DIVISION 1
GENERAL REQUIREMENTS

SECTION 01011
OWNER FURNISHED EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. General work included in this section:
   1. Coordinating delivery, unloading, storage, and installation of Owner Pre-purchased equipment under a separate equipment procurement contract.
   2. Coordination and scheduling of shipping and manufacturer's field services for the equipment.
   3. See Section 13400: Installation of Owner Pre-Purchased Equipment.

B. Owner Pre-Purchased Scope of Supply:
   1. Zenon Environmental will provide to the Owner the following major equipment delivered to the project site:
      a. Two (2) automatic self-cleaning strainers with the following;
         1) Control panel;
         2) Differential pressure gauges;
         3) Backwash ball valves with electric actuators; and
         4) Backwash assist ball valves with electric actuators.
      b. Two (2) membrane air scour blowers with the following for each;
         1) Inlet filter-silencer;
         2) Outlet flex connectors;
         3) Discharge low flow switch;
         4) Discharge check valve; and
         5) Discharge isolation valve;
      c. One (1) membrane train, which will include the following for each:
         1) Membrane cassette support beams;
         2) Tank drain valves;
         3) Membrane cassettes;
         4) Permeate collection header pipes;
         5) Tank water level transmitter;
         6) Tank high water level switch;
         7) Tank low water level switch;
         8) Cassette isolation valves;
         9) Permeate header MIT isolation valve;
         10) MIT/TMP pressure transmitter;
         11) Turbidimeter with associated valves and accessories;
         12) REDOX/pH analyzer with associated valves and accessories;
         13) Air scour header pipes;
         14) Air scour header isolation valves;
         15) Cyclic aeration valves;
         16) Cyclic air header flow switches;
         17) CIP recirculation block and bleed valves;
         18) Fasteners for header piping; and
         19) Miscellaneous valves and items not listed.
      d. Two (2) process pumps with the following for each;
         1) Header automatic block and bleed valves;
         2) Inlet pressure gauge with isolation valve;
         3) Discharge check valve;
         4) Discharge isolation valve;
         5) Discharge pressure gauge with isolation valve;

6) Flowmeter; and
7) Miscellaneous valves and items not listed.

e. Backpulse/Break tank with the following;
1) Storage tank;
2) Tank water level transmitter;
3) Discharge strainer;
4) Tank air vent filter;
5) Tank potable water line fill valve;
6) Tank drain valve;
7) Tank overflow valve;

f. Two (2) drain pumps with the following:
1) Suction isolation valve;
2) Discharge check valve;
3) Discharge isolation valve;
4) Inlet pressure gauge with isolation valve;
5) Discharge pressure gauge with isolation valve;
6) Flowmeter; and
7) Miscellaneous valves and items not listed.

g. Sodium hypochlorite air diaphragm metering pump with the following :
1) Spare air diaphragm pump;
2) Backpressure valve;
3) Calibration column ;
4) Foot valve ;
5) Needle valve ;
6) Solenoid valves ; and
7) Ball isolation valves.

h. Sodium bisulfite air diaphragm metering pump with the following :
1) Backpressure valve;
2) Calibration column ;
3) Foot valve ;
4) Needle valve ;
5) Solenoid valve ; and
6) Ball isolation valves.

i. Citric acid air diaphragm metering pump with the following :
1) Backpressure valve;
2) Calibration column ;
3) Foot valve ;
4) Needle valve ;
5) Solenoid valve ; and
6) Ball isolation valves.

j. Sodium hydroxide air diaphragm metering pump with the following :
1) Backpressure valve;
2) Calibration column ;
3) Foot valve ;
4) Needle valve ;
5) Solenoid valve ; and
6) Ball isolation valves.

k. Compressed Air System for MIT and Controls with the following:
1) Air compressors;
2) Air receiver;
3) Air receiver auto-drain valves;
4) Air receiver pressure gauge with isolation valve;
5) Air receiver pressure relief valve;
6) Pressure switches;
7) Air receiver tank discharge isolation valves;
8) Air drier;

9) Air filter-regulator;
10) MIT Air System air filter;
11) MIT Air System air filter-regulator;
12) MIT Air System isolation valves;
13) MIT Air System pressure gauge;
14) MIT Air System pressure relief valve;
15) MIT Air System check valve;
16) MIT Air System drain valve; and
17) Air system distribution valves.

l. PLC Control system that includes the following:
1) Main PLC panel, enclosure, and panel mounted touchscreen HMI.
2) Remote I/O panels, enclosures, and hardware.

m. Miscellaneous equipment that includes the following:
1) Anchor bolts for tanks, pumps, blowers, compressors, etc.

n. General that includes the following:
1) Equipment general arrangement and layout drawings;
2) Operation and Maintenance Manuals
3) Freight & Insurance
4) Performance and Payment Bonds

2. Refer to Manufacturer's Tender Package for more detailed information on the Owner Pre-Purchased Equipment.

C. Tender Package.
1. The Manufacturer for the use of the Contractor has prepared a Tender Package, which outlines the equipment to be supplied as well as the Work to be performed by the Contractor. The Tender Package is part of the Contract Documents for review by the Contractor.
2. Shop drawings for equipment covered by this Section including unloading, storage, and installation requirements will be supplied by the Owner upon request.

1.2 DELIVERY

A. The Contractor shall be responsible for coordinating the deliver of the equipment to the project site and special services with the equipment manufacturer.

B. Contractor shall arrange for shipment and delivery of equipment directly with the manufacturer in accordance with an approved construction schedule.
1. Contractor shall provide a minimum of 30 days prior notice to Owner for scheduling of equipment delivery.

C. Immediately upon delivery of the equipment the Owner and the Contractor will inspect shipment to assure compliance with the Contract Documents and accepted submittals, and that products are properly protected and undamaged.
1. Replacement of products damaged prior to the Owner's inspection will be paid by the Owner through their equipment procurement contract with the manufacturer.

D. Following the Owner's inspection Contractor shall assume responsibility of the equipment through installation and pay for any damage incurred between delivery and final acceptance of the equipment.

1.3 UNLOADING

A. Contractor shall unload and temporarily store the equipment at the project site in accordance with manufacturer's instructions.

1.4 INSTALLATION

A. Contractor shall install all parts and equipment in accordance with the contract documents and the equipment manufacturer's instructions.

1 1.5 FIELD QUALITY CONTROL

2 A. Contractor shall inspect all goods associated with the equipment prior to installation to verify it
3 is complete and undamaged.
4 1. All products that are damaged, used, or in any other way unsatisfactory for use on the
5 project shall not be used.
6 a. Contractor shall confirm all identified deficiencies have been remedied prior to
7 equipment installation.

8 B. Manufacturer's Field Services:
9 1. Contractor shall schedule manufacturer's field services directly with the equipment
10 manufacturer:
11 a. Site visits to be between 8:00 am and 5:00 pm Monday through Friday.
12 b. Contractor shall provide a minimum of 21 days prior notice to Owner for scheduling
13 manufacturer's field services.
14 2. The manufacturer's field representative services:
15 a. Inspect, check, and adjust equipment as required and approve installation.
16 b. Be present when equipment is placed in operation.
17 c. Check for proper operation.
18 d. Check for proper current by measuring amperage and voltage on each phase.
19 e. Startup and commissioning of the equipment and system.

20 **END OF SECTION**

2001/09/14

SECTION 01060
SPECIAL CONDITIONS

PART 1 - GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. A preconstruction conference shall be held at the City of Kerrville Public Works Department, 800 Junction Highway, Kerrville, Texas 78028 after award of Contract. Engineer will notify the Contractor as to the date and time of the conference 2 weeks in advance of the proposed date. Contractor's Project Manager and Project Superintendent and Contractor's Subcontractor Representatives shall attend.

1.2 PROJECT SIGNS

A. Furnish and install one of each of the following signs:
   1. Engineer's sign.
   2. Contractor's standard sign approved by Owner.

B. Submit mock up of project signs to Engineer for approval.

C. Install in location approved by Owner.

D. Signs not listed in this Specification permitted only upon approval of Owner.

1.3 CONTRACTOR'S SUPERINTENDENT'S FIELD OFFICE

A. Establish at site of Project. Allocation will be made by the OWNER for space located on the OWNER's property at the existing water treatment plant site.

B. Equipment: Telephone, telecopy, mailing address, and sanitary facilities.

C. The CONTRACTOR will submit for approval working drawings that show the proposed location and size of office, sanitary facilities, temporary construction roads, storage areas, fencing, temporary stationary equipment, and other similar facilities.

D. The CONTRACTOR will provide independent electrical service.

E. Assure attendance at this office during the normal working day.

F. At this office, maintain complete field file of shop drawings, posted Contract Drawings and Specifications, and other files of field operations including provisions for maintaining "As Recorded Drawings."

G. Remove field office from site upon acceptance of the entire work by the Owner.

H. The Contractor shall be required to provide a project manager for the Project to be the single point of contact throughout the duration of the Contract. The project manager shall be available by telephone at all times during the Project. The project manager will be responsible for attending progress and other project meetings, providing timeline and cost schedule updates, coordinating shop drawing and O&M manual submittals, and any other coordination or correspondence required for the Project.

1.4 TEMPORARY UTILITIES

A. General
   1. Provide and maintain temporary and interim utility services necessary for the performance of the Work. All costs associated with these services shall be included in the CONTRACTOR's price for mobilization.

2. Install and maintain utilities to comply with applicable code, safety, and utility company requirements.

B. Electricity
1. The CONTRACTOR will provide connections sized to provide service for power and lighting. Terminations shall be provided for each voltage supply complete with circuit breakers, disconnect switches and other electrical devices as required to protect the power supply system.

C. Telephone Service
1. The CONTRACTOR will furnish on-site telephone service for himself during the period of construction of the contract.

D. Water Service
1. CONTRACTOR will provide water service for all temporary office facilities and for general construction operations.
2. Water can be obtained from the City of Kerrville from adjacent existing water treatment plant facilities.

E. Sanitary Facilities
1. CONTRACTOR will provide temporary sanitary facilities and will service, clean, and maintain these facilities for the duration of construction.

F. Fire Protection
1. The CONTRACTOR will provide temporary fire protection equipment for the protection of personnel and property during construction. Debris and flammable material shall be removed weekly to minimize potential hazards.
2. Fires will be reported immediately to the OWNER.

1.5 DRAWINGS AND CONTRACT DOCUMENTS FOR CONTRACTOR USE

A. Contractor shall pick up all "no-charge" documents within 10 days from date of Notice to Proceed.

B. Additional documents after "no-charge" documents will be furnished to Contractor at cost.

1.6 PROJECT PHOTOGRAPHS

A. At least once each month during construction of the Work, provide a professional photographer to take digital progress photographs (3.1 mega-pixel or higher resolution) as directed by Engineer or Resident Project Representative. Furnish 'jpg' files on CD, with all rights of reproduction, to Owner. Provide number of photographs as follows:
1. Ten ground level color photos per month.
2. Date all photographs.
3. Include a site plan key map with each month's submittal of photographs showing by arrow the subject and the direction from which each photograph was taken.
4. Contractor shall schedule and coordinate photographer with Resident Project Representative.

1.7 TESTING

A. Payment for Soil, Concrete and Other Testing:
1. Soils and concrete testing: Payment for all testing will be the responsibility of the Contractor. Costs of corrective action, costs of "Failing" soils and concrete tests, and cost of testing associated with establishment of mix design are the sole responsibility of the Contractor.
2. Other testing: Required testing, testing procedures, reports, certificates, and costs associated with all phases of securing required satisfactory test information which may be required by individual sections of Specifications or Drawings are the full responsibility of the Contractor.

1.8 ORDER OF CONSTRUCTION AND CONSTRUCTION SCHEDULE

A. Construction operations will be scheduled to allow the Owner uninterrupted operation of existing adjacent facilities. Coordinate connections with existing work to ensure timely completion of interfaced items.

B. At no time shall Contractor or his employees modify operation of the existing facilities or start construction modifications without approval of the Owner except in emergency to prevent or minimize damage.

C. Within 10 days after award of Contract, submit for approval a critical path type schedule. Account for schedule of Subcontracts. Include proper sequence of construction, various crafts, purchasing time, shop drawing approval, material delivery, equipment fabrication, startup, demonstration, and similar time consuming factors. Show on schedule as a minimum, earliest starting, earliest completion, latest starting, latest finish, and free and total float for each task or item.

D. Evaluate schedule no less than monthly. Update, correct, and rerun schedule and submit to Engineer in triplicate with pay application to show rescheduling necessary to reflect true job conditions. When shortening of various time intervals is necessary to correct for behind schedule conditions, indicate actions to implement to accomplish work in shorter duration. Information shall be submitted to Engineer in writing with revised schedule.

E. If Contractor does not take necessary action to accomplish work according to schedule, Contractor may be ordered by Owner in writing to take necessary and timely action to improve work progress. Owner may require increased work forces, extra equipment, extra shifts or other action as necessary. Should Contractor refuse or neglect to take such action authorized, under provisions of this contract, Owner may take necessary actions including, but not necessarily limited to, withholding of payment and termination of contract.

F. Upon receipt of approved "Work Schedule," within 10 days, submit to Engineer an estimated payment schedule by each month of project duration. Include a composite curve to show estimated value of work complete and stored materials less specified retainage. Establish key months when work will be 50, 80, 90, and 100 percent complete. During the course of work, update with new composite curves at key months or whenever variation is expected to be more than plus or minus 10 percent. Retain original or previous composite curves as dashed curves on all updates. Include a heavy plotted curve to show ACTUAL payment curve on all updates.

1.9 PROJECT MEETINGS

A. Construction Meetings:
   1. The Engineer will conduct construction meetings involving:
      a. Contractor's project manager.
      b. Contractor's project superintendent.
      c. Owner's designated representative(s).
      d. Engineer's designated representative(s).
      e. Contractor's subcontractors as appropriate to the work in progress.
      f. Owner's Construction Quality Control Consultant.
   2. Meetings will be conducted every two weeks or as required.
   3. The Engineer will take meeting minutes and submit copies of meeting minutes to participants and designated recipients identified at the Preconstruction Conference. Corrections, additions or deletions to the minutes shall be noted and addressed at the following meeting.
   4. The Engineer will schedule meetings for most convenient time frame.
   5. The Engineer will have available at each meeting full chronological files of all previous meeting minutes.
   6. The Contractor shall have available at each meeting up-to-date record drawings.

B. Pre-Installation Conferences:

1. Coordinate and schedule with Resident Project Representative and Engineer for each material, product or system specified. Conferences to be held prior to initiating installation, but not more than two (2) weeks before scheduled initiation of installation.
   a. Conferences may be combined if installation schedule of multiple components occurs within the same two (2) week interval.
   b. Review manufacturers recommendations and Contract Documents Specifications.
2. Contractor's Superintendent and individual who will actually act as foreman of the installation crew (installer), if other than the Superintendent, shall attend.

C. Facility startup meetings
1. Schedule and attend a minimum of two (2) facility startup meetings. The first of such meetings shall be held prior to submitting the Facility Startup Plan, as specified in Section 01650, FACILITY STARTUP , which includes additional Facility Startup requirements to be included in the preliminary discussions regarding such plan.
2. Agenda items shall include, but not limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
3. Attendees will include:
   a. Contractor's project manager.
   b. Contractor's project superintendent.
   c. Subcontractors and equipment manufacturer's representatives whom CONTRACTOR deems to be directly involved in facility startup.
   d. Others as required by Contract Documents or as deemed necessary by CONTRACTOR.
   e. Owner's designated representative(s).
   f. Engineer's designated representative(s).
   g. Owner's Construction Quality Control Consultant.

1.10 SPECIAL CONSIDERATIONS

A. Owner's existing water treatment plant water and chemical pipelines, electrical service, and other lines are adjacent to and cross portions of the planned improvements. As-built plans for the existing water treatment plant are available from the Owner. No guarantee is made as to the accuracy of the as-built plans. Contractor shall locate line(s) closest to the new work by potholing before excavating. Contractor shall take precaution to avoid damage to these lines. If these lines are damaged, the Contractor shall immediately shut down construction operations on the water plant expansion and devote his full resources to repair of the damaged lines. Contractor shall coordinate repair work with the Owner and work diligently, around-the-clock if necessary, until the existing line(s) is (are) repaired and returned to operation.

B. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.

C. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

D. The contractor shall install temporary field fence with owner approval were necessary to designate limits of construction for water plant expansion and separate existing water treatment plant facilities as off limits to Contractor personel. Contractor shall ensure that all personel remain within the limits of construction for improvements and enter other areas of existing water treatment plant only with specific approval of owner on as needed basis.

1.11 HISTORICAL AND ARCHAEOLOGICAL

A. If during the course of construction, evidence of deposits of historical or archeological interest is found, the Contractor shall cease operations affecting the find and shall notify Owner. No further disturbance of the deposits shall ensue until the Contractor has been notified by Owner that Contractor may proceed. Owner will issue a notice to proceed after appropriate authorities have surveyed the find and made a determination to Owner. Compensation to the Contractor, if any, for lost time or changes in construction resulting from the find, shall be determined in accordance with changed or extra work provisions of the Contract Documents. The site has no known history of historical or archaeological finds.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SECTION)

PART 3 - EXECUTION - (NOT APPLICABLE TO THIS SECTION)

END OF SECTION

1

1990/05/02

SECTION 01063
TAGGING STANDARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. A listing of the tagging standards used for the Project.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

1.2 TAGGING STANDARDS

A. The following tagging standards are used for the Project.

CITY OF KERRVILLE

Water Treatment Plant Expansion
Tagging Standards (Based on ZENON Standard Tagging Convention)

TEXT ABBREVIATIONS

AC	AIR COMPRESSOR
AR	AIR RECEIVER
ARC	AIR CONDITIONING
AV	AIR VENT
B	BLOWER
BBU	BULK BAG UNLOADER
BFP	REDUCED PRESSURE BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BPV	BACKPRESSURE VALVE
BRC	BRIDGE CRANE
BWC	BACKWASH CLARIFIER RAKE DRIVE
C	CLARIFIER
CHL	CHLORINE GENERATOR
CL	CLARIFIER
CV	CHECK VALVE
DR	AIR DRIER
E	EDUCTOR
EF	EXHAUST FAN

F	FILTER
FCV	FLOW CONTROL VALVE
FG	FLOW SIGHT GLASS
FO	ORIFICE PLATE
FV	AUTOMATIC VALVE
FX	FLOW STRAIGHTENING DEVICE
GV	GATE VALVE
GWC	GRIT WASHER/CLASSIFIER
H	HEATER
HC	HEATING COIL
HCV	HAND CONTROL VALVE
HE	HEAT EXCHANGER
HOP	HOPPER
HT	HOIST AND TROLLEY
HV	HAND VALVE
I/P	ELECTRIC ANALOG TO PNEUMATIC SIGNAL CONVERTER
IAS	INSTRUMENT AIR SUPPLY
JFS	SOFT START
LCV	LEVEL CONTROL VALVE
LG	LEVEL SIGHT GLASS
M	MOTOR
MAG	MAGNETIC
MCC	MOTOR CONTROL CENTER
MFV	MULTI FUNCTION VALVE (COMBINATION RELIEF & BACKPRESSURE VALVE FOR METERING PUMPS
MX	MIXER
MXS	STATIC MIXER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
P	PUMP
PD	PULSATION DAMPENER
PRV	PRESSURE REDUCING VALVE
PSE	RUPTURE DISC
PSV	PRESSURE RELIEF VALVE
RT	RESIN TRAP

SG	SIGHT GLASS
SP	SET POINT
SRV	SURGE RELIEF VALVE
ST	STEAM TRAP
STR	STRAINER
SV	SAMPLE VALVE
TCV	TEMPERATURE CONTROL VALVE
TK	TANK
TURB	TURBINE
UV	ULTRAVIOLET STERILIZER
VB	VACUUM BREAKER
VC	CHECK VALVE (Existing WTP convention)
VF	VOLUMETRIC FEEDER
WPR	WASHPACTOR
YY	SOLENOID FOR PNEUMATIC CONTROL OF AUTOMATIC VALVE

FIRST and SECOND Digits of Tag Number

ZeeWeed Systems	
34	ZeeWeed Membrane Tank (& recirculation pump)
35	ZeeWeed Process Equipment and Pump
36	ZeeWeed Thickener Membrane Tank (& recirculation pump)
37	ZeeWeed Thickener Process Equipment and Pump
38	ZeeWeed Reject Pump
39	ZeeWeed Thickener Reject Pump
Other	
40	Power
41	Generator
42	Drainage
43	Sanitary Sewer
45	Potable Water System
46	Seal Water System
47	Membrane Building Materials Handling
48	Membrane Building
Chemical Feed Assemblies	
51	NaOCl Feed Assembly – Maintenance Clean

52	Antiscalant Feed Assembly
53	Sodium Bisulfite Feed Assembly – Neutralization
54	NaOCl Feed Assembly – Biogrowth Prevention
55	Sodium Hydroxide Feed Assembly – Neutralization
56	Coagulant Feed Assembly
57	Powder Activated Carbon Slurry Feed Assembly
58	Phosphoric Acid Feed Assembly
Chemical Feed Assemblies	
60	Citric Acid Feed Assembly – Maintenance Clean
61	Anti-Foam Chemical Feed Assembly
63	Permanganate Feed Assembly – Raw Water
64	Hypochlorite Feed Assembly – Raw Water
65	Citric Acid Feed Assembly – Recovery Clean
66	NaOCl Feed Assembly – Recovery Clean
67	Hypochlorite Feed Assembly – Finished Water
68	Ammonium Sulfate Feed Assembly – Finished Water
69	Brine Feed Assembly
Tank and Pumping Systems	
70	ZeeWeed/UF Feed Storage Tank/Pumps
71	Finished Water Tank/Pumps
72	ZW Concentrate/Sludge Tank/Pumps
73	Bioreactor Tank and Related Components
74	Denitrification Tank/Pumps
75	ZW Permeate – Tank/Pumps
76	Raw Water Storage Tank/Pumps
78	Backwash Recycle Tank/Pumps
79	Backwash Waste Tank/Pumps
Auxiliaries/Cleaning Systems	
80	Hypochlorite Dip Tank Assembly
81	ZeeWeed 1st Stage CIP
82	Citric Acid Dip Tank Assembly – ZW 2nd Stage CIP
83	Cleaning Chemical Waste
84	ZeeWeed Thickener Membrane Aeration Blower
85	ZeeWeed Membrane Aeration Blower
86	ZeeWeed Thickener Supplemental Blower

87	ZeeWeed Supplemental / Bioreactor Blower
88	ZeeWeed Backpulse System
89	ZeeWeed Thickener Backpulse System
Utilities	
90	Seal Water System
91	Air Compressors
92	Vacuum Pumps
93	Service Water
94	Potable Water
95	Air Compressors – Oil Free (MIT)
97	Drain Pump / Transfer Pump / Recirculation Pump Equipment

THIRD and FOURTH Digits of Tag Number

00-19 Digital Signals	
00	Pumps / Blowers
01	LSHH
02	LSH
03	LSL
04	LSLL
05	FSH / Mixer / Dryer
06	FSL
07	PSH
08	PSL
09	TSH
10	TSL
20-39 Analog Instruments - **Transmitters**	
20	Flow Transmitters
21	Pressure Transmitters for MIT
22	Net Flow Indicator (calculated)
23	Pressure Transmitters / TMP
26	Level Transmitters
28	Flow Demand Setpoint typically CO from PID loop
30	Temperature Transmitters
32	pH Transmitters
34	Chlorine Transmitters

36	Particle Counter
37	Turbidimeters
38	Dissolved Oxygen Transmitters
40-59 Indicators – Pressure gauges, temperature gauges, rotameters	
40	Discharge Pressure Gauge
41	Suction Pressure Gauge
42	Flow Meter
44	Temperature Gauge
45	Sight Glass Level Gauge
46	Flow Totalizer
60-79 Automatic Valves	
60	Pump Discharge Isolation Valve
61	Pump Suction Isolation Valve
62	Pump Recycle Valve
63	Pump Discharge Throttling Valve
64	Tank to Pump Suction Isolation Valve
68	Pump Discharge Crossover to other Pump(s) Isolation Valve
69	Pump Suction Crossover to other Pump(s) Isolation Valve
70	Tank Potable Water Isolation Valve
71	Seal Water Isolation Valve
73	Tank Process Water Isolation Fill Valve
74	Tank Process Water Level Control Valve
75	Tank Drain Valve
76	Primary Discharge Point Isolation Valve
77	Secondary Discharge Point Isolation Valve
80-99 Manual Valves – Hand valves, check valves, pressure relief valves, etc.	
80	Pump Discharge Isolation Valve
81	Pump Suction Isolation Valve
82	Pump Relief Valve
83	Pump Discharge Throttling Valve
84	Tank to Pump Suction Isolation Valve
85	Check Valve for Pump
86	Pump Suction Drain (or to Calibration Column) Isolation Valve
87	Pump Discharge Drain (or to Calibration Column) Isolation Valve
88	Pump Discharge Crossover to other Pump(s) Isolation Valve

89	Pump Suction Crossover to other Pump(s) Isolation Valve
90	Tank Makeup Water (tap water) Isolation Valve
91	Seal Water / Compressed Air Isolation Valve
92	Seal Water / Compressed Air Control Valve
93	Tank Process Water Isolation Valve
94	Tank Process Water Level Control Valve
95	Tank Drain Valve
96	Primary Discharge Point Isolation Valve
97	Secondary Discharge Point Isolation Valve
98	Surge Relief Isolation Valve
99	Field Isolation Valve
Suffix for multiple pieces of equipment	
-A, -B, -C	Multiple devices alternating operation
-1, -2, -3	Multiple trains operating in parallel
-S, -T, …	Standby device, not normally operating

END OF SECTION

1

SECTION 01110
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Description of Work.
   2. Existing Conditions.
   3. Work Sequence.
   4. Contractor's Use of Premises.

B. Related Sections include but not necessarily limited to:
   1. Division 0 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 – General Requirements.

1.2 DESCRIPTION OF WORK

A. The Work of this Contract, Water Treatment Plant Expansion, is the expansion of the existing surface water treatment plant for the City of Kerrville utilizing Zenon Environmental ultrafiltration membranes.

B. All work done under this Contract shall conform to all governing local or state ordinances and laws. CONTRACTOR shall arrange and pay all cost of permits and fees, and shall confine his operations to the limits set by law.

C. It is the intent of the OWNER to award this project to one CONTRACTOR.

D. Portions of this project may be subject to review and acceptance by various agencies. The CONTRACTOR will be required to coordinate with these agencies for such items as issuance of permits or work orders, inspections during construction, and final acceptance. The agencies for this project that may require coordination include but are not limited to the following:
   1. City of Kerrville Public Works Department
   2. City of Kerrville Building Inspection
   3. Kerr County Public Works Department
   4. Texas Commission on Environmental Quality
   5. Texas Department of Licensing and Registration
   6. U.S. Environmental Protection Agency

1.3 EXISTING CONDITIONS

A. Locate and protect all existing utilities impacted by this project.

B. There are existing overhead electrical power lines located at the project site.
   1. Provide Owner with notice if it appears that the power line will conflict with proposed work.

C. There are existing water lines located at the project site.
   1. Provide Owner with notice if it appears that the water line will conflict with proposed work.

1.4 WORK SEQUENCE

A. Construct work in stages to provide proper coordination with work by Others. Coordinate the construction schedule and operations with the OWNER's representative.

B. Coordinate connections with existing work to ensure timely completion of interfaced items.

1.5 CONTRACTOR'S USE OF PREMISES

A. CONTRACTOR shall limit his use of the premises for Work and for storage, to allow for work by other contractors.

B. Coordinate use of premises under direction of OWNER.

C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

D. Move any stored products, under CONTRACTOR's control, which interfere with operations of the OWNER or separate contractor.

E. Obtain and pay for the use of additional storage or work areas needed for operations.

END OF SECTION

SECTION 01270
MEASUREMENT AND BASIS OF PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. This section defines the method, which will be used to determine the quantities of work performed, or materials supplied, and establishes the basis upon which payment will be made.

B. Related Sections include but not necessarily limited to:
   1. Division 0 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 – General Requirements.

1.2 MEASUREMENT AND PAYMENT FOR LUMP SUM ITEMS

A. Unless noted otherwise in paragraph 1.4, where a bid item is on a lump sum basis, the Contractor shall file with the OWNER a balanced price segregation of his lump sum bid into items similar to the various subdivisions of the general and detailed specifications, the sum of which shall equal the total sum bid. The cost of various materials shall be furnished upon request of the OWNER, and such data will then be used as a basis for making progress estimates. Breakdown of cost shall be itemized by specification section and trade, and distributed to individual applicable units and structures. Where structures, units, equipment, or other components are identified by a specific series or, identification number, utilize said designation throughout cost breakdown.
   1. The Contractor's Project Schedule shall reflect the same breakdown as provided for the Schedule of Values.
   2. Provide detailed breakdown (Schedules of Values) for quantifiable units such as individual piping, conduit runs, and identify other approximate quantities involved to satisfaction of the Owner.
   3. Provide line items as appropriate for construction materials testing to be furnished by the Contractor.
   4. Provide a line item for monthly payment of reoccurring bond and insurance costs, unless a paid invoice can be provided showing the one time payment of these costs.
   5. Provide a line item for monthly payment of reoccurring administration costs such as general supervision, project management, clerical, on-site facilities, and other administration and utility costs.
   6. The schedule of values shall include line items for the start-up of each segregated equipment/system, start-up of the facility as a whole, manufacturer's training, and submission/approval of the preliminary and final operation and maintenance materials, where appropriate.
      a. Allowable cost for start-up, testing, and demonstration for each segregated equipment/system except for the instrumentation and control system designated in Division 13 shall be $25,000 or 10% of the equipment/system cost from the Schedule of Values, whichever is less.
         1) Cost for start-up, testing, and demonstration of the instrumentation and control system may exceed the amounts listed herein, but must be specifically defined on the Schedule of Values.
      b. Allowable cost for Manufacturer's Training shall be $2,500 per eight (8) or less hours of training provided. The allowable cost shall be prorated for training durations specified as greater than eight (8) hours.

c. The combined allowable cost for preliminary and final operation and maintenance materials for each equipment/system shall be $20,000 or 15% of the equipment/system cost from the Schedule of Values, whichever is less. Only 25% of this amount will be paid for the approval of the preliminary manual. The remainder will be paid upon receipt of the required copies of the final manual.

7. Provide separate breakdown for change order items or items requested.
8. Provide an additional breakdown sheet, equivalent to AIA document G703, showing the tabulation format for stored materials. The detail and format of cost breakdown and stored materials tabulation sheet shall be fully approved by Engineer.
   a. Submit this sheet each month with Contractor's Schedule of Values pay request breakdown along with bill of sale, invoice, or other documentation satisfactory to the Owner warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance.

B. Schedules of Estimated Progress Payments
   1. Show estimated payment requests throughout Contract Time aggregating initial Contract Price.
   2. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.3 CASH ALLOWANCES

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:
   1. The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
   2. Contractor's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
   3. In certain cases where the amount of equipment and its arrangement are not specifically known at this time, the cost of installation of equipment is specifically included in the bid item description for the allowance. In this case, the installation cost for the equipment shall be included in the allowance cost, but all costs listed in paragraph 1.3 A.2 shall be included elsewhere in the Contract Price.
   4. Submit, with application for payment, invoice showing date of purchase, from whom the purchase was made, the date of delivery of the product or service, and price, including delivery to the site.

B. Contract settlement and final payment, the Contract Price for any allowance shall be adjusted so that any unused portion of the cash allowance is credited back to the Owner.

1.4 MEASUREMENT AND PAYMENT

A. Item No. 1 - Mobilization
   1. Description - This item shall govern the mobilization of personnel, equipment and supplies at the project site in preparation for the beginning work on contract items and the acquisition of insurance and bonds. Mobilization shall include, but not be limited to the movement of equipment, personnel, material, supplies, etc. to the project site and the establishment of temporary offices and other facilities necessary to the start of the work as well as any upfront cost of bonds and insurance.

2. Measurement - Measurement of the item, "Mobilization" will be by the lump sum as the work progresses. "Mobilization" lump sum shall not exceed seven percent (7%) of the base project bid. A base bid shall be defined as all bid items excluding Item 1, Mobilization and Item 4, Demobilization. A bid containing the above mentioned pay item in excess of seven percent (7%) shall be considered unbalanced and shall be rejected.
3. Payment - Partial payments of the lump sum bid for mobilization will be as follows:
   a. When 1% of the adjusted contract amount for construction items (which is defined as the total contract amount less the lump sum bid for mobilization and demobilization) is earned, 50% of the mobilization lump sum bid will be paid. Insurance and bonds will be paid on the initial request for payment under a sub-heading to mobilization entitled "Insurance and Bonds". The amount paid for insurance and bonds will not exceed 3.5% of the total contract amount for construction items.
   b. When 5% of the adjusted contract amount for construction items is earned, 75% of the mobilization lump sum bid will be paid.
   c. When 10% of the adjusted contract amount for construction items is earned, 100% of the mobilization lump sum bid will be paid.

B. Item No. 2 – Trench Safety Systems
1. Description - This item shall govern the preparation of a trench safety plan by the Contractor and the installation of shoring, sheeting, bracing, sloping, or any other measures that the Contractor determines is necessary to comply with OSHA Safety and Health Regulations for Construction. It shall include the furnishing of all materials, equipment, tools, labor, supervision, and incidentals necessary to complete the work.
2. Measurement - Measurement of the item "Trench Safety Systems" will be by the lump sum.
3. Payment - This item will be paid for at the contract lump sum price for trench safety systems. The lump sum price will be pro-rated based on the length of buried piping installed as compared to the total amount of buried piping include on the Schedule of Values.

C. Item No. 3 – Bid Allowance for the Membrane System
1. Description – This item shall constitute the cash allowance for the purchase of the membrane system from Zenon Environmental Corporation as outlined in their Bid Proposal to the City of Kerrville, dated July 22, 2003.
2. Measurement – Measurement of this item will be by the Allowance amount.
3. Payment – This item will be paid in accordance with the Zenon Environmental Corporation as outlined in their Bid Proposal to the City of Kerrville, dated July 22, 2003.

D. Item No. 4 - Demobilization
1. Description - This item shall govern the demobilization of personnel, equipment and supplies at the project site in preparation for the ending of Work on the Project. Demobilization shall include, but not be limited to the movement of equipment, personnel, material, supplies, etc. off the project site and the establishment of permanent ground cover.
2. Measurement - Measurement of the item, "Demobilization" will be by the lump sum as the work progresses. "Demobilization" lump sum shall be at least four percent (4%) of the base project bid. A base bid shall be defined as all bid items excluding Item 1, Mobilization and Item 4, Demobilization. A bid containing the above mentioned pay item less than four percent (4%) may be considered unbalanced and may be rejected.
3. Payment - Partial payments of the lump sum bid for demobilization will be as follows:
   a. When all major equipment and half of the office/storage trailers have been moved off the site, 50% of the demobilization lump sum bid will be paid.
   b. When all equipment and office/storage trailers have been removed, 75% of the demobilization lump sum bid will be paid.
   c. Upon completion of all work under this contract, specifically the ground cover are accepted, payment for the remainder of the lump sum bid for demobilization will be made.

E. Item No. 5 – Lump Sum Bid for All Work Not Include in Other Bid Items

1. Description - This item shall govern all other work not specifically included in other bid items. It shall include the furnishing of all materials, equipment, tools, labor, supervision, and incidentals necessary to complete the work.
2. Measurement - Measurement of the item " Lump Sum Bid for All Work Not Include in Other Bid Items " will be by the lump sum.
3. Payment - This item will be paid for at the contract lump sum price for the Lump Sum Bid for All Work Not Include in Other Bid Items. The lump sum price will be paid in accordance with the approved Schedule of Values based on the percentage of labor and materials incorporated into the work for each payment item.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

2003/07/30

SECTION 01340
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanics and administration of the submittal process for:
      a. Shop Drawings.
      b. Samples.
      c. Miscellaneous submittals.
      d. Operation and maintenance manuals.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Sections in Divisions 2 through 16 identifying required submittals.

1.2 DEFINITIONS

A. Shop Drawings:
   1. See General Conditions.
   2. Product data and samples are Shop Drawing information.

B. Miscellaneous Submittals:
   1. Submittals other than Shop Drawings.
   2. Representative types of miscellaneous submittal items include but are not limited to:
      a. Work plans and Construction Schedule.
      b. Erosion and Sedimentation Control Plan
      c. NDPES Letter of Intent and other Required SWPPP Submittals
      d. Accident reports
      e. Inspection and test reports
      f. Concrete, soil compaction, and pressure test reports.
      g. HVAC test and balance reports.
      h. Installed equipment and systems performance test reports.
      i. Manufacturer's installation certification letters.
      j. Instrumentation and control commissioning reports.
      k. Warranties.
      l. Service agreements.
      m. Construction photographs.
      n. Survey data.
      o. Cost breakdown (Schedule of Values).

1.3 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings, Samples and Operation and Maintenance Manuals:
   1. Transmit all submittals to:

HDR Engineering, Inc.
2211 South IH-35, Suite 300
Austin, TX 78741
Attn: Cari Harrington

   2. Utilize two copies of attached Exhibit "A" to transmit all Shop Drawings and samples.

3. Utilize two copies of attached Exhibit "B" to transmit all Operation and Maintenance Manuals.
4. All submittals must be from Contractor and bear his approval stamp. Submittals will not be received from or returned to subcontractors.
    a. Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.17D".
    b. Operation and Maintenance Manual submittal stamp may be Contractor's standard approval stamp.
5. Provide submittal information defining specific equipment or materials utilized on the project. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
6. Calculations required in individual specification sections will be received for information purposes only, as evidence calculations have been performed by individuals meeting specified qualifications, and will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.
7. Submittal schedule:
    a. Schedule of Shop Drawings:
        1) Submitted and approved within 14 calendar days of receipt of Notice to Proceed.
        2) Account for multiple transmittals under any specification section where partial, but original submittals will be transmitted.
    b. Shop Drawings:
        1) All shop drawings for the Project are to be submitted and approved prior to 50 percent completion of Project as measured by Contractor's submitted monthly progress payments.
    c. Operation and Maintenance Manuals and Equipment Record Sheets:
        1) Initial submittal within 60 days after date Shop Drawings are approved.

B. Miscellaneous Submittals:
1. Transmit under Contractor's standard letter of transmittal or letterhead.
2. Submit in triplicate or as specified in individual specification section.
3. Transmit to:

HDR Engineering, Inc.
2211 South IH-35, Suite 300
Austin, TX 78741
Attn: Cari Harrington

4. Provide copy of letter of transmittal to Resident Project Representative.
    a. Exception for concrete, soils compaction and pressure test reports.
        1) Transmit one copy to Engineer.
        2) Transmit one copy to location and individual indicated above for other miscellaneous submittals.

1.4 PREPARATION OF SUBMITTALS

A. Shop Drawings:
1. Scope of any submittal and letter of transmittal:
    a. Limited to one Specification Section.
    b. Do not submit under any Specification Section entitled (in part) "Basic Requirements".
2. Numbering letter of transmittal:
    a. Include as prefix the specification section number followed by a series number, "-xx", beginning with "01" and increasing sequentially with each additional transmittal.
    b. If more than one submittal under any specification section, assign consecutive series numbers to subsequent transmittal letters.
3. Describing transmittal contents:

a. Provide listing of each component or item in submittal capable of receiving an independent review action.
b. Identify for each item:
    1) Manufacturer and Manufacturer's drawing or data number.
    2) Contract Document tag number(s).
    3) Unique page numbers for each page of each separate item.

4. Contractor stamping:
    a. General:
        1) Contractor's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
            a) Contractor's signature and date shall be original ink signature.
        2) Letters of transmittal may be stamped only when the scope of the submittal is one item.
        3) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for each page of that item, which shall be stamped with the Contractor's review and approval stamp.
            a) Individual pages or sheets of independent items shall be numbered in a manner that permits Contractor's review and approval stamp to be associated with the entire contents of a particular item and vice-versa.
        4) In the event submittals are transmitted as a single item and found to include multiple independent items, the Owner and Engineer reserve the right to limit review to the single item listed, remove the other items from the submittal and return them not reviewed to the Contractor for coordination, stamping and submittal under a new transmittal number that is not a re-submittal number.
            a) The items not listed in the transmittal letter will not be logged as received, or in any other manner acknowledged as submitted.
    b. Electronic stamps:
        1) Contractor may electronically embed Contractor's review and approval stamp to either the letter of transmittal or a separate index sheet preceding each independent item in the submittal.
        2) Contractor's signature and date on electronically applied stamps shall be original ink signature.
5. Resubmittals:
    a. Number with original root number and a suffix letter starting with "A" on a (new) duplicate transmittal form.
    b. Do not increase the scope of any prior transmittal.
    c. Account for all components of prior transmittal.
        1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
            a) Do not include submittal information for items with prior "A" or "B" Action in transmittal.
        2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
            a) Obtain Engineer's prior approval to exclude items.
6. For 8-1/2 x 11 IN size sheets, provide seven (7) copies of each page for Engineer plus the number required by the Contractor. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed five (5).
7. For items not covered in Paragraph 1.4A.5., submit one reproducible transparency or camera-ready quality print and one additional print of each drawing until approval is obtained. Utilize mailing tube; do not fold. The Engineer will mark and return the reproducible to the Contractor for his reproduction and distribution.
8. Provide clear space (3 IN SQ) for Engineer stamping of each component defined in 1.4-A.4.
9. Contractor shall not use red color for marks on transmittals. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible. Outline Contractor marks on reproducible transparencies with a rectangular box.
10. Transmittal contents:

a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
b. Identify equipment or material use, tag number, drawing detail reference, weight, and other project specific information.
c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
d. Submit items like equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 IN pages. Indicate exact item or model and all options proposed.
e. Include legible scale details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout drawings, parts catalogs, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data. Arrange data and performance information in format similar to that provided in Contract Documents. Provide, at minimum, the detail provided in the Contract Documents.
f. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

B. Samples:
1. Identification:
a. The CONTRACTOR will submit three (3) copies of each sample for review. Samples will be retained, but review action will be returned to CONTRACTOR.
b. Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Standard Specification section or drawing detail reference, color, range, texture, finish and other pertinent data.
c. If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.
2. Include application specific brochures, and installation instructions.
3. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.
4. Resubmit samples of rejected items.

C. Operation and Maintenance Manuals:
1. Number transmittals for Operation and Maintenance Manual with original root number of the approved Shop Drawing for the item.
2. Submit three copies until approval is received.
3. Identify resubmittals with the original number plus a suffix letter starting with "A."
4. Submit Operation and Maintenance Manuals printed on 8-1/2 x 11 IN size heavy first quality paper with standard three-hole punching and bound in stiff metal hinged binder constructed as a three-ring style. Provide binders with titles on front and on spine of binder. Tab each section of manuals for easy reference with plastic-coated dividers. Provide index for each manual. Provide plastic sheet lifters prior to first page and following last page.
5. Reduce drawings or diagrams bound in manuals to an 8-1/2 x 11 IN or 11 x 17 IN size. However, where reduction is not practical to ensure readability, fold larger drawings separately and place in vinyl envelopes which are bound into the binder. Identify vinyl envelopes with drawing numbers.
a. Provide fly-leaf for each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment and provide with heavy section dividers with numbered plastic index tabs.
1) Secure numbers within index tabs or use preprinted tabs.
b. Provide each manual with title page, and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
c. Cover and Spine Identify each volume with typed or printed title "OPERATION AND MAINTENANCE MANUAL, VOLUME NO. - OF -", if applicable, and list:

1) Project title.
2) Designate the system or equipment for which it is intended.
3) Identity of separate structure as applicable.
4) Identity of equipment tag number and Specification section.

d. Assemble and bind material in same order as specified, as much as possible.
e. Final copy shall not have fax copies or photocopies of manufacturer information. Each manual shall have original materials.
f. Do not use Project record documents as maintenance manual drawings.
g. The contents shall be edited to be specific to this Project. All superfluous information not pertinent to the Project shall be deleted, not marked out.

6. Transmittal contents:
   a. Submission of Operation and Maintenance Manuals is applicable but not necessarily limited to:
      1) Section 11065 Pumping Equipment – Sump
      2) Section 11072 Pumping Equipment – Vertical Turbine (Line Shaft)
      3) Section 11078 Pumping Equipment – Seal-Less Magnetic Drive Pumps
      4) Section 11079 Pumping Equipment – Chemical Metering Pumps
      5) Section 11922 Polyethylene Chemical Storage Tanks
      6) Section 11947 In-Line Static Mixer
      7) Section 11949 Mixers: Flocculator
      8) Section 13121 Metal Building Systems
      9) Sections 13440 – 13448 Instrumentation
      10) Section 14301 Hoists Trolleys and Monorails
      11) Section 14305 Bridge Cranes
      12) Section 15100 Valves – Basic Requirements
      13) Section 15103 Butterfly Valves
      14) Section 15104 Ball Valves
      15) Section 15106 Check Valves
      16) Section 15114 Miscellaneous Valves
      17) Section 15440 Plumbing Fixtures and Equipment
      18) Section 15605 HVAC: Equipment
      19) Section 16135 Electrical: Exterior Underground
      20) Section 16230 Standby Engine Generator
      21) Section 16265 Variable Frequency Drives – Low Voltage
      22) Section 16410 Safety Switches
      23) Section 16440 Switchboards
      24) Section 16441 Panelboards
      25) Section 16442 Motor Control Equipment
      26) Section 16460 Dry-Type Transformers
      27) Section 16490 Overcurrent and Short Circuit Protective Devices
      28) Section 16491 Low Voltage Surge Protection Devices (SPD)
      29) Section 16492 Electrical Metering Devices
      30) Section 16493 Control Equipment Accessories
      31) Major equipment.
      32) Equipment used with electrical motor loads of 1/6 HP nameplate or greater.
      33) Specialized equipment including valves and instrumentation and control system components for HVAC and process systems such as meters, recorders, and transmitters.
      34) Valves greater than 12 IN DIA.
   b. Operation and maintenance manuals shall include, but not necessarily be limited to, the following detailed information, as applicable:
      1) Equipment function, normal operating characteristics, limiting operations.
      2) Assembly, disassembly, installation, alignment, adjustment, and checking instructions.
      3) Operating instructions for start-up, routine and normal operation, regulation and control, shutdown, and emergency conditions.

4) Lubrication and maintenance instructions.
5) Guide to "troubleshooting."
6) Parts list and predicted life of parts subject to wear.
7) Outline, cross-section, and assembly drawings; engineering data; and electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, word description of wiring diagrams and interconnection diagrams.
8) Test data and performance curves.
9) A list of recommended spare parts with a price list and a list of spare parts provided under these specifications.
10) Copies of installation instructions, parts lists or other documents packed with equipment when delivered.
11) Instrumentation or tag numbers relating the equipment back to the Contract Documents.
12) Include a filled-out copy of the Equipment Record Sheet, Exhibits C1 and C2 as the first page(s) of each Operation and Maintenance Manual. Complete maintenance requirements in detail. Simple reference to the Manual is not acceptable.
13) For equipment items involving components or subunits, an Equipment Record Sheet for each operating component or subunit is required.

c. Final Manuals.
1) If different than accepted Preliminary Manuals:
a) Provide adequate copies of any necessary supplemental material, including revised table of contents.
b) Instructions for insertion of supplemental material in unreturned sets.
c) Electronic files shall be final and require no additional editing or manipulation. If changes need to be made, resubmit disks.
2) Operation and Maintenance Manual submittals shall contain CONTRACTOR's standard approval stamp.
3) If Final Manuals are acceptable, CONTRACTOR will be so notified.
4) If rejected, and at OWNER's option:
a) All copies will be returned to CONTRACTOR for revision, or;
b) All copies will be retained by OWNER and the necessary revision data will be requested from CONTRACTOR.
5) Submit five paper (hard) copies of Final Manuals.
6) Submit two copies of the complete and final O&M manual in electronic format on separate disks. Electronic format shall be portable document format (pdf) latest version of Adobe at the time of submission.
a) Each electronic manual shall be a single file.
b) Provide a linked table of contents (reflecting the hard copy manual) that allows users to navigate to each section and sub-section of the manual from the table of contents.
c) Provide bookmarks for all table of contents headings, sub-headings, tables, and figures allowing navigation through the Adobe pdf bookmark window. Nesting of bookmarks to be the same as the hardcopy table of contents.
d) Links will standard blue and underlined.
e) Text/font shall match the hard copy manual.
f) For scanning of the manuals:
(1) Text-only content can be scanned using at least 1-bit line art or grayscale settings to help reduce the file size.
(2) Image content should be scanned in grayscale unless the image is in color.
(3) Resolution shall be 300 dpi or greater to allow for character recognition.
(4) Capture language shall be English with the pdf output style set to "Original Image with Hidden Text" to allow for searching the content of the document.

1.5 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:
   1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
      a. A - FURNISH AS SUBMITTED.
      b. B - FURNISH AS NOTED (BY ENGINEER).
      c. C - REVISE AND RESUBMIT.
      d. D - REJECTED.
      e. E - ENGINEER'S REVIEW NOT REQUIRED.
   2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp. Drawings not stamped by the Contractor or stamped with a stamp containing language other than that specified in Paragraph 1.3A.4.a., will not be reviewed for technical content and will be returned without any action.
   3. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
   4. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
      a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference). One copy or the one transparency of the "C" or "D" drawings will be marked up and returned to the Contractor. Correct and resubmit items so marked.
      b. Items marked "A" or "B" will be fully distributed.
      c. If a portion of the items or system proposed are acceptable, however, the major part of the individual drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action. This is at the sole discretion of the Engineer. In this case, some drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package." Distribution to the Owner and field will not be made (unless previously agreed to otherwise).
   5. Failure to include any specific information specified under the submittal paragraphs of the specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.
   6. If a shop drawing submittal cannot returned with Action "A" or "B" after the second resubmittal (suffix letter B), then the Contractor will be pay the Owner for the Engineer's time to review the resubmittal (suffix letter C) and any subsequent resubmittal. The hourly rate will be $175.00 per hour. The Engineer will keep track of this time and bill the Owner separately for this time.
   7. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a prior submittal, will be returned with Action "E. Engineer's Review Not Required."
   8. Samples may be retained for comparison purposes. Remove samples when directed. Include in bid all costs of furnishing and removing samples.
   9. Approved samples submitted or constructed, constitute criteria for judging completed work. Finished work or items not equal to samples will be rejected.

B. Operation and Maintenance Manuals:
   1. Engineer will review and indicate one of the following review actions:
      a. ACCEPTABLE.
      b. FURNISH AS NOTED.
      c. REVISE AND RESUBMIT.
      d. REJECTED.

2. Acceptable submittals will be retained with the transmittal form returned with a request for five (5) additional paper and two (2) electronic copies.
3. Deficient submittals will be returned along with the transmittal form, which will be marked to indicate deficient areas.

END OF SECTION

EXHIBIT A

Shop Drawing Transmittal No. _____-____

Project Name:		Date Received:
Project Owner:		Checked By:
Contractor:	HDR Engineering, Inc.	Log Page:
Address Attn:	Address: Attn:	HDR No. Spec Section: Drawing/Detail No. 1sr Sub. ☐ ReSub. ☐
Date Transmitted:	Previous Transmittal Date:	

Item No.	No. Copies	Description	Manufacturer	Mfr/Vendor Dwg or Data No.	Action Taken *

Remarks:

* The Action Designated Above is in Accordance with the Following Legend:

A - Furnish as Submitted

B - Furnish as Noted

C - Revise and Submit
1. Not enough information for review
2. No reproducibles submitted.
3. Copies illegible.
4. Not enough copies submitted.
5. Wrong sequence number.
6. Wrong resubmittal number.
7. Wrong spec section.
8. Wrong form used.
9. See Comments.

D - Rejected

E - Engineer's review not required.
1. Submittal not required.
2. Supplemental information. Submittal retained for informational purposes only.
3. Information reviewed and approved on prior submittal.
4. See Comments.

Comments:

By _____ Date _____

Distribution: Contractor ☐ File ☐ Field ☐ Owner ☐ Other ☐

EXHIBIT B

O&M Manual Transmittal No. _____-_____

Project Name:		Date Received:
Project Owner:		Checked By:
Contractor:	Owner:	Log Page:
Address: Attn:	Address: Attn:	HDR No.: 1st. Sub. ☐ ReSub. ☐

Date Transmitted:	Previous Transmittal Date:

No. Copies	Description of Item	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:

To:

From:

HDR Engineering, Inc.

Date:

* The Action Designated Above is in Accordance with the Following Legend:

A - Acceptable, Provide five additional Copies

B - Furnish as Noted

C - Revise and Resubmit
This Operation and Maintenance Manual Submittal is deficient in the following area:

1. Equipment record sheets.
2. Functional description.
3. Assembly, disassembly, installation, alignment, adjustment & checkout instructions.
4. Operating instructions.
5. Lubrication & maintenance instructions.
6. Troubleshooting guide.
7. Parts list and ordering instructions.
8. Organization (index and tabbing).
9. Wiring diagrams & schematics specific to installation.
10. Outline, cross section & assembly diagrams.
11. Test data & performance curves.
12. Tag or equipment identification numbers.
13. Other - see comments.

D - Rejected

Comments:

By

Date

Distribution: Contractor ☐ File ☐ Field ☐ Owner ☐ Other ☐

C1

EQUIPMENT MAINTENANCE DATA SUMMARY

Equipment Maintenance Data Summary

Project Name		Page of
Equip. Description	Date Installed	Date Started
Equip. Location	Cost	Estimated Life
Project Equip. Tag No.	Shop Dwg. Trans. No.	Spec. Sec.
Equip. Manuf.		
Manuf. Address		Phone
Local Vendor		
Vendor Address		Phone

BREAK-IN MAINTENANCE REQUIREMENTS (INITIAL OIL CHANGES, ETC.)	D	W	M	Q	S	A	Hours

PREVENTIVE MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

ELECTRICAL NAMEPLATE DATA

Equip.			
Make			
Serial No.		ID No.	
Model No.		Frame No.	
HP	V.	Amp.	HZ
PH	RPM	SF	Duty
Code	Ins. Cl.	Des.	Type
Nema	C Amb.	Temp. Rise	Rating
Misc.			

MECHANICAL NAMEPLATE DATA

Equip.			
Make			
Serial No.		ID No.	
Model No.		Frame No.	
HP	RPM	Cap.	Size
TDH	Imp. Sz.	Des.	CFM
PSI	Assy. No.	Case No.	
Misc.			

Lubricant information on following page

Lubrication Summary

Equipment Description	Project Equip. Tag No.	Page of
Lubricant Point		

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
1					
2					
3					
4					
5					

Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
1					
2					
3					
4					
5					

Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
1					
2					
3					
4					
5					

Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
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Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
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Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
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3					
4					
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Lubricant Point

Lubr	Manufacturer	Product	AGMA#	SAE#	ISO
1					
2					
3					
4					
5					

1994/12/07

SECTION 01560
ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Addresses:
   1. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

1.2 SUBMITTALS

A. Shop Drawings:
   1. See Section 01340.
   2. Prior to the start of any construction activities submit:
      a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
      b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.
      c. Storm Water Pollution Prevention Plan (SWPPP) as required by NPDES General Permit. Since Owner and Engineer do not control construction means, methods, or practices, Owner will receive this submittal from Contractor for record purposes. Contractor is responsible for providing a SWPPP that is appropriate for the construction methods selected in compliance with NPDES regulations.
      d. A copy of the approved pollution prevention plan.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SECTION)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.

B. Land Protection:
   1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition. Contractor shall confine his construction activities to areas defined for work within the Contract Documents.
   2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
   3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
   4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
   5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.

6. Except for areas designated by the Contract Documents to be cleared and grubbed, the Contractor shall not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the Engineer. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense.

C. Surface Water Protection:
   1. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Engineer. Physically retard the rate and volume of run-on and runoff by:
      a. Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rocked outlet protection, sediment traps and temporary basins.
      b. Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.
      c. Providing Construction sites with graveled or rocked access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
   2. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.

D. Solid Waste Disposal:
   1. Collect solid waste on a daily basis.
   2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
   3. Provide disposal of nondegradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Engineer and regulatory agencies.
   4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

E. Fuel and Chemical Handling:
   1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
   2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
   3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
   4. The Contractor shall provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

F. Control of Dust:
   1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants. The use of chemical agents such as calcium chloride must be approved by the State of Texas DOT.
   2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
   3. The Engineer will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

G. Burning:
   1. Do not burn material on the site. If the Contractor elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all agency regulations.

H. Control of Noise:

1. Control noise by fitting equipment with appropriate mufflers.

I. Completion of Work:
   1. Upon completion of work, leave area in a clean, natural looking condition.
   2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.

J. Historical Protection:
   1. If during the course of construction, evidence of deposits of historical or archaeological interests is found, cease work affecting find and notify Engineer. Do not disturb deposits until written notice from Engineer is given to proceed.
   2. The Contractor will be compensated for lost time or changes in construction to avoid the find based upon normal change order procedures.

END OF SECTION

1

1992/02/17

SECTION 01600
PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Scheduling of product delivery.
   2. Packaging of products for delivery.
   3. Protection of products against damage from:
      a. Handling.
      b. Exposure to elements or harsh environments.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

C. Payment:
   1. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved shop drawings.
      a. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

1.2 DELIVERY

A. Scheduling:
   1. Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.

B. Packaging:
   1. Deliver products or equipment in manufacturer's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

C. Identification:
   1. Clearly and fully mark and identify as to manufacturer, item, and installation location.

D. Protection and Handling:
   1. Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SECTION)

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Manufacturer's Instruction:
   1. Protect all products or equipment in accordance with manufacturer's written directions.
      a. Store products or equipment in location to avoid physical damage to items while in storage.
      b. Handle products or equipment in accordance with manufacturer's recommendations and instructions.
   2. Protect equipment from exposure to elements and keep thoroughly dry.

3. Store pumps, motors, electrical equipment, and other equipment having antifriction or sleeve bearings in weathertight warehouses which are maintained at a temperature of at least 50 DegF.
4. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

3.2 STORAGE FACILITIES

A. Temporary Storage Building may be required and Contractor shall provide to store all equipment, the membrane system in particular. If deemed necessary should the equipment not be protected on site:
1. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment.
2. Provide methods of storage of products and equipment off the ground.
3. Provide this structure within 60 days after Notice to Proceed. Locate building on-site in location approved by Engineer. Remove building from site prior to startup and demonstration period.

3.3 FIELD QUALITY CONTROL

A. Inspect Deliveries:
1. Inspect all products or equipment delivered to the site prior to unloading. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area:
1. Monitor storage area to ensure suitable temperature and moisture conditions are maintained.

END OF SECTION

2000/04/28

SECTION 01601
JOB CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Job conditions.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

1.2 PROJECT CONDITIONS

A. Prior to installation of material, equipment and other work, verify with Subcontractors, material or equipment manufacturers, and installers that the substrate or surface to which those materials attach is acceptable for installation of those materials or equipment. (Substrate is defined as building surfaces to which materials or equipment is attached to i.e., floors, walls, ceilings, etc.).

B. Correct unacceptable substrate until acceptable for installation of equipment or materials.

END OF SECTION

1

2003/07/16

SECTION 01640
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. The procedure for requesting substitution approval for a product which is specified by descriptive or performance criteria or defined by reference to one or more of the following:
      a. Name of manufacturer.
      b. Name of vendor.
      c. Trade name.
      d. Catalog number.
   2. This Section does not address substitutions for major equipment. See "Instructions to Bidders."

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

C. Requests for Substitution - General:
   1. Base all bids on materials, equipment, and procedures specified.
   2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog numbers, provided said products are capable of accomplishing the same tasks as the products specifically indicated.
   3. Other types of equipment and kinds of material may be acceptable.

1.2 QUALITY ASSURANCE

A. In making request for substitution or in using an approved product, Contractor represents:
   1. He has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform function for which it is intended.
   2. He will provide same guarantee for substitute item as for product specified.
   3. He will coordinate installation of accepted substitution into work, to include building modifications if necessary, making such changes as may be required for work to be complete in all respects.
   4. He waives all claims for additional costs related to substitution which subsequently arise.

1.3 DEFINITIONS

A. Product: Manufactured material or equipment.

1.4 PROCEDURE FOR REQUESTING SUBSTITUTION

A. Considered after award of Contract.
   1. Considered only if:
      a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,
      b. Contractor proposes a cost reduction incentive to the Owner.

B. Written requests through Contractor only.

C. Transmittal Mechanics:

1. Follow the transmittal mechanics prescribed for Shop Drawings in Section 01340. Product substitution will be treated in a manner similar to "deviations," as described in Paragraph 1.4A.9.f. of Section 01340. List the letter describing the deviation and justifications on the transmittal form in the space provided under the column with the heading "DESCRIPTION." Include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in Paragraph D below.

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

1.5 APPROVAL OR REJECTION

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

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

C. In event substitution results in a change of Contract price or time, provisions in General Conditions will be applied for adjustment.

D. Substitutions will be rejected if:
   1. Submittal is not through the Contractor with his stamp of approval.
   2. Requests are not made in accordance with this Section.
   3. In the Engineer's opinion, acceptance will require substantial revision of the original design.
   4. In the Engineer's opinion, substitution will not perform adequately the function consistent with the design intent.

END OF SECTION

SECTION 01650
FACILITY STARTUP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Procedures and actions required of the Contractor, which are necessary to achieve a Letter of Conditional Approval and Certificate of Acceptance.
   a. Pre-Demonstration Period
      1) Manufacturer's Field Services
      2) System Startup
   b. Demonstration Period
      1) Functional Tests
      2) Performance Test
2. Requirements for acceptance Submittals.

B. Related Sections include but are not necessarily limited to:
1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 1 - General Requirements.
3. Section 11005 - Equipment: Basic Requirements.
4. Section 13440 - Instrumentation for Process Control: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Reference Standards:
1. American National Standards Institute (ANSI)/American Water Works Association (AWWA).
   a. ANSI/AWWA B301 – Liquid Chlorine.
   b. ANSI/AWWA B302 – Ammonium Sulfate.
   c. ANSI/AWWA B408 – Liquid Polyaluminum Chloride.
   d. ANSI/AWWA B501 – Sodium Hydroxide (Caustic Soda)
   e. ANSI/AWWA B600 – Powdered Activated Carbon.
2. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)
   a. ANSI/NSF 60 – Drinking Water Chemicals – Health Effects
3. U.S. Environmental Protection Agency
   a. Membrane Filtration Guidance Manual (Proposed draft)

B. Qualifications:
1. Manufacturer's Representative
   a. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, system, or subsystem. Sales representatives or agents of the manufacturer will not be acceptable.
   b. Representatives are subject to acceptance by OWNER. No substitute representatives will be allowed unless prior written approval by OWNER has been given.

1.3 DEFINITIONS

A. System: The overall process, or a portion thereof, that performs a specific function. A system may consist of the entire facility or two or more subsystems as well as two or more types of equipment.

B. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
   1. Finishing construction work to ensure the Project has reached a tentative state of Substantial Completion pending completion of the Demonstration Period.
   2. Manufacturer's Field Services
      a. Installation Certification
      b. Personnel training.
   3. Start-up of Systems

C. Demonstration Period: A period of time following the Pre-Demonstration Period, during which the Contractor initiates process flow through the facility and operates the facility without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the facility as evidence of Substantial Completion. Demonstration Period includes the following steps.
   1. Functional Testing and Performance Testing.
   2. Disinfection of Facilities.
   3. May include follow-up (post operation) Personnel training, if required in individual specifications sections.
   4. Completion of all submittals and work to allow Owner to issue Final Acceptance.

D. Functional Tests: A test or tests in the presence of the OWNER to demonstrate that individual installed equipment or systems or subsystems meet manufacturer's installation and adjustment requirements and other requirements specified including, but not limited to, noise, vibration, alignment, speed, proper electrical and mechanical connections, thrust restraint, proper rotation, and initial servicing.

E. Performance Test: A test performed in the presence of the OWNER and after all required functional tests, to demonstrate and confirm without exceeding specified downtime limitations that the equipment and/or system meet the specified performance requirements.

F. Protection, Cleaning, and Disinfection of Facilities: See Section 01733.

G. Letter of Conditional Approval: See Division 0, General Conditions.

H. Substantial Completion: See Division 0, General Conditions.

I. Final Acceptance: See Division 0, General Conditions.

1.4 SUBMITTALS

A. See Section 01312.

B. See Section 01340.

C. See Section 13440.
   1. Include instrumentation and control activities in all plans, schedules, notices and other submittals required in this section.
   2. Additional requirements listed in Section 13440 include:
      a. Testing Submittals for instrumentation and control.
      b. Training Submittals for instrumentation and control.

D. Submit in chronological order listed below (as applicable) prior to the completion of the Pre-Demonstration Period.
   1. Master operation and maintenance training schedule:
      a. Submit 21 days (minimum) prior to the start of equipment installation.
      b. Schedule to include:
         1) Target date and time for installation completion.
         2) Target date and time for Owner witnessing of each system initial startup.

3) Target date and time for Operation and Maintenance training for each system, both field and classroom.
a) Schedule to allow for multiple sessions when several shifts are involved.
4) Target date for initiation of Demonstration Period.
c. Submit for review and approval by Owner and revise as necessary for acceptance.
d. Include holidays observed by Owner.
e. Attend a schedule planning and coordination meeting 90 calendar days prior to first anticipated training session.
1) Provide a status report and schedule-to-complete for requirements prerequisite to manufacturer's training.
2) Identify initial target dates for individual manufacturer's training sessions.
f. Schedule to be resubmitted until approved
g. Adjust training schedule to ensure training of appropriate personnel as deemed necessary by OWNER and to allow full participation by manufacturer's representatives.
h. Adjust schedule for interruptions in operability of equipment.
i. All training must be complete at least 14 days prior to initiation of Demonstration Period.
j. Owner reserves the right to insist on a minimum 7 days' notice of rescheduled training session not conducted on master schedule target date for any reason.

2. Pre-Demonstration Start-up Plan
a. Schedule for Manufacturer's installation certification and start-up of equipment or systems.
1) Submit at least 21 days prior to first system start-up.
2) Indicate plan, procedures, checklist, and log format.
b. Include plan for Management of Water Used for Start-up as required in this Section.
1) Describe use of clean water or product flow (raw water from Well Field) for start-up of various systems and how water will be provided, handled, and disposed.
c. Include log/documentation format. Utilize Manufacturer's Certificate of Proper Installation Form and supplement as necessary.
1) Documentation shall include:
a) Log and description of problems, outages, failures, and alarms.
b) Description of any corrective action taken.
c) Log of calibration settings.
d) Log of water quality test reports and any other testing performed to prove acceptable operation of facilities.
e) Any calculations or pertinent information.
f) Other information requested by Owner during review
2) See Section 13440 for additional instrumentation and controls requirements.

3. Pre-Demonstration Period Equipment Startup Notices
a. Provide written request to Owner to witness each system pre-demonstration startup.
1) Request to be received by Owner minimum 1 week before start-up activities.

4. Training Materials
a. Submit written outlines of proposed training sessions not less than 21 days prior to scheduled training.
b. Provide complete training materials to include operation and maintenance data as required in this section to be retained by trainee.
c. Upon completion of training session, submit log of attendees and copy of materials distributed and retained by trainees.

5. Notice of Training Session
a. Submit Notice of Training Session to confirm date, time, location, and agenda of each training session not less than 7 days prior to each session so that OWNER may schedule staff.
b. Owner reserves the right to insist on a minimum 7 days notice of rescheduled training session not conducted on notified date for any reason.

c. Unless specified in individual specification sections, training sessions may not be held until systems/equipment have been started-up, the corresponding final O&M Manuals have been approved and delivered per Section 01340, and the corresponding Training Materials have been submitted.

6. Quality Control Submittals
   a. Manufacturer's Certificate of Proper Installation
      1) When specified in the individual Specifications, submit certificate certifying:
         a) The product or system has been installed in accordance with the manufacturer's recommendations, inspected by a manufacturer's authorized representative, and serviced with the proper lubricants.
         b) Necessary safety equipment has been properly installed.
         c) Electrical and mechanical connections have been made meeting quality and safety standards and as required.
         d) Free from undue stress imposed by exterior connections or loads.
         e) Adjustments have been made and the product or system is ready for testing, facilities startup, and operation.
      2) Submit on form appended to this section.
      3) See Section 13440 for additional instrumentation and controls requirements.
   b. Certificate of Successful Startup:
      1) Prepare and submit upon completion of successful testing and startup of respective equipment system, subsystem or component.
   c. Log of manufacturer's representative present.
   d. Completed log/checklists for start-up of each system.
   e. Certifications of calibration for analytical instruments and testing equipment.
   f. See Section 13440 for additional instrumentation and controls requirements.
7. Certified Operator Qualifications
   a. Submit documentation demonstrating that the Certified Operator to oversee production of potable water from the facility meets the requirements set forth herein.
8. Demonstration Period Plan
   a. Functional and performance test plan and schedule for testing and demonstration of equipment, units, and systems.
   b. Integrate major activities required for demonstration of instrumentation and control systems as described in Section 13440.
   c. Submit at least 21 days prior to start of related testing.
      a) Indicate test plan, procedures,
   d. Include scheduling of Disinfection of Facilities.
   e. Include plan for Management of Water Used for Demonstration as required in this Section.
      1) Describe use of water or product flow (raw water from reservoir or river) for demonstration and how water will be provided, handled, and disposed.
   f. Include log/documentation format. Utilize Manufacturer's Certificate of Proper Installation Form and supplement as necessary.
      1) Documentation shall include:
         a) Operational scenarios utilized or simulated during demonstration.
         b) Log and description of problems, outages, failures, and alarms.
         c) Description of any corrective action taken.
         d) Log of changes in operations, settings, flows, etc.
         e) Log of water quality test reports and any other testing performed to prove acceptable operation of facilities.
         f) Any calculations or pertinent information.
         g) CONTRACTOR's written certification that the equipment or system performs as specified
         h) Other information requested by Owner during review
   g. See Section 13440 for additional instrumentation and controls requirements.
9. Disinfection Plan as defined in Section 01733.
   a. Submit with Demonstration Plan.

10. Notice of Completion of Pre-Demonstration Period:
    a. File Contractor's Notice that all Pre-Demonstration Period tasks are completed and project is ready for Demonstration Period.
        1) Notice represents that CONTRACTOR certifies that the project has reached a state of tentative Substantial Completion and will be Substantially Completed after successful completion of Demonstration Period.
        2) Notice shall include a Request for Inspection.
        3) Notice shall represent that all Pre-Demonstration tasks have been completed, specifically including the following:
            a) Pre-Demonstration start-up of systems.
                (1) Notice give to Owner for each system start-up.
            b) Personnel Training.
            c) Quality Control Submittals.
            d) Approval and submission of all shop drawings, O&M Manuals, and Miscellaneous Submittals.
            e) Receipt of all specified items from manufacturers or suppliers as final items prior to initiation of Demonstration Period.
                (1) Includes any spare parts and special tools.
11. Demonstration Period Notice of Test
    a. Submit Notice of Test (functional or performance) to confirm date, time, location, and plan for of each Demonstration Period test.
        1) Submit not less than 10 days prior to each functional test.
        2) Submit not less than 21 days prior to performance test.
    b. Owner reserves the right to insist on a minimum 10 days notice of rescheduled tests not conducted on notified date for any reason.
12. Demonstration Period Test Reports.
    a. To be submitted at the completion of the Demonstration Period.
    b. Provide functional and performance log/testing reports, in a format acceptable to OWNER.
    c. Provide certification that function and performance test has been completed and is acceptable for each piece of equipment.

1.5 COST OF STARTUP

A. Contractor to pay for all costs associated with Facility startup and Pre-Demonstration and Demonstration Periods, except for the treatment chemicals used as well as the connection costs for and electricity used from the main service.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 GENERAL

A. Facility Startup is divided into Two Periods:
    1. Pre-Demonstration Period including:
        a. Completion of construction work to bring Project to a state of tentative Substantial Completion.
        b. Startup of Systems and Equipment.
        c. Manufacturer's Field Services.
            1) Installation Certification.
            2) Training of Personnel.
        d. Instrumentation and Control Start-up
            1) Factory Demonstration Test

2) I/O Checkpoint Test.
e. Completion of the filing of all required submittals.
f. Filing of Contractor's Notice of Completion of Pre-Demonstration Period.

2. Demonstration Period including:
a. Functional Testing.
b. Performance Testing.
c. Instrumentation and Control System Testing.
1) Site Demonstration Test
2) Site Availability Test
d. May include follow-up (post operation) Personnel Training, if required in individual specifications sections.

3.2 MANAGEMENT OF WATER USED FOR START-UP AND DEMONSTRATION

A. Water to fill and start the plant will be available from the Owner from the existing City of Kerrville water treatment plant and raw water from the adjacent Guadalupe River.

B. General Requirements
1. Contractor shall include management and handling of water into the plans submitted for the Pre-Demonstration and Demonstration Periods.
2. Coordinate schedule of water needs with the Owner to ensure that water is available.
3. All "waste" water may be pumped into the existing sanitary grinder pump station or into the existing sludge lagoons.
a. All neutralized chemical cleaning solutions shall be pumped to the existing sludge lagoons.
4. Untreated raw water may not be placed in the Clearwell or used as a supply source for chemical feed systems.
a. Raw water must undergo treatment to full compliance with TCEQ requirements for potable water prior to introducing into the clearwell or chemical feed systems.
5. Note that finished water cannot be delivered to the City's distribution system unless finished water meets TCEQ potable water standards.
a. OWNER must approve quality prior to distribution.

C. Water Management Basic Sequence
1. A basic sequence for filling the treatment facilities with water and beginning start-up of plant systems is listed below.
2. As part of the Pre-Demonstration Start-up Plan and Demonstration Plan, Contractor may enhance these general requirements with Owner approval or propose alternative approaches for approval.
a. See subsequent paragraphs for requirements related to Alternative Approaches.
3. Basic Sequence
a. Complete testing of all structures and piping, underground and above, using potable water.
b. Fill the raw water pipeline up to the Membrane Building with water from the Guadalupe River.
c. Operate the ferric sulfate feed system using potable water to begin injecting the coagulant into the raw water prior to the flocculation basin.
d. Allow water to enter membrane basins through the flocculation basin.
e. Begin the commissioning of the membranes.
f. All waste water to be pumped to the existing raw water feed line to the existing clarifier, pumped to the existing backwash return basin or the existing sludge lagoons.
g. Initiate commissioning of the membrane system, Functional Tests and instrumentation and control Site Demonstration Test of all systems with the plant in this mode.
h. When testing indicates that facilities are ready to begin delivery of water to the City's Distribution System, drain water from the process units and piping to be disinfected and complete Facility Disinfection per Section 01733. Make connection to the existing finished water line that runs to the existing clearwell.

i. Complete remaining Functional Tests and instrumentation and control Site Demonstration Test. Begin Performance Testing and instrumentation and control Site Availability Tests. Note that a Certified Water Treatment Plant Operator must be provided to oversee plant operations when the facility is operated to produce potable water meant for consumption.

j. Once all testing is complete and potable water is being produced, pump permeate to the clearwell.

D. Alternative Approaches

1. If Contractor desires, Alternative Approaches may be proposed for Management of Water During Start-up and Demonstration.

3.3 PRE-DEMONSTRATION PERIOD

A. Completion of Construction Work:

1. Complete the work to bring the Project to a state of tentative substantial completion pending demonstration.

B. Equipment Startup:

1. Requirements for individual items of equipment are included in Divisions 2 through 16 of these Specifications.
2. Prepare the equipment so that at completion of start-up it will operate properly and safely and be ready for personnel training and to demonstrate functional integrity during the Demonstration Period.
3. Prior to start-up of the facilities, the CONTRACTOR shall have prepared and pre-tested all equipment insofar as possible to check its ability for sustained operation, including inspections and adjustments by manufacturer's servicemen.
4. Prior to start-up, the CONTRACTOR shall prepare a schedule detailing the proposed start-up and plans for manpower and auxiliary facilities to be provided. The start-up schedule is subject to approval of the OWNER.
5. After the facilities are sufficiently complete to permit start-up, the CONTRACTOR shall furnish competent personnel to start-up the facilities. The CONTRACTOR will be responsible for start-up of all facilities constructed under this Contract.
6. During the start-up period the CONTRACTOR shall check and provide for satisfactory mechanical operation of the facilities. Insofar as possible, the manufacturer's representatives shall be present during this period to instruct the system operators in the care, operation, and maintenance of the equipment.
7. Start-up by the CONTRACTOR shall include all mechanical facilities such as pumps, compressors, and like equipment, and the pumping, and electrical/control systems.
8. Permanent plant power service is required for testing and initial start-up. The CONTRACTOR shall make all arrangements to provide this power service via the permanent electrical service facilities.
9. The CONTRACTOR shall pay for the cost of all fuel, oil, and consumables. At the end of the start-up period, the OWNER will assume responsibility for the cost of fuel, electricity and other consumables, provided the system is operating satisfactorily.
    a. Owner shall provide chemicals to fill each chemical feed system bulk storage facility.
10. Perform Equipment start-up to extent possible without introducing flow.
    a. Test tanks, pumping and similar equipment requiring a fluid, using clean water.
11. Introduce flow to complete Equipment Startup.
12. General Facility Start-up Activities Include:
    a. Cleaning.
    b. Removing temporary protective coatings.
    c. Flushing and replacing greases and lubricants, where required by manufacturer.
    d. Lubrication.
    e. Check shaft and coupling alignments and reset where needed.
    f. Check and set motor, pump and other equipment rotation, safety interlocks, and belt tensions.

g. Check and correct if necessary leveling plates, grout, bearing plates, anchor bolts, fasteners, and alignment of piping which may put stress on pumping equipment connected to it.
h. All adjustments required.

13. Provide initial filling of lubricants and all other required operating fluids.
14. Provide fuel, electricity, water, filters, chemicals and other expendables required for initial start-up of equipment unless otherwise specified.
15. Procedures include but are not necessarily limited to the following:
    a. Test or check and correct deficiencies of:
        1) Power, control, and monitoring circuits for continuity prior to connection to power source.
        2) Voltage of all circuits.
        3) Phase sequence.
        4) Cleanliness of connecting piping systems.
        5) Alignment of connected machinery.
        6) Vacuum and pressure of all closed systems.
        7) Lubrication.
        8) Valve orientation and position status for manual operating mode.
        9) Tankage for integrity using clean water or product flow if not practical.
        10) Pumping equipment using clean water or product flow if not practical.
        11) Instrumentation and control signal generation, transmission, reception, and response. See Section 17000.
        12) Tagging and identification systems.
        13) All equipment: Proper connections, alignment, calibration and adjustment.
    b. Calibrate all safety equipment.
    c. Manually rotate or move moving parts to assure freedom of movement.
    d. "Bump" start electric motors to verify proper rotation.
    e. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.
    f. Bearings and Shafts
        1) Inspect for cleanliness, clean and remove foreign materials.
        2) Verify alignment.
        3) Replace defective bearings, and those that run rough or noisy.
        4) Grease as necessary, in accordance with manufacturer's recommendations.
    g. Drives
        1) Adjust tension in V-belt drives, and adjust varipitch sheaves and drives for proper equipment speed (if necessary).
        2) Adjust drives for alignment.
        3) Clean and remove foreign materials before starting operation.
    h. Motors
        1) Check each motor for comparison to amperage nameplate value.
        2) Correct conditions which produce excessive current flow, and which exist due to equipment malfunction.
        3) Check each motor for proper rotation.
    i. Pumps
        1) Check glands and seals for cleanliness and adjustment before running pump.
        2) Inspect shaft sleeves for scoring.
        3) Inspect mechanical faces, chambers, and seal rings, and replace if defective.
        4) Verify that piping system is free of dirt and scale before circulating liquid through the pump.
    j. Valves
        1) Inspect both manual and automatic control valves, clean bonnets and stems.
        2) Tighten packing glands to assure no leakage, but permit valve stems to operate without galling.
        3) Replace packing in valves to retain maximum adjustment after system is judged complete.

4) Replace packing on any valve that continues to leak.
5) Remove and repair bonnets that leak.
6) Coat packing gland threads and valve stems with an appropriate surface preparation after cleaning.

k. Verify that control valve seats are free from foreign material, and are properly positioned for intended service.

l. Tighten all pipe joints after system has been placed in operation. Replace gaskets that show any sign of leaking after tightening.

m. Inspect all joints for leakage.
1) Promptly remake each joint that appears to be faulty; do not wait for rust to form.
2) Clean threads on both parts, apply compound and remake joints.

n. After system has been placed in operation, clean strainers, dirt pockets, orifices, valve seats, and headers in fluid system, to assure freedom from foreign materials.

o. Open traps and air vents where used, remove operating elements. Clean thoroughly, replace internal parts and put back into operation.

p. Remove rust, scale and foreign materials from equipment and renew defaced surfaces.

q. Set and calibrate equipment.

r. Check each electrical control circuit to assure that operation complies with Specifications and requirements to provide desired performance.

s. Inspect each pressure gage and thermometer for calibration. Replace items which are defaced, broken, or which read incorrectly.

t. Repair damaged insulation.

u. Vent gases trapped in any part of systems. Verify that liquids are drained from all parts of gas or air system.

v. Documentation:
1) Prepare a log showing each equipment item subject to this paragraph and listing what is to be accomplished during System Startup. Provide a place for the Contractor to record date and person accomplishing required work. Submit completed document before submitting Notice of Completion of Pre-Demonstration Period.

16. Obtain certifications, without restrictions or qualifications, and deliver to Engineer:
a. Manufacturer's equipment installation check letters.
b. Instrumentation Supplier's Instrumentation Installation Certificate.

C. Instrumentation and Control Systems
1. See Section 13440.
2. Complete the following:
a. Factory Test
b. Installation
c. Manufacturer's Field Services
d. I/O Checkout Test
e. Submission of required shop drawings, O&M materials (System Documentation Submittals), and Training Materials.
1) Provide submittals according to provisions of Section 01340 and meeting the content and processing requirements of Section 13440.
f. Operations training as specified for pre-demonstration.
1) Provide training according to provisions of this section and meeting the content requirements of Section 13440.

D. Cleanup:
1. If appropriate, after successful demonstration, discontinue process flow, drain system and clean as necessary to achieve safe and sanitary conditions.

E. Manufacturer's Field Services

1. Where manufacturers' services are specified, furnish manufacturer's representative qualified to provide these services. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, additional time required to perform the specified services shall be considered incidental work.
    a. Submit qualifications of manufacturer's representative to provide service in accordance with paragraph 1.2A and 1.4A of this Section.
    b. Includes provisions for I&C Supplier performance as described in Section 13440.
2. Schedule manufacturer's field services to avoid conflicting with other field testing or other manufacturer's field services. Determine that all conditions necessary to allow successful testing have been met before scheduling field services.
3. Only those days of service approved by OWNER will be credited to fulfill the specified minimum services.
4. If specified, manufacturer's services shall include as a minimum:
    a. Assistance during installation to include observation, guidance, instruction of CONTRACTOR's assembly, erection, installation or application procedures.
    b. Inspection, checking, and adjustment as required for equipment to function as warranted by manufacturer and necessary to provide written approval of installation.
    c. Revisiting the site as required to correct problems and until installation and operation are acceptable to OWNER.
    d. Resolution of assembly or installation problems attributable to, or associated with, respective manufacturer's products and systems.
    e. Assistance during functional and performance testing and startup demonstration, and until product acceptance by the OWNER.
    f. Training of OWNER's personnel in the operation and maintenance of respective product as required herein.
    g. Completion of Manufacturer's Certificate of Proper Installation (form enclosed at end of this section) with applicable certificates for proper installation and initial, interim, and final test service.

F. Personnel Training:
1. See individual equipment specification sections for designation and table on training requirements in this section.
    a. See Section 13440 for requirements in addition to those listed below applicable to instrumentation and control system training.
2. Conduct all personnel training after completion of Equipment Startup for the equipment for which training is being conducted.
    a. Personnel training on individual equipment or systems will not be considered completed unless:
        1) All pretraining deliverables are received and approved before commencement of training on the individual equipment or system.
        2) No system malfunctions occur during training.
        3) All provisions of field and classroom training specifications are met.
    b. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to Owner.
3. Provide trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with OWNER and familiar with operation and maintenance manual information.
4. Furnish manufacturers' representatives to provide detailed training to OWNER's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
    a. Training services include classroom instruction and onsite hands-on instruction.
        1) Additional training to occur after completion of Demonstration Period may also be specified in individual specifications sections.
    b. Manufacturer's Representative:
        1) Familiar with facility operation and maintenance requirements as well as with the specified equipment and this specific installation.

a) Meeting the requirements of paragraph 1.2A of this Section.

5. Coordinate training sessions with OWNER's operating personnel and manufacturer's representatives.
   a. Complete at least 14 days prior to initiation of Demonstration Period.
6. Post-Demonstration Period Training:
   a. If required in Specifications, furnish and coordinate training of OWNER's operating personnel by respective manufacturer's representatives.
7. Taping of Training Sessions:
   a. OWNER has right to videotape all training and instruction sessions.
8. Field and classroom training requirements:
   a. Hold classroom training on-site.
   b. Notify each manufacturer specified for on-site training that the Owner reserves the right to video record any or all training sessions. Organize each training session in a format compatible with video recording.
   c. Training instructor: Factory trained and familiar with giving both classroom and "hands-on" instructions.
   d. Training instructors:
      1) Be at classes on time.
         a) Session beginning and ending times to be coordinated with the Owner and indicated on the master schedule.
         b) Normal time lengths for class periods can vary, but brief rest breaks should be scheduled and taken.
   e. Organize training sessions into maintenance verses operation topics and identify on schedule.
   f. Plan for minimum class attendance of 20 people at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.
   g. Instructors to have a typed agenda and well prepared instructional material. The use of visual aids, e.g., films, pictures, and slides are recommended for use during the classroom training programs.
      1) Submit agendas prior to the training as required in paragraph 1.4 of this Section.
      2) Provide training materials and documentation to be retained by trainee.
      3) Provide equipment required for presentation of films, slides, and other visual aids.
   h. In the on-site training sessions, cover the information required in the Operation and Maintenance manuals submitted according to Section 01340 and the following areas as applicable.
      1) Operation of equipment.
      2) Lubrication of equipment.
      3) Maintenance and repair of equipment.
      4) Troubleshooting of equipment.
      5) Preventive maintenance procedures.
      6) Adjustments to equipment.
      7) Inventory of spare parts.
      8) Optimizing equipment performance.
      9) Capabilities.
      10) Operational safety.
      11) Emergency situation response.
      12) Takedown procedures (disassembly and assembly).
   i. Address above paragraphs 1), 2), 8), 9), 10), and 11) in the operation sessions. Address above paragraphs 3), 4), 5), 6), 7), and 12) in the maintenance sessions.
   j. Maintain a log of classroom training provided including: Instructors, topics, dates, time, and attendance.
9. Personnel Training is to be provide as follows:

PERSONNEL TRAINING REQUIREMENTS

Section	Description	Hours of Pre-Demonstration Period Training	Hours of Post Demonstration Period Training	Comments
11072	Pumping Equipment – Vertical Turbine Pumps	8		
11947	Static Mixer	4	4	
11949	Mixers: Flocculator	4		
11980	Compressed Air System	4		
13440 - 13448	Instrumentation & Controls	4	4	
14301	Hoists Trolleys and Monorails	8	4	
14305	Bridge Cranes	8	4	
15100	Valves: Basic Requirements (Actuators)	8	4	
15114	Miscellaneous Valves	4	4	
16265	Variable Frequency Drives – Low Voltage	8	8	
16442	Motor Control Equipment	8	2	
	Miscellaneous Training	8	16	Topics to be selected by Owner

G. Complete the filing of all required submittals:
   1. As designated in paragraph 1.4 of this Section.

H. Filing of Contractor's Notice of Completion of Pre-Demonstration Period.
   1. File the notice when the following have been completed:
      a. Construction work (brought to state of tentative Substantial Completion pending demonstration).
      b. Equipment start-up.
      c. Manufacturer's Field Services
         1) System Startup.
         2) Certification of Installation
         3) Personnel Training.
      d. Instrumentation and control system Pre-Demonstration Period work.
      e. Submittal of required documents.
      f. Submission of required spare parts and required tools.
   2. OWNER will review required submittals for completeness within 5 calendar days of Contractor's notice. If complete, OWNER will complete inspection of the Work, within 10 calendar days of Contractor's notice.
   3. Owner will inform Contractor in writing of the status of the Work reviewed, within 14 calendar days of Contractor's notice.
      a. Determination of acceptability of Pre-Demonstration Activities will be by OWNER based at least on the following:
         1) Completeness of Notice of Completion of Pre-Demonstration Period.
         2) Representation by CONTRACTOR of equipment and system readiness for testing.
         3) Acceptable Demonstration Period functional and performance testing plan.
         4) Acceptable Operation and Maintenance Manuals delivered to Owner.
         5) Receipt of Manufacturer's Certificates of Proper Installation, if specified.

6) Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.
7) Availability and acceptability of manufacturer's representative, when specified, to assist in Demonstration Period functional and performance testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.
8) Equipment and electrical tagging complete.
9) All spare parts and special tools delivered to OWNER.

b. Work determined not meeting state of tentative Substantial Completion:
1) Contractor: Correct deficiencies noted or submit plan of action for correction within 5 days of Owner's determination.
2) Owner: Reinspect work within 5 days of Contractor's notice of correction of deficiencies.
3) Reinspection costs incurred by Owner will be deducted from final payment due Contractor.

c. Engineer's Acknowledgement of Completion for Pre-Demonstration Period:
1) Issued for Project as a whole.
2) Issued subject to completion or correction of items cited in the acknowledgement (punch list).
3) Issued with responsibilities of Owner and Contractor cited.
4) Executed by Engineer.
5) Accepted by Owner.
6) Accepted by Contractor.

3.4 DEMONSTRATION PERIOD

A. General:
1. Contractor Demonstration Responsibilities
a. Perform Work for tests specified.
b. Demonstration proper installation, adjustment, function, performance, and operation of mechanical, electrical, equipment, systems, control devices, and required interfaces individually and in conjunction with the process instrumentation and control system.
c. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's questions, provide final field instruction on select systems and to respond to any system problems or failures that may occur.
d. During Demonstration Period, provide a Certified Water Treatment Plant Operator to oversee plant operations at anytime when the facility is treating potable water meant for consumption.
1) Certified Operator shall operate plant and complete all daily documentation as required by TCEQ for a potable water facility.
e. Provide any post-demonstration operational training or final field instruction specified in the individual specifications sections.
1) Provide training in accordance with the Pre-Demonstration Period requirements.
f. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles or any other item necessary to operate and demonstrate all systems being demonstrated.
2. Owner Demonstration Responsibilities
a. General.
1) Review CONTRACTOR's Demonstration Plans and schedule.
2) Witness each functional or performance test.
b. Demonstration Period.
1) Owner will provide operational personnel to provide input on plant operations and performance. Owner's assistance will be available only for general guidance. Contractor will perform all other functions including but not limited to process decisions, equipment operation, and maintenance until successful completion of the Demonstration Period.

2) Owner reserves the right to have the Contractor simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.
3) Provide sampling, labor, and materials as required and provide laboratory analyses.

B. Instrumentation and Control Demonstration
1. See Section 13440.
2. Integrate and/or coordinate the instrumentation and control Site Demonstration Test and Site Availability with Preparation, Functional Test, and Performance Test activities listed below.
a. It is anticipated that the instrumentation and control Site Demonstration Test and the Functional Tests will be ongoing at the same time.
b. The instrumentation and control Site Availability Test and the Performance Test shall be coincident.
3. Provide any additional testing, demonstration, and documentation required in Section 13440.

C. Preparation
1. General.
a. Complete Work associated with the unit and related processes before functional and performance testing, including related manufacturer's representative services.
b. Furnish qualified manufacturer's representatives when required to assist in demonstration period functional and performance testing.
c. Utilize the Manufacturer's Certificate of Proper Installation Form, supplemented as necessary, to document Demonstration Period functional and performance procedures, results, problems, and conclusions.
d. Schedule and attend pretest (functional and performance) meetings related to test schedule, plan of test, materials, chemicals, and liquids required, facilities' operations interface, and OWNER involvement.
e. Designate and furnish one or more persons to be responsible for coordinating and expediting CONTRACTOR's facility startup duties. The person or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.
f. Provide temporary valves, gauges, piping, pumping, test equipment and other materials and equipment required to conduct testing.
2. Cleaning and Checking: Prior to starting functional testing.
a. Confirm that Pre-Demonstration Period system start-up activities have been completed.
1) Calibrate testing equipment for accurate results.
2) Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.
3) Lubricate equipment in accordance with manufacturers' instructions.
4) Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
5) Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
6) Check power supply to electric-powered equipment for correct voltage.
7) Adjust clearances and torque.
8) Test piping for leaks.
9) Balance HVAC systems, measuring airflow (cfm) static pressure, and component pressure losses. Furnish typed report documenting results of balancing.
10) Obtain completion of applicable portions of Manufacturer's Certificate of Proper Installation.

D. Functional Testing General Requirements
1. Conduct separate functional tests as defined in this Section for each equipment item or system.
2. Functional Testing shall be integrated and coincident with instrumentation and control Site Demonstration Testing.

3. Begin testing at a time mutually agreed upon by the OWNER and CONTRACTOR.
4. OWNER will be present during tests. Notify in writing that manufacturer's representative(s) are scheduled and will be present required at least 10 days prior to scheduled date of functional tests.
5. Separate items of equipment demonstrated to function property during subsystem testing may require no further test during the Functional Test for the system if documentation of subsystem testing is acceptable to OWNER.
6. Demonstrate all operational features and instrumentation and control functions operate as intended while in automatic mode.
7. If, in OWNER's opinion, test results do not meet requirements specified, the systems will be considered as nonconforming.
8. Performance testing shall not commence until all equipment and systems meets the specified functional tests.

E. Performance Test General Requirements
1. Shall be coincident with instrumentation and control Site Availability Test.
   a. See Section 13440 for additional Site Availability Test requirements.
2. Begin testing at a time mutually agreed upon by the OWNER and CONTRACTOR.
3. Attend planning meetings and arrange for attendance by key major equipment manufacturer representatives as required by the Contract Documents.
4. Designate one or more persons on the CONTRACTOR's staff to be available for coordinating and expediting CONTRACTOR's facility response startup duties.
5. OWNER will be present during test. Notify in writing manufacturers representative(s) at least 21 days prior to scheduled date of functional tests.
6. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.
7. Prepare performance test report and log summarizing test method. Include test logs, pertinent calculations, and CONTRACTOR's written certification that the equipment or system performs as specified.
8. When performance testing has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup.
9. Support performance testing activities with adequate staff to prevent delays. Such staff shall include, but not be limited to, major equipment and system manufacturer's representatives, electricians, instrumentation and control personnel, millwrights, pipe fitters, and plumbers.
10. Furnish and coordinate specified manufacturer's facility startup services.
11. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems, which could not be successfully tested prior to the performance test period.

F. Performance Test Procedures
   a. Performance test for the entire facility or any portion thereof shall be conducted solely by the Contractor with coordination and operational guidance by OWNER.
   b. Conduct the demonstration of integrity under full operational conditions.
   c. Performance test period shall occur after all required functional tests have been completed and those performance tests deemed necessary for the safe operation of the entire facility have been completed.
   d. Performance test the entire facility or any portion thereof shall be considered complete when, in the opinion of the OWNER, the facility or designated portion has operated in the manner intended for 30 continuous days without significant interruption. This period is in addition to any training, functional or performance test periods specified elsewhere.
   e. Significant interruption may include any of the following events.
      1) Failure of CONTRACTOR to maintain qualified onsite startup personnel as schedule.
      2) Failure to meet specified performance for more than 2 consecutive hours.

3) Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within 1 hours after failure.
4) Failure of any non-critical unit, system, or subsystem that is not satisfactorily corrected within 8 hours after failure.
5) Failure of the same piece of equipment more that two times during the test.
6) Unavailability of back-up equipment for more than a 12 hour repair period during test.

f. A significant interruption will require the performance test then in progress to be stopped and restarted after corrections are made. The new performance test shall have the same requirements and duration as the performance test previously conducted.

2. Performance Test Reports: As applicable to the equipment furnished, certify in writing that:
   a. Hydraulic structures, piping systems, and valves have been successfully demonstrated.
   b. Equipment systems and subsystems have been checked for proper installation, started, and successfully demonstrated to indicate that they are operational.
   c. Systems and subsystems are capable of performing their intended functions, including fully automatic.
   d. Facilities are ready for intended operation.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

CITY OF KERRVILLE

EQPT SERIAL NO.: _____

EQPT TAG NO.: _____

EQPT/SYSTEM: _____

PROJECT NO.: _____

SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer.)

Comments:

_____

_____

_____

_____

_____

_____

I, the undersigned Manufacturer's Representative, hereby certify that I am

(i) a duly authorized representative of the manufacturer,

(ii) empowered by the manufacturer to inspect, approve, and operate his equipment, and

(iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein.

I further certify that all information contained herein is true and accurate.

Date: _____, 20___

Manufacturer: _____
(Printed Name and Address)

By Manufacturer's Authorized Representative: _____
(Printed Name of Authorized Representative)

By Manufacturer's Authorized Representative: _____
(Signature of Authorized Representative)

1

1990/08/17

SECTION 01710
CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Intermediate and final cleaning of Work not including special cleaning of closed systems specified elsewhere.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.

1.2 STORAGE AND HANDLING

A. Store cleaning products and cleaning wastes in containers specifically designed for those materials.

1.3 SCHEDULING

A. Schedule cleaning operations so that dust and other contaminants disturbed by cleaning process will not fall on newly painted surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents:
   1. Compatible with surface being cleaned.
   2. New and uncontaminated.
   3. For Manufactured Surfaces: Material recommended by manufacturer.

PART 3 - EXECUTION

3.1 CLEANING - GENERAL

A. Prevent accumulation of wastes that create hazardous conditions.

B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.

C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.

D. Dispose of degradable debris at an approved solid waste disposal site.

E. Dispose of nondegradable debris at an approved solid waste disposal site or in an alternate manner approved by Engineer and regulatory agencies.

F. Handle materials in a controlled manner with as few handlings as possible.

G. Do not drop or throw materials from heights greater than 4 FT or less than 4 FT if conditions warrant greater care.

H. On completion of work, leave area in a clean, natural looking condition. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.

I. Do not burn on-site.

3.2 INTERIOR CLEANING

A. Cleaning During Construction:
   1. Keep work areas clean so as not to hinder health, safety or convenience of personnel in existing facility operations.
   2. At maximum weekly intervals, dispose of waste materials, debris, and rubbish.
   3. Vacuum clean interior areas when ready to receive finish painting. Continue vacuum cleaning on an as-needed basis, until substantial completion.

B. Final Cleaning:
   1. Complete immediately prior to Demonstration Period.
   2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.
   3. Wipe all lighting fixture reflectors, lenses, lamps and trims clean.
   4. Wash and shine glazing and mirrors.
   5. Polish glossy surfaces to a clear shine.
   6. Ventilating systems:
      a. Clean permanent filters and replace disposable filters if units were operated during construction.
      b. Clean ducts, blowers and coils if units were operated without filters during construction.
   7. Replace all burned out lamps.
   8. Broom clean process area floors.
   9. Mop office and control room floors.

3.3 EXTERIOR (SITE) CLEANING

A. Cleaning During Construction:
   1. Construction debris:
      a. Confine in strategically located container(s):
         1) Cover to prevent blowing by wind.
         2) Haul from site minimum once a week.
      b. Remove from work area to container daily.
   2. Vegetation:
      a. Keep weeds and other vegetation trimmed to 3 IN maximum height.
   3. Soils, sand, and gravel deposited on paved areas and walks:
      a. Remove as required to prevent muddy or dusty conditions.
      b. Do not flush into storm sewer system.

B. Final Cleaning:
   1. Remove trash and debris containers from site:
      a. Re-seed areas disturbed by location of trash and debris containers.
   2. Clean paved roadways.

3.4 FIELD QUALITY CONTROL

A. Immediately prior to Demonstration Period, conduct an inspection with Engineer to verify condition of all work areas.

END OF SECTION

SECTION 01720
FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. CONTRACTOR shall provide necessary field surveying and engineering services required for construction of the project. Such work shall include survey work to transfer lines and levels and to locate and lay out all improvements, structures, and controlling lines for the Work. Also included are such services as are specified or required to execute CONTRACTOR's construction methods.

B. Related Sections include but not necessarily limited to:
   1. Division 0 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 – General Requirements.

1.2 SUBMITTALS

A. See Section 01340.

B. Contractor's Daily Reports are to be submitted to the OWNER with all pertinent information pertaining to the Project as follows:
   1. Number of employees, subcontractor employees and breakdown of employees by trades.
   2. Major equipment and materials installed.
   3. Major construction equipment utilized.
   4. Location of all areas in which construction was done.
   5. Materials received.
   6. Work accomplished for each day.
   7. Weather conditions
   8. Signed by CONTRACTOR

1.3 CONSTRUCTION STAKES

A. OWNER's Responsibility:
   1. Treatment Plant: Establish base line for the Project by providing one bench mark with horizontal and vertical information for use by the CONTRACTOR.

B. CONTRACTOR's Responsibility
   1. Detailed transfers of elevation, line and grades to structures and other features of the Work.
   2. When the construction stakes have been set, the preservation of such stakes as to position, elevation and marking shall become the responsibility of the CONTRACTOR. Should any of the original stakes be destroyed by the CONTRACTOR's operations, or by any other non-OWNER related third parties or means whatsoever, the replacement of such stakes by OWNER will be at the expense of the CONTRACTOR.

C. The use of laser leveling equipment for vertical control of recycled water mains, potable water mains, and sanitary sewers shall be permitted provided the CONTRACTOR makes available to the City of Kerrville Construction Observer/Inspector when requested, a level and rod of sufficient sensitivity to accurately determine differences in elevation between points 300 feet apart with one instrument setup.

1.4 CONTRACTOR'S FIELD ENGINEER

A. CONTRACTOR shall employ and retain at the site of the Work a field engineer capable of performing all engineering tasks required of the CONTRACTOR. Tasks included are:

1. Daily reports of Project activity to be submitted to the OWNER with all pertinent information pertaining to the Project as follows:
   a. Numbers of employees.
   b. Subcontractor employees.
   c. Breakdown of employees by trade.
   d. Major equipment and materials installed.
   e. Major construction equipment utilized.
   f. Location of all areas in which construction was done.
   g. Materials and equipment received.
   h. Work performed.
2. Provide all surveying equipment required including transit, level, stakes and required surveying accessories.
3. Furnish all required lines and grades for construction. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment.
4. Maintain field office files and drawings, record drawings, and coordinate engineering services with Subcontractors. Prepare layout and coordination drawings for construction operations.
5. Check and coordinate Work for conflicts and interferences and immediately advise OWNER of all discrepancies noted.
6. Cooperate with OWNER in field inspections as required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01733
DISINFECTION OF FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for cleaning and disinfection of:
      a. Water Mains and Pipelines
      b. Water Storage Facilities.
      c. Water Treatment Facilities.
   2. This Section covers the protection, cleaning, flushing, and disinfection of all pipelines, water storage facilities, treatment facilities, and chemical feed systems that are any part of the water treatment process, including raw water through finished water, or contain finished water or service water for distribution and use within the facility.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Section 11005 - Equipment: Basic Requirements.
   4. Section 15060 – Pipe and Pipe Fittings – Basic Requirements

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American National Standards Institute (ANSI)/American Water Works Association (AWWA):
      a. ANSI/AWWA B300 – Hypochlorites
      b. ANSI/AWWA B301 – Liquid Chlorine.
      c. ANSI/AWWA C651 – Disinfection Water Mains.
      d. ANS/AWWA C652 – Disinfection of Water Storage Facilities.
      e. ANSI/AWWA C653 – Disinfection of Water Treatment Plants.
   2. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF):
      a. ANSI/NSF 60 - Drinking water treatment chemicals-Health effects
      b. ANSI/NSF 61 - Drinking water system components-Health effects
   3. American Public Health Association (APHA)/American Water Works Association (AWWA)/Water Environment Federation (WEF)
      a. APHA/AWWA/WEF - Standard Methods for the Examination of Water and Wastewater.
   4. U.S. Environmental Protection Agency
      a. Membrane Filtration Guidance Manual (Proposed Draft).

B. Qualifications:
   1. Provide qualified person to supervise use of liquid chlorine as defined in Part 2.

1.3 SUBMITTALS

A. See Section 01340.

B. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Product data for disinfectants to be used.

C. Miscellaneous Submittals

1. Qualifications of supervising personnel for use of liquid chlorine.
2. Disinfection Plan
   a. Accompany Contractor's Demonstration Plan as required in Section 01650.
   b. Include the following:
      1) Schedule for activities.
      2) Procedure and plan for cleaning and flushing system.
      3) Procedure and plan for disinfection and verification testing.
      4) Proposed locations where samples are to be taken.
      5) Proposed sampling intervals.
      6) Schedule of samples to be tested by Owner.
      7) Type of disinfecting solution and method of preparation.
      8) Method of disposal of highly chlorinated water.
   c. Certified bacteriological verification test results.

1.4 SEQUENCING AND SCHEDULING

A. See Section 01650 for requirements regarding sequencing of disinfection work with Facility Demonstration.

B. Commence disinfection after completion of the following:
   1. Completion and acceptance of internal coatings systems.
   2. Hydrostatic and pneumatic testing, pressure testing, functional and performance testing and acceptance of pipelines, pumping systems, structures, and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Water for Disinfection
   1. Clean, uncontaminated, and meeting the requirements outlined in Section 01650 for Management of Water during Start-up and Demonstration.

B. Equipment
   1. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection.
   2. Provide protection as required by AWWA for cross-connection to previously disinfected sources.

C. Disinfectants
   1. Liquid Chlorine.
      a. Conforming to requirements of ANSI/AWWA B301.
      b. Certified for potable water application per ANSI/NSF 60 or ANSI/NSF 1 as applicable.
      c. May be used only if following conditions are met:
         1) Used in combination with appropriate gas-flow chlorination equipment to provide controlled high-concentration solution feed to the water to the water to be chlorinated.
         2) Used under direct supervision of a person familiar and experienced physiological, chemical, physical properties of liquid chlorine and who is trained and equipped to handle any emergency that may arise.
            a) Owner must approve qualifications of supervising person designated by Contractor.
         3) When appropriate safety practices are observed to protect working personnel and the public.
   2. Sodium Hypochlorite
      a. Conforming to requirements of ANSI/AWWA B300.
      b. Certified for potable water application per ANSI/NSF 60 or ANSI/NSF 1 as applicable.
   3. Calcium Hypochlorite
      a. Conforming to requirements of ANSI/AWWA B300.

b. Certified for potable water application per ANSI/NSF 60 or ANSI/NSF 1 as applicable.
c. Sequestered calcium hypochlorite intended for swimming pool disinfection may not be used.

PART 3 - EXECUTION

3.1 GENERAL

A. All facilities covered by this section shall be protected, cleaned, and flushed in accordance with the requirements herein. The specific facilities to be disinfected are also listed herein.

B. Protection During Construction Period
1. Observe Preventive and Corrective Measures During Construction as defined in ANSI/AWWA C651.
2. Keep pipe clean and dry during storage and installation.
3. Protect pipe during wet-trench installation and provide protection from flooding or storm events.
4. In the event of contamination, clean and swab pipe in accordance with ANSI/AWWA C651.

C. Disinfection procedures shall conform to ANSI/AWWA, EPA Guidance Manual, and this Specification.
1. Disinfect surfaces of materials that will contact finished water, both during and following construction, using one of the methods specified in this section.
2. Take care to avoid recontamination following disinfection.
3. Allow freshwater and disinfectant solution to flow into pipe or vessel at a measured rate so that chlorinated water is mixed and at a consistent concentration meeting or exceeding the required solution strength.
4. Do not place concentrated commercial disinfectant in pipeline or other facilities to be disinfected before it is filled with water.

D. Facilities to be Disinfected:
1. Disinfection is required for all elements of the treatment plant and pump station that are downstream of the Membrane System (starting with the Permeate piping).
   a. All equipment and pipelines upstream of the Membranes that are or will be in contact with process water shall be cleaned and flushed in accordance with this section.
2. Items to be disinfected include, but are not limited to:
   a. All potable water piping including plumbing and service water (SVW).
   b. All non-potable water piping supplying wash down connections, water to chemical feed systems, etc.
   c. All process water piping downstream of the Membranes including but not limited to the following:
      1) Permeate piping between Membranes and Clearwell (PER).
      2) Backpulse System including Backpulse Tank, pumps, and piping.
      3) Cleaning System including pumps and piping
   d. All water treatment process units downstream of the Membranes including the following:
      1) Membranes.
      2) Backpulse Tank.
   e. Any other associated piping, appurtenances, or treatment process units located downstream of the Membranes.
3. All equipment and storage facilities for chemical feed systems that contain or contact liquid products shall be cleaned and rinsed with disinfectant prior to being placed into service.

3.2 PREPATION

A. No membranes shall be installed until all piping, pumps, and basins are thoroughly flushed and all chemical feed systems are checked.

1. Observe the requirements as outlined in the Zenon information included in Specification Section 01011 and the Zenon Tender package.
2. Dispose of the membrane storage solution in an acceptable manner before installing the membranes.

B. Cleaning and Flushing for all Facilities
1. Thoroughly clean and flush piping systems including supply, source and any appurtenant devices before performing disinfection.
2. Cleaning agents used shall not contain hazardous substances or deleterious compounds that would cause a violation of water quality standards or cause health effects is subsequently introduced into the water supply during any disinfection or filling operations.
3. Clean piping in accordance with requirements of Section 15060.

C. Cleaning and Flushing of Piping and In-line Equipment.
1. Flush all foreign matter from pipe in accordance with ANSI/AWWA C651.
2. Provide hoses, temporary connections, ditches, and other conduits are necessary to dispose of flushing water without damage to adjacent structures or terrain.
3. Use water suitable for disinfection.
4. Flush service connections and hydrants. Flush distribution lines prior to flushing hydrants and service connections.
5. Operate valves during flushing process at least twice during each flush.

D. Cleaning of Tanks, Reservoirs, and Membranes
1. Remove all materials not part of the operating facilities including temporary works, tools, and debris.
2. Remove all water, dirt, paint chips, sediment, or foreign material and rinsing, vacuuming, or other removal techniques.
3. Thoroughly clean walls, floors, and attached structures with high-pressure water jet and by sweeping, scrubbing, or other similar means.
4. Cleaning shall
   a. Remove all deposits of foreign nature.
   b. Remove biological growths.
   c. Clean the slopes, walls, tops, and bottom.
   d. Avoid damage to the structure.
   e. Remove and avoid pollution or oil deposits by workers and equipment.

3.3 DISINFECTION

A. Piping and In-Line Equipment
1. Applies to piping and inline equipment such as pumps and valves that are not covered under other disinfection provisions.
2. Disinfect in accordance with ANSI/AWWA C651.
3. Utilize any of the three disinfection procedures.
   a. Tablet Method.
   b. Continuous Feed Method.
   c. Slug Method.
4. Provide signage and tagging at all outlets from the piping being disinfected to prevent discharge of highly chlorinated water.
5. After applicable retention period, flush piping at a velocity of not less than 2.5 feet per second.
   a. Flush water shall be Membrane Permeate water with a minimum free chlorine residual of 0.5 milligram per liter.

B. Water Storage Facilities- Tanks and Reservoirs
1. Disinfect in accordance with ANSI/AWWA C652.
2. Utilize one of the following disinfection procedures.
   a. Method 1.
   b. Method 2.

c. Method 3.

3. Parts of structures, such as ceilings or overflows that cannot be immersed, shall be spray or brush disinfected.
4. Provide signage and tagging at all outlets from the tank being disinfected to prevent discharge of highly chlorinated water.
5. After applicable retention period, flush tank or reservoir with Membrane Permeate water with a minimum free chlorine residual of 0.5 milligram per liter to remove heavily chlorinated water.

C. Water Treatment Plant Facilities - Membranes
1. Disinfect the following components
   a. Membranes
   b. Wetted portion of Membrane basins.
   c. Piping as required under other provisions in this Section.
2. Disinfect in accordance with ANSI/AWWA C653.
3. Utilize one of the two disinfection procedures outlined in ANSI/AWWA C653.
   a. Disinfection Procedure.
   b. Alternate Disinfection Procedure.
4. Provide signage and tagging at all outlets from areas being disinfected to prevent discharge of highly chlorinated water.
5. After applicable retention period and testing of residual, remove heavily chlorinated water to the Backwash Clarifier and pump it to the existing sanitary force main through the sludge pumping station.

3.4 DISPOSAL OF FLUSHING WATER

A. Dispose of flushing water in accordance with the Management of Water Used for Start-Up and Demonstration as defined in Section 01650.

B. Heavily chlorinated water must be dechlorinated in accordance with ANSI/AWWA C651, C652, and C653 prior to release.
1. See appendix of ANSI/AWWA standards for additional information.

3.5 VERIFICATION TESTING

A. Upon completion of flushing, provide verification in the form of bacteriological sampling meeting the requirements of applicable ANSI/AWWA standard.

B. Collection of Samples
1. Contractor shall collect samples and deliver to Owner for laboratory analysis.
2. Coordinate activities to allow samples to be taken in accordance with this Section.
3. Provide valves at sampling points.
4. Provide access to sampling points.

C. Testing Equipment
1. Clean containers, equipment, and connections used in sampling to make sure they are free of contamination.
2. Obtain laboratory sampling bottles with instructions for handling from Owner.

D. Chlorine Sampling and Analysis
1. Collect samples in accordance with applicable ANSI/AWWA standard.
2. Samples of Disinfecting Solution:
   a. One sample per batch of disinfecting solution mixed and injected into pipe or vessel.
   b. If mixed solution not used, sample structure or pipe being disinfected during or immediately after filling.
3. Free Chlorine Residual Samples:
   a. As required to establish concentrations at the beginning and end of retention period.
4. Sampling Locations and Intervals
   a. Sampling points shall be representative and accepted by Owner.

5. Laboratory analysis to be performed by Owner. Samples will be analyzed for disinfectant residual concentration.
6. If chlorine concentration testing results in disinfection concentrations not meeting the required standard, disinfecting procedures and verification testing shall be repeated until specified limits are met.

E. Bacteriological Sampling and Analysis
1. Collect samples in accordance with applicable ANSI/AWWA standard.
2. Sampling Locations and Intervals
   a. In accordance with applicable ANSI/AWWA Standard.
   b. Sampling points shall be representative and accepted by Owner.
   c. If ANSI/AWWA Standard is not applicable or does not fully describe sampling procedure, utilize the following minimum requirements:
      1) A minimum of two (2) samples on two (2) consecutive days from each separable structure and every 1,000 feet of pipeline.
3. Laboratory analysis to be performed by Owner. Samples will be analyzed for disinfectant residual and coliform concentrations using methods as described in the latest edition of Standard Methods for Examination of Water and Wastewater.
4. If verification testing results in bacterially positive samples or disinfection concentrations not meeting the required standard, disinfecting procedures and verification testing shall be repeated until specified limits are met.

F. Documentation
1. Secure from Owner' laboratory and submit, certified bacteriological reports on samples taken from system. Certify that sampling and testing procedures/results are in full compliance to ANSI/AWWA standards, and applicable requirements of the Texas Natural Resource Conservation Commission.

END OF SECTION

2002/01/14

SECTION 01800
OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. All openings and penetrations in construction.

B. Related Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Section 07270 - Firestopping.
   4. Section 07600 - Flashing and Sheet Metal.
   5. Section 07900 - Joint Sealants.
   6. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 318, Building Code Requirements for Structural Concrete.
   2. ASTM International (ASTM):
      a. A36, Standard Specification for Carbon Structural Steel.
      b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
   3. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
      b. 90A, Standard for Installation of Air Conditioning and Ventilating Systems.
   4. Sheet Metal and Air Conditioning Contractors National Association, Inc.(SMACNA).

B. Assure all firestopping materials are in full compliance with Section 07270.

C. Obtain prior approval from Engineer when any opening larger than 100 SQ IN must be made in existing or newly completed construction.

1.3 DEFINITIONS

A. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.

B. Washdown Areas: Areas having floor drains or hose bibs.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Section 01340.
   2. For each structure provide dimensioned or scaled (minimum 1/8 IN = 1 FT) plan view drawings containing the following information:
      a. Vertical and horizontal location of all required openings and penetrations.
      b. Size of all openings and penetrations.
      c. Opening type.
      d. Seal type.
   3. Manufacturer's installation instructions for standard manufactured products.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe Sleeves: Steel, ASTM A53, Schedule 40, black.

B. Pipe Sleeves Penetrating into Corrosive Areas: Stainless steel.

C. Backing Rod and Sealant: See Section 07900.

D. Modular Mechanical Seals:
   1. Acceptable Manufacturers.
      a. Link-Seal.
   2. 316 stainless steel bolts, nuts and washers.

E. Sheet Metal Sleeves: Steel, ASTM A36, 12 GA.

F. Commercial Wall Castings:
   1. For Unclassified Areas both sides of penetration:
      a. Ductile Iron, class equal to connecting piping system.
   2. For Wet/Corrosive Areas either side of penetration:
      a. Stainless Steel, 304L.

PART 3 - EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Perform HVAC penetrations in accordance with NFPA 90A.

B. Perform electrical penetrations in accordance with NFPA 70, Article 501.

C. Install sleeves and castings in accordance with ACI 318, Chapter #6.

D. Hot dip galvanize (or paint in accordance with Section 09905) all steel sleeves installed.

E. When mechanical or electrical work cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, insets, fixtures or devices necessary to permit installation later. Lay out chases, holes or other openings which must be provided in masonry, concrete or other work.

F. Where pipes, conduits or ducts pass through floors in washdown areas, install sleeves with top 3 IN above finish floors. In non-washdown areas, install sleeves with ends flush with finished surfaces.

G. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.

H. For insulated piping and ducts, size sleeves, blockouts and cutouts large enough to accommodate full thickness of insulation.

I. Do not cut into or core drill any beams, joists, or columns.

J. Do not install sleeves in beams, joists, or columns.

K. Do not install recesses in beams, joists, columns, or slabs.

L. Field Cutting and Coring:
   1. Saw or core drill with non-impact type equipment.
   2. Mark opening and drill small 3/4 IN or less holes through structure following opening outline.
   3. Sawcut opening outline on both surfaces. Knock out within sawcuts using impact type equipment. Do not chip or spall face of surface to remain intact. Do not allow any overcut with saw kerf.

M. Precast-Prestressed Concrete Construction:
   1. Do not cut openings nor core drill vertically or horizontally through stems of members.
   2. Do not locate or install sleeves or recess sleeves vertically or horizontally through or in stems of members.
   3. Cast openings and sleeves into flanges of units.
   4. Cast openings larger than 6 IN in diameter or 6 IN maximum dimension in units at time of manufacture.
   5. Cast openings smaller than 6 IN in diameter or 6 IN maximum dimensions in flanges of units at time of manufacture or field cut.

N. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.

O. Provide waterstop plate/anchor flange for piping, ducts, castings and sleeves cast-in-place in concrete.
   1. For fabricated units, weld plate to sleeve, pipe, or ductwork.
   2. For commercial castings, cast water stop/anchor with wall pipe.
   3. Plate is to be same thickness as sleeve, pipe, casting or ductwork.
   4. For fabricated units, diameter of plate or flange to be 4 IN larger than outside diameter of sleeve, pipe or ductwork.
   5. For commercial castings, waterstop/anchor size to be manufacturer standard.
   6. Provide continuous around entire circumference of sleeve, pipe, or ductwork.

P. Where area is blocked out to receive sheet metal sleeve at later date:
   1. If blockout size is sufficient to allow placement, utilize dowels for interface of initially placed concrete and sleeve encasement concrete which is placed later.
      a. Size blockout based on sleeve size required plus 4 to 6 IN each side of sleeve for concrete encasement.
      b. Provide #4 dowels at 12 IN spacing along each side of blockout with minimum of two dowels required per side.
   2. If blockout size is not sufficient to allow placement of dowels, provide keyway along all sides of blockout.
      a. Size blockout based on sleeve size required plus 2 to 4 IN each side of sleeve for concrete encasement.

Q. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.

R. Refer to Drawings for location of fire-rated walls, floors, and ceilings. Utilize firestopping materials and procedures specified in Section 07270 in conjunction with scheduled opening type to produce the required fire rating.

S. Use full depth expanding foam sealant for seal applications into hazardous areas and applications where multiple pipes, conduits, etc. pass through single sleeve. Use full depth compressible sealant for applications involving single components passing through sleeves and for penetrations into non hazardous area.

T. Do not make duct or conduit penetrations below high water levels when entering or leaving tankage, wet wells, or other water holding structures.

U. Modular Mechanical Seals:
   1. Utilize one seal for concrete thickness less than 8 IN and two seals for concrete, 8 IN thick or greater.
   2. Utilize two seals for piping 16 IN diameter and larger if concrete thickness permits.
   3. Install seals such that bolt heads are located on the most accessible side of the penetration.

V. Backer Rod and Sealant:
   1. Install in accordance with Section 07900.
   2. Provide backer rod and sealant for modular mechanical seal applications. Apply on top side of slab penetrations and on interior, dry side wall penetrations.

3.2 SCHEDULES

A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:

1. Provide the following opening and penetration types:
   a. Type A - Block out 2 IN larger than outside dimensions of duct, pipe, or conduits.
   b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
   c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
   d. Type D - Commercial type casting or fabrication.
   e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
   f. Type F - Integrally cast pipe, duct or conduit.
   g. Type G - Saw cut or line-drill and remove area 1 IN larger than outside dimensions of duct, pipe or conduit.
   h. Type H - Core drill.
   i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
2. Provide seals of material and method described as follows.
   a. Category 1 - Modular Mechanical Seal.
   b. Category 2 - Roof curb and flashing according to SMACNA specifications unless otherwise noted on Drawings. Refer to Section 07600 and roofing specification sections for additional requirements.
   c. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annullus.
   d. Category 4 - Backer rod and sealant.
   e. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
   f. Category 6 - Full depth compressible sealant and flanges on both sides of opening. Flanges constructed of same material as duct, fastened to duct and minimum 1/2 IN larger than opening.
   g. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
3. Furnish openings and sealing materials through new floors, roofs, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
4. Furnish openings and sealing materials through existing floors, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.
5. For two penetrations through wall of membrane tank for 10 IN, Sch 10, 316 L SS, permeate line provided by membrane system manufacturer, grout pipe in place after installation of membrane equipment to allow adjustment of pipe connecting to membrane cassettes. After pipe grouting, coat grouting on interior of tank according to System #6 in Section 09905.

SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE FOR NEW CONSTRUCTION

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	C F I	7 Not Req 7	D F I [1]	Not Req Not Req 7	C F	7 Not Req
Through floors on grade above water table	C F I	4 Not Req 4	C F I [1]	7 Not Req 7	C F I [1]	4 Not Req 7
Through slab on grade below water table	F	Not Req	F	Not Req	F	Not Req
Through floors in washdown areas	C I	4 4	C H [2] I [1]	4 3 4	F H [2] I [1]	Not Req 3 7
Through walls where one side is a hazardous area	C F I	7 Not Req 7	D F I [1]	Not Req Not Req 7	C F	7 Not Req
Through exterior wall below grade above water table	C F I	7 Not Req 7	C D F I [1]	1 Not Req Not Req 1	F I [1]	Not Req 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	C F I	7 Not Req 7	C D F H [2]	1 Not Req Not Req 1	C F H [2] I [1]	7 Not Req 7 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	F	Not Req	F	Not Req	F	Not Req
Through exterior wall above grade	A B C	6 6 6	A B D H [2]	5 5 Not Req 5	C H [2]	5 4
Roof penetrations	A	2	A	2	A	2
Through interior walls and slabs not covered by the above applications	A C	4 4	A C	4 4	A C F	4 4 Not Req

SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE FOR EXISTING CONSTRUCTION

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	B E	7 Not Req	B (1) E (3) H (2)	7 Not Req 7	B (1) E (3) H (2)	7 Not Req 7
Through floors on grade above water table	B	7	B	7	B	7
Through slab on grade below water table	E	Not Req	E	Not Req	E	Not Req
Through floors in washdown areas	G	3	G H (2)	3 3	G H (2)	3 3
Through walls where one side is a hazardous area	B E	7 Not Req	B (1) B (3) E H (2)	7 1 Not Req 7	B (1) (3) E H (2)	7 Not Req 7
Through exterior wall below grade above water table	B	7	B (1) B (3) H (2)	7 1 7	B (1) (3) H (2)	7 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	B E	7 Not Req	B E H (2)	1 Not Req 1	B (1) (3) E H (2)	7 Not Req 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	E	Not Req	E	Not Req	E	Not Req
Through exterior wall above grade	G	6	G (1) (3) H (2)	5 5	G (1) (3) H (2)	5 7
Roof penetrations	G	2	G (1) (3) H (2)	2	G	2
Through interior walls and slabs not covered by the above applications	G	4	G (1) (3) H (2)	4 4	G (1) (3) H (2)	4 4

(1) Multiple piping 3 IN and smaller or multiple conduits.
(2) Single pipe 3 IN and smaller or single conduit.
(3) Single pipe or conduit larger than 3 IN.

END OF SECTION