

Northeast Water Purification Plant (NEWPP)  
Improvements Package No. 2 – High Service Pump Station  
and Miscellaneous Piping Improvements  
WBS No. S-000066-012A-4

**NOTICE OF  
ADDENDUM**

Document 00911

NOTICE OF  
ADDENDUM NO. 1

Date of Addendum: 11/10/15

PROJECT NAME Northeast Water Purification Plant (NEWPP) Improvements Package No. 2  
– High Service Pump Station and Miscellaneous Piping Improvements

PROJECT NO: WBS No. S-000066-012A-4

BID DATE: November 19, 2015 (There is no change to the Bid Date.)

FROM: Mr. Ravi Kaleyatodi, P.E., CPM, Senior Assistant Director  
City of Houston, Department of Public Works and Engineering  
611 Walker Street, 15<sup>th</sup> Floor  
Houston, Texas 77002  
Attn: Tina Yao, P.E., Project Manager

TO: Prospective Bidders

The referenced Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable.

Written questions regarding this Addendum may be submitted to the Project Manager following the procedures specified in Document 00200 – Instructions to Bidders. Immediately notify the City Engineer through the named Project Manager upon finding discrepancies or omissions in the Bid Documents.

This Addendum includes:

**ADDENDUM SYNOPSIS**

Changes to Project Manual  
    Introductory Information  
    Bidding Requirements  
    Specifications  
Changes to Drawings  
Clarifications

00911-1  
11-06-2015

Northeast Water Purification Plant (NEWPP)  
Improvements Package No. 2 – High Service Pump Station  
and Miscellaneous Piping Improvements  
WBS No. S-000066-012A-4

**NOTICE OF  
ADDENDUM**

DATED:



Ravi Kaleyatodi, P.E., CPM  
Senior Assistant Director  
Department of Public Works and  
Engineering



END OF DOCUMENT

Northeast Water Purification Plant (NEWPP)  
Improvements Package No. 2 – High Service Pump Station  
and Miscellaneous Piping Improvements  
WBS No. S-000066-012A-4

**ADDENDUM**

Document 00910

ADDENDUM NO. 1

Date of Addendum: 11/10/15



*Yue Sun*  
NOV-6-2015

PROJECT NAME: Northeast Water Purification Plant (NEWPP) Improvements  
Package No. 2 – High Service Pump Station and Miscellaneous Piping Improvements

PROJECT NO: WBS No. S-000066-012A-4

BID DATE: November 19, 2015 (There is no change to the Bid Date.)

FROM: J. Timothy Lincoln, P.E., CPM, City Engineer  
City of Houston, Office of City Engineer  
611 Walker Street  
Houston, Texas 77002  
Attn: Tina Yao, P.E., Project Manager

TO: Prospective Bidders

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

*This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars ( | ) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.*

CHANGES TO PROJECT MANUAL

INTRODUCTORY INFORMATION

1. Document 00010 – Table of Contents. Replace Section in its entirety.

## BIDDING REQUIREMENTS

1. Document 00410 – Bid Form Part B. Replace Section in its entirety.

## SPECIFICATIONS

1. Section 01110 – Summary of Work. Replace Section in its entirety.
2. Section 01114 – Construction Sequence. Remove page 01114-5 and replace with revised page 01114-5.
3. Section 01576S- Waste Material Disposal. Replace Section in its entirety.
4. Section 02915 – Tree Planting. Add Section in its entirety.
5. Section 13300 - Instrumentation and Controls – General Provisions. Remove page 13300-1 and replace with revised page 13300-1.
6. Section 15100 -- Valves. Replace Section in its entirety.
7. Section 15120 – Piping Specialties. Remove page 15120-6 and replace with revised page 15120-6.

## CHANGES TO DRAWINGS

1. Replace Drawing E-18, Sheet 85, with revised E-18.
2. Replace Drawing E-20, Sheet 87, with revised E-20.
3. Replace Drawing E-22, Sheet 89, with revised E-22.
4. Replace Drawing E-31, Sheet 98, with revised E-31.

## CLARIFICATIONS

1. Question: Sheet 85 shows T-LA and T-LB transformers to be 25kVA. Sheet 80 shows them to be 15kVA. Please advise which is correct.

Answer: 15 kVA is correct, as indicated on Sheet 80, the One Line Diagram. Sheet 85 is revised.

2. Question: Per Sheet 89, what feeds power to Panel 08-STBY-PP01 after demo of Power House?

Answer: The referenced Panel 08-STBY-PP01 is fed out of Switchboard "SWBD-STBY" located in the UV1 building. Removal of the HSPS Power House, or the circuit indicated on Sheet 89 for removal, will not affect power to existing 08-STBY-PP01.

3. Question: Per Sheet 89, existing Panel 08-STBY-LP01 shows to be 480V. Please clarify correct voltage.

Answer: The existing HSPS low voltage Panel 08-STBY-LP01 is 120/208 Volt. Sheet 89 is revised.

4. Question: Per Sheet 87 tag numbers HSP1-VP thru HSP9-VP, comment states only required for alternate valve. Per Sheets 75 to 76 show these conduits are used for both type valve installation. Sheet 93 Notes 1 and 5, show new power from new panelboards HA and HB. Sheet 89, Note 3 states to reuse existing conduits for new valve actuators and conductors. Please clarify.

Answer: Sheets 93, 75 and 76 are correct, new valve actuator power (HSP1-VP thru HSP9-VP) is required for all valve options. Sheets 87 and 89 are revised.

5. Question: Sheet 92 calls for 8-4" c to be concrete encased and stub-up into pull box enclosure. Sheet 69 calls for 8-4" c and 2-4" c spares. Are the 2-4" c spares to be stubbed up into the pull box enclosures? Please clarify.

Answer: Yes, Sheet 69 is correct; the spare conduits SP-5 and SP-6 are to enter the Pull Box enclosure with the pump power ducts. Sheet 92 contains details to illustrate methodology.

6. Question: Sheet 78 shows the elevation of the existing 84" discharge pipe on Section 1. Are we to install the new power and control duct banks under this discharge pipe? If so, they will be around 15 feet to the bottom of trench. Please clarify.

Answer: Yes, see Drawing E-3 (Sheet 69) note number 13.

7. Question: Specification Section 16346-3/1.07A requires that the Electrical Contractor/Switchgear Installer have successfully installed a minimum of 10 lineups of Medium Voltage Metal-Clad Switchgear. The successful Electrical Contractor/Switchgear Installer shall submit a list of 10 Medium Voltage Metal-Clad Switchgear projects with project descriptions and the name of the owner's contact person and telephone number. Electrical Contractor without the required project experience will be rejected. What will happen if a General Contractor uses an

unqualified Electrical Contractor that doesn't meet these requirements?  
Disqualification of his bid or have to resubmit a qualified Electrical Contractor that  
doesn't meet these requirements? Disqualification of his bid or have to resubmit a  
qualified Electrical Contractor at his own expense?

Answer: An electrical contractor / switchgear installer that does not comply with the  
requirements of specification 16346, paragraph 1.07A. will be rejected.

8. Question: Is it your intention to sole source the Siemens LDR (Robicon) Perfect  
Harmony Series or will you allow equal by another manufacture (ToshibaASD)?

Answer: In accordance with Specification 16485, Paragraph 2.01.B. a request for  
evaluation as an equal product will be made by the engineer if sufficient information  
is submitted in a timely manner. Please note that material furnished under  
Specification 16485 is required to be provided by the Electrical Contractor  
(Specification 16485, Paragraph 1.01.A.). A request for evaluation as an equal  
product must be submitted by the Electrical Contractor.

9. Question: What are the limits of new painting at the meter (42" and 8") and coupling  
(20") replacement at the High Service Pump Station (sheet 43)? With all of the  
cutting, welding, new pipe, and new meters we would suggest painting all of the  
above ground in that immediate area.

Answer: The reference sheet should be Sheet 42 instead of 43. Please refer to Note  
4 on sheet 42 that requires all above ground piping, valves and equipment be  
repainted per 09910 and labeled per 15120. Contractor is advised to read through all  
notes on the drawings to understand design requirements and intent. Contractor  
shall coordinate finish paint requirements with the magmeter manufacturer as well  
as other installation requirements such as the furnishing of insulation joints on each  
maggmeter flange, magmeter grounding, etc.

10. Question: There are two unit prices (Extra Unit Price Table #9 & #10) for line  
stops. On the plans some detail call for the tapping valve to remain, others just  
show a blind flange. Which detail applies to the unit prices?

Answer: The Extra Unit Price items 9 & 10 are for isolation of suction and discharge  
pipes of the High Service Pumps, if the existing isolation valves don not function  
properly to provide a tight closure. There will be a blind flange installed at the  
completion of the work should line stops be required. The details shown on the  
drawings and standard details refer to the temporary bypass piping system at the UV  
Building work areas that are required for the coupling removal / replacement work.

11. Question: The plans call for a base bid for providing 30" triple offset disc control valves. There are also alternate plans for providing 24" EMO ball control valves. However, there are not alternate bid items in the bid schedule. Please clarify.

Answer: The 30" triple offset disc control valves and electrical actuators system represents pump control valve Improvement Option 1, and the 24" metal seated resilient ball valve with electrohydraulic actuator system represents pump control valve Improvement Option 2. It is up to bidders to select which option to include in the final bid.

12. Question: Plan Sheets M-1 and M-2 call for 6" isolation plug valves for the 6" air valves. Will a plug valve spec be issued?

Answer: Refer to revised Spec 15100.

13. Question: Spec Section 02767, Page 8 shows two 30" line stop assemblies. However, on Plan Sheets D-6 and M-4, it's shown as a Tap Assembly at UV Building 1. Only the assembly at UV Building 2 is shown as a line stop assembly. Please clarify.

Answer: Both locations have 30" line stops. Drawing D-6 calls out 30" tapping valve and line stop.

END OF ADDENDUM NO. 1

Northeast Water Purification Plant (NEWPP)  
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WBS No. S-000066-012A-4

**ADDENDUM**

DATED:



Ravi Kaleyatodi, P.E., CPM  
Senior Assistant Director  
Department of Public Works and  
Engineering



CDM Smith  
TBPE Firm Registration No. F-3043

END OF DOCUMENT

00910-6  
11-06-2015

Document 00010

**TABLE OF CONTENTS**

NOTE: Bold capitalized Specification Sections are included in the City of Houston Department of Public Works and Engineering Standard Construction Specifications for Wastewater Collection Systems, Water Lines, Storm Drainage, Street Paving, and Traffic located here: <http://edocs.publicworks.houstontx.gov/engineering-and-construction/specifications/division-02-16-standard-specifications.html>; and are incorporated in Project Manuals by reference as if copied verbatim. Documents listed "for filing" are to be provided by Bidder and are not included in this Project Manual unless indicated for example only. The Document numbers and titles hold places for actual documents to be submitted by Contractor during Bid, post-bid, or construction phase of the Project. Specification Sections marked with an asterisk (\*) are amended by a supplemental specification, printed on blue paper and placed in front of the Specification it amends. Documents in the 200, 300 and 400 series of Division 00, except for Document 00410B – Bid Form, Part B, are not part of the Contract.

| <b><u>Doc. No.</u></b> | <b><u>Document Title</u></b> | <b><u>Doc. Date</u></b> |
|------------------------|------------------------------|-------------------------|
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**INTRODUCTORY INFORMATION**

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| 00015 | List of Drawings .....  | 02-01-2004 |

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| 00450 | Bidder's Statement of MWBE/PDBE/DBE/SBE Status.....        | 07-01-2013 |
| 00452 | Contractor Submission List - Fair Campaign Ordinance ..... | 04-30-2004 |
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| 00454 | Affidavit of Non-interest .....                            | 02-01-2004 |
| 00455 | Affidavit of Ownership or Control .....                    | 09-04-2007 |
| 00457 | Conflict of Interest Questionnaire.....                    | 02-28-2006 |
| 00460 | (POP-1) Pay or Play Acknowledgement Form .....             | 07-03-2012 |
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00602 Contractor's Drug Free Workplace Policy (For filing)  
00604 History of OSHA Actions and List of On-the-job Injuries .....02-01-2004  
00605 List of Safety Impact Positions .....02-01-2004  
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**ADDENDA AND MODIFICATIONS**

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| *01782 | Operations and Maintenance Data .....                         | 08-01-2003 |
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| 02521 | <b>GATE VALVES</b> .....  | 01-01-2011 |
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| 15051 | Piping – General Requirements .....  | 07-31-2015 |
| 15061 | Steel Pipe and Fittings.....   | 09-25-2015 |
| 15064 | PVC & CPVC Pipe and Fittings.....  | 09-25-2015 |
| 15100 | Valves.....  | 09-25-2015 |
| 15114 | Electro-Hydraulic Valve Actuators .....  | 07-31-2015 |
| 15120 | Piping Specialties .....   | 09-25-2015 |
| 15140 | Pipe Hangers, Supports and Restraints .....  | 07-31-2015 |
| 15200 | Electric Valve Actuators .....   | 09-25-2015 |
| 15500 | HVAC - General Provisions .....  | 07-31-2015 |
| 15855 | HVAC – Direct Expansion (DX) Air Handling Units .....                                      | 07-31-2015 |
| 15860 | HVAC – Metal Fans .....  | 07-31-2015 |
| 15953 | Resilient Metal Seated Ball Type Pump Control Valve for High Service<br>Pump Station ..... | 07-31-2015 |
| 15954 | Triple Offset Disc Type Pump Control Valve for High Service<br>Pump Station .....          | 09-25-2015 |

**DIVISION 16 - ELECTRICAL**

|               |  |                   |
|---------------|--|-------------------|
| 16010S        | Basic Electrical Requirements .....              | 09-25-2015        |
| <b>*16010</b> | <b>BASIC ELECTRICAL REQUIREMENTS .....</b>       | <b>01-01-2011</b> |
| 16060         | Electrical Demolition .....                      | 07-31-2015        |
| 16111         | Conduit, Fittings, and Bodies .....              | 09-25-2015        |
| 16120         | 600-Volt Insulated Wire .....                    | 09-25-2015        |
| 16123         | Medium Voltage Power Cable .....                 | 09-25-2015        |
| 16126         | Instrumentation Cable.....                       | 09-25-2015        |
| 16131         | Device, Pull, Junction and Terminal Boxes .....  | 07-31-2015        |
| 16140         | Wiring Devices.....                              | 07-31-2015        |
| 16161         | Panelboards .....                                | 07-31-2015        |
| 16170         | Grounding and Bonding .....                      | 07-31-2015        |
| 16171         | Low Voltage Motors .....                         | 07-31-2015        |
| 16195         | Electrical Identification .....                  | 07-31-2015        |
| 16322         | Unit Substation Transformers .....               | 09-25-2015        |
| 16340         | Switchgear 125V DC Battery System.....           | 07-31-2015        |
| 16346         | Medium Voltage Metal-Clad Switchgear .....       | 09-25-2015        |
| 16349         | Medium Voltage Motor Controller Switchgear ..... | 09-25-2015        |
| 16402         | Underground Duct Banks.....                      | 09-25-2015        |

**DIVISION 16 – ELECTRICAL - Continued**

|       |  |            |
|-------|--|------------|
| 16461 | Dry Type Transformers .....                                  | 07-31-2015 |
| 16475 | Overcurrent Protective Devices .....                         | 07-31-2015 |
| 16476 | Disconnects and Circuit Breakers .....                       | 07-31-2015 |
| 16481 | Motor Controllers .....                                      | 07-31-2015 |
| 16485 | Medium Voltage Adjustable Speed Drives .....                 | 07-31-2015 |
| 16670 | Lighting Protection System .....                             | 07-31-2015 |
| 16995 | Relay and Protective Device Settings (with Attachments)..... | 07-31-2015 |

END OF DOCUMENT

Document 00410B

BID FORM – PART B

**1.0 TOTAL BID PRICE HAS BEEN CALCULATED BY BIDDER, USING THE FOLLOWING COMPONENT PRICES AND PROCESS (PRINT OR TYPE NUMERICAL AMOUNTS):**

**A. STIPULATED PRICE:**

N/A

(Total Bid Price; minus Base Unit Prices, Extra Unit Prices, Cash Allowances and All Alternates, if any)

**B. BASE UNIT PRICE TABLE:**

| Item No. | Spec Ref.   | Base Unit  | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in Figures         |
|----------|---|--|-----------------|--------------------|-----------------------------------|--------------------------|
| 1.       | 01502   | Mobilization   | LS              | 1                  | \$250,000 <sup>(1)</sup>          | \$250,000 <sup>(1)</sup> |
| 2.       | 01570   | Installation of stormwater pollution prevention control measures including filter fabric fencing, storm inlet sediment trap, and inlet protection barrier to comply with the requirement of the Storm Water Pollution Prevention Plan, including furnishing all materials and incidentals.   | LS              | 1                  |                                   |                          |
| 3.       | 01110   | Coordination of new CenterPoint easement installation, including clearing, grubbing, new electrical service and temporary roadway provisions in the Construction Staging Area, to be utilized for this and subsequent projects.  | LS              | 1                  |                                   |                          |
| 4.       | 09910S, 09910, 15114, 15120, 15140, 15200, 15953, 15954, Division 13, Division 16 | Replacement of existing globe style silent check valves (quantity 8) at the plant High Service Pump Station with new pump control valves and actuators to provide fail-close upon power failure. Provide complete package in place with associated process mechanical demolition, piping modifications, structural, electrical, instrumentation and control improvements | LS              | 1                  |                                   |                          |

**B. BASE UNIT PRICE TABLE:**

| Item No. | Spec Ref.  | Base Unit   | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in Figures |
|----------|--|---|-----------------|--------------------|-----------------------------------|------------------|
| 5.       | 02050  | Demolition of two existing hydropneumatic surge tanks and associated piping, fittings, valves, all related electrical and structural foundation. Installation of flush-type hydrant.  | LS              | 1                  |                                   |                  |
| 6.       | 02050, 16060   | Demolition and removal of the High Service Pump Station Powerhouse and two 10,000 kVA transformers. These items shall be the Contractors sole possession for Salvage  | LS              | 1                  |                                   |                  |
| 7.       | Division 13, 16402   | Installation of duct bank for 12.47kV Medium Voltage feeders and Communications from the 138kV Substation Electrical Building to the proposed Substation Transformers and High Service Electrical Building and new pad-mounted transformers     | LS              | 1                  |                                   |                  |
| 8.       | Division 13, Division 16   | Installation of four Medium Voltage 4.16 kV Adjustable Speed Drives (ASDs) and medium-voltage electrical switchgear with all required electrical and instrumentation and control improvements   | LS              | 1                  |                                   |                  |
| 9.       | Divisions 2 through 10, 11501, 15500, 15855, 15860, and Division 13, Division 16 | Construction of a new Electrical Building to house new electrical switchgear, ASDs and PLC control panel and ancillary equipment. Provide all associated building structural, architectural, HVAC and plumbing, and civil and site improvements | LS              | 1                  |                                   |                  |
| 10.      | 13900  | Implementation of a new pump operation and optimization software to maximize pump station operation efficiency.   | LS              | 1                  |                                   |                  |

**B. BASE UNIT PRICE TABLE:**

| Item No.                             | Spec Ref.   | Base Unit   | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in Figures |
|--------------------------------------|---|---|-----------------|--------------------|-----------------------------------|------------------|
| 11.                                  | 13340   | Replacement of existing 42-inch distribution flow meter (quantity 2.), existing 8-inch plant potable water (utility water) flow meter, HSPS suction and discharge header pressure indicating transmitters, plant potable water loop pressure indicating transmitter, post-GST1 chlorine analyzer, and associated electrical and instrumentation and control improvements                | LS              | 1                  |                                   |                  |
| 12.                                  | 02050,<br>02518,<br>02768,<br>11500,<br>15120,<br>15140 | Miscellaneous piping elements and structural support improvements at the plant High Service Pump Station, Treated Water Flow Meter Station, and UV1 and UV2 Buildings areas as shown on the Drawings and specified herein, including installation of temporary line stops and bypass piping to remove existing Victaulic Depend-O-Lok couplings and replace with new piping connections | LS              | 1                  |                                   |                  |
| 13.                                  | 01110   | Enter equipment data of new material provided on this project into the City's work Management System (WMS) database. Coordinate with Drinking Water Operations (DWO) staff for training and data input  | LS              | 1                  |                                   |                  |
| 14.                                  | Division<br>2   | All miscellaneous civil and site work including paving, grading, drainage, and utilities as shown on the Drawings and specified herein, including provisions for storm water Inlet and storm water line to connect the existing storm water line.   | LS              | 1                  |                                   |                  |
| <b><u>TOTAL BASE UNIT PRICES</u></b> |   |   |                 |                    |                                   | \$ _____         |

**C. EXTRA UNIT PRICE TABLE:**

| Item No. | Spec Ref.        | Extra Unit  | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in figures              |
|----------|------------------|---|-----------------|--------------------|-----------------------------------|-------------------------------|
| 1.       | 01576S,<br>01576 | Stormwater quality detention basin cleaning as shown on the Drawings including handling, removing, laboratory testing, transporting, and disposal of vegetation and soil, and hydromulching the basin | CY              | 1,250              | [\$60.00] <sup>(2)</sup>          | [\$75,000] <sup>(2)</sup>     |
| 2.       | 02318            | Hand Excavation and Backfill  | CY              | 10                 | [\$100.00] <sup>(2)</sup>         | [\$1,000] <sup>(2)</sup>      |
| 3.       | 02318            | Machine Excavation and Backfill   | CY              | 10                 | [\$25.00] <sup>(2)</sup>          | [\$250.00] <sup>(2)</sup>     |
| 4.       | 02320            | Bank Sand Backfill  | CY              | 10                 | [\$10.00] <sup>(2)</sup>          | [\$100.00] <sup>(2)</sup>     |
| 5.       | 02320            | Select Backfill   | CY              | 10                 | [\$15.00] <sup>(2)</sup>          | [\$150.00] <sup>(2)</sup>     |
| 6.       | 02321            | Cement Stabilized Sand Backfill   | TON             | 10                 | [\$40.00] <sup>(2)</sup>          | [\$400.00] <sup>(2)</sup>     |
| 7.       | 02465            | 30" Ø Drilled Pier with Reinforcement and Casing  | LF              | 60                 | [\$100.00] <sup>(2)</sup>         | [\$6,000.00] <sup>(2)</sup>   |
| 8.       | 02751            | Concrete Pavement and Subgrade  | SY              | 20                 | [\$70.00] <sup>(2)</sup>          | [\$1,400.00] <sup>(2)</sup>   |
| 9.       | 02768            | Extra Allowance on 42" Line Stop Installation on HSPS Suction Pipe including excavation, replacement of fill, and compaction etc. to complete the installation.                                       | EA              | 4                  | [\$65,500.00] <sup>(2)</sup>      | [\$262,000.00] <sup>(2)</sup> |
| 10.      | 02768            | Extra Allowance on 30" Line Stop Installation on HSPS Discharge Pipe including excavation, replacement of fill, and compaction etc. to complete the installation.                                     | EA              | 4                  | [\$50,000.00] <sup>(2)</sup>      | [\$200,000.00] <sup>(2)</sup> |

**C. EXTRA UNIT PRICE TABLE:**

| Item No. | Spec Ref.       | Extra Unit  | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in figures              |
|----------|-----------------|---|-----------------|--------------------|-----------------------------------|-------------------------------|
| 11.      | 03200           | Grade 60 Reinforcement  | Ton             | 5                  | [\$1,200.00] <sup>(2)</sup>       | [\$6,000.00] <sup>(2)</sup>   |
| 12.      | 03300           | Class A (4,000 psi) Concrete  | CY              | 10                 | [\$300.00] <sup>(2)</sup>         | [\$3,000.00] <sup>(2)</sup>   |
| 13.      | 03600           | Non-shrink Epoxy Grout (14,000 psi)   | CF              | 5                  | [\$555] <sup>(2)</sup>            | [\$2,775.00] <sup>(2)</sup>   |
| 14.      | 03600           | Concrete Grout (2,500 psi min)  | CY              | 2                  | [\$800] <sup>(2)</sup>            | [\$1,600.00] <sup>(2)</sup>   |
| 15.      | 05580           | Fabricated Structural Steel   | Ton             | 1                  | [\$2,500] <sup>(2)</sup>          | [\$2,500] <sup>(2)</sup>      |
| 16.      | 02518,<br>15061 | Steel Piping and Fittings   | Ton             | 5                  | [\$4,000.00] <sup>(2)</sup>       | [\$20,000] <sup>(2)</sup>     |
| 17.      | 15100           | Extra Unit Cost for seat repairing/replacing existing 30" pump discharge butterfly valves with new as specified in Section 15100  | EA              | 4                  | [\$10,000.00] <sup>(2)</sup>      | [\$40,000.00] <sup>(2)</sup>  |
| 18.      | 15100           | Extra Unit Cost for seat repairing or replacing existing 42" pump suction butterfly valves with new as specified in Section 15100   | EA              | 4                  | [\$25,000.00] <sup>(2)</sup>      | [\$100,000.00] <sup>(2)</sup> |
| 19.      | 15120           | Extra Allowance for Removing existing Depend-o-Lok couplings and replacement with welded butt strap connection complete with pipe interior coating repair and finish painting complete in place | EA              | 2                  | [\$2,000.00] <sup>(2)</sup>       | [\$4,000.00] <sup>(2)</sup>   |
| 20.      | 16111           | 1" Rigid Aluminum Conduit installed above ground  | LF              | 200                | [\$15.50] <sup>(2)</sup>          | [\$3,100.00] <sup>(2)</sup>   |
| 21.      | 16111           | 2" Rigid Aluminum Conduit installed above ground  | LF              | 100                | [\$29.50] <sup>(2)</sup>          | [\$2,950.00] <sup>(2)</sup>   |
| 22.      | 16111           | 3" Rigid Aluminum Conduit installed above ground  | LF              | 100                | [\$55.50] <sup>(2)</sup>          | [\$5,550.00] <sup>(2)</sup>   |

**C. EXTRA UNIT PRICE TABLE:**

| Item No. | Spec Ref. | Extra Unit   | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in figures                  |
|----------|-----------|--|-----------------|--------------------|-----------------------------------|-----------------------------------|
| 23.      | 16120     | Copper No. 12 AWG conductor with XHHW-2 insulation, installed                      | LF              | 2,000              | <u>[\$0.72]<sup>(2)</sup></u>     | <u>[\$1,440.00]<sup>(2)</sup></u> |
| 24.      | 16120     | Copper No. 10 AWG conductor with XHHW-2 insulation, installed                      | LF              | 1,000              | <u>[\$0.94]<sup>(2)</sup></u>     | <u>[\$940.00]<sup>(2)</sup></u>   |
| 25.      | 16120     | Copper No. 6 AWG conductor with XHHW-2 insulation, installed                       | LF              | 500                | <u>[\$1.68]<sup>(2)</sup></u>     | <u>[\$840.00]<sup>(2)</sup></u>   |
| 26.      | 16120     | Copper No. 2 AWG conductor with XHHW-2 insulation, installed                       | LF              | 500                | <u>[\$3.25]<sup>(2)</sup></u>     | <u>[\$1,625.00]<sup>(2)</sup></u> |
| 27.      | 16120     | Copper No. 1/0 AWG conductor with XHHW-2 insulation, installed                     | LF              | 250                | <u>[\$4.63]<sup>(2)</sup></u>     | <u>[\$1,157.50]<sup>(2)</sup></u> |
| 28.      | 16120     | Copper No. 4/0 AWG conductor with XHHW-2 insulation, installed                     | LF              | 100                | <u>[\$7.25]<sup>(2)</sup></u>     | <u>[\$725.00]<sup>(2)</sup></u>   |
| 29.      | 16123     | Copper No. 2/0 AWG conductor with (15Kv) EPR insulation, installed, and terminated | LF              | 400                | <u>[\$21.40]<sup>(2)</sup></u>    | <u>[\$8,560.00]<sup>(2)</sup></u> |
| 30.      | 16123     | Copper 250 KCMIL conductor with (15Kv) EPR insulation, installed, and terminated   | LF              | 300                | <u>[\$27.90]<sup>(2)</sup></u>    | <u>[\$8,370.00]<sup>(2)</sup></u> |
| 31.      | 16126     | 2/C or 3/C, #16 AWG twisted shielded instrument cable, installed                   | LF              | 1,000              | <u>[\$2.10]<sup>(2)</sup></u>     | <u>[\$2,100.00]<sup>(2)</sup></u> |
| 32.      | 16402     | 1" PVC SCH 40 Conduit installed in Underground duct bank                           | LF              | 500                | <u>[\$2.50]<sup>(2)</sup></u>     | <u>[\$1,250.00]<sup>(2)</sup></u> |
| 33.      | 16402     | 2" PVC SCH 40 Conduit installed in Underground duct bank                           | LF              | 500                | <u>[\$4.30]<sup>(2)</sup></u>     | <u>[\$2,150.00]<sup>(2)</sup></u> |
| 34.      | 16402     | 3" PVC SCH 40 Conduit installed in Underground duct bank                           | LF              | 400                | <u>[\$5.50]<sup>(2)</sup></u>     | <u>[\$2,200.00]<sup>(2)</sup></u> |

**C. EXTRA UNIT PRICE TABLE:**

| Item No.                              | Spec Ref. | Extra Unit   | Unit of Measure | Estimated Quantity | Unit Price (this Column controls) | Total in figures                    |
|---------------------------------------|-----------|--|-----------------|--------------------|-----------------------------------|-------------------------------------|
| 35.                                   | 16402     | 4" PVC SCH 40 Conduit installed in Underground duct bank   | LF              | 200                | <u>[\$6.50]<sup>(2)</sup></u>     | <u>[\$1,300.00]<sup>(2)</sup></u>   |
| 36.                                   | 16402     | Duct bank trenching, rebar, concrete encasement and backfill for duct bank where the top of the duct bank is 48" below grade or less | LF              | 200                | <u>[\$35.00]<sup>(2)</sup></u>    | <u>[\$7,000.00]<sup>(2)</sup></u>   |
| 37.                                   | 16402     | Duct bank trenching, rebar, concrete encasement and backfill for duct bank where the top of the duct bank is 48" below grade or more | LF              | 200                | <u>[\$50.00]<sup>(2)</sup></u>    | <u>[\$10,000.00]<sup>(2)</sup></u>  |
| <b><u>TOTAL EXTRA UNIT PRICES</u></b> |           |  |                 |                    |                                   | <u>[\$787,432.50]<sup>(2)</sup></u> |

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Northeast Water Purification Plant (NEWPP)  
Improvements Package No. 2 – High Service Pump Station  
and Miscellaneous Piping Improvements  
WBS No. S-000066-012A-4

**BID FORM  
PART B**

**D. CASH ALLOWANCE TABLE:**

| Item No.                            | Spec Ref. | Cash Allowance Short Title                             | Cash Allowance in figures (1) |
|-------------------------------------|-----------|--|-------------------------------|
| 1                                   | 01110     | Building Permit Fee                                    | \$28,000                      |
| 2                                   | 01110     | CenterPoint Energy Temporary Power                     | \$50,000                      |
| 3                                   | 01110     | Tree Removal Permit Application and Planting Allowance | \$50,000                      |
| <b><u>TOTAL CASH ALLOWANCES</u></b> |           |  | \$128,000                     |

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Northeast Water Purification Plant (NEWPP)  
Improvements Package No. 2 – High Service Pump Station  
and Miscellaneous Piping Improvements  
WBS No. . S-000066-012A-4

**BID FORM  
PART B**

**E. ALTERNATES TABLE: N/A**

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**F. TOTAL BID PRICE:**

(Add Totals for Items A., B., C., D., and E. above) \_\_\_\_\_

**2.0 SIGNATURES:** By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Bid Price.

Bidder: \_\_\_\_\_

(Print or type full name of your proprietorship, partnership, corporation, or joint venture.\*)

\*\* By: \_\_\_\_\_

Signature

Date

Name: \_\_\_\_\_

(Print or type name)

Title

Address: \_\_\_\_\_

(Mailing)

\_\_\_\_\_  
(Street, if different)

Telephone and Fax Number: \_\_\_\_\_

(Print or type numbers)

\* If Bid is a joint venture, add additional Bid Form signature sheets for each member of the joint venture.

\*\* Bidder certifies that the only person or parties interested in this offer as principals are those named above. Bidder has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding.

Note: This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided in § 37.10 of the Texas Penal Code.

Footnotes for Tables B through E:

- (1) Fixed Unit Price determined prior to Bid. Cannot be adjusted by the Bidder.
- (2) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder, but not decreased, by crossing out the Minimum and inserting revised price on the line above. **Cannot** be decreased by the Bidder.
- (3) Maximum Bid Price determined prior to Bid. Can be decreased by the Bidder, but not increased, by crossing out the Maximum and inserting revised price on the line above. A Bid that increases the Maximum Bid Price may be found non-conforming and non-responsive. **Cannot** be increased by the Bidder.
- (4) Fixed Range Bid Price determined prior to Bid. Unit Price can be adjusted by Bidder to any amount within the range defined by crossing out prices noted and noting revised price on the line above.

SECTION 01110  
SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Summary of the Work including Work Covered By Contract Documents, Cash Allowances, Work Sequence, Contract Use Of Premises, Warranty, Minimum Conditions For Substantial Completion, General Construction Notes, and Confidentiality of Contract Documents.
- B. Work related to this Section is found in:
  - 1. Section 01114 – Construction Sequence
  - 2. Section 01325 – Construction Schedule

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of the contract is for the Improvements at the Northeast Water Purification Plant (NEWPP). The project is to provide better pump operation and control to meet variable flow and pressure conditions by installing adjustable speed drives and pump control valves to the plant high service pumps. The project also addresses unbalanced conditions and overstress in the existing piping systems in order to protect city infrastructure and assets, consisting of the following:
  - 1. Mobilization by the Contractor to initiate project start-up, as specified in Section 01502.
  - 2. Installation of stormwater pollution prevention control measures including filter fabric fencing, storm inlet sediment trap, and inlet protection barrier to comply with the requirement of the Storm Water Pollution Prevention Plan, including furnishing all materials and incidentals.
  - 3. Coordination of new CenterPoint easement installation including clearing, grubbing, new electrical service and temporary roadway provisions in the Construction Staging Area, to be utilized for this and subsequent projects.
  - 4. Replacement of existing globe style silent check valves (quantity 8) at the plant High Service Pump Station with new pump control valves and actuators to provide fail-close upon power failure. Provide complete package in place with associated process mechanical demolition, piping modifications, structural, electrical, instrumentation and control improvements.
  - 5. Demolition of two existing hydropneumatic surge tanks and associated piping, fittings, valves, all related electrical and structural foundation. Installation of flush-type hydrant.
  - 6. Demolition and removal of the High Service Pump Station Powerhouse and two 10,000 kVA transformers. These items shall be the Contractors sole possession for Salvage.

7. Installation of duct bank for 12.47kV Medium Voltage feeders and Communications from the 138kV Substation Electrical Building to the proposed Substation Transformers and High Service Electrical Building.
  8. Installation of four Medium Voltage 4.16 kV Adjustable Speed Drives (ASDs) with all required electrical, instrumentation and control improvements. Perform a 7-day consecutive demonstration test of the entire High Service Pump Station with all pumps in service and new improvements complete in place and functional. See Specification 16010 for requirements.
  9. Construction of a new Electrical Building to house new electrical switchgear, ASDs, PLC control panel and ancillary equipment. Provide all associated building structural, architectural, HVAC, plumbing, civil and site improvements.
  10. Implementation of new pump operation and optimization software to maximize pump station operation efficiency.
  11. Replacement of existing 42-inch distribution flow meter (quantity 2.), existing 8-inch plant potable water (utility water) flow meter, HSPS suction and discharge header pressure indicating transmitters, plant potable water loop pressure indicating transmitter, post-GST 1 chlorine analyzer, and associated electrical and instrumentation and control improvements.
  12. Miscellaneous piping elements and structural support improvements at the plant High Service Pump Station, Treated Water Flow Meter Station, and UV1 and UV2 Buildings areas as shown on the Drawings and specified herein, including installation of temporary line stops and bypass piping to remove existing Victaulic Depend-O-Lok couplings and replace with new piping connections.
  13. Enter equipment data of new material provided on this project into the City's work Management System (WMS) database. Attachment to this Section is a copy of the City's WMS typical equipment data sheet. This activity needs to be coordinated with Drinking Water Operations (DWO) staff for training and data input.
  14. All miscellaneous civil and site work including paving, grading, drainage, and utilities as shown on the Drawings and specified herein, including provisions for storm water Inlet and storm water line to connect the existing storm water line.
- B. Extra Unit Price Items are included in Section 00410 for use if extra work is encountered.
- C. Coordination
1. Coordination and meetings for this project shall be provided as specified in Section 01312.
- D. Field Office
1. A field office is required for this project. Refer to Section 01520.

E. General Construction Notes

1. The Contractor shall be responsible for verifying the location(s) of all underground utility lines in the areas on proposed construction before beginning construction.
2. The information contained within the project Drawings with regards to the existing facilities was taken from the original construction plans with the original work shown light and proposed work shown dark. Original work shown light is for the Contractor's information only. Its accuracy is not guaranteed and its use in no way relieves the contractor or others of any responsibility for loss due to inaccuracies. Refer to Specification Section 00330 Existing Conditions for additional detail.
3. Contractor shall be responsible for providing required security to protect his own property, equipment and work in progress as defined in Section 01560.
4. Contractor shall be responsible for adequately protecting existing structures, utilities, trees, shrubs, and other adjoining facilities and repair or replace due to damage caused by Contractor.
5. Contractor shall field verify all dimensions and conditions before commencing work. All landscaping features shall be field verified. It shall be the Contractor's responsibility to report any discrepancies to the Construction Manager in a timely manner.
6. Contractor to keep access road to existing plants open and free of construction related debris at all times. Contractor staging area shall be used for Contractor's personnel, parking, material, and storage. Stockpile, material fabrication and related construction uses will not be allowed to interfere with normal plant operation. Contractor to provide temporary all-weather access roads as needed to maintain access to all unloading areas, throughout the duration of the project.
7. The Contractor to give notice to all authorized inspectors, superintendents or persons in charge of private and public utilities affected by his operations prior to commencement of work.
8. Obtain all required construction permits prior to commencement of work.
9. Plant coordinates shown for proposed structure locations are referenced to outside of face of exterior wall or to centerline of structure, unless otherwise noted on the Drawings.
10. The finished grade elevations shown are intended to provide drainage away from plant facilities. Minor changes may be necessary to provide adequate drainage.
11. Maintain drainage of site during all phases of construction. Do not block drainage from adjacent areas or add flow to adjacent areas.
12. These Drawings, prepared by CDM Smith Inc., do not extend to or include designs or systems pertaining to the safety of the construction Contractor or its employees or agents. CDM Smith Inc.'s registered professional engineer(s) that have sealed these bid documents

does not extend to any such safety systems that may now or hereafter be incorporated in these Drawings. The construction Contractor shall prepare or obtain the appropriate safety systems required by Federal, State, and local laws and regulations.

13. The Contractor shall contact the following, a minimum of 48 hours prior to beginning construction:

Texas One Call

811

14. Contractor shall not operate any existing valves, plant appurtenances or plant equipment. Provide sufficient notification and lead time, in accordance with the requirements of Section 01114, for Plant Operator where it becomes necessary to actuate or de-actuate valves, plant appurtenances, or plant equipment.
15. Plant Manager and Construction Manager to be notified in advance of any existing process equipment "shutdown", as specified in Section 01114.
16. Contractor is responsible for submitting fitting schedule and method of joint restraint where first below-ground fitting will not be flanged.
17. Contractor to provide adequate restrained joints as scheduled or concrete thrust blocking at all tees, wyes, bends, crosses, flushing valves and offsets to withstand test pressure as specified.
18. Contractor shall comply with all Federal, State, and local laws and regulations of utility companies concerning safety and health practices.
19. Contractor shall provide sodding in all areas disturbed as a result of construction operations that are not covered by structures or pavement. Temporary roadways shall be removed at the conclusion of the project, and site will be restored to its original conditions.
20. Piping drawings indicate invert elevations for gravity flow lines. Slope pipe uniformly between elevations shown. No valleys or peaks permitted in gravity flow lines. For other piping, refer to detail sheets for pipe elevations at each structure. Yard piping drawings do not indicate vertical bends and transitions. When necessary, make vertical transitions or furnish and install vertical bends at no extra cost. Do not exceed manufacturer's recommendations for curvature of lines and/or deflection of pipe joints. All vertical transitions and bends to be documented on required "red line drawings."
21. Yard piping locations shown are approximate. Field verify locations of existing pipe. Arrange new piping as necessary to avoid interference and provide clearance noted. All changes in piping shown, to be documented on required "red line drawings."
22. Maintain minimum clearance of 3 feet from edge of structures to closest edge of pipeline adjacent and parallel to edge of structure unless otherwise noted on plans.
23. The Contractor to provide tape, fittings, plugs, and other devices for use in filling, flushing, testing, etc. (no separate pay).

24. Overhead lines exist along the plant boundary. Contractor to locate them prior to beginning any construction. Texas Law, Session 752, Health and code governing any activities which may cause people or objects to approach live overhead high-voltage lines shall be strictly adhered to. Contractor is legally responsible for safety of construction workers under this law. This law carries both criminal and civil liability.
25. The Contractor shall not operate any equipment or have any persons within 10 feet (vertical and horizontal) of electrical power lines.
26. Contractor shall refer to the latest City of Houston standard detail drawings included in the City of Houston's "Standard Construction Details for Wastewater Collection Systems, Water Lines, Storm Drainage, and Street Paving", for any details not included in the construction drawings.

#### 1.03 CASH ALLOWANCES

- A. Include the following specific Cash Allowances in the Contract Price under provision of General Conditions Paragraph 3.11:

1. Building Permit Fee.
2. Center Point Energy Temporary Electrical Service.
3. Tree Removal Permit Application and Planting Allowance. Contractor shall adhere to City of Houston Tree Ordinance including latest amendments with regard to trees that are to be removed and replaced. Contractor is responsible for preparing and submitting required documents and plans to obtain a tree removal permit prior to removing any tree within the plant property line when clearing a 30' right-of-way for CenterPoint Power Company truck access easement. The permit can be obtained by contacting City of Houston, Department of Parks and Recreation representative Mr. Victor Cordova at 832-395-8454. Notify Mr. Victor Cordova at least two (2) weeks in advance of clearing and cutting any tree. Contractor shall adhere to the requirements of Section 01562- Tree and Plant Protection, Section 02915 – Tree Planting, Section 01740 – Site Restoration and the tree protection plan.

#### 1.04 ALTERNATES

- A. There are no alternates included in this project.

#### 1.05 CITY-FURNISHED PRODUCTS

- A. There are no City Furnished Products in this project.

#### 1.06 WORK SEQUENCE

- A. The work sequence for this project is specified in Section 01114.

1.07 CONTRACTOR USE OF PREMISES

- A. Comply with procedures for access to the site and Contractor's use of rights-of-way as specified in Section 01145 and Section 01145S – Use of Premises.
- B. Construction Operations: Limited to the City's rights-of-way provided by the City and areas shown or described in the Contract documents.
- C. Utility Outages and Shutdown: Provide a minimum of 14 calendar days' notice to the City and private utility companies (when applicable) in advance of required utility, equipment, or process shutdowns. Coordinate all work as required. Contractor shall submit a shutdown plan to the Construction Manager for approval within 30 days of the Notice to Proceed. Thereafter, the Contractor shall update the shutdown plan at a minimum on a monthly basis or more frequently if requested by the Construction Manager. Comply with the requirements of Section 01114.

1.08 STREET CUT ORDINANCE

- A. No work will be conducted in City of Houston right-of-way under this Contract.

1.09 WARRANTY

- A. Comply with warranty requirements in accordance with Document 00700 – General Conditions.

1.10 CONDITIONS FOR SUBSTANTIAL COMPLETION

- A. The conditions for Substantial Completion for this project is specified in Section 01114.

1.11 CONFIDENTIALITY OF CONTRACT DOCUMENTS

- A. Contractor shall keep the Plans confidential as provided in this Agreement and shall not make copies of the Plans. Contractor understands that the Plans are confidential information under the Texas Homeland Security Act, Chapter 421 of the Texas Government Code.
- B. Contractor shall keep the Plans in a locked secure location. The Company shall keep this location confidential and share this information only with its personnel, subcontractors and designated City staff for the purpose of performing the Work.
- C. The Contractor shall require all sub-contractors who use the Plans to sign a confidentiality Agreement acceptable to the Owner.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

- C. The Contractor shall make every effort to group work in similar areas or work that will affect similar operation together.
- D. There is a separate construction contract for improvements to existing Chemical Feed System near the Phase I and Phase II UV Building areas (NEWPP Improvements Package No.1 – Chemical Feed System Improvements, City of Houston WBS No. S-000066-0012-4). It is anticipated that the Package No. 1 construction will start concurrently with the Package No. 2 construction. Upon the Improvement Package No. 2 construction work is authorized by the City, selected Contractor shall coordinate construction activities in the common areas shown on the Drawings with the selected Contractor for Package No. 1.
- E. Contractor shall keep CM informed of all work activities, including daily notification of all crews performing work and the locations thereof. To facilitate work planning, Contractor shall submit no later than 3:00 p.m. local time each Friday his work plan for the upcoming week which will identify the work to be performed each day and the location thereof.
- F. The Contractor is required to protect all equipment, buildings, structures, piping, electrical cables, tanks, underground utilities, and all associated appurtenances during construction.
- G. The Contractor is clearly responsible for all temporary supports and bracing for all structural elements affected by Work including, but not limited to, pumps, piping, walls, and foundations. All proposed temporary bracing and supports must be submitted by the Contractor for approval by the City and must be prepared by a Registered Professional Engineer retained by the Contractor. It is the Contractor's responsibility to insure the safety and functionality of the piping and associated appurtenances in the intermediate conditions of sequencing between these said phase conclusions. Furthermore, should the Contractor feel that any supports or bracing illustrated or depicted within these construction documents present a potential problem in terms of safety or interference with operations, it is the Contractor's responsibility to immediately document these concerns and immediately present this said documentation to the City's attention.
- H. Contractor shall provide temporary trailer facilities for use by the Engineer and Construction Management Team for the duration of the project through Construction Closeout Activities. Contractor will be responsible for all utility connections and services.

#### 1.08 SCHEDULE CONSIDERATIONS

- A. Contractor shall develop the construction schedule to accommodate all construction sequence requirements identified in this Section.
- B. At the request of City Drinking Water Operations, Contractor shall perform the Stormwater Quality Detention Basin cleaning work as shown on the Drawings and this work will be paid under Extra Unit Price Item. Upon receiving a request from the City, Contractor shall mobilize and begin the cleaning work within 30 days.
- C. Contractor shall coordinate with manufacturers of critical equipment and submit all time-critical submittals in accordance with Section 01112. The pump control valve and actuator equipment shall be delivered to the site within 24 weeks upon approval of the equipment submittals.

SUPPLEMENTARY SPECIFICATION

SECTION 01576S  
WASTE MATERIAL DISPOSAL

The following supplement modifies Specification Section 01576. Where a portion of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

1. Add the following to Paragraph 1.02:

“F. Submit records of volume of vegetation and soil disposed of including manifests, volumes, location of site, associated TCLP Test Number and lab name. Hard copy shall be submitted and the complete record for the project submitted in Excel, Lotus or equal after all vegetation and soil has been disposed of.”

2. Add Paragraph 1.03:

"1.03 MEASUREMENT AND PAYMENT

- A. Payment for Stormwater Quality Detention Basin cleaning as shown on the Drawings and hydromulching the basin, shall be made on the basis of per cubic yard (CY) as verified and documented by the City Construction Manager representative in the field. Payment shall include all related cost for handling, removal, laboratory testing, transporting and disposal of vegetation and soil from the stormwater quality detention basin, including repair of damages occurring as a result of vegetation and soil removal operation. Volumes shall be established by measurement of the trailer or truck empty and with load before leaving. ”

3. Add the following paragraph:

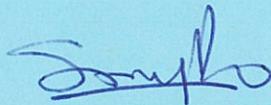
“3.03 VEGETATION AND SOIL REMOVAL FOR STORMWATER QUALITY DETENTION BASIN CLEANING

- A. Vegetation and soil shall be removed from stormwater quality detention basin by means the contractor chooses, allowing excess water to drain out of basin, loading into truck or trailer for ultimate disposal, and transportation to disposal site.
- B. Vegetation and soil removal shall include arrangement of a TCLP test, a paint filter test, and other required tests to be performed by an NELAP-accredited laboratory.
- C. Included under this contract are provisions for removal, hauling, and disposal of vegetation and soil removed from basin in a licensed site.

- D. Provide trucks with dumps, roll off dumps or dump trailers that are watertight and comply with Federal, State and local regulations for grit transport. Provide maintenance of the trucks and trailers as well as all required licenses, insurance, and inspections.
- E. The Contractor shall be completely familiar with, and shall enforce all City, State of Texas and Federal OSHA regulations and requirements as applicable for all services performed under this Contract.
- F. The Contractor shall consider all trash and debris resulting from their activities as their property. The Contractor shall remove and dispose of discarded materials in a manner that meets all Federal, State and local regulations.
- G. The Contractor shall be responsible for the repair and cost thereof, of all damages to City property caused by carelessness or neglect on the part of the Contractor, his agent or employees.”

END OF SUPPLEMENT

Approved by:



\_\_\_\_\_  
Sonny Do, P.E.  
Acting Assistant Director  
Engineering and Construction Division  
Department of Public Works and Engineering

Date

11/10/15

SECTION 13300  
 INSTRUMENTATION AND CONTROLS – GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall procure the services of a Process Control System Supplier (PCSS) to furnish and install all materials, equipment, labor and services, required to achieve a fully integrated and operational system as specified herein, in the Specification Sections listed below, and in related drawings, except for those services and materials specifically noted.

| 1. Section No | Title  |
|---------------|--|
| 13301         | I&C – Testing                                    |
| 13303         | I&C – Training                                   |
| 13305         | I&C – Control Descriptions                       |
| 13306         | I&C – Applications Engineering Services          |
| 13311         | I&C – PLC Hardware and Software                  |
| 13320         | I&C – Control and Data Network Equipment         |
| 13321         | I&C – Fiber Optic Cabling and Equipment          |
| 13330         | I&C – Control Panels and Panel Mounted Equipment |
| 13335         | I&C – Uninterruptible Power Supply (1 Phase)     |
| 13340         | I&C – Instruments                                |
| 13900         | Pump Operation and Optimization Software         |

2. An Application Engineering System Supplier (AESS) shall perform the PLC and HMI programming for the work described here and for integrating it with the existing system. An addition to programming High Service Pump Station (HSPP) PLC-3, AESS shall also be responsible for programming the following pump PLCs as specified in section 16349 and 16485:
- a. HS-P1-PLC
  - b. HS-P2-PLC
  - c. HS-P3-PLC
  - d. HS-P4-PLC
  - e. HS-P5-PLC
  - f. HS-P6-PLC
  - g. HS-P7-PLC
  - h. HS-P8-PLC
- B. Furnish and install two (2) transit time flow meter for temporary UV bypass piping. The termination I/O point for existing flow meter shall be reconnected to the new flow meter to allow monitoring capability from the HMI. Refer to electrical sheet E-29 and E-30 for additional information.
- C. Coordination with Pump Operation and Optimization Software vendor to provide an integrated system for SCADA monitoring of pump optimization data per specification section 13900. Coordination shall be consistent through factory and field testing.

SECTION 15100  
VALVES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install complete and ready for operation and test all non-buried valves as shown on the Drawings and as specified herein.
- B. The equipment shall include, but not be limited to, the following. However not all items specified herein may be included in this project.
  - 1. General Requirements
  - 2. Valve Actuators – Manual
  - 3. Valve Actuators – Powered
  - 4. Plug Valve
  - 5. Butterfly Valves
  - 6. Gate Valves
  - 7. Ball Valves
  - 8. Corporation Stops
  - 9. Air Release and Vacuum Relief Valves

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Price.
- B. Payment for extra unit price work shall be as defined in the extra unit price schedule.

1.03 RELATED WORK

- A. Buried valves and appurtenances are included in Division 2.
- B. Piping and disinfection for potable water systems is included in the respective Sections of Divisions 2.
- C. Shop and Finish painting is included in Sections 09915 and 09901.
- D. Instrumentation, not specified herein, is included in Division 13.

- E. Valves on all HVAC and plumbing systems are included in their respective sections of Division 15.
- F. Piping Specialties are included in section 15120.
- G. Pump Control Valves are included in Sections 15953 and 15954.
- H. Electrical work is included in Division 16.
- I. Certain items similar to those specified in this Section may be specified to be furnished and installed with individual equipment or systems. In case of a conflict, those individual equipment or system requirements shall govern.
- J. Electric valve operators of all types, rate of flow controllers (including modulating valves and operators) and other types of valves which are part of the automated instrumentation (such as some solenoid valves) if not included herein are included in Division 13. Valve operators shall, however, be mounted at the factory on the valves as specified herein, as part of the work of this Section.
- K. Certain items similar to those specified in this Section may be specified to be furnished and installed with individual equipment or systems. In case of a conflict, those individual equipment or system requirements shall govern.

#### 1.04 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01330, materials required to establish compliance with this Section. The first submittal shall be the valve schedule described in Paragraph 1.09. Approval of the valve schedule submittal is required prior to Contractor submitting any of the equipment in this specification. Subsequent Equipment Submittals shall include at least the following:
  - 1. Valve tag number and location within plant.
  - 2. The manufacturer and supplier.
  - 3. The address at which equipment will be fabricated or assembled.
  - 4. Shop drawings showing assembly details, materials of construction (by common name and ASTM number), and dimensions.
  - 5. Provide hydraulic characteristics of valves being provided.
  - 6. Descriptive literature, bulletins and/or catalogs of the equipment.
  - 7. The total weight of each item.
  - 8. A complete bill of materials.
  - 9. Additional submittal data, where noted with individual pieces of equipment.

10. Individual electrical/pneumatic/hydraulic control schematics and wiring diagrams for each valve operator with all external interfaces, identified exactly as detailed on the Electrical and Instrumentation Drawings. Standard catalogue cut sheets that show typical wiring diagrams only are not acceptable. Valve actuators shall be coordinated with electrical requirements shown on the Drawings and valves as specified herein.

B. Test Reports

1. Provide certified hydrostatic test data, per manufacturer's standard procedure or MSS SP 61 for all valves.

C. Certificates

1. For each valve specified to be manufactured, tested and/or installed in accordance with AWWA and other standards, submit an affidavit of compliance with the appropriate standards, including certified results of required tests and certification of proper installation.

D. Manufacturer's Installation and Application Data

E. Operating and Maintenance Data

1. Operating and maintenance instructions shall be furnished to the Engineer as provided in Section 01782. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions and other information required to instruct operating and maintenance personnel unfamiliar with such equipment.

1.05 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
3. ASTM A240 - Standard Specification for Heat Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
4. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
5. ASTM A436 - Standard Specification for Austenitic Gray Iron Castings.
6. ASTM A536 - Standard Specification for Ductile Iron Castings.
7. ASTM B30 - Standard Specification for Copper Base Alloys in Ingot Form.
8. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings

B. American Water Works Association (AWWA)

1. AWWA C111 - Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
2. AWWA C500 - Metal-Seated Gate Valves Supply Service
3. AWWA C504 - Rubber Seated Butterfly Valves
4. AWWA C507 - Ball Valves, 6 in through 48 in (150mm through 1200mm)
5. AWWA C508 - Swing Check Valves for Waterworks Service, 2-in (50mm through 24 in (600mm) NPS
6. AWWA C509 - Resilient Seated Gate Valves for Water Supply Service
7. AWWA C511 - Reduced-Pressure Principle Backflow-Prevention Assembly
8. AWWA C540 - Power Actuating Devices for Valves and Sluice Gates
9. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants
10. AWWA C800 - Underground Service Line Valves and Fittings

C. American National Standards Institute (ANSI)

1. ANSI B1.20.1 - Specifications, Dimensions, Gauging for Taper and Straight Pipe Threads (except dry seals).
2. ANSI B16.1/16.42/16.5 - Cast Iron/Ductile Iron/Steel and Stainless Steel Pipe Flanges and Flanged Fittings
3. ANSI B16.10 - Face to Face and End to End Dimensions of Valves
4. ANSI B16.104 - Butterfly Valves

D. American Iron and Steel Institute (AISI)

E. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS)

1. MSS SP 61 - Pressure Testing of Steel Valves.
2. MSS SP 67 - Butterfly Valves.
3. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
4. MSS SP 71 - Cast Iron Swing Check Valves, Flanges and Threaded Ends.
5. MSS SP 72 - Ball Valves with Flanged or Butt Welding Ends for General Services.

6. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
  7. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
  8. MSS SP 82 - Valve Pressure Testing Methods
  9. MSS SP 98 - Protective Coatings for the Interior of Valves, Hydrants and Fittings.
- F. National Electrical Manufacturers Association (NEMA)
- G. Underwriters Laboratories (UL)
- H. Factory Mutual (FM)
- I. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.
- 1.06 QUALITY ASSURANCE
- A. Qualifications
1. Valves and actuation systems shall be products of well established firms who are fully experienced, minimum 10 years, reputable and qualified in the manufacture of the particular equipment to be furnished.
  2. The equipment shall be valves shall be mated to actuators at manufacturers or integrators facility. Actuated valves shall be fully tested and certified ready for installation prior to shipment to the job site. In no case shall actuators be mounted to the valves in the field.
  3. All valves of the same type shall be the product of one manufacturer.
  4. Valve actuators in each below category shall be the product of one manufacturer, Contractor shall coordinate this requirement with actuated valves included in the scope of vender furnished equipment specified in Division 11, 13, 14 and 15.
    - a. 120 volt, single phase for valves 3 inch and below
    - b. 480 volt, three phase
    - c. Pneumatic
    - d. Hydraulic
- B. Certifications
1. The manufacturers shall furnish an affidavit of compliance with Standards referred to herein as specified in Paragraph 1.03C above. Refer to PART 3 for testing required for certain items in addition to that required by referenced standards.
- C. Provide the services of a qualified and factory trained service representative of the manufacturer to provide operational and maintenance instruction, for a 1 day, 8 hour period for each type of the following equipment, as applicable:

1. 480 volt electric actuators.
  2. Pneumatic actuators.
  3. Hydraulic cylinder actuators.
  4. Pressure regulating valves.
  5. Surge relief valves.
  6. Pinch valves.
- D. Inspection of the units may also be made by the Engineer or other representative of the Owner after delivery. The equipment shall be subject to rejection at any time due to failure to meet any of the specified requirements, even though submittal data may have been accepted previously. Equipment rejected after delivery shall be marked for identification and shall be removed from the job site at once.

#### 1.07 SYSTEM DESCRIPTION

- A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of water, wastewater, sludge, air, and chemicals as noted on the Drawings.
- B. Valves, appurtenances and miscellaneous items shall be installed as shown on the Drawings and as specified, so as to form complete workable systems.
- C. Unless otherwise noted all electrically powered valve operators shall have:
  1. Valves larger than 3-in: electric operators 460 Volt, 3 Phase, 60 Hz.
  2. Valves 3-inch and under: electric operators, 120 Volt, 1 Phase, 60 Hz.
  3. See other paragraphs for additional requirements.

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. Reference is made to Section 01610 for additional information.
- B. Packing and Shipping
  1. Care shall be taken in loading, transporting and unloading to prevent injury to the valves, appurtenances, or coatings. Equipment shall not be dropped. All valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage to the coatings shall be repaired as acceptable to the Engineer.
  2. Prior to shipping, the ends of all valves shall be acceptably covered to prevent entry of foreign material. Covers shall remain in place until after installation and connecting piping is completed.

- a. All valves 3-in and larger shall be shipped and stored on site until time of use with wood or plywood covers on each valve end.
- b. Valves smaller than 3-in shall be shipped and stored as above except that heavy cardboard covers may be used on the openings.
- c. Rising stems and exposed stem valves shall be coated with a protective oil film which shall be maintained until the valve is installed and put into use.
- d. Any corrosion in evidence at the time of acceptance by the Owner shall be removed, or the valve shall be removed and replaced.
- e. Actuated valve assemblies shall be blocked and secured to prevent any strain on the mounting arrangement during transit and storage. All electrical/pneumatic/hydraulic components shall be protected from weather and moisture in any form.

C. Storage and Protection

1. Special care shall be taken to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, to prevent deformation. See the individual piping sections and manufacturer's information for further requirements.

1.09 MAINTENANCE

- A. Special tools and the manufacturer's standard spare parts, if required for normal operation and maintenance, shall be supplied with the equipment in accordance with Section 01730 and where noted, as specified herein. Tools shall be packaged in a steel case, clearly and indelibly marked on the exterior to indicate equipment for which tools are intended.
- B. Provide one Operations and Maintenance manual for each type of valve and operator supplied under this specification in accordance with Section 01782 and Section 01782S.
- C. Included within the Operations and Maintenance manuals, provide a list of all spare and replacement parts with individual prices and location where they are available.

1.10 VALVE DESIGNATIONS AND SCHEDULE

- A. Valve locations and basic types are shown on the Drawings. The specific valve type and trim required is identified by the valve call outs. The valve call outs include an alpha-numeric Tag that indicates the required valve type/trim for that location. The products specified in Section 2 below each have a Tag identifier. Powered actuator type is identified by symbology on the P&IDs. If a valve Tag is not included on the Drawing call outs, Contractor shall submit an RFI requesting valve identification.
- B. The Contractor shall refer to the P&IDs and Mechanical Drawings and prepare a Valve Schedule for each process valve in the Project. Contractor's first submittal under this Section shall be the Valve Schedule, which shall include a unique valve Number as labeled on the P&IDs. Submit with the Valve List a copy of the Contract Drawing P&IDs indicating each unique valve Number next to the valve symbol. This valve schedule shall NOT include the valves furnished in Plumbing and HVAC sections of Division 15.

- C. The valve schedule shall include: valve Number; valve Tag; valve size; end connections, operator type and reference Drawing number(s). The valve tag convention shall be consistent with the P&ID Sheet on which it is shown. Identical valves in the same position in parallel processes (EX. Pump inlet/outlet isolation valves where there are 3 parallel pumps of same type) shall have same tag number followed by a hyphen and quantifier -1, 2, 3 etc. Where electric, hydraulic or pneumatic actuators are supplied their type shall be so noted with an E, H or P. Modulating duty actuators shall be noted with an M following the actuator type notation.
- D. The Contractor shall include the Valve Number and Tag with each valve shop drawing submittal.

E. An excerpt of an EXAMPLE schedule is as follows:

| <u>Number</u> | <u>Tag</u> | <u>Size</u> | <u>Ends</u> | <u>Operator</u> | <u>Drawing Number</u> |
|---------------|------------|-------------|-------------|-----------------|-----------------------|
| 1000          | BFV1       | 2-in        | Flanged     | Lever           | I-4, M-12             |
| 1002-, 1,2,3  | BFV3       | 8-in        | Lugged      | Gear/Handwheel  | I-5, M-15             |
| 1005          | PV1        | 6-in        | Flanged     | EM              | I-7, M-16             |

## PART 2 PRODUCTS

### 2.01 MATERIALS AND EQUIPMENT - GENERAL

- A. Reference is made to Division 1 for additional requirements, including nameplates, provisions for temporary pressure gauges, protection against electrolysis and anchor bolts.
- B. The use of a manufacturer's name and/or model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- C. Valves shall be of the size shown on the Drawings or as noted and as far as possible equipment of the same type shall be identical and from one manufacturer.
- D. All products shall be new and unused. All valves and as far as possible equipment of the same type shall be identical and from one manufacturer.
- E. Valves and appurtenances shall have the name of the maker, nominal size, flow directional arrows, working pressure for which they are designed and standard referenced, cast in raised letters or via riveted stainless steel nameplate upon some appropriate part of the body.
- F. Unless otherwise noted, items shall have a minimum working pressure of 150 psig or be of the same working pressure as the pipe they connect to, whichever is higher and suitable for the pressures noted where they are installed.
- G. Provide all special adaptors as required to ensure compatibility between valves, appurtenances and adjacent pipe.
- H. Valves and actuators located outdoors but not within a building; within maximum 2-ft above liquid; in vaults; or where otherwise noted shall be especially designed for submerged service where water may completely submerge the valve and operator. All other units shall be as a minimum weather tight.

- I. No alternative materials will be considered for approval unless complete documentation is provided regarding their satisfactory long-term use in similar conditions; in addition, the consideration of any substitution will be considered only if the superiority of the proposed materials is the intent of the substitution, and only if sufficient evidence is provided to document that superiority.

## 2.02 VALVE ACTUATORS – MANUAL

- A. Nut actuated valves shall be provided where indicated and where installed in valve boxes or accessed through floor penetrations.
  1. Provide one tee handle wrench for every four nut actuated valves. Tee handle extension length shall be determined based on the nut height as shown on the Drawings, and coordinated during the submittal process. Tee handle wrench length shall provide tee handle approximately 3 feet above floor of vantage point. Provide one nut wrench for each nut differing 1.5 feet or more from vantage point description.
- B. See the Paragraph 2.01H above for submergence requirements.
- C. The valve manufacturer shall supply, mount and test all actuators on valves at the factory. The valves and their individual actuators shall be shipped as a unit.
- D. Manually actuated butterfly valves 6 inches and smaller for fluid service shall have a 10 position, spring retained ratcheting handle. Handle shall be fusion bonded epoxy coated steel or cast iron, hardware, spring and ratcheting plate shall be 316 stainless steel. Manually actuated butterfly valves for air service 6 inches and smaller shall have a memory stop handle with infinite throttling position capability. Memory stop plate and all hardware shall be 316 stainless steel.
- E. Except as otherwise shown on the Drawings or specified herein, all valves 3-in diameter or larger, with the valve hand wheel center line located 7-ft or more above the operating floor, shall be provided with chain wheel operators complete with chain guides and hot dipped galvanized steel chain, which loop within 4-ft of the operating floor. These requirements shall supersede positioning lever actuator requirements of manual butterfly valves 6 inches and smaller.
- F. All actuators shall be capable of moving the valve from the full open to full close position and in reverse and holding the valve at any position part way between full open or closed.
- G. Each operating device shall have cast on it the word "OPEN" and an arrow indicating the direction of operation.
- H. Floor boxes for operating nuts recessed in concrete shall be standard cast iron type, cast in place, with fastening top by Clow, Trumbull, or equal.
- I. Stem guides shall be of the adjustable wall bracket type, bronze bushed, with maximum spacing of 10-ft as manufactured by Clow; Rodney Hunt, Trumbull, or equal. Extended operating nuts

and/or stems shall have universal joints and pin couplings, if longer than 10-ft and a rating of at least five times the maximum operating torque. Stem adaptors shall be provided.

- J. Where required by the installation, or as specified, provide the following: extended stem; floor stand and handwheel; position indicator and etched or cast arrow to show direction of rotation to open the valve; resilient, moisture-resistant seal around stem penetration of slab.
- K. Gear Actuators
1. Unless otherwise noted, gear actuators shall be provided for the following: plug and ball valves larger than 3-in diameter; butterfly valves larger than 6 inch diameter; where specified and/or indicated on the Drawings; where manual operator effort is greater than 40 lbs rim pull.
  2. Actuators shall be capable of being removed from the valve without dismantling the valve or removing the valve from the line.
  3. Gear actuators for quarter turn valves shall be of the worm or helical worm gear type with output shaft perpendicular to valve shaft, having a removable hand wheel mounted on the output shaft. Where shown on the Drawings, a 2 inch cast iron operating nut shall be provided. Actuators shall conform to AWWA C504 except where more stringent requirements are provided hereinafter. Worm shall be hardened steel, driven gear shall be bronze. Bearings shall be permanently lubricated, with bronze bearing bushings provided to take all thrusts and mechanical shaft seals to contain lubricants. Housings shall be sealed to exclude moisture and dirt, allow the reduction mechanisms to operate in lubricant and be constructed of cast iron, ASTM A126, Grade B, or of ductile iron, ASTM A536. Gear housing bodies for thermoplastic valves may be cast aluminum or fabricated steel to reduce weight. Gear actuators shall indicate valve position and have adjustable stops.
  4. Where indicated on the Drawings, gear actuators for butterfly valves shall be of the travelling nut type with output shaft perpendicular to valve shaft, having a removable hand wheel mounted on the output shaft. Unless noted they shall conform to AWWA C504. Stem shaft shall be machine cut alloy steel, nut and cross head shall be bronze, lever shall be ductile iron. Nut Actuators for valves 24-in and smaller shall be slotted lever design, actuators for valves greater than 24 inch shall be link and lever design. Mechanism shall be lubricated with water resistant extreme pressure NLGI No. 2 grease. Bevel gear reduction box shall be mounted on the actuator when required to meet specified manual operating effort requirements Gear actuators shall have mechanical, external indication of valve position and have adjustable threaded stops secured to the stem with spring pins. Stop shall be capable of withstanding 450-ft-lb of input torque. Stop adjustment requiring shims are not acceptable.
  5. Manual Input torque to produce required valve operating torque for worm and travelling nut gear operators shall not exceed 80 ft-lbs. In addition, hand wheel rim pull shall not exceed 20 lbs for valve sizes up to 12 inches, 40 lbs for valve size between 14 and 20 inches, 60 lbs for valve size 24 and greater. Minimum hand wheel size shall be 8 inches for up to 12 inch valve size, 12 inches for up to 16 inch valve size, 18 inches for up to 20 inch size.

6. Gear actuators for multi turn valves shall be of the bevel or spiral bevel type with output shaft perpendicular to valve shaft, having a removable hand wheel mounted on the output shaft. Gearing shall be machine cut steel designed for smooth operation. Bearings shall be permanently grease lubricated, with dual anti-friction ball bearings on the output shaft and mechanical shaft seals to contain lubricants. The output flange of the primary gear reducer shall be designed to meet an appropriate MSS or ISO standard to allow mounting to the secondary gear reducer. The ring gear shall ride on ball bearings. The stem nut shall be bronze alloy, shouldered, and ride on needle bearings. Housing components shall be o-ring sealed to exclude moisture and dirt, constructed of cast iron, ASTM A126, Grade B, or of ductile iron, ASTM A536. Gear housing bodies for thermoplastic valves may be cast aluminum or fabricated steel to reduce weight. Manual operator input effort to the hand wheel shall be a maximum of 30 lbs for operating the valve from full open to full close, under any conditions. Maximum hand wheel size shall be 24-in diameter.

L. Additional valve actuator requirements are included with the individual valve types and as noted in Paragraph 1.02 above.

M. All position indication and direction of opening arrows shall be embossed, stamped, engraved, etched or raised castings. Decals or painted indications shall not be allowed.

N. Unless otherwise noted, all valves larger than 3-in nominal diameter shall be provided with position indicators at the point of operation.

## 2.03 VALVE ACTUATORS – POWERED

### A. General

1. Electric actuators for ¼ turn valves three inches and under which do not have submergence requirements, and which exhibit a maximum torque specified below shall be operated on 120 volt single phase power as specified below. All other actuators shall be operated on 480 volt power.
2. The actuators shall conform to AWWA Standard C540, insofar as applicable and as herein specified. Actuators shall be O-ring sealed, watertight to standard NEMA 4X/6, submersion to 6 feet for 30 minutes. Actuators installed in vaults below grade and elsewhere subject to submergence shall be watertight to standard NEMA 6P/IP68, 15 ft for 72 hours minimum. Actuators installed in hazardous locations as noted on the Electrical Drawings and/or area classification sheets of the Architectural Drawings shall be FM certified explosion proof for Class 1 Division 1 & 2, Groups C & D and also meet the standard NEMA 4X/6 rating.
3. Valve service/operation shall be as indicated on the P&IDs and as specified in the Control Descriptions in Section 13305.
4. Actuators shall be configured as required to provide for part turn or multi-turn and be coupled with gearboxes as required to obtain the speed and operating torque as required for the valve or gate it controls.

5. Modulating actuators shall contain proportional control unit and be capable of 1200 starts per hour, open-closed valve actuators shall not require a proportional control unit, and be capable of 60 starts per hour.
  6. Where shown on the Instrumentation Drawings, actuators shall have a digital control module, to allow valves or gates to be positioned remotely via a 2-wire non-proprietary field bus protocol. The digital control module shall be equipped with serial communication ports to allow actuation to be linked by a two wire local area network utilizing Modbus function code (report by exception) and arranged in a self-healing ring configuration, with multi-drop taps to each actuator.
- B. 120 Volt Single Phase Reversing, Non Spring Return Electric Actuators for ¼ Turn Valves, 100 to 1000 in-lb Torque Range
1. Valve actuators shall be sized by the valve supplier meeting the requirements of AWWA C540. Actuators shall be mounted on the valves in the valve supplier's facility, and factory tested.
  2. Actuators shall operate on 120 volt, 60 Hz single phase, power supply. Enclosure rating shall be NEMA 4X, constructed of cast aluminum or steel alloy, powder coated or fusion bonded epoxy finish.
  3. Power train shall be self-locking planetary epicyclical gear design, consisting of hardened steel and or hardened bronze alloy gears with bronze bearings. Housing penetrations shall be sealed with mechanical seals. Housing shall be equipped with space heaters. Valve mounting system shall be ISO 5211.
  4. Actuator shall be designed for open/close/jog reversing service. Proportional/modulating service shall be provided where required in the equipment specifications or Instrumentation Drawings. Actuators shall have visual mechanical indication of position. Manual override shall be direct worm drive with minimum 5 inch diameter hand wheel. Hand wheel size shall be provided such that a maximum 40 lb rim pull is required.
  5. Motors shall be designed specifically for valve actuation service, with Class F insulation, with split phase capacitor protection. Duty cycle shall not be less than 40% at 100 deg F. for open/close duty, and 100% for modulating duty. 90 degree travel time shall vary from 10 to 20 seconds depending on actuator size. Actuators shall have SPDT contacts for remote valve position indication.
  6. Actuators shall be P Series as manufactured by Promation Engineering, Brooksville, FL, or equal.
- C. 480 Volt Powered Actuators for Part Turn or Multi-Turn Valve Operation
1. Per Section 15200.

2.04 PLUG VALVES: TAG TYPE PV

- A. Plug valves shall be of the offset disc type, 1/4 turn, non-lubricated and capable of sealing in both directions at the rated pressure. Plug valves specified herein shall be manufactured by GA Industries; M&H Valve, Pratt. All manufacturers named or otherwise, must comply completely with this Section.
1. For clean liquid or screened sewage, plug valves up to 24 inch diameter shall have a minimum port area of 80 percent.
  2. All plug valves shall be capable of passing "pigging" cleaning equipment (using a Girard or similar cleaning pig of full nominal pipeline diameter) in either direction and manufacturer shall so certify that this may be done without the use of special equipment.
- B. Valves shall be rated at minimum 175 psi WOG (Water, Oil and Gas) working pressure for sizes 4-in to 12-in inclusive and at minimum 150 psi WOG working pressure for sizes 14-in and larger and shall be capable of providing drop tight shut-off to the full valve rating with pressure on either side of the plug.
1. All plug valves under this Paragraph shall be performance, leakage and hydrostatically tested in accordance with AWWA C504, except as modified herein.
  2. At the above rated minimum working pressures, the valves shall be certified by the manufacturer as permitting zero leakage for a 5-minute duration with full pressure applied in either direction.
  3. At the direction of the Engineer, the valve manufacturer may be requested to perform a valve seat leakage test, witnessed by the Engineer to prove compliance with this Section.
- C. Valve bodies shall be of ductile iron, ASTM A536 and of the top entry, bolted bonnet design, cast with integral flanges conforming to the connecting piping. All exposed bolts, nuts and washers shall be zinc or cadmium plated, except for submerged valves, which shall have Type 316 stainless steel hardware.
1. Valve bodies shall be glass lined for plug valves installed in glass lined ductile iron pipelines. Glass lining shall be as specified in the piping specification.
- D. The valve plug:
1. Shall be fully encapsulated Buna N coated, ductile iron, ASTM A536, Grade 65 45-12.
  2. Shall be removable without removing the valve from the line.
  3. Shall have an integral upper and lower shaft which shall have seals on the upper and lower journals to prevent entrance of solids into the journals.
  4. Plug valves shall be round port design up through 24".

- E. Shaft bearings shall be permanently lubricated stainless steel or bronze at both upper and lower stem journals. The operator shaft shall have easily replaceable seals, which shall be repackable without removing the bonnet from the valve, and shall have self-adjusting packing.
- F. The valve seating surface shall provide full 360 degree seating by contact of a resilient seating material on the plug mating with welded in high nickel content overlay seating surface in the body.
  - 1. The seating design shall be resilient and of the continuous interface type having consistent opening and closing torques and shall be non-jamming in the closed position. Screw in seats shall not be acceptable.
  - 2. Plugs shall be fully encapsulated resilient covering, except for bearing surfaces, of neoprene or Buna-N.
- G. Valves 6 inch and larger shall be actuated via gearbox and hand wheel, unless mechanized, which shall require gearbox and actuator. On above ground valves a suitably sized steel actuator mounting bracket shall be provided to provide an air gap between the actuator and the valve stem seal. On motor actuated valves, under no circumstance shall the gear box be mounted directly to the top body flange such that leakage could directly enter the gear box.
- H. Unless otherwise required due to location or mechanized operation, each valve 4-in and smaller shall be provided with its own securely attached lever. Provide adjustable limit stops for both opening and closing and a clearly marked position indicator.
- I. Plug valves shall be installed so that the direction of flow through the valve and the shaft orientation is in accordance with the manufacturer's recommendations. Unless otherwise noted, shaft shall be horizontal, with plug opening up.

2.05 BUTTERFLY VALVES: TAG TYPE BFV

- A. See Section 02522 for requirements.

2.06 GATE VALVES TAG TYPE NOTED BELOW

- A. Gate Valves 3 inch and Smaller: Tag Type GV

- 1. Gate valves 2.5-in diameter and smaller shall have screwed ends and shall be bronze body. Gate valves 3-in diameter shall be flanged end, iron or bronze body. Gate shall be brass, bronze, or Type 304 stainless steel solid wedge; union bonnet; silicon bronze rising-stem; equal to Jenkins Figure 47CUJ, division of Crane Valve Group; Lunkenheimer Figure 3127, Cincinnati Valve Co, Fairbanks Figure U-0252, or equal. Model numbers referenced above are for screwed ends, flanged shall be equal construction with appropriate end connections. Iron body valves shall be installed in steel or iron pipelines.

B. Tapping Valves and Sleeves: Tag Type TPGV

1. Under no circumstances shall a standard gate valve be used for a tapping valve. Tapping valves shall comply with the same requirements as solid wedge, resilient seat or double disc gate valves except they shall have the flanged end and port opening modified for tapping service. Tapping valves shall be provided with plugged flush port at bottom of gate guide and plugged tap for pressure/leak testing. Valves shall be capable of passing a full nominal sized cutter without damage to the valve. The tapping sleeve shall be gray cast iron or ductile iron mechanical joint type with the outlet flange conforming to MSS SP 60.

2.07 BALL VALVES: TAG TYPE NOTED BELOW

A. General Service Ball Valves: Tag Type BV1

1. Valves shall be bronze or stainless steel to match the piping material, resilient seated, full port, threaded or solder end three piece bolted body type valves. Manual valves shall have locking levers. The body and cap shall be ASTM B584 brass or 316 stainless steel, SAE Grade 8 steel body bolts, the ball and stem of Type 316 stainless steel and the seats and seals of glass reinforced TFE. The balls shall be full floating, non-lubricated. Valve seats shall be easily accessible and replaceable.
2. Valves shall be Apollo Series 82-100/200, Milwaukee BA-300 series; or equal.

B. Corrosion Resistant Ball Valves 2-1/2 Inch and Smaller: Tag type BV2.

1. Valves shall be two-piece stainless steel full port; solid ball construction with bottom loading stems, and adjustable packing with manual locking lever actuator.
2. Body shall be ASTM A276, Type 316 or ASTM A351 GR CF8M stainless steel, 2000 psig rated at 200 Deg F, FNPT ends. Ball and stem shall be type 316 stainless steel. Seats and seals shall be reinforced PTFE.
3. Valves shall be Jamesbury Series 6F as manufactured by Metso Automation; KF Contromatics Series 8000, equal by Milwaukee; or equal.

C. Corrosion Resistant Ball Valves 3 Inch and Larger: Tag Type BV3.

1. Valves shall be two-piece full port stainless steel, solid, floating ball construction with bottom loading stems. Working pressure 250 psig; end connections shall be 150 lb full face flange.
2. Body: Stainless steel, ASTM A351, Grade C8M, Type 316. Ball/stem: ASTM B164 Ni-Cu Alloy- (alloy 400) Seats/seals: Reinforced PTFE.
3. Shall be Model WKM Dynaseal 310C or equal

D. Methanol Service Ball Valves: Tag Type BV4.

1. Valves shall be two way, one-piece body, standard ball, circular port. Ends shall be flanged, Class 150, ANSI B16.5. Valves shall be fire safe, anti-static, meeting the following standards: API 607, BS-5146 App B, BS-5351, FM 7440, EXES 3-14-1-2A.
2. Body/ball/stem: Type 316 Stainless steel; stem seal shall be flexible graphite; seals shall be type 316 stainless steel, TFE-coated for 2-in and smaller, Graph-lock for 2-1/2-in and larger; seats shall be TFE.
3. Valves shall be Worcester Controls Series AF51, equal by Jamsbury, or equal.

E. Slurry Service Ball Valves: Tag Type BV5

1. High solids and slurry service ball valves shall be resilient seated, threaded, three piece bolted body, swing out design, all of Type 316 stainless steel. The body, caps, ball, stem and all other internal components shall be of Type 316 stainless steel. External components shall be of carbon steel. The seats and seals shall be of TFE. The valves shall have full floating ball and shall be non-lubricated. Valve seats and seals shall be easily accessible and replaceable. Valves shall be rated for at least 250 psi and shall be as manufactured by Jamesbury; WKM or equal.

F. Flanged Iron Body Ball Valves Tag Type BV6

1. Valves shall be cast or ductile iron body with interior and exterior epoxy coating, full port design. Flanges shall be flat faced Class 125 lb, valve face to face dimensions shall be equal to ANSI 16.10 for gate valves. Ball shall be 316 stainless steel or PFA infused cast iron, seats and seals shall be reinforced PTFE. Valves 4 inch and larger shall be provided with gearbox and handwheel.
2. Valves shall be Sureflow type 125BVIS, American Valves Series 4000; or equal.

G. V-Port Ball Valves for Process Flow Control: Tag Type VPB1.

1. Valves shall be 3 piece, bolted body, soft seat, V-port insert design. Ends shall be flanged, Class 150, ANSI B16.5. Valves actuator shall be electric motorized, modulating. Valve characteristics shall provide for the operating conditions shown on the Drawings.
2. Body: Type 316 stainless steel; Ball and characterized insert: Type 316 stainless steel with hard chrome face. Shaft: Type 316 stainless steel, one piece. Seats: 316 stainless steel filled PTFE, replaceable; Packing: PTFE. Fasteners: Type 316 stainless steel.
3. Valves shall be Marwin CV 3000, or equal.

2.08 CORPORATION STOPS: TAG TYPE CS

- A. 3/4" through 2" Corporation Stops shall be ball valve type, meeting AWWA Standard C800-01, Sec. 4.2.3 (High Pressure), withstanding working pressures up to 300 psi. The body, ball,

operating stem, T-head, and service line connector shall be manufactured from red brass and conform to ASTM B62 and/or ASTM B584, UNS No. C83600. The ball shall be fluorocarbon coated and shall float on two EPDM seats and be watertight in both directions. The operating stem and nut shall be one piece, held in place by a mating machined flange on the stem and in the body. The operating stem shall have an EPDM O-ring to provide a watertight seal against the body.

- B. Inlet threads shall be AWWA Taper, except where used with service clamps, where threads shall be IPS threads. All thread types and diameters shall conform to AWWA C800. The inlet threads will be integral to the body. The waterway diameter shall be approximately equivalent to the nominal size of the stop, and shall accommodate the maximum cutter size established by AWWA C800. The outlet shall be a compression connection meeting AWWA C800 Sec. 4.4.9.
- C. Corporation Stops shall be FB Style Ballcorp, as manufactured by The Ford Meter Box Company, Inc., Wabash, Indiana, or equal by Mueller – Model H-15008 (or H-15013), James Jones Corporation, or McDonald. Where corporation stops are used with plastic pipe, a brass companion flange shall be provided on the outlet of each corporation stop.

2.09 AIR RELEASE AND VACUUM RELIEF VALVES: TAG TYPE NOTED BELOW

- A. All pipeline air and vacuum valves shall be supplied with isolation gate or ball valves with operator handle or lever removed. Isolation valves shall be of same metallurgy as the connecting piping or nipples.
- B. Relief valves shall be properly vented and piped to drain.
- C. Valve pressure rating shall be at least equal to the attached pipe's rating.
- D. Air and Vacuum Valves for sewage service shall have connections for draining and flushing with isolation ball valves for connection size up to 3 inch, and solid wedge gate valves for size 4 inch and larger.
- E. Air Release Valves: Tag Type ARV
  - 1. Small orifice assembly air release valves shall automatically release air accumulations from the pipe while under positive pressure. When the valve body fills with air, the float mechanism shall fall to open the small orifice and exhaust the air to atmosphere. When the air has been exhausted, the float mechanism shall be buoyed up and shall tightly close the small orifice. The small orifice assembly shall be furnished with 304 stainless steel body and cover, and shall use 316 stainless steel hardware. The float mechanism shall be constructed of polypropylene or 316 stainless steel. All wetted components shall be polypropylene, Buna-N or 316 stainless steel. A resilient, Buna N seat shall provide drop tight closure.
  - 2. Separate air release valves shall be Vent-O-Mat Model RBXb, equal as ARI of the special type for use with non-clean water.

3. For clean water acceptable manufacturers are Cla-Val, GA Industries-LLC, Val-matic, and ARI.

F. Vacuum Relief Valves: Tag Type VRV

1. Large orifice assembly vacuum valves shall automatically allow air to enter pipeline when pressure falls below atmospheric pressure. Vacuum relief valves shall not be configured to release air.
2. Vacuum relief valves shall be constructed as specified in subparagraph G below, except providing vacuum relief only, as manufactured by Cla-Val, ARI, Dorit, GA Industries or Vent-O-Mat or as indicated on the Drawings.

G. Combination Air and Vacuum Relief Valves: Tag Type Noted Below

1. Valves shall be single body, solid multiple float design configured to release large amounts of air during pipeline filling, release small amounts of air accumulated during pipeline operation, and allow large volume of air entry during pipeline. Single or segmented float shall be solid thermoplastic and shall not deform under any operating conditions. The body and float design shall limit the transient pressure rise to not more than twice the valve working pressure. Valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when highly compressed air is released suddenly. Valves shall have intake area equal to nominal size of the valve. Valve bodies shall be smooth contoured for solids flushing, and shall have ports for flush and drain. Valve body shall be easily dismantled with single split coupling, top entry bolted flange or be of cylindrical construction with flanged ends secured with external tie rods. Valves shall be rated for 250 psi service pressure.
2. General Service Combination Air/Vacuum Valve: Tag Type CAV1
  - a. Body shall be ductile iron, 304 stainless steel or 316 stainless steel.
  - b. Floats shall be HDPE or 316 stainless steel
  - c. Internal wetted components shall be 316 stainless steel
  - d. Seals and elastomers shall be Neoprene or EPDM.
  - e. External bolting shall be 316 stainless steel
  - f. Manufacturer shall be Vent-O-Mat RGXII, A.R.I. D-026, Dorit DAV, APCO ASU
3. Saline Water Service Combination Air/Vacuum Valve: Tag Type CAV2
  - a. Body shall be 316 stainless steel or cast nylon.
  - b. Floats shall be HDPE or Monel
  - c. Internal wetted components shall be Monel
  - d. Seals and elastomers shall be Neoprene or EPDM.
  - e. External bolting shall be 316 stainless steel.
  - f. Pump discharge
  - g. Manufacturer shall be Vent-O-Mat RBX, A.R.I. D-026, Dorit DAV
4. Pump Discharge Air/Vacuum valve: Tag Type CAV3
  - a. Body shall be 316 stainless steel or cast nylon.
  - b. Floats shall be HDPE or Monel

- c. Internal wetted components shall be Monel
  - d. Seals and elastomers shall be Neoprene or EPDM.
  - e. External bolting shall be 316 stainless steel.
  - f. Provide valve with throttling control device
  - g. Manufacturer shall be Cla-Val 33A, Vent-O-Mat RBX, A.R.I. D-026, Dorit DAV
5. Valves shall be as manufactured by GA Industries or equal by Vent-O-Mat, Model RBX 2521 or 1631 or as indicated on the Drawings

## 2.10 SURFACE PREPARATION AND SHOP COATINGS

- A. **All valves (inclusive of valve actuators) shall be finished painted by way of spray application prior to installation. Provide touch up paint after installed and commissioned.**
- B. Notwithstanding any of these specified requirements, all coatings and lubricants in contact with potable water shall be certified as acceptable for use with that fluid.
- C. If not specified herein, coatings shall comply with the requirements of Section 09915 and 09901. In case of a conflict, the requirements of this Section govern.
- D. If the manufacturer's requirement is not to require finished coating on any interior surfaces, then manufacturer shall so state and no interior finish coating will be required, if acceptable to the Engineer.
- E. The exterior surface of various parts of valves, operators, floor stands and miscellaneous piping shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter one shop coat of an approved rust inhibitive primer such as Inertol Primer No. 621 shall be applied in accordance with the instructions of the paint manufacturer or other primer compatible with the finish coat provided.
- F. Unless otherwise noted, interior ferrous surfaces of all valves shall be given a shop finish of an asphalt varnish conforming to AWWA C509, (except mounting faces/surfaces) or epoxy conforming to AWWA C550 with a minimum thickness of 16 mils or as required by Division 9 whichever is greater.
- G. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust resistant coating. Mounting surfaces shall be especially coated with a rust preventative.
- H. Special care shall be taken to protect uncoated items and plastic items, especially from environmental damage.

## 2.11 FACTORY INSPECTION AND TESTING

- A. Factory inspection, testing and correction of deficiencies shall be done in accordance with the referenced standards and as noted herein.

- B. See Division 1 for additional requirements. Also refer to PART 1, especially for required submission of test data to the Engineer.
- C. In addition to all tests required by the referenced standards, the following shall also be factory tested:
  - 1. Pressure regulating valves shall be factory tested at the specified pressures and flows.
  - 2. Butterfly valves shall be factory tested to demonstrate drop tight closure at the specified conditions.
  - 3. All types of air and vacuum valves.

### PART 3 EXECUTION

#### 3.01 INSTALLATION - GENERAL

- A. All valves and appurtenances shall be installed per the manufacturer's instructions in the locations shown, true to alignment and rigidly supported. Gearboxes, electric, hydraulic and pneumatic actuators shall be installed at the valve supplier's facility, completely adjusted and tested. Valve and actuator assemblies shall not be mated in the field under any circumstance.
- B. In no case shall stems be installed upside down- or vertical in the 6 o'clock position. Unless otherwise indicated on the Drawings:
  - 1. Gate, Globe, Ball valves shall be installed with stem vertical in the 12 o'clock position.
  - 2. Plug valves shall be installed with stem horizontal and plug opening to the top of the body unless position will not allow proper actuator access, in which case stem shall be vertical in the 12 o'clock position.
  - 3. Butterfly valves 12 inch and smaller may be installed with stem horizontal or vertical in the 12 o'clock position, 14 inch and larger shall be installed with the stem horizontal unless position will not allow proper actuator access, in which case stem shall be vertical in the 12 o'clock position.
- C. Install all brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings, or otherwise required. Before setting these items, check all Drawings and figures which have a direct bearing on their location. The Contractor shall be responsible for the proper location of valves and appurtenances during the construction of the work.
- D. All materials shall be carefully inspected for defects in construction and materials. All debris and foreign material shall be cleaned out of openings, etc. All valve flange covers shall remain in place until connected piping is in place. All operating mechanisms shall be operated to check their proper functioning and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced at no additional cost to the Owner.

- E. Where installation is covered by a referenced standard, installation shall be in accordance with that standard, except as herein modified, and the Contractor shall certify such. Also note additional requirements in other parts of this Section.
- F. Unless otherwise noted, joints for valves and appurtenances shall be made up utilizing the same procedures as specified under the applicable type connecting pipe joint and all valves and other items shall be installed in the proper position as recommended by the manufacturer. Contractor shall be responsible for verifying manufacturers' torquing requirements for all valves.

### 3.02 INSTALLATION OF MANUAL OPERATIONAL DEVICES

- A. Unless otherwise noted, all operational devices shall be installed with the units of the factory, as shown on the Drawings or as acceptable to the Engineer to allow accessibility to operate and maintain the item and to prevent interference with other piping, valves and appurtenances.
- B. Valve operators and indicators shall be rotated to display toward normal operation locations.
- C. Floor boxes, valve boxes, extension stems and low floor stands shall be installed vertically centered over the operating nut, with couplings as required and the elevation of the box top shall be adjusted to conform to the elevation of the finished floor surface or grade at the completion of the Contract. Boxes and stem guides shall be adequately supported during concrete placement to maintain vertical alignment.

### 3.03 INSPECTION, TESTING AND CORRECTION OF DEFICIENCIES

- A. See also Division 1. Take care not to over pressure valves or appurtenances during pipe testing. If any unit proves to be defective, it shall be replaced or repaired to the satisfaction of the Engineer.
- B. Functional Test: Prior to plant startup, all items shall be inspected for proper alignment, quiet operation, proper connection and satisfactory performance. After installation, all manual valves shall be opened and closed in the presence of the Engineer to show the valve operates smoothly from full open to full close and without leakage. Valves equipped with electric, pneumatic or hydraulic actuators shall be cycled 5 times from full open to full closed in the presence of the Engineer without vibration, jamming, leakage, or overheating. Pressure control and pressure relief valves shall be operated in the presence of the Engineer to show they perform their specified function at some time prior to placing the piping system in operation and as agreed during construction coordination meetings.
- C. The various pipe lines in which the valves and appurtenances are to be installed are specified to be field tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable to the Engineer.
- D. Various regulating valves, strainers, or other appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the Engineer.

3.04 CLEANING

- A. All items including valve interiors shall be inspected before line closure, for the presence of debris. At the option of the Engineer, internal inspection of valve and appurtenances may be required any time that the likelihood of debris is a possibility. All pipes and valves shall be cleaned prior to installation, testing disinfection and final acceptance.

3.05 DISINFECTION

- A. Disinfection of valves and appurtenances on all potable water lines and where otherwise noted, shall be as noted in Paragraph 1.03B above.

END OF SECTION

- D. Unless otherwise noted, items shall have a minimum working pressure of 150 psig or be of the same working pressure as the pipe they connect to, whichever is higher and suitable for the pressures noted where they are installed.

2.02 CHEMICAL INJECTION ASSEMBLY

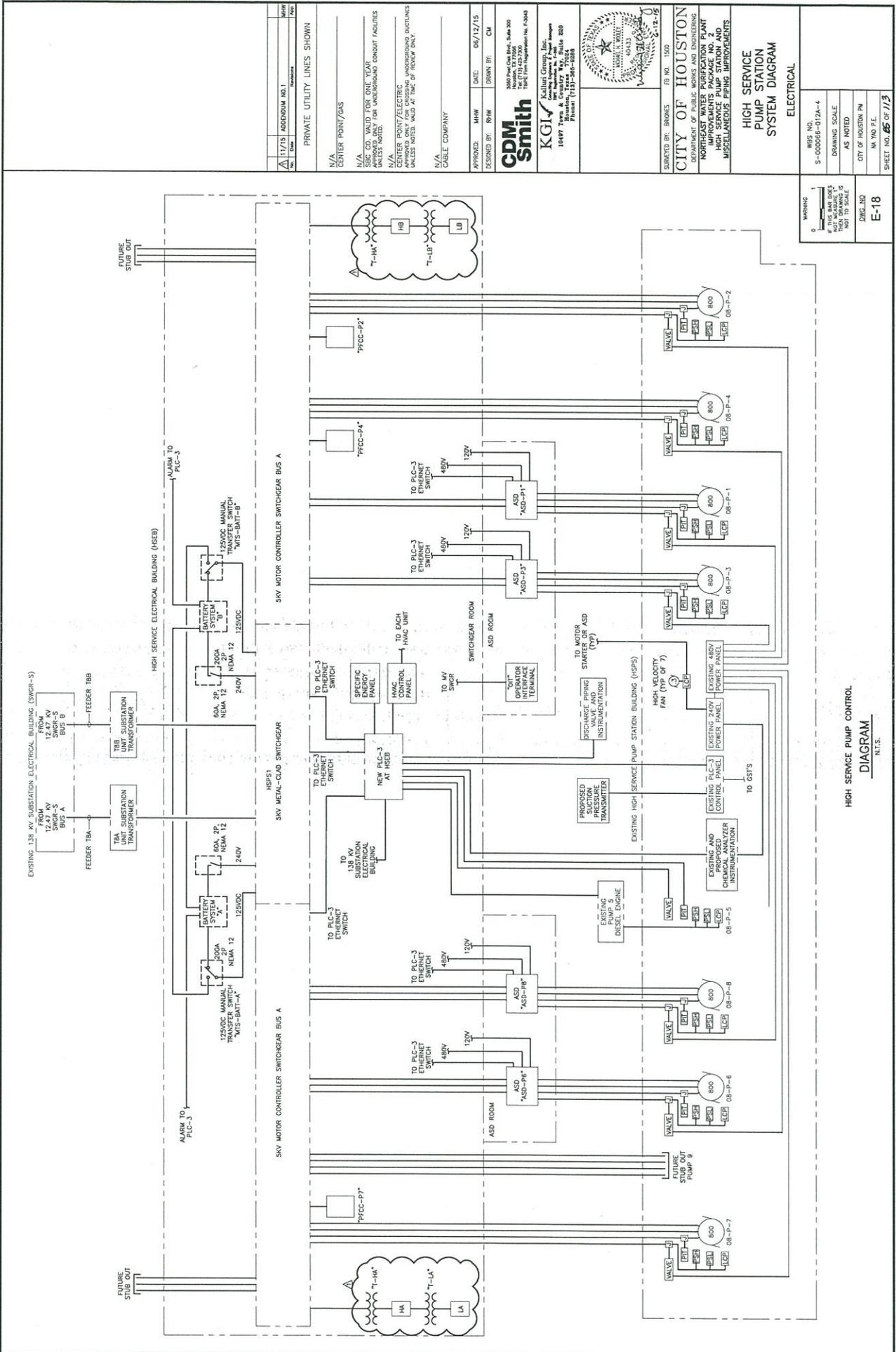
- A. Provide chemical injection assembly on 48-inch temporary bypass pipelines and 30-inch temporary filter backwash supply pipeline as shown on the Drawings and specified herein.
- B. Injection quills shall consist of a ball type corporation stop assembly with bushing on the inlet thread nozzle and with male outlet threads to accept packing nut assembly; packing nut assembly with gasket and Teflon antifriction ring; injection quill assembly; stainless steel safety chain. A ball check valve shall be included with the Injection Quill Assembly and shall either meet the ball check valve requirements in Section 15100 or shall be a spring loaded ball check valve per injection quill manufacturer. Injection quill length shall provide installed quill end located one third into process pipe diameter. All wetted components shall be compatible with the applied chemical solution and the pipeline pressure and velocity as recommended by the equipment supplier.

C. Performance:

| Chemical Service              | Pipeline Flow (GPM)<br>Min/Avg/Max | Pipeline Diameter (In) | Chemical Flow Rate (GPH) | Typical Injector Model by Inyo Process |
|-------------------------------|------------------------------------|------------------------|--------------------------|--|
| Caustic (25%)                 | 12,222/20,555/27,800               | 48                     | 8.8-175.3                | CS-100-S-S-22-F                        |
| Fluoride (23%)                | 12,222/20,555/27,800               | 48                     | 0.6-7.8                  | CS-100-S-H-22-F                        |
| Liquid Ammonium Sulfate (40%) | 12,222/20,555/27,800               | 48                     | 3.7-39.6                 | CS-100-S-S-22-F                        |
| Sodium Hypochlorite (12.5%)   | 12,222/20,555/27,800               | 48                     | 29.2-157                 | CS-100-S-H-22-F                        |
| Sodium Hypochlorite (12.5%)   | 12,222/20,555/27,800               | 30                     | 29.2-157                 | CS-100-S-H-22-F                        |

D. Injection Assembly units to be constructed as follows:

1. Isolation Valve: Brass.
2. Solution Tube: Hastelloy C-276 for sodium hypochlorite, Hastelloy C-276 for fluoride, type 316 stainless steel for liquid ammonium sulfate and caustic. Length as recommended by the manufacturer.
3. End Style: Flat
4. Chemical Injection Assembly: as manufactured by Saf-T-flo, Inyo Process or Engineer approved or Equal.



HIGH SERVICE PUMP CONTROL  
DIAGRAM  
N.T.S.

|                    |                 |
|--------------------|-----------------|
| WBS NO.            | 5-000066-012A-4 |
| DRAWING SCALE      | AS NOTED        |
| CITY OF HOUSTON PN | NA YAO P.E.     |
| SHEET NO.          | 66 OF 113       |

|              |     |           |          |
|--------------|-----|-----------|----------|
| APPROVED:    | MHW | DATE:     | 06/12/15 |
| DESIGNED BY: | RHW | DRAWN BY: | CM       |

**CDM Smith**  
KGL/Kalidatt Group, Inc.  
10497 Tapp & University Way, Suite 200  
Houston, TX 77056  
Phone: (713) 461-1000

**CITY OF HOUSTON**  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
NORTHEAST WATER PURIFICATION PLANT  
HIGH SERVICE PUMP STATION AND  
MISCELLANEOUS PIPING IMPROVEMENTS

PROJECT: HIGH SERVICE PUMP STATION AND MISCELLANEOUS PIPING IMPROVEMENTS  
DATE: 06/12/15

11/15 ADDENDUM NO. 1

PRIVATE UTILITY LINES SHOWN

N/A CENTER POINT/GAS

N/A SBC CD. VALID FOR ONE YEAR FOR UNDERGROUND CONDUIT FACILITIES UNLESS NOTED.

N/A UNLESS POINTS/ELEMENTS APPROVED ONLY FOR CROSSING UNDERGROUND DISTURBANCES UNLESS NOTED. VALID AT TIME OF REVIEW ONLY.

N/A CABLE COMPANY

WARNING: IF THIS DRAWING IS USED FOR CONSTRUCTION, THE DRAWING IS NOT TO SCALE.

DWG-NO: E-18



- NOTES:**
- EQUIPMENT TO BE REMOVED IN THIS PROJECT. CONDUCTORS AND ALL EXPOSED CIRCUIT RELATED TO THE EQUIPMENT OR SYSTEM SHALL BE REMOVED. REMOVE CONTROL PANELS, INSTRUMENTS, TAPS, SUPPORTS AND ANCHORS RELATED TO REMOVED EQUIPMENT.
  - THE EXISTING HIGH SERVICE PUMP STATION POWERHOUSE IS TO BE REMOVED IN THIS PROJECT. REMOVE CONDUCTORS AND LABEL.
  - EXISTING PUMP STATION VALVE ACTUATORS TO BE REMOVED IN THIS PROJECT. REMOVE CONDUCTORS AND LABEL BREAKERS "SPARE".
  - EXISTING PUMP STATION VALVE ACTUATORS TO BE REMOVED IN THIS PROJECT. REMOVE CONDUCTORS AND LABEL BREAKERS "SPARE".
  - CONTRACTOR SHALL COORDINATE BREAKER SIZES REQUIRED FOR PROPOSED EQUIPMENT AND PROVIDE ANY BREAKERS REQUIRED TO MEET VENDOR REQUIREMENTS. RECONFIGURATION OF CHEMICAL ANALYZER POWER CIRCUITS MAY BE REQUIRED AND A DATA LOGGER ADDED. CONTRACTOR SHALL COORDINATE RECONFIGURATIONS WITH EQUIPMENT VENDOR FOR COMPLETE WORKING SYSTEMS. PROVIDE A NEW BREAKER FOR EACH PUMP AIR CIRCULATION FAN POWER CIRCUIT. REMOVE EXISTING BREAKERS TO AVAILABLE SPACES FOR FUTURE USE.

LOCATED IN EXISTING HIGH SERVICE PUMP STATION BUILDING

EXISTING PANEL 08-STBY-LP01

NOTES:  
1. PANEL STAYS IN SERVICE

BUS AMPS \_\_\_\_\_ WIRE SIZE \_\_\_\_\_  
 MAIN BRKR: AMPS 100 WIRE \_\_\_\_\_ AC \_\_\_\_\_  
 VOLTS 120/208 WIRE 4 SN \_\_\_\_\_

| CKT. DESCRIPTION     | WIRE | LOAD | BKR. | PHASE |    |    | BKR. LOAD | WIRE | CKT. DESCRIPTION                 |
|----------------------|------|------|------|-------|----|----|-----------|------|----------------------------------|
|                      |      |      |      | A     | B  | C  |           |      |                                  |
| MAIN                 |      |      | 100  |       |    |    | 20        |      | 1. SURGE TANK CONTROL PANEL      |
|                      |      |      | 100  | 2     | 4  | 4  | 20        |      | 2. ANALYZER RECEP/FALES          |
|                      |      |      | 100  | 2     | 4  | 4  | 20        |      | 3. HIGH BAY LIGHTS               |
| EXTERIOR RECEP/FALES |      |      | 20   | 8     | 8  | 8  | 20        |      | 4. HIGH BAY LIGHTS               |
| INTERIOR RECEP/FALES |      |      | 20   | 8     | 8  | 8  | 20        |      | 5. HIGH BAY LIGHTS               |
| BATTERY CHARGER      |      |      | 20   | 11    | 12 | 12 | 20        |      | 6. HIGH BAY LIGHTS               |
| BATTERY BLOCK HEATER |      |      | 20   | 13    | 14 | 14 | 20        |      | 7. EXHAUST FAN NO. 1 (EAST)      |
| SPARE                |      |      | 20   | 15    | 16 | 16 | 20        |      | 8. EXHAUST FAN NO. 2 (WEST)      |
| SPARE                |      |      | 20   | 17    | 18 | 18 | 20        |      | 9. PLC CABINET                   |
| SECURITY CAMERA      |      |      | 20   | 19    | 20 | 20 | 20        |      | 10. FIT'S G8RT--1000, 1001, 1002 |
| SPARE                |      |      | 20   | 21    | 22 | 22 | 20        |      | 11. PUMP 1 HIGH VELOCITY FAN     |
| SPACE                |      |      | 20   | 23    | 24 | 24 | 20        |      | 12. PUMP 2 HIGH VELOCITY FAN     |
| SPACE                |      |      | 20   | 25    | 26 | 26 | 20        |      | 13. PUMP 3 HIGH VELOCITY FAN     |
| NATURAL              |      |      | 100  | 29    | 30 | 30 | 20        |      | 14. PUMP 4 HIGH VELOCITY FAN     |
| SODIUM PUMP          |      |      | 20   | 31    | 32 | 32 | 20        |      | 15. PUMP 5 HIGH VELOCITY FAN     |
| SODIUM PUMP          |      |      | 20   | 33    | 34 | 34 | 20        |      | 16. PUMP 6 HIGH VELOCITY FAN     |
| SPARE                |      |      | 20   | 35    | 36 | 36 | 20        |      | 17. PUMP 7 HIGH VELOCITY FAN     |
| SPARE                |      |      | 20   | 37    | 38 | 38 | 20        |      | 18. PUMP 8 HIGH VELOCITY FAN     |
| SPARE                |      |      | 20   | 39    | 40 | 40 | 20        |      | 19. SPARE                        |
| SPARE                |      |      | 20   | 41    | 42 | 42 | 40A       |      | 20. SPARE                        |
| SPACE                |      |      | 20   | 43    | 44 | 44 | 40A       |      | 21. SPACE                        |
| SPACE                |      |      | 20   | 45    | 46 | 46 | 20        |      |                                  |
| SPACE                |      |      | 20   | 47    | 48 | 48 | 20        |      |                                  |
| SPACE                |      |      | 20   | 49    | 50 | 50 | 20        |      |                                  |
| SPACE                |      |      | 20   | 51    | 52 | 52 | 20        |      |                                  |
| SPACE                |      |      | 20   | 53    | 54 | 54 | 20        |      |                                  |

TOTAL VA = 79.3KVA

LOCATED IN EXISTING HIGH SERVICE PUMP STATION BUILDING

EXISTING PANEL 08-STBY-PP01

NOTES:  
1. PANEL STAYS IN SERVICE

BUS AMPS \_\_\_\_\_ WIRE SIZE \_\_\_\_\_  
 MAIN BRKR: AMPS 480 WIRE \_\_\_\_\_ AC \_\_\_\_\_  
 VOLTS 480 WIRE 3 SN \_\_\_\_\_

| CKT. DESCRIPTION   | WIRE | LOAD | BKR. | PHASE |    |    | BKR. LOAD | WIRE | CKT. DESCRIPTION        |
|--------------------|------|------|------|-------|----|----|-----------|------|-------------------------|
|                    |      |      |      | A     | B  | C  |           |      |                         |
| 1. AIR COMPRESSOR  |      |      | 60   |       |    |    | 60        |      | 1. LIGHTING PANEL/BOARD |
| 2. VALVE ACTUATORS |      |      | 80   | 1     | 4  | 4  | 60        |      | 2. LIGHTING PANEL/BOARD |
| 3. VALVE ACTUATORS |      |      | 80   | 3     | 4  | 4  | 60        |      | 3. VALVE ACTUATORS      |
| 4. VALVE ACTUATORS |      |      | 20   | 9     | 8  | 8  | 20        |      | 4. VALVE ACTUATORS      |
| 5. VALVE ACTUATORS |      |      | 20   | 9     | 10 | 10 | 20        |      | 5. VALVE ACTUATORS      |
| 6. VALVE ACTUATORS |      |      | 20   | 11    | 12 | 12 | 20        |      | 6. VALVE ACTUATORS      |
| 7. VALVE ACTUATORS |      |      | 20   | 13    | 14 | 14 | 20        |      | 7. VALVE ACTUATORS      |
| 8. VALVE ACTUATORS |      |      | 20   | 15    | 16 | 16 | 20        |      | 8. VALVE ACTUATORS      |
| 9. VALVE ACTUATORS |      |      | 20   | 17    | 18 | 18 | 20        |      | 9. VALVE ACTUATORS      |
| 10. VALVE ACTUATOR |      |      | 20   | 19    | 20 | 20 | 20        |      | 10. VALVE ACTUATOR      |
| 11. VALVE ACTUATOR |      |      | 20   | 21    | 22 | 22 | 20        |      | 11. VALVE ACTUATOR      |
| 12. BRIDGE CRANE   |      |      | 20   | 23    | 24 | 24 | 20        |      | 12. BRIDGE CRANE        |
| 13. BRIDGE CRANE   |      |      | 30   | 25    | 26 | 26 | 40        |      | 13. BRIDGE CRANE        |
| 14. BRIDGE CRANE   |      |      | 30   | 27    | 28 | 28 | 40        |      | 14. BRIDGE CRANE        |
| 15. BRIDGE CRANE   |      |      | 30   | 29    | 30 | 30 | 40        |      | 15. BRIDGE CRANE        |
| 16. SPARE          |      |      | 20   | 31    | 32 | 32 | 60        |      | 16. SPARE               |
| 17. SPARE          |      |      | 20   | 33    | 34 | 34 | 60        |      | 17. SPARE               |
| 18. SPARE          |      |      | 20   | 35    | 36 | 36 | 60        |      | 18. SPARE               |
| 19. SPARE          |      |      | 20   | 37    | 38 | 38 | 20        |      | 19. SPARE               |
| 20. SPARE          |      |      | 20   | 39    | 40 | 40 | 20        |      | 20. SPARE               |
| 21. SPARE          |      |      | 20   | 41    | 42 | 42 | 20        |      | 21. SPARE               |

TOTAL VA = 79.3KVA

|       |                |      |     |
|-------|----------------|------|-----|
| 11/15 | ADDENDUM NO. 1 | DATE | NO. |
|       |                |      |     |

PRIVATE UTILITY LINES SHOWN

N/A CENTER POINT/GAS

N/A

1" = 10' SCALE  
 E-22  
 DWG. NO.  
 CITY OF HOUSTON PM  
 N/A YAO P.E.  
 SHEET NO. 87 OF 113

SUBMITTED BY: BRIONES FB NO. 1500  
**CITY OF HOUSTON**  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
 NORTH HOUSTON PLANT  
 HIGH SERVICE PUMP STATION AND  
 MISCELLANEOUS PIPING IMPROVEMENTS  
**HIGH SERVICE PUMP STATION PANELBOARD SCHEDULES**  
 ELECTRICAL  
 WBS NO. 5-000066-012A-4  
 DRAWING SCALE AS NOTED  
 CITY OF HOUSTON PM  
 N/A YAO P.E.  
 SHEET NO. 87 OF 113

