November 16, 2017
BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA

Y18-703-CH / Addendum #6

SHERRY DRIVE BRIDGE REPLACEMENT

REVISED BID OPENING DATE: DECEMBER 5, 2017

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough.~~

A. The Bid Opening Date has changed as follows:

Delete: ~~November 16, 2017 at 2:00 P.M.~~

Replace with: December 5, 2017 at 2:00 P.M.

B. **Note the following REVISION to the Roadway Construction Plans as follows**:

Delete: ~~Sheet 1 (Cover Sheet) and Sheet 4 (Summary of Pay Items) of the construction plans included in the Invitation for Bids~~.

Replace with: **Sheet 1 (Cover Sheet dated 10/10/17) and Sheet 4 (Summary of Pay Items dated 10/10/17) of the construction plans have been revised and are included in this addendum**.

C. **Note the REVISION to the Part D, Schedule of Prices as follows**:

Delete: ~~The Schedule of Prices issued in the Invitation for Bids~~, Pages ~~D-2 through D-7 in its entirety~~.

Replace with: **The Revised Schedule of Prices, REVISED Page D-2 through REVISED Page D-7 included in this addendum**.

FAILURE TO SUBMIT THE REVISED SCHEDULE OF PRICES INCLUDED IN THIS ADDENDUM WITH YOUR SEALED BID, SHALL RENDER YOUR BID RESPONSE BEING DEEMED NON-RESPONSIVE.

D. **Note the REVISION to Part H, Technical Provisions as follows**:

. Technical Provision TP-530-4-4 (Articulating Concrete Block Revetment System), Section 2.1.2 is hereby modified as follows:

"2.1.2 ***CELLULAR CONCRETE MATTRESSES*** *shall be SHOREBLOCK® BD or approved equal. Cellular concrete mattresses shall be pre-manufactured as an assembly of concrete blocks when connected into mattresses by the use of revetment cables. Two (2) integral longitudinal cables per block are required, as well as one (1) integral transverse cable. No partial or "half" blocks will be allowed without a transverse cable. The final revetment system must be tied continuously throughout with cables in two perpendicular directions.*

The cellular concrete mats shall be placed on a filter fabric as specified herein. Under no circumstances shall the filter fabric be affixed (i.e. chemically bonded) to the mattress in a manner in which would jeopardize the functionality of the filter fabric. Specifically, the filter fabric shall be independent of the block system.

~~*Proposed equals must be submitted to the engineer a minimum of fifteen (15) days prior to bid date. The owner or his engineer reserves the right to accept or reject any proposed equal cellular concrete mattress system for reasons including but not limited to previous performance record, appropriate and applicable testing, hydraulic performance characteristics, and qualified technical support. If initial submittal of an alternate cellular concrete mattress system is rejected, additional resubmittals of alternate systems will result in engineering fees, charged to the contractor for submittal review, at the engineer's normal hourly billable rate.*~~*"*

E. **Note the REVISION to the Utilities Specifications as follows**:

Delete: ~~Utilities Specifications issued in the Invitation for~~ Bids in it's entirety.

Replace with: **Utilities Specifications included this addendum**.

F **Note the REVISION to the Utilities Construction Plans Sheets as follows**:

Delete: ~~Utilities Construction Plans Sheets 1 through 5 issued in the Invitation for Bids.~~

Replace with: Utilities Construction Plans Sheets 1 through 5 included in this addendum.

G. **The following are questions and responses to Request for Information received**:

QUESTION 1: There are utility conduit(s) +/- 4" in diameter fastened to both the North and South sides of the bridge that are not identified on the drawings. Please provide clarification as to what type of service the conduits contain.

ANSWER: On the north side, there is a 3" galvanized steel pipe that is being abandoned by Orange County Utilities (OCU). The 4" pipe attached to the north side of the bridge is capped on both ends, is abandoned and shall be removed by the contractor. On the south, OCU owns a 6" DIP water main, and there is a 4" pipe being removed by AT&T. The contractor is to coordinate any utility improvements and / or relocations for this project as indicated on Page G-19 of Part G (Special Provisions).

QUESTION 2: On Drawings 22 through 25 relating to Sherry Drive Cross Sections there is a Note in the upper right hand corner of the drawing that says: "All utilities that are in conflict will be relocated or removed by others in coordination with the contractor". Please identify these utilities so the contractor can factor the amount of time and value of the coordination effort(s).

ANSWER: The contractor is to coordinate any utility improvements and / or relocations for this project as indicated on Page G-19 of Part G (Special Provisions).

QUESTION 3: On Drawings 26 through 34 relating to Sherry Court Cross Sections there is a Note in the upper right hand corner of the drawing that says: "All utilities that are in conflict will be relocated or removed by others in coordination with the contractor". Please identify these utilities so the contractor can factor the amount of time and value of the coordination effort(s).

ANSWER: Please refer to Question/Answer #2.

QUESTION 4: On Drawings 35 through 37 relating to Pond 1 Cross Sections there is a Note in the upper right hand corner of the drawing that says: "All utilities that are in conflict will be relocated or removed by others in coordination with the contractor". Please identify these utilities so the contractor can factor the amount of time and value of the coordination effort(s).

ANSWER: Please refer to Question/Answer #2.

QUESTION 5: On Drawings 37A and 37B relating to Additional Canal Cross Sections there is a Note in the upper right hand corner of the drawing that says: "All utilities that are in conflict will be relocated or removed by others in coordination with the contractor". Please identify these utilities so the contractor can factor the amount of time and value of the coordination effort(s).

ANSWER: Please refer to Question/Answer #2.

QUESTION 6: Can you kindly advise the percentage of self-perform work the Prime Contractor is required to perform?

ANSWER: There is no percentage of work required to be self-performed.

QUESTION 7: What line item covers the river bypass?

ANSWER: The river bypass and all other information shown on sheets 38, 39 and 40 of the plan set shall be paid under pay item 104-14. See revised Plan Sheet 4 included in this Addendum.

QUESTION 8: What kind of flows (GPM) should we accommodate for the river bypass?

ANSWER: The bypass flow (GPM) is to be determined by the contractor. The contractor shall submit a river bypass for review and approval. The implementation of the river bypass is considered to be contractor's "means and methods". The river bypass information described on sheets 38, 39 and 40 is for reference and guidance only. Contractor shall not be entitled to any additional compensation as a result of the river bypass he/she chooses to use. Work performed as part of the river bypass system shall be paid under pay item 104-14.

QUESTION 9: What does the County plan to do with the 8" clay sanitary line across the river? I don't see any utility adjustments for this pipe in the plans?

ANSWER: This is an 8 inch steel (aerial crossing) sanitary main and is not attached to the bridge. The main is to be protected during demolition of the bridge and shall remain in service.

QUESTION 10: On Sheet 13A of the plans, it indicates to use bank and shore top of the articulated block system when connecting to the existing gabions. But the detail on Sheet 13E indicates to use concrete or grout. How should we bid this item?

ANSWER: Sheet 13A refers to the connection on the bottom of the channel to the existing gabions. Sheet 13E refers to the connection on the side slopes to the existing gabions.

QUESTION 11: Does the County have a detail for the inlet trash basket or suggested manufacturers?

ANSWER: The specifications for the inlet trash baskets can be found in TP 425. The County does not recommend specific manufacturers.

QUESTION 12: May the Armor Flex Class 40 Revetment System be used as an "approved equal" in lieu of the Shoreblock BD-400-OC Revetment System indicated in the plans?

ANSWER: Please refer to the Invitation for Bids, Part C, Paragraph 7 ("Substitute Material and Equipment").

QUESTION 13: The detail on Sheet 13E, calls for a concrete or grout fill connection to gabions. This detail applies to the gabions on the floor of the canal. Is there a detail that shows the connections to the tie-ins to the existing gabions on the side of the canal? There are 4 points of connections with gabions per plans.

ANSWER: The detail on Sheet 13E (open cell) refers to the connection to the existing gabions on the sides of the channel, not the bottom of the channel. The detail on Sheet 13A (Section A-A, closed cell) refers to the connection to the existing gabions on the bottom of the channel.

QUESTION 14: On sheet 13A, Section A-A Detail - shows tie-in with ACB to Gabion Mattress, trench opening to be "bank & shore rubble rip rap"; and on sheet 13E, by ACF - "ACB to Gabions transition detail" shows trench opening to be filled with 4,000 PSI concrete or grout. Please clarify if concrete grout needed on the inside portion of the ACB mats, where ACB mats join each other, forming a 'seam' or utilize the bank & shore rubble rip rap tie-in approach.

ANSWER: The detail on Sheet 13E (open cell) refers to the connection to the existing gabions on the sides of the channel, not the bottom of the channel. The detail on Sheet 13A (Section A-A, closed cell) refers to the connection to the existing gabions on the bottom of the channel**.**

QUESTION 15: On sheet 13A, Section A-A Detail shows tie-in with ACB to Gabion Mattress, trench opening to be "bank & shore rubble rip rap", on sheet 13E, "ACB to Gabions transition detail" shows trench opening to be filled with 4000 PSI concrete or grout. Please clarify.

ANSWER: The detail on Sheet 13E (open cell) refers to the connection to the existing gabions on the sides of the channel, not the bottom of the channel. The detail on Sheet 13A (Section A-A, closed cell) refers to the connection to the existing gabions on the bottom of the channel.

H. All other terms and conditions remain unchanged.

The Bidder/Proposer shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the bid or proposal.

_____ _____

Authorized Signature Date Signed

_____

Title

_____

Name of Firm

CONSTRUCTION PLANS FOR

SHERRY DRIVE BRIDGE REPLACEMENT

ORANGE COUNTY - DISTRICT NO. 2
PROJECT NO: 2722

TERESA JACOBS, COUNTY MAYOR

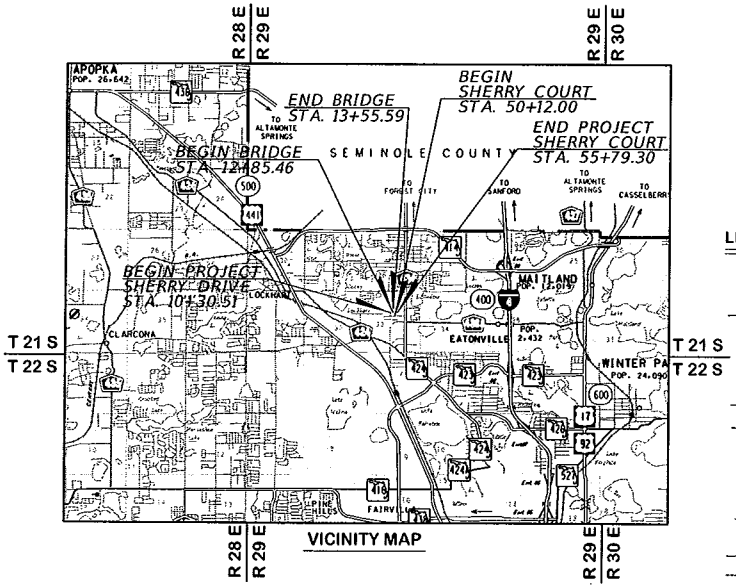
BOARD OF COUNTY COMMISSIONERS

BETSY VANDERLEY	DISTRICT 1
BRYAN NELSON	DISTRICT 2
PETE CLARKE	DISTRICT 3
JENNIFER THOMPSON	DISTRICT 4
EMILY BONILLA	DISTRICT 5
VICTORIA P. SIPLIN	DISTRICT 6

MARK V. MASSARO, P.E., PUBLIC WORKS DIRECTOR

GOVERNING STANDARDS AND SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION DESIGN STANDARDS DATED 2017, AND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2017, AS AMENDED BY CONTRACT DOCUMENTS.

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.



VICINITY MAP

N

0 1 2
Miles

LEGEND

- LIGHT POLE
- SIGN
- 4" GAS
- WATER VALVE
- WATER SERVICE
- FIRE HYDRANT
- 10" WM
- OVERHEAD ELECTRIC
- ELECTRIC POLE
- GUY WIRE
- SANITARY MANHOLE
- FIBER OPTIC DUCT RUN
- FIBER OPTIC BOX
- 16" FM
- 4' CHAIN LINK FENCE
- 6' WOOD FENCE
- PALM TREE
- OAK TREE
- BUSH
- F.S.E. FILL SLOPE EASEMENT
- D.E. DRAINAGE EASEMENT
- ABND ABANDONED
- OS OUT OF SERVICE
- ESTIMATED SEASONAL HIGH WATER TABLE
- ENCOUNTERED GROUNDWATER TABLE (6/11/10)

LENGTH OF PROJECT

	LINEAR FT.	MILES
NET LENGTH OF PROJ.	892.00	0.169
EXCEPTIONS	0.00	0.000
GROSS LENGTH OF PROJ.	892.00	0.169

NOTE:

PLANS WERE PREPARED ACCORDING TO AVAILABLE INFORMATION TO ADEQUATELY ADDRESS CONDITIONS AS THEY EXISTED AT THE TIME OF PLANS PREPARATION. NEEDS, CONDITIONS AND OWNERSHIP OF PROPERTIES MAY HAVE CHANGED SINCE PROJECT DESIGN. THE COUNTY'S REPRESENTATIVE WILL ADDRESS CHANGES AND NEEDS WITH THE PROPERTY OWNER OR THEIR REPRESENTATIVES. CONTRACTOR SHALL WORK WITH THE COUNTY'S REPRESENTATIVE IN ADDRESSING AND MEETING NEEDS AND CONDITIONS THAT MAY HAVE CHANGED SINCE PLANS PREPARATION.

SOURCE OF BENCH MARK DATUM

THE SOURCE BENCHMARKS USED ARE BASED ON ORANGE COUNTY 88 DATUM:
S-639-016 - RECOVERED 2" ORANGE COUNTY BRASS DISC IN C/L OF CONCRETE HEADWALL AT S.E. CORNER OF MAGNOLIA HOMES ROAD AND DR. LOVE ROAD.
ELEVATION: 99.866'

L-831-009 - RECOVERED 3.5" BRASS DISC "CORPS OF ENGINEER U.S. ARMY" STAMPED "LWR-6 YEAR 1969" IN N.E. CORNER OF BRIDGE, N. SIDE OF KELVINGTON DR.
ELEVATION: 83.172'

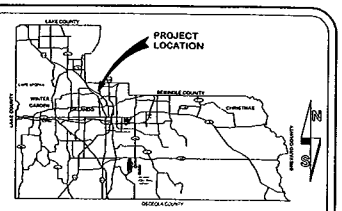
CERTIFICATION TO PLANS

I HEREBY CERTIFY that the design for this project and the attached construction plans comply with the requirements of Section 336.045 of the Florida Statutes and are in substantial conformance with

the standards contained in the edition of the "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways" in effect on this date as adopted by the Florida Department of Transportation pursuant to Subsection 336.045(1) of the Florida Statutes.

DATE: _____ ENGINEER: _____ REG. NO. 35490
CLAUDE L. CASSAGNOL, P.E. State of Florida

omeola 10/10/2017 10:31:54 AM H:\Jobs\FL011.10-SherryDrive\roadway\keysrd01.dgn



LOCATION MAP

INDEX OF SHEETS

UTILITIES ENCOUNTERED

PROGRESS ENERGY	407-772-5308
BRIGHT HOUSE NETWORKS	407-532-8509
COMCAST	352-315-8528
LAKE APOPKA NATURAL GAS	407-656-2734
ORANGE COUNTY UTILITES	407-254-9700
AT&T DISTRIBUTION	407-380-0938

GTC Engineering Corporation
98 South Semoran Blvd, Orlando, FL 32807
Phone Number - 407.380.0402

Certificate of Authorization Number 6758
Claude L. Cassagnol, P.E. P.E. Number 35490

REVISIONS	DATE	BY
ADDENDUM #1 - SHEET NO. 4	10/10/17	AM

DESIGNED BY:	CLC/AM	DATE: 01/26/17
DRAWN BY:	AM	DATE: 01/26/17
CHECKED BY:	CLC	DATE: 01/26/17
APPROVED BY:	CLC	DATE: 01/26/17
PROJECT NO:	2722	

SHEET 1 OF 58

FINAL SUBMITTAL
APRIL, 2017

SUMMARY OF PAY ITEMS

PAY ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY TOTAL	
			PLANS	FINAL
101-1	MOBILIZATION	LS	1	
102-1	MAINTENANCE OF TRAFFIC	LS	1	
104-14	PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION	LS	1	
110-1-1	CLEARING & GRUBBING	LS	1	
120-4	SUBSOIL EXCAVATION (A-8 MATERIAL)	CY	300	
120-9	EXCAVATION, EMBANKMENT, AND GRADING	LS	1	
160-4	TYPE "B" STABILIZATION (12") (MIN. LBR 40)	SY	1,710	
270-8	SOIL CEMENT BASE, (PRIMED) (8") (300 PSI)	SY	741	
285-706	OPTIONAL BASE GROUP 6 (5.0" TYPE B-12.5 ONLY) (BLACK BASE)	SY	607	
327-70-6	MILLING EXISTING ASPHALT PAVEMENT (1 1/2" AVG DEPTH)	SY	1,368	
334-1-13	SUPERPAVE ASPHALTIC CONCRETE (1 1/2") (SP-12.5) (INCL. TACK COAT)	SY	2,692	
339-1	MISCELLANEOUS ASPHALT PAVEMENT	TN	10.0	
400-1-2	CLASS I CONCRETE, ENDWALLS (INCLUDES REINFORCING STEEL)	CY	2.24	
425-1-341	INLETS, CURB, TYPE P-4, ≤10'	EA	5	
425-1-342	INLETS, CURB, TYPE P-4, >10'	EA	1	
425-1-529	INLETS, DITCH BOTTOM, TYPE C, MODIFY	EA	1	
425-1-541	INLETS, DITCH BOTTOM, TYPE D, ≤10'	EA	1	
425-2-41	MANHOLES, P-7, ≤10'	EA	2	
425-2-42	MANHOLES, P-7, >10'	EA	2	
430-175-118	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 18"	LF	336	
430-175-124	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 24"	LF	132	
430-175-130	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 30"	LF	63	
430-175-215	STEEL REINFORCED CONCRETE PIPE, CLASS III, ELLIPTICAL, 12"x18"	LF	52	
430-982-125	MITERED END SECTION, CONCRETE, 18"	EA	2	
430-982-129	MITERED END SECTION, CONCRETE, 24"	EA	2	
430-982-133	MITERED END SECTION, CONCRETE, 30"	EA	1	
430-982-623	MITERED END SECTION, ELLIPTICAL, 12"x18", CD	EA	1	
520-1-8	CONCRETE CURB & GUTTER, SPECIAL, RIBBON	LF	12	
520-1-10	CONCRETE CURB & GUTTER (TYPE F)	LF	454	
520-2-4	CONCRETE CURB (TYPE D)	LF	1,094	
522-1	SIDEWALK CONCRETE, 4" THICK	SY	219	
522-2	SIDEWALK CONCRETE, 6" THICK	SY	620	
530-3-3	RIPRAP-RUBBLE, BANK AND SHORE	TN	92	
530-3-4	RIPRAP-RUBBLE, F&I, DITCH LINING	TN	3.0	
530-4-4A	ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM, THICKNESS 4", OPEN CELL	SY	2,164	
530-4-4B	ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM, THICKNESS 4", CLOSED CELL	SY	1,186	
536-1-1	GUARDRAIL - ROADWAY	LF	375	
536-6	GUARDRAIL - PIPE RAIL	LF	300	
536-85-25	GUARDRAIL END ANCHORAGE ASSEMBLY - TYPE II	EA	2	
536-85-26	GUARDRAIL END ANCHORAGE ASSEMBLY - TYPE CRT	EA	2	
550-10-220	FENCING, TYPE B, 6.0', STANDARD	LF	37	
550-60-223	FENCE GATE, TYPE B, DOUBLE, 14' OPENING	EA	1	
550-60-234	FENCE GATE, TYPE B, SLIDE/CANTILEVER, 20' OPENING	EA	1	
570-1-2	PERFORMANCE TURF (SOD)	SY	4,200	
700-20-11	SIGN, SINGLE (F&I) (LESS THAN 12 SF)	AS	5	
700-20-60	SIGN, EXISTING (REMOVE) (SINGLE POST)	AS	2	
705-10-1	OBJECT MARKER, TYPE 1	EA	3	
705-10-4	OBJECT MARKER, TYPE 4	EA	6	
710-90	PAINTED PAVEMENT MARKINGS, FINAL SURFACE	LS	1	
711-11-123	SOLID TRAFFIC STRIPE (WHITE) (12") (THERMOPLASTIC)	LF	99	
711-11-125	SOLID TRAFFIC STRIPE (WHITE) (24") (THERMOPLASTIC)	LF	16	
900-1	AS-BUILT PLANS	LS	1	
900-2	INDEMNIFICATION	LS	1	
900-3	GROUNDWATER TREATMENT AND DISPOSAL	DA	180	

PAY ITEM FOOTNOTES

102-1 INCLUDES ALL ITEMS OF MAINTENANCE OF TRAFFIC INCLUDING, BUT NOT LIMITED TO, THE DESIGN OF THE MAINTENANCE OF TRAFFIC PLAN BY THE CONTRACTOR AND APPROVAL OF THE PLANS BY ORANGE COUNTY HIGHWAY CONSTRUCTION AND ORANGE COUNTY TRAFFIC. ALSO INCLUDES ALL TEMPORARY AND PERMANENT STRIPING, REMOVAL OF EXISTING AND TEMPORARY STRIPING VIA HYDRO BLASTING, SIGNING, FLAGGERS, ETC. REQUIRED TO MAINTAIN TRAFFIC DURING CONSTRUCTION IN ACCORDANCE WITH THE MUTCD AND THE FDOT ROADWAY AND DESIGN STANDARDS, 2017 EDITION. ATTENTION IS DIRECTED TO THE 600 SERIES INDEX NUMBERS. NOTE THAT THE MAINTENANCE OF TRAFFIC PLAN SHOWN IN THE CONSTRUCTION PLANS IS FOR INFORMATION ONLY. FINAL PLAN TO BE SUBMITTED BY THE CONTRACTOR AND APPROVED BY THE COUNTY. THE MAINTENANCE OF TRAFFIC PLAN DONE BY THE CONTRACTOR SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA.

⚠1 **104-14** INCLUDES THE COST OF ALL ITEMS REQUIRED FOR EROSION CONTROL INCLUDING, BUT NOT LIMITED TO SYNTHETIC BALES, TURBIDITY BARRIERS, SILT FENCES AND TEMPORARY GRASSING AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. NOT AN FDOT PAY ITEM NUMBER. INCLUDES ALL WORK SHOWN ON SHEETS NO. 38, 39 & 40 INCLUDING THE RIVER BYPASS.

110-1-1 INCLUDES, BUT IS NOT LIMITED TO, THE COST OF REMOVAL AND DISPOSAL OF CONCRETE CURBS, DRIVEWAYS, CONCRETE BRIDGE STRUCTURE, BRIDGE DECK DEMOLITION, BRIDGE PILINGS & ABUTMENTS, WALLS, BRICK WALLS, GABIONS, VARIOUS TYPES OF FENCES, CAPPING WELLS, REMOVAL AND DISPOSAL OF SEPTIC TANKS AND DRAIN FIELDS, UNDERGROUND STORAGE TANKS, PAVEMENT, BASE, AND TRIMMING OF TREES AND SHRUBS AS REQUIRED TO CONSTRUCT THE PROJECT. ALSO INCLUDES THE COST FOR SAWCUTTING EXISTING PAVEMENT AND CONCRETE AND REMOVAL OF EXISTING TREES AND STUMPS AS INDICATED IN PLANS.

120-4 THIS ITEM AND QUANTITY ARE INCLUDED FOR CONTINGENCY IF UNSUITABLE MATERIAL IS FOUND DURING CONSTRUCTION. AS DIRECTED BY THE COUNTY, THE CONTRACTOR SHALL REMOVE AND REPLACE THE UNSUITABLE SOIL AND THE CONTRACTOR SHALL PROVIDE ORANGE COUNTY HIGHWAY CONSTRUCTION WITH A SIGNED AND SEALED SURVEY, PREPARED BY A REGISTERED FLORIDA SURVEYOR, INCLUDING ELEVATIONS AND CROSS SECTIONS OF THE AREA WHERE UNSUITABLE SOILS ARE FOUND. THE ELEVATIONS SHALL BE PROVIDED EVERY 25 FEET AND SHALL BE REPRESENTATIVE OF THE CONDITIONS. THE PURPOSE OF THE SURVEY, WITH CROSS SECTIONS, IS TO VERIFY THE QUANTITY OF THE UNSUITABLE SOILS REMOVED.

120-9 INCLUDES THE COST OF ALL EARTHWORK OPERATIONS TO CONSTRUCT THE PROJECT. NOT AN FDOT PAY ITEM.

425-1-341
425-1-342 INCLUDES THE COST OF FABRICATING AND INSTALLING CURB INLET TRASH BASKETS.

425-1-529 INCLUDES THE COST OF THE 6" THICK X 5' WIDE X 8'-1" LONG CONCRETE PAD.

430-982-XXX FOR MITERED END SECTIONS WITHIN THE ACB MAT, REMOVE BLOCKS AS NECESSARY (CRIMP ENDS OF ACB CABLES) TO CONSTRUCT MITERED END SECTION, AND FILL VOIDS BETWEEN THE MITERED END SECTION AND ACB WITH 4000 PSI GROUT. THIS IS TO BE INCLUDED IN THE COST FOR MITERED END SECTIONS.

522-1 INCLUDES THE COST OF CURB RAMPS WITH DETECTABLE WARNING SURFACE PER FDOT INDEX 304.

522-2 THIS PAY ITEM INCLUDES ALL CONCRETE DRIVEWAYS AND THE 6" THICK CONCRETE SIDEWALK ALONG SHERRY COURT. ALSO INCLUDES THE COST OF CURB RAMPS WITH DETECTABLE WARNING SURFACE PER FDOT INDEX 304.

530-3-3 THIS PAY ITEM INCLUDES THE RIPRAP AT THE CANAL BOTTOM, AT THE BEGINING AND END OF THE CONCRETE REVETMENT BLOCK LINING, FOR THE TRANSITION BETWEEN EXISTING GABION SYSTEM TO THE PROPOSED CONCRETE REVETMENT MATTRESS.

530-3-4 THIS PAY ITEM INCLUDES THE 10' X 5' RIPRAP PAD IN THE POND AT STRUCTURE S-5.

530-4-4A
530-4-4B SHOREBLOCK 4" THICK OPEN CELL & CLOSED CELL, BD400 ACB MAT WITH POLYESTER CABLE, OR APPROVED EQUAL. INCLUDES COST OF 4,000 PSI GROUT / CONCRETE CONNECTION TO EXISTING GABIONS NORTH OF KELVINGTON DRIVE AND NORTH OF SHERRY DRIVE. INCLUDES FILLING OPEN CELLS WITH TOPSOIL AND HYDROSEEDING. WATER AS REQUIRED FOR ESTABLISHMENT OF PERMANENT SODDING. ALSO INCLUDES THE COST OF MOWING UNTIL FINAL PROJECT ACCEPTANCE BY THE COUNTY. CLOSED CELL TO BE USED ON CANAL BOTTOM AND OPEN CELL ON CANAL BANKS / SIDE SLOPES. CONTRACTOR TO SUBMIT A STRUCTURAL DESIGN AND ANALYSIS OF THE ACB SYSTEM SIGNED AND SEALED BY AN ENGINEER LICENSED IN THE STATE OF FLORIDA.

570-1-2 INCLUDES THE COST OF SOD (MATCH EXISTING), PEGGING THE SOD, FERTILIZER AND WATER AS REQUIRED FOR ESTABLISHMENT OF PERMANENT SODDING. ALSO INCLUDES THE COST OF MOWING UNTIL FINAL PROJECT ACCEPTANCE BY THE COUNTY.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
10/10/17	ADDENDUM #1 - ADDED TO PAY ITEM NOTE 104-14.		

GTC Engineering Corporation
98 South Semoran Blvd, Orlando, FL 32807
Phone Number - 407.380.0402
Certificate of Authorization Number 6758
Claude L. Cassagnol, P.E. P.E. Number 35490

ORANGE COUNTY PUBLIC WORKS

GTC PROJECT NO.	SHERRY DRIVE BRIDGE REPLACEMENT	OCPW PROJECT NO.
FLO 11.10		2722

SUMMARY OF PAY ITEMS

SHEET NO. 4

onoola 10/10/2017 10:18:43 AM H:\Jobs\FLO11.10-SherryDrive\roadway\CESSR001.DGN

FILE: H:\Jobs\FLO11.10-SherryDrive\roadway\CESSR001.DGN
DATE: 10/10/2017 10:18:43 AM

To the Board of County Commissioners
Orange County, Florida

The Undersigned, hereinafter called "Bidder", having visited the site of the proposed project and familiarized himself with the local conditions, nature and extent of the work, and having examined carefully the Contract Form, General Conditions, Supplementary Conditions, Plans and Specifications and other Contract Documents, with the Bond requirements herein, proposes to furnish all labor, materials, equipment and other items, facilities and services for the proper execution and completion of: **SHERRY DRIVE BRIDGE REPLACEMENT** in full accordance with the drawings and specifications prepared in accordance with the Contract Documents and, if awarded the Contract, to complete the said work within the time limits specified for the following ESTIMATED TOTAL BASE BID.

It is understood that this is a unit price Contract and the resultant Contract will contain estimated quantities, unit prices, extended totals and that the Estimated Total Base Bid is the sum of all pay item totals from the schedule of prices, REVISED Page D-3 through REVISED D-7.

The Contract resulting from this solicitation is based on estimated quantities. The contractor shall only be paid for materials installed in the work in accordance with the applicable unit prices for the specific work element (line item). No payment shall be made for excess materials delivered to the jobsite and not incorporated into the work. Therefore, it shall be the contractor's responsibility to determine the quantities of materials necessary to perform the project to its completion.

ESTIMATED TOTAL BASE BID:

_____DOLLARS
(In Words)

$_____

In the event the Contract is awarded to this Bidder, he/she will enter into a formal written agreement with the County in accordance with the accepted bid within ten (10) calendar days after said Contract is submitted to him/her and will furnish to the County a Contract Payment and Performance Bond with good and sufficient sureties, satisfactory to the County, in the amount of 100% of the accepted bid. The Bidder further agrees that in the event of the Bidder's default or breach of any of the agreements of this proposal, the said bid deposit shall be forfeited as liquidated damages.

Failure of the Bidder to provide pricing for all unit priced items and/or the Base Bid and ALL requested additive/deductive bid items, or alternate bids shall be cause for rejection of the bid as non-responsive.

SHERRY DRIVE
BRIDGE REPLACEMENT
REVISED SCHEDULE OF PRICES
Y18-703-CH
ROADWAY PAY ITEMS

REF. NO.	PAY ITEM NO	ITEM DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	TOTAL COST
1	101-1*	MOBILIZATION (10%) *See Note at the End of the Schedule of Prices	LS	1		
2	102-1	MAINTENANCE OF TRAFFIC	LS	1		
3	104-14	PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION	LS	1		
4	110-1-1	CLEARING & GRUBBING	LS	1		
5	120-4	SUBSOIL EXCAVATION (CONTINGENCY ITEM, A-8 MATERIAL)	CY	300		
6	120-9	EXCAVATION, EMBANKMENT AND GRADING	LS	1		
7	160-4	TYPE "B" STABILIZATION (12")(MIN. LBR 40)	SY	1,710		
8	270-8	SOIL CEMENT BASE, (PRIMED)(8")(300 PSI)	SY	741		
9	285-706	OPTIONAL BASE GROUP 6 (5.0" TYPE B-12.5 ONLY)(BLACK BASE)	SY	607		
10	327-70-6	MILLING EXISTING ASPHALT PAVEMENT (1 ½" AVG. DEPTH)	SY	1,368		
11	334-1-13	SUPERPAVE ASPHALTIC CONCRETE (1 ½")(SP-12.5)(INCL. TACK COAT)	SY	2,692		
12	339-1	MISCELLANEOUS ASPHALT PAVEMENT – 2"	TN	10		
13	400-1-2	CLASS I CONCRETE, ENDWALLS (INCLUDES REINFORCING STEEL)	CY	2.24		
14	425-1-341	INLETS, CURB, TYPE P-4, <=10'	EA	5		
15	425-1-342	INLETS, CURB, TYPE P-4, >10'	EA	1		

SHERRY DRIVE
BRIDGE REPLACEMENT
REVISED SCHEDULE OF PRICES
Y18-703-CH

REF. NO.	PAY ITEM NO	ITEM DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	TOTAL COST
16	425-1-529	INLETS, DITCH BOTTOM, TYPE C, MODIFIED	EA	1		
17	425-1-541	INLETS, DITCH BOTTOM, TYPE D, <=10'	EA	1		
18	425-2-41	MANHOLES, P-7, <=10'	EA	2		
19	425-2-42	MANHOLES, P-7, >10'	EA	2		
20	430-175-118	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 18"	LF	336		
21	430-175-124	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 24"	LF	132		
22	430-175-130	STEEL REINFORCED CONCRETE PIPE, CLASS III, ROUND, 30"	LF	63		
23	430-175-215	STEEL REINFORCED CONCRETE PIPE, CLASS III, ELLIPTICAL, 12"X18"	LF	52		
24	430-982-125	MITERED END SECTION, CONCRETE, 18"	EA	2		
25	430-982-129	MITERED END SECTION, CONCRETE, 24"	EA	2		
26	430-982-133	MITERED END SECTION, CONCRETE, 30"	EA	1		
27	430-982-623	MITERED END SECTION, CONCRETE, 12"X18", ELLIPTICAL, CD	EA	1		
28	520-1-8	CONCRETE CURB & GUTTER, SPECIAL, RIBBON	LF	12		
29	520-1-10	CONCRETE CURB & GUTTER (TYPE F)	LF	454		
30	520-2-4	CONCRETE CURB (TYPE D)	LF	1,094		
31	522-1	SIDEWALK CONCRETE, 4" THICK	SY	219		

SHERRY DRIVE
BRIDGE REPLACEMENT
REVISED SCHEDULE OF PRICES
Y18-703-CH

REF. NO.	PAY ITEM NO	ITEM DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	TOTAL COST
32	522-2	SIDEWALK CONCRETE, 6" THICK	SY	620		
33	530-3-3	RIPRAP-RUBBLE, BANK AND SHORE	TN	92		
34	530-3-4	RIPRAP-RUBBLE, F&I, DITCH LINING	TN	3		
35	530-4-4A	ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM, THICKNESS 4",OPEN CELL	SY	2,164		
36	530-4-4B	ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM, THICKNESS 4",CLOSED CELL	SY	1,186		
37	536-1-1	GUARDRAIL – ROADWAY	LF	375		
38	536-6	GUARDRAIL – PIPE RAIL	LF	300		
39	536-85-25	GUARDRAIL END ANCHORAGE ASSEMBLY – TYPE II	EA	2		
40	536-85-26	GUARDRAIL END ANCHORAGE ASSEMBLY – CRT	EA	2		
41	550-10-220	FENCING, TYPE B, 6.0', STANDARD	LF	37		
42	550-60-223	FENCE GATE, TYPE B, DOUBLE, 14' OPENING	EA	1		
43	550-60-234	FENCE GATE, TYPE B, SLIDE / CANTILEVER, 20' OPENING	EA	1		
44	570-1-2	PERFORMANCE TURF (SOD)	SY	4,200		
45	700-20-11	SIGN (F&I)(LESS THAN 12 SF)(SINGLE POST)	AS	5		
46	700-20-60	SIGN, EXISTING (REMOVE)(SINGLE POST)	AS	2		
47	705-10-1	OBJECT MARKER, TYPE 1	EA	3		

SHERRY DRIVE
BRIDGE REPLACEMENT
REVISED SCHEDULE OF PRICES
Y18-703-CH

REF. NO.	PAY ITEM NO	ITEM DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	TOTAL COST
48	705-10-4	OBJECT MARKER, TYPE 4	EA	6		
49	710-90	PAINTED PAVEMENT MARKINGS, FINAL SURFACE	LS	1		
50	711-11-123	SOLID TRAFFIC STRIPE (WHITE)(12")(THERMOPLASTIC)	LF	99		
51	711-11-125	SOLID TRAFFIC STRIPE (WHITE)(24")(THERMOPLASTIC)	LF	16		
52	900-1	AS-BUILT PLANS	LS	1		
53	900-2	INDEMNIFICATION	LS	1	$100.00	$100.00
54	900-3	GROUNDWATER TREATMENT AND DISPOSAL	DA	180		
ORANGE COUNTY UTILITIES PORTION						
U1	OCU 1	~~FURNISH AND INSTALL WATER MAIN~~ MOBILIZATION AND DEMOBILIZATION	~~LF~~ LS	~~328~~ 1		
U2	OCU 2	~~IDEMNIFICATION~~ WATER MAIN	~~LS~~ ~~LF~~	~~1~~ 328		
U3	OCU 3	~~FURNISH AND INSTALL FIRE HYDRANT~~ PRECAST CONCRETE MANHOLES	EA	1		

SHERRY DRIVE
BRIDGE REPLACEMENT
REVISED SCHEDULE OF PRICES
Y18-703-CH

TOTAL ESTIMATED BASE BID :

(Reference Numbers 1 through 54)

(Reference Numbers U1 through U3

SUMMARY:

TOTAL ESTIMATED BASE BID **$**

(Reference Numbers 1 through 54 plus U1 through U3)

*Any amount of Mobilization in excess of 10% of Roadway Bid Item 2 through 54 will be paid upon completion of all work in accordance with TP-101.

TABLE OF CONTENTS FOR

TECHNICAL SPECIFICATIONS

ORANGE COUNTY

SHERRY ROAD WATERMAIN INSTALLATION PROJECT

APPENDICES

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

A. Section Includes

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

B. Summary of Work

A. The Utility work shown on the drawings prepared by OCU are to be constructed in conjunction with the Orange County Public Works Roadway Project. The project consists of the installation of new water main along Sherry Court between Sherry Drive and Kelvington Drive. Work includes installation of approximately 328 lineal feet of new water main along the Sherry. The remaining utilities are anticipated to require only support during construction.

The work associated with this project involves active water mains that are within the Rights-Of-Way of Orange County. All work activities shall be required to be in accordance with the permits issued by the respective agencies. All work performed will be required to be done while maintaining the functional operation of the utility lines.

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

C. The Orange County Utilities Standards and Construction Specifications Manual (OCU Manual) is incorporated by reference into these specifications. Should any conflicting information exist between these two documents, then the OCU Manual shall apply and take precedence over this document. OCU Manual is available for download at:

"ftp://ftp.ocfl.net/divisions/Utilities/pub/PlanReview/ManualOfStandardsAndSpecs/Manual_Approved2011/Orange%20County%20Utilities%20Standards%20and%20Construction%20Specifications%20Manual.pdf"

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

E. Construct the Project under a Unit Price Contract.

F. The CONTRACTOR shall perform the work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean up,

replacements, and restoration required as a result of disruptions caused during this construction.

G. The materials used to complete the Work shall be listed in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

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

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

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

C. Work Sequence

The CONTRACTOR's sequence of work may be of his choosing in order to complete the work in the allowed time frame. The CONTRACTOR shall submit a schedule and work sequence to the OWNER at least five (5) days prior to the Notice to Proceed. Work on all utility lines shall be accomplished so that all facilities will stay in operation.

D. Orange County Working Hours

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

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

E. Operation of Existing Facilities

The proposed work for this project involves the installation of new water mains as well as the removal/abandonment and replacement of operating water mains in Rights-Of-Way with both vehicular and pedestrian traffic. The CONTRACTOR shall perform their work taking all proper precautions and safety measures to insure a safe work area. The work shall be so conducted to maintain existing utility systems in operation. All utilities that occupy or are adjacent to the subject construction site are to remain in

operation. The CONTRACTOR shall coordinate all construction activities with the Orange County Resident Inspectors.

F. CONTRACTOR Use of Premises

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

G. Coordination

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

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

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

H. Cutting and Patching

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

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

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

I. Drawings and Project Manual

A. The Utility Work associated with the new water main along the Sherry Court as well as the relocation of the existing County utility lines on Sherry Drive and Kelvington Drive shall be performed in accordance with the Drawings and Specifications prepared by OCU.

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

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

D. Intent

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

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

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

J. Weather

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

K. Protection and Restoration

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

B. Protection of Trees and Shrubs

1. Protect with boxes or other barricades.

2. Do not place excavated material so as to injure trees or shrubs.

3. Support trees to prevent root disturbances during nearby excavation.

4. Ordered tree removal shall be paid for under the appropriate Contract Items.

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

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

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

L. Delivery and Storage

A. General

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

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

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

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

B. Delivery – The CONTRACTOR shall

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

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

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

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

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

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

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

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

C. Storage

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

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

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

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

5. The CONTRACTOR shall arrange the storage area in a manner to provide

easy access for inspection. Periodic inspections of stored products shall be done to assure that products are maintained under specified conditions and free from damage or deterioration.

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

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

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

D. Specific Material Storage Requirements

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

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

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

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

Should the CONTRACTOR fail to take proper action on storage and handling of equipment supplied under this Contract, within seven days after written notice to correct the deficiencies, the OWNER retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the CONTRACTOR's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, and Engineering and any other costs associated with making the necessary corrections. In any event, equipment and materials not properly stored will not be included in a payment estimate. Any materials not suitable for use will be removed from the site and replaced with new materials.

M. Manufacturer's Instructions for Installation

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

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

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

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

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

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

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

H. The CONTRACTOR shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the ENGINEER and made of ample size and strength for the purposes intended. The manufacturer shall furnish substantial templates and working drawings for installation.

N. Construction Field Engineering

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

1. Identify existing rights-of-ways and property lines along or adjacent to the Work;
2. Locate all existing utilities and structures as may be affected by the Work;
3. Locate control points prior to starting the Work;
4. Replace control points or reference points which may be lost or destroyed.

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

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

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

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

C. Submittals

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

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

3. Completed Record Drawing Tables.

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

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

A. Utilities

A. Utility Construction

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

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

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

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

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

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

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

B. Existing Utilities

1. The locations of all existing underground piping, structures and utilities have been taken from information received from the respective OWNER.

The locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered.

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

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

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

5. It is the responsibility of the CONTRACTOR to ensure that all utility or other poles, the stability of which may be endangered by the proximity of excavation, be temporarily stayed and/or shored in position while Work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the CONTRACTOR.

C. Notices

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

directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.

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

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

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

D. Exploratory Excavations

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

E. Utility Crossings

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

F. Relocations

1. Relocations shown on the Drawings – Public utility installations or structures, including but not limited to light poles, signs, fences, piping, conduits and drains that interfere with the positioning of the Work which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the CONTRACTOR shall be considered as part of the general cost of

doing the Work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.

2. Relocation not shown on the Drawings

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

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

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

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

G. Lines and Grades

1. All Work under this Contract shall be constructed in accordance with the line and grades shown on the Drawings, or as given by the ENGINEER. The full responsibility for keeping alignment and grade shall rest upon the CONTRACTOR.

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

3. Water main shall have a minimum of 36-inches of cover over the top of the pipe. Cover shall vary to provide long uniform gradient or slope to pipe to minimize air pockets and air release valves. The stationing shown on the Drawings for air and vacuum release valve assemblies are approximate and the CONTRACTOR shall field adjust these locations to locate these valves at the highest point in the pipeline installed. All locations must be approved by the OWNER.

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

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

B. Special Project Procedures

A. Construction Phasing

Construction of the project shall be in accordance with the roadway construction schedule. CONTRACTOR shall adjust the schedule and/or MOT to provide for utility installations at no additional cost to Orange County.

B. Maintenance of Traffic

Refer to roadway construction documents for maintenance of traffic requirements.

C. Operation of existing Utility Systems

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

D. Contractor to provide a bacteriological sampling plan that is in accordance with the approved FDEP permit for sampling locations for all installed water mains no less than 30 days prior to the first request for clearance. Contractor shall provide all sample points as needed for partial and final water main clearances. Sample points are not paid separately and included the cost of all pipe taps fittings, etc. At a minimum, sample points are required in all straight runs of pipe spaced no greater than 1,000 LF intervals, all service connections over 4", temporary ends of partially cleared lines and any connection to an existing water main.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 DESCRIPTION

A. Payment for all Work done in compliance with the Contract Documents, inclusive of furnishing all manpower, equipment, materials, and performance of all operations relative to construction of this project, will be made under Pay Items listed herein. Work for which there is not a Pay Item will be considered incidental to the Contract and no additional compensation will be allowed.

B. The OWNER reserves the right to alter the Drawings, modify incidental work as may be necessary, and increase or decrease quantities of work to be performed to accord with such changes, including deduction or cancellation of any one or more of the Pay Items. Changes in the work shall not be considered as a waiver of any conditions of the Contract nor invalidate any provisions thereof. When changes result in changes in quantities of Work to be performed, the Contractor will accept payment according to Contract Unit Prices that appear in the original Contract. A supplemental agreement between the CONTRACTOR and the OWNER will be required when such changes involve a net increase or decrease of more than 25 percent of the estimated quantity of a payment item where the item amounts to 10% or more of the Contract Price.

C. Quantities necessary to complete the work as shown on the Drawings or as specified herein shall govern over those shown in the Proposal. The CONTRACTOR shall take no advantage of any apparent error or omission in the Drawings or Specifications, and the ENGINEER shall be permitted to make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents.

D. The ENGINEER will make measurements and determinations as necessary to classify the work within pay items and determine the quantities for pay purposes; such decisions will be final after 3 days if the CONTRACTOR does not submit a written notice as defined in the following paragraph.

E. If the CONTRACTOR differs with the ENGINEER'S classification of the Pay Items or determination of quantities of the Pay Items, he must notify the ENGINEER in writing within 3 days of the time that the CONTRACTOR is informed of the ENGINEER'S decision. Otherwise the OWNER will not consider any such difference as a claim for payment.

F. Failure on the part of the CONTRACTOR to construct any item to plan or authorized dimensions within the specification tolerances shall result in reconstruction to acceptable tolerances at no additional cost to the OWNER,

acceptance at no pay, or, acceptance at reduced final pay quantity or reduced unit price, all at the discretion of the ENGINEER.

G. The quantity for a payment item will be revised only in the event that it is determined to be substantially in error. An error shall be deemed substantial if the quantity will increase or decrease in excess of five percent of the original quantity for that item or the amount due for that item will increase or decrease in excess of $500 (whichever is smaller). In general, such revisions will be determined by final measurement or plan calculations or both as additions to or deduction from plan quantities specified within these Contract Documents.

H. Work shall not be considered complete until all testing has been satisfactorily completed and the item of work has demonstrated compliance with plans and specifications.

I. A preliminary monthly application for payment shall be submitted to the OWNER for review five (5) days prior to the submittal for approval of the CONTRACTOR'S monthly payment request.

J. All materials supplied for this project shall be in accordance with the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products". Products that are submitted for use on this project that are not on the approved list will not be considered as acceptable for use.

1.2 APPLICATION FOR PAYMENT

A. Applications for Payment shall be submitted by the CONTRACTOR to the OWNER'S Resident Project Representative (RPR) in accordance with the schedule established by General Conditions and Agreement between the Owner and the Contractor.

B. Format

1. Submit applications typed on forms provided by the OWNER. The CONTRACROR shall prepare itemized continuation sheets using the accepted Schedule of Values and attach them to the Application. Each item shall have an assigned dollar value for the current pay period, and a cumulative value for the project to date. Change Orders executed prior to the date of submission shall be listed at the end of the continuation sheets and shall be totaled separately.

2. The following items shall be included with each copy of the application for payment:

    a. Progress Schedule
    b. Stored Material Log
    c. Partial Release of Liens (for payment for stored material)
    d. Consent of Surety

e. Invoices for Stored Material
f. Updated record drawings

3. The CONTRACTOR shall certify, for each current pay request, that all previous payments received from the OWNER, under his Contract, have been applied by the CONTRACTOR to discharge in full all obligations of the CONTRACTOR in connection with Work covered by prior applications for payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest and encumbrances. CONTRACTOR shall attach to each application for payment like affidavits by all Subcontractors and Suppliers. CONTRACTOR shall also attach a "Consent of Surety" to each application for payment. Additionally, a "Partial Release of Lien" for each subcontractor and supplier shall be attached to each application for payment.

4. Submit seven (7) copies of each application to the Resident Project Representative. Each copy shall include original signatures. The Resident Project Representative shall review the application and verify quantities of installed work and stored materials. Upon RPR approval, the CONTRACTOR shall submit the application to the OWNER for review. When the OWNER finds the application properly completed and correct, the OWNER will make payment to the CONTRACTOR.

C. Work not installed in accordance with the requirements of the Contract Documents or materials not conforming to the Contract Documents will not be approved by the Resident Project Representative, OWNER or OWNER/ENGINEER for payment.

D. The Application for Final Payment shall be prepared in accordance with Section 01750 Contract Closeout.

E. Methods of Measurement

1. Units of measurement shall be defined in general terms as follows:

a. Linear Feet (LF)
b. Square Feet (SF)
c. Square Yards (SY)
d. Cubic Yards (CY)
e. Each (EA)
f. Sacks (SK)
g. Lump Sum (LS)

2. Unit Price Contracts/Items

a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified.

Pipe shall be measured along the length of the completed pipeline, regardless of the type of joint required, without deduction for the length of valves or fittings. Pipe included within the limits of lump sum items will not be measured.

b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Sacks (SK) shall be measured as the amount of the unit of measure installed within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured by land surveying equipment. CONTRACTOR shall provide supporting documentation (i.e., drawings, truck tickets, invoices, etc.) to verify actual installed quantities.

c. No measurement is required for Lump Sum (LS) items.

3. Lump Sum Contract/Items

The Measurement of Work for lump sum contracts and/or items shall be based on the information provided in the Contract Documents and compiled through the CONTRACTOR'S own field verifications, investigations and testing prior to Bidding.

F. The following describes the specific work and methods of measurement for the items listed in the Bid Schedule. Measurement and payment for each Bid Item shall include all labor, materials and equipment required to perform the work included for that respective item to provide a complete and operable installation. Related work not specifically listed or identified, but evidently necessary for satisfactory completion of the item, shall be considered to be included.

G. No separate payment will be made for the following work, and its cost shall be included in the appropriate payment item:

- Applications and pulling of all utility and construction permits;
- Shop drawings, working drawings and samples;
- Field engineering, surveying and layout;
- Clearing and grubbing;
- Trench excavation, sheeting, shoring and bracing;
- Locating and supporting existing utilities;
- Structural fill, backfill, compaction and grading;
- Sodding;
- Cleanup;
- Testing materials and apparatus, including provisions for water to fill, flush and test mains;
- Maintenance of utility service;
- Fittings and pipe restraints;

PART 2 PAY ITEMS

2 Mobilization and Demobilization (OCU 1)

A. Work Includes

Measurement for mobilization and demobilization will be lump sum. Amount shall be less than 5% of total of the utility pay OCU 2. Payment shall be based on the Contractor's estimated percentage of completion as approved by Owner with 50% allowed at the beginning of the project and 50% upon completion of the project.

B. Measurement

The units of measurement for this item will be Lump Sum.

2.1 Water Main (OCU 2)

A. Work Includes

a) Furnishing all labor, materials, bonds, MOT, dewatering, equipment and constructing the respective pipeline's complete installation including clearing and grubbing, protection of existing utilities, excavation, sheeting, shoring and bracing, backfill, compaction, grading, temporary erosion control, survey, layout, pipeline identification and warning tape, thrust restraints, sodding, all testing (including pressure and bacteriological), flushing or pigging, disposal of excess material, open cut and restoration of roadway or other areas within the project limits disturbed. This item also includes all necessary pipe fittings including reducers, line stops, bends, tees, wyes, gate valves, sleeves, restraining devices, nuts, bolts, gaskets, line location wires, removal and restraint of existing pipes as required, replacement of sidewalks, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, and other obstructions, tree removal or protection, installation of silt fence, connection to (and mechanical restraint of) existing pipes or structures, removal and disposal of existing mains or service lines as called for in the plans and all other items incidental to the construction of the pipelines. Furnish and install fire hydrant including dewatering, excavation, fitting at water main as well as connection to it, installation of gate valve and box, installation of hydrant, all pipe as needed for main line to the location shown per plan, concrete shear pad, and blue reflective pavement marker at hydrant, painting of hydrant, bedding rock, backfill, accessories, thrust restraint, disinfection, bacteriological and leakage testing, hydrant extension if approved by County, restoration and pipe. Furnish and install blow off valve assemblies of the size and type for water mains as specified and shown on the Contract Drawings. This shall include valves with valve boxes, excavation, backfilling, sheeting, shoring, bracing, trench safety, dewatering, installation of blow off valve assembly including piping, gate valve, valve boxes, tapped pipe cap, stone, backfilling, compaction and sodding where required. Contractor shall provide certification that all pipes were properly installed as per the manufacturer's requirements. This pay item also includes Record Drawings as specified in Section 1720 and Survey as specified in Section 1050.

B. Measurement

The units of measurement for this item will be Lump Sum, which payment shall be full compensation for water main including all necessary labor, materials, equipment and transportation for a complete and working installation

2.2 Precast Concrete Manholes (OCU 3)

A. Work Includes:

Furnish all labor, materials, and equipment necessary for constructing manholes (regardless of depth) as necessary for the complete installation including excavation, protection of existing utilities, sheeting, shoring and bracing, dewatering, sodding, backfill, compaction, grading, pipeline identification and warning tape, construction of inverts, installation of femco couplings, bypass pumping, all testing, disposal of excess material, and restoration of the area. This item also includes line location, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, and other obstructions, tree removal or protection, and all other items incidental to the construction of the manholes. All excavated areas shall be restored to existing conditions or better. No doghouse manholes will be allowed.

B. Unit of measurement is each. The depth of manholes will be measured from the invert of the effluent culvert to the top of the frame.

C. Payment will be made in accordance with the type of manhole and depth per each manhole.

END OF SECTION

SECTION 01050

SURVEYING AND FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

1.2 REQUIREMENTS

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

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

1.3 SUBMITTALS

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

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

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

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

PART 2 - PRODUCTS

2.1 SURVEY DOCUMENTS

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

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

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

Table 01050-1
Minimum Survey Accuracies

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

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

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

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

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

TABLE 01050-2
Asset Attribute Data Examples

Hydrants Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Manufacturer	Model #	Comments
2	FH-1	C-7	518456.40	1483743.63	49.53	Brand B	XJ7-B	
3	FH-2	C-9	518477.68	1483758.95	54.23	Brand B	XJ7-B	
4								
5								

Hydrant | Valve | Manhole | Meter | Fitting | Cleanout | Pipe | Pumpstation | Well | Property or Easement Corner | Existing OC Utility Crossing

Valves Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	Actuator Manufacturer	Comments
2	ARV-1	C300	518080.09	1483231.33	81.72	ARV - Combination	Water Main	2	Brand H	100XT						
3	ARV-1	C303	518083.55	1483280.50	81.15	ARV - Vacuum	Force Main	4	Brand G	1000						
4	BFP-1	C303	518086.00	1483282.88	78.21	Backflow Preventer	Reclaimed Water Main	8	Brand F	2000 fgs						
5	BO-9	C405	518088.83	1483289.43	78.20	Blowoff	Water Main	2	Brand E	14 turbo						
6	BFV-1	C405	518088.11	1483295.00	81.95	Butterfly	Water Main	30	Brand D	230 xls	200	Yes	3 to 1	Yes	Brand C	
7	GV-3	C405	518132.54	1483372.75	81.23	Gate	Water Main	16	Brand C	2225846	300	Yes	3 to 1	NO		
8	LS-W1	C405	576779.36	1539708.97	64.30	Line Stop	Water Main	16	Brand B	7r6r44						
9	PV-22	C405	576880.60	1539719.32	64.52		Force Main	12	Brand A	Z100	200	Yes	3 to 1	Yes	Brand A	
10																

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

Manhole Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	ID Number	Plan Sheet #	Easting	Northing	Rim Elevation	Invert Elv N	Invert Elv NE	Invert Elv E	Invert Elv SE	Invert Elv S	Invert Elv SW	Invert Elv W	Invert Elv NW	Manufacturer	Comments
2	SAN-MH01	AT-2	475216.00	1501637.12	115.89							111.28		Del Zotto	
3	SAN-MH02	AT-2	474685.63	1501636.02	114.98			110.22			110.12			Del Zotto	
4	SAN-MH03	AT-2	474849.33	1501600.22	115.18		109.96			109.86				Del Zotto	
5	SAN-MH04	AT-2	474850.21	1501416.85	115.91	109.19		110.42		108.56				Del Zotto	
6	SS-1	C1.05A	478117.70	1501622.99	118.13					113.73				Del Zotto Products of Florida Inc.	Del Zotto Products of Florida Inc.
7	SS-2	C1.05A	478116.77	1501534.19	117.79	113.41				113.38				Del Zotto Products of Florida Inc.	Del Zotto Products of Florida Inc.
8	SS-3	C1.05	478111.28	1501152.49	116.45	111.98				111.94				Del Zotto Products of Florida Inc.	Del Zotto Products of Florida Inc.
9	SS-4	C1.05A	478105.19	1500781.07	115.72	110.76		110.75						Del Zotto Products of Florida Inc.	Del Zotto Products of Florida Inc.
10															

General Info | Hydrant | Valve | Manhole | Meter | Fitting | Cleanout | Pipe | Pumpstation | Well | Prop

Meter Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Comments
2	MM-1	C-6	576533.64	1539520.08	58.01	Water Main	
3	RWMM-1	C-6	576937.42	1539598.78	64.84	Reclaimed Water Main	
4							

Hydrant | Valve | Manhole | Meter | Fitting | Cleanout | Pipe | Pumpstation | Well | Property or Easement Corner | Existing OC Utility Crossing

Fitting Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Comments
2	FM-1	C-3	572389.28	1539339.13	46.27	Force Main	Bend 11 1/4°	
3	FM-2	C-3	574840.74	1539856.91	51.73	Force Main	Bend 22-1/2°	
4	RW-1	C-4	574887.22	1539849.64	51.75	Reclaimed Water Main	Cross	
5	RW-2	C-4	574904.30	1539849.56	48.98	Reclaimed Water Main	Reducer	
6	WM-1	C-5	572532.38	1539848.16	54.42	Water Main	Tapping Saddle	
7	WM-2	C-5	572631.00	1539337.10	45.27	Water Main	Tee	
8								

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

Cleanout Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
2	CO-1	C-6	576533.64	1539520.08	58.01	
3	CO-2	C-6	576937.42	1539598.42	64.84	Sanitary Service
4						

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

Pipes Worksheet

Asset Attribute Table Examples

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

General Info / Hydrant / Valve / Manhole / Meter / Fitting / Cleanout / **Pipe** / Pumpstation / Well / Property or Easemer

Pump Station Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
2	PS-1	C-40	517914.35	1482906.56	83.91	
3						

Valve / Manhole / Meter / Fitting / Cleanout / Pipe / **Pumpstation** / Well / Property or Easement Corner / Existing OC Utility Crossing

Well Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Well Type	Comments
2						Well	
3						Monitoring Well	
4							

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

Easements Worksheet

Asset Attribute Table Examples

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Boundary Corner Type	Comments
2	Corner-1	C-8	463484.59	1511029.72		Pump Station Tract	N.W. CORNER
3	Corner-2	C-8	463523.24	1511040.01		Pump Station Tract	N.E. CORNER
4	Corner-3	C-8	463480.46	1511015.23		Pump Station Tract	S.W. CORNER
5	Corner-4	C-8	463526.97	1511025.49		Pump Station Tract	S.E. CORNER
6						Easement	
7						Property	
8							

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

Existing OC Utility Crossing

Asset Attribute Table Examples

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

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

Grease Interceptor

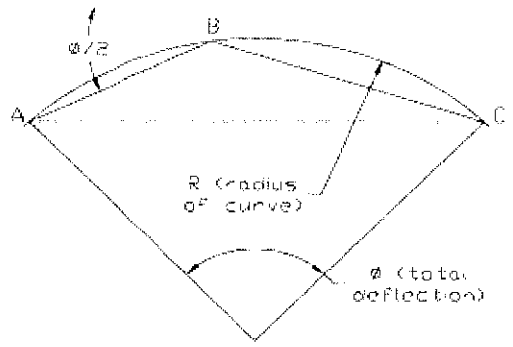
Asset Attribute Table Examples

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Volume (Gallons)	Comments
2	GI-1	C-400	508387.30	1487203.18	89.70	1000.00	
3							

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

TABLE 01050-3
Pipe Deflection Data EXAMPLE

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



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

Data that has be inputted

Values in yelloware over spec

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

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

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

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

PART 3 - EXECUTION

3.1 SURVEY FIELD WORK

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

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

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

D. Use survey control points to layout such work tasks including but not limited to:

1. Clearing, grubbing, work limits, right-of-way lines and easements
2. Locations for pipelines and all associated structures and appurtenances

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

3.2 SURVEY DOCUMENTS DELIVERABLES

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

END OF SECTION

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SECTION 01340
SUBMITTALS

PART 1 - GENERAL

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

1.1 SHOP DRAWINGS AND DATA

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

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

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

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

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

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

1.2 REVIEW OF SHOP DRAWINGS AND SAMPLES

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

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

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

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

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

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

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

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

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

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

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

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

1.3 PRODUCT DATA

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

1.4 MANUFACTURERS' INSTRUCTIONS

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

1.5 SAMPLES

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

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

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

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

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

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

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

1.6 FIELD SAMPLES

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

1.7 DRAWINGS, PRODUCT DATA AND CERTIFICATES

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

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

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

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

1.8 SUBSTITUTIONS

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

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

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

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

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

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

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

1.9 AVAILABILITY OF SPECIFIED ITEMS

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

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

1.10 OPERATING MANUALS

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

1.11 WARRANTIES, GUARANTEES AND BONDS

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

1.12 CADD FILES

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

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

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

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

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

1.13 PROGRESS PHOTOGRAPHS

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

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

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

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

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

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

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

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

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

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

K. Descriptive Information:

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

1.14 PROJECT RECORD DOCUMENTS

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SHOP DRAWING SUBMITTAL DISTRIBUTION

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

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

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

3.2 CONTRACTOR'S REVIEW

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

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

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

3.3 COUNTY'S / PROFESSIONAL'S REVIEW

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

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

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

END OF SECTION

SECTION 01405

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 Section Includes

Regulatory requirements, project permits

1.2 Related Sections

General Conditions
Supplementary Conditions

1.3 Requirements of Regulatory Agencies

A. All piping installed within the right-of-way of any city, county, state, or federal highway or railroad shall be in accordance with a permit to construct issued by the controlling agency and obtained by the OWNER. In no case shall an open trench be constructed within a railroad right-of-way unless otherwise indicated.

B. Whenever the Drawings and Specifications conflict with the requirements of the permit, then the requirements of the permit shall govern and the cost of abiding by the provisions of the permit shall be considered incidental to the Contract.

C. All electrical apparatus and wiring pertaining to a piece of equipment or an appliance furnished and installed under this Contract shall comply with the National Electrical Code and shall be listed by Underwriters Laboratories or bear the approval of a recognized Testing Laboratory approved by the ENGINEER.

1.4 Project Permits

A. The following permits are being obtained from the permitting agencies for the construction of the project, and will be provided to the selected CONTRACTOR prior to award of the contract:

1. FDEP Water Permit
2. FDEP Sewer Permit

B. The CONTRACTOR shall review and become familiar with all permits for the Project, complete with all conditions, attachments, exhibits and permit modifications. A copy of all permits for the Project shall be maintained by the CONTRACTOR at the project site, and shall be available for review upon request.

C. Any permits not referenced here but that are required for the project will be obtained by the Contractor. The CONTRACTOR shall be fully responsible to abide by all provisions of the permits. The CONTRACTOR is responsible for the selection, implementation and operation of all measures required by the permits, including the maintenance of said measures as necessary during construction. No additional compensation will be allowed for any work associated with permit requirements.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

1.2 CONTRACTOR'S RESPONSIBILITIES

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

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

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

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

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

F. Furnish incidental labor and facilities:

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

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

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

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

(NOTUSED)

END OF SECTION

SECTION 01516

TEMPORARY BYPASS PUMPING SYSTEM

PART 1 – GENERAL

1.01 SCOPE

A. The CONTRACTOR shall furnish all materials, labor, equipment, power and maintenance to implement a temporary pumping system while performing replacement of the in-service sewer lines and lift station rehabilitation.

B. The temporary bypass pumping system shall divert the existing wastewater flow around the work area. The purpose of bypassing is to prevent wastewater overflows and provide continuous service to all wastewater customers. The CONTRACTOR shall maintain wastewater flow in the construction area in order to prevent backup and/or overflow and provide reliable wastewater service to the users of the wastewater system at all times.

C. The CONTRACTOR shall include in his bid and bear all expenses incurred to provide bypass pumping (including but not limited to) all temporary piping, valves fittings, controls and temporary power. Temporary bypass pumping capability hall be maintained from start to completion of construction as specified herein.

D. The design, installation, and operation of the temporary pumping system shall be CONTRACTOR'S responsibility. The temporary pumping system shall comply with the requirements of all codes and regulatory agencies having jurisdiction. CONTRACTOR shall employ the services of a vendor who can demonstrate to Engineer that he specializes in the design and operation of temporary bypass pumping systems.

1.02 BYPASS PLAN

A. The CONTRACTOR shall submit to the Owner a comprehensive written plan for approval and acceptance that describes the intended bypass for the maintenance of flows during construction. The CONTRACTOR shall also provide a sketch showing the location of bypass pumping equipment for each line segment(s) around which flows are being bypassed. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, material and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of public and private property from damage and flooding by surcharging of sewers. No construction shall begin until all provisions and requirements have been reviewed and approved by Engineer. The plan shall include but not be limited to details of the following:

1. Staging areas for pumps

2. Sewer plugging method(s) and types of plugs

3. Number, size, material, location and method of installation of discharge piping

4. Diversion pump sizes, capacity, number of each size to be on site, and fuel Requirements

5. Calculations of static lift, friction losses, and flow velocity

6. Manufacturer's pump performance curves for all pumping equipment.

7. Required fuel source and location

8. Discharge plan

9. Method of protecting discharge manholes or structures from surface water infiltration, erosion and damage

10. Thrust and restraint block sizes and locations

11. Method of noise control for each pump and/or generator

12. Any temporary pipe supports and anchoring required

13. Calculations for selection of diversion pumping pipe size

14. Schedule for installation of and maintenance of diversion pumping lines

15. Plan indicating selected location of diversion pumping line and air valve locations

16. Overflow control contingency plan

17. Proposed tanker(s)

18. Work schedule

19. Monitoring log for bypass pumping

20. Monitoring plan of the bypass pumping operation

21. Maintenance of traffic plan

22. Emergency backup plan and equipment

B. The CONTRACTOR shall cease bypass operations and return flows to the new and/or existing sewer when directed by the Owner. All piping shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi whichever is greater. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system. When bypass operations are complete, all bypass piping shall be drained into the wastewater system prior to disassembly.

C. Temporary By-Pass for Water and Force Mains
   1. The CONTRACTOR is responsible for all means and methods necessary for installation, support, protection and removal of all temporary water main and force main piping.

2. Temporary force main and water main piping to be restrained for the entire length of pipe.

3. Temporary pipe and fittings are not part of the asset table. Fitting identifications shown on asset table are for permanent fittings only.

4. The CONTRACTOR is responsible for determining the best suitable location for temporary water main and force main piping within the limits of right-of-way. At no time shall any temporary piping encroach outside of the right-of-way limits.

5. Temporary connections shall be limited to 2 each for water main and force main (one at each end of temporary pipe). If the temporary piping is constructed in segments adding additional connections it shall be the cost of the CONTRACTOR and not the COUNTY.

6. The CONTRACTOR shall submit to the COUNTY a comprehensive written plan for approval and acceptance that describes the intended bypass for the maintenance of flows during construction. The CONTRACTOR shall also provide a sketch showing the location of bypass water and force main. The plan shall include any proposed bypass piping, backup plan and equipment, work schedule, monitoring log and plan for bypass operation, and maintenance of traffic plan. The CONTRACTOR shall cease bypass operations and return flows to the new and/or existing water and sewer systems when directed by the COUNTY, but after approval by the FDEP. Plan shall show that every water and wastewater customer is served with the connection size they currently have from the existing main from the proposed bypass piping.

7. The COUNTY shall accept the bypass plan prior to implementation of the bypass. The CONTRACTOR shall maintain the temporary water main and force main system at all times and shall ensure that the systems are not allowed to shut down.

8. The CONTRACTOR shall be responsible for monitoring the bypass operation 24 hours per day, 7 days per week. If accepted in the bypass plan by the COUNTY, any electronic monitoring in lieu of on-site monitoring must be detailed in the comprehensive written plan and approved by the COUNTY.

9. The CONTRACTOR shall have all materials, equipment and labor necessary to complete any repair, replacement, or rehabilitation on the job site prior to isolating the water main and force main. The CONTRACTOR shall demonstrate that the mains are in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 24 hours prior to beginning the work.

10. The CONTRACTOR shall be liable for all COUNTY personnel and equipment costs, penalties and fines resulting from problems associated with the temporary water main or force main not functioning as required. The CONTRACTOR is required to establish adequate bypass pumping as required regardless of the flow conditions in the systems.

1.03 QUALITY ASSURANCE

A. The design, installation, and operation of the temporary pumping system shall be Contractor's responsibility. The diversion system shall meet the requirements of all codes

and regulatory agencies having jurisdiction. Contractor shall be responsible for any spillage of raw sewage that results in civil or criminal charges from any local, state, or federal agency and will bear all costs for these charges and any restoration required.

B. The Contractor shall provide and maintain adequate equipment, piping, tankers, and other necessary appurtenances in order to maintain continuous and reliable wastewater service in all wastewater lines as required for construction. The Contractor shall have tankers, backup pump(s), piping, and appurtenances ready to deploy immediately.

1.04 BYPASS OPERATION

A. The Owner shall accept the bypass plan prior to implementation of the bypass.

B. The Contractor shall be required to install all equipment and connections for the bypass pumping system prior to any demolition activities of the pump station.

C. By-pass pumping shall be required to be in successful operation for a minimum of 48 hours prior to existing pumping facilities being taken out of service.

D. The Contractor shall plug off and pump down the sewer manhole or line segment in the immediate work area and shall maintain the wastewater system so that surcharging does not occur.

E. Where work requires the line to be blocked beyond working hours and bypass pumping is being utilized, the Contractor shall be responsible for monitoring the bypass operation 24 hours per day, 7 days per week. If accepted in the bypass plan by the Owner, any electronic monitoring in lieu of on-site monitoring must be detailed in the comprehensive written plan and approved by the Owner.

F. The Contractor shall ensure that no damage will be caused to private property as a result of bypass pumping operations. The Contractor shall complete the work as quickly as possible and satisfactorily pass all tests, inspections and repair all deficiencies prior to discontinuing bypassing operations and returning flow to the sewer manhole or line segment.

G. The Contractor shall immediately notify the Owner should a sanitary sewer overflow occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of the Owner or other governmental agency. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up and disinfect the spillage to the satisfaction of the Owner.

H. One back-up pump equal to the primary unit shall be required. Bypass pumps shall have a maximum rating of 55 decibels for sound attenuation.

I. Pumping System Extra Materials

1. Spare parts for pumps and piping shall be kept on site at all times.

2. Spare parts shall include, but not be limited to, the following:

   a. One (1) spare pump identical to the operating pumps.

   b. 50 feet of extra pipe for each pipe size in use.

3. For each diversion discharge line installed, the Contractor shall have available at the site repair clamps or necessary fittings for the pipe system being used.

1.05 CONTRACTOR LIABILITY

The Contractor shall be responsible for all required pumping, equipment, piping, and appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances. The Contractor shall also be liable for all Owner personnel and equipment costs, penalties and fines resulting from sanitary sewer overflows. It is the intent of these specifications to require the Contractor to establish adequate bypass pumping as required regardless of the flow condition.

PART 2 – PRODUCTS

2.01 ESIGN REQUIREMENTS

A. Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping, to ensure that the wastewater flows can be safely diverted around the main pumping station. Diversion pumping system shall be operated 24 hours per day 7 days per week.

B. The Contractor shall furnish and install a temporary non-clog pumping system and associated temporary above- or below-grade piping to pump wastewater around the construction conflict. The pumping system shall be provided with an on-line nonclog backup pump in the event of breakdown. The discharge piping shall be provided with a discharge plug valve for flow throttling purposes.

C. The Contractor is responsible for preparing the by-pass pumping methods and sequencing.

2.02 PERFORMANCE REQUIREMENTS

A. It is essential to the operation of the existing transmission system that there be no interruption in the flow of wastewater throughout the duration of the Project. Contractor shall provide, maintain, and operate all temporary facilities such as plugs, pumping equipment (both primary and backup units as required), conduits, all necessary power or fuel source, and all other labor and equipment necessary to handle the sewage by-pass flow.

B. The design, installation, and operation of the flow diversion pumping system shall be Contractor's responsibility. The diversion system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. Contractor shall provide all necessary means to safely convey the wastewater past the work area. Contractor shall not stop or impede the interceptor flows under any circumstances.

D. Contractor shall maintain sewage flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.

E. Contractor shall protect water resources, wetlands, and other natural resources.

2.03 EQUIPMENT

A. All pumps shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves, diaphragm pumps, or vacuum pumps in the priming system. The pumps must be diesel powered. Hydraulic submersible type and electric submersible type pumps will not be acceptable for temporary bypass pumps. All pumps shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of sewage flows.

B. Contractor shall provide the necessary stop/start controls and a visual alarm indicating a pump malfunction for each pump. Each pump shall have a 0-30 inch Hg vacuum gauge on the inlet and a 0-60 PSI pressure gauge on the outlet.

C. Contractor shall incorporate noise prevention measures for any and all equipment used to insure minimum noise impact on the surrounding areas. Such measures shall include but not be limited to:

1. Hospital grade silencers or mufflers.

2. Equipment modifications.

PART 3 – EXECUTION

2.01 REPARATION

A. The Contractor shall have all materials, equipment and labor necessary to complete the repair, replacement, or rehabilitation on the job site prior to isolating the gravity main segment, manhole, or pump station. The Contractor shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 48 hours prior to beginning the work.

B. Contractor is responsible for locating any existing utilities in the area Contractor selects to locate the diversion pipelines. The Contractor shall obtain approval of the pipeline locations from the Owner prior to installation.

C. The Contractor shall locate bypass pumping suction and discharge lines so as to not cause undue interference with the use of streets, private driveways, and alleys to include the possible temporary trenching of piping at critical intersections. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or others methods shall be deployed by the Contractor to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.

2.02 INSTALLATION

A. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance of work, the plugs or blocks shall be removed in a manner that permits the sewage flow to slowly return to normal, to prevent surcharging or causing other major disturbances downstream.

B. When working inside manholes, Contractor shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces.

C. Contractor shall protect the diversion lines from damage in the areas of backhoe operations. Protection shall be by either concrete Jersey Barriers or wood timbers.

3.03 FIELD QUALITY CONTROL

A. Contractor shall perform a hydrostatic pressure test for each section of discharge piping using a pressure equal to 1.5 times the maximum operating pressure of the system to ensure that there are no leak in the discharge piping prior to actual operation.

B. The Operator shall inspect the diversion pumping system from pump suction to the temporary screening facility every hour the diversion system is in operation or on a schedule approved by Owner. An inspection log shall be kept at the pumping site.

C. Each inspection log shall be marked with a time clock stamp to ensure the required maintenance and inspections are performed. Failure to perform these inspections will result in immediate removal of the Operator from the site and Contractor shall be assessed liquidated damages of $1,000.00 for each occurrence. Copies of the maintenance and inspection logs shall be submitted to Engineer on a weekly basis or as directed by Engineer.

3.04 PROJECT CLOSEOUT

A. The temporary pumping system shall remain operable for at least 72 hours after the work in the pump station is completed. Its removal shall be approved by the Engineer. Once written permission is issued, Contractor shall remove all components of the temporary pumping system.

B. Disturbed Areas

On completion of the diversion pumping operation, Contractor shall clean all areas disturbed by these operations and restore all areas to equal or better conditions that existed prior to the start of work.

END OF SECTION

SECTION 01610
DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

1.2 REQUIREMENTS

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

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

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

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

1.3 DELIVERY

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

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

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

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

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

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

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

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

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

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

1.4 STORAGE AND HANDLING

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

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

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

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

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

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

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

1.5 SPECIFIC STORAGE AND HANDLING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 1630
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 QUALITY ASSURANCE

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

1.3 DEFINITIONS

A. Product: Manufactured material or equipment.

1.4 PROCEDURE FOR REQUESTING SUBSTITUTION

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

B. Written request through Contractor only.

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

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

1.5 APPROVAL OR REJECTION

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

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

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

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

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

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

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The purpose of the Project Record Documents is to provide the County with factual information regarding all aspects of the Work, both concealed and visible.

B. To insure the Work was constructed in conformance with the Contract Drawings, the following survey documents are required to be prepared and certified by a Surveyor as per Spec Section 01050 "Surveying and Field Engineering":
   1. Asset Attribute Data Form
   2. Pipe Deflection Table
   3. Gravity Main Data
   4. Boundary Survey and Survey Map Report for pump stations and easements with constructed improvements

The Asset Attribute Data and Pipe Deflection Table forms can be found on the County's web site:
http://www.orangecountyfl.net/WaterGarbageRecycling/UtilitiesCapitalImprovementProgram.aspx

1.2 DEFINITIONS

A. Boundary Survey: Boundary survey, map and report certified by a Surveyor shall be provided that meets the requirements of Chapter 5J-17 'Minimum Technical Standards', FAC.

B. Surveyor: Contractor's Surveyor that is licensed by the State of Florida as a Professional Surveyor and Mapper pursuant to Chapter 472, F.S.

1.3 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of the Record Documents to one person on the Contractor's staff as approved by the County.

B. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications and each sheet of Drawings and other documents where such entry is required to show progress and changes properly.

C. Make entries within 24-hours after receipt of information has occurred.

1.4 RECORD DOCUMENTS AT SITE

A. Maintain at the site and always available for County's use one (1) record copy of:
   1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents
   2. Change Orders, Verbal Orders, and other modifications to Contract
   3. Written instructions by the County as well as correspondence related to Requests for Information (RFIs)
   4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests
   5. Field test records, inspection certificates, manufacturer certificates and construction photographs
   6. Paper copies of the Progressive As-Built Drawings
   7. Current Surveyor's tables for the Assets Attribute Data, Pipe Deflection Data, and Gravity Main Data

B. Maintain the documents in an organized, clean, dry, legible condition and protected from deterioration, loss and damage until completion of the Work, transfer of all record data to the final As-built Drawings for submittal to the County.

C. Store As-Built Documents and samples in Contractor's office apart from documents used for construction. Do not use As-Built document for construction purposes. Label each document "AS-BUILT" in neat large printed letters. File documents and samples in accordance with CSI/CSC format.

D. Record information concurrently with construction progress. Do not conceal any Work until required information is recorded.

PART 2 - PRODUCTS

2.1 AS-BUILT SURVEY DRAWINGS

A. Maintain the electronic As-Built Drawings to accurately record progress of Work and change orders throughout the duration of the Contract.

B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.

C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected or other means. In the event of overlapping changes, use different colors for entries of the overlapping changes.

D. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated "AB") and be shown in a bolder text that is completely legible.

E. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As required minimum, make entries to also record:
   1. Depths of various elements of foundation in relation to finish floor datum and

State Plane Coordinates and elevations.

2. As-Built Asset Attribute Data tables shall be completed in the Drawings.
3. When electrical boxes, or underground conduits and plumbing are involved as part of the Work, record true elevations and locations, dimensions between boxes.
4. Actually installed pipe or other work materials, class, pressure-rating, diameter, size, specifications, etc. Similar information for other encountered underground utilities, not installed by Contractor, their owner and actual location if different than shown in the Contract Documents.
5. Details, not on original Contract Drawings, as needed to show the actual location of the Work completed in a manner that allows the County to find it in the future.
6. The Contractor shall mark all arrangements of conduits, circuits, piping, ducts and similar items shown schematically on the construction documents and show on the As-Built Drawings the actual horizontal and vertical alignments and locations.
7. Major architectural and structural changes including relocation of doors, windows, etc. Architectural schedule changes according to Contractor's records and Shop Drawings.

2.2 RECORD DOCUMENTS

A. Three (3) paper copy sets and three (3) digital media sets of the following final Record Documents below.

1. The following documents shall be signed and sealed by the Surveyor:
   a. As-built survey drawings as previously described in paragraph 2.01.
   b. As-built Asset Attribute Data (see Specification Section 01050 "Surveying and Field Engineering," Table 01050-2 for an example)
   c. Boundary Survey on an 81/2"x11" format of fee simple and/or permanent easement sites for pump stations, treatment facilities, etc. As a minimum the Boundary Survey shall show all above ground and underground structures or equipment, pipe, and conduit. All property or easement corners and the center of wetwell shall be shown with GPS coordinates. The Boundary Survey field work shall be dated after the Work has been completed.
   d. Boundary Survey on an 81/2"x11" format for Work related to constructed pipes within any permanent easements. As a minimum the Boundary Survey shall show the location of the pipe centerline and property corners with GPS coordinates. The Boundary Survey field work shall be dated after the Work has been completed within the easements.
   e. Gravity Main Table (see Specification Section 01050 "Surveying and Field Engineering", Table 01050-4 for an example)
   f. Pipe Deflection Table (see Specification Section 01050 "Surveying and Field Engineering" Table 01050-3 for an example). An electronic blank table will be supplied by the County.
   g. Provide an encompassing digital AutoCAD file in the Engineer's current version of AutoCAD and the file shall be saved under in the format dwg. The file includes all the information of the As-Built Survey and any other graphical information in the As-Built Drawings. It shall include the overall Work, utility system layout and associated parcel boundaries

and easements. Feature point, line and polygon information for new or altered Work and all accompanying geodetic control and survey data shall be included. The Surveyor's certified As-Built Asset Attribute Data shall be added to the As-Built Drawings.

2. Provide Scanned "As-Built" Drawing sets complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the As-Built Drawings shall be included in the electronic drawings, with each sheet being converted into an individual tif (tagged image file). The plan sheets shall be scanned in tif format Group 4 at minimum of 400 dpi resolution to maintain legibility of each drawing. Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set.
3. Provide Scanned Record Documents reflecting changes from the Contract Documents.

PART 3 - EXECUTION

3.1 FINAL RECORD DOCUMENTS SUBMITTAL

A. Submit the Final Record Documents within 20-days after Substantial Completion.
   1. Participate in review meetings as required and make required changes and promptly deliver the Final Record Documents to the County.

END OF SECTION

SECTION 01750

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 SCOPE OF WORK

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

1.3 RELATED WORK

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

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

C. Section 01720 "Project Record Documents"

D. Section 01740 "Warranties and Bonds"

1.4 PREREQUISITES FOR SUBSTANTIAL COMPLETION.

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

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

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

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

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

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

F. Submit Operation and Maintenance Manuals.

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

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

I. Complete final cleaning requirements necessary for Substantial Completion.

1.5 FINAL CLEANING.

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

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

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

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

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

1.6 OPERATION AND MAINTENANCE MANUALS

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

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

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

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

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

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

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

1.7 SUBSTANTIAL COMPLETION INSPECTION PROCEDURES

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

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

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

1.8 PREREQUISITES FOR FINAL ACCEPTANCE.

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

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

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

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

C. Submit consent of surety.

D. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

1.9 FINAL ACCEPTANCE INSPECTION PROCEDURES

A. The County will re-inspect the Work upon receipt of the Contractor's written notice that the Work, including punch list items resulting from earlier inspections, has been completed, except for those items for which completion has been delayed because of circumstances that are acceptable to the County.

B. Upon completion of re-inspection, the County will either prepare a certificate of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled, which are required for final acceptance.

C. If necessary, the re-inspection procedure will be repeated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 02140
DEWATERING

1.01 DESCRIPTION

Scope of Work: This Section specifies the furnishing of equipment; labor and materials necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth, as shown on the Drawings, and/or geotechnical report.

1.02 QUALITY ASSURANCE

A. Qualifications: The Contractor shall engage a Geotechnical Engineer registered in the State of Florida, to design the temporary dewatering system. The Contractor shall submit conceptual plan for the dewatering system prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan and certification of this shall be provided by the Geotechnical Engineer. The dewatering system shall be designed by a firm who regularly engages in the design of dewatering systems and who is fully experienced, reputable and qualified in the design of such dewatering systems.
B. The dewatering of any excavation areas and the disposal of the water shall be in strict accordance with the latest revision of all local and state government rules and regulations.
C. Permits: The Contractor shall obtain and pay respective fees for all local, state, and federal permits (including the Orange County, St. Johns River Water Management District, and/or South Florida Management District discharge permits) required for the withdrawal, treatment and disposal/discharge of water from the dewatering operation, prior to start of work.
D. Comply with Florida Administrative Code, Chapter 62-621.300 (2).

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the County for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
B. In accordance with FAC 62-621.300(2), submit analytical test results from a certified laboratory for the parameters listed in the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" to the FDEP and the County. The submitted information shall show the location of the work, where the water will be going to, as well as an estimate for the amount, rate and duration of discharge
being proposed.
C. Provide notification to all jurisdictional permitting agencies in accordance with the requirements of the respective agency.
D. Provide a detailed plan and operation schedule for dewatering of excavations.
   1. Provide descriptive literature of the dewatering system.
   2. Provide a plan for erosion and sedimentation control during dewatering.
   3. Provide copies of all permits/approvals for disposal/discharge of water during dewatering.

2.01 GENERAL

A. The Contractor shall have on-site and available the analytical test results performed in accordance with the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" (FAC 62-621.300(2)).
B. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate within the excavation.
C. The Contractor's attention is directed to the water surface elevations discussed in the report(s) on subsurface investigations. Water levels will normally vary from season to season.
D. The Contractor shall be required to monitor the performance of the dewatering system during the progress of the Work and make such modifications as may be required to assure that the systems will perform satisfactorily. The dewatering system shall be designed in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the bottom of the trench or excavation.
E. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the County. Approval of the dewatering plan shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
F. If subsurface water is encountered, the Contractor shall utilize suitable equipment to adequately dewater the excavation. A well point system or other County acceptable dewatering method shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. Within and adjacent to residential areas and other areas as required by the County, engines driving dewatering pumps shall be equipped with residential type mufflers and the noise shall not exceed 55 decibels within 50-feet.

2.02 DEWATERING AND DISPOSAL

A. The Contractor shall construct and place all pipelines, structures, concrete work, structural fill, backfill and bedding material in-the-dry. In addition, the Contractor shall make the final 24-inches of excavation in-the-dry and not until the water level is a minimum of 2-foot below proposed bottom of excavation. For purposes of this Contract, in-the-dry is defined as ±2% of the optimum moisture content of the soil.
B. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of all water entering excavations. Contractor shall keep excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
C. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
D. It is expected that dewatering will be required for pre-drainage of the soils prior to final excavation for most of the in-ground structures or piping and for maintaining the

lowered groundwater level until construction has been completed so that the structure, pipeline or fill will not be floated or otherwise damaged.

E. If well points are used, Contractor shall adequately space well points to maintain the necessary dewatering. Provide suitable filter sand and/or other means to prevent pumping of fine sands and silts. A continual check shall be maintained by the Contractor to ensure that the subsurface soil is not being removed by the dewatering operations. Pumping from well points shall be continuous and standby pumps shall be provided.
F. The Contractor's proposed method of dewatering shall include groundwater observation wells to determine the water level during construction. Observation wells shall be installed along pipelines as required to verify depth to water level and at locations approved by the County.
G. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from the surface shall be collected in shallow
H. ditches around the perimeter of the excavation, drained to sumps, and pumped or drained by gravity to maintain an excavation bottom free from standing water.
I. Flotation shall be prevented by the Contractor by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible for all damages which may result from failure to adequately keep excavations dewatered.
J. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent properties or facilities. No water shall be discharged without appropriate treatment for adverse contaminants. No water shall be drained in work built or under construction without prior consent from the County. Water shall be filtered to remove sand and fine soil particles before disposal into any drainage system.
K. Dewatering of excavations shall be considered incidental to the construction of the Work and all costs shall be included in the various Contract prices in the Bid Form, unless a separate bid item has been established for dewatering.

3.03 GROUNDWATER TREATMENT (IF REQUIRED)

A. If concentrations of tested groundwater quality parameters exceed those allowable in the FDEP Generic Permit for the Discharge of Produced Groundwater from any Non-Contaminated Site Activity (62-621.300(2), F.A.C.), the Contractor shall treat the effluent.
B. The Contractor shall immediately notify the County and discuss the parameters that exceed allowable limits.
C. The Contractor shall meet with the FDEP to determine alternatives that are acceptable to the FDEP.
D. The Contractor shall apply for and obtain any and all permits and/or treatment approvals that FDEP requires including but not limited too:
    1. Generic Permit for Discharges from Petroleum Contaminated Sites (62-621.300(1)). Allows discharges from sites with automotive gasoline, aviation gasoline, jet fuel, or diesel fuel contamination; or
    2. Permit for all Other Contaminated Sites (62-04; 62-302; 62-620 & 62-660). The coverage is available only through the individual NPDES permit issued by FDEP, allows discharges from sites with general contaminant issues i.e. ground water and/or soil contamination other than petroleum fuel contamination; or

3. Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity (62-621.300(2), F.A.C.); or
4. Generic Permit for Stormwater Discharge from Large or Small Construction Activities (62-621.300(4)(a), F.A.C.); or
5. An Individual Wastewater Permit (62-604.300(8) (a)

E. The Contractor shall implement the appropriate treatment that is acceptable to FDEP and County to attain compliance for all excess limits encountered during dewatering activities. Treatment may include, but is not limited to: Chemical, Biological, Electrolysis or any combination of the three.

F. The Contractor shall make every effort to minimize the spread of contamination into uncontaminated areas. Provide for the health and safety of all workers at the job site and make provisions necessary for the health and safety of the public that may be exposed to any potentially hazardous conditions. Ensure provision adhere to all applicable laws, rules or regulations covering hazardous conditions and will be in a manner commensurate with the level of severity of the conditions.

G. If necessary, provide contamination assessment and remediation personnel to handle site assessment, determine the course of action necessary for site security and perform the necessary steps under applicable laws, rules and regulations for additional assessment and/or remediation work to resolve the contaminations issue.

H. Delineate the contamination area(s) and any staging or holding area required and develop a work plan that will provide the schedule of projected completion dates for the final resolution of the contamination issue.

I. Maintain jurisdiction over activities inside any delineated contamination areas and any associated staging or holding areas. Be responsible for the health and safety of workers within the delineated areas. Provide continuous access to representatives of regulatory or enforcement agencies having jurisdiction.

2.04 REMOVAL

Immediately upon completion of the dewatering system, the Contractor shall remove all of his equipment, materials, and supplies from the site of the Work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started. The site shall be thoroughly cleaned and approved by the County.

END OF SECTION

SECTION 02605

PRECAST STRUCTURES AND ACCESSORIES

PART 1 GENERAL

1.01 Section Includes

A. Precast sanitary manhole structures

B. Pump Station Wet Wells and Vaults

C. Precast structure grates, access covers, and accessories

D. Precast structure linings and coatings

1.02 Related Sections

A. Section 02320 - Trenching, Bedding, and Backfilling

B. Section 09871 - Interior Protective Lining for Concrete Structures

1.03 References

American Society for Testing and Materials (ASTM) latest edition:

A. A48 - Gray Iron Castings

B. A185 - Steel Welded Wire Reinforcement, Plain, for Concrete

C. C216 - Facing Brick

D. C270 - Mortar for Unit Masonry

E. C478 - Precast Reinforced Concrete Manhole Sections

1.04 Submittals

A. All gratings and castings

B. Precast structures

C. Coatings and Linings for precast structures

D. Connections to precast structures

PART 2 PRODUCTS

2.01 General

A. Concrete shall have minimum 4000 psi compressive strength.

B. A crystalline waterproofing admixture shall be added during the mixing cycle of concrete for the wet well, valve vault and manhole pre-cast structures in accordance with the manufacturer's recommendation. The admixture shall be Xypex Admix C-1000-R with red dye, Kryton KIM or an acceptable equal.

C. Welded wire fabric shall conform to ASTM A185. Use 4 x 4 - W4 x W4 welded wire fabric unless otherwise indicated.

D. Integrally cast steps within precast structures are not allowed.

E. The date of manufacture and the name or trademark of manufacturer shall be clearly marked on each precast section.

2.02 Bases

A. Bases shall be one-piece precast base sections consisting of integrally cast slab, bottom ring section and concrete flow channels. Base sections shall have integral inverts with gaskets to match the pipe. The Contractor shall be responsible for determining all invert angles. Provide outlet stubs with joints to match the pipe.

B. If angles are such that a one-piece base section is not feasible, separate base, ring and flow channel may be used if approved by the Engineer.

2.03 Risers

A. Risers shall be precast reinforced concrete per ASTM C478, manufactured using sulfate resistant cement (ASTM C150, Type II).

B. Risers shall be 48 inch diameter unless otherwise indicated and shall have a minimum wall thickness of 5 inches.

C. Gaskets for seating precast sections shall be cold adhesive preformed plastic gaskets conforming to FDOT Specification 942-2.

2.04 Cones and Tops

Unless otherwise indicated, cone top sections shall be precast, eccentric type with 24 inch diameter top opening slab tops with eccentric 24 inch diameter opening, unless otherwise indicated.

2.05 Pump Station Wet Well – Not Used

2.06 Pump Station Valve Vault – Not Used

2.07 Manhole Frames and Lids

A. Frames and covers shall be gray iron per ASTM A48, Class 30B and shall be US Foundry Type 227AS, traffic bearing (AASHTO H-20 loading), unless otherwise noted in the Drawings. Raised lettering on covers shall be "SEWER", or as detailed on the drawings.

B. Castings shall be smooth, clean and free from blisters, blowholes, shrinkage.

2.08 Catch Basin Inlets, Frames, and Grates - Not Used

2.09 Sanitary Manhole Coatings and Finishes

A. Interior of manholes which receive force main discharge - integrally attached interior liner, full height, as specified in Section 09871 - Interior Protective Lining for Concrete Structures and "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

PART 3 EXECUTION

3.01 Manhole, Inlet and Wet Well Installation

A. Install required bedding.

B. Install base to proper elevation and alignment. Handle precast sections by lift rings only. Remove lift rings and fill all holes with non-shrink grout after erection.

C. Pour invert immediately after setting first section of barrel.

D. Prior to setting subsequent barrel sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer's recommendations. Add additional material on exterior joint if necessary for watertight joint.

E. Apply coatings and liners as required.

F. Backfill in accordance with Section 02320.

3.02 Installation of Castings

A. Manhole castings to be fully embedded in mortar with adjustment brick courses placed between the frame and manhole, minimum of 2 courses, maximum of 4 courses. Mortar shall conform to ASTM C270, type M, brick to conform to ASTM C216, grade SW, size 3 ½" (w) x 8" 9L) x 2 ¼" (h).

B. Top of manhole castings in paved areas, including driveways and sidewalks to be flush with grade. Top of manhole castings outside paved areas to be 2 inches above grade, unless otherwise noted on the Drawings.

3.03 Channels

Manhole flow channels shall be smooth with carefully shaped bottoms, built up sides and benching constructed using cement and brick with no voids. Channels shall conform to the dimension of the adjacent pipe and provide changes in size, grade, and alignment evenly. Cement shall be Portland

Cement Type II only.

3.04 Pipe Connections

Special care shall be taken to see that the openings through which pipes enter the structure are provided with watertight connections. For ductile iron and PVC pipe, connections shall conform to ASTM C 923, "Standard Specifications for Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes."

3.05 Cleaning

All newly constructed manholes shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind shall be free from such accumulations at the time of final inspection.

END OF SECTION

SECTION 02660
POTABLE WATER SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of Work: Provide a complete system for water transmission/distribution pressure piping and appurtenant items.

1.2 QUALITY ASSURANCE

A. Design Requirements
   1. Piping shall be laid with a minimum cover of 36-inches below finished grade for mains sized 12-inch and below and a minimum cover of 48-inches for mains sized 16-inch and greater. Pipe located within Local roadways (subdivisions) or within an easement, shall be laid with a minimum cover of 30-inches.
   2. Pipelines shall be constructed of the materials indicated in this specification and on the Drawings.

B. Pipe Inspection:
   1. The Contractor shall obtain a certificate of inspection from the pipe manufacturer stating that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications.
   2. The entire product of any plant may be rejected when, in the opinion of the County, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.
   3. All pipe and fittings shall be subjected to a visual inspection at the time of delivery and before being lowered into the trench. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.
   4. The County reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

C. Prevention of electrolysis is required in accordance with AWWA C105 and when crossing, or adjacent to, a power easement, gas easements, any location where induced currents may be present, in areas where aggressive soils exist, and where shown on Drawings. Electrolytic action through the contact of dissimilar metals shall be prevented by either:

1. The separation of one material from the other by means of an insulating or dielectric coupling (polyethylene wrap), or
2. The use of alternative materials, as directed by the County.

1.3 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the County for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
   1. Mill test certificates or certified test reports on pipe
   2. Details of restrained and flexible joints
   3. Detailed laying schedule for pipe
   4. Valves and valve boxes

1.4 JOB CONDITIONS

A. Water in Excavation
   1. Dewatering shall be in accordance with. Section 02140 "Dewatering." Water shall not be allowed in the trenches while the pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the County. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working.
   2. In no case shall the pipelines being installed be used as drains. The ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment.
   3. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the Work any such material has entered the pipelines, it must be cleaned as directed by the County so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.1 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.2 MATERIALS

A. Pipe, Fittings, Valves, and Ancillary Equipment shall be installed as shown on the Drawings and as specified in Division 15.

B. Additional Work: Additional items of construction, necessary for the complete installation of the systems, shall conform to specific details shown on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these specifications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Bedding:

1. Pipe Cradle: Upon satisfactory installation of the pipe bedding material as specified in Section 02220 "Excavating, Backfilling and Compacting", a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.
2. Cleanliness: The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying operations by means of plugs or other methods approved by the County. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

3.2 INSTALLATION

A. Pipe Identification/Location

1. All PVC water mains shall be solid blue. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use.
2. All ductile iron water mains shall be color coded blue with tape. The tape (minimum 2- inches) shall be permanently affixed to the top and each side of the pipe (3 locations parallel to the axis of the pipe). For pipes less than 24-inches in diameter, a single tape may be used along the top of the pipe.
3. All HDPE water mains shall be a solid blue or black with 4 co-extruded equally spaced blue stripes of the same material as the pipe. Stripes painted on the pipe outside surface shall not be acceptable.
4. If main is located over 30-feet from the edge of the pavement or in an easement, the Contractor shall install 4-inch diameter schedule 80 PVC utility pipe line markers over the pipe alignment at 1,000-feet intervals, at all valves, and at all locations where fittings deflect the pipe alignment in the horizontal plane. Utility pipeline markers shall include a decal and shall be colored blue for water service.
5. All mains (PVC, HDPE, and DI) shall be installed with a continuous, insulated 10- gauge copper wire installed directly above the pipe for location purposes. Locate wire shall terminate in a test station box and be capable of extending 12-inches above the top of the box. Directionally drilled pipe shall be installed with 2 insulated 10-gauge copper wires.

B. Pipe: The color stripe and pipe text shall be located on the top of the pipe when installed. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.
   1. Gradient: Pipe shall be laid straight and depth of cover shall vary to provide uniform gradient or slope to pipe, whether grading is completed or proposed at time of pipe installation. When a grade or slope is shown on the Drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade.
   2. Pipe Joint Deflection
      a. Ductile Iron Pipe: Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed 75% of the maximum limits as shown in AWWA Standard C600 for ductile iron pipe.
      b. PVC Pipe: Joint deflection or pipe bending shall not be permitted. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.
   3. Rejects: Any pipe found defective shall be immediately removed and replaced with sound pipe at the Contractor's expense.
   4. Joint Compounds: No sulfur base joint compound shall be used.
   5. Thrust restraints shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein. Restraining devices shall be specified in Sections 15062 "Ductile Iron Pipe and Fittings" and 15064 "Polyvinyl Chlorine (PVC) Pipe and Fittings", respectfully.

C. Installing Valves and Boxes
   1. Valves: Valves shall be carefully inspected, fully opened, and then tightly closed and the various nuts and bolts shall be tested for tightness. Any valve that does not operate correctly shall be removed and replaced.
   2. Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the valves so as to permit a valve key to be fitted easily to the operating nut. In unpaved areas, valve boxes shall be set to conform to the level of the finished surface and held in position by a concrete collar placed under the support flange as shown on the Drawings. The letter "V" shall be etched in the curb at each valve location. The valve box shall not transmit surface loads to the pipe or valve but be supported by bedding rock as shown on the Drawings. Extensions or risers for valve boxes shall be an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in extending the box to its proper height. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.
   3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or collar as shown in the Drawings.

4. Identification Disc: Each 16-inch or larger valve (unless otherwise shown on the Drawings) installed shall be identified by a 3-inch diameter bronze disc anchored in the concrete pad or collar in unimproved areas and/or anchored on a 4-inch by 4-inch by 18-inch long concrete post set flush with the pavement surface in improved areas. The disc shall be stamped with the following information as shown on the Drawings:
   a. Size of the valve
   b. Type of valve
   c. Service
   d. Direction and number of turns to open

D. Concrete Encasement
   1. Concrete encasement shall be constructed in accordance with details shown on the Drawings and shall be constructed of Class C concrete. Encasement shall be constructed where;
   a. Indicated on the Drawings
   b. The County orders the pipe encased
   2. The points of beginning and ending of pipe encasement shall be not more than 6- inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.

E. Flush Out Connections: Flush out connections shall be installed at the locations as determined by the County and be full pipe size.

F. Service Connections: Service connections shall be installed at the locations determined by the County and in the manner shown on the Drawings. No service line shall terminate under a driveway.

G. Backfilling: Backfilling shall be in accordance with Section 02220 "Excavating, Backfilling and Compacting" of these specifications.

3.3 CLEANING

A. General: At the conclusion of the Work, the Contractor shall thoroughly clean the new pipelines by flushing with water or other means to remove all dirt, stones, or other material which may have entered the line during the construction period. Flushing is permitted for pipes less than or equal to 12-inch diameter.

B. Correction of Non-Conforming Work: All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the County. Non-conforming work shall be defined as failure to adhere to any specific or implied directive of this Project Manual and/or the Drawings, including but not limited to pipe not laid straight, true to the lines and grades as shown on the Drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, visible or detectable leakage, or failure to pass any specified test or inspection.

3.4 FIELD QUALITY CONTROL

A. Flushing

1. All pipelines less than or equal to 12-inches shall be flushed to remove all sand and other foreign matter. After initial slow-fill, pipe shall sit full for 24-hours to facilitate cleaning and collection of debris from interior of pipe. Flushing shall be accomplished through full pipe size connections at full pipe depth. The velocity of the flushing water shall be at least 2.5-feet per second. Flushing shall be terminated at the direction of the County. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. The Contractor shall arrange with the County and pay for the source of flushing water.
2. In lieu of flushing, new water mains may be hydraulically or pneumatically cleaned with a polypropylene swabbing device in accordance with "Orange County Utilities Standards and Construction Specifications Manual."
   a. The Contractor is responsible to provide temporary access and egress points.
   b. Passage of the cleaning swabs through the system shall be constantly monitored, controlled, and all poly swabs entered into the system shall be individually marked and identified.
   c. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test.
   d. The Contractor is responsible for collection of debris, water, and the swab. Considerations shall be made for protecting surrounding property and personnel.
   e. Swabbing speed shall range between 2 and 5-feet per second.

B. Pressure and Leakage Tests of Pressure Piping

1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all pressure piping. Tests shall be made between valves and shall not exceed 2,000-feet. Each side of all valves shall be pressure tested. Multiple sections of main may be tested simultaneously providing there are non-pressurized sections in between each pressure-tested section.
2. Standard: AWWA C600, Section 4, with the exceptions required herein and the exception that the Contractor shall furnish all gauges, meters, pressure pumps, and other equipment needed to test the lines.
3. Hydrostatic Pressure Test
   a. Test Pressure: Pressure test at 50% above the normal working pressure, but not less than 150-psi, unless otherwise noted on the Drawings.
   b. Test Duration: Duration is 2-hours. If during the test, the integrity of the tested line is in question, the County may require a 6-hour pressure test.
   c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser, and angle globe valves shall be provided at each dead-end to bleed air from the line.
4. Hydrostatic Leakage Test
   a. General: Following the pressure test, the Contractor shall perform the leakage test. The line shall be filled with water and all air removed for the test. The Contractor shall provide a pump to maintain the test pressure for the entire test period.
   b. Test Pressure: Maximum operating pressure as determined by the County but not less than 150-psi unless otherwise noted.
   c. Test duration: 2-hours.

d. Allowable leakage: $L = \frac{SD(P)0.5}{148,000}$

L = Allowable leakage (gallons per hour)
S = Length of pipe tested (feet)
D = Nominal diameter of pipe (inches)
P = Average test pressure maintained (psig)

e. Visible Leakage: All leaks evident at the surface shall be repaired and leakage eliminated regardless of the measured total leakage.
f. Leakage Measurement: The amount of water required to maintain the test pressure is the leakage.

C. Wire Continuity Check: The Contractor shall perform a continuity check of the 10-gauge locating wire for the entire length of the main by performing a continuity test at each valve test station box.

3.5 DISINFECTING POTABLE WATER PIPELINES

A. General: Before being placed in service, all potable water pipelines shall be disinfected by chlorination. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required. The disinfection procedure shall be approved by the County.

B. Standard: AWWA 651, "Standard Procedures for Disinfecting Water Mains."

C. Procedure
1. Flush all dirty or discolored water from the line and introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line.
2. The chlorine solution shall remain in the pipeline for 24-hours.
3. Following the chlorination period, all treated water shall be flushed from the line and replaced with water from the distribution system.
4. Bacteriological sampling and analysis shall be made in full accordance with AWWA Manual C651 and the appropriate FDEP permit. If necessary, the Contractor will be required to re-chlorinate.
5. Sampling and analysis shall be done by the County.

D. Approval: The line shall not be placed in service until the requirements of the State and County Public Health Department are met and the bacteriological test results are approved by the Department of Environmental Protection.

3.6 CONNECTION TO EXISTING SYSTEM

A. All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the County. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the County. The cost of the Work in making the connections shall be paid for by the Contractor.

B. In the event the proposed main is to be connected to a main which has one or more active services between the point of connection and the first existing line valve, a temporary plug or cap shall be installed on the new main until the pressure tests and disinfecting are completed. Upon satisfactory completion, the cap or plug shall be removed from both mains and the connection made with pipe which has been swabbed out with a solution of chlorine and water. The connection shall be made as swiftly as possible and any water in the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in service by the County's personnel.

C. In the event any existing users will be without water while a connection is being made, the Contractor shall notify the County 72-hours prior to disconnection. The County shall notify the affected user(s) when the water will be turned off and when the service is estimated to be resumed. In some instances, these connections may have to be made at night. No user shall be without water service for more than 3-hours.

3.7 SUPPLIER'S FIELD SERVICE:

A. The Contractor shall, at no additional cost to the County, arrange for a pipe supplier's field representative to be on-site to provide instruction to each crew working on the installation for a minimum of 4 push-on joints (PVC, DIP). The supplier's field representative shall certify that the installations observed were satisfactorily completed and all pipe installation crews were familiar with the proper methods and procedures for the pipeline installations.

3.8 WATER FOR USE IN FLUSHING, TESTING, AND DISINFECTION:

A. The Contractor shall arrange with the County for water required for pressure testing, flushing, and disinfection required by the Contractor. The Contractor shall provide meter and backflow preventer.

END OF SECTION

SECTION 02670

PRESSURE MAIN SAMPLE COLLECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. SCOPE:

Where an existing pressure main is being tapped, connected to a new constructed main, or being prepared for abandonment, a pipe sample shall be collected in order for the County to perform a condition assessment of the pipe. This section specifies the procedures for collecting pipe samples and does not address the work involved in the tapping, the repair, or the actual abandonment of the pipeline.

B. GENERAL SAMPLE REQUIREMENTS:

The pipe samples shall be taken from all existing pipe connections or abandoned pipe that is ductile iron pipe, cast iron pipe, asbestos cement pipe, and prestressed concrete cylinder pipe.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION

3.1 PIPE SAMPLE COLLECTION

Contractor shall be responsible for obtaining coupons or sections from pressure mains being tapped, removed, or abandoned, digital photos, and completing the Pressure Main Sample Collection Submittal Form (see Appendix B). As indicated on the drawings, the Contractor shall collect coupons taken from line-stop operations, line taps, dry connection, or from any other operations such as where the pipe will be disconnected, removed or abandoned.

A. The submittal requirements are not considered complete unless all of the requirements described below are complete for each sample of pipe.
   1. Complete the Pressure Main Sample Collection Submittal Form (see Appendix B)
   2. If applicable, note in the comments section of the form:
      a. The condition of the DIP external polyethylene wrap.
      b. Site observations relevant to work site of the sample (e.g. gas main in close proximity, AC pipe with areas of softness, etc.)
      c. Visually inspect the exposed asbestos cement pipe and note if there are areas of softness
   3. Pipe sample unique identification number as shown on the drawings:
      a. Shall be printed on a sturdy waxed tag affixed to each whole piece of pipe sample or legibly marked on the pipe sample with permanent marking pen.

b. Wet-tap samples shall have a legibly written ID number on the exterior side and top of the sample.
c. An additional digit will be added at the end to indicate where multiple samples were taken from a pipe with the same ID number.

4. Pipe sample requirements:
   a. Wet-taps from a tapping sleeve - the complete tapping coupon
   b. Dry connection – 12" length of pipe
   c. Abandoned pipe – 12" length of pipe at the beginning and the end if applicable
   d. Pipe repair – 12" length of pipe that was cut from the existing pipe representative of damage or typical conditions.
5. GPS coordinates of where the sample was taken shall be noted on the Submittal Form
6. Provide digital photographs for the following views:
   a. Overall Work site
   b. Exposed pipe before tap or abandonment
   c. Sample exterior
   d. Close-up of the edge (thickness of pipe)
   e. All photos shall bear the unique sample ID number shown on the drawings, date, and time.

B. Prior to submitting a monthly pay request that includes payment for taps, connections, replacement or abandonment of pipe, the Contractor's requirements as specified herein shall be acceptable to the County.

END OF SECTION

SECTION 03300

CONCRETE

PART 1 GENERAL

1.01 Section Includes

General requirements for formwork, reinforcement, accessories and cast-in-place concrete.

1.02 References

A. American Concrete Institute (ACI) latest edition:

1. ACI 301 - Structural Concrete for Buildings
2. ACI 305 - Hot Weather Concreting
3. ACI 306 - Cold Weather Concreting
4. ACI 315 - Detailing Manual
5. ACI 318 - Building Code Requirements for Structural Concrete
6. ACI 347 - Formwork for Concrete

B. American Association of State Highway and Transportation Officials (AASHTO)latest edition:

AASHTO T152 - Air Content of Freshly Mixed Concrete by the Pressure Method

C. American Society for Testing and Materials (ASTM) latest edition:

1. ASTM A185 - Steel Welded Wire Fabric, Plain, for Reinforced Concrete
2. ASTM A615 - Deformed and Plain Billet Steel Bars
3. ASTM C31 - Making and Curing Concrete Test Specimens in the Field
4. ASTM C33 - Concrete Aggregates
5. ASTM C39 - Test Method for Compressive Strength
6. ASTM C94 - Ready-Mixed Concrete
7. ASTM C138 - Test Method for Unit Weight, Yield, and Air Content
8. ASTM C143 - Test Method for Slump of Hydraulic Cement Concrete
9. ASTM C150 - Portland Cement
10. ASTM C173 - Test Method for Air Content of Freshly Mixed Concrete (Volumetric Method)
11. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete (Pressure Method)
12. ASTM C260 - Air-Entraining Admixtures for Concrete
13. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete
14. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction

1.03 Submittals

A. Submit reinforcement steel shop drawings in accordance with Division 1, the General Conditions and prepared in accordance with ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures. Drawings shall indicate bending diagrams, shapes, dimensions, clearances, splicing and laps, accessories, and installation notes.

B. Submit manufacturer's literature for all admixtures proposed for the work.

C. Submit delivery tickets in accordance with ASTM C94 for each batch of ready mixed concrete. Information on the ticket shall include class of concrete, water content, time of loading, truck number, admixtures, and quantity.

D. At least 35 days prior to placing of concrete, the CONTRACTOR shall submit proposed mix proportions and samples of proposed materials.

1.04 Quality Control

A. Materials and methods of mixing and placing concrete shall conform to ACI 318, Building Code Requirements for Reinforced Concrete.

B. Tests for slump shall be made when directed by the ENGINEER in accordance with ASTM C143.

C. Air content tests shall be made, when directed by the ENGINEER, in accordance with ASTM C138, C173, C231, or AASHTO T-152.

PART 2 PRODUCTS

2.01 Formwork

Formwork lumber shall be straight and clean. All nails shall be withdrawn and surfaces in contact with concrete shall be thoroughly cleaned before reuse.

2.02 Reinforcement

A. Reinforcement bars shall be ASTM A615, Grade 60 deformed bars, except as otherwise indicated.

B. Smooth dowels shall be ASTM A615, Grade 60 plain bars.

C. Threaded dowels shall be ASTM A36.

D. Welded wire fabric shall conform to ASTM A185. Where welded wire fabric is shown but not sized on Drawings, use 6" x 6" x W2.9 x W2.9 WWF.

E. Accessories for proper installation of reinforcement shall conform to CRSI "Manual of Standard Practice for Reinforced Concrete Construction". Bar supports at exposed surfaces shall be Class C-Plastic Protected.

F. Reinforcement fabrication shall conform to ACI 315 and ACI 318, and approved shop drawings.

2.03 Joint Fillers

A. Joint fillers shall be products of the following manufacturers, or equal:

1. W. R. Meadows, Inc., Elgin, Illinois.

2. W. R. Grace and Co., Cambridge, Massachusetts.

B. Preformed bituminous fiber joint filler shall be non-extruding type conforming to ASTM D1751.

C. Control joint strips shall have a minimum depth of 25 percent of slab thickness and a minimum thickness of 1/8 inch.

2.04 Concrete Materials

A. Water shall be clean and potable.

B. Portland cement shall be ASTM C150 Type I, II or III.

C. Aggregate

1. Fine and coarse aggregate shall be clean, hard, natural, or manufactured material conforming to ASTM C33.

2. The nominal maximum size of the aggregate shall not be larger than three-fourths of the minimum clear spacing between individual reinforcing bars. Coordinate with maximum aggregate sizes specified hereafter for classes of concrete.

D. Admixtures

Admixtures shall conform to ASTM C260 (air entrainment) or C494 (water reduction) and shall be products of one of the following manufacturers, or equal.

1. Dewey and Almy Chemical Div., W. R. Grace and Co.

2. Euclid Chemical Co.

3. Master Builders Co.

4. Sika Chemical Corp

2.05 Miscellaneous Materials

A. Vapor barrier shall be polyethylene film 0.006 inches thick and shall conform to Product Standard PS-17.

B. Liquid Membrane Curing Compound

1. Membrane curing compound shall conform to ASTM C309, Type 1 or Type 2. Type 2 compound shall be used for Portland cement concrete pavement only. All permanently exposed exterior slabs shall receive clear acrylic curing and sealing compound. Moisture loss shall not be more than 0.055 gr./sq. cm when applied to 200 sq. ft./gal.

2. Products shall conform to the above and shall be products of one of the following manufacturers, or equal:

a. W.R. Meadows "Curettard"
b. Sonneborn-Contech "Sonsil"
c. Burke Co. "Res-Xnu"
d. Lambert Corp. "Gardseal"

C. Chemical Hardener

1. Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, conforming to Federal Specifications TT-C-800A and Corps of Engineers Specification CE 204.

2. Products shall conform to the above and shall be products of one of the following manufacturers, or equal:

a. Euclid Chemical Co. "Surfhard"
b. Sonneborn-Contech "Lapidolith"
c. Master Builders "Saniseal"
d. Lambert Corp. "Solidus"

2.06 Concrete Mixtures

A. Concrete not indicated otherwise shall be Class A concrete.

B. The proportions of cement, aggregate, and water shall be selected by the CONTRACTOR in accordance with ACI 318 to provide a plastic and workable mix. Coarse aggregate shall be limited to prevent harshness and honeycombing. Coarse aggregate size shall not be greater than the maxima listed for the various classes of concrete and as previously specified under aggregate.

C. Class A Concrete: Class A structural concrete shall have a 28-day strength of 4000 psi, shall contain not less than 540 pounds (5-3/4 bags) of cement per cubic yard of concrete, shall have a water-cement ratio of not more than 0.47 (5- 1/4 gallons per bag of cement), and shall contain 4 percent to 6 percent entrained air, by volume, except interior slabs subject to abrasion shall not contain more than 3 percent entrained air. In addition, Class A concrete shall contain a water-reducing, densifying admixture and have a maximum slump of 4 inches. The maximum aggregate size for slabs shall be 1 inch.

D. Class B Concrete: Class B lean concrete shall have a 28-day strength of 2500 psi, it shall contain not less than 420 pounds (4-1/2 bags) of cement per cubic yard of concrete, shall have a water-cement ratio of not more than 0.71 (8 gallons per bag of cement), and shall have a 5-inch maximum slump. The maximum aggregate size shall be 2 inches.

E. Admixtures
   1. Water-reducing densifying admixture added to Class A concrete shall reduce the water-cement ratio while maintaining slump and compressive strength. Use as manufacturer recommends.

   2. Other admixtures may be proposed by the CONTRACTOR or requested by the ENGINEER and shall be provided at no additional cost to the OWNER. Subject to approval, admixtures may be used for the following:

      a. To increase slump up to 50% while maintaining compressive strength and water-cement ratio.

      b. To retard set during hot weather.

   3. Calcium chloride, admixtures containing calcium chloride, or admixtures not approved, in writing by the ENGINEER, are prohibited.

PART 3 EXECUTION

3.01 General

A. Comply with ACI 305 or 306 for hot or cold weather concreting.

B. Do not mix salt, chemicals, or other foreign materials with the concrete to prevent freezing without approval of the ENGINEER. Maintain the temperature of concrete above 50 degrees F for 5 days after placement. When high early strength Portland cement concrete is used, the temperature shall not be less than 70 degrees F for 2 days or 50 degrees F for 3 days.

C. In no case shall the temperature of concrete exceed 90 degrees F at the time of placement.

3.02 Preparations

A. Coordinate with other trades and properly place and locate in position all necessary dowels, bolts, anchors, anchor slots, inserts, sleeves, openings, hangers, metal ties and other fastening devices required for attachment and support of adjacent work. Securely anchor all embedded items.

B. The subgrade and/or bedding shall be compacted and free of frost. If placement is allowed at temperatures below freezing, provide temporary heat and protection as required to remove all frost. Saturate the subgrade approximately 8 hours before placement and sprinkle ahead of the placement of concrete in areas where vapor barrier is not used. Remove all standing water, ice, mud, and foreign matter before concrete is deposited.

C. On porous subgrade or beddings, or where indicated on the Drawings, provide vapor barrier. Lay vapor barrier sheets with 6-inch edge laps and tape or seal with mastic. Stretch and weight edges and laps to maintain their positions until concrete is placed. Coordinate with placement of reinforcement.

3.03 Formwork Requirements

A. Formwork shall comply with ACI 347 and to shape, lines and dimensions as indicated on the Drawings. Forms shall be properly braced or tied to maintain position and shape under all dead and live loads and to prevent leakage. Forms shall be assembled so their removal will not damage the concrete. Tolerances for formed surfaces shall be in compliance with ACI 301.

B. Lumber formwork may be used for surfaces which will not be exposed to view. Use plywood or metal forms for exposed surfaces.

C. The inside surface of lumber forms shall be soaked with clean water prior to placing concrete. All other forms shall be treated with an approved form oil or lacquer. If oil is used, all excess oil shall be wiped off.

3.04 Reinforcement

A. The placement of reinforcing steel shall conform to "Placing Reinforcing Bars", as published by the Concrete Reinforcing Steel Institute except as noted.

B. Reinforcement shall be inspected and approved by the ENGINEER before enclosing forms are erected and shall be rechecked immediately prior to depositing concrete.

C. Splices, Laps, and Dowels

1. Provide continuous reinforcement or dowels through construction joints. One half of reinforcement shall be discontinued across control joints

unless otherwise indicated. All reinforcement shall be discontinued across expansion joints.

2. Splice laps shall be as indicated on the Drawings. Dowels shall be of the same size as the largest bar to which they lap, unless otherwise indicated.

3. Splices for horizontal wall reinforcement of circular tanks shall be staggered so that no more than each fifth bar in each face is spliced within any two feet of wall perimeter. Slab reinforcement splices for circular tanks shall be staggered as indicated on the Drawings. The minimum length of staggered lap splices in circular structures shall be as indicated on the Drawings.

D. Fabric Reinforcement for Slabs

1. Fabric reinforcement for slabs shall be overlapped at splices not less than the spacing of the cross wires plus 2 inches. Fabric shall extend to within 4 inches of concrete edges.

2. Unless otherwise shown, place reinforcement 2 to 3 inches below the top of the finished slab. Mesh shall either be sandwiched between two layers of fresh concrete or supported on mesh supports. Supports that may puncture the vapor barrier, if any, shall not be used.

E. Reinforcement for Formed Concrete

Secure steel reinforcement to maintain proper position during concrete placement. Concrete protection for reinforcement shall conform to ACI 318, except as otherwise indicated on the Drawings. The distance from the center of reinforcing bars to the opposite face of all structural slabs, walls, columns, or beams shall conform to ACI 318. The distance may be increased provided the required cover is maintained.

3.05 Joints

A. Provide construction joints with shear transfer keyways as indicated.

B. Tops of edge forms and screeds shall be set to the finished elevations and to provide uniform pitch to drains as indicated on Drawings.

C. For drives, pavements, parking areas, walks and slabs on grade, provide preformed non-extruding asphalt strip or bituminous fiber joint filler set 1/8-inch below finished surface unless otherwise indicated. Tool concrete edges on each side of joint. No sealant is required.

3.06 Batching

A. Materials for concrete shall be proportioned and batched according to the approved design mix.

B. Water shall be measured to within 1 pint of the total amount required per batch. Admixtures shall be measured by weight or volume to an accuracy of 3 percent.

3.07 Mixing and Transporting Concrete

A. Concrete shall be ready-mixed or job-mixed at the CONTRACTOR's option. Ready mixed concrete shall be mixed and delivered to the project in accordance with ASTM C94. Job-mixed concrete shall be in accordance with the requirements of ACI 318.

B. Concrete shall be in its final position within one hour after the water and aggregate have been added to the cement, except in cool weather (50`F or less).

C. Concrete shall be transported from the mixer to place of final deposit in such manner to prevent separation or loss of ingredients.

3.08 General Concrete Placement Schedule

All structural concrete..... Class A Concrete
Sidewalks ..... Class B Concrete

3.09 Depositing Concrete

A. Concrete shall be placed in accordance with the requirements of ACI 318 and within 10 feet of its final position. Place concrete only during normal working hours unless the ENGINEER is notified at least 24 hours in advance. Concrete shall not be placed until the ENGINEER has approved the formwork, reinforcement, and embedded items and debris has been removed.

B. Whenever new concrete is to be placed against existing surfaces, roughen and clean the surface to improve bond.

C. Depositing Slabs and Flatwork

1. Provide runways and chutes to discharge concrete close to final position to minimize spreading and segregation.

2. Place slabs-on-grade using formed construction joints. Maximum size of pour shall be 40 feet each way for slabs with wire mesh reinforcement and 75 feet each way for slabs with bar reinforcement. Allow 24 hours between pours of adjacent slabs. Provide joints as specified or shown. Set continuous joint strips between slabs and abutting vertical surfaces as indicated on the Drawings.

3.10 Finishing Slabs and Flatwork

A. Unless otherwise indicated, provide the following slab finishes:

Description	Concrete Finish
Class B concrete surfaces	Float
Submerged slabs	1 troweling
Exposed slabs	3 trowelings
Ramps and walks	Float & broom finish

B. Concrete Tolerances
   1. Concrete shall be within ¼-inch of a 10-foot straightedge in all directions except where slabs are dished for drains. Deviations from the elevation indicated shall not exceed ¼-inch.

   2. Slabs sloped for drainage shall not have depressions which retain water.

C. Screeding

   1. Immediately after placement, screed concrete with straightedges or power strike offs. Do not use roller screeds or vibrating screeds.

   2. Stakes for wet screeds shall be driven down flush with subgrade or pulled out as work progresses to avoid disturbing screeded concrete.

   3. For drains in level slabs, form a 5-foot diameter depression approximately ½-inch below the adjacent slab surface.

   4. Unless otherwise indicated on the Drawings, slabs sloped for drainage shall be uniformly pitched toward the drains at 1/8-inch per foot. Form a dished depression at drains unless otherwise indicated.

D. Immediately after screeding, darby surface with wood or magnesium darby to eliminate ridges and to fill in voids left by screeding.

E. Float Finish

   1. Float concrete using magnesium or aluminum hand floats or power floats after the concrete has stiffened to a point where only a ¼-inch indentation can be imparted by normal foot pressure.

   2. Float finish shall result in a uniform, smooth, granular texture. After floating, check slab tolerances with 10-foot straightedge. Fill low spots with fresh concrete; do not sprinkle with dry cement.

F. Trowel Finish
   1. Where scheduled, or indicated, trowel with steel trowels after floating.

   2. Initial troweling shall be done either by power or by hand with the trowel blade kept as flat as possible against concrete surface to prevent washboard or chatter effect.

   3. Second troweling may be done by power if three trowelings are scheduled. If two trowelings are specified, second troweling shall be done by hand.

   4. Third troweling shall be done by hand and shall continue until the concrete is consolidated to a uniform, smooth, dense surface free of trowel marks and irregularities.

   5. Allow sufficient time between successive trowelings to allow the concrete to become harder. Each successive troweling shall be done with trowels that are progressively smaller and are tipped more to increase compaction of the concrete surface.

G. Broom at right angles to direction of traffic to give a non-skid finish. Use a fine, soft-bristled broom for pedestrian ramps and walks, and a coarse, hard-bristled broom for vehicular pavement.

3.11 Control Joints

A. Control joints for non-structural slabs shall consist of partial depth plastic strips set flush with finished surface or 1/8-inch wide joints cut with a diamond saw. Control joints shall be one-quarter to one-third the depth of the slab unless otherwise indicated.

B. Saw joints as soon as concrete has hardened sufficiently so aggregate will not be dislodged but before shrinkage stresses develop cracks. Sawn joints shall be filled with joint sealant in accordance with Section 07900.

C. Unless otherwise indicated on the Drawings, spacing of control joints shall not exceed 25 feet in each direction.

3.12 Protection and Curing

A. Comply with ACI 305 and 306 for protecting and curing concrete in hot and cold weather. Fresh concrete shall be protected from rain, premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss for the period of time necessary for the hydration of the cement and proper hardening of the concrete. Cure all concrete for a

minimum period of 7 days (3 days for high early strength concrete) after placing.

B. Flatwork

1. Immediately after finishing, begin curing by covering with constantly saturated moisture retaining fabrics, impervious sheeting, or membrane curing compounds. Surfaces shall be thoroughly wetted with a fine spray before they are covered with sheeting.

2. Sheeting shall provide complete surface coverage with all joints lapped at least 4 inches and shall be placed and secured in a manner that will not mar or damage the concrete surface.

C. Membrane Curing Compounds

1. Apply compound hereinbefore specified in accordance with manufacturer's recommendations. Apply by spraying in a two-coat continuous operation. Apply the coats at right angles to each other with a coverage of 200 square feet per gallon per coat. Begin application not later than 4 hours after finishing of the surface. The application shall result in an uninterrupted adherent film free of defects.

2. On surfaces scheduled to receive sealants, paint, seamless flooring, or other adhesive bonded finishes, either the membrane curing compound shall be compatible with the bonding agent or the curing compound shall be removed with sandblasting, acid etching or grinding, to the satisfaction of the installer of the finish surfacing. Bonded surfaces that fail to adhere to the concrete shall be removed and replaced at no additional cost to the OWNER.

D. Concrete Floor Hardener

1. Apply hardener to floors of mechanical and electrical rooms and in other areas as required. Application shall be in strict accordance with the manufacturer's recommendations and as follows:

   a. Hardener shall be applied at original container consistency without dilution to dry, clean surfaces no sooner than 30 days following completion of curing. NOTE: Hardener shall not be applied over surfaces covered with membrane curing agent.

   b. Application shall generally be a three-coat process adjusted to accommodate extreme concrete densities only if prior review has been obtained from the Architect. Application coverage shall be made at the approximate rate of one gallon to 100 square feet.

   c. Apply first and second coats generously to surface, mop or squeegee standing water to leave a uniformly wet surface, allow to dry. Apply

third coat in a manner similar to first two, except that surplus must be scrubbed with stiff bristled broom and flushed from floor surface with clear water. Scrubbing and flushing shall remove all traces of effervescence. Remove excess water and allow to dry.

3.13 Defective Concrete

A. All concrete not formed as indicated on the Drawings within tolerances specified in ACI 347 shall be removed and replaced.

B. Temperature and shrinkage cracks which develop prior to final acceptance of the work shall be repaired.

3.14 Miscellaneous Concrete Work

Provide concrete equipment pads and supports as indicated and conforming to approved shop drawings. Fastening devices and accessories shall be located by templates or setting diagrams furnished by the manufacturer.

3.15 Clean-Up

A. All concrete floor construction shall have the surfaces thoroughly scrubbed and cleaned with clear water. After cleaning, the floors shall be protected until they are accepted.

B. Clean all surfaces affected by the Concrete Work. No extraneous concrete or discoloration shall be left on any construction.

3.16 Concrete Testing

A. Compressive Strength Tests: Conform to ASTM C31 and ASTM C39. One set of four cylinders for each 50 cu. yds, or fraction thereof, of each strength concrete placed in any one day. Test one specimens at seven days; test two specimens at 28 days. One specimen shall be retained for 56 days and tested only at the direction of the ENGINEER.

B. Slump Tests: Conform to ASTM C143. Perform one test for each load point of discharge and one for each set of compressive strength test specimens.

END OF SECTION

SECTION 15064
POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
PART 1 – GENERAL

1.01 DESCRIPTION

D. Scope of Work: Furnish all labor, materials, equipment and incidentals required and install and test all polyvinyl chloride (PVC) piping, fittings and appurtenances as shown on the Drawings and specified herein.

E. General Design: The equipment and materials specified herein are intended to be standard types of PVC pipe and ductile iron fittings for use in transporting wastewater, reclaimed water, and water.

1.02 QUALITY ASSURANCE

A. Qualifications: All of the PVC pipe and ductile iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

B. Standards:
1. AWWA C900/C905
2. ASTM D1784 / D1785 / D2241 / D2466 / D2564 / D2729 / D2774 /
3. D3034 / D3139 /D3212
4. NSF 14
5. UNI-B-1 through 5

C. Factory Tests: The manufacturer shall perform the factory tests described in Section 3 - AWWA C900/C905.

D. Quality Control:
1. The manufacturer shall establish the necessary quality control and inspection practice to ensure compliance with the referenced standards.
2. In addition to the manufacturer's quality control procedures, the County may select an independent testing laboratory to inspect the material at the production facility for compliance with these specifications. The County will pay for the cost of facility inspection requested by the County.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the County/Professional for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

B. Materials and Shop Drawings

C. Manufacturer's Certification
1. Submit sworn certification of factory tests and their results.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with the manufacturer's recommendations. PVC pipe shall be covered with black plastic with a minimum thickness of 15-mil. Joint gaskets shall be stored in a clean, dark and dry location until use.

B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage to the pipe or fittings and their respective coatings. Pipe or fittings shall not be rolled off the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All pipe or fittings shall be examined before installation and no piece shall be installed which is found to be defective. Pipe shall be handled to prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of County or it shall be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on level ground, graded to eliminate all rock points and to provide uniform support along the full pipe length. When being transported, the pipe shall be supported at all times in a manner to prevent distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of the County, is damaged beyond repair by the Contractor shall be removed from the site.

C. The Contractor shall be responsible for all materials furnished and stored until the date of project completion. The Contractor shall replace, at his expense, all materials found to be defective or damaged in handling or storage. The Contractor shall, if requested by the County, furnish certificates, affidavits of compliance, test reports, samples or check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

PART 2 – PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

A. Polyvinyl Chloride (PVC) Pipe
   1. Standards: AWWA C900/C905 and ASTM D1784/D3034/F679 (Gravity Sewer)

2. Compounds: Class 12454-A or Class 12454-B
3. PVC Gravity Pipe and Fittings: PVC gravity pipe (6-inch to 15-inch), shall conform
   to ASTM D3034, maximum SDR 35. PVC gravity pipe (18-inch to 36-inch), shall
   conform to ASTM F679 and uniform minimum "pipe stiffness" at 5% (percent)
   deflection shall be 46-psi. The joints shall be integral bell elastomeric gasket joints
   manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI
   Bell Plastic Pipe Association standard is UNI B.
4. PVC Pressure Pipe and Fittings: All PVC pipe of nominal diameter 4 to 12-inches
   shall be manufactured in accordance with AWWA Standard C900 and greater than
   12-inches shall be manufactured in accordance with AWWA Standard C905. The
   PVC pipe shall have a minimum working pressure rating of 100-psi and shall have a maximum dimension ratio of 18. Pipe shall be the same outside diameter as ductile iron pipe.
5. Dimension Ratio/Thickness: (unless otherwise shown on the Drawings)
   a. Raw Wastewater:
      (1) Pressure Systems: DR 18
      (2) Gravity Systems: DR 35 (ASTM D3034) or PS 46 (ASTM F679)
   b. Treated Wastewater: DR 18
   c. Reclaimed Water: DR 18
   d. Raw Water: DR 18
   e. Potable Water: DR 18
   f. Irrigation Piping: Schedule 40 or SDR 21
6. Joints:
   a. Push-on integral bell elastomeric gasket joints:
      (1) Standards: ASTM D3212/D3139/F477 and UNI-B-1
      (2) Gaskets:
         (1) Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) rieber type.
      (3) Pipe Markings: Pipes shall have a manufacturer's home-mark on the spigot. On field cut pipe, the Contractor shall provide home-mark on the spigot in accordance with manufacturer's recommendations. Solvent weld (nominal diameter less than 4-inches):

         (1) Standards: ASTM D2466/D2564
         (2) Type: Slip Fitting Socket (tapered)
         (3) Exclusions: Plastic saddle and flange joints will not be used.
   b. Restrained Joints:
      (1) Restrained joint devices shall be made specifically for PVC pipe and meet or exceed the requirements in ASTM F-1674.

(2) Manufacturers: Uni-flange mechanical joint restraints and bell restraints (for all sizes); Meg-a-lug system as manufactured by EBBA Iron (sizes 12-inches or less), or acceptable equal.
(3) Design pressure rating equal to or above test pressure as specified herein.

c. Pipe Length:
(1) Pressure systems: 20-feet maximum nominal length
(2) Gravity systems: 13-feet minimum nominal length

B. Fittings - Pressure Systems (nominal diameter 4-inches and greater):
a. Materials: Ductile iron
b. Joints: Mechanical Joint, Minimum 350-psi pressure rating
c. Gaskets:
a. Water and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type
b. Wastewater Service: Neoprene rubber ring type
d. Exclusions: Standard double bell couplings will not be acceptable where the pipe will slip completely through the coupling.
e. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron.
f. All fittings shall have a date code cast (not printed or labeled), with identification of
the date, factory and unit at which it was cast and machined. Fittings shall have
distinctly cast on them the pressure rating, nominal diameter of openings, manufacturer's name, the country where cast, and deflection angle. Ductile iron
fittings shall have the letters "DI" or "Ductile" cast on them.
g. All potable water main fittings shall have NSF certification and ISO 9001 certification for both the foundry and manufacturer. The NSF 61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for
potable water applications.
h. All ductile iron fittings shall have exterior coatings, including markings and colors, and interior linings.

C. Fittings - Pressure Systems (nominal diameter less than 4-inches)
1. Material: Polyvinyl Chloride (PVC)
2. Joints: Slip fitting tapered socket with solvent weld
3. Solvent: Sure Guard 12 or acceptable equal
4. Exclusions: Plastic saddle and flange joint fittings shall not be used

2.03 LOCATION MARKERS, LOCATION WIRE AND IDENTIFICATION MARKINGS

a. Lettering along top 90° (degrees) of pipe, minimum 3/4-inch in height with appropriate wording appearing 1 or more times every 21-inches along the entire length of the pipeline.
   (1) Raw Wastewater: Safety Green
   (2) Reclaimed Water: Purple (Pantone 522C)
   (3) Potable Water: Safety Blue

PART 3 – EXECUTION

3.01 INSTALLATION

A. Standards: AWWA C900/C905/UNI-B 3 and 4
B. Underground Polyvinyl Chloride (PVC) Pipe and Fittings
   1. Bedding: Firm, dry and even bearing of suitable material. Blocking under the pipe will not be permitted.
   2. Placement/Alignment:
      a. Installation shall be in accordance with lines and grades shown on the Drawings. For pressure systems, deflection of joints shall not exceed 75% of that recommended by the manufacturer.
      b. All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken or otherwise defective materials are being used. All homing marks shall be checked for the proper length so as to not allow a separation or over homing of connected pipe. Homing marks incorrectly marked on pipe shall result in rejection of pipe and removal from site. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
      c. Proper implements, tools and facilities shall be used for the safe and proper protection of the Work. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.
      d. Trench Dewatering and Drainage Control: Contractor shall prevent water from entering trench during excavation and pipe laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.
      e. Pipe Laying in Trench: Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and re-laid. Pigging of pipe may be used to remove foreign materials in lieu of flushing. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the County to ensure absolute cleanliness inside the pipe. The color stripe and pipe text shall be viewed from the top of pipe when installed. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

f. Locating Wire: Locating wire, for electronically locating pipe after it is buried, or installed by trenchless technology shall be attached along the length of and installed with the pipe. This is applicable to all sizes and types of pressure mains. At a minimum, the tracing wire is to be attached to the pipe with nylon wire ties. The wire itself shall be 10-gauge single strand solid core copper wire with nonmetallic insulation. The insulation shall be color coded for the type of pipe being installed. Continuous continuity must be maintained in the wire along the entire length of the pipe run. Permanent splices must be made in the length of the wire using wire connectors approved for underground applications as listed in the uniform electric code handbook. The coiled wire shall extend to a minimum of 12-inches above the surface and be connected to a test station box at valve locations.

g. PVC Pressure Pipe Installation and Training: PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL "Handbook of PVC Pipe", AWWA C605, and AWWA Manual M-23. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer. At no time shall the bell spigot end be allowed to go past the "insertion line" or "homing mark" for pressure pipe applications and homing mark shall be visible.

h. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc making a square cut. The end shall be beveled with a beveling tool, wood rasp or power sander to the same angle as provided on the factory-finished pipe. The insertion line on the spigot shall be remarked to the same dimensions as the factory-marked spigot.

i. All Contractor pipe crews utilizing PVC pressure pipe shall be trained on an annual basis by Uni-Bell in coordination with the County and attended by the manufacturer's representative of the respective approved Manufacturers in Appendix D "List of Approved Products." The Uni-Bell PVC training session will consist of proper handling, storage, installation, and compaction as well as County requirements regarding PVC pipe and deflection. Every person handling, installing or backfilling PVC pipe shall not be permitted to install County owned and / or maintained pipe without training.

j. Approved manufacturers representatives (Appendix D "List of Approved Products"), not present at the hosted Uni-Bell training session or individuals of pipe crews not in attendance shall be trained on every project site. On-site project training shall be for each manufacturer of pipe utilized on-site, per crew and per project. Specifically each crewmember shall be trained on every project by every pipe manufactures representative regardless of previous on-site training. Every person handling, installing or backfilling PVC pipe

shall not be permitted to install County owned and / or maintained pipe without training.

k. PVC Gravity Pipe Installation: Gravity sewer pipe shall be installed to the homing mark, no tolerance. Any noticeable separation shall be removed and reinstalled. The homing mark may be disregarded to meet the maximum of 1-inch separation between bell and spigot requirement.

l. Joint Placement
   (1) Push on joints: Pipe shall be laid with the bell ends facing upstream. The gasket shall be inserted and the joint surfaces cleaned and lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.
   (2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

C. Thrust Restraint
   1. Thrust restraint shall be accomplished by the use of mechanical restraining devices
      unless specifically identified otherwise on the Drawings or herein.
   2. Length of restrained joints shall be in accordance with the lengths listed in the table
      as shown on the Drawings.

D. Installation of Pipes on Curves:
   1. No joint deflection or pipe bending is allowed in PVC pipe. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.

3.02 CLEANING AND FIELD TESTING

A. At the conclusion of the Work, the Contractor shall provide all associated cleaning and field testing as specified in associated sections of these specifications.

END OF SECTION

APPENDIX 1

ORANGE COUNTY UTILITIES STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL, APPENDIX D – LIST OF APPROVED PRODUCTS

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Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Air Release	ARV Enclosure	**All ARV above ground enclosures shall be vented with tamper proof locking device**				
		Water Plus Polyethylene Enclosure	131632 H30-B	Blue 44" Tall	131632 H30-P	Pantone 44"
			171730 H40-B	Blue 30" Tall	171730 H40-P	Pantone 30"
		Hot Box Vent Guard Fiberglass Enclosure	AVG2036 Encl GP3232 Base	Blue 36" Tall	AVG2036 Encl GP3232 Base	Pantone 36" Tall
			AVG2041 Encl GP3232 Base	Blue 41" Tall	AVG2041 Encl GP3232 Base	Pantone 41" Tall
		Safety-Guard/Hydro Guard	15100 Encl	Blue 34" Tall	15100 Encl	Pantone 34" Tall
	Air Release Valves	**Air Release Valves shall be Combination Type, 316 SS**				
		ARI	D-040SS	Combination	D-040SS	Combination
		H-TEC	NA	NA	NA	NA
		Vent-O-Mat	Series RBX DN50	2"	Series RBX DN50	2"
	ARV Vault	**Air Release Valve Frame and Cover**				
		US Foundry	NA	NA	NA	NA
Blow Off	Auto Blow Off	**Automatic Blow Off Valve**				
		Hydro Guard	HG-1 Standard Unit	Automatic	NA	NA
	Blow Off Valve	**Blow Off Valve - Fits standard 5-1/4 inch Valve Box**				
		Kupferle Foundry Co	Truflo Series TF #550		Truflo Series TF #550	
		Water Plus Corp	The Hydrant Plus Series VB 2000B		The Hydrant Plus Series VB 2000B	
Casing Seals / Spacers	Casing End Seals	**Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.**				
		Advance Products	Model AC and AW		Model AC and AW	
		BWM Company	Model WR and PO		Model WR and PO	
		Cascade Water Works	Model CCES		Model CCES	
		CCI Pipeline	Model ESW and ESC		Model ESW and ESC	
		Pipeline Seal & Insulator, Inc (PSI)	Model C and W		Model C and W	
		Power Seal	Model 4810ES		Model 4810ES	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Casing Seals / Spacers	Casing spacer	**Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16 or greater , shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC iuterior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.**				
		Advance Products	SSI8 / SSI12		SSI8 / SSI12	
		BWM Company	BWM-SS-8 / SS-12		BWM-SS-8 / SS-12	
		Cascade Water Works	Series CCS 8" / 12"		Series CCS 8" / 12"	
		CCI Pipeline	Model CCS8 / CSS12		Model CCS8 / CSS12	
		Pipeline Seal & Insulator, Inc (PSI)	Series S8G-2 / S12G-2		Series S8G-2 / S12G-2	
Coatings	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenauces - System 1 Zinc / Urethane / Fluoropolymer application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**				
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
			Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils
	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 2 Zinc / Epoxy / Urethane application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**				
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
		PPG / Ameron	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils
			Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils
			Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Fittings	Fittings	**Ductile Iron Fittings C153 SSB / C110 FLG: (Water & Reclaimed Water fittings shall cement lined or holiday free fusion bonded epoxy lined) (Wastewater fittings interior shall he Protecto 401 and holiday free)**				
		American	30" & up	FBE / Cement	30" & up	FBE / Cement
		Sigma		FBE / Cement		FBE / Cement
		Star		FBE / Cement		FBE / Cement
		Tyler Union & Clow		FBE / Cement		FBE / Cement
Flow	Flow Meter	**Flow Meters With Replaceable Sensors**				
		EMCO	NA	NA	NA	NA
Hydrants	Hydrants	**Hydrants Shall open left, 1-1/2 Pentagon operating nut, NST hose & pumper thread, rotate 360 degrees, closed drains, epoxy on shoe in & out and 304 SS nuts & bolts below ground.**				
		American Flow Control	B-84-B (6 inch)		NA	NA
		Clow	Medallion 2545		NA	NA
		Mueller	Super Centurion 250		NA	NA
Joint Restraints	Ductile iron pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances.**				
		EBAA Iron Inc	Megalug Series 1100		Megalug Series 1100	
		Ford / Uni-Flange	UFR-1400		UFR-1400	
		Sigma	OneLok Series SLD/SLDE		OneLok Series SLD/SLDE	
		Smith Blair	Cam Lok Series 111		Cam Lok Series 111	
		Star	Star Grip Series 3000		Star Grip Series 3000	
		Tyler Union	TufGrip Series TLD		TufGrip Series TLD	
	DIP Bell Joint Restraints (4"-12") (New & Existing)	**Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM)**				
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390C		Uni-Flange Series 1390C	
		Sigma	PV-Lok Series PWP-C		PV-Lok Series PWP-C	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165	
		Star	StarGrip Series 3100S		StarGrip Series 3100S	
		Tyler Union	TufGrip-Series 300C		TufGrip-Series 300C	
	DIP Bell Joint Restraints (16" & Greater)	**Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water & reclaimed water piping 16" and greater shall have restraint gaskets or locking bells.**				
		EBAA Iron Inc	Series 1100HD	Existing Only	Series 1100HD	Existing Only
		Sigma	Series SSLDH	Existing Only	Series SSLDH	Existing Only
		Star	Series 3100S	Existing Only	Series 3100S	Existing Only

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Sewer Model #	Sewer Comments
Joint Restraints	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	**Bell Joint Restraiut Gaskets and Locking Bell (4" & Above) Stainless Steel locking wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.**						
		American	Fast Grip Gasket	Gasket	Fast Grip Gasket	Gasket	NA	NA
			Flex-Ring Joint	Bell Lock	Flex-Ring Joint	Bell Lock	NA	NA
			Lok-Ring Joint	Bell Lock	Lok-Ring Joint	Bell Lock	NA	NA
		Griffin	Talon RJ Gasket	Gasket	Talon RJ Gasket	Gasket	NA	NA
			Snap-Lok	Bell Lock	Snap-Lok	Bell Lock	NA	NA
		McWane Inc. DI Pipe Group	Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	NA	NA
			Thrust-Lock	Bell Lock	Thrust-Lock	Bell Lock	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			Super-Lock	Bell Lock	Super-Lock	Bell Lock	NA	NA
		US Pipe	Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	NA	NA
			Field Lok Gasket	Gasket	Field Lok Gasket	Gasket	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			HP Lok Restraint Joint	Bell Lock	HP Lok Restraint Joint	Bell Lock	NA	NA
	SS to DIP Transition Restraint	**SS to DIP Transition Restraint -Flanged stainless steel pipe from Wetwell to Valve box restrained joint transition (epoxy coated, SS hardware) Flg x PE RJ.**						
		EBAA Iron Inc	NA	NA	NA	NA	NA	NA
		Sigma	NA	NA	NA	NA	NA	NA
		Smith Blair	NA	NA	NA	NA	NA	NA
	PVC Pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances.**						
		EBAA Iron Inc	Mega-lug Series 2000PV		Mega-lug Series 2000PV			
			NA	NA	NA	NA		
		Ford / Uni-Flange	UFR 1500 Series		UFR 1500 Series			
		Sigma	One Lok Series SLC/SLCE		One Lok Series SLC/SLCE			
		Smith Blair	Cam Lok Series 120		Cam Lok Series 120			
		Star	Star Grip Series 4000		Star Grip Series 4000			
		Tyler Union	TufGrip Series TLP		TufGrip Series TLP			
	PVC Bell Joint Restraints (4" - 12") (New & Existing)	**PVC Bell Joint Restraints: PVC pipe Split Serrated on Bell End and Spigot End. (4" - 12") (New & Existing)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD			
		Ford / Uni-Flange	Uni-Flange Series 1390		Uni-Flange Series 1390			
		Sigma	PV-Lok Series PWP		PV-Lok Series PWP			
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165			
		Star	Series 1100C		Series 1100C			
		Tyler Union	TufGrip 300C		TufGrip 300C			

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	PVC Bell Joint Restraints (16" & Greater)	**PVC Bell Joint Restraints: (16" & Greater) PVC pipe Split Serrated on Bell End and Spigot End. Water & Reclaimed Water Existing pipe only. Wastewater shall be new and existing pipe.**						
		Ford / Uni-Flange	Series 1390	Existing Only	Series 1390	Existing Only	Series 1390	
		JCM	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	
		Sigma	PV-Lok PWP	Existing Only	PV-Lok PWP	Existing Only	PV-Lok PWP	
		Smith Blair	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	
		Star	Series 1100C	Existing Only	Series 1100C	Existing Only	Series 1100C	
Pipe	PVC C900 DR 18 Bell & Spigot (4" - 12")	**C900 Bell & Spigot PVC Pipe: 4 to 12-inch - AWWA C-900, Minimum DR18 for Water, Reclaimed and Wastewater. DR14 for Fire Lines. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 4" to 12"	Certa-Lok C900/RJ	Blue	Certa-Lok C900/RJ	Pantone Purple	Certa-Lok C900/RJ	Green
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C-900 Blue Brute	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura- Blue	Blue	C-900	Pantone Purple	C-900 Pipe	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
	PVC C905 DR 18 Bell & Spigot 16" and Larger	**C905 Bell & Spigot PVC Pipe 16" and Larger: AWWA C-905, Minimum DR18 for all Force Mains up to 24". Minimum DR21/DR25 for 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 16"	NA	NA	NA	NA	Certa-Lok C905 RJ	NA
		Diamond Plastics Corp	NA	NA	NA	NA	Truss-21 DR 18	Green
		Ipex Inc	NA	NA	NA	NA	IPEX Centurion	Green
		JM Eagle	NA	NA	NA	NA	C905 Big Blue	Green
		National Pipe & Plastics Inc	NA	NA	NA	NA	C905	Green
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	C905 Big Blue	Green
	HDPE C906 DR11	**HDPE Pipe DR11 AWWA C906 shall be Ductile Iron Pipe Size, PE 3408/3608/4710 DIPS manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901,AWWA C906. Compression type connections are not acceptable in new installations. Pipe joints shall be butt fusion or electro-fusion with flange or adapter. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code. Manufacturers shall be members in good standing with PPI to maintain approval status.**						
		JM Eagle	HDPE	DR11 Blue	HDPE	DR11 Pantone	HDPE	DR11 Green
		Performance Pipe(Chevron)	Driscoplex 4000	DR11 Blue	Driscoplex 4000	DR11 Pantone	Driscoplex 4000	DR11 Green
		PolyPipe, Inc.	EHMW Poly Pipe	DR11 Blue	EHMW	DR11 Pantone	EHMW	DR11 Green

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Pipe	Ductile Iron Pipe	**Ductile iron/Cast iron: (4" to 12" = Class 350, I6" to 24" - Class 250, 30" to 64" = Class 200). Water and Reclaimed water shall be cement lined. Wastewater Piping shall be Protecto 401 and Holiday Free. Exterior coatings as specified. Wastewater DIP piping shall be for pump station piping only. Manufacturers shall be members in good standing with DIPRA to maintain approval status.**				
		American	Cement Lined	Blue	Cement Lined	Pantone Purple
		Griffin	Cement Lined	Blue	Cement Lined	Pantone Purple
		McWane Inc. DI Pipe Group	Cement Lined	Blue	Cement Lined	Pantone Purple
		US Pipe	Cement Lined	Blue	Cement Lined	Pantone Purple
Sample	Sample Station	**Sample Stations - Bacteriological Sample Station with built in flush system, all internal piping to be 2", brass and includes lockable green enclosures.**				
		Safety-Guard	SG-BSS-05 pedestal #77	green enclosure	NA	NA
		Water Plus Corp	Model 5000	green	NA	NA
Services	Brass Service Saddles	**Brass Service Saddles for 1" & 2" water & reclaimed water services on 4" through 12" Mains - Service saddles can be hinge or bolt controlled OD saddles to be used on C-900 and existing IPS OD PVC pipe.**				
		Ford	Series S-70, S-90	4"-12"	Series S-70, S-90	4"-12"
		AY McDonald	Model 3891 / 3895,3801 / 3805	4"-12"	Model 3891 / 3895,3801 / 3805	4"-12"
		Mueller	Series S-13000/H-13000	4"-12"	Series S-13000/H-13000	4"-12"
	Service Saddles	**Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water & Reclaimed Water services on mains greater than 12". Service saddles for 2" taps (iron pipe threads) on 4" mains and greater for Waste Water. : Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 / C905 or DI for all 1-in and -2in taps on pipes over 12in.**				
		Ford	Series FC202	16" & greater	Series FC202	16" & greater
		JCM	Series 406	16" & greater	Series 406	16" & greater
		Mueller	DR2S	16" & greater	DR2S	16" & greater
		Romac	Series 202NS	16" & greater	Series 202NS	16" & greater
		Smith Blair	Series 317	16" & greater	Series 317	16" & greater
	Service Saddles for HDPE	**Service Saddles for 1" (CC) & 2" (Iron Pipe threads) Water and Reclaimed Water Services: Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on HDPE for all 1-in and -2in taps. Taps to HDPE pipe shall be approved on a case by case basis.**				
		Ford	Series FCP202		Series FCP202	
		Romac	Series 202N-H		Series 202N-H	
		Smith Blair	Series 317-1 for HDPE		Series 317-1 for HDPE	
	Corporation Stops Ball Type	**Corporation Stops Ball Type (1-inch with AWWA taper C threads only/pack joint outlet for CTS) 2" Corporation Stop Ball Type shall be 2" MIP X FIP threads.**				
		Ford	FB1000, FB1700-7		FB1000, FB1700-7	
		AY McDonald	4701B-22, 3149B2		4701B-22, 3149B2	
		Mueller	P25008, B-20046		P25008, B-20046	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Services	Curb Stops	**Curb Stops - Straight Valves: Ball type compression 2" cts O.D. tubing by 2" FIP**						
		Ford	B41-777W		B41-777W		NA	NA
		AY McDonald	6102W-22		6102W-22		NA	NA
		Mueller	P25172		P25172		NA	NA
	Curb Stops	**Curb Stops - Straight Valves: ball type compression x compression**						
		Ford	B44-444W		B44-444W		NA	NA
		AY McDonald	6100W-22		6100W-22		NA	NA
		Mueller	P25146		P25146		NA	NA
	PE tubing	**Polyethylene tubing: AWWA C901. UV protection (SDR-9) 1-inch and 2-inch only. PE 3408 / PE 4710**						
		Charter Plastics	Blue Ice		Lav Ice		NA	NA
		Endot	Endopure Blue		Endocore Lavender		NA	NA
		JM Eagle	Pure-Core		NA	NA	NA	NA
Tapping Sleeves and Valves	Line Stops	**Line Stops**						
		JCM						
		Romac						
		Smith Blair						
	Tapping Sleeves	**Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts.**						
		American Flow Control	Series 2800		Series 2800		Series 2800	
			Series 1004		Series 1004		Series 1004	
		Clow	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC
			Series F-5207	A/C Pipe	Series F-5207	A/C Pipe	Series F-5207	A/C Pipe
		JCM	Series 414	FBE	Series 414	FBE	Series 414	FBE
		Mueller	Series H-615	DIP/PVC	Series H-615	DIP/PVC	Series H-615	DIP/PVC
			Series H-619	A/C Pipe	Series H-619	A/C Pipe	Series H-619	A/C Pipe
		Smith Blair	Style 623	FBE	Style 623	FBE	Style 623	FBE
	Tapping Valves: 12" and smaller	**Tapping Valves: 12" and smaller - Tapping Valves shall be furnished with an alignment lip and installed in the vertical position for Water and Reclaim Water. Wastewater shall be installed horizontally and abandoned in the open position. Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515**						
		American Flow Control	Series 2500	Alignment Lip	Series 2500	Alignment Lip	Series 2500	Alignment Lip
		Clow	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip
		Mueller	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	[redacted]
Tapping Sleeves and Valves	Tapping Valves: 16" and Larger	**Tapping Valves: 16" and Larger - Tapping valves shall be furnished with an alignment lip and be installed in the vertical position for Water and Reclaimed Water. No tapping valve shall be installed horizontally for Water and Reclaim Water unless approved by the engineer. Tapping Valves 16" and larger AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a spur gear actuator unless noted by the engineer. All tapping valves above 24" shall be furnished with NPT pipe plugs for flushing the tracks when valves are installed horizontally. Tapping valves for Wastewater shall be installed horizontally and abandoned in open position.**						
		American Flow Control	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	[redacted]
		Clow	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	[redacted]
		Mueller	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	[redacted]
Valves	Butterfly Valve 42" and Above	**Butterfly Valves 42"and above. AWWA C504. Actuators input torques based on 150 psi valve pressure and 16 fps velocity with a maximum inpnt of 80 ft-lb on 2" nuts and shall withstand 250 ft-lbs. Valve seats shall be leak-tight in both directions at 150 psi.**					
		Clow	Style #1450		Style #1450		NA
		Dezurik	BAW		BAW		NA
		Mueller / Pratt	LINSEAL III / Groundhog		LINSEAL III / Groundhog		NA
	Check Valves	**Valves (Check) 4-inch and Larger (8 mil epoxy lined)**					
		American Flow Control	NA		NA		[redacted]
		Clow / M&H / Kennedy	NA		NA		[redacted]
		Mueller	NA		NA		[redacted]
	Gate Valves 4" - 12"	**Gate Valves 12" and smaller - resilient seated only AWWA C509 or C515. Valve seat shall be leak-tight in both directions at 150 psi.**					
		American Flow Control	Series 2500		Series 2500		NA
		Clow	Series F-6100		Series F-6100		NA
		Mueller	Series A-2360		Series A-2360		NA
	Gate Valves (Vertical) 16" and Up	**Gate Valves 16" and larger (Vertical Installation) AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a gear actuator unless noted by the engineer. Valve seat shall be leak-tight in both directions at 150 psi.**					
		American Flow Control	Series 2500		Series 2500		NA
		Clow	Series F-6100		Series F-6100		[redacted]
		Mueller	Series A-2361		Series A-2361		NA

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Valves	Plug Valves	**Plug Valves - Bi-directional, MJ & Flanged (min. 8mil fusion bonded epoxy with staiuless steel bolts), gear operator to be sized for rated pressure of the valve. Valves 4"-20" shall be 80% Full Port and valves 24" and greater shall be minimum of 70% full port. Valve shall be factory tested to minimium 100 PSI in both directions.**				
		Clow	NA	NA	NA	NA
			NA	NA	NA	NA
		Dezurik	NA	NA	NA	NA
		Millikan / Pratt	NA	NA	NA	NA
		Val-Matic	NA	NA	NA	NA
			NA	NA	NA	NA
Valve Boxes	Valve Boxes with Locking Lids (Cast Iron)	**Two piece standard screw type Heavy Duty Valve Boxes with Locking Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48**				
		Bingham/Taylor	Series 4905	Box	NA	NA
			4905-X	Extension	NA	NA
			4904-L	Blue Water Locking Lid	NA	NA
		Sigma	Series VB 261X-267X	Box	VB-25031LK-VB-2612	Box
			VB 6302	Extension	VB-6302	Extension
			VB 4650W	Blue Water Locking Lid	VB2503LK	Purple Square Locking Lid
		Star	Series VB-0002	Box	NA	NA
			VBEX 12-24S	Extension	NA	NA
			VBLIDLOCK	Blue Water Locking Lid	NA	NA
		Tyler Union	Series 6850	Box	NA	NA
			58, 59, 60	Extension	NA	NA
			Locking Lid	Blue Water Locking Lid	NA	NA
	Valve Box	**For mains equal to, or greater than, 16" diameter or equal to greater than 6' feet deep**				
		American Flow Control	# 2A - 9A Retrofit Valve Box Insert	Fit inside std valve boxes	NA	
		Mueller Company	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Blue Water Locking Lid	MVB050CR thru MVB130CR with Extension Stem MVB875 Guide Plate	Purple Square Locking Reclaim Lid

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Coatings	Anti-Graffiti Paint	**Block Walls-Anti-Graffiti Paint per Section 3119 Coatings & Linings**						
		American Building Restoration Products	NA	NA	NA	NA	[illegible]	[illegible]
		Tnemec / Chemprobe	NA	NA	NA	NA	[illegible]	[illegible]
		Professional Products of Kansas, Inc	NA	NA	NA	NA	[illegible]	[illegible]
	Coatings for Existing Manholes	**Rehabilitation corrosion protection system per Section 3119 Coatings & Linings. Interior coating for force main connections to existing concrete manholes only. New precast structures and existing pump stations shall be lined.**						
		CCI Spectrum, Inc	NA	NA	NA	NA	[illegible]	[illegible]
		Kerneos Aluminate Technologies	NA	NA	NA	NA	[illegible]	[illegible]
		Raven Lining System	NA	NA	NA	NA	[illegible]	[illegible]
		Sauereisen	NA	NA	NA	NA	[illegible]	[illegible]
		Tnemec	NA	NA	NA	NA	[illegible]	[illegible]
PVC Pipe and fittings	Pipe SDR 35 Gravity Mains	**PVC Pipe for Gravity SDR26/SDR 35 (Green in color) ASTM-D034. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed	NA	NA	NA	NA	[illegible]	[illegible]
		Diamond Plastics Corp	NA	NA	NA	NA	[illegible]	[illegible]
		JM Eagle	NA	NA	NA	NA	[illegible]	[illegible]
		National Pipe & Plastics, Inc.	NA	NA	NA	NA	[illegible]	[illegible]
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	[illegible]	[illegible]
		Sanderson Pipe Corp	NA	NA	NA	NA	[illegible]	[illegible]
	Locate Balls	**Locating Marker Systems - Wastewater Locator balls placed at all sanitary sewer cleanouts**						
		3M	NA	NA	NA	NA	[illegible]	[illegible]
	Fittings SDR 35	**Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26/ SDR 35**						
		GPK Products, Inc.	NA	NA	NA	NA	[illegible]	[illegible]
		Harrington Corporation (HARCO)	NA	NA	NA	NA	[illegible]	[illegible]
		Multi Fittings Corp.	NA	NA	NA	NA	[illegible]	[illegible]
		JM Eagle	NA	NA	NA	NA	[illegible]	[illegible]
		Plastic Trends Inc	NA	NA	NA	NA	[illegible]	[illegible]
		TIGRE USA, Inc.	NA	NA	NA	NA	[illegible]	[illegible]

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
PVC Pipe	Flexible Pipe Connectors	**Flexible Pipe Connectors and Transitions**						
		Fernco	NA	NA	NA	NA	[illegible]	
		Indiana Seal	NA	NA	NA	NA	[illegible]	
		Mission Rubber	NA	NA	NA	NA	[illegible]	
Precast Concrete Structures	MH Lids	**Frame and Cover**						
		USF Fabrication Inc.	NA	NA	NA	NA	[illegible]	
	Adj Ring	**Top Adjusting Rings - HDPE with heavy duty loading (H-20)**						
		Ladtech, Inc	NA	NA	NA	NA	[illegible]	
	Hatches	**Wet Well and Valve Vault Access Frames and Covers (Include the term "Confined Space" etched or cast into the cover with recessed lock & hasp. Frames and covers per manufacturers specifications.**						
		Halliday Products	NA	NA	NA	NA	[illegible]	
		USF Fabrication Inc.	NA	NA	NA	NA	[illegible]	
	Precast Concrete Structures	**Precast Manhole and Wetwell Structures ASTM C478. Precast concrete shall be batched with concrete dyed crystalline waterproofing admixture with corrosion protection. Concrete without admixture or without color tint /tracer shall be rejected.**						
		Allied Precast	NA	NA	NA	NA	[illegible]	
		Atlantic Concrete Products, Inc.	NA	NA	NA	NA	[illegible]	
		Delzotto Products, Inc.	NA	NA	NA	NA	[illegible]	
		Dura Stress Underground Inc.	NA	NA	NA	NA	[illegible]	
		Hanson Pipe & Product	NA	NA	NA	NA	[illegible]	
		Mack Concrete	NA	NA	NA	NA	[illegible]	
		Oldcastle Precast	NA	NA	NA	NA	[illegible]	
		Standard Precast Inc.	NA	NA	NA	NA	[illegible]	
	Concrete Admix	**Crystalline Waterproofing Concrete Admix with color dye shall be added to all concrete structures (precast and cast-in-place) to provide waterproofing and corrosion resistance. Concrete without admixture or without color tint / tracer shall be rejected. % concentration of admix with colored dye added to the mix shall be based on weight of cement.**						
		Kryton International	NA	NA	NA	NA	[illegible]	
		Xypex Chemical Corp	NA	NA	NA	NA	[illegible]	
	Liners	**Interior Liner for New or existing Precast Manhole and Precast Wetwell Structures per Section 3119 Coatings & Linings**						
		AFE	NA	NA	NA	NA	[illegible]	
		AGRU Liner	NA	NA	NA	NA	[illegible]	
		Containment Solutions Inc. (Flowtite)	NA	NA	NA	NA	[illegible]	
		GSE Studliner	NA	NA	NA	NA	[illegible]	
		GU Liner	NA	NA	NA	NA	[illegible]	
		L & F Manufacturing	NA	NA	NA	NA	[illegible]	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments
Precast Concrete Structures	Heat Shrink Seal	**Heat Shrink Seal - Precast structures shall be primed with manufacturer approved primer prior to application of heat shrunk encapsulation.**				
		Canusa-CPS	NA	NA	NA	NA
		Pipeline Seal & Insulator, Inc (PSI)	NA	NA	NA	NA
	Jointing Material	**Jointing Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.**				
		Henry Company	NA	NA	NA	NA
		Martin Asphalt Company	NA	NA	NA	NA
		Trelleborg Pipe Seals	NA	NA	NA	NA
	Pipe Seals Gravity	**Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep**				
		Atlantic Concrete	NA	NA	NA	NA
		Hail Mary Rubber	NA	NA	NA	NA
		IPS	NA	NA	NA	NA
		NPC	NA	NA	NA	NA
		Press seal gasket	NA	NA	NA	NA
	Pipe Seals Gravity	**Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep**				
		Atlantic Concrete	NA	NA	NA	NA
		Hail Mary Rubber	NA	NA	NA	NA
	FM Pipe Seals	**Modular Pipe Seals for Wet Well and Valve Box penetrations and all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware**				
		CCI Pipeline Systems	NA	NA	NA	NA
		Pipeline Seal & Insulator, Inc / Link Seal	NA	NA	NA	NA
		Proco Products, Inc	NA	NA	NA	NA

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Generator	Gen	**Generator Systems, Fixed Shall be UL 2200 Certified.**						
		Caterpillar	NA	NA	NA	NA	[illegible]	
		Cummins Power Generation	NA	NA	NA	NA	[illegible]	
	Fuel Tanks	**Generator Fuel Tanks. Shall be UL2085 certified.**						
		Convault	NA	NA	NA	NA	[illegible]	
		Phoenix	NA	NA	NA	NA	[illegible]	
	GR	**Generator Receptacle (GR)**						
		Cooper Crouse-Hinds	NA	NA	NA	NA	[illegible]	
		Cooper Crouse-Hinds	NA	NA	NA	NA	[illegible]	
		Pyle National	NA	NA	NA	NA	[illegible]	
	ATS	**Generator Transfer Switch**						
		Russelectric	NA	NA	NA	NA	[illegible]	
Odor Control Units	Biotrickling Filters	**Biotrickling filters**						
		BioAir	NA	NA	NA	NA		
		Biorem	NA	NA	NA	NA	[illegible]	
		Envirogen	NA	NA	NA	NA	[illegible]	
		Siemens	NA	NA	NA	NA	[illegible]	
	Carbon Adsorption Units	**Carbon Adsorption Units**						
		Calgon	NA	NA	NA	NA		
		Pure Air Filtration	NA	NA	NA	NA		
		Siemens	NA	NA	NA	NA		
Pressure Gauges	Pressure Gauges	**Pressure Gauges shall have Diaphragm Seals. Oil filled.**						
		Ashcroft	NA	NA	NA	NA	[illegible]	
		Trerice	NA	NA	NA	NA	[illegible]	
		Winter Gauges	NA	NA	NA	NA	[illegible]	
Pumps	Pumps	**Submersible Pumps**						
		ABS	NA	NA	NA	NA		
		Flygt	NA	NA	NA	NA		

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Redundant Model #	Redundant Comments
Pumps	Floats	**Float Regulator (FR) - Duplex and Triplex Pump Stations**						
		Atlantic Scientific	NA	NA	NA	NA		
	Radar	**Radar - Pulse Burst Radar Transmitter. Input 24 VDC and Output 4-20 mA**						
		Magnetrol	NA	NA	NA	NA		
Pump Station Main Ser	Main Srvc Disconnect	**Main Service Disconnect Breaker**						
		Square D	NA	NA	NA	NA		
	Surge Protector Device	**Surge Protector - UL 1449, 3rd Edition listed and labeled, minimum 10 year warranty, NEMA LS-1 and IEEEC62, 41/45 tested with NEMA 4X enclosure, internal fusing, voltage and phase to match service. Rated 80,000 amps per mode for Duplex & Triplex stations and 150,000 Amperes per mode for Master Stations. All devices shall be provided witb a NEMA 4X Plastic enclosure which is approved in lieu of stainless steel.**						
		Current Technology (Power & Systems	NA	NA	NA	NA		
		Josyln AKA (Total Protection Solutions)	NA	NA	NA	NA		
		Surge Suppressors, Inc	NA	NA	NA	NA		
Sub Panel	Sub Panel	**Sub-Panel Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
Pump Station Control Panel	Control Panel	**Control Panel Supplier**						
		ECS	NA	NA	NA	NA		
		Sta-Con Inc	NA	NA	NA	NA		
	Enclosure	**Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
	Mnts	**Mounting Channel for Enclosures**						
		Unistrut Stainless Steel	NA	NA	NA	NA		
	Seal-off	**Explosion-Proof Sealoff**						
		Cooper Crouse-Hinds	NA	NA	NA	NA		
	FL	**Flasher (FL)**						
		MPE	NA	NA	NA	NA		
		SSAC	NA	NA	NA	NA		

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	AL	**Alarm Light / With Base and Globe (AL)**						
		American Electric	NA	NA	NA	NA	[illegible]	
		Red Dot Globe Red Dot Base	NA	NA	NA	NA	[illegible]	
	AH	**Alarm Horn (AH)**						
		Wheelock	NA	NA	NA	NA	[illegible]	
	Fuse	**Fuses (F)**						
		Bussmann	NA	NA	NA	NA	[illegible]	
	HOA	**Hand-Auto-Off Selector (HOA)**						
		Square D	NA	NA	NA	NA	[illegible]	
	HSS	**Horn Silence Button (HSS)**						
		Square D	NA	NA	NA	NA	[illegible]	
	Inter-lock	**Mechanical Interlock**						
		Square D	NA	NA	NA	NA	[illegible]	
	Breakers	**Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch**						
		Square D	NA	NA	NA	NA	[illegible]	
		Emergency Circuit Breaker (ECB) With S29450 Circuit Breaker Auxiliary Switch						
		Square D	NA	NA	NA	NA	[illegible]	
		Motor Circuit Breaker (MB)						
		Square D	NA	NA	NA	NA	[illegible]	
		Control Circuit Breaker/ GFCI Receptacle Breaker/ SCADA Breaker						
		Square D	NA	NA	NA	NA	[illegible]	
	MS	**Motor Starter (MS)**						
		Square D	NA	NA	NA	NA	[illegible]	
	OL	**Overload Heater(OL)**						
		Square D	NA	NA	NA	NA	[illegible]	
	OR	**Overload Reset**						
		Square D	NA	NA	NA	NA	[illegible]	
	Transformer	**Control Circuit Transformer (XMFR)**						
		Square D	NA	NA	NA	NA	[illegible]	
		Main Circuit Transformer (MCT)						
		Square D	NA	NA	NA	NA	[illegible]	
	SPB	**Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor**						
		Square D	NA	NA	NA	NA	[illegible]	

Cat.	Desc	Manufacturer	Water		Reclaimed Water		[illegible]	
			Model #	Comments	Model #	Comments	[illegible]	[illegible]
Pump Station Control Panel	PM	**Phase Monitor (PM)**						
		MPE 240 V.	NA	NA	NA	NA	[illegible]	
		MPE 480 V.	NA	NA	NA	NA	[illegible]	
	Pump Alternator	**Pump Automatic Alternator (PAA)**						
		Diversified Duplex	NA	NA	NA	NA	[illegible]	
		Diversified Triplex	NA	NA	NA	NA	[illegible]	
		MPE Duplex	NA	NA	NA	NA	[illegible]	
		MPE Triplex	NA	NA	NA	NA	[illegible]	
		MPE Triplex Socket	NA	NA	NA	NA	[illegible]	
	Alt. Test Switch	**Alt. Test Switch**						
		Carling Technologies	NA	NA	NA	NA	[illegible]	
		Honeywell	NA	NA	NA	NA	[illegible]	
	Relay	**Relay**						
		Potter Brumfield 24 Volt	NA	NA	NA	NA	[illegible]	
		Potter Brumfield 120 Volt	NA	NA	NA	NA	[illegible]	
		Square D 24 Volt	NA	NA	NA	NA	[illegible]	
		Square D 120Volt	NA	NA	NA	NA	[illegible]	
	Relay Base	**Relay Base**						
		IEDC 8 Pin Relay Base 600 Volt	NA	NA	NA	NA	[illegible]	
	Duplex Receptacle / GFCI	**Duplex Receptacle/GFCI (DR) Upgraded to 20 Amp**						
		Hubbell	NA	NA	NA	NA	[illegible]	
		Pass & Seymour	NA	NA	NA	NA	[illegible]	
	ETM	**Elapse Time Meter (ETM)**						
		Reddington	NA	NA	NA	NA	[illegible]	
	Grounding	**Grounding System**						
		Marathon	NA	NA	NA	NA	[illegible]	
		Panduit	NA	NA	NA	NA	[illegible]	
		Square D	NA	NA	NA	NA	[illegible]	
	TS	**Terminal Strip (TS)**						
		Marathon	NA	NA	NA	NA	[illegible]	
		Square D	NA	NA	NA	NA	[illegible]	
	TS	**Terminal Strip End Blocks and End Clamps**						
		Square D	NA	NA	NA	NA	[illegible]	

APPENDIX D **LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water		Reclaimed Water		[illegible]	
			Model #	Comments	Model #	Comments	[illegible]	[illegible]
Pump Station Control Panel	PL	**Pilot Light (PL) 24 Volt with 1819 Bulb**						
		Dialight	NA	NA	NA	NA	[illegible]	
		Lighting Components & Design	NA	NA	NA	NA	[illegible]	
	RL	**Run Indicator Light (RL) 120 Volt**						
		Dialight	NA	NA	NA	NA	[illegible]	
		Lighting Components & Design	NA	NA	NA	NA	[illegible]	
	MT	**Moisture and Temperature Failure Light (MT) 120 Volt with 120MB Bulb**						
		Dialight	NA	NA	NA	NA	[illegible]	
		Lighting Components & Design	NA	NA	NA	NA	[illegible]	
Sluice	Sluice Gate	**Sluice Gate for Wet Well with Motorized Operator**						
		BNW	NA	NA	NA	NA	[illegible]	
		Fontaine	NA	NA	NA	NA	[illegible]	
VFD	VFD	**Variable Frequency Drives**						
		Square D	NA	NA	NA	NA		

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APPENDIX 2

ORANGE COUNTY STANDARDS WATER SECTION

CHAPTER 2 GENERAL REQUIREMENTS AND DESIGN STANDARDS
Section 2210: Water Main Design Standard

PART 1 – GENERAL

A. Water mains shall be designed for the estimated tributary population, as delineated in the approved UTILITIES' MASTER PLAN (latest edition). When DEVELOPER's water MASTER PLANS are required, water mains shall be designed for the estimated ultimate build out, as approved by UTILITIES. DEVELOPER shall be required to satisfy the domestic water and fire protection design flow for their planned development (PD) or the development of regional impact (DRI).

PART 2 – LOCATION

A. Mains shall be located within dedicated rights-of-way or utility easements.
   1. Right-of-way
      When installed in rights-of-way, mains shall maintain a consistent alignment with respect to the centerline of the road. No parallel mains shall be allowed. Water mains shall be installed on the opposite side of the right-of-way as the reclaimed water main and the force main. Mains shall be installed along one side of the road, with crossings kept to a minimum.

   2. Easements
      If piping is constructed within an easement, the centerline of the pipe shall be located within two feet of the centerline of the easement.
      a. Adjacent to right-of-way – minimum 15 feet;
      b. Not adjacent to right-of-way – minimum 20 feet;
      c. Additional easement width, as determined by UTILITIES, shall be required under the following conditions.
         i. Pipe sizes greater than 12 inches;
         ii. When the pipe depth is greater than five feet, the easement width shall be increased by three feet for each additional foot of depth;
         iii. More than one parallel pipe within the easement; or
         iv. Pipe is not centered in the easement.
         v.

B. Mains within easements shall not be placed under buildings, retention ponds, courts, swimming pools, fountains or other structures. Landscape and privacy walls and foundations shall not be placed parallel over mains. Placement of mains under pavement shall be kept to a minimum. Mains shall not be located along interior side or rear lot lines, unless approved by UTILITIES. Placement of mains along interior side or rear lot lines or storm water retention pond berms may be allowed on a case by case basis if such a configuration results in efficient placement and utilization of the system, as determined by UTILITIES. Services, air release valves and other valves shall not be placed along interior side or rear lot lines.

C. Proposed commercial and residential development offsite mains shall be extended a minimum of 10 feet beyond the furthest entrance to the development.

D. Water mains shall be designed with uniform positive or negative slopes to avoid undulations and minimize high points and low points in the profile.

PART 3 - DESIGN BASIS

A. Average Daily Flow and Peak Flows:
Average daily water flow shall be calculated by referencing the equivalent residential connection (ERC) flow rates as outlined in Appendix E, "ERC/ERU Design Factors". Water flow rates shall be based on a maximum day to average day peaking factor of 2.0 and a peak hour to average day peaking factor of 4.0.

B. Fire Flow Requirements:
Fire flow requirements shall be determined in accordance with applicable COUNTY/city fire codes and SUBDIVISION REGULATIONS. Where fire flow requirements exceed the anticipated available fire flow from the central water system, on-site fire protection system or other COUNTY/city fire department approved mitigation measures shall be utilized.

C. Design Calculations:
DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all water distribution projects. Calculations shall show that the water mains will have sufficient hydraulic capacity to transport the greater of peak hourly flows or the combination of maximum daily flows and fire flows while meeting the requirements of this Section and FDEP. Minor head losses shall be incorporated in calculations including losses through meters, detector checks and backflow prevention assemblies.

PART 4 - DESIGN AND CONSTRUCTION

A. Pipe Cover:
A minimum cover of 30 inches shall be provided for pipe located within LOCAL roadways or within an easement. Water mains located within non-LOCAL roadways shall require a minimum cover of 36 inches for mains sized 12 inch and below and a minimum cover of 48 inches for mains sized 16 inch and greater. See Table 2210-1 for minimum valve depths and Appendix A for pipe separation requirements.

B. Work on roads identified in FDOT, COUNTY, or a city five year widening plan shall be coordinated by the DEVELOPER / ENGINEER with the respective road agency for future depth and location of utilities. Additional depth and / or easements shall be required to accommodate future proposed work of Agencies and all practical measures shall be taken to avoid conflicts / relocations due to proposed work.

C. Pressure:
All water mains shall be designed in accordance with this Section. The system shall be designed to maintain a minimum pressure of 20 psi at all points in the distribution system under all conditions of flow. Due to internal water demands, higher minimum pressures may be required at commercial, industrial and high-density residential areas. The design pressure in the distribution system should be approximately 45 psi, but in no case less than 35 psi on the upstream side of a meter. For excessive pressures, pressure-reducing provisions may be required.

D. Design Friction Losses:
Friction losses through mains shall be based on the Hazen and Williams or Darcy-Wiesbach formulas. In the use of Hazen and Williams formula, the value for "C" shall be 120 for ductile iron pipe and 130 for PVC and HDPE pipe. "C" values greater than 130 shall not be allowed.

E. Design Pressure and Restraint
1. The main and fittings, including all restrained joint fittings shall be designed to withstand pump operating pressures and pressure surges, but not less than 150 psi.
2. The restrained joint lengths shall be calculated consistent with the table format shown in the STANDARD DRAWINGS.

F. Velocity and Diameter:
Only 6, 8, 12, 16, 20, 24, 30, 36, 42, 48 and 54-inch diameter water mains shall be permitted. Four-inch water mains shall be permitted only in cul-de-sacs with a maximum length of 500 feet of pipe if reclaimed water is provided. If reclaimed water is not provided, a minimum of 6-inch diameter water main is required in cul-de-sacs. A minimum of six-inch looped systems shall be required in low-density residential projects. Where looping of mains is not practical, minimum eight-inch mains shall be required. Mains shall be sized so velocities do not exceed eight feet per second under the fire plus max day flow condition. In no case shall connections be made to cause velocities to exceed eight feet per second in existing mains.

G. Material:
1. Water transmission pipe greater than 12 inches shall be ductile iron pipe.
2. Water distribution pipe less than or equal to 12 inches shall be either PVC or ductile iron. HDPE may be used in specific applications as specified in this MANUAL or as approved by UTILITIES.

H. Pipe Deflection: Fittings and sleeves shall be used for all changes in direction.
1. Ductile Iron Pipe Mains - Allowable deflection for design of ductile iron pipe shall not exceed 50% of the manufacturer's recommended allowable joint deflection. No pipe bending shall be permitted. Where pipe is not straight and deflection is utilized, the Engineer shall provide limits of deflection on the plan and profile sheets including the radius of curvature and angle of deflection for each segment of pipe to be deflected.
2. PVC Pipe. No allowable deflection is permitted for design of PVC mains. Fittings and sleeves shall be designed in lieu of deflection for changes in direction.

I. Fire Hydrant Location and Spacing:
At a minimum, specifications outlined in the latest version of SUBDIVISION REGULATIONS and applicable COUNTY fire codes shall apply. Hydrants shall be placed on the same side of the roadway as the water mains and shall be placed at 500-foot intervals in commercial, multifamily and industrial areas. Hydrant spacing for single-family residential and other areas shall be 1,000-foot intervals. Fire hydrants shall be connected to a 6" water main or greater.

J. Dead Ends:
1. In order to provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined

by UTILITIES.

2. Where permanent dead-end mains occur, they shall be provided with an approved flushing hydrant or blow-off assembly for flushing purposes. Automatic-metered flushing devices may be required to maintain water quality in water mains. No flushing device shall be directly connected to any WASTEWATER SYSTEM. Connection to storm water system shall require an approved backflow prevention device and approval from PUBLIC WORKS.

K. Valves:

Resilient seat gate valves shall be installed vertically in accordance with the specifications in Chapter 3 and Appendix D to isolate water mains. Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located no more than 500 feet apart in commercial, industrial and high-density residential areas and no more than 1000 feet in all other areas. Valves shall be spaced to isolate a maximum of 40 single-family residential lots. A minimum of two valves per tee shall be required to isolate and maintain adequate service. Valves shall be placed at phase lines and located at the end of all water main extensions except at cul-de-sacs. The pipe profile shall show valves with the minimum valve cover specified in Table 2210-1.

Table 2210-1 - Minimum Pipe Cover Required for Valves

Pipe Diameter (Inches)	Vertical Gate Valve Cover	
	Local Roadway	Non-LOCAL Roadway*
4"-8"	30"	36"
12"	26"	36"
16"	44"	48"
20"	-	50"
24"	-	54"

Note: * Additional 12" of cover is required for all vertical valves 16" and greater located in the pavement.

L. Separation of Water Mains and Sewers:

1. Separation of potable water, reclaimed water, storm and sewer systems shall comply with FDEP regulations and STANDARD DRAWINGS.
2. Water pipes shall not pass through any part of a storm sewer or manhole. A three foot minimum separation from storm water structures shall be maintained to facilitate maintenance and operation.

M. Air Release Valves:

Provisions shall be made to remove air at high points in water mains where elevation changes exceed five feet. Automatic air release valves shall be located at high points in water mains for pipe systems greater than 12 inches in diameter.

N. Permanent sample stations may be required as directed by UTILITIES.

O. Provision for the installation of permanent access points into and egress points out of the piping system for pigging and cleaning purposes shall be incorporated into the design for pipe diameters greater than 12-inch. Permanent and temporary access and egress points shall conform to the STANDARD DRAWINGS.

PART 5 – SYSTEM CONNECTION AND SERVICE CONNECTIONS

A. Water connections shall conform to the applicable provisions of this MANUAL.
B. Water Services:
   1. Water services shall conform to the applicable provisions of this MANUAL. Only 1, 2, 4, 6, 8, and 12-inch services will be permitted. Where water services greater than 12 inches are required, additional services shall be provided. It is recommended that hospitals install at least two services. For single family homes, single services are required where reclaimed water is unavailable or reclaimed water is available with lots greater than 1/3 acre. Otherwise, dual services shall be provided.
   2. One and two-inch services shall be polyethylene tubing. Services 4-inch and larger shall be DIP from the point of connection to the existing main to the meter assembly, if the existing main is on the same side of the street as the property. If the main is on the opposite side of the street, as a minimum, the segment of pipe immediately upstream from the meter assembly shall be DIP.
   3. UTILITIES will install services and connections to existing water systems up to two-inch, after payment of applicable fees and charges. On existing water mains, services and connections larger than two-inch may be made by UTILITIES or by the CONTRACTOR. The CONTRACTOR shall furnish service connections for new water main extensions.
C. Multi-family subdivisions and town home developments require a 4-inch stub out for each building, or groups of buildings for future fire sprinkling system.

PART 6 - WATER METERING

A. General:
   Water service connections shall be metered. In general, the method of metering will follow the guidelines listed below and require UTILITIES approval.

B. Single Family, Duplex and Multi-Family Subdivisions/Town Homes with Public Rights-of-Way:

1. Each unit shall be individually metered. Services shall be installed as indicated by the STANDARD DRAWINGS.
2. A double detector check valve assembly shall be provided if a fire sprinkling system is required. Both the double detector check valve assembly and the fire sprinkling system are to be owned and maintained by the Homeowner's Association.

C. Single Family, Duplex and Multi-Family Subdivisions/Town Homes with Private Streets:

   1. Individual meters may be permitted in accordance with this section if the private streets are designed in accordance with the latest edition of the ROAD CONSTRUCTION SPECIFICATIONS for an urban design cross section. Easements shall be dedicated over the entire private street common areas. In addition, sufficient area must be available outside of paved areas to locate water mains, services, and meters. If the above criteria cannot be met, the subdivision shall be master metered.

2. A double detector check valve assembly shall be provided if a fire sprinkling system is required. Both the double detector check valve assembly and the fire sprinkling system are to be owned and maintained by the Homeowner's Association.

D. Commercial, Industrial and Institutional Projects without Private Fire Lines:
In general, each building shall be individually metered. Meter(s) shall be located in the public rights-of-way at the property line.

E. Commercial, Industrial, Institutional, Multi-Family with Private Streets and Fire Lines (including timeshares, condo hotels, duplexes, triplexes, quadplexes, apartments and condominiums projects):
   1. Apartments, condominiums, hotels, schools, shopping malls (containing interior hallways) and multi-family projects:
      a. Requires installation of fire line master meter.
   2. Commercial, industrial and institutional projects:
      a. Master meter; or
      b. Dual systems as approved by UTILITIES. Dual systems shall require installation of a double detector check valve assembly on the fire line. Domestic line shall also be metered.
   3. Shopping centers (contain no interior hallways):
      a. A master domestic meter or individual domestic meters to each building. Individual meters shall be located at the right-of-way;
      b. Dual systems may be required with individual meters for developments requiring fire protection systems, as approved by UTILITIES. Dual systems shall require installation of a double detector check valve assembly on the fire line.

F. Meter Installation:
Meters (5/8"-2") will be installed after payment of applicable fees and charges. Master meter assemblies will be delivered to the site after payment of applicable fees and charges. All meters 1-inch and less in size may be installed underground in an approved meter box. Meters 1-1/2 to 10 inches in size shall be installed above ground, within a utility easement adjacent to the public right-of-way.

G. Meter Sizing:
UTILITIES shall determine the size and quantity of all meters. The DEVELOPER's ENGINEER shall provide sufficient information on estimated average, peak and minimum flows so that meter size can be determined in accordance with Table 2210-2, below.
Sites with potable irrigation shall have a separate irrigation meter. Irrigation meters shall be sized using Table 2210-2, where the Peak Irrigation Flow is defined as the highest flow resulting from a combination of zones designed to flow simultaneously. In addition, the DEVELOPER's ENGINEER shall provide the square footage of the area to be irrigated.

Table 2210-2 Flow and Selection of Meter Size.

Meter Size (inches)	Domestic Meter Average Daily Flow Up to (GPM)	Irrigation Meter Peak Flow Up to (gpm)
5/8	8	10
1	20	25
1.5	40	50
2	65	80**
2	***	N/A
4x1	***	N/A
6x2	***	N/A
8x2	***	N/A
10x2	***	N/A

* For flows between 20 gpm to 130 gpm a minimum of 2 meters shall be required.
* For peak irrigation flows above 80 gpm, contact Development Engineering for guidance.
** Size meter to maintain adequate pressure during the fire flow conditions.

PART 7 - MATERIALS, INSTALLATION AND TESTING

A. Applicable provisions of this MANUAL shall apply.

PART 8 - LOCATION AND IDENTIFICATION

A. A means for locating and identifying all water mains and valves shall be provided in accordance with this MANUAL, STANDARD DRAWINGS and Chapter 2 Section 2111 "Project Documents and Submittals."

PART 9 - CROSS CONNECTION CONTROL

A. General:
   1. In order to protect the potable water supply system from contamination due to cross-connections, UTILITIES approved backflow prevention devices shall be installed on the potable water system. Some of the common instances requiring installation of cross connection control devices are listed below.
   2. UTILITIES is protecting public health through the enforcement of requirements and standards for design, construction, operation and maintenance of public potable water supply systems and reclaimed water systems. Refer to "*Orange County Utilities Cross Connection Control Program Manual*" for design guidelines. Copies of this Manual may be obtained from Orange County Utilities web site at: http://www.orangecountyfl.net/cms/DEPT/utilities/cross_connection_backflow_prevention.htm. These minimum requirements are also outlined in the following regulations.
      a. State of Florida Safe Drinking Water Act; "Drinking Water Standards, Monitoring and Reporting", Chapter 62-550, FAC, "Permitting Construction,

Operation and Maintenance", Chapter 62-555, FAC and "Reuse of Reclaimed Water and Land Application", Chapter 62-610, FAC;

b. "Chapter 4A-46, 'Fire Protection Contractors and Systems', Division of State Fire Marshall";
c. "Fire Prevention and Control", Chapter 633, F.S.; and
   i. "Section 9-203, 'Florida Building Code, Plumbing, Adopted', Article V, Chapter 9, Orange County Code".
   ii.

B. Commercial, Industrial, and Multi-Family Residential:
Commercial, industrial, and multi-family residential projects shall, as a minimum, require installation of an approved double check valve assembly on the potable water system. Projects with a higher degree of hazard may be required to install an approved reduced pressure backflow prevention assembly.

C. Irrigation Systems:
Pressure-type vacuum breakers or reduced pressure backflow prevention device shall be utilized on all potable water irrigation systems.

D. Location and Installation:
Backflow prevention devices are to be located directly following the water meter on DEVELOPER's property. Backflow prevention devices shall be installed above ground to facilitate maintenance and testing. It shall be the DEVELOPER's responsibility to provide, install and test all backflow prevention devices.

E. General areas of concern for installation of backflow prevention assemblies connecting to County water service:
1. Commercial/Industrial properties: Potable domestic, lawn irrigation and fire suppression system.
2. Temporary meter connections: fire hydrants or other water services not intended to be permanent.
3. Residential: potable domestic if (auxiliary water supply, well or reclaimed irrigation is present), potable lawn irrigation and fire suppression systems.

F. Backflow Assembly Standards:
Any backflow assembly below shall be installed and placed on the discharge side of the potable water meter connection or property line if meter is not used. The standard type of assembly is based on degree of hazard from the water user. Backflow assemblies shall meet at least one of the following standards including but not limited to:
1. Approved listing from FCCC&HR of SC, or ASSE
2. AWWA standards C510, Double Check Valve Assembly
3. AWWA standards C511, Reduced-Pressure Principle, Backflow Assembly
4. ASSE -1011 Hose Bib Vacuum Breakers, Hose connection
5. ASSE -1013 Reduced-Pressure Principle, Backflow Assembly
6. ASSE -1015 Double Check Valve Assembly
7. ASSE -1020 Pressure-Type Vacuum Breakers normally lawn irrigation
8. ASSE -1047, & (FM) approval, Reduced Pressure Detector Check Assembly, (chemical use protection from antifreeze, corrosion inhibitors) on dedicated fire systems.
9. ASSE -1048, & (FM) approval Double Check Detector Check Assembly, dedicated fire systems.

G. Commercial/Industrial
All Commercial/Industrial connection from the potable water system shall have the following:
1. Minimum protection for any Commercial/Industrial connection: DCVA ASSE 1015
2. Toxic chemical used on site: RPBA-ASSE 1013
3. Non-toxic chemicals used on site: DCVA ASSE 1015
4. Irrigation: RPBA-ASSE 1013 or PVB-ASSE 1020
5. Master Meter connections (fireline and domestic combination): DCVA-ASSE 1015

H. Dedicated Fire Lines Minimum Type of Protection:
1. All commercial/industrial or residential fire suppression systems without chemical additives or additional auxiliary non-potable water supply including on site fire hydrants: DCDA ASSE-1048, Double Check Detector Assembly and (FM) approval.
2. All commercial/industrial or residential fire suppression systems with chemical additives or additional auxiliary non-potable water supply including on site fire hydrants: RPPDA ASSE-1047, Reduced Pressure Principle Detector Assembly and (FM) approval.

I. Hydrant or temporary constructions: RPBA-ASSE 1013

J. Residential:
1. Residential properties maintaining auxiliary water supply (wells, other auxiliary water or reclaimed water): DCVA- ASSE 1015
2. Residential fire suppression systems, using one potable meter for both homes & fire system: DCVA-ASSE 1015
3. Residential fire suppression systems, Double Check Detector Check Assembly: DCDA ASSE-1048 and (FM) approval.

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APPENDIX 3

FDEP PERMITS

Florida Department of Environmental Protection

Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Ryan E. Matthews
Interim Secretary

Notification of Acceptance of Use of a General Permit

Permittee:
Jose Hernandez, P.E., Chief Engineer
Orange County Utilities
9150 Curry Ford Road
Orlando, FL 32825
Jose.hernandez2@ocfl.net

Permit Number: 0080772-650-DSGP
Issue date: May 2, 2017
Expiration Date: May 1, 2022
County: Orange
Project Name: Sherry Court
Water Supplier: Orange County Utilities- Western
PWS ID: 3481546
PWS Type: Community

Dear Mr. Hernandez:

On May 1, 2017, the Florida Department of Environmental Protection received a "*Notice of Intent to Use the General Permit for Construction of Water Main Extensions for PWSs*" [DEP Form No. 62-555.900(7)], under the provisions of Rule 62-4.530 and Chapter 62-555, Florida Administrative Code (F.A.C.). The proposed project includes the construction of 328 linear feet of 8-inch ductile iron water main to serve the existing residences on Shery Court. The water main will be constructed as part of a road project. The project is located on Sherry Court, Orlando, Florida from Station 50+12.00 to Station 54+00.00.

Based upon the submitted Notice and accompanying documentation, this correspondence is being sent to advise that the Department does not object to the use of such general permit at this time. Please be advised that the permittee is required to abide by Rule 62-555.405, F.A.C., all applicable rules in Chapters 62-4, 62-550, 62-555, F.A.C., and the General Conditions for All General Drinking Water Permits (found in 62-4.540, F.A.C.).

The permittee shall comply with all sampling requirements specific to this project. These requirements are attached for review and implementation.

Pursuant to Rule 62-555.345, F.A.C., the permittee shall submit a certification of construction completion [DEP Form No. 62-555.900(9)] to the Department and obtain approval, or clearance, from the Department before placing any water main extension constructed under this general permit into operation for any purpose other than disinfection or testing for leaks.

Within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service in total by the Department, both the permittee and the proposed

permittee shall sign and submit an application for transfer of the permit using Form 62-555.900(8), F.A.C., with the appropriate fee. The permitted construction is not authorized past the 30-day period unless the permit has been transferred.

This permit will expire five years from the date of issuance. If the project has been started and not completed by that time, a new permit must be obtained before the expiration date in order to continue work on the project, per Rule 62-4.030, F.A.C.

Sincerely,

G. Bret LeRoux, P.G.
Environmental
Administrator
Permitting and Waste Cleanup

Program cc: Daissan Villareal,

FDEP

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APPENDIX 4

ORANGE COUNTY UTILITY FORMS

APPENDIX B FORMS

Pressure Main Sample Collection Submittal Form

Proposed

Project: _____

Contractor: _____

LOCATION OF SAMPLE

Address: _____ Date: _____ Submitted by: _____

PIPE SAMPLE ID NUMBER _____

GPS NORTHING _____ **EASTING** _____

REASON FOR SAMPLE COLLECTION (e.g. Line Tap, Tie in, Abandonment, etc):

SAMPLE TYPE: ☐Coupon ☐Pipe Section ☐Other (description)_____

SAMPLE SIZE:_____x _____

PIPE MATERIAL: ☐Ductile Iron ☐Cast Iron ☐PCCP ☐Asbestos Cement

PIPE DIAMETER: _____

SAMPLE LOCATION ON PIPE (Clock position): _____

SITE OBSERVATIONS (Describe any relevant observations (e.g. "Plastic wrap", "gas main in proximity", "areas of softness in AC pipe", etc.)

DIGITIAL PHOTOGRAPHS: (Insert file name)

Overall Work Site _____

Exposed Pipe _____

Exterior of Sample _____

Edge of Pipe _____

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APPENDIX B FORMS

Pressure Test

February 11, 2011

Project Name: _____

Constructed by:

☐ **Force Main**
☐ **Reclaimed Main**
☐ **Water Main**

Allowable Loss – 2 Hours
L = SD (P) 1/2
148,000 *See Note Below*

DATE	LINE SEGMENT	STATION		LENGTH	N	D	START		END		LOSS (gal)		Pass /Fail STATUS
		From	To				Time	PSI	Time	PSI	Allow	Actual	

COUNTY Inspector's Name:		**Signature:**		**Date:**	
Tester's Name:		**Signature:**		**Date:**	

Comments:

Note: L - Allowable leakage in gallons per hour.
S - Length of pipe tested, in feet.
D - Nominal diameter of the pipe in inches.
P - Average test pressure during leakage test in pounds per square inch gauge.

APPENDIX B FORMS

Water Main Disinfection Certification

February 11, 2011

This form is required to schedule and document the disinfection of newly installed water mains to AWWA C-651 – latest revision. The CONTRACTOR shall complete the top portion of this form to document the subject water main, disinfection method and amount of chlorine applied. The UTILITIES inspector will document the residuals at each sample point on the bottom portion of this form.

Date Requested: _____

CONTRACTOR's Name: _____

Project Name: _____

Project Number: _____

Location: _____ Plan Sheet No.(s): _____ Starting Location: _____ Ending Location: _____ Line Length: _____ Line Size: _____ Pipe Material: _____ Type of Joint(s): _____ Gallons to Fill Pipe: _____ Pounds of Chlorine Applied: _____ Method of Disinfection Used: _____ CONTRACTOR's Signature: _____ Date: _____

For COUNTY Use Only

Certification Information

Start Time: _____ *Start PSI:* _____

Stop Time: _____ *Stop PSI:* _____

Sample Point Number	*Sample Point Location*	*Initial Chlorine Reading, Minimum 25 ppm Required*	*24 Hr Chlorine Reading, Minimum 10 ppm Required*

Lab Test Results

*Passed:*_____ *Failed:*_____ *Incomplete:*_____

Comments:

_____

_____

Inspector's Signature:_____Date: _____

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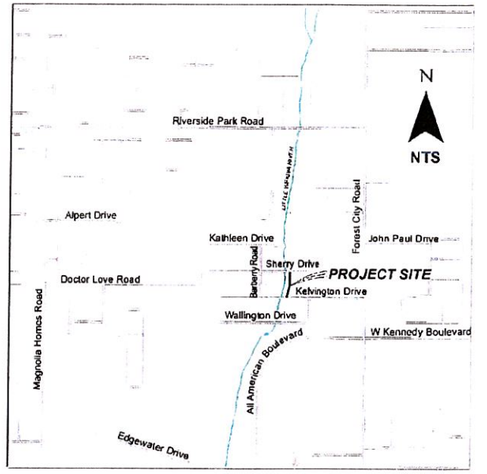
CONSTRUCTION PLANS
FOR

SHERRY COURT
WATER MAIN IMPROVEMENTS

ORANGE COUNTY - DISTRICT NO. 2

ORANGE COUNTY UTILITIES DEPARTMENT
ORANGE COUNTY, FLORIDA



PROJECT LOCATION

BOARD OF COUNTY COMMISSIONERS

TERESA JACOBS
ORANGE COUNTY MAYOR

BETSY VANDERLEY
DISTRICT 1

JENNIFER THOMPSON
DISTRICT 4

BRYAN NELSON
DISTRICT 2

EMILY BONILLA
DISTRICT 5

PETE CLARKE
DISTRICT 3

VICTORIA P. SIPLIN
DISTRICT 6

AJIT LALCHANDANI
COUNTY ADMINISTRATOR

RAYMOND E. HANSON, P.E.
DIRECTOR, ORANGE COUNTY UTILITIES DEPARTMENT

INDEX OF SHEETS

100% SUBMITTAL

MAY 2017

Design Engineer
Jose E. Hernandez, P.E.
Florida PE No. 54[illegible]

Date

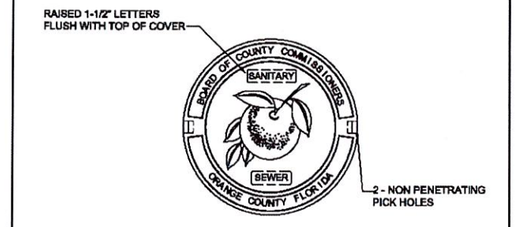
CIP FUND CODE 1482-45
OCU FILE NUMBER 92506

SHEET NO. 1

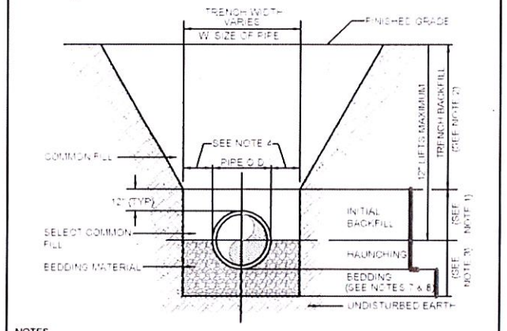
E:\Projects\Christina\SherryDrive_2016\Jan 2017\PLPRR002+OCU_WM[Apr2017]

OCU GENERAL NOTES:

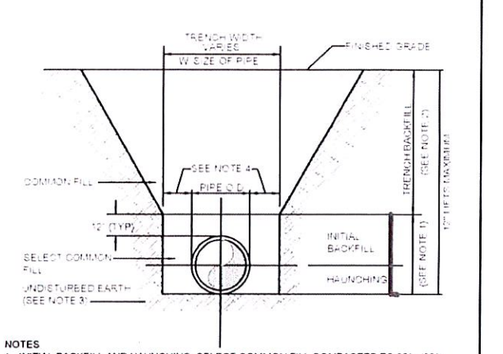
1. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING IN PROXIMITY OF WATER MAINS, WASTEWATER FORCE MAINS, GRAVITY MAINS AND RECLAIMED WATER MAINS. MAIN LOCATIONS SHOWN ON PLANS MAY NOT BE EXACT. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING EXISTING UTILITY LOCATIONS.
2. SHOULD A PIPE EMERGENCY OCCUR, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OCU DISPATCH OPERATOR (407-836-2777) AND THE OCU INSPECTOR.
3. THE CONTRACTOR SHALL NOTIFY THE OCU CONSTRUCTION DIVISION AT LEAST SEVEN DAYS PRIOR TO COMMENCEMENT OF THE CONSTRUCTION PROJECT BY CALLING (407) 254-9798.
4. THE CONTRACTOR SHALL NOTIFY THE OCU CONSTRUCTION DIVISION AT LEAST 48 HOURS PRIOR TO ANY UTILITIES CONSTRUCTION BY CALLING (407) 254-9798.
5. THE MATERIALS, PRODUCTS, AND CONSTRUCTION OF ALL UTILITIES CONNECTING TO THE OCU SYSTEM SHALL BE IN CONFORMANCE WITH THE ORANGE COUNTY UTILITIES STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL.
6. ALL OCU MAINS AND FACILITIES WITHIN THE LIMITS OF THE PROJECT SHALL BE SUPPORTED AND PROTECTED AGAINST DAMAGE DURING CONSTRUCTION.
7. THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, SHALL IMMEDIATELY REPAIR ALL DAMAGES TO OCU MAINS AND FACILITIES. IF THE REPAIR IS NOT MADE IN A TIMELY MANNER, AS DETERMINED BY OCU, OCU MAY PERFORM REQUIRED REPAIRS AND CLEANUP. THE CONTRACTOR WILL BE CHARGED FOR ALL EXPENSES ASSOCIATED WITH THE REPAIR.
8. THE CONTRACTOR SHALL ADJUST ALL EXISTING OCU MAINS AND FACILITIES IN CONFLICT WITH NEW GRADE, NEW OR ALTERED ROADWAYS, SIDEWALKS, DRIVEWAYS, OR STORM WATER IMPROVEMENTS. OCU FACILITIES TO BE ADJUSTED INCLUDE, BUT ARE NOT LIMITED TO PIPELINES, PUMP STATIONS, VALVE BOXES, AIR RELEASE VALVES, FIRE HYDRANTS, MANHOLE COVERS, AND METERS.
9. ONLY OCU SHALL OPERATE OCU WATER, WASTEWATER, AND RECLAIMED WATER VALVES. THE CONTRACTOR SHALL COORDINATE VALVE OPERATION WITH THE OCU INSPECTOR. FOR OPERATION OF MAINS NOT OWNED BY OCU, IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE APPROPRIATE UTILITY REPRESENTATIVE.
10. CONSTRUCTION ACTIVITIES SHALL NOT CAUSE INTERRUPTIONS IN WATER, WASTEWATER, OR RECLAIMED WATER SERVICE. THE CONTRACTOR SHALL COORDINATE PRE-APPROVED INTERRUPTIONS OF SERVICE WITH THE OCU INSPECTOR 7 WORKING DAYS IN ADVANCE.
11. THE CONTRACTOR SHALL PROVIDE FOR BYPASSING AND/OR HAULING WASTEWATER DURING APPROVED INTERRUPTIONS OF WASTEWATER FLOWS AND CONNECTIONS. THE CONTRACTOR SHALL SUBMIT A BYPASS PLAN SIGNED AND SEALED BY A PROFESSIONAL ENGINEER TO OCU DEVELOPMENT ENGINEERING FOR APPROVAL PRIOR TO IMPLEMENTATION BY CONTRACTOR.
12. ALL VALVES INSTALLED AS PART OF THIS CONSTRUCTION PROJECT SHALL REMAIN CLOSED DURING CONSTRUCTION. KEEP VALVES ON ALL WET TAPS CLOSED UNTIL CLEARED BY FDEP. DO NOT CONNECT NEWLY CONSTRUCTED WATER MAINS TO ANY EXISTING WATER MAINS UNLESS CLEARED BY FDEP AND OCU.
13. THE CONTRACTOR SHALL PROVIDE A JUMPER ASSEMBLY WITH A BACKFLOW PREVENTER FOR MAKING TEMPORARY CONNECTIONS TO AN EXISTING POTABLE WATER SOURCE IN ORDER TO CHLORINATE AND FLUSH NEW WATER MAINS WITH POTABLE WATER. ANY TEMPORARY POTABLE WATER CONNECTIONS TO RECLAIMED WATER OR FORCEMAIN SHALL ALSO BE EQUIPPED WITH A BACKFLOW PREVENTER.
14. FOR PVC PIPE THAT WILL BE OWNED AND MAINTAINED BY OCU, NO PIPE BENDING IS ALLOWED. THE MAXIMUM ALLOWABLE TOLERANCE FOR JOINT DEFLECTION IS 0.75 DEGREES (3-INCHES PER JOINT PER 20 FT STICK OF PIPE.) ALIGNMENT CHANGE SHALL BE MADE ONLY WITH SLEEVES AND FITTINGS.
15. FOR NON-PVC PIPE THAT WILL BE OWNED AND MAINTAINED BY OCU, LONG RADIUS CURVES, EITHER HORIZONTAL OR VERTICAL, MAY BE INSTALLED WITH STANDARD PIPE BY DEFLECTIONS AT THE JOINTS. MAXIMUM DEFLECTIONS AT PIPE JOINTS, FITTINGS AND LAYING RADIUS FOR THE VARIOUS PIPE LENGTHS SHALL NOT EXCEED 75 PERCENT OF THE PIPE MANUFACTURER'S RECOMMENDATION.



NOTES:
1. ONLY APPLIES TO UTILITIES OWNED AND MAINTAINED MANHOLES. "ORANGE COUNTY" SHALL NOT APPEAR ON PRIVATE MANHOLES.



NOTES
1. INITIAL BACKFILL SELECT COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
2. TRENCH BACKFILL COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
3. TYPE A BEDDING MATERIAL SHALL CONFORM TO FDOT NO. 57 AGGREGATE
4. 15" MAX. (12" MIN.) FOR PIPE DIAMETER LESS THAN 24" AND 24" MAX. (12" MIN) FOR PIPE DIAMETER 24" AND LARGER
5. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION
6. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW
7. BEDDING DEPTH SHALL BE 4" MINIMUM FOR PIPE DIAMETER UP TO 12" AND 6" MINIMUM FOR PIPE DIAMETER 16" AND LARGER
8. DEPTH FOR REMOVAL OF UNSUITABLE MATERIAL SHALL GOVERN DEPTH OF BEDDING ROCK BELOW THE PIPE. UTILITIES SHALL DETERMINE IN THE FIELD REQUIRED REMOVAL OF UNSUITABLE MATERIAL TO REACH SUITABLE FOUNDATION
9. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN ORANGE COUNTY RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF R/W UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS



NOTES
1. INITIAL BACKFILL AND HAUNCHING SELECT COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
2. TRENCH BACKFILL COMMON FILL COMPACTED TO 95% (98% UNDER PAVEMENT) OF THE MAXIMUM DENSITY AS PER AASHTO T-180
3. PIPE BEDDING UTILIZING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WITH TYPE A BEDDING AND TRENCHING DETAIL MAY BE REQUIRED AS DIRECTED BY UTILITIES
4. 15" MAX. (12" MIN.) FOR PIPE DIAMETER LESS THAN 24" AND 24" MAX. (12" MIN) FOR PIPE DIAMETER 24" AND LARGER
5. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION
6. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW
7. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN ORANGE COUNTY RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS

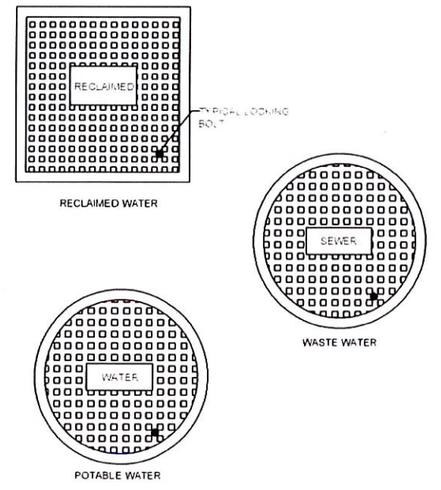
MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)

TYPE	PIPE SIZE									
	PVC				DIP					
	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"
37° BEND	25	36	46	55	64	85	77	89	105	120
45° BEND	10	15	19	23	26	27	32	37	44	50
22 1/2° BEND	5	8	9	11	13	15	16	18	21	24
11 1/4° BEND	3	4	5	6	6	7	8	9	10	12
PLUG OR BRANCH OF TEE	53	74	97	117	135	138	166	194	231	265
VALVE	27	38	48	59	66	69	83	97	116	133
REDUCER	VARIES BY SIZE. TO BE DETERMINED BY THE DESIGN ENGINEER.									

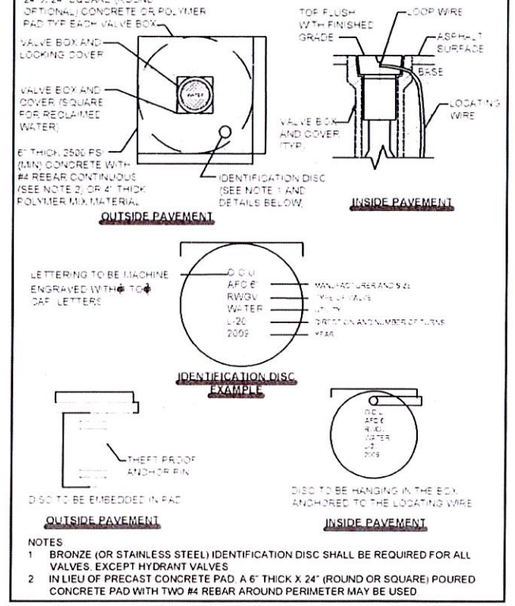
NOTES
1. FITTINGS SHALL HAVE RESTRAINED JOINTS UNLESS OTHERWISE INDICATED
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN LENGTH SHOWN IN THE TABLE
3. WHERE TWO OR MORE FITTINGS ARE IN SERIES, SELECT FITTING RESTRAINT LENGTH THAT YIELDS THE LONGEST RESTRAINT DISTANCE
4. ALL INLINE VALVES SHALL BE RESTRAINED
5. WHERE INTERNAL RESTRAINED JOINTS ARE USED, THE ENTIRE BELL SHALL BE PAINTED RED
6. LENGTHS SHOWN IN THE TABLE WERE CALCULATED IN ACCORDANCE WITH PROCEDURES OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" GUIDELINES PUBLISHED BY DIPRA, USING THE ASSUMPTIONS SHOWN BELOW

WORKING PRESSURE 150 PSI
SOIL DESIGNATION SAND AND SILT
LAYING CONDITIONS 2
DEPTH OF COVER 3 FT
SAFETY FACTOR 1.5
CONVERSION FACTOR FOR PVC PIPE 1.25

THE DESIGN ENGINEER SHALL INCREASE THE VALUES IN THE TABLE AS WARRANTED BY SITE-SPECIFIC SOIL DESIGNATIONS, LAYING CONDITIONS, PIPE MATERIAL, ETC. FOR DIP ENCASED IN POLYETHYLENE, INCREASE THE GIVEN VALUE BY A FACTOR OF 1.25



NOTE
1. LOCKING LIDS ARE REQUIRED ON ALL VALVE BOXES

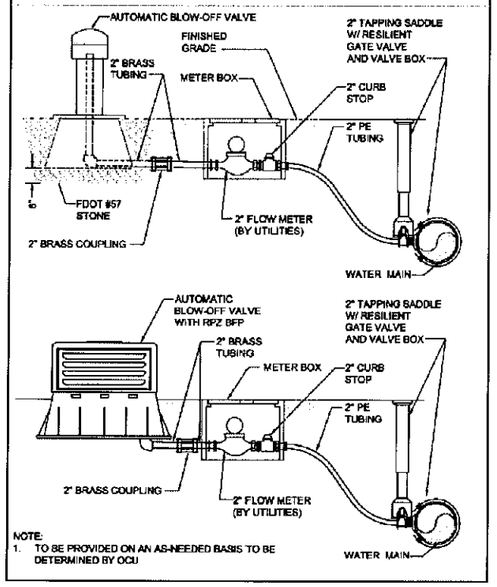


NOTES
1. BRONZE (OR STAINLESS STEEL) IDENTIFICATION DISC SHALL BE REQUIRED FOR ALL VALVES, EXCEPT HYDRANT VALVES
2. IN LIEU OF PRECAST CONCRETE PAD, A 6" THICK X 24" (ROUND OR SQUARE) POURED CONCRETE PAD WITH TWO #4 REBAR AROUND PERIMETER MAY BE USED

ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A | STANDARD DRAWINGS | GENERAL

DATE: February 11, 2011 — **BLOW OFF VALVE, AUTOMATIC, WATER** — FIGURE A122-3

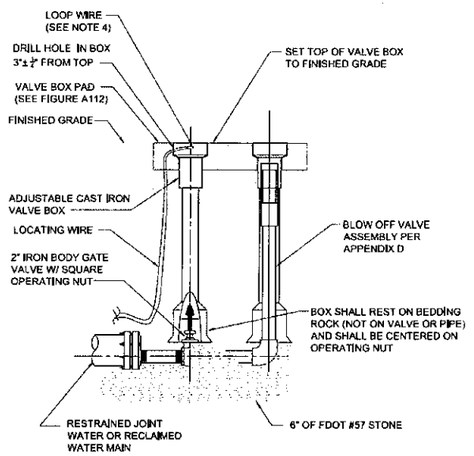


NOTE:
1. TO BE PROVIDED ON AN AS-NEEDED BASIS TO BE DETERMINED BY OCU

ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A | STANDARD DRAWINGS | GENERAL

DATE: February 11, 2011 — **PERMANENT BLOW OFF VALVE, MANUALLY OPERATED, WATER AND RECLAIMED WATER** — FIGURE A122-1

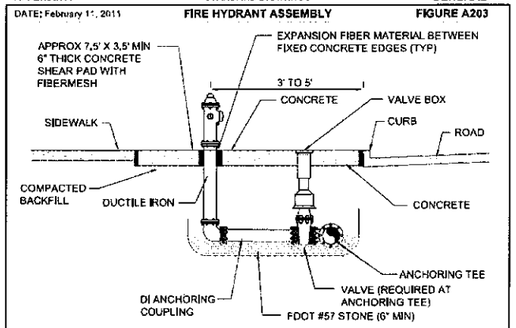


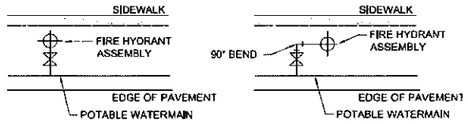
NOTES:
1. INSTALL MANUFACTURED BLOW OFF BOXES AS DEPICTED IN APPENDIX D, BRING VALVE BOX TO GRADE AND INSTALL CONCRETE COLLAR.
2. FOR USE AT PERMANENT WATER AND RECLAIMED WATER DEAD-ENDS, SUCH AS CUL-DE-SACS.
3. LOCATING WIRE SHALL BE CONTINUOUS INSIDE THE VALVE BOX AND SHALL EXTEND 12" ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.

ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A | STANDARD DRAWINGS | GENERAL

DATE: February 11, 2011 — **FIRE HYDRANT ASSEMBLY** — FIGURE A203





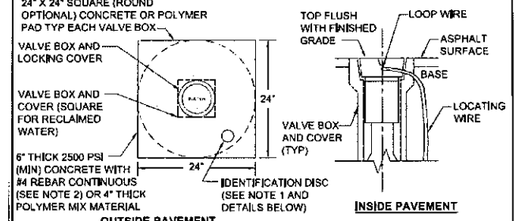
STANDARD CONFIGURATION — ALTERNATE CONFIGURATION

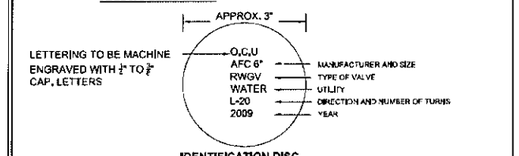
NOTES:
1. CENTER OF THE FLANGE CONNECTION SHALL BE 5" FROM THE TOP OF THE SLAB.
2. BARREL COLORS: PRIVATE HYDRANTS - RED; PUBLIC HYDRANTS - SILVER.
3. BONNET COLORS: TO BE DETERMINED BY FLOW TEST.

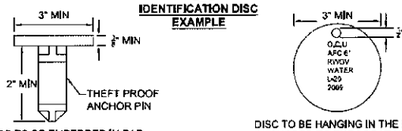
ORANGE COUNTY UTILITIES
STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL

APPENDIX A | STANDARD DRAWINGS | GENERAL

DATE: February 11, 2011 — **VALVE BOX PAD** — FIGURE A112







NOTES:
1. BRONZE (OR STAINLESS STEEL) IDENTIFICATION DISC SHALL BE REQUIRED FOR ALL VALVES, EXCEPT HYDRANT VALVES.
2. IN LIEU OF PRECAST CONCRETE PAD, A 6" THICK X 24" (ROUND OR SQUARE) POURED CONCRETE PAD WITH TWO #4 REBAR AROUND PERIMETER MAY BE USED.

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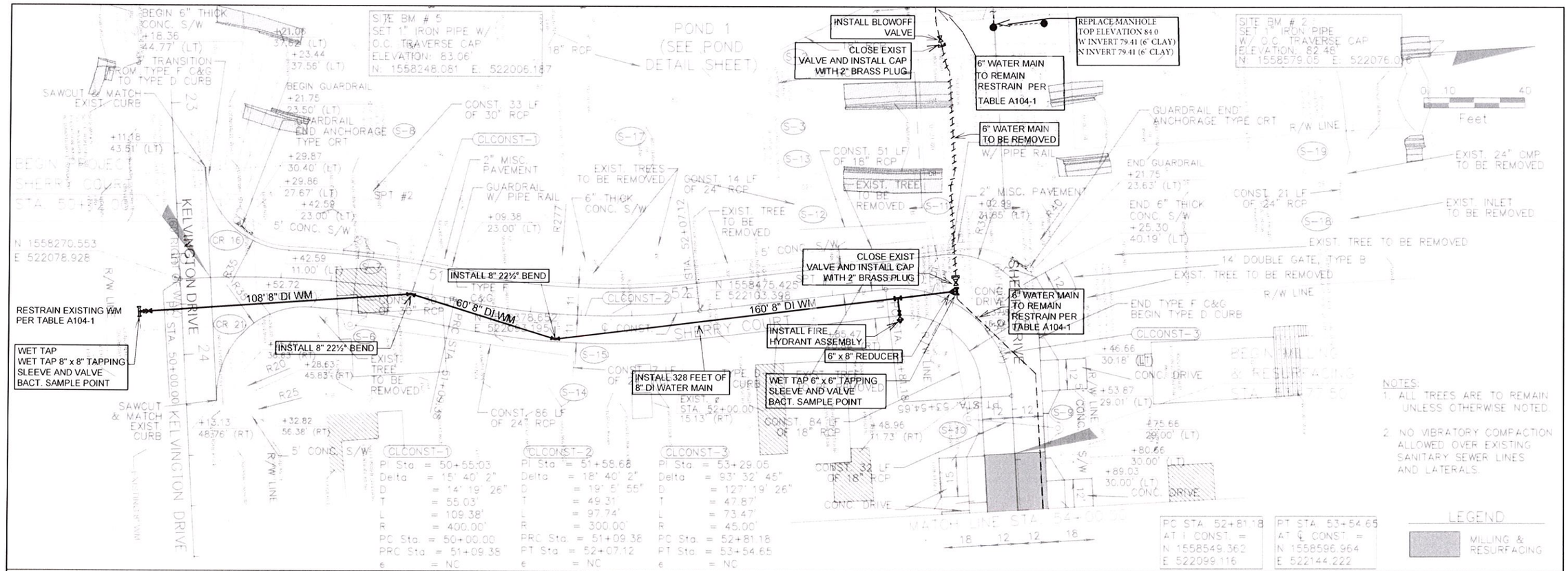
REVISIONS		ORANGE COUNTY UTILITIES DEPARTMENT	ORANGE COUNTY UTILITIES DEPARTMENT ENGINEERING DIVISION 9150 CURRY FORD ROAD ORLANDO FL 32825		SHERRY COURT WATER MAIN IMPROVEMENTS GENERAL NOTES AND CONSTRUCTIION DETAILS	SHEET NO. 3
DATE	DESCRIPTION					



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REVISIONS					
DATE	DESCRIPTION		ORANGE COUNTY UTILITIES DEPARTMENT ENGINEERING DIVISION 9150 CURRY FORD ROAD ORLANDO, FL 32825	Design Engineer: Jose E. Hernandez, P.E. Florida PE No. 54612 Date:	SHERRY COURT WATER MAIN IMPROVEMENTS PLAN AND PROFILE STA. 50+12.00 TO STA 54+00.00	SHEET NO. 4

VALVES

ID Number	Plan Sheet	Easting	Northing	Elevation	Valve Type	Main Type	Size	Valve Manufacturer

FITTINGS

ID Number	Plan Sheet	Easting	Northing	Elevation	Main Type	Fitting Type	Size	Comments

HYDRANTS

ID Number	Plan Sheet	Easting	Northing	Elevation	Manufacturer	Model #	Comments

PIPES

ID Number	Plan Sheet	Easting	Northing	Elevation	Main Type	Type of Shot	Construction Method	Material	Pressure Class	Manufacturer	Comments