

Bidding Requirements, Contract Forms and Conditions of the Contract
ADDENDUM
Section 00900

ADDENDUM No. 2

Date December 8, 2015

City of Austin

Project Name Davis Water Treatment Plant Treated Water Discharge System

C.I.P. No. 2015.041

This Addendum forms a part of Contract and clarifies, corrects or modifies original Bid Documents, dated October 27, 2015 . Acknowledge receipt of this addendum in space provided on bid form. Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

1. Replace Section 00020 in its entirety with the attached revised Section 00020.
2. Replace Attachment E of Section 00400 with the attached revised Attachment E of Section 00400.
3. Replace Section 01030 in its entirety with the attached revised Section 01030.
4. Replace Page 3 of Section 01500 with the attached revised Page 3 of Section 01500.
5. Replace Pages 2 and 13 of Section 11210 with the attached revised Pages 2 and 13 of Section 11210.
6. Replace Section 11290 in its entirety with the attached revised Section 11290.
7. Replace Section 11310 in its entirety with the attached revised Section 11310.
8. Replace Pages 3 to 4 of Section 16200 with attached revised Pages 3 to 4 of Section 16200.
9. Replace Project Manual Volume 5/Section 3 Contractor Safety Requirements/5.3 Safety Requirements, paragraph beginning with "All Contractors shall have safety...", with the following:

"All Contractors shall have safety staffing based on the project value and the man-hours consistent with this section. In addition, the Contractor will ensure that all Subcontractors have the appropriate safety staffing based on the contract value consistent with this section. For example:..."

B. Drawing Revisions:

1. Replace drawing MSPS-M-25 with the attached revised drawing.
2. Include attached drawing MSPS-E-70 as part of the bid package.
3. Replace drawing MSPS-I-45 with the attached revised drawing.
4. Replace drawing TD-E-1 with the attached revised drawing.

This addendum consists of 32 page(s)/sheet(s).

Approved by OWNER

Joan Chilarescu

Approved by ENGINEER/ARCHITECT

END



Bidding Requirements, Contract Forms and Conditions of the Contract
INVITATION FOR BIDS
Section 00020

Following is a summary of information for this Project. Bidder is cautioned to refer to other sections of the Project Manual, Drawings and Addenda (Bid Documents) for further details.

The City of Austin, hereafter called OWNER, is requesting sealed written Bids for furnishing all labor, materials, equipment, supervision, and incidentals, and for performing all Work required for the following Project:

Davis Water Treatment Plant Treated Water Discharge System

Located at: 3500 West 35th Street, Austin, Texas 78703

CIP ID# 2015.041

IFB# CLMC 569

The Work consists of, but not limited to, construction of a new Medium Service Pump Station, construction of yard piping, valves and valve vaults, construction of electrical duct banks, demolition of existing Medium Service Pump Station, improvement to the existing High Service Pump Station, improvements to the Filter Backwash System, site civil improvements, retaining wall installation, pavement installation and other upgrades to the treated water discharge system.

Bid Documents may be obtained at One Texas Center, 505 Barton Springs Road, Ste. 1045 (Front Desk), Austin, TX 78704. Copies will be available in CD format at no cost.

At the time Bid Documents are obtained, Bidder must provide a working e-mail address, so that they will receive any addenda or clarification issued by the Owner.

Sealed Bids will be received at the Contract Management Department, 105 W. Riverside Dr., Suite 210, Austin, Texas 78704 and then publicly opened and read aloud in the **SUITE 210 Conference Room**.

ALL BIDS ARE DUE PRIOR TO (Austin time) 8:30 AM Thursday January 7, 2016.

ALL COMPLIANCE PLANS ARE DUE PRIOR TO (Austin time) 12:30 PM January 7, 2016.

BIDS WILL BE OPENED AT (Austin time) 12:30 PM Thursday January 7, 2016 .

ALL BIDS AND COMPLIANCE PLANS NOT RECEIVED PRIOR TO THE DATE AND TIME SET FORTH ABOVE WILL NOT BE ACCEPTED FOR CONSIDERATION. The time stamp clock in **SUITE 210** is the time of record and is verified with www.time.gov, the official U.S. time.

All CONTRACTORS must be registered to do business with OWNER prior to the Contract Award. All Subcontractors must be registered with the OWNER prior to execution of a contract. Prime Contractors are responsible for ensuring that their Subcontractors are registered as vendors with the City of Austin. Registration can be done through the OWNER's on-line Vendor Registration system. Log onto <https://www.ci.austin.tx.us/vss/Advantage> and follow the directions.

All City procurements are subject to the City's Minority-Owned and Women-Owned Business Enterprise Procurement Program found at Chapter 2-9-A of the City Code, as amended. The Program provides Minority-Owned and Women-Owned Business Enterprises (MBEs/WBEs) or Disadvantaged Business Enterprises (DBEs) full opportunity to participate in all City contracts. Goals for MBE/WBE or DBE participation are stated for each solicitation. Information on achieving the goals or documenting good faith efforts to achieve the goals are contained in the MBE/WBE Procurement Program Package or DBE Procurement Program Package attached to the solicitation. When goals are established, Bidders are required to complete and return the MBE/WBE or DBE Compliance Plan with their Bid. If a Compliance Plan is not submitted prior to the date and time set forth in the solicitation, the Bid will not be accepted for consideration. (See Section 00820 for MBE/WBE requirements on "no goal" solicitations.)

All Bids shall be accompanied by an acceptable Bid guaranty in an amount of not less than five percent (5%) of the total Bid, as specified in Section 00100, Instructions To Bidders.

Performance and payment bonds when required shall be executed on forms furnished by OWNER. Each bond shall be issued in an amount of one hundred percent (100%) of the Contract Amount by a solvent corporate surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law.

Minimum insurance requirements are specified in Section 00810, Supplemental General Conditions.

Minimum wage rates have been established and are specified in Section 00830, Wage Rates and Payroll Reporting.

Contract Time is of the essence and all Work shall be substantially completed within one thousand sixty five (1065) Calendar Days after date specified in the Notice to Proceed, in accordance with the Bid Form, Section 00300L. Final Completion shall be achieved within 150 Calendar Days after Substantial Completion. Additional schedule milestones have been established for the beneficial use of the Pump Station Vertical Walls and the East Electrical Ductbank and defined in the Bid Form, Section 00300L.

Liquidated damages are \$2,960.00 per Calendar Day for failure to substantially complete the work and \$1,470.00 per Calendar Day for failure to achieve final completion within 150 Calendar Days after substantial completion, in accordance with the Bid Form, Section 00300. Additional liquidated damages include \$2,960.00 per Calendar Day for Pump Station Vertical Walls and the East Electrical Ductbank Beneficial Use Milestone, in accordance with the Bid Form, Section 00300L.

OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bid).

A **mandatory** Pre-Bid Conference will be held on Wednesday November 18, 2015 at 1:00 PM
(Austin time) (date) (time)
at Davis Water Treatment Plant, 3500 West 35th Street, Austin, Texas 78703 Austin, Texas.
(location)

A **mandatory** site visit will be held on Wednesday November 18, 2015 at 2:30 pm (Austin time) at Davis Water Treatment Plant, 3500 West 35th Street, Austin, Texas 78703

Attendance is mandatory unless otherwise stated. Bidders must attend any mandatory Pre-Bid Conference and are encouraged to attend any non-mandatory Pre-Bid Conference to ensure their understanding of Owner's bidding and contracting requirements, particularly MBE/WBE Procurement Program requirements. If the Pre-Bid Conference is mandatory the Bidder must arrive and sign-in within fifteen (15) minutes of the scheduled start time of the meeting, otherwise the Bidder will not be allowed to submit a Bid for the project.

The persons listed below may be contacted for information regarding the Invitation for Bid. If the Bidder contacts any other City employee, including Council Members and members of Boards and Commissions, the Bidder may be found in violation of Ordinance No. 20111110-052, dated November 10, 2011, regarding Anti-Lobbying and Procurement. The text of that Ordinance may be viewed at <http://www.cityofaustin.org/edims/document.cfm?id=161145>.

AUTHORIZED CONTACT PERSONS

PROJECT MANAGER: Richard Duane telephone (512) 974-7730 email richard.duane@austintexas.gov
CONTRACT COMPLIANCE REP.: Mary Lou Ochoa telephone (512) 974-7215 email marylou.ochoa@austintexas.gov

END

ATTACHMENT E**SPECIFIC CONSTRUCTION EXPERIENCE (GENERAL CONTRACTOR OR SUBCONTRACTOR PERFORMING THE WORK)**

Bidder must provide the following project history information for each Construction Experience requirement listed below. OWNER may in its reasonable discretion deem the provided experience information insufficient and reject the Bid.

For each Construction Experience item listed below, list and describe the applicable Construction Experience for a minimum of three (3) successfully completed projects of comparable size, scope, and complexity to the Work described for this project. Comparability requirements may be spread among the three (3) projects per item submitted, e.g. One Project may demonstrate comparable size, another Project may demonstrate comparable scope and another may demonstrate comparable complexity. Decisions on "comparability" are at the complete discretion of the OWNER.

The Work must have been performed within the past five (5) years.

Bidder must provide all requested information in a complete, clear, and accurate manner. If necessary, additional information may be provided on separate attached sheets. Failure to provide any requested information may cause the Bid to be rejected by OWNER as non-responsive.

If the Bidder proposes to fulfill any specific construction experience requirement with subcontracted resources, the applicable Subcontractor must be included in the Bidder's Original MBE/WBE Compliance Plan. Failure to include subcontractors on the MBE/WBE Compliance Plan may render your bid non-responsive.

SPECIFIC CONSTRUCTION EXPERIENCE ITEMS REQUIRED:

- ITEM 1. Water Treatment Plant retrofit-type project in an operating water plant.
- ITEM 2. Water Treatment Plant retrofit-type project including 42-inch and larger valve replacement in an operating water plant.
- ITEM 3. Furnish and/or installation of Horizontal Split Case pumps (capacity over 1,000 HP).
- ITEM 4. Furnish and/or installation of large steel pipes (36" to 72")
- ITEM 5. Construction of large concrete structures/buildings.
- ITEM 6. Extensive electrical power systems renovation experience, minimum of five (5) years of experience, in working in water treatment plants or wastewater treatment plants with close and careful coordination with owner, and, if an existing plant, continuous coordination of power system outages and system down time with owner and provision of means to maintain load energization, including such loads as control systems, security systems, process equipment, and lighting systems, to assure owner's continuous use and operation of the plant per owner requirements. The power systems renovation experience shall include furnishing and installation of new Medium Voltage 5KV or 15KV class Switchgear with vacuum circuit breakers and/or motor operated load break switches that are AC or DC controlled. In

addition, the power systems renovation experience shall also include furnishing and installation of new 600V class distribution equipment.

- ITEM 7. Furnish and/or installation of excavation support systems for deep structural excavation
- ITEM 8. Disinfection of water treatment facilities and piping.
- ITEM 9. Demolition of industrial buildings
- ITEM 10. Furnishing and installing of electrical instrumentation and control systems. Refer to specification section 17100 for additional requirements of acceptable instrument and control system suppliers and installers (ICS) and submit the ICS qualifications package, as identified in specification section 17100, at the time of and along with the submittal of the forms of this attachment E.

The Bidder shall complete and duplicate the following specific Construction Experience Form as required to provide the requested documentation for a minimum of three (3) successfully completed projects for each of the above specific Construction Experience requirements.

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM

EXPERIENCE ITEM NUMBER: _____

Project Number: _____

Does Bidder plan to self perform this work? YES (____) NO (____)

If "NO", provide the following Subcontractor information:

Company Name: _____

Permanent Address: _____

Phone Number: _____

Number of years Subcontractor has been in business under current company name: _____

Name of Project: _____

Location: _____

OWNER's Name: _____

OWNER's Address: _____

OWNER's Contact Person (Print): _____

Phone/Fax No.: _____ / _____

Initial Contract Price: _____

Final Contract Price: _____

Contract Start Date: _____ (Date of Notice To Proceed)

Contract Time: _____ () Calendar Days () Working Days

Contract Substantial Completion Date: _____

Actual Substantial Completion Date: _____

If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each.

Project Description and why it is comparable to the size, scope, and/or complexity for this item:

PART 1 GENERAL

1.01 SUMMARY

- A. This document is a supplement to Section 00300L, "Bid Form". It defines the limits of the alternates listed in Section 00300L. It establishes the modifications required to the PLANS in the event one or more of the alternate bid items are included in the accepted bid.

- B. The PLANS show the proposed construction for the Davis WTP Treated Water Discharge System project. The work under Base Bid Item No. 1 shall not include the replacement of the High Service Pumps Motors. The work associated with the replacement of the High Service Pump Motors shall be included in the alternate bid item, however, the entirety of the work described in Specification Section 16044.1.09 that is associated with High Service Pump Station shall be performed assuming the High Service Pump Station existing loads and shall be included under Base Bid Item No. 1. The entirety of the work described in Specification Section 16044.1.09 that is associated with the proposed motors of the High Service Pump Station shall be included under the alternate bid item. The work associated with the alternate bid item is further defined in the following paragraphs.

1.02 LIMITS OF ALTERNATE BID ITEMS

- A. **Alternate No. 1:** Includes demolition of the existing motors for the existing High Service Pumps No. 22, 23, 24 and 25, furnishing and installation of new TEWAC motors and cooling water piping with work performed in accordance with Contract Specifications and Construction Plans. The work is defined in drawings HSPS-M-2 to HSPS-M-8, HSPS-E-1 to HSPS-E-8, and HSPS-I-1 to HSPS-I-14.

END

Rocip Project: Withhold insurance cost. Please refer to Section 00425 & 00810 for information

parkways, and medians, shall be restored to their original condition, whether within or outside the easement/right-of-way. All replacements shall be made with new materials.

CONTRACTOR shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or men to or from the Work, whether by him or his Subcontractors. CONTRACTOR shall make satisfactory and acceptable arrangements with the owner of, or the agency having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

3.6 Tree and Plant Protection

All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by the CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

No tree shall be removed outside of permanent easement(s), except where authorized by the E/A. Whenever practicable, CONTRACTOR shall tunnel beneath trees in yards and parking lots when on or near the line of trenching operations. Hand excavations shall be employed as necessary to prevent injury to trees. Care shall be taken with exposed roots, unearthed during construction, so that roots do not dehydrate causing tree damage.

Trees considered by the E/A to have any significant effect on construction operations are indicated on the PLANS and those which are to be preserved are so indicated.

CONTRACTOR shall take extra measures to protect trees designated to be preserved, using methods shown on the PLANS and as specified in Standard Specification Item No. 610S "Preservation of Trees and other Vegetation".

3.7 Security

CONTRACTOR shall be responsible for protection of the site, and all Work, materials, equipment, and existing facilities hereon, against vandals and other unauthorized persons.

No claim shall be made against OWNER by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to the OWNER's property resulting from CONTRACTOR's failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by OWNER to protect existing facilities during normal operations, and shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site. When required, the CONTRACTOR shall provide a security plan to the OWNER for review as to appropriateness of the security measures proposed.

3.8 (NOT USED)

3.9 Access Roads

CONTRACTOR shall establish and maintain temporary access roads to various parts of the site as required to complete the Project. Such roads shall be available for the use of all others performing Work or furnishing services in connection with the Project.

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- ASTM B148 Standard Specification for Aluminum-Bronze Sand Castings
- ASTM B505 Standard Specification for Copper Alloy Continuous Castings
- ASTM B584 Standard Specification for Copper Alloy Sand Castings for General Applications

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

- ASME B16.5-2009 Pipe Flanges and Flanged Fittings

AMERICAN NATIONAL STANDARD INSTITUTE/HYDRAULIC INSTITUTE (ANSI/HI)

- ANSI/HI 1.1-1.2 Rotodynamic (Centrifugal) Pumps for Nomenclature and Definitions
- ANSI/HI 1.3 Rotodynamic (Centrifugal) Pumps for Design and Application
- ANSI/HI 1.4 Rotodynamic (Centrifugal) Pumps for Manuals Describing Installation, Operation and Maintenance
- ANSI/HI 1.6 Centrifugal Pump Tests
- ANSI/HI 9.6.4 Rotodynamic (Centrifugal and Vertical) Pumps for Vibration Measurements and Allowable Values
- ANSI/HI 9.6.6 Rotodynamic Pumps for Pump Piping
- ANSI/HI 9.8 Pump Intake Design

AMERICAN WATER WORKS ASSOCIATION (AWWA)

- AWWA E103-07 Horizontal and Vertical Line-Shaft Pumps

1.04 (NOT USED)

1.05 DESIGN AND PERFORMANCE CRITERIA

- A. The pump shall be a horizontal, split-case, double suction, double volute centrifugal pump with vertical suction and horizontal discharge, with horizontal motor, coupling, coupling guard, and pump supplied on a common structural steel base plate with motor. Accessories shall be furnished as required for a complete functioning pumping unit in accordance with the specified performance and installation conditions.
- B. Rotation shall be suitable for pumps installation as indicated on the drawings.
- C. The Contractor/pump manufacturer shall provide the design and construction drawings of the structural steel base as required for the selected pump sealed by a licensed professional engineer in the State of Texas.
- D. The design requirements for the pumps shall be as follows:
 - 1. Design requirements for the pumps shall be as specified in Attachment "A" at the end of this Specification Section.
 - 2. Critical speed analysis: The Contractor shall require that the pump manufacturer perform critical speed analyses for the pumping assembly to identify and ensure that:
 - a. The first critical speed shall be at least 25 percent above the maximum pump speed;

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18. Prior tests on similar or identical pumps are not acceptable.

2.04 ADJUSTABLE SPEED DRIVE EQUIPMENT

A. MSPS-BWP-1 shall be driven by an adjustable speed drive, as specified in Division 16.

PART 3 EXECUTION

3.01 - 3.02 (NOT USED)

3.03 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

- A. Installation of equipment and materials provided under this Specification Section shall be in accordance with the manufacturer's recommendations and the approved shop drawings.
- B. Install pumping units on a concrete pad and align thereon.
1. Coupling halves must be disconnected and only reconnected after alignment.
 2. Set base on metal shims placed directly under the part of the base carrying the greatest weight and spaced close enough to provide uniform support.
 3. Dowel pump and drive to baseplate after alignment in field to facilitate realignment after disassembly.
- C. After installation of pump equipment, bring piping into direct axial alignment with pump discharge. Flange faces shall fit closely and squarely. The pump discharge shall have no strain imposed upon it by piping misalignment.
- D. Final Coupling Alignment:
1. Perform only after base is installed and piping is connected and pump nozzle connections tested in accordance with paragraph 3.02.E
 2. If realignment is required piping must be disconnected prior to alignment, piping reconnected and alignment checked prior to connecting coupling halves.
 3. After alignment is correct, grout using high grade non-shrink grout, fill entire base and leave no gaps or voids. Do not imbed leveling nuts in grout.
- E. Test piping connections, to prove the pump nozzles are installed with the pipe in a free supported state without need to apply vertical or horizontal pressure to align piping with pump nozzles, by removing all flange bolts and checking flange to flange alignment.
- F. Install split mechanical seal. Split mechanical seal to be installed by the seal manufacturer's field service representative or the pump manufacturer shall provide seal manufacturer approved installation procedure to factory install seals.
- G. Special Precautions: Before starting the pumps the Contractor to check the following:
1. Check that pump rotating elements are free
 2. Check rotation of motor with pump drive disconnected.
 3. Check flow and pressure of cooling water used for motor windings is adequate.
 4. Check settings of the pumps control valve and air vacuum valve.
- H. After start-up and testing as specified below, shut down pump and recheck alignment of coupling. Check in all directions and follow manufacturer's instructions.
- I. After unit has been operated within the allowable operating range for one week, check couplings for misalignment and correct as necessary.

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SECTION 11290

VENTURI FLOWMETER

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes a Venturi flowmeter with transmitter and accessories as shown on PLANS and specified herein

1.02 RELATED REQUIREMENTS

- A. PLANS show general arrangement, location and basic dimensions.
- B. Related work as called for on PLANS or specified in this or other TECHNICAL SPECIFICATIONS Sections.

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

- ASTM A48 Gray Iron Casting
- ASTM A105 Forging Carbon Steel for Piping Components
- ASTM A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- ASTM A276 Stainless and Heat-Resisting Steel Bars and Shapes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI B16.5 Steel Pipe Flanges and Flanged Fittings

NSF International (NSF)

- NSF 61 Drinking Water System Components, Health Effects

1.04 DEFINITIONS

1.05 SYSTEM DESCRIPTION

1.06 SUBMITTALS

- A. Submit the following in accordance with Specification Sections 01300 "Submittals" and Specification Section 01730 "Operation and Maintenance Data".
- B. Shop Drawings
 1. Completed manufacturer's data sheets, cut sheets, and catalog data.
 2. Manufacturers written and illustrated instructions for the construction and installation method.
 3. Instruction for handling and storage.
 4. Dimensions and weight.
- C. Certificates
 1. Certified Test Reports for factory tests.

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2. The results of the hydrostatic test must be certified by the manufacturer in writing and submitted to the engineer as part of the final O&M manual.
3. A certificate of final factory dimensions and associated tolerances shall be submitted to the engineer prior to shipment of the meter. This report shall also be provided to the engineer as part of the final O&M manual.
4. The Manufacturer shall furnish a certified curve with data, which shall show the flow versus differential pressure from minimum flow to maximum flow with final O&M manuals.

D. Operation and Maintenance Data

1. General: Operation and maintenance data shall cover the flowmeter and all appurtenances.

1.07 QUALITY ASSURANCE

A. System Coordination:

1. Contractor is responsible for all details necessary to properly install, adjust, and place in operation a working system.

B. Manufacturer's Qualification

1. The CONTRACTOR shall provide evidence to the ENGINEER that the manufacturer has a minimum of 10 years of current manufacturing experience building cast iron venturi flowmeters. The manufacturer must have on permanent staff a designated flow engineer with a minimum of 15 years' experience in the design and fabrication of venturi flowmeters.
2. The CONTRACTOR shall provide a list of at least 10 venturi flow meters of similar diameter that have been designed, engineered and produced by the manufacturer that will be supplying the venturi on this project. This list shall include the size, application, and date, owner and owner's current contact person with telephone number.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver venturi to project site in original undamaged containers, with manufacturer's labels and seals intact.

1.09 – 1.11 NOT USED

PART 2 PRODUCTS

2.01 MANUFACTURERS:

- A. One of the following, or approved equal.
1. BIF
 2. Primary Flow Signal

2.02 MATERIAL AND/OR EQUIPMENT

- A. General:
1. The meter tube, signal cable, flow transmitter, and all related equipment and components shall be an integrated system to develop the desired flow signal.

2.03 HYDRAULIC PROFILE

- A. General:
1. The metering design shall be a differential pressure producing type, utilizing pure static pressure sensed at the inlet and throat. The differential pressure shall indicate static pressure change only. Devices employing pitot effects, amplifying

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- the differential by causing changes in the direction of the flow at the inlet and/or throat cross sections, or introducing unwanted noise are not acceptable.
2. The entrance section shall be a cylindrical section of similar diameter as the pipe in which the meter is being installed. The high-pressure tap shall be installed in this entrance section. The entrance section shall incorporate a hydraulic shape to condition the flow pattern before it enters the throat section. Vent and drain ports shall be included in the venturi entrance section on a 90 degree plane to metering taps.
 3. The throat section shall be a cylindrical section with a length at least 0.50 times the throat diameter. The low-pressure tap shall be installed in the throat section.
 4. The pressure recovery section (outlet cone) shall be truncated and have an included angle of 10 degrees. An inspection port shall be included in the recovery section of the venturi.
 5. The metering element shall not have debris collecting cavities or annular chambers, and shall have a single pressure connection at the inlet and throat on the horizontal centerline.

2.04 MATERIALS OF CONSTRUCTION

- A. Body:
 1. The flow meter body shall be constructed of cast iron ASTM A126, Class B.
 2. The throat liner and pressure tap bushings shall be Type 316 Stainless Steel.
 3. The flow meter flanges shall be ANSI 16.1 125 lb. rating with drilling to match adjacent pipeline flanges.
 4. The flow meter shall be hydrostatically tested at twice the working pressure for a period of not less than 10 minutes.
 5. The interior surfaces shall be coated with paint that meets the requirements of the United States EPA, and is NSF 61 approved for potable water applications. Interior paint shall be a minimum of 12mils in dry film thickness. The exterior surfaces except flange faces shall come factory-coated with a universal epoxy primer compatible with final field-applied coating. Final coating is to be per 09902.
- B. Transmitter and Tubing:
 1. Refer to Section 17380.
- C. Components:
 1. Vent tap: $\frac{3}{4}$ " diameter with 316 stainless steel threaded plug.
 2. Drain tap: $\frac{3}{4}$ " diameter with 316 stainless steel threaded plug.

2.05 PERFORMANCE DATA AND SUBSTANTIATION

- A. General
 1. Coefficient values and tolerances shall be based on actual calibrations, performed by a hydraulic laboratory, which has been in the calibration business for at least 15 years. This laboratory shall have routinely conducted flow meter calibrations with standards traceable to NIST and in conformance with standard calibration protocol (hereafter called "recognized hydraulic laboratory).
 2. The data submitted must be from the meter manufacturer and from the testing of its own venturi. The data shall indicate that the venturi meter discharge coefficient is independent of line size and beta ratio. In addition, the test data shall prove that the coefficient remains constant above a Reynolds Number of 75,000 whichever is higher. Use of substantiation data from any sources other than actual laboratory live testing will be rejected.
 3. Test results from the calibration of at least 30 hydraulically similar meters used for this substantiation shall show that the discharge coefficient 2 times standard deviation is no greater than ± 0.5 percent. This data must have been obtained and performed by the manufacturer submitting its venturi meter for approval.

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4. Documentation tabulating calibration data of at least 200 venturi meters of the same hydraulic profile and proportions, as those supplied shall be made available to the engineer upon request. The venturi meters included in this tabulation must be in the same hydraulic shape and proportion as the venturi meter proposed for this contract. These venturis must have been designed, engineered and their performance tested by the same manufacturer as will be manufacturing the venturi meter proposed to be furnished under this contract.
 5. Effects of upstream piping configuration shall be known and based on testing performed by a recognized hydraulic laboratory. Test data gathered from patents, ASME publications or other sources will not be acceptable unless the data listed in these sources is from actual testing of that manufacturer's own venturi meters. The manufacturer must have performed these tests on meters of the same hydraulic profile as the meter proposed for this application. Data must show that venturi can be installed in the actual application piping with ≤ 9 upstream piping diameters and have no effect on metering uncertainty.
 6. Substantiation shall show headloss as a function of the velocity head expended.
- B. If a manufacturer cannot substantiate performance of their venturi flow meters, or does not have the required data from 30 calibrations of hydraulically similar venturis, the manufacturer shall provide actual wet calibration data for the meters provided under this contract. A laboratory meeting all of the requirements of section 2.05.A above shall perform this calibration.
- C. Provide flow transmitter per Division 17 Specifications.

2.06 CALIBRATION STANDARD

- A. General:
1. Each flowmeter and transmitter shall be hydraulically calibrated at a facility which is traceable to the National Bureau of Standards. The calibration procedure shall conform to the requirements of MIL-STD-45662-A.
 2. A real-time computer generated printout of the actual calibration data indicating apparent and actual flows at 5, 20 and 40 percent of the calibrated range shall be submitted to the ENGINEER at least 30 days prior to shipment of the meters to the project site.
- B. Accuracy:
1. The un-calibrated meter accuracy shall be $\pm 0.5\%$ of flow reading.
 2. Flowtube accuracy: 0.25% of flow rate for flows at Reynolds Numbers of 75,000 or more for 8:1 turndown.
 3. Flowtube and transmitter combined accuracy not to exceed 0.5% percent for 8:1 turndown.

2.07 ACCESSORIES/APPURTENANCES

- A. Identification Plate: At a minimum the following information shall be included:
1. Manufacturer's name and address.
 2. Model Number
 3. Serial Number
 4. ANSI flange rating.
 5. Beta value.
 6. Discharge coefficient.
 7. Process pressure operating ranges.
 8. Nominal Size
- B. Pressure taps:
1. Placed on the sides of the meter at centerline at 3 and 9 o'clock positions $\frac{3}{4}$ " diameter with 316 stainless steel threaded plug each.

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2. Two low-pressure taps 180 degrees apart on horizontal or vertical centerline (for horizontal and vertical flow, respectively).
3. Two high- pressure taps 180 degrees apart on horizontal or vertical centerline (for horizontal and vertical flow, respectively).

PART 3 EXECUTION

3.01 PREPARATION FOR FLOWMETER INSTALLATION

- A. Coordination: The Contractor shall provide the necessary coordination with piping installation to ensure that the flowmeters are installed properly.

3.02 FLOWMETER INSTALLATION

- A. The Contractor shall install the equipment in accordance with the contract documents, construction schedule, manufacturer drawings and instructions, subject to the approval of the Engineer.
- B. The Contractor shall have an experienced and competent representative of the flowmeter manufacturer present as needed during installation and during testing to provide technical guidance for the work and approve the results.
- C. Install flowmeters and appurtenances in accordance with manufacturer's written instructions to permit intended performance.

3.03 FLOWMETER INSTALLATION

- A. Prepare and start systems in accordance with the Contract.
- B. Flowmeters:
 1. Hydrostatic Test: The flowmeters shall be subjected to a hydrostatic test with the adjacent piping. Refer to the PLANS for field hydrostatic testing values.
 2. The accuracy of the flowmeter shall be verified in the field.

3.04 3.04 – 3.10 NOT USED

3.11 MEASUREMENT AND PAYMENT

No separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

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SCHEDULE 1

Tag No.	Description	Process Media	Inlet Diameter (in.)	Minimum Flow Rate (gpm)	Maximum Flow Rate (gpm)	Process Pressure (psig)
MSPS-VFM-002	Finished Water Venturi Flowmeter	FW	24	4800	11,400	95
MSPS-VFM-003	Finished Water Venturi Flowmeter	FW	36	10,700	17,350	95
MSPS-VFM-004	Finished Water Venturi Flowmeter	FW	24	4800	11,400	95
MSPS-VFM-005	Finished Water Venturi Flowmeter	FW	36	10,700	17,350	95
MSPS-VFM-006	Finished Water Venturi Flowmeter	FW	36	10,700	17,350	95
MSPS-VFM-007	Finished Water Venturi Flowmeter	FW	30	8,000	16,000	26.4/58*

*MSPS-BWP-1 is controlled by a VFD and will operate at multiple rated conditions.

END OF SECTION

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SECTION 11310

PACKAGED SUMP PUMP SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Pump systems including packaged submersible sump pump systems for area and process drainage. Pumps shall be designed and manufactured to be able to pump significant amounts of sand and girt in water.
- B. Provide a packaged control system for the sump pumps per section 13390.

1.02 RELATED REQUIREMENTS

- A. "Attachment A" to this Section designates acceptable manufacturers, number of units, performance, sizes, motor characteristics, and special features.
- B. Other related work as called for on PLANS or specified elsewhere in this or other Technical Specification Sections.

1.03 REFERENCES

The publications listed below for a part of this specification to the extent referenced. The publications are referenced by text by basic designation only

AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)

- ABMA 9 Load Ratings and Fatigue Life for Ball Bearings
- ABMA 11 Load Ratings and Fatigue Life for Roller Bearings

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

- ASME B 16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
- ASME B 16.5 Pipe Flanges and Flanged Fittings.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A 48 Standard Specification for Gray Iron Castings
- ASTM A 108 Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
- ASTM A 276 Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes
- ASTM A 278 Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650 degrees Fahrenheit.
- ASTM A 743 Standard Specification for Castings, Iron-Chromium, Iron-Nickel, Corrosion Resistant, for General Application
- ASTM E 10 Test Method for Brinell Hardness of Metallic Materials.

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AMERICAN NATIONAL STANDARDS INSTITUTE AND HYDRAULIC INSTITUTE (ANSI/HI)

- | | |
|-----------------|--|
| ANSI/HI 1.1-1.5 | Centrifugal Pumps - Nomenclature, Definitions, Application and Operation |
| ANSI/HI 1.6 | Centrifugal Pump Tests |
| ANSI/HI 9.1-9.5 | Pumps - General Guidelines for Types, Definitions, Application and Sound Measurement |

1.04 DEFINITIONS

- A. Pump Head (Total Dynamic Head), Flow Capacity, Pump Efficiency, Net Positive Suction Head Available, and Net Positive Suction Head Required: As defined in ANSI/HI 1.1-1.5 and 9.1-9.5.
- B. Suction Head: Gauge pressure available at pump intake flange or bell in feet of fluid above atmospheric; when multiple suction pressure taps are used, average pressure shall be suction head regardless of variation in individual taps.
- C. Tolerances: As stipulated in the listed ANSI/HI standards, unless specified more restrictively.

1.05 DESIGN AND PERFORMANCE CRITERIA

- A. Submersible Sump Pumps with Components: Pumps, motors, base elbows, guide rails and lifting devices, electrical devices internal to pump housing, all submersible cabling for power and control conductors, sump level floats and control components, local control panels, and other items as required for a complete and operational system.
- B. Design Requirements:
 - 1. Pump Performance Characteristics: Refer to Sump Pump Schedule appended to this Section.
 - 2. Motor Characteristics: Refer to Sump Pump Schedule appended to this Section.

1.06 SUBMITTALS

Submit the following in accordance with Specification Sections 01300 "Submittals" and Specification Section 01730 "Operation and Maintenance Data".

- A. Shop Drawings
 - 1. Pump design data including name of pumping unit Manufacturer, pump model number, rotating speed, proposed impeller size, maximum and minimum impeller size to fit proposed pump case, type of wear rings and materials for impeller and case wear rings, type of pump bearings (radial and axial), type of mechanical seal and materials of construction, net weight of pump and net weight of base plate.
 - 2. Factory-certified pump performance curve showing capacity in gpm versus total dynamic head (TDH), NPSH required, brake horsepower required, operating speed, and wire-to-water efficiency. Curve to be complete from shut-off to minimum TDH.
 - 3. Dimensioned installation drawings.
 - 4. Motor design data and rating, including motor manufacturer's name, type of motor and/or motor enclosure type, insulation class and type, temperature rise over 40 C ambient, service factor, frame size, rated horsepower, full load speed, operating voltage (volts at 60 Hz), locked rotor current (amps and/or letter code), full load current (amps), starting inrush magnetizing current (% of full load, amps), motor stator winding resistance (ohms) and net motor weight.

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5. Complete outline drawing of the pump and motor showing overall dimensions, installation details, location of terminal boxes, mounting provisions, and lifting provisions. Sectional drawing showing all components and a list of materials for each component per ANSI, ASTM, NEMA. Show motor shaft diameter at all points.
6. Information covering availability of parts and service.
7. Submit per the requirements of Section 13390.

B. Operation and Maintenance Manuals

- C. Certified Report: Furnish three copies of a report prepared by manufacturer's technical representative certifying satisfactory installation, operation, and in service placement of units.

1.07 QUALITY ASSURANCE

- A. System Coordination: Contractor is responsible for all details necessary to properly install, adjust, and place in operation a working system.
- B. Standardization: All pumps to be product of a single manufacturer.
- C. Motor compatibility: The manufacturer shall ensure that the motor included with the pump is compatible with the pump equipment and complies with these specifications.
- D. Pump vendor to design and provide pump guide rail system.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, unload, and store products on site in manner that prevents damage. Use special care to prevent damage from temperature and condensation.
- B. Flanges to be protected by wooden blank flange protectors, strongly built and securely bolted thereto, or otherwise attached.
- C. Power and control cables to be shipped with securely attached caps on cable ends to prevent moisture wicking into cable while stored.

1.09 – 1.10 (NOT USED)

1.11 MAINTENANCE

- A. Special Tools: Deliver 1 set of special tools required for complete assembly or disassembly of pump system components for each type or size of pump specified.
- B. Spare Parts: Pack and label the following for warehouse storage. Deliver to OWNER for each type or size of pump specified:
 1. Thrust bearing set.
 2. Radial bearing set.
 3. Mechanical Seal: 1 each size and type.
 4. O-Ring set.
 5. Power cable entry seal set.
 6. Wear ring set (rotating and stationary)
 7. One spare set of complete moisture leak detector sensory components.
 8. Spare nameplates shall be provided for each pump/motor assembly to be mounted on the control panel.
 9. Any additional spare parts recommended by the manufacturer.

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PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sump Pumps: Packaged system consisting of pumps, motors and components, including base elbows, guide rails and lifting devices, electrical devices internal to pump housing, all submersible cabling for power and control conductors, sump level floats and control components, local control panels.
1. One of the following or equal:
 - a. KSB;
 - b. Fairbanks Morse (Pentair);
 - c. Or approved equal.

2.02 MATERIALS AND/OR EQUIPMENT

- A. Pump
1. Casing: Flanged, ASTM A48 Class 35B minimum, gray cast iron, designed to be supported from discharge elbow; smooth rounded passages to minimize clogging
 2. Impeller: One piece, free of cracks and porosity, ASTM A48 Class 35B minimum cast iron. The impeller shall be of, free-flow, vertex design, capable of handling coarse solids as specified in Attachment A. The impeller shall be keyed, not screwed or pinned to the shaft and shall be readily removable without the use of a special tool. The impeller shall be locked against rotation in any direction by a stainless steel or bronze impeller nut. The impeller shall be statically or dynamically balanced for smooth performance.
 3. Wear Ring: Equip with replaceable wear ring in volute and on impeller..
 4. Pump Shaft: ASTM A 276 Type 420 Stainless Steel isolated from liquid pumped through the use of a stainless steel sleeve, capable to withstand minimum of 1.5 times maximum operating torque and other loads.
 5. Enclosures: Top, motor, and intermediate castings to be ASTM A48 Class 25 minimum. Mating surfaces machined and fitted with O-rings shall not require secondary sealing compounds, gasket, grease or other devices.
 6. Seals: Tandem mechanical seal system. Lower seal to have stationary and rotating lapped seal faces of tungsten carbide; upper to run in oil-filled chamber and to have stationary silica carbide ring and rotating carbon or silica carbide ring. Each seal to have separate springs and positively driven rotating members. Seals shall be non-proprietary in design, and shall be available from another vendor in addition to the pump manufacturer. The seals shall require neither routine maintenance nor adjustment, but capable of being easily inspected and replaced.
 7. O-rings: All O-rings shall be made of Nitrile Rubber (NBR) or approved equal.
 8. Testing: Perform 5 minute hydrostatic test of pump casing at minimum 1.5 times Maximum Working Pressure.
- B. Motor
1. Sized to be nonoverloading at any point on the pump performance curve without exceeding 90 percent of the service factor rating.
 2. Insulation: Moisture-resistant Class F 155°C/311°F.
 3. Design: Squirrel cage induction, NEMA Design B for continuous operation.
 4. Shaft: The motor shaft shall be constructed of solid stainless steel.
 5. Bearings:
 - a. Permanently lubricated, anti-friction ball bearings.
 - b. Bearings to have an L₁₀ "rating life" of 50,000 hours per ABMA 9.
 6. Motor to have sufficient cooling and insulation to withstand ten (10) starts per hour, with motor submerged, and without use of cooling water being pumped through the motor.

7. Equip with three (3), normally closed, thermal switches (one per phase) embed in the coils of the stator windings. Switches to open on rise in temperature.
8. Motors over five (5) HP to be equipped with a terminal board with threaded compression type binding posts for power cable connection. Terminal board to be in separate junction chamber sealed from stator housing.
9. Motor Protection Devices: Motor shall have a moisture leak detector sensor in the seal chamber or motor housing to detect the collection/leakage of water into the motor housing and actuate designated applicable contact signals. Pump/motor manufacturer shall furnish applicable moisture sensory components and a complete schematic and wiring diagram.
10. Motor Cable: Special submersible service cable with Hypalon jacket in one continuous length from pumping unit to the junction box. Cable shall be oil and watertight, rated for continuous submergence service. Cable conductors shall be copper, sized and rated per NEC. Cable shall be sized using 125% of motor nameplate. Power cable shall include a dedicated ground conductor.
11. Provide stainless steel cable and stainless steel wire braid sleeve to support power cable from underside of wet well roof slab or access frame.
12. Cable Sealing: Separate entry compartment with external mechanical clamp and internal separate compartment sealed from above and below to prevent migration of moisture and gas through conductors.

C. Fastenings and Fittings

1. Nuts, bolts, and fastenings exposed to liquid pumped to be type 316 series stainless steel.

D. Accessories

1. Discharge Elbow: Construct of ASTM A48 cast iron with ANSI Class 125 flanged outlet. For pumps without legs, design to support entire weight of pumping unit.
2. Discharge Interface:
 - a. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact.
 - b. Self-aligning without having to enter the wet well.
 - c. Discharge elbow to mate to pump discharge and transition to discharge piping.
3. Guide Rails and Brackets: Provide sliding guide bracket of 316 Stainless Steel. Guide rails to be minimum 2-inch diameter, schedule 40, 316 stainless steel pipe. Upper guide bar support to be fabricated from 316 S.S. Lower guide bar support to be integrally cast boss on discharge elbow, arranged so that guide bar is held in position by sliding over boss. Provide intermediate guide bar supports, fabricated from 316 S.S. when guide bars exceed 8 feet in length. Bolts to be type 316 stainless steel.
4. Lift System: Furnish for each unit type 316 stainless steel Flygt "grip-eye" system or equal sized by pump manufacturer; secure with type 316 stainless steel fittings.

E. Nameplate

1. The pump motor assembly shall have a stainless steel nameplate attached to its frame with stainless steel fasteners. The nameplate shall meet the requirements of NEMA MG-1. The following information shall be displayed on the nameplate:
 - a. Pump manufacturer's name.
 - b. Pump model number.
 - c. Pump serial number.
 - d. Rated capacity in gallons per minute.
 - e. Rated total dynamic head in feet.
 - f. Pump speed.
 - g. Pump bearing information.

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- h. Motor frame description.
- i. Motor horsepower.
- j. Service factor.
- k. Motor speed.
- l. Motor voltage, phases, and frequency.
- m. Motor wiring diagram.
- n. Motor amperage at full and no load.

F. Controls

1. General: Provide a dedicated packaged control system to serve the sump pumps per the requirements of Section 13390. Provide Type B packaged control system type as specified in Section 13390. Provide the following:
 - a. Each packaged control system shall receive a single point 480 Volt, three phase, 60 Hz electrical service.
 - b. Refer to and comply with the additional requirements as shown on the PLANS and as specified herein
 - c. Field instruments, associated mounting brackets, and hardware as required.
 - d. Provide all required devices and means to interface the packaged control system with the equipment as specified herein and as shown on the PLANS for a complete and functional system.
 - e. Provide the manufacturer's standard features for proper operation and protection of a packaged sump pumping system with the additional features as specified herein and as shown on the PLANS.
 - f. Packaged control system will be connected to the Owner's distributed control system as indicated. Provide all components within the packaged control system to achieve the connectivity as indicated and specified.
 - g. Additional requirements per Section 13390
 - h. Provide for the additional functionality as specified hereinafter.
 - i. The packaged system control panel will mount adjacent to the sump. Extend conduit/wire accordingly.
 - j. Provide level switches as required to indicate LSL, LSA (lead pump start), LSB (lag pump start) and LSHH conditions at the sump location.
 - k. Start/lockout-stop pushbuttons.
 - l. Additional controls as specified.
 - m. Mount control panel as shown on plans.
2. All wiring, conduits, and electrical devices for the control panel and between the pump, instruments, and control panel shall be provided for complete operable system as specified herein.
3. Control Module:
 - a. Each pump shall be supplied with its own self-contained control/protection module to provide for the direct connection to all internal pump monitoring devices, including:
 - 1) Stator thermal switches.
 - 2) Moisture detection in motor or stator chamber.
 - b. The module shall signal an alarm condition if any of the internal monitoring devices is activated.
 - c. Install module in the manufacturer supplied control panel.

G. Pumps Operation:

- a. In addition to the controls specified above, each local control panel shall also have the following controls:
 - 1) A Start/Lockout-Stop switch for each pump.
 - 2) "Run" indicating light, Red.
 - 3) A 3-position MANUAL/OFF/AUTO switch for each pump.

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- b. With the manual/automatic switch in the "M" position, manual start-stop (SS) control of the associated pump shall be from the pumps' SS switch on the local control panel.
- c. With the manual/automatic switch in the "A" position, the pump shall operate automatically in response to level switch signals.
 - 1) Alternate pumps to select the lead and lag pump.
 - 2) If the pump has been selected as lead pump, the pump shall start when rising water level in the wet well causes level switch LSA to actuate.
 - 3) If the pump has not been selected as lead pump, the pump shall start when rising water level in the wet well causes level switch LSB to actuate.
 - 4) If level switch LSHH is actuated, both pumps shall start.
- d. With the manual/automatic switch in either position, an operating pump shall stop when falling water level in the wet well causes level switch LSL to actuate.
- e. The following abnormal conditions shall stop an operating pump:
 - 1) Pump motor overload.
- f. The following conditions shall be locally and remotely alarmed:
 - 1) High temperature detection in pump motor windings.
 - 2) Moisture detection in pump motor.
 - 3) Actuation of level switch LSB and LSHH.
- g. The following conditions shall be locally indicated:
 - 1) Each alarm condition above.
 - 2) On-off status of Pump Number 1.
 - 3) On-off status of Pump Number 2.
- h. A reset button shall be provided on the local control panel to extinguish the alarm lights upon removal of the associated alarm condition.

H. Level Sensors

- 1. Float Switch Level Sensors: Furnish and install per the requirements of Section 17380. Coordinate required cable length with the PLANS. Furnish and install continuous float cable length, without splices, between float and control panel.

2.03 SOURCE QUALITY CONTROL

- A. Factory Test: Each pump is to be tested at the factory to determine capacity, shut-off head, rated head, minimum head (for continuous operation), required power, efficiency and as required to develop an accurate performance curve. Certified copies of a report for each test are to be submitted to the Owner. All of the above tests are to be performed in conformity with the requirements and recommendations of the Hydraulic Institute and NEMA MG-1.
- B. Pump manufacturer to factory prime pump/motor and discharge elbow as specified in Section 09902. CONTRACTOR to provide field coatings as specified in Section 09902.

PART 3 EXECUTION

3.01 – 3.02 (NOT USED)

3.03 INSTALLATION

- A. Install equipment specified in this Section and associated accessories as per manufacturer's printed instructions, shop drawings, and recommendations. Adjust and secure free length of power cable to minimize movement with pump in place.
- B. Guide Rails: Install guide rails plumb and parallel.

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3.04 REPAIR/RESTORATION (NOT USED)

3.05 FIELD QUALITY CONTROL.

- A. Manufacturer's Field Services: Furnish services of manufacturer's trained, competent, technical representative to provide a minimum of one eight-hour working day assistance for the proper installation, operation, and maintenance of the equipment to perform the following:
1. Inspect the completed installation for conformance with manufacturer's recommended installation requirements;
 2. Supervise operational test of each unit;
 3. Instruct OWNER's personnel in operation and maintenance of equipment; and
 4. Prepare and certify field inspection report.
- B. Inspection: Manufacturer's technical service representative to perform, at a minimum, the following for each unit:
1. Check seal chamber oil level and lubrication of seals;
 2. Check proper rotation;
 3. Check power supply voltage;
 4. Inspect each unit for insulation breaks or moisture;
 5. Measure motor no-load current; and
 6. Manually trip level sensors and check complete cycle of control operation.
- C. Placing in Service
1. Field Tests: Run each unit submerged for not less than 60 minutes. During the test, observe and record head and capacity. Promptly correct or replace all defects or defective equipment at no additional cost to OWNER, and repeat tests until the specified results are obtained.
 2. Remove each unit and repeat insulation and moisture test. Raise and lower each unit three times in presence of OWNER and ENGINEER to ensure alignment of guide rail system.
 3. CONTRACTOR shall provide labor, material, equipment, piping, and calibrated measuring equipment for conduction the tests. All calibrations must be within 30 days of the field testing.

3.06 – 3.10 (NOT USED)

3.11 MEASUREMENT AND PAYMENT

No separate measurement and payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

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ATTACHMENT A

A.	Pump Performance and Size	
1.	Quantity:	2 (two) pumps
2.	Location:	Medium Service Pump Station sump
3.	Service:	Waste Water
4.	Tag Numbers:	MSPS-SP-1, MSPS-SP-2.
5.	Rated Capacity Each:	121 gpm
6.	TDH at Rated Capacity:	36.5 feet
7.	Minimum Pump Efficiency at rating point	42%
8.	Maximum Driven Speed:	1,800 rpm
9.	Voltage:	460 Volt - 3 phase - 60 Hz.
10.	Maximum Motor Horsepower:	7.5HP
11.	Minimum Pump Discharge Size:	4"
12.	Solids Handling Size:	1.5"

END OF SECTION

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2.03 INSTRUMENT SIGNAL WIRING ,“4-20MADC SIGNAL WIRING”

- A. Instrument wiring (4-20 milliamp signal wiring) shall be twisted shielded pair, #16 AWG stranded copper conductor with 600 volt PVC insulation over each conductor, a tinned copper drain wire, an overall aluminum mylar shield and an outer overall PVC jacket (35 mils). Color of the twisted pair shielded cable jacket shall be BLACK. The color of the positive (+) and negative (-) conductors within the each cable shall be BLACK and WHITE respectively.
- B. Instrument Signal Wiring ,“4-20mAdc signal wiring” Cable shall be Samuel Moore and Company Dekoron Division Series 1852, Belden, or approved equal.

2.04 MULTI-CONDUCTOR RTD TEMPERATURE WIRING CABLES

Resistance Temperature Detection “RTD” Wire: Single triad cable, #16 AWG, 7 strand bare copper; 15 mil 90°C PVC insulation over each conductor, color coded black, white and red; 100% 0.85 mil aluminum mylar tape shield over triad and 18-gauge 7-strand tinned copper drain wire with each triad; 35 mil thick black FR-PVC outer jacket. RTD wire shall be Dekoron Type 1862-6860R, or approved equal.

2.05 SINGLE CONDUCTOR CONTROL WIRING

- A. Single conductor control wiring shall be 98% conductivity copper, 19-Strand, single conductor Type XHHW-2. This wire shall have moisture resistant insulation and clean stripping characteristics. Wire shall be marked every ten feet (10') with the size, type and voltage of the wires as well as the manufacturer's name and measurement markers.
- B. Conductors of all sizes of wire shall be stranded, 19 strands (minimum). The color of the wire shall be RED.
- C. The minimum wire size shall be #12 AWG, unless SPECIFICALLY noted otherwise on the PLANS.
- D. Single Conductor Control Wiring shall be as manufactured by General Cable Company, The Okonite Company, or approved equal.

2.06 600 VOLTS MULTI-CONDUCTOR - GENERAL ELECTRICAL POWER SYSTEM AND AUXILIARY ELECTRICAL SYSTEM WIRING CABLES

- A. General:
 - 1. Utilize multi-conductor cables for Electrical Power System and Auxiliary Electrical System Wiring only where specifically called for by the PLANS.

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2. Multi-Conductor cables shall be the non-shielded type and shall be rated 600 volts. Cables shall be suitable and rated for installation in wet or dry locations, for AC or DC service at conductor temperature of 90 °C. Cables shall be suitable and rated for installation in conduit system, duct bank system, cable trough system, cable tray system, and directly buried in the ground/earth.

B. Features:

As minimum, the Multi-Conductor cables shall have the following features:

1. Excellent flame resistance. Passes the IEEE 383 Vertical Tray Flame Test at 70,000 BTU/hr and also when modified for 210,000 BTU/hr flame source utilizing the corner configuration.
2. Cables shall comply with IEEE 383 standards requirements “Type Test of Class IE Electrical Cables”.
3. Cables shall have mechanical rigidity and shall be flexible, easy to install and terminate.
4. Cables shall be resistant to water, oil, and chemicals. Cables shall also be stable at elevated temperatures.

C. Conductors:

Each individual conductor in the Multi-Conductor cables shall be copper per ASTM B-3, compact stranded per ASTM B-496, minimum of 19-strands, with 600 volt XHHW insulation. Insulation shall be heat, moisture, flame and chemical resistant, mechanically rugged Ethylene-Propylene insulation compound. . Size of each conductor shall not be less than No. 10 AWG. Also refer to PLANS for additional information.

D. Assembly:

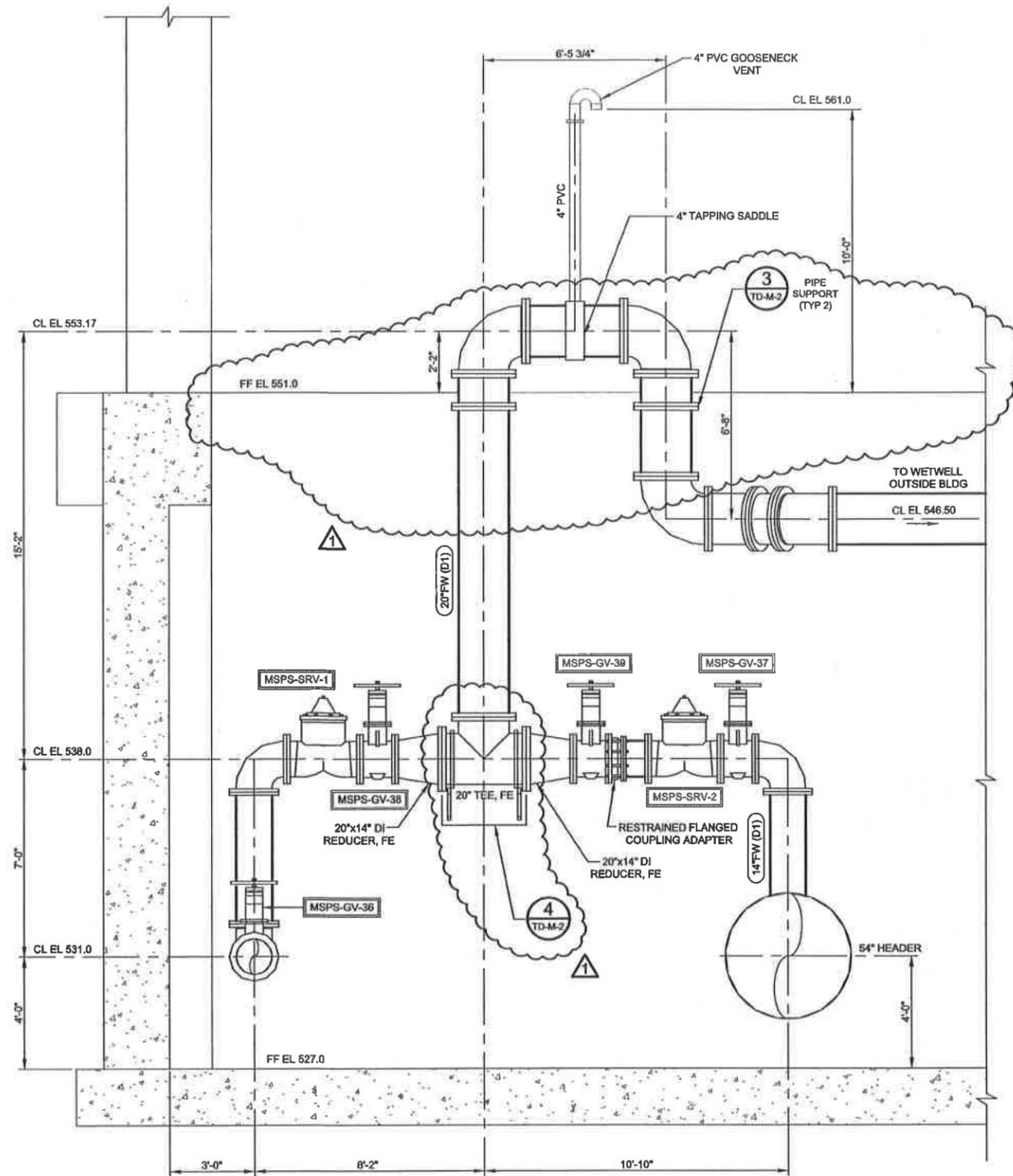
Individual conductors cabled in accordance to U.L 1277, using extruded fillers with an overall binding tape (over entire multi-conductor and fillers assembly, and just prior to overall cable jacket).

E. Overall Jacket, Conductor sizes, Conductor Quantity, Overall Diameters:

Each Multi-Conductor cable shall be covered with overall FLAME-RETARDANT PVC jacket which shall meet or exceed the requirements of ICEA S-68-516. The jacket thickness, number of

NOTES:

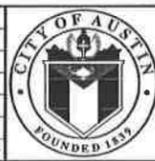
1. CONNECT SURGE VALVE PILOT PIPING TO 54" AND 60" PER VALVE MANUFACTURER'S RECOMMENDATIONS.



SECTION **A**
SCALE: 3/8"=1'-0"

REV	DATE	DESCRIPTION
1	11/30/2015	ADDENDUM No. 2 - REVISED PIPING / ADDED SUPPORTS

APPROVED



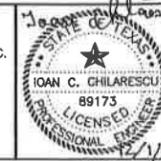
CITY OF AUSTIN

DAVIS WATER TREATMENT PLANT
TREATED WATER DISCHARGE SYSTEM
CIP PROJECT No. 2015.041

MEDIUM SERVICE PUMP STATION
SURGE RELIEF PIPING DETAILS



AECOM TECHNICAL SERVICES INC.
400 W 15th STREET SUITE 600
AUSTIN, TEXAS 78701
WWW.AECOM.COM
TBPE REG. NO. F-3580



VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1" SCALE: 1/2"=1'-0"
IF THIS BAR DOES NOT MEASURE ONE INCH, DRAWING IS NOT TO SCALE

DESIGNED: JB	PROJECT No. 60215430
DRAWN: PW	DRAWING No. MSPS-M-25
CHECKED: ICC	SHEET No. OF
APPROVED: SGE	
SCALE: 1/2"=1'-0"	
DATE: DECEMBER 2014	

CONDUIT/WIRE SCHEDULE		
CONDUIT TAG	SIZE	CABLE/WIRE DESCRIPTION
MSPS-TIT2356-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2366-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2603-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2711/2-I	1"	2 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2711-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2712-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2721/31-I	1"	2 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2721-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-TIT2731-I	3/4"	1 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-UPSCPP2-C	3/4"	2 #12 (C),2 #12 (SP),1 #10 (G)
MSPS-UPSCPP2-F	1-1/4"	3 #4 (P),1 #8 (G)
MSPS-UPSCPP2-G	1"	1 #1 (G)
MSPS-VF1-PSH	3/4"	3 #10 (P),1 #10 (G),2 #10 (SH)
MSPS-VF2-PSH	3/4"	3 #10 (P),1 #10 (G),2 #10 (SH)
MSPS-VF3-PSH	3/4"	3 #10 (P),1 #10 (G),2 #10 (SH)
MSPS-VFDBWP1-C1	2"	32 #12 (P),8 #12 (SP),1 #10 (G)
MSPS-VFDBWP1-COM	3/4"	1 COPPER ETHERNET CABLE (COM)
MSPS-VFDBWP1-F1	3"	3 350 kCMIL (P),1 #1/0 (G)
MSPS-VFDBWP1-F2	3"	3 350 kCMIL (P),1 #1/0 (G)
MSPS-VFDBWP1-I1	1-1/4"	2 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I),6 #12 (C),2 #12 (SP),1 #10 (G)
MSPS-WSHP1-C	3/4"	2 #12 (C),2 #12 (SP),1 #12 (G)
MSPS-WSHP1-P	1-1/4"	3 #2 (P),1 #6 (G)
MSPS-WSHP2-C	3/4"	2 #12 (C),2 #12 (SP),1 #12 (G)
MSPS-WSHP2-P	1-1/4"	3 #2 (P),1 #6 (G)
MSPS-WSHP3-P	3/4"	3 #8 (P),1 #10 (G)
MSPS-WSHP4-P	3/4"	3 #8 (P),1 #10 (G)
MSPS-WSHP-C	1"	4 #12 (C),4 #12 (SP),2 #12 (G)
MSPS-XFMR1A-F1	3-1/2"	3 #2 15KV RATED SHIELDED CABLE (P),1 #6 (G)
MSPS-XFMR1A-F2	3-1/2"	EMPTY
MSPS-XFMR1A-G	1-1/2"	1 250 kCMIL (G)
MSPS-XFMR1B-F1	3-1/2"	3 #2 15KV RATED SHIELDED CABLE (P),1 #6 (G)
MSPS-XFMR1B-F2	3-1/2"	EMPTY
MSPS-XFMR1B-G	1-1/2"	1 250 kCMIL (G)
MSPS-XFMRCP1-F	1"	3 #8 (P),1 #8 (G)
MSPS-XFMRCP1-IG	1"	1 #1 (G)
MSPS-XFMR1P1-F	1-1/2"	3 #1/0 (P),1 #4 (G)
MSPS-XFMR1P2-F	1-1/2"	3 #1/0 (P),1 #4 (G)
MSPS-XFMR1P3-F	1-1/2"	3 #1/0 (P),1 #4 (G)
MSPS-XIT232X-I	1"	3 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-XIT233X-I	1"	3 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-XIT234X-I	1"	3 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-XIT235X-I	1"	3 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-XIT236X-I	1"	3 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
MSPS-XIT2603/4-I	1"	2 #16 2-CONDUCTOR TWISTED PAIR SHIELDED CABLE (I)
PGC-BFV37-C1	3/4"	3 #12 (C),1 #12 (G)
PGC-GV5-C1	3/4"	3 #12 (C),1 #12 (G)
PGS-BFV19-C	1-1/4"	12 #12 (C),4 #12 (SP),1 #12 (G)
PGS-BFV19-C1	3/4"	3 #12 (C),1 #12 (G)
PGS-BFV19-P	3/4"	3 #10 (P),1 #10 (G)
PGS-GV1-C	1-1/4"	12 #12 (C),4 #12 (SP),1 #12 (G)
SUB1-1A07-F1	5"	3 500 kCMIL 15KV RATED SHIELDED CABLE (P),1 250 kCMIL (G)
SUB1-1A07-F2	5"	3 500 kCMIL 15KV RATED SHIELDED CABLE (P),1 250 kCMIL (G)
SUB1-1A07-F3	5"	EMPTY
SUB1-1A07-F4	5"	EMPTY
SUB1-1A08-F1	5"	EMPTY
SUB1-1A08-F2	5"	EMPTY

CONDUIT/WIRE SCHEDULE		
CONDUIT TAG	SIZE	CABLE/WIRE DESCRIPTION
SUB1-1A09-F1	5"	EMPTY
SUB1-1A09-F2	5"	EMPTY
SUB1-1A09-F3	5"	EMPTY
SUB1-1A09-F4	5"	EMPTY
SUB1-1B07-F1	5"	3 500 kCMIL 15KV RATED SHIELDED CABLE (P),1 250 kCMIL (G)
SUB1-1B07-F2	5"	3 500 kCMIL 15KV RATED SHIELDED CABLE (P),1 250 kCMIL (G)
SUB1-1B07-F3	5"	EMPTY
SUB1-1B07-F4	5"	EMPTY
SUB1-1B08-F1	5"	EMPTY
SUB1-1B08-F2	5"	EMPTY
SUB1-1B09-F1	5"	EMPTY
SUB1-1B09-F2	5"	EMPTY
SUB1-1B09-F3	5"	EMPTY
SUB1-1B09-F4	5"	EMPTY
SUB1-AS-1	5"	EMPTY
SUB1-AS-2	5"	EMPTY
SUB1-AS-3	5"	EMPTY
SUB1-AS-4	5"	EMPTY
SUB1-AS-5	5"	EMPTY
SUB1-AS-6	5"	EMPTY
SUB1-BS-1	5"	EMPTY
SUB1-BS-2	5"	EMPTY
SUB1-BS-3	5"	EMPTY
SUB1-BS-4	5"	EMPTY
SUB1-BS-5	5"	EMPTY
SUB1-BS-6	5"	EMPTY
SUB1-MCP-COMA2	3"	1 FIBER OPTIC CABLE - TYPE 1 (COM)
SUB1-MCP-COMB2	3"	1 FIBER OPTIC CABLE - TYPE 1 (COM)
SUB1-SEC-2	3"	1 FIBER OPTIC CABLE - TYPE 2 (COM) (1)
SUB1-TEL-2	3"	1 FIBER OPTIC CABLE - TYPE 2 (COM) (1)
Y-SWGR1A-C1	5"	1 #10 4-CONDUCTOR (P) W/1#10 (G) CABLE (C)
Y-SWGR1B-C1	5"	1 #10 4-CONDUCTOR (P) W/1#10 (G) CABLE (C)

KEY NOTES:

- (1) COORDINATE FINAL CONNECTION REQUIREMENTS WITH THE OWNER/SECURITY SYSTEM CONTRACTOR AS APPLICABLE AND MAKE ALL FINAL CONNECTIONS.



REV	DATE	DESCRIPTION	APPROVED
1	11/30/2015	ADDENDUM NO. 2 - ADDED SHEET	ICC



CITY OF AUSTIN

**DAVIS WATER TREATMENT PLANT
TREATED WATER DISCHARGE SYSTEM
CIP PROJECT No. 2015.041
MEDIUM SERVICE PUMP STATION
CONDUIT WIRE SCHEDULES
(SHEET 5 OF 5)**



AECOM TECHNICAL SERVICES INC.
400 W 15th STREET SUITE 500
AUSTIN, TEXAS 78701
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TBPB REG. NO. F-3580



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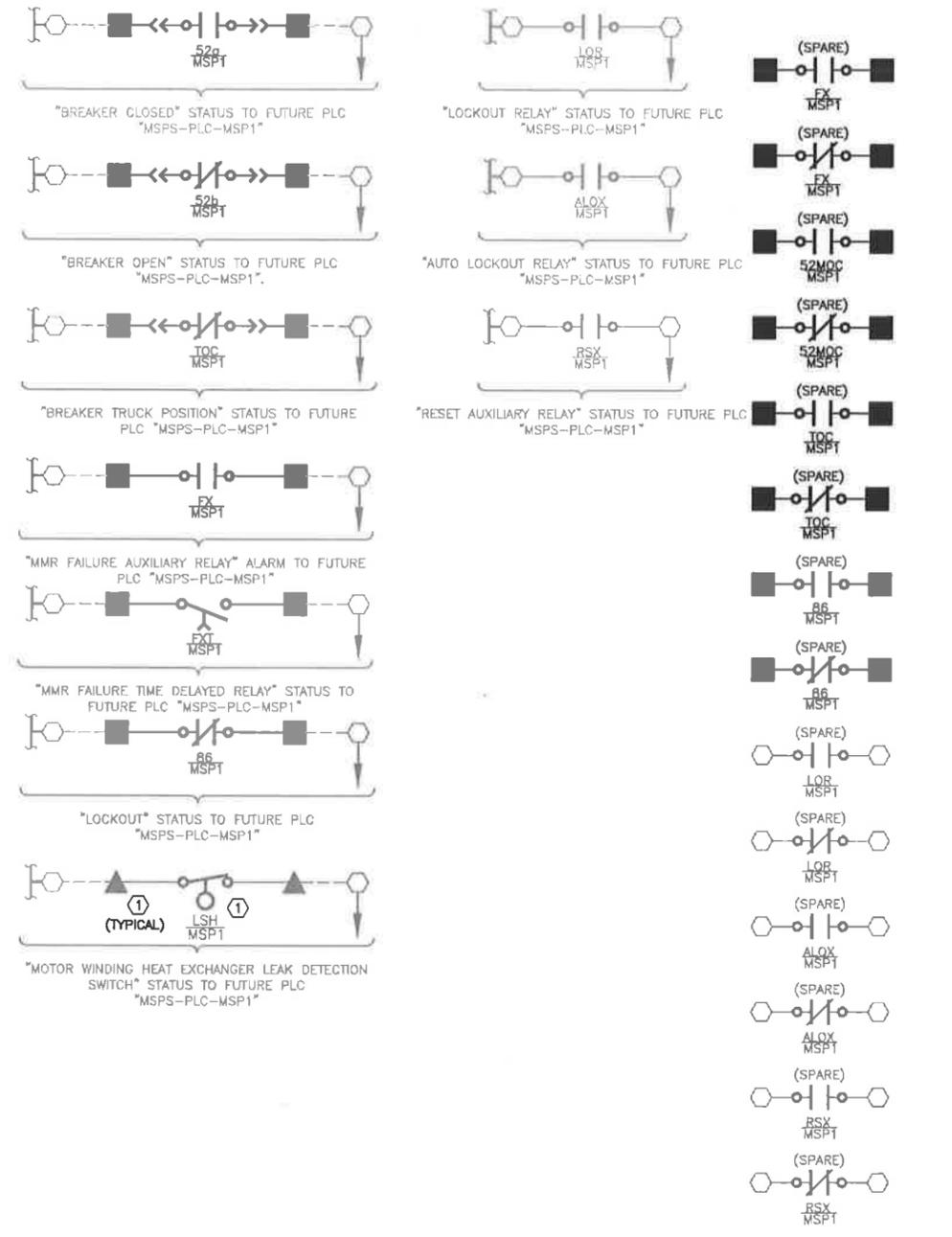
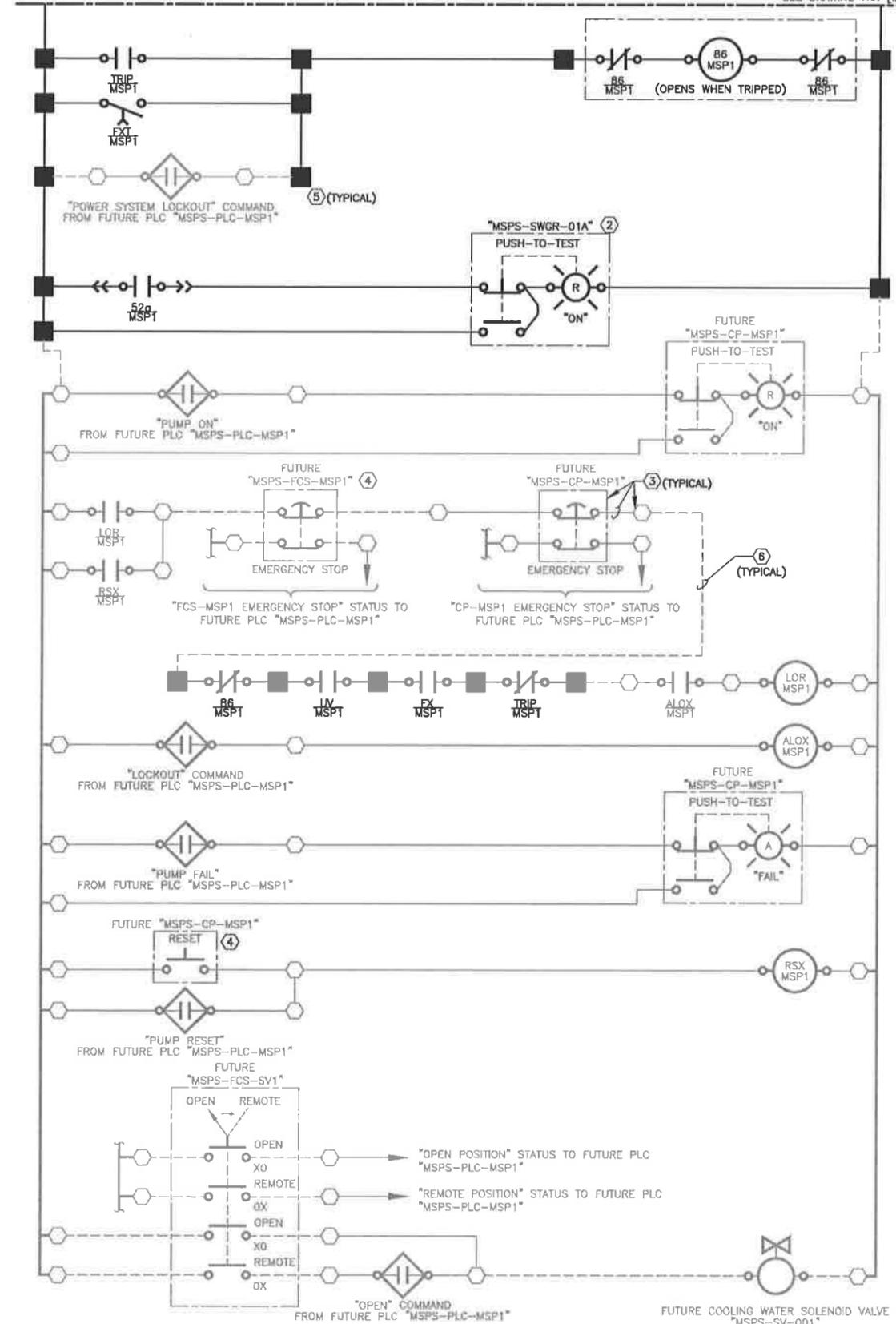
VERIFY SCALES BAR IS ONE INCH ON ORIGINAL DRAWING 0 1"	DESIGNED: HEI	PROJECT No. 60215430
	DRAWN: HEI	DRAWING No. MSPS-E-70
	CHECKED: HEI	SHEET No. OF
	APPROVED: HEI	DATE: AUGUST 2015

CONTROL LOGIC DEVICE LEGEND:

- 52a BREAKER MOUNTED AUXILIARY CONTACT
- OPEN WHEN BREAKER IS OPEN
- 52b BREAKER MOUNTED AUXILIARY CONTACT
- CLOSED WHEN BREAKER IS OPEN
- 52MOC MECHANISM OPERATED CELL SWITCH
- OPERATES AS AUXILIARY CONTACT WHEN BREAKER IS IN CONNECTED OR TEST POSITION
- TOC TRUCK OPERATED CONTACT
- CONTACTS SHOWN WITH BREAKER RACKED OUT
- LS-MC SPRING MOTOR CUTOFF SWITCH
- OPEN WHEN BREAKER IS RACKED OUT
- LS-SM SPRING MOTOR LIMIT SWITCH
- SHOWN WITH SPRINGS CHARGED
- CHANGES STATES WHEN SPRING IS DISCHARGED
- LS-LC LATCH CHECK SWITCH
- OPENS WHEN TRIP LATCH MOVES OUT OF ITS NORMAL POSITION
- SM SPRING CHARGING MOTOR
- Y ANTI-PUMP RELAY
- PREVENTS ENERGIZATION OF CLOSE COIL WHEN ENERGIZED
- CC BREAKER CLOSE COIL
- CLOSSES BREAKER WHEN ENERGIZED
- TC BREAKER TRIP COIL
- OPENS BREAKER WHEN ENERGIZED
- CIR "CLOSE BREAKER" COMMAND INTERPOSING RELAY
- OIR "OPEN BREAKER" COMMAND INTERPOSING RELAY
- M SPACE HEATER CONTACTOR
- LORX LOCKOUT AUXILIARY RELAY
- TRIP MOTOR MANAGEMENT RELAY TRIP COMMAND AUXILIARY RELAY
- ENERGIZES TO TRIP
- FX PROTECTIVE RELAY FAILURE AUXILIARY RELAY
- B6 PROTECTIVE RELAY TRIP LOCKOUT RELAY
- MANUAL RESET
- LOR LOCKOUT RELAY
- ALOX AUTO LOCKOUT AUXILIARY RELAY
- RSX RESET AUXILIARY RELAY

KEY NOTES:

- ① PUMPING UNIT MSPS-MSP-1 WILL BE FURNISHED AND INSTALLED IN THE FUTURE BY OTHERS.
- ② MOUNTED ON FRONT OF PROPOSED SWITCHGEAR "MSPS-SWGR-01A" SECTION 1A06A.
- ③ CONTROL PANEL "MSPS-CP-MSP1" EQUIPMENT WILL BE FURNISHED AND INSTALLED IN THE FUTURE BY OTHERS.
- ④ FIELD CONTROL STATION WILL BE FURNISHED AND INSTALLED IN THE FUTURE BY OTHERS.
- ⑤ FURNISH AND INSTALL TERMINAL BLOCKS AS REQUIRED TO FACILITATE THE OWNER'S FUTURE USE.
- ⑥ FIELD WIRING WILL BE FURNISHED AND INSTALLED IN THE FUTURE BY OTHERS.



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HARUTUNIAN ENGINEERING INCORPORATED
ENGINEERING AND ENVIRONMENTAL CONSULTANTS
305 EAST HUNTLAND DRIVE, SUITE 600
AUSTIN, TEXAS 78752

REV	DATE	DESCRIPTION
1	11/20/2015	ADDENDUM NO. 2



CITY OF AUSTIN

DAVIS WATER TREATMENT PLANT
TREATED WATER DISCHARGE SYSTEM
CIP PROJECT No. 2015.041
MEDIUM SERVICE PUMP STATION
MSPS-MSP-001 PUMPING UNIT
CONTROL WIRING SCHEMATIC (SHEET 3 OF 3)

AECOM
AECOM TECHNICAL SERVICES INC.
400 W 15th STREET SUITE 500
AUSTIN, TEXAS 78701
WWW.AECOM.COM
TBPE REG. NO. F-3580



DESIGNED: HEI	PROJECT No. 60215430
DRAWN: HEI	DRAWING No. MSPS-I-45
CHECKED: HEI	SHEET No. OF
APPROVED: HEI	DATE: AUGUST 2015

LIGHTING FIXTURE SCHEDULE

TYPE	LAMP	MANUF./CATALOG NO.	DESCRIPTION
A	(2) GE #F32 T8 cool white rapid start	COLUMBIA #KL4-232-VR-EU/PAF/0'F BALLAST OR APPROVED EQUAL	THE LUMINAIRE SHALL BE A 48", 2 LAMP, FLUORESCENT RAPID START INDUSTRIAL. BOTH HOUSING AND REFLECTOR SHALL BE FORMED FROM COLD ROLLED STEEL. THE HOUSING AND REFLECTOR METAL SHALL BE PRETREATED USING A FIVE-STATE IRON PHOSPHATE TREATMENT TO ENSURE PAINT-ADHESION AND RUST RESISTANCE. THE PARABOLIC REFLECTOR SHALL BE DIEBOSSED AND CENTER "V" FORMED FOR RIGIDITY. SLOTS AT THE TOP OF THE REFLECTOR SHALL PROVIDE A MINIMUM OF 10% TO A MAXIMUM OF 20% UP LIGHT. THE PARABOLIC REFLECTOR SHALL HAVE A BAKED WHITE ENAMEL FINISH FOR THE REFLECTIVE SURFACE. THE HOUSING FINISH SHALL ALSO BE A HIGH-GLOSS, BAKED WHITE ENAMEL. THE UNIVERSAL VOLTAGE BALLAST SHALL BE A RAPID START, ELECTRONIC TYPE, SUITABLE FOR LOW TEMPERATURE (0°F) THERMALLY PROTECTED, RESETTING, WITH .9 HPF, AND ≤ 10% THD. THE LAMP HOLDERS SHALL BE TURRET TYPE PRESSURE LOCK. THE LUMINAIRE SHALL BE UL APPROVED FOR DAMP LOCATIONS.
B	LED 4500 LUMENS	LUSIO #LW-LUSIO-ES-BAY-2MS -CW-FROST-SUR-120 OR APPROVED EQUAL	2-FT CEILING MOUNTED LED LUMINAIRE. END CAPS SHALL BE FINISHED WITH MULTI-STAGE CORROSION RESISTANT PRIMER AND WHITE POWDER COAT FINISH. LENS SHALL BE FROSTED SEMI-DIFFUSE ULTRA-VIOLET STABILIZED ACRYLIC. HEAT SINK SHALL BE ALUMINUM. AMBIENT OPERATING TEMPERATURES SHALL BE 0 DEGREES CELSIUS TO +40 DEGREES CELSIUS. TOTAL HARMONIC DISTORTION SHALL BE 20 PERCENT OR LESS. DRIVERS AND LED CIRCUIT BOARDS SHALL BE CAPABLE OF BEING DISCONNECTED AND REMOVED FROM THE FIXTURE IN THE FIELD. LED SHALL BE COOL WHITE WITH MINIMUM CRI OF 70. DRIVER POWER FACTOR SHALL BE 0.9 LAGGING AT MINIMUM. THE LUMINAIRE SHALL BE UL LISTED FOR DAMP LOCATIONS. COMPLY WITH LIGHTING FIXTURE SCHEDULE NOTE 1.
C	LED 18000 LUMENS	LITHONIA #PTN/18000L/WD/MVOLT/ LP750/CS3W/IBAC120 M20 /WGPTN DNA OR APPROVED EQUAL	THE FIXTURES SHALL BE A HIGH BAY, LED. THE BODY SHALL BE OF HEAVY DUTY CODE GRADE STEEL PRE-TREATED WITH FIVE-STAGE IRON PHOSPHATE PROCESS. A WHITE HIGH-GLOSS POLYESTER POWDER COAT FINISH SHALL BE APPLIED AFTER FABRICATION. HEAT SINK SHALL BE 6063-T5 ALUMINUM. ACCESS TO DRIVER AND WIRING COMPARTMENT SHALL BE COMPLETELY TOOL-LESS AND ALLOW FOR QUICK AND EASY ACCESS. DRIVERS AND LED CIRCUIT BOARDS SHALL BE CAPABLE OF BEING DISCONNECTED AND REMOVED FROM THE FIXTURE IN THE FIELD. LENS SHALL BE A SEMI-DIFFUSE ACRYLIC. FIXTURE SHALL HAVE A WIDE DISTRIBUTION PATTERN. LED COLOR RENDERING INDEX SHALL BE 67 AT MINIMUM. THE REFLECTOR SHALL BE OF HIGHLY REFLECTIVE SPECULAR ALUMINUM WITH A MEDIUM SPREAD UPLIGHT. PROVIDE FIXTURE WITH 5 YEAR WARRANTY. THE FIXTURE SHALL BE SUITABLE FOR DAMP LOCATIONS. SUSPENSION OF FIXTURE SHALL BE BY AIRCRAFT CABLE WITH HANGERS WITH MOUNTING TO CEILING STRUCTURE AS SHOWN ON THE PLANS. THE LENS SHALL HAVE A #316 STAINLESS STEEL WIRE GUARD. EXTERNAL HARDWARE SHALL BE OF #316 STAINLESS STEEL. FIXTURE SHALL BE PROVIDED WITH NEMA RATED TWIST LOCK 1P-20 AMPERE RATED PLUG AND SIX FOOT LONG CORD FOR INTERCONNECTION BETWEEN FIXTURE AND REMOTE MOUNTED RECEPTACLE.
D	LED 3300 LUMENS	LITHONIA #VAP/39LED/57/SYM/MVOLT/SF/ STSL/JSB/WLFEND2/OMB OR APPROVED EQUAL	4-FT VAPOR-TIGHT, CEILING/WALL MOUNTED LED LUMINAIRE. LUMINAIRE BODY SHALL BE FULLY GASKETED AND POLYCARBONATE HOUSING. CAPTIVE, CORROSION RESISTANT PIVOT STAINLESS STEEL LATCHES OR RAIL CLAMPS SHALL SECURE THE DIFFUSER. THE NEOPRENE GASKET SHALL BE PERMANENTLY MOLDED IN LENS FOR A RELIABLE SEAL. THE LENS SHALL BE OF ULTRA-VIOLET STABILIZED, CLEAR POLYCARBONATE. THE DRIVER SHALL BE HIGH POWER FACTOR. THE LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS. LED COLOR RENDERING INDEX SHALL BE 70 AT MINIMUM. FURNISH AND INSTALL WITH MANUFACTURER'S STANDARD SURFACE MOUNTING BRACKETS. COORDINATE, FURNISH, AND INSTALL FIXTURE WITH WET LOCATION FITTINGS. REFER TO THE PLANS.
F1	(1) 250W METAL HALIDE AND (1) 100W QUARTZ	CROUSE-HINDS # DMVM3TW250GP-RA739-QTZ (30° ANGLE REFLECTOR) AND WITH CORROSION-FREE EPOXY COATING INSIDE AND OUT WITH NATURAL ALUMINUM FINISH. OR APPROVED EQUAL	THE WALL MOUNTED 250W PULSE START METAL HALIDE LIGHTING FIXTURE WITH THROUGH FEED. THE HINGED, BALLAST HOUSING AND OPTICAL ASSEMBLY SHALL BE GASKETED/SEALED TO ISOLATE FROM THE ENVIRONMENT. THE BALLAST HOUSING WITH MOUNTING SHALL BE OF CAST COPPER FREE ALUMINUM WITH CORROSION-FREE EPOXY POWDER COATING INSIDE AND OUT POWDER (NATURAL ALUMINUM) FINISH. THE LAMP SOCKET SHALL BE PORCELAIN IN A MOGUL BASE CONFIGURATION. THE MULTI-TAP (SUITABLE FOR 120 OR 208 VOLT) INTEGRAL ENCLOSED HIGH POWER FACTOR BALLAST SHALL BE ABLE TO OPERATE IN AN AMBIENT TEMPERATURE RANGE FROM -40°C TO +40°C. THE GLOBE SHALL BE OF A HIGH IMPACT, HEAT RESISTANT GLASS WITH AN INTERNAL FLUTED PATTERN. 30 DEGREE ANGLE REFLECTOR SHALL BE OF FIBERGLASS REINFORCED POLYESTER. PROVIDE GLOBE WITH #316 STAINLESS STEEL WIRE GUARD. EXTERNAL HARDWARE SHALL BE OF #316 STAINLESS STEEL. FIXTURE SHALL BE UL LISTED. PROVIDE FIXTURE WITH INTEGRAL 100W QUARTZ RESTRIKE AUXILIARY LIGHT WIRED TO DE-ENERGIZE ONCE THE MAIN METAL-HALIDE LAMP ILLUMINATES. THE QUARTZ RESTRIKE FEATURE SHALL BE THE ONLY FEATURE PREVENTING THE LIGHT FIXTURE FROM ACHIEVING SUITABILITY FOR USE IN CLASS 1, DIV. 2 ENVIRONMENT.
F2	(1) 250W METAL HALIDE AND (1) 100W QUARTZ	CROUSE-HINDS # DMVM3TW250GP-RD739-QTZ AND WITH CORROSION-FREE EPOXY COATING INSIDE AND OUT WITH NATURAL ALUMINUM FINISH. OR APPROVED EQUAL	THE WALL MOUNTED 250W PULSE START METAL HALIDE LIGHTING FIXTURE WITH THROUGH FEED. THE HINGED, BALLAST HOUSING AND OPTICAL ASSEMBLY SHALL BE GASKETED/SEALED TO ISOLATE FROM THE ENVIRONMENT. THE BALLAST HOUSING WITH MOUNTING SHALL BE OF CAST COPPER FREE ALUMINUM WITH CORROSION-FREE EPOXY POWDER COATING INSIDE AND OUT POWDER (NATURAL ALUMINUM) FINISH. THE LAMP SOCKET SHALL BE PORCELAIN IN A MOGUL BASE CONFIGURATION. THE MULTI-TAP (SUITABLE FOR 120 OR 208 VOLT) INTEGRAL ENCLOSED HIGH POWER FACTOR BALLAST SHALL BE ABLE TO OPERATE IN AN AMBIENT TEMPERATURE RANGE FROM -40°C TO +40°C. THE GLOBE SHALL BE OF A HIGH IMPACT, HEAT RESISTANT GLASS WITH AN INTERNAL FLUTED PATTERN. STANDARD DOME REFLECTOR SHALL BE OF FIBERGLASS REINFORCED POLYESTER. PROVIDE GLOBE WITH #316 STAINLESS STEEL WIRE GUARD. EXTERNAL HARDWARE SHALL BE OF #316 STAINLESS STEEL. FIXTURE SHALL BE UL LISTED. PROVIDE FIXTURE WITH INTEGRAL 100W QUARTZ RESTRIKE AUXILIARY LIGHT WIRED TO DE-ENERGIZE ONCE THE MAIN METAL-HALIDE LAMP ILLUMINATES. THE QUARTZ RESTRIKE FEATURE SHALL BE THE ONLY FEATURE PREVENTING THE LIGHT FIXTURE FROM ACHIEVING SUITABILITY FOR USE IN CLASS 1, DIV. 2 ENVIRONMENT.
F3	(1) 250W METAL HALIDE AND (1) 100W QUARTZ	CROUSE-HINDS # DMVM3C250GP-RD739-QTZ AND WITH CORROSION-FREE EPOXY COATING INSIDE AND OUT WITH NATURAL ALUMINUM FINISH. OR APPROVED EQUAL	THE CEILING MOUNTED 250W PULSE START METAL HALIDE LIGHTING FIXTURE WITH THROUGH FEED. THE HINGED, BALLAST HOUSING AND OPTICAL ASSEMBLY SHALL BE GASKETED/SEALED TO ISOLATE FROM THE ENVIRONMENT. THE BALLAST HOUSING WITH MOUNTING SHALL BE OF CAST COPPER FREE ALUMINUM WITH CORROSION-FREE EPOXY POWDER COATING INSIDE AND OUT POWDER (NATURAL ALUMINUM) FINISH. THE LAMP SOCKET SHALL BE PORCELAIN IN A MOGUL BASE CONFIGURATION. THE MULTI-TAP (SUITABLE FOR 120 OR 208 VOLT) INTEGRAL ENCLOSED HIGH POWER FACTOR BALLAST SHALL BE ABLE TO OPERATE IN AN AMBIENT TEMPERATURE RANGE FROM -40°C TO +40°C. THE GLOBE SHALL BE OF A HIGH IMPACT, HEAT RESISTANT GLASS WITH AN INTERNAL FLUTED PATTERN. STANDARD DOME REFLECTOR SHALL BE OF FIBERGLASS REINFORCED POLYESTER. PROVIDE GLOBE WITH #316 STAINLESS STEEL WIRE GUARD. EXTERNAL HARDWARE SHALL BE OF #316 STAINLESS STEEL. FIXTURE SHALL BE UL LISTED. PROVIDE FIXTURE WITH INTEGRAL 100W QUARTZ RESTRIKE AUXILIARY LIGHT WIRED TO DE-ENERGIZE ONCE THE MAIN METAL-HALIDE LAMP ILLUMINATES. THE QUARTZ RESTRIKE FEATURE SHALL BE THE ONLY FEATURE PREVENTING THE LIGHT FIXTURE FROM ACHIEVING SUITABILITY FOR USE IN CLASS 1, DIV. 2 ENVIRONMENT.

LIGHTING FIXTURE SCHEDULE (CONTINUED)

TYPE	LAMP	MANUF./CATALOG NO.	DESCRIPTION
G	(1) 400W METAL HALIDE AND (1) 100W QUARTZ	HUBBELL-KEMLUX III KH SERIES #KH/E/P/40/0/B/2/RP/G/F1/BP /KPA40/QS AND WITH CORROSION-FREE EPOXY COATING INSIDE AND OUT WITH NATURAL ALUMINUM FINISH. OR APPROVED EQUAL	THE WALL MOUNTED 400W PULSE START METAL HALIDE LIGHTING FIXTURE WITH THROUGH FEED. THE HINGED, BALLAST HOUSING AND OPTICAL ASSEMBLY SHALL BE GASKETED/SEALED TO ISOLATE FROM THE ENVIRONMENT. THE BALLAST HOUSING WITH MOUNTING SHALL BE OF CAST COPPER FREE ALUMINUM WITH CORROSION-FREE EPOXY POWDER COATING INSIDE AND OUT POWDER (NATURAL ALUMINUM) FINISH. THE LAMP SOCKET SHALL BE PORCELAIN IN A MOGUL BASE CONFIGURATION. THE MULTI-TAP (SUITABLE FOR 120 OR 208 VOLT) INTEGRAL ENCLOSED HIGH POWER FACTOR BALLAST SHALL BE ABLE TO OPERATE IN AN AMBIENT TEMPERATURE RANGE FROM -40°C TO +40°C. THE GLOBE SHALL BE OF A HIGH IMPACT, HEAT RESISTANT GLASS WITH AN INTERNAL FLUTED PATTERN. 30 DEGREE ANGLE REFLECTOR SHALL BE OF FIBERGLASS REINFORCED POLYESTER. PROVIDE GLOBE WITH #316 STAINLESS STEEL WIRE GUARD. EXTERNAL HARDWARE SHALL BE OF #316 STAINLESS STEEL. FIXTURE SHALL BE UL LISTED. PROVIDE FIXTURE WITH INTEGRAL 100W QUARTZ RESTRIKE AUXILIARY LIGHT WIRED TO DE-ENERGIZE ONCE THE MAIN METAL-HALIDE LAMP ILLUMINATES. THE QUARTZ RESTRIKE FEATURE SHALL BE THE ONLY FEATURE PREVENTING THE LIGHT FIXTURE FROM ACHIEVING SUITABILITY FOR USE IN CLASS 1, DIV. 2 ENVIRONMENT.
J	LED 960 LUMENS	TERON LIGHTING #CRNW/L116.8/208/BT/51K OR APPROVED EQUAL	WALL MOUNTED, LED LUMINAIRE. THE LIGHT FIXTURE SHALL COMPLY WITH THE REQUIREMENTS OF A FULLY CUT-OFF FIXTURE PER THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA). HOUSING AND DOOR FRAME SHALL BE OF CORROSION-RESISTANT, DIE-CAST ALUMINUM. HARDWARE SHALL BE OF STAINLESS STEEL. FINISH SHALL BE DARK BRONZE WITH A CLEAR COAT OF POLYESTER (UV-STABILIZED) FINISH FOR CORROSION RESISTANCE. THE DOWN LIGHT REFLECTOR SHALL BE A HIGHLY REFLECTIVE SURFACE. THE LENS SHALL BE OF FLAT HEAT RESISTANT TEMPERED GLASS. BOTH LENS AND DOOR ARE SEALED WITH ONE PIECE SILICONE GASKET. THE REFRACTOR IS SEALED AND GASKETED TO INHIBIT THE ENTRANCE OF CONTAMINANTS. THE DIMMING DRIVER SHALL BE HIGH POWER FACTOR AND 100% FACTORY TESTED. THE DRIVER AND COMPONENTS WITH PLUG-IN WIRE CONNECTIONS SHALL BE EASY TO SERVICE AND MEET ANSI STANDARDS AND IS UL LISTED. THE LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS. LED SHALL HAVE MINIMUM CRI OF 75.
K	LED 5500 LUMENS	LITHONIA (CONTOUR SERIES) #CSXW LED 1 308700/40K SR2 208 DF/DBDX OR APPROVED EQUAL	WALL MOUNTED, LED LUMINAIRE. THE LIGHT FIXTURE SHALL COMPLY WITH THE REQUIREMENTS OF A FULLY CUT-OFF FIXTURE PER THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA). HOUSING AND DOOR FRAME SHALL BE OF CORROSION-RESISTANT, DIE-CAST ALUMINUM. HARDWARE SHALL BE OF STAINLESS STEEL. FINISH SHALL BE POWER COAT DARK BRONZE FOR CORROSION RESISTANCE. THE LENS SHALL BE OF MOLDED ACRYLIC. BOTH LENS AND DOOR ARE SEALED WITH ONE PIECE SILICONE GASKET. THE REFRACTOR IS SEALED AND GASKETED TO INHIBIT THE ENTRANCE OF CONTAMINANTS. THE DIMMING DRIVER SHALL BE HIGH POWER FACTOR AND 100% FACTORY TESTED. THE DRIVER AND COMPONENTS WITH PLUG-IN WIRE CONNECTIONS SHALL BE EASY TO SERVICE AND MEET ANSI STANDARDS AND IS UL LISTED. THE DRIVER SHALL BE FUSED. THE LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS. LED SHALL HAVE MINIMUM CRI OF 65.
L	LED 330 LUMENS	LITHONIA (LED STEP LIGHT SERIES) #OLSS 4000K/208V/DBD OR APPROVED EQUAL	WALL MOUNTED, LED LUMINAIRE. THE LIGHT FIXTURE SHALL COMPLY WITH THE REQUIREMENTS OF A FULLY CUT-OFF FIXTURE PER THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA). HOUSING AND DOOR FRAME SHALL BE OF CORROSION-RESISTANT, DIE-CAST ALUMINUM. HARDWARE SHALL BE OF STAINLESS STEEL. FINISH SHALL BE POWER COAT DARK BRONZE FOR CORROSION RESISTANCE. THE LENS SHALL BE OF POLYCARBONATE. THE DRIVER AND COMPONENTS WITH PLUG-IN WIRE CONNECTIONS SHALL BE EASY TO SERVICE AND MEET ANSI STANDARDS AND IS UL LISTED. THE DRIVER SHALL BE FUSED. THE LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS. LED SHALL HAVE MINIMUM CRI OF 65.
R	LED 4680 LUMENS	LITHONIA (AERIS SERIES) #AS1VG LED 1 49B350/40K SR3/208/RPA RPA19/AS DF/DBDX OR APPROVED EQUAL	PARKING LOT LED LUMINAIRE SHALL HAVE A RUGGED DIE-CAST ALUMINUM HOUSING WITH NOMINAL WALL THICKNESS OF 1/8". A DIE-CAST DOOR FRAME SHALL BE FULLY GASKETED. THE GLASS LENS (MINIMUM 3/16" THICK) SHALL BE IMPACT RESISTANT AND TEMPERED. THE LUMINAIRE FINISH IS DARK BRONZE. THE REFLECTORS ARE ANODIZED, SEGMENTED AND ARE ATTACHED WITH TOOL-LESS FASTENERS. THE LIGHT FIXTURE SHALL COMPLY WITH THE REQUIREMENTS OF A FULLY CUT-OFF FIXTURE PER THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA). THE LIGHT DISTRIBUTION SHALL BE A TYPE III. LED SHALL HAVE MINIMUM CRI OF 65. THE DRIVER SHALL BE HIGH POWER FACTOR TYPE AND 100% FACTOR TESTED AND SHALL BE FUSED. THE DRIVE SHALL BE EASILY REMOVABLE AND HAVE POSITIVE LOCKING QUICK DISCONNECTS. HARDWARE SHALL BE OF STAINLESS STEEL. THE LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS. THE LUMINAIRE SHALL BE LISTED "NIGHT TIME FRIENDLY" AND BE CONSISTENT WITH LEED GOALS OF ZERO LIGHT OUTPUT AT 90° OR ABOVE FROM NADIR. MOUNT FIXTURE TO POLE PER DETAILS AND SPECIFICATIONS. COORDINATE FINAL COLOR WITH OWNER AND MATCH COLOR TO POLE. FURNISH AND INSTALL FIXTURE WITH MANUFACTURER'S STANDARD VANDAL GUARD. COMPLY WITH LIGHTING FIXTURE SCHEDULE NOTE 2.
S	LED 1100 LUMENS	VISIONAIRE LIGHTING (OCEANWALK SERIES) #OWK-2/BR42/COG/20LC/3/4K/ UNV/AB/BZ/DF208 OR APPROVED EQUAL	208 VOLT, BOLLARD TYPE LUMINAIRE. THE BOLLARD SHALL BE (APPROX) 42" TALL, AND 8" ROUND. THE CROWN SHALL BE ROUND DOME SHAPED. THE INTERNAL LENS ASSEMBLY SHALL BE OF HIGH-IMPACT-RESISTANT ACRYLIC FULLY GASKETED FOR WATER TIGHT SEAL UNDER NO CIRCUMSTANCES SHALL HORIZONTAL LIGHT COMPONENT BE ALLOWED - ALL LIGHT SHALL BE PROJECTED DOWNWARD. THE LOWER LUMINAIRE HOUSING SHALL BE OF ONE PIECE SEAMLESS, EXTRUDED ROUND BODY OF ALUMINUM. THE LOWER LUMINAIRE HOUSING SHALL ATTACH (WITH STAINLESS STEEL PINS) TO A CAST ALUMINUM PLATE. THE FINISH SHALL WITHSTAND EXTREME WEATHER CHANGES WITHOUT CRACKING OR PEELING AND SHALL BE GUARANTEED FOR A MINIMUM OF FIVE FULL YEARS. THE CONTRACTOR SHALL INSTALL THE LUMINAIRE IN ACCORDANCE TO MANUFACTURER'S REQUIREMENTS. ALL HARDWARE TO ANCHOR/MOUNT LUMINAIRE SHALL BE OF #316 STAINLESS STEEL.
X	LED	CROUSE-HINDS #CCH UX70R8KSD/UXUK OR APPROVED EQUAL	UNIVERSAL MOUNTED, DOUBLE FACED NEMA 4X RATED, LED EXIT SIGN COMPLETE WITH SEALED LONG LIFE HEAVY DUTY NICKEL CADMIUM BATTERY AND 120V/277V AS REQUIRED BY CHARGER. HOUSING SHALL BE OF CAST ALUMINUM CONSTRUCTION WITH BLACK ENAMEL FINISH AND RED LETTERS WITH STENCIL FACE OF BRUSHED ALUMINUM. EACH FACE SHALL BE COVERED BY A HEAVY DUTY POLYCARBONATE LENS. FIXTURE SHALL HAVE SELF DIAGNOSTIC TESTING FUNCTIONALITY TO PERFORM PERIODIC AND AUTOMATIC SELF TEST OF BATTERY AND CIRCUIT OPERATION AND INDICATE FAILURE VIA INTEGRAL DIAGNOSTIC LED INDICATING LIGHT MOUNTED ON THE SIDE OF THE FIXTURE. THE SOLID STATE CHARGER SHALL HAVE INTEGRAL TEST SWITCH AND BE CAPABLE TO FULLY CHARGE BATTERIES WITHIN 24 HOURS. THE UNIT SHALL BE UL LISTED AND MEETS THE CURRENT LIFE SAFETY CODE, NFPA 101, THE NEC AND OSHA ILLUMINATIONS STANDARDS. FURNISH WITH ARROW IN DIRECTION AS SHOWN ON PLANS. FURNISH WITH DOUBLE FACE AS SHOWN ON THE PLANS.
Y	(2) 9 WATT HIT (OR) 8 WATT HALOGEN PAR36 SEALED BEAM	EMERGI-LITE #12 KSE 36-2 SERIES OR APPROVED EQUAL	WALL MOUNTED 12V TWIN LIGHT, BATTERY EMERGENCY LUMINAIRE. NEMA 4X CABINET SHALL BE CONSTRUCTED OF MOLDED FIBERGLASS WITH ASA 61 GRAY FINISH AND WITH FULLY GASKETED FRONT DOOR. CHARGER IS 100% SOLID STATE, AUTOMATIC PULSE TYPE WITH TRANSFER BY SEALED RELAY THAT ENERGIZES LAMP LOAD UPON FAILURE OF AC SUPPLY. A LOW VOLTAGE BATTERY DISCONNECT CIRCUIT SENSES LOW BATTERY VOLTAGE AND AUTOMATICALLY DISCONNECTS THE LAMP LOAD FROM THE BATTERY TO PREVENT DEEP DISCHARGES. UNIT EQUIPPED WITH VOLT METER. UNIT BATTERIES ARE SEALED MAINTENANCE FREE LONG LIFE LEAD TYPE WITH 35-WATT CAPACITY. OPERATION INPUT VOLTAGE SHALL BE 120V. PROVIDE WITH CHORD AND PLUG. COMPLETE UNIT SHALL COME WITH A 3-YEAR FULL WARRANTY. UNIT SHALL BE UL LISTED.

LIGHTING FIXTURE SCHEDULE NOTES:

- ALTHOUGH IT MAY NOT BE SHOWN ON THE PLANS, THE CONTRACTOR SHALL SIZE, FURNISH, AND INSTALL A DEDICATED JUNCTION BOX, LID, AND MOUNTING HARDWARE FOR EACH LIGHT FIXTURE.
- FURNISH AND INSTALL DEDICATED POLE COMPLETE WITH ALL ACCESSORIES WITH EACH LIGHT FIXTURE.

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REV	DATE	DESCRIPTION
12/03/2015	ADDENDUM NO. 2	

KAH
APPROVED

CITY OF AUSTIN
FOUNDED 1855

DAVIS WATER TREATMENT PLANT
TREATED WATER DISCHARGE SYSTEM
CIP PROJECT No. 2015.041
PROPOSED LIGHTING FIXTURE SCHEDULE

AECOM TECHNICAL SERVICES INC.
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AUSTIN, TEXAS 78701
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K.A. HARUTUNIAN
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VERIFY SCALES BAR IS ONE INCH ON ORIGINAL DRAWING 0" = 1"	DESIGNED: HEI DRAWN: HEI CHECKED: HEI APPROVED: HEI SCALE: AS NOTED DATE: AUGUST 2015	PROJECT No. 60215430 DRAWING No. TD-E-1 SHEET No. OF
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