



**ADDENDUM NO. 1
TO THE**

**4S Ranch Neighborhood 1 Sewer Pump Station Replacement Project
For Olivenhain Municipal Water District**

December 9, 2021

The following addendum shall be made part of the Bidding Opportunity. **The deadline for submitting proposals REMAINS UNCHANGED at 2:00 p.m. Thursday, January 13, 2022 at 1966 Olivenhain Road, Encinitas, CA 92024.**

ADDENDUM SECTION 1 – BIDDING QUESTIONS

1. Q: Specification Section 15860 FRP DUCTWORK, Part 2.2 section G-1 - Comment; Perry Fiberglass Products, Inc. is an established manufacturer of FRP ductwork. No exceptions are being taken. Perry meets the specification. Can Perry Fiberglass Products, Inc. be added as a named supplier?
A: As 'or equals' are allowed per Specification Section 15860.2.2D, please submit as an 'or equal' through the contractor via the standard submittal procedure.

2. Q: Spec section 17000 1.1-B states "PLC, OIT and SCADA hardware and software programming will be provided by the District's preferred supplier – Tesco Controls, Inc. The Contractor shall obtain quotes and utilize the preferred supplier." We are asking that the District consider adding Technical Systems Inc. to the list of acceptable suppliers for PLC, OIT and SCADA hardware and software programming.
A: Refer to the amended Bid Schedule (Item #20) and amended Section 17000.

3. Q: Detail 2 / MD-2 shows a Stud / Machine Bolt config for Grating attachment. In our past projects, this config has been difficult to shop weld to ensure the studs will be centered between the Grating Bars. They often need to be cut off in the field for re-welding or shipped loose for field welding. Is it acceptable to use Self-drilling screws? If not, Struct-Fast (www.structfast.com) offers alternative types of grating clips that eliminate the need for field welding. If either of these alternative config is acceptable, it will save the cost for field welding of studs in between bearing bars.
A: Field welding is acceptable. Alternate options will be reviewed during the submittal phase.

4. Q: For the Aluminum Stair Tower per S16, Det 3 / S16 shows the Post mounting PLs to be 316SS or AL PL. Spec Section 05510 para 2.1 shows Aluminum Railings. Could you confirm the Stair Railings shall be Aluminum Railings?
A: Railings shall be Aluminum.

ADDENDUM SECTION 2 – REVISIONS


1. Bid Schedule – **REMOVE** Bid Schedule (Pages 3 and 4 of Bid Form)
REPLACE with Bid Schedule – Amended (Pages 3 and 4 of Bid Form)
2. Section 01010 Summary of Work – **REMOVE** Summary of Work
REPLACE with Section 01010 Summary of Work – Amended
3. Section 01563 Sewer Bypass Pumping – **REMOVE** Sewer Bypass Pumping
REPLACE with Section 01563 Sewer Bypass Pumping – Amended
4. Section 11400 Surge Control Equipment – **REMOVE** Surge Control Equipment
REPLACE with Section 11400 Surge Control Equipment – Amended
5. Section 17000 Instrumentation and Controls – **REMOVE** Instrumentation and Controls
REPLACE with Section 17000 Instrumentation and Controls – Amended

END OF ADDENDUM NO. 1

Attachments: Bid Schedule – Amended (Pages 3 and 4 of Bid Form)
Section 01010 Summary of Work – Amended
Section 01563 Sewer Bypass Pumping – Amended
Section 11400 Surge Control Equipment – Amended
Section 17000 Instrumentation and Controls – Amended

APPROVED:

OLIVENHAIN MUNICIPAL WATER DISTRICT



Jason P. Hubbard, P.E.
Engineering Manager

BID SCHEDULE - AMENDED

4S RANCH NEIGHBORHOOD 1 SEWER PUMP STATION REPLACEMENT PROJECT

Item	Item Description	Quantity	Unit	Amount
1.	Mobilization, Demobilization, Bonds, Permits, Insurance, & Cleanup and Demobilization ¹	1	LS	\$ _____
2.	Temporary Erosion Control/Storm Water Pollution Protection Program (SWPPP)	1	LS	\$ _____
3.	Sheeting, Shoring & Bracing	1	LS	\$ _____
4.	Demolition	1	LS	\$ _____
5.	Earthwork	1	LS	\$ _____
6.	Over-Excavation & Imported Bedding	100	CY	\$ _____
7.	Civil Site Work	1	LS	\$ _____
8.	Site Piping	1	LS	\$ _____
9.	Dry-Pit Submersible Pumps	5	EA	\$ _____
10.	Pump Station Mechanical	1	LS	\$ _____
11.	Modifications to the Operating Wet Well	1	LS	\$ _____
12.	Pump Station Building/Dry Pit	1	LS	\$ _____
13.	Pump Station HVAC System	1	LS	\$ _____
14.	Restroom in Existing Building	1	LS	\$ _____
15.	Surge Tank Rehabilitation	1	LS	\$ _____
16.	Surge Control Equipment	1	LS	\$ _____

BID SCHEDULE - AMENDED

4S RANCH NEIGHBORHOOD 1 SEWER PUMP STATION REPLACEMENT PROJECT

Item	Item Description	Quantity	Unit	Amount
17.	Emergency Power Generation Equipment	1	LS	\$ _____
18.	Electrical & Telemetry	1	LS	\$ _____
19.	Systems Start-Up & Testing	1	LS	\$ _____
20.	System Programming & Integration	1	LS	\$ _____
21.	Sewer Bypass Operations	1	LS	\$ _____

TOTAL AMOUNT OF BID SCHEDULE \$ _____

TOTAL AMOUNT OF BID SCHEDULE (IN WORDS)

Amounts shall be shown in both words and figures, where indicated. In case of discrepancy, the amount shown in words will govern.

The above prices shall include all labor, materials, removal, overhead, profit, insurance, and incidentals required to complete the work.

¹Mobilization is limited to 8% of the total bid price for Bid Schedule.

Note: By submission of this Bid, the Contractor acknowledges the two year guarantee as outlined in Section 5-14 of the General Provisions and has included said expenses as a part of this Bid.

SECTION 01010 – SUMMARY OF WORK – AMENDED

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

- A. The work to be performed under this Contract shall consist of furnishing all plant, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the Owner.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 – Record Drawings and Submittals

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work generally includes, but is not limited to, furnishing all products, labor, equipment, material, transportation, and incidental services to construct the following:
 - 1. Replacement of the 4S Ranch Neighborhood 1 Sewer Pump Station comprised of an electrical building and dry pit pump room adjacent to the existing operating wet well, modifications to the operating wet well, all site improvements, and all equipment including but not limited to pumps and motors, piping, valves, flowmeter, air conditioning and ventilation, odor control equipment, emergency standby generator, surge control facilities and all electrical equipment.

1.4 PROJECT LOCATION

- A. The 4S Ranch Neighborhood 1 Sewer Pump Station site is a District owned parcel located in the southern portion of the 4S Ranch area in the City of San Diego, near the intersection of Dove Creek Road and 4S Ranch Parkway. The pump station is immediately south of Boys and Girls Club of Greater San Diego and the 4S Ranch Community Park. The address of the station is 16106 4S Ranch Parkway, San Diego, California, 92127.

1.5 WORK BY OTHERS

- A. The 4S Ranch Neighborhood 1 Sewer Pump Station is an active and operating facility. The pump station is required to be operational during the construction of the new station. The Contractor's attention is directed to the fact that work may be conducted concurrently at or near the site by District staff or other Contractors during the performance of the work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the work of such other Contractors, and shall cooperate fully with such Contractors to provide

SECTION 01010 – SUMMARY OF WORK – AMENDED

continued safe access to their respective portions of the site, as required to perform work under their respective contracts.

- B. Interference with work on utilities: The Contractor shall cooperate fully with all utility forces of the District or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of utilities which interfere with the progress of work by others, and shall schedule the work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

PART 2 – MEASUREMENT AND PAYMENT

GENERAL

The Contractor shall provide all labor, materials, equipment and incidentals for the work described within these Specifications and Construction Drawings. Payment for each bid item shall be included in the contract unit price or unit price shown on the Bidder's proposal.

Prior to the execution of a lump sum contract, the Contractor shall submit a detailed price breakdown showing the allocated portion of the total bid price to the various items of Work. Contractor must submit a preliminary price breakdown for the review and approval of the Engineer. The Owner reserves the right to reject any breakdown submitted by the Contractor which the Owner judges insufficient to allow for the preparation of accurate monthly progress payment estimates or extra work, whether addition or deletion, similar in nature to the Work included in the Contractor's bid. The detailed price breakdown shall be listed by specification section number and shall include a separate cost item for all items of equipment or work. The price breakdown shall typically be a unit price type breakdown and shall include quantities, unit prices and total bid cost for each cost item. Where a unit price breakdown is judged impractical, the Owner may allow a breakdown by lump sum for certain cost items. This information will be used by the Owner in preparing monthly progress payment estimates.

Payment for each bid item shall include full compensation for all labor, materials, tools, equipment, supplies, subcontracts, and incidentals necessary to complete the work in its entirety and no additional compensation will be allowed. Payment for each bid item shall include the costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). This includes the cost of work not specifically listed in the Bid Schedule or Schedule of Values, but is necessary to complete the project as described and shown in the Contract Documents. Work for which no separate payment has been provided will be considered a subsidiary obligation of the Contractor, and the cost therefore shall be included in the applicable contract price for the item to which the work applies. All measurements of work done will be made by the District or its representative.

2.1 BID ITEM NO. 1 – MOBILIZATION, BONDS, PERMITS, CLEANUP AND DEMOBILIZATION

Payment for Mobilization, Bonds, Permits, Cleanup and Demobilization shall be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price shall include, but is not limited to the following principal items: obtaining all permits, insurance, and bonds; mobilizing labor force, equipment and construction facilities onto site; providing field offices and storage yard as needed for the contractors activities; securing offsite staging if necessary;

SECTION 01010 – SUMMARY OF WORK – AMENDED

securing construction water supply; providing all temporary construction fencing; installing and removing of temporary water meters and highlines; providing on-site sanitary facilities; posting OSHA requirements and establishing safety programs; daily cleanup; preparing the Schedule of Values prior to the pre-construction meeting; preconstruction/progress video and photographs; work not specified for payment in any other bid item; controlling site ingress/egress; performing all work and documentation necessary for the mobilization, bonding, and permitting for construction of the project as described within the Contract Documents. This work also includes the cost for maintaining and submitting the project record drawings at the end of the project. These record drawings must be reviewed monthly with the Owner to receive payment for any work. The amount for this bid item shall be limited to 8% of the total contract amount.

2.2 BID ITEM NO. 2 – TEMPORARY EROSION CONTROL/STORM WATER POLLUTION PROTECTION PROGRAM (SWPPP)

Payment shall include compensation for all labor, materials, tools, and equipment including but not limited to the following principal items: preparing a temporary Erosion Control Plan (ECP), SWPPP, Water Quality Control Plan (WQCP), or other storm water pollution prevention documentation in conformance with the Construction General Permit and/or jurisdictional authority as is applicable; implementing best management practices and erosion control measures in conformance with the Contractor's SWPPP documentation; placement of erosion control measures, monitoring, reporting, and any appurtenant work; and all other incidental work as described in the Contract Documents.

2.3 BID ITEM NO. 3 – SHEETING, SHORING & BRACING

Payment for Sheeting, Shoring, and Bracing will be paid for at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. Payment shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in providing work and material protection. Payment shall include the cost of preparation and submittal of plans by a licensed Engineer and obtaining the required permit from the State Division of Industrial Safety and other agencies having jurisdiction for excavations 5 feet deep or greater; and all incidental work for sheeting, shields, shoring, sloping or benching of excavation side slopes, or other protective systems necessary for the support of trench excavations and for worker protection from materials or equipment that could pose a hazard by falling or rolling into excavations, including but not limited to railing and fence. This Bid Item includes all other work necessary to complete this item of work.

2.4 BID ITEM NO. 4 – DEMOLITION

Payment for Demolition will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, transportation and equipment and performing all work required to complete the demolition as shown on the Contract Drawings in its entirety including all other work as described within the Contract Documents. This work shall include legal disposal of all items designated for demolition or removal, the abandonment of pipelines and structures and the filling of voids with 2-sack slurry as part of the demolition work, patching wall penetrations left behind from demolition work, the protection of existing improvements and active District operations, and salvaging items to the District as required.

SECTION 01010 – SUMMARY OF WORK – AMENDED

2.5 BID ITEM NO. 5 – EARTHWORK

Payment for Earthwork will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, transportation and equipment and performing all work required to complete the earthwork including but not limited to potholing, clearing and grubbing, mass grading, dewatering, constructing a stockpile, backfilling and/or slurry backfill after structures have been constructed, and the export of the spoil as shown on the Contract Drawings in its entirety including all other work as described within the Contract Documents.

2.6 BID ITEM NO. 6 – OVER-EXCAVATION AND IMPORTED BEDDING

Payment for over-excavation and imported bedding shall be made at the contract unit price in accordance with the Contract Documents, and as directed by the Owner. The contract price for work under this item shall include, but not be limited to, furnishing all labor, material, tools, and equipment, and performing all work necessary for the over-excavation of unsuitable subgrade soils as directed by the Engineer and to depths in accordance with the specifications, moisture conditioning, backfill, and compaction of suitable soils, and all other incidental work as described in the Contract Documents.

2.7 BID ITEM NO. 7 – CIVIL SITE WORK

Payment for Civil Site Work will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required for site improvements including final grading, asphalt concrete pavement and base, redwood pavement headers, concrete pavement and steps, concrete curb and gutters, cross gutter, bollards, housekeeping pad for the overflow pond recycled water washdown and pressure relief piping, area lights, new brow ditch, retaining curb to existing brow ditch, BMP filter insert, surface improvements such as weed barriers, $\frac{3}{4}$ " rock, and mulch, and all other work as described within the Contract Documents.

2.8 BID ITEM NO. 8 – SITE PIPING

Payment for Site Piping will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required for construction of all buried or above grade site piping including the wet well influent sewer, wet well overflow, force main, bypass connection, relocated and new water and reclaimed water lines, storm water pump discharge line, pump station drain, suction, and sump piping to the wet well, concrete encasement, and all other piping as described by the Contract Documents. Work required includes, but is not limited to, potholing, excavation, rock removal, dewatering, water control, pipe bedding, pipe, backfill, detector tape, valves/stem extensions/valve cans, appurtenances, and all other work necessary for construction of the Site Piping.

SECTION 01010 – SUMMARY OF WORK – AMENDED

2.9 BID ITEM NO. 9 – DRY-PIT SUBMERSIBLE PUMPS

Payment for the Dry-pit Submersible Pumps will be made at the contract unit price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to install the dry-pit submersible pumps **suitable for in-series pumping conditions** in their entirety including but not limited to the pumps, pump bases and supports, and all other work as described within the Contract Documents.

2.10 BID ITEM NO. 10 – PUMP STATION MECHANICAL

Payment for Pump Station Mechanical will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to complete the Pump Station Mechanical construction in its entirety including but not limited to piping and supports, valves, flowmeter, gauges, flanges, sewage air-release valves, utility water piping, hose bibs, eyewash/shower and piping, floor drains, sump pumps and grating for sump, vents, motorized bridge crane, conditioning pump in the wet well, and all other work as described within the Contract Documents.

2.11 BID ITEM NO. 11 – MODIFICATIONS TO THE OPERATING WET WELL

Payment for Modifications to the Operating Wet Well will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to complete the modifications to the Operating Wet Well in their entirety as described within the Contract Documents including, but not limited to demolition and concrete repair/rehab, new concrete and reinforcement, new wet well cover and access hatches, shoring and protection, coatings and waterproofing for concrete, liner repairs straight and level around the perimeter of the wet well, inlet, overflow, suction, and force main drain connections, sluice gates, new odor control system and connections and all other work as described within the Contract Documents. The Contract Price for work under this item shall include pre-excavation and post-excavation survey and reporting from work performed under bid item no. 12.

2.12 BID ITEM NO. 12 – PUMP STATION BUILDING/DRY PIT

Payment for the Pump Station Building/Dry Pit will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to complete the Pump Station Building/Dry Pit construction in its entirety including but not limited to concrete masonry, reinforced concrete, equipment pads, stairways, railing, roof, doors, acoustical louvers, access hatch, hardware, finishes, industrial floor coatings, floor trench, safety equipment, architectural improvements, downspout, hose rack, wall penetrations, and all other work as described within the Contract Documents.

SECTION 01010 – SUMMARY OF WORK – AMENDED

2.13 BID ITEM NO. 13 – PUMP STATION HVAC SYSTEM

Payment for the Pump Station HVAC System will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to complete and test the pump station HVAC system installation in its entirety including but not limited to exhaust and supply fans, fiberglass ducting with straightening vanes, fiberglass registers, fittings, transition pieces, supports, roof ventilator, equipment pad, and wiring and controls. This item also includes removal, temporary storage, replacement of pipelines, and reinstallation of the existing AC system (indoor and outdoor units) in the locations shown on the Contract Drawings, and all other work as described within the Contract Documents.

2.14 BID ITEM NO. 14 – RESTROOM IN EXISTING BUILDING

Payment for the Restroom in the Existing Building will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to complete the restroom in the existing building in its entirety including but not limited to building modifications, walls, door, ceiling, tiling, floor coating, lighting, ventilation, fixtures, electric water heater, plumbing, drainage, bathroom accessories, and all other work as described within the Contract Documents.

2.15 BID ITEM NO. 15 – SURGE TANK REHABILITATION

Payment for the Surge Tank Rehabilitation will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to rehabilitate the existing vertical surge tank including, but not limited to, removing the existing tank, removing all connections and appurtenances, recoating, and reinstallation of the tank as shown on the Contract Drawings.

2.16 BID ITEM NO. 16 – SURGE CONTROL SYSTEM

Payment for the Surge Control System will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to completely provide an operable surge control system including, but not limited to, providing a surge tank control panel, piping, appurtenances, concrete pad, and making all connections to the existing surge tank and air compressor. This item shall also include testing of the existing air compressor prior to startup of the surge system to verify proper operation. The system shall accomplish all functions applicable to the surge control system as described in the Contract Documents. This cost also includes all programming, testing, balancing, and all other work to make the surge control equipment operable.

SECTION 01010 – SUMMARY OF WORK – AMENDED

2.17 BID ITEM NO. 17 – EMERGENCY POWER GENERATION EQUIPMENT

Payment for the Emergency Power Generation Equipment will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required to completely install the new standby generator, engine, automatic silencer, start-up, testing, permitting, and all other work in its entirety to make the emergency power generation equipment operable as described within the Contract Documents. This cost includes all miscellaneous appurtenances, piping, pipe supports, concrete pad, and controls.

2.18 BID ITEM NO. 18 – ELECTRICAL AND TELEMETRY

Payment for Electrical and Telemetry will be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. The Contract Price for work under this item shall include but is not limited to furnishing all labor, material, tools, and equipment and performing all work required for all electrical and telemetry work including power distribution, instrumentation and control, all work and coordination with SDG&E, utility extensions, transformers, wire, conduit, switches, controls, instrumentation, radios, PLC's, receptacles, area lights, antenna mast, reconnecting the solar power system, gas monitoring system, and all other work as described within the Contract Documents.

2.19 BID ITEM NO. 19 – SYSTEMS START-UP AND TESTING

Payment for Systems Start-Up and Testing shall be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. Payment for this bid item shall include, but not be limited to, all labor, materials, tools, equipment, supplies, supervision, and incidentals required to complete all pump station systems start-up and testing as described in the Contract Documents.

2.20 BID ITEM NO. 20 – SYSTEM PROGRAMMING AND INTEGRATION

Payment for System Programming and Integration shall be made at the contract lump sum price, complete and in accordance with the Contract Documents, and as directed by the Owner. Payment for this bid item shall include, but not be limited to, all labor, materials, tools, equipment, supplies, supervision, and incidentals required to complete all pump station system programming and integration as described in the Contract Documents.

2.21 BID ITEM NO. 21 – SEWER BYPASS PUMPING OPERATIONS

Payment for Sewer Bypass Pumping Operations shall be made at the contract unit price, complete, and in accordance with the Contract Documents, and as directed by the Owner. Payment for this bid item shall include, but not be limited to, the preparation of a bypass plan to be submitted by the Contractor for approval by the Owner, and furnishing all labor, materials, incidentals, and equipment to construct, establish, operate, and maintain all bypass pumping required to perform the Work as described in the Contract Documents. The work of this item shall include but is not limited to implementing a 24 hour per day/7 day per week operation and maintenance program throughout the required duration of the bypass pumping operation and shall include all excavation, pipe, fittings, pumps,

SECTION 01010 – SUMMARY OF WORK – AMENDED

redundant (backup) pumps, tanks, labor, power acquisition and utility coordination, generators, fuel, compliance with all noise ordinances and regulations, and removal of equipment and facilities at job completion. The Contractor shall obtain all necessary permits for the bypassing and ensure complete pumping redundancy. Work will also include the replacement of the non-operation valve in the bypass vault to perform the Contractor's bypass operations and removal of the valve at the conclusion of the work per the Contract Documents.

****END OF SECTION****

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The Contractor shall provide a complete sewer bypass pumping system capable of operating continuously, 24-hours per day, 7-days per week while the existing sewer pump station is taken out of service and until such time that the proposed pump station is placed into service. The bypass pumping system shall include but not be limited to pumps, controls, fuel, piping, valving, storage tanks, and all other equipment necessary for operation of the system.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 00810 – Special Provisions
- B. Section 01300 – Record Drawings and Submittals
- C. Section 01500 – Construction Facilities and Temporary Controls

1.3 SUBMITTALS

- A. All submittals required by this Specification shall be provided to the District for approval within 20 days of receiving the Notice to Proceed. No construction activities related to bypass pumping shall begin prior to the approval by the District of the required submittals. Approval of the Contractor's Bypass Pumping Plan and Spill Prevention and Emergency Response Plan in no way relieves the Contractor of his responsibility to maintain sewage service or provide sewer bypass pumping as necessary during construction and to prevent any spills.
- B. Bypassing Plan
 - 1. The Contractor shall develop and submit to the District, for review and approval, a written Bypass Pumping Plan including sequence of work outlining how sewage flows will be maintained and the existing lift station bypassed during construction. The Bypass Pumping Plan shall include, but not be limited to:
 - a. A primary and 100% redundant backup pumping system, each capable of handling the peak flow of the system, which shall be on site and available 24 hours a day.
 - b. A flow monitoring plan describing the method of monitoring and showing the location of monitoring units as well as an emergency notification system.
 - c. Shop drawings for proposed bypass pumping equipment, system components, and controls.
 - d. A bypass pumping drawing showing the site/staging and configuration of all bypass pumping equipment and components. The Contractor's bypass pumping system shall not impede the District's operations or access to the site. Include pump sizes, capacity, and number of each size to be onsite. Include hydraulic calculations and a system head curve plotted on the pump curve.

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

- e. Sewer plugging method and the type of plug(s). How the plug(s) will be secured and emergency removal of the plug(s).
- f. Number, size, material, location, and method of installation of the suction and discharge piping.
- g. Number and size of portable power generators and the details of the noise suppression equipment. At least one standby generator for each size shall be provided in the event of an emergency.
- h. A description of bypass pumping operations, including installation, operation and maintenance procedures, and schedule.
- i. Certifications and operating experience of personnel operating and maintaining the bypass pumping system.

C. Spill Prevention and Emergency Response Plan

- 1. The Contractor shall develop and submit to the District, for review and approval, a written Spill Prevention and Emergency Response Plan. The Spill Prevention and Emergency Response Plan shall be developed to prevent and respond to any construction related sewage spills. The plan shall include, but not be limited to:
 - a. Identification of all nearby waterways, channels, catch basins and entrances to underground storm drains.
 - b. Furnishing of all the necessary materials, supplies, tools, equipment, labor and other services to prevent sewage from coming into contact with these areas.
 - c. Arrangements for an emergency response unit comprised of emergency response equipment and trained personnel to be immediately dispatched to the Site in the event of sewage spill(s).
 - d. An emergency notification procedure, which includes an emergency response roster with telephone numbers and arrangements for backup personnel and equipment and an emergency notification roster of designated District representatives.
 - e. Direct phone numbers (no voicemail) for 3 Contractor representatives who shall be accessible and available at all times to respond immediately to any construction related emergency.

D. Confined Space Entry Plan (CSEP)

- 1. Develop a CSEP to comply with all laws and regulations. Submit for project records. This plan will not be reviewed and approved. It is the Contractor's plan. Be informed that sewers may have methane gas, H₂S gas, and low oxygen gas levels. Include appropriate portable gas safety monitors for worker use in verifying the quality of air inside manholes and other confined spaces.

1.4 RESPONSIBILITIES OF CONTRACTOR

- A. The Contractor shall observe and comply with all Federal, State, and local laws, ordinances, codes, orders, and regulations which in any manner affect the conduct of the work, specifically as it relates to sewage and prevention of sewage spills. The Contractor shall be fully responsible for preventing sewage spills, containing

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

any sewage spills, recovery and legal disposal of any spilled sewage, paying any and all fines, incurring and handling any penalties, claims, or liability arising from negligently causing or allowing a sewage spill, failure to prevent a sewage spill, or any violation of any law, ordinance, code, order, or regulation as a result of the spillage.

1.5 QUALITY ASSURANCE

- A. The Contractor shall conduct a demonstration of its bypass pumping system continuously for 48 hours prior to taking the existing pump station out of service.

PART 2 – MATERIALS

2.1 GENERAL

- A. All equipment and tools used for sewer bypassing shall be designed to prevent any and all sewage leaks or spills.
- B. All equipment used as part of the bypassing system shall not cause a significant noise impact to the community in accordance with local noise ordinances. If noise complaints occur due to the Contractor's activities, the Contractor shall immediately replace the noise generating equipment or reduce the noise generated with mitigating devices to the satisfaction of the District.
- C. The sewer bypassing system shall include means of sewage odor control. If odor complaints occur due to the Contractor's activities, the Contractor shall immediately improve or replace the odor control system to the satisfaction of the District.

2.2 PUMPING EQUIPMENT

- A. The Contractor shall use the following parameters as guidance in determining the preliminary size of the bypassing pumping system components. The Contractor is solely responsible for determining the size of all system components and providing equipment which will operate under the conditions required. The Contractor shall test the complete system prior to taking the existing pump station out of service. The Contractor shall replace equipment or components with units of adequate size, if testing identifies any deficiencies in the system.
 - 1. Average Dry Weather Flow into Station: 370 gallons per minute (gpm)
 - 2. Peak Dry Weather Flow: 750 gpm
 - 3. Peak Wet Weather Flow: 840 gpm
 - 4. Approximate Elevation Difference Between Existing Wet Well and Force Main Discharge at Treatment Plant: 227 feet
 - 5. Anticipated Total Dynamic Head Condition thru 10" Force Main at 840 gpm: 260 feet

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

- C. The pumps shall be specifically intended for use with raw sewage and shall be capable of passing a 3-inch diameter solid.

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall ensure personnel are on site continuously monitoring the system during bypass pumping operations.
- B. The Contractor shall take preventive measures to ensure no sewage spills occur.
- C. The Contractor shall be responsible for complete operation and maintenance of the bypass pumping system and shall be responsible for payment of all fines and clean-up costs as a result of sewage spills, including but not limited to District staff and equipment response.
- C. Interception of sewage flows may be required at multiple locations upstream of the lift station inlet manhole.
- D. The Contractor shall continuously monitor the flow levels upstream of the lift station site to detect any possible failure that may cause a sewage backup and spill. The Contractor shall include the means and methods of monitoring the flow in their Sewer Bypassing Plan.
- E. The Contractor may connect to the existing force main at the Bypass Vault shown on the Drawings. The Contractor is responsible for providing the piping necessary to make the temporary connection.
- F. The Contractor shall ensure an adequate fuel supply is onsite at all time during bypassing.
- G. The Contractor shall implement best management practices (BMPs) in order to prevent leakage of fuel, oil, and lubricants, and shall immediately clean up such spills.
- H. The Contractor shall exercise care not to damage existing public and private improvements, interrupt existing services and/or facility operations which may cause a sewage spill. Any reasonably anticipated utility and/or improvement which is damaged by the Contractor shall be immediately repaired at the Contractor's expense. In the event that the Contractor damages an existing utility or interrupts an existing service which causes a sewage spill, the Contractor shall immediately notify the Owner. The Contractor shall request and obtain from the Owner an emergency roster of the designated Owner representatives with their respective telephone numbers, pager numbers, and cellular phone numbers. The Contractor shall take all measures necessary to prevent further damage or service interruption, and to control, contain and clean up the resultant impacts of the damage, service interruption and any resulting sewage spill(s).

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

3.2 SEWAGE SPILLS

- A. In case of sewage spill, the Contractor shall act immediately – without instructions from the District – to control the spill and take all appropriate steps to contain it in accordance with their Spill Response Plan.
- B. The Contractor shall immediately notify the District representatives of the sewage spill(s) and all remedial actions taken.
- C. The Contractor shall, within 24 hours from the occurrence of the spill, submit to the District a draft written report describing the following information related to the spill: the location on a current aerial map; the nature and volume; the date and time; the duration; the cause; the type of remedial and/or preventive actions taken; and the water body impacted and results of any necessary monitoring. The District will review the draft report, and if revisions are required, the Contractor shall make those revisions and submit the final report to the District within 24 hours of the receipt of comments. The Engineer may institute further corrective actions, as deemed necessary, to fully comply with existing law, ordinance, code, order or regulation. The Contractor shall be responsible for all costs incurred for the corrective actions.
- D. It shall be the Contractor's responsibility to assure that all field forces, including Subcontractors, know and obey all safety and emergency procedures, including the Spill Response Plan, to be maintained and followed at the Site.

3.3 SEWER BYPASSING

- A. The Contractor shall size the bypass system to handle the peak flow of the system. The Contractor shall provide a redundant, identically sized, one-hundred percent (100%) backup bypass pumping system. The Contractor shall utilize the backup system to mitigate any additional wet weather flows, perform the necessary maintenance and repairs on the primary bypass pumping system, and exercise and ensure the operability of the backup system. Each pump, including the backup pumps, shall be a complete unit with its own suction and discharge piping. The Contractor shall operate the backup bypass system for a minimum of twenty-five percent (25%) of the time on a weekly basis. The backup bypass system shall be fully installed and operationally ready at all times.
- C. Prior to the full operation of the bypass system, the Contractor shall demonstrate, to the satisfaction of the District, that both the primary and backup bypass systems are fully functional and adequate, and shall certify the same, in writing, in a manner acceptable to the District.
- D. The Contractor shall provide all equipment necessary to minimize the noise generated by the bypassing operations. Noise levels from the complete bypassing system shall not exceed the levels allowable under the local jurisdictional codes and requirements.
- E. The Contractor shall continuously monitor the operation of the bypass system and all impacted facilities. During bypass pumping operations, 24-hour, full-time

SECTION 01563 – SEWER BYPASS PUMPING – AMENDED

monitoring by a person qualified and trained to operate and maintain the bypass pumps and bypass system shall be provided by the contractor. This person (bypass monitor) may not be assigned any other duties and will be solely dedicated to the bypass system. The bypass monitor shall regularly inspect and maintain the pumped bypass system including the backup system. Monitoring intervals shall be no longer than twenty (20) minutes with more frequent monitoring intervals required for critical pumped bypass periods such as AM/PM diurnal periods. The Contractor shall submit, as part of their bypass plan, their system monitoring and notification procedures. The Contractor shall maintain a log of the monitoring in a manner approved by the District as part of the Bypass Pumping Plan.

- F. The Contractor shall continuously monitor the flow levels upstream of the bypass location(s) to detect any possible failure that may cause a sewage backup and/or spill. The Contractor shall include the means and methods of monitoring the flow in District on a weekly basis in a format acceptable to the District.
- G. The Contractor shall routinely inspect and maintain the bypass system, including the backup system. The Contractor shall perform all necessary maintenance and repairs on the pumped bypass system. The Contractor shall submit as part of their Bypassing Plan their maintenance procedures and frequency. The Contractor shall maintain a log of all pertinent inspection, maintenance and repair records in a manner acceptable to the District.
- H. Sewer flows in new, rechanneled, or rehabilitated manholes or concrete structures shall be controlled across the surface in such a manner that sewage does not flow over concrete channels until they have cured for 24 hours or for the duration specified by the concrete material manufacturer. The controls shall prevent backup of sewage upstream from the manhole or structure.

3.4 PAYMENT

- A. All costs associated with sewer bypass requirements listed above shall be included in the Bid Item “Sewer Bypass Operations”.

****END OF SECTION****

SECTION 11400 – SURGE CONTROL EQUIPMENT – AMENDED

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. This section includes materials, testing, and installation of a surge control system. The system will include both new materials and the existing surge tank and air compressor provided by the Owner. The Contractor shall be responsible for supplying a Surge System Control Panel and all other materials required to accomplish all functions applicable to the surge control system in order to protect the pump station, discharge, and suction piping from transient surges.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 – Record Drawings and Submittals
- B. Section 09900 – Painting and Coating
- C. Section 15000 – Piping Components
- D. Section 15132 – Pressure Gauges

1.3 SUBMITTALS

- A. The following shall be submitted in compliance with Section 01300:
 - 1. Submit layout drawings showing dimensions of equipment and accessories. Provide piping diagram showing configuration and location of all valves and appurtenances.
 - 2. Submit manufacturer's data for Surge System Control Panel.
 - 3. Submit manufacturer's catalog data on gages and valves.

1.4 MANUFACTURER'S SERVICES

- A. Provide equipment manufacturer's services at the jobsite for a minimum of two man-days to perform the following list, travel time excluded:
 - 1. Installation assistance and inspection of surge control system.
 - 2. Field testing and adjustment of the surge control system operations.
 - 3. Instruct the Owner's personnel in the operation and maintenance of the surge control system.

1.5 MANUFACTURERS

- A. The Surge System Control Panel manufacturer shall be experienced in the design and operation of surge control systems. The control panel shall be supplied by PULSCO, or Owner approved equal.

SECTION 11400 – SURGE CONTROL EQUIPMENT – AMENDED

1.6 EQUIPMENT WARRANTY

- A. Provide equipment warranty for a period of one year following Owner's acceptance. The supplier shall guarantee all new equipment items against defects in materials and workmanship. Repairs and/or replacement of defective items shall be performed at no cost to the Owner.

PART 2 – MATERIALS

2.1 GENERAL

- A. The Owner will provide the existing vertical surge tank (pressure vessel) and existing air compressor. The Contractor shall inspect the equipment at the site to determine what rehabilitation is required to return the equipment to operating condition. At a minimum the Contractor shall perform the following:
1. Surge Tank
 - a. Remove all connections from the existing surge tank and remove tank from its foundation.
 - b. Verify the internal condition of the tank. If any damage, corrosion, or defects are found, notify the Owner immediately.
 - c. Pressure test tank.
 - d. Remove and reapply the internal lining in accordance with Section 09900, System No. 5.
 - e. Remove and reapply coating in accordance with Section 09900, System No. 15.
 - f. Reinstall tank where shown on the drawings.
 - g. Install new piping, valves, gages, and appurtenances as shown on the drawings.
 - h. Existing Surge Tank: Wendland Mfg Corp. Serial # 33731. Year Built 2001. Rating: 225 psi at 300°F
 2. Air Compressor
 - a. Inspect motor, mechanical components, and air tank. If damage, corrosion, or defects are found, notify the Owner immediately.
 - b. Repair damaged coatings, as required.
 - c. Perform regular maintenance activities as recommended by the manufacturer.
 - d. Install temporary piping and appurtenances as necessary, and test air compressor's operation under proposed operating conditions.
 - e. Existing Air Compressor: Saylor Bael Compressor. Model #VT-720-80. Two Stage. 510 RPM. 80 Gallons. Baldor 3-Phase 2HP Motor with 1725 RPM, 2.8 amps, and 46 volts.
- B. The Contractor shall provide a new Surge System Control Panel in accordance with the requirements herein and test the entire Surge Control System together prior to testing with the pump station. The Contractor is responsible for providing

SECTION 11400 – SURGE CONTROL EQUIPMENT – AMENDED

an operational Surge Control System based upon the requirements herein and the Contract Documents.

2.2 HYDRAULIC DESIGN CRITERIA

- A. The system for which the surge control system is to be provided consists of a sewage pump station and associated discharge pipeline system. All final hydraulic design criteria shall be per the project pressure surge analysis report available for review for reference purposes only.

2.3 PRESSURE VESSEL

- A. The Contractor shall rehabilitate and install the existing Owner provided surge tank.
- B. Existing connections which are not required for operation shall be plugged.
- C. The tank shall have a concrete foundation and be anchored as shown on the structural drawings.
- D. The tank is to be connected to a drain line and the discharge pipeline as shown on the drawings.

2.3 SAFETY RELIEF VALVE

- A. Safety relief valve shall comply with the ASME Boiler and Pressure Vessel Code. Valve shall be bronze and shall have a pressure rating of 400 psig WOG. Valve shall have a bottom NPT inlet and shall have incorporated a calibrated spring set to allow the valve to open at the vessel design pressure. Valve shall be a Kunkle Model 913 or approved equal.

2.4 PRESSURE GAUGES

- A. See Section 15132.

2.5 SURGE SYSTEM CONTROL PANEL

- A. The surge system control panel shall operate the air compressor and solenoid valves to fill or draw air in the surge tank based upon pressure and level signals from tank to maintain the liquid level. See drawings for configuration of piping, valves, gages, and appurtenances.
- B. The surge control system PLC control panel shall be in a NEMA 4X UL Listed wall mounted enclosure. The enclosure shall be mounted near the air compressor as shown on the Contract Drawings.
- C. The PLC control panel will be equipped with a door mounted digital display for continuous indication of liquid volume and corresponding liquid level in real time, and all required level control and alarm set points, including air compressor running status, compressor fail alarm, and low oil level alarm.

SECTION 11400 – SURGE CONTROL EQUIPMENT – AMENDED

- D. The level control system is based upon an ultrasonic level sensor with 4-20mA output and backed up by a differential pressure transmitter with 4-20mA signal proportional to level outputs.
- E. The level control system shall include a solenoid valve on the air supply piping to recharge the surge vessel.
- F. The control panel shall connect to the station PLC and the District's SCADA system and provide the same remote monitoring and control functionality as is available locally at control panel.

PART 3 – EXECUTION

3.1 PAINTING AND COATING

- A. Apply coating at shop and test for pinholes or “holidays” prior to reinstallation.
- B. Apply primer at shop. Finish paint shall be field applied by Contractor in accordance with Section 09900.

3.2 CONTROL DESCRIPTION

- A. The surge control system shall automatically maintain the liquid level (liquid to air ratio) in the surge vessel.
- B. Surge Tank System
 - 1. The Surge System Control Panel shall monitor the level signal sent by the level sensor/differential pressure transmitter and use that to initiate air charging of the surge vessel.
 - a. Under steady state or no flow conditions, the surge vessel shall contain 65% air, equivalent to liquid level [x], to be determined during installation.
 - b. If the liquid level in the surge vessel increases to [x] above steady state, the surge tank control panel shall signal the solenoid valve to open. Time delays shall be used to prevent air additions during minor fluctuations that last a short period of time. The valve shall remain open until the liquid level is at steady state, at which time the surge tank control panel shall signal the solenoid valve to close.
 - c. If the liquid level in the surge vessel falls to [x] below the steady state, air shall be automatically vented from the surge vessel. Time delays shall be used to prevent air venting during minor fluctuations that last a short period of time.
- C. Air Compressor System
 - 1. The air compressor control panel shall monitor and automatically the air pressure in the air receiver at the design pressure, provided its H-O-A switch is in the AUTO position. When in the HAND position, the air

SECTION 11400 – SURGE CONTROL EQUIPMENT – AMENDED

compressor shall run continuously. When in the OFF position, the compressor shall not operate.

- a. If the pressure in the air receiver falls [x] psi below the design pressure, the air compressor shall automatically start. The compressor shall operate until the air receiver reaches the design pressure.
- b. The compressor shall be shutdown by the motor thermal overload, or low oil level. An alarm condition shall energize a local alarm light, which shall be monitored by the Surge System Control Panel.

3.2 FIELD TESTING

- A. Test the surge control system by simulating a power outage with all duty pumps in operation. Attach pressure detector with strip chart recorder to record maximum and minimum surge pressures at the pump station. Results of all testing shall be provided to the Engineer prior to final acceptance.

****END OF SECTION****

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SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section provides specifications for all instrumentation and control equipment, control panel, and necessary appurtenances for an integrated control system. These specifications and drawings include descriptions of functional operation and performance, as well as standards, but do not necessarily enumerate detailed specifications for all components and devices which are necessary. However, all components and devices shall be furnished and installed as required to provide complete and operable systems capable of providing the functions and meeting the performance set forth hereinafter.
- B. Not Used.
- C. Wherever submittals are required hereunder, all such submittals by the CONTRACTOR shall be submitted to the ENGINEER.
- D. In these Contract Documents all systems, meters, instruments, and other elements are represented schematically, and are designated by numbers, as derived from criteria in Instrument Society of America Standard ANSI/ISA S5.1. The CONTRACTOR shall assign nomenclature and instrument tags on their submittal drawings. ANSI nomenclature and numbers shall be employed exclusively throughout shop drawings, data sheets, computer programming and similar materials. Any other symbols, designations, and nomenclature unique to the manufacturer's standard methods shall not replace those prescribed above.
- E. Should an error be found in a shop drawing during installation or testing of equipment, the correction, including any field changes found necessary, shall be noted on the drawing and submitted finally "as-built" prior to acceptance of the project.
- F. The submittal shall be submitted complete at one time within 60 working days after date of Notice to Proceed. Any incomplete submittal will be rejected and returned without comments.

1.2 RESPONSIBILITIES

- A. The CONTRACTOR through the use of a System Integrator shall be responsible to the OWNER for the implementation of the Control System, with other required electrical, instrumentation, and control devices.
- B. Due to the complexities associated with the interfacing of numerous control system devices, it is the intent of these specifications that the System Integrator be responsible to the CONTRACTOR for the integration of the SCADA system with existing devices and devices provided under other sections with the objective of providing a completely integrated control system free of signal incompatibilities.
- C. The CONTRACTOR shall provide all engineering, documentation, labor, and materials required to resolve signal, power, or functional incompatibilities between

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

the control and instrumentation system and interfacing devices. This includes all interfaces to existing instruments and equipment.

- D. As a minimum, the System Integrator shall perform the following work:
 - 1. Prepare field instrument submittal
 - 2. Prepare a test plan submittal
 - 3. Procure field instrumentation
 - 4. Verify calibration of field instruments after installation
 - 5. Oversee and certify installation of instruments.
 - 6. Oversee, document, and certify loop testing
 - 7. Oversee, document, and certify system commissioning
 - 8. Conduct the performance test
 - 9. Coordinate with the District for PLC I/O software functional testing
 - 10. Prepare Owner's Manuals
 - 11. Prepare record drawings
- E. Integration of the SCADA system with instrumentation and control devices being provided under other sections:
 - 1. Resolve signal, power, or functional incompatibilities between the SCADA system and interfacing devices.
- F. Any System Integrator responsibilities in addition to the list above are at the discretion of the CONTRACTOR and the System Integrator and shall be at no additional cost to the DISTRICT.

1.3 QUALIFICATIONS OF THE SYSTEM INTEGRATOR

- A. The CONTRACTOR shall retain the services of a System Integrator licensed in the State of California who shall perform, under the direction of the CONTRACTOR, all work identified in the Contract Documents associated with implementation of the Control System, with other required electrical, instrumentation, and control devices. The System Integrator shall submit evidence the business entity has been in continuous operation over the last 10 years in control system integration at publicly owned water or wastewater treatment facilities and of successful completion of five (5) projects in the last 10 years.
- B. System Integrators shall submit evidence of the following qualifications:

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

1. Rockwell Solution Partner
2. Inductive Automation Gold Certification
3. CSIA Certified

1.4 RELATED WORK SPECIFIED ELSEWHERE

- A. Electrical work specified hereunder shall conform to the requirements of this section and the applicable requirements of section entitled "Basic Electrical Requirements". (See Section 16010).

1.5 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

- A. The installation and fabrication of all items within the scope of this section of the specifications shall be accomplished according to the requirements of the regulatory agencies as specified in Electrical Section 16000 and the referenced standards listed including UL, IEEE, ICEA, and NEMA.

The primary reference standards for this section of the specifications shall be ISA-Instrument Society of America.

Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the applicable requirements of the referenced documents to the extent that the requirements therein are not in conflict with the provisions of this section; provided, that where such documents have been adopted as a code or public ordinance by the public agency having jurisdiction, such code or ordinance shall take precedence.

1.6 SUBMITTALS

- A. General Submittal Requirements:
 1. Submittals shall be provided per Section 01300.
- B. Shop Drawings
 1. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, list, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is to be built, unless otherwise directed.
 2. Fabrication of an item shall be commenced only after the ENGINEER has reviewed the pertinent submittals and declared to the CONTRACTOR either "NO EXCEPTIONS TAKEN" or MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

3. All CONTRACTOR shop drawings submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR, prior to submission to the ENGINEER. The Engineer's review of Contractor shop drawings submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

C. Field Instrument Submittal

1. This submittal to include field instrumentation and RTU modifications in a singular, all-inclusive submittal which shall include but not be limited to.
 - a. A complete index appearing in the front of each bound submittal volume. Labeled tags shall separate system groups.
 - b. Installation, mounting, and anchoring details for all components and assemblies, including access requirements and conduit connection or entry details.
 - c. Drawings showing schematic diagrams for control circuits. Complete details on the circuit interrelationship of all devices within and outside each Control Panel shall be submitted using schematic control diagrams. The diagrams shall show numbered terminals on components together with the unique number of the wire to be connected to each terminal. The diagrams shall also show terminal assignments from all primary measurement devices, such as flowmeters, and to all final control devices. The CONTRACTOR shall furnish all necessary equipment suppliers' shop drawings to facilitate inclusion of this information by the System Integrator.
 - d. Complete and detailed bills of materials: A bill of material list, including quantity, description, manufacturer, and part number, shall be submitted for cabinet assemblies and subassemblies. Bills of material shall include all items within an enclosure.
 - e. Data sheets for each component, together with a technical product brochure or bulletin: The data sheets shall show:
 - 1) Component functional description used herein and on the Drawings;
 - a) Manufacturer's model number or other product designation;
 - b) Project tag number used herein and on the Drawings;
 - c) Project system or loop of which the component is a part;
 - d) Project location or assembly at which the component is to be installed;

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

- e) Input and output characteristics;
 - f) Scale range and units (if any) and multiplier (if any);
 - g) Requirements for electric supply (if any);
 - h) Materials of construction and of component parts to be in contact with or otherwise exposed to, process media;
 - i) Special requirements or features, such as specifications for ambient operating conditions.
 - j) Features and options which are furnished.
- 2) A separate technical brochure or bulletin shall be included with each instrument data sheet. The data sheets shall be indexed in the submittal by systems or loops, as a separate group for each system or loop. If within a single system or loop, a single instrument is employed more than once, one data sheet with one brochure or bulletin may cover all identical uses of that instrument in that system. Each brochure or bulletin shall include a list of tag numbers for which it applies. Special options and features, which are furnished, shall be identified.
- 3) Calibration, adjustment and test details for all components and systems.

D. Submittals - Test Procedures

1. Submit the procedures proposed to be followed during each test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests.
2. Upon completion of each required test, document the test by submitting a copy of the signed off test procedures. Testing documentation shall consist of the following:
 - a. The summary check-off index shall be an index of all PLC and telemetry systems in the project and shall include the following as a minimum for each system:
 - 1) System description
 - 2) Physical installation check-off box
 - 3) Functional check-off box for each point
 - 4) Satisfactory completion check-off box for each point
 - 5) Comments box
 - 6) Sign-off area for the SI, the Engineer, and the Agency
 - b. The individual instrument sign-off sheet(s):
 - 1) The instrument tag number
 - 2) The manufacturer and part number
 - 3) Description of instrument

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

- 4) Power requirements
 - 5) Calibration procedure including calibration ideal vs. actual chart for 0%, 25%, 50%, 75%, and 100% of full scale value
 - 6) Calibration range
 - 7) Calibration data (setpoint, deadband, etc.)
 - 8) Switch settings
 - 9) PLC I/O address(es)
 - 10) Additional comments as required
 - 11) Signoff space for the SI, the Engineer, and the Agency
- c. The System Integrator shall submit the Test Plan and receive a satisfactory review approval by the Engineer before any witnessed testing can occur.
- E. Submittals - Operations and Maintenance Manuals
1. The CONTRACTOR shall submit technical operation and maintenance information for each item of mechanical, electrical and instrumentation equipment in an organized manner in the OWNER'S MANUAL. It shall be written so that it can be used and understood by the DISTRICT's operation and maintenance staff.
 2. All drawings developed for the RTU shall be generated utilizing a commercial CAD system and shall be delivered on CD-ROM in a DWG format, as completely compatible with/readable by the latest AutoCAD software package.
 3. The OWNER'S MANUAL shall be in both hard copy and electronic as stated in Section 01630 in latest version of MSWord and Adobe Acrobat PDF formats on CD-ROM, subdivided first by specification section number; second, by equipment item; and last, by "Part." "Parts" shall conform to the following (as applicable):
 - a. Part 1 — Equipment Summary:
 - 1) Procedures: Manufacturer-recommended procedures on the following shall be included in Part 2:
 - 2) Form: The ENGINEER will supply an Equipment Summary Form for each item of mechanical, electrical and instrumentation equipment in the WORK. The CONTRACTOR shall fill in the relevant information on the form and include it in Part 1.
 - b. Part 2 — Operational Procedures:
 - 1) Summary: A summary table shall indicate the equipment name, equipment number, and process area in which the equipment is installed.
Installation

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

Adjustment

Location of controls, special tools, equipment required, or related instrumentation needed for operation

Operation procedures

Load changes

Calibration

Shutdown

Troubleshooting

Disassembly

Reassembly

Realignment

Testing to determine performance efficiency

Tabulation of proper settings for all pressure relief valves, low and high-pressure switches, and other protection devices

List of all electrical relay settings including alarm and contact settings

c. Part 3 — Preventive Maintenance Procedures:

- 1) Procedures: Preventive maintenance procedures shall include all manufacturer-recommended procedures to be performed on a periodic basis, both by removing and replacing the equipment or component, and by leaving the equipment in place.
- 2) Schedules: Recommended frequency of preventive maintenance procedures shall be included. Lubrication schedules, including lubricant SAE grade, type, and temperature ranges, shall be covered.

d. Part 4 - Parts List:

- 1) Parts List: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included.
- 2) Drawings: Cross-sectional or exploded view drawings shall accompany the parts list.

e. Part 5 - Wiring Diagrams:

- 1) Diagrams: Part 5 shall include complete internal and connection wiring diagrams for electrical equipment items.

f. Part 6 - Shop Drawings:

- 1) Drawings: This part shall include approved shop or fabrication drawings.

g. Part 7 - Safety:

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

- 1) Procedures: This part describes the safety precautions to be taken when operating and maintaining the equipment or working near it.
- h. Part 8 - Documentation:
 - 1) All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.
4. OWNER'S MANUALS shall be submitted in final form to the ENGINEER not later than the 75 percent of construction completion date. The CONTRACTOR shall correct all discrepancies found by the ENGINEER in the TECHNICAL MANUALS within 30 days from the date of written notification by the ENGINEER.
5. Incomplete or unacceptable OWNER'S MANUALS at the 75 percent construction completion point shall constitute sufficient justification to withhold adequate amount, proportional in value, from any monies due the CONTRACTOR.

1.7 SPARE PARTS

- A. The CONTRACTOR shall include in the Owner's Manual a list of spare parts as per the specifications requirements

1.8 QUALITY ASSURANCE

- A. Unless otherwise specified, each individual instrument shall have a minimum accuracy of +0.5 percent of full scale and a minimum repeatability of +0.25 percent of full scale.

1.9 GUARANTEE

- A. The CONTRACTOR shall guarantee the performance and the hardware of all the CONTROL PANEL equipment as specified herein, for a period of one year following the date of completion and formal acceptance of the WORK as specified under the General Conditions of these Specifications. Services shall begin within 24 hours for critical items and within 3 days for non-critical items after notification by the DISTRICT.
- B. Equipment, software, and materials which do not achieve design requirements after installation shall be replaced or modified by the System Integrator to attain compliance, at no additional cost to the DISTRICT. Following replacement or modification, the CONTRACTOR shall retest the system and perform any additional procedures needed to place the complete system in satisfactory operation and attain design compliance approval from the ENGINEER.

SECTION 17000 – INSTRUMENTATION AND CONTROLS – AMENDED

- C. All parts, material (excluding consumables), labor, travel, subsistence, or other expenses incurred in providing all the services and service visits during the one-year warrantee period shall be borne by the CONTRACTOR under the guarantee.
- D. The warrantee period shall start when the work has been completed and accepted by the DISTRICT and the ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS AND STANDARD SPECIFICATIONS

- A. Provide instruments, equipment and materials suitable for service conditions and meeting standard specifications such as ANSI, ASTM, ISA, and SAMA. The intent of this Specification is to insure instruments and equipment are of a uniform quality and manufacture throughout the plant. All instruments in the plant of the same type shall be made by the same manufacturer.

2.2 NAME TAGS

- A. All instrumentation and equipment items or systems shall be identified by name tags. Field equipment shall be tagged with the assigned instrumentation tag number listed in the Instrument Schedule.
- B. Name tags shall be stainless steel with engraved or stamped black characters of 3/16 inch minimum height. Tags shall be attached to equipment with a tag holder and stainless steel band with a worm screw clamping device. Use 20-gauge stainless steel wire where banding is impractical. For field panels or large equipment cases use stainless steel screws; however, such permanent attachment shall not be on an ordinarily replaceable part.

2.3 FIELD-MOUNTED EQUIPMENT

- A. All instrument and control equipment mounted outside of protective structures shall be equipped with suitable surge arresting devices to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby electrical devices. Protective devices used on 120 Vac inputs to field mounted equipment shall be secondary valve surge protectors conforming to the requirements of ANSI C62.1.

2.4 EQUIPMENT OPERATING CONDITIONS

- A. All equipment shall be rated for normal operating performance with varying operating conditions over the following minimum ranges.
 - 1. Operation and Maintenance (O&M) Manuals shall be prepared respective to the Work of this Instrumentation Section. Preliminary and final O&M Manuals shall be submitted for Engineer approval.
 - 2. Field Instruments:

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a. Outdoor Areas:

Ambient Temperature: +15°F to +120°F

Ambient Relative Humidity: 5% to 100%

Weather: Rain, and ice

b. Indoor Unheated Areas:

Ambient Temperature: +30°F to +110°F

Ambient Relative Humidity: 10% to 95%, non-condensing

c. Indoor Environmentally Controlled Areas:

Ambient Temperature: +60°F to +104°F

Ambient Relative Humidity: 10% to 90%, non-condensing

2.5 EQUIPMENT LOCATIONS

- A. Provide equipment and materials suitable for the types of locations in which they are located as defined under Division 16. All equipment specified for field mounting shall be weatherproof and splash proof as a minimum.

2.6 CURRENT TECHNOLOGY

- A. All meters, instruments, and other components shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the shop drawings unless otherwise required to match existing equipment.

2.7 LOOP ACCURACY

- A. The accuracy of each instrumentation system or loop shall be determined as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of the designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual instrument shall have a minimum accuracy of plus and minus 0.5 percent of full scale and a minimum repeatability of plus and minus 0.25 percent of full scale unless otherwise indicated. Instruments which do not conform to or improve upon these criteria are not acceptable.

2.8 ANALOG SIGNAL INDICATED UNITS

- A. For all instruments with local or remote indicators, provide indicators scaled in actual engineering units, i.e., gallons per minute, feet, psi, etc., rather than 0 to 100%, unless noted otherwise on the Drawings or Instrument Schedule.

2.9 SIGNAL TRANSMISSION

- A. Analog:
1. Signal transmission between electric or electronic instruments shall be 4-20 mA and shall operate at 24 Vdc. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating.

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2. Nonstandard transmission systems such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted in the Instrument Schedule or shown on the Drawings. When transmitters with nonstandard outputs do occur, their output shall be converted to 4-20 mA prior to transmission.
- B. Discrete: All alarm and status signals shall be 24 VDC unless specified otherwise on the Instrument Schedule.

2.10 FASTENERS

- A. Fasteners for securing equipment to walls, floors and the like shall be 316 stainless steel. When fastening to existing walls, floors, and the like, provide capsule anchors, not expansion shields. Size capsule anchors to meet load requirements. Minimum size capsule anchor bolt is 3/8 inch.

2.11 ELECTRONIC MEDIA

- A. As-built drawings shall be provided in AutoCAD 7 (DWG) format on CD – ROMs. The CD shall be organized to simplify user browsing.

PART 3 – EXECUTION

3.1 GENERAL

- A. Elements such as transmitters, and the like, shall be tested and exercised to demonstrate correct operation, first individually and then collectively as functional analog networks. Each analog system shall be tested to verify proper performance. Individual component uncertainty requirements shall be as specified by the manufacturer.

3.2 MOUNTINGS

- A. Mount and install equipment as indicated. Mount field instruments on pipe mounts or other similar means in accordance with suppliers' recommendation. Where mounted in control panels, mount according to requirements of that section.
- B. Equipment specified for field mounting shall be suitable for direct pipe mounting or surface mounting, surface-mounted indicators and equipment with calibration adjustments or requiring periodic inspection shall be mounted not lower than 3 feet 6 inches nor higher than 6 feet above walkways, platforms, catwalks, and the like.
- C. All devices shall be accessible to operators for servicing, operating, reading, etc. Provide permanent platforms to assure devices are continuously accessible.

3.3 FIELD WIRING

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- A. Ring out signal wiring prior to termination and perform surge withstand tests where required. Verify all terminations are tight and shields are uniformly grounded at one location.

3.4 CALIBRATION

- A. General: All devices provided under Division 17 shall be calibrated according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements.
- B. Calibration Points: Each instrument shall be calibrated at 0, 25, 50, 75, and 100% of span using test instruments to simulate inputs. The test instruments shall have accuracies traceable to National Institute of Testing Standards.
- C. Bench Calibration: Instruments which have been bench-calibrated shall be examined in the field to determine whether any of the calibrations are in need of adjustment. Such adjustments, if required, shall be made only after consultation with the ENGINEER.
- D. Field Calibration: Instruments which were not bench-calibrated shall be calibrated in the field to insure proper operation in accordance with specification data sheets.
- E. Analyzer Calibration: Each analyzer system shall be calibrated and tested as a workable system after installation. Testing procedures shall be directed by the manufacturers' technical representatives. All samples and sample gases shall be furnished by the manufacturers.
- F. Calibration Sheets: Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit.
 - 1. Project name
 - 2. Loop number
 - 3. Tag number
 - 4. Manufacturer
 - 5. Model number
 - 6. Serial number
 - 7. Calibration range
 - 8. Calibration data: Input, output, and error at 0, 25, 50, 75, and 100% of span
 - 9. Switch setting, contact action, and deadband for discrete elements
 - 10. Space for comments

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11. Space for sign-off by System Integrator and date
 12. Test equipment used and associated serial numbers
- G. Calibration Tags: A calibration and testing tag shall be attached to each piece of equipment or system at a location determined by the ENGINEER. The CONTRACTOR shall have the System Integrator sign the tag when calibration is complete.

3.5 LOOP TESTING

- A. Control Valve Tests: All control valves, cylinders, drives and connecting linkages shall be stroked from the operator interface units as well as local control devices and adjusted to verify proper control action, hand switch action, limit switch settings, torque settings, remote control actions, and remote feedback of valve status and position. Control valve actions and positioner settings shall be checked with the valves in place to insure that no changes have occurred since the bench calibration.
- B. Interlocks: All hardware and software interlocks between the instrumentation and the motor control circuits, control circuits of softstarters and packaged equipment controls shall be checked to the maximum extent possible.
- C. Instrument and Instrument Component Validation: Each instrument shall be field tested, inspected, and adjusted to its indicated performance requirement in accordance to its Manufacturer's specifications and instructions. Any instrument which fails to meet any Contract requirement, or, in the absence of a Contract requirement, any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced.
- D. Loop Validation: Controllers and electronic function modules shall be field tested and exercised to demonstrate correct operation. All control loops shall be checked under simulated operating conditions by impressing input signals at the primary control elements and observing appropriate responses of the respective control and monitoring elements, final control elements, and the graphic displays associated with the PLC. Actual signals shall be used whenever available. Following any necessary corrections, the loops shall be retested. Specified accuracy tolerances for each analog network are defined as the root-mean-square-summation of individual component accuracy requirements. Individual component accuracy requirements shall be as indicated by Contract requirements or by published manufacturer accuracy specifications, whenever Contract accuracy requirements are not indicated. Each analog network shall be tested by applying simulated analog or discrete inputs to the first element of an analog network. For networks which incorporate analog elements, simulated sensor inputs corresponding to 0, 25, 50, 75, and 100% of span shall be applied, and the resulting element outputs monitored to verify compliance to calculated root-mean-square-summation accuracy tolerance requirements. Continuously variable analog inputs shall be applied to verify the proper operation and setting of discrete devices. Provisional settings shall be made on controllers and alarms during

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analog loop test. All analog loop test data shall be recorded on test forms which include calculated root-mean-square-summation system accuracy tolerance requirements for each output.

- E. Loop Validation Sheets: The CONTRACTOR shall prepare loop confirmation sheets for each loop covering each active instrumentation and control device except simple hand switches and lights. Loop confirmation sheets shall form the basis for operational tests and documentation. Each loop confirmation sheet shall cite the following information and shall provide spaces for sign-off on individual items and on the complete loop by the System Integrator:
1. Project name
 2. Loop number
 3. Tag number, description, manufacturer and model number for each element
 4. Installation bulletin number
 5. Specification sheet number
 6. Loop description number
 7. Adjustment check
 8. Space for comments
 9. Space for loop sign-off by System Integrator and date
 10. Space for sign-off by System Integrator and date
 11. Space for sign-off by Engineer or District and date
- F. Loop Certification: When installation tests have been successfully completed for all individual instruments and all separate analog control networks, a certified copy of all test forms shall be retained by the CONTRACTOR.

3.6 FIELD FUNCTIONAL TESTING

- A. General: Field functional testing shall commence after acceptance of all wire test, calibration tests and loop tests, and all inspections have demonstrated that the instrumentation and control system complies with all Contract requirements. Field functional testing shall demonstrate proper operation of all systems with process equipment operating over full operation ranges under conditions as closely resembling actual operation conditions as possible.
- B. Field functional Test Procedures and Documentation: All field functional testing activities shall follow detailed test procedures and check lists accepted by the ENGINEER. All test data shall be acquired using equipment as required and shall

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be recorded on test forms accepted by the ENGINEER, which include calculated tolerance limits for each step. Completion of all system field functional testing activities shall be documented by a certified report, including all test forms with test data entered and retained by the CONTRACTOR.

- C. Operational Validation: Where feasible, system field functional testing activities shall include the use of water to establish service conditions that simulate, to the greatest extent possible, normal final control element operation conditions in terms of applied process loads, operation ranges, and environmental conditions. Final control elements, control panels, and ancillary equipment shall be tested under start-up and steady-state operation conditions to verify that proper and stable control is achieved using motor control center and local field mounted control circuits. All hardwired and software control circuit interlocks and alarms shall be operational. The control of final control element and ancillary equipment shall be tested using both manual and automatic (where provided) control circuits. The stable steady-state operation of final control elements running under the control of field mounted controllers as required eliminating oscillatory final control element operation. The transient stability of final control elements operation under the control of field mounted, and software based automatic analog controllers shall be verified by applying control signal disturbances, monitoring the amplitude and decay rate of control parameter oscillations (if any) and making necessary controller adjustments as required to eliminate excessive oscillatory amplitudes and decay rates.
- D. Field Functional Test Validation Sheets: Field functional testing shall be documented on one of two types of test forms as follows:
1. For functions which can be demonstrated on a loop-by-loop basis, the form shall include:
 - a. Project name
 - b. Loop number
 - c. Loop description
 - d. Tag number, description, manufacturer and data sheet number for each component
 - e. Space for sign-off and date by both the System Integrator and ENGINEER
 2. For functions which cannot be demonstrated on a loop-by-loop basis, the test form will be a listing of the specific tests to be conducted. With each test description the following information shall be included:
 - a. Specification page and paragraph of function demonstrated
 - b. Description of function
 - c. Space for sign-off and date by both the System Integrator and ENGINEER
- E. Field Functional Test Certification: The CONTRACTOR shall submit an instrumentation and control system field functional test completion report which shall state that all Contract requirements have been met and shall include a listing

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of all instrumentation and control system maintenance and repair activities conducted during the field functional testing. Acceptance of the instrumentation and control system field functional testing must be provided in writing by the ENGINEER before the acceptance testing may begin. Final acceptance of the control system shall be based upon plant completion as stated in the General Conditions:

3.7 ACCEPTANCE TEST

- A. General: Subsequent to Field Functional Test and instrument calibration, verifying substantial completion of field installation and start-up, the system will be given a final 14-day acceptance test. The 14-day test must be successfully completed, including resolution of punch-list items generated during the test period, prior to the date of substantial completion of the entire project. The system must run continuously for 14 consecutive days. During this period, all system functions shall be exercised, and any system interruption and accompanying component, subsystem, or hardware failure shall be logged for cause of failure, as well as time of occurrence and duration of each failure. The CONTRACTOR shall provide a competently trained technician on call during all normal working days and hours from the start of the acceptance test until final acceptance of the system.
- B. Testing: The systems to be tested on-line will include general operations as well as the Report Generator and Operation as specified herein. Each system function, e.g., status report-backs, logs, and displays shall be exercised several times at a minimum, and in a manner which approximates "normal" system operation. Failure of the system during the above program testing shall be considered as indicating that the programs and operating system do not meet the requirements of the specifications and corrective action shall be required before restarting the acceptance test. Only those components, subsystems, and systems covered in this specification shall be considered for this acceptance test. Problems and failures of other systems shall not be considered as part of this test (except as they display the capabilities of this system to detect failures).
- C. Failures: Failures shall be classified as either major or minor. A minor failure would be a small and non-critical component failure, which can be corrected by the OWNER operators. This occurrence shall be logged but shall not be reason enough for stopping the test and shall not be grounds for non-acceptance. However, should the same or similar component failure occur repeatedly, this may be considered as grounds for non-acceptance. A major failure shall be considered to have occurred when a component, subsystem, or program fault causes a halt in operation of the system and/or when a technician's work is required to make a repair or to re-initiate operation of the system. A major failure shall cause termination of the acceptance test. When the causes of a major failure have been corrected, a new acceptance test with a new 14-day duration shall be started.
- D. Technician Report: Each time a technician is required to respond to a system malfunction, he or she must complete a report which shall include details concerning the nature of the complaint or malfunction and the resulting repair action required and taken. If a malfunction occurs which clears itself or which the operator on duty is able to correct, no report shall be required (logged as specified

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above). If a technician has performed work but no report is written, then a major failure shall be considered to have occurred. Each report shall be as specified above). Each report shall be submitted within 24 hours to the ENGINEER or its representative, and the OWNER.

****END OF SECTION****