORTHEAST CORNER OF HOLLYWOOD BOULEVARD AND N. 9TH AVENUE.
- NORTH ARROW RELATIVE TO ASSUMED S.87°31'53"W. ALONG THE CENTERLINE OF WILEY STREET.

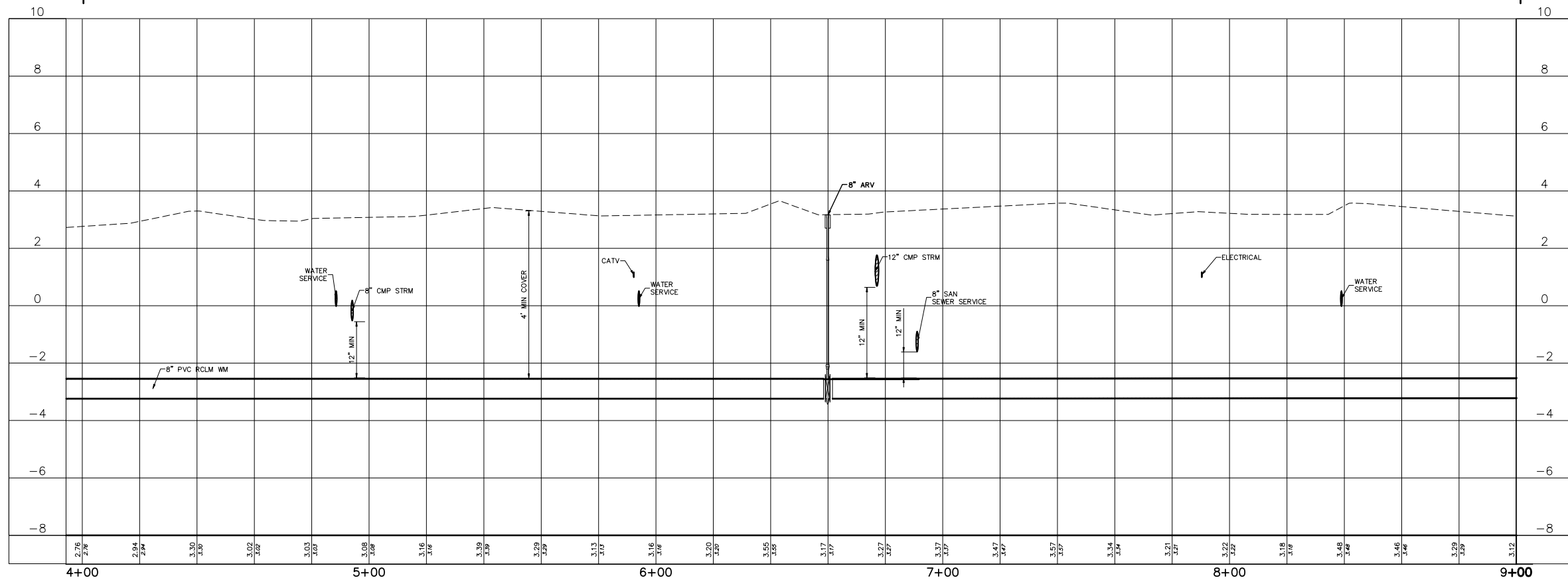
CONTRACTOR NOTE:

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DIPLOMAT GOLF ESTATES ADDITION
P.B. 45, PG. 43, B.C.R.

DIPLOMAT GOLF ESTATES ADDITION
P.B. 45, PG. 43, B.C.R.



REUSE EXTENSION PLAN & PROFILE

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DIPLOMAT PKWY REUSE EXTENSION

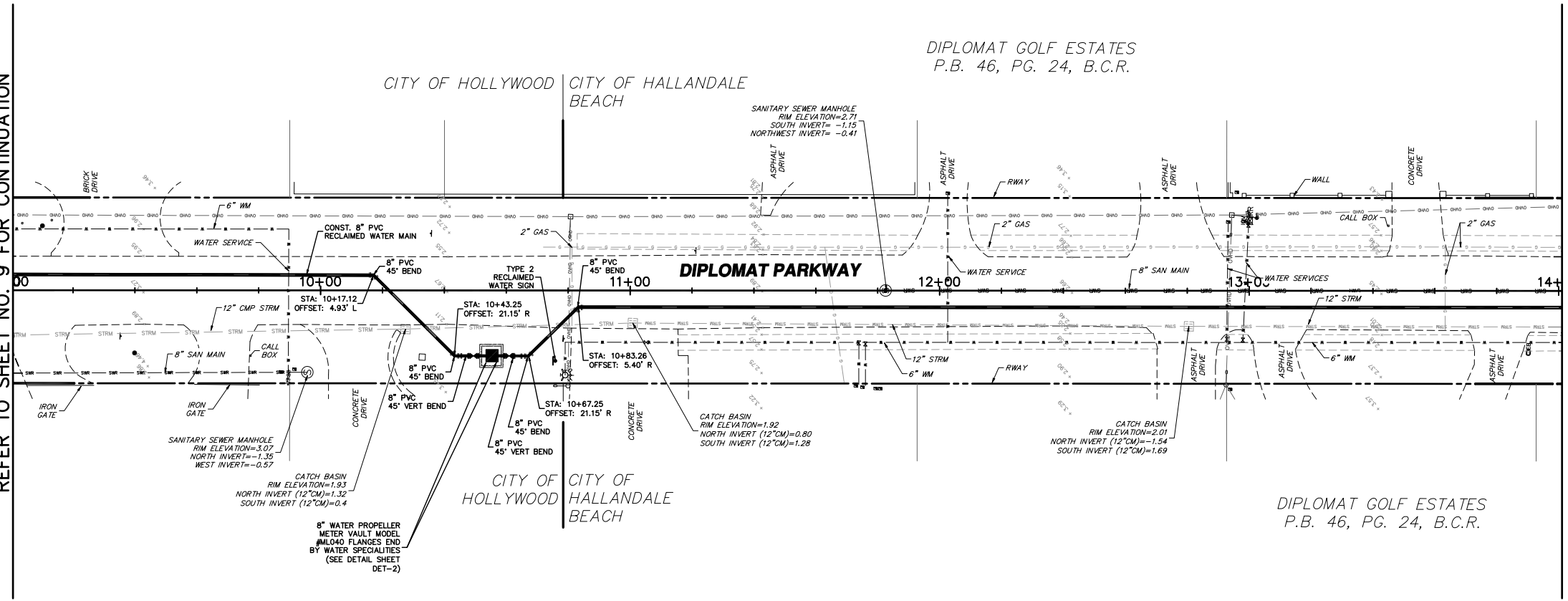
FOR: CITY OF HALLENDALE BEACH

APPROVED: _____
FLA. REGISTRATION NO. 63042 DATE: _____

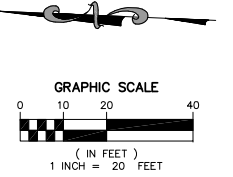


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DES.	DWN.	CHK.	
PROJECT / FILE NO.			
12-00148			
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REFER TO SHEET NO. 9 FOR CONTINUATION



REFER TO SHEET NO. 11 FOR CONTINUATION

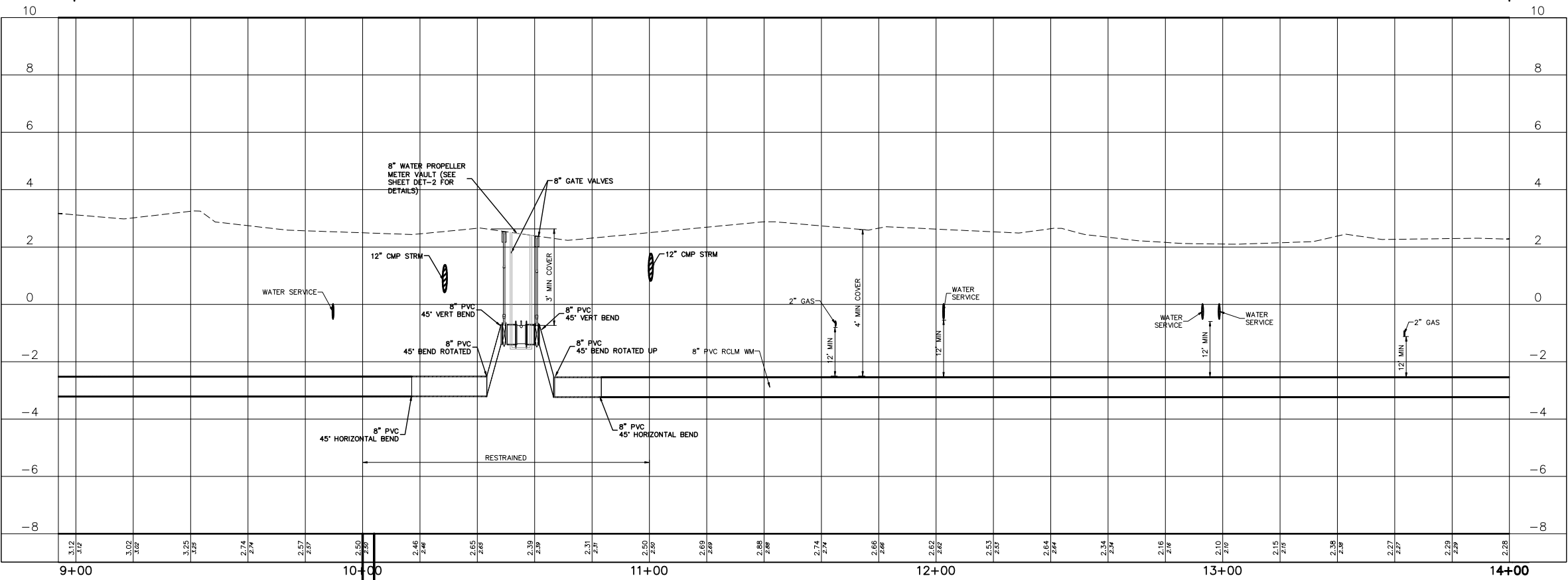


SURVEY NOTES:

1. ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
2. BENCHMARK: NGS MONUMENT PID: AD2430, ELEVATION=1.68, NAVD88 AT NORTHEAST CORNER OF HOLLYWOOD BOULEVARD AND N. 9TH AVENUE.
3. NORTH ARROW RELATIVE TO ASSUMED S.87°31'53"W. ALONG THE CENTERLINE OF WILEY STREET.

CONTRACTOR NOTE:

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REUSE EXTENSION PLAN & PROFILE

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FOR: CITY OF HALLANDALE BEACH

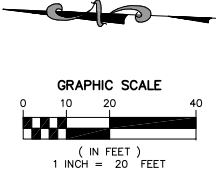
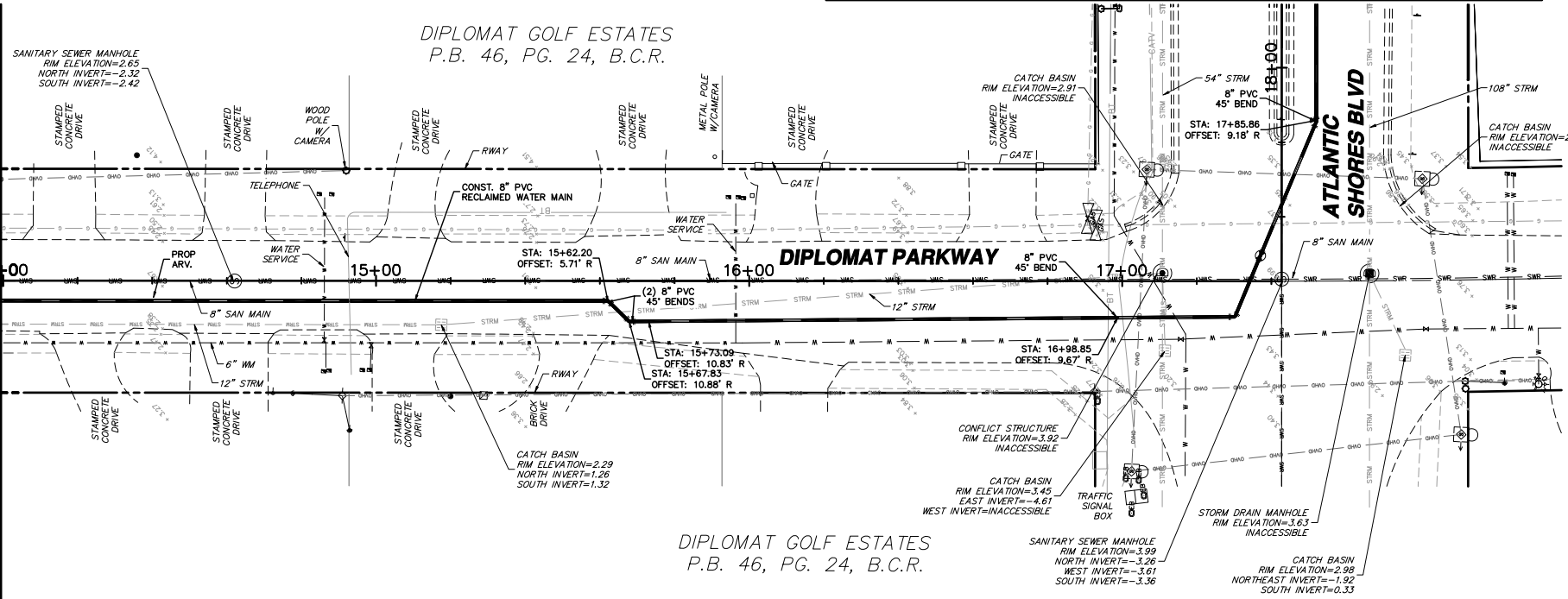
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FLA. REGISTRATION NO. 63042 DATE: _____



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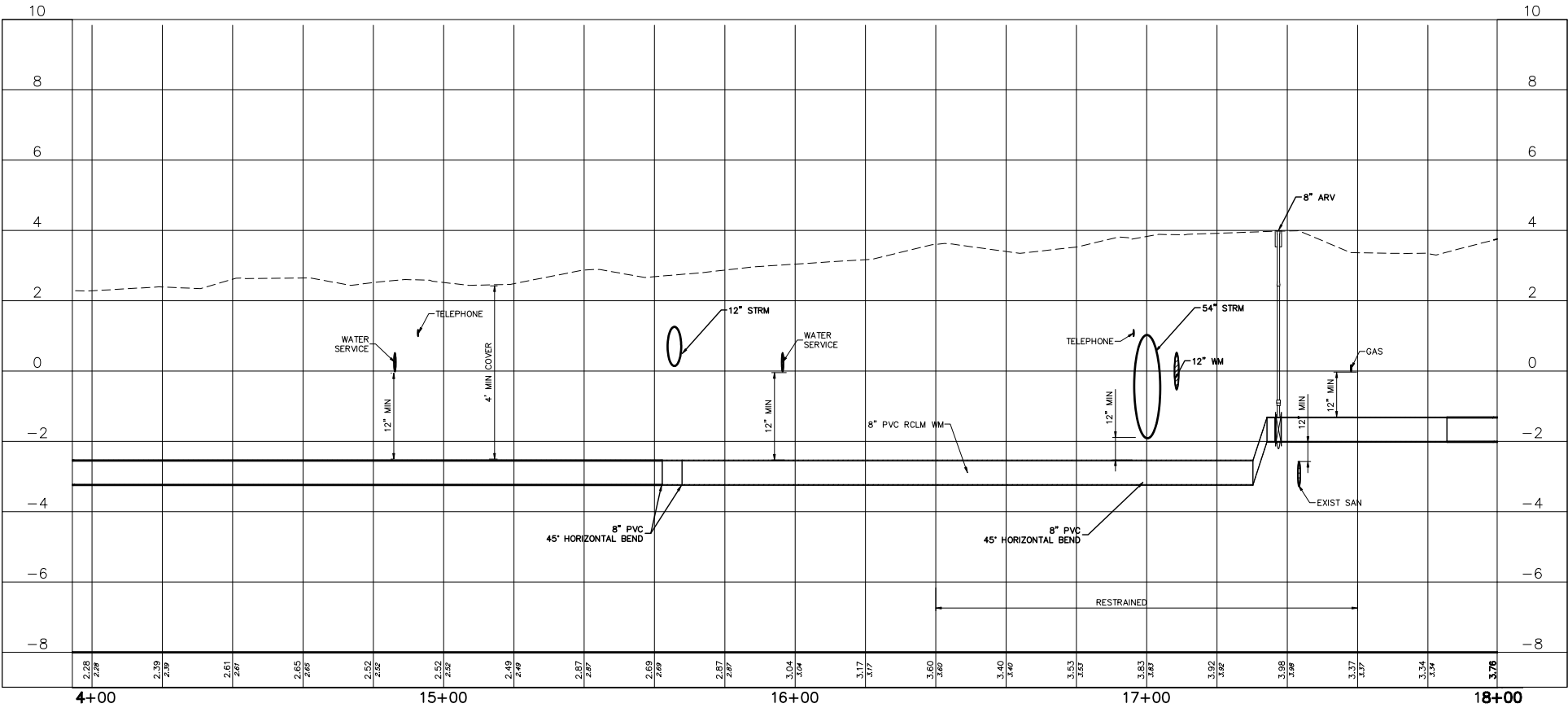
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- SURVEY NOTES:**
- ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
 - BENCHMARK NGS MONUMENT PID AD2430, ELEVATION=1.68, NAVD88 AT NORTHEAST CORNER OF HOLLYWOOD BOULEVARD AND N. 9TH AVENUE.
 - NORTH ARROW RELATIVE TO ASSUMED S.87°31'53\"/>

CONTRACTOR NOTE:

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REUSE EXTENSION PLAN & PROFILE

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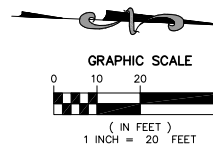
DIPLOMAT PKWY REUSE EXTENSION

FOR: CITY OF HALLENDALE BEACH

APPROVED: _____
FLA. REGISTRATION NO. 63042 DATE: _____



CERTIFICATE OF AUTHORIZATION			
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1. ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
2. BENCHMARK NGS MONUMENT PID AD2430, ELEVATION=1.68, NAVD88 AT NORTHEAST CORNER OF HOLLYWOOD BOULEVARD AND N. 9TH AVENUE.
3. NORTH ARROW RELATIVE TO ASSUMED S.87°31'53"W. ALONG THE CENTERLINE OF WILEY STREET.

ALL UTILITIES LISTED WITHOUT PIPE SIZE AND MATERIAL
NEED TO BE FIELD VERIFIED.



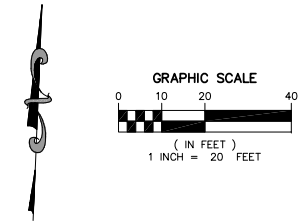
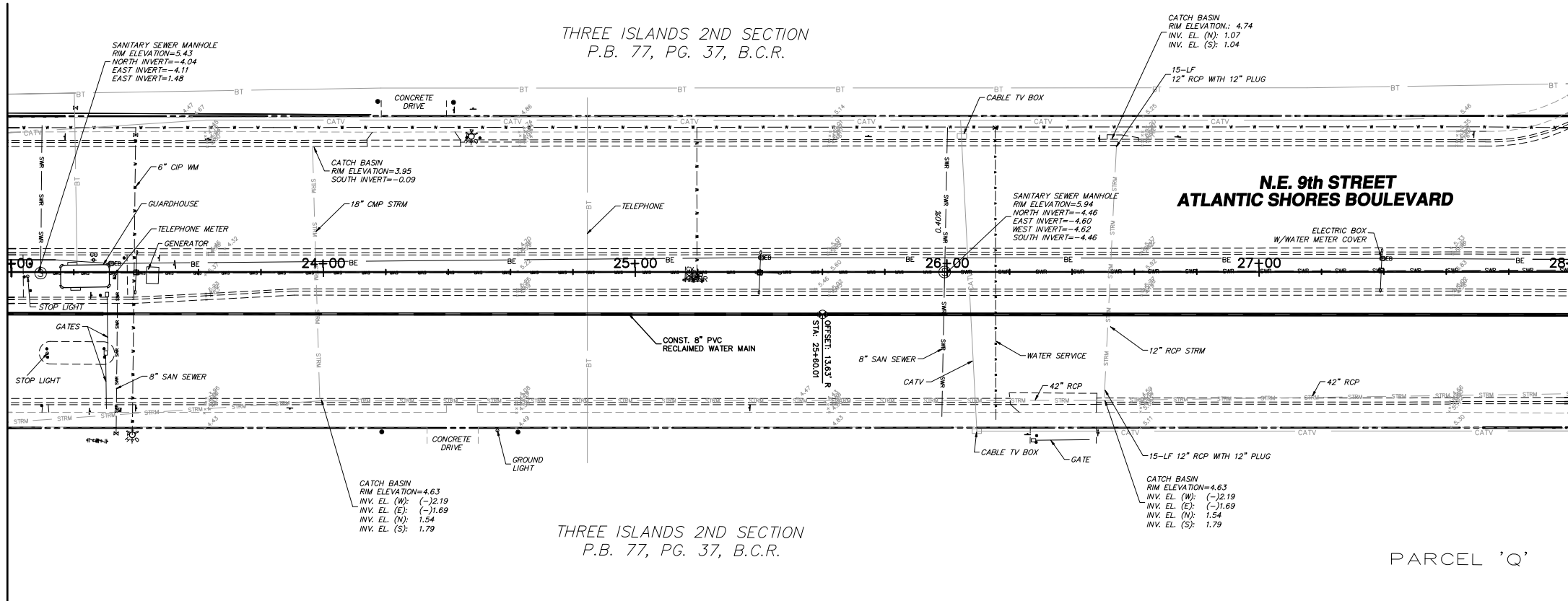
FOR: CITY OF HALLENDALE BEACH

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FLA. REGISTRATION NO. 63042 DATE : _____



CERTIFICATES OF AUTHORIZATION		
EB7318 LB6680 LC03		
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DES.	DWN.	CHK
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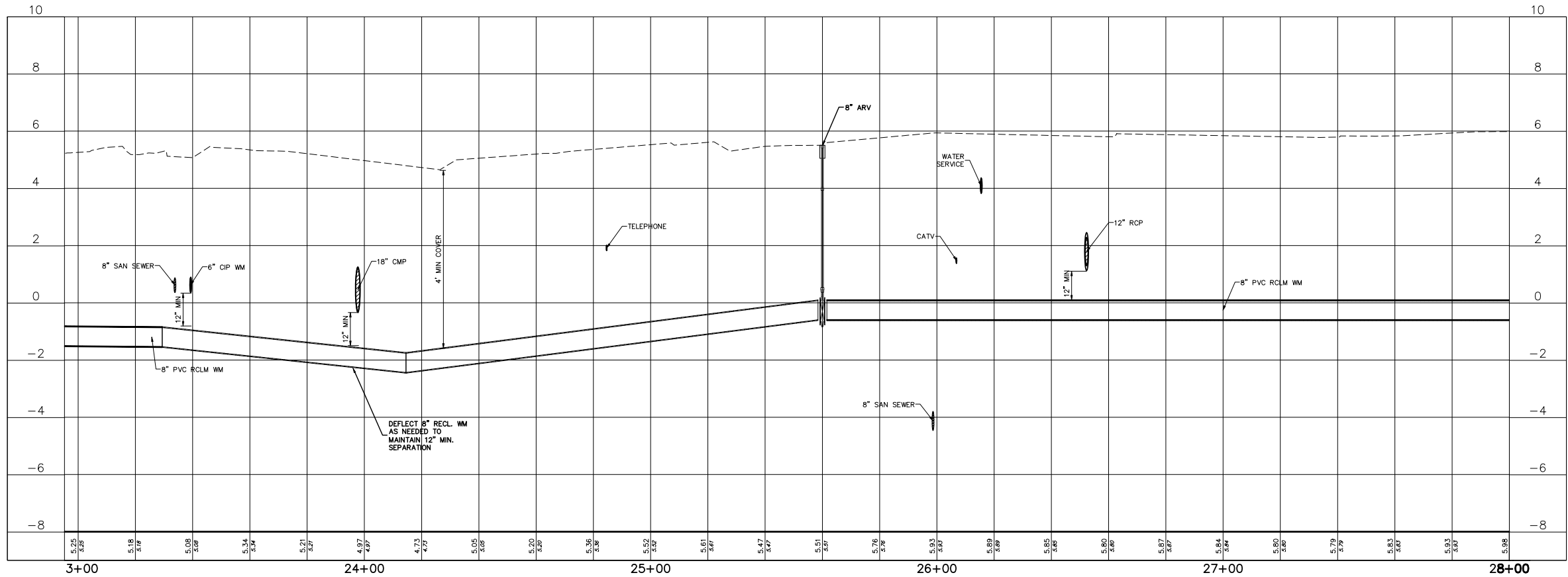
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- ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.
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REUSE EXTENSION PLAN & PROFILE

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DIPLOMAT PKWY REUSE EXTENSION

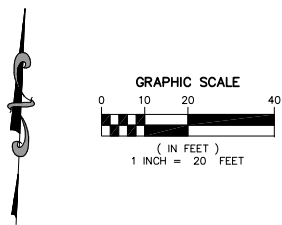
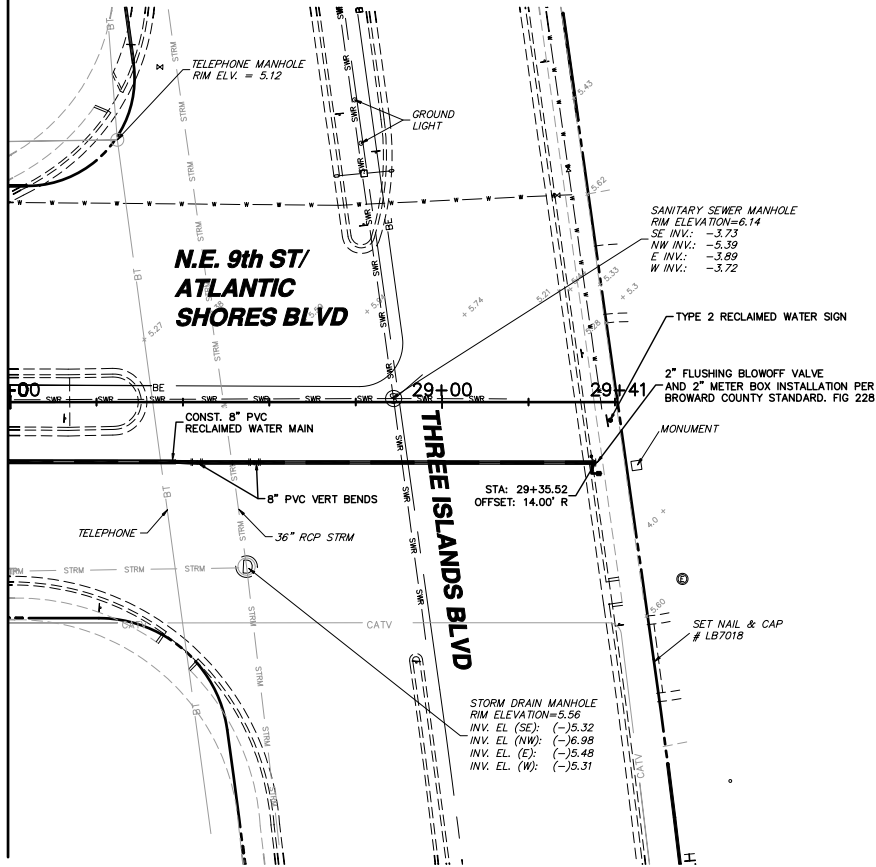
FOR: CITY OF HALLENDALE BEACH

APPROVED: WERNER J. RENEVELLO, P.E.
FLA. REGISTRATION NO. 63042 DATE:



CERTIFICATE OF AUTHORIZATION			
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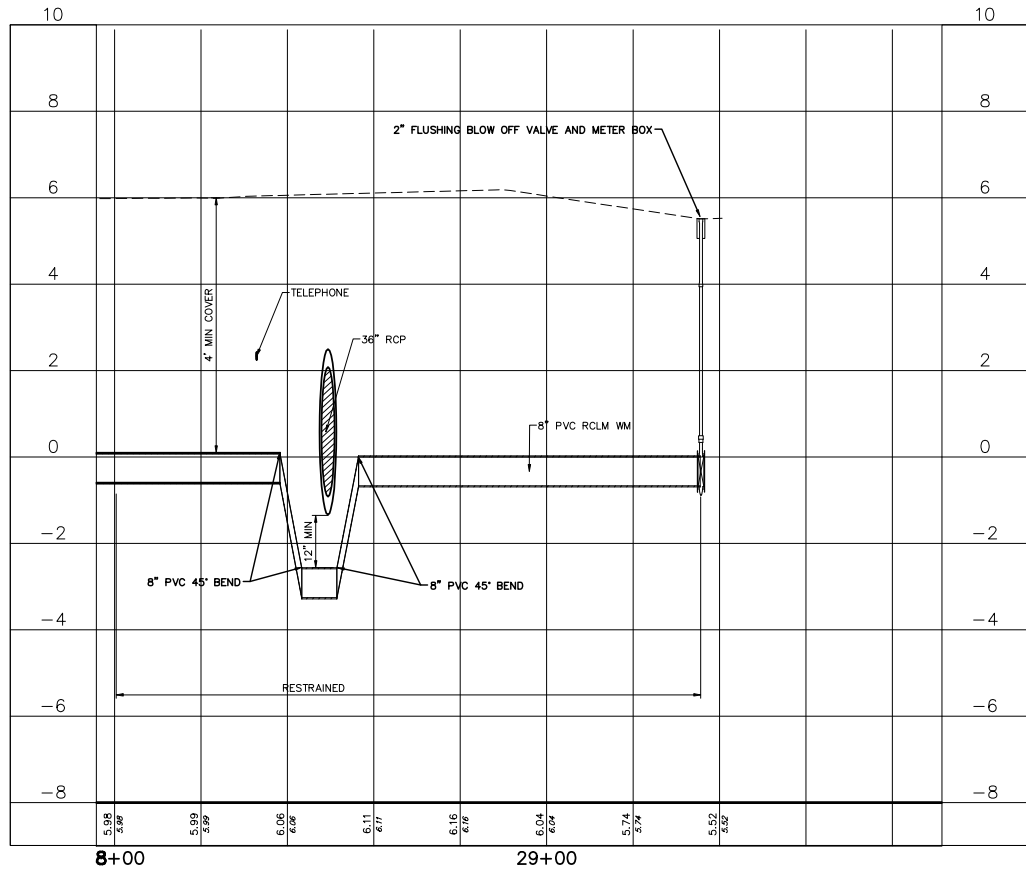
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- SURVEY NOTES:**
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CONTRACTOR NOTE:

ALL UTILITIES LISTED WITHOUT PIPE SIZE AND MATERIAL NEED TO BE FIELD VERIFIED.



REUSE EXTENSION PLAN & PROFILE

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NO.	DATE	REVISIONS	DES.	CHK.



DIPLOMAT PKWY REUSE EXTENSION

FOR: CITY OF HALLENDALE BEACH

APPROVED: _____
FLA. REGISTRATION NO. 63042 DATE: _____



CERTIFICATES OF AUTHORIZATION		
SHA	GAT	WR
DES.	DRAW.	CHK.
PROJECT / FILE NO.		
12-00148		
DRAWING NO.		
RW-7		
DATE DRAWN	DATE	14
11/7/12		14

APPENDIX B

SITE OBSERVATION PHOTOGRAPHS



Figure 1: West side of Diplomat Parkway facing south toward intersection of Diplomat Parkway and Atlantic Shores Boulevard



Figure 2: Existing bridge crossing De Soto Waterway along Atlantic Shores Boulevard, facing east



Figure 3: South side of bridge structure facing east



Figure 4: Existing water main and gas line attached to north side of bridge structure, facing east



Figure 5: Existing water main and gas line attached to north side of bridge structure, facing east



Figure 6: Close-up of water main pipe hanger

APPENDIX C

GENERAL SPECIFICATIONS

SECTION 15000

PIPING GENERAL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install to the required line and grade, all piping together with all fittings and appurtenances, required for a complete installation. All piping located outside the face of structures or building foundations and all piping embedded in concrete within a structure or foundation shall be considered exterior piping.
- B. The CONTRACTOR shall furnish and install fittings, couplings, connections, sleeves, adapters, harness rods and closure pieces as required to connect pipelines of dissimilar materials and/or sizes herein included under this Section and other concurrent contracts for a complete installation.
- C. The CONTRACTOR shall furnish all labor, materials, equipment, tools, and services required for the furnishing, installation and testing of all piping as shown on the Drawings, specified in this Section and required for the Work. Piping shall be furnished and installed of the material, sizes, classes, and at the locations shown on the Drawings and/or designated in this Section. Piping shall include all fittings, adapter pieces, couplings, closure pieces, harnessing rods, hardware, bolts, gaskets, wall sleeves, wall pipes, hangers, supports, and other associated appurtenances for required connections to equipment, valves, or structures for a complete installation.
- D. Piping assemblies under 4-inch size shall be generally supported on walls and ceilings, unless otherwise shown on the Drawings or ordered by the ENGINEER, being kept clear of openings and positioned above "headroom" space. Where practical, such piping shall be run in neat clusters, plumb and level along walls, and parallel to overhead beams.
- E. The CONTRACTOR shall provide taps on piping where required or shown on the Drawings. Where pipe or fitting wall thicknesses are insufficient to provide the required number of threads, a boss or pipe saddle shall be installed.
- F. The work shall include, but not be limited to, the following:
 - 1. Connections to existing pipelines.
 - 2. Test excavations necessary to locate or verify existing pipe and appurtenances.
 - 3. Installation of all new pipe and materials required for a complete installation.
 - 4. Cleaning, testing and disinfecting as required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 1, General Requirements
- B. Division 2, Sitework
- C. Division 9, Finishes
- D. Division 15, Mechanical Construction

1.03 SUBMITTALS

- A. The CONTRACTOR shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the requirements in section entitled "Submittals" and as specified in the individual piping sections.
- B. Each shop drawing submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the CONTRACTOR without review.
- C. Data to be submitted shall include, but not be limited to:
 - 1. Catalog Data consisting of specifications, illustrations, and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
 - 2. Complete layout and installation drawings with clearly marked dimensions and elevations. Piece numbers which are coordinated with the tabulated pipe layout schedule shall be clearly marked. Piping layout drawings shall indicate the following additional information; pipe supports, location, support type, hanger rod size, insert type and the load on the hanger in pounds.
 - 3. Weight of all component parts.
 - 4. Design calculations specified above.
 - 5. Tabulated pipe layout schedule which shall include the following information for all pipe and fittings, service, pipe size, working pressure, wall thickness and piece number.
- D. Certifications: Prior to installation, the CONTRACTOR shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of AWWA and these specifications. No pipe or fittings will be accepted for use in the Work on this project until the affidavits have been submitted and accepted in accordance with

Section 01300 – Submittals.

- E. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.04 QUALITY ASSURANCE

- A. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

- A. Where the assistance of a manufacturer's service representative is advisable, in order to obtain correct pipe joints, supports, or special connections, the CONTRACTOR shall furnish such assistance at no additional cost to the CITY.

1.06 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation caused by ground contact. Any materials susceptible to UV degradation shall be protected to eliminate exposure to sunlight. All defective or damaged materials shall be replaced with new materials. Storage shall conform with Section entitled "Site Access and Storage".

1.07 CLEANUP

- A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. All specials and every length of pipe shall be marked with the manufacturer's name or trademark, size, class, and the date of manufacture. Special care in handling shall be exercised during delivery, distribution, and storage of pipe to avoid damage and unnecessary stresses. Damaged pipe will be rejected and shall be replaced at the CONTRACTOR's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
- B. Testing of pipe before installation shall be as described in the corresponding ASTM or AWWA Specifications and in the applicable standard specifications listed in the

following sections. Field testing after the pipe is installed shall be as specified in Section 15995 – Pipeline Testing.

- C. Joints in piping shall be of the type as specified in Sections 15006 and 15007.
- D. All buried exterior piping shall have restrained joints for thrust protection unless otherwise specified or shown on the drawings. All exposed exterior piping shall have flanged joints, unless otherwise specified or shown on the drawings.
- E. The Drawings indicate work affecting existing piping and appurtenances. The CONTRACTOR shall excavate test pits as required of all connections and crossings which may affect the CONTRACTOR's work prior to ordering pipe and fittings to determine sufficient information for ordering materials. The CONTRACTOR shall take whatever measurements that are required to complete the work as shown or specified.
- F. Any ferrous metal pipes are required to be polywrapped, minimum 8 mil, with polywrap and secured with polytape. Polywrap and polytape to be approved by the City.

2.02 WALL PIPES

- A. Where wall sleeves or wall pipes occur in walls that are continuously wet on one or both sides, they shall have water stop flanges at the center of the casting or as shown on the Drawings. Ends of wall pipes shall be flange, mechanical joint, plain end, or bell as shown on the Drawings, or as required for connection to the piping. Wall pipes shall be of the same material as the piping that they are connected to. If welded waterstop flanges are employed, welds shall be 360 degree continuous on both sides of flange. Unless otherwise shown on the Drawings, waterstop flanges shall conform to the minimum dimensions shown below:

Pipe Size	Waterstop Flange Diameter	Waterstop Flange Thickness
4" - 12"	OD + 3.10"	0.50"
14" - 24"	OD + 4.15"	0.75"
30" - 36"	OD + 4.50"	1.00"
42" - 48"	OD + 5.00"	1.25"
54"	OD + 5.90"	1.50"
60" – 72"	OD + 6.00"	1.50"

2.03 SLEEVES

- A. Unless shown otherwise, all piping passing through walls and floors shall be installed in sleeves or wall castings accurately located before concrete is poured, or placed in position during construction of masonry walls. Sleeves passing through floors shall extend from the bottom of the floor to a point 3 inches above the finished floor, unless shown otherwise. Water stop flanges are required on all sleeves located in floors or walls which are continually wet or under hydrostatic pressure on one or both sides of the floor or wall.
- B. Sleeves shall be ductile iron, black steel pipe, or fabricated steel in accordance with

details shown on the Drawings. If not shown on the Drawings, the CONTRACTOR shall submit to the ENGINEER the details of sleeves he proposes to install; and no fabrication or installation thereof shall take place until the ENGINEER'S acceptance is obtained. Steel sleeves shall be fabricated of structural steel plate in accordance with the standards and procedures of AISC and AWS. Steel sleeve surfaces shall receive a commercial sandblast cleaning and then be shop painted in accordance with Section 09900, Painting.

- C. When shown on the Drawings or otherwise required, the annular space between the installed piping and sleeve shall be completely sealed against a maximum hydrostatic pressure of 20 psig. Seals shall be mechanically interlocked, solid rubber links, trade name "Link-Seal", as manufactured by the Thunderline Corp., Wayne, Michigan, or equal. Rubber link, seal-type, size, and installation thereof, shall be in strict accordance with the manufacturer's recommendations. For non-fire rated walls and floors, pressure plate shall be glass reinforced nylon plastic with EPDM rubber seal and 304 stainless steel bolts and nuts. For fire rated walls and floors, two independent seals shall be provided consisting of low carbon steel, zinc galvanized pressure plates, silicon rubber seals and low carbon steel, zinc galvanized bolts and nuts.
- D. Ductile iron mechanical joint; adapter sleeves shall be Clow # 1429, as manufactured by the Clow Corp., or equal. Mechanical joint adapter sleeves shall be provided with suitable gasket, follower ring, and bolts to effect a proper seal. In general, sleeves installed in walls, floors, or roofs against one side of which will develop a hydrostatic pressure, or through which leakage of liquid will occur, shall be so sealed. If welded waterstop flanges are employed, welds shall be 360 degree continuous on both sides of flange.

2.04 SOLID SLEEVE COUPLINGS

- A. Solid sleeve couplings shall be used to connect buried service piping where shown on the Drawings. Solid sleeves shall be ductile iron, long body and shall conform to the requirements of ANSI A21.10 (AWWA C110). Unless otherwise shown or specified, solid sleeve couplings shall be Style A11760 as manufactured by American Cast Iron Pipe Co., or equal.

2.05 SLEEVE TYPE COUPLINGS (SEWER ONLY)

- A. Sleeve type, flexible couplings shall be furnished and installed where shown on the Drawings.
- B. Materials shall be of high strength steel and couplings shall be rated for the same pressures as the connecting piping.
- C. Gaskets shall be rubber. Bolts and nuts shall be hot dipped galvanized alloy steel.
- D. Couplings shall be shop primed with a premium quality primer compatible with the painting system specified in Section 09900 - Painting. Interior surfaces (exposed to wastewater) shall receive the same coating as the pipe interior.

E. Harnessing

1. Harness couplings to adjacent flanges as shown, specified or otherwise required to restrain all pressure piping.
2. Dimensions, sizes, spacing and materials for lugs, tie rods, washers, and nuts shall conform to the standards for the pipe size, and design pressure specified.
3. No less than two bolts shall be furnished for each coupling.
4. Tie bolts, nuts and washers shall be ASTM A 193, Grade B7 steel or better.
5. Harness rods shall have lengths less than 10 feet between adjacent flanged joints on fittings and shall be coated in accordance with Section 09900 - Painting.

F. All couplings shall be provided without interior pipe stop.

G. Sleeve Type Coupling suppliers, or equal:

1. Rockwell (Smith-Blair), Style 411 (2 ½" – 4").
2. Dresser, Style 38.

2.06 MECHANICAL COUPLINGS

A. Construction: Mechanical couplings shall be provided where shown on the Drawing, and shall be of similar material as the pipe, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7-inches long for standard steel couplings, and 16-inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket.

B. Gaskets

1. Gaskets for mechanical couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N", Grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:
 - a. Color - Jet Black.
 - b. Surface - Nonblooming.
 - c. Durometer Hardness - 74 + 5.

- d. Tensile Strength - 1000 psi Minimum.
 - e. Elongation - 175 percent Minimum.
- 2. The gaskets shall be immune to attack by the material which is being transported.
- 3. Where couplings are used in water containing chloramines or other fluids which attack rubber materials, gasket material shall be compatible with the piping service and fluid utilized.
- 4. Gasket materials used for potable water containing chloramines shall be EPDM.
- C. Bolts, nuts and washers shall be ASTM A193, Grade B7 for above-ground applications. Buried applications shall use 316 stainless steel hardware.
- D. Coatings: Couplings shall be shop primed with a primer compatible with the painting system specified in the Section entitled "Painting".
- E. Harnessing: Where harnesses are required for mechanical couplings, they shall be in accordance with the requirements shown on the Drawings.
- F. Manufacturer shall be the following, or equal:
 - 1. Rockwell (Smith-Blair), Style 411
 - 2. Dresser, Style 38
 - 3. Total Piping Solution, Inc. (TPS) -Hymax
 - 4. Ford Meter Box Co., Inc., Style FC1 or FC3.

2.07 FLANGED ADAPTERS

- A. Flanged adapters shall be furnished as required and as shown on the Drawings.
- B. All flanged adapters, 12 inches in diameter and smaller, except as shown on the Drawings or directed by the ENGINEER, shall be locking type flanged adapters.
- C. Pressure and service shall be the same as connected piping.
- D. Materials shall be cast iron for pipes up to 12-inch diameter and high strength steel for pipes larger than 12 inch diameter.
- E. Flanged adapters shall be shop primed with a premium quality primer compatible with the paint system specified in Section 09900 - Painting.
- F. Bolts and nuts shall be alloy steel, corrosion-resistant and prime coated.

- G. Flanged coupling adapters shall be harnessed by tying the adapter to the nearest pipe joint flange using threaded rods and rod tabs. The threaded rods and rod tabs shall be as shown on the Drawings.
- H. Flanged adapters shall be as manufactured by Dresser Industries, Style 127 or 128, Smith Blair Corporation, or equal.

2.08 UNIONS

- A. For ductile iron piping, see Section 15006 "DUCTILE IRON PIPE"
- B. For copper piping, unions shall have ground joints and conform to ANSI B16.18.
- C. For PVC and CPVC piping, see Section 15007 "AWWA C900/C905 PVC PIPE".

2.09 TAPPING SLEEVES AND TAPPING SADDLES

- Refer to Section 15102 "TAPPING SLEEVES AND TAPPING VALVES".

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. All piping shall be installed by skilled workmen and in accordance with the best standard practice for piping installation as shown on the Drawings, specified or recommended by the pipe manufacturer. Proper tools and appliances for the safe and convenient handling and installing of the pipe and fittings shall be used. Great care shall be taken to prevent any pipe coating from being damaged on the inside or outside of the pipe and fittings. All pieces shall be carefully examined for defects, and no piece shall be installed which is known to be cracked, damaged, or otherwise defective. If any defective pieces should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the CONTRACTOR and at his own expense. Pipe and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they are accepted in the complete work. All piping connections to equipment shall be provided with unions or coupling flanges located so that piping may be readily dismantled from the equipment. At certain applications, Dresser, Victaulic, or equal, couplings may also be used. All piping shall be installed in such a manner that it will be free to expand and contract without injury to itself or to structures and equipment to which it is connected. All piping shall be erected to accurate lines and grades with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent. All exposed piping shall be installed with vertical and horizontal angles properly related to adjoining surfaces or pipes to give the appearance of good workmanship. Unless otherwise shown or approved, provided a minimum headroom clearance under all piping of 7 feet 6 inches.
- B. Unless otherwise shown or specified, all waste and vent piping shall pitch uniformly at a 1/4-inch per foot grade and accessible cleanouts shall be furnished and installed as shown and as required by local building codes. Installed length of waste and vent

piping shall be determined from field measurements in lieu of the Drawings.

- C. All excavation shall be made in such a manner and to such widths as will provide ample room for properly installing the pipe and permit thorough compaction of backfill around the pipe. The minimum trench widths shall be in strict accordance with the "Trench Width Excavation Limits" as shown on the Drawings. All excavation and trenching shall be done in strict accordance with these specifications and all applicable parts of the OSHA Regulations, 29CFR 1926, Subpart P.
- D. Enlargements of the trench shall be made as needed to give ample space for operations at pipe joints. The width of the trench shall be limited to the maximum dimensions shown on the Drawings, except where a wider trench is needed for the installation of and work within sheeting and bracing. Except where otherwise specified, excavation slopes shall be flat enough to avoid slides which will cause disturbance of the subgrade, damage to adjacent areas, or endanger the lives or safety of persons in the vicinity.
- E. Hand excavation shall be employed wherever, in the opinion of the ENGINEER, it is necessary for the protection of existing utilities, poles, trees, pavements, or obstructions.
- F. No greater length of trench in any location shall be left open, in advance of pipe laying, than shall be authorized or directed by the ENGINEER and, in general, such length shall be limited to approximately one hundred (100) feet. The CONTRACTOR shall excavate the trenches to the full depth, width and grade indicated on the Drawings including the relevant requirements for bedding. The trench bottoms shall then be examined by the ENGINEER as to the condition and bearing value before any pipe is laid or bedding is placed.
- G. No pipe trench shall be backfilled until required pressure testing has been performed. All testing shall be in accordance with Section 15995 – Pipeline Testing and Disinfection.
- H. All pipes passing through walls and/or floors shall be provided with wall pipes or sleeves in accordance with the specifications and the details shown on the Drawings. All wall pipes shall be of ductile iron and shall have a water stop located in the center of the wall. Each wall pipe shall be of the same class, thickness, and interior coating as the piping to which it is joined. All buried wall pipes shall have a coal tar outside coating on exposed surfaces.
- I. Joint deflection shall not exceed 75 percent of the manufacturer's recommended deflection. Excavation and backfilling shall conform to the requirements of Section 02222 – Excavation and Backfill for Utilities, and as specified herein. Maximum trench widths shall conform to the Trench Width Excavation Limits shown on the Drawings. All exposed, submerged, and buried piping shall be adequately supported and braced by means of hangers, concrete piers, pipe supports, or otherwise as may be required by the location.
- J. Following proper preparation of the trench subgrade, pipe and fittings shall be

carefully lowered into the trench so as to prevent dirt and other foreign substances from gaining entrance into the pipe and fittings. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall any of the materials be dropped or dumped into the trench.

- K. Water shall be kept out of the trench until jointing and backfilling are completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no water, earth, or other substance will enter the pipes, fitting, or valves. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored as required.
- L. All piping shall be installed in such a manner that it will be free to expand and/or contract without injury to itself or to structures and equipment to which it is connected. All piping shall be erected to accurate lines and grades with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent. All exposed piping shall be installed with vertical and horizontal angles properly related to adjoining surfaces or pipes to give the appearance of good workmanship. Pipes crossing within a vertical distance of less than or equal to one (1) foot shall be encased and supported with concrete at the point of crossing to prevent damage to the adjacent pipes as shown on the Drawings.
- M. The full length of each section of pipe shall rest solidly upon the bed of the trench, with recesses excavated to accommodate bells, couplings, joints, and fittings. Before joints are made, each pipe shall be well bedded on a solid foundation; and no pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid by the CONTRACTOR at his own expense. Pipe shall not be laid in water or when trench conditions are unsuitable for work.
- N. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall in general agree with manufacturer's recommendations.
- O. At the close of each work day the end of the pipeline shall be tightly sealed with a cap or plug so that no water, dirt, or other foreign substance may enter the pipeline, and this plug shall be kept in place until pipe laying is resumed.
- P. During the laying of pipe, each pipe manufacturer shall provide his own supervisor to instruct the CONTRACTOR's pipe laying personnel in the correct procedure to be followed.
- Q. All piping shall have bedding – refer to the Drawings and other Specification Sections.

3.02 JOINTS IN PIPING

- A. Restrained joints: shall be provided on all pipe joints as specified herein and shown on the Drawings. Restrained joints shall be made up similar to that for push-on joints.
- B. Push-on joints: include a single rubber gasket which fits into the bell end of the pipe.

The gasket shall be wiped clean, flexed and then placed in the socket. Any bulges in the gasket which might interfere with the entry of the plain end of the pipe shall be removed. A thin film of lubricant shall be applied to the gasket surface which will come into contact with the spigot end of the pipe. The lubricant shall be furnished by the pipe manufacturer. The plain end of the pipe, which is tapered for ease of assembly, shall be wiped clean and a thick film of lubricant applied to the outside. The pipe shall be aligned and carefully entered into the socket until it just makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be pulled "home" with an approved jack assembly as recommended by the pipe manufacturer. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.

- C. Mechanical joints: shall be made up with gaskets, glands and bolts. When a joint is to be made up, the bell or socket and plain end shall be cleaned and washed with a solution or mild soap in water; the gland and gasket shall be slid onto the plain end and the end then entered into the socket until it is fully "home" on the centering ring. The gasket shall then be painted with soapy water and slid into position, followed by the gland. All bolts shall be inserted and made up hand tight and then tightened alternately to bring the gland into position evenly. Excessive tightening of the bolts shall be avoided. All nuts shall be pulled up using a torque wrench which will not permit unequal stresses in the bolts. Torque shall not exceed the recommendations of the manufacturer of the pipe and bolts for the various sizes. Care shall be taken to assure that the pipe remains fully "home" while the joint is being made. Joints shall conform to the applicable AWWA Specifications.
- D. Threaded and/or screwed joints: shall have long tapered full depth threads to be made with the appropriate paste or jointing compound, depending on the type of fluid to be processed through the pipe. All pipe up to, and including 1-1/2-inches, shall be reamed to remove burr and stood on end and well pounded to remove scale and dirt. Wrenches on valves and fittings shall be applied directly over the joint being tightened. Not more than three pipe threads shall be exposed at each connection. Pipe, in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot. Joints in all piping used for chlorine gas lines shall be made up with a glycerine and litharge cement. Joints in plastic piping (PVC/CPVC) shall be laid and joints made with compounds recommended by the manufacturer. Installation shall conform to the requirements of ASTM D2774 and ASTM D2855. Unions required adjacent to valves and equipment.
- E. Solvent or adhesive welded joints: in plastic piping shall be accomplished in strict accordance with the pipe manufacturer's recommendations, including necessary field cuttings, sanding of pipe ends, joint support during setting period, etc. Care shall be taken that no droppings or deposits of adhesive or material remain inside the assembled piping. Solvent or adhesive material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer. Unions are required adjacent to valves and equipment. Sleeve-type expansion joints shall be supplied in exposed piping to permit 1-inch minimum of expansion per 100 feet of pipe length.
- F. Dielectric unions: shall be installed wherever dissimilar metals are connected except for bronze or brass valves in ferrous piping. Unions shall be provided downstream of

each valve with screwed connections. The CONTRACTOR shall provide screwed or flanged unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.

- G. Eccentric reducers: shall be installed where air or water pockets would otherwise occur in mains because of a reduction in pipe size.

3.03 TESTING

- A. All testing shall be in accordance with Section 15995 – Pipeline Testing and Disinfection

3.04 PAINTING

- A. All piping specified in this Section shall be painted in accordance with Section 09900 - Painting.

- END OF SECTION -

SECTION 15001

VALVES, SERVICES AND MISCELLANEOUS FITTINGS

PART 1 -- GENERAL

1.01 SCOPE

- A. This Section consists of furnishing water, sewer, storm water piping complete with fittings, couplings, adapters, valves, and other appurtenances required during construction due to piping relocation or replacement.

1.02 GENERAL INFORMATION AND DESCRIPTION

- A. The pipe and fittings shall be furnished by fully qualified manufacturers experienced in the fabrication, casting and manufacture of the pipe materials specified herein. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein.
- B. Pipe materials shall be the same as the existing pipe being replaced or relocated.
- C. No material furnished under this specification shall be shipped to the job site until all submittals have been reviewed.

1.03 SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings in accordance with the procedures and requirements set forth in Section 01300 - Submittals.
- B. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the CONTRACTOR without review. Data to be submitted shall include, but is not limited to: catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used.
- C. The CONTRACTOR shall submit to the ENGINEER certified shop tests in accordance with the Section 01300 - Submittals.
- D. The CONTRACTOR shall submit to the ENGINEER certified letters of compliance in accordance with the Section 01300 - Submittals.

PART 2 – PRODUCTS

2.01 FITTINGS

- . All fittings shall be marked with the manufacturer's name or trade mark, size, class or pressure rating, and the date of manufacture in accordance with the standards specified herein.

2.02 VALVES IN GENERAL

- A. General: The Contractor shall furnish all valves, gates, valve operating units, stem extensions, operators and other accessories as shown or specified. All valves and gates shall be new and of current manufacture. All non-buried valves, 6-inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes, covers and valve extensions. Valves mounted higher than 6-feet above working level shall be provided with chain operators. All valve boxes shall be Taylor and all valves shall have a minimum design pressure rating of 150 psi unless otherwise specified elsewhere herein. If two (2") or smaller valves are needed, Nibco T-133 or T-136 shall be used.
- B. Ductile iron parts of valves shall meet the requirements of ASTM A126, "Standard Specifications for Gray Iron Castings for Valves, Flanges and Pipe Fittings, Class 'B'." Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125.
- C. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2. Gaskets shall be full-face and made of synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics, especially chemical compatibility and temperature. Non-ferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application.
- D. All buried valves shall be provided with cast-iron valve boxes unless otherwise indicated. The boxes shall conform with Department Standards and be installed perpendicularly, centered around and covering the upper portions of the valve operator. The top of each valve box shall be placed flush with finish grade unless otherwise indicated on the Drawings. Valve boxes shall be as specified elsewhere in this Section.
- E. All buried valves and other valves located below a concrete operating deck or level, specified or noted to be key operated, shall have an operator to finish grade or deck level, non-rising stem, a 2-inch square AWWA nut with skirt, and cover or box and cover, as may be required.
- F. Extension Shafts:
 - 1. A one-piece extension shaft with an AWWA 2-inch square operator nut pinned at the top end and coupling shear pin shall be furnished with valves, where applicable, as shown in the Plans or Standard Details. Extension shafts shall be designed and furnished by the valve manufacturer and shall each be complete with coupling, standard AWWA 2-inch square operating nut with skirt, shear pins and centering-identification plate, for connection to the valve operator (or input) shaft as specified herein below. Shafts shall be of solid section. Hollow shafting is not acceptable.
 - 2. All operator components between the operating nut and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs. The shaft shall be furnished with an AWWA 2-inch square operating nut with skirt, mounted and pinned to the top of the shaft. A coupling shall be provided for the bottom of the shaft to connect the extension to the valve operator (or input) shaft.
 - 3. The coupling shall be welded to the bottom end of the extension shaft after the exact required length of the shaft has been determined by field measurement during the valve installation and cut to size. The weld shall be wire brushed and painted with Kop-Coat Super Hi-Gard 891

or approved equal. The sized extension shaft with welded coupling shall be installed to the valve operator shaft and pinned with the coupling shear pin. The welding of the coupling to the extension shaft shall be performed by operators who are certified. The welding shall conform to all of the applicable recommendations of the American Welding Society and the American Institute of Steel Construction.

4. The pin through the coupling and valve operator (or input) shaft shall be of a larger diameter than the pin through the top nut and extension shaft, so that if torques exceed the designed limits, the pin through the nut will shear first. Pins shall be either force fit or mechanically locked. Mechanical locking shall be by lock washers, lock nuts, force fit or other sturdy and corrosion resistant means. No roll pins will be allowed. Riveted or welded type pins will not be allowed.
 5. The extension shaft shall also be equipped with a combination centering-identification plate. The combination centering-identification plate, with a drilled or punched center hole, will be slipped onto the shaft prior to welding the shaft's bottom coupling as specified above. The center hole in the plate shall be 1/4 inch larger in diameter than the shaft, maximum. The plate shall be 1/8-inch thick AISI Type 316 stainless steel with an outside diameter of 6-3/4 inches. The top of the plate shall be buffed to remove mill scale, and the following information shall be stamped into the top of the plate in letters and numerals not less than 3/8 inch in height; valve manufacturer; valve type, size and class; direction to open; and number of turns to fully open from a fully closed position. The valves shall open by turning the operating nuts counterclockwise.
- G. Valve Flanges: The flanges of valves shall be in accordance with Section 15000, "Piping General".
- H. Gate Valve Stems: Gate valve stems shall be of bronze conforming to ASTM B62, containing not more than 5 percent of zinc nor more than 2 percent of aluminum.
- I. Protective Coating: Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the fluid passages of all valves 4-inch and larger shall receive an epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The valve manufacturer, shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.
- J. Valve Labeling: A label shall be provided on all shut-off valves exclusive of hose bibs and chlorine cylinder valves. The label shall be of 1/16-inch brass or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve or as indicated by the Department.
- K. VALVE OPERATORS

1. General

- a. All butterfly valves, plug valves over 8-inch size and gate valves installed horizontally shall be furnished with geared operators, provided by the manufacturer. All valves of a particular size and pressure rating by a given manufacturer shall be supplied with the same operator. No variation will be permitted during the contract. All valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the manufacturing plant. Operator orientation shall be verified with the Department prior

to fabrication. If this requirement is not met, changes to orientation shall be made at no cost the Department.

- b. All operators shall turn counter-clockwise to open. Operators shall have the open direction clearly and permanently marked. Field adjustment and testing of the operators and valves to ensure proper installation and operation shall be the responsibility of the Contractor.

2. Manual Operators

- a. All manual operators shall be equipped with AWWA square nuts, handwheels or chain drives as appropriate. Some small (6-inch or less) valves may be lever operated if so specified elsewhere herein. Where buried, the valves shall have extensions with square nuts or floor stands as indicated on the Drawings. Valves mounted higher than 6 feet above floor or operating level shall have chain operators with chain terminating 4 feet above operating level.
- b. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.
- c. Chainwheel operator shall be fabricated of malleable iron with pocketed type chainwheels with chain guards and guides. Chainwheel operators shall be marked with an arrow and the word "open" indicating direction to open. The operators shall have galvanized smooth welded link type chain. Chain that is crimped or has links with exposed ends is not acceptable.

L. TORQUE LIMITING DEVICE

Each valve shall be provided with a torque limiting device designed to protect the actuator and valve parts. The device shall consist of an overtorque protection mechanism enclosed in a hermetically sealed cast iron housing. The mechanism shall be permanently lubricated and factory set to trip between 200 and 220 ft. lbs. of applied torque. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nuts, respectively. The socket shall be provided with a set screw to fit the device. The direction of rotation shall be permanently shown with word and arrow next to the operating nut. The entire device shall be coated inside and out with a 2-part epoxy. The torque limiting device shall be as manufactured by Annspace Controls Company of St. Louis, Missouri, or approved equal.

M. FLOOR STANDS

Floor stands shall be cast iron, non-rising stem type with lockable hand wheel operator, valve position indicator and stainless steel or bronze extension stem. Hand wheel shall be lockable in the full open and full closed positions. The floor stand shall be furnished with an armored padlock and six keys. Lock shall be as manufactured by Master, Schlage or equal. Floor stand shall be standard pattern type as manufactured by Clow Corporation, or equal.

N. END CONNECTIONS:

The dimensions of end connections shall conform to AWWA Standard C111-85. The end flanges of flanged valves shall conform in dimensions and drilling to ANSI Standard B16.1 for cast iron flanges and flanged fittings, Class 125, unless specifically provided otherwise. The bolt holes shall straddle the vertical center-line.

2.03 PLUG VALVES

1. Plug valves shall be of the non-lubricated, eccentric type with resilient faced plugs. Port areas shall be at least 80 percent of full pipe area. Bodies shall be semi steel with raised seats. Seats shall have a welded in overlay of high nickel content on all surfaces contacting the plug face. Valves shall have permanently lubricated, stainless steel bearings in the upper and lower plug stem journals. All valves shall be of the bolted bonnet design. Valves shall be designed so that they can be repacked without removing the bonnet from the valve and the packing shall be adjustable. All nuts, bolts, springs and washers shall be cadmium plated.
2. Valves shall be suitable for underground service and designed for working pressure of 150 P.S.I. The valve and actuator shall be capable of satisfactory operation in either direction of flow against pressure drops to and including 100 P.S.I.
3. The exterior valve surfaces shall be epoxy coated.
4. The valves shall be tested in accordance with ANSI/AWWA C504. The CONTRACTOR shall furnish certified copies of reports with every valve stating that the valve has met the requirements of the tests.
5. Plug valve shall be Model 100 Series as manufactured by DeZurik Company, or equal.

2.04 GATE VALVES LESS THAN THREE INCH (3") IPS, BRONZED:

Gate valves for use with pipe less than three inches (3") in diameter shall be rated for two hundred (200) psi working pressure, non-shock, block pattern, screwed bonnet, non-rising stem, brass body, and solid wedge. They shall be standard threaded for PVC pipe and have a malleable iron handwheel. Gate valves less than three inches (3") in diameter shall be Nibco-Scott T-133 or T-136 with no substitutions allowed.

2.05 GATE VALVES THREE INCH (3") TO TWELVE INCH (12"):

1. The valves shall be resilient seated and shall conform in design, material, and workmanship to the standards of AWWA C509. Gate valves shall open counterclockwise and shall be of iron body, non-rising stem, and mechanical cut-in joint ends. All resilient seat valves must be bi-directional.
2. Valves shall be coated with a two-part thermosetting epoxy coating on inside of valve and on valve disc. The coating shall conform with the requirements of AWWA C-550. After the factory test and inspection, all ferrous parts of the valves except finished or bearing surfaces shall be painted with two (2) coats of asphalt varnish, Federal Specification TT-V-51A or approved equal.

3. Gate valves four inches (4") through twelve inches (12") in size shall be American Flow Control Series 2500 or A-USP1 Resilient Wedge Gate Valve with Type 316 stainless steel fasteners and components. No Substitutions.

2.06 BUTTERFLY VALVES:

1. Valves shall conform to all requirements of AWWA C504 Standard Class 150B. Valves shall have mechanical - joint-type ends conforming to AWWA C111 and cast iron body conforming to ASTM A126 Class B standards.
2. Valve bodies shall have two shaft bearing hubs cast integrally with the valve bodies. Valve bearings shall be sleeve type bearings with nylon bearings that are self-lubricating and do not have a harmful effect on water. Valve disc shall be cast iron conforming ASTM A-126 Class B with 316 stainless steel disc edge.
3. Valves shall be Mueller 3211-20, Clow F-5370, American Flow Control, or City of Hollywood approved equal.

2.07 FLUSHING VALVE OUTLETS:

1. The flushing valve assemblies shall be installed in accordance with the details shown in the Standard Details. The following products shall be used to construct the assemblies:

Angle Valves (for flushing valve outlets): 2-inch screwed valves with handwheel, bronze and flushing valve outlet) body and composition disc, Nibco T311 or ITT Grinnell Fig. No. 3220

2. After the tap has been made, and the corporation stop installed a pipe conveying potable water, the exposed exterior surfaces of the stop shall be heavily coated with Kop-Coat Super Hi-Gard 891 White 1898, or approved equal. Where taps are made in a pipe conveying sewerage, the Contractor shall heavily coat the inside of the pipe around the stop and the exposed exterior surfaces of the stop with Bitumastic 300M, by Kop-Coat Co., or Protecto 401 for sewer applications.
3. The installation of the flushing valve outlet shall include excavation; cutting, threading and installing PVC and galvanized pipe and fittings; tapping the ductile iron plug; concrete thrust block; furnishing and installing angle valve; cutting and placing cast iron riser pipe complete with valve boxes and cover, set in concrete; backfilling and compaction; and all other appurtenant items and work.

2.08 TAPPING VALVES AND TAPPING SLEEVES:

See Section 15102 "Tapping sleeves and tapping valves"

2.09 VALVE BOXES AND COVERS

1. Valve boxes and covers for all size valves shall be of cast iron construction and adjustable screw-on type. The lid shall have cast in the metal the word "WATER" for the water lines. All valve boxes shall be six-inch (6") nominal diameter and shall be suitable for depths of the particular valve. The stem of the buried valve shall be within twenty-four inches (24") of the finished grade unless otherwise approved by the ENGINEER. Valve boxes shall be Opelicka No. 19, no substitution.
2. Cast iron valve box shall not rest directly upon the body of the valve or upon the pipe. The box shall be placed in proper alignment and to such an elevation that its top will be at the final grade. Backfilling around both units shall be placed and compacted to the satisfaction of the ENGINEER.

2.10 HIGH DENSITY POLYETHYLENE (HDPE) FOR USE IN POTABLE WATER SERVICES 2-INCH NOMINAL DIAMETER AND LESS

All mechanical fittings utilized with HDPE pipe and tubing services, shall conform with ANSI/AWWA C800-01 "Underground Service Line Valves and Fittings" as modified herein, shall utilize AWWA Standard (Mueller) threads on tapped pipe and tapping saddles; shall be; designed and manufactured to withstand a sustained working pressure of 150 psi and to restrain the pipe against pull out under loading beyond that causing tensile yield in the HDPE pipe or tubing connected. The manufacturer shall supply certification of these capabilities and fittings shall not be accepted or installed without said certification. If fittings are being supplied to the Department the certification shall ship with the fittings and payment will not be made without this certification. At the discretion of the Engineer, this certification may be required to be signed and sealed by a professional engineer licensed to practice in the state where the supplying firm is located or in the State of Florida. His decision in this regard shall be final. In all cases, fittings shall be installed in strict accordance with the manufacturer's instructions.

2.11 WATER METER VALVES

1. Curb stops shall be ball valves manufactured by Ford Meter Company or CITY approved equal, except for 1 ½"-inch and 2-inch meters instead of curb stops, and shall be installed in meter boxes. Control gate valves shall be Nibco Scott T-133 or T-136. No substitution.
2. Corporation stops shall be Mueller H-10046 or equal.

2.11 METER BOXES, SECTIONAL PLATES AND VAULTS FOR WATER SERVICE

- A. The Contractor shall furnish and install all concrete meter boxes, lids, sectional plates and precast vaults required for a complete installation.
- B. All concrete meter boxes, sectional plates and vaults shall be in accordance with the Department's Standard Details and as specified herein.

All materials used in the production of the concrete meter boxes, lids sectional plates and vaults shall be new and or recent manufacture. Aggregates shall not originate in salt or brackish water areas and no calcium chloride containing admixtures shall be used.

FINE AGGREGATE

Fine aggregate for concrete mixes shall consist of sand or stone screening, composed of hard durable grains, free of foreign matter such as loam, clay, dirt, organic matter or other impurities. Fine aggregate shall conform to the following gradation requirements:

Size Sieve	Percent Passing
3/8"	100
No. 4	90 to 100
No. 8	70 to 95
No. 16	50 to 85
No. 30	30 to 70
No. 50	10 to 45
No. 100	0 to 10

COARSE AGGREGATE

- Coarse aggregate for concrete mixes shall consist of gravel, broken stone or local limerock.
- Coarse aggregate shall be hard, durable and free of foreign matter such as loam, clay, dirt, organic matter or other impurities. It shall be free of adherent coatings. Coarse aggregate shall conform to the following gradation requirements:

Meter Boxes, Lids and Sectional Plates

Size Sieve	Percent Passing
3/4"	100
1/2"	90 to 100
3/8"	40 to 70
No. 4	0 to 85
No. 8	0 to 5

Vaults

Size Sieve	Percent Passing
1-1/2"	100
1"	95 to 100
1/2"	25 to 60
No. 4	0 to 10
No. 8	0 to 6

CEMENT

- Cement shall be a standard brand of Portland cement meeting the requirements of ASTM C150-86, "Portland Cement", Type I.
- Different brands of cement, even if tested and approved, shall not be mixed during use.

REINFORCING STEEL

- a. General: All reinforcing steel shall be free of rust, grease, dirt or mortar and shall be thoroughly cleaned of any such foreign matter or loose mill scale before being placed in position.
- b. Wire reinforcement shall conform to ASTM A82, "Steel Wire, Plain, for Concrete Reinforcement".
- c. Wire mesh reinforcement shall conform to ASTM A185, "Steel Welded Wire, Fabric, Plain for Concrete Reinforcement".
- d. Bar reinforcement shall conform to ASTM A615-7a, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement", Grade 60, deformed, except that steel manufactured by the Bessemer process will not be accepted.

WATER:

Water used in mixing concrete that is not in the form of surface moisture on the aggregate shall be from the Department's water supply or other approved source.

2.16 TAPPING SADDLES:

Double strap tapping saddles shall be constructed of 316 stainless steel with neoprene gaskets cemented to body and iron pipe thread, designed to withstand a working pressure of five hundred (500) psi and accurately fit the pipe for which it is intended. The straps shall be forged steel with curvature accurately designed to fit pipe. All nuts and straps including threads shall be stainless steel. Tapping saddles shall be Mueller K-10509, Clow F-1280, Smith Blair, or approved equal.

2.17 DRESSER COUPLINGS:

Dresser couplings shall be regular black couplings with plain gaskets. They shall be Dresser Style 90 with no substitutions allowed. Polyethylene liner shall be used to fully encased the dresser couplings.

2.18 MEGATAPE:

Megatape and locating metal wire to be buried 18 inches below finished grade over the water main and sewage force mains or service lines on plastic (no exceptions).

2.19 LINE STOP FITTING:

Valve cut-in on the existing water main shall be performed under pressure using line stop fittings. The body of the fittings shall be carbon steel conforming to ASTM A-36. The flange shall be steel flanges Class D, conforming to AWWA C207 with stainless steel bolts and nuts. The line stop fitting shall be manufactured by International Piping Services Company (1-407-843-2800), or equal.

2.20 FIRE HYDRANTS:

1. All fire hydrants shall be of the dry-barrel type and shall conform in design, material and workmanship to AWWA C502. Hydrants shall have five and one-quarter inch main valve opening and a three way nozzle arrangement. The connection pipe shall be ductile iron pipe conforming to AWWA C151, Class 52.
2. The depth of bury, measured from the bottom of the connecting pipe to the ground line of the hydrant shall be three feet six inches minimum. Exact depth at each location shall be determined by depth of line to which the hydrant is connected.
3. Inlet connection shall be six-inch mechanical joint. Typical installation detail is shown in the Contract drawing.
4. Two - 2-1/2 inch hose nozzles and one - 5-1/4 inch pump nozzle connection threads shall conform to NFPA No. 194 (ANSI B26) Standard for Screw Threads and Gaskets for Fire Hose Couplings.
5. Hydrants shall be furnished with accessories to include mechanical joint follower rings with set screws and at least one adjustable hydrant wrench with spanner included with every ten hydrants supplied. Barrel extension sections shall not be allowed on new fire hydrants, except by special permission from the ENGINEER. All fire hydrants shall be Mueller Super Centurion Model A-423 or American Darling Model B84B, with no substitutions allowed.
6. There shall be no shrubbery planted within 6 feet of any fire hydrant.

2.21 HDPE PIPE FOR WATER SERVICES:

All 2-inch high density polyethylene pipe used for services shall be IPS-O.D. Controlled with Standard Outside Dimension Ratio (SODR) of 9, pressure rating of 200 psi, nominal outside diameter of 2.375-inches, minimum wall thickness of 0.264-inches, PE 3408, all in conformance with ASTM D3035-95 "Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter". Pipe shall conform with ANSI/AWWA C901-96 "Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service" as modified herein. Pipe shall have a (natural) inner core with a blue colored outer shell. Pipe shall have footage marks at a maximum interval of every two feet.

Polyethylene material shall have a minimum cell classification in accordance with ASTM D3350-00 "Polyethylene Plastics Pipe and Fitting Materials" of 345444D for the core, which shall be 100% virgin material, and 345444E for the outer shell. Note that both of these materials are UV stabilized as signified by the "D" for natural colored and "E" for the colored shell. Pipe shall conform with NSF 61 or 14. Manufacturer shall supply certification of compliance with all of the above requirements. Certification shall ship with the pipe on

material sold to the Department and shall always be submitted with shop drawings and catalogue cuts. When required by the Chief, Engineering Division, Miami-Dade Water and Sewer Department or his designee, certification shall be signed and sealed by a professional engineer licensed to practice in the state in which the manufacturer is located or in the State of Florida.

2.21 BACTERIOLOGICAL SAMPLE POINTS:

Bacteriological sample points shall be provided in accordance to the City of Hollywood Public Utilities Department Standard Details, Specifications Policies and Procedures for Water Distribution.

Sampling point shall not be removed until approval is obtained from Broward County Health Department.

2.14 FITTINGS

Refer to Section 15006: "Ductile iron pipe and fitting"

Refer to Section 15000 "Piping General"

PART 3 -- EXECUTION

3.01 GENERAL

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and, in general, conform with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the CONTRACTOR at his expense.
- B. Pipe and fittings shall, at all times, be handled with great care to avoid damage. In loading and unloading, they shall be lifted with cranes or hoists or slid or rolled on skidways in such manner as to avoid shock. Under no circumstances shall this material be dropped or allowed to roll or slide against obstructions. Pipe and other material shall be distributed along the right-of-way in advance of installation only to the extent approved by the ENGINEER. Such materials shall be so placed as to keep obstruction to traffic minimum.
- C. Upon satisfactory completion of the pipe bedding, 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 with no pressure being exerted on the pipe joints from the trench bottom.
- D. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter and other methods acceptable to the ENGINEER. 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. Any pipe which is disturbed or found defective shall be immediately removed and replaced with sound pipe.

- E. Lines shall be laid straight and true to the lines, matching existing grade.
- F. Any work within the pipe and fittings shall be performed with care to prevent damage to the interior wall of the pipe. Damaged interior walls shall be repaired or the pipe section or fitting replaced as required by the ENGINEER. No cables, lifting arms, hooks or other devices shall be inserted into the pipe or fitting. All lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe or fitting.
- G. After pipe has been laid, reviewed and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the required tests.

3.02 VALVE INSTALLATION

- A. General: All work shall be performed by skilled workmen experienced in similar installations. All valves shall be adequately supported by clamps, brackets, straps, concrete supports or other devices as shown or specified. All supports shall be secured to structures by approved inserts or expansion shields and bolts.
- B. All valves shall be thoroughly cleaned internally before being installed. Installation of valves shall be done in accordance with this section.
- C. Install valves as recommended by manufacturer.
- D. Install valves so that they are easily accessible for operation, visual inspection and preventive maintenance.
- E. Location of valves and chain operators: Install valves so as to be accessible for operation and free from interferences when operated. Position so that leakage will not contact any electrical equipment that may be located below.
- F. The installation of all underground valves shall include a valve box and riser in accordance with the Details shown on the Plans or in the Standard Details for the various sizes and types of valves to be installed. Riser pipes and valve boxes shall be carefully centered and set flush with the finished grade if in paving, or with the top of the ground if out of paved areas. All valve boxes shall be held in position with concrete as shown on the Plans or in the Standard Details.
- G. Upon completion of the Project, but prior to final acceptance, the Contractor in the presence of the Engineer, shall fully open each valve installed by him, except at connections to existing Department mains. For valves 16-inch and larger, the Contractor, shall count the number of turns required to operate each valve from a completely closed to a fully opened position, and shall paint the number on the bottom of the valve box lid or manhole cover. Valves at connections to existing Department mains shall only be operated by Department forces.

3.03 VALVE CUT-INS ON WATER MAINS

Water system shall be maintained under pressure during entire construction. All valve additions shall be performed while the system is in service. No line shall be shut down during construction by CONTRACTOR or others unless approved by the OWNER.

3.04 HYDRANT INSTALLATION

- A. All fire hydrants shall be installed in strict accordance with the manufacturer's published recommendations, AWWA Standards, and all applicable codes, and the applicable provisions of this Section. All installations shall be to the satisfaction of the local fire and building department.
- B. New fire hydrants and branch runs shall be installed by the Contractor where shown on the Plans and in accordance with the Standard Details herein. Installation of a new fire hydrant shall include excavation, installation of the branch run, installation of the hydrant on the branch run, the concrete anchor at the hydrant elbow, protective concrete slab in nonsidewalk areas, replacing concrete sidewalk when in sidewalk area; steel posts filled with concrete, where required; plastic warning posts where required in FDOT right of way; backfilling and compaction. Fire hydrants shall be touched up or repainted with yellow paint, as specified, where necessary, and the same type of paint shall be used to paint the guard posts after treating the galvanized surface with a neutralizer.
- C. All hydrants isolating valves with slip joints, friction type, or caulked joint connections shall be harnessed to the main pipe by means of welded steel harness sets, or clamps and steel rods, designed for this purpose. Dry barrel fire hydrants shall be set on a bed of pea gravel not less than 18 inches deep and 3 feet square, for drainage, or as required by local regulations and conditions.
- D. All 6-inch valve additions can be performed with partial-localized system isolation with the approval of the ENGINEER and proper notifications/coordination with the City (i.e. 48 hours minimum prior notice).
- E. Existing concrete thrust blocks shall be removed and replaced in accordance to the requirements of the miscellaneous details in the drawings.
- F. Restrained joints shall be placed at all joints of fire hydrant, pipe connections, and valves.

3.05 INSTALLATION OF WATER SERVICES

- A. High Density Polyethylene (HDPE) shall be used for 2-inch services (galvanized steel is no longer used for 2-inch services). Water services (single and dual) are going to be provided to connect proposed water meters and also to reconnect the existing water meters that remain in place. All HDPE services require the use of a 10 gauge stranded copper blue tracer wire.
- B. 2-Inch Services: Services from the new WMs shall consist of corporation stops, 2-inch HDPE tubing and terminal fittings as shown in the City of Hollywood Standard Details. The services shall be installed where designated in the field by the Engineer, and will be determined as soon as possible in order that the Contractor may tap the mains as they are installed. All meter boxes shall be installed in non-traffic and non-parking areas.
- C. Where meter boxes are located in existing sidewalks, the whole flag of sidewalk shall be removed and replaced with new concrete. The concrete walk shall be 4 inches thick and finished with the proper tools and techniques to resemble the existing walk. The concrete support for meter boxes shall be eliminated when the box is installed in an existing sidewalk. Where meter boxes are located out of sidewalk areas, a concrete support is required. Concrete supports shall be to the established line and grade. Construct a 3'x3'x6" reinforced concrete slab for non-

sidewalk conditions. Meter boxes shall be set flush with the finished grade if inside walks, or with the top of the ground if out of sidewalk areas. All bends in copper tubing shall be made with an approved type tube bender to the satisfaction of the Engineer. Flattened, out of round or kinked tubing will not be permitted. Each 1-inch service connection to be installed as part of this Project will be one of the following:

- D. Short Single - Consisting of a short run of 2-inch HDPE tubing from the main on the same side of the street as the proposed meter, to the meter installation approximately 2 1/2 feet from property line. Single meter box installation included.
- E. Long Single - Same as above but from a main on the opposite side of the street from the proposed/existing meter, requiring additional HDPE tubing to cross the street to the meter installation, and requiring a 3-inch (min.) galvanized or black iron casing pipe, to be driven under the street pavement. Single meter box installation included.
- F. Short Dual - Consisting of a short run of 2-inch HDPE tubing from the main on the same side of the street as the proposed meter, to the meter installation approximately 2 1/2 feet from property line. Two (2) single meter boxes installation included or double meter box with brass yoke.
- G. Long Dual - Same as above but from a main on the opposite side of the street from the proposed/existing meter, requiring additional HDPE tubing to cross the street to the meter installation, and requiring a 3-inch (min.) galvanized or black iron casing pipe, to be driven under the street pavement. Two (2) single meter boxes installation included.

3.06 METER BOXES, SECTIONAL PLATES AND VAULTS FOR WATER SERVICE

MANUFACTURE

- A. General:
All concrete meter boxes, lids, sectional plates and vaults shall be manufactured in accordance with the applicable provisions of ASTM C858, "Underground Precast Concrete Utility Structures", as modified herein.
- B. Forms: The Forms shall be made from of a non-porous material with smooth surfaces and shall be accurate and strong enough to maintain the structure's dimensions within one half of the allowable tolerances given in Section 3.4 of ASTM C858
- C. Forms: Cleaning and Oiling: Forms shall be cleaned before each use, and shall be free of paint or other protective coatings that might cling to the surface of the concrete. Releasing agents applied to the form to aid in breaking the bond shall not be injurious to the concrete.
- D. Reinforcement: Steel reinforcing shall be securely positioned in the form to maintain the concrete cover shown on the Standard Details.
- E. Mixture
 - 1. The aggregates shall be sized, graded, proportioned and thoroughly mixed in a batch mixer with proportions of cement and water that will produce a homogeneous concrete having a compressive strength of 3500 psi at 28 days of age for the boxes and plates and 3000 psi for the vaults after the same curing period.

2. Batched concrete shall be made in standard concrete mixers only, and not in mortar boxes, wheelbarrows or similar equipment.
3. Mixers shall be standard mechanical (power-driven) rotary type for concrete. Mixers normally used for mortar or plaster mixing will not be permitted.

F. Concrete Placement

1. Concrete shall be placed either by gravity into the form at a rate such that the concrete is plastic at all times and flows readily into all parts of the form and around all reinforcement steel without segregation of materials, or by highspeed pneumatic rammer resulting in sense, evenly compacted concrete without disturbing the reinforcement. The surfaces from top to bottom shall show uniform compaction.
2. The top surface of the molded items shall be flat and finished smooth while in the mold. Capping will not be permitted. Where required by the Department, corners shall be rounded.

G. Curing: Curing shall be by any method or combination of methods that will develop the required compressive strength within 28 days or less.

H. Repairs: The precast units may not be repaired without specific approval by the Department.

I. Inspection: The quality of materials, manufacturing process, and the finished units shall be subject to inspection at any time by the Department, and the supplier shall afford access for this purpose, if so required.

CERTIFICATION

Prior to installation of any of the above mentioned units, the Contractor shall furnish the Engineer, upon his request, with a statement giving the following information:

- A. Name of manufacturer.
- B. The source and type of cement.
- C. The source and specific gravities of the aggregates.
- D. The concrete mix proportions, and strength at 28 days.
- E. Name of admixtures, if any.
- F. Mill certificates for the reinforcement steel.
- G. Source of water.

REJECTION

The Precast units shall be subject to reject, either at the manufacturing plant or at delivery, upon failure to conform to any of the specified requirements herein. The following imperfections shall also be cause for rejection:

- A. Defects that indicate any imperfect concrete mixing and molding.
- B. Surface defects such as honey-combed or open textured and damaged area which would affect the structural adequacy.
- C. Repaired areas or capping.
- D. Improper radius at corners or improper tolerances.

3.07 TESTING WATER MAIN LINES

A. Water mains shall be tested in accordance with ANSI/AWWA Standard C600.

B. HYDROSTATIC TESTS:

1. After a new water main has been laid and backfilled, it shall be pumped to a pressure of 150 psi and all visible leaks stopped by approved methods.
2. A leakage test shall then be conducted at the above-mentioned pressure, and no installation will be acceptable by the OWNER until the leakage is less than the number of gallons per hour as determined by the formula:

$$Q = \frac{L \cdot D \cdot \sqrt{P}}{148,000}$$

in which Q equals the allowable leakage in gallons per hour; L is the length of line in feet being tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch. The test is usually maintained for two hours, but it may be continued for one additional hour if it becomes apparent that the leakage is equal to or greater than the amount allowable. Water supplied to the main during the test to maintain the required pressure shall be measured by a 5/8-inch meter installed on the discharge side of the test pump, or by pumping from a calibrated container. A hose bib connection will be provided to accept the test gauge supplied by the OWNER.

3. The section of main being tested shall be limited to a maximum length of 2000 feet. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallon / hour / inch of nominal valve size shall be allowed. Any questions pertaining to procedures used during the test shall be decided by the ENGINEER.
4. The CONTRACTOR shall supply and install temporary air release valves for purposes of facilitating proper hydrostatic testing conditions. Location of the ARV's shall be as per the instructions given by the ENGINEER. The CONTRACTOR shall be responsible to remove the ARV's upon the successful completion of the testing and shall be responsible for all associated site restorations resulting from his/her work.

C. DISINFECTION

1. After the water mains have satisfied the leakage requirements, they shall be flushed through openings of the required size as detailed in ANSI/AWWA Standard C601 latest revision. The main shall then be disinfected in accordance with the provisions of the applicable sections of the above-named specifications. On main breaks, cut-ins, etc., a liberal application of calcium hypochlorite shall be made.
2. Mains shall not be put into domestic service until the necessary bacteriological samples have been approved by the applicable regulatory agencies.

3.08 TESTING WATER SERVICE LINES

- A. HYDROSTATIC TESTING: Hydrostatic testing of water service lines shall be done in conjunction with the testing of the lateral or main line. No additional leakage allowance will be made for service lines.
- B. DISINFECTION: Disinfection of service lines shall be done in conjunction with the disinfection of the lateral or main line. Sufficient sampling points shall be taken from service line connections to assure uniform results throughout the system being tested.

- END OF SECTION -

SECTION 15006

DUCTILE IRON PIPE

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. The CONTRACTOR shall furnish and install ductile iron pipe and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals
- B. Painting
- C. Piping, General

1.03 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings 3-inch through 60-inch for Water and Other Liquids
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances

1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings in accordance with the requirements set forth in the Sections entitled – “Piping” and “Submittals”.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. Pipe shall be centrifugally cast in metal molds or sand lined molds in accordance with ANSI A21 .51 (AWWA C151) of grade 60-42-10 ductile iron. The above standard covers ductile iron pipe with nominal pipe sizes from three inches up to and including sixty-four inches in diameter. Working pressure shall be as specified herein, unless higher pressure is indicated on the Piping Schedule in Section 15000 - Piping.

B. Wall Thickness:

1. Buried push-on, mechanical, and restrained joint pipe shall have a wall thickness class in accordance with ANSI A21 .51 equal to or greater than classes indicated below, unless indicated to be otherwise in the Piping Schedule:

<u>Buried Pipe Size</u>	<u>Class</u>
4"-12"	52
14"-54"	51
60"	Pressure Class 150

2. All flanged, grooved pipe shall have a wall thickness class in accordance ANSI A21.15 (AWWA C115) and be rated at 250 psi working pressure. The nominal thickness of pipe 6-inch and larger shall not be less than those shown in Table 15.1 of ANSI C115. The nominal thickness of 4-inch pipe shall be ANSI C151 Class 54.

C. Joints:

1. Ductile iron pipe above grade shall be flanged. All pressurized ductile iron pipe below grade shall have thrust restrained joints. Thrust restrained push-on joint pipe shall be provided at grade where indicated on the Drawings and noted in the Piping Schedule.
2. Mechanical and push-on type joints shall be in accordance with ANSI/AWWA C153/A21 .53-00.
3. Flanges for flanged pipe shall be in accordance with ANSI A21 .15 (AWWA C115), shall be ductile iron, shall be manufactured in the United States, shall be rated at 250 psi maximum working pressure, and shall be similar to flange Class 125 per ANSI B 16.1. Where shown on the drawings, pipe and fittings shall be furnished with flanges similar to flange Class 250 per ANSI B1 6.1. Fittings shall be provided with flanges having a bolt circle and bolt pattern the same as the adjacent pipe and/or mechanical devices. Joint materials shall be ANSI sized and approved and shall consist of hot dip galvanized carbon steel bolts and nuts and full faced 1/8" thick neoprene gaskets.
4. No raised face flanges shall be used. The raised faces shall be milled flat.

5. Flange gaskets shall be full face neoprene rubber unless noted otherwise. Flange gaskets for potable water service shall be full face EPDM as manufactured by ACIPCO Toruseal or US Pipe Flange – Type Gasket.

D. Restrained Push-on Joints (Single Gasket):

1. Restrained joints in pipe and fittings shall be of the single gasket push-on type, and shall conform to all applicable provisions of ANSI/AWWA Standard C111/A21.11, except that gaskets for pipe and fittings shall conform with Paragraph 2.01 C, and the following requirements:
 - a. Thickness of the pipe barrel remaining at grooves cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non restrained pipe as specified in Item 2.01 B.
 - b. Restrained joints using field welding, set screws or gaskets with expanding metal inserts will not be acceptable.
 - c. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel.
 - d. Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be of high strength cast iron with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11, except that the length of the bolts shall meet the requirements for the restrained joint design.
 - e. The proper number of gaskets, bolts, nuts and all necessary joint material, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protection containers.
 - f. Each restrained joint, as well as the pipe and fitting of which it is part, shall be designed to withstand the axial thrust from an internal pipeline pressure of at least 150 psi at bulkhead conditions, regardless of its position in the pipeline, and without regard for external thrust block support.
 - g. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly. During deflection, all components in the restrained system shall be in contact to provide an equal force on all contact areas.
 - h. When restrained spigot ends are ordered the corresponding bell ends of the pipe to be restrained.
2. Restrained push-on joints for ductile iron pipe and fittings shall be TR-FLEX as manufactured by U.S. Pipe and Foundry, Flex-Ring (4-inch to 36-inch) and Lok-Ring (42-inch to 64-inch) by the American Ductile Iron Pipe Co., or equal. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength noncorrosive alloy steel. For cut grooved retainers, the thickness of barrel left after grooving shall not be less than the

nominal wall thickness of equal sized non-restrained pipe as specified herein above for the centrifugally cast ductile iron pipe.

3. Restrained Mechanical Joint: Mechanical joints shall be restrained with Megalug Series 1100 as manufactured by EBAA Iron, Inc., or approved equal. Restrained mechanical joint pipe shall only be used in special cases when requested by the CONTRACTOR and acceptable to the ENGINEER. Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be of high strength cast iron with composition, dimensions and threading as specified in ANSI/AWWA Standard C111 /A21 .1 1, except that the length of the bolts shall meet the requirements for the restrained joint design.

E. Fittings:

1. Shall be manufactured in accordance with ANSI A21.10 (AWWA C110) for nominal pipe sizes three inches to sixty-four inches, and shall be either flanged or mechanical joint. Any other fittings, not included in ANSI A21 .10 (AWWA C1 10) shall conform in design and performance to the requirements of this Standard.
2. Shall have a rated pressure equal to or greater than the specified working pressure for nominal pipe sizes of three inches to sixty-four inches (350 psi fittings available through and including twenty-four inches, only).
3. Grey iron fittings which conform to the specifications contained herein may be used with ductile iron pipe providing the piping systems minimum working pressure is met or exceeded.
4. Blind, filler, companion and reducing flanges shall conform to ANSI B16.1.

F. Pipe Coating General: All ductile iron pipe and fittings shall be supplied with the same coating material throughout the project. Coating shall be provided in the interior and exterior of the pipe as described hereinafter.

1. The standard asphaltic coating shall be applied prior to shipment to the exterior wall of buried pipe and fittings in accordance with ANSI A21.51 (AWWA C151).
2. A coating of rust inhibitive primer, compatible with the coating system specified in Section 09900 – Painting, shall be applied prior to shipment to all exposed and interior piping.
3. Cement-Mortar Lining: Pipe and fittings not for sewage and used when asked for on the Drawings shall be cement-lined and seal-coated in accordance with ANSI/AWWA Standard C1 04/A21.4-90, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
4. Where scheduled, the interior of all ductile iron pipe and fittings shall be lined with an epoxy lining. The epoxy lining shall be Protecto 401 Ceramic Epoxy as manufactured by the Protecto Division of Vulcan painters, Inc. All pipe and fittings shall be lined with a minimum dry film thickness of 40 mils, except for the gasket

groove and spigot end up to six inches back from the end of the spigot which shall be lined with ten mils of the material. All ductile iron pipe and fittings shall be checked for dry film thickness in accordance with the SSPC-PA2. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date. The pipe CONTRACTOR shall furnish a certificate stating that lining applicator has complied with all specification requirements relative to the material, its application and inspection. Surface preparation, number of coats, application of the lining material and field touch-up shall be in strict accordance with the lining material manufacturer's recommendations. During the installation of the pipe, the lining material manufacturer shall provide the services of a field ENGINEER to instruct and demonstrate to the CONTRACTOR's personnel the procedure for the field touch-up of lining where field cuts and taps were required. Holiday inspection shall be conducted using test equipment described in American Water Works Association Standard, AWWA C210, Section 5.3.3.1. In accordance with coating manufacturer's recommendation, holiday testing may be conducted any time after the coating has reached sufficient cure.

5. Polyethylene Encasement: All ductile iron pipe, fittings and valves installed underground shall be encased with polyethylene film in accordance with ANSI Standard A21 .5, Method A or B at the CONTRACTOR's option. Encasement shall terminate 3-inches to 6-inches above ground where pipe is exposed.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. The CONTRACTOR shall perform all earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, dewatering and grading in accordance with Division 2 - Sitework.
- B. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends facing upstream in the normal direction of flow and in the direction of laying.
- C. Thrust restrained and mechanical joints shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between mechanical joint pipe and/or fittings shall be made in accordance with ANSI/AWWA Standard C600, except that deflection at joints shall not exceed one-half of the manufacturer's recommended allowable deflection, or one-half of the allowable deflection specified in ANSI/AWWA C600, whichever is the lesser amount.
- D. Before laying thrust restrained and mechanical joint pipe and fittings, all lumps, blisters and excess bituminous coating shall be removed from the bell and spigot ends. The outside of each spigot and the inside of each bell shall be wire brushed, and wiped clean and dry. The entire gasket groove area shall be free of bumps or any foreign matter which might displace the gasket. The cleaned spigot and gasket shall not be allowed to touch the trench walls or trench bottom at any time. Vegetable soap lubricant shall be applied in accordance with the pipe manufacturer's recommendations, to aid in making the joint. The workmen shall exercise caution to

prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Deflections shall only be made after the joint has been assembled.

- E. Prior to making up flanged joints in ductile iron pipe and fittings, the back of each flange under the bolt heads and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to insure that bolt stresses are evenly distributed.
- F. Bolts and nuts in thrust restrained, mechanical and flanged joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The mechanics shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the ENGINEER, the mechanics have become accustomed to the proper amount of pressure to apply on standard wrenches.
- G. Cutting of the ductile iron pipe for inserting valves, fittings, etc., shall be done by the CONTRACTOR in a neat and workmanlike manner without damage to the pipe, the lining, or the coating. Pipe 16 inches and larger in diameter shall be cut with a mechanical pipe saw. After cutting the pipe, the plain end shall be beveled with a heavy file or grinder to remove all sharp edges.
- H. Areas of loose or damaged lining associated with field cutting shall be repaired or replaced as recommended by the pipe manufacturer and required by the ENGINEER. Repair methods shall be as recommended by the manufacturer and shall be submitted to the ENGINEER for review.
- I. Any work within the pipe shall be performed with care to prevent damage to the lining. No cable, lifting arms or other devices shall be inserted into the pipe. All lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe barrel.
- J. Homing the pipe shall be accomplished by the use of a hydraulic or mechanical pulling device, unless otherwise accepted by the ENGINEER. No pipe shall be driven or struck in order to seat it home.
- K. Cleaning: Cleaning methods shall be acceptable to the ENGINEER, and must be sufficient to remove silt, rocks, or other debris which may have entered the pipeline during its installation and shall also follow the requirements of Section 15995, "Pipeline Testing".

- END OF SECTION -

SECTION 15007

AWWA C900/C905 PVC PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The WORK of this Section includes materials and installation of polyvinyl chloride (PVC) pressure transmission pipe conforming to AWWA C-900 and C905. In general, the maximum working pressure will be limited to 175 psi. The CITY, at its sole discretion, may allow a working pressure of 200 psi if certain operational conditions concerning the limitations of AWWA C900 and C905 PVC pipe are not compromised. AWWA C905 PVC Pipe is intended for use solely as a transmission main.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15000 - Piping, General
- B. Section 15995 - Pipeline Testing and Disinfection

1.03 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

- A. Commercial Standards:

ANSI/AWWA C104/A21	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
ANSI/AWWA C110/A21	Ductile Iron and Gray Iron Fittings 3-inch through 48-inch for Water and other Liquids
ANSI/AWWA C111/A21.1	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
ANSI/AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for Water
ANSI/AWWA C905	Polyvinyl Chloride (PVC) Pressure Pipe 14-inch through 48-inch for Water
ANSI/AWWA M23	PVC Pipe-Design and Installation
ASTM D1599	Test Method for Short-Time Hydraulic Failure

	Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 2584	Test Method for Ignition Loss of Cured Reinforced Resins
PPI Technical Report	Policies and Procedures for Developing
TR 3/4	Recommended Hydrostatic Design Stresses for Thermoplastic
AWWA Manual M23	PVC Pipe – Design and Installation

1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings and appurtenances in accordance with the requirements in Section 01300, "Submittals".
 - 1. Shop drawings showing dimensions and details of pipe joint fittings, fitting specials, valves and appurtenances.
 - 2. Detailed layout, spool or fabrication drawings showing pipe spools, spacers, adapters, connectors, fittings and pipe supports not indicated in the Contract Documents.
 - 3. Manufacturer's product data and samples of all materials proposed for use on the work.
- B. Certifications
 - 1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
 - 2. The manufacturer of each shipment of pipe may be required to supply a statement certifying that each lot of pipe has been subjected to the tests specified for PVC pipe, and has been found to meet all the requirements of the AWWA C900 and C905 Standards.
 - 3. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR

1.05 QUALITY ASSURANCE

- A. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.
- C. Acceptable PVC pipe shall carry a current certification of the National Sanitation Foundation (NSF) as acceptable to use in the transport of potable water.
- D. Acceptable PVC pipe and couplings shall bear indelible identification markings as required by ANSI/AWWA C900 and C905.
- E. The pipe and couplings shall be carefully inspected for defects. Any length of pipe, coupling or elastomeric gasket found to be defective in workmanship or materials, or so damaged as to make repairs and use questionable, shall be rejected and not delivered to the jobsite. The Opinion of the Engineer shall be final.
- F. Do not install any pipe contaminated with a petroleum product (inside or outside).
- G. Do not install any pipe that shows evidence of exposure to sunlight, age, surface deterioration, or other physical damage. The decision of the Engineer shall be final as to the acceptability of the pipe to be installed.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. PVC pressure pipe (4-inch through 12-inch) shall conform to the applicable requirements of ANSI/AWWA C900 and subject to additional requirements specified herein.
- B. PVC pressure pipe (14-inch through 36-inch) shall conform to the applicable requirements of ANSI/AWWA C905 and subject to additional requirements specified herein.

2.02 PIPE

- A. PVC pipe shall conform to all aspects of AWWA C900 and C905. Provide pipe with cast iron equivalent outside diameter and integral wall-thickened bell and spigot ends. Provide one elastomeric gasket for each bell end.
- B. PVC pipe shall be provided in standard 20 foot lengths, unless otherwise specified, detailed or required on the approved plans. Shorter lengths, up to 10 feet, will be permitted when authorized by the Engineer. Field cut lengths of pipe used as closures may not be shorter than 2 feet in length unless approved by the Engineer.

- C. Acceptable PVC pipe shall have common profiles for interchangeability between rough-barrel dimensions, couplings, ends, and elastomeric gaskets so as to facilitate future repairs. When assembled, the pipe will have only one gasket per bell and spigot end, and/or two gaskets per coupling.
- D. The pipe shall be of the diameter and pressure class specified or shown, shall be furnished complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and pressure classes for Dimension Ratios for large PVC pressure pipe with Cast-Iron Pipe Equivalent O.D.'s shall conform to the requirements of AWWA.
- E. Polyvinyl Chloride (PVC) C900 and C905 pipes shall be provided with the following Dimension ratios (DR) and Pressure Ratings (PR):
 - 1) 16-inch C-905 Potable Water Main - DR 18 and PR of 235 psi
 - 2) 4" to 12"-inch C-900 Potable Water Main - DR 18 and PR of 235 psi
- F. Unless otherwise provided in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the ENGINEER, the additive and filter content shall be determined using the prolysis method as specified in ASTM D 2584.
- G. Joints: All joints for the buried PVC pipe shall be either an integral bell manufactured on the pipe or a separate coupling both employing a rubber ring joint. The bell and coupling shall be the same thickness as of the pipe barrel, or greater thickness. The sealing ring groove in the coupling shall be of the same design as the groove in cast iron fittings and valves available from local water works supply distributors. Where required, restrained joint retainer glands shall be used and shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and test pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures with a safety factor of 2:1. The retainers shall be Series 1500 or 6500 as manufactured by EBAA, Iron, Inc.
- H. Joint Deflection: Joint deflection shall not exceed 1.5° (for PVC C905) and 1.0° (for PVC C900) or ½ of the maximum deflection recommended by the manufacturer. No deflection of the joint shall be allowed for joints which are overbelled or not belled to the stop mark.
- I. Color: Pipe color shall be appropriate for service. All potable water mains shall be blue, force mains shall be green, and reclaimed water shall be purple.

2.03 JOINTS

- A. All joints shall be integral, bell and spigot gasketed joints, or plain end with rubber ring couplings.

- B. When the spigot end of pipe is to be inserted into a mechanical joint fitting, the beveled end of the pipe shall be removed prior to insertion.
- C. Solvent weld joints are not permitted.

2.04 GASKETS AND LUBRICANTS

- A. Gaskets and lubricants shall be made from materials that are compatible with the plastic material and with each other when used together. They shall not support the growth of bacteria and shall not adversely affect the potable qualities of the water that is to be transported.
- B. One elastomeric gasket shall be furnished with each length of bell-end pipe.

2.05 FITTINGS

- A. Fittings for use with PVC pipe shall be ductile iron and shall conform to the requirements of AWWA C1 10, Class 250. All pipe fittings shall be restrained joint.
- B. All fittings shall be lined and coated in accordance with the requirements of Section entitled "Ductile Iron Pipe" and "Piping, General".
- C. Each fitting shall be clearly labeled to identify its size and pressure class.
- D. Mechanical joint restraint shall be incorporated in the design of the follower gland or follower gland and gasket. The restraining system shall meet the requirements of ASTM 1674 for testing joint restraint products. The restraint mechanism shall consist of a plurality of gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA A21.11/C111 and ANSI/AWWA A21.53/C153 of latest revision. For the restrained gland type, twist-off nuts of the same size as the tee-head bolts, shall be used to insure proper actuating of restraining devices. The restraining glands shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be Megalug Series 2000 PV as manufactured by EBAA, Iron Inc., or approved equal. Alternatively, for sizes through 12-inch, the restraint system shall be internal to the gasket which is actuated by the gland. The restraining system shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be MJ FIELD LOK Gasket Series PV as manufactured by U.S. Pipe or approved equal.

2.06 DEFLECTION COUPLINGS

- A. A solid PVC coupling manufactured from DR 18 or DR 21 PVC pipe stock may be used to obtain deflection horizontally or vertically. A straight coupling may be used to obtain deflections up to 1.52 degrees per gasket, or a total of 3 degrees per coupling. For deflection requirements greater than 3 degrees, ductile iron fittings shall be used.

Use of these couplings shall only be permitted upon the prior approval of the Engineer.

2.07 REPAIR OR TRANSITION COUPLINGS

- A. A ductile iron mechanical straight coupling shall be used to effect repairs on same size pipe or to transition from one type of plain end pipe to another type of plain end pipe. The coupling shall be epoxy coated inside and outside, and utilize stainless steel bolts and nuts.

PART 3 -- EXECUTION

3.01 GENERAL

- A. All laying, jointing and testing for defects and for leakage shall be performed in the presence of the ENGINEER, and shall be subject to acceptance by the ENGINEER.
- B. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.
- C. The CONTRACTOR shall install all the pipe closure sections, fittings, valves and appurtenances shown on the approved plans, including bolts, nuts, gaskets and joining materials.
- D. The CONTRACTOR shall excavate sufficiently in advance of pipe laying operations to enable the alignment and profile to be revised to clear existing utilities and to align with existing connection points.
- E. PVC pipe which has been gouged shall not be used. PVC pipe which has received minor scratches during handling may be used solely at the discretion of the Engineer.
- F. The CONTRACTOR shall maintain the interior of the pipe clean, sanitary and free from foreign materials. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trenches shall be kept tightly closed to prevent the entrance of animals and foreign materials. To prevent unwanted water intrusion, open ends of pipe shall be closed temporarily with a watertight bulkhead.

3.02 HANDLING AND STORAGE

- A. Handling
 - 1. Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and

accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.

B. Storage

1. Pipe should be stored, if possible at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of pipe. Pipe shall be supported uniformly while being stored and not stacked with the weight on bells. All pipe should be stored in such a way as to prevent sagging or bending and be protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, in the original packaging.
2. For pipe older than 24 months, the Engineer will require information on the pipe storage during the period. The Engineer reserves the right to reject pipe older than 24 months or to require retesting and recertification by the pipe manufacturer.

3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section entitled "Excavation and Backfill for Utilities" and as specified herein.

3.04 INSTALLATION

- A. The pipe shall be hoisted with mechanical equipment using a cloth belt sling or a continuous fiber rope which avoids scratching the pipe. A chain is not permitted.
- B. The maximum deflection at any joint shall be in accordance with the manufacturer's recommendations. The pipe layout for curved alignments using 20-foot pipe lengths with bell-end or coupling shall also be as recommended by the manufacturer.
- C. Pipe installation for straight and horizontal or vertical curve alignments shall be as described below. In no case shall the pipe be bent between the couplings, nor shall deflection be made at a joint without the use of a deflection coupling.
- D. Installation tolerances for the pipe shall not vary more than 0.15 foot horizontally or 0.1 foot vertically from the alignment and elevations shown on the approved plans.
- E. All pipe, fittings, valves, and other pipeline materials shall be lowered into the trench in a manner that prevents damage. Under no circumstances shall pipe, fittings or any other materials be dropped or dumped into trenches. Each length of pipe, immediately prior to being placed in position in the trench, shall be inspected, cleaned and prepared for installation. Gaskets shall be thoroughly checked for cracks, cuts or other damage, and shall be free of oil, grease, dirt or other foreign

matter. Pipe joints shall be assembled with care

- F. Bell and spigot pipe shall be laid with the bell end pointing in the direction of laying. Pipe shall be graded in straight lines, taking care to avoid the formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. At the end of each day's work, open ends of pipe shall be closed temporarily with wood blocks or bulkheads.
- G. Pipe shall be supported at its proper elevation and grade, care being taken to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with recessed excavation to accommodate bells, joints and couplings. Anchors and supports shall be provided where necessary and where indicated on the Drawings for fastening work into place. Fittings shall be independently supported.
- H. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing material shall be replaced by one of proper dimensions. Blocking or wedging between bells and spigots will not be permitted.
- I. Joints shall be installed according to manufacturer's recommendations. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.
- J. Assemble the pipe joint using the lubricant supplied by the manufacturer. Insert the spigot end into the bell or coupling to the proper insertion mark. Check that the elastomeric ring has not left the groove during assembly by passing a feeler gauge around the completed joint. Apply steady pressure until the spigot easily slips through the gasket. Do no push or swing the spigot into the bell. Small diameter pipe and fittings may be assembled manually. Mechanical means such as bars and blocks, rackets or jacks shall be used for joining larger pipe and fittings. Power equipment, such as backhoe bucket, shall not be used to assemble pipe and fittings, since excessive force may damage the gasket or bell.
- K. Pipe shall be cut by means of saws, power driven abrasive wheels or pipe cutters which will produce a square cut. After cutting and before insertion into a PVC bell-end, the end of the pipe shall be beveled using a beveling tool, portable type sander or abrasive disk. When a PVC pipe is to be inserted into a mechanical joint fitting, the end shall be left square or made square by cutting off the beveled end.
- L. The pipe shall have a minimum cover of 36 inches from finished grade.

3.05 COPPER TRACER WIRE

- A. All non-metallic pipeline, including water service laterals, shall be provided with a No. 10 AWG insulated copper wire laid along the top of the pipe and held in place with ties or hitches. The ties or hitches shall be spaced not more than 10 feet apart. The copper wire is to be used in the future as a means of locating the pipe with an

electronic-type pipe locator.

3.06 FIELD TESTING AND DISINFECTION

- A. Field testing and disinfection of water mains shall conform to the requirements of Section entitled "Pipeline Testing and Disinfection".

-END OF SECTION-

SECTION 15009
PVC PRESSURE PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish and install polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping, General
- B. Piping Schedule
- C. Pipeline Testing

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.04 SUBMITTALS

A. Shop Drawings

1. The CONTRACTOR shall submit shop drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section entitled, "Submittals."

B. Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.05 QUALITY ASSURANCE

A. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

PART 2- PRODUCTS

2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

2.02 PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
- B. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.
- C. PVC pipe exposed to sunlight shall contain U.V. protectant.

2.03 JOINTS

- A. Pipe joints shall be provided as specified in the pipe schedule.
- B. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.
- C. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.

- D. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

2.04 FITTINGS

- A. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
- B. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
- C. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

PART 3 - EXECUTION

3.01 GENERAL

- A. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

3.02 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment Materials" as specified in ASTM D 2321.

3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of the Section entitled "Excavation and Backfill for Utilities," and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in ASTM D 2321.
- C. The minimum depth of cover over the top of the pipe shall be 36-inches unless otherwise shown on the Drawings.

3.04 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR at its own expense under the direction of the ENGINEER.

3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

3.06 FIELD JOINTING

- A. All pipe joints shall be made in accordance with the manufacturers written instructions.
- B. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable for such Work.

3.07 PROTECTIVE COATINGS

- A. Protective coating shall be as indicated in Section 15390 – Piping Schedule.

3.08 FIELD TESTING

- A. Field testing and disinfection of water mains shall conform to the requirements of the Section entitled "Pipeline Testing and Disinfection."

- END OF SECTION -

SECTION 15056

PIPE SUPPORTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Design, and provide a complete system of pipe supports with inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, sliding Teflon plates, and accessories as indicated and specified. The term pipe support includes hangers, guides, restraints, anchors and saddles.
- B. Provide all support systems and the design of all support systems for all piping as specified herein. The Contractor shall provide pipe support locations, configurations and details through accepted shop drawing submittals stamped by a Registered Professional Engineer as specified herein.
- C. The Contractor shall be responsible for the proper design, fabrication, location, shop drawings and installation of all pipe supports in accordance with the specified requirements.
- D. Pipe support locations and types for piping 12 in. and larger shall be determined by the Contractor using the guidelines for support spacing specified herein and other criteria contained in this pipe support specification. Guidelines for pipe supports may need to be adjusted based upon field coordination, field routing, or other considerations outlined herein such as structural load limits. The Contractor may revise the pipe support locations and details through accepted shop drawing submittals stamped by a Registered Professional Engineer as specified herein. The Contractor is responsible for the proper design, installation and fabrication of all pipe supports in accordance with the specified requirements. For pipe supports 2 in. and larger pipe support shop drawings together with a marked up piping drawing showing support number, location and typical type shall be submitted by the Contractor for acceptance.
 - 1. The Contractor shall be responsible for coordinating all pipe support designs for all trades to ensure compliance with all of the requirements of this specification, including but not limited to the total limitations specified herein.
- E. Design and provide all temporary pipe supports required during installation and testing.

1.02 RELATED WORK

- A. Division 1: General Requirements
- B. Section 03300: Cast-in-Place Concrete

1.03 REFERENCES:

- A. American Institute of Steel Construction (AISC) Manual of Steel Construction.
- B. American Society for Testing and Materials (ASTM) Publications:
 - 1. A36: Specification for Structural Steel.
 - 2. A500: Cold formed welded and seamless carbon steel structural tubing.
 - 3. E165: Practice for Liquid Penetrant Inspection Method.
 - 4. E709: Practice for Magnetic Particle Examination.
 - 5. A307: Specification for Carbon Steel Bolts and studs, 60,000 psi Tensile.
 - 6. A3 12: Seamless and welded austenitic stainless steel pipe.
 - 7. A572: Specification for Steel Plate.
- C. American National Standards Institute (ANSI):
 - 1. ASME/ANSI B3 1.1: Power Piping Code.
- D. American Welding Society (AWS) Code: 1. Structural Welding Code D1. 1.
- E. Manufacturers' Standardization Society (MSS):
 - 1. MSS SP-58: Pipe Hangers and Supports - Materials and Design.
 - 2. MSS SP-69: Pipe Hangers and Supports - Selection and Application.
 - 3. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.
 - 4. MSS SP-90: Guidelines on Terminology for Pipe Hangers and Supports
- F. National Association of Expansion Joint Manufacturers: Standards of the Expansion Joint Manufacturers Association, Inc.
- G. OSHA 1.04 SEISMIC DESIGN REQUIREMENTS:
- H. It shall be the responsibility of the Contractor to conform to the seismic design requirements for this project and for the work of this specification section.
- I. Provide all pipe supports designed in accordance with the seismic requirements indicated and specified.
- J. Additionally, provide with the Certificate Design, certification signed by a registered structural engineer stating that computations were performed and that all components

have been sized for the seismic forces specified and indicated.

1.05 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 – Submittals:

1. Pipe support drawings specified in paragraph 1.01 and including data for accessory items for acceptance prior to fabrication. The Contractor shall submit pipe support coordination drawings including all piping and pipe supports for all trades.
 - a. Detailed drawing of the device with dimensions.
 - b. A table of applied forces and moments.
 - c. A complete bill of materials.
 - d. A unique identification and revision level.
 - e. Stamp of a Registered Professional Engineer, registered in the state where this project is being constructed, experienced in pipe support design and pipe stress analysis as specified in paragraph. 1.06 E.
 - f. Detailed connections to existing structure.
 - g. Indicate all welds, both shop and field, by Standard Units of Measurement as specified in AWS D1.1-1.7.
2. Welding Procedure: Submit description as required to illustrate each welding procedure to be performed in the specified work.
3. Welding Equipment: Submit descriptive data for welding equipment, including type, voltage and amperage.
4. Qualification for Welders: Provide certification that welders to be employed in work have satisfactorily passed AWS or ASME qualification tests. If recertification of welders is required, retesting is the Contractor's responsibility at no additional cost to the Owner.
5. Pipe support manufacturers' qualifications as specified in paragraph 1.06.E.
 - a. List of at least five (5) successful pipe support projects and current addresses and telephone numbers of persons in charge of representing the owner or the owner of those construction projects during the time of pipe support design, fabrication and installation.
 - b. Qualification of manufacturers' Registered Professional Engineer, registered in the state where this project is being constructed, who stamps and seals shop drawings and designs.
6. Coordination drawings for pipe supports shall include as a minimum the following

information.

- a. These coordination drawings will be used by the Contractor to ensure that the pipe supports do not obstruct access, access for equipment operation or removal including all mechanical and electrical equipment, panels, valves, gauges, and instrumentation.
 - b. The Contractor shall be responsible for including and coordinating the work of all subcontractors into the coordination drawings.
 - c. Prepare reproducible coordination drawings, indicating equipment, piping, valves, expansion joints, ductwork, conduit, cable trays, junction boxes, lighting fixtures, sleeves, inserts, embedments, supports, hangers and appurtenances at not less than 1/4 inch scale. Drawings shall show beams, columns, ceiling heights, wall, floors, partitions and structural features as indicated on the contract drawings. Individual pipes and conduit 2-in. or less in diameter that will be field routed need not be shown on coordination drawings.
 - d. Coordination drawings shall include large-scale details as well as cross and longitudinal sections as required to fully delineate all conditions. Particular attention shall be given to the location, size, and clearance dimensions of equipment items, shafts, operators and necessary maintenance access.
 - e. Make all minor changes in duct, pipe or conduit routings that do not affect the intended function, but items may not be resized or exposed items relocated without the approval of the Owner. No changes shall be made in any wall locations, ceiling heights, door swings or locations, window or other openings or other features affecting the function or aesthetic effect of the building. If conflicts or interferences cannot be resolved, the Owner shall be notified. Any problems of coordination that require architectural or structural changes of design shall be submitted to the Owner for resolution.
 - f. After the reproducible drawings have been coordinated and all changes have been made, the drawings shall be signed by the Contractor and all subcontractors indicating that all work on that drawing has been coordinated with all associated vendors and subcontractors and all conflicts have been resolved.
 - g. Relocation of any duct, pipe, conduit or other material that has been installed without proper coordination among all trades shall be performed at no additional cost to the Owner.
7. Written notification of any deviations from the requirements of this specification.
 8. Support documentation and justification as specified.
 9. Certificates of Design signed by a Registered Professional Engineer for all pipe supports. See Section 01300 for form.

1.06 QUALITY ASSURANCE:

- A. Provide in accordance with Section 01400 and as specified herein.
- B. Pipe supports: All supports and parts shall conform to the latest requirements of the Code for Pressure Piping ASME/ANSI B3 1.1 and Manufactures Standardization Society (MSS) Standard Practice SP-58, SP-69, SP-89 and SP-90 except as supplemented or modified by the requirements of this specification.
- C. Structural Concrete: Conform to the requirements of Section 03300. Concrete strength: 4,000 PSI unless noted otherwise.
- D. Conform to the requirements of the latest edition of the AISC Manual of Steel Construction for miscellaneous and supplementary steel. Tube steels are ASTM A500 Grade B, structural shapes A36, plates A-572 or equal. Stainless steel structural members shall conform to ASTM requirement Type 31 6L.
- E. Pipe Support Manufacturer Qualifications:
 - 1. Must possess a written quality assurance program.
 - 2. Have a minimum of 5 years experience in the design and fabrication of pipe supports.
 - 3. Have completed the design and fabrication of at least 5 successful pipe support projects of equal size, complexity, and systems as this project within the past 10 years.
 - 4. Retains the services of a Registered Professional Engineer, registered in the state where this project is being constructed, with a minimum of ten years experience in the design of piping systems and pipe supports.
 - 5. Manufacturers' Standardization Society (MSS) Member.
 - 6. Have a field service technician on staff with at least 5 years experience in resolving field installation, interference and interface problems associated with the design, installation and manufacture of pipe supporting components.
- F. Hanger inspections shall be performed in accordance with MSS-SP-89 and ASME B3 1.1.

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Materials shall be stored as to ensure the preservation of their quality and fitness for the work. When considered necessary they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground.
- B. Shipping:
 - 1. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

C. Receiving:

1. Inspection and inventory items upon delivery to site.
2. Store and safeguard material in accordance with manufacturers' written instructions.

1.08 SPECIAL REQUIREMENTS

A. Refer to applicable specification sections of Division 1 and provide the following.

1. Foundations, Installations and Grouting.
2. Bolts, Anchor Bolts, and Nuts.
3. Sleeves and inserts.
4. Protection against electrolysis.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Carpenter & Paterson.
- B. Grinnell Corporation.
- C. Basic Engineers Inc.
- D. Or acceptable equivalent .

2.02 MATERIALS:

- A. Provide materials used in pipe supports, which are compatible with the pipes to which they are attached. Provide Type 31 6L stainless steel supports for all stainless steel piping. Copper plated pipe supports are not acceptable.
- B. Allowable materials: As indicated in ANSI B31.1 Appendix A and MSS-SP-58 Table 2.
- C. Provide Type 31 6L stainless steel for pipe supports, hangers, guides, restraints, and anchors that are exterior or interior submerged, in potentially wetted areas in wet wells, channels, screening and grit removal areas and in chemically corrosive atmospheres.
- D. Provide only new material. Previously used and/or scrap material is not acceptable.
- E. Provide tube steels that are ASTM A500 Grade B, Structural shapes A-36, plates A-572 or equal.

- F. Provide sliding Teflon plates as required. The sliding surfaces shall be a nominal 3/8 in. glass filled Teflon bonded to stainless steel backup plate with a 10 gauge minimum thickness. The bearing pad upper and lower units shall be as follows: Conslide Type CSA elements as manufactured by Con-Serv. Inc., Balco TFE Slide Bearing Plates 10N-CS as manufactured by Balco Inc., or Dynalon Slide Bearings as manufactured by JVI, Inc. or acceptable equivalent product.
1. The blended TFE material used for this bearing shall be composed of virgin (unreprocessed) TFE resin tested per ASTM D1457 and reinforcing agents milled glass fibers. This structural material shall have the following representative mechanical and physical properties:
 2. Tensile strength - 2,000. psi
 3. Elongation - 225%
 4. Specific Gravity - 2.17 to 2.22
 5. The coefficient of friction shall average 0.06 under compressive load of 2,000 psi.
 6. The compressive creep shall be a minimum of 2% at 2,000 psi and 70 degrees F.
 7. The elements shall be flat, clean and prepared for installation in the structure. Slots and holes shall be fabricated in the bearing manufacturer's plant.
- G. Concrete anchor bolts - Hilti Kwik-Bolt II Stud Anchors, Rawl Bolt, Phillips Wedge Anchors, or equal.

2.03 DESIGN, LOCATION, AND TYPE OF PIPE SUPPORTS

- A. Design and provide pipe supports for piping 1/2 in. and larger to include the following loads:
1. Gravity Force: This force includes the weight of pipe, pipe contents (hydro load as required), valves, in-line equipment, insulation and any other weight imposed on the piping and/or pipe support.
 2. Thermal Expansion Force: This force is developed by the restraint of free end displacement of the piping due to thermal growth.
 3. Hydrostatic/Dynamic Forces: These forces are developed due to the internal pressure (positive and negative) during operation of the piping system. These forces include the forces due to water hammer, pressure pulses due to rapid valve closure, fluid discharge resulting from pump startup, operation of positive displacement pumps, etc.
 4. Wind Loadings: Wind loadings.
- B. Provide supports, guides, anchors, flexible couplings and expansion joints in accordance with the coupling and joint manufacturers' specifications and requirements.

- C. For all pump suction and discharge nozzles provide an anchor located between the pump nozzles and the nearest expansion joint or non-rigid coupling.
- D. Where possible, provide pipe supports, which are the manufacturers' standard products.
 - 1. Provide pipe supports with individual means of adjustment for alignment.
 - 2. Provide pipe supports complete with appurtenances including locking and adjusting nuts.
 - 3. Hanger rods shall be subjected to tension only.
 - 4. Where lateral or axial pipe movement occurs, provide hangers for the necessary swing without exceeding 4 degrees. Provide base supports designed using pipe slides. The bearing surfaces: 0.06 coefficient of friction or less.
 - 5. Provide concrete inserts capable of supporting the design loads.
 - 6. Metal framing systems will be acceptable to support piping 2 in. and smaller.
 - 7. Provide insulated piping supported using rigid load bearing insulation (baton board type) with 16 gauge shields to fit between the insulation and the support. Shields to encompass a minimum 1/3 of the pipe circumference and be 12 in. in length.
 - 8. Provide load-bearing insulation capable of supporting the load, as a minimum on the bottom 60 degrees of the pipe support. Cope insulation and adjust to avoid interference of steel structures.
 - 9. Provide supplementary steel as needed.
 - 10. Do not support pipes from other pipe, conduits or metal stairs.
 - 11. Chain, strap, T-bar, perforated bar and/or wire hangers are not acceptable.
 - 12. Contact between piping and dissimilar metals such as hangers, building structural work or equipment subject to galvanic action is not acceptable.
 - 13. All pipe supports located in fluid flow shall be supplied with double nutting.
- E. Provide thrust anchors to resist thrust where required. Wall pipes may be used as thrust anchors if so designed. Welded attachments shall be of material comparable to that of the piping, and designed in accordance with governing codes.
- F. Provide expansion joints where indicated and where required based on Contractor's design of the pipe support system. Indicate expansion joints on submittal drawings.
- G. Pipe supports connected to structural framing and slabs are subject to the following limitations:

1. Less than 100 lb horizontal load per support.
 2. Vertical loads not to exceed a maximum load per hanger of 1000 lbs.
 3. For a maximum of one pipe support per foot of slab width perpendicular to the span.
- H. All outside above ground supports shall be Type 31 6L stainless steel as specified in paragraph 2.02(C).
- I. Provide pipe supports that do not overload or over stress the piping, equipment, or structure that they are supporting or to which they are attached. Allowable pipe stress to be within ANSI B3 1.1 code allowable.
- J. The Contractor shall provide the services of a field service technician (preferably from the pipe support manufacturer) to field coordinate the locations of supports and resolve interferences and conflicts encountered during installation.

2.04 FABRICATION:

- A. Provide pipe supports formed in accordance with paragraph 5.1 of MSS-SP-58.
- B. Providing welding in accordance with Structural Welding Code.
- C. Provide dimensional tolerances as specified in MSS-SP-89.
- D. Provide threading and tapping in accordance with MSS-SP-89.

2.05 SHOP PAINTING

- A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, minimum of two (2) coats of manufacturers standard high solids epoxy paint (min. 60% solids).
1. Color: As specified for piping system of same service or as selected by the Engineer.
 2. Provide similar additional paint for touch-up after installation.
- B. Surface preparation, mixing and application and safety requirements shall be in accordance with the paint manufacturer's printed instructions.
- C. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Install items in accordance with manufacturers' printed instructions and as indicated and

specified herein.

- B. Perform welding in accordance with Structural Welding Code:
1. Visually inspect welding while the operators are making the welds and again after the work is completed in accordance with AWS D1. 1 Section 6.0. After the welding is completed, hand or power wire brush welds, and clean them before the Qualified Inspector makes the check inspection. The Qualified Inspector shall inspect welds with magnifiers under light for surface cracking, porosity, and slag inclusions; excessive roughness; unfilled craters; gas pockets; undercuts; overlaps; size and insufficient throat and concavity. The Qualified Inspector shall inspect the preparation of groove welds for throat opening and for snug positioning for back-up bars.
 2. Nondestructive evaluation of welds connecting structural steel members subjected to critical stresses: Perform in accordance with the weld quality and standards of acceptance in AWS D1.1.
 3. Magnetic Particle Inspection: Perform in accordance with ASTM E 709.
 4. Liquid Penetrant Inspection: Perform in accordance with ASTM E 165.
 5. For weld areas containing defects exceeding the standards of acceptance in accordance with AWS D1.1, Section 3.7. Provide additional testing of the repaired area at no additional cost to the Owner.
 6. Test Locations: As selected by the Owner.
 7. Correct any deficiencies detected as directed by the Engineer at no additional cost to the Owner.
- C. Proceed with the installation of the pipe supports only after required building structural work has been completed and concrete support structure has reached its 28-day compressive strength as specified in Section 03300.
- D. Install pipe supports to comply with MSS-SP-89. Group parallel runs of horizontal piping to be supported together on trapeze type hangers. Install pipe supports to provide indicated pipe slopes. Do not exceed maximum pipe deflection allowed by ANSI B3 1.1.
- E. For exposed continuous pipe runs, install pipe supports of same type and style as installed for adjacent similar piping.
- F. Install pipe supports to allow controlled movement of piping systems. Permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Piping to be free to move when it expands or contracts except where fixed anchors are indicated or as required by the Contractor's pipe support systems. Where hanger rod swing length cannot be provided or where pipe movement based on expansion of 1 in/ 100 ft, for each 100 deg. F change in temperature exceed 1/2 in., provide sliding supports.

- H. Prevent contact between dissimilar metals. Where concrete or metal support is used, place 1/8 in. thick Teflon, neoprene rubber, or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and pipe support.
- I. Prevent electrolysis in support of copper tubing by use of pipe supports which are plastic coated. Electrician's tape is not an acceptable isolation method.
- J. Apply an anti-seize compound to nuts and bolts on all pipe supports.
- K. Locate reinforcing steel in concrete structure with x-ray prior to drilling for embedment plates and anchor bolts. Avoid contact or interference with reinforcing steel.

3.02 INSTALLATION OF BUILDING ATTACHMENTS:

- A. Support piping from structural framing, unless otherwise indicated.
- B. Concrete Inserts:
 - 1. Use existing embedded concrete items whenever possible.
 - 2. Use expansion anchors only when existing embedded attachment points are not available or unsuitable. Attach to hardened concrete or completed masonry.

3.03 THRUST ANCHORS AND GUIDES:

- A. Thrust Anchors:
 - 1. Center thrust anchors between expansion joints and between elbows and expansion joints for suspended piping. Anchors must hold pipe rigid to force expansion and contraction movement to take place at expansion joints and/or elbows and to preclude separation of joints.
 - 2. Restraining rod size and number shall be as indicated and adhere to manufacturers recommendations as a minimum.
- B. Pipe guides: Provide adjacent to sliding expansion joints in accordance with recommendations of the National Association of Expansion Joint Manufacturers and the specific joint manufacturer.

3.04 PIPE SUPPORTS:

- A. Where piping of various sizes is to be supported together, space supports for the largest pipe size and install intermediate supports for smaller diameter pipes.
- B. Provide minimum of two pipe supports for each pipe piece unless approved by Engineer.
- C. Where pipe connects to equipment, support pipe independently from the equipment. Do not use equipment to support piping.

- D. Provide pipe supports so that there is no interference with maintenance or removal of equipment.
- E. Unless otherwise indicated or authorized by the Engineer, place piping running parallel to walls approximately 1-1/2 in. out from face of wall and at least 3 in. below ceiling.
- F. Pedestal pipe supports: adjustable with stanchion, saddle, and anchoring flange. Provide grout between base plate and floor.
- G. Piping supports for vertical piping passing through floor sleeves: use hot dipped galvanized steel riser clamps.
- H. Support piping to prevent strain on valves, fittings, and equipment. Provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, adjacent to non-rigid joints, and where otherwise indicated. Do not install pipe supports in equipment access areas or bridge crane runs.
- I. Stacked horizontal runs of piping along walls may be supported by metal framing system attached to concrete insert channels.
- J. Do not support piping from other piping.
- K. Designs generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized whenever possible.
- L. Whenever possible, pipe attachments for horizontal piping shall be pipe clamps.
- M. All rigid rod hangers shall provide a means of vertical adjustment after erection.
- N. Where the piping system is subjected to shock loads, such as disturbances due to pump discharge or thrust due to actuation of safety valves, hanger design shall include provisions for rigid restraints or shock absorbing devices.
- O. Hanger rods shall be subject to tensile loading only. At hanger locations where lateral or axial movement is anticipated suitable linkage shall be provided to permit rod swing.
- P. Hanger spacing shall not exceed the spacing listed below:
 - 1. In the case of concentrated loads the supports shall be placed as close as possible to the load to reduce the bending stress.
 - 2. Where changes in direction of the piping system occur between supports, the total length between supports shall be kept to less than three-fourths of the full span. When practical, a support shall be placed immediately adjacent to any change in direction of the piping system.
- Q. Where practical, riser piping shall be supported independently of the connected horizontal piping. Pipe support attachments to the riser piping shall be riser clamp shear lugs. Welded attachments shall be of material comparable to that of the piping, and designed in accordance with governing codes. If friction is relied upon to support riser

piping proper justification and documentation shall be submitted to ensure that enough friction force is provided to resist the applied loading.

- R. Hanger components shall not be used for purposes other than for which they were designed. They shall not be used for rigging and erection purposes.
- S. All threads shall be UNC unless otherwise specified.
- T. TFE slide bearing plates with steel backup plates shall be stitch weld attachments to the structure. A 1/8 in. fillet weld, 1/2 in. long every 3 inches on center each side of an element shall be used unless otherwise indicated or specified by the manufacturers' written recommendations. Bearing elements with slots or holes shall be stitch welded in place for location. The TFE surfaces of the bearings shall be maintained clean and free from grit, dirt or grease.

3.05 INSULATED PIPING:

- A. Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed allowable pipe stresses.
- B. Where vapor barriers are indicated on water piping, install coated protective shields.

3.06 FIELD PAINTING:

- A. Pipe supports and accessories painted in accordance with Section 09900.

3.07 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01700.

- END OF SECTION -

SECTION 15102

TAPPING SLEEVES AND TAPPING VALVES

PART1 -- GENERAL

1.01 SCOPE

- A. The Contractor shall furnish and install tapping sleeves and tapping valves, as shown on the Plans and/or as specified herein. All items not specifically mentioned in these specifications or noted on the Drawings, but which can be reasonably inferred as necessary to make a complete working installation, shall be included.
- B. Tapping sleeves, where shown on the Plans, shall fit the existing pipe to be tapped and the Contractor shall determine the outside diameter and type of pipe before ordering the sleeve. Contractor must field verify dimensions, locations, distances and elevations before ordering tapping sleeves. The Contractor shall adjust his work to conform to said field conditions.
- C. Only tapping sleeves shall be used for tapping existing mains to connect new mains. Tapping saddles will not be permitted.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 15000 "Piping General"

Section 15001 "Valves, Services and Miscellaneous Fittings"

1.03 MANUFACTURER

- A. All valves shall be the products of domestic manufacturing firms which have been regularly engaged in the production of valves for at least 5 years. All valves specified herein shall be tested at the factory in accordance with the AWWA Standard Leakage and Hydrostatic Test as modified herein and a certified test report shall be furnished for each valve.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for all tapping sleeves and valves.
- B. For all AWWA valves, submit an affidavit stating the valves and all materials used in their construction conform to the applicable requirements of AWWA C500 as modified herein, that all specified tests have been performed and all test requirements have been met.

PART2 -- PRODUCTS

2.01 TAPPING SLEEVES

- A. Tapping sleeves shall be of stainless steel construction except as specified below, shall be full-bodied and shall be designed to withstand a working pressure of at least 150 psi.

- B. The tapping sleeves, including outlet flanges shall be as dimensioned and thicknesses shall be as required by AWWA/ANSI C110/A21.10. The tapping sleeves shall be mechanical joint ended, on the run, and shall have a connecting flange outlet, with centering groove (for all valves size 12-inch and below and for valves above 12-inch if available from the manufacturer), for connecting to the tapping valve. For tapping sleeves with outlets 12 inches and smaller, the connecting flange joint between the tapping sleeve and the tapping valve shall be in compliance with all applicable provisions of MSS Standard Practice SP60, latest revision, as developed and approved by the Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street N.E. Vienna, VA. 22180. For tapping sleeves with outlets larger than 12 inches, the connecting flange must provide a matching fit with tapping valves by other manufacturers.
- C. Each mechanical joint on the tapping sleeve shall be furnished complete with tee-head bolts and nuts complying with ANSI/AWWA C111/A21.11, "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings" (latest edition). Tee-head bolts and hex nuts shall be of high strength cast iron. Bolts and nuts to join the two halves of the sleeve together shall be standard stainless steel, hex, or tee-head bolts and nuts.
- D. Each tapping sleeve shall be furnished complete with all necessary split end gaskets, longitudinal gaskets and two-piece (split) steel glands (follower glands held in place by set screws not acceptable). Gasket shall be shipped separately in suitable protective containers. Material for split end gaskets shall conform to ANSI/AWWA Standard C111/A21.11. Material for longitudinal gaskets shall be rubber conforming to ANSI/AWWA Standard C111/A21.11.
- E. The sleeves shall be suitable for use with ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51, "Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids", with wall thickness and outside diameter as specified in Table 51.4 and 51.5. The sleeves shall also be suitable for use with other cast iron pipe with differing outside diameters and other types of pipe where required.
- F. The Department will permit the use of the PowerSeal Pipeline Products Corp. No. 3490MJ Mechanical Joint tapping sleeve as an approved equal to ductile iron tapping sleeves. This unit has a mechanical joint branch outlet tapping connection which mates with a standard resilient-seated gate valve rather than the tapping flange x mechanical joint ends required by the standard design of tapping sleeve.
- G. These units shall be manufactured of AISI Type 316 stainless steel passivated after welding or Type 316L. Threaded fasteners shall be Type 316 and gasketing shall be Neoprene, EPDM, or Nitrile for sanitary sewer use and SBR for potable water.

2.02 TAPPING VALVE - See Specification Section 15001 "Valves, Services and Miscellaneous Fittings"

PART 3 -- EXECUTION

3.01 GENERAL

- A. Where shown on the approved plans, the Contractor shall install the tapping sleeves and valves of the indicated size, without taking existing main out of service. Under no

circumstances shall the Contractor be permitted to tap these existing mains. The Contractor shall pressure test the tapping sleeve and valve after installation on the main, but prior to tapping operations. The test shall be conducted in the presence of the Department's Inspector. No leakage will be permitted at any joint in either the tapping sleeve or tapping valve. Taps shall be made by tapping specialists with credentials acceptable to the Department.

- B. Tapping valves 16-inch and smaller require the installation of a cast iron or C900 PVC riser pipe, complete with ductile iron valve box and cover, centered over the operator and set in concrete. Tapping valves 16-inch and larger shall be installed in a horizontal position with the operator in the vertical position with valve box over the operator and set in concrete.
- C. Where a tapping valve with by-pass gate valve will be installed, the Contractor shall install a valve box over the main valve and a valve box over the by-pass valve. Valve boxes and covers for all size valves shall be cast iron construction and adjustable screw-on type. Valve boxes shall be Opelicka No. 19, no substitutes.
- D. The tapping sleeve and valve shall be installed complete, and the work shall include all necessary excavation, including interlocking sheeting and shoring, backfilling and compaction, surface repairs, and sheeting and shoring outside of the main trench line, dewatering, testing the sleeve and valve, supporting tapping by Department forces, constructing the concrete thrust anchor and all other appurtenant items and work. Installation of tapping sleeve shall be in accordance with City of Hollywood Public Utilities Department Standard Details, Specifications Policies and Procedures for Water Distribution.
- E. Prior to ordering the tapping sleeve, the Contractor shall excavate and field-verify the type and outside diameter of the main.

3.02 TAPS

- A. The Contractor shall comply with all applicable provisions of Subsections 3.01 above, including installation and pressure testing of tapping sleeve and tapping valve in the presence of the Department's Inspector.
- B. Since cutting equipment used for this type of installation is of a special design, the Contractor shall make provisions for furnishing a tapping specialist to perform actual tapping operation. The qualifications of the tapping specialist shall be forwarded to the Department prior to any tapping work. The Contractor shall also furnish all incidental equipment necessary to operate the tapping machine.
- C. The tapping valve shall be installed in the horizontal position with the operator in the vertical position, and shall include a valve box cover. Tapping valves shall be left in the closed position.
- D. When the invert of the tapping valve is under water, interlocking sheeting and tremie concrete shall be used, unless otherwise approved by the Department. Seal the perimeter of all pipes passing through the sheeting below the water table. Only minimum seepage will be permitted. The cofferdam must be designed and sealed by a State of Florida, P.E.

No work will be permitted within the cofferdam until it is demonstrated to the Department to be dry. Approval to remove the initial water in the cofferdam must be obtained from the Department and other governmental agencies having jurisdiction over the work.

- E. All tapping operations shall be conducted under the direct supervision of City of Hollywood Utility Inspector or Engineer. All operations shall have prior approval of the Department.

3.03 RECORD DRAWINGS

- A. Record Drawing shall be prepared in accordance with Section 01300
- B. The location and elevation for each valve, tapping flange outlet, fitting, service line and other appurtenances along the pipeline shall be recorded by the Contractor's Florida Registered Land Surveyor.

-END OFSECTION-

SECTION 15115

CHECK VALVES

PART 1 -- GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish and install check valves complete and operable, including all appurtenances and accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 15001 - Valves, Services and Miscellaneous Fittings

1.3 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.
- B. Product Data: Submit data indicating material used for check valves.
- C. Shop Drawings: Submit shop drawings for check valves.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Manufacturers: Val-Matic, APCO or approved equal by the City.

PART 2 -- PRODUCTS

2.1 CHECK VALVE

A. General

1. The swing-check valves shall be standard (plain), outside lever-and-weight or outside lever-and-spring types, for normal horizontal installations, conforming to all of the applicable requirements of the most current ANSI/AWWA Standard C508, "Swing-Check Valves for Waterworks Service, 2-in. through 24-in. NPS", except as otherwise specified herein. The valves shall be iron body, bronze mounted and suitable for buried service.
2. Valve bonnet opening shall be large enough to allow ample clearance for direct removal of disc by hand.
3. Check valves 2" – 12" shall have a minimum working pressure of 175 psi.

B. External Ferrous Items

All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with the most current ANSI/ASTM Standard A123, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products", or ANSI/ASTM Standard A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or stainless steel.

C. Flanged Valves

Flanged valves shall have ends plain-faced and drilled conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", Class 125. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerline. All joint materials for flanged valves will be furnished with the valves; neoprene for sewer and SBR for water applications.

D. Clapper

1. The clapper shall swing clear of the waterway when the valve opens, permitting a full flow through the valve equal to the nominal diameter of the pipe.
2. The body and clapper seating surface shall be metal to metal, and shall be bronze.
3. The clapper disc and the clapper hinge arm, including the clapper disc cap screw, shall be bronze or cast iron. Clapper to hinge arm connection shall be such that the unit cannot be unscrewed by fluid flow.

D. Clapper Hinge Pin

1. The clapper hinge pin shall be stainless steel conforming to AISI Type 316. For check valves with outside levers, the clapper hinge pin shall rest in bronze bushings and shall extend through the casing on the right hand side when facing the valve inlet.
2. The clapper hinge pins shall rest in bronze bushings provided with a packing type seal ("O"-rings are not acceptable) and shall extend through the casing on the right hand side when facing the valve inlet. An opening shall be provided in each of two bosses on the body for easy access to either end of the hinge pin. The openings shall be tapped and provided with plugs.

- E. See Part 2 of Section 15001, Valves, Services and Miscellaneous Fittings for other components.

2.2 TESTING

All check valves shall be tested at the factory in accordance with Section 5.2 of the most current ANSI/AWWA Standard C508 and a Certified Test Report shall be furnished with each valve.

PART 3 - EXECUTION

3.1 GENERAL

All valves shall be installed in accordance with provisions of Section 15100, "Valves, General." Care shall be taken that all valves are well supported.

END OF SECTION

APPENDIX D

PRELIMINARY ENGINEER'S OPINION OF PROBABLE COST

**PRELIMINARY ENGINEER'S OPINION OF
PROBABLE CONSTRUCTION
COST**

MLA No: 12-00148
Phase: Schematic Design
By: WR
Date: 03/29/13

Diplomat PKWY Reuse Extension

**City of Hallandale Beach
Broward County, Florida
Summary of Pay Items**

Item No.	Description	Quantity	Unit	Unit Price	Extended Price
General					
1	Maintenance of Traffic	1	LS	\$ 11,978.17	\$ 11,978
Water Main					
2	Furnishing and Installation of ARV	4	EA	\$ 1,600.00	\$ 6,400
3	Furnishing and Installation of 18"x24" Tapping Sleeve and Tapping Valve	1	EA	\$ 4,500.00	\$ 4,500
4	Furnishing and Installation of 8" Gate Valve	1	EA	\$ 1,600.00	\$ 1,600
5	Furnish and install 8-inch diameter PVC C-905 pipe and Fittings for Reuse water Main including lining , and restrained as required by Open-Cut	2,640	LF	\$ 40.00	\$ 105,600
6	Furnish and install 8-inch diameter DIP and Fittings for Reuse Water Main including lining , and restrained as required by Open-Cut	270	LF	\$ 60.00	\$ 16,200
7	Furnishing and Installation of 45° bends	22	EA	\$ 60.00	\$ 1,320
8	Sheeting and Shoring ordered Left in Place	50	SY (Cont. Item)	\$ 20.00	\$ 1,000
Restoration					
8	Limerock Base for Type I Pavement Restoration (8" Limerock)	1,760	SY	\$ 16.00	\$ 28,160
9	1 1/2" Asphalt Pavement Restoration	3,520	SY	\$ 10.00	\$ 35,200
10	Concrete Sidewalk Restoration	50	SY (Cont. Item)	\$ 25.00	\$ 1,250
11	Concrete Curb and Gutter Restoration	100	LF (Cont. Item)	\$ 20.00	\$ 2,000
11	Pavement Marking Restoration	1	LS	\$ 4,500.00	\$ 4,500
12	Sod Restoration	133	SF	\$ 10.00	\$ 1,333
Pipe support					
13	8" Pipe Support & 8" Pipe Hanger	12	EA	\$ 2,000.00	\$ 24,000
Water Meter					
14	8" Propeller Flow Meter & Vault	1	EA	\$ 6,500.00	\$ 6,500
Subtotal 1:					\$ 251,542
15	Approved Permit Reimbursable Fee (3% of subtotal 1)	1	LS	\$ 7,546.25	\$ 7,546
Subtotal 2:					\$ 259,088
16	For unforeseeable conditions for minor construction changes and for quantity adjustments, if ordered by the engineer. (10% of subtotal 2)	1	LS	\$ 25,908.78	\$ 25,909
Total*:					\$284,997

*Estimates are based on our best engineering judgement. Accuracy is not guaranteed.



APPENDIX E

DESIGN TICKET

Ticket : 221201057 Rev:000 Taken: 08/08/12 08:35ET

State: FL Cnty: BROWARD GeoPlace: HOLLYWOOD
CallerPlace: HOLLYWOOD
Subdivision:

Address :
Street : WILEY ST
Cross 1 : S 13TH AVE
Within 1/4 mile: Y

Locat: STARTING AT THE INTERSECTION OF WILEY ST AND S 13TH AVE IN HOLLYWOOD, GO EAST ON WILEY STREET TO DIPLOMAT PKWY, THEN SOUTH ON DIPLOMAT PKWY TO ATLANTIC SHORES BLVD, AKA NE 9TH ST, THEN EAST ON NE 9TH ST TO THREE ISLANDS BLVD
:

Remarks : IN RESPONSE TO RECEIPT OF A DESIGN TICKET, SSOCOF PROVIDES THE ORIGINATOR OF THE DESIGN TICKET WITH A LIST OF SSOCOF MEMBERS IN THE VICINITY OF THE DESIGN PROJECT. SSOCOF DOES NOT NOTIFY SSOCOF MEMBERS OF THE RECEIPT BY SSOCOF OF A DESIGN TICKET. IT IS THE SOLE RESPONSIBILITY OF THE DESIGN ENGINEER TO CONTACT SSOCOF MEMBERS TO REQUEST INFORMATION ABOUT THE LOCATION OF SSOCOF MEMBERS' UNDERGROUND FACILITIES. SUBMISSION OF A DESIGN TICKET WILL NOT SATISFY THE REQUIREMENT OF CHAPTER 556, FLORIDA STATUTES, TO NOTIFY SSOCOF OF AN INTENT TO EXCAVATE OR DEMOLISH. THAT INTENT MUST BE MADE KNOWN SPECIFICALLY TO SSOCOF IN THE MANNER REQUIRED BY LAW. IN AN EFFORT TO SAVE TIME ON FUTURE CALLS, SAVE YOUR DESIGN TICKET NUMBER IF YOU INTEND TO BEGIN EXCAVATION WITHIN 90 DAYS OF YOUR DESIGN REQUEST. THE DESIGN TICKET CAN BE REFERENCED , AND THE INFORMATION ON IT CAN BE USED TO SAVE TIME WHEN YOU CALL IN THE EXCAVATION REQUEST.

*** LOOKUP BY MANUAL ***

:
Grids : 2559A8007A 2559A8007B 2559A8008D 2559B8007A 2559B8007B
Grids : 2600D8007A 2600D8008D

Work date: 08/08/12 Time: 08:52ET Hrs notc: 000 Category: 6 Duration: UNKNOWN
Due Date : 08/10/12 Time: 23:59ET Exp Date : 09/07/12 Time: 23:59ET
Work type: DESIGN Boring: N White-lined: N
Ug/Oh/Both: U Machinery: N Depth: UNK Permits: N N/A
Done for : DESIGN

Company : MILLER LEGG Type: CONT
Co addr : 5747 N ANDREWS WAY
City : FT LAUDERDALE State: FL Zip: 33309
Caller : PAT LEGUE Phone: 954-436-7000
BestTime: 7-4
Fax : 954-436-8664
Email : PLEGUE@MILLERLEGG.COM

Submitted: 08/08/12 08:35ET Oper: PAT Chan: WEB
Mbrs : BC1338 CC1279 COH693 CS1288 FPLBRO HPU893 HW1297 LS1104 PGSND SBF22

Service Area Code	Service Area Name	Contact	Phone Numbers	Utility Type
BC1338	BROWARD COUNTY TRAFFIC	GREG LOVAGLIO	Day: (954) 847 - 2725 Emerg: (954) 309 - 6334	WATER,SEWER,TRAFFIC

	ENGINEERING			
CC1279	COMCAST CABLE	LEONARD MAXWELL- NEWBOLD	Day: (954) 447 - 8405 Alt: (954) 444 - 5113	CATV & FIBER
COH693	CITY OF HALLANDALE BEACH	RAISA ZELDIS	Day: (954) 457 - 1617	WATER/SEWER
FPLBRO	FLORIDA POWER & LIGHT-- BROWARD	TRACY STERN**	Day: (800) 868 - 9554	ELECTRIC
HPU893	CITY OF HOLLYWOOD PUBLIC UTILITIES DEPT	GREG JEFFRIES	Day: (954) 782 - 8222 x231 Alt: (754) 224 - 1672	OTHER
HW1297	CITY OF HOLLYWOOD, PUBLIC WORKS DEPARTMENT	GREG JEFFRIES	Day: (561) 791 - 9280 Alt: (754) 224 - 1672	
PGSND	TECO PEOPLES GAS SOUTH FLORIDA	YVONNE GOLDMAN	Day: (954) 453 - 0824	GAS
SBF22	A T & T/ DISTRIBUTION	OTIS KEEVE **	Day: (954) 723 - 2540	TELEPHONE

IRTH One Call - Windows Internet Explorer

http://www.online811.com/IRTHOneCall/Ticket/TicketCreation.aspx

File Edit View Favorites Tools Help

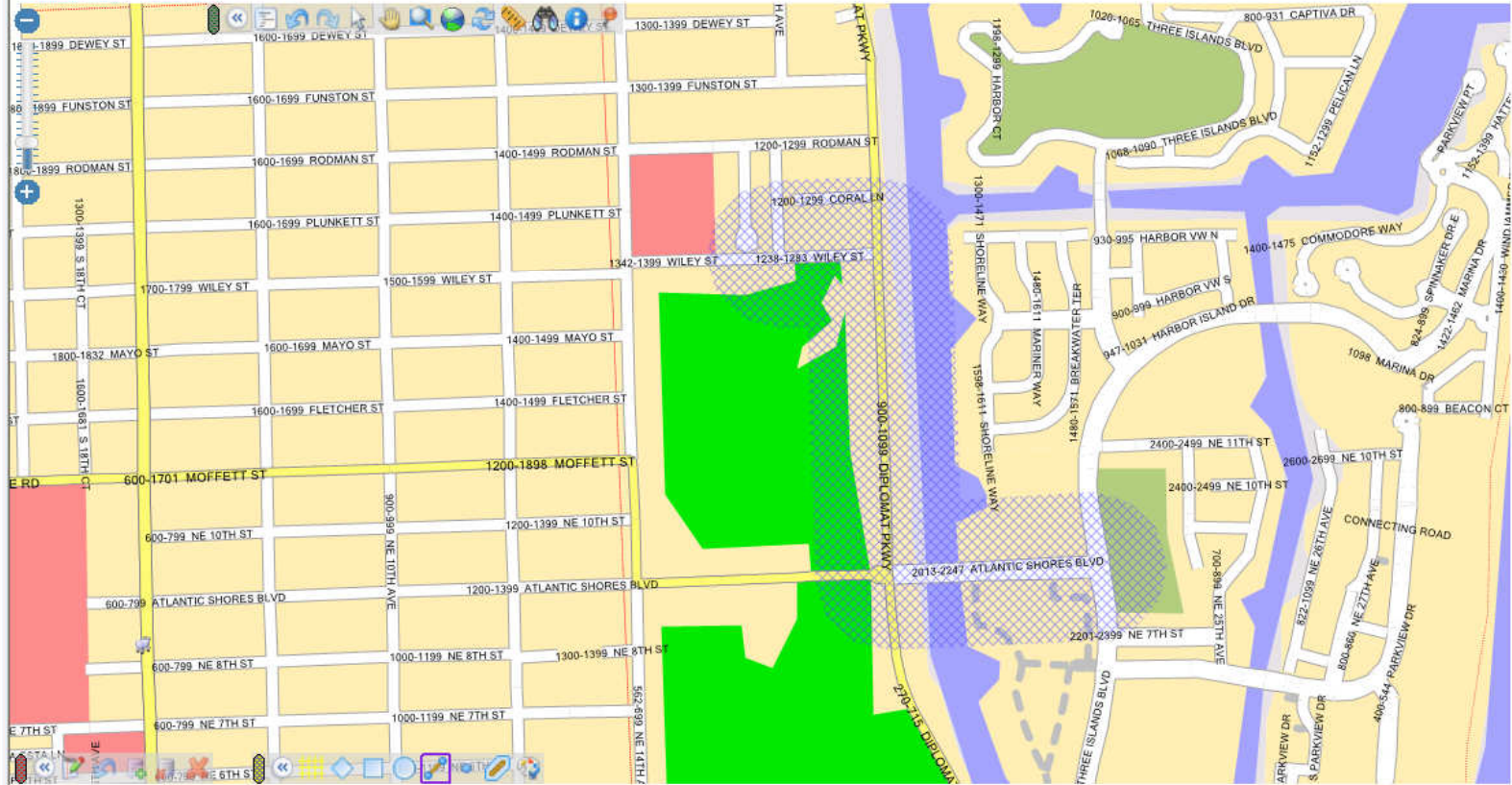
Favorites Suggested Sites Web Slice Gallery

ATT.NET - Email, Ne... (127 unread) att.net... Hallandale, FL - Goog... SunTrust - Online Ba... IRT H One Call http://www.broward...

Find: Previous Next Options

Step 4 of 6: Map

Lookup Type: Manual



Scale: 0.0243 (1.52 x 0.57 mi) Position: x=-80.124997, y=26.003211 TR5Q - Section: 51542E23

Previous Next Finish Cancel

Done Trusted sites 100%