Financial Management Department
Purchasing Division
1112 Manatee Ave W Suite 803
Bradenton, FL 34205
Phone: (941) 749-3014
www.mymanatee.org

February 3, 2016

TO: All Interested Bidders

SUBJECT: Invitation for Bids #16-0435CD
Water Treatment Plant- Biological Treatment Unit

ADDENDUM #2

Bidders are hereby notified that this Addendum shall be acknowledged on page Bid Form-1 of the Bid Form and made a part of the above named bidding and contract documents. Bids submitted without acknowledgment of the Addendum will be considered incomplete.

The following items are issued to add to, modify, and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding and contract documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date, shall conform to the additions and revisions listed herein.

1. **CLARIFICATION** of Article 1.04.2, Substitutions and Product Options, of Section 01600 on page 1600-2 of the Technical Specifications:

   The County and the Engineer of Record will not provide review and approval of "or equal" products prior to bid award. Prospective bidders are directed to bid on the products specified within the respective sections of the Technical Specifications. After award of the project, the County and the Engineer of Record will review requests for substitutions from the awarded Contractor, if requested, during shop drawing submittals to determine "or equal" status to the product(s) specified in the Technical Specifications.

2. **DELETE** all of Section 02615 Ductile Iron Pipe and Fittings that are in the Technical Specifications, and **INSERT** the Section 02615 Ductile Iron Pipe and Fittings, (pages 1 thru 5) that are attached to this Addendum #2.
3. **DELETE** all of Section 02640 Valves and Appurtenances that are in the Technical Specifications, and **INSERT** the Section 02640 Valves and Appurtenances, (pages 1 thru 26) that are attached to this Addendum #2.
4. **DELETE** Table 09900-1 Painting Schedule that is in Article 3.12.A of Section 09900 of the Technical Specifications, and **INSERT** the Table 09900-1 Painting Schedule that is attached to this Addendum #2.
5. **DELETE** Plan Sheet Number E.03 of the Plan Set and **INSERT** the revised Plan Sheet E.03 that is attached to this Addendum #2.

6. **Please see attached Clarification of Engineer's Changes and responses to questions asked by potential bidders.**

An additional Addendum will issued in the near future that will address all questions submitted prior to the deadline for clarifications.

END OF ADDENDUM #2

Bids will be received at Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, Florida 34205 until **Friday, February 19, 2016 at 3:00 PM.**

Sincerely,

Melissa M. Wendel, CPPO
Purchasing Official

McKIM&CREED

ENGINEERS

SURVEYORS

PLANNERS

To All Bidders,

Subject: Invitation for Bid #16-0435CD
Water Treatment Plant – Biological Treatment Unit
Manatee County Project No.: 6085870

Addendum No. 2 **February 2, 2016**

The following items are issued to modify and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding and contract documents, and all costs involved shall be included in the bid prices. Bids to be submitted on the specified bid date shall conform to the additions and revisions listed herein.

PART I – PERTAINING TO THE DRAWINGS

1. Sheet C-1.10 on the PVC sewer line to the south of San MH-1; the tie in calls for 6" x 4" reducer and 6" fittings - use 8" x 8" x 4" Wye to make connection between existing 4" PVC lateral, new 8" PVC sanitary, and new 8" PVC cleanout.
2. Sheet C-2.10; change 10" forcemain to 8" forcemain in plan view to match profile view.
3. Sheet M-3.2 - Change label from ARV-414B to ARV-414C for the east valve labeled ARV-414B
4. Sheet M-3.5 - Change label ARV-414B to ARV-414C on M-3.6, section B.
5. Sheet M-3.5 section M; change scale to ¼"=1'-0". Change the 15'-10" dimension to 14'-6".
6. Sheet M-6.1 – Change label for 4" tap on the 12" 90 bend for ARV-515 to 3".
7. Drawing C-1.14 – Call out for "24" DIP OVERFLOW ENCASED IN CONCRETE (x2)" – disregard the "ENCASED IN CONCRETE."
8. Drawing I-0.2 – Change Ethernet Fiber Unmanaged Switch (OIT, TYPE 3) to TYPE 2 for PLC 7.
9. Drawing I-0.2 – Unmanaged switches shown in the each of the six filter consoles shall be TYPE 2.
10. Drawing E-1.3 Call out – Add "On concrete Pads" to "2000kVA Unit Outdoor Substations XFMR'S 7 & 8"
11. Reissue Drawing E-0.3 - Proposed MV One Line

1365 Hamlet Avenue

Clearwater, FL 33756

727.442.7196

Fax 727.461.3827

www.mckimcreed.com

12. Drawing E-1.1 Add to Note 1 "(Size control power transformer with 25% spare capacity"
13. Drawing E-2.1 Note 3 Add – "As Needed"
14. Drawing E-2.7 Call out Remove "Ground rod of grid system (typ.)" Add – "Ground Rd (Bond to grid system typ.)"
15. Drawing E-3.2
    a. Add 4 Spare 20A 1P Breakers to panel UPS-UPP
    b. Add 2 Spare 20A 1P Breakers to panel MPZ
    c. Add 2 Spare 20A 1P Breakers to panel EMG-UPP
    d. Add 1 spare 40A, 1 Spare 20A 2P and 2 spare 20A 1P Breakers to MPC-1

PART II – PERTAINING TO THE SPECIFICATIONS

1. Replace Specification 02615 Ductile Iron Pipe and Fittings with the included attachment.
2. Replace Specification 02640 Valves and Appurtenances with the included attachment.
3. Specification 13310, 2.13, A., first sentence – remove "3/16-inch thick" and replace with "14 gauge."
4. Section 13320, 2.02, A., first sentence – remove "3/16-inch thick" and replace with "14 gauge."
5. Specification Section 13310-5, F – replace first sentence with – "Ultrasonic Level Transmitters shall be Siemens Hydroranger 200 with Echomax XPS-15 sensors or Rosemount Model 3102 sensor/transmitter and model 3409 controller, with analog signal cable, between sensor/transmitter and controller, included."
6. Specification Section 13310-11, D – replace with – "Lever type limit switches shall be Model 9007C type as manufactured by Square D."
7. Specification Section 13320-5, D1 – First sentence, delete "galvanized steel"; and replace with "aluminum."
8. Specification Section 13320-8, G5 – Replace the last sentence with – "Relays shall be as manufactured by Square D."
9. Specification Section 13320-8, H1 – Replace the last sentence with – "Power supplies shall be DIN rail mounted type, manufactured by SOLA."

10. Specification 16075, 3.01, B., 9., c. – replace chart with:

Color	Legend
Green	Stopped, Closed
Red	Running, Open
Amber	Alarm
Blue	Power
White	Status

11. Painting Schedule Table 09900-1 has been replaced; see attachment. Clearwells have been added to Painting System J-3 and Concrete has been added to Painting System A-1. Clarifications added regarding painting of floors to Painting Systems A-4 and C-1.

PART III – QUESTIONS AND CLARIFICATIONS

CLARIFICATIONS:

1. The design conditions of the vertical turbine pump specified in Section 11206, 3.07 are being evaluated, and if necessary, will be revised on a subsequent Addendum.
2. The Contractor shall be responsible for payment of the following Manatee County Building Department fees as follows:
    a. Accessory Structure (BTU) - $1,006.00
    b. Concrete Structure (EQ) - $261.62
    c. Electrical (Plant Drain Pump Station) - $72.00
    d. Electrical Application (Grinder Lift Station) $72.00
3. The Contractor shall be responsible for payment of the following East Manatee Fire Rescue District fees:
    a. Assessed User Fee - $65.00
4. In addition, the Contractor shall be responsible for payment of all fees required to obtain the Final Certificate of Occupancy.
5. The Contractor will be provided with conformed Drawings and Specifications subsequent to the award of the Construction Contract.

QUESTIONS

Question 1 What is the budget amount or engineers estimate for this project, thanks?

Response 1 ***The Engineer's Opinion of Probable Construction Cost is $22,174,000.00***

Question 2 Per the contract documents issued for Bid October 2015, the following specifications only list Square D/Schneider Electric as an approved vendor for this project. General Electric would like to formally submit to be approved on the following specification sections for this project: 16143 – Disconnect Switches, 16260 – Low Voltage Variable Frequency Drives, 16271 – Dry Type Low Voltage Distribution Transformers, 16272 – Secondary Unit Substations, 16289 – Surge Protective Devices, 16423 – Motor Control Centers, 16430 – Low Voltage Switchgear, and 16442 – Panelboards. Will General Electric be accepted as a supplier on the indicated spec sections above provided they meet the spec requirements?

Response 2 **"Approved equal" will be addressed during equipment submittal phase, subsequent to the award of the Construction Contract.**

Question 3 Section 02640 Valves and Appurtenances Article 2.03 Butterfly Valves we respectfully request approval for Val-Matic butterfly valves. Val-Matic butterfly valves have been approved for the recent Manatee County MARS projects.

Response 3 **Due to the County's recent acceptance of alternative valve suppliers, Val-Matic butterfly valves are acceptable.**

Question 4 Section 02640 Valves and Appurtenances Article 2.04 Plug Valves we respectfully request approval for Val-Matic 100% port plug valves. Kennedy plug valves do not meet the 100% port design specifications, which will sole source Dezurik plug valves. Val-Matic plug valves are currently installed within Manatee County.

Response 4 **Due to the County's recent acceptance of alternative valve suppliers, Val-Matic plug valves are acceptable.**

Question 5 Section 02640 Valves and Appurtenances Articles 2.06 and 2.11 Air Release Valves and Slow Opening Air and Vacuum Valves we respectfully request approval of Val-Matic air release valves. Val-Matic air release valves are used currently within Manatee County and approved for the MARS project.

Response 5 **Due to the County's recent acceptance of alternative valve suppliers, Val-Matic air release and slow opening air and vacuum valves are acceptable.**

Question 6 Section 02640 Valves and Appurtenances Article 2.12 Check Valves we respectfully request approval for Val-Matic swing check valves. Val-Matic swing check valves are used by Manatee County.

Response 6 **Due to the County's recent acceptance of alternative valve suppliers, Val-Matic check valves are acceptable.**

Question 7 We respectfully request consideration for the Val-Matic Surgebuster be an alternative to the swing check valves specified. The Val-Matic Surgebuster is guaranteed not to slam, has a 25 year warranty on the only moving part, the disc. Our Surgebuster can be supplied at a lower cost for the larger valves requiring air cushion to prevent slamming.

Response 7 **Review of alternate technology will be handled through the submittal process subsequent to the award of the Construction Contract.**

Question 8 Section 11201 Slide Gates and Weir Gates we respectfully request approval for Orbinox stainless steel slide gates. Orbinox knife gates are approved for use in this project. Orbinox slide gates have an allowable leakage rate of 0.05 gpm, which exceeds AWWA and specification requirements.

Response 8 **Section 11201, 2.01, A., 4., allows for…"engineer approved equal," which would be addressed through the submittal process subsequent to the award of the Construction Contract.**

Question 9 Section 02615 2.01F – "All joints on the WTP site shall be fully restrained…" Please provide a specification for restraint requirements for pipe and fittings.

Response 9 **Specification section 02615 has been replaced in its entirety, see attachments. Refer to Section 2.01, E. for restrained joint requirements.**

Question 10 Please provide a specification for flange accessory kits.

Response 10 **Specification section 02615 has been replaced in its entirety, see attachments. Refer to Section 2.01, J., and K. for flange accessory kit requirements.**

Question 11 Sheet M-0.4 has a note called out for "ARV (Typ)" but there is not a detail or callout for the ARV. In the valve schedule in section 02640 it indicates these to be 8" combination air valve. Will these require an isolation valve? Please provide your expectations at these areas.

Response 11 **Install 8" butterfly valves at the base of each ARV for all above grade meter and motorized valve assemblies shown on Drawings M-0.3 and M-0.4. Specification section 02615 was revised to include the BFVs and updates for 6" and 8" ARVs. Specification section 02615 has been replaced in its entirety, see attachments. Install a 2" stainless steel ball valve at the base of the ARV shown for the above ground meter assembly on Drawing M-0.5.**

Question 12 Valve HV-114B is listed as MJ in the schedule, but shown as FL on the drawings. Please clarify.

Response 12 **HV-114B is to be flanged and has been updated in the valve schedule. Specification section 02640 has been replaced in its entirety, see attachments.**

Question 13 Valve MOV-110 is listed as MJ in the schedule, but shown as FL on the drawings. Please clarify.

Response 13 **MOV-110 is to be flanged and has been updated in the valve schedule. Also, note that Specification section 02640 has been replaced in its entirety, see attachments.**

Question 14 There are several locations where the drawings indicate a restrained flanged dismantling joint. There is not a specification on this item. Please provide a specification.

Response 14 **See revised Specification 02640, 2.08. Also, note that Specification Section 02640 has been replaced in its entirety, see attachments.**

Question 15 Valve MOV-111 is shown on sheet M-0.4 and C-1.13 as 36", but the valve schedule indicates 30". Please clarify.

Response 15 **MOV-111 is to be 36" and has been updated in the valve schedule. Also, note that Specification section 02640 has been replaced in its entirety, see attachments.**

Question 16 Valve MOV-112 is listed as MJ in the schedule, but shown as FL on the drawings. Please clarify.

Response 16 **MOV-112 is to be flanged and has been updated in the valve schedule. Also, note that Specification section 02640 has been replaced in its entirety, see attachments.**

Question 17 Valve HV-116B is listed as MJ in the schedule, but shown as FL on the drawings. Please clarify.

Response 17 **HV-116B is to be flanged and has been updated in the valve schedule. Also, note that Specification section 02640 has been replaced in its entirety, see attachments.**

Question 18 Sheet C-1.10 on the PVC sewer line to the south of San MH-1 the tie in calls for 6" x 4" reducer and 6" fittings, but the main line is designated as 8." Is the main line 6" or should the fittings be 8"?

Response 18 **Use 8" x 8" x 4" Wye to make connection between existing 4" PVC lateral, new 8" PVC sanitary and new 8" PVC cleanout.**

Question 19 The valve schedule has valve HV-203E listed twice. Please adjust the valve schedule accordingly.

Response 19 **Noted. Specification section 02640 has been replaced in its entirety, see attachments.**

Question 20 The valve schedule indicates valves HV-203F, 203G, and 110A all being installed on existing lines, but they are not shown on the drawings. Please provide detail where these valves are being installed.

Response 20 **Valves HV-203F, 203G, and 110A are noted as existing valves and are located northeast of MOV assembly #3 as shown on Sheet C-1.16.**

Question 21 Sheet C-2.10 in the plan view shows 10" Force main, but the profile shows 8". Please clarify.

Response 21 **Pipe is to be 8".**

Question 22 On the offsite force main there are 12 places where we are to replace the water meter assembly. Please provide sizing and detail for the extent of the replacement at each location for bidding purposes.

Response 22 **Details for water meter replacement are shown in UW-17 and UW-19 on Drawing C-0.5. For the purposes of bidding assume all will be 1" meters. During construction these will be field verified and replaced in like size to existing, and any additional cost or credit will be addressed at that time.**

Question 23 The valve schedule indicates seven MJ gate valves along the line. We have counted eighteen (18). Please clarify.

Response 23 **Eighteen MJ gate valves are required and are included on the revised valve table. Specification section 02640 has been replaced in its entirety, see attachments.**

Question 24 The Valve schedule shows valve HV-612 as 6", but the drawings show 8". Please clarify.

Response 24 **HV-612 is to be 8" as shown on the revised valve schedule. Specification section 02640 has been replaced in its entirety, see attachments.**

Question 25 Sheet M-3.5 section M shows a scale of 1/8"=1'-0", but that doesn't scale properly with the other drawings. What is this scale supposed to be? It mostly scales at ¼"=1'-0" but the 15'-10" dimension doesn't match any scale.

Response 25 **The scale for section M is ¼" = 1'-0". The 15'-10" dimension should be 14'-6".**

Question 26 Section 13310 2.13 A Sunshield states "All outdoor mounted transmitters shall be provided with 3/16-inch thick, 316 stainless steel sunshields" 3/16" is considered structural sheet material not sheet metal typical for this application. Please specify a reasonable Gauge for this application.

Response 26 **Section 13310, 2.13, A., first sentence – remove "3/16-inch thick" and replace with "14 gauge."**

Question 27 Section 13320 2.02 A 1 Outdoor Enclosures states " All outdoor Enclosures shall be rated 4X constructed of 3/16-inch thick stainless steel with powder epoxy coating." None of the three listed manufactures of Enclosures use 3/16-inch thick material for their product. Typical Hoffman catalog list 16 and 14 Gauge as typical thickness for Enclosure fabrication. Please specify a standard Gauge for this application.

Response 27 **Section 13320, 2.02, A., first sentence – remove "3/16-inch thick" and replace with "14 gauge."**

Question 28 Section 13330 2.15 A Network Equipment list Type 1 (Managed), and Type 2 (unmanaged) switch specifications. Drawing I-0.2 shows one type 1 switch in PLC 7 and 6 type 3 switches. Please clarify a Type 3 switch or give specification for Type 3 switch.

Response 28 **Drawing I-0.2 – Change Ethernet Fiber Unmanaged Switch (OIT, TYPE 3) to TYPE 2 for PLC 7.**

Question 29 Drawing I-0.2 shows two unmanaged switches in each of six filter consoles. Please clarify which type of switch these are.

Response 29 **Unmanaged switches shown in the each of the six filter consoles shall be TYPE 2.**

Question 30 Section 13300 1.09 Definition and Abbreviations Please define PSS as used in this bid document.

Response 30 **PSS: Pumping System Supplier**

Question 31 Sheet S-0.1 note 3.1 makes the contractor responsible for performing adjustments made by the engineer post bid. Please confirm these adjustments will be handled through a cost and time change order.

Response 31 **Any required adjustments are part of the contract with no additional cost to the owner. Project geotechnical report is available for review.**

Question 32 In the specification section B section B.02 states the site visit and inspection is mandatory, but the pre-bid is not mandatory. How do

we know who participated in the site inspection if the pre-bid isn't mandatory?

Response 32 **The County logs visitors to the Water Treatment Plant.**

Question 33 Will the concrete ceilings and concrete walls in the electrical and storage rooms get coated ?

Response 33 **The walls in the electrical and storage rooms shall be coated; the ceilings in the electrical and storage rooms will not be coated. Reference, the revised painting schedule in section 09900, item A.8, included as an attachment.**

Question 34 Will the remaining interior concrete walls & ceilings at the Biological Treatment Unit get coated?

Response 34 **Yes, with the exception of the ceiling directly above the filters. Reference, the revised painting schedule in section 09900, item A.1, included as an attachment.**

Question 35 Does the ceiling above the Filters get coated ?

Response 35 **No.**

Question 36 Will the floor of the Filter & Clear Well get coated ?

Response 36 **Yes. For the filters reference, the revised painting schedule in section 09900, item A.4, included as an attachment.**

Question 37 Will the Clear Well submerged walls & ceilings get coated?

Response 37 **Yes. "Clearwells" has been added to item A.4 in the revised painting schedule section 09900, included as an attachment.**

Question 38 Will the floor in the Backwash Equalization Tanks get coated ?

Response 38 **Yes. Reference note 5, drawing S-6.1.**

Question 39 The backwash waste lines on sheet M-3.5 section M are shown as 30", but the valve schedule shows the valves as 20". Please clarify which is correct.

Response 39 **Backwash waste valves are 30" as shown on sheet M-3.5 and on the valve schedule.**

Question 40 Sheet M-3.2 on the Backwash Supply line there are two ARV valves both labeled ARV-414B, and the one labeled ARV-414A is at the pumps. So should the quantity on the valve schedule be 3 or should one be labeled something else. Please clarify.

Response 40 **Valve schedule has been updated to quantity of 3 for the ARVs. Change label from ARV-414B to ARV-414C for the east valve labeled ARV-414B on Drawing M-3.2; change label ARV-414B to ARV-414C on M-3.6, section B. Specification section 02640 has been replaced in its entirety, see attachments.**

Question 41 There are six 4" butterfly valves for the bypass line at the air scour valves that are not shown on the valve schedule. Please add to the schedule.

Response 41 **The 4" plug valves have been added to Specification section 02640, which has been replaced in its entirety, see attachments.**

Question 42 The valve schedule shows three inline check valves (CV-510A, 510B, and 510C) at the equalization tank, but we can't find 510C. Please clarify.

Response 42 **See north 24" overflow on Drawing M-6.1 (located directly southeast of EQ tank) for CV-510C location.**

Question 43 Sheet M-6.1 has a 4" tap on the 12" 90 bend for ARV-515, but the valve schedule shows this as being 3". Please clarify.

Response 43 **ARV-515 shall be 3".**

Question 44 Polyethylene encasement is called out in spec section 02615 page 5, but there is not a specification on type, color, or thickness of encasement. Please provide information.

Response 44 **See revised Specification 02615, 2.01, B. for type, color and thickness of polyethylene encasement. Specification section 02615 has been replaced in its entirety, see attachments.**

Question 45 Does the Venturi flowmeter testing require calibration of each Venturi using the flow laboratory's normal methods and without any special piping configuration at the test facility? This testing would specifically provide Venturi flowmeter accuracy, discharge coefficient, and permanent pressure loss under conventional laboratory testing conditions and procedures? ***Note: The TESTING specification does not include nor does it imply that the testing requires that the actual plant piping configuration be duplicated in the flow laboratory. If the County's desire is to test flowmeters using piping configurations similar to the plant, then a more detailed specification is necessary, along with a detailed calibration program that fully describes calibration methods and piping details.***

Response 45 **Yes, the venturi flowmeters testing requires calibration using conventional laboratory testing conditions and procedures.**

Question 46 Will Manatee County require that the Venturi flowmeters be calibrated using piping and equipment valves/tees/elbows/etc.…) of a similar physical configuration to that in which the flowmeter will be installed in the new plant? If yes, then who is responsible for providing the plant piping configuration to the laboratory? ***Below is a common Flow Lab specification that does not include matching the plant piping configuration. Flow Calibration – Laboratory Conditions: Each Venturi flowmeter shall be flow calibrated by an independent flow laboratory for meter accuracy, actual discharge coefficient, and headloss. At a minimum, each Venturi meter shall be tested at 12 points over the range of minimum to maximum flow rates. Certified copies of the final test results to substantiate the flow meter's accuracy, discharge coefficient and permanent pressure loss shall be submitted within 4 weeks of approval of the calibrations. Venturi meters that fail to meet the specified requirements for accuracy and headloss shall be rejected and the manufacturer will be required to supply new Venturi meters and perform the same testing as is required above. All costs related to re-testing or replacing any unacceptable meters will be the responsibility of the Venturi meter manufacturer. The engineer/owner may elect to witness the calibration.***

Response 46 **No, with the exception of the individual Filter Effluent and Rapid Mix A and B which are installed with attached flow control valves. As the valve is considered part of the venturi**

measurement, testing should include the valve. The contractor shall coordinate with the venturi manufacturer on the logistics of the testing.

Sincerely,
MCKIM & CREED, INC.

Phillip J. Locke, P.E.
Senior Project Manager

SECTION 02615 DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.

B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.

D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe installed underground shall be poly wrapped unless noted otherwise on the plans.

E. The Contractor shall coordinate all deliveries with the related Vendor(s) in a manner not to impede construction.

1.02 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. The Contractor shall submit to the Engineer, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.

C.. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

D. Except as otherwise shown on the Drawings, either push-on, mechanical or flanged joints shall be used. Prior to commencing work, jointing systems for pipe shall be submitted to the Engineer for approval. The joints of all buried pipe, fittings and valves on the treatment plant site shall be restrained.

E. All ductile iron pipe and fittings to be installed under this Contract shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish in duplicate to the Engineer sworn certificates of such tests and their results.

F. Shop Drawings including layout drawings shall be submitted to the Engineer for approval and shall include dimensioning, methods and locations of supports and all other pertinent technical specifications for all piping to be furnished. Layout Drawings shall be to scale, and shall clearly indicate the amount of pipe to be restrained from each fitting.

G. The Contractor shall transmit from the Vendor to the Engineer, the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

H. The Contractor shall submit to the Engineer, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ductile iron pipe shall conform to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, current editions. Thickness of pipe shall be Class 50 or pressure Class 350. All pipe not buried shall be Class 53. All ductile iron pipe shall be clearly marked on the outside of the barrel to readily identify it from cast iron.

B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 feet. Unless otherwise called for in the Contract Documents, unrestrained joint pipe shall be either the rubber-ring type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or approved equal.

C. Fittings up to 24” shall be pressure rated for 350 psi, fittings 30” and up shall be pressure rated to 250 psi both shall meet the requirement of AWWA C110 or AWWA C153 except flanged fittings shall be rated for 250 psi. Rubber gaskets shall conform to ANSI A21.11 for mechanical and push-on type joints for diameters up to 14" diameter. Gaskets for 16" diameter and larger pipe shall be EPDM (Ethylene-Propylene Dine Monomer) such as the "Fastite Gasket" of American Ductile Iron Pipe Co., or approved equal.

D. Water Mains: All ductile iron pipe and fittings shall have a standard thickness cement lining on the inside in accordance with AWWA/ANSI C104/A21.4 and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. All interior linings shall be EPA/NSF approved.

E. Thrust restraint devices shall be provided at all horizontal and vertical bends and fittings, in casings under roads and railroads and at other locations specifically indicated on the construction drawings. Thrust restraint devices shall be either concrete thrust blocks or restraining glands as manufactured by Star Pipe Products, Stargrip 3000 and 3100, Allgrip 3600, or as manufactured by EBAA Iron Sales, Megaflange, 2000 PV, or other approved equal restraining gland products. Restrained joints, where used, shall be installed at bend and fitting locations and at pipe joint locations both upstream and downstream from the bends or fittings at distances as required by these Standards. Restrained joint pipe fittings shall be designed and rated for the following pressures:

350 psi for pipe sizes up to and including 16" diameter
250 psi for pipe sizes >16" diameter and above

F. Mechanical joint fittings up to 24” shall be pressure rated for 350 psi fittings 30”

and up shall be pressure rated to 250 psi both shall meet the requirement of AWWA C110 or AWWA C153 except flanged fittings shall be rated for 250 psi. Rubber gaskets shall conform to AWWA C111 for mechanical and push-on type joints and shall be EPDM (Ethylene-Propylene Diene Monomer) rubber for potable water and reclaimed water pipelines. Standard gaskets shall be such as Fastite as manufactured by American Cast Iron Pipe Company, or an approved equal. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used where both classes of contaminates are found.

G. Force Main: All ductile iron pipe and fittings shall have a factory applied fusion bonded epoxy or epoxy and polyethylene lining on the inside in accordance with manufacturer's specifications and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. The interior lining is to be based on manufacturer's recommendation for long-term exposure to raw sewage.

H. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures: 350 psi for pipe sizes up to and including 24" diameter; 250 psi for pipe sizes 30" diameter and above. All joints on the WTP site shall be fully restrained. Offsite forcemain shall be restrained as shown on the civil detail sheets, unless otherwise indicated.

I. Flanged ductile-iron pipe for above ground piping shall conform to current ANSI/AWWA C115/A21.15 with factory applied screwed long hub flanges except as otherwise specified hereinafter. Flanges shall be faced and drilled after being screwed on the pipe with flanges true to 90 degrees with the pipe axis and shall be flush with end of pipe conforming to ANSI B16.1, 125 pounds standard. Flanged pipe shall be special thickness Class 53.

J. Flanged fittings shall be ductile as specified herein. Flanges and flanged fittings shall be flat face and shall conform to ANSI/AWWA C110/A21.10 for 250 psi pressure rating. Full face type 1/8-inch thick SBR rubber ring gaskets shall conform to ANSI/AWWA C111/A21.11.

K. Bolts and nuts on flanged fittings shall be hot dipped galvanized steel and conform to AWWA C110 and ANSI B16.1 for Class 125.

L. All ductile iron pipe and fittings shall have a standard thickness cement lining and seal coats on their interiors in accordance with ANSI/AWWA C104/A21.4.

M. Pipe and fitting manufacturers shall be the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, McWane, Tyler, or approved equal.

2.02 IDENTIFICATION

A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.

B. Pipe shall be poly wrapped (8 mil thickness) blue for potable water mains, purple for reclaimed water mains and green for sewage force mains. All potable water pipe shall be NSF certified and copies of lab certification shall be submitted to the Engineer.

C. All above ground potable water mains and appurtenances shall be painted safety blue.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Engineer.

B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being installed.

C. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner.

3.02 PIPE INSTALLATION

A. Install pipe in horizontal or vertical planes, parallel or perpendicular to building surfaces unless otherwise shown. Support pipe and fittings to prevent strain on joints, valves and equipment. Install flanged joints so that contact faces bear uniformly on the gasket. Tighten bolts with relatively uniform stress.

B. All pipe fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer who may prescribe corrective repairs or reject the materials.

C. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign material before the pipe is laid.

D. Joint Assembly: Pipe joints shall be assembled in accordance with the Manufacturer's instructions and the requirements of ANSI/AWWA C600.

E. Pipe Cutting: Cutting pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat, workmanlike manner without creating damage to the pipe

or lining. Ductile cast iron may be cut using an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw, or oxyacetylene torch. Cut ends and rough edges shall be ground smooth and for push-on joint connections, the cut end shall be beveled.

3.03 TESTING

A. Hydrostatic pressure and leakage test shall conform to Section 4 of AWWA C600, with the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line.

B. The pressure required for the field hydrostatic pressure test shall be 180 psi for potable water lines and reclaimed water lines, and shall be 150 psi for force mains. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure of 180 psi or 150 psi. Corporation cocks at least 3/4-inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least two hours.

C. The leakage test may be conducted at the same time as the pressure test, and shall be of not less than one hour duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such sections as may be required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

D. The amount of leakage which will be permitted shall be in accordance with AWWA C600 Standards for all pressure tests. No pipe installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)1/2}{133,200*}$$

L = Leakage in gallons per hour
S = Length of pipe in feet
D = Nominal diameter in inches
P = Pressure in psi

* Note: If 20-foot pipe lengths are used, factor to be 148,000

3.04 SURFACE PREPARATION AND PAINTING

A. All piping and fittings exposed to view shall have their surfaces prepared and painted with a prime coat as defined in these Specifications. Surface preparation and shop priming is a part of the work of this Section.

END OF SECTION

SECTION 02640 VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.

B. All valves and appurtenances shall be of the size shown on the Drawings and, to the extent possible, all equipment of the same type on the Project shall be from one manufacturer.

C. All valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. All valves shall have a factory applied, fusion bonded epoxy coating on interior and exterior unless noted otherwise in the plans or this specification.

E. The equipment shall include, but not be limited to, Table 02640-1 at the end of this section and the following:

1. Gate valves (Sec. 2.01)
2. Ball Valves for PVC Pipe (Sec. 2.02)
3. Butterfly Valves (Sec. 2.03)
4. Plug Valves (Sec. 2.04)
5. Valve Actuators (Sec. 2.05)
6. Air Release Valves (Sec. 2.06)
7. Valves Boxes (Sec. 2.07)
8. Flange Adapter Couplings (Sec. 2.8)
9. Flexible Couplings (Sec. 2.9)
10. Hose Bibs (Sec. 2.10)
11. Slow Closing Air and Vacuum Valves (Sec. 2.11)
12. Check Valves (Sec. 2.12)
13. Hydrants (Sec. 2.13)
14. Restraining Clamps (Sec. 2.14)
15. Tapping Sleeves and Tapping Valves (Sec. 2.15)
16. In-Line Elastomeric Check Valves (Sec. 2.16)
17. Corporation Cocks (Sec. 2.17)
18. Knife Gate Valves (Sec. 2.18)

1.02 DESCRIPTION OF SYSTEMS

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaim water, wastewater, etc., depending on the applications.

1.03 QUALIFICATIONS

All of the types of valves and appurtenances shall be products of well-established

reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable. Valves shall be as covered under mechanical devices in Section 8 of ANSI/NSF Standard 61.

1.04 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

1.05 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

1.06 WARRANTY

A. Provide a three (3) year warranty from date of Substantial Project Completion.

PART 2 PRODUCTS

2.01 GATE VALVES

A. All buried valves shall have cast or ductile iron three (3) piece valve bodies.

B. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

C. Where required, gate valves shall be provided with a box cast in a concrete slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Orange, Massachusetts, Clow, DeZurik or approved equal.

D. Gate valves with 3"-20" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or C515 and UL/FM of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

E. Wrench nut shall be provided for operating the valve.

F. Valves shall be suitable for an operating pressure of 200 psi and shall be tested in accordance with AWWA C509 or C515. Mueller, Kennedy, M&H, and Clow are acceptable valves.

G. All bonnet bolts, nuts and studs shall be stainless steel.

2.02 BALL VALVES FOR PVC PIPE

A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Wallace and Tiernan, Inc., Plastiline, Inc., or approved equal.

B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

2.03 BUTTERFLY VALVES

A. Butterfly valves shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C504, except as hereinafter specified. Valves shall be Class 250 and equal to those manufactured by Henry Pratt Company, DeZurik, Mueller, Val-Matic, or approved equal. M&H/Kennedy/Clow are not generally approved equals. Ductile iron conforming to ASTM A536, Grade 65-45-12 shall be provided for all Class 250 valves. All valves shall be leak tested at 200 psi.

B. The face-to-face dimensions of flanged end valves shall be in accordance with Table 1 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1.

C. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock screws and be capable of the 1/8-inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where the EPDM seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or Nickel-Chrome, 80-20%. Where the EPDM seat is mounted on the valve disc, the valve body shall be fitted with an 18-8 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.

D. The valve body shall be constructed of ductile iron or close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Butterfly valves of the "wafer" or "spool" type will not be accepted.

E. The valve shaft shall be turned, ground, and polished constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.

F. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve for a period of five minutes. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 230 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. The Class 150 valves shall be tested in conformance with AWWA C-504.

G. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable, and as herein specified.

H. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.

I. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.

J. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.

K. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.04 PLUG VALVES

A. All plug valves shall be eccentric plug valves capable of sustaining 150 psi in either direction without leaking.

B. Plug valves shall be tested in accordance with current AWWA Standard C-504-80 Section 5. Each valve shall be performance tested in accordance with paragraph 5.2 and shall be given a leakage test and hydrostatic test as described in paragraphs 5.3 and 5.4. Plug valves shall be Kennedy, Val-Matic, or Dezurik.

C. Plug valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the Plans. Flanged valves shall be faced and drilled to the ANSI 150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-72. Bell ends shall be to the AWWA Standard C100-55 Class B. Screwed ends shall be to the NPT standard.

D. Plug valve bodies shall be of ASTM A126 Class B Semi-steel, 31,000 psi tensile strength minimum in compliance with AWWA Standard C507-73, Section 5.1 and AWWA Standard C504-70 Section 6.4. Plug valves shall have a minimum 100% circular cross sectional area and full port unless written approval is received from the County. All exposed nuts, bolts, springs, washers, etc. shall be zinc or cadmium plated. Resilient plug facings shall be of Hycar or Neoprene.

E. Plug valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. These bearings shall comply with current AWWA Standards.

2.05 VALVE ACTUATORS

A. General

1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor operated.

2. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

3. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designated C504, insofar as applicable and as herein specified.

B. Manual Actuators

1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Actuator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

C. Motor Actuators (Modulating)

1. The electronic motor-driven actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter, control power transformer, electronic controller, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit. Motor actuators for below grade valves shall be supplied with floor stands designed and manufactured by the actuator manufacturer.

2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, 3-phase power as shown on the electrical drawings.

The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbed teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.

3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.

4. The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.

5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone. Actuator for modulating valves shall be rated for 1200 starts per hour.

7. All units shall have strip heaters in both the motor and limit switch compartments.

8. The actuator shall be equipped with open-stop-close push buttons, an Local-Off-Remote selector switch, valve position controller(0-100%), valve position indicator (0-100%) and valve open/close indicating lights, all mounted on the actuator or on a separate locally mounted remote power control station (dependent for valves higher than 5 feet off finish floor or where accessibility is limited). Auxiliary dry contacts shall be provided for local-remote switch position feedback, valve open/close position, and valve in fail. Valve position signal, 4-20mA, shall be provided to the plant SCADA system for remote monitoring. When valve is placed in the remote mode, the valve position shall have the capability to be controlled remotely by the Plant SCADA system, via 4-20mA signal.

9. The actuator shall provide a 4-20 mA dc output for position indication and capable of accepting valve position control from a remote 4-20 mA dc signal when in Remote mode. Auxiliary dry contacts shall be provided for remote switch position feedback, valve open/close position and valve in fail.

10. The electronics for the electric operator shall be protected against temporary submergence.

11. Actuators shall be Limitorque L120 with Modutronic Control System or approved equal.

D. Remote Located Motor Actuators (Open-Close/Modulating)

1. A separate, remotely located and mounted motor actuator controller shall be furnished and installed to provide the Owner with easy access for maintenance and repairs for all actuators higher than 5-feet above finished floor and for the actuators that would be difficult to maintain and repair if mounted directly to the motor actuator.

2. As the size of the valve actuators may vary between the acceptable actuator manufacturers, final decisions on the need for remote actuator controllers will be determined in the field. The Contractor shall include in his base bid, all remote actuator controllers needed for the project. No additional payment will be made to the Contractor on the failure to identify or anticipate the need for remote actuator controllers.

E. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully

machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit. Motor actuators for buried valves shall be supplied with floor stands designed and manufactured by the actuator manufacturer.

2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.

   (a) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.

   (b) The motor shall be prelubricated and all bearings shall be of the anti-friction type.

3. The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.

4. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings. The torque switch shall be provided with double-pole contacts.

5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but

not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.

6. The actuator shall be equipped with open-stop-close push buttons, a Local-Off-Remote selector switch, valve open/close indicating lights, control circuit transformer, and three-phase thermal overload relays in a NEMA 4X enclosure all mounted on the actuator or on a separate locally mounted remote power control station (dependent for valves higher than 5 feet off finish floor or where accessibility is limited). Auxiliary dry contacts shall be provided for local-remote switch position feedback, valve open/close position, and valve in fail. When the valve is placed in the remote mode, the valve shall have the capability to be controlled remotely by the Plant SCADA system, In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all undergrounded phase conductors.

7. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. Auxiliary dry contacts shall be provided for remote switch position feedback valve open/close position and valve in fail.

8. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.

9. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

2.06 AIR RELEASE VALVES

The air release valves for use in water or force mains shall be installed as shown on the Drawings. The valves shall have a cast iron body cover and baffle, stainless steel float, bronze water diffuser, Buna-N or Viton seat, and stainless steel trim. The fittings shall be threaded. The air release valves shall be Model 200A or 400A as manufactured by APCO Valve and Primer Corporation, Schaumburg, Illinois; Val-Matic, or approved equal.

2.07 VALVE BOXES

A. Buried valves shall have cast-iron three piece valve boxes or HDPE adjustable valve boxes. Cast iron valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by the County. The barrel shall be two-piece, screw type, having a 5-1/4 inch shaft. The upper section shall have a flange at the bottom with sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have WATER OR SEWER, as applicable, cast into the top. Lids will be painted “safety” blue for potable and green for sanitary sewer.

B. All valves shall have actuating nuts extended to within four (4) feet of the top of the valve box. All valve extensions will have a centering guide plate two (2)

inches maximum below the actuating nut. The valve extension shall be fastened to the existing nut with a set screw. Valve boxes shall be provided with a concrete base and a valve nameplate engraved with lettering 1/8-inch deep as shown on the Drawings.

C. HDPE adjustable valve boxes shall be one complete assembled unit composed of the valve box and extension stem. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodate variable trench depths.

D. The entire assembly shall be made of heavy wall high density polyethylene. All exterior components shall be joined with stainless steel screws. The valve box top section shall be adaptable to fit inside a valve box upper section.

E. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The stem material shall be of plated steel square tubing. The stem assembly shall have a built-in device that keeps the stem assembly from disengaging at its fully extended length. The extension stem must be torque tested to 1000 foot pounds. Covers shall have WATER or SEWER clearly and permanently impressed into the top surface.

2.08 FLANGE ADAPTER COUPLINGS

Plain end couplings and adapters shall be fusion-bonded epoxy coated carbon steel with Ethylene Propylene Diene Monomer (EPDM) rubber gaskets and stainless steel nuts, bolts and spacers. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non- chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used for potable water mains if the soil is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons, and is also contaminated with low molecular-weight petroleum products or organic solvents. Couplings shall be Dresser Style 38, or another approved equal. Flange adapters shall have a plain end compression seal similar to the style 38, with an ANSI 125 Class flange on the opposite end, and shall be Dresser Style 128W or an approved equal. Stainless steel backup rings shall be used for force mains that are located in corrosive environments including wetwells and valve vaults.

2.09 FLEXIBLE COUPLINGS

Flexible couplings shall be either the split type or the sleeve type as shown on the Drawings.

1. Split type coupling shall be used with all interior piping and with exterior pipings noted on the Drawings. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contracting and expansion.
2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl

composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A 183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.

3. Victualic type couplings and fittings may be used in lieu of flanged joints. Pipes shall be radius grooved as specified for use with the Victaulic couplings. Flanged adapter connections at fittings, valves, and equipment shall be Victaulic Vic Flange Style 741, equal by Gustin-Bacon Group, Division of Certain-Teed Products, Kansas City, Kansas, or approved equal.
4. Sleeve type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38 or 40, as shown on the Drawings, or equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
5. All couplings shall be furnished with the pipe stop removed.
6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
7. If the Contractor decides to use victaulic couplings in lieu of flanged joints, he shall be responsible for supplying supports for the joints.

2.10 HOSE BIBS

Unless otherwise indicated, hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.11 SLOW CLOSING AIR AND VACUUM VALVES

A. The Contractor shall furnish and install slow closing air and vacuum valves as shown on the Drawings which shall have two (2) independent valves bolted together. The air and vacuum valve shall have all stainless steel float, guided on both ends with stainless shafts. The air and vacuum valve seat shall be Buna-N to insure drop tight closure. The Buna-N seat shall be fastened to the cover stainless shoulder screws in a manner to prevent distortion of the seat. The float shall be guided at both ends with stainless steel bushings.

B. The valve cover shall have a male lip designed to fit into the body register for accurate alignment of the float into the Buna-N seat. The valve cover shall have 250-pound class flanged outlet connection.

C. The surge check valve shall be bolted to the inlet of the air and vacuum valve and consist of a body, seat, disc, and compression spring. A surge check unit shall operate on the interphase between the kinetic energy and relative velocity flows of air and water, so that after air passes through, and water rushes into the surge check, the disc starts to close, reducing the rate of flow of water into the air valve by means of throttling orifices in the disc to prevent water hammer in the air valves. The surge check orifices must be adjustable type for regulation in the field to suit operating conditions. Valve shall be rated for 250-pound class working pressure.

D. The complete slow closing air and vacuum valve with air release valve shall have been flow tested in the field, substantiated with test data to show reduction of

surge pressure in the valve. Flow test data shall be submitted with initial shop drawings for approval.

E. Valve exterior to be painted Red Oxide, Phenolic TT-P86, Primer or approved equal for high resistance to corrosion.

F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Air Valve Cover, Body, and Surge Check Body	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Surge Check Seat and Disc	Stainless Steel	ASTM A582
Air Valve Seat	Buna-N	
Spring	Stainless Steel	T302

2.12 CHECK VALVES

A. Check valves for cast iron and ductile iron pipe lines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall be iron body, bronze mounted, single disc, 175 psi working water pressure and nonshock. Valves shall be as manufactured by Mueller, Clow, Kennedy, Val-Matic, or M&H. Valves 8" and larger shall be air cushioned to reduce valve slam.

B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.

C. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers. The interior and exterior of the valve body shall have a factory applied fusion bonded or 10 mil 2 part epoxy coating (Protecto 401 or approved equal).

D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Weights provided and approved by the County shall be installed.

2.13 HYDRANTS

Hydrants shall be AVK Series 2780 Barrel (nostalgic style with stainless steel bolts) American Darling B-84-B or Mueller Super Centurian 250, or approved equal and shall conform to the "Standard Specification for Fire Hydrants for Ordinary Water Works Service", AWWA C502, and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern and of standard size, and shall have one 4-1/2" steamer nozzle and two 2-1/2" hose nozzles.
2. Hydrant inlet connections shall have mechanical joints for 6" ductile-iron pipe.
3. Hydrant valve opening shall have an area at least equal to that area of a 5-1/4" minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two 2-1/2" hose nozzles when opened together with a loss of not more than 2 psi in the hydrants.
4. Each hydrant shall be designed for installation in a trench that will provide 5-ft. cover.
5. Hydrants shall be hydrostatically tested as specified in AWWA C502.
6. Hydrants shall be rated at 200 psi.
7. All nozzle threads shall be American National Standard.
8. Each nozzle cap shall be provided with a Buna N rubber washer.
9. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism and without the mechanism obstructing the discharge from any outlet.
10. Hydrants must be capable of being extended without removing any operating parts.
11. Hydrants shall have bronze-to-bronze seatings as per AWWA C502-85.
12. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The resilient seat material shall meet the requirements of AWWA C-509 and shall preferably be EPDM Elastomer.
13. Internal and below ground iron parts (bonnet, nozzle section and base) shall have a fusion bonded epoxy coating per AWWA C550. Aboveground external hydrant parts (cap, bonnet and nozzle section) shall be either epoxy coated together with a UV resistant polyester coating or have two shop coats of paint per AWWA C502. The lower stand pipe or barrel shall be protected with asphaltic coatings per AWWA C502.
14. Exterior nuts, bolts and washer shall be stainless steel. Bronze nuts may be used below grade.
15. All internal operating parts shall be removable without requiring excavation.

2.14 RESTRAINING CLAMPS

Restraining clamp assemblies as detailed in the drawings for use at hydrant connections to water mains, or at fittings where shown on the Drawings, shall be as manufactured by American Cast Iron Pipe, Star Pipe Products, U.S. Pipe; or approved equal.

2.15 TAPPING SLEEVES AND TAPPING VALVES

A. Tapping valves shall meet the requirement of AWWA C500. The valves shall be flanged, shall be mechanical joint outlet with non-rising stem, designed for vertical burial and shall open left or counterclockwise. Stuffing boxes shall be the "O-ring" type. Operating nut shall be AWWA Standard 2" square for valves 2"

and up. The valves shall be provided with an overload seat to permit the use of full size cutters. Gaskets shall cover the entire area of flange surfaces and shall be supplied with EPDM wedges up to 30" diameter.

B. Tapping sleeves and saddles shall seal to the pipe by the use of a confined "O" ring gasket, and shall be able to withstand a pressure test of 180 psi for one hour with no leakage in accordance with AWWA C110, latest edition. A stainless steel 3/4" NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be protected from corrosion by being fusion applied epoxy coated, or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

2.16 IN-LINE ELASTOMERIC CHECK VALVES

A. Check Valves are to be all rubber and the flow operated check type with slip-in cuff or flange connection. The entire valve shall be ply reinforced throughout the body, disc and bill, which is cured and vulcanized into a one-piece unibody construction. A separate valve body or pipe used as the housing is not acceptable. The valve shall be manufactured with no metal, mechanical hinges or fasteners, which would be used to secure the disc or bill to the valve housing. The port area of the disc shall contour down, which shall allow passage of flow in one direction while preventing reverse flow. The entire valve shall fit within the pipe I.D. Once installed, the valve shall not protrude beyond the face of the structure or end of the pipe.

B. The downstream end of the valve must be circumferentially in contact with the pipe while in the closed positions.

C. Slip-in style valves will be furnished with a set of stainless steel expansion clamps. The clamps, which will secure the valve in place, shall be installed inside the cuff portion of the valve, based on installation orientation, and shall expand outwards by means of a turnbuckle. Each clamp shall be pre-drilled allowing for the valve to be pinned and secured into position in accordance with the manufacturer's installation instructions.

D. Manufacturer must have flow test data from an accredited hydraulics laboratory to confirm pressure drop and hydraulic data. Company name, plant location, valve size patent number, and serial number shall be bonded to the check valve.

E. When line pressure exceeds the backpressure, the line pressure forces the bill and disc of the valve open, allowing flow to pass. When the backpressure exceeds the line pressure, the bill and disc of the valve is forced closed, preventing backflow.

F. All valves shall be of the slip-in or flanged CheckMate™ as manufactured by Tideflex Technologies® or approved equal.

2.17 CORPORATION COCKS

Corporation cocks for connections to cast-iron, ductile iron or steel piping shall be all brass or bronze suitable for 180 psi operating pressure and similar to Mueller

Co. H-10046 or approved equal by Clow Corp., and shall be of sizes required and/or noted on the Drawings.

2.18 KNIFE GATE VALVES

A. Provide and install Bonneted Knife Gate Valves as shown on the Drawings.

B. Description
Each Valve shall be resilient seated with a pressure-retaining bonnet that fully encloses the gate. The bonnet shall be rated at the same pressure as the valve body and shall not include any type of internal gate packing or gate wiper. A packing gland shall be located at the top of the bonnet to provide a tight seal to prevent leakage around the stem. The valves shall be designed for submerged service and provided with valve extensions for installation as shown on the Drawings. Valves shall be provided by Orbinox, or approved equal.

C. Materials

1. BODY & BONNET: Except for the resilient seat, all wetted parts of the body and bonnet shall be 316SS, including flanges and fasteners. Flush and drain ports, shall be 316SS. The 316SS body cladding and face rings shall be fully welded or cast as one piece to the body – "floating" body liners are not acceptable.

2. GATE: The gate shall be 316SS, suitable for the service conditions, and shall be ground and polished to prevent damage to the seat.

3. SEAT: The resilient seat shall be Viton, installed in a self-retaining groove that is cut into the 316SS seat ring, and shall be replaceable without removing the valve from the pipeline. No fasteners or adhesives shall be allowed to hold the seal in place.

4. STEM: The stem shall be 430SS.

5. PACKING: The packing shall be Teflon-impregnated synthetic fiber and the packing follower shall be 304SS. The packing shall be replaceable without disassembling the valve or removing the valve from the pipeline, and while under pressure.

6. YOKE: The valve yoke shall be epoxy-coated carbon steel, designed to support the manual operator and resist twisting.

D. Construction Details

1. FLANGES: Flanged drilling shall match ANSI B16.1, Class 125.

2. LUBRICATION: The valve shall be designed so that all required lubrication can be completed externally with the valve installed.

3. DESIGN PRESSURE: The 24-inch valves shall be rated at a minimum of 50 PSI.

4. TESTING: Manufacturer's Testing shall be conducted as follows:
   a) Shell Test – Each valve body and bonnet shall be hydrostatically pressure tested in the manufacturer's shop at 1.5 times the rated working pressure with no visible leakage allowed (leakage through the packing shall not be a cause for rejection, as long as there is no leakage at the rated pressure).

   b) Gate/Seat Test – Each valve shall be hydro-statically pressure tested at 1.1 times the rated working pressure in the direction of closure with no visible leakage through the gate material or past the seat.

E. Valve Operators

1. Valve operators shall be mounted in locations shown the Drawings per the manufacturer's recommendations. Refer to section 2.05 in this specification.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the County.

B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the County.

C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.

E. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.

F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been

brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.

H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

I. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.

J. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.

K. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.

L. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.

M. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.02 HYDRANTS

A. Hydrants shall be set at the locations designated by the County and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or

crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.

3.03 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.04 FIELD PAINTING

All metal valves and appurtenances specified herein and exposed to view shall be painted.

Refer to Division 9 for paint color schedule.

3.05 INSPECTION AND TESTING

Completed pipe shall be subjected to hydrostatic pressure test for two hours at 180 psi. All leaks shall be repaired and lines retested as approved by the County. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

3.06 VALVE SCHEDULE

Table 02640-1 below includes a valve schedule that is provided solely to assist the Contractor. The schedule shall be worked with other Contract Documents to establish all valves and actuators that are required for the project. If valves or actuators are not shown on the schedule and are shown on other Contract Documents or are required to provide a complete, tested and ready to be placed into operation system, the Contractor shall include these valves in the Base Bid and no additional payment will be made to the Contractor.

TABLE 02640-1
VALVE SCHEDULE

MANATEE COUNTY WTP BIOLOGICAL TREATMENT UNIT VALVE & SLIDE GATE SCHEDULE

BIOLOGICAL TREATMENT UNIT									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ELECTRIC ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
2" INLET & 3/16" ORIFICE	AIR RELEASE VALVE	WATER AIR VALVE	BTU LOWER LEVEL, BW PUMPS	NO	N/A	3	ARV-414A, ARV-414B & ARV-414C	N/A	NO
4-INCH	PLUG	AIR SCOUR BYPASS	BTU UPPER LEVEL AT EACH FILTER	NO	N/A	6	HV-2X1-5	FL	NO
6-INCH	AIR VACUUM VALVE	WATER AIR VALVE	BW PUMPS	NO	N/A	2	ARV-411 & ARV-412	FL	NO
8-INCH	BUTTERFLY	POTABLE WATER	BTU LOWER LEVEL NORTH SIDE	NO	N/A	1	HV-410	FL	NO
8-INCH	PLUG	INFLUENT TROUGH DRAIN	BTU LOWER LEVEL AT BACKWASH DRAIN	NO	N/A	1	HV-207	FL	NO
10-INCH	BUTTERFLY	AIR UNLOADING	BTU UPPER LEVEL WEST SIDE	YES	OPEN/CLOSE	1	MOV-273	FL	NO
12-INCH	PLUG	BACKWASH DECANT	ON VERTICAL BWD NEAR TIE-IN WITH 42-INCH BTU INF	NO	N/A	1	HV-203C	FL	NO
12-INCH	BUTTERFLY	AIR SCOUR SUPPLY	BTU UPPER LEVEL AT EACH FILTER	YES	OPEN/CLOSE	6	MOV-2X1-5	FL	NO
12-INCH	BUTTERFLY	CLEARWELL INFLUENT	BTU LOWER LEVEL NW SIDE OF CLEARWELL	YES	OPEN/CLOSE	1	MOV204	FL	NO

BIOLOGICAL TREATMENT UNIT (CONT.)									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ELECTRIC ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
12-INCH	CHECK	CLEARWELL INFLUENT	BTU LOWER LEVEL NW SIDE OF CLEARWELL	NO	N/A	1	CV-410	FL	NO
12-INCH	BUTTERFLY	BLOWER ISOLATION	BTU LOWER LEVEL AT BLOWERS	NO	N/A	2	HV-271 & HV 272	FL	NO
20-INCH	BUTTERFLY	FILTER EFFLUENT	BTU LOWER LEVEL AT EACH FILTER	YES	MODULATING	6	MOV-2X1-1	FL	NO
20-INCH	BUTTERFLY	FILTER TO WASTE	BTU LOWER LEVEL AT EACH FILTER	YES	OPEN/CLOSE	6	MOV-2X1-4	FL	NO
20-INCH	BUTTERFLY	FILTER DRAIN	BTU LOWER LEVEL SOUTH SIDE	YES	OPEN/CLOSE	1	MOV-205	FL	NO
24-INCH	BUTTERFLY	BACKWASH SUPPLY	BTU LOWER LEVEL AT EACH FILTER	YES	OPEN/CLOSE	6	MOV-2X1-2	FL	NO
24-INCH	BUTTERFLY	BACKWASH PUMP ISOLATION	BTU BACKWASH PS	NO	N/A	2	HV-411 & HV-412	FL	NO
24-INCH	CHECK	BACKWASH SUPPLY PUMP	BTU BACKWASH PS	NO	N/A	2	CV-411 & CV-412	FL	NO
30-INCH	BUTTERFLY	BACKWASH WASTE	BTU LOWER LEVEL PIPE GALLERY	YES	OPEN/CLOSE	6	MOV-2X1-3	FL	NO
42-INCH	BUTTERFLY	BTU RAW (WEST)	BTU EXTERIOR WEST SIDE	YES	MODULATING	1	MOV-201	FL	NO
42-INCH	BUTTERFLY	BTU RAW (EAST)	BTU EXTERIOR EAST SIDE	YES	MODULATING	1	MOV-202	FL	NO

BIOLOGICAL TREATMENT UNIT (CONT.)									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ELECTRIC ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
3'-0"x8'-0"	SLIDE GATE (SELF CONTAINED)	INFLUENT GATE	BTU UPPER LEVEL AT EACH FILTER	YES	OPEN/CLOSE	6	SLG-2X2	FL	NO

YARD PIPING									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ELECTRIC ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
2" INLET & 9/64" ORIFICE	COMBINATION AIR VALVE	WASTEWATER AIR VALVE	PD PS	NO	N/A	1	N/A	N/A	NO
3" INLET & 11/64" ORIFICE	COMBINATION AIR VALVE	WASTEWATER AIR VALVE	EQ YARD PIPING	NO	N/A	2	N/A	N/A	YES
6" INLET & 3/16" ORIFICE	COMBINATION AIR VALVE	WASTEWATER AIR VALVE	BW YARD PIPING	NO	N/A	1	N/A	N/A	YES
8" INLET & 3/8" ORIFICE	COMBINATION AIR VALVE	WATER AIR VALVE	42” MOV ASSEMBLIES	NO	N/A	3	N/A	FL	NO
8" INLET & 3/8" ORIFICE	COMBINATION AIR VALVE	WATER AIR VALVE	42” METER ASSEMBLIES	NO	N/A	2	N/A	FL	NO
8-INCH	BUTTERFLY	ARV ISOLATION	42” METER AND MOV ASSEMBLIES	NO	N/A	5	N/A	FL	NO
8-INCH	GATE	10"x8" TAPPING SLEEVE AND VALVE FOR POTABLE	NORTH OF BTU	NO	N/A	1	HV-414	FL	YES
12-INCH	PLUG	BACKWASH DECANT METER ISOLATION	OUTSIDE OF BWD METER VAULT	NO	N/A	2	HV-203A & HV-203B	MJ	YES
12-INCH	PLUG	BACKWASH DECANT TO RAPID MIX B	EAST OF BTU	NO	N/A	1	HV-203D	MJ	YES
12-INCH	PLUG	EQ RETURN TO BTU	EAST OF BTU; BETWEEN CROSS & TEE	NO	N/A	1	HV-203H	MJ	YES

YARD PIPING (CONT.)									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ELECTRIC ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
12-INCH	PLUG	EQ RETURN TO BTU OR BASIN A	NORTHEAST OF BTU	NO	N/A	1	HV-516	MJ	YES
30-INCH	PLUG	BACKWASH DIVERSION	SOUTH OF BACKWASH PONDS	NO	N/A	3	HV-205A, 205B & 205C	MJ	YES
36-INCH	BUTTERFLY	RAW WATER BYPASS FROM LAKE PS 1	NORTH OF LAB	YES	OPEN/CLOSE	1	MOV-111	MJ	YES
36-INCH	BUTTERFLY	EAST CO WELLFIELD (RW) TO BTU EFF	EAST OF BTU	NO	N/A	1	HV-113	MJ	YES
36-INCH	BUTTERFLY	BTU TO DEGASIFIED GW	NORTH EAST OF BTU	NO	N/A	1	HV-110C	MJ	YES
36-INCH	BUTTERFLY	RAW WATER BYPASS FROM LAKE PS 2	NORTH OF BTU	YES	OPEN/CLOSE	1	MOV-110	FL	YES
42-INCH	BUTTERFLY	BTU BYPASS TO RAPID MIX B	NORTH EAST OF BTU	NO	N/A	1	HV-110B	MJ	YES
42-INCH	BUTTERFLY	ISOLATION (BASIN B)	DIRECTLY EAST OF BASIN B	NO	N/A	1	116B	FL	YES
42-INCH	BUTTERFLY	ISOLATION (BASIN A)	DIRECTLY NORTH OF BASIN A	NO	N/A	1	114B	FL	YES
42-INCH	BUTTERFLY	RAPID MIX INFLUENT (BASIN B)	BASIN B FLOW METER ASS'Y EAST OF BASIN B	YES	MODULATING	1	MOV-117	FL	NO
42-INCH	BUTTERFLY	RAPID MIX INFLUENT (BASIN A)	BASIN A FLOW METER ASS'Y NORTH OF BASIN A	YES	MODULATING	1	MOV-115	FL	NO
42-INCH	BUTTERFLY	BTU ISOLATION	NORTH OF LAB	YES	OPEN/CLOSE	1	MOV-112	FL	YES

YARD PIPING (CONT.)									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
42-INCH	BUTTERFLY	BTU BYPASS ISOLATION	NORTH OF BTU	YES	OPEN/CLOSE	1	MOV-113	MJ	YES
12-INCH	PLUG	EQ RETURN TO RAPID MIX B	EAST OF BTU	NO	N/A	1	HV-203E	MJ	YES
12-INCH	PLUG (EXISTING)	BWD TO RAPID MIX A	NE OF MOV ASSEMBLY 3	NO	N/A	1	HV-203F	MJ	N/A
12-INCH	PLUG (EXISTING)	BWD TO RAPID MIX B	NE OF MOV ASSEMBLY 3	NO	N/A	1	HV-203G	MJ	N/A
42-INCH	BUTTERFLY (EXISTING)	RAW WATER PUMP STATION NO. 2 ISOLATION	EAST OF MOV ASSEMBLY 3	NO	N/A	1	HV-110A	MJ	N/A

EQUALIZATION TANK									
VALVE SIZE	VALVE TYPE	FUNCTION	LOCATION	ELECTRIC ACTUATOR	ACTUATOR TYPE	QTY	TAG NUMBER	FL OR MJ	VALVE BOX
3" INLET & 11/64" ORIFICE	COMBINATION AIR VALVE	AIR VALVE	MAG METER ASSEMBLY	NO	N/A	1	ARV-515	N/A	NO
10-INCH	PLUG	EQ RETURN PUMP ISOLATION	EQ TANKS	NO	N/A	4	HV-511 TO HV-514	FL	NO
10-INCH	CHECK	EQ RETURN PUMP	EQ TANKS	NO	N/A	4	CV-511 TO CV-514	FL	NO
12-INCH	PLUG	METER ISOLATION	MAG METER ASSEMBLY	NO	N/A	1	HV-515	FL	NO
12-INCH	PLUG	EQ TANK DRAIN	BETWEEN 12-INCH HEADER & OVERFLOW PIPE	NO	N/A	1	HV-520	MJ	NO
24-INCH	IN-LINE CHECK	EQ OVERFLOW	BETWEEN EQ TANKS AND BW POND	NO	N/A	3	CV-510A & 510B & 510C	N/A	NO
30-INCH	KNIFE GATE	EQ TANK 1 ISOLATION	EQ TANKS	YES	OPEN/CLOSE	1	MOV-518	FL	NO
30-INCH	KNIFE GATE	EQ TANK 2 ISOLATION	EQ TANKS	YES	OPEN/CLOSE	1	MOV-519	FL	NO

OFF-SITE FORCEMAIN ALONG WATERLINE ROAD									
2" INLET & 9/64" ORIFICE	COMBINATION AIR VALVE	WASTEWATER AIR VALVE	FORCEMAIN HIGH POINTS	NO	N/A	12	N/A	N/A	NO
8-INCH	GATE VALVE	FORCEMAIN ISOLATION	FORCEMAIN	NO	N/A	18	N/A	MJ	YES
8-INCH	GATE VALVE	MAGMETER ISOLATION (WEST)	PDPS	NO	N/A	1	HV-615A	FL	NO
6-INCH	GATE VALVE	PUMP ISOLATION	PDPS	NO	N/A	2	HV-611A, HV-611B	FL	NO
8-INCH	GATE VALVE	METER ASSEMBLY ACCESS PT	PDPS	NO	N/A	1	HV-612	FL	NO
6-INCH	CHECK VALVE	PUMP ISOLATION	PDPS	NO	N/A	2	CV-613A, CV-613B	FL	NO

END OF SECTION

TABLE 09900-1
PAINTING SCHEDULE

A.	Biological Treatment Unit Building	Painting System
1.	Exterior Concrete and Concrete Underneath Filter Structure (Above Grade)	A-3
2.	Stucco Walls	H-1
3.	Exterior Concrete Walls (Below Grade)	A-4
4.	Interior Concrete Surfaces of Filters, Clearwells and Channels and Top of Walls (Includes Floors)	J-3
5.	Exterior Concrete Slab	M-3
6.	Exterior Exposed Steel	B-2
7.	Miscellaneous Steel, Interior/Exterior, not in contact with potable water	B-2
8.	Interior Concrete and Masonry Walls (Electrical & Storage Rooms)	A-1
9.	Interior Concrete Slabs	M-3
10.	Interior Concrete Housekeeping Pads	M-3
11.	Interior / Exterior Steel Doors and Frames	B-6
12.	Motors and Equipment	B-2
13.	Interior Galvanized Steel	C-1
14.	Interior Aluminum Items	Painting not Required
15.	FRP Grating	Painting not Required
16.	Aluminum Stairs, Handrail, Kickplate, Hatches	Painting Not Required
17.	Roof	See Drawings
B.	**Biological Treatment Unit Process Equipment and Piping**	**Painting System**
1.	Bituminous Coated Cast Iron, Ductile Iron or Steel Pipe, not in contact with potable water	B-3
2.	Steel Pipe, not in contact with potable water	B-2
3.	Galvanized Steel Items	C-1

4.	Aluminum Items	Painting not Required
5.	Ductile Iron Pipe, Valves and Fittings, not in contact with potable water	B-2
6.	Pumps, Motors, Equipment	B-2
7.	Stainless Steel Items (Including Pipe)	Painting Not Required
8.	PVC Pipe	Painting Not Required
C.	**Equalization Tank**	**Painting System**
1.	Interior of Concrete Tank (Including Floors) and Top of Walls	J-3
2.	Exterior of Concrete Tank Walls (Above Grade)	A-3
3.	Exterior of Concrete Tank (Below Grade)	A-4
4.	Submerged Ductile Iron Pipe	B-7
5.	Aboveground Ductile Iron Pipe and Fittings	B-8
6.	Motors and Equipment (Not Submerged)	B-2
7.	Valves (Aboveground, Not Submerged)	B-2
8.	PVC Pipe	Painting Not Required
9.	Galvanized Steel Items	C-1
10.	Miscellaneous Aluminum Items	Painting Not Required
11.	Stainless Steel Items (Including Pipe)	Painting Not Required
12.	Factory Coated and Finished Equipment	Painting Not Required
D.	**Plant Drain Pump Station and Grinder Lift Stations**	**Painting System**
1.	Exposed Ductile Iron Pipe, Valves and Fittings and supports in or out of vaults	N-1
2.	Galvanized and Non-ferrous Metals	1
3.	Exterior Walls of Concrete Wetwell and Vaults	L-1

4.	Interior Walls, Floor and Ceiling of Concrete Vaults	L-2
5.	Interior Walls, Floor and Ceiling of Concrete Wetwell	L-3
6.	PVC Pipe and Conduit	M-4