SEWERAGE and WATER BOARD

of

NEW ORLEANS

SPECIFICATIONS

FOR

CONTRACT **#5251**

NDR GRANT – ADDITIONAL INSTRUMENTATION PROJECT

Proposals To Be Opened

11:30 O'clock A.M., Local Time on, **[C:9/1/2026____]**

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SECTION 01 10 00 – SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

1.03 PROJECT INFORMATION

A. Project Identification: Sewerage and Water Board of New Orleans, Drainage System NDR Instrumentation Project.

B. Project and Property Owner: Sewerage and Water Board of New Orleans.

C. Engineering Consultant: Stanley Consultants, Inc.
8000 South Chester, Suite 500
Centennial, CO 80112

D. Engineer's Consultants: The Engineer has retained the following design professionals who have assisted in preparation of the design documents:
1. Infinity Engineering Consultants, LLC - 4001 Division Street, Metairie, LA 70002.

1.04 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the detailed design and installation of wireless instrumentation systems, their submittal to and approval by OWNER, and installation of instruments and sensors to supplement and enhance the real time monitoring and reporting system. Monitoring of critical equipment shall be integrated into the existing PLC/HMI/SCADA system maintained by the SWBNO in order to increase visibility across the Drainage Pump Station system. Work includes:
1. Selection and installation of various types of instrumentation at multiple pump stations including, but not limited to:
a. Power meters for critical pump motors.
b. Channel level sensors on both intake and discharge canals, including both new installations and upgrading of existing sensors.
c. Rain gauges at additional locations for more visibility across the greater Drainage Pump Station System to enable the operations team more predictive capabilities.
d. Pressure sensors monitoring the critical vacuum pump systems at each drainage station.
e. Vibration, temperature and other various types of measurement for performance and machine-health monitoring of critical pumping equipment at the Drainage Pump Stations.
2. Installation of PLC equipment required to integrate and communicate the new instrument signals to both local operations, but also to engineering and GSO personnel via the S&WBNO SCADA system.

B. Type of Contract:
   1. Project will be constructed under a single prime contract.

1.05 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.06 ACCESS TO SITE

A. General: Contractor shall have use of Project site for construction operations during construction period. Contractor's use of Project site is limited by Owner's right to operation of the site or to retain other contractors on portions of Project.
   1. Limits: Limit site disturbance as allowed and directed by Owner.
      a. See Demolition and Drawing for additional site disturbance limitations.

1.07 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Work hours will be discussed with awarded contractor. These are working drainage stations. No work shall impeded the operation of the plant without prior notification and approval by Owner.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
   2. Obtain Owner’s written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner’s written permission before proceeding with disruptive operations.

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
   1. Maintain list of approved screened personnel with Owner's representative.

1.08 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
   1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used.

Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

C. DIVISION 01 General Requirements: Requirements of Sections in DIVISION 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

E. Documentation Included in this procurement package
   1. The SWBNO and the Engineer have gathered information on the existing systems. Available original construction drawings including the PLC Enclosure wiring diagrams Have been marked to provide a guide to the current state of the facilities. The Contractor must verify the information before beginning the final detailed design for the submittals, procurement and integration of the additional instrumentation requirements of this project.
   2. The SWBNO has provided a list of preferred process measuring devices that shall be utilized for this project. To the maximum extent possible, these preferred devices must be used. No substitutions will be accepted by SWBNO without prior authorization by SWBNO.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 01 10 00

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SECTION 01 20 00 – PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Schedule of values.

B. Applications for payment.

C. Change procedures.

D. Defect assessment.

E. Unit prices.

1.02 SCHEDULE OF VALUES

A. Submit a printed schedule on EJCDC C-620 – Contractor’s Application for Payment or other format as approved by OWNER. Contractor's standard form or electronic media printout will be considered.

B. Submit Schedule of Values in duplicate within 20 days after date of Owner-Contractor Agreement.

C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance.

D. Schedule of Values shall show breakdown of quantities, labor, materials, equipment, and other costs used in preparation of the Bid for each item in Section 01 22 00, Unit Prices.

E. Costs shall be prepared for each Section of the Specifications. They shall be in sufficient detail to indicate separate amounts for each Section of the Specifications. Amounts shall be included for each type of Work specified, in a manner approved by the Engineer.

F. Each item shall include a directly proportional amount of Contractor’s overhead and profit.

G. When requested by Engineer, support values with data that will substantiate their correctness.

H. Revise schedule to list approved Change Orders, with each Application for Payment.

I. The sum of the individual values shown on the Schedule of Values shall equal the total Contract Price.

J. Schedule of Values shall show the purchase and delivery costs for materials and equipment that Contractor anticipates they shall request payment for prior to their installation.

K. The Schedule of Values shall be prepared to a level of detail equal to or greater than required by the Supplementary Conditions.

1.03 APPLICATIONS FOR PAYMENT

A. Submit 3 copies of each application on EJCDC C-620 – Contractor’s Application for Payment or other format as approved by OWNER. Contractor's electronic media driven form will be considered.

B. Content and format: Use Schedule of Values for listing items in Application for Payment.

C. Submit an updated construction Progress Schedule in accordance Section 01 32 01 with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in Agreement.

E. Submit with transmittal letter.

F. Substantiating data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include following with application:
   1. Current construction photographs specified in Section 01 33 00.
   2. Partial release of liens from major subcontractors and vendors.
   3. Record documents as specified in Section 01 33 00, for review by Owner which will be returned to Contractor.
   4. Affidavits attesting to off-site stored products.
   5. Construction progress schedules: revised and current as specified in Section 01 32 01.

1.04 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to Work.

B. Engineer will advise of minor changes in Work not involving an adjustment to Contract Price or Contract Time by issuing supplemental instructions.

C. Engineer may issue Instruction to Contractor (ITC) which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing change with a stipulation of any overtime work required and the period of time during which requested price will be considered valid. Contractor will prepare and submit an estimate within 15 days.

D. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on Work. Include a statement describing reason for change, and effect on Contract Price and Contract Time with full documentation Document any requested substitutions in accordance with Section 01 25 13.

E. Unit price Change Order: For contract unit prices and quantities, Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a EJCDC C940 - Work Directive Change or other format as approved by OWNER. Changes in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Work Directive Change: Engineer may issue a directive, on EJCDC C940 - Work Directive Change or other format as approved by OWNER, instructing Contractor to proceed with a change in Work, for subsequent inclusion in a Change Order. Document will describe changes in Work, and designate method of determining any change in Contract Price or Contract Time. Promptly execute change.

G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of Contract. Engineer will determine change allowable in Contract Price and Contract Time as provided in Contract Documents.

H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in Work.

I. Document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation.

J. Change Order Forms: EJCDC C-941 Change Order or other format as approved by OWNER.

K. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of Contract.

L. Correlation of Contractor Submittals:
1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust Contract Price.
2. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.05 DEFECT ASSESSMENT

A. Replace Work, or portions of Work, not conforming to specified requirements.

B. If, in opinion of Engineer it is not practical to remove and replace Work, Engineer will direct an appropriate remedy or adjust payment.

C. Defective Work may remain, but unit price will be adjusted to a new price at discretion of Owner and Engineer.

D. Defective Work will be partially repaired to instructions of Engineer, and unit price will be adjusted to a new price at discretion of Owner and Engineer.

E. Individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

F. Authority of Owner and Engineer to assess defect and identify payment adjustment, is final.

G. Nonpayment for rejected products: Payment will not be made for rejected products for any of following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of Work.
6. Loading, hauling, and disposing of rejected products.

1.06 UNIT PRICE

A. Authority: Unit Prices quantities and Lump Sum items are delineated in Section 01 22 00 and individual specification sections.

B. Payment shall be based on approved schedule of values, measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements Section 01 22 00 govern.

C. Engineer will verify percent complete of each item in the schedule of values.

D. Unit Quantities: Quantities and measurements indicated in Bid form are for contract purposes only. Quantities and measurements supplied or placed in Work shall determine payment.
1. If actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit prices contracted.
2. If actual Work requires a 15 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim for a Contract Price adjustment.

E. Payment includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of an item of Work; overhead and profit.

F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit price for Work which is incorporated in or made necessary by Work.

G. Measurement of quantities:
   1. Weigh scales: Inspected, tested and certified by applicable state. Weights and Measures department within past year.
   2. Platform scales: Of sufficient size and capacity to accommodate conveying vehicle.
   3. Metering devices: Inspected, tested and certified by applicable state department within past year.
   4. Measurement by weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
   5. Measurement by volume: Measured by cubic dimension using mean length, width and height or thickness.
   6. Measurement by area: Measured by square dimension using mean length and width or radius.
   7. Linear measurement: Measured by linear dimension, at item centerline or mean chord.
   8. Stipulated price measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of Work.

H. Unit price schedule:
   1. Work Items: All Work Items are Lump Sum (LS) in accordance with Contract Documents. Lump Sum Items includes all costs of materials, equipment, labor, overhead, and profit for construction of NDR Grant – Additional Instrumentation Project.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 22 00 – UNIT PRICES

PART 1 GENERAL

1.01 UNIT PRICE REQUIREMENTS

A. Items of Work described herein are specifically listed in Agreement for separate measurement and payment.

B. No other items of Work required by Contract Documents shall be measured or paid for as a separate item but shall be included as part of listed unit price item to which Work pertains. Failure to list all such related Work in following descriptions of unit price items shall not invalidate this stipulation.

C. Contractor shall measure unit price quantities for payment and submit to Engineer.

1.02 DESCRIPTION OF UNIT PRICE ITEMS

A. Ref No.1 Mobilization and Demobilization; lump sum (LS): Price includes mobilization costs, demobilization costs, and bonding cost complete in every detail and all-inclusive. A maximum payment of 5 % of total extended prices will be made for this item. Payment shall be made along with first monthly payment after commencement of major construction. Includes field offices and project sign.

B. Ref No. 2 Drainage Pump Station 01; lump sum (LS): Price includes instrumentation installation and wiring, 12-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 7 Horizontal Drainage Pumps, 3-Vacuum pump systems, 2-constant duty pumps, 2-Vertical Pumps, 1 – fuel tank level, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

C. Ref No. 3 Drainage Pump Station 02; lump sum (LS): Price includes instrumentation installation and wiring, 8-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 4 Horizontal Drainage Pumps, 3-Vacuum pump systems, 2-constant duty pumps, 0-Vertical Pumps, 0 – fuel tank level, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

D. Ref No. 4 Drainage Pump Station 03; lump sum (LS): Price includes instrumentation installation and wiring, 10-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 5-Horizontal Drainage Pumps, 3-Vacuum pump systems, 2-constant duty pumps, 0-Vertical Pumps, 0-fuel tank level, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

E. Ref No. 5 Drainage Pump Station 04; lump sum (LS): Price includes instrumentation installation and wiring, 10-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 4-Horizontal Drainage Pumps, 3-Vacuum pump systems, 2-constant duty pumps, 0-Vertical Pumps, 0-fuel tank level, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

F. Ref No. 6 Drainage Pump Station 05; lump sum (LS): Price includes instrumentation installation and wiring, 10-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 3-Horizontal Drainage Pumps, 3-Vacuum pump systems, 1-constant duty pumps, 2-Vertical Pumps, 0-fuel tank level, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

G. Ref No. 7 Drainage Pump Station 06; lump sum (LS): Price includes instrumentation installation and wiring, 21-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 9-Horizontal Drainage Pumps, 5-Vacuum pump systems, 2-constant duty pumps, 4-Vertical Pumps, 2-fuel tank levels, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

H. Ref No. 8 Drainage Pump Station 07; lump sum (LS): Price includes instrumentation installation and wiring, 11-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 3-Horizontal Drainage Pumps, 3-Vacuum pump systems, 2-constant duty pumps, 0-Vertical Pumps, 2-fuel tank levels, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

I. Ref No. 9 Drainage Pump Station 10; lump sum (LS): Price includes instrumentation installation and wiring, 5-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 4-Vertical Pumps, 0-fuel tank levels, and 2-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

J. Ref No. 10 Drainage Pump Station 11; lump sum (LS): Price includes instrumentation installation and wiring, 7-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 4-Horizontal Drainage Pumps, 4-Vacuum pump systems, 1-constant duty pumps, 4-Vertical Pumps, 2-fuel tank levels, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

K. Ref No. 11 Drainage Pump Station 12; lump sum (LS): Price includes instrumentation installation and wiring, 3-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 1-Horizontal Drainage Pumps, 1-Vacuum pump systems, 0-constant duty pumps, 0-Vertical Pumps, 0-fuel tank levels, and 2-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

L. Ref No. 12 Drainage Pump Station 13; lump sum (LS): Price includes instrumentation installation and wiring, 12-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 2-Horizontal Drainage Pumps, 4-Vacuum pump systems, 1-constant duty pumps, 2-Diesel Pumps, 2-Vertical Pumps, 6-fuel tank levels, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

M. Ref No. 13 Drainage Pump Station 17; lump sum (LS): Price includes instrumentation installation and wiring, 4-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 2-Vacuum pump systems, 2-constant duty pumps, 0-Diesel Pumps, 0-Vertical Pumps, 0-fuel tank levels, and 2-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

N. Ref No. 14 Drainage Pump Station 14; lump sum (LS): Price includes instrumentation installation and wiring, 5-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Diesel Pumps, 4-Vertical Pumps, 2-fuel tank levels, and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

O. Ref No. 15 Drainage Pump Station 15; lump sum (LS): Price includes instrumentation installation and wiring, 4-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 2-Diesel Engines, 3-

Vertical Pumps, 2-fuel tank levels, and 2-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

P. Ref No. 16 Drainage Pump Station 16; lump sum (LS): Price includes instrumentation installation and wiring, 5-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Diesel Engines, 4-Vertical Pumps, 2-fuel tank levels, and 2-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

Q. Ref No. 17 Drainage Pump Station 18; lump sum (LS): Price includes instrumentation installation and wiring, 3-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Diesel Engines, 2-Vertical Pumps, 0-fuel tank levels, 1-rain gage and 1-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

R. Ref No. 18 Drainage Pump Station 19; lump sum (LS): Price includes instrumentation installation and wiring, 8-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 3-Horizontal Drainage Pumps, 3-Vacuum pump systems, 0-constant duty pumps, 0-Diesel Engines, 2-Vertical Pumps, 2-fuel tank levels, 0-rain gage and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

S. Ref No. 19 Drainage Pump Station 20; lump sum (LS): Price includes instrumentation installation and wiring, 3-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 2-Electric Motors, 2-Vertical Pumps, 1-fuel tank levels, 0-rain gage and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

T. Ref No. 20 Drainage Pump Station I-10; lump sum (LS): Price includes instrumentation installation and wiring, 7-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 2-Vacuum pump systems, 1-constant duty pumps, 0-Electric Motors, 3-Vertical Pumps, 2-fuel tank levels, 0-rain gage and 1-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

U. Ref No. 21 Drainage Pump Station Elaine; lump sum (LS): Price includes instrumentation installation and wiring, 3-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Electric Motors, 2-Vertical Pumps, 0-fuel tank levels, 1-rain gage and 1-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

V. Ref No. 22 Drainage Pump Station Oleander; lump sum (LS): Price includes instrumentation installation and wiring, 0-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Electric Motors, 3-Vertical Pumps, 0-fuel tank levels, 0-rain gage and 1-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

W. Ref No. 23 Drainage Pump Station Pritchard; lump sum (LS): Price includes instrumentation installation and wiring, 4-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 1-constant duty pumps, 0-Electric Motors, 2-Vertical Pumps, 0-fuel tank levels, 0-rain gage and 1-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and

as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

X. Ref No. 24 Drainage Pump Station Dwyer; lump sum (LS): Price includes instrumentation installation and wiring, 4-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Electric Motors, 3-Vertical Pumps, 2-fuel tank levels, 0-rain gage and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

Y. Ref No. 25 Drainage Pump Station Grant; lump sum (LS): Price includes instrumentation installation and wiring, 7-wireless data transfer system panels, and PLC/HMI programming for the following equipment: 0-Horizontal Drainage Pumps, 0-Vacuum pump systems, 0-constant duty pumps, 0-Electric Motors, 6-Vertical Pumps, 0-fuel tank levels, 0-rain gage and 3-channel level gages. Work includes all repairs and replacement, transportation, delivery, installation, startup and testing, and as indicated on Drawings and Lists included in plans and specifications, all-inclusive for continuous operation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. Project Management Software
   4. Requests for Information (RFIs).
   5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
   1. DIVISION 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. DIVISION 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. DIVISION 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.03 DEFINITIONS

A. RFI: Request from the CONTRACTOR seeking information required by or clarifications of the Contract Documents.

1.04 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.

B. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.05 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for the CONTRACTING OFFICER and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as OWNER's property.

1.06 PROJECT MANAGEMENT SOFTWARE

A. General: The CONTRACTOR shall purchase, provide training, and technical support for their project personnel and provide the funding, required training, and technical support for a "stand alone" account for the OWNER that will cover the project period plus 12 months after contract close-out.

B. Computer Software: Utilize “Procore” or approved alternate to manage the following items:

   1. Budget, Cash Flow Projections, Schedule of Values (SOVs), PCOs, COs and Pay Applications.
   2. Schedules.
   3. Construction Drawings.
   4. As-built Red-line Drawings.
   5. ASKs, SSKs, etc.
   6. Construction Directives.
   7. RFIs.
   8. Submittals.
   9. Deliverables.
   10. Meeting Notes.
   11. E-mail and Correspondence.
   12. Transmittal Letters.
   13. Contact List.
   14. Punch Lists.
   15. Daily Reports.

16. Safety Meetings.
17. Safety Job Loss Reports.

1.07 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Indicate required installation sequences.
      e. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to OWNER indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

1.08 REQUESTS FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, CONTRACTOR shall prepare and submit an RFI in the form specified.
   1. Submit RFI to OWNER and copy CONTRACTING.
   2. OWNER will return RFIs submitted to OWNER by other entities controlled by CONTRACTOR with no response.
   3. Coordinate and submit RFIs in a prompt manner so as to avoid delays in CONTRACTOR's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Contract number.
   3. Date.
   4. Name of CONTRACTOR.
   5. RFI number, numbered sequentially.
   6. RFI subject.
   7. Specification Section number and title and related paragraphs, as appropriate.
   8. Drawing number and detail references, as appropriate.
   9. Field dimensions and conditions, as appropriate.
   10. CONTRACTOR's suggested resolution. If CONTRACTOR's suggested resolution impacts the Contract Time or the Contract Sum, CONTRACTOR shall state impact in the RFI.
   11. CONTRACTOR's signature.
   12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. Hard-Copy RFI Forms:
   1. Form approved and provided by CONTRACTING.
   2. Identify each page of attachments with the RFI number and sequential page number.

D. Software Generated RFI Forms:
   1. Form approved and provided by CONTRACTING OFFICER.
   2. Identify each page of attachments with the RFI number and sequential page number.
   3. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. CONTRACTING OFFICER's Action: CONTRACTING OFFICER will review each RFI, determine action required, and respond. Allow seven working days for OWNER's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
   1. The following CONTRACTOR-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of CONTRACTOR's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of OWNER's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.
   2. CONTRACTING OFFICER's action may include a request for additional information, in which case CONTRACTING OFFICER's time for response will date from time of receipt of additional information.
   3. CONTRACTING OFFICER's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for CONTRACTOR to submit Change Proposal.
      a. If CONTRACTOR believes the RFI response warrants change in the Contract Time or the Contract Sum, notify CONTRACTING OFFICER in writing within seven days of receipt of the RFI response.

F. RFI Log: CONTRACTOR shall prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. CONTRACTING OFFICER should be copied on all RFIs when submitted to OWNER and on OWNER's response. CONTRACTING OFFICER will not respond to RFIs unless the RFI directly pertains to contractual questions. Software log with not less than the following:
   1. Project name.
   2. Name and address of CONTRACTOR.
   3. Name and address of COR and CONTRACTING OFFICER.
   4. RFI number including RFIs that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date CONTRACTING OFFICER's response was received.
   8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
   9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.09 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify CONTRACTING OFFICER and OWNER of scheduled meeting dates and times.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Notes: The OWNER will record significant discussions and agreements achieved. Distribute the meeting notes to everyone concerned, including CONTRACTING OFFICER, within three days of the meeting.
   4. The CONTRACTOR shall acknowledge concurrence with meeting notes by signing notes and forwarding copy to CONTRACTING OFFICER. Any exceptions to the meeting notes should be noted by the CONTRACTOR to the COR for action prior to concurrence.

B. Preconstruction Conference: The OWNER will schedule and conduct a preconstruction conference before starting construction, at a time and location convenient to OWNER.
   1. Conduct the conference to review responsibilities and personnel assignments.
   2. Attendees: Authorized representatives of OWNER, CONTRACTING OFFICER and their consultants; CONTRACTOR and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Critical work sequencing and long-lead items.
      c. Designation of key personnel and their duties.
      d. Lines of communications.
      e. Procedures for processing field decisions and Change Orders.
      f. Procedures for RFIs.
      g. Procedures for testing and inspecting.
      h. Procedures for processing Applications for Payment.
      i. Distribution of the Contract Documents.
      j. Submittal procedures.
      k. Preparation of record documents.
      l. Use of the premises.
      m. Work restrictions.
      n. Working hours.
      o. Responsibility for temporary facilities and controls.
      p. Procedures for moisture and mold control.
      q. Procedures for disruptions and shutdowns.
      r. Construction waste management and recycling.
      s. Parking availability.
      t. Office, work, and storage areas.
      u. Equipment deliveries and priorities.
      v. First aid.
      w. Security.
      x. Progress cleaning.
   4. Notes: OWNER shall conduct the meeting and will record and distribute meeting notes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
   1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise CONTRACTING OFFICER of scheduled meeting dates.
   2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
      a. Contract Documents.
      b. Options.
      c. Related RFIs.
      d. Related Change Orders.
      e. Purchases.
      f. Deliveries.
      g. Submittals.
      h. Review of mockups.
      i. Possible conflicts.
      j. Compatibility requirements.
      k. Time schedules.
      l. Weather limitations.
      m. Manufacturer's written instructions.
      n. Warranty requirements.
      o. Compatibility of materials.

p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute notes of the meeting to each party present and to other parties requiring information within three days of meeting event.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals to be determined at the preconstruction meeting. Coordinate dates of meetings with preparation of payment requests.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of OWNER and CONTRACTING OFFICER, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve notes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
a. CONTRACTOR's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to CONTRACTOR's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
1) Review schedule for next period.
b. Review present and future needs of each entity present, including the following:
1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Notes: Entity responsible for conducting the meeting will record and distribute the meeting notes to each party present and to parties requiring information, within three days of the meeting event.
    a. Schedule Updating: Revise CONTRACTOR's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
    1. Attendees: In addition to representatives of OWNER, CONTRACTING OFFICER each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
    2. Agenda: Review and correct or approve notes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
        a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        b. Review present and future needs of each contractor present, including the following:
            1) Interface requirements.
            2) Sequence of operations.
            3) Status of submittals.
            4) Deliveries.
            5) Off-site fabrication.
            6) Access.
            7) Site utilization.
            8) Temporary facilities and controls.
            9) Work hours.
            10) Hazards and risks.
            11) Construction Waste Management Requirements
            12) Progress cleaning.
            13) Quality and work standards.
            14) Change Orders.
    3. Notes: Entity responsible for conducting the meeting will record and distribute the meeting notes to each party present and to parties requiring information, within three days of the meeting event.
        a. Schedule Updating: Revise CONTRACTOR's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 PART 2 - PRODUCTS

NOT USED

PART 3 PART 3 - EXECUTION

NOT USED

END OF SECTION 01 31 00

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SECTION 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. CONTRACTOR's construction schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Special reports.
      a. Preconstruction photographs.
      b. Periodic construction photographs.
      c. Progress documentation construction photographs.
      d. Final completion construction photographs.

B. Related Requirements:
   1. DIVISION 01 Section “Project Management and Coordination” for submitting and distributing meeting and conference minutes.
   2. DIVISION 01 Section "Submittal Procedures" for submitting schedules, reports, and photographic documentation.
   3. DIVISION 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.
   4. DIVISION 01 Section “Closeout Procedures” for submitting photographic documentation as project record documents at Project closeout.
   5. DIVISION 02 Section “Selective Demolition” for photographic documentation before cutting, patching, or demolition operations commence.

1.03 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by OWNER.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time belongs to the OWNER.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Fragment: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

H. Major Area: A significant roof section, or a similar significant construction element.

I. Milestone: A key or critical point in time for reference or measurement.

J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.04 INFORMATIONAL SUBMITTALS

A. Submittal Schedule: Submit two (2) hard copies of submittal schedule at project kickoff meeting.

Arrange the following information in tabular form:
   1. Scheduled date for first submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for OWNER’s final release or approval.
   7. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.

B. Startup construction schedule: Submit five (5) hard copies.
   1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Preliminary Network Diagram: Submit five (5) copies of size required to display entire network for entire construction period. Show logic ties for activities.

D. CONTRACTOR's Construction Schedule: Submit five (5) copies of Initial schedule, of size required to display entire schedule for entire construction period.
   1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
   3. Total Float Report: List of all activities sorted in ascending order of total float.
   4. Earnings Report: Compilation of CONTRACTOR's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at five copies at weekly intervals.

H. Material Location Reports: Submit at five copies at weekly intervals.

I. Field Condition Reports: Submit five copies at time of discovery of differing conditions.

J. Special Reports: Submit five copies at time of unusual event.

K. Photographic Documentation:
1. Key Plan: Submit key plan of Project site with notation of vantage points marked for location and direction of each photograph. Indicate elevation or location of construction. Include same information as corresponding photographic documentation.
2. Photo log: Submit photo log with two horizontal photographs per page. Include sequential identifier, date of photograph, description of vantage point and direction (by compass point). Include description of feature(s) being photographed.
3. Digital Photographs: Submit image files within three days of taking photographs.
   a. Digital Camera: Minimum sensor resolution of 8 megapixels.
   b. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
4. Identification: Provide the following information with each image description in file metadata tag:
   a. Name of Project.
   b. Name and contact information for photographer.
   c. Name of OWNER.
   d. Name of CONTRACTOR.
   e. Date photograph was taken.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation.
   g. Unique sequential identifier keyed to accompanying key plan.

1.05 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 48 hours of OWNER’s request. Scheduling Consultant may be either CONTRACTOR employee or subconsultant and shall be approved by OWNER.

B. Project Kickoff Meeting: Conduct conference at Project site to comply with requirements in DIVISION 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and CONTRACTOR's construction schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages, area separations, interim milestones.
4. Review delivery dates for OWNER-furnished products.
5. Review schedule for work of OWNER’s separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and OWNER startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.06 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate CONTRACTOR's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.07 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to OWNER for unlimited reproduction of photographic documentation.

PART 2 PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and CONTRACTOR's Construction Schedule.
   2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   3. Final Submittal: Submit concurrently with the first complete submittal of CONTRACTORS's Construction Schedule.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each section or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by OWNER.
   2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
      a. Major or Critical Submittals are identified on Submittal Register found at the end of Section 01 33 00 "Submittal Procedures."
   3. Submittal Review Time: Include review and resubmittal times indicated in DIVISION 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in CONTRACTOR's construction schedule with submittal schedule.
   4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
   5. Final Completion: Indicate completion in advance of date established for Final Completion, and allow time for OWNER's administrative procedures necessary for certification of Final Completion and Acceptance by OWNER.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Work under More Than One Contract: Include a separate activity for each contract.
   2. Work by OWNER: Include a separate activity for each portion of the Work performed by OWNER.
   3. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.

d. Partial use before Substantial Completion.
e. Use of project restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
   e. Fabrication.
   f. Sample testing.
   g. Deliveries.
   h. Installation.
   i. Tests and inspections.
   j. Adjusting.
   k. Curing.
   l. Utility flushing.
   m. Startup and placement into final use and operation.
5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Work accepted by the OWNER prior to Final Completion and Final Completion and acceptance by the OWNER. Interim milestones shall be discussed in the pre-construction meeting.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

2.03 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare CONTRACTOR's construction schedule using a computerized cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established of Contract award.
   a. Failure to include any work item required for performance of this Contract shall not excuse CONTRACTOR from completing all work within applicable completion dates, regardless of OWNER’s approval of the schedule.
2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.
   d. Delivery.
   e. Fabrication.
   f. Utility interruptions.
   g. Installation.
   h. Work by OWNER that may affect or be affected by CONTRACTOR's activities.
   i. Testing and commissioning.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. CONTRACTOR or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediately preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts one week before each regularly scheduled progress meeting.

H. Identify potential schedule risks outside of Critical Path.

2.04 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Accidents.
   8. Meetings and significant decisions.
   9. Unusual events (see special reports).
   10. Stoppages, delays, shortages, and losses.
   11. Meter readings and similar recordings.
   12. Emergency procedures.
   13. Orders and requests of authorities having jurisdiction.
   14. Change Orders received and implemented.
   15. Change Directives received and implemented.
   16. Services connected and disconnected.
   17. Equipment or system tests and startups.
   18. Partial completions and occupancies.
   19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.05 SPECIAL REPORTS

A. General: Submit special reports directly to OWNER within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by CONTRACTOR's personnel, evaluation of results or effects, and similar pertinent information. Advise OWNER in advance when these events are known or predictable.

2.06 DIGITAL IMAGES

A. Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

B. Photographic submittals shall be compiled into a photo log naming the files utilizing the date, location, and description of photo content.

PART 3 EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: OWNER may waive the requirement to retain a consultant if CONTRACTOR employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. CONTRACTOR's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities.
1. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
2. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to OWNER, testing and inspecting agencies, and other parties identified by CONTRACTOR with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.02 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs shall be oriented in landscape only. Photographs with blurry or out-of-focus areas will not be accepted. Wide range photographs showing vicinity of detailed photographs shall accompany close-up detail photographs
1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to OWNER.

C. Preconstruction Photographs: Before commencement of excavation, cutting, or demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction. Take photographs from a selection of different vantage points, as directed by the Contracting Officers.
1. Flag construction limits before taking construction photographs.
2. Take a minimum of 8 photographs to show existing conditions adjacent to property before starting the Work.

D. Periodic Construction Photographs: Take a minimum of 12 digital photographs bi-weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken. Utilize common vantage points from the Preconstruction Photographs when feasible.

END OF SECTION 01 32 00

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SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
1. DIVISION 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. DIVISION 01 Section "Construction Progress Documentation" for submitting schedules and reports, including CONTRACTOR's construction schedule.
3. DIVISION 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. DIVISION 01 Section "General Requirements" for submitting record Drawings, record Specifications, and record Product Data.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require OWNER’s responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require OWNER’s responsive action. Submittals may be rejected for not complying with requirements.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.04 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by OWNER and additional time for handling and reviewing submittals required by those corrections.

1.05 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Submittal Register Form is included in this document for reference and record keeping.

B. CONTRACTOR’s Digital Data Files: Electronic copies of the Contract Drawings will be provided in PDF format for CONTRACTOR's use in preparing submittals. It is the CONTRACTOR’s responsibility to field-verify dimensions.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. OWNER reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on OWNER's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. OWNER will advise CONTRACTOR when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.

1.06 SUBMITTAL PROCEDURES

A. Submit electronically when required by Specification Sections. Contact OWNER as defined during the Project kickoff meeting. An FTP/FTA site or direct posting site will be provided after award to post submittals and to receive return submittals if requested by OWNER.

B. OWNER will distribute to other interested parties as necessary.

C. Submittals shall be in English language.

D. Weights, measures, and units shall be English units with SI metric values following in parenthesis.

E. Symbols and drawings shall conform to ANSI Y32.2/IEEE 315/CSA Z99.

F. Submittals shall include the following Identification and Information:
   1. Include a submittal transmittal form with all submittals. Incorporate the following:
      a. Sequential Transmittal number.
      b. Name of firm or entity that prepared each submittal on label or title block.
      c. Provide a space approximately 5 by 8 inches below title block to record CONTRACTOR's review and approval markings and action taken by OWNER.
      d. Include the following information for processing and recording action taken:
         1) Project name.
         2) Date.
         3) Name of OWNER.
         4) Name of CONTRACTOR.
         5) Name of subcontractor (if applicable).
         6) Name of supplier (if applicable).
         7) Name of manufacturer (if applicable).
         8) Submittal number or other unique identifier, including revision identifier.
            a) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g. 01 33 00.01) Resubmittals shall include an alphabetic suffix after another decimal point (e.g. 01 33 00.01.A).
         9) Number and title of appropriate Specification Section.
         10) Drawing number and detail references, as appropriate.
         11) Category and type of submittal.
         12) Location(s) where product is to be installed, as appropriate.
         13) Include a brief narrative explaining intended purpose of the product, as appropriate.

14) If the submittal is a resubmittal, attach a separate sheet, prepared on CONTRACTOR's letterhead, a record narrative of changes from the previous submittal.
15) Name and Signature of transmitter.

e. Assemble each submittal individually and appropriately for transmittal handling.
f. OWNER will return without review submittals received from sources other than CONTRACTOR.

2. Physical Material Sample Submittals: Include completed submittal transmittal form.

1.07 CONTRACTOR RESPONSIBILITIES

A. Review submittals prior to submission. CONTRACTOR shall review and apply stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/ product, dimensions, and coordination of information with other parts of the Work.

B. Determine and verify:
1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance to Specifications.

C. Coordinate each submittal with other submittals and with requirements of Work and of Contract Documents.

D. Notify OWNER in writing, at time of submission, of any deviations in submittals from requirements of Contract Documents. Any such deviations permitted by OWNER will require modifications of Contract Documents.

E. Provide space on Shop Drawings for CONTRACTOR and OWNER stamps.

F. When Shop Drawings are revised for resubmission, identify all changes made since previous submission.

G. Submittals containing language imposing duties on others (such as verification of dimensions or supply of related information) inconsistent with contract language shall be null and void.

H. Submittals shall not be used as media for inquiries for information or for verification of information that must be supplied by others to CONTRACTOR. Inquiries or verification of information shall be made by separate CONTRACTOR submittal using Request for Information (RFI) process.

I. Begin no fabrication or Work which requires submittal review until return of submittals by OWNER with stamp, as either "Reviewed" or “Reviewed as Noted". Submittals returned “Reviewed as Noted-Resubmit” require resubmittal.

J. Distribute copies of reviewed submittals that carry OWNER stamp as either "Reviewed" or "Reviewed as Noted" as appropriate. Instruct parties to promptly report any inability to comply with requirements.

K. Submittals not requested will not be recognized or processed.

1.08 OWNER DUTIES

A. Review required submittals with reasonable promptness and in accord with schedule, only for general conformance to design concept of Project and compliance with information given in Contract Documents. Review shall not extend to means, methods, sequences, techniques, or procedures of construction or to safety precautions or program incident thereto. Review of a separate item as such will not indicate approval of assembly in which item functions.

B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or review of submittal. OWNER's action on submittals is classified as follows:
   1. No Exceptions Taken: Submittal has been reviewed and appears to be in conformance to design concept of Project and Contract Documents. CONTRACTOR may proceed with fabrication of work in submittal.
   2. Exceptions As Noted: Submittal has been reviewed and appears to be in conformance to design concept of Project and Contract Documents, except as noted by reviewer. Contractor may proceed with fabrication of work in submittal with modifications and corrections as indicated by reviewer.
   3. Revise and Resubmit: Submittal has been reviewed and appears not to be in conformance to design concept of Project or with Contract Documents. CONTRACTOR shall not proceed with fabrication of work in submittal, but instead shall make any corrections required by reviewer and resubmit for review.
   4. Returned without Review: Submittal is being returned without having been reviewed because: 1) not required by Contract Documents; 2) grossly incomplete; 3) indicates no attempt at conformance to Contract Documents; 4) cannot be reproduced; 5) lacks CONTRACTOR's completed approval stamp; or 6) lacks design professional's seal when required by law or Contract Documents. If submittal is required by Contract Documents, CONTRACTOR shall not proceed with Work as detailed in submittal, but instead shall correct defects and resubmit for review.
   5. For Information Only: Submittal has not been reviewed but is being retained for informational purposes only.
   6. Void: Submittal is voided because it is no longer required or has been superseded by another submittal.

C. Return one electronic copy of submittals to CONTRACTOR. CONTRACTOR shall make additional distribution as required.

D. Review of submittals shall not relieve CONTRACTOR from responsibility for any variation from Contract Documents unless CONTRACTOR has, in writing, called OWNER's attention to such variation at time of submission, and OWNER has given written concurrence pursuant to Contract Documents to specific variation, nor shall any concurrence by OWNER or other reviewer relieve CONTRACTOR from responsibility for errors or omissions in submittals.

1.09 SHOP DRAWINGS SUBMITTALS

A. Submit for review for limited purpose of checking for conformance to information given and design concept expressed in Contract Documents.

B. Designate in construction schedule, or in separate coordinated submittal schedule, dates for submission and dates that reviewed submittals will be needed.

C. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in Work or in work of other contractors.

D. Present in clear and thorough manner, complete with respect to dimensions, design criteria, materials of construction, and like information to enable review of information as required.

E. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Drawings.

F. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

G. Equipment which is identified on Contract Documents with tag number or name shall be identified on Shop Drawing with same tag.

H. Schedule submittals to expedite Project. Coordinate submission of related items.

I. For each submittal for review, allow 15 days to complete review process.

J. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

K. Shop Drawings shall be submitted in electronic format.
   1. Submit electronic copy to OWNER at project site, or post in FTP site. Specific instructions will be provided after award.
   2. Submittal Transmittal form (see pdf attached) shall be provided in Word format for CONTRACTOR to edit and use with each submittal. MSWord template will be provided after award.
   3. Text documents shall be submitted in .pdf format except for the shop drawing Transmittal Form.
   4. Drawings shall be submitted in .pdf or .tif format.
   5. Electronic submittal shall be suitable for reproduction in black and white.
   6. Samples may be submitted to OWNER at address decided during Preconstruction meeting.

L. Submittals shall contain Submittal Transmittal Form as described under 1.06. Submittals shall also contain:
   1. Field dimensions, clearly identified as such.
   2. Relation to adjacent or critical features of Work or materials.
   3. Applicable standards, such as ASTM.
   4. Identification of deviations from Contract Documents.
   5. Identification of revisions on resubmittals.
   6. An 8" x 3" blank space for CONTRACTOR and reviewer stamps.
   7. Indication of CONTRACTOR's approval, initialed or signed, with wording substantially as follows:

      "Contractor represents to Owner that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or assumes full responsibility for doing so and has reviewed or coordinated each submittal with requirements of Work and Contract Documents."

   8. If Contract Documents include performance specifications stating required results which can be verified as meeting stipulated criteria, so that further design by CONTRACTOR prior to fabrication is necessary, Submittal depicting such design must be prepared under seal of registered professional engineer licensed in the state of Louisiana and Submittal shall be signed and sealed in accordance with applicable regulations and with following certification statement:

      "I hereby certify that this engineering document was prepared by me or under my direct personal supervision, that I am a duly licensed professional engineer under laws of state of Louisiana and I accept responsibility for adequacy of this document to meet criteria stipulated in Contract Documents."

M. Product Data:
   1. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
   2. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

N. Design data:
   1. Submit for OWNER’s knowledge.
   2. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

O. Data sheets:
   1. Data sheets may require information not known until CONTRACTOR's engineering is complete. Furnish estimated values based on good engineering judgment. Estimated values shall be identified by placement of "(est.)" next to value.
   2. Data Sheets shall be updated and resubmitted by CONTRACTOR once final values are known.
   3. Do not leave items blank or labeled "To Be Determined" or "Later."
   4. Do not submit manufacturer Product Data instead of completed data sheets.

P. Test reports:
   1. Submit for OWNER's knowledge.
   2. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

Q. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Owners, and other information as specified or otherwise requested.

R. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

S. Certificates:
   1. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor.
   2. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   3. Certificates and Certification Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   4. Certificates may be recent or previous test results on material or product, but must be acceptable to reviewer.

T. Test and Inspection Report Submittals: Comply with requirements specified in Division 01 Section 01 40 00 "Quality Requirements".

U. Manufacturer's instructions:
   1. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Owner in quantities specified for Product Data.
   2. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

V. Manufacturer's field reports:
   1. Submit report within 30 days of observation for information.
   2. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

W. Erection drawings:
   1. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action Owner.

X. Samples:
   1. Samples for selection as specified in product sections:
      a. Submit for aesthetic, color, or finish selection.
      b. Submit samples of finishes for selection.
   2. Submit to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

3. Include identification on each sample, with full Project information.
4. Submit number specified in individual Specification Sections; 2 of which will be retained by OWNER.
5. Reviewed Samples which may be used in Work are indicated in individual Specification Sections.
6. Samples will not be used for testing purposes unless specifically stated in specification section.
7. Field Samples and mock-ups:
   a. Erect at Project Site, at location acceptable to OWNER.
   b. Fabricate each Sample and mock-up complete and finished.
   c. Remove mock-ups upon acceptance of Work or when acceptable to OWNER.

Y. Proposed products list:
1. Within 15 days after date of Notice to Proceed, submit list of major products proposed to OWNER for use, with name of manufacturer, trade name, and model number of each product.
2. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

Z. Operations and maintenance manuals:
1. Designate in construction schedule, or in separate coordinated schedule, dates for submission and dates that reviewed operations and maintenance manuals will be needed.
2. Operations and maintenance manuals shall be presented in clear and thorough manner, complete with respect to dimensions, design criteria, materials of construction, and like information to enable reviewer to review information as required. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Drawings.

1.10 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in submittals required by OWNER and resubmit until stamped as either "No Exceptions Taken," "Exceptions as Noted," or “For Information Only.”

B. Text and depictions changed on Submittal shall be back-circled (clouded).

C. OWNER will assume that portions of Submittal not back-circled have not been changed by CONTRACTOR from previous submission.

D. Indicate revision number and date in document revision block.

1.11 DISTRIBUTION

A. Distribute reproductions of Shop Drawings which carry OWNER stamp as either "No Exceptions Taken" or "Exceptions as Noted" to:
1. Job site file.
2. Record Documents file.
3. Other affected contractors.
4. Subcontractors.
5. Supplier or fabricator.

1.12 CONSTRUCTION PROGRESS DOCUMENTATION

A. Construction progress schedules:
1. Submit preliminary outline Schedules to OWNER within 15 days after Notice to Proceed, or as established in Notice to Proceed for coordination with Owner's requirements. After review, submit detailed schedules within 15 days modified to accommodate revisions recommended by OWNER.
   a. Submit revised Progress Schedules with each Application for Payment. Refer to 01 32 00.
   b. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
2. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

1.13 PHOTOGRAPHIC DOCUMENTATION

A. Provide photographs of Site and construction throughout progress of Work produced by a photographer acceptable to OWNER. Refer to See 01 32 00.

B. Submit photographs with each Application for Payment.

C. Photographs: Refer to requirements described in Section 01 32 00.

1.14 SAFETY PROCEDURES MANUAL

A. Prepare and submit to Owner safety procedures manual defining CONTRACTOR's safety program for work on site. Manual shall include:
1. Safety responsibilities of CONTRACTOR's personnel.
2. Description of CONTRACTOR's safety program.
3. Requirements of use of personal protective equipment.
4. General safety-related rules of conduct.
5. Fire prevention measures.
6. Accident reporting procedures.
7. Procedures for hot work (welding, cutting, etc.), overhead work, and work in enclosed, confined spaces (tank, boiler, etc.). Reference 29 CFR Part 1910.

1.15 SUBMITTAL TRANSMITTAL FORM PROCEDURES

A. Submittals shall be accompanied by completed copies of Submittal Transmittal form, bound herein. An electronic version of transmittal form is available and may be obtained from OWNER. Reproduce additional copies as required.

B. Submit 3 copies of transmittal form for initial submittals and resubmittals. Sequentially number transmittal form. Revise submittals with original number and sequential alphabetic suffix.

C. Prior to submittal, complete information under heading “CONTRACTOR's Transmittal.”

D. OWNER will complete information under “Reviewer's Action.”

E. Do not include submittals for more than one section of Specifications on Submittal Transmittal form.

F. Identify project title, location, and number and contract title and number.

G. Identify preparer name and, submittal number, including preparer’s submittal revision number.

H. A brief description under "Title" should clearly identify specific application of equipment or material covered by Submittal, utilizing where possible same title used in Drawings and Specifications.

I. Identify Specification Section number.

J. Apply CONTRACTOR's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of Work and Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 01 33 00

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SUBMITTAL TRANSMITTAL

Transmittal No. _____ **Project Location** _____

Project No. _____ **Date Received** _____ **Contract Title** _____

Contract No. _____ **Date Distributed** _____ **Project Title** _____

CONTRACTOR'S TRANSMITTAL

ENGINEER'S/ARCHITECT'S ACTION

STATUS ABBREVIATIONS

R - Reviewed
RN - Reviewed as Noted
RNR - Reviewed as Noted Resubmit
RS - Resubmit
RET - Returned Without Review
FIO - For Information Only
V - Void

Preparer		Preparer Submittal No.		Rev No.	Title			Section	Dwg No.	Status

CONTRACTOR's Remarks

Address

By Date

Action of any kind on drawings by ENGINEER/ARCHITECT does not relieve CONTRACTOR from responsibility for errors, correctness of details, or conformance to the Contract.

ENGINEER'S/ARCHITECT'S Remarks

By

Date

Stanley Consultants

SECTION 01 40 00 – QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve CONTRACTOR of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit CONTRACTOR's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for CONTRACTOR to provide quality-assurance and quality-control services required by OWNER or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:
   1. DIVISIONs 01, 02 through 40 Sections for specific test and inspection requirements.

1.03 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by OWNER.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: CONTRACTOR or another entity engaged by CONTRACTOR as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

J. Special Tests and Inspections: Testing or inspection of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.
1. Periodic Special Inspection: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

1.04 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to OWNER for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to OWNER for a decision before proceeding.

1.05 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.06 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.07 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. CONTRACTOR responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to OWNER with copy to CONTRACTOR. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.08 QUALITY CONTROL

A. CONTRACTOR Responsibilities: Tests and inspections not explicitly assigned to Owner are CONTRACTOR's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. CONTRACTOR will furnish Government with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by the CONTRACTOR.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to CONTRACTOR.
4. Testing and inspecting requested by CONTRACTOR and not required by the Contract are CONTRACTOR's responsibility.
5. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
6. Where quality-control services are indicated as CONTRACTOR's responsibility, submit a certified written report, in duplicate, of each quality-control service.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in DIVISION 01 Section "Submittal Procedures."

C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were CONTRACTOR's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with OWNER and CONTRACTOR in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify OWNER and CONTRACTOR promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through CONTRACTOR.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of CONTRACTOR.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and - control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.09 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: CONTRACTOR will engage the services of qualified Special Inspectors acceptable to the Contracting Officer, to conduct special tests and inspections.
   1. CONTRACTOR shall complete “Statement of Special Inspections” attached to this Section upon award, and shall perform all necessary inspections per the requirements specified herein, and the Building Code:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
   2. Notifying OWNER and CONTRACTOR promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to OWNER with copy to CONTRACTOR and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in DIVISION 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are CONTRACTOR's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 43 33 – MANUFACTURER'S FIELD SERVICES

PART 1 GENERAL

1.01 INSTALLATION SUPERINTENDENT RESPONSIBILITIES

A. *Contractor shall* provide qualified Installation Superintendent(s), as necessary to:
   1. Instruct and advise installation Contractor regarding proper method for unloading, erecting, and installing equipment to assure installation in accordance with manufacturer's instructions.
   2. Assure that alignment and clearances of equipment are checked and adjusted to allowable tolerances.
   3. Inspect completed installation to assure that apparatus is in operating condition, making such detailed checks of equipment installation as are necessary to ascertain that equipment is assembled, installed, aligned, connected, lubricated, and prepared for operation in accordance with manufacturer's instructions and recommendations.
   4. Provide Engineer with duplicate copies of final alignment and clearance measurements on all rotating or reciprocating equipment. Measurements shall clearly identify each piece of equipment.
   5. Supervise preliminary operation of equipment and necessary adjustments.
   6. Fully instruct Owner's operating personnel in operation and maintenance of equipment.

B. Presence of Installation Superintendent will in no way relieve Contractor of any responsibility assumed under Agreement.

C. Work and abilities of Installation Superintendent shall be subject to review of Engineer. If Engineer determines that any Installation Superintendent is not properly qualified, Contractor shall replace Installation Superintendent upon written notification by Engineer.

D. Contractor shall provide continuity in assignment of Installation Superintendent to Work. In event substitution of Installation Superintendent is made which is not at request of Engineer, substitute's time for "familiarization" shall be at Contractor's expense.

1.02 SERVICE ENGINEER RESPONSIBILITIES

A. Contractor shall provide qualified Service Engineer(s), as necessary to:
   1. Supervise assembly of equipment.
   2. Inspect equipment after it is installed to assure that all details of installation are correct and that equipment is prepared for operation in accordance with manufacturer's instructions and recommendations.
   3. Check connections to equipment and adjust, or supervise adjustment of, control and indicating devices after equipment has been installed and connected.
   4. Fully instruct Owner's operating personnel in operation and maintenance of equipment.

B. Presence of Service Engineer will in no way relieve Contractor of any responsibility assumed under Agreement.

C. Work and abilities of Service Engineer shall be subject to review of Engineer. If Engineer determines that any Service Engineer is not properly qualified, Contractor shall replace Service Engineer upon written notification by Engineer.

D. Contractor shall provide continuity in assignment of Service Engineer to Work. In event substitution of Service Engineer is made which is not at request of Engineer, substitute's time for "familiarization" shall be at Contractor's expense.

E. Service Engineer shall make trips only with approval of Engineer, shall report in person daily to Resident Project Representative while at site, and shall submit written record of time spent at site and report on results of trip to site to Resident Project Representative weekly.

F. If any of Service Engineer's time spent at site or if any of his trips to site are required to make corrections to equipment supplied under Agreement resulting from defective design, material or workmanship used in manufacture of equipment, such time and trips will be at Contractor's expense and will not be counted against number of working days or trips specified, nor will unit *adjustment* prices apply.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 PRODUCTS

A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer for components being replaced.

1.02 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

D. Schedule delivery to minimize long-term storage at Project sites and to prevent overcrowding of construction spaces.

E. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

1.03 RECEIVING, UNLOADING AND STORING

A. Receive and unload shipments to plant sites from suppliers of equipment under this Contract.

B. Unload equipment as soon as possible after arrival.

C. Pay freight car and truck demurrage, detention, and any other costs which may be billed to OWNER due to failure to unload cars or trucks within time required by freight companies.

D. Store materials in a manner that will not endanger or otherwise be detrimental to structures.

E. Store materials to allow for inspection and measurement of quantity or counting of units.

F. Provide physical protection for equipment placed in storage.
   1. Store and maintain materials and equipment after receipt until completed installation is accepted by OWNER. Such storage and maintenance shall be in accordance with manufacturer's recommendations and requirements of these Specifications. Provide materials, equipment, and labor required for such storage and maintenance. CONTRACTOR shall be accountable for any deterioration of materials or equipment occasioned by improper storage or maintenance, and shall recondition, repair, or replace any such materials or equipment without additional cost to OWNER.
   2. Stored equipment shall be supported above ground and shall be covered with canvas or other heavy-duty sheeting. Cover shall be securely fastened and shall be replaced if torn or otherwise damaged during storage period.

3. Following items shall be stored in weatherproof building complete with bins for storage of small pieces of equipment. Heat to a minimum of 50ºF (10°C).
   a. Electronic instruments and cabinets.
   b. Electrical equipment with general-purpose enclosures.
   c. Insulation materials.
   d. Miscellaneous electronic equipment, gaskets, and small, machined parts.
   e. Instruments and controls.

G. Inspect stored equipment weekly. Renew protective coatings as necessary to preserve fitness of equipment.

1.04 GENERAL STORAGE

A. Store products immediately on delivery in accordance with manufacturer's instructions, with seals and labels intact. Protect until installed.

B. Arrange storage in manner to provide access for maintenance of stored items and for inspection.

1.05 ENCLOSED STORAGE

A. Store products subject to damage by elements in substantial weathertight enclosures.

B. Maintain temperature and humidity within ranges required by manufacturer's instructions.

C. Provide humidity control and ventilation for sensitive products, as required by manufacturer's instructions.

D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

1.06 EXTERIOR STORAGE

A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.

B. For products subject to discoloration or deterioration from exposure to elements, cover with impervious sheet material. Provide ventilation to avoid condensation.

C. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.

D. Provide surface drainage to prevent flow or ponding of rainwater.

E. Prevent mixing of refuse or chemically injurious materials or liquids.

1.07 MAINTENANCE OF STORAGE

A. Periodically inspect stored products on scheduled basis. Maintain log of inspections, make available to OWNER on request.

B. Verify storage facilities comply with manufacturer's product storage requirements.

C. Verify manufacturer required environmental conditions are maintained continually.

D. Verify surfaces of products exposed to elements are not adversely affected and if weathering of finishes is acceptable under requirements of Contract Documents.

1.08 MAINTENANCE OF EQUIPMENT STORAGE

A. For electrical equipment in long-term storage, manufacturer's service instructions shall accompany each item, with notice of enclosed instructions shown on exterior of package.

B. Service equipment on regularly scheduled basis, maintaining log of services; submit as record document.

1.09 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve CONTRACTOR of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to OWNER.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for OWNER.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. See DIVISIONs 01, 02 and 40 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in DIVISION 01 Section "Closeout Procedures”

1.10 PRODUCTS LIST

A. Within 30 days after effective date of Agreement, submit electronically complete list of major products which are proposed for installation to OWNER.

B. Tabulate products by Specification section number and title.

C. For products specified only by reference standards, list for each such product:
   1. Name and address of manufacturer.
   2. Trade name.
   3. Model or catalog designation.
   4. Manufacturer's data:
      a. Reference standards.
      b. Performance test data.

1.11 PRODUCT OPTIONS

A. For products specified only by reference standard, select product meeting that standard, by any manufacturer.

B. For products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.

C. For products specified by naming one or more products or manufacturers and stating, "or equal," submit request as for substitutions for any product or manufacturer which is not specifically named in accordance with 1.12 below.

D. For products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.

E. Whenever Specifications call for item by manufacturer's name and type and additional features of item are specifically required by Specifications, additional features specified shall be provided whether or not they are normally included in standard manufacturer's item listed.

1.12 SUBSTITUTIONS

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.

B. For period of 30 days after effective date of Agreement, OWNER will consider formal requests from CONTRACTOR for substitution of products in place of those specified. After end of that period, requests will be considered only in case of product unavailability or other conditions beyond control of CONTRACTOR.

C. Submit 3 copies of request for substitution for consideration using attached Product Substitution Request Form. Limit each request to one proposed Substitution. Support each request with:
   1. Complete data substantiating compliance of proposed substitutions with requirements stated in Contract Documents. Burden of proof is on proposer.
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature; identify:
         1) Product description.
         2) Reference standards.
         3) Performance and test data.
      c. Samples, as applicable.
      d. Name and address of similar projects on which product has been used, and date of each installation.
   2. Itemized comparison of proposed substitution with product specified; list significant variations.
   3. Data relating to changes in construction schedule.
   4. Any effect of substitution on separate contracts.
   5. List of changes required in other work or products.
   6. Accurate cost data comparing proposed substitution with product specified. Amount of any net change to Contract Price.
   7. Designation of required license fees or royalties.
   8. Designation of availability of maintenance services, sources, or replacement materials.

D. Substitutions will not be considered for acceptance when:
   1. They are indicated or implied on Shop Drawings.
   2. They are requested directly by Subcontractor or supplier.
   3. Acceptance will require substantial revision of Contract Documents.

E. Substitute products shall not be ordered or installed without written notification from OWNER’s acceptance.

F. OWNER will determine acceptability of proposed substitutions.

1.13 CONTRACTOR'S REPRESENTATION

A. In making formal request for substitution CONTRACTOR represents that:
   1. It has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
   2. It will provide same warranties or Bonds for substitution as for product specified or as required by OWNER.
   3. It will coordinate installation of accepted substitution into Work, and will make such changes as may be required for Work to be complete in all respects.

4. It waives claims for additional costs caused by substitution which may subsequently become apparent.
5. Cost data is complete and includes related costs under its Agreement, but not:
   a. Costs under separate contracts.
   b. OWNER's costs for redesign or revision of Contract Documents.
6. It will reimburse OWNER for charges of OWNER's consultants for evaluating any proposed substitute, whether proposed substitute is accepted or rejected.

1.14 OWNER DUTIES

A. Review CONTRACTOR's requests for substitution with reasonable promptness.

PART 2 PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. Procurement of Domestic Products: Specify products that comply with the minimum American-made content standard and other provisions stated under the Buy American Act.

B. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. OWNER reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," OWNER will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

C. Product Selection Procedures:
   1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for CONTRACTOR's convenience will not be considered.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for CONTRACTOR's convenience will not be considered.
   3. Products:
      a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide the named products that complies with requirements.
      b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for CONTRACTOR's convenience will not be considered unless otherwise indicated.
   b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.02 COMPARABLE PRODUCTS

A. Conditions for Consideration: OWNER will consider CONTRACTOR's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, OWNER will return requests without action, except to record noncompliance with these requirements.

B. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

C. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

D. Evidence that proposed product provides specified warranty.

E. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and Owners, if requested.

F. Samples, if requested

PART 3 EXECUTION

NOT USED

END OF SECTION 01 60 00

SECTION 01 73 00 – EXECUTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of OWNER-installed products.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

B. Related Requirements:
   1. DIVISION 01 Section "Summary of Work" for limits on use of Project site.
   2. DIVISION 01 Section "Submittal Procedures" for submitting surveys.
   3. DIVISION 01 Section "Closeout Procedures" for submitting Project Record Documents, recording OWNER-accepted deviations.

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.04 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor.

1.05 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land- surveying services of the kind indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in DIVISION 01 Affirmative Procurement requirements Section.

PART 3 EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work. CONTRACTOR responsible for contacting utility locates. CONTRACTOR will coordinate with OWNER for any digging permits. Any work requiring open flame, welding, grinding, etc. will require a Burn Permit to be issued by OWNER. All required permits must be approved prior to the work taking place.
   1. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   1. Description of the Work.
   2. List of detrimental conditions, including substrates.
   3. List of unacceptable installation tolerances.
   4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of CONTRACTOR, submit a request for information to OWNER according to requirements in DIVISION 01 Section "Project Management and Coordination."

3.03 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

E. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

F. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.04 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in DIVISION 01 Section "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Proceed with patching after construction operations requiring cutting are complete.

3.05 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

3.06 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

END OF SECTION 01 73 00

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUBSTANTIAL COMPLETION

A. When the CONTRACTOR considers the Work is substantially complete, submit written notice, with list of items to be completed or corrected (CONTRACTOR's punch list). CONTRACTOR shall indicate the value of each item on the list and reasons why the Work is incomplete.
   1. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
      a. Deficiencies and Omission List: Prepare a list of items to be completed and corrected, the value of items on the list, and reasons why the Work is not complete.
      b. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
      c. Obtain and submit releases permitting Government unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
      d. Prepare and submit Project Record Document, operation and maintenance manuals, Final Completion construction photographs, damage surveys, property surveys, and similar final record information.
      e. Deliver tools, spare parts, extra materials, and similar items to location designated by the Contracting Officer. Label with manufacturer’s name and model number where applicable.
      f. Complete startup and testing of systems and equipment.
      g. Submit test/adjust/balance records.
      h. Terminate and remove temporary facilities from Project site, along with construction tools, and similar elements.
      i. Advise the OWNER of changeover in heat and other utilities, where applicable
      j. Submit changeover information related to OWNER 's occupancy, use, operation, and maintenance.
      k. Complete final cleaning requirements, including touchup painting.
      l. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Within reasonable time, OWNER will inspect to determine status of completion.

C. Should OWNER determine that Work is not substantially complete, it will promptly notify CONTRACTOR in writing, giving reasons therefor.

D. CONTRACTOR shall remedy deficiencies, and send second written notice of substantial completion, and OWNER will reinspect Work.

E. When OWNER determines that Work is substantially complete, it will prepare Certificate of Substantial Completion in accordance with General Conditions.

1.02 FINAL COMPLETION

A. When the CONTRACTOR considers the Work is complete, it shall submit written certification that:
   1. Contract Documents have been reviewed.
   2. Work has been inspected for compliance with Contract Documents.
   3. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
   4. Equipment and systems have been tested in presence of OWNER and are operational.
   5. Work is complete and ready for final inspection.

B. OWNER will inspect to verify status of completion with reasonable promptness.

C. Should OWNER consider that Work is incomplete or defective, it will promptly notify CONTRACTOR in writing, listing incomplete or defective Work.

D. CONTRACTOR shall take immediate steps to remedy deficiencies and send second written certification that Work is complete, and OWNER will reinspect Work.

E. When OWNER finds Work is acceptable, it will consider closeout submittals.

1.03 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. There shall be a maximum of thirty (30) days allowed between Pre-Final Inspection and Final Acceptance for the completion of outstanding punch list items.

B. OWNER cannot take Beneficial Occupancy if there are any life safety items included among the outstanding punch list items.

C. Preparation: OWNER will include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by CONTRACTOR that are outside the limits of construction. Use form provided by the OWNER.
   1. Organize list of spaces in sequential order. Organize items applying to each space by major element
   2. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Contracting Officer.
      d. Name of CONTRACTOR.
      e. Page number.

1.04 CLOSEOUT SUBMITTALS

A. Closeout Submittals will be provided within eight (8) weeks of the last pump station commissioning completed of the project.

B. 5 hard copies, 2 thumb drives, and files in fileshare will be provided.

C. Evidence of compliance with requirements of governing authorities:

D. Certificate of occupancy.

E. Certificates of inspection, including but limited to:
   1. Mechanical
   2. Electrical.
   3. Others as appropriate.

F. Project record documents
   1. Project Management Files
   2. Photo Log
   3. RFI Log
   4. As-Built Drawings
   5. Warranty data
   6. Submittal Logs
   7. Product Data

G. Operation and maintenance data, instructions to OWNER's personnel: In accordance with Section 01 78 23.

H. Warranties and Bones.

I. Evidence of payment and release of liens.

J. Consent of Surety to final payment.

K. Certificates of insurance for products and completed operations: In accordance with Supplementary Conditions.

1.05 ADJUSTMENT OF ACCOUNTS

A. Submit final statement of accounting, reflecting adjustments to Contract Price:

B. Original Contract Price.

C. Additions and deductions resulting from:
1. Previous Change Orders.
2. Allowances.
3. Unit prices.
4. Deductions for uncorrected Work.
5. Penalties and bonuses.
6. Deductions for liquidated damages.
7. Deductions for reinspection payments.
8. Other adjustments.

D. Total Contract Price, as adjusted.

E. Previous payments.

F. Sum remaining due.

G. OWNER will issue final Change Order, reflecting approved adjustments to Contract Price not previously made by Change Orders.

1.06 WARRANTIES:

A. Time of Submittal: Submit written warranties on request of OWNER for designated portions of the Work where commencement of warranties other than date of Final Acceptance is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of CONTRACTOR.

C. Provide additional copies of each warranty to include in operation and maintenance manuals

1.07 APPLICATION FOR FINAL PAYMENT

A. Submit Application for Final Payment in accordance with procedures and requirements in conditions of Agreement.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 01 77 00

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SECTION 01 78 23 – OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 OPERATING AND MAINTENANCE DATA REQUIREMENTS

A. Operating and maintenance data shall be in English language.

B. Compile product data and related information appropriate for OWNER's maintenance and operation of products furnished under Agreement.

C. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of Specifications.

D. Instruct OWNER 's personnel in maintenance of products and in operation of equipment and systems. See equipment specifications for training requirements.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:
1. Trained and experienced in maintenance and operation of described products.
2. Familiar with requirements of this section.
3. Skilled as technical writers to extent required to communicate essential data.
4. Skilled as draftsmen competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by OWNER 's personnel.

B. Format:
1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to OWNER.
   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial completion and at least 15 days before commencing demonstration and training. OWNER will return copy with comments.
1. Sheet size: 8-1/2" x 11" minimum.
2. Paper: 20 lb minimum, white, for typed pages.
3. Text: Manufacturer's printed data, or neatly typewritten.
4. Drawings:
   a. Provide reinforced punched binder tab, bind in with text.
   b. Larger size drawings shall be folded to 8-1/2” x 11” and inserted into pockets.
5. Provide fly-leaf for each separate product, or each piece of operating equipment.
   a. Provide typed description of product, and major component parts of equipment.
   b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS." List:
   a. Title of Project.
   b. Identity of separate structure as applicable.
   c. Identity of general subject matter covered in manual.
7. Binders:
   a. Commercial quality 3-ring binders with durable and cleanable plastic covers.
   b. Maximum ring size: 1".
   c. When multiple binders are used, correlate data into related consistent groupings.

1.04 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.
   1. Contractor, name of responsible principal, address, and telephone number.
   2. List of each product required to be included, indexed to content of volume.
   3. List, with each product, name, address, and telephone number of:
      a. Subcontractor or installer.
      b. Maintenance contractor, as appropriate.
      c. Identify area of responsibility of each.
      d. Local source of supply for parts and replacement and list of recommended spare parts.
   4. Identify each product by product name and other identifying symbols as set forth in Contract Documents, including nameplate information and shop order numbers for each item of equipment furnished.

B. Product data:
   1. Include only those sheets which are pertinent to specific product.
   2. Annotate each sheet to:
      a. Clearly identify specific product or part installed.
      b. Clearly identify data applicable to installation.
      c. Delete references to inapplicable information.

C. Drawings:
   1. Supplement product data with Drawings as necessary to clearly illustrate:
      a. Relations of component parts of equipment and systems.
      b. Control and flow diagrams.
   2. Coordinate Drawings with information in Project record documents to assure correct illustration of completed installation.
   3. Do not use Project record documents as maintenance Drawings.

D. Written text, as required to supplement product data for particular installation.
   1. Organize in consistent format under separate headings for different procedures.
   2. Provide logical sequence of instructions for each procedure.

E. Copy of each warranty, Bond, and service contract issued.
   1. Provide information sheet for OWNER 's personnel, giving:
      a. Proper procedures in event of failure.
      b. Instances which might affect validity of warranties or Bonds.

1.05 MANUAL FOR MATERIALS AND FINISHES

A. Submit 5 copies of complete manual in final form.

B. Contents, for architectural products, applied materials and finishes:
   1. Manufacturer's data, giving full information on products.
      a. Catalog number, size, composition.
      b. Color and texture designations.
      c. Information required for re-ordering special-manufactured products.

C. Contents, for moisture protection and weather-exposed products:
   1. Manufacturer's data, giving full information on products.
      a. Applicable standards.
      b. Chemical composition.
      c. Details of installation.
   2. Instructions for inspection, maintenance, and repair.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit 3 copies of complete manual in final form Contents, for each unit of equipment and system, as appropriate:
   1. Description of unit and component parts:
      a. Function, normal operating characteristics, and limiting conditions.
      b. Performance curves, engineering data, and tests.
      c. Complete nomenclature and commercial number of replaceable parts.
   2. Operating procedures:
      a. Startup, break-in, routine, and normal operating instructions.
      b. Regulation, control, stopping, shutdown, and emergency instructions.
      c. Summer and winter operating instructions.
      d. Special operating instructions.
   3. Maintenance procedures:
      a. Routine operations.
      b. Guide to "trouble-shooting."
      c. Disassembly, repair, and reassembly.
      d. Alignment, adjusting, and checking.
   4. Servicing and lubrication schedule: List of lubricants required.
   5. Manufacturer's printed operating and maintenance instructions.
   6. Description of sequence of operation by control manufacturer.
   7. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
      a. Predicted life of parts subject to wear.
      b. Items recommended to be stocked as spare parts.
   8. As-installed control diagrams by controls manufacturer.
   9. Each contractor's coordination Drawings.
   10. Chart of valve tag numbers, with location and function of each valve.
   11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
   12. Other data as required under pertinent sections of Specifications.

C. Content, for each electrical and electronic system, as appropriate.
   1. Description of system and component parts:
      a. Function, normal operating characteristics, and limiting conditions.
      b. Performance curves, engineering data, and tests.
      c. Complete nomenclature and commercial number of replacement parts.
   2. Circuit directories of panelboards:
      a. Electrical service.
      b. Controls.
      c. Communications.
   3. As-installed color-coded wiring diagrams.
   4. Operating procedures:
      a. Routine and normal operating instructions.
      b. Sequences required.
      c. Special operating instructions.
   5. Maintenance procedures:
      a. Routine operations.
      b. Guide to "trouble-shooting."
      c. Disassembly, repair, and assembly.
      d. Adjustment and checking.
   6. Manufacturer's printed operating and maintenance instructions.
   7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
   8. Other data as required under pertinent sections of Specifications.

D. Prepare and include additional data when need for such data becomes apparent during instruction of OWNER t’s personnel.

E. Preliminary draft:
   1. Provide 2 copies with shipped equipment.
   2. Submit 3 copies to OWNER of proposed formats and outlines of contents prior to start of Work. OWNER will review draft and return 1 copy with comments.

F. Submit 1 copy of completed data in final form 15 days prior to final inspection or acceptance. Copy will be returned after final inspection or acceptance, with comments.

G. Submit specified copies of approved data in final form 10 days after final inspection or acceptance.

1.07 DEMONSTRATION AND INSTRUCTION OF GOVERNMENT'S PERSONNEL

A. Demonstrate operation and maintenance of products to OWNER 's personnel 2 weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within 6 months.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER 's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at time agreed with OWNER.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. Amount of time required for instruction on each item of equipment and system is that specified in individual sections.

PART 2 PRODUCTS

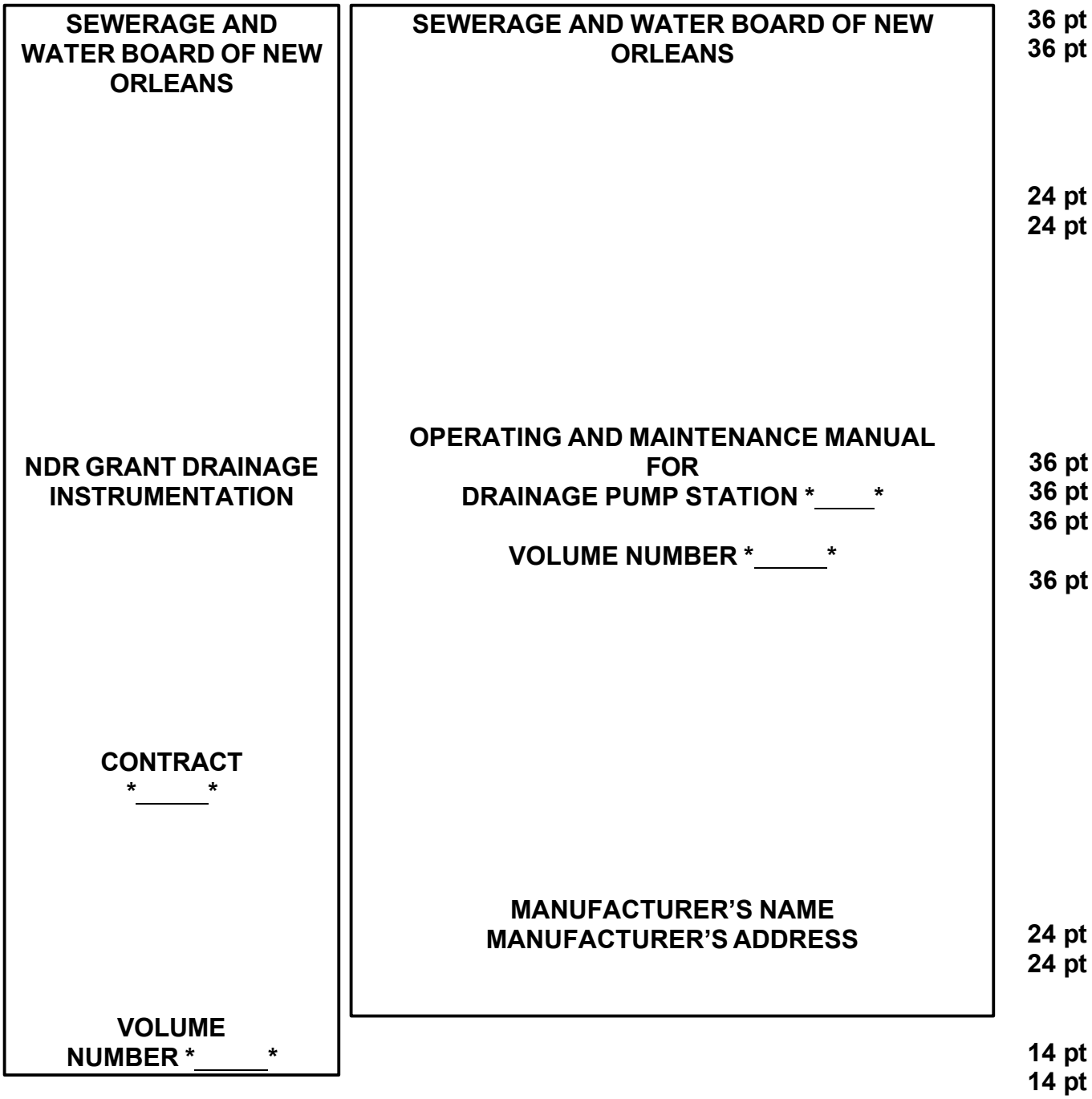
NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 01 78 23

OPERATING AND MAINTENANCE MANUAL COVER DIAGRAM



SPINE **COVER**

1. **Imprinting shall be in Arial font.**
2. **Spine printing shall be 12-point.**
3. **Cover printing shall be in point sizes indicated.**

* **If more than one volume is necessary, imprint cover with volume numbers.**

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SECTION 01 91 13 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

A. Perform commissioning in a systematic process to ensure that all systems perform interactively according to design intent and Owner's operational needs. Commissioning process shall encompass and coordinate separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing, and training.

B. Commissioning during construction phase is intended to achieve following specific objectives according to Contract Documents:
   1. Verify applicable equipment and systems are installed in accordance with manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
   2. Verify and document proper performance of equipment and systems.
   3. Verify operation and maintenance documentation left on Site is complete.
   4. Verify Owner's operating personnel are adequately trained.

C. Commissioning process shall not take away from or reduce responsibility of Contractor to provide finished and fully functioning product.

1.02 RELATED SECTIONS

A. General Conditions of the Construction Contract.

B. Section 01 73 00 - Execution and Closeout Requirements: Substantial Completion and Functional Completion milestones relative to commissioning.

C. *Section 01 77 00 - Closeout Submittals: Operation and Maintenance Documentation.

D. *Section 01 78 23 – Operation and Maintenance Data: Operation and Maintenance Documentation.

1.03 DEFINITIONS

A. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, operation and maintenance documentation review, and training occurs.

B. Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to Contract Documents.

C. Architect / Engineer - Prime consultant and subconsultants who comprise design team, generally mechanical designer/engineer and electrical designer/engineer.

D. OWNER - an independent agent, not otherwise associated with Architect / Engineer team members or Contractor, though he/she may be hired as a subcontractor to them. OWNER directs and coordinates day-to-day commissioning activities. OWNER does not take an oversight role like Construction Manager. OWNER is part of Construction Manager team or shall report directly to Construction Manager.

E. Commissioning Plan - an overall plan, developed before or after bidding, that provides structure, schedule and coordination planning for commissioning process.

F. Contractor - Provider of labor, materials, equipment, and services to complete the Work as outlined in the Contract Documents.

G. Control system - central building energy management control system.

H. Construction Manager:
   1. Owner's representative in day-to-day activities of construction. In general, construction management services contractor is hired by Owner to assist in overall management of project including supervising and on-site managing authority over a project's construction. The General Contractor reports to Construction Manager. Construction Manager is Owner's on-site representative.

I. Data Logging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from control system.

J. Deferred Functional Tests - Functional tests that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow test from being performed.

K. Deficiency - a condition in installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents (that is, does not perform properly or is not complying with design intent).

L. Design Intent - a dynamic document that provides explanation of ideas, concepts and criteria that are considered to be very important to owner. It is initially outcome of programming and conceptual design phases.

M. Design Narrative or Design Documentation - sections of either Design Intent or Basis of Design.

N. Factory Testing - testing of equipment on-site or at factory by factory personnel with an Owner's representative present.

O. Functional Performance Test - test of dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is dynamic testing of systems (rather than just components) under full operation (e.g., chiller pump is tested interactively with chiller functions to see if pump ramps up and down to maintain differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. Systems are run through all control system's sequences of operation and components are verified to be responding as sequences state. Traditional air or water test and balancing is not functional testing, in the commissioning sense of the word. Testing and balancing contractor's primary work is setting up system flows and pressures as specified, while functional testing is verifying that which has already been set up. Contractor develops functional test procedures in a sequential written form, coordinates, oversees and documents actual testing, which is usually performed by installing contractor or vendor. Functional tests are performed after prefunctional checklists and startup are complete.

P. Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

Q. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make "observation").

R. Monitoring - recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or trending capabilities of control systems.

S. Noncompliance - see Deficiency.

T. Nonconformance - see Deficiency.

U. Overwritten Value - writing over a sensor value in control system to see response of a system (e.g., changing outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."

V. Owner-Contracted Tests - tests paid for by Owner outside of the Agreement with Contractor and for which OWNER does not oversee. Tests will not be repeated during functional tests if properly documented.

W. Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to size of structure or other scheduling issues, in order minimize total construction time.

X. Prefunctional Checklist - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by Contractor to Subcontractor. Prefunctional checklists are primarily static inspections and procedures to prepare equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some prefunctional checklist items entail simple testing of function of a component, a piece of equipment or system (such as measuring voltage imbalance on a three phase pump motor of a chiller system). The word 'prefunctional' refers to before functional testing. Prefunctional checklists augment and are combined with manufacturer's start-up checklist.

Y. Project Manager - contracting and managing authority for Owner over design and/or construction of project, a staff position.

Z. Sampling. - functionally testing only a fraction of total number of identical or near identical pieces of equipment. Refer to article "Functional Performance Testing" for additional details.

AA. Seasonal Performance Tests – Functional Tests that are deferred until system(s) will experience conditions closer to their design conditions.

BB. Simulated Condition - condition that is created for purpose of testing response of a system (e.g., applying a hair blower to a space sensor to see response in a VAV box).

CC. Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to transducer and DDC system to simulate a sensor value.

DD. Startup - initial starting or activating of dynamic equipment, including executing prefunctional checklists.

EE. Subcontractors – Specialty contractors who hold contracts with the Contractor to furnish and install building components and systems.

FF. Test Procedures - step-by-step process which must be executed to fulfill test requirements. The test procedures are developed by Contractor.

GG. Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not detailed test procedures. The test requirements are specified in Contract Documents

HH. Trending - monitoring using building control system.

II. Vendor - supplier of equipment.

1.04 SUBMITTALS

A. OWNER will provide appropriate Subcontractors with specific request for type of submittal documentation OWNER requires to facilitate commissioning work. Requests will be integrated into normal submittal process and protocol of construction team. At minimum, request will include manufacturer and model number, manufacturer's printed installation and detailed start-up procedures, full sequences of operation, operation and maintenance data, performance data, any performance test procedures, control drawings and details of Owner-contracted tests. In addition, installation and checkout materials that are actually shipped inside equipment and actual field checkout sheet forms to be used by factory or field technicians shall be submitted to OWNER. All documentation requested

by OWNER will be included by Subcontractors in their operation and maintenance data manual contributions.

B. OWNER will review submittals related to commissioned equipment for conformance to Contract Documents as it relates to commissioning process, to functional performance of equipment and adequacy for developing test procedures. Review will be primarily to aid in development of functional testing procedures and only secondarily to verify compliance with equipment specifications. OWNER will notify Construction Manager, Project Manager, or Engineer as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.

C. OWNER may request additional design narrative from Engineer and controls contractor, depending on completeness of design intent documentation and sequences provided with Specifications.

D. Submittals to OWNER do not constitute compliance for operation and maintenance manual documentation. Operation and maintenance manuals are responsibility of Contractor, though OWNER will review them.

E. Written work products: Commissioning process generates a number of written work products described in various parts of Specifications. Commissioning plan lists all formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and location of specification to create them. Written products are:

Product	Developed By
Final commissioning plan	Contractor
Meeting minutes	Contractor
Commissioning schedules	Contractor and Construction Manager
Equipment documentation submittals	Subcontractors
Sequence clarifications	Subcontractors and Architect / Engineer as needed
Prefunctional checklists	Contractor
Startup and initial checkout plan	Subcontractors and Contractor (compilation of existing documents)
Startup and initial checkout forms filled out	Subcontractors
Final TAB report	TAB Subcontractor
Issues log (deficiencies)	Contractor
Commissioning Progress Record	Contractor
Deficiency reports	Contractor
Functional test forms	Contractor
Filled out functional tests	Contractor
O&M manuals	Subcontractors
Commissioning record book	Contractor
Overall training plan	Construction Manager
Specific training agendas	Subcontractors
Final commissioning report	Contractor
Misc. approvals	OWNER

1.05 QUALITY ASSURANCE

A. Meetings:
1. Scoping meeting. Within 60 days of commencement of construction, Contractor will schedule, plan and conduct a commissioning scoping meeting with entire commissioning team in attendance. Meeting minutes will be distributed to all parties by Contractor. Information gathered from this meeting will allow Contractor to revise commissioning plan to its “final” version, which will also be distributed to all parties.
2. Miscellaneous meetings. Other meetings will be planned and conducted by Contractor as construction progresses. Meetings will cover coordination, deficiency resolution, and planning issues with particular Subcontractors. Contractor will plan meetings and will minimize

unnecessary time being spent by Subcontractors. For large projects, meetings may be held monthly, until final 3 months of construction when they may be held as frequently as one per week.

B. Coordination:
   1. Members of commissioning team shall consist of Project Manager, designated representative of Owner's Construction Management firm, Contractor, electrical subcontractor, controls subcontractor, and other installing subcontractors or vendors. Owner's building or plant operator/engineer shall also be a member of commissioning team.Management: Members of commissioning team shall work together to fulfill their contracted responsibilities and meet objectives of the Contract Documents.

C. Reporting:
   1. Contractor will provide regular reports to Construction Manager, Project Manager, or Owner, depending on management structure, with increasing frequency as construction and commissioning progresses. Standard forms are provided and referenced in commissioning plan.
   2. Contractor will regularly communicate with all members of commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.
   3. Testing or review approvals and nonconformance and deficiency reports are made regularly with review and testing as described in later sections.
   4. Final summary report (approximately 4 to 6 pages, not including backup documentation) by Contractor will be provided to Construction Manager, Project Manager, or Owner, focusing on evaluating commissioning process issues and identifying areas where process could be improved. Acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with summary report. Prefunctional checklists, functional tests, and monitoring reports will not be part of final report but will be stored in Commissioning Record in operation and maintenance manuals.

1.06 ENGINEER'S RESPONSIBILITIES

A. Construction and acceptance phase:
   1. Perform normal submittal review, construction observation, "as-built" Record Drawing preparation, etc., as contracted. On-site observation shall be completed just prior to system startup.
   2. Provide design narrative and sequences documentation requested by OWNER. Engineer shall assist (along with Subcontractors) in clarifying operation and control of commissioned equipment in areas where specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
   3. Attend commissioning scoping meetings and other selected commissioning team meetings.
   4. Participate in resolution of system deficiencies identified during commissioning, according to Contract Documents.
   5. Prepare and submit final record "as-built" design intent and operating parameters documentation for inclusion in operation and maintenance manuals. Review and approve operation and maintenance manuals.
   6. Provide presentation at one training session for Owner's personnel.
   7. Review prefunctional checklists for major pieces of equipment for sufficiency prior to their use.
   8. Review functional test procedure forms for major pieces of equipment for sufficiency prior to their use.
   9. Witness testing of selected pieces of equipment and systems.

B. Warranty period: Participate in resolution of noncompliance, nonconformance and design deficiencies identified during commissioning during warranty period commissioning.

C. Attend commissioning scoping meeting and additional meetings, as necessary.

D. Follow commissioning plan.

1.07 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

A. Commissioning Authority shall not be responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. Commissioning Authority may assist with problem-solving, nonconformance or deficiencies. Primary role of Commissioning Authority shall be to develop and coordinate execution of testing plan, observe and document performance that systems are functioning in accordance with documented design intent and in accordance with Contract Documents. Contractor shall provide tools and labor to start, check-out and functionally test equipment and systems.

B. Construction and acceptance phase:
   1. Coordinate and direct commissioning activities in a logical, sequential, and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with necessary parties, frequently updated timelines and schedules, and technical expertise.
   2. Coordinate commissioning work and, with Construction Manager, ensure that commissioning activities are being scheduled into master schedule.
   3. Revise commissioning plan as necessary.
   4. Plan and conduct commissioning scoping meeting and other commissioning meetings.
   5. Request and review additional information required to perform commissioning tasks, including operation and maintenance materials, Contractor start-up, and checkout procedures.
   6. Before startup, gather and review current control sequences and interlocks and work with Subcontractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
   7. Review Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with Engineer reviews.
   8. Write and distribute prefunctional tests and checklists.
   9. Develop enhanced start-up and initial systems checkout plan with Subcontractors.
   10. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to commissioning process. Assist in resolving any discrepancies.
   11. Notify Owner of prefunctional tests and checklist completion by reviewing prefunctional checklist reports and by selected site observation and spot checking.
   12. Notify Owner of systems startup by reviewing start-up reports and by selected site observation.
   13. With necessary assistance and review from installing subcontractors, write functional performance test procedures for equipment and systems. Test procedures may include energy management control system trending, stand-alone data logger monitoring, or manual functional testing. Submit to Construction Manager for review, and for approval if required.
   14. Analyze functional performance trend logs and monitoring data to verify performance.
   15. Coordinate and witness functional performance tests performed by installing subcontractors. Coordinate retesting as necessary until satisfactory performance is achieved.
   16. Maintain master deficiency and resolution log and separate testing record. Provide Construction Manager with written progress reports and test results with recommended actions.
   17. Review equipment warranties to ensure that Owner's responsibilities are clearly defined.
   18. Compile and maintain commissioning record and building systems book(s).
   19. Review operation and maintenance manuals.
   20. Provide final commissioning report as specified below.

1.08 CONSTRUCTION MANAGER'S - OWNER'S REPRESENTATIVE'S RESPONSIBILITIES

A. Construction and acceptance phase:
   1. Facilitate coordination of commissioning work by Contractor, ensure that commissioning activities are being scheduled into master schedule.
   2. Review and approve final commissioning plan.
   3. Attend commissioning scoping meeting and other commissioning team meetings.
   4. Perform normal review of Contractor submittals.
   5. Furnish copy of construction documents, addenda, change orders and approved submittals and Shop Drawings related to commissioned equipment to Contractor.

6. Prior to testing, review and approve functional performance test procedures.
7. When necessary, observe and witness prefunctional checklists, startup and functional testing of selected equipment.
8. Review commissioning progress and deficiency reports.
9. Coordinate resolution of noncompliance and design deficiencies identified in all phases of commissioning.
10. Sign-off (final approval) on individual commissioning tests as completed and passing. Recommend completion of commissioning process to Project Manager.
11. Assist Contractor in coordinating training of owner personnel.

B. Attend commissioning scoping meeting and additional meetings, as necessary.

C. Follow commissioning plan.

1.09 OWNER'S PROJECT MANAGER'S RESPONSIBILITIES

A. Construction and acceptance phase:
1. Manage contract of Engineer and of Contractor.
2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to commissioning plan - construction phase.
3. Provide final approval for completion of commissioning work.

B. Warranty period: Ensure seasonal or deferred testing and deficiency issues are addressed.

C. Attend commissioning scoping meeting and additional meetings, as necessary.

D. Follow commissioning plan.

1.10 CONTRACTOR'S RESPONSIBILITIES

A. Construction and acceptance phase:
1. Ensure that commissioning activities are being scheduled into master schedule.
2. Include cost of commissioning in total Contract Price.
3. Furnish copy of construction documents, addenda, change orders and approved submittals and Shop Drawings related to commissioned equipment to Commissioning Authority.
4. In each Purchase Order or subcontract written, include requirements for submittal data, operation and maintenance data, commissioning tasks and training.
5. Ensure Subcontractors execute commissioning responsibilities according to Contract Documents and schedule.
6. Facilitate commissioning scoping meeting and other necessary meetings scheduled to facilitate commissioning process.
7. Coordinate training of Owner's personnel.
8. Prepare operation and maintenance manuals, according to Contract Documents, including clarifying and updating original sequences of operation to record "as-built" conditions.

B. Warranty period:
1. 12 Month Warranty period.
2. Ensure Subcontractors execute seasonal or deferred functional performance testing according to Contract Documents.
3. Ensure Subcontractors correct deficiencies and make necessary adjustments to operation and maintenance manuals and "as-built" Record Drawings for applicable issues identified in seasonal testing.

C. Attend commissioning scoping meeting and additional meetings, as necessary.

D. Follow commissioning plan.

1.11 VENDOR'S RESPONSIBILITIES

A. Provide requested submittal data, including detailed start-up procedures and specific responsibilities of Owner to keep warranties in force.

B. Assist in equipment testing per agreements with Subcontractors.

C. Include special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment in accordance with Contract Documents in bid price.

D. Analyze specified products and verify that designer has specified newest most updated equipment reasonable for Project's scope and budget.

E. Review test procedures for equipment installed by manufacturer's factory representatives.

F. Attend commissioning scoping meeting and additional meetings, as necessary.

G. Follow commissioning plan.

1.12 SCHEDULING

A. Contractor shall work with OWNER according to established protocols to schedule commissioning activities. Contractor shall provide sufficient notice to OWNER for scheduling commissioning activities. Contractor shall integrate commissioning activities into master schedule. OWNER, Construction Manager, and Contractor shall address scheduling problems and make necessary notifications in timely manner to expedite commissioning process.

B. Contractor shall provide initial schedule of primary commissioning events at commissioning scoping meeting. Commissioning plan shall provide format for schedule. As construction progresses, more detailed schedules shall be developed by Contractor. Commissioning plan shall also provide format for detailed schedules.

1.13 OWNER'S INSTRUCTION

A. Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring training is completed.

B. Contractor shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for commissioned equipment.
   1. Contractor shall interview facility manager and lead engineer to determine special needs and areas where training will be most valuable. Owner and shall decide how rigorous training should be for each piece of commissioned equipment. Contractor shall communicate results to Subcontractors and vendors who have training responsibilities.
   2. Contractor shall develop overall training plan, coordinate and schedule with OWNER for commissioned systems. Contractor shall develop criteria for determining that training was satisfactorily completed, including attending some of training, etc. Contractor shall recommend approval of training to Construction Manager using standard form. Construction Manager shall also sign approval form.
   3. At one of the training sessions, Contractor shall demonstrate use of blank functional test forms for re-commissioning equipment.
   4. Video taping of training sessions will be provided by Contractor and added to operation and maintenance manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by each contractor for equipment being tested. For example, mechanical subcontractor shall ultimately be responsible for standard testing equipment for HVAC

system and controls system, except for equipment specific to and used by testing and balancing contractor in their commissioning responsibilities. Two-way radios shall be provided by contractor for equipment being tested.

B. Except for standalone data logging equipment that may be used by Commissioning Authority, special equipment, tools and instruments which are only available from Vendor, specific to a piece of equipment and required for testing equipment shall be provided, left on site, and shall become property of Owner.

C. Data logging equipment and software required to test equipment will be provided by Contractor, but will not become property of Owner.

D. Testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with tolerances specified. If not otherwise noted, following minimum requirements apply:
   1. Temperature sensors and digital thermometers shall have a certified calibration within past year to accuracy of 0.5°F and a resolution of ±0.1°F.
   2. Pressure sensors shall have accuracy of ±2.0% of value range being measured (not full range of meter) and have been calibrated within last year.
   3. Equipment shall be calibrated according to manufacturer's recommended intervals and when dropped or damaged.
   4. Calibration tags shall be affixed or certificates readily available.

E. Refer to Section 01 91 13-16 for details regarding equipment that may be required to simulate required test conditions.

PART 3 EXECUTION

3.01 COMMISSIONING PROCESS

A. Commissioning plan shall provide guidance in execution of commissioning process. Immediately after initial commissioning scoping meeting, Contractor will develop plan, which is then considered "final" plan. Plan will continue to evolve and expand as project progresses.

B. Commissioning tasks and sequence:
   1. Commissioning during construction shall begin with scoping meeting conducted by Commissioning Authority to review commissioning process with commissioning team members.
   2. Additional meetings required during construction shall be scheduled by Contracor with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
   3. Equipment documentation shall be submitted to Contractor during normal submittals, including detailed start-up procedures.
   4. Contractor shall work with Subcontractors in developing startup plans and startup documentation formats, including providing Subcontractors with prefunctional checklists to be completed, during startup process.
   5. Checkout and performance verification shall proceed from simple to complex; from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
   6. Subcontractors shall execute and document prefunctional checklists and perform startup and initial checkout. Contractor shall document that checklists and startup were completed according to approved plans. Contractor may witness start-up of selected equipment.
   7. Contractor shall develop specific equipment and system functional performance test procedures. Subcontractors shall review procedures.
   8. Procedures shall be executed by Subcontractors, under direction of, and documented by Commissioning Authority.
   9. Items of noncompliance in material, installation, or setup shall be corrected at Subcontractor's expense and system shall be retested.
   10. Contractor review operation and maintenance documentation for completeness.
   11. Commissioning shall be completed prior to Substantial Completion.

12. Contractor shall review, preapprove, and coordinate training provided by Subcontractors and verify that training was completed.
13. Deferred testing shall be conducted, as specified or required.

3.02 STARTUP, PREFUCTIONAL CHECKLISTS, AND INITIAL CHECKOUT

A. Perform following procedures on equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified prefunctional checklists and startup.

B. Prefunctional checklists shall verify that equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. Prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of given system.

C. Start-up and initial checkout plan:
   1. Contractor shall ensure that there is written documentation that each manufacturer-recommended procedure has been completed. Parties responsible for prefunctional checklists and startup will be identified in commissioning scoping meeting and in checklist forms. Parties responsible for executing functional performance tests are identified in testing requirements in Section 20 08 00.
   2. Contractor shall adapt representative prefunctional checklists and procedures specified herein. Checklists shall indicate required procedures to be executed as part of startup and initial checkout of systems and party responsible for their execution.
   3. Contractor shall determine which trade is responsible for executing and documenting each of line item tasks and notes that trade on form. Each form will have more than one trade responsible for its execution.
   4. Subcontractor responsible for purchase of equipment shall develop full start-up plan by combining (or adding to checklists with manufacturer's detailed start-up and checkout procedures from operation and maintenance manual and normally used field checkout sheets. Plan shall include checklists and procedures with specific boxes or lines for recording and documenting checking and inspections of each procedure and a summary statement with signature block at end of plan.
   5. Full start-up plan to consist of:
      a. Prefunctional checklists.
      b. Manufacturer's standard written start-up procedures copied from installation manuals with check boxes by each procedure and a signature block added by hand at end.
      c. Manufacturer's normally used field checkout sheets.
   6. Subcontractor shall submit full startup plan to Contractor for review and approval.
   7. Contractor shall review and approve procedures and format for documenting them, noting procedures that need to be added.
   8. Full start-up procedures and approval form may be provided to Construction Manager for review and approval, depending on management protocol.

D. Sensor and actuator calibration:
   1. Field-installed temperature, relative humidity, CO, CO_2 and pressure sensors and gages, and actuators (dampers and valves) on equipment shall be calibrated using methods specified. Alternate methods may be used with prior written approval of Owner.
   2. Test instruments shall have had certified calibration within last 12 months. Sensors installed in unit at factory with calibration certification provided do not need to be field calibrated.
   3. Procedures used shall be fully documented on prefunctional checklists or other suitable forms, clearly referencing procedures followed and written documentation of initial, intermediate and final results.
   4. Sensor calibration methods:
      a. Verify sensor locations are appropriate and away from causes of erratic operation. Verify sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine temperature or pressure difference, verify sensors are reading within 0.2°F of each other for temperature and within tolerance equal to 2% of reading, of each other, for pressure. Tolerances for critical applications may be tighter.

b. Sensors without transmitters; standard application: Make reading with calibrated test instrument within 6" of site sensor. Verify that sensor reading (via permanent thermostat, gage or building automation system) is within tolerances in table below of instrument-measured value. If not, install offset in building automation system, calibrate or replace sensor.
c. Sensors with transmitters:
   1) Standard Application. Disconnect sensor. Connect signal generator in place of sensor. Connect ammeter in series between transmitter and building automation system control panel. Using manufacturer's resistance-temperature datum, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by ammeter. Repeat for maximum temperature matching 20 mA to potentiometer span or maximum and verify at building automation system. Record values and recalibrate controller as necessary to conform to specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make reading with calibrated test instrument within 6" of site sensor. Verify sensor reading (via permanent thermostat, gage or building automation system) is within tolerances in table below of instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform similar process with suitable signal generator.
   2) Critical applications: For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

5. Tolerances, standard applications:

Sensor	Required Tolerance (±)	Sensor	Required Tolerance (±)
Cooling coil, chilled and condenser water temperatures	0.4°F	Flow rates, water Relative humidity	4% of design 4% of design
AHU wet bulb or dew point	2.0°F	Combustion flue temps	5.0F
Hot water coil and boiler water temperatures	1.5°F	Oxygen or CO_2 monitor	0.1 % pts
Outside air, space air, duct air temperatures	0.4°F	CO monitor	0.01 % pts
Watt-hour, voltage and amperage	1% of design	Natural gas and oil flow rate	1% of design
Pressures, air, water and gas	3% of design	Steam flow rate	3% of design
Flow rates, air	10% of design	Barometric pressure	0.1 in. of Hg

E. Execution of prefunctional checklists and startup:
1. Four weeks prior to startup, Subcontractors and vendors shall schedule startup and checkout with Construction Manager, and Contractor. Performance of prefunctional checklists, startup and checkout are directed and executed by Subcontractor or vendor. When checking off prefunctional checklists, signatures may be required of other Subcontractors for verification of completion of their work.
2. Contractor shall observe, at minimum, procedures for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as approved by Construction Manager). In no case will number of units witnessed be less than four on any one building, nor less than 20% of total number of identical or very similar units.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), Contractor shall observe sampling of prefunctional and start-up procedures. Sampling procedures are identified in commissioning plan.
4. Subcontractors and vendors shall execute startup and provide Contractor with signed and dated copy of completed start-up and prefunctional tests and checklists.
5. Only individuals that have direct knowledge and witnessed that line item task on prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, nonconformance and approval in checklists and startup:
   1. Subcontractors shall clearly list any outstanding items of initial start-up and prefunctional procedures that were not completed successfully, at bottom of procedures form or on an attached sheet. Procedures form and any outstanding deficiencies shall be provided to Contractor within 2 days of test completion.
   2. Contractor shall review report and submits either noncompliance report or approval form to Subcontractor or Construction Manager. Contractor shall work with Subcontractors and vendors to correct and retest deficiencies or uncompleted items. Contractor will involve Construction Manager and others as necessary. Installing Subcontractors or vendors shall correct all areas that are deficient or incomplete in checklists and tests in a timely manner, and shall notify Contractor as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on original noncompliance report. When satisfactorily completed, Contractor recommends approval of execution of checklists and startup of each system to Construction Manager using a standard form.
   3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back-charges to responsible party. Refer to article “Documentation, Nonconformance and Approval of Tests.”

3.03 FUNCTIONAL PERFORMANCE TESTING

A. Functional performance testing shall demonstrate that each system is operating in accordance with documented design intent and Contract Documents. Functional testing shall facilitate bringing systems from state of Substantial Completion to full dynamic operation. During testing process, areas of deficient performance shall be identified and corrected, improving operation and functioning of systems.

B. Each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verify each sequence in sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Development of test procedures: Before test procedures are written, Contractor shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Each Subcontractor or vendor responsible to execute a test shall provide limited assistance to Contractor in developing procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, Contractor shall provide a copy of test procedures to Subcontractor(s) who shall review tests for feasibility, safety, equipment and warranty protection. Contractor may submit tests to Engineer for review, if requested.

D. Purpose of specific test is to verify and document compliance with stated criteria of acceptance given on test form.

E. Representative test formats and examples (not designed for this facility) are bound at end of this Section. The test procedure forms developed by Contractor shall include, but not be limited to, following information:
   1. System and equipment or component name(s).
   2. Equipment location and ID number.
   3. Unique test ID number, and reference to unique prefunctional checklist and start-up documentation ID numbers for piece of equipment.
   4. Date.
   5. Project name.
   6. Participating parties.
   7. Copy of specification section describing test requirements.
   8. Copy of specific sequence of operations or other specified parameters being verified.
   9. Formulas used in any calculations.
   10. Required pre-test field measurements.

11. Instructions for setting up test.
12. Special cautions, alarm limits, etc.
13. Specific step-by-step procedures to execute test, in a clear, sequential and repeatable format.
14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of test was achieved.
15. Section for comments.
16. Signatures and date block for Commissioning Authority.

F. Test methods:
1. Functional performance testing and verification may be achieved by manual testing (persons manipulate equipment and observe performance) or by monitoring performance and analyzing results using control system's trend log capabilities or by standalone data loggers. Contractor may substitute specified methods or require additional method to be executed, other than what was specified, with approval of Construction Manager. This may require a Change Order and adjustment in charge to Owner. Contractor shall determine which method is most appropriate for tests that do not have a method specified.
2. Simulated conditions. Simulating conditions (not by an overwritten value) will be allowed, though timing testing to experience actual conditions is encouraged wherever practicable.
3. Overwritten values. Overwriting sensor values to simulate condition, such as overwriting outside air temperature reading in control system to be something other than it really is, will be allowed, but shall be used with caution and avoided when possible. Simulating a condition is preferable. e.g., for above case, by heating outside air sensor with hair blower rather than overwriting value or by altering appropriate setpoint to see desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
4. Simulated signals: Using signal generator creating simulated signal to test and calibrate transducers and DDC constants is acceptable instead of using sensor to act as signal generator via simulated conditions or overwritten values.
5. Altering setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see AC compressor lockout work at an outside air temperature below 55ºF, when outside air temperature is above 55°F, temporarily change lockout setpoint to be 2°F above current outside air temperature.
6. Indirect indicators: Relying on indirect indicators for responses or performance will be allowed only after visually and directly verifying and documenting, over range of tested parameters, that indirect readings through control system represent actual conditions and responses.
7. Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. Subcontractor executing test shall provide all necessary materials, system modifications, etc. to produce necessary flows, pressures, temperatures, etc. necessary to execute test according to specified conditions. At completion of test, Subcontractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
8. Sampling. Multiple identical pieces of nonlife-safety or otherwise noncritical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. Specific recommended sampling rates are specified with each type of equipment in Section 20 08 00. It is noted that no sampling by Subcontractors is allowed in prefunctional checklist execution.

    a. A common sampling strategy referenced in Specifications as "xx% Sampling - yy% Failure Rule" is defined by following example. Example below describes a 20% Sampling - 10% Failure Rule.

        xx = percent of group of identical equipment to be included in each sample.
        yy = percent of sample that if failing, will require another sample to be tested.

        1) Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute "first sample."
        2) If 10% (yy) of units in first sample fail functional performance tests, test another 20% of group (the second sample).
        3) If 10% of units in second sample fail, test all remaining units in whole group.

4) If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, Commissioning Authority may stop testing and require responsible Subcontractor to perform and document a checkout of remaining units, prior to continuing with functionally testing remaining units.

G. Coordination and Scheduling: Subcontractors shall provide sufficient notice to Contractor regarding their completion schedule for prefunctional checklists and startup of all equipment and systems. Contractor will schedule functional tests through Construction Manager and affected Subcontractors. Contractor will direct, witness and document functional testing of equipment and systems. Subcontractors shall execute tests.

H. In general, functional testing is conducted after prefunctional testing and startup has been satisfactorily completed. Control system is sufficiently tested and approved by Contractor before it is used for testing and balancing or to verify performance of other components or systems. Air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When proper performance of all interacting individual systems has been achieved, interface or coordinated responses between systems is checked.

I. Problem Solving: Contractor will recommend solutions to problems found and burden of responsibility to solve, correct and retest problems is with Contractor & Subcontractors and Engineer.

3.04 DOCUMENTATION OF TESTS

A. Contractor will witness and document results of functional performance tests using specific procedural forms developed for that purpose.

B. Prior to testing, these forms are provided to Construction Manager for review and approval and to Subcontractors for review.

C. Contractor will include filled out forms in O&M manuals.

3.05 NONCONFORMANCE OF TESTS

A. Contractor will record results of functional test on procedure or test form. Deficiencies or nonconformance issues will be noted and reported to Construction Manager on a standard non-compliance form.

B. Corrections of minor deficiencies identified may be made during tests at discretion of Contractor. In such cases deficiency and resolution will be documented on procedure form.

C. Every effort will be made to expedite testing process and minimize unnecessary delays, while not compromising integrity of procedures. However, Contractor will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at request of Construction Manager.

D. As tests progress and a deficiency is identified, Commissioning Authority discusses issue with executing contractor.
   1. When there is no dispute on deficiency and Subcontractor accepts responsibility to correct it:
      a. Contractor documents deficiency and Subcontractor’s response and intentions and they go on to another test or sequence. After day’s work, Commissioning Authority submits non-compliance reports to Construction Manager for signature, if required. A copy is provided to Subcontractor and Contractor. The Subcontractor corrects deficiency, signs statement of correction at bottom of non-compliance form certifying that equipment is ready to be retested and sends it back to Contractor.
      b. The Contractor reschedules test and test is repeated.
   2. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

a. Deficiency shall be documented on non-compliance form with Subcontractor's response and a copy given to Construction Manager and to Subcontractor representative assumed to be responsible.
b. Resolutions are made at lowest management level possible. Other parties are brought into discussions as needed. Final interpretive authority is with A/E. Final acceptance authority is with Owner.
c. Contractor documents resolution process.
d. Once interpretation and resolution have been decided, appropriate party corrects deficiency, signs statement of correction on non-compliance form and provides it to Contractor. Contractor reschedules test and test is repeated until satisfactory performance is achieved.

E. Cost of retesting:
1. Responsibility of Subcontractor to retest a prefunctional or functional test, if Subcontractors are responsible for deficiency. If Subcontractors are not responsible, any cost recovery for retesting costs shall be negotiated with Contractor.
2. For deficiency identified, not related to any prefunctional checklist or start-up fault, following shall apply:
a. Contractor and Construction Manager will direct retesting of equipment once at no "charge" to Owner for their time.
b. Contractor's and Construction Manager's time for a second retest will be charged to OWNER, who may choose to recover costs from responsible Subcontractor.
3. Time for Contractor and Construction Manager to direct any retesting required because a specific prefunctional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to OWNER, who may choose to recover costs from party responsible for executing faulty prefunctional test.
4. Refer to article "Sampling" for requirements for testing and retesting identical equipment.

F. OWNER shall respond in writing to Contractor and Construction Manager at least as often as commissioning meetings are being scheduled concerning status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

G. Owner retains original nonconformance forms until end of Project.

H. Required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by prime contractor.

I. Failure due to manufacturer defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by Construction Manager or Owner. In such case, Contractor shall provide Owner with following:
1. Within 1 week of notification from Construction Manager or Owner, Contractor or manufacturer's representative shall examine other identical units making a record of findings. Provide findings to Construction Manager or Owner within 2 weeks of original notice.
2. Within 2 weeks of original notification, Contractor or manufacturer shall provide a signed and dated, written explanation of problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. Proposed solutions shall not significantly exceed specification requirements of original installation.
3. Construction Manager or Owner will determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of proposed solution shall be installed by Contractor and Construction Manager will be allowed to test installations for up to one week, upon which Construction Manager or Owner will decide whether to accept solution.
5. Upon acceptance, Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend warranty accordingly, if original equipment warranty had begun. Replacement/repair work shall proceed with reasonable speed beginning within 1 week from when parts can be obtained.

3.06 APPROVAL OF TESTS

A. Contractor will note each satisfactorily demonstrated function on test form. Formal approval of functional test is made later after review by Contractor and by Construction Manager, if necessary. Contractor recommends acceptance of each test to Construction Manager using a standard form. Construction Manager gives final approval on each test using same form, providing a signed copy to Contractor.

3.07 DEFERRED TESTING

A. Unforeseen deferred tests: If any check or test cannot be completed due to building structure, required occupancy condition, or other deficiency, execution of checklists and functional testing may be delayed upon approval of Owner. Tests shall be conducted in same manner as seasonal tests and as soon as possible. Services of necessary parties will be negotiated.

B. Seasonal testing: During warranty period, seasonal testing (tests delayed until weather conditions are closer to system design) specified in Section 20 08 00 shall be completed. Commissioning Authority shall coordinate seasonal testing. Tests shall be executed, documented, and deficiencies corrected by appropriate Subcontractors, with facilities staff and Commissioning Authority witnessing. Final adjustments to operation and maintenance manuals and Project Record Drawings due to testing shall be made.

3.08 PHASED COMMISSIONING

A. Startup and initial checkout shall be executed in phases.

B. Phasing shall be planned and scheduled during coordination meeting of Construction Manager, Contractor and mechanical, testing and balancing, and controls contractors.

C. Results shall be incorporated into master and commissioning schedule.

3.09 OPERATION AND MAINTENTANCE MANUALS

A. Standard operation and maintenance manuals:
   1. Specific content and format requirements for standard operation and maintenance manuals shall be as specified in Section 01 78 23.
   2. Commissioning Authority review and approval: Prior to Substantial Completion, Contractor shall review operation and maintenance manuals, documentation and redline Record Drawings for systems commissioned to verify compliance with Contract Documents. Contractor shall communicate deficiencies in manuals to Construction Manager, Project Manager, or Engineer, as requested. Upon a successful review of corrections, Contractor shall recommend acceptance of these sections of operation and maintenance manuals to Construction Manager, Owner, or Engineer. Contractor shall review each equipment warranty and verify requirements to keep warranty valid are clearly stated. Contractor’s work specified above does not supersede Engineer’s review of operation and maintenance manuals according to Engineer’s contract.

B. Commissioning record in operation and maintenance manuals: Contractor shall compile, organize and index following commissioning data by equipment into labeled, indexed and tabbed, 3-ring binders and deliver to Contractor, to be included with operation and maintenance manuals. Three copies of manuals shall be provided. Format of manuals shall be:
   1. Tab I-1 - Commissioning Plan.
   2. Tab I-2 - Final Commissioning Report.
   3. Tab 01 - System Type 1 (chiller system, packaged unit, boiler system, etc.).
      a. Sub-Tab A - Design narrative and criteria, sequences, approvals for Equipment 1.
      b. Sub-Tab B - Startup plan and report, approvals, corrections, blank prefunctional checklists. Colored Separator Sheets—for each equipment type (fans, pumps, chiller, etc.)
      c. Sub-Tab C - Functional tests (completed), trending and analysis, approvals and corrections, training plan, record and approvals, blank functional test forms and a recommended recommissioning schedule.

4. Tab 02 - System Type 2: Repeat same as for System 1.

C. Final report details. Final commissioning report shall include executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, report shall contain disposition of commissioning authority regarding adequacy of equipment, documentation and training meeting contract documents in following areas:
   1. Equipment meeting equipment specifications.
   2. Equipment installation.
   3. Functional performance and efficiency.
   4. Equipment documentation and design intent.
   5. Operator training.

D. Outstanding noncompliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed.

E. Each noncompliance issue shall be referenced to specific functional test, inspection, trend log, etc. where deficiency is documented.

F. Functional performance and efficiency section for each piece of equipment shall include brief description of verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from testing.

3.10 SYSTEMS TO BE COMMISSIONED

The systems to be commissioned are deatailed in each Drainage Pump Station package. A list of the anticipated I/O as well as the instrumentation installed at each Drainage Pump Station is provided for contractor reference. Some of the Drainage pump stations will require a new PLC, others will just require augmentation of the HMI and PLC to incorporate the new instrumentation. Please refer to Appendix B for the specific Drainage Pump Station Location Plans, Instrument List, I/O list and PLC recommendations. Each Drainage pump station HMI/PLC will be commissioned upon completion of that specific station. Therefore, it is expected that there will be 24 short commissioning efforts. Efficiencies in this planning are welcome during the commissioning scheduling efforts at the beginning of the project.

END OF SECTION

SECTION 02 41 19 – SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

B. Related Sections:

   1. Division 01 Section "Summary of Work" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor and must be promptly moved from the job site.

B. Decommisioned devices and instrumentation will be retained by OWNER.

1.05 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's and other tenants' on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

D. Predemolition Photographs or Video: Submit before Work begins.

1.06 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
   1. Comply with requirements specified in Division 01 Section “Summary of Work.”

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect/Construction Coordinator of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Retain subparagraph below to cover instances where hazardous materials are unexpectedly found and must be remediated. See the General Conditions for additional requirements on hazardous materials.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.07 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Contractor.

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
   1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements: Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   3. Contractor shall use existing openings within the construction area, or provide new openings for the removal of debris and installation of, materials and equipment. All such openings shall be coordinated with the Construction Coordinator.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

D. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

E. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
      a. Water cannot be used as a dust control measure on the “Airside” portion of project. The contractor shall provide temporary enclosures for dust control with filters as required.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   1. Coordinate subparagraph below with use of elevators, stairs, or building entries permitted by building manager.
   2. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   3. Transportation of debris on the airside shall be in covered vehicles or in enclosed containers that prevent debris, sand, or dust from escaping from the covered vehicle or container.
   4. Loading of debris into disposal vehicles or containers within 300 feet of the boarding gates shall be contained inside the building or within temporary enclosures.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after removal and cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area designated by Construction Coordinator.
   5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Coordinate first subparagraph below with use of elevators, stairs, or building entries permitted by building manager.
   4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   5. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

D. Coordinate Disposal Location with OWNER for each pump station.

3.08 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 40 66 63-13 – RADIO TELEMETRY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procurement, installation, and testing of following for complete and operable communication system:
   1. Communications hardware.
   2. Radio transceivers.
   3. Omni-directional antenna.
   4. Directional antenna.
   5. Transmission cable and miscellaneous materials.
   6. Testing and commissioning.

B. Work shall include complete installation of antennas, radios, cable, power supply and associated equipment to provide complete communication system.

1.02 INFORMATIONAL SUBMITTALS

A. Spare parts lists including maintenance, special tools, test equipment, and name with address of manufacturer’s local supplier for spare parts.

1.03 ACTION SUBMITTALS

A. Submitted information relating to instrumentation and control devices shall be referenced by instrument tag number, as defined herein.

B. Product Data: Manufacturer's data or specification sheets for installation and telemetry equipment showing design parameters, equipment catalog designations, and clearly identifying options provided.

C. List of proposed material identifying manufacturer, and type for following:
   1. Radios.
   2. Antennas.
   3. Transmission cables.
   4. Surge suppressors.

1.04 CLOSEOUT SUBMITTALS

A. Complete instruction manuals and parts list covering installation, operation, wiring interconnections, and maintenance of equipment. Manuals shall include interface drawings defining terminal numbers and functions for interface with other instruments or equipment.

1.05 MAINTENANCE MATERIALS

A. Provide 1-year supply of spare parts as recommended by equipment manufacturer as part of initial installation.

B. Include complete itemized list of radio system spare parts including pricing with Bid.

1.06 QUALITY ASSURANCE

A. Regulatory requirements: Communication system shall operate within range of 902-928 MHz. Communication system shall utilize spread spectrum, frequency hopping technology. No FCC licensing shall be required.

B. Provide instruments from same manufacturer and of same model series when multiple units of same item are required. Instruments and control equipment shall be readily available from U.S. suppliers.

C. Furnish new and unused instruments and control devices.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Furnish equipment for performing testing. Test equipment shall remain property of Contractor.

B. Testing equipment shall include, as minimum, following devices:
1. System analyzer.
2. Frequency counter.
3. Digital power/multimeters.
4. Field strength meter.
5. Oscilloscope.
6. Compass.
7. Altimeters.

2.02 COMMUNICATIONS HARDWARE; GENERAL REQUIREMENTS

A. Supply integrated radio modem hardware defined herein. Radio and modem shall be packaged together and internally interfaced with each other.

B. Units shall be data transparent to allow for minimum amount of data transmission latency, and to limit data transmission overhead to allow radio modem to obtain data rates specified.

2.03 RADIO TRANSCEIVER

A. Applications, tag, and operational settings:
1. *Field Panel, Pump, RT-xxx, Remote.
2. * Field Panel, Pump, RT-xxx,, Master.*

B. Unlicensed radios

C. Ethernet-based 900 MHz license free, spread spectrum radios.A combination of “Master” and “Remote” operational type radios shall be used throughout the sites. Operational modes shall be settable within single model radio. Refer to Device Location Plan for identification of radio quantities and type associated with each drainage pump station site.

2.04 OMNIDIRECTIONAL ANTENNA

A. Application: Repeater site at each Field Panel.

B. Provide omni-directional antenna suitable for data transfer.

C. Frequency range: Antennas shall be factory tuned to 900 MHz.

D. Gain: 7.0 dB.

E. Connector: Type N, female.

F. Antennas shall be encapsulated in white heavy-duty fiberglass radomes with thick walled aluminum mounting base and dc grounded.

G. Mounting hardware: Clamps, standoff hardware as recommended by antenna manufacturer to adapt to tower. Provide with heavy-duty mast mount, Model MMK4, or equal.

H. Provide with mechanical tilt up or down provisions as required for antenna location.

I. Manufacturer: Banner Model DXM700-B1R2, or equal.

2.05 TRANSMISSION CABLE

A. Antenna cable between antenna and radio receiver shall use splice-free, manufacturer provided cable.

B. Installations per manufacturer's recommendation.

C. Antenna shall be grounded as required for mounting location of antenna.

D. Antenna cable grounding:
1. Bare or green insulated in accordance with NEC, soft-drawn copper cable or bar, not smaller than 1/0 AWG.
2. Ground rods:5/8" (16 mm) diameter x 8' (2.4 m) long, with copper jacket bonded to steel core.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Ground antenna installations in accordance with local and national codes.

C. Install warning signs in highly visible locations.

D. Install equipment as defined in specification or as shown on Drawings.

E. Mount rigidly supported, level and plumb, and in such manner to provide accessibility as much as possible; protection from damage; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical work.

3.02 FIELD QUALITY CONTROL

A. Notify Owner and Engineer prior to performing tests to permit observation.

B. Work involved with testing shall be coordinated in presence of Owner and Engineer at their discretion.

C. Notify Owner of any equipment or wiring furnished under this Contract which may be disclosed by tests as unsatisfactory.

3.03 PATH STUDY

A. Verify need for additional radio equipment, such as repeater radios, antennas, antenna towers and associated equipment to existing communication system to meet requirements of specifications.

B. There shall be no additional cost to Owner during installation for additional equipment not identified in path study report.

C. Study shall include, as a minimum, following procedure:
1. Determine transmitter deviation, integrity of transmitted tones and audios, and receiver sensitivity using system analyzer device.
2. Use frequency counter device to determine center frequency of transmitter as well as frequency generating section in transmitters and receivers.
3. Forward and reflected power and overall integrity of antenna systems shall be determined using power meter.
4. Field strength meter shall be used to determine strength of signal to receiver of transceiver being tested.

5. Other tools, materials, and procedures used in normal course of testing.

END OF SECTION

SECTION 40 68 66-13 – PROGRAMMING AND CONFIGURATION OF PROCESS CONTROL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This specification includes programming and commissioning of programming logic controllers (PLCs).

B. 19 of the drainage pump stations will have existing PLCs that will require programming updates to include the new devices as well as display the data.

C. 5 of the drainage pump stations will need to have a new PLC installed to replace existing data collection systems.

D. The number of devices to be integrated is detailed in the Facility PLC I/O list and the Facility Instrument List provided for each pump station in Appendix B.

E. Radio Devices:
1. One transmitter is used at each major piece of equipment to receive the different devices associated with a piece of equipment.
2. The radio transmits to a receiver at the PLC cabinet.
3. The receiver then communicates all data via modbus communication link into the PLC.
4. Configuration of each input is needed for each pump island transmitter and will be accomplished by the radio system supplier prior to shipping to the site.
5. All transmitters will be synchronized with the receiver for each pump station by radio system supplier.
6. Once the transmitters and receiver are coordinated and configured, the PLC programmer will map in the Modbus addresses from the receiver into the PLC and coordinate HMI graphical displays with SWBNO SCADA department on remote SCADA displays.

F. Script writing to incorporate data in the HMI as well as coordinating data between systems shall be kept to a minimum. Any scripts needed will be explained and documented to OWNER.

1.02 WORK BY OTHERS

A. Licensing of control system software furnished under this contract by Owner.

1.03 DEFINITIONS

A. Terms defined to describe use and performance of instruments used in process industry and in accordance with ISA SP51.1 as follows:
   1. Accuracy: Degree of conformity of indicated value to a recognized accepted standard value, or ideal value.
   2. Availability: Ability of device or system to be used or acquired over a period of time.
   3. Redundancy: Amount of duplication for purpose of preventing failure of entire system upon failure of single component.
   4. Reliability: Probability that a device or system will perform its objective adequately, for period of time specified, under operating conditions specified.
   5. Repeatability: Ability to reproduce, among a number of consecutive measurements, output for same operating conditions, approaching from same direction for full range traverses.

B. Network diagram: Diagram detailing major components and communication interconnections of system. Diagrams shall show interfaces between equipment, communication highway details including differentiating between fiber optics and copper cables, and listing communications protocols.

C. Following definitions will be used in project correspondence and documentation. Owner will establish common library of terminology to be used by all parties.
   1. Initialization – Process by which initial values of mode, setpoint and output of a control block are set.
   2. Running – State in which device, which has been commanded to start, has achieved commanded state.
   3. Stopped – State in which device, which has been commanded to stop, has achieved commanded state.
   4. Tripped – Device has been stopped by something other than an operator command either within control system or external to control system.
   5. Failed – State in which device, which has been commanded, has not achieved requested state within predefined time period.
   6. Electrical Protection – Tripping of device for electrical reasons, changed device state independent of any system output or command, i.e. overcurrent, undervoltage, etc.
   7. Hot Cut-Over (HCO) – Initiation of an active, operating system control loop onto DCS control.

1.04 ACTION SUBMITTALS

A. Prior to construction:
   1. Control system network diagrams for each pump station.

B. During construction:
   1. Detailed connection diagrams from end devices to the radio system.
   2. Detailed connection diagrams for radio receiver to the PLC Communication card.

1.05 INFORMATIONAL SUBMITTALS

A. Training plan containing course outlines and schedules for training to be provided on-site.

B. Factory demonstration test procedure.

C. Factory test schedule: Provide agenda for factory testing listing sequence in which system components shall be checked.

1.06 CLOSEOUT SUBMITTALS

A. Operation and maintenance manual, for information only:
   1. Complete instruction manuals and parts lists covering installation, operation, and maintenance of panel-mounted devices. Manuals shall include interface drawings defining terminal numbers and functions for interface with other instruments and equipment.

2. Schematic and wiring diagrams for each panel and enclosure. Show color of wire, termination points, terminal numbers, cable, and wire numbers.
3. Manufacturer's data and or specification sheets for control system equipment, showing design parameters, equipment catalog designations, calibration range, features and options provided. All sheets shall be identified with corresponding identification numbers.

B. Prior to project closeout:
1. Final operation and maintenance manuals.
2. Provide submittals updated to reflect "as-built" conditions.
3. Provide USB flash drive containing programming files & back-up files for PLCs and HMIs.

1.07 QUALITY ASSURANCE

A. Qualifications:
1. Contractor shall be certified under International Standards Organization (ISO9001) Quality Guidelines.
2. System integrator: Company specializing in programming systems specified with minimum 5 years documented experience. Contractor shall demonstrate minimum of 5 years experience for projects of similar size and complexity involving control systems with continuous process operation, PID loop control, data communications, graphic screens and reports in similar applications.

B. After functional testing is witnessed by Owner and Owner' representative, necessary corrections shall be made to system to satisfaction of Owner before system is shipped.

D. Manufacturer's qualifications: Contractor shall use manufacturers who's equipment will continue to be manufactured for a period of at least 5 years or who will maintain a stock of compatible spare parts

D. Regulatory requirements: Work shall be in accordance with applicable requirements of following codes and standards.

1. Electronic Industry Association (EIA) 232-D – Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange
2. Institute of Electrical and Electronic Engineers (IEEE)
   a. ANSI/IEEE C37.90.1 – Standard Surge Withstand Capability (SWC) Tests for Protection Relay Systems
   b. ANSI/IEEE C37.90.2 – Trial Use Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Trans-receivers
3. National Fire Protection Association (NFPA):
   a. 70 – National Electrical Code
   b. 85 – Boiler and Combustion Systems Hazards Code
4. National Electrical Manufacturer's Association (NEMA):
   a. AB-1 – Molded Case Circuit Breakers
   b. ICS-1 – General Standards for Industrial Control and Systems
   c. ICS-2 – Standards for Industrial Control Devices, Controllers and Assemblies
   d. ICS-4 – Terminal Blocks for Industrial Use
   e. ICS-6 – Enclosures for Industrial Controls and Systems
5. International Society of Automation (ISA):
   a. ANSI/ISA-50.00.01 – Compatibility of Analog Signals for Electronic Industrial Process Instruments
   b. ANSI/ISA-51.1 – Process Instrumentation Terminology.
   c. ISA-101 – Human Machine Interfaces

1.08 WARRANTY

A. Manufacturer's warranty:
1. Warranty shall not begin until acceptance after final inspection of system by Owner.

2. Specified availability shall be maintained throughout warranty period. Failure to achieve specified availability may at Owner option result in extension of warranty period until specified performance has been met for a continuous period equivalent to warranty period.

B. Special warranty:
1. Provide extended warranty for software and firmware supplied. Warranty shall provide parts and maintenance for installed system to Owner for period extending through startup and acceptance period of plant and for period extending 5 years beyond that date.
2. Warranty provisions of license agreement shall cover system software and firmware including any third party software supplied with system.
3. Provide telephone support service for period beginning with delivery of equipment and extending throughout software warranty period. Service shall provide telephone consultation services as required on operation, configuration development, trouble shooting, and maintenance of system hardware or software by persons in Contractor's organization who are thoroughly familiar with equipment and software supplied.

C. Extended correction period: Provide post-warranty software maintenance program. Program shall provide operating and configuration software upgrades for installed system to client for a period extending through startup and acceptance period of plant and for a period extending 5 years beyond that date.

1.09 LICENSE

A. Assign standard software license to Owner for software provided upon initial installation of each software component. Software licenses shall be issued in Owner's name and transferred without restrictions to Owner upon completion of Project.

B. Extend to Owner all rights of software purchase including telephone support during warranty period.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. System operation shall maintain constant duty cycle regardless of upsets, operator activities, or remote access of system from LAN.

B. Process variables shall be scanned, limit checked, broadcast and updated on monitor displays each second, synchronously.

C. Software maintenance functions shall not affect any drop in system except during download procedures.

D. On-line self-diagnostic routines shall run automatically and notify operator of any malfunctions and location of malfunction.

E. Provide special software required for system installation, operation, and maintenance.

F. Expandability:
1. Addition of new functions shall not affect existing operations and shall not degrade current performance.
2. Expansion shall include addition of:
a. Configuration additions such as I/O points, alarming, logging, performance calculations, environmental monitoring, graphics displays, sequence of events reporting, and historical data collection.
b. Remote monitoring of system from existing LAN.
3. Define overall system limitations proposed in terms of total I/O and update rates under all operating conditions.
4. Expansion of system shall be implemented with software identical to that of base system if at all possible, or at a minimum shall be totally compatible with original system.

G. Reliability:
   1. Control system shall operate with high degree of reliability.
   2. Control software shall implement simple, predictable, high-level task-specific organizations of modules.
   3. On-line diagnostics shall be provided to disconnect drop from process data highway should malfunction occur.

H. Maintainability:
   1. Materials and equipment shall be standard products of reputable manufacturer regularly engaged in production of same.
   2. Maintenance procedures shall be simple, straight forward and well documented.
   3. Software tools required to maintain, expand, reconfigure, and reload system shall be provided.

I. Communications:
   1. Highway data communication:
      a. Communication bus: Distributed controllers shall be interconnected with high-throughput network.
      b. Communication protocol: Data highway communication shall use both synchronous and asynchronous modes.
      c. Reliability: No single drop point of failure shall disable any part of data highway. Self-diagnostics shall cause any drop to disconnect itself from system upon detection of any unrecoverable error.
   2. Management information communication:
      a. Communication Bus: Workstations shall interconnect to process data highway for LAN. It shall be possible for remote devices to interconnect via bridges, switches, or routers.
      b. Communication protocol: Network shall be TCP/IP compliant.

2.02 PERFORMANCE REQUIREMENTS

A. Accuracy: System shall report values conforming to standard values indicated by field instruments.

B. Availability: Overall system availability (operator workstation to field instruments) shall be 99% over 30-day test period (>712 hours).

C. Reliability: Overall system reliability shall be 99% over 30-day test period. During the 30-day test period, Overall system shall be allowed no more than eight (8) hours of downtime calculated cumulatively over the 30-day period. Any system trips or faults shall be immediately reported to the Owner. Contractor shall provide a fault report to Owner within 14 days of any unexpected system interruption event.

D. Repeatability: System shall produce consistently acceptable results over 30-day test period.

E. Screen access and update within network shall be less than 2 seconds.

2.03 SOURCE QUALITY CONTROL

A. Prior to delivery of software, Owner shall witness performance tests.

B. Contractor shall be responsible software provided for Contract and shall notify Owner, in writing, when it is considered complete, in good operating condition, and ready for performance tests.

C. Testing costs:
   1. Pre-tests: Costs of conducting tests shall be borne by Contractor.
   2. Factory demonstration test:
      a. Include cost of conducting factory demonstration test in Bid.
      b. Owner will include cost (when necessary) of 1 person including round trip for 1-day duration to Contractor’s facility for factory demonstration tests.
      c. Owner and Owner’ Representative will each render bill to be paid by Contractor covering costs incurred by retesting or supplemental testing exceeding limits noted herein.
      d. Billings to Contractor for Owner and Owner’ Representative costs for retesting and supplemental testing exceeding limits noted herein shall be paid directly to Owner or Owner’ Representative, as appropriate, within 30 calendar days from receipt by Contractor.

Contractor's failure to pay such billings shall be cause for withholding final payment in amount equal to such costs.

e. Owner' Representative costs, when applicable, will be determined at Owner's Representative current per diem rates, plus direct expenses.

D. Factory demonstration tests:
   1. Contractor's factory demonstration test shall include but not be limited to following requirements as described herein.
   2. Visual inspection.
      a. Verify correctness of required tag identification of each system component and accessory including radio system units, system processors, enclosures, peripherals, cabling, I/O boards, circuit breakers, power supply terminals, etc.
      b. Verify physical appearance and workmanship, hardware redundancy, furnished spare allocations and expandability conforms to specifications.
      c. Verify equipment is complete, marked and located according to parts lists, cabinet layouts and termination schedules.
      d. Check cable bundles, plugs and sockets, termination blocks and equipment racks and connections are clearly labeled.
   3. Demonstration test:
      a. Input/output points: Confirm point-to-point wiring by continuity and verify database addressing, ranges, and alarm assignments by simulating one I/O point per I/O module at termination unit and viewing response on operator workstation. If any I/O point fails testing outlined above, Owner or Engineer reserves right to test points on associated I/O module.
         1) Analog inputs scaling, engineering unit values, and scan rates shall be verified. While cycling through input span, database alarm functions shall be demonstrated by noting graphic displays, alarm displays, and hard copy alarm documentation when alarm limits are exceeded.
         2) Analog output values shall be checked.
         3) Digital inputs shall be toggled to confirm status change and scan rate. Database linkages shall be verified by observing associated display data fields while changing state of database points and noting changes in state/color in respective fields. If alarms are generated, verify alarm listings and hard copy documentation.
         4) Digital output shall be checked.
      b. Demonstrate functionality of each control strategy.
         1) Use functional descriptions and control logic diagram.
         2) Simulate analog and discrete inputs as well as operator commands to demonstrate functionality of each control loop and sequence including both manual and automatic modes.
         3) Verify output signals response in proper direction and magnitude.
         4) Verify override and interlock logic.
         5) Verify action of controllers in both manual and automatic modes.
      c. Demonstrate functionality of digital communication interfaces:
         1) Verify communication interface with PLCs by forcing values in control program and monitoring response from operator workstation. Approximately 10% of values will be verified.
         2) Verify that radio receiver has all new data in a Modbus map to coordinate with PLC.
         3) Sync and verify all radio transmitters are coordinated with radio receiver.
      d. Demonstrate on-line diagnostic capabilities including performance information statistics of stations and peripheral equipment.
      e. Demonstrate data management functions including one display of each type. Owner to select displays and trends to be demonstrated.
         1) Review graphic display displays for content and verification of data field linkages.
         2) Include verification that data collection occurs and that data collected and stored can be retrieved and displayed in form of reports or historical trends.
         3) Simulated input data shall also be used to generate sample reports to confirm report format, calculation algorithms, and reporting frequencies.

4) Check trend displays during testing period.

f. Demonstrate system report generation including one specific report and one overall plant report. Owner will select report to be demonstrated.
   1) Report content shall be verified to insure proper linkages, format, calculations and reporting frequencies.
   2) Report format and logging capabilities shall be verified by introduction of real time data into database.
   3) Report content shall be verified to insure proper linkages, format, calculations and reporting frequencies.

g. Demonstrate effects of system malfunctions on process controls.
   1) Check power and grounding systems according to drawings. With main power disconnected, test earth grounds on power supply system be checking that there is an open circuit between cabinet frame and power rails.
   2) Disconnect primary power supply to one of power modules in power supply systems. System should be unaffected in operation and supply failure alarm should be generated to operator for each system.
   3) Disconnects highways and field buses to verify operation of redundant highway maintains system performance and a highway failure or backup highway selected alarm is generated.
   4) Check redundant cards to verify that backup cards maintain system performance and appropriate alarm is generated.
   5) Check that system properly reboots after power outage.

4. After factory demonstration testing, witnessed by Owner, necessary corrections shall be made to system to satisfaction of Owner before system is shipped.

E. Tests results:
1. If system fails to perform properly:
   a. Make necessary changes and adjustments to equipment.
   b. Notify Owner when system is ready for retesting.
   c. Repeat factory demonstration testing at no cost to Owner or impact to project schedule.
2. If testing is substantially correct with minor defects, Contractor shall verify deficiencies are corrected in writing to Owner.
3. Upon completion of hardware factory demonstration testing, Contractor shall submit certificate of test performance and compliance to Owner.
4. Upon completion of application software application factory demonstration testing, Contractor shall submit certified copy of test results to Owner. Included shall be a statement that system and application software have been tested and operate in accordance with specifications.

PART 3 EXECUTION

3.01 TRAINING

A. Provide training at Owner's site facilities following site acceptance tests. Training shall include aspects of operator's interface, system operation, and maintenance. Purpose of training session will be to answer questions by operations and maintenance personnel, which have arisen out of initial use of system during site acceptance.

B. Furnish training programs to train Owner' personnel in administration, configuration, operation, and maintenance of control system. Contractor shall provide basic required training and recommend additional training programs for Owner.

C. Two separate training programs shall be developed. Sessions shall be presented as operational training (2 sessions) and maintenance and configuration training (1 session). Training programs shall be conducted for numbers of personnel as listed below.
1. Maintenance and configuration training:
   a. 2 maintenance technicians/personnel.

b. 2 engineers/personnel.

D. Provide following quantities of training:
1. Maintenance and Configuration Training: 2 hours.

E. Provide copies of training material for Owner.

F. Provide training to familiarize Owner' personnel with system. Training shall be oriented toward installed equipment and software and satisfy requirements for following.
1. General training: Familiarize project management personnel, engineers, operators, and maintenance personnel with control system overview, philosophy, major hardware components, reporting, and data retrieval.
2. Programmer training:
a. Use and modify programs, as desired, during plant operation.
b. Compose and generate required monitor-based process graphics and report/log formats.
c. Write, edit, file, delete, and apply applicable programming language and high-level process control language programs necessary to implement control system and process information functions.
d. Function and use of support and application software.

G. Training shall be taught by person with significant training experience. Instructor and course materials shall be approved in advance of training.

H. Tuition costs associated with training shall be included with Bid. For on-site training, food, lodging, and travel expenses for trainer shall be included.

I. Courses shall be scheduled such that courses do not overlap to allow same personnel to attend more than one training course.

J. Training shall be scheduled by system supplier minimum of 60 days in advance of start of training.

END OF SECTION

SECTION 40 91 00 – PRIMARY PROCESS MEASURING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Impulse, instrument air supply, control, and signal piping including tubing, fittings, valves, and support materials.

B. Sun protection and instrument enclosures.

C. Pre-insulated tubing bundle.

D. Instrument mounting stands.

E. Instruments and control equipment:
   1. Pressure sensing devices.
   2. Flow sensing devices.
   3. Level sensing devices.
   4. Temperature sensing devices.
   5. Rain Gauges.
   6. RPM & Direction.
   7. Power Meter.

F. Installation of instrumentation and control equipment including field transmitters, sensing elements, and miscellaneous devices.

G. The OWNER's Preferred Instrumentation List is included for reference.

1.02 INFORMATIONAL SUBMITTALS

A. Submit with Bid: Preliminary instrument listing including instrument tag number, manufacturer, and model number.

B. Submitted information relating to instrumentation and control devices shall be referenced by instrument tag number.

C. Submittals provided without following information will be marked "returned without review" as defined in submittal section. Submittals shall clearly identify:
   1. Each item by instrument tag number as defined in each specific pump stations instrument index.
   2. Complete part or catalog number including material selections, design parameters, equipment catalog designations, calibration range, device options and accessories to be provided.

D. Product Data: Spare parts lists including maintenance, special tools, test equipment, and name with address of manufacturer's local supplier for spare parts.

1.03 ACTION SUBMITTALS

A. Product Data:
   1. Manufacturer's data or specification sheets for instrumentation and control devices showing design parameters, equipment catalog designations, calibration range, and clearly identifying options provided.
   2. Instrument listing: Listing shall be oriented by instrument tag number and include manufacturer, model number, calibrated range, and setpoint values.
   3. Certified calculation sheets:
      a. Flow meter sizing.
      b. Thermowell stress analysis.
      c. Control valve sizing and aerodynamic noise predictions.

d. Pressure relieving device sizing.

B. Shop Drawings:
1. Certified outline drawings.
2. Installation drawings including mounting and grounding requirements.
3. Wiring interconnection drawings for equipment and accessories provided. Wiring interconnection drawings shall define terminal numbers and functions for interface with other instruments and equipment.

1.04 CLOSEOUT SUBMITTALS

A. Operation and maintenance manuals:
1. Complete instruction manuals and parts lists covering installation, operation, wiring interconnections, and maintenance of equipment.
2. Control loop diagrams for instrument and control devices wired or tubed to control system enclosures. Diagrams shall be in accordance with minimum requirements of ANSI/ISA S5.4. Control loop diagrams shall also include manufacturer, model number, and calibrated range; setpoint values for alarm and shutdown devices; equipment numbers for racks, panels, and junction boxes; exact location of device including column, row, and elevation; and control of solenoid valve fail-safe operation. Assign tag number oriented cable, wire, and tube numbers.
3. Schematic drawings for motor or relay-based control logic. Show color of wire, all termination points, terminal numbers, cable and wire numbers. Assign cable and wire numbers for external panel wiring. Cable and wire numbers shall be tag number oriented.

B. Record Documents:
1. “As-built” control loop diagrams and schematic drawings as defined above.

1.05 MAINTENANCE MATERIALS

A. Provide 1-year supply of spare parts as recommended by equipment manufacturer as part of initial installation.

1.06 QUALITY ASSURANCE

A. Provide instruments from same manufacturer and of same model series when multiple units of same item are required.

B. Instruments, control devices, and accessories shall be free of mercury and asbestos.

C. Use plant instrument air source pressure or furnish pressure regulator with filter and output gage.

D. Furnish insect-proof screens on vents.

E. *****Furnish new and unused instruments and control devices.*****

F. *****Provide linkages, mounting accessories, etc. necessary to place device into service.*****

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Flow meters:
1. Orifice plates: ISA SP3.
2. Turbine flow meters: ISA SP31.
3. Submit certified calculation sheets verifying meter selection for operating conditions at minimum and maximum flow rate.

B. Temperature measurement:
1. Thermocouples: ISA SP1.1.

2. RTDs: ISA SP1.3.
3. Temperature gages: ISA SP1.4 and SP1.6.
4. Thermowells:
   a. SAMA RC-17 application and dimensional standards.
   b. Verify stress analysis calculations in accordance with ANSI/ASME PTC-19.3, Part 3, for operating conditions to demonstrate thermowell shall not exceed material stress limitations.

C. Analytical measurement:
1. Combustible gas detectors: ISA SP12.13.
2. Hydrogen sulfide detectors: ISA SP92.01.
3. Carbon monoxide detectors: ISA SP92.02.
4. Ammonia detectors: ISA SP92.03.
5. Chlorine detectors: ISA SP92.06.

D. Verify pressure relieving device sizing for gas, liquid, and steam applications in accordance with ASME Boiler and Pressure Vessel Code, Section VIII – Rules for Construction of Pressure Vessels.

2.02 IMPULSE TUBING

A. Tubing:
1. Process: Water/air/steam/gas below 300 psig and 1,200°F.
   a. Outside diameter: 0.5” (14 mm).
   b. Wall thickness: 0.049” (1.5 mm).
   c. Material (ASTM): A213.
   d. Type: 316H stainless steel.
   e. Construction: Seamless.
2. Process: Water/air/steam/gas at or above 300 psig, and below 2,500 psig and 1,200°F.
   a. Outside diameter: 0.5” (14 mm).
   b. Wall thickness: 0.083” (2.2 mm).
   c. Material (ASTM): A213.
   d. Type: 316H stainless steel.
   e. Construction: Seamless.

2.03 INSTRUMENT VALVES

A. Low-pressure water, air, gas, and steam below 300 psig and 500°F service:
1. Type: Ball.
2. Material: Type 316 stainless steel, ASTM A479.
3. Pressure rating: 1,500 psig at 100°F.
4. Internals: Type 316 stainless steel ball, teflon packing.

B. Manufacturer: Swagelok, Parker, or equal.

2.04 INSTRUMENT MANIFOLDS

A. Type: 2-valve for pressure applications and 3-valve for differential pressure applications.

B. Pressure class: ASME/ANSI B16.34 Class 2500.

C. Material: ASTM A479 Type 316 stainless steel.

D. Internals: Carbide ball seat and graphoil packing.

E. Manufacturer: Anderson Greenwood Co., PGI International, or equal.

2.05 SUN PROTECTION CANOPY

A. Construction: Molded polyurethane or other chemical and ultraviolet light-resistant material.

B. Canopy shall fully protect instrument from exposure to direct sunlight.

C. Mount directly to instrument, instrument mounting bracket, or other suitable support.

2.06 INSTRUMENT ENCLOSURE

A. Construction: Molded polyurethane or other chemical, ultraviolet light- and fire-resistant material.

B. Enclosure shall fully enclose instrument and manifold.

C. Mount on same mounting bracket as instrument.

2.07 ELECTRICAL MATERIALS

A. Rigid steel conduit:
1. Material: Zinc-galvanized aluminum with smooth interior surface.
2. Couplings, unions, fittings, and conduit bodies: Threaded type.

B. Wire and cable:
1. Analog signal cable:
a. Configuration: Twisted pair, shielded, and jacketed.
b. Insulation: 600-volt, 80ºC, PVC, color-coded to permit identification of each conductor.
c. Conductors: Stranded copper, 16 AWG.
d. Shield: Metallized foil or tinned copper braid providing 100% coverage against noise together with 18 AWG stranded tinned copper drain wire.
2. RTD extension wire:
a. 3-wire system:
1) Configuration: Twisted triad, shielded, and jacketed.
2) Insulation: 600-volt, 60ºC, PVC, color-coded to permit identification of each conductor.
3) Conductors: Stranded copper, 16 AWG.
4) Shield: Metallized foil or tinned copper braid providing 100% coverage against noise together with 18 AWG stranded tinned copper drain wire.
b. 4-wire system:
1) Configuration: 4-conductor twisted, shielded, and jacketed.
2) Insulation: 300-volt, 80ºC, PVC, color-coded to permit identification of each conductor.
3) Conductors: Stranded copper, 18 AWG.
4) Shield: Metallized foil or tinned copper braid providing 100% coverage against noise together with 20 AWG stranded tinned copper drain wire.
3. Thermocouple extension wire:
a. Configuration: Single twisted pair, shielded, and jacketed.
b. Conductors: Solid, 16 AWG.
c. Insulation: 300-volt, 200ºC, teflon FEP, color-coded as defined below.
d. Conductor, jacket, and color:
1) Type EX:
1) Jacket: Purple, teflon FEP.
2) Positive conductor: Chromel, purple.
3) Negative conductor: Constantan, red.
4) Tolerance: ±1.7ºC for 0 to 200ºC.
2) Type JX:
1) Jacket: Black, teflon FEP.
2) Positive conductor: Iron, white.
3) Negative conductor: Constantan, red.
4) Tolerance: ±2.2ºC for 0 to 200ºC.
3) Type KX:
1) Jacket: Yellow, teflon FEP.
2) Positive conductor: Chromel, yellow.
3) Negative conductor: Alumel, red.
4) Tolerance: ±2.2ºC for 0 to 200ºC.
4) Type TX:
1) Jacket: Blue, teflon FEP.

2) Positive conductor: Copper, blue.
3) Negative conductor: Constantan, red.
4) Tolerance: ±1.0ºC for 0 to 100ºC.

e. Shield: Metallized foil or tinned copper braid providing 100% coverage against noise together with 18 AWG stranded tinned copper drain wire.

4. Discrete signal cable:
   a. Insulation: 600-volt, 90ºF, PVC.
   b. Conductors: 16 AWG, stranded copper.
5. Power wire:
   a. Insulation: 600-volt, 90ºF.
   b. Conductors: 12 AWG, stranded copper.
6. Communication cable: _____.

C. Wire and cable tags:
   1. Type: Embossed, heat-shrink tubing.
   2. Color: White.

2.08 INSTRUMENT WIRING

A. Provide No. 16 AWG single twisted shielded pair cable for 24-volt dc analog signals.

B. Provide No. 16 AWG, 600-volt wire for 120-volt ac signals.

C. Provide No. 12 AWG, 600-volt wire for 120-volt ac power circuits.

2.09 INSTRUMENTS AND CONTROL DEVICES

A. Refer to each pump stations specific Instrument Index for device listing and instrumentation details.
   1. Information including but not limited to range and calibration data, sizes, special features, and process data (fluid and fluid state, pressure, temperature, and flow rates).
   2. Instrument and control devices shall be rated according to applicable design process temperatures and pressures.

B. Pressure transmitters:
   1. Type: Absolute, differential, and/or gauge.
   2. Output: 4 – 20 mA.
   3. Materials of construction: Type 316 stainless steel flange and drain/vent.
   4. Isolating diaphragm: Type 316L stainless steel.
   5. O-ring: PVDF.
   6. Housing material: Polyurethane-covered aluminum.
   7. Manufacturer: Vega Bar 28, or equal.

C. Thermocouple assemblies, thermocouples –:
   1. Sensors:
      a. Thermocouple: Type J.
      b. Cover style: Standard.
      c. Cover material: Standard.
      d. Sensor style: Spring loaded.
      e. Element: Single, ungrounded.
      f. Element length: Sized to suit thermowell.
      g. Leads: 2-wire iron-constantan.
      h. Sheath diameter: 1/4” (6 mm).
      i. Sheath material: Type 316 stainless steel.
      j. Extension type: 4” (100 mm) nipple-union-nipple.
      k. Extension material: Carbon steel.
      l. Connection: 1/2” (13 mm) NPT.
      m. Electrical connection: 3/4” (19 mm) NPT.
   2. Thermowells:
      a. Features specified on Section 40 91 00-13:

1) Material of construction.
2) Process connection.
3) Insertion length “U”.
4) Lagging: “F” length (lag extension “T” + 1-3/4” (44 mm)).
5) Shank style.

b. Bore: 0.260” (6.604 mm).
c. Internal thread: 1/2” (13 mm) NPT.

3. Manufacturer: Thermo Electric, Pyco, or equal.

D. RTD assemblies:
1. Sensors:
a. RTD: 100 Ohm platinum, conforming to IEC 751 Class B.
b. Cover style: Standard.
c. Cover material: Standard.
d. Sensor style: Spring-loaded.
e. Element: Single.
f. Element length: Sized to suit thermowell.
g. Lead configuration: See Section 40 91 00-13.
h. Sheath diameter: 1/4” (6 mm).
i. Sheath material: Rated for high temperatures up to 1,070°F (577°C) or above.
j. Extension type: 4” (100 mm) nipple-union-nipple.
k. Extension material: Carbon steel.
l. Connection: 1/2” (13 mm) NPT.
m. Electrical connection: 3/4” NPT.
2. Thermowells:
a. Features specified on Section 40 91 00-13:
1) Material of construction.
2) Process connection.
3) Insertion length “U”.
4) Lagging: “F” length (lag extension “T” + 1-3/4” (44 mm)).
5) Shank style.
b. Bore: 0.260” (6.604 mm).
c. Internal thread: 1/2” (13 mm) NPT.
3. Manufacturer: Thermo Electric, Pyco, or equal.

E. Vibration-Temperature Dual Sensors:
1. Sensor Housing: 316L Stainless Steel
2. Communication Protocol: Modbus RTU serial
3. Sensor Wiring: RS-485
4. Mounting:
a. Refer to manufacturer’s technical specifications for proper vibration axes determination.
1) Assembly quick start guide #213323.
b. Mounting bracket shall be epoxied to motor
c. Part Number: BW-BKA-023
5. Supply Voltage 10-30VDC
6. Baud Rate: 9.6k
7. Vibration:
a. Sampling frequency: 20 kHz
b. Frequency range: 10Hz to 4kHz
c. Measuring range: 0-46mm/sec
d. Sample duration 0.4s
8. Temperature
a. Resolution 1°C
b. Measuring range: -40°C to 105°C
c. Accuracy: +/- 3°C
9. Quick disconnect
10. Manufacturer: Banner
11. Model: QM30VT2-SS-QP

2.10 INSTRUMENT IDENTIFICATION

A. Each instrument and control device shall have a tag permanently attached to case with following applicable information:
   1. Tag number.
   2. Manufacturer's name.
   3. Model number.
   4. Serial number.
   5. Operating range.
   6. Calibration setting/range.
   7. Power rating.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Install instrument and control devices in accordance with manufacturer's recommendations and/or where approved by Owner's Representative.

B. Locate instruments and control devices as shown on Device Location Plans for each specific pump station. and/or designated by Owner's Representative.

C. Mount instruments so they are rigidly supported, level and plumb, and in such a manner as to provide accessibility; protection from damage; isolation from heat, shock and vibration; and freedom from interference with other equipment, piping, and electrical work.

D. Do not install instruments until heavy construction work adjacent to instruments has been completed to extent that damage will be unlikely to installation by such construction work.

E. Manufacturer's recommendations referred to herein shall be as stated in manufacturer's installation manual and/or by manufacturer's service representative. Final interpretation of "installation requirements" will be by Owner's Representative.

F. Perform welding in accordance with appropriate piping or structural welding specifications and procedures.

3.02 INSTRUMENT EQUIPMENT MOUNTING

A. Mount instrumentation equipment to building steel, concrete floors, or walls using pipe mounting stands or field-fabricated mounting brackets.
   1. Secure instrumentation equipment mounting bracket to building steel by welding or bolting, and to concrete or masonry building structure by expansion-type anchors. Do not mount instrumentation equipment to exterior removable panels.
   2. Grout mounting brackets on concrete floors with nonmetallic, chloride-free gypsum material, ASTM C1107, Grade A; formulation suitable for application.
   3. If vibration-free location is not available for instrument mounting, appropriate vibration shock mounting shall be provided by use of rubber grommets or other vibration dampeners designed for vibration absorption subject to Owner's review. Mounting of process pressure and temperature gages or process pressure and temperature switches to process piping shall be allowable only if vibration is minimized.
   4. Install instrumentation mounted outdoors within sun protection enclosures. Enclosure opening shall face north or east, insofar as practicable.

B. Instrument accessibility: Following general rules shall be adhered to, unless limited by other requirements in design of system.
   1. Locate instrument process connections for maximum convenience in operation and servicing of instrument. Orient connections so instruments or piping will not obstruct aisles, platforms, or ladders.

2. Install field-mounted instruments so they are accessible from grade, platform, or permanent ladder. Instruments requiring adjustment or inspection shall be accessible for servicing from grade, walkway, platform, or permanent ladder.
3. Locate remote instruments and control devices (devices not located in or on process lines) at nominal height of 4-1/2' (1.35 m) above finished floor, grade, or platform. Provide instrument racks for location in which 3 or more instruments or control devices are located within close proximity of each other.
4. Mount local indicators, recorders, and controllers so they are readable, controllable, and serviceable from grade or platforms.

3.03 TUBING INSTALLATION - GENERAL

A. Install instrument impulse piping parallel (except for slope) to building lines and other piping following instrument manufacturer's instructions.

B. Tubing shall be continuously supported with 12-gage aluminum angle and held in place with appropriate tubing clips and fasteners. Install tubing supports in such a manner to preclude fatigue failure of tubing due to vibration.

C. Only tool-made bends shall be acceptable.

D. Minimize number of unions used to join tubing lengths.

3.04 IMPULSE TUBING INSTALLATION

A. Instrument impulse piping work shall be from last block valve through, and including, blowdown piping to nearest equipment drain.

B. Install horizontal impulse piping with slope of 1" per foot (25 mm per 300 mm).
1. Slope impulse piping toward instrument for liquid and steam service.
2. Slope impulse piping away from instrument for gas service.

C. Blowdown and drain valves are required in impulse lines to all transmitters and instruments used on water, steam, and condensing vapor services.

D. Attach isolation valves to instruments so that it is possible to disconnect instrument from connecting pipe without having to drain pipe.

E. Install expansion loops in impulse piping installations where movement of last block valve and instrument is not in same plane or length of expansion varies.

F. Support pressure gages and other instruments connected to impulse piping independently of tubing. Provide ample expansion loops in tubing connections to instruments subject to vibrations to prevent failure due to metal fatigue.

G. Furnish and install accessories required for complete impulse piping system including instrument isolation valves, snubbers, siphons, and calibration and test connections at instrument.

3.05 CLEANING

A. Before assembly or erection, thoroughly clean instruments of temporary protective coatings and foreign materials.

B. After erection of equipment, clean external surfaces of oil, grease, dirt, or other foreign material.

3.06 WIRE AND CABLE INSTALLATION

A. Maintain minimum of 1' (300 mm) separation between signals operating at voltages greater than 120-volts ac and instrumentation or communications signals. Group and route wire/cables as follows:

1. Low-voltage/low current dc instrumentation signals (30-volts/50 mA or lower).
2. High-voltage dc alarm signals (48-volts or greater).
3. Low-voltage ac control signals (120-volts or lower).
4. High-voltage ac power signals (greater than 120-volts).
5. Communications signals.

B. Install continuous wire from terminal-to-terminal. Splices not acceptable.

C. Shielded signal cable:
   1. Connect shields to common ground at source of loop power.
   2. Shields of multiple cable runs shall be connected on separate terminal blocks, but not grounded.
   3. Cut and tape shield at destination end.

D. Identify both ends of wires and/or cables with permanent wire marker.

END OF SECTION

SEWARAGE WATER BOARD, NEW ORLEANS (LA)
DRAINAGE PUMP STATIONS
NDR ADDITIONAL INSTRUMENTATION

SWBNO PREFERRED INSTRUMENTS/DEVICES LIST

Instrument/Equipment	Reference instrument provided by client	Suggested alternative	Comments
Vibration - bearing	Metrix $700, ElectroSensors $410		
Temperature - bearing	BBP $213, ElectroSensors $250		
Vibration - vac. pump/ motor/ gearbox	Metrix $700, ElectroSensors $410		
Temperature - vac. pump/ motor/ gearbox	BBP $368, ElectroSensors $250+$40=$290		
Oil Level - bearing	Vega Point 21 $193		
RPM/Direction Sensor	ElectroSensors $1335/$1700, Turck $605		
RPM Conversion			
Vacuum Pressure	Vega Bar 28 $407		
Oil Temperature	ElectroSensors $260		
Oil Pressure	Vega Bar 28 $407		
Fuel Pressure	Vega Bar 28 $407		
Power Meter	Satec PM130 Plus		
Power Meter			
Radar Level Sensor	Vega PSC21 $854		
Rain Gauge	Xylem $850, NovaLynx 260-2500 $640		

SECTION 40 94 43 – PROGRAMMABLE LOGIC PROCESS CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES
- A. Programmable controller system.
- B. Local non-networked graphic operator interface.
- C. Performance tests.

1.02 WORK BY OTHERS
- A. Field installation of equipment.
- B. Enclosures for remote I/O racks.
- C. Field wiring of devices to input/output (I/O) terminal strips for controller equipment.
- D. Programming and configuration.

1.03 INFORMATIONAL SUBMITTALS
- A. Product Data:
  1. Manufacturer's installation instructions and product data.
  2. Complete set of instruction manuals sufficient for installation, programming, and operation of equipment supplied.

1.04 ACTION SUBMITTALS
- A. Shop Drawings:
  1. System network drawing indicating model numbers of items provided.
  2. Outline and installation drawings for equipment and accessories provided, including mounting requirements, and grounding requirements. Submittal shall clearly identify each item by instrument tag number or specification section number and paragraph, part or catalog number and options or accessories provided.
  3. Graphic screens associate with graphic operator interface specified in this section in .pdf file format.
- B. Quality assurance data:
  1. Recommended spare parts list.
  2. Name and address of Owner's local supplier for spare parts.
  3. Name and address of nearest technical support. Provide description of technical support and availability for following:
     a. Equipment, system software, and data communication.
     b. Application software.
  4. Within 30 days of Factory Demonstration Tests, provide detailed performance criteria and testing procedures used to determine satisfactory operation meeting functional performance criteria of control algorithms, data communications, graphic displays, etc., including operating system(s) for process control equipment hardware and software.

1.05 CLOSEOUT SUBMITTALS
- A. Record documents which accurately record actual location of controller cabinets and input and output devices connected to system. Include:
  1. Interconnection wiring and cabling information.
  2. Terminal block layouts in controller cabinets.
  3. Input/output schedule in Microsoft Excel or Microsoft Access file format.
  4. Electronic media and hard copy of ladder logic and control description in .jpg format.
- B. Operation and maintenance data for each item, including each type of I/O card and processing card provided.
  1. Bound copies of operating and programming instructions for all items.
  2. Card replacement, adjustments, and preventative maintenance procedures and materials.
  3. Complete set of instruction manuals sufficient for installation, programming, and operation of equipment furnished.

1.06 MAINTENANCE MATERIALS
- A. Furnish the following spare equipment/parts:

1. **2** isolated input cards.
2. **2** isolated output cards.
3. **2** 24 volts dc output cards for control panel graphics.
4. **2** analog input cards and **2** analog output cards.
5. One spare memory module for each type of programmable controller furnished.
6. **2** spare programmable controller power supplies.
7. **2** spare remote data communication transmission modem.
8. **2** spare memory module for local graphic operator interface.
9. Additional spare part as recommended by manufacturer.*

1.07 QUALITY ASSURANCE

A. Design, construct, and test in conformance to NEMA ICS 1, ICS 2, and ICS 3.

1.08 DELIVERY, HANDLING, AND STORAGE

A. Delivery, storage, and protection shall be in accordance with manufacturer's recommended procedures.
B. Accept products on site in factory containers and verify damage.
C. Store products in clean, dry area. Maintain temperature in accordance with NEMA ICS 1.

1.09 WARRANTY

A. Warranty shall not begin until final acceptance of system by Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Automation Direct – Productivity 2000
B. Allen-Bradley - CompactLogix

2.02 PERFORMANCE REQUIREMENTS

A. Functional performance: Configuration and base level programs shall conform to control strategies and graphic displays specified.
B. Reliability:
   1. Equipment hardware and software shall have uptime operation meeting functional performance criteria in manner reasonably satisfactory to Owner and Engineer.
   2. Control equipment shall have no component whose failure shall cause system to be non-operative.

2.03 PROGRAMMABLE CONTROLLER SYSTEM

A. System shall provide following capabilities:
   1. Field instrumentation wiring terminations, instrument signal input/output for system, monitor and control functions, operator interface via local graphic operator displays, and self-diagnostics.
   2. Ability to expand control equipment, i.e. add controllers and local graphic interface panels. Control equipment shall be computer-compatible, but shall not require computer for data communication device expansion.
   3. Capable of supporting copper of fiber-optic data communication for processor, work station, and remote I/O networking.
   4. Multiple processors shall function as a network interfaced through data communication system with network programming capability. Processors shall support simultaneous on-line/remote programming and continuous data acquisition and control. Programming shall employ fill-in-the-blanks or interactive techniques.
B. Data communication system shall be capable of supporting copper or fiber-optic media for processor, work station, local graphic operator interfaces, and remote I/O networking.
   1. Arrange system as indicated on each Pump Station’s PLC Layout Drawing.
   2. System hardware shall have sufficient data protection to prevent erroneous data communication during power-up or power-down.
   3. System shall recognize transmission format errors and either correct or request retransmission.
   4. Construct data communication of multipoint, multidrop configuration.
   5. Contractor shall be responsible for confirming final selection of components to support a fully complete and operable system.

C. Supply cabinets, consoles, power supplies, digital instrumentation, communications, interconnecting cables as required, and necessary voltage regulation or conditioning equipment for complete and operable system meeting performance and control description specifications.
D. Power supply: 120 volts ac, single-phase, 60 Hz.
E. Manufacturer shall have application training and customer assistance services available.
F. Major assemblies, subassemblies, circuit card, and devices shall be permanently marked with manufacturer's part or identification number.
G. Controller system shall be of expandable design supporting replaceable I/O modules and remote I/O. Components shall be serviced and supported by same company.
H. Label I/O card strips with English descriptions.
I. Provide 10 spare CDs, DVDs, or other acceptable electronic media for use with programming panel.

2.04 SYSTEM COMPONENTS

A. Manufacturer: Automation Direct Productivity 2000 or Allen-Bradley CompactLogix
B. Chassis:
   1. Main base housing:
      a. Slots: 4, 7 or 11.
         1) Refer to Factility PLC Modification List for each pump station’s IO
      b. Part number:
         1) P2-04B
         2) P2-07B
         3) P2-11B
C. Power supply/sequencer module:
   1. Available input power source: 120VAC.
   2. Mounted in Slot 1 of base housing chassis.
   3. Part number: P2-01AC.
D. Main chassis CPU module:
   1. Controller shall be configured by system integrator.
   2. Mounted in Slot 2 of base housing chassis.
   3. Scan Time: 500 microseconds.
   4. Communication ports:
      a. Two (2) 10/100baseT Ethernet
      b. One (1) RS 232
      c. One (1) RS 485 – 3-pin terminal
      d. One (1) MicroUSB
   5. Removable Media: MicroSD card slot
   6. Battery backed static RAM (SRAM).
   7. 512 KB boot/downloader flash.
   8. 500kB retentivememory.
   9. Lithium battery: 3.0V. 560 mA coin-type.
   10. Configuration software requirements:
      a. Programming via ProductivitySuite configuration software. Configuration software shall support relay ladders, structured text, function block diagram and sequential function chart programming.
      b. Program CPU on-line or off-line.
   11. Part number: P2-550.
E. Local I/O modules:
   1. In addition to I/O quantities shown on Drawings, provide 20% spare installed I/O points of each type.
   2. Discrete input:
      a. Capacity: 16-point.
      b. Voltage: *24-volt dc, internally powered.
      c. Grouping: Two isolated commons.
      d. Requires P2-RTB removable terminal block.
      e. Part number: P2-16N3
   3. Discrete output:
      a. Capacity: 16-point.
      b. Voltage: 24-volt dc, externally powered (sinking).
      c. Loading: 0.25 amperes maximum per point.

d. Grouping: 1 group of 16 with common source and ground.
e. Requires P2-RTB removable terminal block.
f. Part number: P2-16TD1P.

4. Relay contact output:
   a. Capacity: 16-point.
   b. Voltage: Rated 120-volt ac or 24-volt dc.
   c. Loading: 1 amperes maximum per point.
   d. Grouping: 2 Groups of 8, each with their own common
      1) 8A per common.
   e. Requires P2-RTB removable terminal block.
   f. Part number: P2-16TR.
5. Communication Module:
   a. Communication Ports (4):
      1) One (1) RS-485 – 4-pin terminal
      2) Three (3) RS-232 – RJ12
   b. Port Protocols:
      1) Modbus RTU
      2) ASCII
   c. Refer to manufacturer's technical specifications for individual port configuration options.
6. Analog input:
   a. Capacity: 8-point.
   b. Voltage/current: 24-volt dc 4-20.
   c. Grouping: Non-isolated and externally powered.
   d. Part number: P2-08AD1.
7. Analog output:
   a. Capacity: 8-point, isolated.
   b. Voltage/current: 24-volt dc 4-20 mA, internally powered.
   c. Loading: 0-810 ohm.
   d. Resolution: 16-bit.
   e. Part number: P2-08DA-1.

F. I/O expansion CPU module:
1. Controller shall be configured by system integrator.
2. Mounted in Slot 2 of expansion housing chassis.
3. System clock speed: 25 MHz.
4. Communication ports: One 10/100baseT Ethernet, three RS-232, and one RS-485 communication serial ports.
5. 64 MB synchronous dynamic RAM (SDRAM).
6. 512 KB boot/downloader flash.
7. 32 MB simultaneous read/write flash memory.
8. Lithium battery: 3.6 volts. 950 mA-hr 1/2 AA battery.
9. Configuration software requirements:
   a. Programming via ControlWave Designer IEC 61131-3 compliant configuration software. Configuration software shall support relay ladders, structured text, function block diagram and sequential function chart programming.
   b. Program CPU on-line or off-line.
10. Part number: 396458-18-1.

2.05 PROGRAMMING DEVICE

A. Computer capable of interfacing with programmable controllers furnished by this contract. New laptop computer equipped with configuration and communication software shall be furnished to Owner.
B. Programming device shall incorporate:
1. Alphanumeric keypad.
2. Function keys shall allow user to construct a relay ladder diagram on operator display screen, as well as complete programming instructions.
C. Programming controls shall permit user to enter, edit, and delete logic and to monitor registers in decimal, hexadecimal, binary or ASCII and obtain On/Off status of discrete I/O points.

2.06 PROGRAM DOCUMENTATION AND REPORT GENERATION SYSTEM

A. Programmable controller manufacturer shall provide a program documentation package to perform following tasks:
   1. Ladder diagram reports complete with ladder rungs; English description for every contact, bit, or word; organized logic sections with comment lines to identify logic function; rung comments to facilitate maintenance; and element cross references.
   2. Cross reference report: Sequential listing by element address of associated lines (or rungs).
   3. Input/output configuration summary: Table of entire I/O address range, showing which addresses are used by programmable controller program, which addresses have descriptions, and which are hardwired I/O points.
   4. Contact address listing: Lists I/O addresses and their associated symbolic definitions.
   5. Record, load, and verification of program logic with program file on compatible electronic media, and program difference listings.

2.07 PROGRAMMING

A. Configuration of control systems and their entry into microprocessor-based control system shall be responsibility of Contractor. Refer to Section 40 68 66-13 for programming and configuration requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and/or where designated by Engineer.
B. Locate PLC where shown on Drawings and/or designated by Engineer. Enclosure shall be positioned to allow doors to be fully opened for easy access to wiring and components.
C. Mount rigidly supported, level and plumb, and in such manner as to provide accessibility; protection from damage; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical work. Equipment shall not be installed until adjacent heavy construction work has been completed to extent that damage will be unlikely to installation by such construction work.

D. Manufacturer's recommendations referred to herein shall be as stated in manufacturer's instruction books and/or by manufacturer's service representative. Final interpretation of "installation requirements" will be by Engineer.

3.02 FIELD QUALITY CONTROL

A. Following field demonstration tests shall be conducted:
   1. Perform visual check to ensure correct equipment.
   2. Latest revision of configuration and base level programs has been loaded.
   3. Complete loop functional checks shall be performed.
   4. Input signals shall be applied to each loop, and when applicable, outputs measured.
   5. Compare input/output values to graphic operator interface values.
   6. Verify configuration displayed on graphic operator interface.

3.03 REFERENCE DOCUMENTS

A. A brief summary of modifications for each PLC is included for reference.

END OF SECTION

Control Panel/PLC Description	Panel ID	Existing Controller Type	New Controller Type	Existing UPS	Description of Panel Modifications	Drawings Available?
DPS-01	PLC-DPS01	P2-550	N/A	YES	1. Install a new 7 slot base. Add a power supply and P2-RS remote I/O module. Provide ethernet cable to connect existing controller to the remote I/O module. 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-RS module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	Yes
DPS-02	PLC-DPS02	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-03	PLC-DPS03	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-04	PLC-DPS04	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-05	PLC-DPS05	P2-550	N/A		1. Install a new 7 slot base. Add a power supply and P2-RS remote I/O module. Provide ethernet cable to connect existing controller to the remote I/O module. 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to the new P2-RS module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-06	PLC-DPS06	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-07	PLC-DPS07	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	

DPS-10	PLC-DPS10	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-11	PLC-DPS11	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-12	PLC-DPS12	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-13	PLC-DPS13	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-14	PLC-DPS14	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-15	PLC-DPS15	P2-550	N/A		1. Install a new 7 slot base. Add a power supply and P2-RS remote I/O module. Provide ethernet cable to connect existing controller to the remote I/O module. 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to the new P2-RS module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS. 4. Install a new canopy to prevent rain and moisture from further impacting the enclosure.	
DPS-16	PLC-DPS16	N/A	P2-550		1. Install a new enclosure with a new 7 slot base. Add a power supply and P2-550 Controller. 2. Install a new P2-SCM module. 3. Install a new radio receiver in new PLC panel. Connect radio receiver over serial link to the new P2-SCM module. 4. Install a new UPS. Power existing PLC & new equipment off the new UPS. 5. Coordinate location of new PLC with Owner.	
DPS-17	PLC-DPS17	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	

DPS-18	PLC-DPS18	N/A	P2-550		1. Install a new enclosure with a new 7 slot base. Add a power supply and P2-550 Controller. 2. Install a new P2-SCM module. 3. Install a new radio receiver in new PLC panel. Connect radio receiver over serial link to the new P2-SCM module. 4. Install a new UPS. Power existing PLC & new equipment off the new UPS. 5. Coordinate location of new PLC with Owner. 6. Integrate Mission Control Box IO into new PLC. Add modules as needed to accomodate the new hardwired signals.	
DPS-19	PLC-DPS19	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
DPS-20	PLC-DPS20	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
Dwyer	PLC-DPSDWY	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
Elaine	PLC-DPSELN	N/A	P2-550		1. Install a new enclosure with a new 7 slot base. Add a power supply and P2-550 Controller. 2. Install a new P2-SCM module. 3. Install a new radio receiver in new PLC panel. Connect radio receiver over serial link to the new P2-SCM module. 4. Install a new UPS. Power existing PLC & new equipment off the new UPS. 5. Coordinate location of new PLC with Owner. 6. Integrate Mission Control Box IO into new PLC. Add modules as needed to accomodate the new hardwired signals.	
Grant	PLC-DPSGRNT	N/A	P2-550		1. I?nstall a new enclosure with a new 7 slot base. Add a power supply and P2-550 Controller. 2. Install a new P2-SCM module. 3. Install a new radio receiver in new PLC panel. Connect radio receiver over serial link to the new P2-SCM module. 4. Install a new UPS. Power existing PLC & new equipment off the new UPS. 5. Coordinate location of new PLC with Owner. 6. Integrate Mission Control Box IO into new PLC. Add modules as needed to accomodate the new hardwired signals.	

I-10	PLC-DPSI10	P2-550	N/A		1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	
Oleander	PLC-DPSOLN	N/A	P2-550		1. Install a new enclosure with a new 7 slot base. Add a power supply and P2-550 Controller. 2. Install a new P2-SCM module. 3. Install a new radio receiver in new PLC panel. Connect radio receiver over serial link to the new P2-SCM module. 4. Install a new UPS. Power existing PLC & new equipment off the new UPS. 5. Coordinate location of new PLC with Owner. 6. Integrate Mission Control Box IO into new PLC. Add modules as needed to accomodate the new hardwired signals.	
Pritchard	PLC-DPSPRT	P2-550	N/A	No	1. Install a new P2-SCM communication module in slot 4 2. Install a new radio receiver in existing PLC panel. Connect radio receiver over serial link to a new P2-SCM module. 3. Install a new UPS. Power existing PLC & new equipment off the new UPS.	

Section 3 Contract Clause

The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The purpose of Section 3 is to ensure that the employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low - and very low-income persons in the project area.

The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference; job titles subject to hire; availability of apprenticeship and training positions; the qualifications for each; the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 75 and agrees to take appropriate action, as provided in an applicable provision of the subcontractor in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

The contractor will certify that any vacant employment positions, including training positions, that are filled: 1) after the contractor is selected but before the contract is executed; and 2) with persons other than those to whom the regulations of 24 CFR part 75 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 75.

Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this contract for default and debarment or suspension from future HUD assisted contracts.

SECTION 3 HOUSING AND URBAN DEVELOPMENT REQUIREMENTS

The contractor shall abide by the Housing and Urban Development (HUD) requirements in accordance with 24 CFR § 75. For this contract, bidders are required to submit a Section 3 Plan(Attachment 6) as part of their post-bid documents submission. This document contains information about Section 3 requirements, and serves as the bidder's or respondent's commitment and plan to meet the Section 3 benchmarks. After the lowest responsive bidder or successful respondent has been identified, all identified subcontractors must also complete and submit a Section 3 plan. Bidders or respondents that fail to submit a Section 3 Plan may be deemed non-responsive and ineligible for contract reward.

This contract shall also require the successful bidder and identified subcontractors to submit periodic and project end reports using the Section 3 Compliance Report form (Attachment 7) as well as supporting documentation of any qualitative efforts and achievements. Unless otherwise provided, reporting must be carried out quarterly to SWBNO in a manner consistent with the reporting requirements for the applicable HUD program [24 CFR 75.25(c)].

This subsection outlines the requirements and procedures to be followed to ensure the objectives of Section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. 1701u)—colloquially "Section 3"—are met. The purpose of Section 3 is to ensure that economic opportunities, most importantly employment, generated by certain HUD financial assistance shall be directed to Low- and Very Low-Income Persons—particularly those who are recipients of government assistance for housing or residents of the community in which the Federal assistance is spent.

Section 3 is not an entitlement program; therefore, employment and contracts are not guaranteed. Low- and Very-Low-Income Persons and Section 3 Business Concerns must be able to demonstrate that they have the ability or capacity to perform the specific job or successfully complete the contract that they are seeking.

This subsection addresses the requirements outlined in 24 CFR Part 75 (the "New Rule"), and grantees or subrecipients seeking any further guidance, clarification, or context regarding any topics covered in this subsection should refer to that specific regulation. Any contracts or agreements executed, or projects for which assistance or funds were committed, prior to the New Rule Effective Date of November 30, 2020 are still required to adhere to all requirements outlined in 24 CFR Part 135 (the "Old Rule").

1. Applicability of Section 3

A "**Section 3 Project**" is any project that involves housing rehabilitation, housing construction, and other public construction projects assisted under HUD programs that provide housing and community development financial assistance when the total amount of assistance to the project exceeds a threshold of **$200,000**. (The threshold is $100,000 where the assistance is from the Lead Hazard Control and Healthy Homes Programs.) The "project" is the site or sites together with any building(s) and improvements located on the site(s) that are under common ownership, management, and financing; and applicability is determined at the **project level**.

Additional considerations for public housing financial assistance regarding Section 3 applicability are provided in 24 CFR 75.3. Section 3 requirements do not apply to (1) Materials Supply Contracts [24 CFR 75.3(b)]; or (2) Indian and Tribal Preferences [24 CFR 75.3(c)].

2. Overall Requirements

To the greatest extent feasible, and consistent with existing Federal, state, and local laws and regulations, recipients must ensure that, within the metropolitan area (or nonmetropolitan county/parish) in which the project is located: (1) *employment and training opportunities* arising in connection with Section 3 Projects are provided to Section 3 Workers; and (2) *contracts for work* awarded in connection with Section 3 Projects are provided to business concerns that provide economic opportunities to Section 3 Workers.

To help grantees comply with the Section 3 requirements and achieve Section 3 goals, a sample **Section 3 Plan** is included. This plan is intended to be a tool to guide grantees through all of the Section 3 requirements outlined in this section. While 24 CFR Part 75 does not specifically require grantees to have Section 3 plans or policies in place, HUD views having them as a best practice that will aid recipients in complying with Section 3 requirements and achieving Section 3 goals. To this end, grantees are encouraged to utilize the sample plan as a template; and adapt it to fit the resources within their individual communities and to meet the respective needs of their specific programs and activities. Once their respective plan has been fully developed, it is recommended that grantees formally adopt the resulting Section 3 plan and maintain a signed copy within the project files.

2.1 Requirements for Employment and Training

Where feasible, priority for *opportunities and training* should be given in the following order to:

1. Section 3 Workers residing within the Service Area or Neighborhood of the Project; and Employed by a Section 3 Business Concern; and
2. Participants in YouthBuild programs.

2.2 Requirements for Contracting

Where feasible, priority for *contracting opportunities* should be given in the following order to:

1. Section 3 Business Concerns that provide economic opportunities to Section 3 Workers residing within the Service Area or Neighborhood of the Project; and
2. YouthBuild programs.

3. **Labor Hours and Worker Categorizations**

One of the principal features that was rolled out as part of the Section 3 New Rule was that tracking and reporting would be now focused upon labor hours rather than new hires. This change was designed to prioritize local employment and promote employee retention. As a result, recipients are expected to track and report upon the total number of **labor hours worked** by: (1) Section 3 Workers; (2) Targeted Section 3 Workers; and (3) All workers overall.

A "**Section 3 Worker**" is an individual that currently fits (or when hired in the past five years fits) at least *one* of the following criteria: (1) Low- or Very Low-Income as established by HUD's income limits; (2) Employed by a Section 3 Business Concern; or (3) a YouthBuild participant. A "**Targeted Section 3 Worker**" is a Section 3 Worker, who meets any of the three aforementioned criteria and *in addition* also meets one of the two following criteria:

1. Employed by a Section 3 Business Concern
2. Currently fits—or when hired fits—at least one of the following categories:
    a. Living within the Service Area or the Neighborhood of the Project; or
    b. A YouthBuild participant

To this end, the above definitions provide for the following Venn Diagram:

4. **Section 3 Measurement Ratios and Benchmarks**

Recipients and subrecipients must attempt to reach the Section 3 benchmarks and targets as established by 24 CFR Part 75.23(b)(3) and Federal Register Notice 2020-19183:

> Twenty-five (25) percent or more of the total number of labor hours worked by all workers on a Section 3 Project are Section 3 Workers:

$$\frac{\textit{Section 3 Worker Labor Hours}}{\textit{Total Labor Hours}} \textit{ >= 25\%}$$

Five (5) percent or more of the total number of labor hours worked by all workers on a Section 3 Project are Targeted Section 3 Workers, as defined at §75.21(a):

$$\frac{\textit{Target Section 3 Worker Labor Hours}}{\textit{Total Labor Hours}} \textit{ >= 5\%}$$

In the absence of evidence to the contrary, subrecipients of covered funding will be considered in compliance with Section 3 Safe Harbor [24 CFR 75.23] if the established benchmarks regarding the above ratios are met. Subrecipients that fail to meet the minimum numerical goals outlined above must also report upon the specific qualitative efforts that they have employed in pursuit of the numerical goals, which are outlined in subsection 5.2 below.

5. **Section 3 Reporting**

5.1 Reporting of Labor Hours

Per 24 CFR 75.25(a), for Section 3 Projects, contractors and recipients are required to submit periodic and project end reports using the Section 3 Compliance Report form (Attachment 7) as well as supporting documentation of any qualitative efforts and achievements. Such compliance reporting may include:

i. The total number of labor hours worked;
ii. The total number of labor hours worked by Section 3 Workers; and
iii. The total number of labor hours worked by Targeted Section 3 Workers
iv. Section 3 worker and Targeted Section 3 worker certification forms
v. Payroll or time-and attendance based records
vi. Documentation of qualitative efforts

Eligibility of Labor Hours Reported — Section 3 Workers' and Targeted Section 3 Workers' labor hours may be counted for five years from when their status as a Section 3 Worker or Targeted Section 3 Worker is established, pursuant to subsection 6 below. [24 CFR 75.25(a)(2)]

Inclusion of Hours Reported — The labor hours reported must include the total number of labor hours worked on a Section 3 Project, including labor hours worked by any subrecipients, contractors, and subcontractors that the recipient is required, or elects pursuant to any considerations for Professional Services (see below). [24 CFR

75.25(a)(3)]

Basis of Hours Reported — Recipients may report their own labor hours or that of a subrecipient, contractor, or subcontractor based on the employer's good faith assessment of the labor hours of a full-time or part-time employee informed by the employer's existing salary or time and attendance based payroll systems, unless the project or activity is otherwise subject to requirements specifying time and attendance reporting. [24 CFR 75.25(a)(5)]

Frequency of Reporting — Unless otherwise provided, reporting must be carried out quarterly to SWBNO in a manner consistent with reporting requirements for the applicable HUD program. [24 CFR 75.25(c)]

Professional Services — Professional Services contracts for non-construction services that require an advanced degree or professional licensing are not required to be reported as a part of total Section 3 labor hours.

However, grantees, subrecipients, contractors, and subcontractors may report labor hours from Section 3 Workers and Targeted Section 3 Workers (the numerators in the outcome ratios in subsection 4) from Professional Services without including Professional Services in the Total Labor Hours worked (the denominator in both of the outcome ratios in subsection 7.4). The effect of this reporting structure is to give the recipient a bonus if they are able to report Section 3 hires in the Professional Services context.

It should also be noted that if a contract covers both Professional Services and other work and the subrecipient/contractor/subcontractor chooses not to report labor hours from Professional Services, the labor hours under the contract that are not from Professional Services must still be reported. [24 CFR 75.25(a)(4)]

5.2 Additional Reporting Requirements / Qualitative Efforts

If the grantee or subrecipient's reporting indicates that that the Section 3 Benchmarks outlined in section 4 above are not met, the subrecipient must report on the qualitative nature of its activities and those that its contractors and subcontractors pursued. Examples of such qualitative efforts include, but are not limited to, the following:

- Applicant Outreach – Engaging in outreach efforts to generate job applicants who are Targeted Section 3 Workers.

- Training and Apprenticeship – Providing training or apprenticeship opportunities.

- Employment Assistance – Providing Technical Assistance (TA) to help Section 3 Workers compete for jobs—e.g., resume assistance, coaching—or providing or connecting Section 3 Workers with assistance in seeking

employment, including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.

- Job Fairs – Holding one or more job fairs, or sponsoring a job informational meeting in the Service Area / Neighborhood of the Project.

- Work Readiness & Retention – Providing or referring Section 3 Workers to services supporting work readiness and retention—such as work readiness activities, interview clothing, test fees, transportation, and child care.

- Educational Assistance – Providing assistance to apply for or attend community college, a four-year educational institution, or vocational/technical training.

- Financial Literacy – Assisting Section 3 Workers to obtain financial literacy training and/or coaching.

- Business Concern Outreach – Engaging in outreach efforts to identify and secure bids from Section 3 Business Concerns.

- Competition Assistance – Providing Technical Assistance to help Section 3 Business Concerns understand and bid on contracts.

- Contract Sizing – Sizing, splitting, or dividing contracts into smaller jobs to facilitate participation by Section 3 Business Concerns, particularly where economies of scale or efficiency of delivery are not factors. [2 CFR 200.321(b)(3)]

- Bidder Viability Support – Providing bonding assistance, guaranties, or other efforts to support viable bids from Section 3 Business Concerns.

- Business Registries – Promoting use of business registries designed to create opportunities for disadvantaged and small businesses.
- One-Stop Outreach – Providing outreach, engagement, or referrals with the state One-Stop System as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act of 2013.

The above listing is not intended to be all inclusive. Grantees and subrecipients are encouraged to develop and tailor their specific qualitative efforts with the end goal of Section 3 benchmark achievement in mind, as outlined in subsection 7.4 above. Clear, affirmative steps to achieve the established numerical goals must be taken, and documentation to adequately corroborate all efforts and attempts must be retained. **To this end, grantees and subrecipients that are unable to meet the minimum numerical goals outlined in subsection 7.4 above must demonstrate why it was not possible to do so, and retain supporting documentation to sufficiently substantiate this determination.** Such justifications should describe

the efforts that were taken, any barriers, roadblocks, or impediments encountered, and any other relevant information that will enable OCD to make the most accurate, informed compliance determination.

6. Recordkeeping to Support Section 3 Worker Categorizations and Certifications

6.1 Recordkeeping for Workers

Recipients must maintain documentation—or ensure that a subrecipient, contractor, or subcontractor that employs the worker maintains documentation—to ensure that workers meet the definition of a Section 3 Worker or a Targeted Section 3 Worker, at the time of hire or the first reporting period, as follows:

- **Section 3 Worker** – For a worker to qualify as a Section 3 Worker, one of the following must be maintained:

    i. Self-Certification of Income – A worker's self-certification that their income is below the income limit from the prior calendar year;

    ii. Self-Certification of Program Participation – A worker's self-certification of participation in a means-tested program such as public housing or Section 8-assisted housing;

    iii. Program Management Certification of Program Participation – Certification from a Public Housing Agency, or the owner or property manager of project-based Section 8-assisted housing, or the administrator of tenant-based Section 8-assisted housing that the worker is a participant in one of their programs;

    iv. Employer Certification of Income – An employer's certification that the worker's income from that employer is below the income limit when based on an employer's calculation of what the worker's wage rate would translate to if annualized on a full-time basis; or

    v. Employer Certification of Section 3 Business Concern Employment – An employer's certification that the worker is employed by a Section 3 Business Concern.

- **Targeted Section 3 Worker** – For a worker to qualify as a Targeted Section 3 Worker, one of the following must be maintained:

    i. Employer Confirmation of Worker Residence – An employer's confirmation that a worker's residence is within one mile of the work site or, if fewer than 5,000 people live within one mile of a work site, within a circle centered on the work site that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census;

ii. Employer Certification of Section 3 Business Concern Employment – An employer's certification that the worker is employed by a Section 3 Business Concern.

iii. Self-Certification of YouthBuild Participation – A worker's self-certification that the worker is a YouthBuild participant.

Recipients and subrecipients may report on Section 3 Workers and Targeted Section 3 Workers for five years from when their certification as a Section 3 Worker or Targeted Section 3 Worker is established.

Grantees, subrecipients, contractors, and subcontractors have the express right to request any necessary evidence that would help substantiate an individual's claim to Section 3 status or certification. Examples of evidence to satisfy the above documentation requirements include but are not limited to: evidence of receipt of Federal housing assistance; evidence of receipt of other Federal subsidies or participation in Federal assistance programs; Federal tax returns; proof of residence in a neighborhood, zip code, census tract, or other area that has officially been identified by HUD. To help grantees certify Section 3 Workers and Targeted Section 3 workers and provide the appropriate documentation to support the workers' Section 3 status claims.

6.2 Recordkeeping for Business Concerns

A **Section 3 Business Concern** is defined as a business concern that meets at least one of the following criteria, documented within the last six-month period:

i. It is at least 51% owned and controlled by Low- or Very-Low-Income Persons;
ii. Over 75% of the labor hours performed for the business over the prior three-month period are performed by Section 3 Workers; or
iii. It is a business at least 51% owned and controlled by current public housing residents or residents who currently live in Section 8-Assisted housing.

Grantees, subrecipients, contractors, and subcontractors have the express right to request any necessary evidence that would help substantiate a business concern's claim to Section 3 status or certification. Examples of evidence to satisfy the above documentation requirements may include: Federal tax returns for workers, owners, or businesses; payroll data; employee statements of self-certification; articles of business organization, ownership, or incorporation; partnership or operating agreements; evidence that owners or employees received housing or other Federal subsidies.

To help grantees certify and track Section 3 Business Concerns seeking a preference in contracting. Additionally, businesses that believe they meet the Section 3 Business Concern requirements can self-register in the HUD Business Registry at

the following website:
http://www.hud.gov/Sec3Biz

Section 3 standards are both race and gender neutral. A WBE and/or MBE must provide evidence that it meets at least one criterion of a Section 3 Business Concern as outlined above in order to receive preference under Section 3. More information regarding WBE or MBE programs can be found through HUD's Office of Small and Disadvantaged Business Utilization (OSDBU) at the following website: https://www.hud.gov/program_offices/sdb

The documentation outlined in this subsection must be maintained for the time period required for records retention in accordance with applicable program regulations and 2 CFR 200. For further guidance regarding Section 3 Recordkeeping—including additional considerations specific to Public Housing Agencies—see 24 CFR 75.31.

7. Contracting Requirements

7.1 Contract Provisions

Per 24 CFR 75.27, grantees and subrecipients must include language applying Section 3 requirements in any subrecipient agreement or contract for a Section 3 Project. Additionally, recipients of Section 3 funding must also require subrecipients, contractors, and subcontractors to meet the overall requirements as outlined in subsection 2 above—regardless of whether Section 3 language is included in recipient or subrecipient agreements, program regulatory agreements, or contracts.

7.2 Contracting and Subcontracting Strategies

The following examples are provided to help grantees and subrecipients ensure that the contracting objectives of Section 3 are met, and that the established Section 3 Benchmarks are ultimately achieved. These methods and strategies can be undertaken to assist in reaching Section 3 Workers and Section 3 Business Concerns for contracting opportunities; and when utilized effectively, can supplement some of the qualitative efforts outlined in subsection 5.2 above. This list should not be considered all inclusive. For additional information regarding contracting, see Section 6 – Procurement Methods and Contractual Requirements.

1. Small Purchase Procurement — The use of small purchase procedures (contract may not exceed the Simplified Acquisition Threshold) such as soliciting quotations from a minimum of 3 qualified sources. At the time of solicitation, inform the parties of the Section 3 Covered Contract to be awarded with sufficient specificity; the time within which quotations must be submitted; and the information that must be submitted. A valid attempt to obtain at least 3 quotes from qualified sources must be made and documented.

2. Section 3 Compliance History — In determining the responsibility of potential contractors, consider their past records of Section 3 compliance and their current plans for the pending contract.

3. Contractors Associations and Community Organizations — Utilize minority contractors associations and community organizations to assist in identifying Section 3 businesses who may be potential bidders.

4. Housing Development Publicity — Advertise contracting opportunities by posting notices concerning the work to be contracted in common areas of housing developments.

5. Formalized Notices — Providing written notice to all known Section 3 Business Concerns of the contracting opportunities.

6. Maintain Contact — Follow up with Section 3 Business Concerns that have expressed interest in the contracting opportunities by personal contact to provide additional information.

7. Pre-Bid Meetings — Coordinating pre-bid meetings at which Section 3 Business Concerns could be informed of the upcoming contracting opportunities.

8. Section 3 Workshops — Provide workshops on contracting procedures and specific contract opportunities in a timely manner so that Section 3 Business Concerns can take advantage of upcoming contracting opportunities.

9. Assisting with Barriers to Entry — Advising Section 3 Business Concerns as to where they may seek assistance to overcome limitations such as inability to obtain bonding, lines of credit, financing, or insurance.

10. Bidding Facilitation — Arranging solicitations, times for the presentation of bids, quantities, specifications, and delivery schedules in ways to facilitate the participation of Section 3 Business Concerns.

11. Contract Sizing — As noted in subsection 5.2 above, where appropriate, break out contract work items into economically feasible units to facilitate participation of Section 3 Business Concerns.

12. YouthBuild Programs — Contacting agencies administering HUD YouthBuild programs and notifying these agencies of the contracting opportunities.

13. Advertisement / Publication — Advertising the contracting opportunities through trade association papers and local media such as television, newspapers, radio, and websites.

14. Business Concern Listing — Developing and maintaining a list of eligible Section 3 Business Concerns.

15. Advance Goal Setting — Establishing concrete numerical goals (dollar amounts, and number of awards) for contracts to Section 3 Business Concerns.

8. Additional Section 3 Resources

All grantees and subrecipients are highly encouraged to ensure that contractors, residents, and businesses in their community are aware of the available tools and resources that will assist with employment and training opportunities—principally the HUD Section 3 Opportunity Portal and the HUD Section 3 Business Registry.

8.1 HUD Section 3 Opportunity Portal

The HUD Section 3 Opportunity Portal helps match Section 3 Workers to employment and training opportunities, and Business Concerns to contracting opportunities. The portal can be accessed online at the following address: https://hudapps.hud.gov/OpportunityPortal/

8.2 HUD Section 3 Business Registry

The HUD Section 3 Business Registry is a listing of firms that have self-certified that they meet one of the regulatory definitions of a Section 3 business and are included in a searchable online database that can be used by agencies that receive HUD funds, developers, contractors, and others to facilitate the award of certain HUD-funded contracts. The database can also be used by Section 3 residents to identify businesses that may have HUD-funded employment opportunities. The HUD Section 3 Business Registry can be accessed online at the following web address: http://www.hud.gov/Sec3Biz

Attachment 6 Section 3 Project Plan

Section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. 1701u and 24 CFR Part 75) requires that employment and economic opportunities generated by certain HUD financial assistance shall be directed to low- and very low-income persons, particularly those who receive government assistance for housing and those residing in the community in which the federal assistance is spent.

This project will be funded using HUD Housing and Community Development Financial Assistance and is therefore subject to Section 3. The selected bidder, respondent or funding applicant will be responsible for ensuring compliance with all applicable Section 3 requirements.

Instructions: For sealed bids, the two lowest bidders must complete and submit this form with your post-bid document submission. RFP/RFQ respondents must submit this form as part of your proposal or qualifications submission. All subrecipients, contractors and subcontractors on Section 3 projects must submit this form. The entity receiving a contract from SWBNO must submit all required documentation, including subcontractors' Section 3 Plans, prior to contract award.

Project:_____ **Solicitation #:**_____

Business Name:	Address:
Authorized Representative:	Title:
Phone #:	Email:
Trade/Services Provided:	

Section 3 Requirements

Employment and Training

To the greatest extent feasible, employment and training opportunities arising in connection with Section 3 projects shall be provided to Section 3 workers within the New Orleans metropolitan area. Where feasible, priority for employment and training will be given to:

1. Section 3 workers residing within the service area or neighborhood of the project, and
2. Participants in YouthBuild programs.

Contracting

To the greatest extent feasible, contracts for work awarded in connection with Section 3 projects shall be provided to business concerns that provide economic opportunities to Section 3 workers residing within the New Orleans metropolitan area. Where feasible, priority for contracting opportunities will be given to:

1. Section 3 business concerns that provide economic opportunities to Section 3 workers residing within the service area or the neighborhood of the project, and
2. YouthBuild programs.

Compliance Benchmarks

To demonstrate compliance with Section 3, contractors are required to follow the prioritization of effort outlined above and meet or exceed the following benchmarks:

1. **25 percent** or more of the total number of labor hours worked by all workers on the project shall be performed by **Section 3 workers**, and
2. **5 percent** or more of the total number of labor hours worked by all workers on the project shall be performed by **Targeted Section 3 workers**.

Definitions

- **Section 3 worker:** Any worker who currently fits or when hired within the past five years fit at least one of the following categories, as documented:
  (1) The worker's income for the previous or annualized calendar year is below the income limit established by HUD (*see Income Limits table below*).
  (2) The worker is employed by a Section 3 business concern.
  (3) The worker is a YouthBuild participant.

- **Targeted Section 3 worker:** A Section 3 worker who is:
  (1) A worker employed by a Section 3 business concern; or
  (2) A worker who currently fits or when hired within the past five years fit at least one of the following categories, as documented:
    (i) Living within the service area or the neighborhood of the project; or
    (ii) A YouthBuild participant.

- **Service area or the neighborhood of the project:** An area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

HUD Income Limits

The table below shows the income limits set by HUD that determine eligibility for certain programs, including Section 3. HUD develops income limits based on Area Median Income (AMI) estimates and Fair Market Rent (FMR) area definitions. For more information, please see the HUD Income Limits Documentation System online at www.huduser.gov/portal/datasets/il.html.

New Orleans-Metairie, LA HUD Metro FMR Area

Fiscal Year	2022	2021	2020	2019	2018	2017
Low-income (80% AMI)	**$43,900**	**$39,300**	**$39,450**	**$37,750**	**$36,750**	**$35,500**

The New Orleans-Metairie, LA HUD Metro FMR Area contains the following parishes: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany.

1. Does your business qualify as a Section 3 business concern? ☐ **YES** ☐ **NO**

If you answered YES, complete the Section 3 Business Certification form on p. 6 and submit with this Plan. If you answered NO, you do not need to complete the Section 3 Business Certification.

A **Section 3 business concern** is a business that satisfies ***at least one*** of the following criteria, as documented within the last six-month period:

a. The business is at least 51% owned and controlled by low- or very low-income persons;

b. The business is at least 51% owned and controlled by residents who currently live in public housing or Section 8-assisted housing; or

c. Over 75% of the labor hours performed for the business over the prior three-month period were performed by Section 3 workers – *i.e.*, workers who currently are, or when hired within the past five years were: i) low-income persons or ii) YouthBuild participants.

2. How many workers are needed to complete the project?

Please list the job classifications and number of workers your company will need to complete the contract work. Attach additional sheets if necessary.

Job classification (Office/Clerical, Manager, Engineer, Technician, Supervisor/Foreman, Electrician, Plumber, Laborer, Trainee, Security, etc.)	**Total estimated number of workers needed**	**Number of workers in current workforce**	**Estimated number of additional workers needed**

3. Will you be using subcontractors on this project? ☐ YES ☐ NO

If you answered YES, please list below. Attach additional sheets if necessary.

Business name	**Scope of work (trade or service description)**	**Is this a Section 3 business? *Yes / No***	**Estimated contract value**
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$

4. Do you commit to engage in good faith efforts to meet or exceed the Section 3 Benchmarks?

☐ **YES** ☐ **NO**

Such qualitative efforts may include, but are not limited to:

- Applicant Outreach –
- Engage in outreach efforts to generate job applicants who are Targeted Section 3 workers, including posting job openings at the job site, HUD Opportunity Portal, social media pages, and other platforms.
    - Clearly indicate Section 3 eligibility on all job postings, notifications, and advertisements with the following statement: *"This is a Section 3 eligible job opportunity. We encourage applications from individuals that are low-income, live in public housing, and/or receive a Section 8 voucher."*
    - Include the Section 3 Worker Self-Certification form in all job postings.
- One-Stop / YouthBuild Outreach – Engage in outreach or referrals with local YouthBuild programs, Louisiana Workforce Commission, JOB 1, or other community organizations to assist with training and recruiting Section 3 and Targeted Section 3 workers.
- Training and Apprenticeship – Provide training or apprenticeship opportunities.
- Job Fairs – Hold one or more job fairs, or sponsor a job informational meeting in the project area.
- Business Concern Outreach –
    - Engage in outreach efforts to identify and secure bids from Section 3 businesses by advertising notices of contracting opportunities and related information on the HUD Opportunity Portal and local community papers.
    - Provide written notice to all known Section 3 business concerns, with sufficient time for interested businesses to respond to bid invitations.
    - Send notice of contracting opportunities to local community development organizations, business development organizations, or minority contracting associations.
    - State clearly in all notices that the contracting opportunity is Section 3 eligible, and include a copy of the Section 3 Business Concern Certification form.
- Competition Assistance – Provide technical assistance to help Section 3 business concerns understand and bid on contracts.
- Contract Sizing – Size, split, or divide contracts into smaller jobs to facilitate participation by Section 3 business concerns, particularly where economies of scale or efficiency of delivery are not factors. [2 CFR 200.321(b)(3)]
- Bidder Viability Support – Provide bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.
- Business Registries – Promote use of the HUD Opportunity Portal or other business registries designed to create opportunities for disadvantaged and small businesses.
    - Visit https://hudapps.hud.gov/OpportunityPortal/ to post jobs and contracting opportunities.

Additional activities and efforts aimed at increasing economic opportunities for Section 3 workers and businesses may include, but are not limited to:

- Employment Assistance – Provide technical assistance to help Section 3 workers compete for jobs, or connect them with assistance in seeking employment, including resume assistance, interview preparation, coaching, or job placement services.
- Work Readiness and Retention – Provide or refer Section 3 workers to services supporting work readiness and retention, such as interview clothing, licensing or testing fees, transportation, or childcare.
- Financial Literacy – Help Section 3 workers obtain financial literacy training or coaching.

- Education Assistance – Provide assistance to Section 3 workers to apply for or attend community college, four-year educational institution, or vocational/technical training.

5. Do you commit to prioritize your efforts in hiring, training, and contracting as required by the Section 3 regulations and outlined on page 1 of this Plan?

☐ **YES** ☐ **NO**

Certification

The business entity identified above commits to comply with Section 3 of the Housing and Urban Development Act of 1968 (24 CFR Part 75). If awarded a contract subject to Section 3, the business agrees to adhere to all such requirements, including meeting the benchmarks set forth by the regulations, maintaining records of Section 3 activity, providing evidence of qualitative efforts, and submitting compliance reports to the City of New Orleans periodically or upon request. The business will submit any additional documentation as necessary, including updates or revisions to this Section 3 Plan, documentation of labor hours, and certification forms for Section 3 workers and business concerns.

Authorized Representative Signature	**Date**

Attachment 7 - Section 3 Compliance Report

Instructions: All subrecipients, contractors, and subcontractors on Section 3 projects must complete and submit this Section 3 Compliance Report. The report summarizes efforts and progress toward achieving the Section 3 benchmarks. If more space is needed, you may attach additional pages, a spreadsheet supplying the required information, or a letter to further state your efforts, achievements, or obstacles encountered. Attach all supporting documentation including Section 3 Worker Certification forms, payroll information, and evidence of qualitative efforts to comply with Section 3 as applicable.

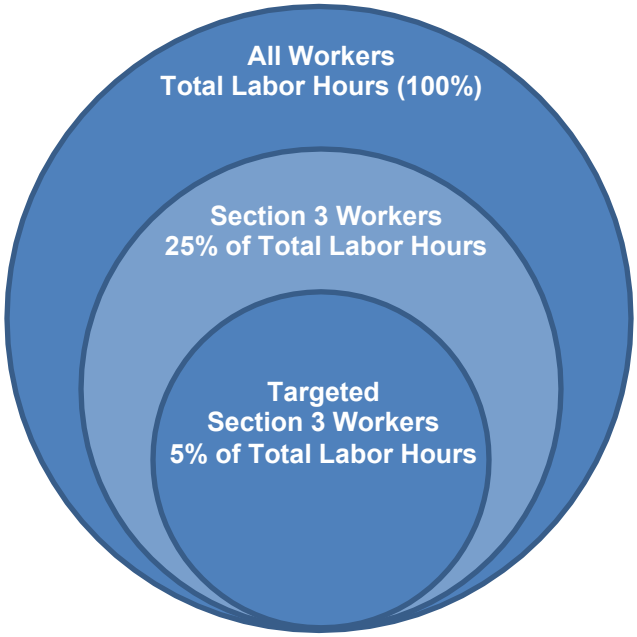
Business Name:	Project:
Authorized Representative:	Title:
Phone #:	Email:
Reporting Period:	

General Guidance

Compliance Benchmarks

To demonstrate compliance with Section 3, contractors are required to follow the prioritization of effort outlined in 24 CFR 75.19 and meet or exceed the following benchmarks:

1. **25 percent** or more of the total number of labor hours worked by all workers on the project shall be performed by **Section 3 workers**, and
2. **5 percent** or more of the total number of labor hours worked by all workers on the project shall be performed by **Targeted Section 3 workers**.



$$\frac{\text{Section 3 Labor Hours}}{\text{Total Labor Hours}} = 25\%$$

AND

$$\frac{\text{Targeted Section 3 Labor Hours}}{\text{Total Labor Hours}} = 5\%$$

Definitions

- **Section 3 worker:** Any worker who currently fits or when hired within the past five years fit at least one of the following categories, as documented:
  (1) The worker's income for the previous or annualized calendar year is below the income limit established by HUD (*see Income Limits table below*).
  (2) The worker is employed by a Section 3 business concern.
  (3) The worker is a YouthBuild participant.
- **Targeted Section 3 worker:** A Section 3 worker who is:
  (1) A worker employed by a Section 3 business concern; or
  (2) A worker who currently fits or when hired within the past five years fit at least one of the following categories, as documented:
    - Living within the service area or the neighborhood of the project; or
    - A YouthBuild participant.
- **Section 3 business concern:** A business meeting at least one of the following criteria, documented within the last six-month period:
  (1) It is at least 51 percent owned and controlled by low- or very low-income persons;
  (2) Over 75 percent of the labor hours performed for the business over the prior three-month period were performed by Section 3 workers who are currently, or were at the time of hire within the last five years: i) low-income persons or ii) YouthBuild participants; or
  (3) The business is at least 51 percent owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.
- **Service area or the neighborhood of the project:** An area within one mile of the Section 3 project or, if fewer than 5,000 people live within one mile of a Section 3 project, within a circle centered on the Section 3 project that is sufficient to encompass a population of 5,000 people according to the most recent U.S. Census.

HUD Income Limits

HUD develops income limits based on Area Median Income (AMI) estimates and Fair Market Rent (FMR) area definitions. For more information, please see the HUD Income Limits Documentation System online at www.huduser.gov/portal/datasets/il.html.

The income limits for the **New Orleans-Metairie, LA HUD Metro FMR Area** apply to the following parishes: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, St. Tammany.

Fiscal Year	2022	2021	2020	2019	2018	2017
Low-income (80% AMI)	**$43,900**	**$39,300**	**$39,450**	**$37,750**	**$36,750**	**$35,500**

Part I: Labor Hours

Report the number of labor hours worked on this project during the reporting period by *ALL workers*, *Section 3 workers*, and *Targeted Section 3 workers*.

Note—subrecipients/contractors may count an employee as Section 3 or Targeted Section 3 for five years from when their certification as a Section 3 worker or Targeted Section 3 worker is established.

1. Section 3 hours

A. Total number of labor hours worked by **ALL workers**	B. Number of labor hours worked by **Section 3 workers**	% Section 3 hours (Divide column B by column A)
		%

2. Targeted Section 3 hours

A. Total number of labor hours worked by **ALL workers**	B. Number of labor hours worked by **Targeted Section 3 workers**	% Targeted Section 3 hours (Divide column B by column A)
		%

3. Documentation

You must provide documentation supporting labor hours data. Check below as appropriate:

- ☐ Labor hours have been certified in LCPtracker.
- ☐ Other salary-based or time-and-attendance payroll records are attached to this report.

Part II: Section 3 Workers

Identify all Section 3 workers who have worked on this project to date. Attach a Section 3 Certification for each person who is being reported for the first time.

Employee name	**Classification / Job title**	**Number of labor hours worked on the project this period**	**Is this a Targeted Section 3 worker?** ***Yes / No***

Part III: Section 3 Business Concerns

Identify all Section 3 businesses that have performed work on this project to date.

Business name	Trade or services provided	Contract amount

Part IV: Qualitative Efforts

Check the boxes below to indicate the efforts you have made to satisfy your Section 3 obligations, or the nature of activities you pursued in the absence of meeting the labor hour benchmarks.

- ☐ Posted notice of job openings calling for Section 3 applicants at the job site, on the HUD Opportunity Portal, social media pages, and other platforms.
- ☐ Consulted with local YouthBuild programs, Louisiana Workforce Commission, JOB 1, or other community organizations to assist with training and recruiting Section 3 workers and Targeted Section 3 workers.
- ☐ Provided training or apprenticeship opportunities.
- ☐ Held one or more job fairs.
- ☐ Advertised contracting opportunities on the HUD Opportunity Portal.
- ☐ Sent written notice of Section 3 contracting opportunities to local business development organizations, minority contracting associations, or other similar organizations.
- ☐ Searched the HUD Opportunity Portal or other business registries for Section 3, disadvantaged and small businesses to identify potential Section 3 subcontractors.
- ☐ Provided technical assistance to help Section 3 businesses understand and bid on contracts.
- ☐ Divided contracts into smaller jobs to facilitate participation by Section 3 businesses.
- ☐ Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.
- ☐ Provided technical assistance to help Section 3 workers compete for jobs, or connected them with assistance in seeking employment, including resume assistance, interview preparation, coaching, or job placement services.
- ☐ Provided or referred Section 3 workers to services supporting work readiness and retention, such as interview clothing, licensing or testing fees, transportation, childcare.
- ☐ Helped Section 3 workers to obtain financial literacy training and/or coaching.
- ☐ Provided assistance to Section 3 workers to apply for or attend community college, four-year educational institution, or vocational/technical training.
- ☐ Other, please describe:

Additional Notes or Comments

Authorized Representative Signature **Date**